

## **Ground source heat pump**

Heating/cooling+DHW series

6kW, 9kW, 10kW, 13kW  
220~240V/1ph/50Hz

13kW, 16kW, 19kW, 25kW, 30kW, 37kW, 50kW, 62kW  
380~415V/3ph/50Hz



**CE RoHS**

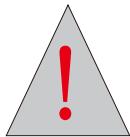
This manual should be kept well by users for installation and future maintenance purpose.

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# Important information

## Safety information



**ELECTRICAL POWER MUST BE SWITCHED OFF BEFORE  
STARTING ANY WORK ON JUNCTION BOXES**

The aim of this manual is to provide instructions for installation, commissioning, operation.

### **WARNING!**

The installation, commissioning and maintenance of these machines should be performed by qualified personnel having a good knowledge of standards and local regulations, as well as experience of this type of equipment.

### **WARNING!**

Any wiring produced on site must comply with local electrical regulations.

### **WARNING!**

Ensure that the electrical supply corresponds to the specification indicated on the unit's maker's plate before proceeding with the connection in accordance with the wiring diagram supplied.

### **WARNING!**

The unit must be grounded to make sure electric safety.

### **WARNING!**

Preparation for shutting down the unit for a prolonged period if the installation does not contain glycol, the evaporator and the chilled water pipes need to be carefully and completely drained of water

### **TAKE CARE!**

The unit should be handled using lifting and handing equipment appropriate to the unit's size and weight.

### **TAKE CARE!**

It is forbidden to start any work on the electrical components without switching off the electrical supply to the unit.

### **TAKE CARE!**

It is forbidden to start any work on the electrical components if water or high humidity is present on the installation site.

### **TAKE CARE!**

When the unit is being connected, ensure that no impurities are introduced into the pipe work and the water circuits.

### **TAKE CARE!**

A mesh filter must be installed for the hydraulic pump and ground source side heat exchanger.

The manufacturers warranty will not apply if the installation recommendations listed in this manual are not followed.

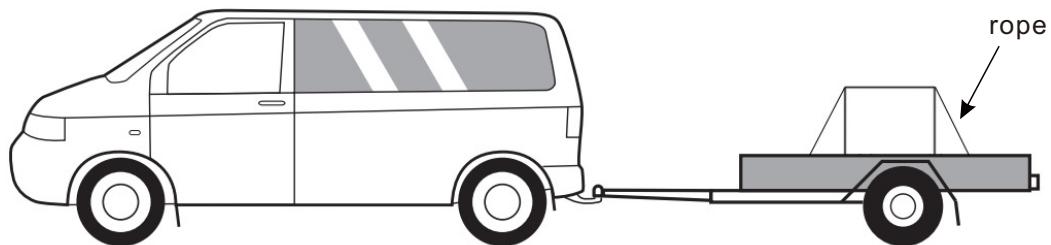
# Transport and handling

The ground source heat pump should be transported and stored vertically in a dry place.

When being moved into a building, make sure the ground source heat pump should not be leant by more than 45 °.

Ensure the ground source heat pump has not been damaged during transport.

During transportation, the ground source heat pump must be placed on the truck and fixed by ropes firmly to avoid moving.



The ground source heat pump has been packed by manufacturer with poly wood package and pallet of EU standard height.

Please be careful that the folk truck must not stab the wooden package, otherwise the ground source heat pump body may be hurt.

When hanging the ground source heat pump by ropes, the ropes must be strong enough to take the height of the ground source heat pump.

When carrying the ground source heat pump by hand, the hands should wear gloves to avoid hurt because sometimes the wooden package might be rough and hard.

# The heat pump design

## Specification

Model		BWH-06F1M1	BWH-09F1M1	BWH-10F1M1	BWH-13F1M1	BWH-16F1M3	BWH-19F1M3
Power supply	V/Ph/Hz	220/1/50	220/1/50	220/1/50	220/1/50	380/3/50	380/3/50
Heating capacity W10/W35 (1)	KW	6.40	9.10	10.20	12.70	15.80	18.70
Heating power input W10/W35	KW	1.37	1.94	2.18	2.71	3.32	3.96
COP W10/W35		4.67	4.69	4.68	4.69	4.76	4.72
Heating capacity W10/W55 (2)	KW	5.70	8.10	9.08	10.86	13.80	16.47
Heating power input W10/W55	KW	1.81	2.56	2.88	3.45	4.38	5.23
COP W10/W55		3.15	3.16	3.15	3.15	3.15	3.15
Heating capacity B0/W35 (3)	KW	5.95	8.46	9.49	11.35	14.42	17.21
Heating power input B0/W35	KW	1.38	1.96	2.20	2.64	3.35	4.00
COP B0/W35		4.30	4.32	4.31	4.30	4.30	4.30
Heating capacity B0/W55 (4)	KW	4.99	7.10	7.96	9.52	12.09	14.43
Heating power input B0/W55	KW	1.99	2.81	3.16	3.78	4.81	5.74
COP B0/W55		2.51	2.52	2.52	2.51	2.51	2.51
Heating capacity B-5/W45 (5)	KW	4.51	6.42	7.19	8.60	10.93	13.04
Heating capacity B-5/W45	KW	1.80	2.55	2.87	3.43	4.37	5.21
COP B-5/W45		2.50	2.51	2.51	2.50	2.50	2.50
Heating capacity W15/W35 (6)	KW	7.04	10.01	11.22	13.42	17.05	20.35
Heating power input	KW	1.36	1.92	2.16	2.58	3.29	3.92
COP W15/W35		5.19	5.21	5.20	5.19	5.19	5.19
Cooling capacity W30/W7 (7)	KW	5.61	7.97	8.94	10.69	13.58	16.21
Cooling power input W30/W7	KW	1.36	1.92	2.16	2.58	3.29	3.92
EER W30/W7		4.13	4.15	4.14	4.14	4.13	4.13
Rated current	A	6.2	8.1	9.3	11.8	6.5	7.6
Max. water temperature	°C	60	60	60	60	60	60
Rated water temperature	°C	55	55	55	55	55	55
Water flow (Heating side)	m3/h	1.00	1.55	1.76	2.24	2.70	3.20
Water flow (ground side)	m3/h	0.90	1.40	1.60	1.80	2.34	2.70
Water pressure drop	Kpa	22	22	22	24	28	30
Noise	dB(A)	40	40	40	41	41	42
Water connections	Inch	3/4"	3/4"	1"	1"	1"	1"
Compressor	Type	Rotary	Rotary	Rotary	Scroll	Scroll	Scroll
	Quantity	1	1	1	1	1	1
Refrigerant		R410A / R32	R410A / R32	R410A / R32	R410A / R32	R410A / R32	R410A / R32
Condenser		Plate type / tube-in-shell			Plate type	Plate type	Plate type
Evaporator		Plate type			Plate type	Plate type	Plate type
Throttling device		EEV	EEV	EEV	EEV	EEV	EEV
Circulation pump (Heating side)	Type	DC inverter	DC inverter	DC inverter	DC inverter	DC inverter	DC inverter
	head(m)	6	7	7	7	12	10
Water flow switch (Heating side)		Yes	Yes	Yes	Yes	Yes	Yes
Water flow switch (Ground side)		Yes	Yes	Yes	Yes	Yes	Yes
Net weight	kg	60	66	73	90	105	130
Gross weight	kg	75	81	88	105	120	145
Net dimensions (W*D*H)	mm	540*540*714	540*540*714	540*540*714	580*600*764	580*600*764	580*600*764
Packing dimensions	mm	600*600*850	600*600*850	600*600*850	640*660*900	640*660*900	640*660*900

# Specification

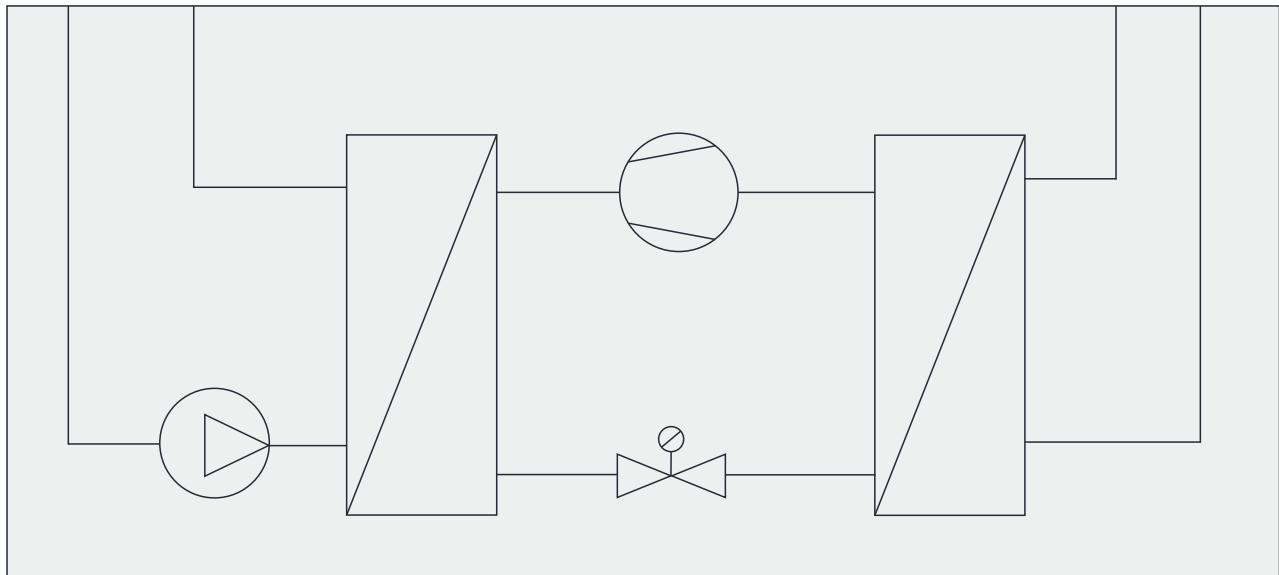
Model		BWH-25F1M3	BWH-30F1M3	BWH-37F1M3	BWH-50F1M3	BWH-62F1M3
Power supply	V/Ph/Hz	380/3/50	380/3/50	380/3/50	380/3//50	380/3//50
Heating capacity W10/W35 (1)	KW	24.50	30.20	37.00	50.00	62.00
Heating power input W10/W35	KW	5.25	6.46	7.92	11.20	14.00
COP W10/W35		4.67	4.67	4.67	4.46	4.43
Heating capacity W10/W55 (2)	KW	21.81	26.88	32.93	44.50	55.18
Heating power input W10/W55	KW	6.93	8.53	10.45	14.78	18.48
COP W10/W55		3.15	3.15	3.15	3.01	2.99
Heating capacity B0/W35 (3)	KW	22.79	28.09	34.41	46.50	57.66
Heating power input B0/W35	KW	5.30	6.52	8.00	11.31	14.14
COP B0/W35		4.30	4.30	4.30	4.11	4.08
Heating capacity B0/W55 (4)	KW	19.11	23.56	28.86	39.00	48.36
Heating power input B0/W55	KW	7.61	9.37	11.48	16.24	20.30
COP B0/W55		2.51	2.51	2.51	2.40	2.38
Heating capacity B-5/W45 (5)	KW	17.27	21.29	26.09	35.25	43.71
Heating capacity B-5/W45	KW	6.91	8.50	10.42	14.74	18.42
COP B-5/W45		2.50	2.50	2.50	2.39	2.37
Heating capacity W15/W35 (6)	KW	26.95	33.22	40.70	55.00	68.20
Heating power input	KW	5.20	6.40	7.84	11.09	13.86
COP W15/W35		5.19	5.19	5.19	5	5
Cooling capacity W30/W7 (7)	KW	21.46	26.46	32.41	43.80	54.31
Cooling power input W30/W7	KW	5.20	6.40	7.84	11.09	13.86
EER W30/W7		4.13	4.14	4.13	3.95	3.92
Rated current	A	9.50	13.0	15.6	20.9	25.8
Max. water temperature	°C	60	60	60	60	60
Rated water temperature	°C	55	55	55	55	55
Water flow (user side)	m3/h	4.00	5.20	6.20	7.50	13.00
Water flow (ground side)	m3/h	3.60	4.70	5.60	6.80	10.40
Water pressure drop	Kpa	33	35	40	50	55
Noise	dB(A)	43	43	43	45	55
Water connections	Inch	2"	2"	2"	2"	2"
Compressor	Type	Scroll	Scroll	Scroll	Scroll	Scroll
	Quantity	1	2	2	2	2
Refrigerant		R410A / R32	R410A / R32	R410A / R32	R410A / R32	R410A / R32
Condenser		Plate type	Plate type	Plate type	Plate type	Plate type
Evaporator		Plate type	Plate type	Plate type	Plate type	Plate type
Throttling device		EEV	EEV	EEV	EEV	EEV
Circulation pump (using side)	Type	DC inverter	no	no	no	no
	head(m)	10	no	no	no	no
Water flow switch (using side)		Yes	Yes	Yes	Yes	Yes
Water flow switch (Ground side)		Yes	Yes	Yes	Yes	Yes
Net weight	kg	145.00	160	198	260	300
Gross weight	kg	160.00	175	218	280	320
Net dimensions	mm	580*600*764	708*1048*750	708*1048*750	708*1048*750	782*782*1325
Packing dimensions	mm	640*660*900	755*1155*900	755*1155*900	755*1155*900	820*820*1470

Test conditions:

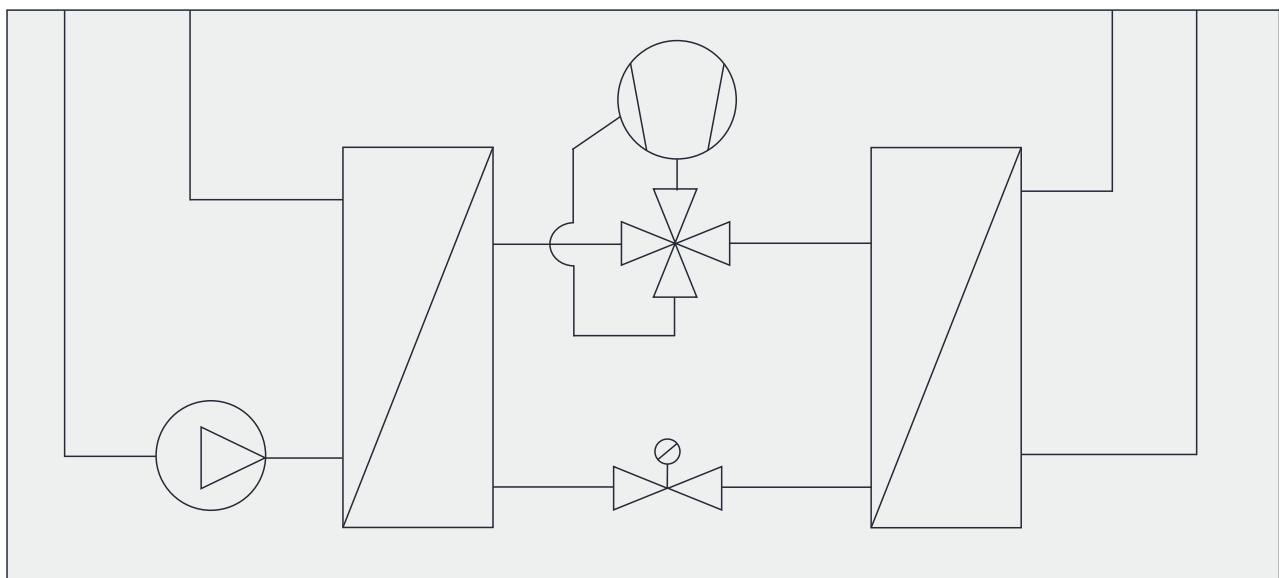
1. W10/W35: ground source water inlet 10DegC, outlet temp. 7DegC. Heating water inlet 30DegC, outlet 35DegC.
2. W10/W55: ground source water inlet 10DegC, outlet temp. 7DegC. Heating water inlet 50DegC, outlet 55DegC.
3. B0/W35: brine inlet 0DegC, outlet -3DegC. Heating water inlet 30DegC, outlet 35DegC.
4. B0/W35: brine inlet 0DegC, outlet -3DegC. Heating water inlet 50DegC, outlet 55DegC.
5. B-5/W45: brine inlet -5DegC. Heating water inlet 40DegC, outlet 45DegC.
6. W15/W35: ground source water inlet 15DegC, outlet temp. 5DegC. Heating water inlet 30DegC, outlet 35DegC.
7. W30/W7: ground source water inlet 30DegC, outlet temp. 35DegC. Heating water inlet 12DegC, outlet 7DegC.

# System diagram

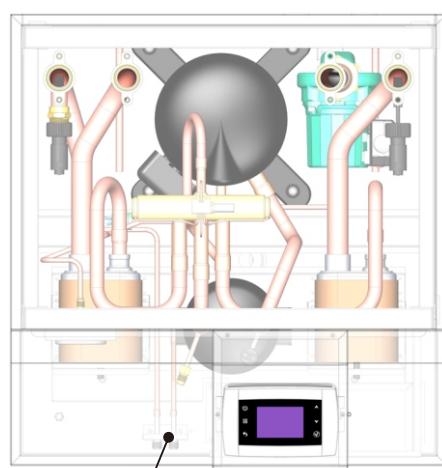
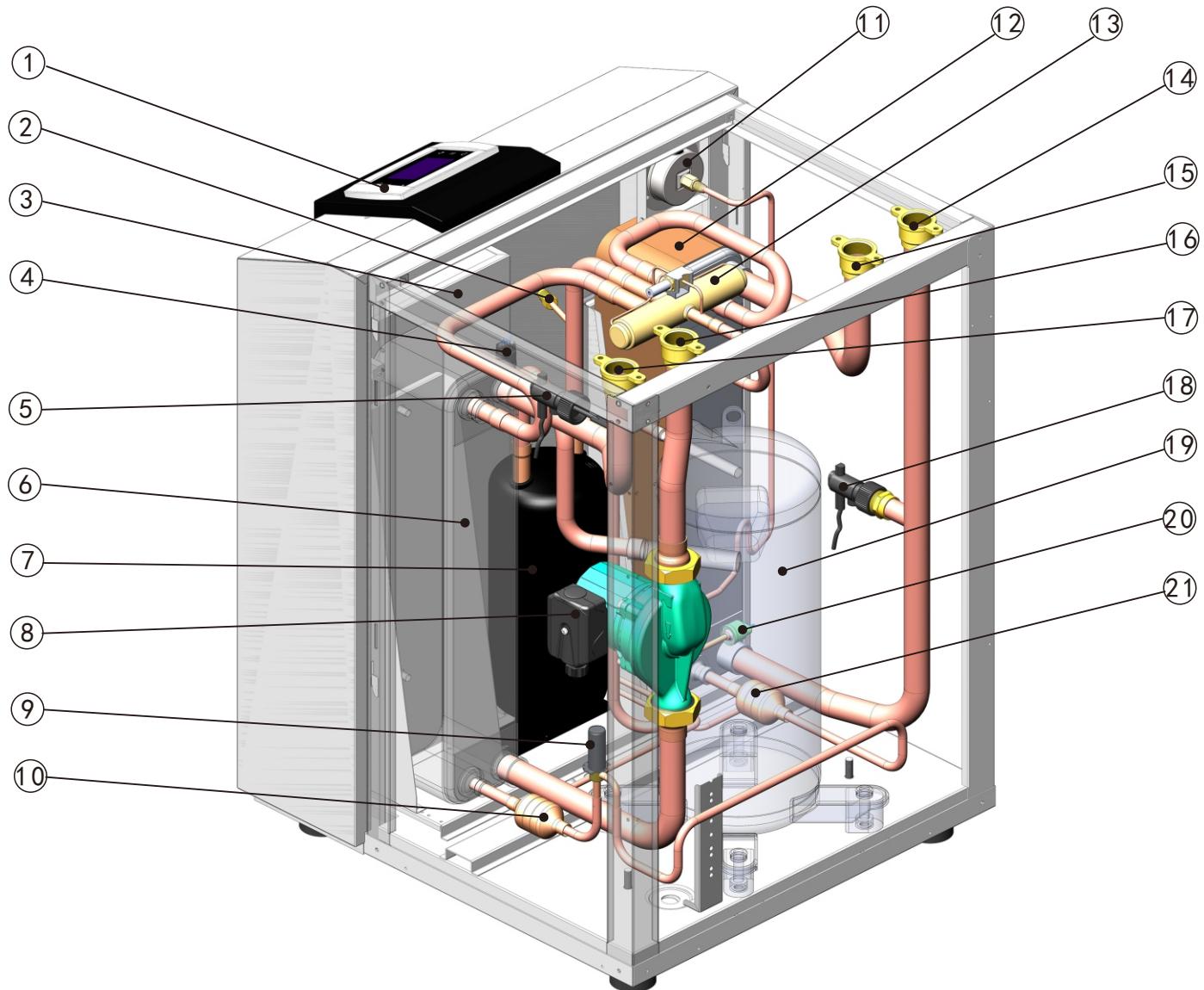
## System for heating/DHW



## System for heating/DHW/cooling



# Structure and components



(22)

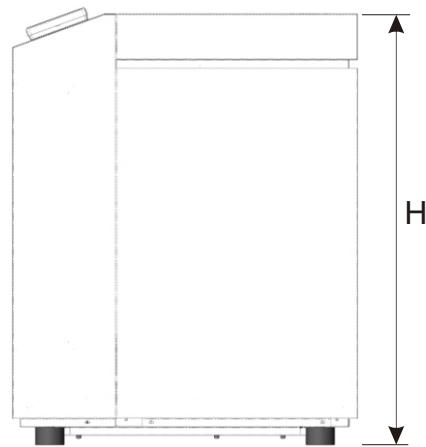
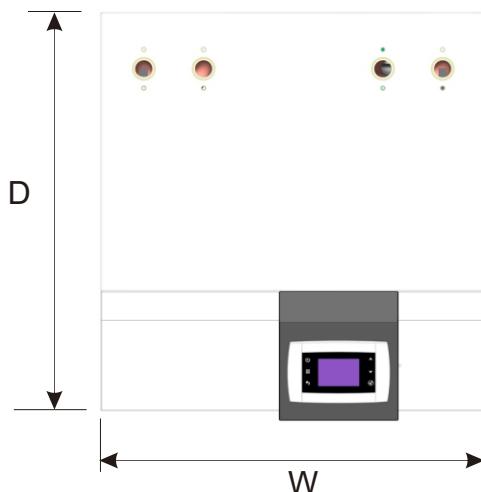
1. Wired controller
2. Refrigerant inject valve
3. Electric box
4. Low pressure switch
5. Using side water flow switch
6. Using side plate heat exchanger
7. Gas-liquid separator
8. Using side water pump
9. EEV
10. Refrigerant filter
11. High pressure gauge
12. Ground source plate heat exchanger
13. 4 way valve
14. Ground source water outlet
15. Ground source water inlet
16. Using side water inlet
17. Using side water outlet
18. Ground source water flow switch
19. Compressor
20. High pressure switch
21. Refrigerant filter
22. AC water and ground water drain valves

# Before installation

## Dimensions

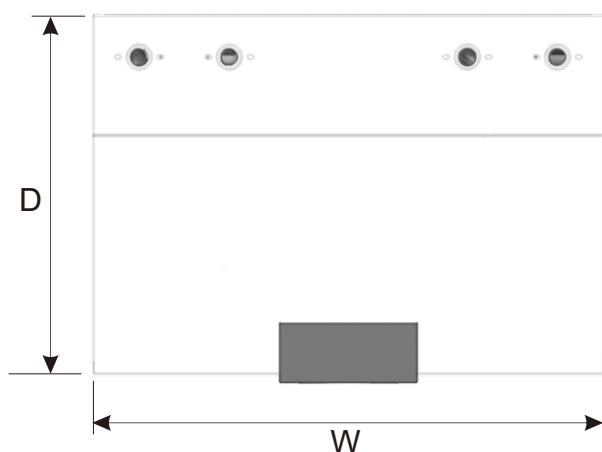
Model: 6kW ~ 25kW

Dimension unit: mm



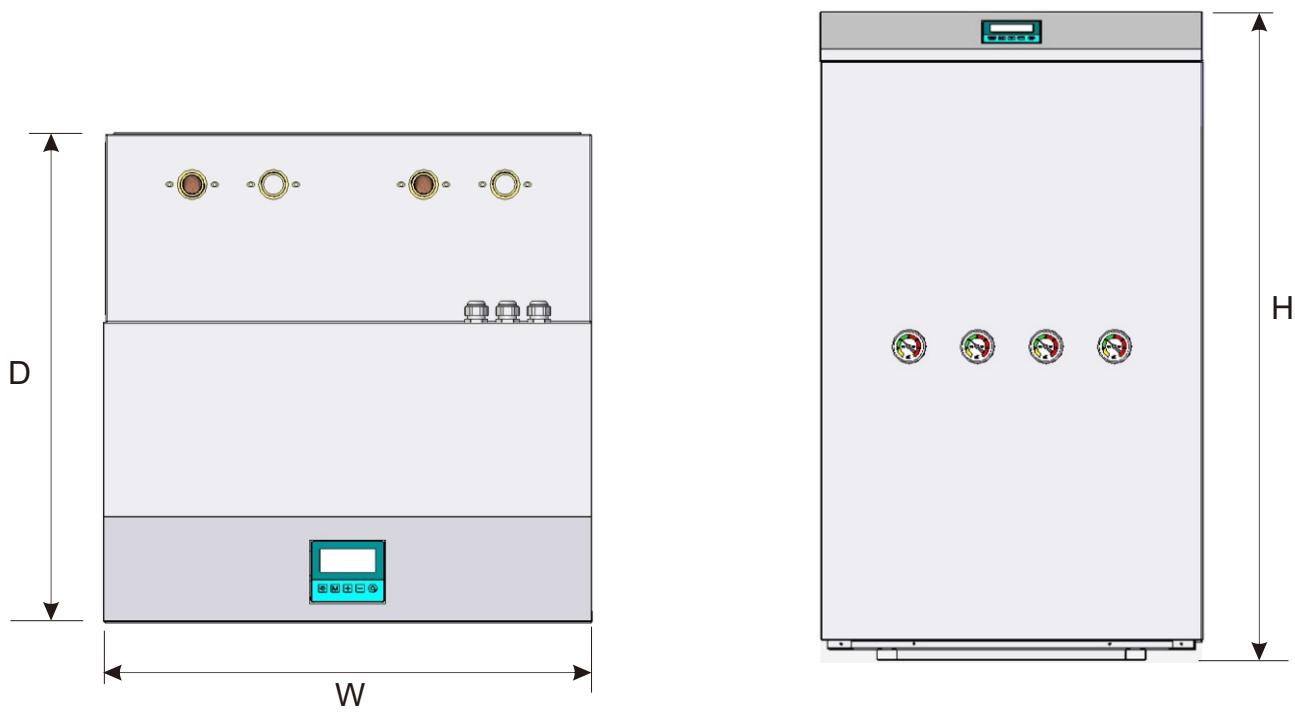
Model	W	D	H
6kW	540	540	714
9kW	540	540	714
10kW	540	540	714
13kW	580	600	764
16kW	580	600	764
19kW	580	600	764
25kW	580	600	764

Model: 30kW, 37kW, 50kW



Model	W	D	H
30kW	708	1048	750
37kW	708	1048	750
50kW	708	1048	750

Model: 62kW



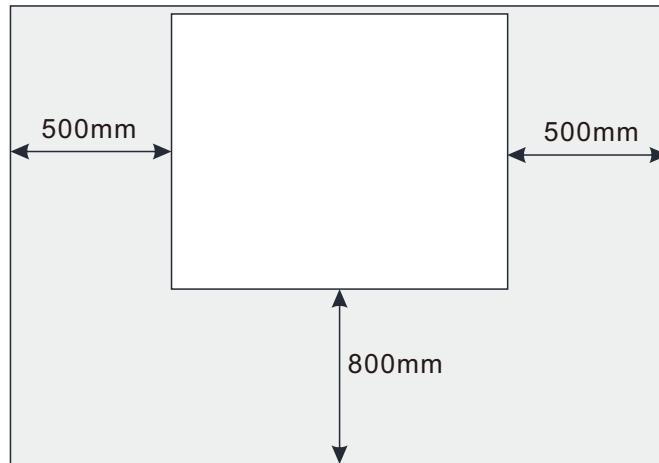
Model	W	D	H
62kW	782	782	1325

## Installation area

- Place the heat pump on a solid foundation indoors that can take the heat pump's weight. Use the product's adjustable feet to attain a horizontal and stable set-up.
- Because water comes from the heat pump, the area where the heating pump is located must be equipped with floor drainage.
- Install with its back to an outside wall, ideally in a room where noise does not matter, in order to eliminate noise problems. If this is not possible, avoid placing it against a wall behind a bedroom or other room where noise may be a problem.
- Wherever the unit is located, walls to sound sensitive rooms should be fitted with sound insulation.
- Route pipes so they are not fixed to an internal wall that backs on to a bedroom or living room.

Leave a free space of 800 mm in front of the product. Approx. 500 mm free space is required on each side, to allow the side panels to be removed (see image). Most service on the heat pump can be carried out from the front, however the side panels may need to be removed. Leave free space between the heat pump and the wall behind (and any routing of supply cables and pipes), to reduce the risk of any vibration being propagated.

A normal installation needs 300 – 400 mm (any side) for connection equipment, e.g. level vessel, valves and electrical equipment.



**Note:**

The rubber feet are completely soft type rubber, which can tolerate some uneven ground. When the heat pump body still cannot get a stable position, please adjust the feet.

For those models without these rubber feet, please use additional rubber pad.

# Pipe installation

## General

Pipe installation must be carried out in accordance with current norms and directives. The heat pump can operate with a return temperature of up to 55 °C and an outgoing temperature from the heat pump of 65 (55 °C with only the compressor). The heat pump is not equipped with external shut off valves; these must be installed to facilitate any future servicing.

### ⚠ Attention

Ensure that incoming water is clean. When using a private well, it may be necessary to supplement with an extra water filter.

### ⚠ Attention

Any high points in the climate system, must be equipped with air vents.

### ⚠ Attention

The pipe systems need to be flushed out before the heat pump is connected so debris cannot damage component parts.

### ⚠ Attention

Water may drip from the safety valve's overflow pipe. The overflow pipe must be routed to a suitable drain, so hot water splashes cannot cause harm. The entire length of the overflow pipe must be inclined to prevent water pockets, and must also be frost-proof. The overflow pipe must be at least the same size as the safety valve. The overflow pipe must be visible and its mouth must be open and not placed close to electrical components.

### ⚠ Attention

This installation is subject to building regulation approval, notify the local Authority of intention to install.

### ⚠ Attention

Use only manufacturer's recommended replacement parts.

# Hard water areas

Normally, there should not normally be any problem installing the ground source in hard water areas, as the operating temperature is 50–60°C.

## Cleaning the water heating system

When the water heater and the climate system have been filled with water, the heat pump must operate at maximum normal temperature for at least one hour. Thereafter the system must be drained of water and refilled.

Before installing the heat pump in an existing system, it is important that the system is properly flushed through. Even if the heat pump is to be installed in a new system, the heat pump and system should be flushed.

After flushing an inhibitor should be used for long-term anticorrosion protection.

The heat pump manufacturer recommends water treatments (supplied by e.g. Fernox and Sentinel) specifically designed for heat pumps.



### Note

Ensure that cleaning agent has been removed from the entire system before adding inhibitor.

## Brine side

### COLLECTOR



### Note

The length of the collector hose varies depending on the rock/soil conditions, climate zone and on the climate system (radiators or underfloor heating) and the heating requirement of the building. Each installation must be sized individually

Max. length per coil for the collector should not exceed 400 m.

In those cases where it is necessary to have several collectors, these should be connected in parallel with the possibility for adjusting the flow of the relevant coil.

For surface soil heat, the hose should be buried at a depth determined by local conditions and the distance between the hoses should be at least 1 metre.

For several bore holes, the distance between the holes must be determined according to local conditions. Ensure the collector hose rises constantly towards the heat pump to avoid air pockets. If this is not possible, air vents should be used.

Because the temperature of the brine system can fall below 0 °C, it must be protected against freezing down to -15 °C. When making the volume calculation, use 1 litre of ready mixed brine per metre of collector hose (applies when using PEM-hose 40x2.4 PN 6.3) as a guide value.

Anti freeze must be mixed according to manufacturer's instructions to ensure frost protection and should be checked using a refractometer.



## Note

Ensure that cleaning agent has been removed from the entire system before the anti-freeze is added.

The manufacturer recommends water treatments(supplied by e.g. Fernox and Sentinel) specifically designed for heat pumps.

## SIDE CONNECTION

It is possible to angle the brine connections, for connection to the side instead of top connection.

To angle out a connection:

1. Disconnect the pipe at the top connection.
2. Angle the pipe in the desired direction.
3. If necessary, cut the pipe to the desired length.

## CONNECTING THE BRINE SIDE

Insulate all indoor brine pipes against condensation.

Mark the brine system with the antifreeze that is used.

Install as follows:

- expansion vessel
- pressure relief valve

Install the safety valve next to the expansion vessel as illustrated.

- pressure gauge

- shut-off valve

Install the shut-off valve as close to the heat pump as possible.

- enclosed filterball

Install the filterball as close to the heat pump as possible.

- vent valve

When necessary you should install venting valves in the brine system.



## Note

Condensation may drip from the expansion vessel. Position the vessel so that this does not harm other equipment.



## Note

In the case of connection to an open groundwater system, an intermediate frost-protected circuit must be provided, because of the risk of dirt and freezing in the evaporator. This requires an extra heat exchanger.

## Tip

If filling connection KB25/KB32 is used, the enclosed filterball does not need to be fitted.

# Heating system

The heating system is a system that regulates the indoor temperature with the help of the control system in the heat pump and, for example, radiators, underfloor heating, underfloor cooling, fan coils, etc.

## CONNECTING THE HEATING SYSTEM

Install as follows:

- expansion vessel
- pressure gauge
- pressure relief valve

Recommended opening pressure is 0.25 MPa (2.5 bar).

For information about max opening pressure, see technical data. Install the safety valve as illustrated.

- enclosed filterball

Install the filterball as close to S1155 as possible.

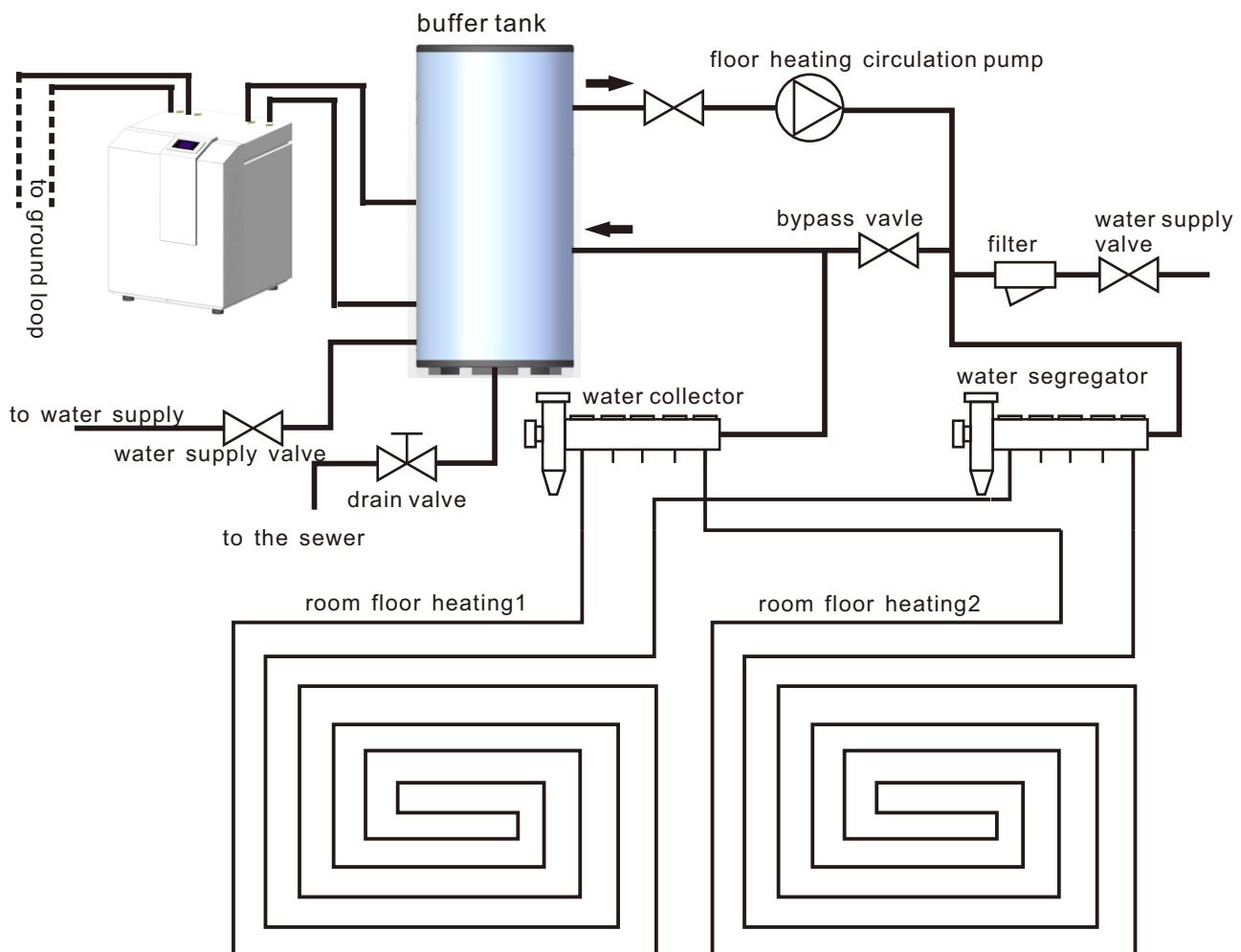
- shut-off valve

Install the shut-off valve as close to S1155 as possible.

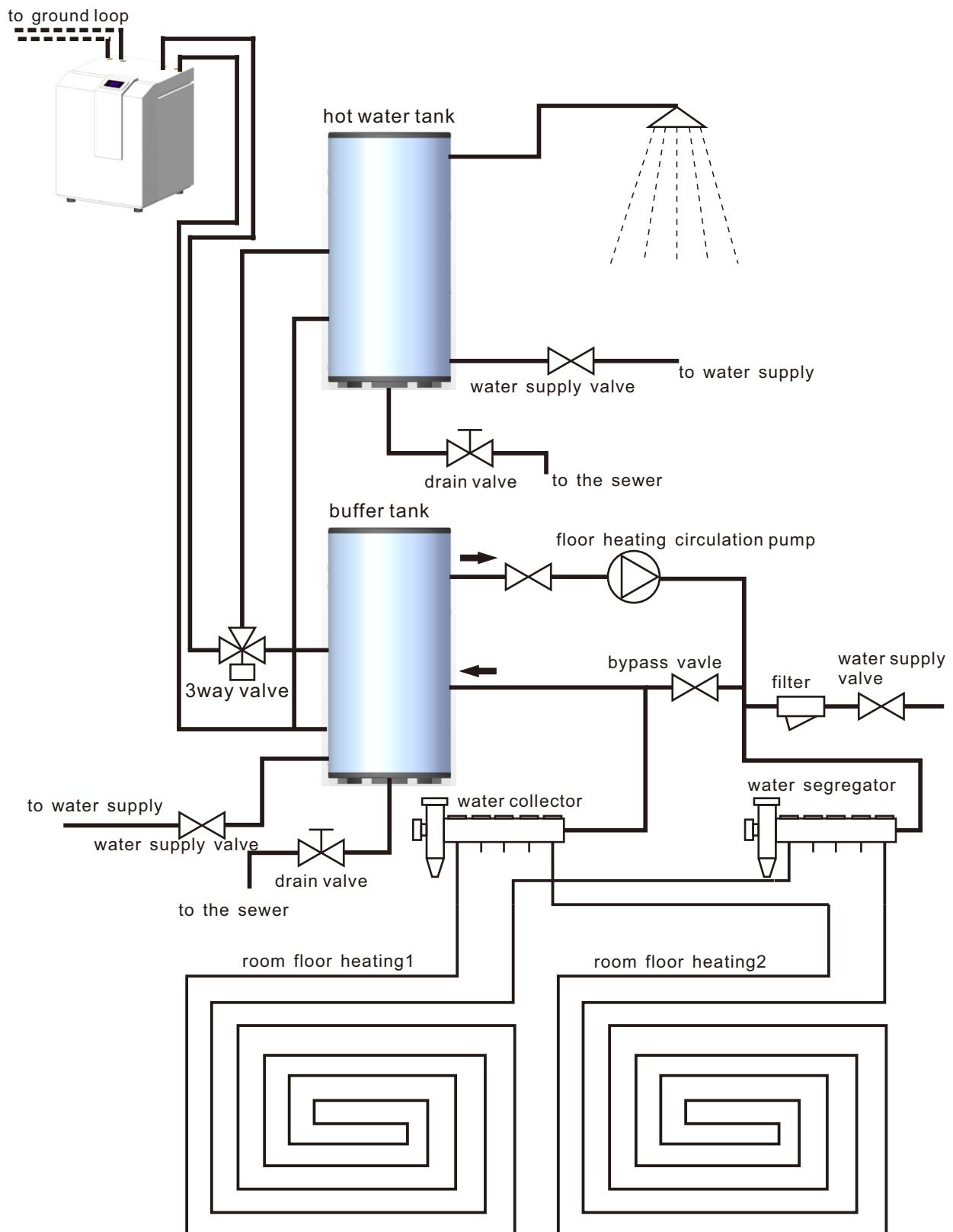
- When connecting to a system with thermostats on all radiators/underfloor heating coils, either a bypass valve

must be fitted or some of the thermostats must be removed to ensure there is sufficient flow and heat emission.

## Installation diagram for heating/cooling only



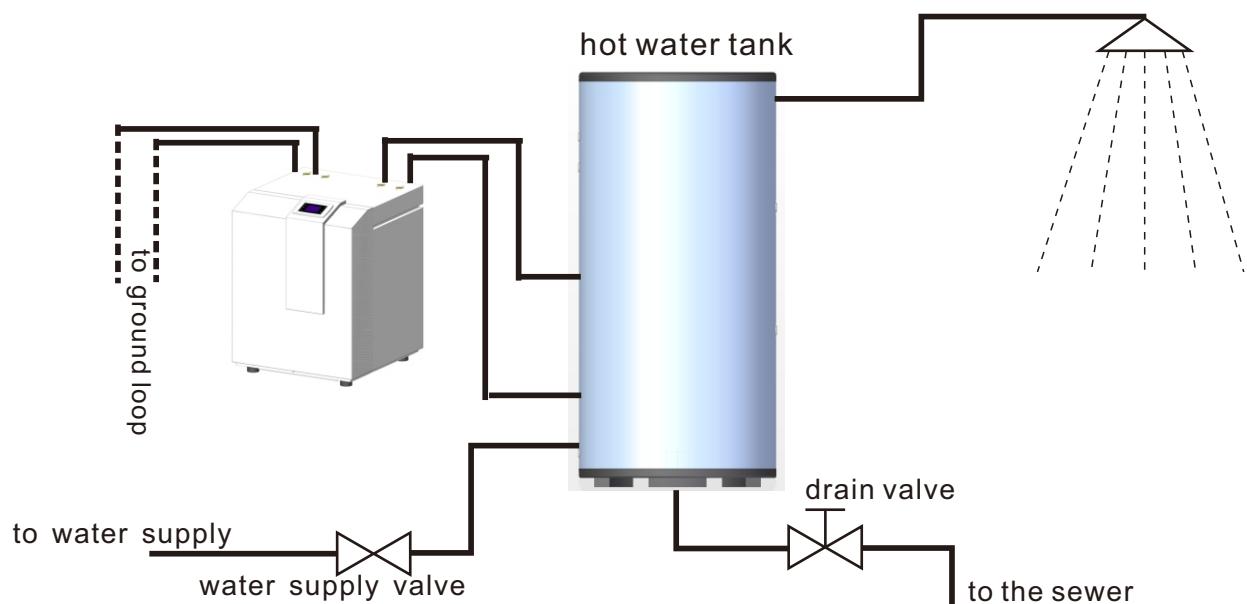
# Installation diagram for heating/cooling + hot water



## Note

the 3 way valve switch between DHW and heating should be motorized valve for 230V AC signal.  
disenergized for DHW, energized for heating.

## Installation diagram for hot water only



# Electrical installation

## General

All electrical equipment, including the outdoor temperature sensor, AC tank temperature sensor and hot water tank sensor are ready connected at the factory.

- Electrical installation and wiring must be carried out in accordance with national provisions.
- Disconnect the heat pump before insulation testing the house wiring.
- If the building is equipped with an earth-fault breaker, the heat pump should be equipped with a separate one.
- The heat pump must be installed via an isolator switch. The cable area has to be dimensioned based on the fuse rating used.
- If a miniature circuit breaker is used, this must have at least triggering characteristic.
- To prevent interference, sensor cables to external connections must not be laid close to high voltage cables.
- The minimum area of communication and sensor cables to external connections must be 0.5 mm<sup>2</sup> up to 50 m, for example EKX, LiYY or equivalent.
- When cable routing in the heat pump, the cable grommets must be used.

### Note

Electrical installation and any servicing must be carried out under the supervision of a qualified electrician. Disconnect the current using the circuit breaker before carrying out any servicing.

## **! Note**

If the supply cable is damaged, only the professional or similar authorised person may replace it to prevent any danger and damage.

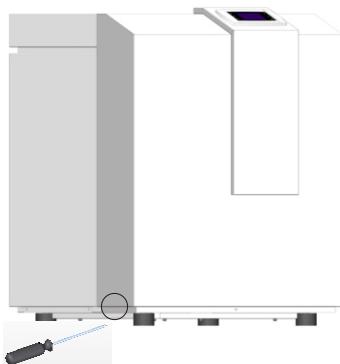
## **! Note**

Check the connections, main voltage and phase voltage before the product is started, to prevent damage to the heat pump electronics.

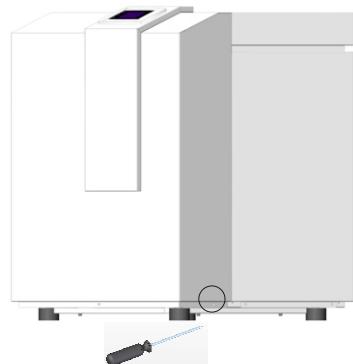
## **! Note**

Do not start the system before filling up with water. Components in the system could be damaged.

## **OPEN THE HEAT PUMP**



1. Remove the screw from the left side of the front panel.



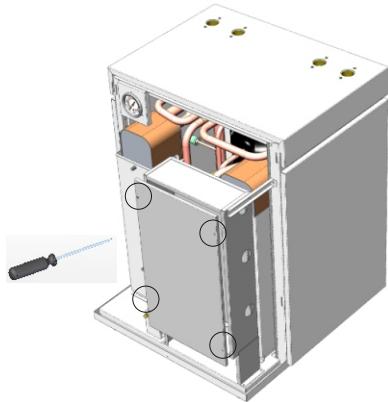
2. Remove the screw from the right side of the front panel.



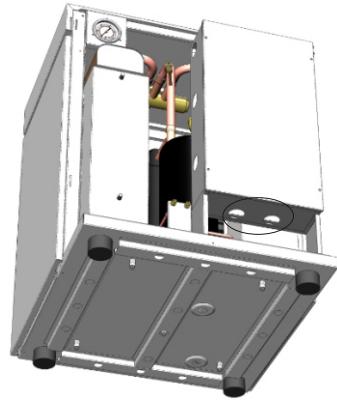
3. Push up the front panel.



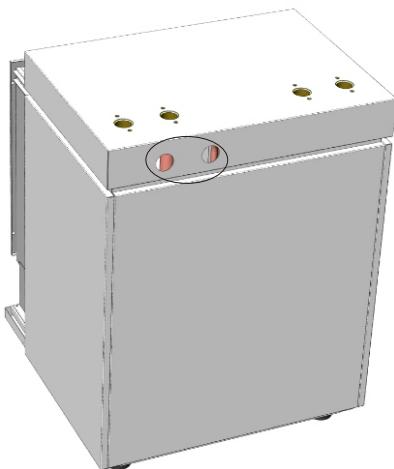
4. Pull upward the front panel. Pay attention on the controller wires.



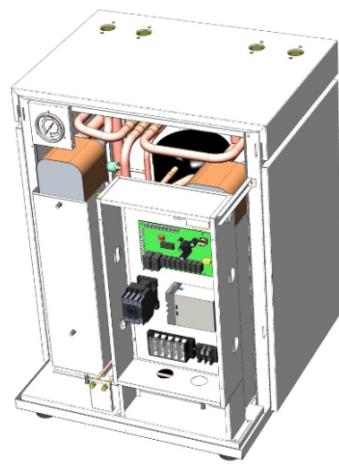
5. Remove the 4 screws from to open the electric box cover.



6. Power cables, water pump power cables should go through the 2 holes on the electric box bottom.

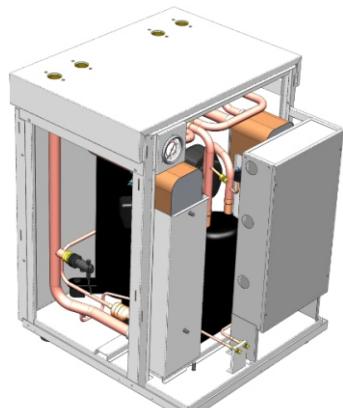
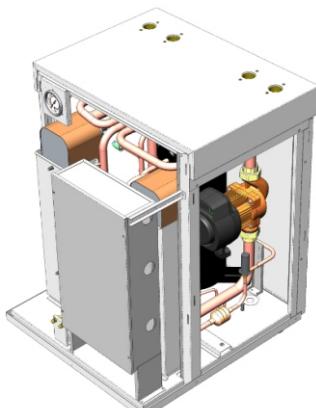


7. Power cables, water pump power cables, sensor cables should go through the 2 holes on the electric box bottom.



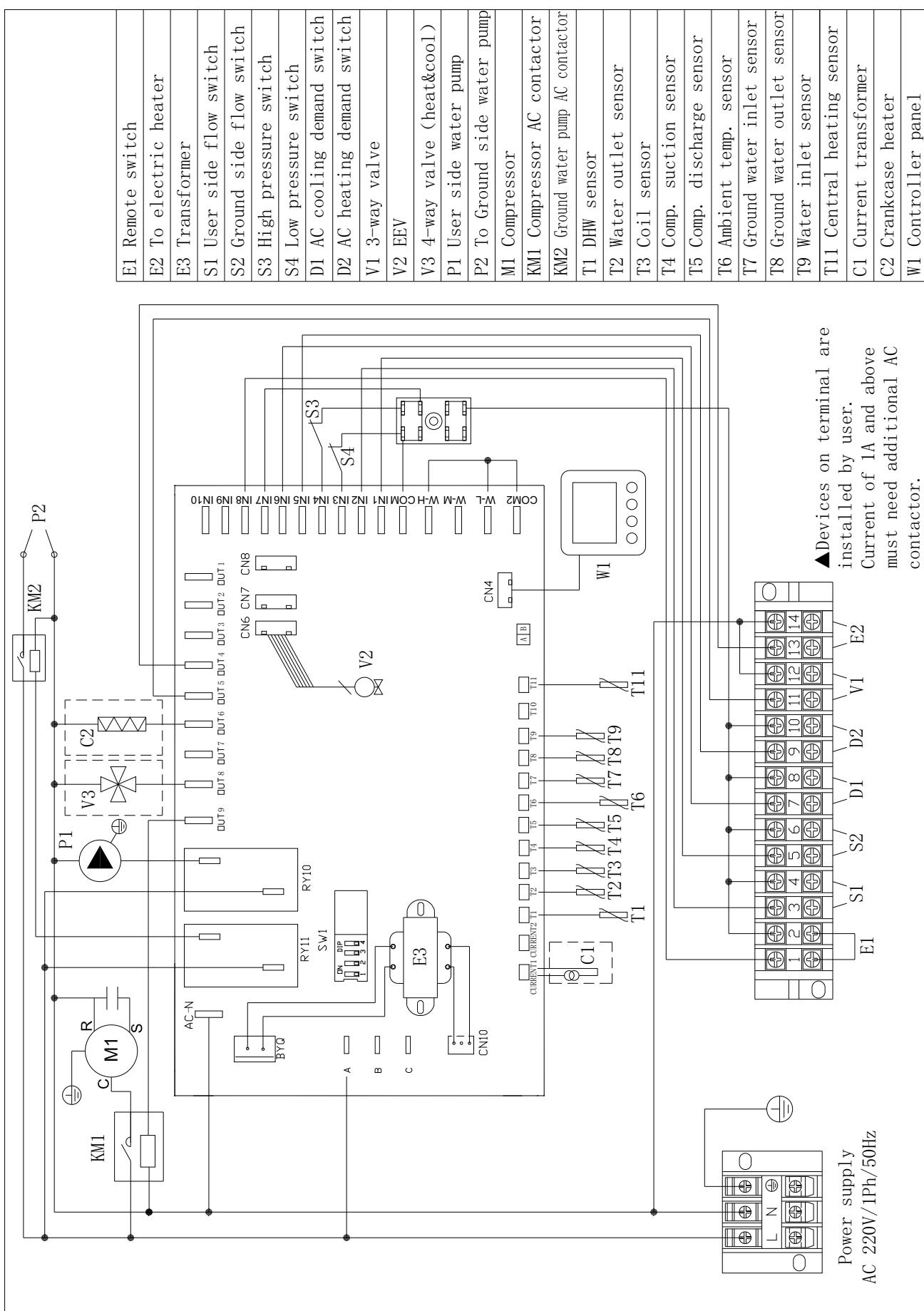
8. The main power source terminals are just at the bottom of the electric box.

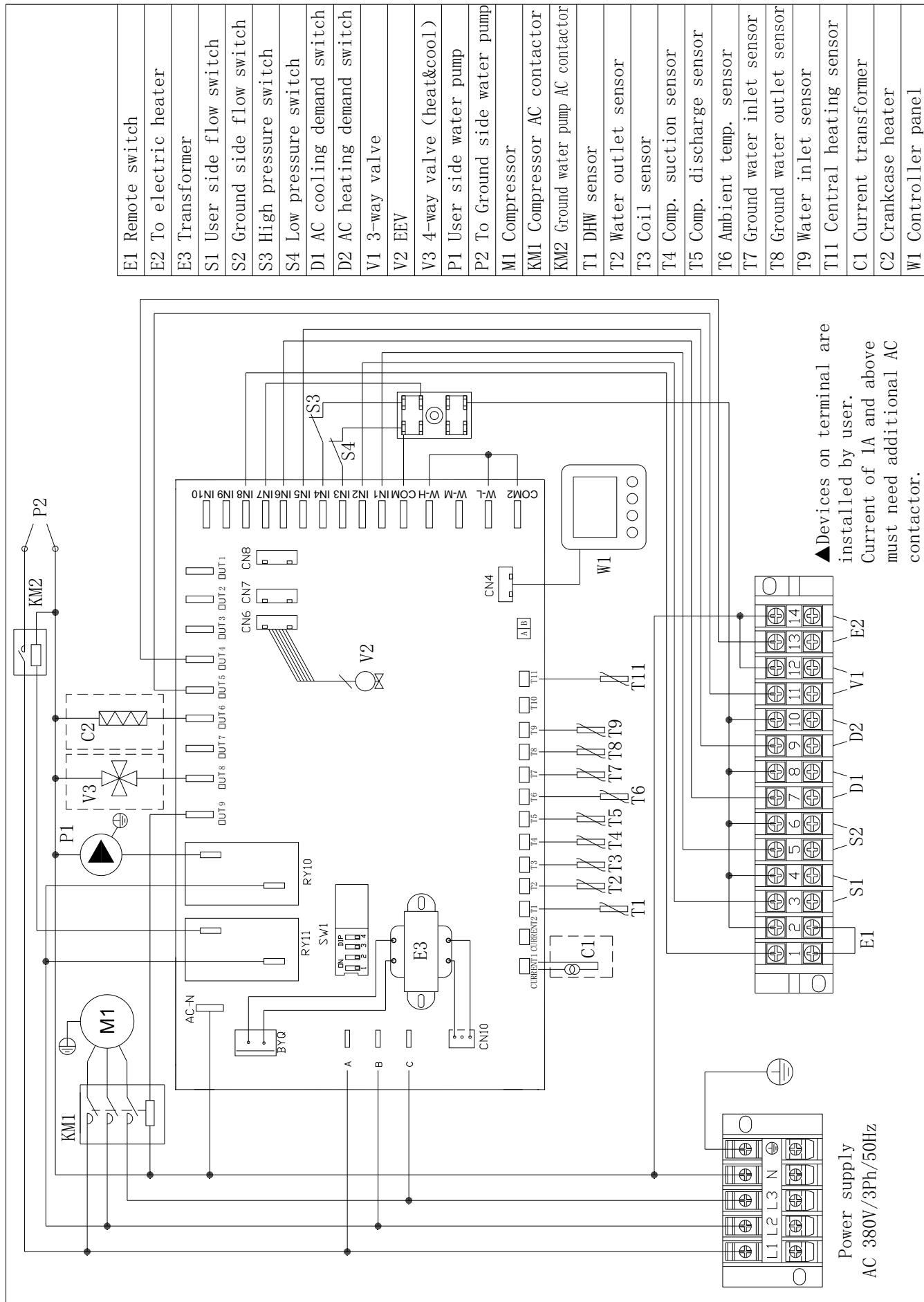
And all of the side panels and rear panel can be removed for repair or the replacement, as follows.



# Wiring diagram

Model: 6kW, 9kW, 10kW, 13kW - 220~240V/1ph/50Hz, single compressor

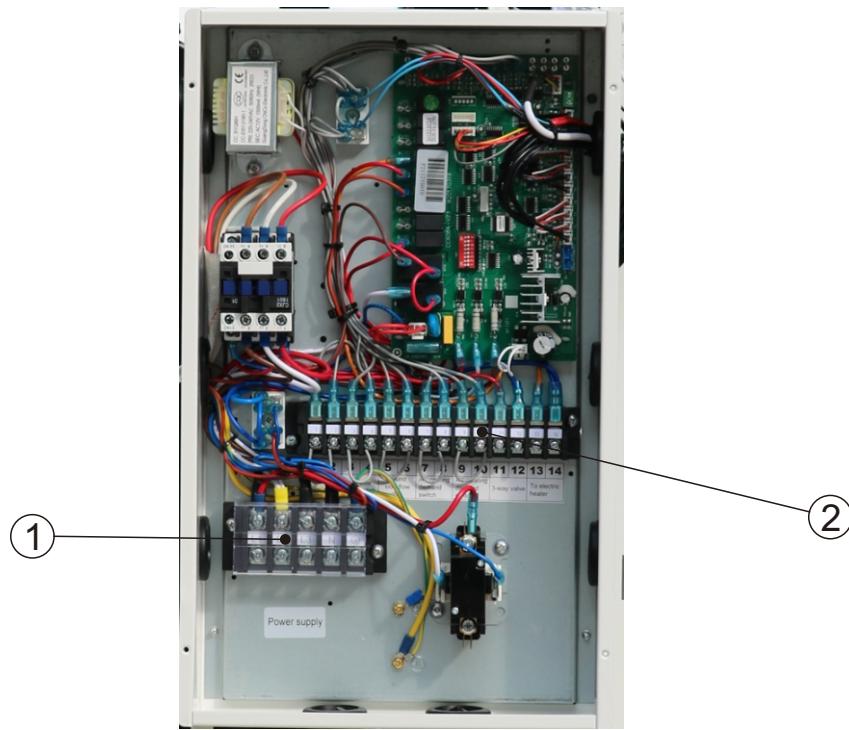




Model: 30kW, 37kW, 50kW, 62kW - 380~415V/3ph/50Hz, double compressors

# Main power connection

Opening the heat pump front panel, and opening the cover of the electric box, you will find the main power source terminal inside the electric box.



1. Power supply
2. Wiring terminals

The main power cables shall be according to the following size:

Model	Main power cable size
6kW, 230V	3 * 1.5 mm <sup>2</sup>
9kW, 230V	3 * 2.5 mm <sup>2</sup>
10kW, 230V	3 * 2.5 mm <sup>2</sup>
13kW, 230V	3 * 4.0 mm <sup>2</sup>
13kW, 380V	5 * 1.5 mm <sup>2</sup>
16kW, 380V	5 * 2.5 mm <sup>2</sup>
19kW, 380V	5 * 4.0 mm <sup>2</sup>
25kW, 380V	5 * 6.0 mm <sup>2</sup>
30kW, 380V	5 * 6.0 mm <sup>2</sup>
37kW, 380V	5 * 10.0 mm <sup>2</sup>
50kW, 380V	5 * 10.0 mm <sup>2</sup>
62kW, 380V	5 * 16.0 mm <sup>2</sup>

## Note

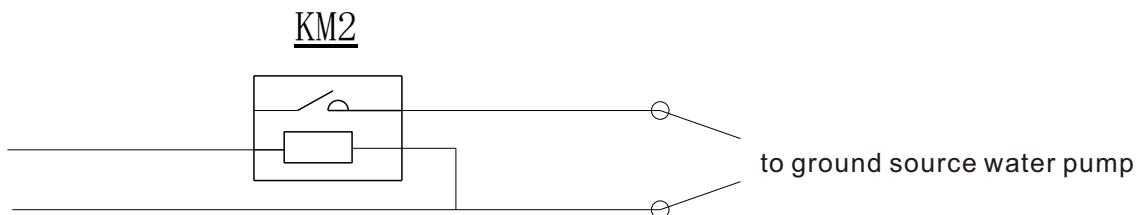
The above main power cables size is recommended by the manufacturer. In the actual installation, the power cable size should not be lower than the above figures, and must conform to local power regulation. And the above main power cable size does not contain the power of back-up electric heater. For those cases with back-up electric heater using power from the main power, the main power cable size must be increased accordingly to take the total power consumption.

# Ground source side water pump connection

The ground source side water pump is not integrated inside the ground source heat pump, so its model selection must be based on the actual condition of the ground loop. And open ground loop and closed ground loop makes very different for the water pump model selection.

The ground source water pump model selection must take the water pressure drop into account, for example, the water pipe diameter, pipe turns, filters etc.

On the wiring terminal inside the electric box, you can find the output AC contactor **KM2** for the ground source water pump.



## 3 way valve connection

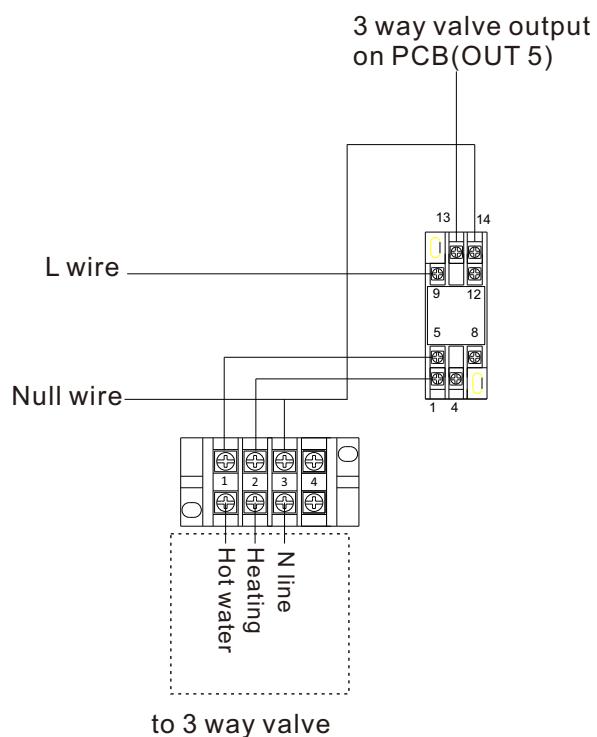
A 3 way valve should be installed onto the water piping system to switch between heating/cooling circuit and hot water circuit for those cases that users needs heating/cooling and hot water together.

3 way valve is off when unit is in DHW mode, switches on in other modes or when unit is off.

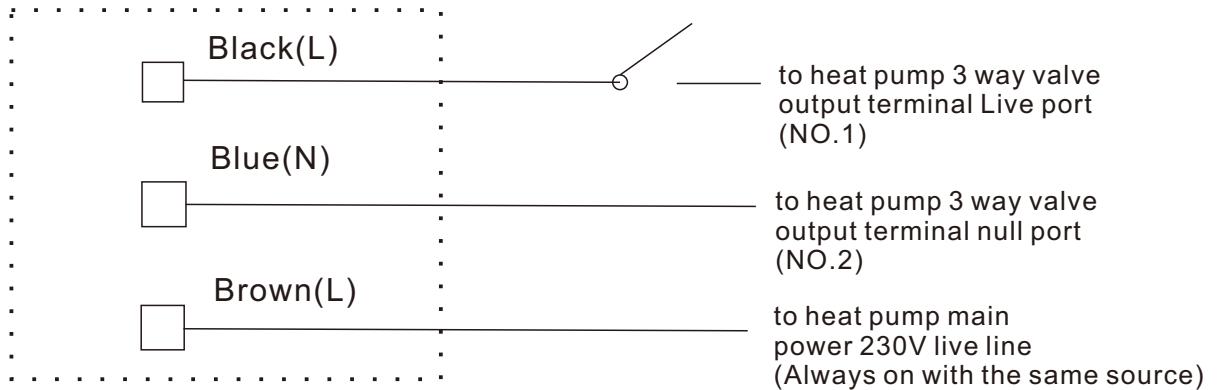
**Output terminal on the heat pump: 11-12**

Below is the wiring diagrams for the 2 types of 3 way valve connections.

Type 1: 3 way valve with 2 L wires



## Type 2: Electromagnetic 3 way valve

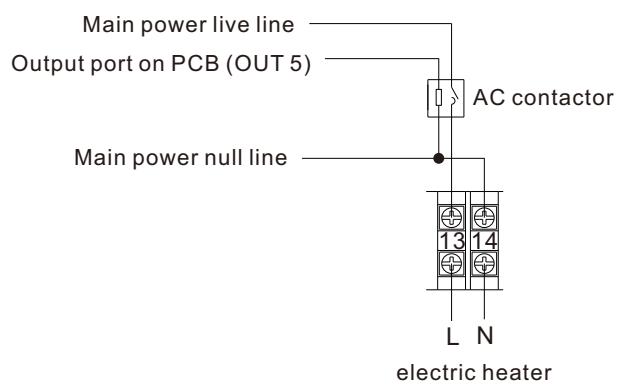


## Electric heater connection

The ground source heat pump is integrated with the output control for the electric back-up heater. The electric back-up heater can be set for heating, hot water or both, according to the actual need of the user.

The terminal for the electric back-up heater from the heat pump is just for output signal control only, and it should use the independent power source with an additional AC contactor.

### Output terminal on the heat pump: 13-14



#### Note:

Please make grounding for the electric heater to make sure electric safety.

## DHW tank sensor connection

The DHW tank sensor means domestic hot water tank sensor, which should be placed into the domestic hot water tank, to regulate the domestic hot water temperature.

The DHW tank sensor has been connected to the controller system, and the sensor body has been pulled out of the heat pump and on the back of the heat pump. It is labeled as "DHW sensor". See picture as below.

- On the back of the heat pump there are 3 sensors:
- DHW tank temperature sensor
  - AC tank temperature sensor
  - Ambient temperature sensor



### Note

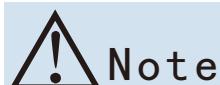
The sensor body must touch the inside surface of the temperature probe of the tank, and there must be full of Thermal conductive silicone grease between the sensor body and the probe, in order that the sensor can feel the tank temperature accurately.

## AC tank sensor connection

The AC tank sensor means heating/cooling water buffer tank sensor, which should be placed into the domestic heating/cooling buffer tank, to regulate the heating/cooling water temperature.

The AC tank sensor has been connected to the controller system, and the sensor body has been pulled out of the heat pump and on the back of the heat pump. It is labeled as "AC sensor". See picture as below.

- On the back of the heat pump there are 3 sensors:
- DHW tank temperature sensor
  - AC tank temperature sensor
  - Ambient temperature sensor

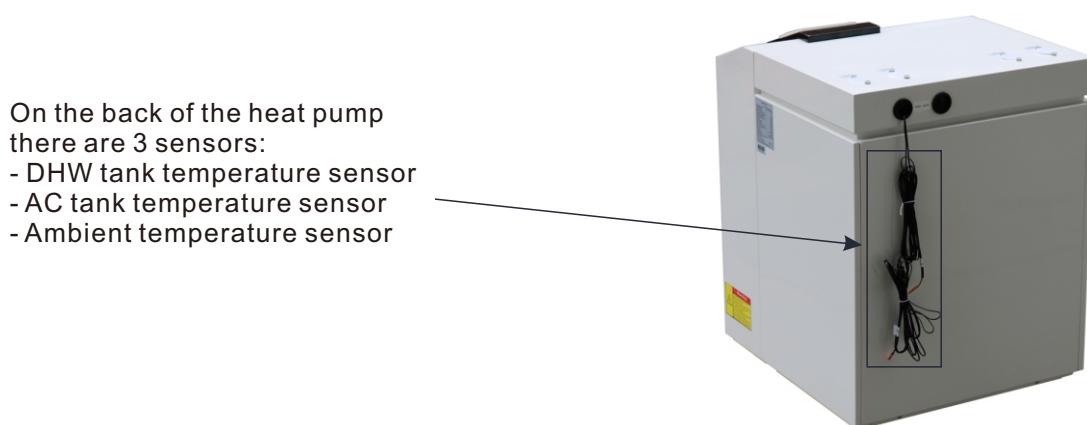


### Note

The sensor body must touch the inside surface of the temperature probe of the tank, and there must be full of Thermal conductive silicone grease between the sensor body and the probe, in order that the sensor can feel the tank temperature accurately.

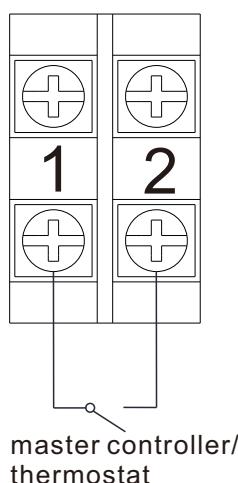
## Ambient temperature sensor connection

The ambient temperature sensor is for feeling the outdoor temperature for the heating curve functions. It has been connected on the controller system and with a wire, and you can find it on the back of the heat pump. It should be placed outdoor and its wire may need to be prolonged. In case it is too difficult or not possible to place it outside, it is better to turn off the heating curves function in the controller. See below picture showing where it is.



## AC signal device connection

The heat pump can work with the AC demand signal, to start or stop the heating or cooling mode. On the terminal inside the electric box, there is the terminal for this AC demand signal, terminal NO. 1-2. When this switch is on, the heat pump starts AC heating mode or cooling mode as per the pre-setting. When this switch is off, the heat pump stops the AC mode. So, this terminal can be connected to a master controller, or a thermostat of the house. Below is the drawing of the wiring.



## Using side water pump connection

Inside the 6kw~25kW models, the using side water pump is included inside the heat pump with ready wiring. For 30kW and bigger models, normally the using side water pump is not included and it needs to be installed outside and connected to the heat pump controller system. The output terminal with label can be found in the electric box. And the additional AC contactor with independent power source must be installed.

# Wi-Fi kit installation



This is the wifi kit. It contains 2 wires. When the dc inverter heat pump is without this wifi kit, its wire controller is directly connected to the PCB. And this wifi kit is connected between the wire controller and the PCB, with anti-mistake plugs, as follows:

Without Wifi kit normally:



Wired controller



PCB controller

Connecting the wifi kit in between, as follows:



Wired controller



Wi-Fi kit



PCB controller

## Note:

The Wi-Fi kit is magnetic. It can be attached on some metal sheet. It should be placed indoor where is closed to the indoor Wi-Fi spot, to get the best Wi-Fi signal.

# Commissioning

## Preparations

Check that the externally mounted filling valves are fully closed.



### Note

Do not start the heat pump if there is a risk that the water in the system has frozen.



### Note

Check all the wirings including the main power wiring and wirings for all the electric components and sensors. Make sure all the wirings are tight and firm.

## Filling and venting



### Caution

Insufficient venting can damage internal components in the heat pump.

### FILLING AND VENTING THE HEATING WATER SYSTEM

#### Filling

1. Open the filling valve (external, not included in the product). Fill the heating system with water.
2. Open the vent valve .
3. When the water that exits the vent valve is not mixed with air, close the valve. After a while, the pressure starts to rise.
4. Close the filling valve when the correct pressure is obtained.

#### Venting

1. Bleed the heat pump via a vent valve and the rest of the heating system via their relevant vent valves.
2. Keep topping up and venting until all air has been removed and the pressure is correct.

### FILLING AND VENTING THE BRINE SYSTEM

When filling the brine system, mix the water with antifreeze in an open container. The mixture should be protected against freezing down to about -15°C. The brine is topped up by connecting a filling pump.

1. Check the brine system for leakage.
2. Connect the filling pump and return line on the brine system's filling connection (accessory).
3. Close the reversing valve in the filling connection.
4. Open the valves on the filler connector.
5. Start the filling pump.
6. Fill until liquid enters the return pipe.
7. Close the valves on the filler connector.
8. Open the reversing valve in the filling connection.

# Start-up and inspection

## START GUIDE



### Note

There must be water inside the heating system before the heat pump is started.



### Note

With several heat pumps connected, the start guide must first be run in the subordinate heat pumps.

In the heat pumps that are not the main unit, you can only make settings for each heat pump's circulation pumps. Other settings are made and controlled by the main unit.

1. Turn on the power source switch of the heat pump, and the wire controller lights up and show the welcome page, and at this time the heat pump is still at off status.
2. Start the heat pump by holding the on/off button of the wired controller.
3. Follow the instructions in the next Chapter "Control and setting" in this manual for more detailed instruction on how to use the controller buttons and make the setting adjustments.



### Note

If the building is cooled when the heat pump starts, the compressor may not be able to meet the entire demand without having to use additional heating.

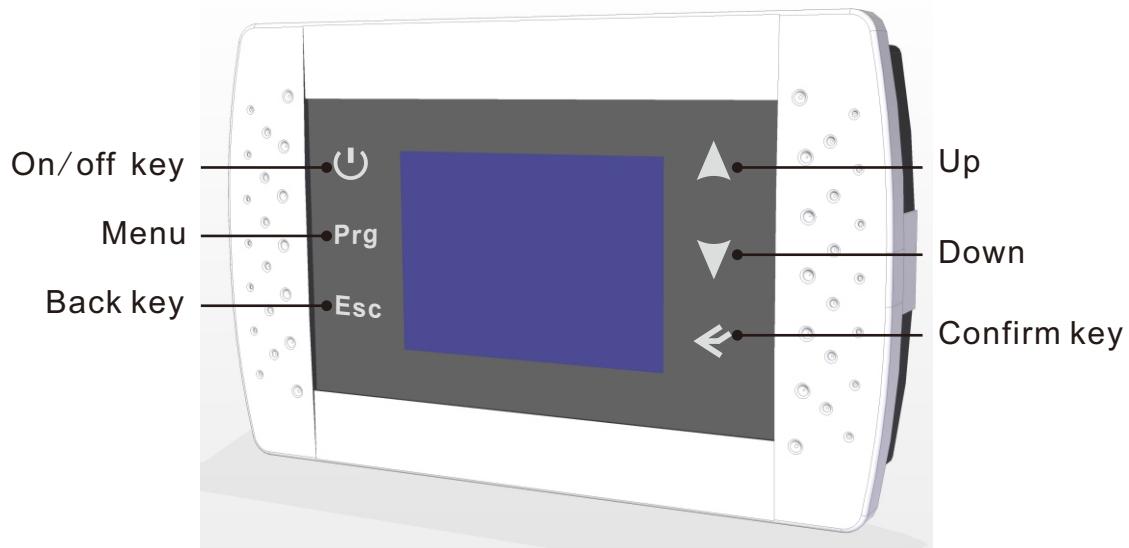
## INSPECTION GUIDE

**Please pay attention to the followings during the start-up and commissioning.**

1. The 2 circulating pumps will start firstly, 60s earlier than the compressor starts. Please check if the circulating pumps at two sides running normally or not.
2. When the circulating pumps are running, the remaining air inside the heating system could be vented out through the vent valve on the top point of the heating system.
3. 60s later, the compressor starts. Please check if the compressor running noise is normal or not. And check the high pressure gauge reading and low pressure gauge reading to see if the heat pump refrigerant pressure is normal or not.
4. When the compressor starts, the heat pump starts producing heating or cooling. Please check the water temperature changes at the water inlet and water outlet of the heat pump. Check these status parameters on the controller display panel.
5. When the heat pump is running for heating or cooling, there should be temperature different between the water inlet and water outlet. Check if the water temperature difference is in normal range or not, normally it should be around 5DegC. If the water temperature difference is too high, it means the water flow rate is not enough, please check the water circulating pump power and specification matching the system or not, or if the water circulating pump is working normally or not.

# Control and setting

## Display and buttons



### On/off key:

Hold this key for 5s to turn on or turn off the heat pump.

### Menu:

- 1) In main interface, touch this key to enter main menu.
- 2) Hold this key for 5s to switch modes.

### Back:

- 1) After enter the menu, touch this key to return to the upper class menu.
- 2) Hold this key for 5s to lock/unlock the keyboard.

### Up:

At main interface touch this key to set temperatures and touch ENTER key to confirm.

### Down:

- 1) At main interface touch this key to set temperatures, and touch ENTER key to confirm.
- 2) At main interface hold this key for 5s to enter electric heater manual mode.

### Confirm/ENTER:

- 1) At main interface hold this key for 5s to open the energy-saving mode (ECO mode).
- 2) When there is combining modes operation at main interface, use this key to switch between modes during temperature settings.

When there is no error, the main interface displays on/off status, mode, tank temperature, setting temperature, date and time.

When there is error, the main interface displays the error code and error description.

### Main interface:

Status:Heating	
A.C tank temp.	25°C
Setting temp	40°C
2019/11/12 14:47	

### Main menu:

<b>Status</b>
<b>Parameter</b>
<b>Time Setting</b>
<b>Timer Setting</b>

## Mode setting

The ground source heat pump can be for heating/hot water, or heating/cooling according to the structure. When it is with 4 way valve, it can heat or cool, otherwise it can heat or make hot water only. These features should be confirmed before the user buying from the local seller.

And the factory parameter H1, is to enable or disable the modes at factory level. These modes are as follows:

- 0: (Hot water)
- 1: (heat+Cool)
- 2: (Hot water+heat)
- 3: All
- 4: heat
- 5: Cool
- 6: (Hot water+Cool)

Users need to double confirm the required modes with the seller before purchase and before installation.

**At main interface, hold the menu (Prg) key for 5s to switch operating modes.**

Status:Heating	
A.C tank temp.	25°C
Setting temp	40°C
2019/11/12 14:47	

The picture at left shows the main interface display. The first line displays the current mode. When switching modes, the displayed mode here will change.

## 1) Cooling mode and its ECO mode (Para. H1 set to 1,3,5)

- When cooling demand switch is on, and the wire controller is set to cooling, the unit will be allowed for cooling. When cooling demand switch is off or wire controller is not set to cooling, the unit is not allowed for cooling. When cooling, water pump, 4 way valve, compressor, 3 way valve are all on.
- When it is in normal cooling mode, the AC tank water temp., parameter L2, L0 work together to determine unit on/off.
- For the first time power on, AC buffer tank temp.>L12(cooling set temp.), the heat pump will run cooling mode.
- When the AC buffer tank temp.  $\leq$ L2, heat pump starts standby status. In standby status, AC buffer tank temp.  $\geq$ L2(cooling set temp.)+L0(water temperature back difference for restarting in AC mode), heat pump starts cooling again.
- When the mode is energy-saving mode (ECO mode), the cooling mode set temperature adjusts automatically according to outdoor ambient temperature.
- When the heat pump is cooling, the cooling set temperature automatically change as per outdoor temperature, as follows:

Outdoor ambient temp.	Cooling set temp.
Ambient temp.>30°C	8°C
30°C $\geq$ ambient temp.>25°C	10°C
Ambient temp. $\leq$ 25°C	12°C

## 2) Heating mode and its ECO mode (Para. H1, unit type: 1, 2, 3, 4)

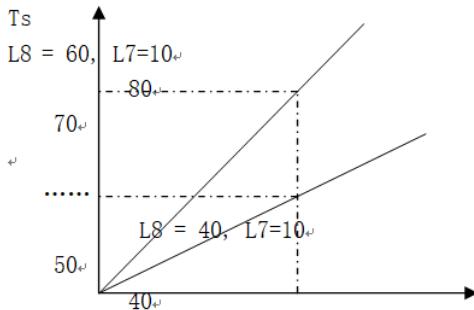
- When heating demand signal switch is ON and the controller mode is heating mode, the unit is allowed for heating; When the on/off signal switch is OFF or the controller mode is not at heating mode, the unit is not allowed for heating. When heating, water pump, fan, 3-way valve, and compressor are on, and 4-way valve is off.
- When the mode is normal mode, the controller turns on/off according to AC water tank temp. and L1, L0.
- At the first start-up, AC water tank temp.<L11, unit operates heating mode.
- When AC water tank temp. $\geq$ L1, unit standby; during standby status, when AC water tank temp. $\leq$ L1-L0, unit restart for heating.
- When the unit is at energy saving mode (ECO mode) (1. Heating Curve, 2. timer), it is decided by L6.
- Heating curves**

L7(Translation set), range 0~30, default 10;  
L8(slope set), range 24~50, default 30;

When heating curve is enabled, the min. water inlet temp. set value is 25°C, max. water inlet temp. set value is as per parameter F0 °C;

L7, L8 and outdoor ambient temp.Ta to calculate the water inlet temp. set value Ts:

$$Ts = \frac{(L8 - 18) * (18 - Tout)}{18} + 18 + L7$$



At the above curve coordinate, the point at the broken line is the Ts value when  $Ta=0^{\circ}\text{C}$ , at this time  $Ts=L8+L7$

- Timing (timing for changing water temperature)
 

Between timing 1 and timing 2, water inlet temp. set value is L13;  
   Between timing 2 and timing 3, water inlet temp. set value is L14;  
   Between timing 3 and timing 4, water inlet temp. set value is L15;  
   Between timing 4 and timing 5, water inlet temp. set value is L16;  
   Default timing 1: 23: 00;  
   Default timing 2: 06: 00;  
   Default timing 3: 09: 00;  
   Default timing 4: 17: 00;

### 3) DHW mode and its ECO mode: (H1 unit type: 0 ,2,3,6)

- When it is in normal mode, the units turns on/off as per DHW temp.,L5, and L4.
- At first start-up to make DHW, DHW tank temp.<L5, unit will operate DHW mode.
- When DHW tank temp. $\geq L5$ , unit standby. At standby status, when DHW tank temp. $\leq L5-L4$ , unit restarts for DHW.
- When unit is running DHW mode, water pump, compressor are on; 3-way valve, and 4-way valve are off.
- When it is in energy-saving mode (ECO mode), the DHW set value automatically adjust as per outdoor ambient temperature, as follows.  
   When  $Ta < 25^{\circ}\text{C}$ , DHW set value is as per the set value.  
   When  $Ta$  is  $26^{\circ}\text{C} \sim 28^{\circ}\text{C}$ , DHW set value is  $51^{\circ}\text{C}$ ,  
   When  $Ta$  is  $30^{\circ}\text{C} \sim 32^{\circ}\text{C}$ , DHW set value is  $49^{\circ}\text{C}$ ,  
   When  $Ta \geq 33^{\circ}\text{C}$ , DHW set value is  $47^{\circ}\text{C}$ .

### 4) Cooling+DHW mode(H1, unit type: 3, 6)

- When cooling demand signal switch is ON and the controller mode is cooling+DHW, unit will operate the cooling+DHW mode. When cooling and DHW have demand at the same time, unit runs DHW as priority, and switches to cooling after DHW reaches set temperature

### 5) Heating+DHW (H1, unit type: 2, 3)

- When heating demand signal switch is ON and the controller mode is heating+DHW, unit will operate the heating+DHW mode. When heating and DHW have demand at the same time, unit runs DHW as priority, and switches to heating after DHW reaches set temperature.

### 6) AUTO mode(H1, unit type: 1,3) (Energy saving mode is not available in AUTO mode)

- When heating demand signal switch or cooling demand signal switch is ON, unit is allowed to start. When on/off signal switch is OFF, unit is now allowed to start.
- When AC water tank temp. $\leq L3-L0$ , unit starts heating mode. When AC water tank temp. $\geq L+L0$ , unit starts cooling. When AC water tank temp. $=L3$ , unit standby.

# Status

After getting into main menu, touch UP or DOWN key to select the sub-menu, and touch ENTER key to go in. When the cursor is at "Status" menu, touch ENTER key to go in and check all the status.

Operating Status	Meaning
D.H.W. temp.	hot water tank temperature
A.C. inlet temp.	AC heating/cooling inlet water temperature
A.C. Outlet temp.	AC heating/cooling outlet water temperature
Ambient temp.	Ambient temperature
A.C tank temp.	AC heating/cooling buffer tank water temperature
Discharge 1 temp.	Compressor 1 discharge temperature
Coil 1 temp.	System 1 coil temperature
Sys. 1 suction	Compressor 1 suction temperature
Sys. 1 Current	System 1 current
Sys. 1 EEV	System 1 electronic expansion valve steps
Discharge 2 temp.	Compressor 2 discharge temperature
Coil 2 temp.	System 2 coil temperature
Sys. 2 suction	Compressor 2 suction temperature
Sys. 2 Current	System 2 current
Sys. 2 EEV	System 2 electronic expansion valve steps
Discharge 3 temp.	Compressor 3 discharge temperature
Coil 3 temp.	System 3 coil temperature
Sys. 3 suction	Compressor 3 suction temperature
Sys. 3 Current	System 3 current
Sys. 3 EEV	System 3 electronic expansion valve steps
Discharge 4 temp.	Compressor 4 discharge temperature
Coil 4 temp.	System 4 coil temperature
Sys. 4 suction	Compressor 4 suction temperature
Sys.4 Current	System 4 current
Sys. 4 EEV	System 4 electronic expansion valve steps
G.side inlet	Ground source water inlet temperature
G.side outlet	Ground source water outlet temperature
A.C.H.SW	AC heating demand signal switch on/off status
A.C.C.SW	AC cooling demand signal switch on/off status
High water SW	High water level switch
Low water SW	Low water level switch
Compressor 1	Compressor 1 on/off status
Compressor 2	Compressor 2 on/off status
Compressor 3	Compressor 3 on/off status
Compressor 4	Compressor 4 on/off status
pump	Using side water pump on/off status
G.side pump	Ground source water pump on/off status
4way- valve	4 way valve on/off status
EVI valve	EVI valve on/off status ( no use)
Unloader	Spray valve on/off status ( no use)
3way- valve	3 way valve on/off status
Supply valve	water supply valve on/off status

# User parameters

## How to find and set user parameter?

When the cursor stops on “parameter setting”, press ENTER button to enter the user parameter query interface, combine with UP and DOWN button, carry on parameter query, let the cursor stop on a certain parameter, press ENTER button can set parameters. After finishing setting, the controller can save the setting automatically. Press ESC button to leave the parameter setting.

## User parameter interface

AC. $\Delta T$	5°C
Heating SET	40°C
Cooling SET	12°C
...	
...	

Parameter	Display	parameter name	range	Default setting
L0	A.C. $\Delta T$	AC heating restart Delta T	2°C ~ 18°C	5°C
L1	Heating SET	Heating set temperature	20°C ~ Para. F0	55°C
L2	Cooling SET	Cooling set temperature	8°C ~ 30°C	12°C
L3	AC Auto. SET	AC auto mode set temperature	8°C ~ Para. F0	40°C
L4	DHW $\Delta T$	DHW mode restart Delta T	2°C ~ 18°C	5°C
L5	DHW SET	DHW mode set temperature	20°C ~ Para. F0	55°C
L6	Heating type	Heating energy-saving type	0 : curve (heating curve)	0
			1 : timer (different temp. in different time period)	
L7	Translation set	Heating curve paralle move	0~30	15
L8	Slope set	Heating curve slope set	24~50	30
L9	Timing 1	Timing 1	00 ~ 23h	23h
L10	Timing 2	Timing 2	00 ~ 23h	6h
L11	Timing 3	Timing 3	00 ~ 23h	9h
L12	Timing 4	Timing 4	00 ~ 23h	17h
L13	SET in period 1	Set temp. in period 1	20°C ~ Para. F0	35°C
L14	SET in period 2	Set temp. in period 2	20°C ~ Para. F0	42°C
L15	SET in period 3	Set temp. in period 3	20°C ~ Para. F0	30°C
L16	SET in T period 4	Set temp. in period 4	20°C ~ Para. F0	40°C
L17	Elec. type	Electric heater type	NO/	NO
			DHW/	
			AC/	
			both(DHW+AC)	
L18	Elec. Ambient set	Ambient temp. to start E-heater	-30°C ~ 35°C	5°C
L19	Elec. delay time	E-heater start delay time	0 ~ 90Min	30Min
L20	area	area type for defrosting	0: wet/1: dry	1
L21	Reserve	Reservation	-30°C ~ -1°C	-10°C
L22	Solar pump $\Delta T$ .	Solar pump start Delta T	3-15°C	10°C
L23	Reserve	Reservation	30°C ~ 65°C	40°C
L24	Water supply SET	Water supply set temperature	20°C ~ 60°C	45°C
L25	Current SET	Compressor current protection	0 ~ 79A	20
L26	Reserve	Reservation	20min ~ 90min	45min
L27	Reserve	Reservation	-15°C ~ -1°C	-7°C
L28	Reserve	Reservation	5min ~ 20min	8min
L29	Reserve	Reservation	1°C ~ 40°C	13°C
L30	G.side PT	Minimum ground source temp.	-10°C ~ 5°C	-5°C

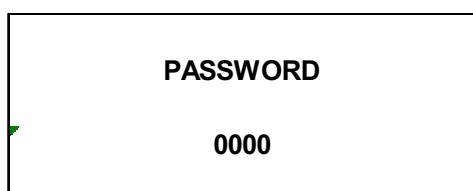
Parameter	Display	parameter name	range	Default setting
L31	E.H. Pump type	water pump on/off when E-heater is on	off/ on	ON
L32	Pump mode	Water pump mode (cool/heat/auto/DHW)	off (off at set temp.)/ on(always on)	OFF
L33	Water flow type	water flow switch type ( cascadde use )	ind.(independent)/ com.(share)	com.
L34	Control type	Control type	efficient/saving	efficient
L35	Module cycle	Module adjust cycle	5~150s	20s
L36	Pump ambient set	Ambient temp. to start water pump	-30°C ~ -1°C	-1 °C
L37	Pump test	water pump test	ON/OFF	OFF
L38	backwater test	water supply pump and return valve/solar pump test	ON/OFF	OFF
L39	Three-way test	3 way valve test	ON/OFF	OFF
L40	eheat run mode	E-heater run mode	1 : forced run mode	2
			2 : AUTO mode	
			3 : Smart mode	
L41	G.Pump test	ground water pump test	ON/OFF	OFF

## Factory parameters

### How to find and set the factory parameters?

Move the cursor to “parameter”menu, hold ENTER button for 5s to enter parameter setting interface (need input password to enter factory parameter interface). After inputting the password, touch ENTER button to get to factory parameter query interface. Use UP and DOWN button to switch between factory parameters. At the factory parameter you want to set, touch ENTER button to enter the setting interface of this parameter, use UP and DOWN button to adjust the setting value. After the value setting adjustment, touch ENTER button to quit the current factory parameter setting interface.

### Password input interface



### Factory parameter setting interface

Type	heat
Max EX temp.	105°C
...	
...	

Parameter	Display	Parameter name	Range	Default setting
H1	Type	0 : (Hot water)	0 : (Hot water)	2
		1 : (heat+Cool)	1 : (heat+Cool)	
		2 : (Hot water+heat)	2 : (Hot water+heat)	
		3 : All	3 : All	
		4 : heat	4 : heat	
		5 : Cool	5 : Cool	
		6 : (Hot water+Cool)	6 : (Hot water+Cool)	
H2	Max EX temp.	Max. compressor discharge temp.	80~150°C	105°C
P	EEV EX. Temp. $\Delta T$ .	Temp. Delta T for EEV discharge temp. control	1°C ~ 30°C	10°C
P0	EEV cycle	EEV adjust cycle	20s ~ 90s	30
P1	Superheat set	Superheat set	-5°C ~ 10°C	5°C
P2	Min EEV set	Min EEV set	10 ~ 400P	150P
P3	Max EEV EX temp.	allow min. discharge temp. for EEV adjusting	80°C ~ 150°C	95°C
P4	Reserve	Reservation	10 ~ 450P	400
P5	Reserve	Reservation	10 ~ 400P	300
P6	Reserve	Reservation	10 ~ 400P	150
P7	Reserve	Reservation	10 ~ 400P	100
P8	EEV mode	EEV mode	0: Manu/ 1: Auto	1
P9	Reserve	Reservation	0: Manu/ 1: Auto	0
PA	Max EEV set	Max EEV set	300 ~ 480P	450
Pb	Reserve	Reservation	10 ~ 400P	80
Pc	Reserve	Reservation	10-400P	70
Pd	Reserve	Reservation	10-400P	60
PE	Reserve	Reservation	1-40	60
F0	Max temp. set	Max. temp. set for AC&DHW	40°C ~ 90°C	55°C
F1	Temp. accuracy	temperature accuracy correction on display	-5°C ~ 15°C	0°C
F2	SSV EX. temp.	SSV EX. temp.	80 ~ 150°C	150°C
F3	SSV EX. temp $\Delta T$ .	SSV EX. temp.	5 ~ 40°C	40°C
F4	EVI set temp.	EVI set temp.	-20 ~ 20°C	5°C
F5	Load-off	Load-off	NO/YES	NO
J0	Aux EEV set 1	Aux EEV set 1	10~480P	120
J1	Aux EEV set 2	Aux EEV set 2	10~480P	120
J2	Aux EEV set 3	Aux EEV set 3	10~480P	120
U0~Ub	Heating Steps set 1- Heating Steps set C	Heating Steps set 1- Heating Steps set C	10~480P	EEV steps fixed control, no use here.
y0~y8	Cooling Steps set 1- Cooling Steps set 9	Cooling Steps set 1- Cooling Steps set 9	10~480P	

# Date and time setting

## How to do date and time setting

When cursor stops at “time setting” menu, touch ENTER button to enter date and clock setting interface. Cursor stops at “date” menu, touch ENTER button to enter setting on year, use UP and DOWN button to adjust year value and touch ENTER button to finish year setting and enter setting of month, doing the same operation as above, and then enter setting on date and do the same, finally touch ENTER button to save and quit date setting. When cursor stops at “clock”, do the same operation as above to set the clock.

## Date and time setting interface

DATE:	2022-05-15
CLOCK:	16: 13

# Timer setting

## How to do date and time setting

When cursor is at “timer setting”, touch ENTER button to get into timer setting interface, use UP and DOWN button to get to timing sections ( 2 sections). For example, when cursor is at “timing 1”, touch ENTER button to get into setting status, use UP and DOWN button to choose yes or no. when it is set to yes, touch ENTER button to enter “timer on” hour setting, use UP and DOWN button to change the values, and touch ENTER button to save and at the same time enter “timer on” minute setting, do the same operation to finish and finally touch ENTER button to save and at the same time enter “timer off” setting, use the same method as above to finish timer off setting and finally touch ENTER button to confirm and quit timing 1 setting.

Do the same key operation for timing 2.

The timing setting for return water, feeding water is the same as the timer setting.

## Timer setting interface

Timing(1):	x
Timing(2) :	x
Backwater timing:	x
Add water timing:	x
WT. supply timing:	x

## Energy-saving mode: Heating curves

The controller is integrated with energy-saving mode (ECO mode) for cooling, heating, and hot water, in order to save more energy for all operating modes and making the house heating more comfortable.

### How to enable the energy-saving mode?

At main interface hold **ENTER** button for 5s to open the energy-saving mode (ECO mode).

The energy-saving mode (ECO mode) for heating contains two functions, as follows:

- Heating curves
- Heating water temperature timer function (ECO heating function)

Below is the user parameters for the heating curves:

Parameter	Display	parameter name	range	Default setting
L6	Heating type	Heating type of energy-saving mode (ECO mode)	0 : curve (heating curve)	0
			1 : timer (different temp. in different time period)	
L7	Translation set	Heating curve paralle move	0~30	15

When the Parameter L6 is set to 0, it means heating curve is selected.

And the L7 and L8 are the parameters for the heating curves. For the detailed introduction on how the heating curves work, please refer to "Mode setting" in Chapter "Control and setting".

## Energy-saving mode: ECO heating function

The ECO heating function calls the heating water temperature timer function, which means different water temperature at different time span in 24 hours, to save more energy. When there is no people at home in day time, the heating water temperature can be lower to save more energy.

When user parameter L6 is set to 1, it means the energy-saving mode (ECO mode) has been set to the ECO heating function.

User parameters L9~L12 is the 4 timing periods.

User parameters L13~L16 is the heating water set temperature in the 4 timing periods.

Below are the parameters for the ECO heating function:

Parameter	Display	parameter name	range	Default setting
L6	Heating type	Heating type of energy-saving mode (ECO mode)	0 : curve (heating curve)	0
			1 : timer (different temp. in different time period)	
L9	Timing 1	Timing 1	00 ~ 23h	23h
L10	Timing 2	Timing 2	00 ~ 23h	6h
L11	Timing 3	Timing 3	00 ~ 23h	9h
L12	Timing 4	Timing 4	00 ~ 23h	17h
L13	SET in period 1	Set temp. in period 1	20°C ~ Para. F0	35°C
L14	SET in period 2	Set temp. in period 2	20°C ~ Para. F0	42°C
L15	SET in period 3	Set temp. in period 3	20°C ~ Para. F0	30°C
L16	SET in T period 4	Set temp. in period 4	20°C ~ Para. F0	40°C

# Back-up electric heater setting

The back up electric heater can be set to serve heating mode, or serve hot water mode, or the both, or disabled. Below is the control logic of the electric heater.

- **NO electric heater:** When L17 is set to 0, unit does not have electric heater, the electric heater over-heat protection is disabled.
- **DHW electric heater:** When L17 is set to 1, the electric heater is for DHW, the control output should be for the DHW tank electric heater.

**DHW electric heater starting conditions: meet the following conditions at the same time:**

- DHW tank temp.  $\leq$  DHW set temp. - restarting Delta T, regardless on or off status.
- Hold the DOWN key for 5s to start DHW heater manually.
- When the E.H. pump mode L31 is set to ON, the circulating pump must run for 20s firstly, and water flow switch is ON.
- Water level switch is at normal status without error.

**Electric heater turn-off conditions: meet one of the following conditions.**

- DHW tank temp.  $\geq$  DHW set temp., regardless heat pump is on or off.
- When L31 is set to off, water flow switch is off.
- water level switch is with error.
- switch the on/off status, cancel electric heater manual mode.

- **AC heating electric heater (L17 Elec. Type is set to AC) :**

**AC electric heater starting conditions: meet the following conditions at the same time:**

- AC tank temp.  $\leq$  set temp. - restarting Delta T.
- When the E.H. pump mode L31 is set to ON, the circulating pump must run for 20s firstly, and water flow switch is ON.
- E.Heater delay time  $\geq$  Parameter L19.
- Ambient temp.  $\leq$  Parameter L18.
- Water level switch is at normal status

**Electric heater turn-off conditions: meet any one of the following conditions.**

- AC tank temp.  $\geq$  set temp.,
- When the E.H. pump mode L31 is set to ON, water flow switch is off,
- Ambient temp.  $\geq$  L18+2°C.
- Water level switch has error

- **DHW+AC Electric Heater (L17 Elec. Type set to both)**

**DHW+AC electric heater starting conditions: meet the following conditions at the same time:**

- Tank temp.  $\leq$  set temp. - restarting delta T.
- When the E.H. pump mode L31 is set to ON, the circulating pump must run for 20s firstly, and water flow switch is ON.
- E.Heater delay time  $\geq$  Parameter L19, and water temp. does not rise up; (If water tank temp rises up by  $\geq 1^{\circ}\text{C}$ , controller will check it again in the next cycle) .
- Ambient temp.  $\leq$  Parameter L18.
- Water level switch is at normal status

**Electric heater turn-off conditions: meet any one of the following conditions.**

- tank temp.  $\geq$  set temp.  $-1^{\circ}\text{C}$ .
- When the E.H. pump mode L31 is set to ON, water flow switch is off,
- Ambient temp.  $\geq$  L18+2°C.
- Water level switch has error

Below user parameters are the parameters for the back-up electric heater.

Parameter	Display	parameter name	range	Default setting
L17		Electric heater type	NO/	NO
			DHW/	
	Elec. type		AC/	
			both(DHW+AC)	
L18	Elec. Ambient set	Ambient temp. to start E-heater	-30°C ~ 35°C	5°C
L19	Elec. delay time	E-heater start delay time	0 ~ 90Min	30Min
L40		E-heater run mode	1 : forced run mode	2
	eheat run mode		2 : AUTO mode	
			3 : Smart mode	

## DHW disinfection

The DHW (domestic hot water) disinfection function is built in the controller as a solid logic. It works as long as DHW mode is active. This means the controller is set to DHW mode or DHW+heating mode, or DHW+cooling mode.

The DHW disinfection starts 7 days (7\* 24 hours) after the DHW mode is active for the first time, and repeats in every 7 days (7\*24 hours).

The DHW disinfection heats the domestic hot water up to 55DegC with compressor and the electric heater working at the same time, and then the compressor stops at 55DegC and the back-up electric heater heats the domestic hot water up to 65DegC and keeps for 30mins.

When the disinfection function is working, it keeps trying to reach 65DegC, and would quit this function 3 hours later, no matter it had succeeded reaching 65DegC.

There must be the electric heater inside the DHW tank to make sure the DHW disinfection function work well. And the parameter L17 should be set to the electric heater to be serve to DHW or both, then the electric heater will work for the DHW disinfection function.

Even if there is no electric heater in the tank, the DHW disinfection function won't bring any negative effect to the heat pump.

Parameter	Display	parameter name	range	Default setting
L17		Electric heater type	NO/	NO
			DHW/	
	Elec. type		AC/	
			both(DHW+AC)	

## Using side water pump setting

The using side water pump is the water pump between the heat pump and the buffer tank/DHW tank. It can be set to work with different type of electric heater, for example the pipe electric heater needs the water pump keep running when it is work, while the tank electric heater does not. See user parameter L31.

Also, the using side water pump can be set to be off by reaching set temperature or keeping on. See user parameter L32.

L36 is the parameter for running the water pump to bring warm water from the buffer tank to the water pipes when outdoor temperature is too cold, when the heat pump is in standby status. This function can avoid the heating water pipes being frozen and damaged. Most ground source heat pumps are installed in basement where is normally colder than hall and living rooms.

Below is the user parameters for the using side water pump.

Parameter	Display	parameter name	range	Default setting
L31	E.H. Pump type	water pump on/off when E-heater is on	off/ on	ON
L32	Pump mode	Water pump mode (for cool/heat/auto/DHW)	off (off at set temp.)/ on(always on)	OFF
L36	Pump ambient set	Ambient temp. to start water pump	-30°C ~ -1°C	-1 °C
L37	Pump test	water pump test	ON/OFF	OFF

# Wi-Fi Control

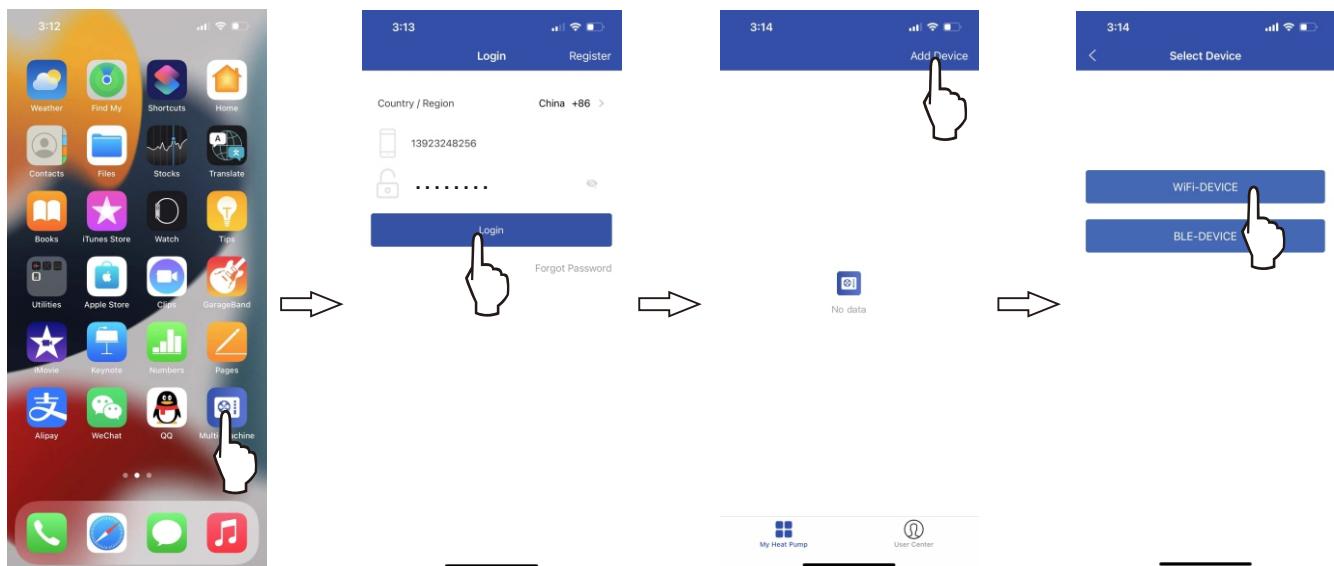
## APP download

For both IOS and Android:

Enter "Multi-Machine" in Application Store, search for multi-function machine APP, download and install.

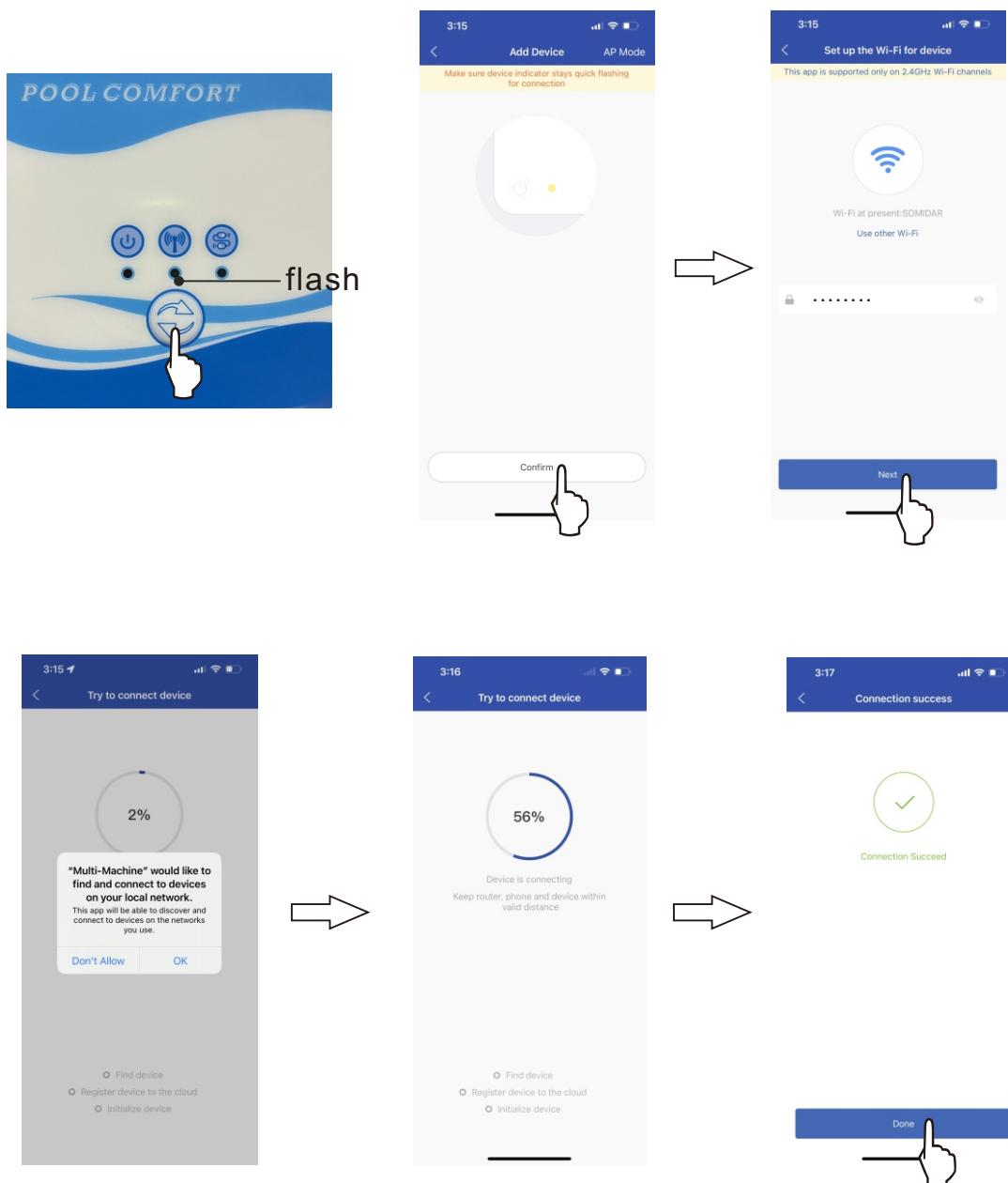
## User registration

- Click the icon “Multi-Machine” to open the app.
- Enter your mobile phone number or email address and password, press the “Login” button.
- After successful registration, click the “Add Device” button.
- Click “WIFI Device” button.



# Wi-Fi connection

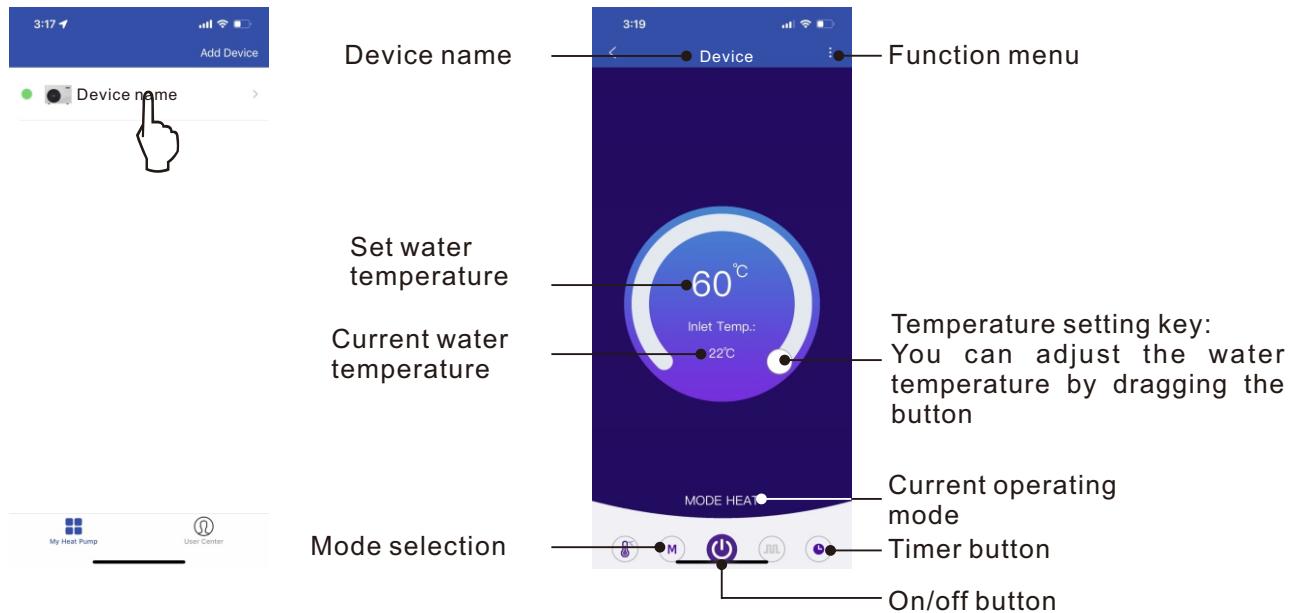
- Connect the Wi-Fi kit between the PCB and the wire controller, the red power light and the green Wi-Fi light are on.
- Long press the "connect" key for 8 seconds, the green Wi-Fi light start flash quickly.
- Click the "Confirm" button on your phone.
- Enter the Wi-Fi password and press the "Next" button.
- Press "OK" button, the app start to find and connect to device.
- When the device is successfully connected, the phone screen will display the "Connection succeed" information, press "OK" button to confirm the connection .



# APP user guidance

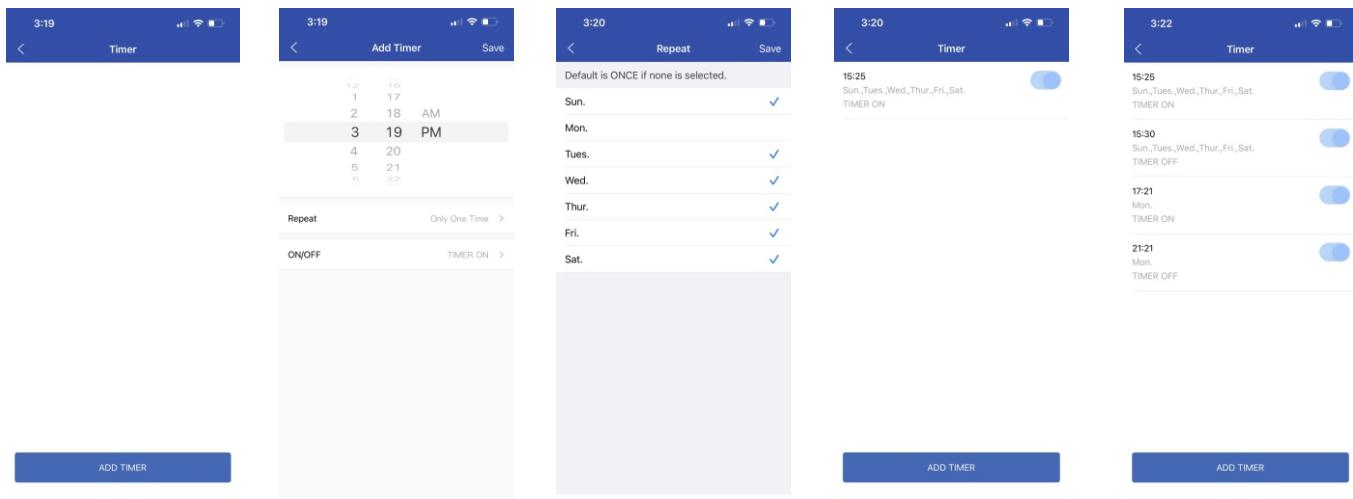
- Open the app, click on the device name.
- Enter the app control interface, see the description for the name of each part of the interface.

## APP user guidance



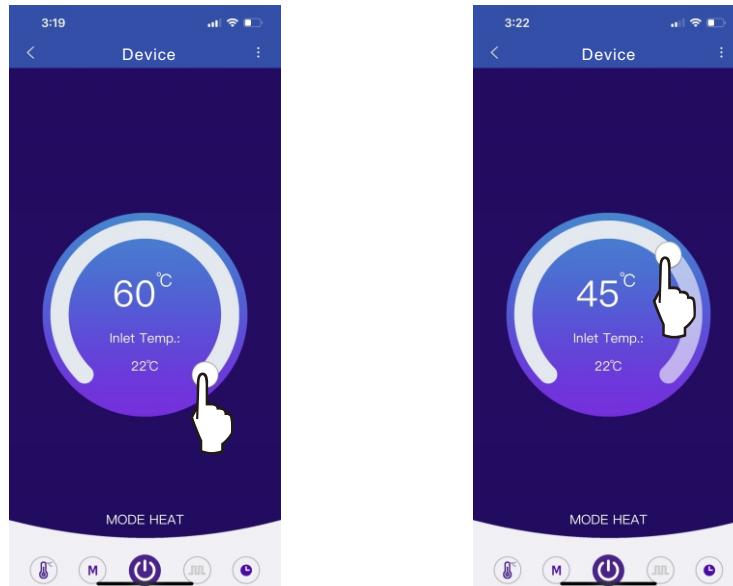
## Timer function

- Press timer button.
  - Press “ADD TIMER” button.
- Set timing time and select date and timing on/off.



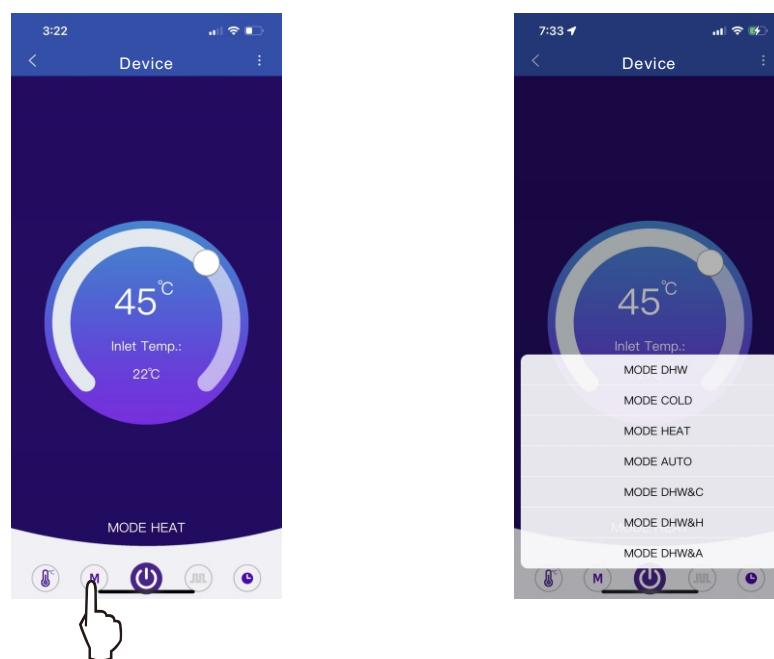
## Set water temperature

- Drag the big dot on the temperature circle with your finger to adjust the set water temperature.



## Set operating mode

- Press the “M” button, You can call out the operating mode menu, you can select the operating mode you need.



# Maintenance & trouble shooting

## Maintenance



### Note

Maintenance may only be carried out by persons with the necessary expertise.

When replacing components on the heat pump, only replacement parts from manufacturer may be used.



### Note

An immersion heater without a temperature limiter is not allowed to be installed.



### Note

The heat pump must be serviced once a year by competent and qualified personnel, such as a heat pump engineer or other qualified professional.

When replacing components in the heat pump, the replacement parts from manufacturer may be as priority.



### Note

If an electrical connection has been disconnected and is connected, ground must be checked using a suitable multimeter.



### Note

After servicing, complete the relevant maintenance record section checklist located in this manual.

Completion of the maintenance record is a condition of warranty. For full terms and conditions of warranty, please contact your local seller.



### Note

All water filters must be cleaned and washed in every 3 months to 6 months accordingly.

## GENERAL INSPECTION

Check the following:

1. Condition of casing.
2. Electrical connections.
3. Pipe connections.
4. Alarm log.

Correct any fault before continuing.

## BRINE SYSTEM

Check the following:

1. Particle filter.
2. Anti-freeze with suitable refractometer.
3. Expansion vessel.
4. System pressure
5. Flow and return temperature. The difference must be 2 - 5 °C.

Correct any fault before continuing.

## HEATING WATER SYSTEM

Check the following:

1. Heating water system start and stop temperature.
2. Heating curve settings.
3. Function of all the water sensors.
4. System pressure.
5. Flow and return temperature. The difference must be 5 - 10 °C.
6. Particle filter if it has.

Correct any fault before continuing.

## **WATER QUALITY AND WATER SCALE**

Cleaning: All the water system should be washed completely and termly, including the water filter. Make sure all the waterway clear and clean.

### **Water quality**

It is suggested that the heating/cooling water should be changed periodically, every year one time.

### **Wash the water scale**

Please use the professional descaling solvent to wash the scale. The gravity flow system or high pressure forcing flow can be used to wash the scale away circularly.

### **Drain the water from the heat exchangers**

Each heat exchanger has its own drain valve in the front of the heat pump, which can be seen and operated after the front panel is removed.

In case the power electricity is cut in extremely cold winter, the water inside the heat exchangers should be drained out fully, to avoid frozen and damage to the heat exchangers.

These drain valves are like the refrigerant injecting valve. Remove its cap, and press the core inside and hold it and the inside water can be drained out.



## Maintenance record

Date of maintenance	Components and parts	Status and conditions

## Error codes

Error/protection code	Display
E01	System 1 discharge temp. Sensor failure
E05	System 1 coil temp. Sensor failure
E09	System 1 suction temp. Sensor failure
E18	AC outlet temp. Sensor failure
E19	AC intlet temp. Sensor failure
E20	Hot water sensor failure
E21	(All) Communication failure
E22	Ambient temp. Sensor failure
E25	Water level failure
E26	A.C.tank temp.sensor failure
E27	G.side inlet sensor failure
E28	G.side outlet sensor failure
P01	Water flow protection
P02	System 1 high pressure protection
P06	System 1 low pressure protection
P10	Power phase failure
P11	Comp. 1 discharge temp. too high protection
P15	Temp. difference too high between inlet and outlet water
P16	Outlet temp. too low protection in cooling
P17	antifreeze protection
P19	System 1 compressor over current
P25	Ambient temp. too low protection
P27	Ground side status antifreeze protection
P28	Ground water flow protection

# Trouble shooting

Please refer to the below explanation and solutions for some common troubles.

Failure	Possible causes	Solutions
No running of the unit	1. Power source failure	1. turn off the switch and check the power source
	2. Loosened wiring	2. find the caused and repair
	3. The power fuse has broke	3. change a new fuse
The pump is running without water recycling or with high noise	1. Water leakage of the water system	1. check the water supply device and inject water
	2. There is air in the system	2. Discharge the air
	3. the valves are not open entirely	3. open the valves completely
	4. Filter blockage	4. Wash the filter
Low refrigerant capacity while compressors are running	1. refrigerant shortage	1. check leakage and supply refrigerant
	2. bad water thermal insulation	2. Improve the insulation
	3. bad heat elimination of air heat exchanger	3. wash the heat exchanger and improve condensing
	4. Water flow shortage	4. Wash the filter
Over-high outlet pressure of compressors	1. Excessive refrigerant	1. discharge unwanted refrigerant
	2. Bad heat elimination of air heat exchanger	2. Wash the heat exchanger and improve condensing
Over-low inlet pressure of compressors	1. refrigerant shortage	1. check leakage and supply refrigerant
	2. filter or capillary blockage	2. change new filter or capillary
	3. water flow shortage	3. wash the filter or discharge the air in the system
	4. Capillary in the expansion valve cracks	4. change the expansion valve
No running of compressors	1. power source failure	1. examine the power source and eliminate the failure
	2. compressor contactor failure	2. change the contactor
	3. loosened wiring	3. check and repair it
	4. Compressor over loading protection	4. compressor over loading protection
	5. wrong setting for inlet water temperature	5. Reset it
	6. Water flow shortage	6. Wash the filter or discharge the air in the system

## Trouble-shooting record

Date and time	errors and problems	Solutions the problems have been solved

**THANK YOU FOR CHOOSING  
SINCEKO HEAT PUMP**