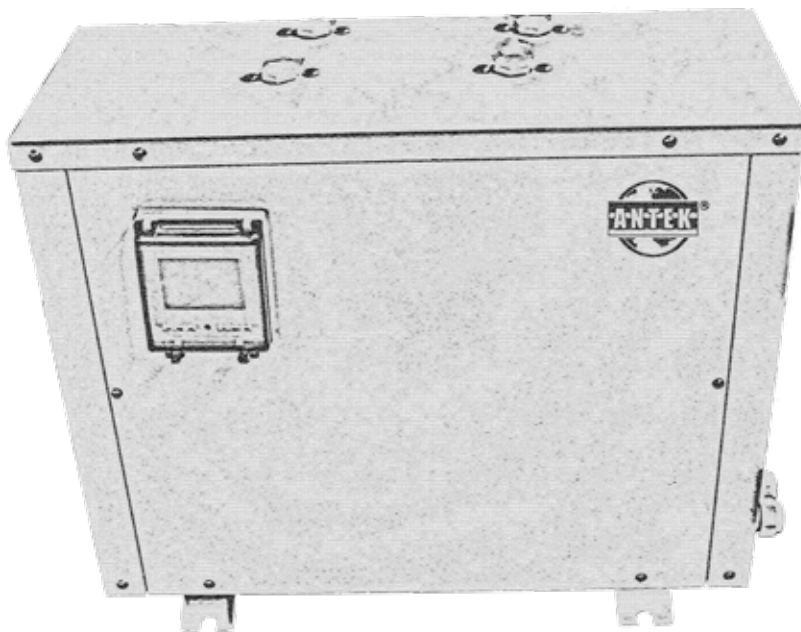


GEOHERMAL HEAT PUMP INSTALLATION AND MAINTENANCE INSTRUCTIONS



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1. SAFE PRECAUTIONS



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 marker's plate before proceeding with the connection in accordance with the wiring diagram supplied.

Warning!

The unit must be EARTHED to avoid any risks caused by insulation defects.

Warning!

No wiring must come in contact with the heat source or the fan rotating parts.

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 handling 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 provided on the hydraulic pump and in exchanger water inlets.

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

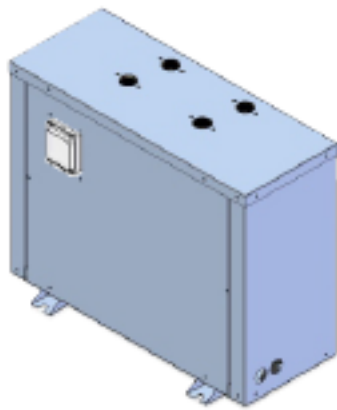
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2. PACKING LIST

Please verify that the following listed accessories are included in the packaging.

If they are damaged or lost, please contact your local distributor or agent immediately.



Installation & instruction manual:

It include basic product information, guidance of proper usage methods and maintenance.



X1

Expansion screws:

Install it on the four points of the bottom plate to fix the unit to the foundation.



X4

Anti-vibration rubber pads:

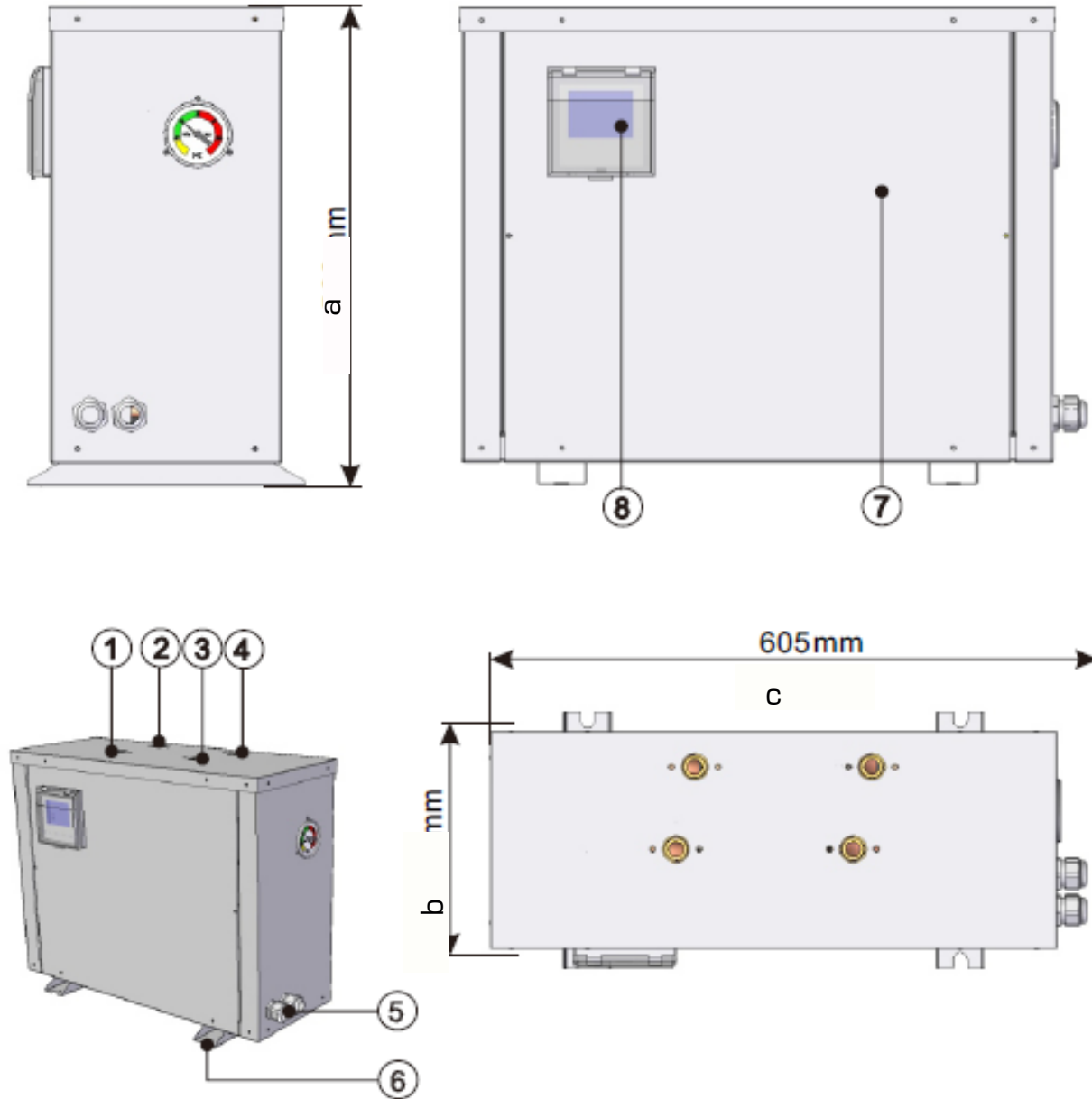
Put it under the four installation points to reduce the vibration and noise produced during operation.



X4

3. STRUCTURE

Outer Structure



- 1-Water Source Inlet
- 2-Water Source Outlet
- 3-Using Side Inlet
- 4-Using Side Outlet

- 5-Power Supply
- 6-Foot
- 7-Maintenance Door
- 8-Wire Controller And Waterproof BOX

Net dimension	TM100-6	TM100-8	TM100-10	TM100-13	TM100-17	TM100-20
a	500	500	500	530	530	530
b	240	240	240	330	330	330
c	605	605	605	910	910	910

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4. SPECIFICATIONS

GEOTHERMAL HEAT PUMP SPECIFICATIONS							
Model		TM100-6	TM100-8	TM100-10	TM100-13	TM100-17	TM100-20
Heating capacity	kW	6,2	8,1	10,2	13	17	20
Heating power input	kW	1,37	1,82	2,3	2,88	3,75	4,5
Rated current	A	6,23	8,27	10,45	13,09	15,7	16,8
COP		4,53	4,45	4,43	4,51	4,53	4,44
Max. water temp.	°C	60					
Rated water temp.	°C	55					
Water flow (using side)	m ³ /h	1,1	1,2	1,8	2,2	2,9	3,4
Water flow (ground source)	m ³ /h	1,3	1,5	2,0	2,5	2,9	3,4
Net weight	kg	49	53	57	66	71	79
Gross weight	kg	57	63	67	76	82	89
Noise	dB	40	40	40	41	42	42
Connection pipe		3/4"			1"		
Power supply		220V/1PH/50Hz			380V/3PH/50Hz		
Net dimension	mm	605*240*500			910*330*530		
Package dimension	mm	650*300*630			950*370*660		
Compressor		Rotary			Panasonic Scroll		
Condenser		High efficiency tube in shell					
Evaporator		High efficiency tube in shell					
4-way valve		No					
Expansion valve		Electronic expansion valve					
Circulation pump		No					
Cabinet		Galvanized white metal sheet					
Controller		LCD					
High pressure switch		4.2/3.6MPa					
Low pressure switch		0.02/0.15MPa					
Water flow switch		Built-in					
Pressure gauge		Yes (high pressure gauge)					
Working mode		Only heating					
Refrigerant		R32			R410a		

Characteristics

High efficient and saving energy

Compared with the air source heat pump, the temperature of the heating source of the ground source heat pump is very stable, and the COP is much better. Generally speaking, the ground source heat pump consumes 1KW, it can supply more than 4KW heating or cooling energy. Compared with the boiler(electricity, fuel), it can save 2/3 energy than the electric boiler, and save 1/2 energy than the fuel boiler, because the boiler just can transfer the 90% electricity or the 70%--90% fuel to the users.

Environmental-friendly and healthy

Ground source heat pump system can be applied without boiler house in winter, without cooling tower in summer, without coal, fuel, and gas. It don't pollute the underground water resource and air, and discharge no exhaust gas, which make it environmental-friendly and healthy.

Renewable Resource

Ground source heat pump is an air conditioning system, which makes use of the heat from the shallow surface of ground as the cooling or heating source to exchange energy. The shallow surface of ground is a giant solar collector, it collects the 47% energy which the sun gives, which is 400 times more than the energy the human used every year. This kind of energy which can be gained anywhere is a renewable energy not subject to the geographical area and other resources, and can be gained anywhere.

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5. INTRODUCTION

● Brief introduction of ground source heat pump

Ground source heat pump is a kind of high efficient energy saving equipment, which takes advantage of the heat underground as the cooling or heating source to supply the heat or air conditioning and hot sanitary water to the house. It is imputed few high efficient electricity to make the low efficient heating become high efficient heating energy. In summer, the system can draw the heat from the room and discharge it into the underground through the carrier--water.

At the same time, the carrier--water gets cooled.

In winter, the system draws the heat from the underground and transfer it to the room through carrier--water. Because the temperature of the underground is stable, so compared with the air source heat pump, it is more efficient and more stable.

● The type of ground source heat pump

Groundwater heat pump



Groundwater heat pump considers the underground water as the cooling or heating source, which draws the water from a group of wells. And the water experiences twice heat exchange in heat pump, or the water directly transfers to the heat pump, and draws the heat or discharge the heat and then back to the wells. No matter how the deep well or the underground, because of the insulation of ground surface, the temperatures of water changes little, especially the temperature of the water in deep dwell keeps the same, which is very convenient to the function of ground source heat pump.

Surface Water Heat Pump

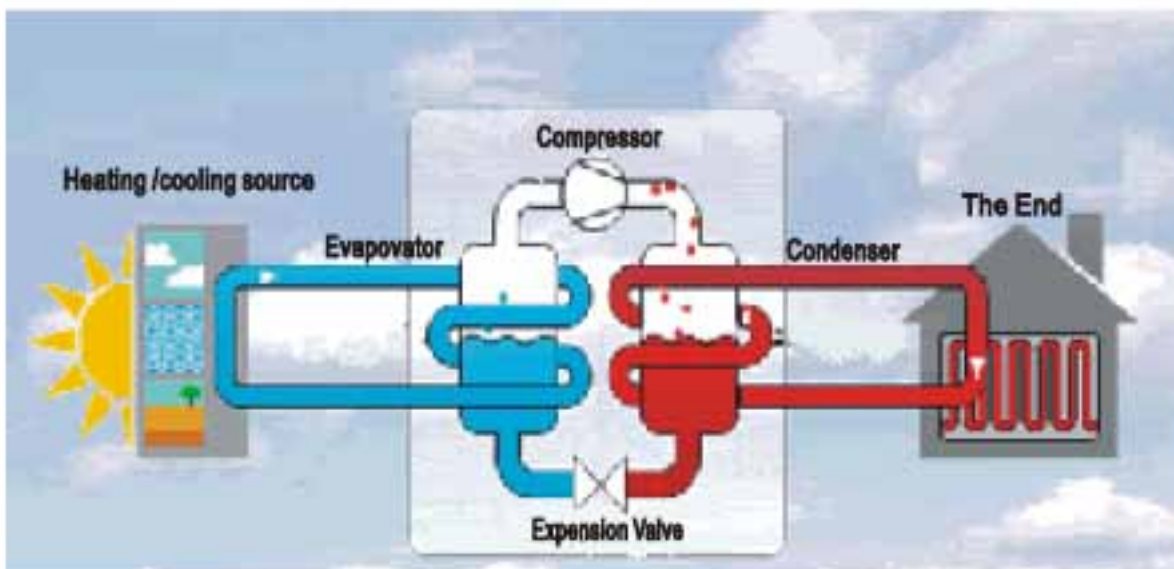


The surface water (river, lake) is considered as the heating/cooling source of surface water heat pump. The water pump just directly draw the water from the river and lake to the heat pump, another method is that the coil is installed in the river or lake to exchange heat.

The surface water heat pump system is applied in building construction near river and lake with rich water resource.

● Working Principle

Heat Pump



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6. INSTALLATION

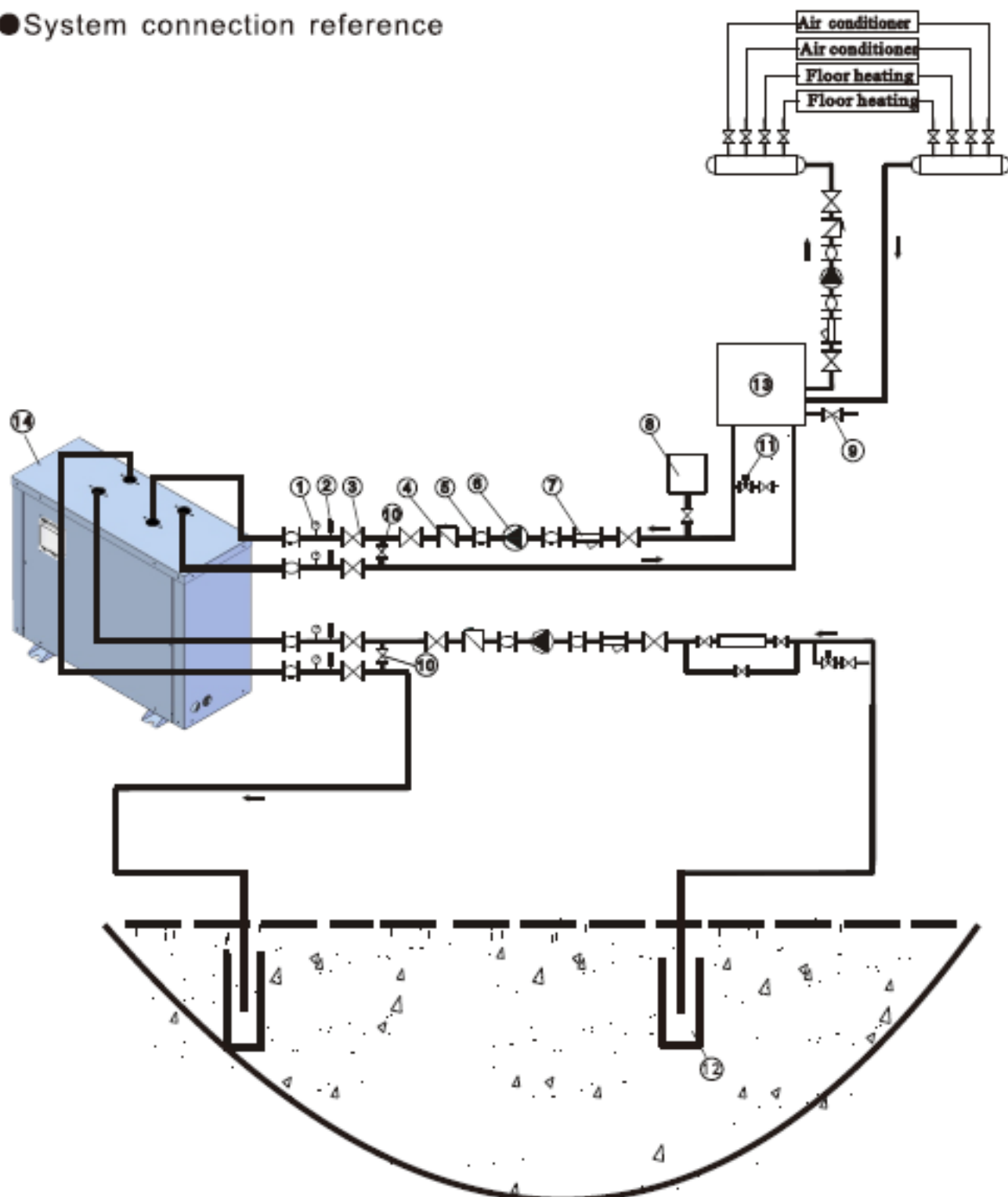
●The unit installation instruction

- 1 Please read the manual carefully before installation;
- 2 The installation location should be convenient for adjusting and repairing. Enough space should be left to check and repair;
- 3 The installation location should be far away from the places affected by artificial strong electricity, magnetic field;.
- 4 The unit should be installed in the indoor environment; if it is installed outside environment, it is a must to built a cover for it;
- 5, The vibration damping device should be installed to prevent the vibration from the building;
- 6 Flexible connection must be used on water inlet and outlet, water system supply and returned pipe. So is the recycle water pump, which prevents vibration from spreading to the building.
- 7 Y-style filter should be installed on the water pump inlet of evaporator and condenser to prevent the welding slag and the impurity from destroying the unit.
- 8 The steel pipes in main heat pump house should be hold by spring to avoid the vibration spread into the building.
- 9 An air discharge valve must be connected at the top of the water system and drainage valve must be installed at the bottom of the water pipe of the unit.
- 10 Please install the water pressure gauge and thermometer to make care and maintenance easy.
- 11The water pipe should be insulated well in order to prevent the energy from losing and forming condensed water.

●The unit installation precaution

1. Please install the air discharge valve on the top of the water system.
2. Install the appropriate drainage valve at the bottom of the water system.
3. Be equipped with the expansion water tank to adapt the changing water volume because of the changing water temperature in water system.
4. It is better for recycled water to use the softening water tap.
5. The bypass pipe should be reserved on the water supply pipe and returned water pipe in order to wash the unit easily and avoid the melting slag and impurity going into heat exchanger.
6. When connecting the pipe, absolutely don't permit to interchange the outlet and inlet of the evaporator and condenser;
7. The water flow in evaporator and condenser should be the same as the marked; absolutely prohibit from exchange water outlet and inlet, or the unit will not run even will be destroyed.
8. The repairing and insulation of Y-style filter should made to be split one, which is convenient to wash and repair for the system
9. Regarding to the water system, advise the client to check it every month.

● System connection reference



- | | | |
|------------------------------|-----------------------------|-----------------|
| 1, Pressure gauge (0-2.5MPa) | 2, Thermometer (0-100℃) | 3, Valve |
| 4, Check valve | 5, Soft connection | 6, Water pump |
| 7, Y-style filter | 8, Expansion water tank | 9, Sewage valve |
| 10, Bypass sewage valve | 11, Automatic drain valve | 12, Well |
| 13, Water tank | 14, Ground source heat pump | |

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● Run the unit

1. Check it before start the unit.

Check the piping system: check whether all the valve is open and the valve of automatic control gorge is in a regularly range. Check whether the insulation of pipes is good.

Check the power supply system: check whether the voltage is regular, any parts are screwed tightly and the power is supplied as the wiring diagram.

Check whether ground line is connected well.

Check the unit: check whether all the screw on the unit is loose.

When switch on, check whether there are indicator malfunctions on main control.

Connect the pressure gauge to the freon connection in order to measure the system pressure when running the unit.

2. Try to run the unit

The compressor will start. Check whether the unit sounds unregularly by hearing, switch off and check if it has. If it doesn't have, keep it running, at the same time pay attention to whether the cooling system pressure is regular.

And then check whether the power input and current corresponds to the performance data in user manual. If not, please stop to check it.

The remote controller parameter has been set when ex-factory, don't adjust it at random. And it should be adjusted by professional personnel if needed.

Regarding to the several connected modular units, the technical parameter should adjusted by professional construction personnel.

3. Running

The following rules should be followed strictly when running the unit:

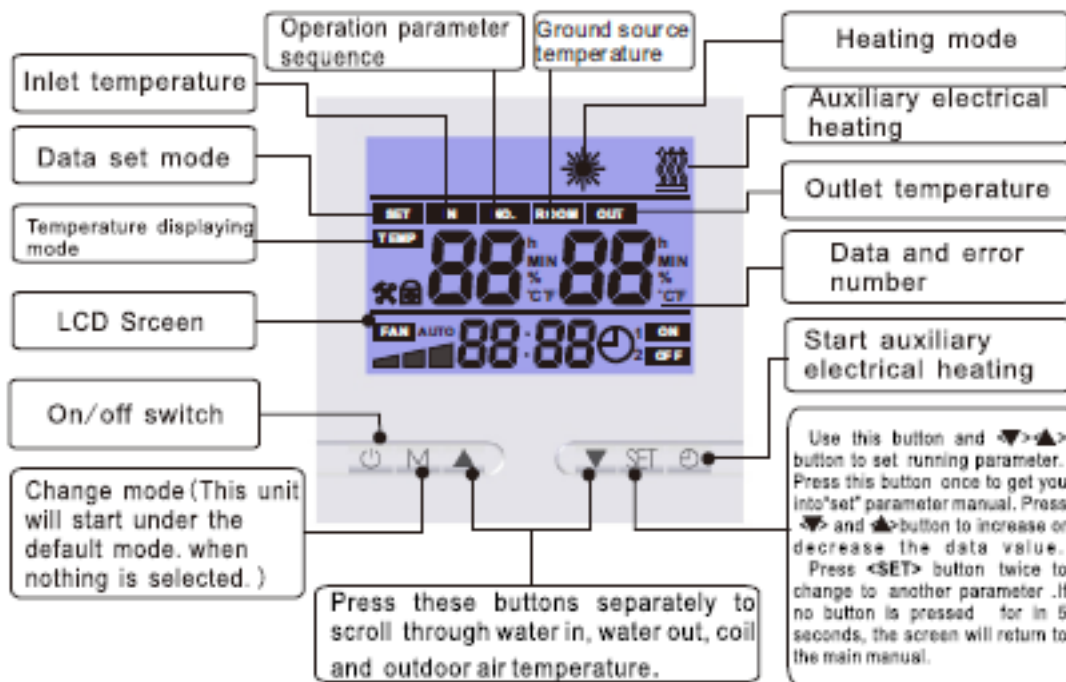
When the unit is running, keep the piping system and environment in a regular state.

The sudden change of system and the environment can cause the motor current change, When serious, it can exceed the rated current and can cause negative consequences.

7. CONTROLLER

The unit can be pre-programmed by the wire controller and will then be turn automatically.

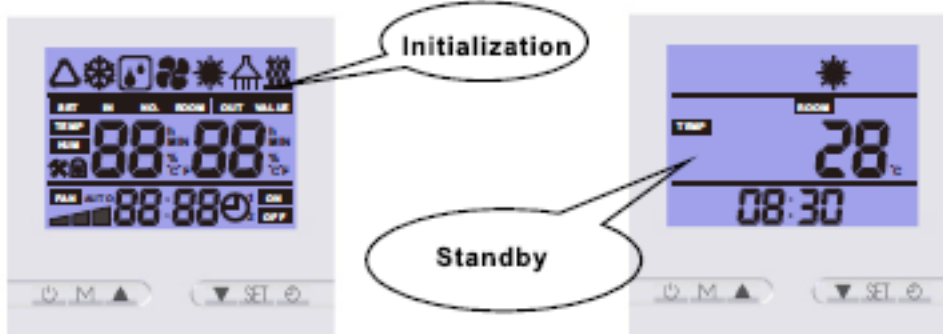
7.1 The appearance of wire controller and its key functions



7.2 Application range

This intelligent wire controller can be used to control the air to water or water to water heat pump series.

7.3 Initialization and standby state



Graph 7-1

Graph 7-2

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- When you turn on wire controller, it will display the data full screen. Meanwhile, the wire controller will get a communication connection with the heat pump. If the connection can not be successful within 10 seconds, that is to say, the connection failed. The heat pump can only be control by its own emergency switch. On the contrary, if the connection can be successful within 10 seconds, the wire controller can also works as well as the heat pump's own emergency switch.
- In the standby state, the wire controller displays the ground source outlet water temperature and the current running mode.

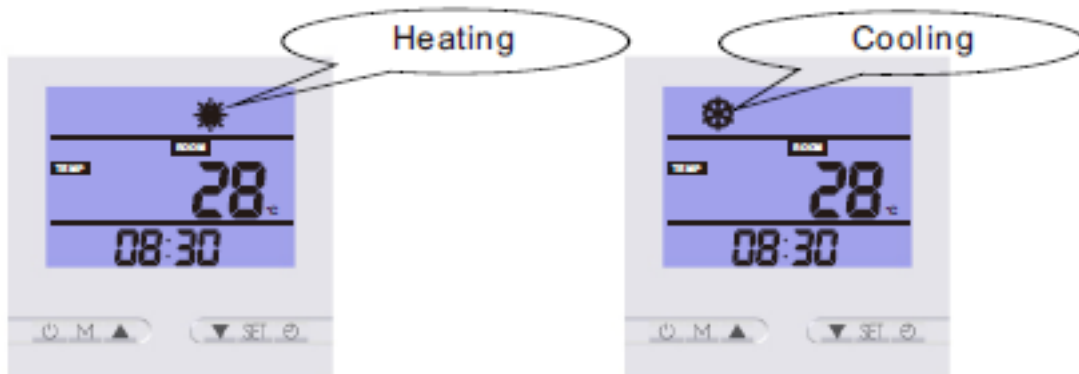
7.4 Press ON/OFF button to turn on/off the heat pump



Graph 7-3



7.5 Mode selection

- In the ON or standby state, press "M" button to choose the heating or cooling mode as the graph 7-4 and 7-5 shows.
- In the ON state the wire controller can display water inlet temperature, water outlet temperature and its running mode.
- In the OFF state, the wire controller can display ground source outlet temperature and current running mode.



Graph 7-4

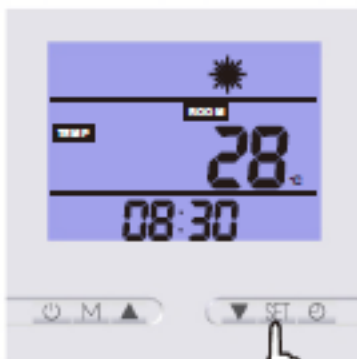
Graph 7-5

-  :this symbol is meant to be in a heating mode.
-  :this symbol is meant to be in a cooling mode.

If your unit is only heating, it can only working on heating mode.

7.6 Temperature setting

- In the standby mode, press "SET" button to enter into the parameter setting page. (as graph 7-6 shows).
- Press "up" or "down" button to set the parameters. "0" stands for the water inlet temperature setting in cooling mode. As the graph 7-7 shows, "15" is real water inlet temperature.
- After setting the water inlet temperature, press "SET" button to turn to the next setting page. "1" stands for the water inlet temperature setting in heating mode. As the graph 7-8 shows, "45" is real water inlet temperature. And press "up" or "down" button to choose parameter you want.
- The screen will return to main page if you don't press any button within 5 seconds and the screen display the water inlet temperature or water outlet temperature in the ON state or ground source temperature in the OFF state.
- In the ON state, you can see the current data of all kinds of parameters, but you can not change it.



Graph 7-6



Graph 7-7



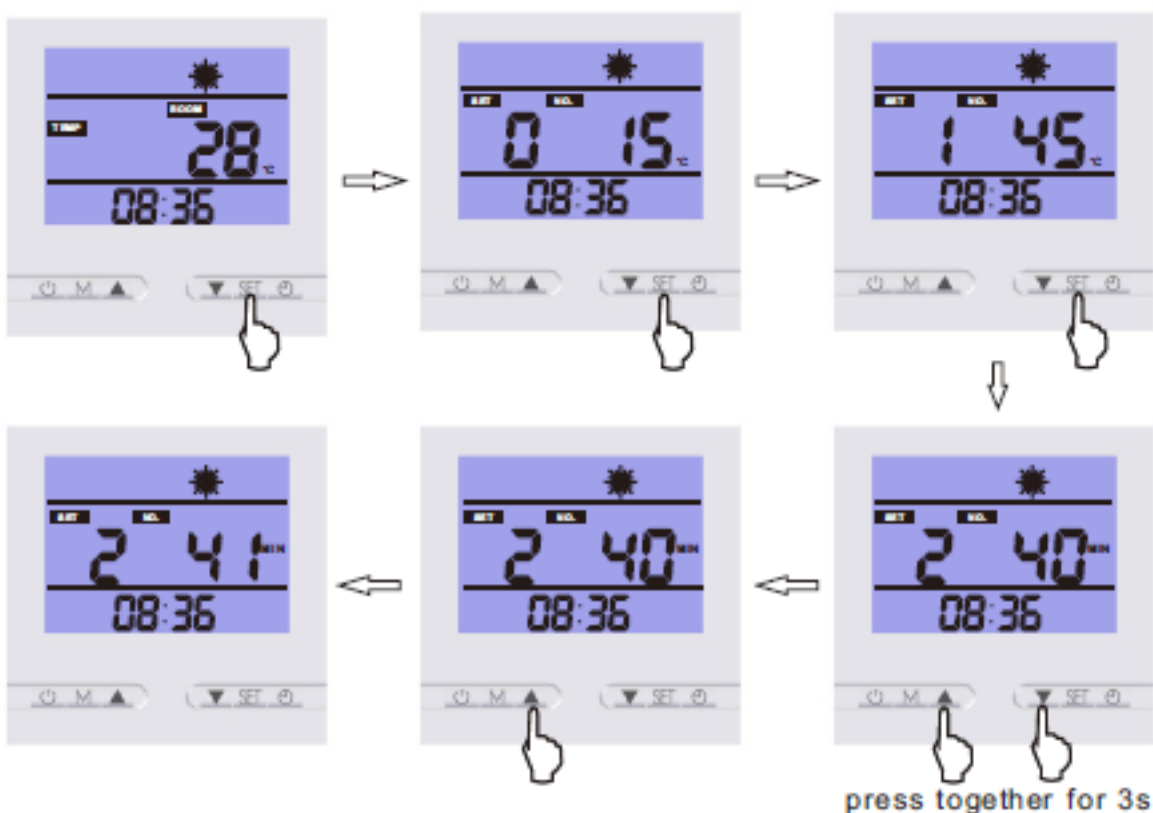
Graph 7-8

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7.7 Other parameters setting

- In the standby state, press "SET" button to enter into parameters setting page as the graph 4-1 shows.
- Press "up" or "down" button at the same time, when you hear "tick" sound, release the buttons and press "up" or "down" button again to set the current page parameter as graph 5-1 shows.
- After setting it, press "SET" button to enter another parameters setting page, press "up" or "down" button to set the parameter of the current page.
- Repeat the above steps to alter other parameter setting. The screen will return to main page if you don't press any button within 5 seconds and the screen display the water inlet temperature or water outlet temperature in the ON state or ground source outlet water temperature in the OFF state.
- In the ON state, you can see the current data of all kinds of parameters, but you can not change it.



Graph 7-9 adjust the parameter "2" to "F"

7.8 Running parameters query (please refer to 9.2)

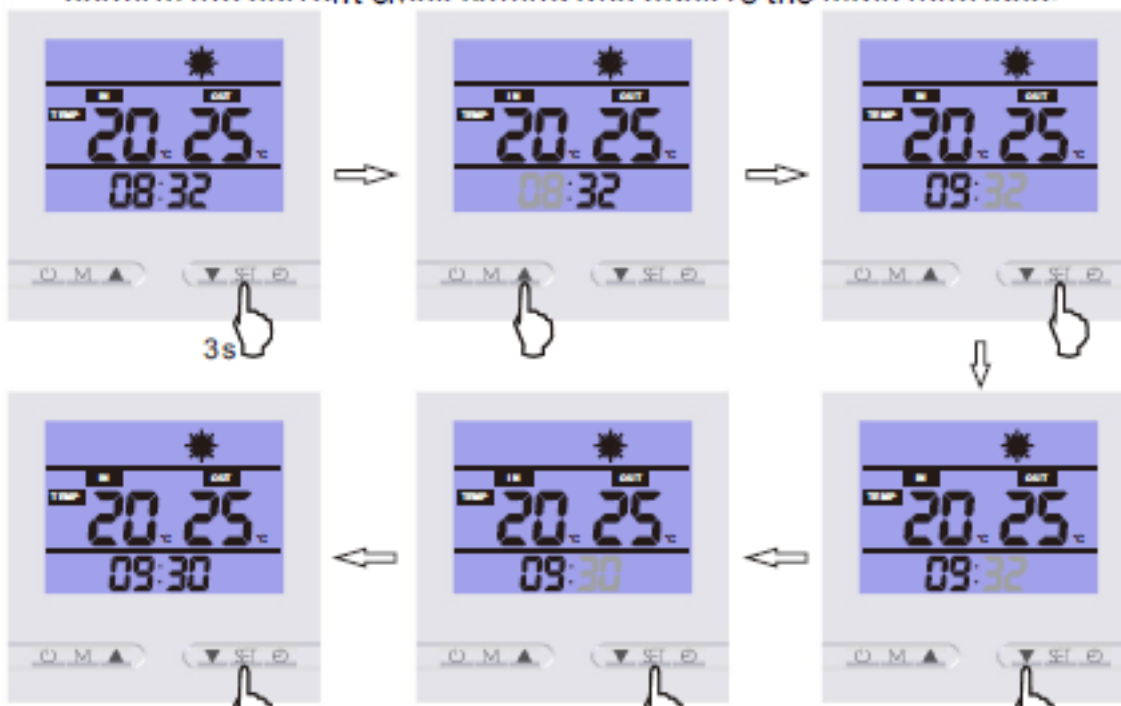
In the standby or on status, press "Up" key or "Down" key to check running parameter "P1" to "P5" one by one;
 If there is no key operation for 5s, it will automatically exit to the main interface.



Graph 7-10

7.9 The current clock setting

In the main interface, press "Set" key for 3s to enter into the current clock setting interface, the number of hour on the display will flash, then press "Up" or "Down" key can change the time (hour), after the hour is set, press "Set" key again, the number of hour will stop flash, and the number of minute will flash, then press "Up" or "Down" can change the time (minute), after the minute is set, press "Set" key to confirm the current clock setting and back to the main interface.



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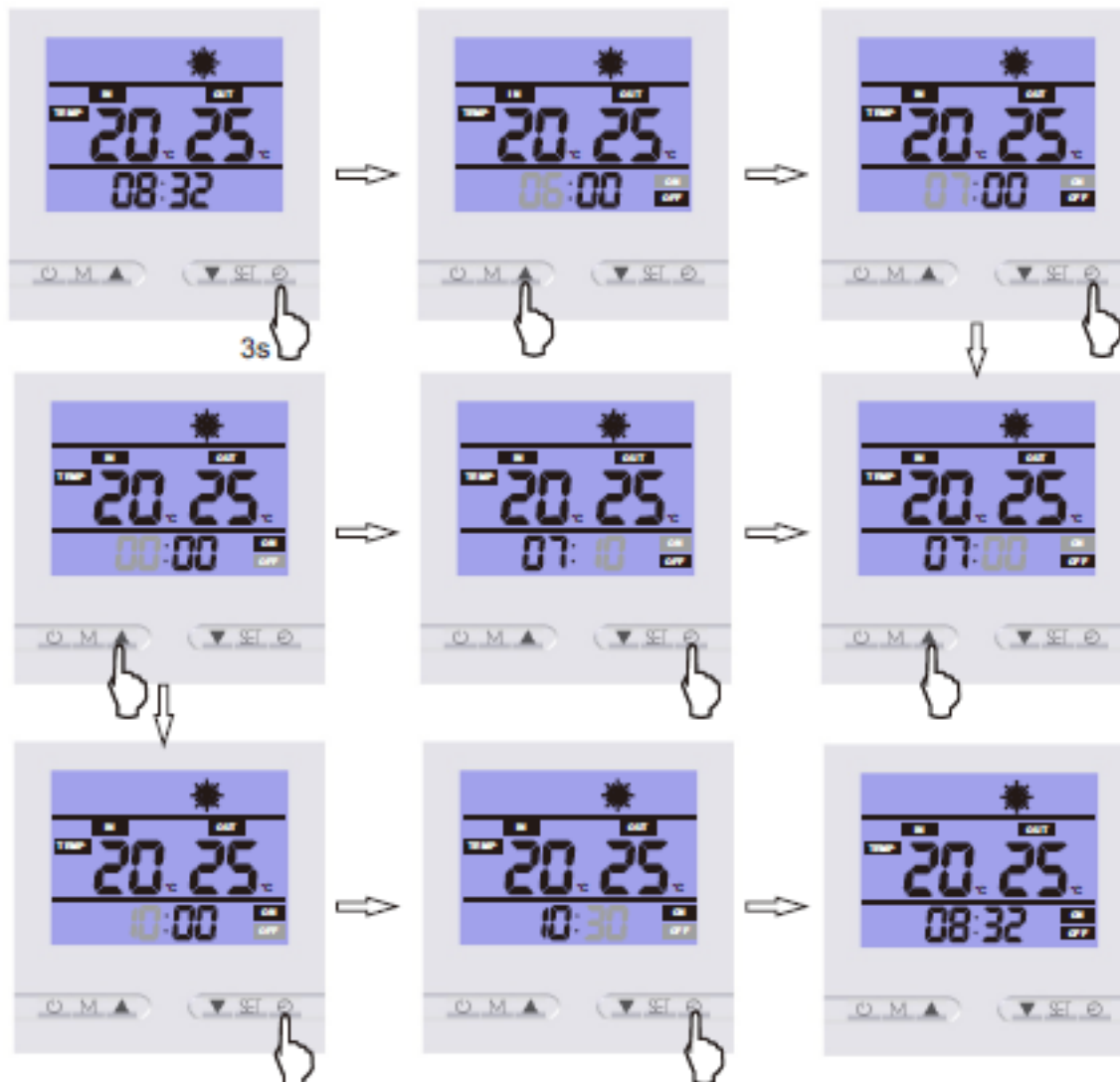
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7.10 The timing on/off setting

In the main interface, press "Timer" key for 3s to enter into the timing on/off setting interface, the icon "timer on" and number of hour on the display will flash, then press "Up" or "Down" key can change the time (hour), after the hour is set, press "Timer" key again, the number of hour will stop flash, and the icon "timer on" and the number of minute will flash, then press "Up" or "Down" can change the time (minute), after the minute is set, press "Timer" key to confirm the current timing on/off setting and enter into the "timer off" setting.

The setting way of "timer off" is same as the above.

In the timing setting interface, press "Set" key to cancel the current timing on/off setting.

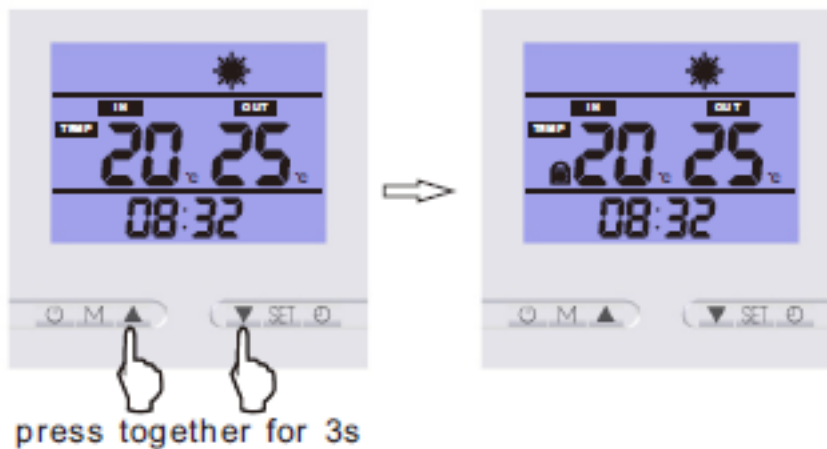


Graph 7-12

7.11 Screen lock setting

In the main interface ,press “Up” key and “Down” key together for 3s, after a “tick”, the controller will enter into the screen lock mode, then all the keys can't be operated.

In the screen lock status, press “Up” key and “Down” key together for 3s, after a “tick”, to unlock the lock mode.

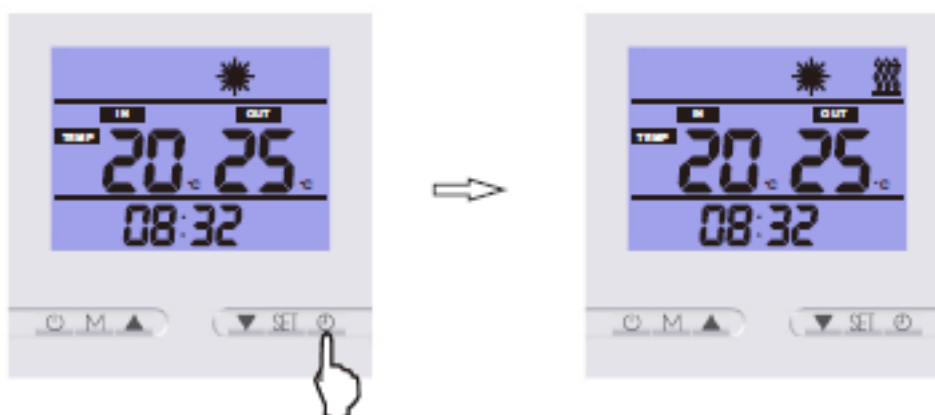


Graph 7-13

7.12 Start electrical heating

This function only for the unit that is having the electrical heating.

In the main interface ,press “Timer” key can start the electrical heating, press it again can stop the electrical heating.



Graph 7-14

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8. CARE AND MAINTENANCE

The care and maintenance of water system

Cleaning: All the system should be washed completely, including filter net in the system. Make sure all the waterway clear.

Get rid of 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.

Water quality: It is suggested that the cooling water should be changed periodically, every time one month. If the water tower is located in the area polluted heavily, please shorten the period of changing cooling water.

Drainage: If the unit will stop for a long time, Please discharge all water from the system. Please note in winter the temperature is very low, it is easy to freeze pipe broken if the unit stops.

The care and maintenance of main unit

There are little chances for malfunction to occur, because the special and high quality raw material is used on the main unit. However, if the malfunction occurs, please contact the installing dealer. Don't repair it by yourself.

Concerning the maintenance of the main unit, the dealer can begin from the front of the main unit.

Take off the top panel and the front panel with wind outlet and then check and repair every part in the main unit.

(1) Turn off all the powers

(2) Screw off the bolts on the front and back of the top panel, take off the panel

(3) Screw off the bolts of the front panel and then get it off

After that it is easy to check and repair the junction box, motor fan and compressor. Generally speaking, the heat exchanger of the unit should be checked and washed every quarter, however, if the unit is installed in the area with too much oil, smog and dust, the heat exchanger should be washed by professional air conditioner technician to make sure enough heat can be exchanged and work properly, or the life-span of the unit will decreased.



Don't charge oxygen and acetylene or other flammable or poisonous gas into the unit when check the leakage, because this kind of gas can cause explosion when in the state of high pressure or high temperature. Nitrogen and refrigerant just can be charged to check the leakage.

9. TROUBLE SHOOTING

9.1 Please refer to the below diagram to judge and manage failures:

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

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Failure	Possible causes	Solutions
High noise of compressor	1. Liquid refrigerant into the compressor	1. Check the cause and eliminate it
	2. compressor crash	2. change the compressor
No running of fan motors	1. Relay failure	1. change the relay
	2. fan motor destroyed	2. change the fan motor
The compressors are running, but the unit is not cooling/heating	1. completely leakage of refrigerant	1. examine leakage and supply refrigerant
	2. Tube-in-tube heat exchanger ruined	2. change the tube-in-tube heat exchanger
	3. Compressors fault	3. Change compressors
Low water temperature protection	1. water flow shortage	1. Wash the filter or discharge the air in the system
	2. Low setting value on temperature	2. Reset the temperature
Low water flow protection	1. water flow shortage	1. wash the filter or discharge the air in the system
	2. water switch damage	2. Change the switch

9.2 System Status

Code	Description	Range	Remark
IN	Water inlet temp.	-9℃~99℃	Actual value
OUT	Water Outlet temp.	-9℃~99℃	Actual value
P1	Coil temp.	-9℃~99℃	Actual value
P2	Suction temp.	-9℃~99℃	Actual value
P3	Ground Source temp.	-9℃~99℃	Actual value
P4	Discharge temp.	0℃~F9℃(249℃)	Actual value
P5	Step of electronic expansion valve	0P~500P	Actual value

9.3 Parameter

Parameter	Function	Range	Value
00	Water inlet temperature during cooling mode	8~28℃	12℃
01	Water inlet temperature during heating mode	15~40℃	45℃
02	Defrosting cycle	30~90min	45min
03	Coil temp. to start the defrosting	0~30℃	-9℃
04	Coil temp. to stop the defrosting	2~30℃	13℃
05	The defrosting duration	1~12min	10min
06	Electronic expansion valve control	0~1(0:Manual /1:Automatic)	1
07	Power down memory function	0~1(0:No /1:Yes)	1
08	Model	0~3(0:Cooling only /1:Cooling and heating /2:Cooling and heating plus electric heating /3:Heating only plus electric heating)	1
09	Work pattern of water pump	0(Ordinary)/1(Special)	0
A	Automatic water inlet temp.setting	8~60℃	45℃
b	Target superheat temp. (heating mode)	-15~15℃	5℃
c	Manual adjustment of electronic expansion valve	10~50	35
d	Target superheat temp. (cooling mode)	-15~15℃	5℃
E	Delta temp. setting	1~20℃	2℃
F	Anti-frosting protection temp. setting	-5~5℃	2℃
H	The max. water temp. setting in heating	30~70℃	55℃

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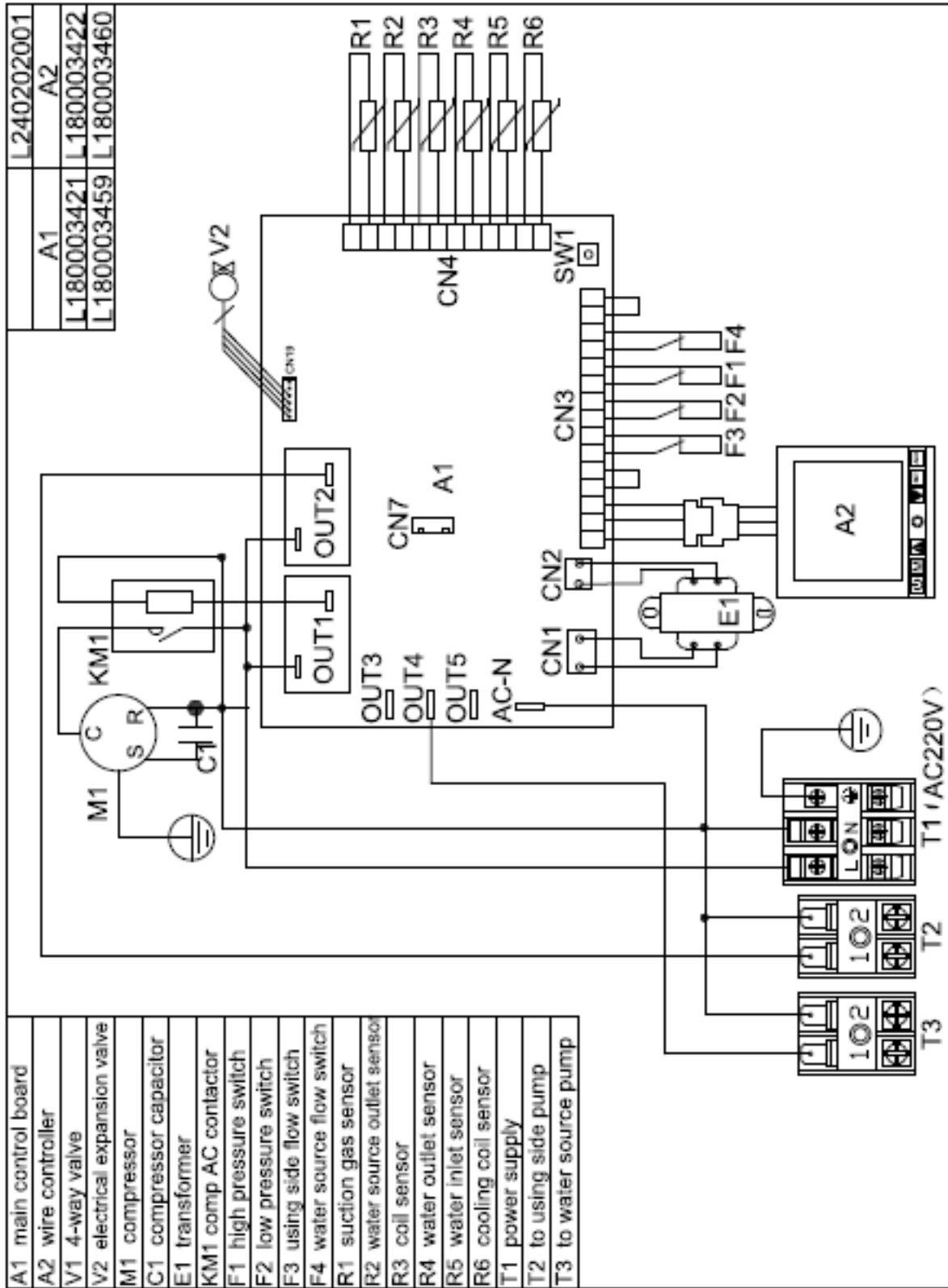
9.4 Fault code table

The unit will stop automatically if any fault happens during the operation, meanwhile, the fault code will display on the controller screen. Please contact the serviceman to check by referring to the following table and exclude the fault.



Protection/Alarm	Error Code	Operation/Error indicator light
Standby state		off
Booting normally		on
Water inlet temp. sensor fault	PP 01	☆● (Flashes on once and off once)
Water outlet temp. sensor fault	PP 02	☆☆● (Flashes on twice and off once)
Coil temp. sensor fault	PP 03	☆☆☆● (Flashes on 3 times and off once)
Suction temp. sensor fault	PP 04	☆☆☆☆● (Flashes on 4 times and off once)
Ground source temp. sensor fault	PP 05	☆☆☆☆☆● (Flashes on 5 times and off once)
Water outlet and inlet temp. differences overlarge protection	PP 06	on
Sub-cooling protection under cooling mode	PP 07	on
The First-degree antifreezing protection in winter	PP 07	off
The Second degree antifreezing protection in winter	PP 07	off
Cooling coil temp. sensor fault	PP 08	☆☆☆☆☆☆☆☆● (Flashes on 9 times and off once)
High pressure protection	EE 01	☆☆☆☆☆☆● (Flashes on 6 times and off once)
Low pressure protection	EE 02	☆☆☆☆☆☆● (Flashes on 7 times and off once)
Water flow fault	EE 03	☆☆☆☆☆☆☆☆● (Flashes on 8 times and off once)
Phase sequence protection	EE 04	☆☆☆☆☆☆☆☆☆☆● (Flashes on 12 times and off once)
Water outlet and inlet temp. overlarge fault	EE 05	☆☆☆☆☆☆☆☆☆☆● (Flashes on 10 times and off once)
Ground source water flow fault	EE 06	☆☆☆☆☆☆☆☆☆☆● (Flashes on 11 times and off once)
Ground source low temp. protection	EE 07	
Communication fault	EE 08	(The fault is only effective on remote controllers)

10. WIRING DIAGRAM



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