Installation & Operation Manual

Air Source Heat Pump Water Heater
All-In-One Type

MODEL:

BWHP200R290

BWHP250R290

BWHP300R290

Thank you very much for purchasing our product, please keep this installation manual safely and read this manual carefully before you install the heat pump.

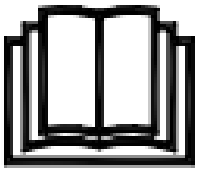
If there are any changes in product upgrades, specifications, or configurations, no further notice will be given. Please refer to the actual nameplate for accuracy.

All the pictures in this manual are for explanation purposes only.

NOTES

Dear customers:

Thank you for selecting our products!



The manual is aimed to let you learn more about installation, operation and maintenance of the heat pump water heater and provides some important safe information for you. It's is required to carefully read the whole contents shown in this manual before you install and use the heat pump, and please keep this installation manual safely for purpose of future reference.

CONTENT

1 Note

1.1 Safety instructions

This part provides quite important safe points for you and please operate it based on safety precautions.

Danger - Any of the following situations must be prohibited, otherwise it may cause serious personal injury and even pose a direct risk of death:

1. **It is strictly prohibited to install the unit without reading the installation & operation manual.**
2. **It is strictly prohibited to touch or modify the components inside the unit without authorization.**
3. **This appliance uses R290 which is colorless, odorless, and flammable, it is prohibited to inject other types of refrigerant .**
4. **It is strictly prohibited to connect the ground wire to neutral wire of the power supply ,gas pipelines, water supply and drainage pipelines, lightning rods, telephone lines, etc.**
5. **It is strictly prohibited to pour water inside the appliance.**
6. **It is strictly prohibited to open the maintenance cover or wire box cover of the appliance without disconnecting the power.**
7. **It is strictly prohibited to install the appliance in areas with high levels of oil mist, flammable gases, salt mist, or toxic gases.**
8. **It is strictly prohibited to dismantle any permanent instructions, labels, or nameplates inside the appliance casing or various panels.**

Warning - All the following situations must be strictly followed, otherwise it may cause personal injury, and even lead to the risk of death or unsafe

1. **Before installation, it should be confirmed that the voltage of the power grid is the same as the voltage required by the appliance, and whether the carrying capacity of the wires and sockets meets the maximum power requirements.**
2. **Do not use insecticide, paint, hair gel or other combustible gases within 1m around the appliance.**
3. **When brazing, ensure that there are no combustible materials around. When using refrigerant, please wear gloves to prevent frostbite.**
4. **Please entrust dealer or professional personnel to install it; Installation personnel must have**

relevant professional knowledge and be able to install on their own. Improper operation can lead to water leakage, fire, electric shock, injury, etc.

5. **Household electric must have a reliable ground connection. When connecting to the power supply, please follow the regulations of the local power company and confirm .**

6. **Ensure that other accessories purchased locally meet the usage requirements of our products.**
7. **The power supply wiring must be equipped with a leakage protector, with a rated current value not lower than the high operating current of the appliance. The grounding must be reliable, kept dry, and prevent leakage. Please make sure to check if the wiring is in good condition. If the contacts are poor, it can cause the equipment to overheat, burn, and even cause personal injury accidents.**
8. **Ensure that the place on which the appliance is placed has sufficient strength, otherwise the machine may fall.**
9. **The installation height of the power socket should not be less than 1.8 meters where water may splash onto walls and ensure that water does not splash onto the socket, and should not be installed in areas where children may reach.**
10. **Please install the appliance in a place that can self drain.**
11. **If the components of appliance are damaged, please perform professional repairs and use the special repair parts provided by the company.**
12. **When abnormal (burning odor) occurs, the manual power switch should be immediately cut off, the operation should be stopped, and the manufacturer's after-sales service department should be contacted. If abnormal work continues, it may cause electric shock.**
13. **If a fire occurs, the power should be cut off immediately.**
14. **Refrigerant leakage can cause difficulty breathing. If you discover a refrigerant leak, immediately turn off the main switch, extinguish any open flames, and contact your dealer.**
15. **This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and**

user maintenance shall not be made by children without supervision.

16. **If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.**
17. **The appliance shall be installed in accordance with national wiring regulations.**
18. **An all-pole disconnection device which has at least 3mm clearances in all poles , and have a leakage current that may exceed 10mA, the residual current device (RCD) having a rated residual operating current not exceeding 30mA, and disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.**

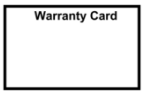
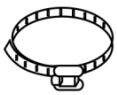
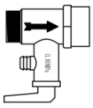
Attention - All the following situations must be followed, otherwise it may be a danger or unsafe situation of personal injury, product damage, and economic damage:

1. **This manual should be considered as a part of the unit, please keep it properly.**
2. **Minors should use this product under the guidance of adults.**
3. **Do not install the unit within 3 meters around the unit with strong electromagnetic radiation.**
4. **The unit should be placed in a firm and flat place without tilting.**
5. **Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.**
6. **The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.)**

1.2 Arrival inspection

After receiving the product, please follow the following steps to inspect the product upon arrival:

1. Check the outer package: Confirm that there is no damage, deformation, moisture or other phenomena on the outer packaging, and that the seal is intact and undamaged. If there are any issues, please do not open the package and contact your local dealer in a timely manner.
2. Check the product: After opening the package, check whether the product is intact and has any obvious physical damage. Also, verify that the product model, color, quantity, etc. are consistent with the order. If there are any issues, please contact your local dealer in a timely manner.
3. Testing product functions: Conduct a simple test on the various functions of the product according to the instructions on the product manual to ensure that the product works properly. If there are any problems, please contact your local dealer in a timely manner.
4. Check accessories: Please confirm that all accessories are complete and free from any missing or damaged items according to the contents listed in the table below. If there are any issues, please contact your local dealer in a timely manner.

NO.	Name	Shape	Quantity
1	Installation & operation manual		1
2	Warranty Card		1
3	Hose Clamp		2
4	Hose		1
5	Drainage joint		1
6	Pressure & Temperature Relief Valve (PTRV)		1

1.3 Disclaimers

1. This product must be powered independently using copper-core power cords with a required wire diameter. The unit requires a reliable grounding wire. The manufacturer is not responsible if the wiring does not meet the requirements and the unit cannot work properly.
2. When cleaning the unit, it is necessary to stop the unit and turn off the power switch; if the unit is powered on for cleaning, resulting in electric shock or personal injury, the manufacturer will not be responsible.
3. In winter or when the ambient temperature is below 2 ℃, if the machine has stopped for a long time without use, please make sure to empty the water pipes and tanks to prevent water from freezing, expanding, damaging the pipes and tanks, and damaging the unit. If the unit is frozen or damaged due to power outage, or if the anti freeze protection of the unit has stopped, the manufacturer will not be responsible.

2 Product information

2.1 Product introduction

The air source heat pump is one of the best equipment to utilize new energy, it is also a new generation of hot water production equipment, following boiler, gas water heater, electric water heater, and solar water heater. Due to the increasingly tight energy supply, and the vigorous promotion of the "carbon reduction" policy，air source heat pump units have quickly been promoted in the market due to their many advantages such as high efficiency, energy conservation, environmental protection, and safety.

All in one heat pump for sanitary hot water :

1. It has complete isolation between water and electricity, without electric shock problem, more safety;
2. No fuel tubes and storage, no potential danger from oil leakage, fire, explosion, and so on;

3. No cross contamination potential, the condenser coil is wrapped around the stainless tank, it is external coil, do not come in contact with water directly, more safety and healthy;
4. The maximum outlet water temperature: 75ºC. The system makes the water is heated stably and quickly with innovative heating methods of combination the electric heating and heat pump heating ;
5. Automatic start-up and shutdown, automatic defrosting by revising refrigerant cycle to save the extra operation;
6. Within the temperature range from -7 ºC to 43 ºC, the unit will not be affected by night, cloudy sky, rain even snow weather;

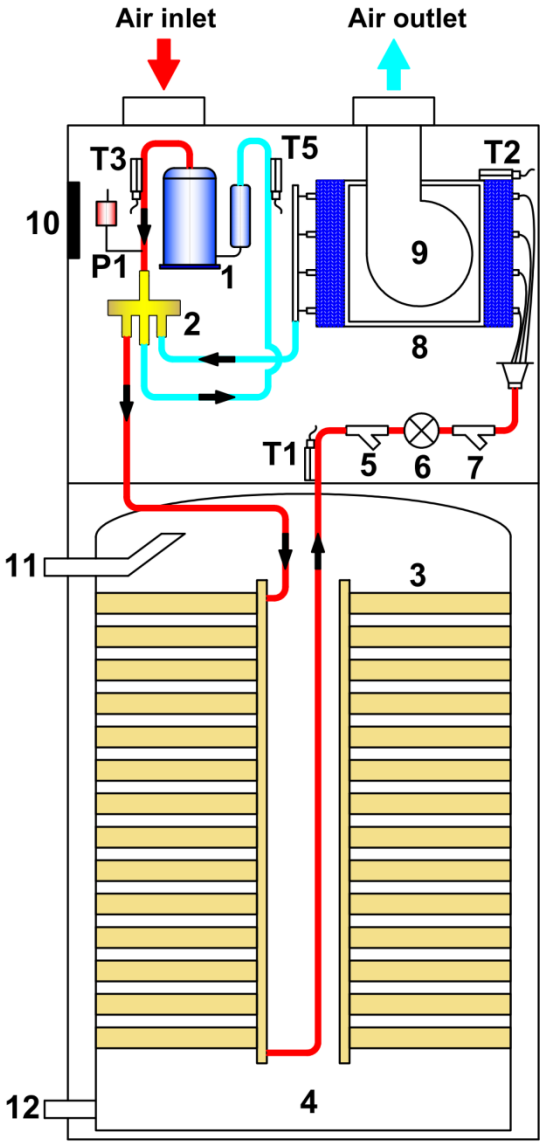
2.2 Operating principle

2.2.1 System composition

Air source heat pump water heater consists of compressor, water tank, evaporator, 4-way valve, heat exchanger micro-channel, EEV and so on.

2.2.2 System principle of air source heat pump water heater

NO.	Name
1	Compressor
2	4-way valve
3	Heat exchanger micro-channel
4	Water tank
5	Filter 1
6	Electronic Expansion Valve
7	Filter 2
8	Evaporator
9	Fan
10	Wire controller
11	Hot water outlet
12	Cold water inlet
T1	Coil temp. sensor
T2	Ambient temp . sensor
T3	Exhaust temp.sensor
T5	Suction temp. sensor
P1	High-pressure sensor

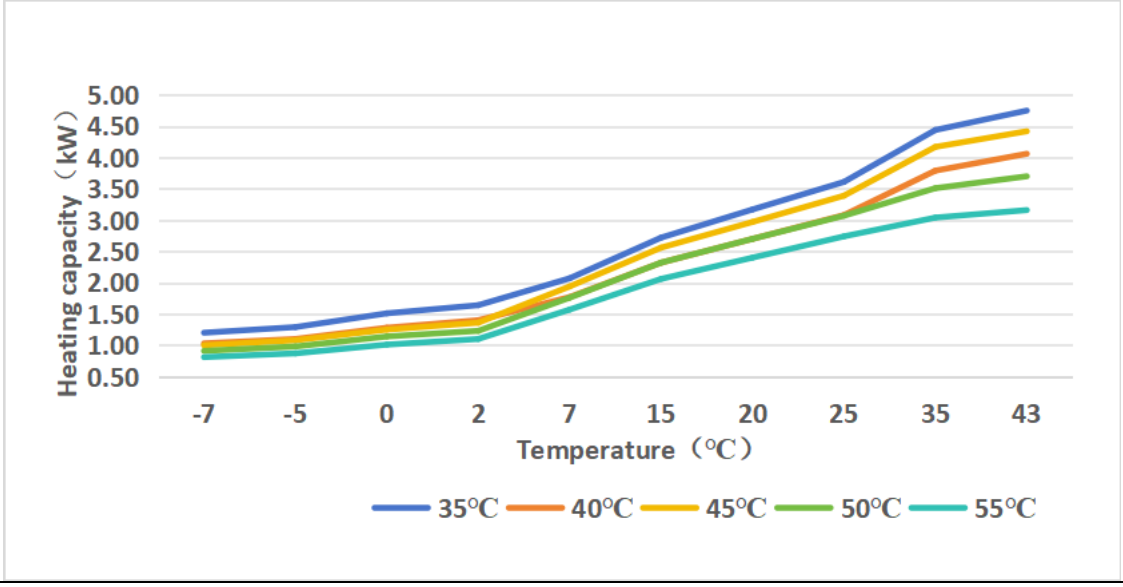


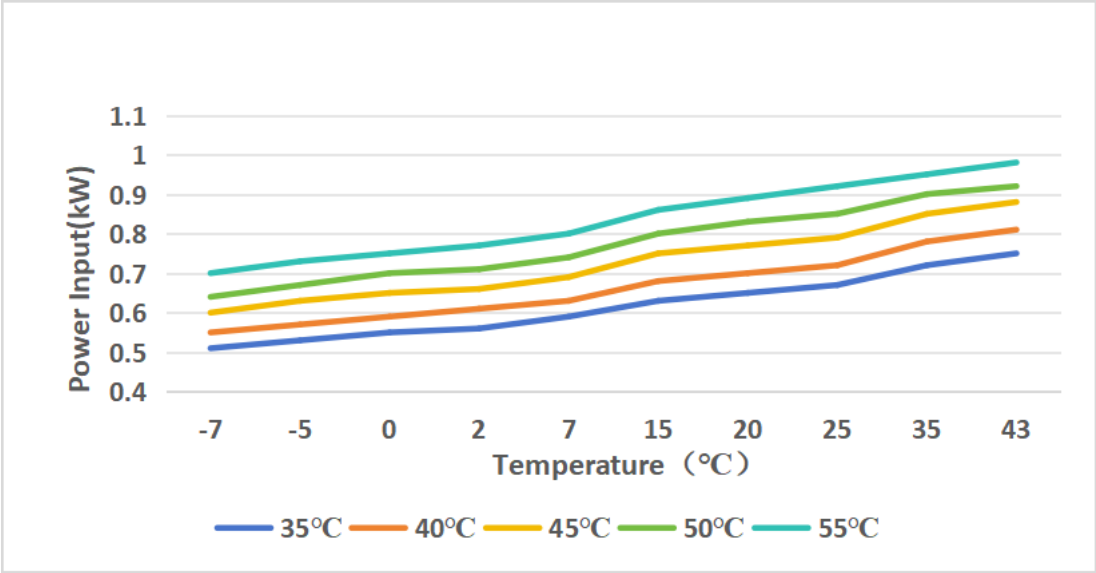
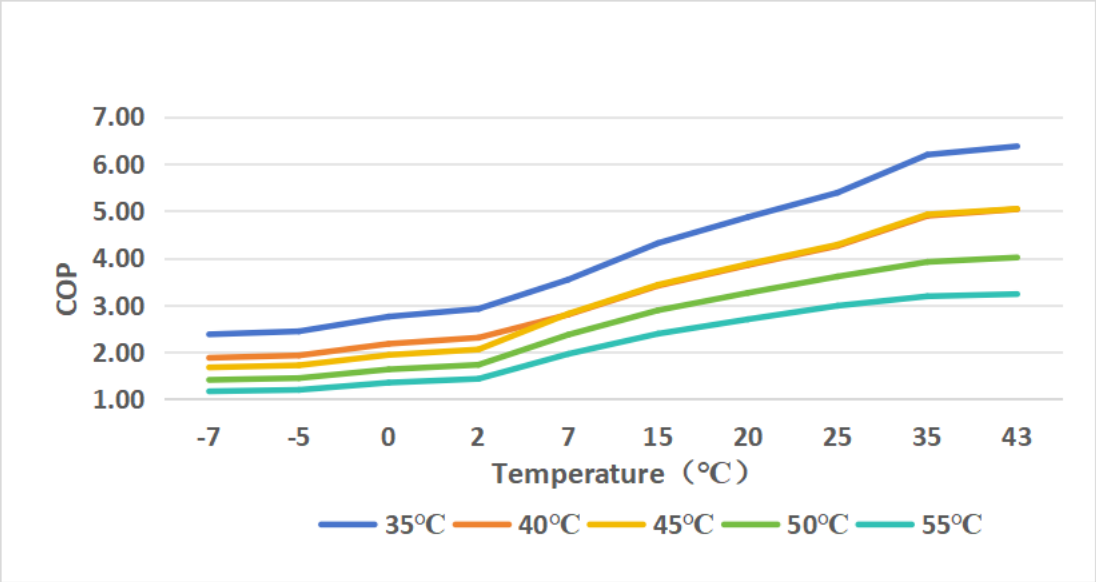
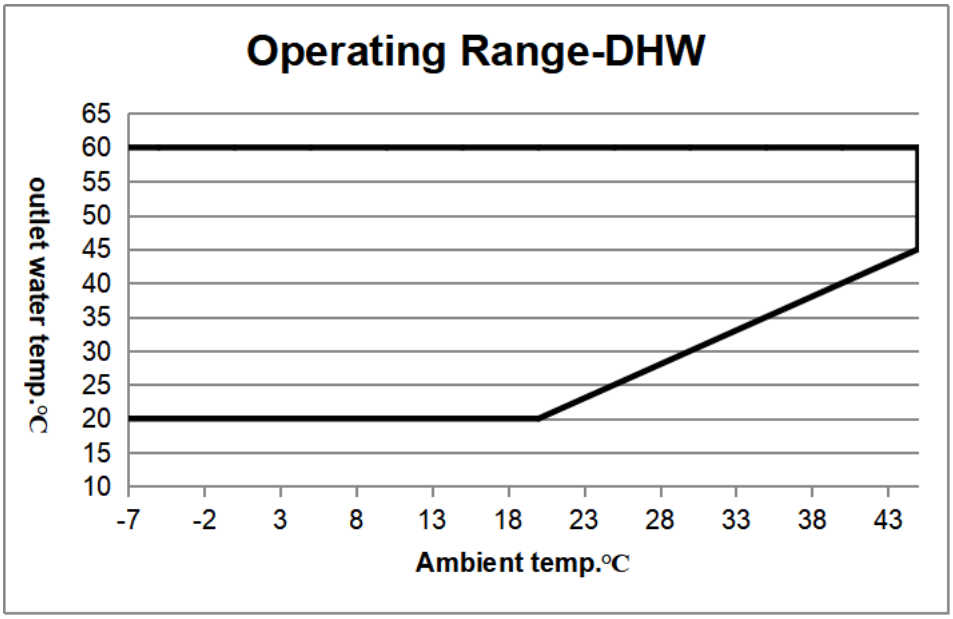
3 Specification and performance

3.1 Specification parameter

Model	BWHP200R290	BWHP250R290	BWHP300R290
Power supply	220V～240V/50HZ		
Rated Heating Capacity(Heat pump)	2.8KW		
Rated Input Power(Heat pump)	0.63KW		
Rated Input Current(Heat pump)	2.8A		
COP	4.45		
Rated Input Power(Resistance)	2.0KW		
Rated Input Current(Resistance)	8.9A		
Max Input Power(HP&Resistance)	3.0KW		
Max Current(HP&Resistance)	13.3A		
Rated Hot Water Production	60L/h		
Water tank volume	200L	250L	300L
COP(A 20/15,W 15-55)	3.67	3.60	3.69
η（EN16147）20/15℃	151.4	148.3	147.6
Refrigerant/charge/GWP	R290 / 400g / 3	R290 / 450g / 3	R290 / 450g / 3
CO_2 Equivalent	0.00135t		
Compressor	Lamda/Rotary		
Expansion valve	EEV		
Fan	Centrifugal		
Ventilation	Vertical discharge		
Heat exchanger	Microchannel /Wrap around tank		
Inner tank material	Enamel		
PTR valve	800KPA		
Rated Outlet Water Temperature	60℃		
Max Outlet Water Temperature	75℃		
Working range with element	-15°C~43℃		
Working range without element	-7°C~43℃		
IP Class	IPX1		
Electric Shock Proof	I		
Unpacked Dimension	Φ620mm*1650mm	Φ620mm*1880mm	Φ620mm*2050mm
Packed Dimension	700*700*1755mm	700*700*1985mm	700*700*2155
Net Weight	95KG	105KG	115
Gross Weight	108KG	118KG	129
Noise	48dBA		

3.2 Performance curve

Ambient Temperature(°C)											
Water Outlet Temperature(°C)		-7	-5	0	2	7	15	20	25	35	43
35	Heating Capacity(kW)	1.20	1.30	1.51	1.64	2.07	2.72	3.17	3.61	4.44	4.75
	Power Input(kW)	0.51	0.53	0.55	0.56	0.59	0.63	0.65	0.67	0.72	0.75
	COP	2.38	2.44	2.75	2.92	3.54	4.31	4.86	5.38	6.19	6.37
40	Heating Capacity(kW)	1.03	1.11	1.29	1.40	1.77	2.33	2.70	3.08	3.79	4.06
	Power Input(kW)	0.55	0.57	0.59	0.61	0.63	0.68	0.70	0.72	0.78	0.81
	COP	1.88	1.93	2.18	2.31	2.80	3.41	3.84	4.26	4.89	5.03
45	Heating Capacity(kW)	1.00	1.08	1.25	1.36	1.94	2.56	2.97	3.39	4.17	4.42
	Power Input(kW)	0.60	0.63	0.65	0.66	0.69	0.75	0.77	0.79	0.85	0.88
	COP	1.68	1.72	1.94	2.06	2.81	3.43	3.87	4.28	4.92	5.04
50	Heating Capacity(kW)	0.91	0.98	1.14	1.24	1.76	2.32	2.70	3.08	3.51	3.70
	Power Input(kW)	0.64	0.67	0.70	0.71	0.74	0.80	0.83	0.85	0.90	0.92
	COP	1.41	1.45	1.63	1.73	2.37	2.89	3.26	3.61	3.91	4.01
55	Heating Capacity(kW)	0.81	0.87	1.01	1.10	1.57	2.06	2.40	2.74	3.04	3.16
	Power Input(kW)	0.69	0.73	0.75	0.77	0.80	0.86	0.89	0.92	0.95	0.98
	COP	1.17	1.20	1.35	1.43	1.96	2.39	2.70	2.98	3.19	3.23
Heating Capacity Curve											

Power Input Curve	
COP Curve	
Operating Range	

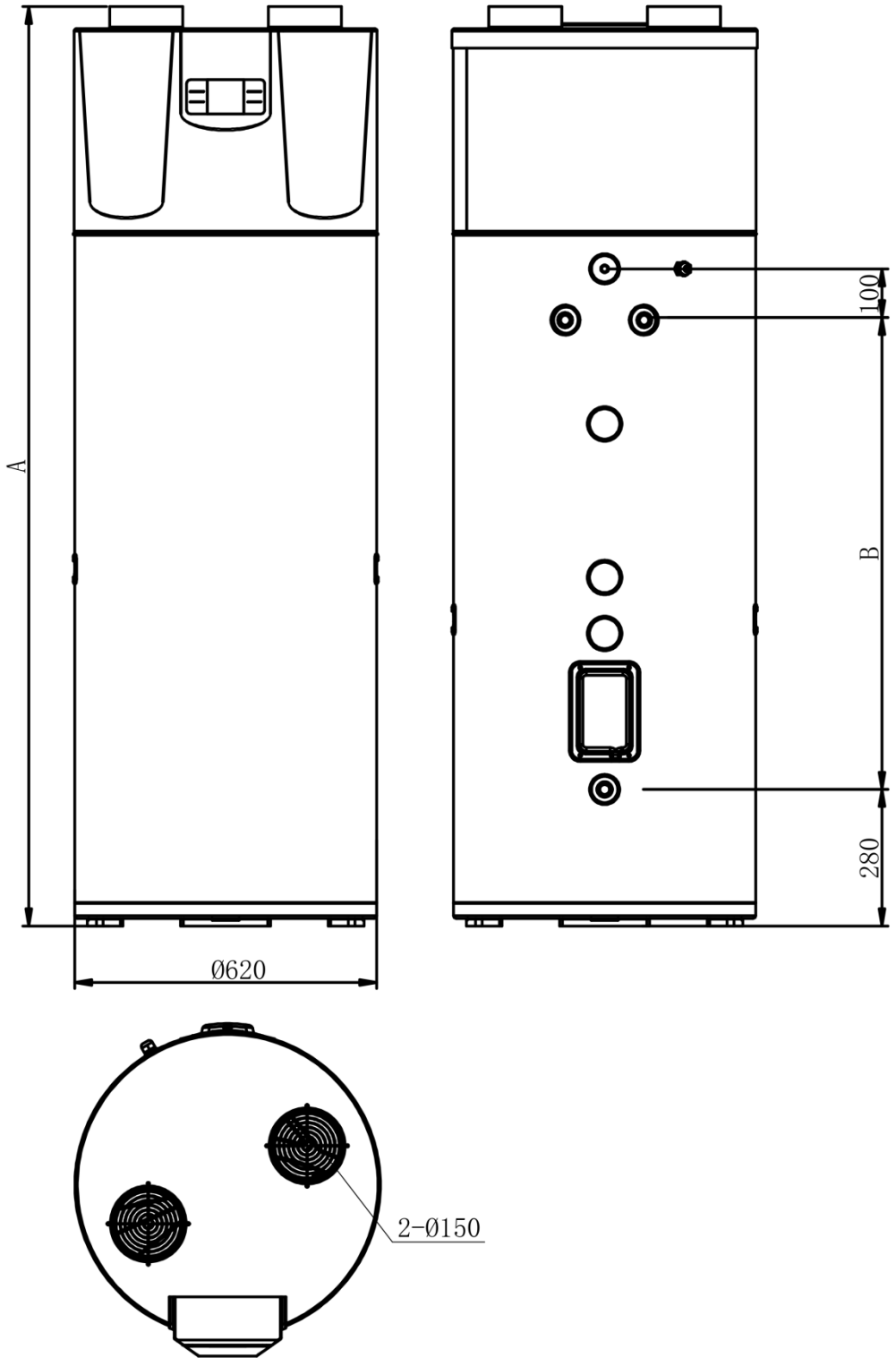
4 General Information

4.1 Appearances

Front view

Back view

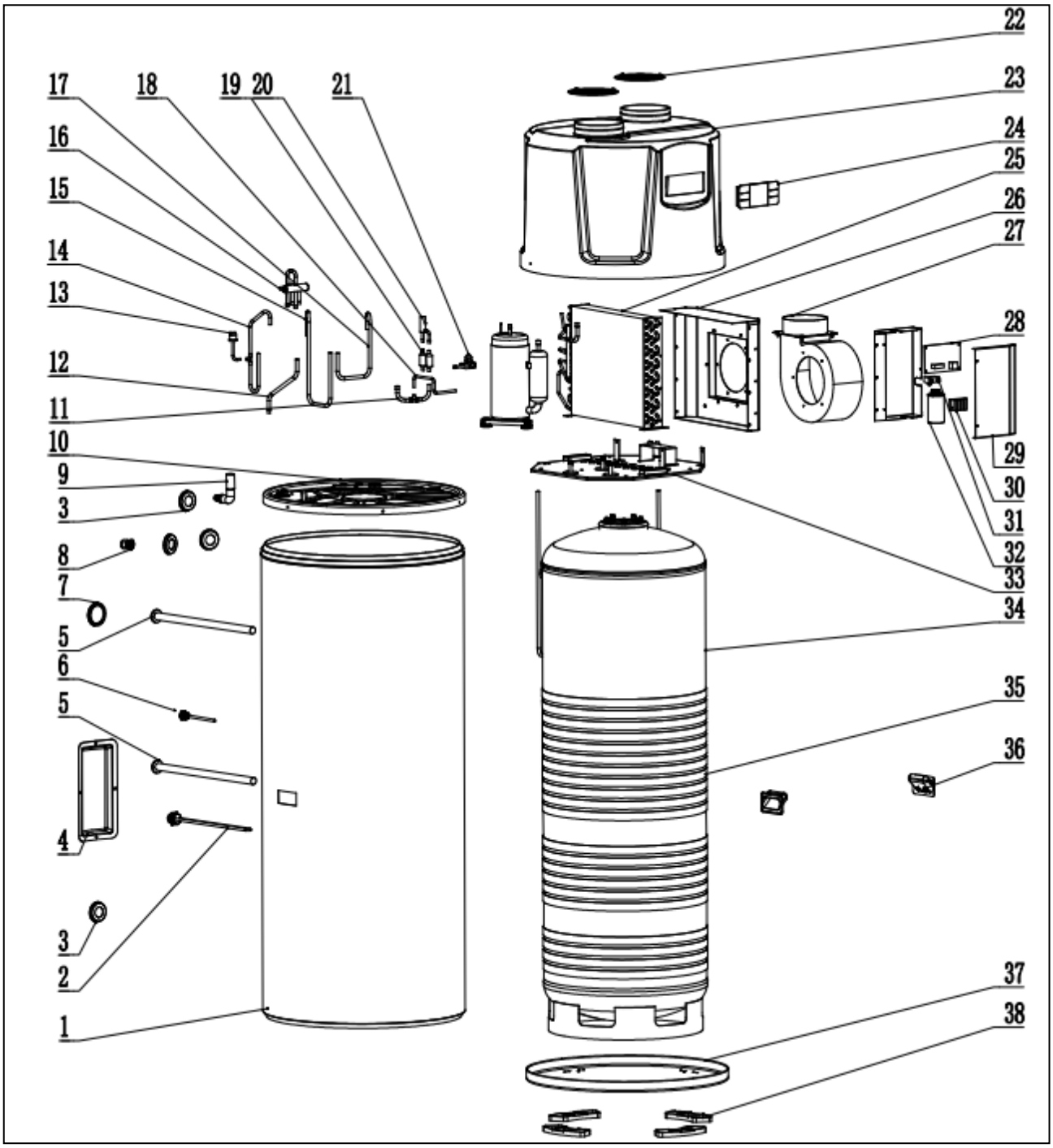
4.2 Dimension



Unit: mm

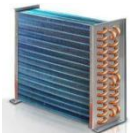
Model	BWHP200R290	BWHP250R290	BWHP300R290
A	1650	1880	2050
B	733	963	1133

4.3 Exploded View



NO.	Name	NO.	Name	NO.	Name
1	Water tank outer sleeve	14	Exhaust pipe	27	Motor
2	Electric heating	15	Muffler	28	Motherboard
3	Trim cover	16	4-way valve	29	Electric control box cover
4	Protection cover for Electric heating	17	E-port pipe of 4-way valve	30	Terminal
5	Magnesium rod	18	Stop valve connection	31	Fan capacitance
6	Temperature sensor	19	Filter	32	Compressor capacitance
7	Trim cover	20	EEV	33	Chassis
8	PG joint	21	Stop valve	34	Water tank liner
9	Condensate water drain pipe	22	Wind net	35	Microchannel
10	Water pan	23	Upper cover	36	Handle
11	Throttling connection	24	Controller	37	Water tank bottom end cover
12	C-port pipe of 4-way valve	25	Evaporator	38	Fixed block
13	High pressure switch	26	Wind outlet component		

4.4 Component name

NO.	Picture	Name	NO.	Picture	Name
1		Compressor	6		Pressure sensor
2		Evaporator	7		Pressure switch
3		EEV	8		Volute fan
4		4-way valve	9		Maintenance valve
5		Solenoid valve			

5 Regular accessory

Before installing the water pipeline of the unit, please purchase the accessory listed in the table below by yourself：

Name	Picture	Type	Function
Stop valve		Diameter according to actual situation	Control water flow on/off
Ball valve		Diameter according to actual situation	Control water flow on/off
Filter		Diameter according to actual situation/40mesh	Filter impurities in water
Check valve		Diameter according to actual situation	Control the direction of water flow
Auto air vent		DN15	Remove gas from The pipeline
Water pipe and connector		-	Composition Of waterway
PTFE tape		-	Increase the sealing at the interface
Power line		See 9.1.1"Power cord specification and model"	Connecting the power supply

6 Installation requirements

6.1 Installation location requirements

Attention-Installation location requirements:

1. **When the appliance is installed on the ground, or other convenient places for installation, ensure that the installation site can withstand the weight of the unit during operation and the sum of the weight of maintenance personnel during unit maintenance，and the site needs to be leveled, so that the appliance can be stable and fixed without tilting.**

2. **If the unit is installed indoors, it may lead to issues such as water overflow, noise, or changes in indoor temperature that could affect comfort. Please make sure appropriate preventive measures are taken beforehand.**

3. **The installation location should be selected with good ventilation and smooth exhaust, do not install the unit in a contaminated or dusty area. If installed indoor, the appliance shall be stored in a well-ventilated room and the area of the room shall be meet the following requirements:**

Model	The Area Of The Room
BWHP200R290	≥253m^2
BWHP250R290/BWHP300R290	≥320m2

4. **Ensure that the installation position of the device is oriented towards the area that is least sensitive to noise. Drainage devices must be installed near the appliance to ensure smooth drainage without accumulated water.**

5. **Do not install the appliance in a location where the wind energy generated by adverse weather conditions can directly blow to the air outlet/inlet .**

6. **Do not site near strong electrical facilities and equipment such as fire sources and power stations; There should be no open flames or high temperature heat source facilities or equipment in the surrounding area.**

7. **The distance between the appliance and the area of petroleum, flammable, explosive, corrosive gases or products, or sulfur-containing compounds shall not be less than 3 meters.**

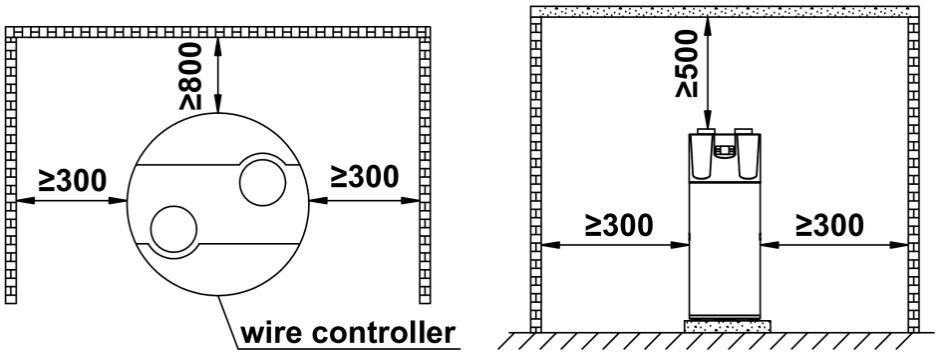
8. **Do not install the appliance near strong electromagnetic radiation .**

9. **Try to keep the appliance out of children's reach as much as possible.**

10. **The most frequently used hot water outlet point and appliance should be placed as close as possible to reduce heat loss.**

6.2 Installation space requirements

When there are obstacles around the appliance, the minimum distance between the appliance and the obstacles is as following

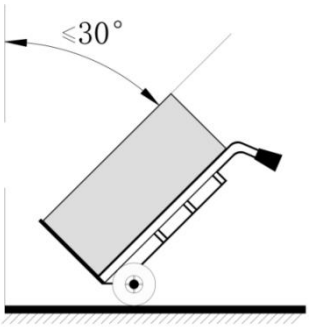


6.3 Transport

Tips: Before transporting, please confirm again whether the model, number, name, color, etc. are consistent with the order. And please have qualified dealers or designated professional technicians responsible for transporting.

*** Before unpacking, the appliance should be transported close to the installation site;**

*** When transporting the appliance, attention should be paid to maintaining verticality , and the inclination should not exceed 30^0, do not store the unit horizontally to prevent damage to compressor and other components;**



*** Prohibit storing any items on the appliance;**

*** Do not hold the air outlet grille on the shell, as it may deform;**

*** Do not let your hands or other objects come into contact with the wind turbine blades.**

*** Do not pierce or burn the appliance.**

*** Transport of equipment containing flammable refrigerants should be compliant with the transport regulations.**

*** Marking of equipment using signs should be compliant with local regulations.**

*** Disposal of equipment using flammable refrigerants should be compliant with national regulations.**

*** The storage of appliance should be in accordance with the manufacturer's instructions.**

*** Storage package protection should be constructed such that mechanical damage to the appliance inside the package will not cause a leak of the refrigerant charge. The maximum number of pieces of appliance permitted to be stored together will be determined by local regulations.**

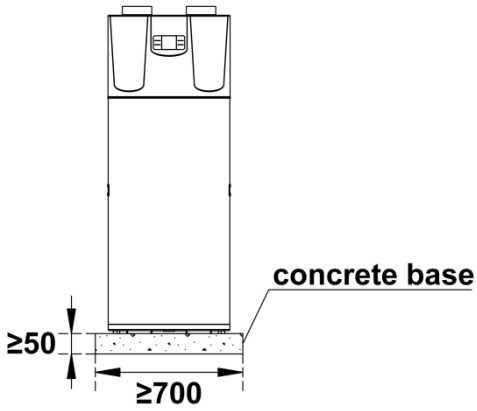
6.4 Installation and fixation

1. The appliance shall not be placed directly on the ground or on the main structure of the building, and additional equipment foundations shall be set up. Equipment foundations are generally divided into steel trough structures or concrete structures.

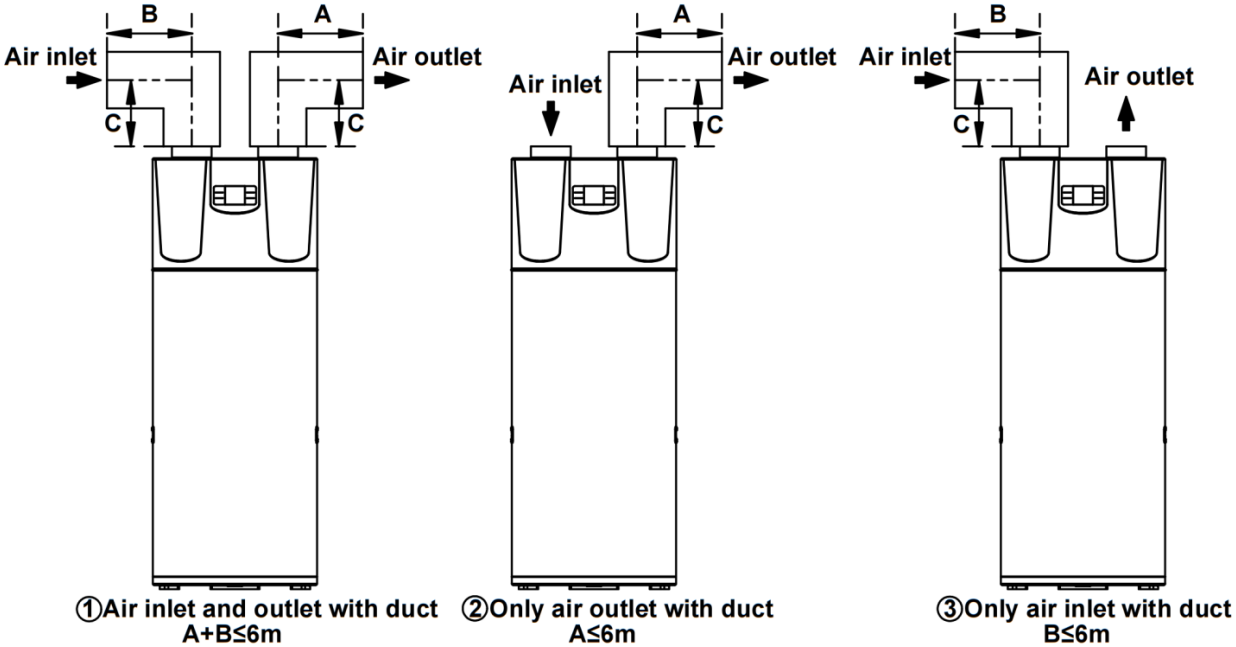
(1) When using channel steel foundation, the design structure should have sufficient stiffness and strength;

(2) When using concrete foundation, the production requirements are as follows:

A concrete base should be at least 50 mm thick and the minimum dimension of the concrete base should be 700 mm x 700 mm. If the rainfall is large, the height of the foundation should be appropriately increased to ensure smooth drainage. Ensure that all four feet are supported on the concrete base being used.



2. If the appliance is installed in the basement, indoor or other airtight spaces, please note exhausting or intake circulation between surrounding air and outdoor air; The air duct total length should be equal or less than 6 meters, and the duct diameter should be equal or more than 150 mm.



(1) Scheme ② It is recommended to install appliance by this way in the winter where there is other heat

source in the room. (**The appliance is installed in room**)

(2) Scheme ③ It is recommended to install appliance by this way in summer that could charge fresh cold air into the room. (**The appliance is installed in room**)

(3) It is recommended installing the appliance by only air outlet with duct (Scheme ②) in summer that could charge fresh cold air into the room. (**The appliance is installed outdoor**);

(4) It is recommended installing the appliance by only air inlet with duct Scheme ③ in winter where there is other heat source in the room. (**The appliance is installed outdoor**);

3. Duct description:

Duct description	**Round duct**	**Rectangle duct**	**Other shaped duct**
Dimension (mm)	Φ150	150×150	Refer to above data
Straight-line pressure drop (Pa/m)	≤2	≤2	
Straight-line length (m)	≤6	≤6	
Bent pressure drop (Pa)	≤2	≤2	
Bent's quantity	≤3	≤3	

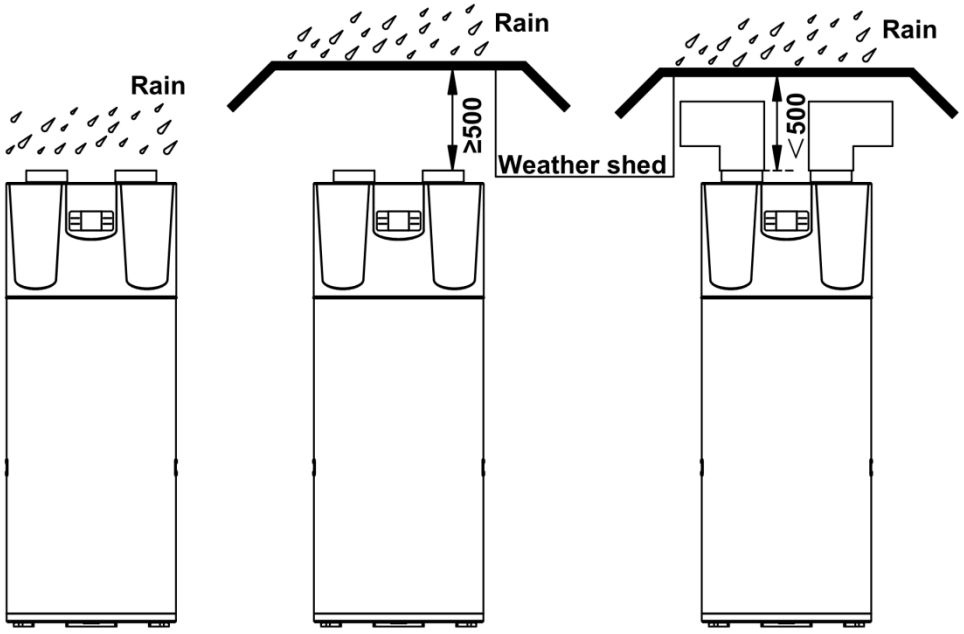
4. The resistance of duct will decrease air-flow-rate, which will lead to capacity of appliance decreased, the duct total length should be no more than 6m or the maximum static pressure should within 20Pa, and the quantity bending should be no more than 3;

5. For appliance air outlet with duct, when appliance operating, condensate will be generated around outside of duct, please pay attention to the drainage work, we suggest to wrap the thermal insulated layer around outside if the duct;

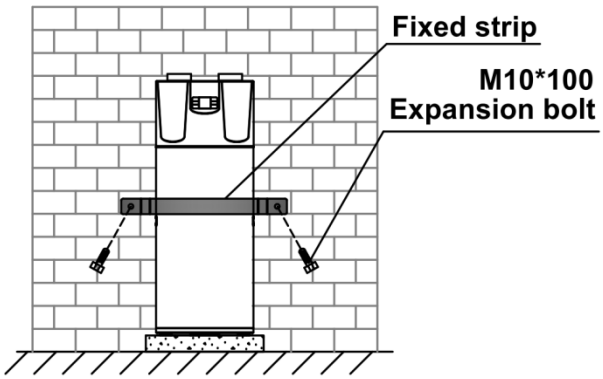
6. It is recommended to install the appliance in the indoor space. It is not allowed to install the unit at outdoor or exposed to rain;

7. In terms of the main unit connect with canvas reaching to outdoor, a reliable water-resistant measure must be conduct on the duct, resist water drop into internal of the main appliance;

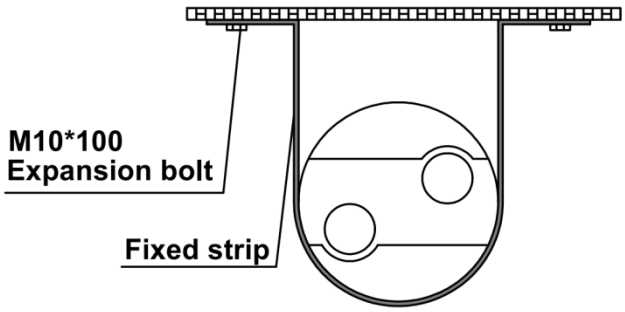
8. Filter should be installed at the appliance inlet, if the air inlet is not connected with duct. In terms of the appliance with duct, filter should be put on the position of duct inlet.



9. Fix the appliance as follows:



Front view



Top view

In the region which the temperature is below 0^0C,the heat pump must be installed indoor or other positions where it will not be frozen for purposes of protecting connection pipe.

If used for those regions which the temperature is below 0^0C,suitable measures must be taken to protect pipes if the heat pump is installed outdoors.

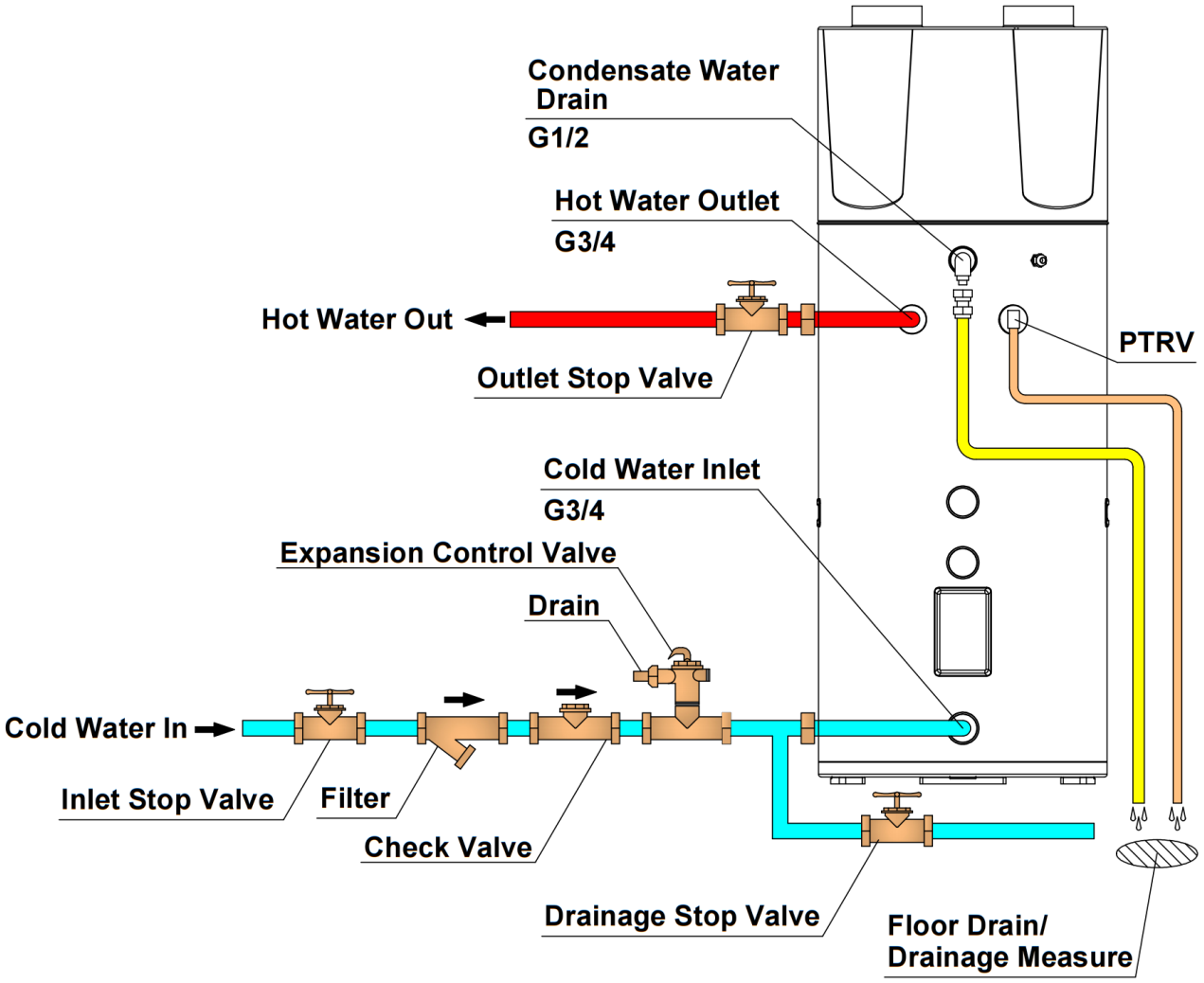
Installation location that experiences high temperature or long-term exposure is prohibited, as it may decrease lifetime of the product.

7 Installation of water pipe

7.1 Selection of water pipe material

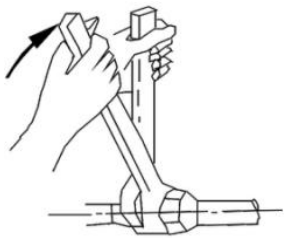
It is recommended to use PPR, which should be heat-resistant and have a pressure bearing capacity that meets local technical requirements. The size of the inlet and outlet interfaces of this unit is G3/4, internal thread.

7.2 Installation of water pipes



Attention- When Water inlet pressure is below 0.15MPa, a booster pump needed to be installed to connect with inlet water pipe for purpose of obtaining larger water capacity; When inlet pressure is greater 0.50MPa, the relief valve needed to be installed to connect with inlet water pipe for purpose of keeping your water tank into a long-term working state.

1. When connecting the inlet and outlet pipes, use two pipe wrench to adjust the pipes to ensure that they are not twisted.



2. The system transmission and distribution pipelines and component connections should comply with the following regulations:
   1）The bending radius of plastic pipes should not be less than 8 times the outer diameter of the pipeline, and the bending radius of composite pipes should not be less than 5 times the outer diameter of the pipeline;
   2）The slope of pipeline laying should be 3 ‰,. Equipment or valve with exhaust function should be installed at the highest point.
3. The connection between pipelines, equipment, and valves should comply with the following regulations:
   1) The connectors should use specialized connectors that are suitable for the pipes;
   2) When using plastic pipe hot melt connection, the working temperature of the hot melt connection should meet the technical requirements of the pipe material;
   3) The outer surface of the hot melt connection socket and the inner surface of the socket should be scraped with a small diameter of 0.2mm. The oxygen blocking layer of the oxygen blocking pipe must be scraped during hot melt connection;
   4) The allowable error in concentricity after hot melt connection should be 2%, and the misalignment at the interface should be less than 10% of the wall thickness;
   5) The hot melt device should use a digital temperature dial, and the temperature should be executed according to the regulations of the pipe manufacturer;
   6) Insulation measures should be taken between plastic pipes and composite pipes and metal supports and hangers, and direct contact should not be allowed. Non metal pads or sleeves should be added between pipes and supports, and the spacing between supports and hangers should meet the design requirements. When there are no requirements, the maximum spacing between plastic pipes and composite pipe supports should comply with the provisions of table:

Diameter(mm)	20	25	32	40	50
Horizontal maximum spacing(mm)	300	350	400	500	600
Vertical maximum spacing(mm)	900	1000	1100	1300	1600

   7) The connection between system pipelines, valves, and metal connectors should be of the clamp type, sliding type, or sleeve type.
4. During the installation process of all winter engineering projects, it is strictly prohibited to inject water into the system before the unit has no normal anti freezing protection ability to prevent freezing and damage to water pipelines and end equipment. The residual water in the pipelines and equipment during the hydrostatic test must be blown clean with compressed air.
5. The system drain valve should be installed at the lowest point of the system pipeline. In cold regions, it is advisable to consider automatic drainage function. When the main engine is powered off, it can automatically empty the water in the system to prevent the system pipeline from freezing and cracking.

6. The system shall be installed with automatic water refill valve, and the highest point shall be installed with automatic exhaust valve.
7. To conveniently maintain the unit, the outlet pipe of the unit needs to be installed with a pressure gauge.
8. Connect the drainage hose to the unit drainage outlet, and connect the end of the drainage hose to the floor drain or a drainable place.
9. The water quality flowing into the hot and cold water system must meet the following requirements. If it cannot meet the requirements, softening treatment is required:

Type	Unit	Standard	Type	Unit	Standard
PH（25^{0}C）	/	7.5~8.0	Dissolved oxygen	mg/L	0
Turbidity	NTU	≤3	Organic phosphorus	mg/L	0
Conductivity（25^{0}C）	μS/cm	≤200	Sulfate	mg/L	≤50
Chloride ions	mg/L	≤50	Acid consumption	mg/L	≤50
Iron ions	mg/L	≤0.3	Sulfide ions	mg/L	0
Calcium hardness	mg/L	≤80	Ammonium ions	mg/L	0
Total alkalinity	mg/L	≤200	Silica	mg/L	≤30

7.3 Insulation of water pipe

1. The transmission and distribution pipelines should adopt insulation measures and comply with the following regulations:
   1) The material and thickness of the insulation layer should be executed according to the construction drawings;
   2) When using non closed cell materials, a protective layer should be placed on the outer surface;
   3) Measures should be taken to prevent "hot bridges" or "cold bridges" at the locations where pipelines pass through walls or floors；
   4) If not specified in the drawings, the minimum insulation layer thickness for pipe and equipment can be selected according to the table.

Heat-insulating material		Flexible foam rubber		
Indoor	Diameter	≤DN20	DN25~DN40	≤DN50
	The minimum insulation layer thickness for pipe(mm)	25	28	32

2.Insulation materials and their products should provide product quality inspection reports and factory certificates, and their specifications, performance, and other technical indicators should comply with relevant technical standards and design documents.

7.4 Pressure testing, anti-corrosion and flushing

7.4.1 Pressure testing

System water pressure test: After the system installation is completed, a water pressure test should be conducted before the pipeline insulation.

1. Before the experiment, the pipeline should be fixed, the joints should be exposed, and water distribution equipment should not be connected;
2. The pressure gauge is installed at the lowest point of the test pipe section, with a pressure

accuracy of 0.01Mpa;

3. Slowly fill the pipeline with water from the lowest point of the pipe section, fully eliminate the air inside the pipeline, and conduct a water tightness test;
4. It is recommended to use a manual pump for pressure increase. The pressure increase time should not be less than 10 minutes;
5. The pressure test should meet the following requirements:
   (1) Steam and hot water heating systems should be subjected to a water pressure test at the top of the system working pressure plus 0.1MPa, and the test pressure at the top of the system should not be less than 0.3MPa;
   (2) High temperature hot water heating system, the test pressure should be the working pressure at the top of the system plus 0.4MPa;
   (3) The heating system using plastic pipes and composite pipes should undergo a water pressure test at the working pressure of the system vertex plus 0.2 MPa, and the test pressure at the system vertex should not be less than 0.4 MPa.
6. Inspection method:
   (1) The heating system using steel pipes and composite pipes should have a pressure drop of no more than 0.02MPa within 10 minutes under the test pressure. After the pressure drops to the working pressure, it should be checked and there should be no seepage or leakage;
   (2) The heating system using plastic pipes should have a pressure drop of no more than 0.05MPa within 1 hour under the test pressure, then reduce the pressure to 1.15 times the working pressure, stabilize for 2 hours, and the pressure drop should not exceed 0.03MPa. At the same time, there should be no seepage or leakage at all connections;
   (3) Allow additional pressures twice in 30mins to increase to the test pressure.

7.4.2 Anti-corrosion

After the system pressure test is qualified, remove the rust on the surface of the pipeline, and apply two coats of red lead anti rust paint to the pipeline, its welding points, and all supports and hangers.

7.4.3 Flushing

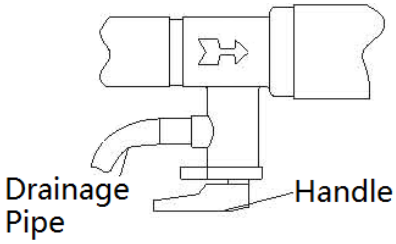
After the pressure test is qualified, the system should be flushed and the filter and dirt remover should be cleaned until the discharged water is free of impurities such as sediment and iron filings, and the water color is not turbid, which is considered qualified.

7.5 PTR valve

After installation, make sure that the drainage pipe which connects with the relief valve, is not blocked;

The relief valve needs to be pulled one time every six months for purpose of taking calcium carbonate out and ensuring no obstacle, outlet temperature of drainage port may be high, please be careful;

Drainage pipe must take measures to keep temperature to prevent the pipe from freezing to cause an accident. The relief valve must be installed so that the drain line is facing downwards at all times with the discharge point remaining open to the atmosphere.



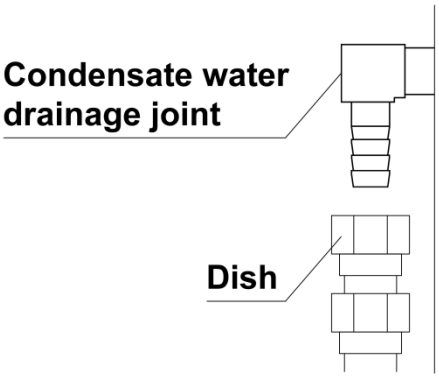
Danger

- **Do not hold down the handle of safety valve;**
- **Do not knock down safety valve;**
- **Do not plug the drainage port;**
- **Excretion pipe must be connected with a open drainage port.**

Explosion Danger

7.6 Condensate Water Drain

1. The process of heat extraction from the atmosphere through evaporator coils results in the production of water in the form of condensation. More humid environments will produce higher rates of condensation.
2. To collect this water by-product a Condensate Tray is located on top of the water storage tank. Overflow from this tray runs out through the Condensate Drain.
3. The system comes with a pre-installed condensate drain connection joint. Drainage of condensate from joint to nearest storm water to be done by the collection into an open dish and drained via copper piping.
4. If not drained properly, the condensate line will attract termites as well produce algae and moss growth.
5. The Condensate line should be free of kinks and as and as the water is gravity fed, should only be running down to ensure the free flow of water.



Attention- A PVC tube is supplied which can be used to bridge the air gap between the condensate elbow and dishes. The PVC tube can also be used to drain condensate directly from condensate elbow to a storm water drainage point, if copper drainage is not required by local council regulations.

Warning：Connecting any pressurised line to the condensate without a gap will void warranties.

8 Installation of electrical

Attention:

1. The appliance should use a dedicated power supply, and the power supply voltage should meet the rated requirements.

2. The power supply circuit of the appliance must have a ground wire, and the ground wire must be reliably connected to the external ground wire, and the external ground wire is effective.

3. The wiring construction must be carried out by professional installers according to the diagram.

4. According to the requirements of relevant national electrical equipment technical standards, install leakage protection devices

5. The arrangement of power and signal lines should be neatly and reasonably arranged, not interfering with each other. The minimum distance should be maintained, and the distance between each other should exceed 25 millimeters. At the same time, do not come into contact with the connecting pipe and valve body

6. Use outdoor appliance leakage protector. It is not allowed to connect two wires. The signal line must use shielded wire.

7. If power cord is damaged, in order to avoid danger, it must be replaced by professionals from the manufacturer, its maintenance department, or similar departments.

8. Some of the connecting wires inside the appliance have been installed in the factory. User only need to connect the power line and the signal line. At the same time, check whether the connected wires are connected correctly and are not damaged or detached.

9. After all wiring construction is completed, the power can only be connected after careful inspection without any errors.

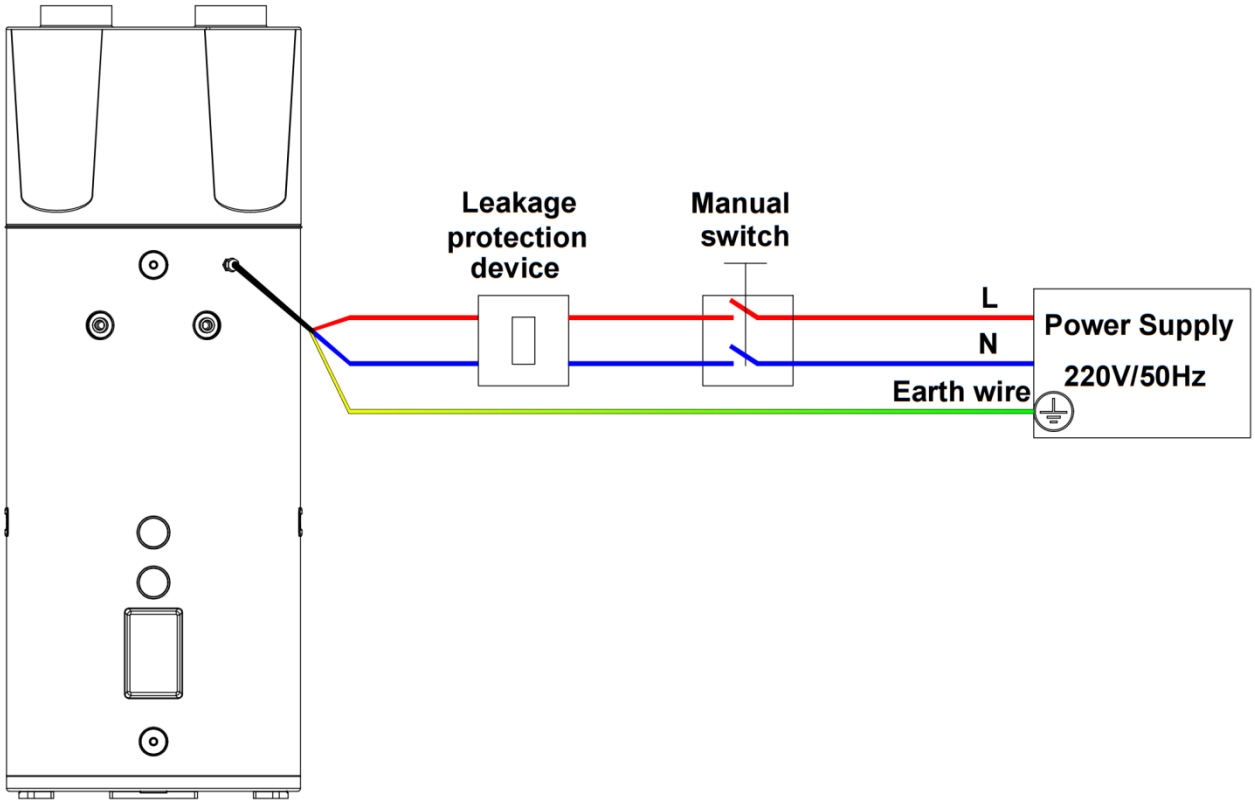
10 In areas where water may splash onto walls, the installation height of the power socket should not be less than 1.8 meters, and ensure that water does not splash onto the socket, and should not be installed in areas where children may reach.

8.1 Connection of power cord and signal line

8.1.1 Specifications of power cord

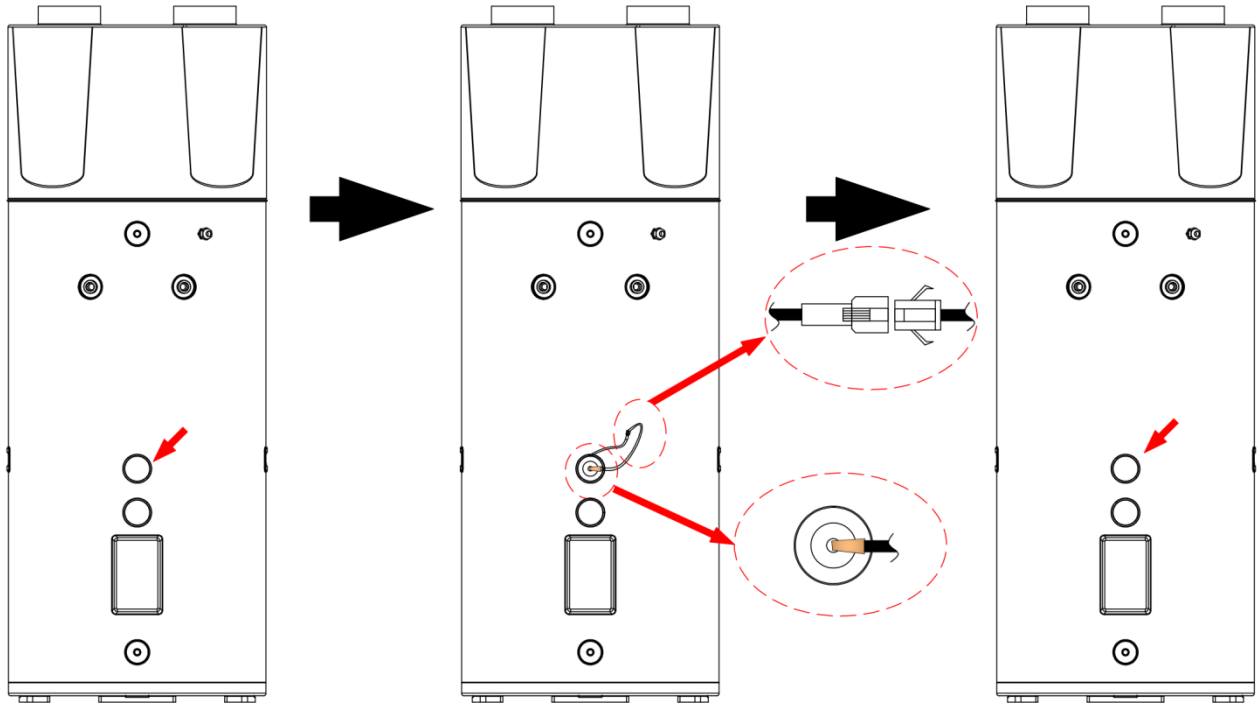
Item / Model	Power supply	Minimum wire diameter (mm2)			Manual switch(A)		Leakage protection device	Circuit breaker
		Size(continuous length ≤30m)		Ground wire	Capacity	Fuse		Rated current
BWHP200R290	220V/50 Hz	14AWG	2.5	≥ϕ1.0mm	≥20	20	Below 30mA 0.1sec	≥20A
BWHP250R290								
BWHP300R290								

8.1.2 Power cord wiring diagram



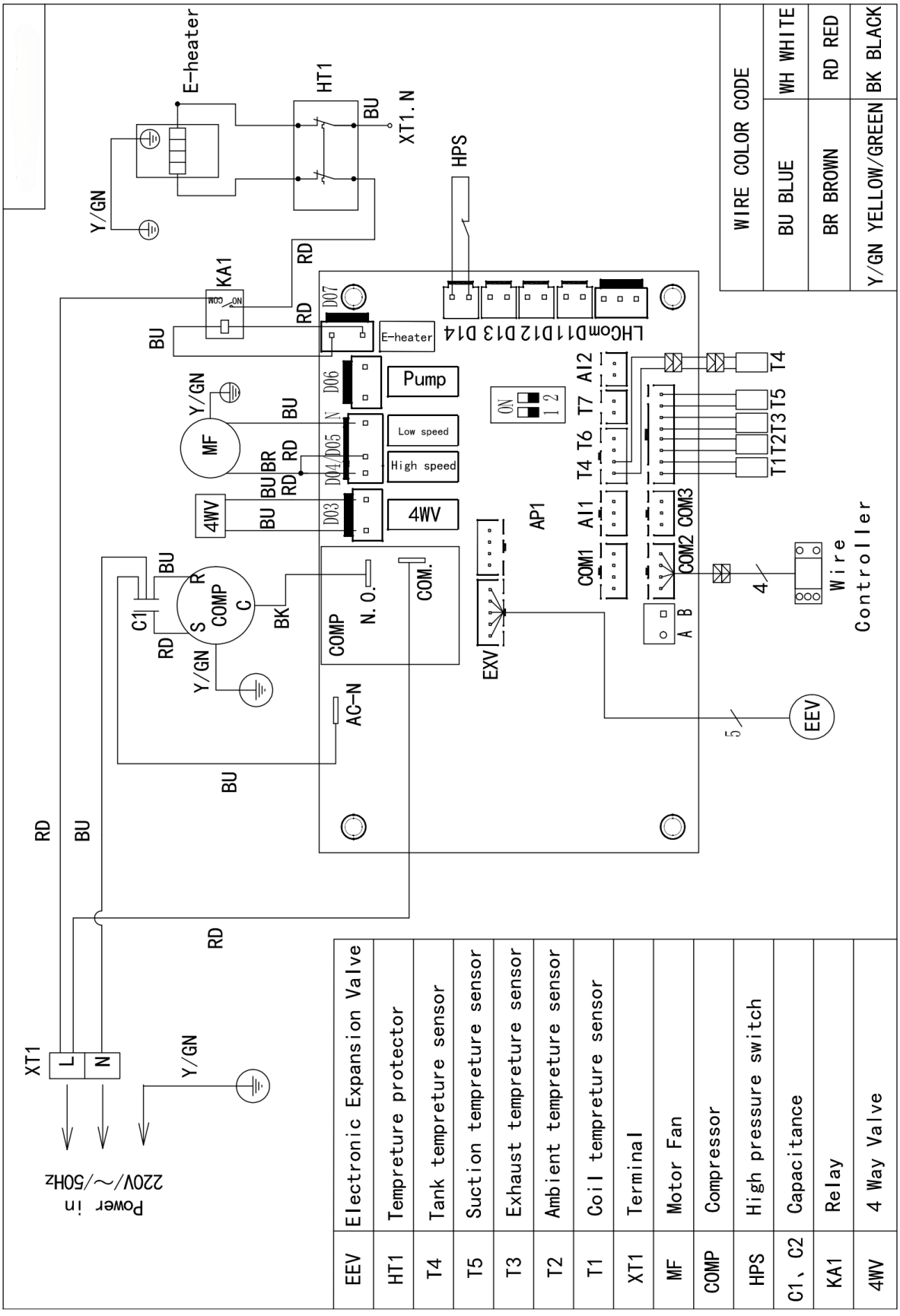
Warning：The power supply must have a leakage protection device installed according to the above diagram for your safety. The equipment cannot be used unless you have confirmed grounding wire is reliably connected.

8.1.3 Signal line wiring diagram



1. Remove the trim cover for temperature sensor sleeve.
2. Pull out the built-in signal line and connect it to the signal line of temperature sensor in the attachment.
3. Insert the temperature sensor to the temperature sensor sleeve.
4. Organize the signal lines, then cover the trim cover.

8.2 Electrical wiring schematic



9 Wire controller

Features

1) Operating condition

● Voltage:220V~±10%,50Hz±1Hz.

● Ambient temperature: -7~+43°C

● Storage temperature: -20~+70°C

● Relative humidity: 0~95%RH

● Temperature accuracy: ±1°C

2) Main function

● Display the water temperature and setting temperature, and also can query the coil temperature, ambient temperature and exhaust temperature and so on.

● Power cut memory function.

● When power is cut, the clock will still work.

● Timing on/off.

● Automatic defrosting.

● Touch screen

● The error code display and query

● Anti-freezing function

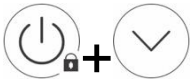
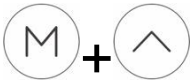
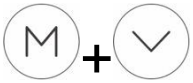
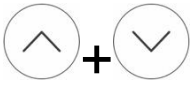
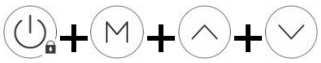
9.1 Controller Instruction

Symbol	Status	Meaning
	Not bright	Heat pump OFF or not in heating mode
	Light up	In heating mode
	Light up	Heating element ON
	Flash for 1s	Run in Boost mode
	Flash for 2s	Run in sterilization mode
	Flash	WIFI distribution network
	Light up	WIFI connect successfully
	Light up	Water temperature
	Light up	Setting temperature
	Light up	degree centigrade
	Light up	degree Fahrenheit (reserved)
	Light up	Percent(reserved)
	Light up	Low/middle/high water level(reserved)
	Flash	Heat pump OFF and refrigerant recovery mode
	Light up	In defrosting mode
	Light up	Maintenance mode
	Light up	There is an error
	Light up	Lock screen
	Light up	Compressor running
	Light up	High fan speed

	Light up	Low fan speed
	Flash for 1s	Ventilation mode: high fan speed
	Flash for 2s	Ventilation mode: low fan speed
	Display	Error code display
	Light up	Timer ON
	Display	In timing ON period
	Flash	Setting timing ON
	Display	In timing OFF period
	Flash	Setting timing OFF
	Light up/Not bright	Timer number 1/2/3
	Display	Week

9.2 Instruction of the buttons

Name	Symbol	Function
On/off key		1.On/off key (hold for 1 second) 2.Return/Escape key 3.Unlock key (hold for 3 seconds)
Clock key		1.Setting the clock, press the key will enter into clock setting interface, and then press one time to switch the hour and minute area 2.Setting the timer (press the key and hold for 3s) 3.During timer setting, press the key and hold for 3s, cancel the current timer setting 4.During clock setting, press the key and hold for 3s, enable or disable the week function
Mode key		1.Press the key and hold for 5s, enter into parameter setting interface 2.Press the key to change operation mode 3.In parameter query interface, press the key enter into value setting or save the setting

Up key		1.Press the key to change temperature setting value or parameter value or change hour and minute value 2.Press the key and hold for 3s to query the system status/ parameter 3.Page up
Down key		1.Press the key to change temperature setting value or parameter value or change hour and minute value 2.Press the key and hold for 3s to query the system status/ parameter 3.Page down
Combination key		Press and hold the two keys for 5s, enter into manual intelligent distribution network connection by manual
		Press and hold the two keys for 5s, enter into manual AP distribution network connection
		When heat pump running in heating mode, press the two keys and hold for 3s, turn ON/OFF Boost mode (turn ON/OFF heating element)
		When heat pump run, press the two keys and hold for 5s, start/exit defrosting mode
		When power on the heat pump, press the two keys and hold for 5s, enter into Ventilation mode, run in high speed, press the two keys for 3s, run in low speed, press the two keys for 3s again, exit Ventilation mode
		Press the three keys and hold for 5s, turn ON/OFF sterilization mode
		Power on within 5 minutes and don’t turn on the heat pump, press the four keys and hold for 5s, restore the factory setting

9.3 Operation Instruction

1) Lock and unlock:

When the controller is in the normal display mode and there is no button operation for more than 60 seconds it will get automatically locked. Press "  " for 3 seconds to unlock, it will beep.

2) Turn ON/OFF the heat pump:

When the controller is in the normal display mode, press "  " for more than 1 second to switch the controller to the power ON or OFF mode.

3) Mode setting:

When the controller is in normal display mode, press "  " to show the existing operation mode, it will display constantly for 8 seconds, before it disappear, press "  " again to switch between different operating modes;

In STAN mode, the controller will display "  ", the temperature ranges from 15℃~60℃，restart temperature difference is 5°C.When the ambient temperature is less than 7℃, start the electric heating to heat to the set temperature.

When the ambient temperature reaches or exceeds 9°C, turn off the electric heater.

In HYB1 mode，, the controller will display "  ", in this mode, heat pump and electric heating run until the water temperature reach at 60°C, when water temperature up to 60°C, heat pump will stop running, electric heating go on heating until the water temperature up to the setting temperature (if the set value more than 60°C). In this mode, water temperature setting range is 15°C-75°C, the restart temperature difference is 5°C(For the maximum operating temperature of the heat pump is 60℃)

In ELE mode，the controller will display"  "，the temperature range to 15~75℃，only electric heating works.

4) Water temperature set

Unlock the controller, in the main interface, press "  " or "  " to increase or decrease the water temperature setting value，Setting Range 15℃~75℃.

5) Clock settings:

In the main interface, click "  " to enter the clock setting interface;

During clock setting, when hour part flash, press and hold "  " for 3 seconds, enable / disable the week function. If enable the week function, it will shows weekday(Monday: 1, Tuesday: 2...Sunday: 7).

If enabled the week function, then in the real-time clock setting interface, press "  ", the weekday part of the number flashes first, press "  " or "  ", you can set the weekday of the clock; if

disabled the week function, press "  ", will set the hours first. the hour part of the number flashes, press "  " or "  ", you can set the hour of the clock;

when the hour part is set, press "  " again, the number of minutes will flash, press "  " or "  " to set the minutes of the clock;

After the minutes part is set, press "  " again to confirm the real-time clock setting and return to the main interface;

In the real-time clock setting interface, if there is no button operation for 60 seconds, the

current clock setting value will be confirmed and return to the main interface;

In the clock setting interface, press "  " to confirm the clock setting value and return to the main interface.

6) Work time settings

Press and hold the "  " button for 3 seconds in the main interface to enable or disable the timer working mode. Then press "  " or "  " to chose the timer No. 1 or No.2 or No.3 period.

When the timer No. 1 period is selected, the symbol flashes, press and release "  " to switch the hour of the start time(ON), the hour part of the number flashes, press "  " or "  ", you can set the hour. When the hour part is set, press "  " again, the number of minutes will flash, press "  " or "  " to set the minutes. After the minutes part is set, press "  " again set the hour of the end time(OFF), the hour part of the number flashes, press "  " or "  ", you can set the hour. When the hour part is set, press "  " again, the number of minutes will flash, press "  " or "  " to set the minutes.

After the minutes part is set, press "  "again to confirm the setting and then switch to next period (No. 2 or No. 3) timer working set, the setting method is the same as above.

If the start time of a certain working period is greater than the end time, the end time is considered to be of the next day.

When all time periods are canceled, it is considered to be in working hours throughout the day.

When the start time and end time of a certain working period are the same, it discards the time period

When enabled the week function, the timing work cycle time is week, if disabled the week function, the cycle time is 24 hours.

7) Forced defrosting:

When the controller is in the normal display mode and the heat pump is ON. Press "M" and "∨" together for more than 5 seconds to activate or deactivate the "Forced Defrost" function. The symbol "  " will light up when the "Forced Defrost" is ON.

8) Boost mode:

When the controller is in the normal display and the heat pump in heating mode. Press "M" and "∧" buttons together for more than 3 seconds to enable or disable the boost mode, when enable the boost mode, the compressor will stop running or never run, heating element ON, the symbol "  " will flash for 1 second then light up, when the temperature reach at the set temperature, heating element off, the symbol "  " will flash, means it is operate in boost mode.
When turn off the heat pump, will exit boost mode.

9) Ssterilisation:
Manual Sterilization Mode:

When the controller is in the normal display mode and the heat pump is ON. Press "⏻" and "🕒" and "∨" together for more than 5 seconds to sterilize the water tank, the symbol "  " will flash for 2 seconds then light up, and the water will be heated up to 70°C and keep at 65°C~70°C, after 30 minutes, exit sterilization mode. If the water can not reach 70C, the heat pump will run in sterilization mode for 2 hours then exit the sterilization mode.
If user set the water temperature≥70°C, then never start sterilization mode

Auto Sterilization Mode: Parameter F67=0 (Default)
If user set the water temperature<70°C, and cumulative time over 7 days, will start Sterilization Mode automatically; finish sterilizing, will re-clock.

In Sterilization Mode, the symbol "  " will flash for 2 seconds then light up, and the water will be heated up to 70°C and keep at 65°C~70°C, after 30 minutes, exit sterilization mode. If the water can not reach at 70C, the heat pump will run in sterilization mode for 2 hours then exit the sterilization mode.
If user set the water temperature≥70°C, then never start sterilization mode

9.4 Wi-Fi Setting

When connecting Wi-Fi, the symbol " " will flash, when connect Wi-Fi successfully, the symbol " " will light up, disconnect Wi-Fi, the symbol " " not light up.

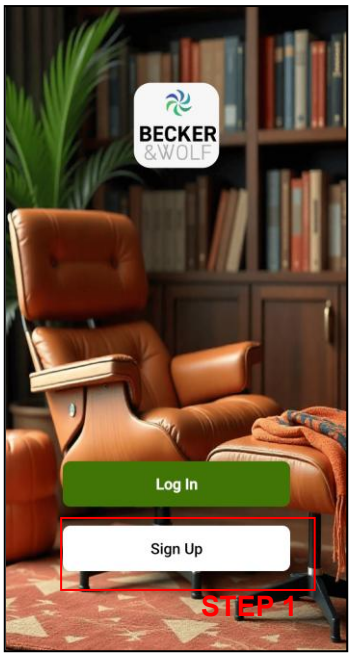
+	Press and hold the two keys for 5s, enter into manual intelligent distribution network connection by manual

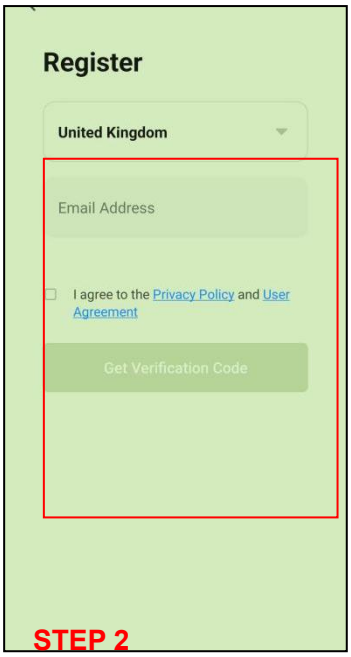
1. Download and Install the App

1) Scan the QR code to download the "Becker&Wolf" application, or download the application in the application store by mobile phone, and then install the application. (available for Android and iOS system)

2) Sign up

After installing the app, press the " " icon and open the Becker&Wolf app, if there is no account, sign up at first time and refer to following process:

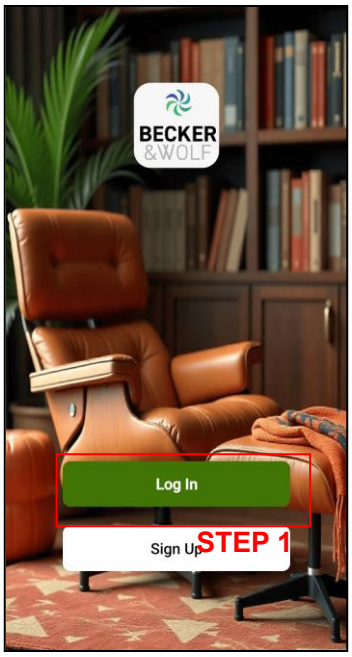


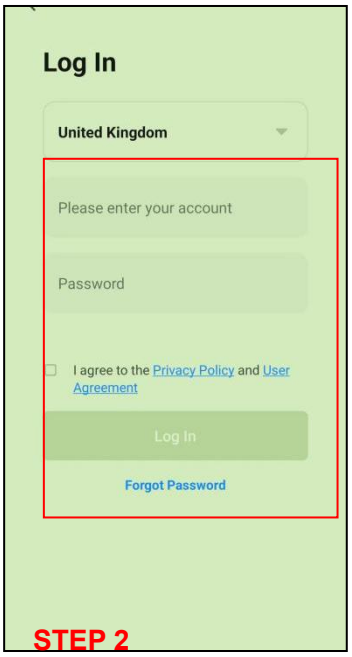


select country, input account and password; select I Agree then Log in

3) Log in

After signing up, log in the application refer to following process:



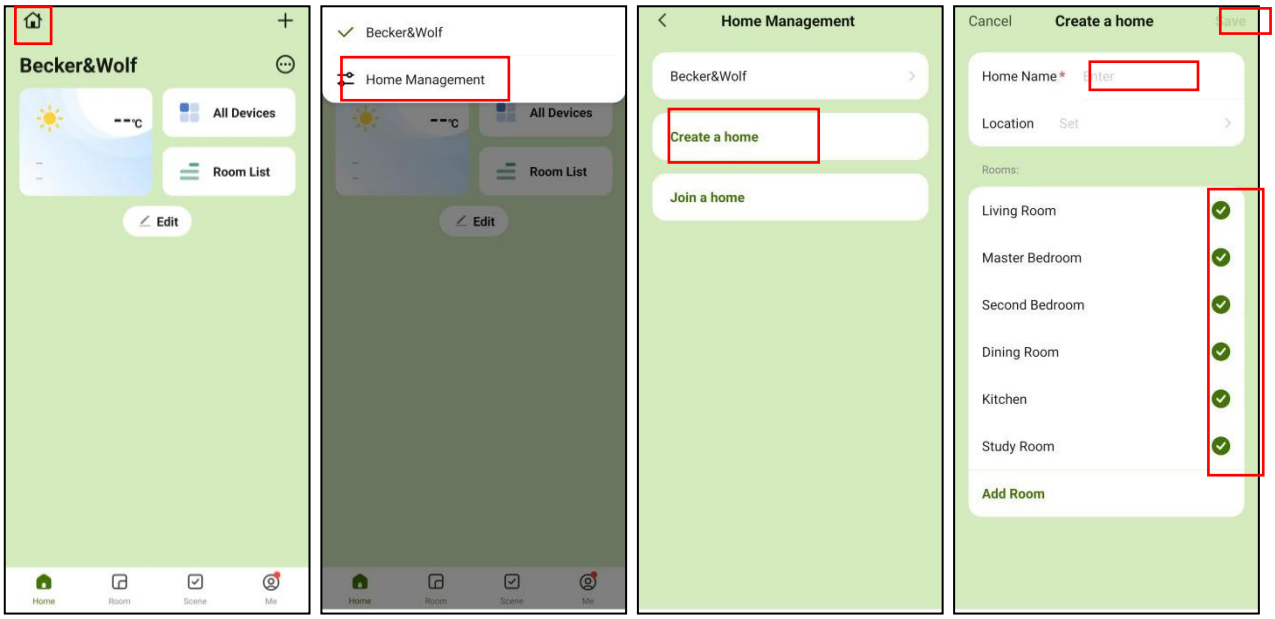


select country, input account and password; select I Agree then Log in

4) Create home

After signing up, should create " **home** ", refer to following process:

Home Management → Create a home→Set home name → Set location → Add room → Save

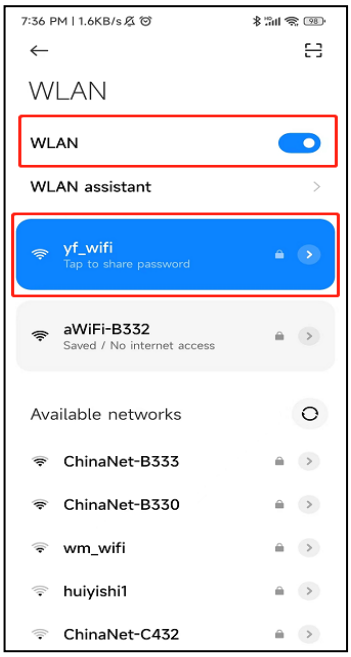


2. Connect the WIFI

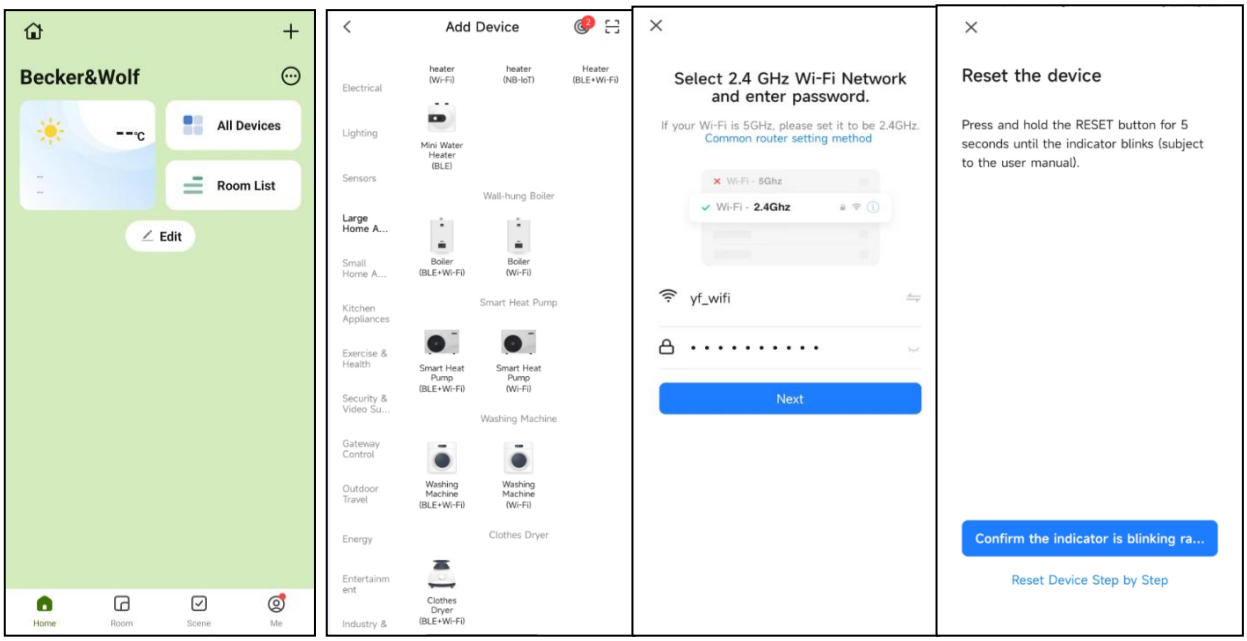
1) Press and hold the two keys  and  for 5s, enter into manual intelligent distribution network

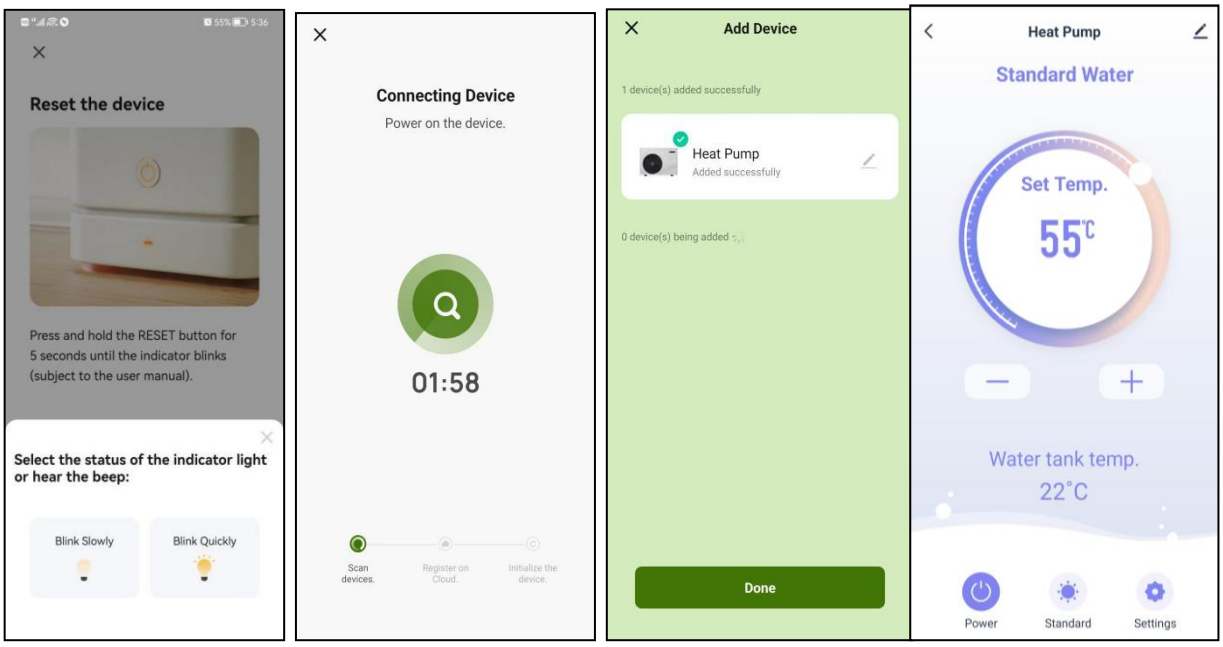
connection, within 3 minutes, wait for connecting, the symbol "  " will flash, after three minutes, exit connecting automatically if failed in connecting.

2) Use mobile phone connect the WIFI hot spot, the hot spot should be available for internet.



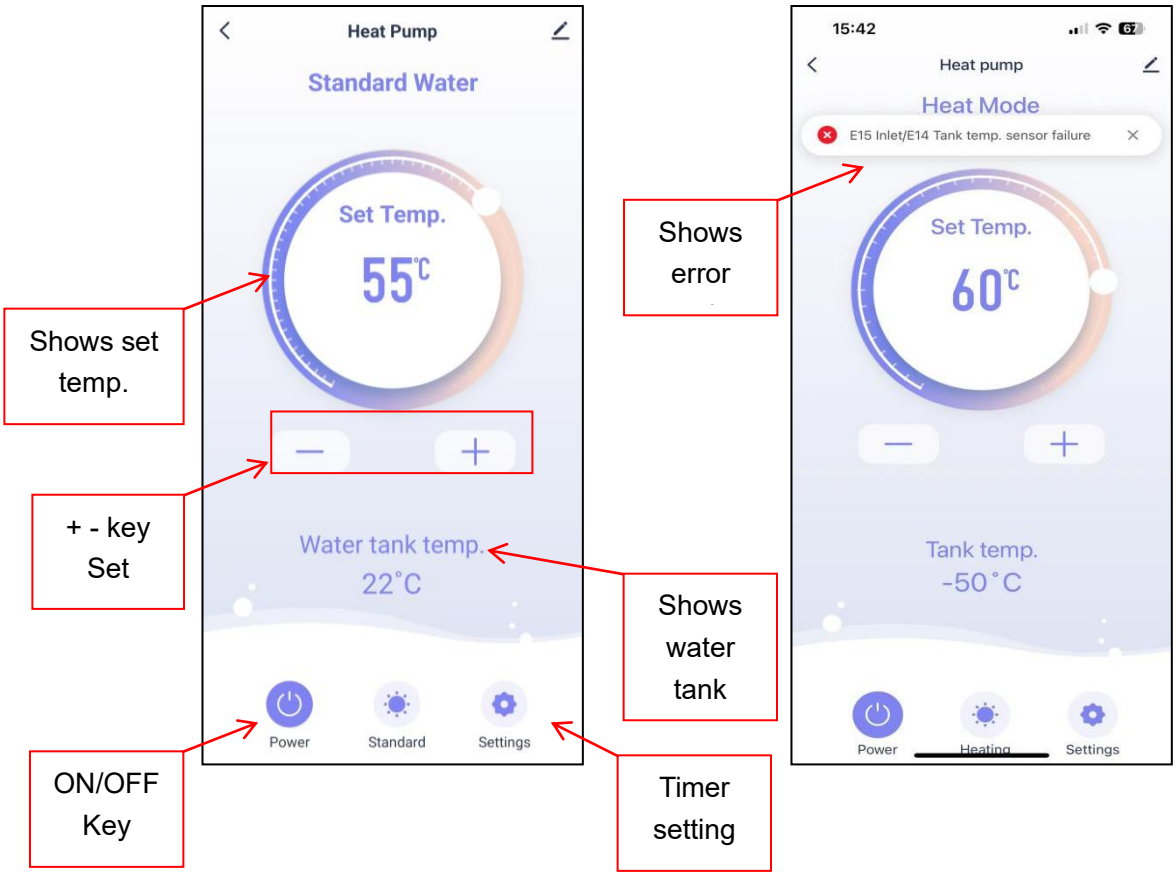
3) Open the app Becker&Wolf and log in, press the icon " + ", or press " **Add Device** " → find " **Large Home Appliance** " → select the" **Smart Heat Pump (Wi-Fi)** " → enter into WIFI connecting interface, input the WIFI password (the WIFI account must be same as the WIFI which mobile phone connected), → press " **next** " → press the " **Confirm the indicator is blinking...** " → select the " **Blink Quickly**" → Wait for finding device, until the device appeared → press " **+** " to add the device, and give a new name of this device if need → finish adding device, shows the operation interface.



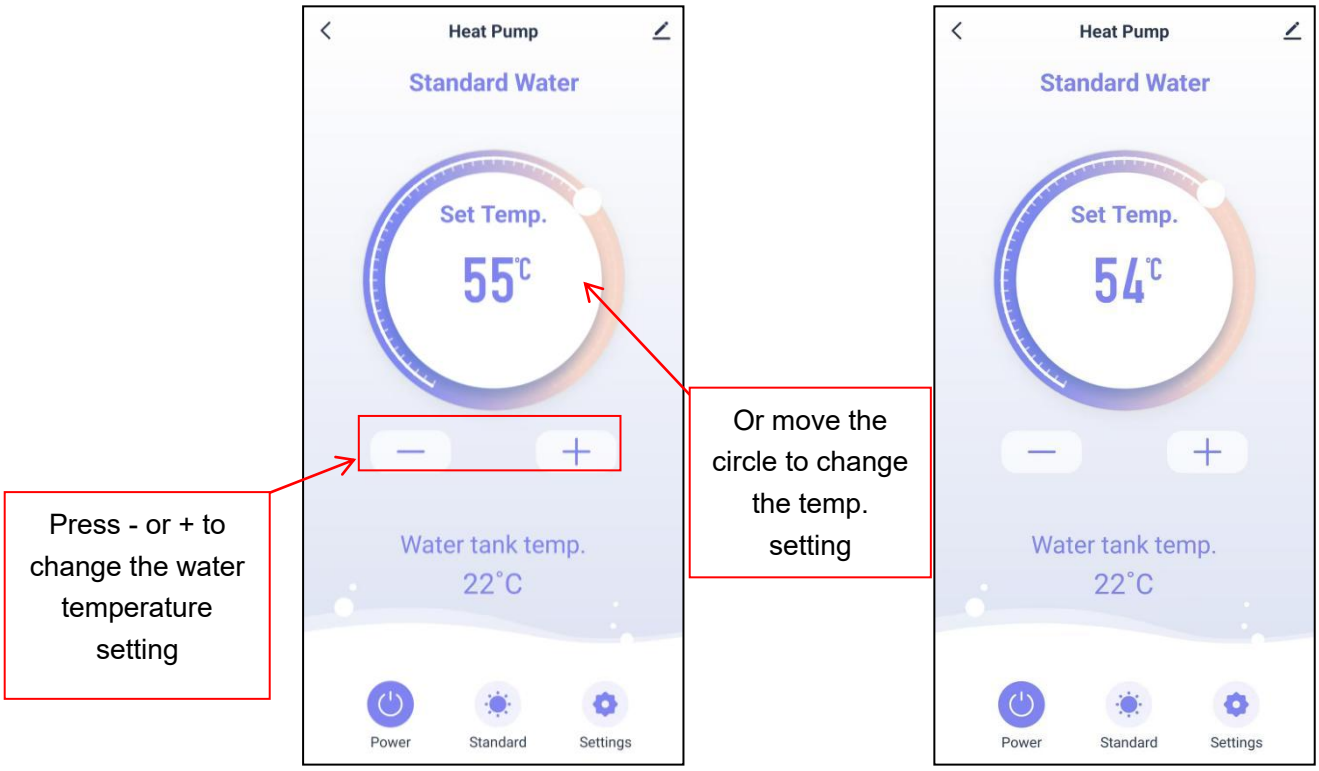


3. Operation

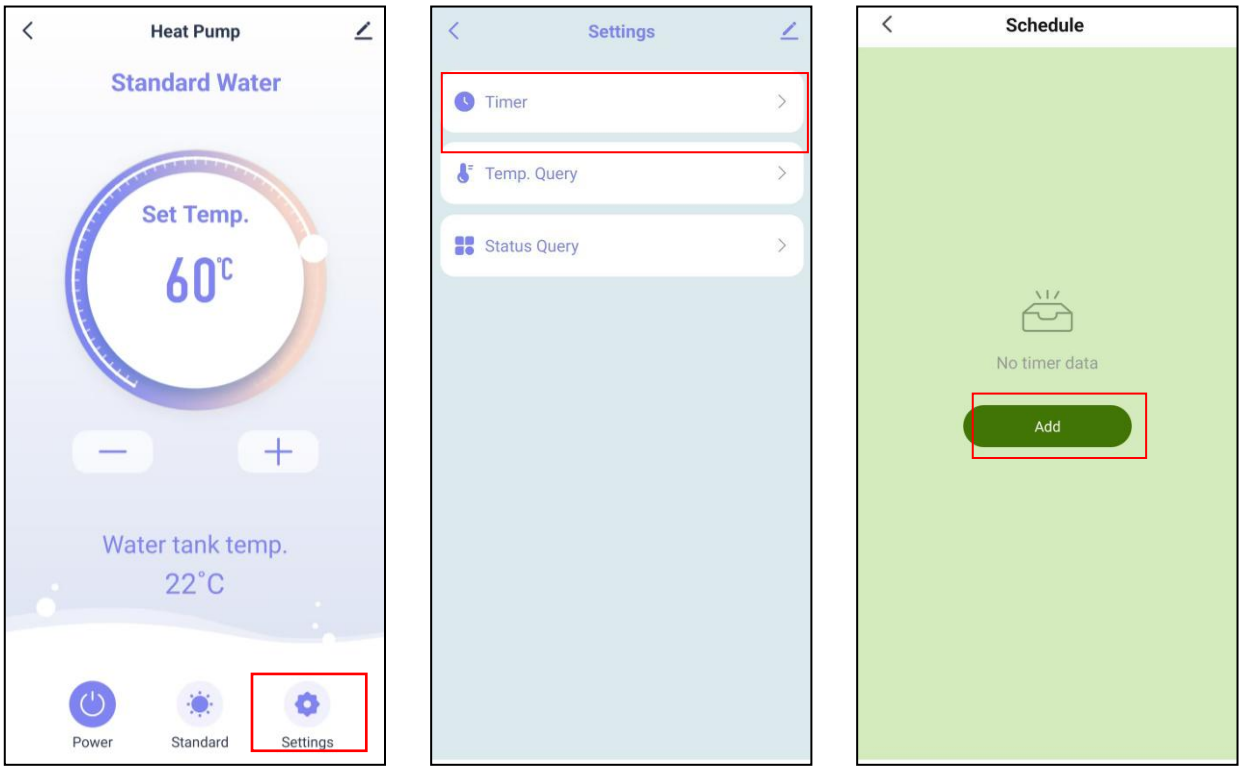
1) Operation interface



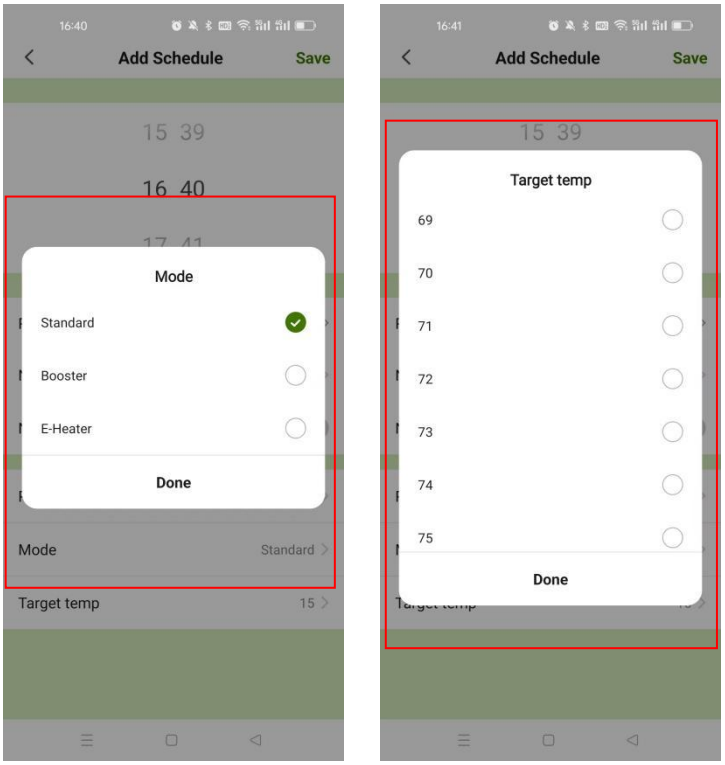
2) Set water temperature

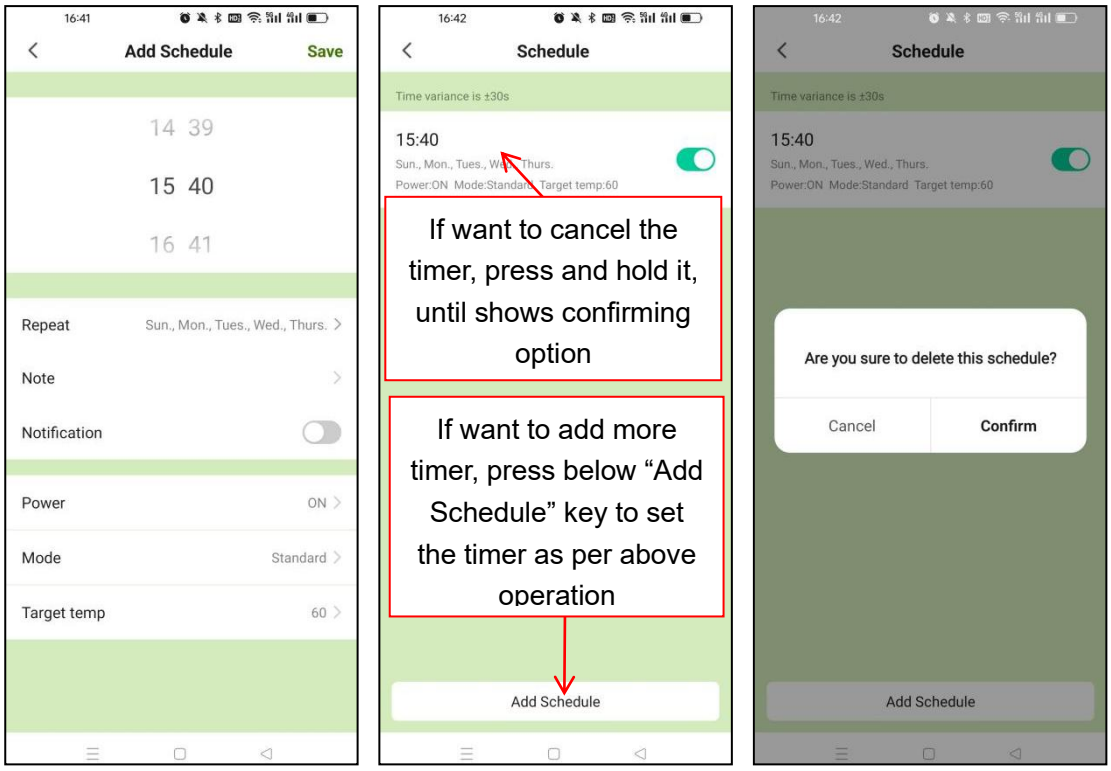


3) Set timer

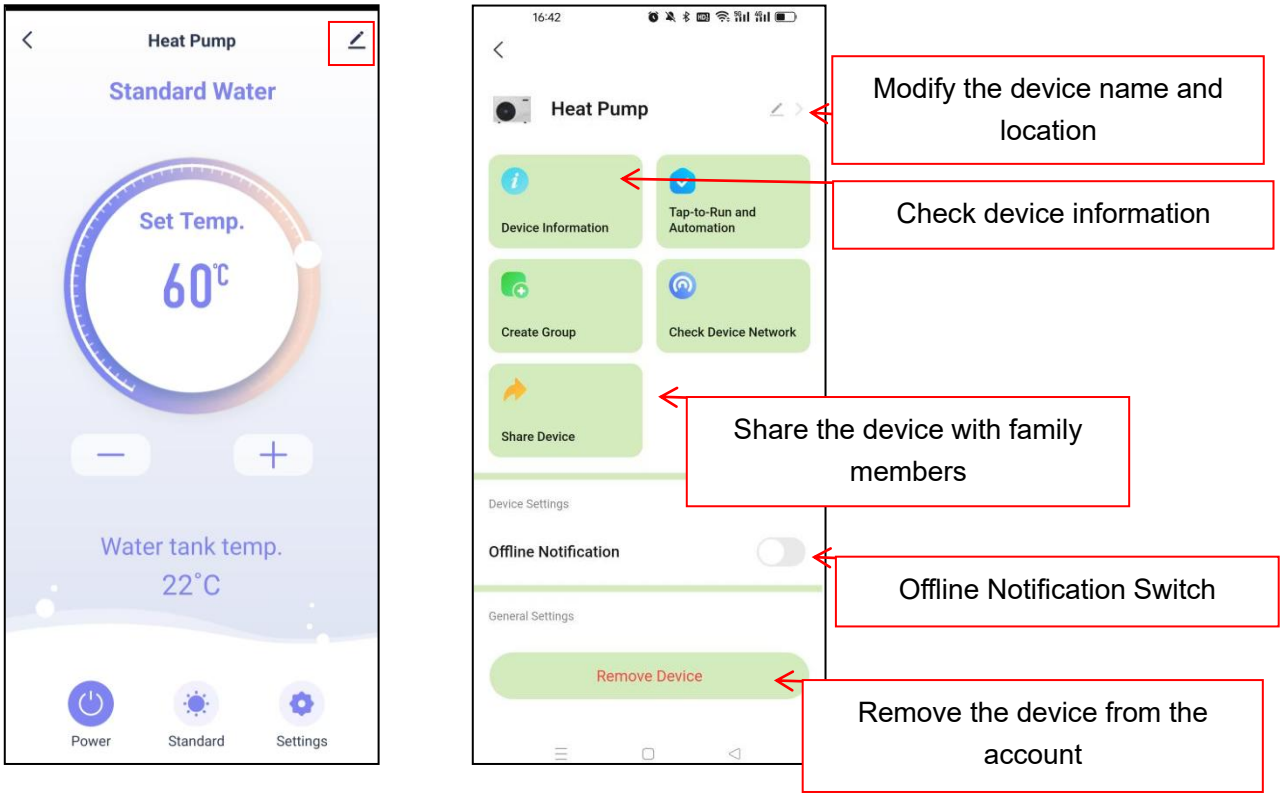



16:40
Add Schedule
Save
15 39
16 40
17 41
Repeat
Once
Note
Notification
Power
ON
Mode
Standard
Target temp
15
Set temp.
Set time
Repeat
Notice
ON / OFF
Mode
Repeat
The action will be carried out only once if you do not select it.
Sun.
Mon.
Tues.
Wed.
Thurs.
Fri.
Sat.
Power
ON
OFF
Done


16:40
Add Schedule
Save
15 39
16 40
Mode
Standard
Booster
E-Heater
Done
Target temp
69
70
71
72
73
74
75
Done



4) Others operation



9.5 Operation Parameter Query

When power on, press "  " or "  " button for 3 seconds, will enter into status query interface, press"  " or "  " button to query each status; Press "  " button will exit status query interface.

No.	Name	Note
00	Fluorine Cycle/Water Cycle system	0=Water Cycle; 1=Fluorine Cycle
01	High pressure switch	0=Open; 1=Close
02	Low pressure switch	0=Open; 1=Close
03	Water flow switch	0=Open; 1=Close
04	EEV open	Measured value
05	Coil temp.	Measured value
06	Ambient temp.	Measured value
07	Suction temp.	Measured value
08	Exhaust temp.	Measured value
09	Water inlet temp.(Water tank)	Measured value
10	Water outlet temp.	0=OFF; 1=ON
11	Compressor	0=OFF; 1=ON
12	4 way valve	0=OFF; 1=ON
13	High fan speed	0=OFF; 1=ON
14	Low fan speed	0=OFF; 1=ON
15	Circulation pump	0=OFF; 1=ON
16	Heating element	0=OFF; 1=ON
17	Compressor working time before defrosting	Measured value
18	Link switch	0=Open; 1=Close
19	Program code	Show the code
20	Dial switch	0=Open; 1=Close
21	Dial switch	0=Open; 1=Close
22	Phase detecting value	0=OK; 3=Lack phase; 4=Phase fault; 5=No connection

9.6 Fault code and solution

Error code	Error Description	Possible Causes	Solution
E05	High pressure protection	High pressure switch is broken/Connection is loose	Contact Customer Care
E09	Communication failure	Signal wire connection loose/There is Strong magnetic field/PCB is broken/Signal wire is broken	
E12	Exhaust temperature too high	Lack of refrigerant/Fluorine system leak	
E14	Tank temperature sensor failure	Sensor failure/Connection is loose	
E16	Coil temperature sensor failure	Sensor failure/Connection is loose	
E18	Exhaust temperature sensor failure	Sensor failure/Connection is loose	
E21	Ambient temperature sensor failure	Sensor failure/Connection is loose	
E29	Suction temperature sensor failure	Sensor failure/Connection is loose	

10. Test operational

10.1 Note

Attention:

1. **The trial operation needs to ensure that the entire system is filled with water and air is removed.**
2. **Only after confirming that all valves are in the correct on /off state can trial operation be carried out.**
3. **Trial operation can only be carried out after electrical safety inspection.**
4. **Absolute prohibition of forced operation.**

10.2 Confirmation items before test operational

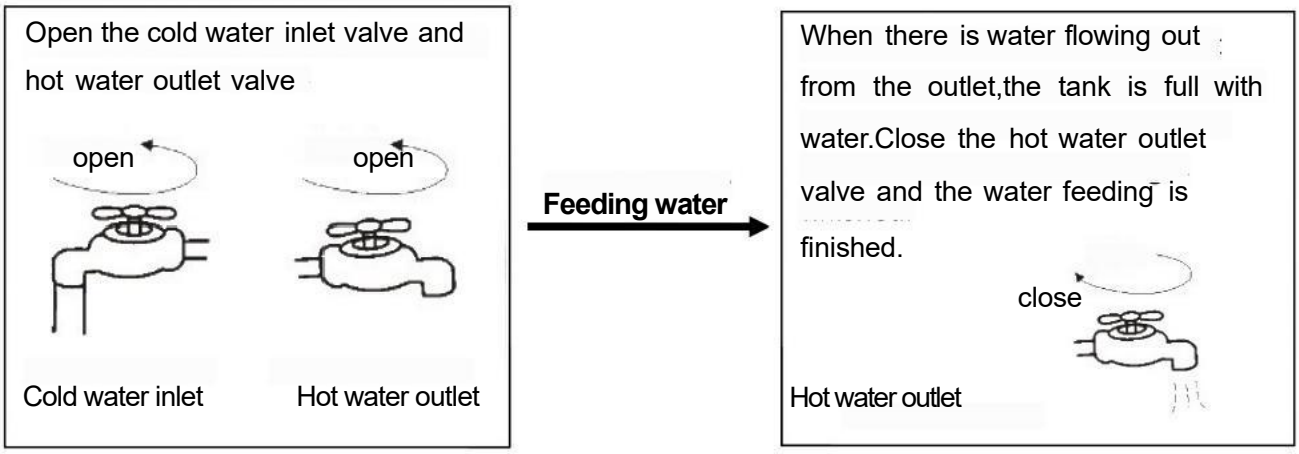
In order to avoid accidents and danger during the trial operation and to ensure safety and reliability during the trial operation, it is necessary to confirm the following items before trial

Type	Inspection Content	Yes or No
Installation of appliance	Is the appearance intact and free of scratches	
	Is the installation space meet the requirements	
	Does the foundation height meet the requirements	
	Does the air inlet and outlet meet the requirements	
	Are rain, sun, snow, and strong wind protection measures implemented	
Installation of water pipe	Is the pipeline well sealed and leak free after water injection	
	Is the pipeline cleaned and free of impurities	
	Are drainage measures in place and ensure smooth drainage	
	Is the pipeline insulation complete	
	Is the air inside the pipe completely discharged	
	Is the pipeline valve in the correct open/ closed state	
	Is an air vent installed at the highest point and other high points of the pipeline	
	Is a drainage valve installed at the lowest point of the pipeline	
Installation of electrical	Does the power supply meet the requirements of the unit	
	Can the leakage protector effectively operate	
	Is the ground wire correctly connected	
	Is the wiring specifications correct	
	Is the power wiring intact and undamaged	

10.3 Test operational

After passing the inspection according to the above list, please operate in the following order:

1. Feeding water when using the appliance for the first time (or reusing it after the tank is emptied), before connecting the appliance to power, please make sure the tank is full of water. Water feeding method is as per below picture.



Attention:

Operation without water in water tank may result in the d auxiliary E-heater. Due to such damage, manufacturer will liable for any damages caused by this issue.

2. Connect the appliance to power. Then the screen will turn on,which shows that the unit is connected to power.

Control the operation of the appliance with a wire controller and check the following items according to the manual: (If there is a fault, please troubleshoot it according to the fault and its cause explained in the manual)

Type	Inspection Content	Yes or No
The operation of the appliance	Is the wire controller working properly	
	Are the function keys of the wire controller working properly	
	Is the indicator light working properly	
	Is there any abnormal vibration or sound in the unit	
	Does it work properly in each mode	
The operation of the water system	Is the drainage normal	
	Is the outlet water temperature normal	
	Is there any water leakage in the pipeline	
	Is the air vent on the pipeline venting properly	
The operation of the electrical system	Does the power supply meet the requirements of the unit	
	Is the ground wire connected securely	

10.4 Operational requirements

Attention:

1.The trial operation of the unit must be carried out by professional technical personnel to avoid danger or damage to the unit.

2. Please do not cut off the power supply of the host when it needs to be shut down for a short period of time of day and night.

10.5 Operation related instructions

10.5.1 Defrosting during heating operation

During heating operation, the main unit may experience frosting. In order to improve heating efficiency, automatic defrosting operation is carried out (about 2-10 minutes).

10.5.2 Regarding power outages

(1) If there is a power outage during operation, stop all operations.

(2) After a power outage, the unit will automatically detect the water level and temperature of the water tank, automatically start the unit or standby, without the need for manual startup.

(3) In case of accidental operation caused by lightning or radio during operation, please cut off the manual power switch, turn it on again, and press the ON/OFF button again.

10.5.3 Regarding leakage current action protectors

(1) The unit itself has a leakage protection switch, but during installation, users are also required to install a leakage protection switch between the power supply and the unit.So when there is no power outage but the unit cannot operate, please check these two leakage protection switches. When operating the protection switch inside the unit, the first step is to confirm that the protection switch installed by users outside the unit is in the disconnected state to avoid electric shock.

(2) After the leakage current action protector on the electrical control box has been running for a period of time (usually one month), the test button needs to be pressed in the closed and energized state; When there is an abnormality and no accident cause is found after inspection, it is allowed to test power once; If there is no action, the cause should be identified and the fault should be identified. If necessary, action characteristic tests should be conducted. After inspection, it is confirmed that the leakage current action protector itself has malfunctioned, and it should be replaced or repaired in a timely manner.

10.5.4 Regarding the power-off memory function

Before each power outage, the line controller automatically remembers the on/off status of the unit. After powering on again, the line controller will send a signal to the unit according to the memory state before powering off, ensure that the unit can still operate according to the user's original setting after abnormal power outage and recovery.

11. Maintenance and solution

11.1 Maintenance

1. All safety protection devices inside the unit are set before the product leaves the factory. Please do not adjust or remove them on your own to avoid damage to the unit.
2. Do not stack debris on the unit, and keep the surroundings dry, clean, and well ventilated.
3. Regularly clean the filters in the water system to avoid blockage that may cause unit protection or damage, and regularly check whether the water system's water replenishment device is functioning properly.
4. When the winter ambient temperature is below zero degrees Celsius, it is strictly prohibited to cut off the power supply, otherwise the anti freezing protection of the unit will fail.
5. When the unit is not in use for a long time, water should be drained from the unit and pipeline system, including the water tank.
6. If the hot water system is not used for two weeks or more, a quantity of highly flammable hydrogen gas may accumulate in the water heater. To dissipate this gas safely, it is recommended that a hot tap be turned on for several minutes or until the discharge of gas ceases. Use a sink, basin, or bath outlet, but not a dishwasher, clothes washer, or other appliance. During this procedure, there must be no smoking, open flame, or any electrical appliance operating nearby. If hydrogen is discharged through the tap, it will probably make an unusual sound as with air escaping.
7. Do not manually start or stop the unit frequently, and do not manually close the manual regulating valve of the water system while the unit is running.
8. Regularly inspect the working condition of various components of the unit, and also inspect the internal pipeline joints of the unit.
9. When the unit malfunctions and the user is unable to solve it, please contact us in a timely manner so that someone can be sent for repair in a timely manner.
10. Attention should be paid to drainage: if not used for a long time in winter or if there is a power outage for a long time, the water in the water system must be drained completely; Before draining, ensure that the unit is powered off while in standby mode, open the water system drain valve, and at the same time, open the unit drain valve.
11. Each device has been matched with one anode rod, and anode rod will be slowly consumed during the process of protecting inner tank and extending use life. Under some water circumstance, anode rod and water can rise reaction, hot water will be quickly corroded and rise leakage when anode rod has been used up. We suggest check insulation materials every one year, if anode rod is used up, you can make an inquiry to a local service center or technical department to acquire a new one.

11.2 Information for service personnel

1. Checks to the area

   Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimised. For repair to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.

2. Work procedure

   Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable

gas or vapor being present while the work is being performed.

3. General work area

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

4. Checking for presence of refrigerant

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e.non-sparking, adequately sealed or intrinsically safe.

5. Presence of fire extinguisher

If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

6. No ignition sources

No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.“No Smoking" signs shall be displayed.

7. Ventilated area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

8. Checks to the refrigeration equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt consult the manufacturer's technical department for assistance.

The following checks shall be applied to installations using flammable refrigerants:

—The charge size is in accordance with the room size within which the refrigerant containing parts are installed;

—The ventilation machinery and outlets are operating adequately and are not obstructed;

—If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;

—Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;

—Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected

against being so corroded.

9. Checks to electrical devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

*That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;

*That there no live electrical components and wiring are exposed while charging, recovering or purging the system;

*That there is continuity of ground bonding.

11.3 Repairs to sealed components

1. During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
2. Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc. Ensure that apparatus is mounted securely. Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications. NOTE: The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. intrinsically safe components do not have to be isolated prior to working on them.

11.4 Repair to intrinsically safe components

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.

Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating. Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

11.5 Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

11.6 Detection of flammable refrigerants

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

11.7 Leak detection methods

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants.

Electronic leak detectors shall be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.)

Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed and the appropriate percentage of gas (25 % maximum) is confirmed.

Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

If a leak is suspected, all naked flames shall be removed/ extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

11.8 Removal and evacuation

When breaking into the refrigerant circuit to make repairs - or for any other purpose conventional procedures shall be used. However, it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to:

*Remove refrigerant;

*Purge the circuit with inert gas;

*Evacuate;

*Purge again with inert gas;

*Open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders. The system shall be "flushed" with OFN to render the unit safe. This process may need to be repeated several times. Compressed air or oxygen shall not be used for this task .Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipe-work are to take place.

Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available.

11.9 Charging procedures

In addition to conventional charging procedures, the following requirements shall be followed.

—Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
—Cylinders shall be kept upright.
—Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
—Label the system when charging is complete (if not already).
—Extreme care shall be taken not to overfill the refrigeration system.
Prior to recharging the system it shall be pressure tested with OFN. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

11.10 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.
a) Become familiar with the equipment and its operation.
b) Isolate system electrically.
c) Before attempting the procedure ensure that:
*Mechanical handling equipment is available, if required, for handling refrigerant cylinders;
*All personal protective equipment is available and being used correctly;
*The recovery process is supervised at all times by a competent person;
*Recovery equipment and cylinders conform to the appropriate standards.
d) Pump down refrigerant system, if possible.
e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
f) Make sure that cylinder is situated on the scales before recovery takes place.
g) Start the recovery machine and operate in accordance with manufacturer's instructions.
h) Do not overfill cylinders. (No more than 80 % volume liquid charge).
i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

11.11 Labeling

Equipment shall be labeled stating that it has been decommissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

11.12 Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants. in addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

11.13 Error & Approaches

Error	Reason	Approach
The outlet water is cold;The screen is dark	1.The plug is not plugged properly 2.The temperature controller is on the lowest temperature control state; 3.The temperature controller is damaged 4.The circuit board of the indicator lamp is damaged	1.Plug in properly. 2.Set the temperature of the controller in higher state. 3.Inform the service department
No water out from the hot water outlet	1.The tap water is cut off 2.The water pressure is too low 3.The tap water inlet valve is closed	1.Waiting for the restore of the tap water. 2.Wait and use when the water pressure is raised 3.Open the tap water inlet valve
Water leakage	Bad tightness in the connecting points between pipes.	Improve the tightness of the connecting points

12. Service Record

It is recommended that your hot water system is serviced regularly and that the appropriate service record is completed.

Service Provider

Before completing the appropriate Service Record below, please ensure you have carried out the service as described in the manufacturer's instructions.

SERVICE 1 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 2 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 3 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 4 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 5 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 6 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 7 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 8 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 9 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 10 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 11 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 12 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature