

DC INVERTER HEAT PUMP

Installation And Operation Instruction

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Please Read the Manual Carefully before Operation

Please read this manual carefully before installation

- ◆ The heat pump unit must be installed by the professional technician.
- ◆ Please install the heat pump and connect the water pipes in accordance with this manual strictly.
- ◆ For safety consideration, please make sure to re-check that everything before the power on.
- ◆ If the machine with any improvement, the content is subject to change without notification.

I. Prologue

Thanks for choosing Nulite New Energy brand heat pump for your heating cooling or sanitary hot water solutions!

Please read this manual carefully before installation and operation! This manual contains the information about installation, electrical debugging, operation, and maintenance. The following items should be focused:

1. Before installation, please confirm if your local voltage supplying matches with the voltage which showed on the machine's nameplate and if the carrying capacity of the power supply, wires and plug bases are suitable for the range of this machine's input power.
2. Users are not allowed to change the power line or plug base by themselves. All wiring works must be carried out by a qualified electrician, please 100% be sure to connect the earth line correctly. If the earth wiring is not connected correctly, it may cause electric shock accidents.
3. After the completion of the construction of all wiring work, please make sure to recheck that everything is well connected before power on.
4. Installing the machine in the place which the combustible gas may leak is strictly forbidden.
5. Do not put your hands or foreign matters into the air outlet of heat pump unit, otherwise it will be dangerous to the people and equipment nearby.
6. In order to obtain a better energy-saving effect, the unit should be installed in a place with well-ventilated.

ATTENTIONS:

1. Please make sure the water circulation system filled with enough water before the machine starts working.
2. When the machine is under operating, all valves of the water systems must be in the open positions.
3. If without inlet water or with a long time stopped using, when re-boot the machine, please refer to the item of attentions 1.
4. A removable filter must be installed at the water inlet and please clean the valve periodically depend on your locate water quality (every 2 or 3 months).
5. The maximum water temperature is 55°C, at hot water heating mode, please adjust the water temperature to a appropriate temperature (The most comfortable water temperature for shower is 38C~42C, if the water temperature above 50°C, there might be with danger of burning skin!)
6. The maintenance of the machine must be carried out by professional electricians.
7. When the unit get powered off, please discharge all the water inside the water circulation system. Otherwise the heat exchanger might be frozen at cold ambient temperatures.
8. Please confirm the installation location of the main controller. When installing the main controller, be sure to install it in a waterproof place, and the installation must be firm.

9. Please install with leakage protection switch. Check whether a leakage protection switch of suitable power is installed between the unit and the power supply, if the leakage protection switch is not installed, it may cause electric shock or fire.

10. Check the water flow and pressure of the circulating water of the equipment when the equipment is at normal use, it must be ensured to prevent the unit from being protected and running short of water.

11. Do not move the detector freely. The temperature detector must not be separated from the water tank temperature detection blind pipe to avoid overheating of the unit heater and might cause the unit damaged.

12. The unit's maintenance and repairing by non-professional technicians to repair or adjust the advanced factory controlling setting of the unit by themselves are not allowed, please contact the local service providers or distributors for the operation.

13. The fuse selection must match with the unit. It is forbidden to use corresponding fuse which is not suitable. Otherwise it may cause system errors or cause a fire.

14. Prevent the unit from fire. Do not spray flammable spray directly to the unit, otherwise it may cause a fire accident.

15. Please cut off the manual power switch immediately when an abnormality (with burnt smell) occurs, stop any further operation, and contact the local service providers or distributors.

If the abnormal operation continues, it may cause electric shock or fire.

16. Emergency measures after out of water or electricity supplying,

In cold areas, please do not cut off the water and power supply to avoid freezing the heat exchanger and the water circulation system. In the event of a power failure, please drain all the cold water out of the heat exchanger and the whole water circulation system, otherwise the heat exchanger will be damaged by freezing and the unit cannot be used normally.

It is recommended with a condensed water drain pipe installed during engineering installation to prevent a large amount of condensate water from flowing to the ground during drainage and causing large areas of water to accumulate.

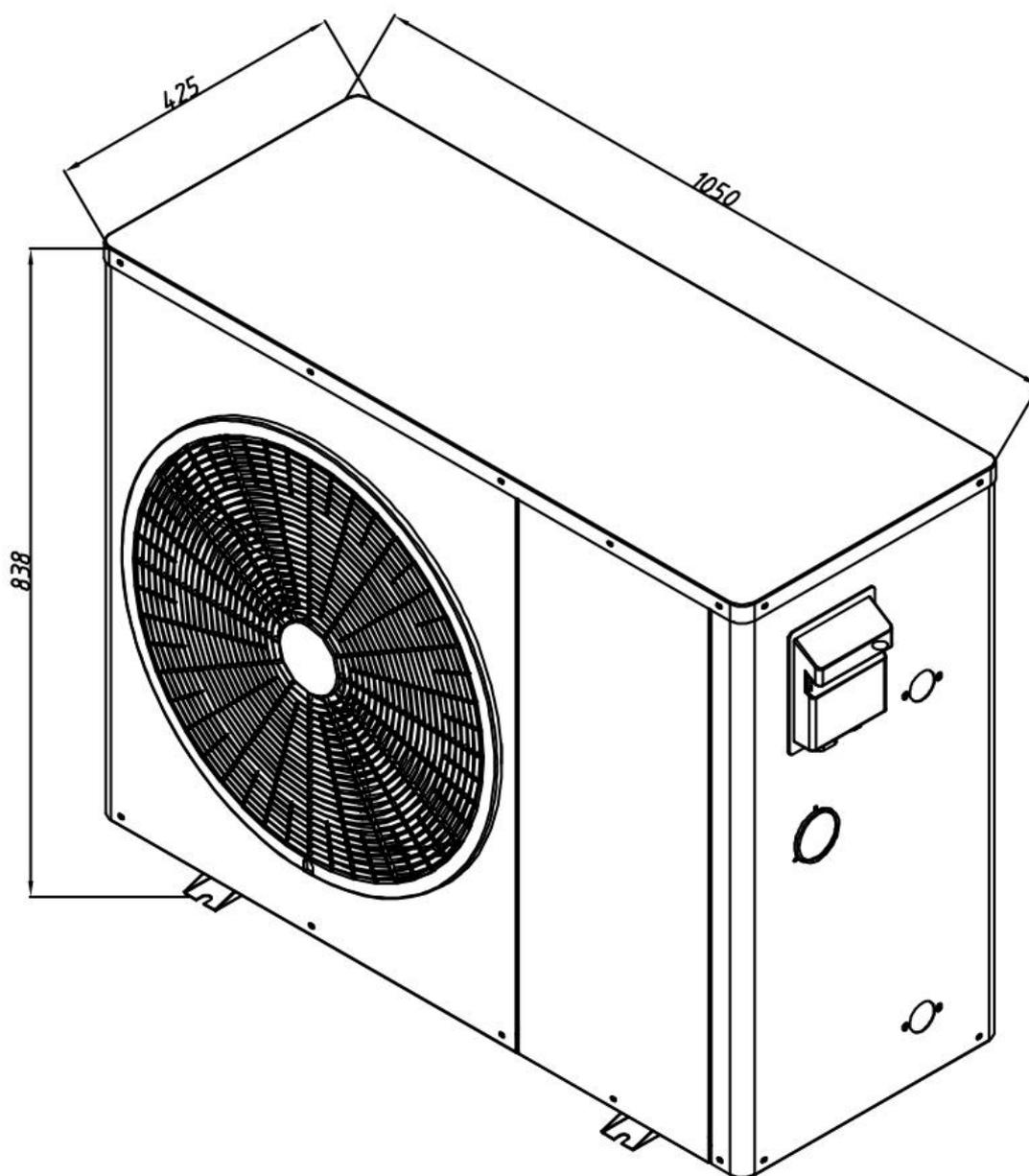
II. Main instruction of product

1. Parameter

Model	Size(L*W*H mm)	Net Weight(KG)	Power Supply
NL-BKDX30-95II/R32	1050x470x838	100	220V ~ Inverter~1N
NL-BKDX40-150II/R32	1050x470x1343	150	380V ~ Inverter~3N
NL-BKDX50-200II/R32	1050x470x1343	155	380V ~ Inverter~3N

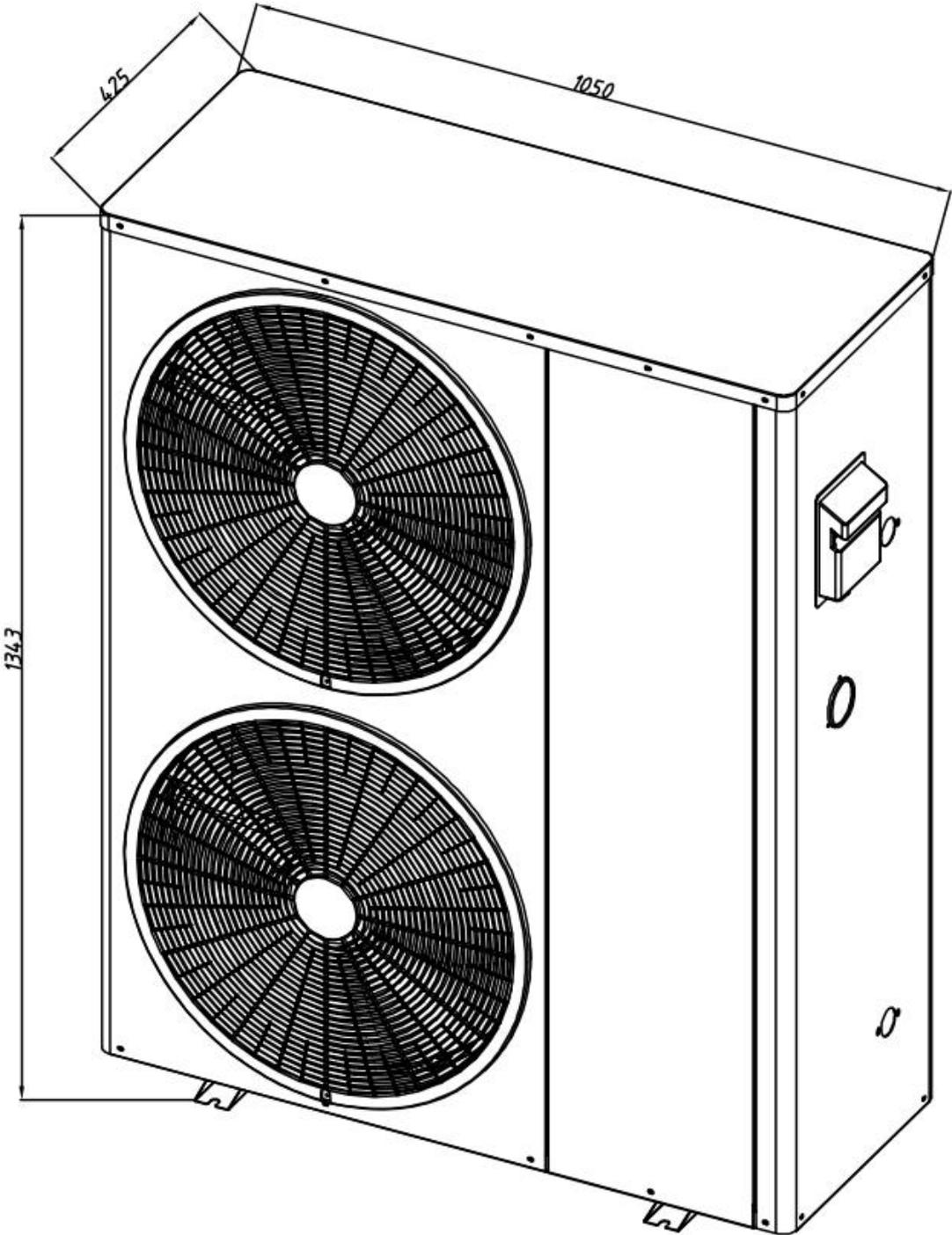
2. Appearance

NL-BKDX30-95II/R32



NL-BKDX40-150II/R32

NL-BKDX50-200II/R32



3.Specifications

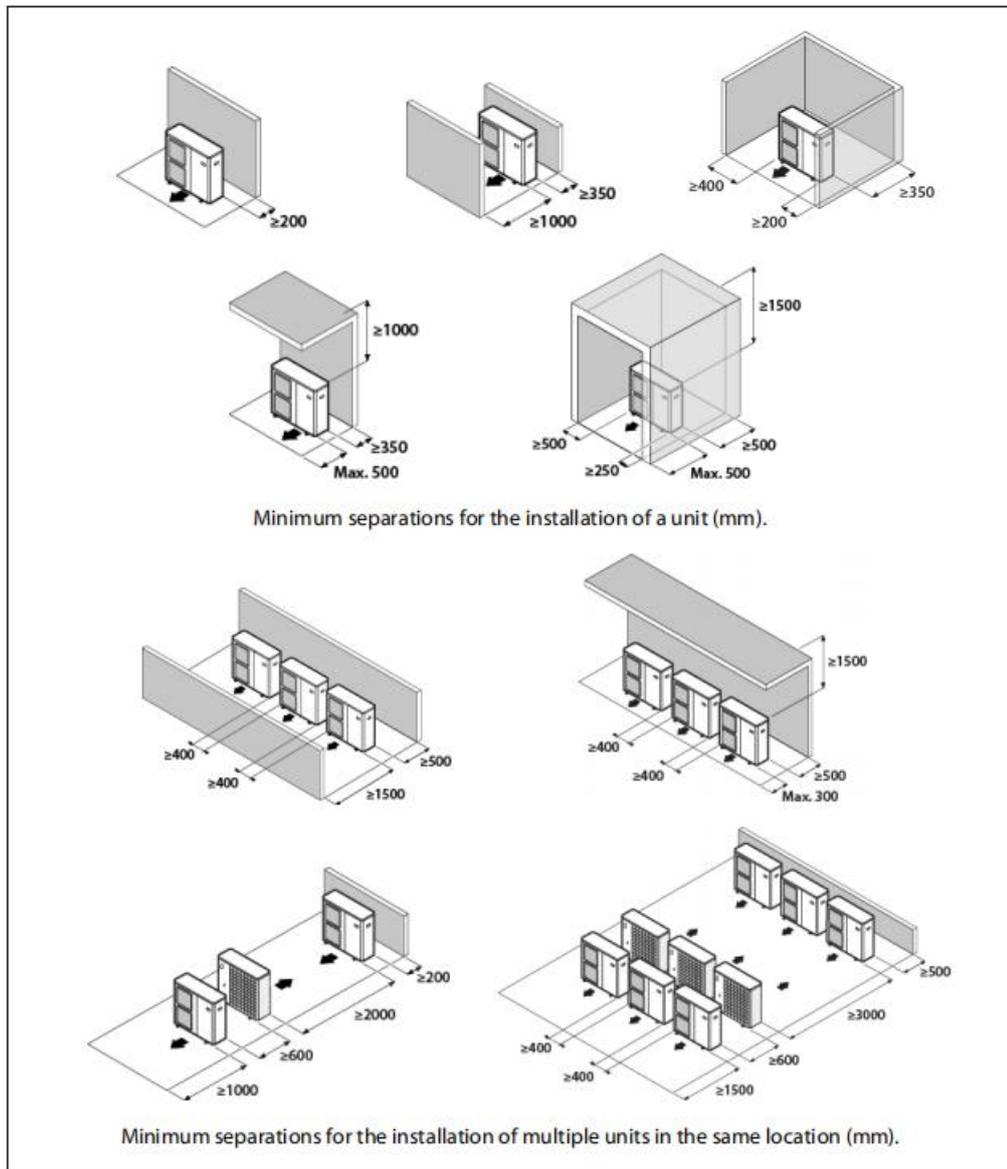
Unit	DC Inverter Monoblock Heat Pump 3 in 1 All In One Type		
	NL-BKDX30-95II/R32	NL-BKDX40-150II/R32	NL-BKDX50-200II/R32
Model	NL-BKDX30-95II/R32	NL-BKDX40-150II/R32	NL-BKDX50-200II/R32
Waterproofing grade	IPX4	IPX4	IPX4
Leakage protection	I Class	I Class	I Class
Power source	220V-50Hz-1N	380V-3N/50Hz	380V-3N/50Hz
Hot water capacity	2500-9500W	3800~16000W	5500-21000W
Heating capacity	2800-10000W	3500~15500W	4500-20000W
Cooling capacity	2500-7500W	3800~11000W	4800-14500W
Heating input power	1000-3200W	1500~5000W	2000-5500W
Hot water input power	1000-3200W	1500~5000W	2000-5500W
Cooling input power	1000-3200W	1500~5000W	2000-5500W
Auxiliary element power	3000W	3000W	3000W
Auxiliary element current	14A	14A	14A
Rated input power	2500W	3650W	4500W
Rated current	11.0A	6.7A	7.8A
Water pump	WILO RS15/6	WILO RS25/8	WILO RS25/8
Max water pump head	6 meters	8 meters	8 meters
Expansion tank	2L	5L	5L
Rated water flow	1.7m ³ /h	2.7m ³ /h	3.5m ³ /h
Refrigerant	R32/1200g	R32/1900g	R32/2800g
Net weight	100kg	150kg	155kg
Noise	≤49dB(A)	≤50dB(A)	≤52dB(A)
Inlet/outlet gas max working pressure	4.2MPa	4.2MPa	4.2MPa
High/low pressure max working pressure	4.2MPa	4.2MPa	4.2MPa
Heat exchanger max working pressure	4.2MPa	4.2MPa	4.2MPa

III. Installation

1. Heat pump installation

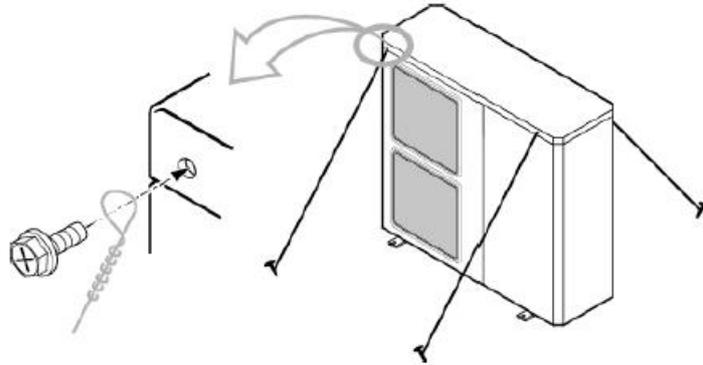
(1) Installation location

◆ The heat pump must be installed exclusively outside the home and, where possible, in a completely clear area. If a protection is needed around the appliance, it should have wide openings on the 4 sides and the installation separations indicated in the following figure must be respected. No obstacle should prevent the circulation of air through the evaporator and the fan outlet.



◆ Consult with the user before choosing the location of the device. It should not be placed next to sensitive walls, such as on the wall next to a bedroom. Make sure that the location of the heat pump is not disruptive to neighbor (sound level, air currents generated, low temperature of the air blown with risk of freezing plants in the path, etc.).

◆ Choose a location that preferably has sunlight and is protected from strong and cold winds. If the heat pump is exposed to gusts of wind that make it possible to overturn it, it should be supported by suitable guys, as indicated in the figure.



◆ The device must be sufficiently accessible for subsequent installation and maintenance work. Make sure that the passage of the hydraulic and electrical connections to the interior of the house is possible and comfortable. The spacing measures indicated in the figure above are those strictly necessary to ensure correct operation of the device; however, sometimes, it will be essential to provide more space for maintenance work.

◆ The heat pump is a device specially designed for outdoor installation. Nevertheless, avoid installing it in a place where it may be exposed to significant water stains or spills (e.g. under a faulty gutter, near gas outlets, etc.) . Move the appliance away from heat sources and flammable products.

◆ In areas where abundant and copious snowfalls occur, special care must be taken to protect the heat pump from possible obstructions due to accumulation of snow around it. The obstruction of the air inlet and/or outlet of the machine due to the accumulation of snow may cause malfunction of the unit and possible breakdowns. The heat pump must be raised at least 100 millimeters above the maximum expected snow level. In turn, the roof should be protected from accumulation of snow, by means of a roof projecting from the building or a similar structure.

(2) Hydraulic installation

◆ **The hydraulic installation must be made by qualified personnel.**

2.1 Selection circulation pipeline : The water flow velocity inside the water pipe is generally required to be 0.8~1.5m/s. The maximum water flow velocity cannot exceed 2m/s.

Determine the diameter of the water pipe according to the rated water flow of the machine. As shown in the table below :

Water flow (m ³ /h)	≤1	1~2	2~3	3~4	4~5
Recommended pipe diameter(mm) (flow velocity 1.2m/s)	DN20	DN25	DN32	DN40	DN40
Minimum pipe diameter(mm) (flow velocity1.8m/s)	DN15	DN20	DN25	DN32	DN32

2.2 Calculation of water pipe resistance : $H_{max}=P_1+P_2$

- ◆ Water pressure drop inside the machine. Can be found on the machine' s nameplate.
- ◆ Water pressure drop in piping system. If the water flow velocity is 1.2m/s, the resistance of the straight pipe is 0.6 Pa/m, and the resistance of each elbow is 2Pa.If the water flow velocity is 1.8m/s, the resistance of the straight pipe is 1.25 Pa/m, and the resistance of each elbow is 4.5Pa.

2.3 Pump selection

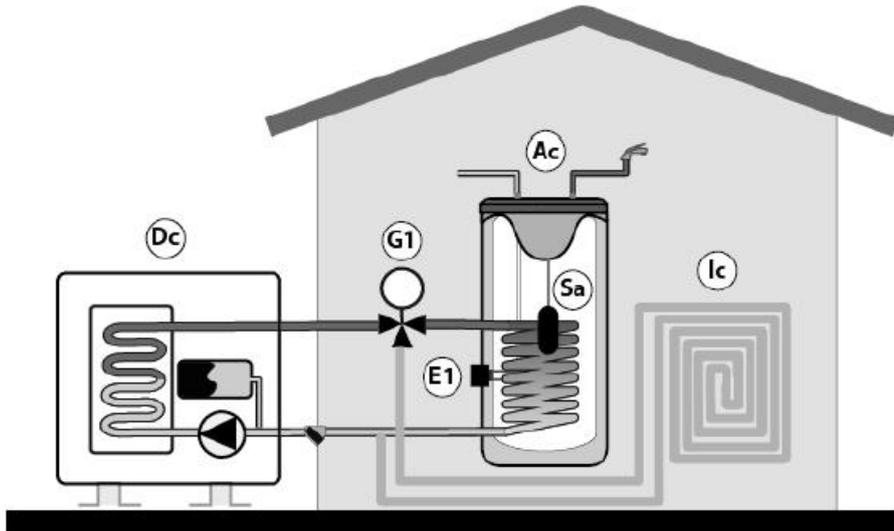
- ◆According to the rated flow of the machine and the calculated water pressure drop.To decide if you need to install an additional circulating water pump.

2.4 Installation of floor heating

- ◆The water flow speed in the fool heating pipe is not less than 0.25m/s, and the general design is 0.25~0.5m/s.
- ◆The distance between the pipes is 150~200mm;
- ◆The length of each loop does not exceed 80m,and the general designed is about 40~70m. The length difference between different loops does not exceed 10m.

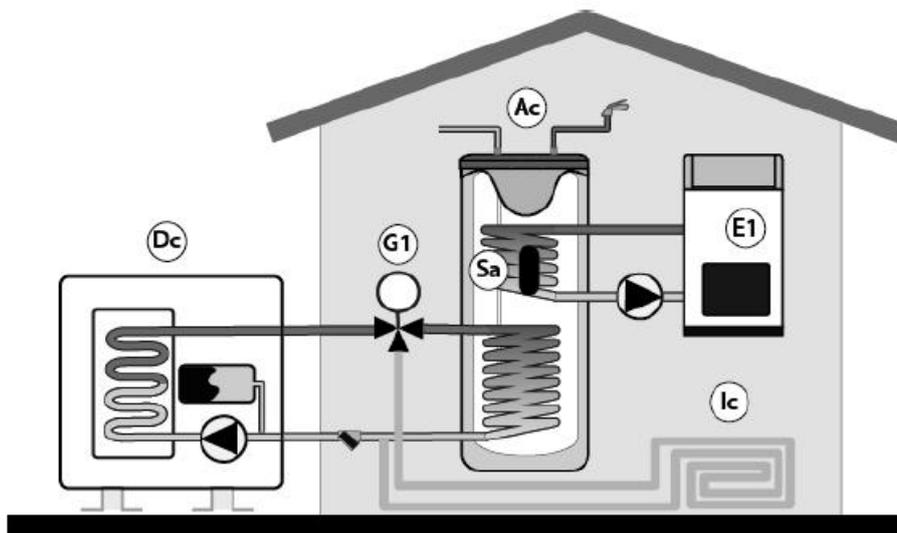
(3) Installing a DHW tank

- ◆The heat pump may include (optionally) in its installation a tank for the production of domestic hot water. The hydraulic installation of the tank must be made by qualified personnel, subject to the applicable installation legislation and attached instructions of the tank.
- ◆To combine an DHW tank with the heat pump, insert the DHW tank sensor supplied with it into the tank sensor housing. In addition, a 3-way diverter valve (G1) must be installed between the external machine and the DHW + heating/cooling installation, by means of what, the electronic controller diverts the water from the heat pump to the DHW production or to the heating/cooling installation, depending on whether there is demand for DHW.



◆ In addition, optionally, a backup heater (E1) can be installed, by means of what DHW temperatures higher than 50°C can be obtained.

As alternative to the backup heater, the heat pump optionally allows the connection of a conventional source of energy (as a gas boiler, oil boiler, etc.) as back up for DHW production, by means of the same electrical connection E1. For it, the DHW tank must be provided with an auxiliary coil exchanger and/or any intermediate system of exchange that allows the hydraulic connection of the above mentioned backup source of energy.



To perform the electrical installation of the DHW tank sensor, the 3-way valve (G1), and the backup heater or boiler (E1), read the “Electrical Connections” section of this manual carefully.

(4) Main components and working principle of water circulation system

4.1 pump: push the water circulate in the water circulation system to realize the heat exchange between

the heat pump and the water terminus.

4.2 Filter: Collect impurities in the water system to prevent impurities from entering the heat pump and the water terminus's heat exchanger to cause blockage.

4.3 Buffer tank: Increase the amount of water in the system, reduce the change rate of water temperature, improve comfort; balance the different temperature difference and flow demand between the heat pump and the water terminus.

4.4 Safety valve: keep the pressure of the water system not exceeding the maximum limit.

4.5 Expansion vessel: balance the pressure of the water system when the volume of water changes.

4.6 vent: remove the air in the water system and ensure that the water cycle is normal.

(5) Estimate the heat demand for room heating

$$Q=K*qn*S$$

- Q Total heat demand for housing
- K Additional factor
- qn Heat demand per square metre
- S Heating area

5.1 qn experience values for different houses

Apartment (W/m ²)		Single house (W/m ²)	
Living room	100~130	Living room	120~150
Bedroom	110~140	Bedroom	120~150
Study room	100~120	Study room	110~130

5.2 Additional factor

Ratio of heating area to total room area	>0.55	0.4~0.55	0.25~0.4	<0.25
Additional factor K	1.0	1.25	1.35	1.5

The rated heating capacity of the heat pump must be $\geq Q$.

(6) Calculation and selection of buffer tank

6.1 Minimum water volume in the water system

Considering the comfort of heating, it is best not to reduce the temperature of the water supply by more than 5°C during the defrosting in winter. The general defrosting time is about 4 minutes.

$$M_{min}=Q*T*2*1000/(60*5*1.163)$$

Mmin Minimum water volume in the water system (L)

Q The rated heating capacity of the heat pump(KW)

T The defrosting time (minute)

M2 Total volume of other parts in the system except the buffer tank

6.2 The volume of the buffer tank must be $\geq M_{min} - M2$

6.3 If $M2 > M_{min}$, It is not necessary to install a buffer tank.

6.4 For the correct operation of the heat pump, a minimum water volume must be ensured in the installation, as well as a minimum flow in the hydraulic circuit of the machine.

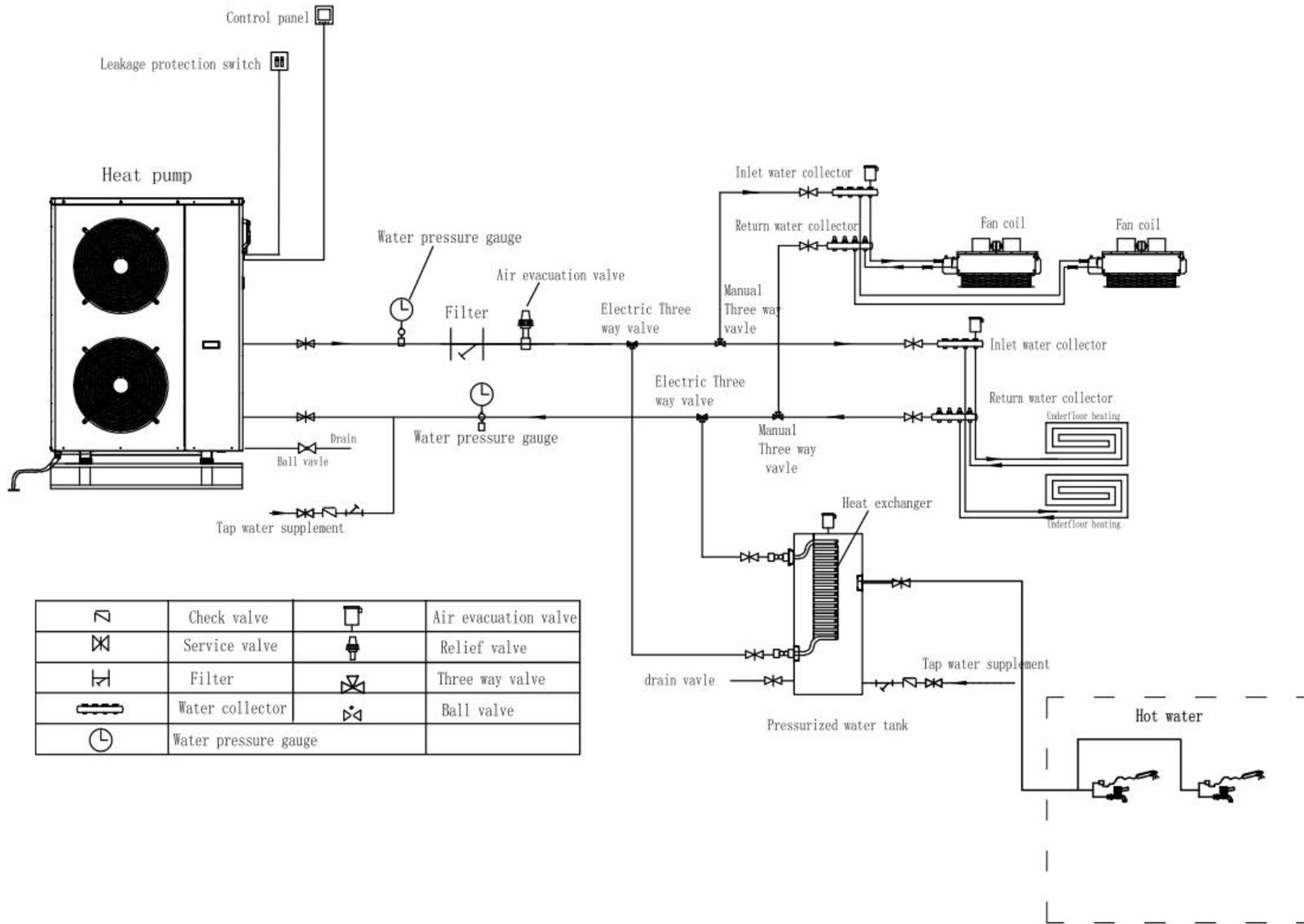
If the minimum circulation flow is not reached by the heat pump, it will be blocked, and an alarm code will be displayed on the controller display. According to the different capacity model installed, these volume will be:

	8KW	11KW	16KW
Minimum volume(l)	100	150	200
Minimum flow rate(l/min)	10	15	20

6.5 If the water volume of the installation is lower than this value, install a buffer tank in the heating/cooling circuit. To avoid condensation and premature deterioration of the buffer tank, make sure that all hydraulic fittings and connections are properly insulated, especially when the tank is to be used in Cooling mode.

6.6 In multi-zone installations managed by thermostatic or similar valves, some method must be provided to maintain the minimum flow rates indicated above, even when all zones are closed (bypass valve, etc.).

2.Connection diagram



3.Circuit connection

(1) Attentions

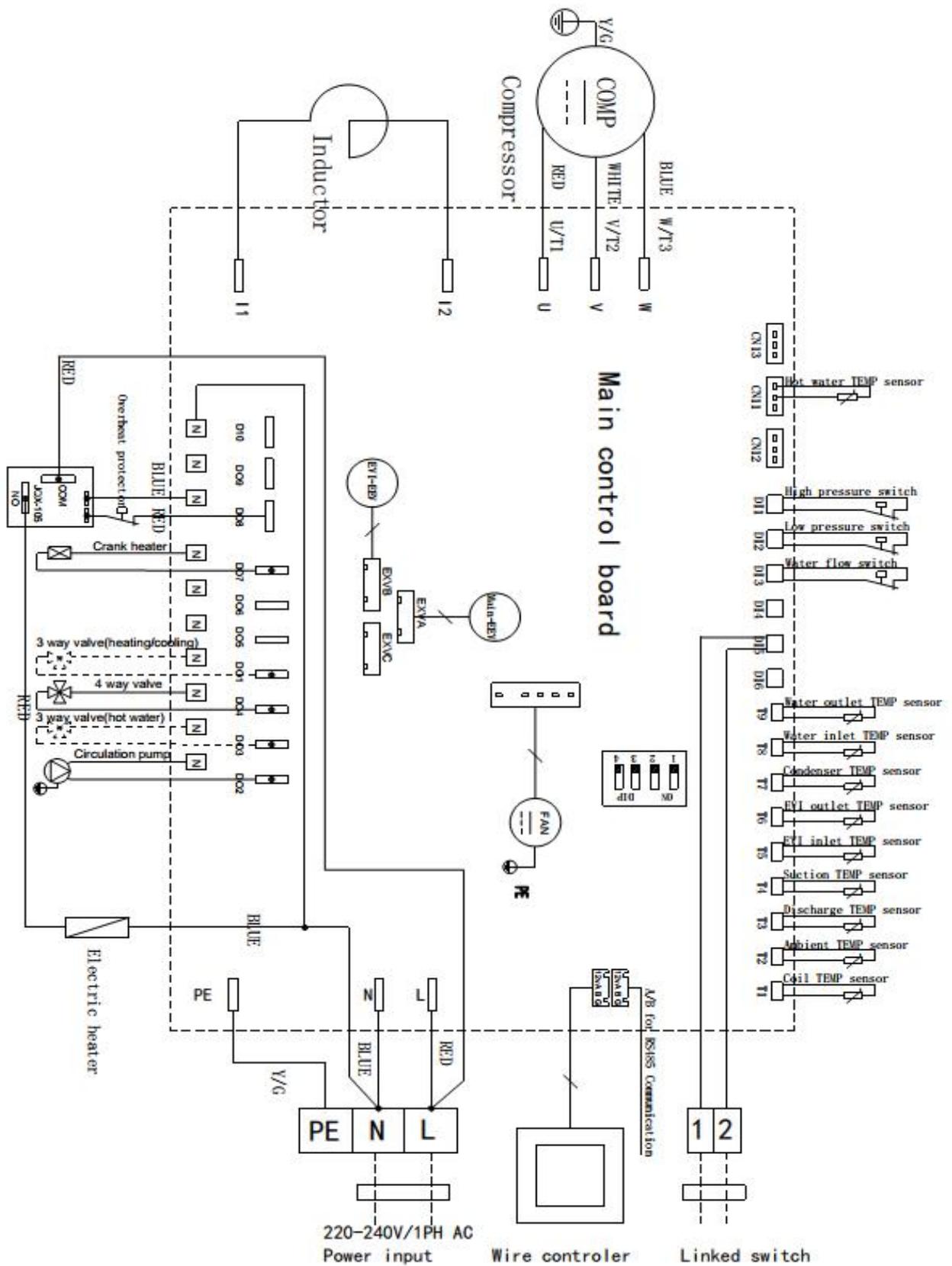
- ◆ Construction wiring must be installed by a professional technician for construction in accordance with the circuit diagram.
- ◆ Appliance installation wiring should be installed in accordance with national wiring rules.
- ◆ Before installation, please confirm whether your local voltage is match with the voltage showed on the machine's nameplate and whether the carrying capacity of the power supply, wires and sockets are suitable for this machine's input power.
- ◆ The power source wire diameter is selected by the nameplate maximum current.
- ◆ The regulation of insurance tube: according to the reality.
- ◆ Users are not allowed to change the power cord, wiring work must be carried out by qualified electricians, and to ensure that the machine metal parts has a good connection with grounding, the machine shall not be allowed to change the grounding method. The electrical connection of the heat pump must be protected by an earth leakage circuit breaker (a high-speed switch of 30 mA (<0.1s)).

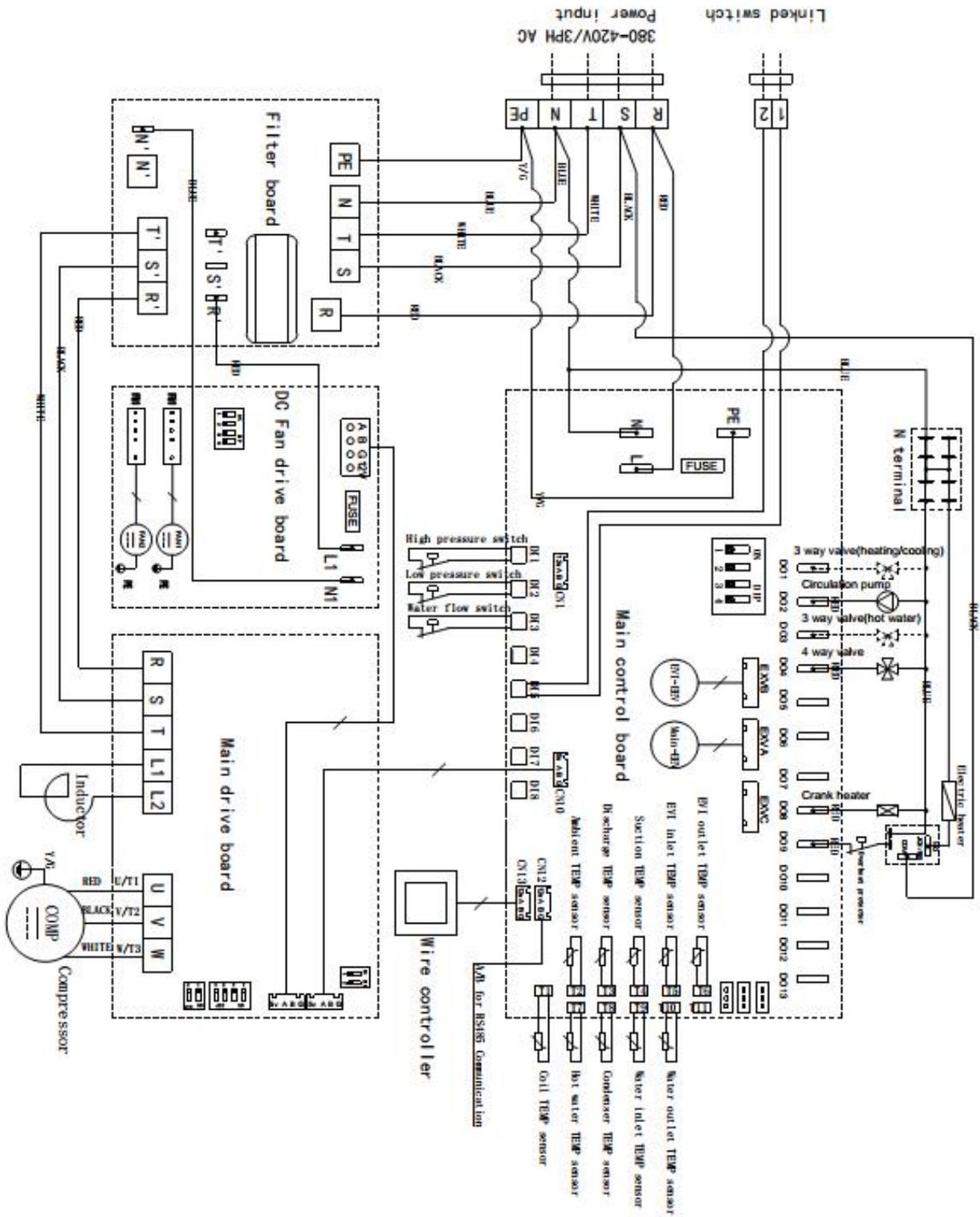
- ◆ The power connection must be equipped with the unit matching and at least 3mm contact with the power from the all-pole disconnect device and leakage protection device.
- ◆ If the power soft wire is damaged, it must be replaced by the manufacturer, its service department, or similar professional to avoid danger.
- ◆ Do not insert hands or foreign objects into the outlet of the unit, which will lead to the danger of personnel and equipment.
- ◆ The remote controller is fixed by screw and installed indoor with the height above 1.5M. It is forbidden to install in the environment where the humidity, rain, acidity, corrosivity and light illuminate directly.
- ◆ The water quality of the unit must meet the national standard of domestic water consumption, otherwise it will cause the machine damage, the company does not bear any responsibility.

IMPOTTANT: Before carrying out any work on the electrical installation of the heatpump, always ensure it is disconnected from the mains.

4.Circuit diagram

NL-BKDX30-95II/R32 (220V)





IV. Trial running

1. Trial running must after all the installation completed.

2. Please confirm the following matters before the trial operation, put “√” in the boxes after confirmation

- ▲ Unit is installed correctly
- ▲ Power supply meets unit's rated power source need
- ▲ Piping and wiring are correctly installed
- ▲ Unit air inlet/outlet well-ventilated
- ▲ Drain off water is done well
- ▲ Leakage protective device act effectively
- ▲ Pipe thermal insulation
- ▲ Grounding wire connected correctly

3. After check and ensure correct, then power on. If the control panel display nothing, that should recheck and tight the line of control panel. The control panel should display time, setting temperature and the current temperature.

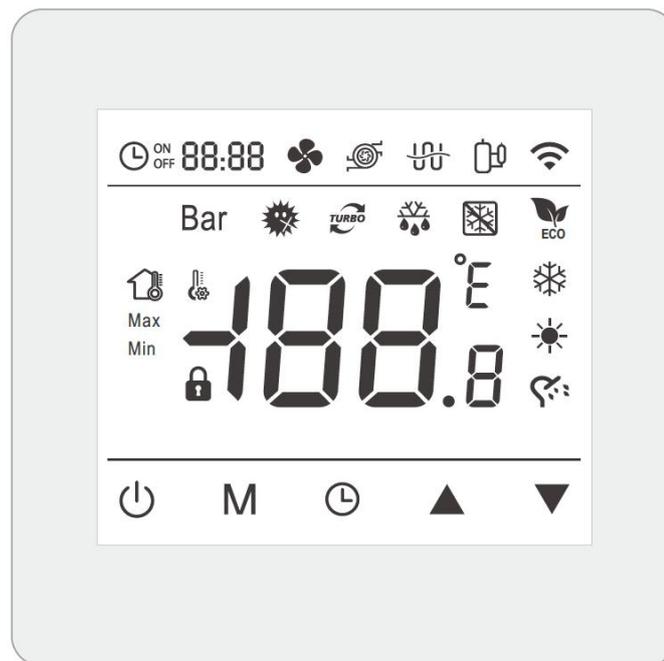
4. Discharge the air out of the pipelines , and then press ON/OFF button, the unit work under the setting temperature, unit's trial running would check the following:

- ▲ First time to run the device, check the current normal or not;
- ▲ The function keys on operation panel are normal or not;
- ▲ The indicator light is normal or not;
- ▲ The whole circulating hot water system has water leakage or not;
- ▲ The condensed water discharge is normal or not;
- ▲ System's pressure is normal or not (according to the high water temperature or low pressure);
- ▲ Whether there is abnormal sound and vibration during operation;
- ▲ The wind, sound and condensate of the unit affect the neighborhood or not;
- ▲ Whether there is leakage of refrigerant.

V. Operation panel instruction

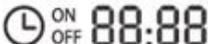
1. Wire Controller Display

1) Display Icon



2) Wire Controller Interface Description

Symbol	Definition	Symbol	Definition
	ON/OFF key		WIFI indication
	Mode key		Compressor operation
	Time setting		Electric heating operation
	Up key		Water pump operation
	Down key		Fan operation
	Cooling mode		Silent mode
	Heating mode		Strong mode

	Hot water mode		Defrosting mode
	ECO mode		Antifreeze mode
	Floor drying mode		Lock key
		Temperature display area	
		Clock/timing area	

3) Operating instructions

1、 ON/OFF key: 

When heat pump shutdown, press  to start up the unit

When heat pump start up, press  to shutdown the unit

2、 Mode key 

When heat pump under start up state, press  more than 3 second to switch machine operation mode, Can be

switched among: cooling  、 heating  、 hot water  、

cooling  + hot water  、 heating  + hot water  5 modes.

3、 Up key  and Down key 

1) Used for flipping query and modifying parameter values ;

2) Combine with  key to enter query and set parameters ;

3) When heat pump under start up state, press  or  key to set the temperature of the current mode.

4、 Clock/timing key 

When heat pump under shutdown state, Press any key except  and  , for display the current time, long

press  to enter the timing on / off setting state, press  or  key to modify the timing time, In the setting,

press  key to return to the previous setting, press  key to confirm and switch to the next step; In the timing

setting state, press and hold the  key to cancel all timing settings.

The specific operation process is as follows:

4) Antifreeze under cooling mode operation:

The unit under cooling operation mode, when the compressor has been running for 10 minutes, and if the temperature of the inner coil is detected $\leq -2^{\circ}\text{C}$ for 2 minutes continuously, the unit will report an anti-freezing protection system protection, then the compressor will stop, and the water pump will keep running. When the temperature of the inner coil is $\geq 6^{\circ}\text{C}$, it will automatically reset. The unit would shut down to antifreeze:

(1) When the outdoor ambient temperature $T_4 \leq 4^{\circ}\text{C}$ and the inlet water temperature $\leq 4^{\circ}\text{C}$, the system enters the first-level antifreeze status, and the water pump would automatically turn on until outdoor ambient temperature $T_4 \geq 6^{\circ}\text{C}$, or when the inlet water temperature $\geq 8^{\circ}\text{C}$, exit the first level antifreezing protection;

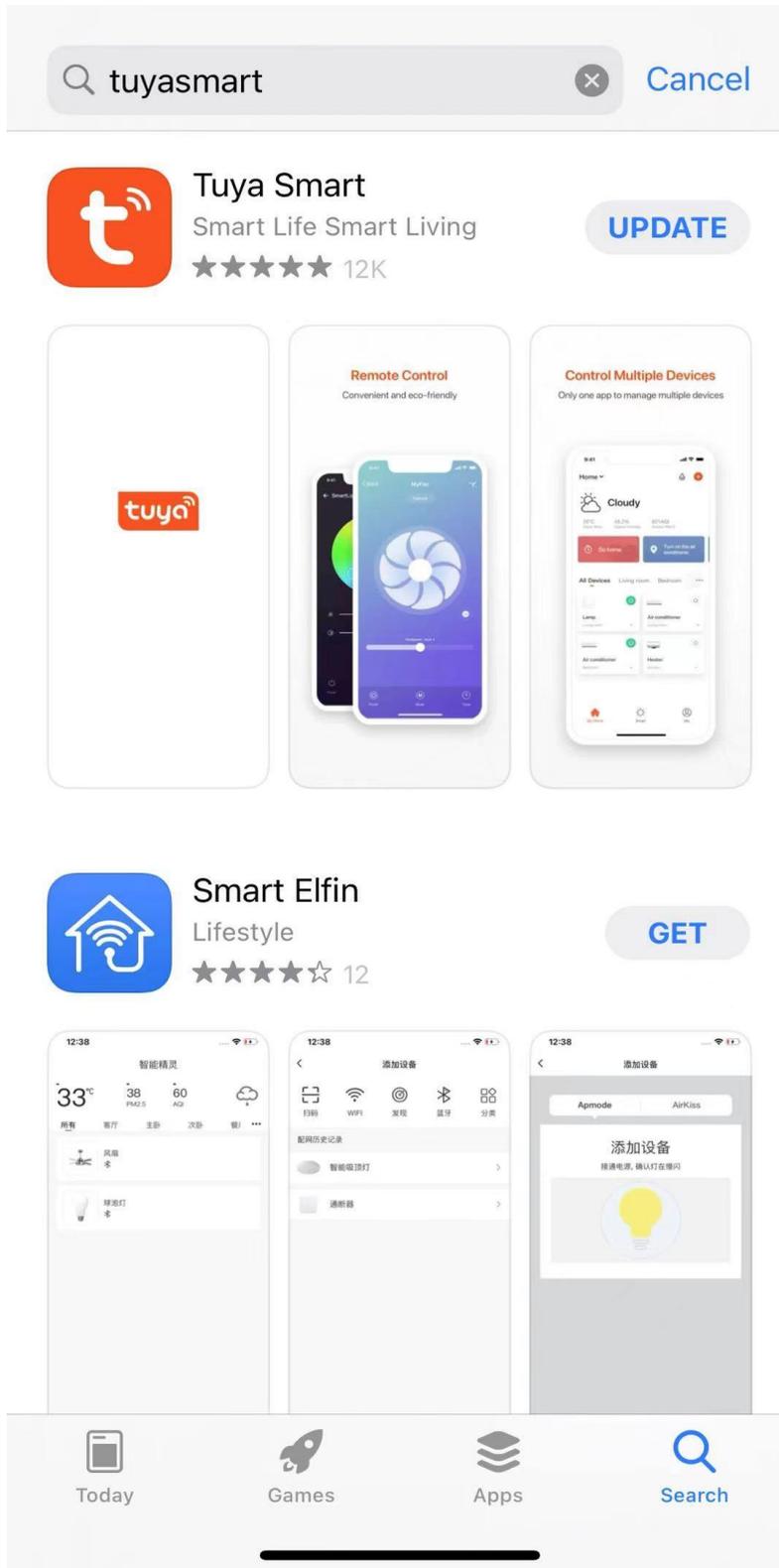
(2) When the outdoor temperature $T_4 \leq 4^{\circ}\text{C}$, and inlet water temperature $\leq 2^{\circ}\text{C}$, the system enters the secondary antifreeze status, and automatically turns on heating until the outdoor ambient temperature $T_4 \geq 6^{\circ}\text{C}$, or the inlet water temperature $\geq 15^{\circ}\text{C}$, exit the secondary antifreeze protection;

Note:

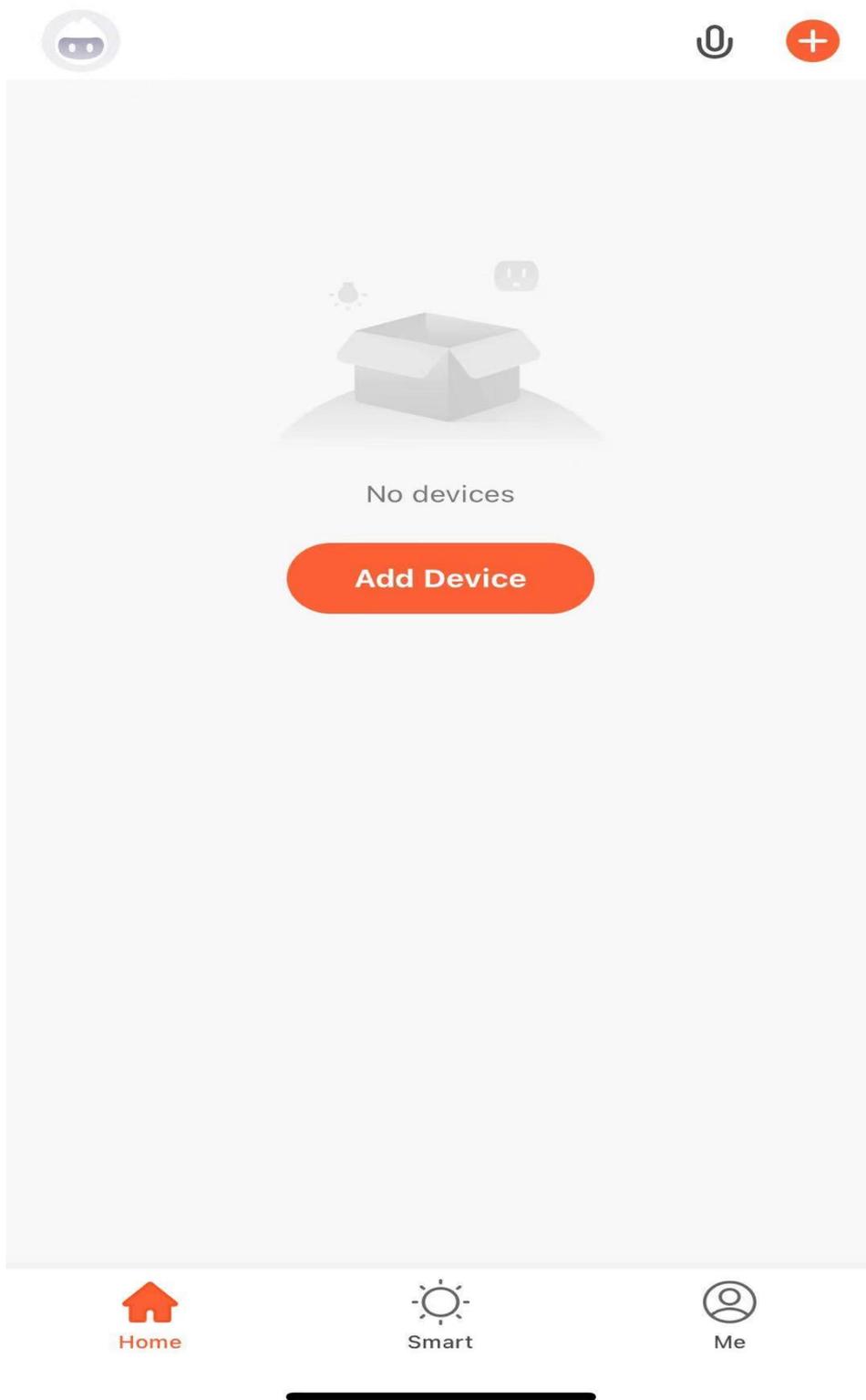
When the heat pump unit is outside with low ambient temperature $< 2^{\circ}\text{C}$, please keep the power on, the built-in antifreeze function of the machine can operate normally to protect the machine from being damaged by freezing.

WiFi connection

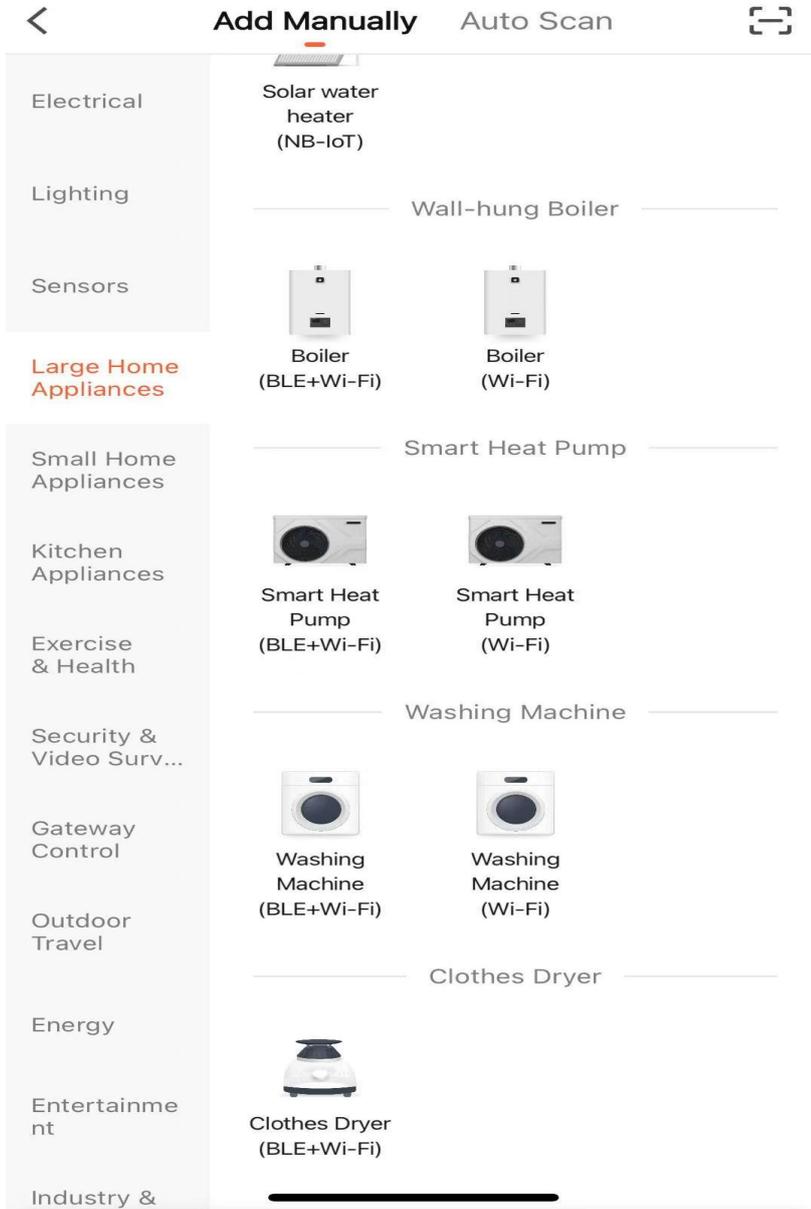
1) Search the "tuyaSmart: in App store



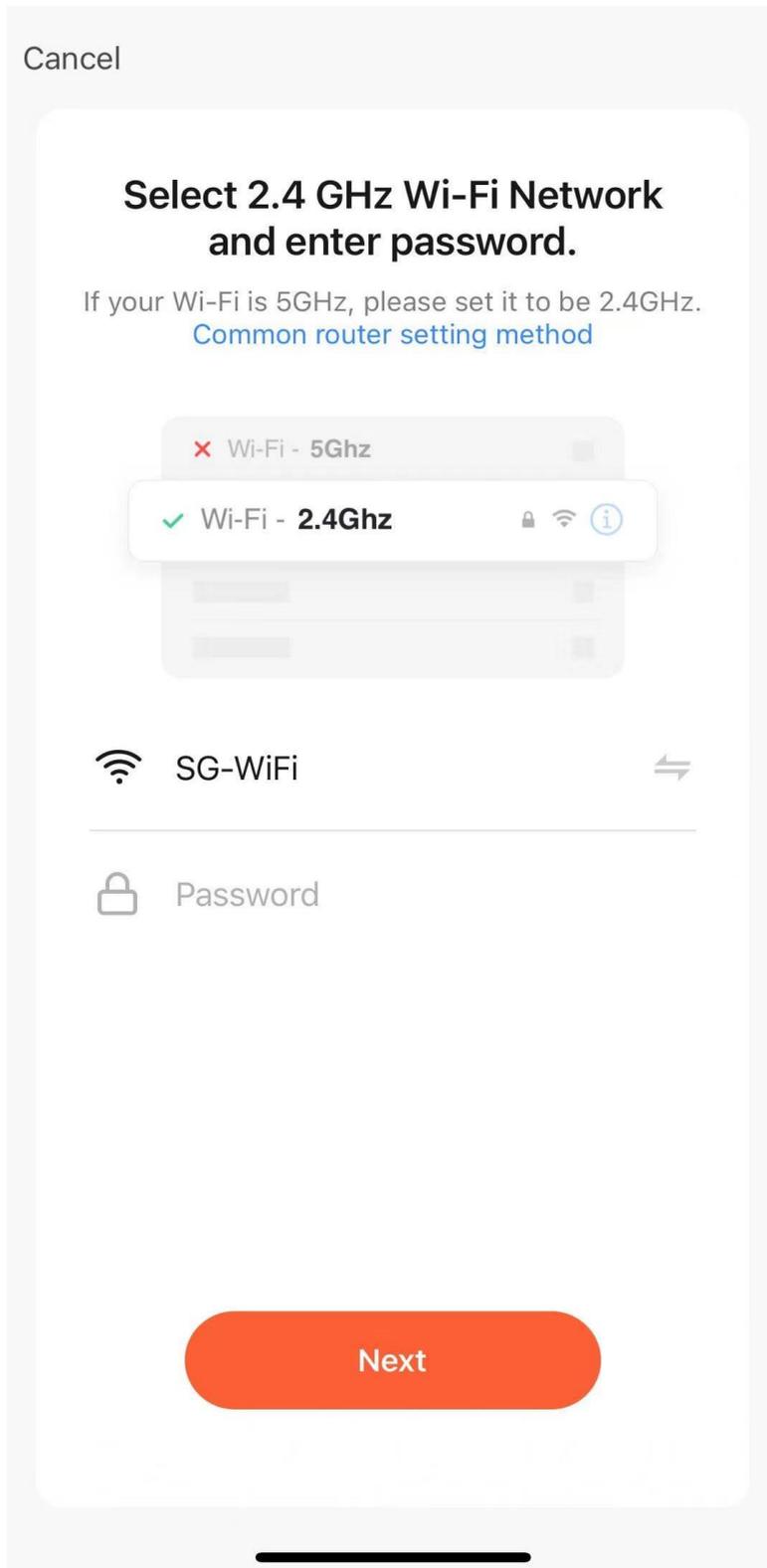
2) Open tuyaSmart APP and choose add device



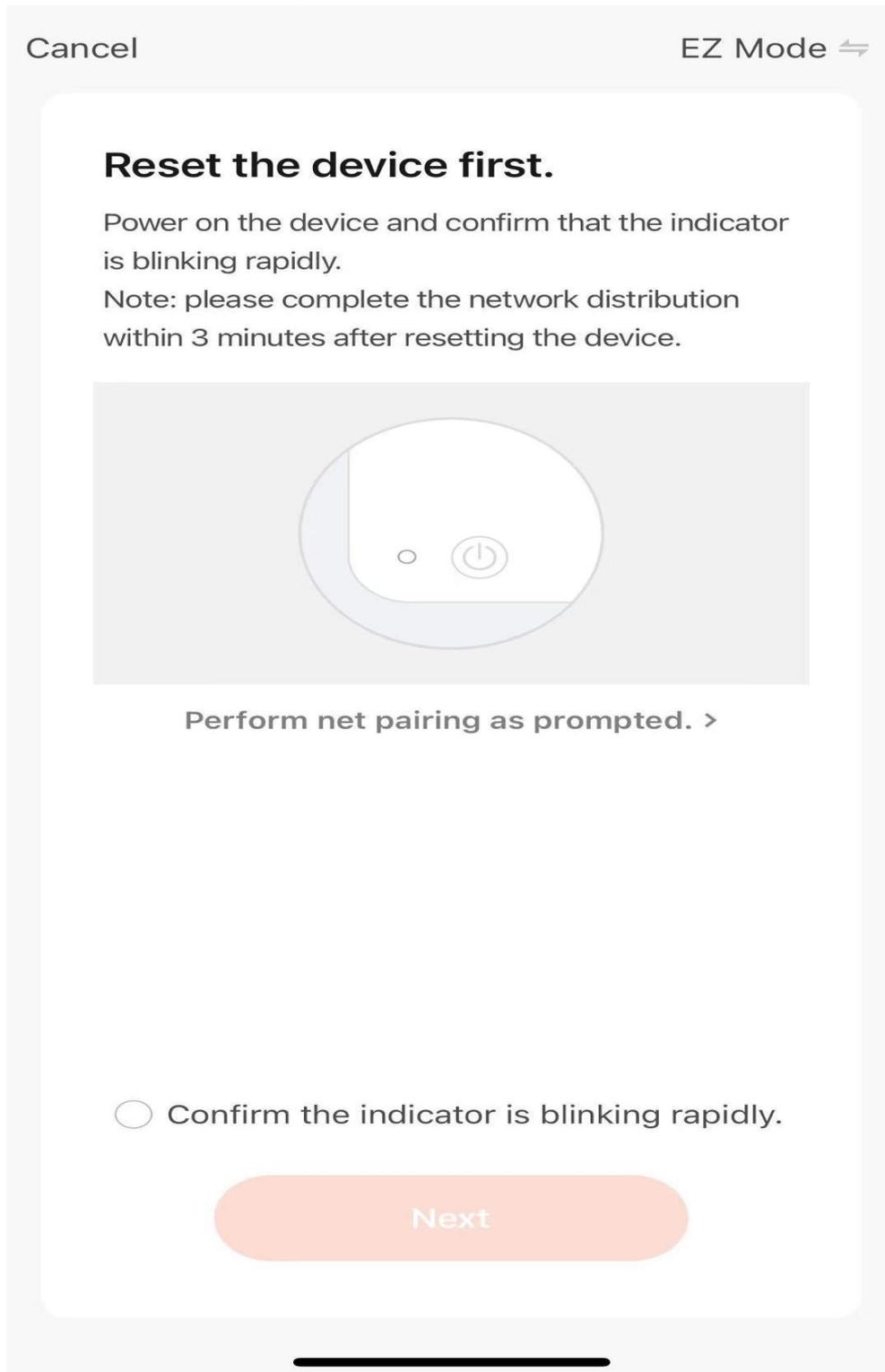
3) large home appliances/smart heat pump(wifi)



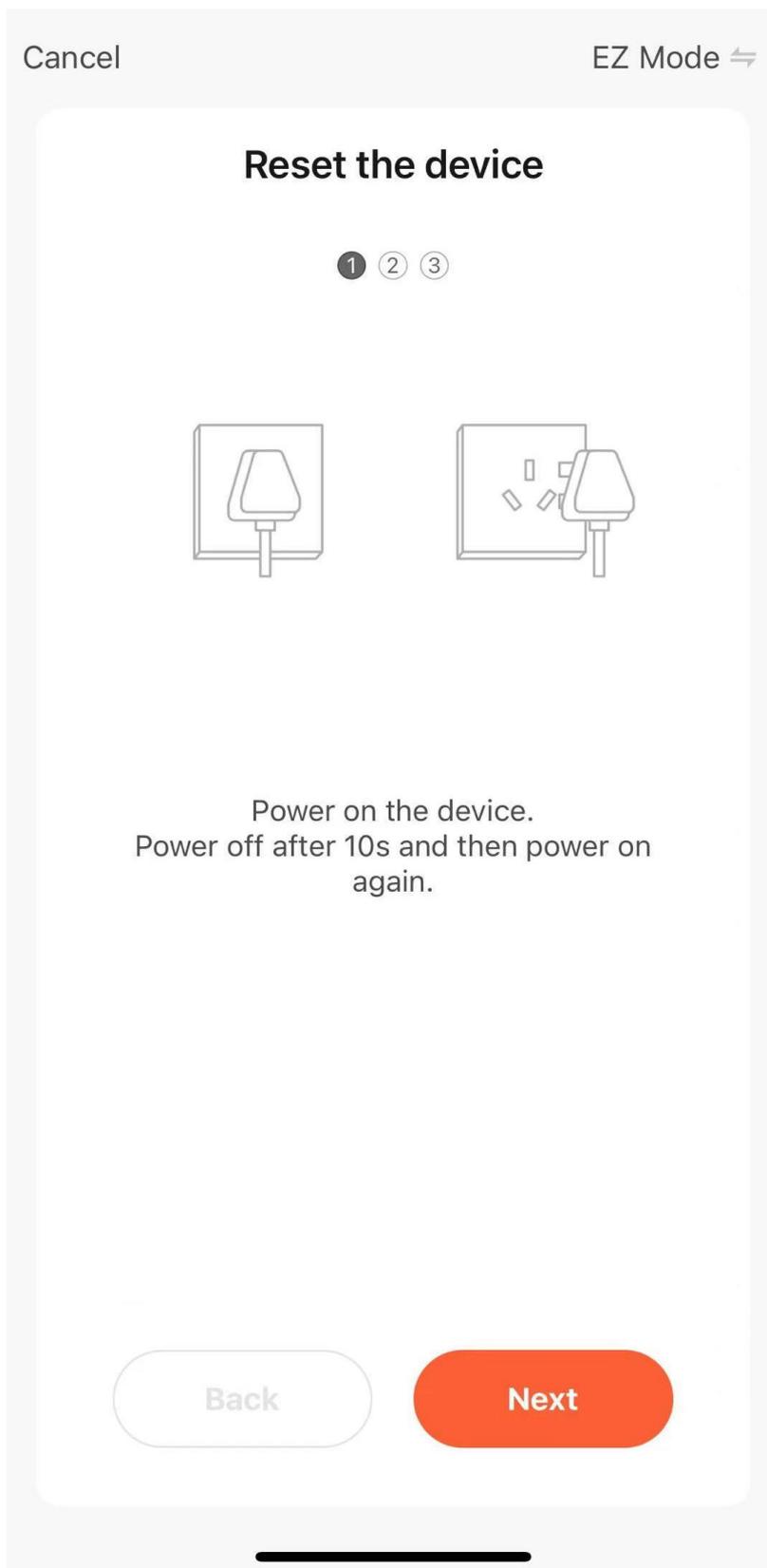
4) Input wifi password,then go to next



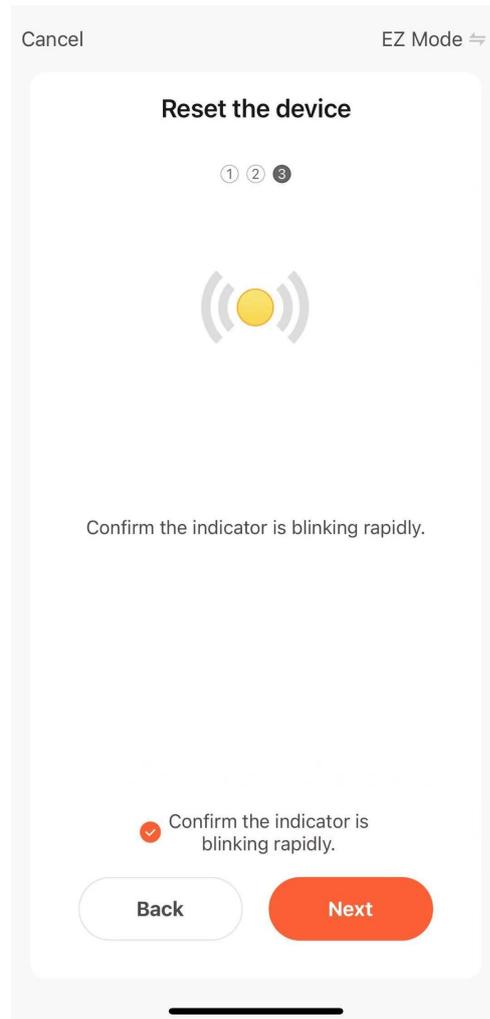
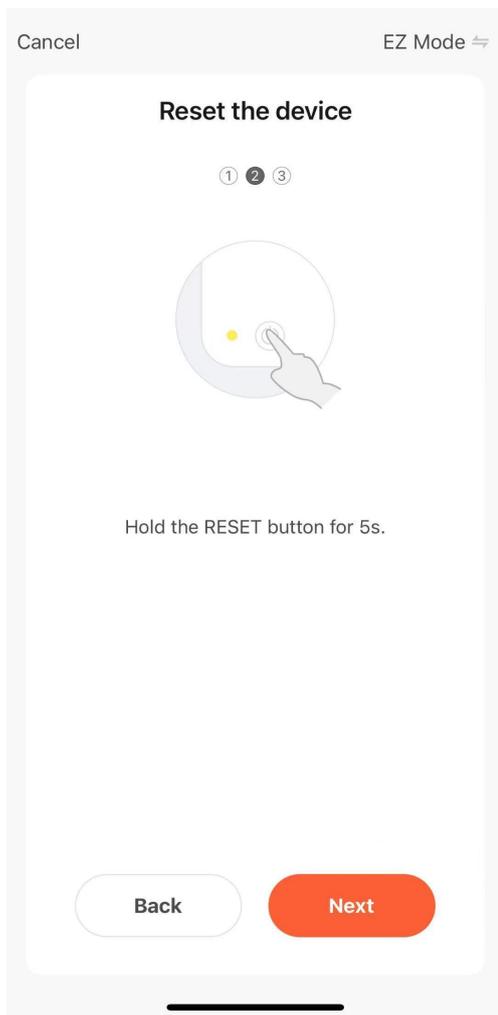
5) Choose perform net pairing as prompted



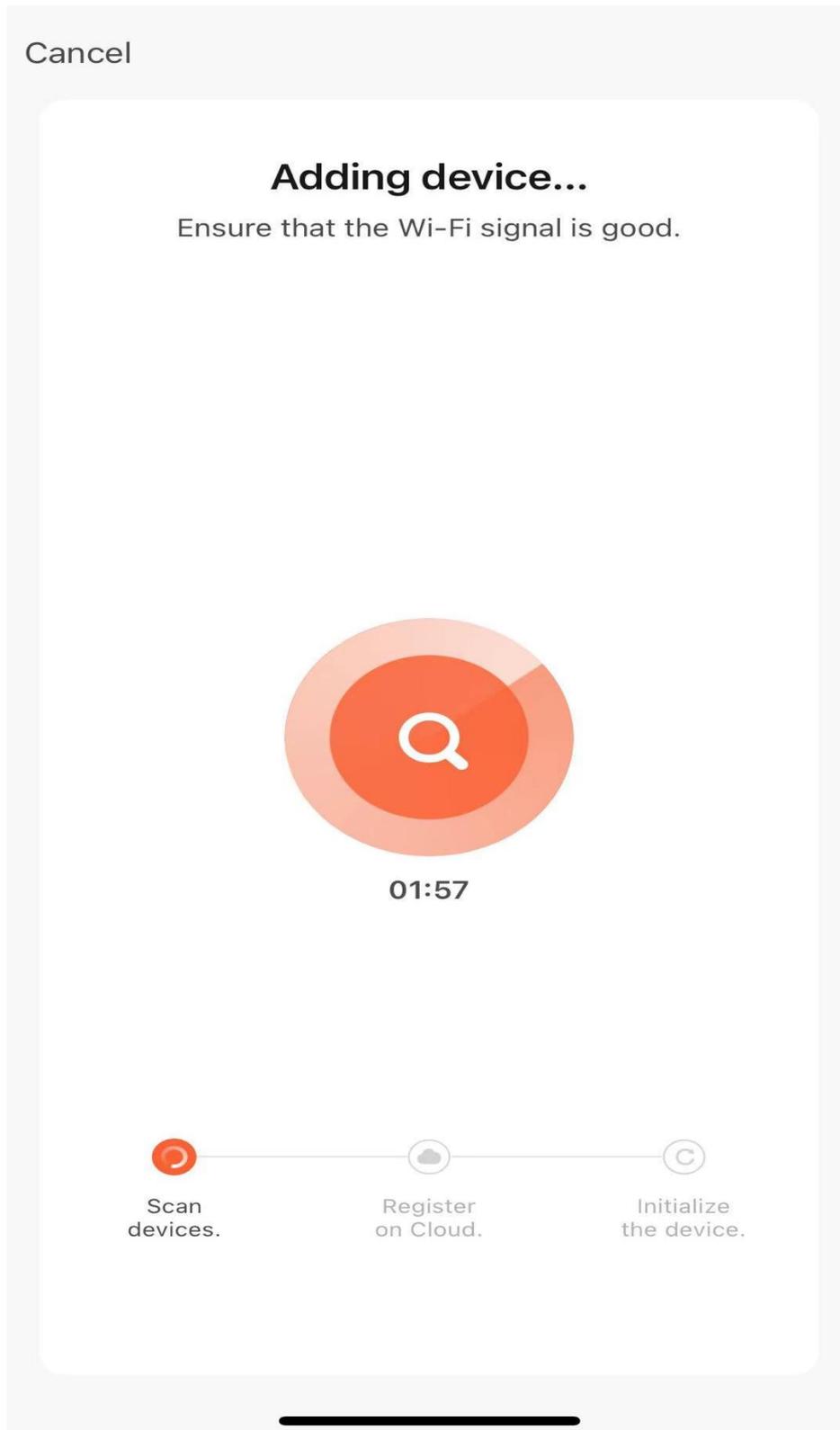
5) Power on the heat pump .After 10 seconds ,power off ,then power on again,and go to next



6) Press ON/OFF 5seconds and reset the device



8) when the  symbol appeared, then go to Next



4) Parameter query

Press and hold the **M** + **▼** key at the same time for 3 seconds to enter the operating parameter query. After entering the parameter query state, press **▲** or **▼** to switch to display the operating parameters.

In the parameter query state, press the switch or automatically exit after 20 seconds without operation. The parameter description is as follows:

No.	Name	Unit	Maximum value	Description
D01	Compressor operating frequency	Hz	0~150	
D02	Compressor operating current	A	0~30	
D03	Exhaust gas temperature	°C	-15~999	
D04	Return air temperature	°C	-30~999	
D05	Evaporator coil temperature	°C	-30~999	
D06	Outdoor ambient temperature	°C	-30~999	
D07	Inlet water temperature	°C	-15~999	
D08	Outlet water temperature	°C	-15~999	
D09	Main electronic expansion valve steps	P	0~500	
D10	DC-link voltage	V	0~500	
D11	Module temperature	°C	-15~999	
D12	EVI inlet temperature	°C	-30~999	
D13	EVI outlet temperature	°C	-30~999	
D14	EVI expansion valve steps	P	0~500	
D15	High pressure sensor pressure	Mpa*10	0~100	Relative pressure
D16	Low pressure sensor pressure	Mpa*10	0~100	Relative pressure
D17	Fan speed	Rpm	0~999	
D18	Inlet temperature of internal heat exchanger	-30~999	-30~999	
D19	Outlet temperature of internal heat exchanger	-30~999	-30~999	
D20	Bypass valve status	°C	0/1	
D21	EVI valve status	°C	0/1	
D22	Floor drying time	h	0~168	
D23	Indoor ambient temperature	°C	-30~999	
D24	Indoor coil temperature	°C	-30~999	

2. Wire Controller Parameters Query Form

NO.	Setting data description	Unit	Numerical range	Defaults	Remarks
1	Power-off memory mode	-	On=0 ; OFF=1	0	The power-off memory setting of the line controller itself does not need to be sent to the internal machine. On=0: restore the state before power-off after power-off OF=1: Standby after power off
2	Temperature unit conversion	-	C=0; F=1	0	C: Celsius temperature; F: Fahrenheit temperature
3	Fan coil	-	0: invalid; 1: valid	1	When this setting is 0, the cooling mode is not selectable
4	Link switch	-	0: invalid; 1: valid	1	When the fan selection is invalid, it will be automatically adjusted to 0
5	Heating mode	-	0: floor heating; 1: fan coil	1	When the fan selection is invalid, it will be automatically adjusted to 0
6	Energy saving function	-	0: invalid; 1: valid	0	
7	Emergency mode	-	0: invalid; 1: valid	1	
8	Electric heating start outer ring temperature	°C	-21 To 10	-20	When set to -21 degrees, the electric heating function is turned off (protection function (Except for power), need to set EEPROM)
9	Water pump anti-rust	-	0: invalid; 1: valid	0	The pump runs regularly during standby
10	Heating high water temperature	°C	40~80	49	When heating, the actual inlet water temperature value is greater than the set value Time, water temperature compensation (need to set EEPROM)
11	Cooling low water temperature	°C	20~10	12	When cooling, when the actual inlet water temperature value is less than the set value, water temperature compensation (EEPROM needs to be set)
12	Automatic temperature regulation (OTC) (screen shield)	-	0: invalid; 1: valid	0: invalid	
13	OTC correction value (shielded)	°C	-8 To 8	0	Automatic temperature adjustment correction value
14	High ambient temperature (shielded)	°C	06-25	20	

15	Low ambient temperature (shielded)	°C	-20 到 5	-20	
16	High ambient temperature setting (shielded)	°C	25-55	25	
17	Low ambient temperature setting value (shield)	°C	20-55	44	
18	The highest setting value of heating temperature	°C	20~60	55	Need to set EEPROM
19	Stop operating temperature when heating reaches the temperature point	°C	-5~5	0	add573
20	Stop operating temperature when cooling reaches the temperature point	°C	-5~5	-1	add575
21	Starting temperature point of heating mode	°C	-10~10	-5	add572
22	Starting temperature point of cooling mode	°C	-5~5	1	add574
23	Compressor manual frequency in test mode (shield)	Hz	10~100	50	Only valid for the test mode (valid at the time, if it is not set, it will be executed according to the parameters set by the program)
24	Manual opening of main electronic expansion valve in test mode(shield)	Pulse	60-480	150	Only valid for the test mode (valid at the time, if it is not set, it will be executed according to the parameters set by the program)
25	Manual opening of auxiliary electronic expansion valve in test mode (shield)	Pulse	0-480	150	Only valid for the test mode (valid at the time, if it is not set, it will be executed according to the parameters set by the program)
26	Test mode fan speed (shield)	rpm	0-999	800	Only valid for the test mode (valid at the time, if it is not set, it will be executed according to the parameters set by the program)
27	Cumulative heating time setting value minute	Min	1~120	45	add319
31	reserved	°C			
32	reserved	°C			
33	reserved	°C			

34	reserved	°C			
28	Setting the maximum defrost time for defrosting operation	Min	1~25	10	add335
29	Exit defrost temperature	°C	1~25	12	add336
30	reserved	°C			
35	Maximum heating frequency (Hz)	Hz	30-100	90	Add121
36	Maximum cooling frequency (Hz)	Hz	30-100	90	Add119
37	Minimum heating frequency (Hz)	Hz	30-60	30	Here is the minimum operating frequency in normal heating state (not including protection state and program specific state) add122?
38	Minimum cooling frequency (Hz)	Hz	30-60	30	Here is the minimum operating frequency in normal cooling state (not including protection state and program specific state) add120?
39	Maximum opening of main electronic expansion valve	Pulse	0-480	480	Add475
40	Maximum opening of auxiliary electronic expansion valve Pulse	Pulse	0-480	300	Add607
41	Minimum opening of main electronic expansion valve	Pulse	0-480	88	Add476
42	Minimum opening of auxiliary electronic expansion valve Pulse	Pulse	0-480	80	Add606
43	Ambient temperature of enthalpy increase solenoid valve opening	°C	-21~20	3	When set to -21 degrees, the enthalpy increase function is closed Add620
44	opening frequency of enthalpy increase solenoid valve	Hz	30-100	50	Add622
45	Water pump operating way after reaching temperature	-	0~2	0	-0~2 0 0-continuous operation; 1-Open for 1min and stop for 3min; 2-Reserved;
46	Four-way valve reversal judgment	-	-0: invalid; 1: valid	0: invalid	0: no judgment; 1: judgment
47	Judgment of too small	°C	8-20	15	(*add287)

	cooling water flow				
48	Judgment of too small heating water flow	°C	8-20	15	(*add289)
49	Number of pressure sensors	-	0-2	0	(*add638)
50	reserved				

The above operating parameters have been adjusted to the best state according to the laboratory test results before leaving the factory. If there is no special requirement, please do not adjust the above parameter values to prevent the machine from being unable to operate normally or even being damaged due to parameter changes.

3. Fault Code Table

Number	Type of fault	Description of fault	Fault code of outdoor unit	Fault code on liner controller
1	Low voltage/over voltage protection	The input voltage is too high or too low	P1	P1
2	Overload Current protection	The operating current exceeds the limit value	P2	P2
3	Protection for outdoor fan motor module		P3	P3
4	Compressor exhaust Temperature overheating protection	Compressor exhaust Temperature exceed the protection value	P4	P4
5	Anti-cooling protection at cooling mode	At cooling mode, condenser temperature is lower than setting value	P5	P5
6	Overheating protection at heating mode		P6	P6
7	Outdoor temperature overheating or over cooling protection	1.At cooling mode, outdoor temperature is too low. 2.At heating mode, outdoor temperature is too high.	P7	P7
8	Condenser temperature overheating protection		P8	P8
9	Drive module protection	The compressor drive is abnormal or doesn't start	P9	P9
10	Module protection	Inverter module overheating or current overload protection	P0	P0
11	Failure of Inverter compressor	Inverter compressor is fault or out of step	PA	PA
12	Insufficient refrigerant		PC	PC
13	Communication failure of liner controller	Communication failure between liner controller and controller board	E0	E0

14	Phase sequence protection		E1	E1
15	Failure of Inner condenser temperature sensor		E2	E2
16	Failure of external condenser temperature sensor		E3	E3
17	Failure of high refrigerant pressure sensor		E4	E4
18	Failure of low refrigerant pressure sensor		E5	E5
19	Failure of four way valve		E6	E6
20	Failure of outdoor ambient temperature sensor		E7	E7
21	Failure of compressor exhaust temperature sensor		E8	E8
22	Inverter driver or module failure	3 times occur of drive module protection within 30 minutes	E9	E9
23	Failure of current sensor	System can't get the value of current	EA	EA
24	Communication failure of outdoor units	Communication failure between power supply board and module board	EC	EC
25	EEPROM fault of liner controller	System can't get the value of EEPROM	Ed	Ed
26	Outdoor unit EEPROM fault	System can't get the value of EEPROM	EE	EE
27	Failure of outdoor fan	Outdoor dc fan motor doesn't work or speed is too low	EF	EF
28	Failure of return gas temperature sensor		EH	EH
29	Failure of voltage sensor	System can't get the value of voltage	EU	EU
30	Failure of EVI condenser inlet temperature sensor		F0	F0
31	Failure of EVI condenser outlet temperature sensor		F1	F1
32	High refrigerant pressure protection	System refrigerant pressure is too high	H1	H1
33	Low refrigerant pressure protection	System refrigerant pressure is too low	H2	H2
34	Failure of inlet temperature sensor		d2	d2
35	Failure of outlet temperature sensor		d4	d4
36	Water flow switch protection		d1	d1
37	Inlet and outlet water temperature difference protection	The temperature difference between the inlet and outlet water is too large	d5	d5
38	Winter Anti-freezing 1	Winter (level 1) frost protection	d6	d6
39	Winter Anti-freezing 2	Winter (level 2) frost protection	d7	d7
40	Water temperature over/under protection	Hot water temperature is overheating protection or cooling water temperature	d8	d8

		is over cooling protection			
41	Failure of DC inverter compressor operation		J0	p9	
42	IPM overload current		J1		
43	Compressor drive failure		J2		
44	Compressor overload current		J3		
45	Input voltage phase loss		J4		
46	IPM current failure		J5		
47	Radiator is overheating and shuts down		J6		
48	Pre-charging failed		J7		
49	DC bus overload voltage		J8		
50	DC bus under voltage		J9		
51	AC input under voltage		JA		
52	AC input overload current		JH		
53	Input voltage failure		JC		
54	DSP and PFC communication failure		JL		
55	Detecting temperature of the driver integrated chip sensor failure		JE		
56	DSP and communication board communicated failure		JF		
57	Abnormal communication with main control board		JJ		
58	IPM module overheating and shuts down		JP		
59	Compressor model failure		JU		
60	Floor drying function is switched on		Hd		Hd

VI. Maintenance & Repair

● Daily inspection

1. Check whether the key of the controller is sensitive or a fault code displayed
2. Before power on, please check the temperature parameters, switch status, and load output.
 - A. There shouldn't have a big difference between the temperature displayed and the real ambient temperature.
 - B. It is the normal status that the high-voltage and low-voltage switches are often closed, and the water flow switches are often open.
 - C. Load display off
3. Check whether the voltage is normal before operating.

4. After starting up, check whether the water pressure is normal, listen to whether working with abnormal noise. After running smoothly, please check whether the current is in accordance with the nameplate.
5. Check whether the parameters are within the normal range after running.

- **Maintenance of the main components.**

1. Compressor: open the box, check whether the terminals are fixed tightly without rusty, and check whether the resistance of three-phase winding is the same.
2. Fins: check whether the evaporator fin is blocked, and clean it timely.
3. Heat exchanger: check whether there are scales, and clean the scales timely.
4. The motor has been lubricated and sealed in advance before left the factory, therefore lubrication is not needed during maintenance.
5. After a long time of operation, the heat transfer surface of the waterside heat exchanger will be deposited with calcium oxide and other minerals because of the high-temperature water outlet. If these minerals fouling too much on the heat transfer surface, it will affect heat transfer performance, so please regularly clean it.

- **Maintenance of main electrical parts**

1. Air switch, AC contactor and relay inspection: whether the terminal is tight, rusty and burnt. Close the switch and check whether the input and output of each phase are connected;
2. Whether the AC contactor and relay coil are sensitive and on-off closed completely.
3. Capacitance: check whether it bulges or leaks oil
4. Motherboard: check whether the power light is on, whether the fuse is burnt out, and whether there are black burnt spots on the board.
5. Transformer: check whether the primary voltage and secondary voltage are consistent with the nameplate
6. Periodically inspect the electrical connection and monitor the operating voltage, operating current, and phase balance. Regularly check the reliability of the electrical components, replace the expired and unreliable parts timely.

- **Maintenance of main waterway parts.**

1. Water supply device: check whether the water supply pressure is more than 2kg and the check valve is stuck
2. Filter device: check whether the filter is dirty and blocked, and clean it regularly
3. Exhaust device: check whether it can exhaust normally. If it cannot exhaust normally, remove and clean the inside of filter.
4. Water pump device: check whether it runs smoothly, whether the rotation direction is correct.
5. Descaling for DHW, the closed water pipeline is no need of descaling.
6. To supplement pipes must add Y-filter to prevent blocks of condenser or pipeline; Descaling material can be formic acid, citric acid, and acetic acid, etc. acid or fluoride sanitizers can't be used, because they will corrode waterside heat exchanger (material is stainless steel)

- **Refill refrigerant**

Whether need to refill the refrigerant depend on the value of exhaust/suction pressure. The air-tight test

should be done. In case of leakage or replacements of the components of the circulate system, in accordance with the following two situations to refill the refrigerant.

1. The refrigerant leak completely

If this happens, you must use 40Kgf/cm²r high-pressure nitrogen or a small amount of refrigerant to do leak detection. Before repair welding, the gas in the system must be drained. Before refill the refrigerant, the system must be thoroughly dried and vacuum.

- a、 Connecting the vacuuming pipe to the refrigerant injection needle valve of the low-pressure side. Use a vacuum pump to evacuate the system for more than 15 minutes. Then confirm if the vacuum gauge shows at - 1.0×10⁵Pa (- 76cmHg) .
- b、 After achieving the required vacuum effect, filling the refrigerant to the system with a refrigerant bottle. On the nameplate and main technical parameters, we have marked the suitable refrigerant. Make sure to fill the refrigerant at the low-pressure side of the system.
- c、 The refilling refrigerant quantity subject to the ambient temperature. If you do not meet the required filling quantity and cannot filling longer, you can turn on the machine, then starting filling continuously from the low-pressure side, in the meantime must prevent damage from the liquid refrigerant.

2. Refill the Refrigerant

Connecting the refrigerant bottle at the refrigerant injection needle valve of the low-pressure side and connecting the pressure gauge at the low-pressure side. Then turn on the machine, filling the refrigerant into the system slowly, and inspect the high and low pressure.

▲Warning: When doing leakage hunting and air-tight test, only high-pressure nitrogen and refrigerant is allowed to use. Filling oxygen, acetylene, or other flammable or toxic gases is strictly forbidden.

● System anti-freezing

1. After power failure, the unit will not start automatically, then the antifreeze function cannot be started.
2. If it is not needed in a short time, antifreeze can be added into the water system
3. If the machine is not used for a long time, please drain all the water in the system, and then disconnect power supply (Drain water from the lowest position of water pump and heat exchanger)
4. Know clearly how to choose antifreeze and its volume.

● If the unit has been shut down for a long time, the following preparations should be made when it starts up again.

1. Thoroughly inspect and clean the unit
2. Clean the water pipe system

3. Check water pump, regulating valve and other equipment of water pipe system etc.
4. Check whether all the wire connections are tight and correct.
5. Please power on and preheat machine for more than 12 hours.
6. Do not add water to the system during preheat. After preheat, let the water pump heat up first, and then start to supplement water.

● **Replacement of spare parts.**

If the spare parts are damaged or need to be replaced. Original spare parts should be used. Any other different replacement is not allowed.

Please contact us to buy original parts(out of warranty)

● **System maintenance**

Malfunction analyze and eliminating

Phenomenon	Reason	Check	Clear	
Machine does not work	Power cut/outage	Measure the voltage of circuitry	Wait for power resume	
	The operation panel has display, but machine can not turn on, key failure	Operation panel lines not connected	Check the circuitry	connect
		Operation panel damaged	Substitution method	Replace operation panel
		disturbed	Check the source of interference	Clear the source of interference
			If the line lengthened by the non-shielded cable	Replace the line(use shielded cable)
		Low voltage	Check the circuitry voltage	Replace the line or increase voltage stabilizer
		PCB damaged	Substitution method	Replace PCB
Machine does not work	operation panel no display	Transformer damaged	Measure with multi-meter	Replace transformer
		Operation panel lines not connected well	Check the circuitry	Welding with soldering iron
		Operation panel damaged	Substitution method	Replace operation panel
		PCB damaged	Substitution method	Replace PCB
		disturbed	Check the source of interference	Clear the source of interference
			If the line lengthened by the non-shielded cable	Replace the line(use shielded cable)
Fan does not	Fan blade is stuck	Check the fan blade	Clear foreign body	

	The sub High pressure(fan uninstal) system' pressure over high	sub high pressure switch damaged	Check the sub high pressure	Replace(short it)
		Too much refrigerant	Check the pressure	Discharge some refrigerant
		Water system dirty	Check if filter is installed	Clean water system and install filter
			Check water system	Clean water system
		Lack of water flow	Check filter	Clean filter
		Water pump damaged	Check water pump	Replace water pump
		Water flow of water pump is small	Measure the water flow of water pump	Change a bigger water pump
	Without power supply	Power cut off	Measure the circuitry voltage	Wait for power supply
		Circuit breaker	Check the circuitry	Connect the circuitry
			PCB damaged (no output)	Measure the output voltage
Transformer damaged			Measure the winding and output voltage	Replace transformer
Capacitor damaged		Capability become smaller	Check the capability of the capacitor	Replace the capacitor
		open circuit	Measure with multi-meter	Replace the capacitor
		short circuit	Measure with multi-meter	Replace the capacitor
Motor damaged		Motor winding open circuit	measure the winding	Replace the motor
		Motor winding short circuit	measure the winding	measure the winding
		Motor winding grounding	measure the winding	measure the winding
The compressor does not work		Compressor wiring terminal without power supply(PCB no output)	The machine is power off	Check the operation panel
	Setting temperature is lower than water		Check setting temperature	Reset
	PCB damaged		Substitution method	Replace PCB
	Transformer damaged		Substitution method	Replace transformer
	Power cut		Measure the circuitry voltage	Wait for power supply
Compressor does not work	Capacitor damaged		Check the capability of the capacitor	Replace the capacitor

	External overload protector damaged		Measure protector resistance	Replace
	Built-in protector	Too much refrigerant	Measure pressure, current and water temperature	Discharge some refrigerant
	Built-in protector	Too little refrigerant	Measure pressure, current and water temperature parameter	Refill refrigerant
		The voltage is low	Measure voltage	Change the lines or increase voltage regulator
		Compressor cylinder jammed	Measure pressure, current and water parameter water temperature	Shunt capacitor, fill refrigeration oil
		Compressor oil shortage, noisy, excessive	Listen to the noisy and test the compressor	fill refrigeration oil
Not defrosting	Defrosting temperature sensor reinstall after broken	Short circuit	Test the resistance	Replace sensor
		Open circuit	Test the resistance	Replace sensor
		Resistance variation	Test the resistance	Replace sensor
	Defrosting temperature sensor loose		Check the sensor	refit
	No frost at the installation site of the defrosting temperature sensor		Visual inspection	Adjust the installation site
	Defrosting detection time is too long		Check the defrosting time	Reset the time
	Defrosting condition setting inappropriate		Setting defrosting temperature too high	Adjust the temperature
	Four way valve does not work	Four way valve coil damage	Measure the winding	Replace the coil
		Four way valve stuck	Knock the four way valve	Replace four way valve
	Four way valve blowby	Touch and feel for way valve's temp. Measure current and voltage		Replace four way valve
PCB damaged	Force to defrost, check whether PCB have power output.		Replace PCB	