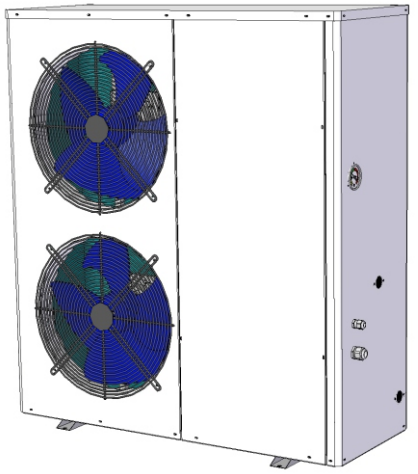
AIR TO WATER HEAT PUIMP

USER MANUAL



MODEL: FA-05

L240602021 1605

Note:

Content

1.Safety 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 maker’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 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.

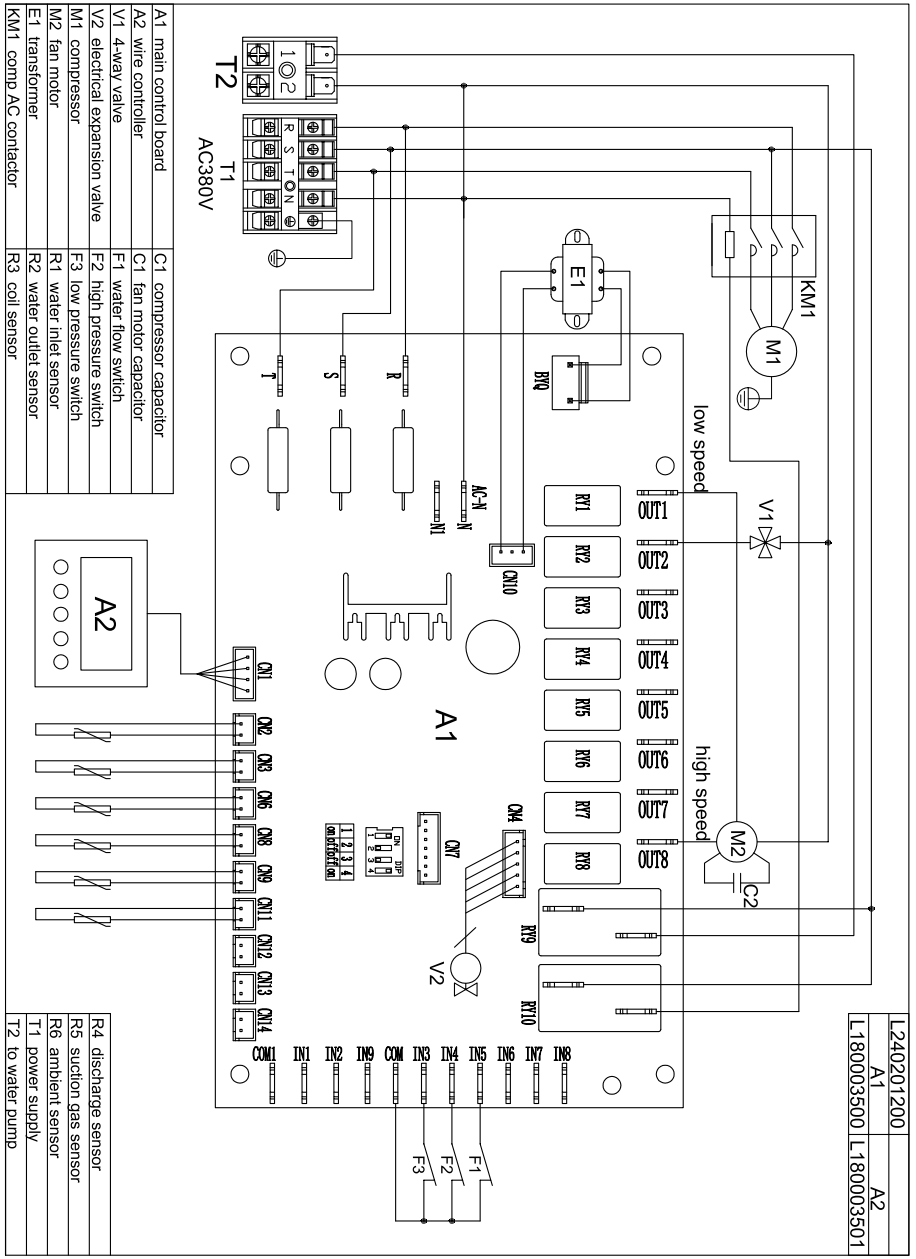
TAKE CARE!

A mesh filer 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.

10. Wiring diagram

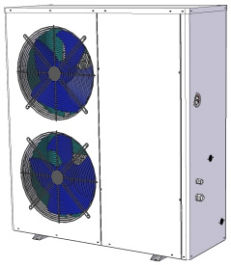
MODEL: FA-05



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

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.



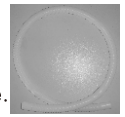
Installation & instruction manual:

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

X1

Water drainage pipe(1m)

Only horizontal discharge units have water drainage pipe to drain out the condensed water from the bottom plate.



X1

Expansion screws:

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

X4

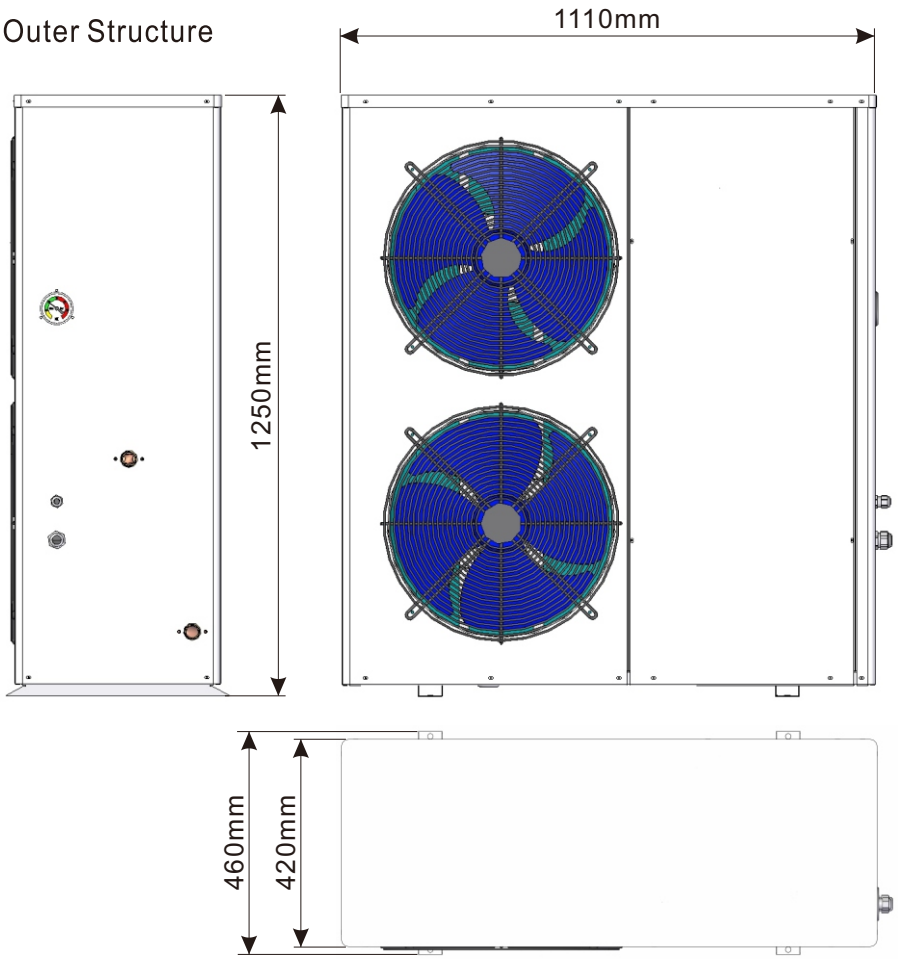
Anti-vibration rubber pads:

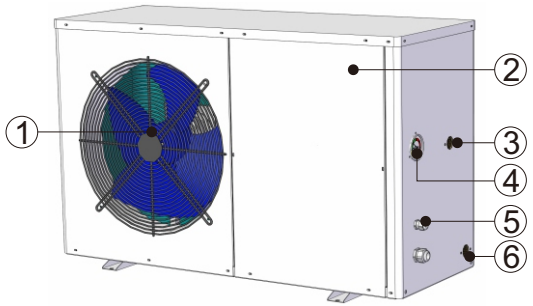
Put it under the four installation points to reduce the vibration and noise produced during operation.

X4

3.Structure

● Outer Structure





1. Fan and motor
2. Maintenance Door
3. Water outlet
4. Pressure gauge
5. Power supply
6. Water inlet

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

8. Maintenance

Before doing any maintenance cut off the power supply of the machine.

[1]Air Passage

To clean the air passage, take off the sound absorption hood and remove leaf and dirt from the evaporator and air way. Clean the evaporator from dust, to keep it`s performance high. There are two ways of cleaning the evaporator.

(1) Choose a detergent which is available in specialised trade and follow the instructions of it`s user manual. Spray the detergent between the fins of the evaporator, wait the stated time and wash it out with tap water.

(2) Use a pressure washer to clean the fins from dust.
Note: The fan can stand splash water. Be very cautious during washing the thin fins, they can be easily bend.

[2]Water Cycle

To assure sufficient water flow volume, wash (or change) the water filter regularly, depending on the pureness and the amount of the heating-circuit water. To wash the water circuit inside the machine, choose a specialist company to do the maintenance.

Avoid frozen water in the water cycle at any time, to prevent the water components from cracking. When the ambient temperature lowers to less than 2℃ the heat pump must be switched on, to avoid freezing.
If the machine is switched off or there is a electrical power outage, the water has to be drained to protect the system. There for open the drainage valves inside the building to drainage the connection pipes. Open the circulation water drainage at the heat pump. Open the drain screw below the water pump inside the heat pump. Close the drains after all water went out.

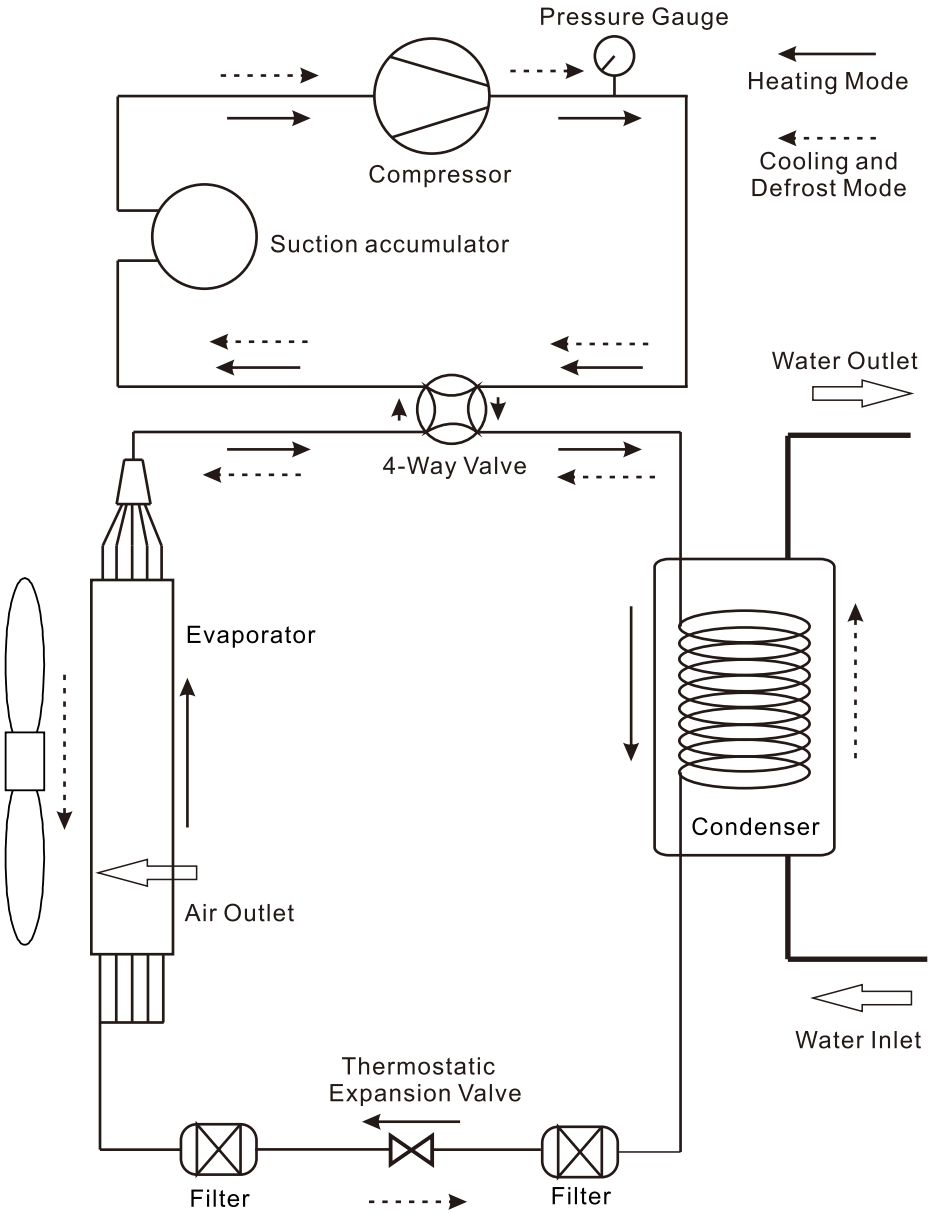
[3]Disposal

To dispose the heat pump refer to the local regulations. Especially take care for disposing the refrigerant and the compressor oil.

4. Inner structure

AIR TO WATER HEAT PUMP SPECIFICATIONS	
Model	**FA-05**
ELECTRICAL INPUT	
Voltage/Phase/Frequency	380~415V/3PH/50HZ
Running Current	7.7Amps
Wire Size	14AWG
PERFORMANCE	
Heating Capacity	19KW
Heating Power Input	4.1KW
Heating COP※	3.5
Heating COP※※	3.9
Sound Level	58dB(A)@3m
TECHNICAL DATA	
Compressor	
Type	Scroll
Number Per Unit	1
FLA (Full Load Amp)	9.5Amps
Voltage/Phase	380~415V/3PH
Fan	
Type	Propeller
Number Per Unit	2
Power Input	0.12kW*2
Voltage/Phase	220~240V/1PH
Fan Speed	670Rpm
HEAT EXCHANGER (Water Side)	
Type	Plate Type Heat Exchanger
Water Flow Rate (m^3/h)	2.4
Max. Outlet Water Temp	55℃
Water Connections	1 Inch
Hot Water Supply （L/H)	297
GENERAL INFORMATION	
Refrigerant	R410a
Defrost	Automatic Hot Gas Injection
Min. Operating Temperature	-15℃
Shipping Weight	140 kg
Dimensions L x W x H (cm)	111 x 46 x 125
※Heating: Outdoor Air Temp:7℃ DB ,6℃WB, Water Temp: 40℃	
※※Heating: Outdoor Air Temp:15℃ DB ,11℃WB, Water Temp: 35℃	

5.System Drawing



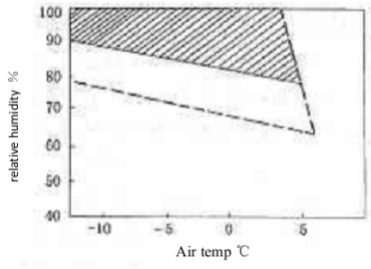
7.5 Defrosting

In the heating mode, when the outdoor evaporator surface has white frost (when the air temp is low or the air is humid, this phenomenon will be more obvious), the heat exchanging and performance will be affected, so when the frost gets to a certain degree, the system will run the defrosting automatically.

In the defrosting mode, the outdoor fan motor will stop run. Sometimes there is while vapor from the outdoor evaporator. Those are normal defrosting phenomenon instead of fault.

7.5.1 Frosting reason

As we know, when the air temp. is below 0 C, the unit is easy to ice up. But when the air temp. is above 0 C and the air humidity is high, there is also the possibility that the unit ices up. Please refer to the below review.



As shown in the view, the dotted area is the possible frosting area, and the shadow part is inevitable/certain frosting area.

7.5.2 The condition of the entrance to defrosting.

When the unit heating continuously for 40 minutes, and condenser is frosting, at that time, the defrosting system will run as long as coil temp. <-9 C.

7.5.3 The condition to quit from defrosting.

When the coil temp. >13 C or defrosting time get to 8 minutes, the system will quit from defrosting.

7.5.4 Defrosting process

The following process will happen when the defrosting condition is satisfied,
1) Compressor and outdoor fan stop.
2) 25 seconds later, four-way valve power off.
3) 30 seconds later, compressor will run.
4) Water pump run normally.

When the exist condition of defrosting is satisfied, the following process will happen.
1) When the exist condition of defrosting is satisfied, defrosting stop, and compressor stop running accordingly, but the outdoor fan start to run, 5 seconds later, four-way valve power on.
2) After the fan run for 30 seconds, the system will recover to heating normally.

Fault code table:

Fault code	Fault description of the system
Er 01	Phase fault
Er 02	Phase loss
Er 03	Water flow switch fault
Er 04	Anti-frosting in winter
Er 05	High pressure protection
Er 06	Low pressure protection
Er 09	Communication fault
Er 10	Anti-frosting in air conditioning side
Er 12	Over-high discharge temp. protection
Er 15	water tank/water inlet temp. sensor fault
Er 16	Coil temp. sensor fault
Er 18	Discharge temp. sensor fault
Er 21	Ambient temp. sensor fault
Er 22	Return water temp. sensor fault
Er 23	Subcooled protection in cooling
Er 27	water outlet temp. temperature sensor fault
Er 29	suction temp. sensor fault
Er 35	Compressor current protection
Er 37	Overlarge water temp. difference Between the water inlet and outlet temp.
Er 42	Cooling coil temp. sensor fault
Er 44	Over-low ambient temp. protection

6.Installation

6. 1. 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 for checking and repairing the unit.
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. There is no water flow switch when ex-works,if user need it, they should install water flow switch by themselves. a water flow switch output has been left on the controller , but two terminals of water flow switch were connected when ex-works. so water flow switch alarm will not happen.
6. The vibration damping device should be installed to prevent the vibration from the building.
7. 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.
8. 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.
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.
11. The water pipe should be insulated well in order to prevent the energy from losing and forming condensed water.

6.2. The unit installation precaution

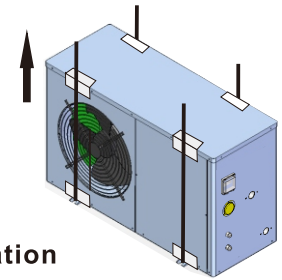
1. Please install the air discharge valve on the top of the water system.
2. Install the appropriate drainage valve at the bottom of the water system.
3. Be equipped with the expansion water tank to adapt the changing water volume because of the changing water temperature in water system.
4. It is better 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 condenson.
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.

6.3.Lifting the unit

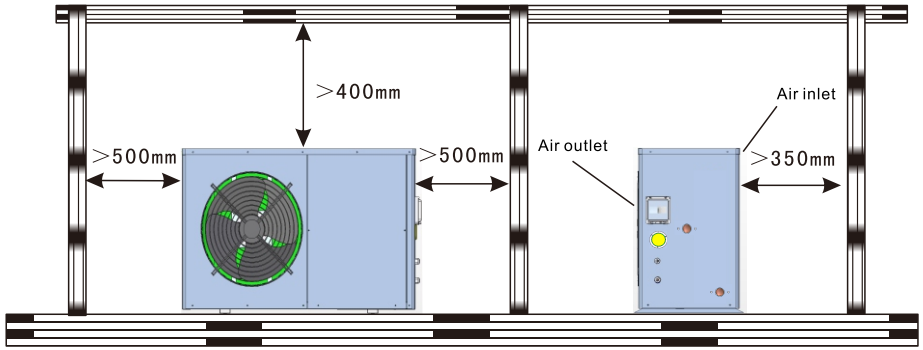
A. Please lift the unit by four steel wires(over 6mm).

B. Please carry or lift the unit as the following drawings.

Note: Please put sponge and cardboard between steel wire and surface of the unit in order to avoid scratch or distortion.



6.4. Space for installation



6.5. Space for installation

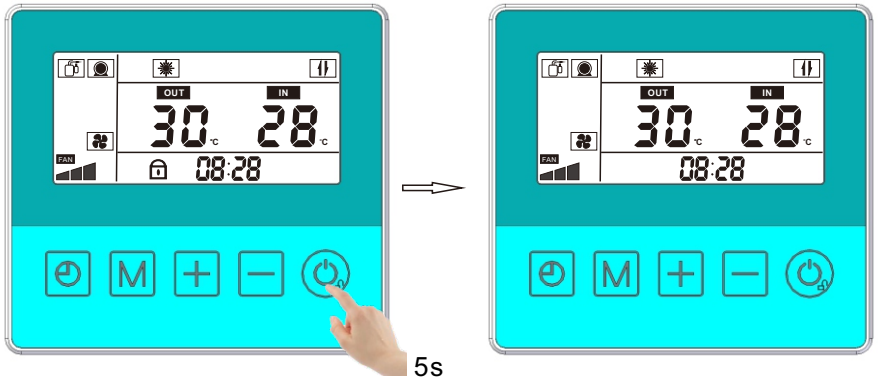
1.The outdoor unit can be installed beside the balcony, on the roof, on the ground or any other places where is convenient of installation and can bear the weight of the unit.
2.a ventilated place
3.no heat radialization or other heat resource place
4.need to build a anti-snow shed
5.enough space should be left around the outdoor unit
6.no barrier beside the air inlet and air outlet
7.no strong wind at the air inlet
8.there should be drainage pipe for condensate draining
9.hot water tank should be install where running water is provided or near to using side.

NOTE: It should be installed where can bear the weight of the unit and can insulate noise and vibration.
If the unit is in a bad operating condition, such as in a place be of oil -resource or poor water quality. This may lead to breakdown

7.3.7 Lock and unlock the keyboard

In the standby or running status, if there is no operation on the key board for 60s, the keyboard will be automatically locked and there is lock icon on the screen. At this time, there is no respond no matter which key is pressed.

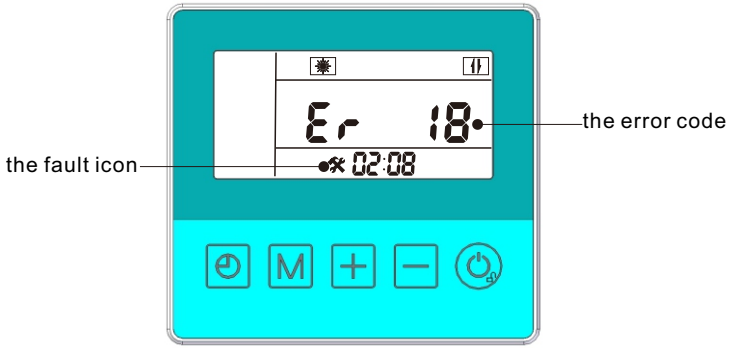
In the lock status, press the on/off key for 5s, the keyboard will be unlocked after a sound of tick. At this time, the lock icon on the screen will disappear and the operation on the keyboard will back to the normal.



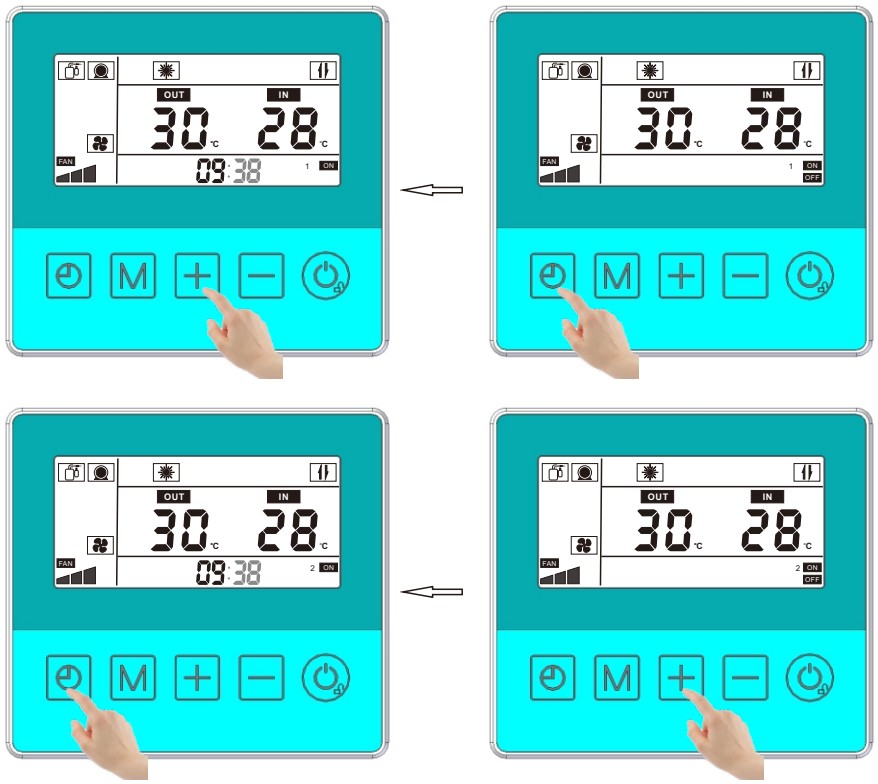
7.4 Fault and protection

When the system running is abnormal, or the running parameter is beyond of the normal range, the system will stop and enter into the protection mode. The corresponding fault code will be displayed on the wired controller screen.

The screen displays as the following:

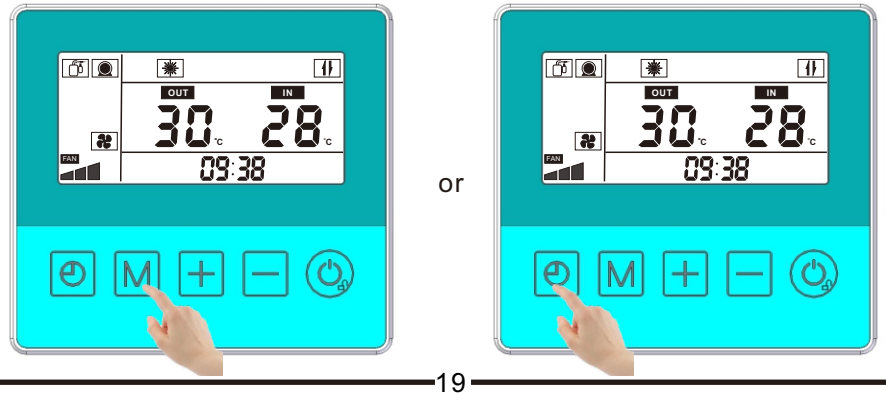


Fault code table as the following:



Note: Only No.1 and No.2 timing groups are the timing for on/off the machine. No.3 and No.4 are unused.

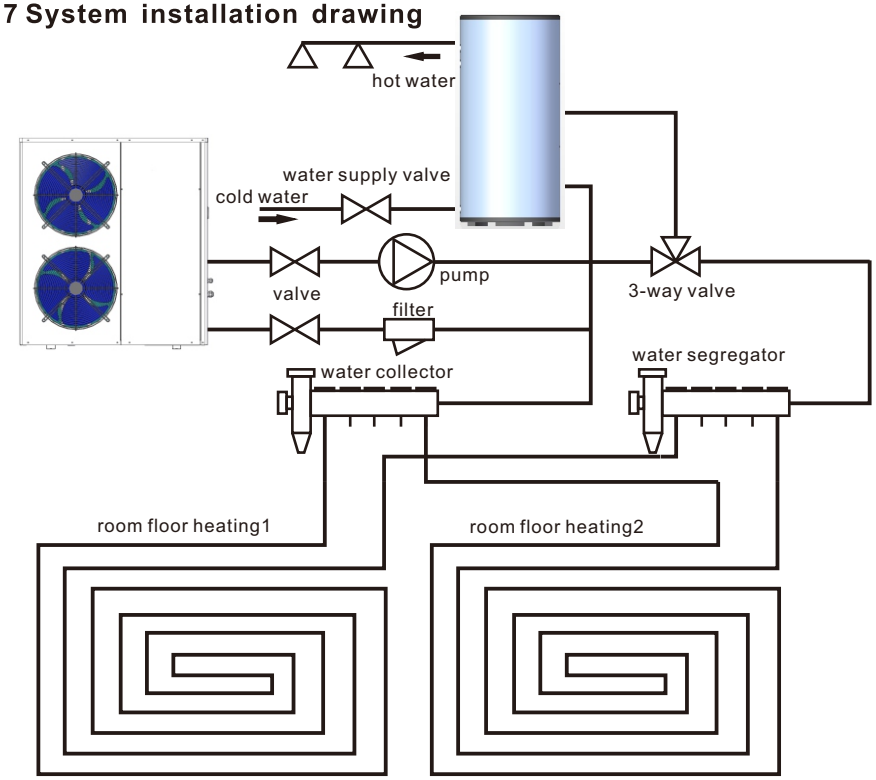
In the timing setting interface, press “function” key to cancel the current timing group. Press “timer” key for 5s to cancel all the timing groups.



6. 6. Water pipe connection

1. The resistance of water pipe should be decrease as possible as we can.
2. All the pipeline should be clean, no rust dreg, avoid blocking the pipe. When finished all the pipe and you should test all the water pipe work well. No leaking and then pack insulation materials
3. **Note:** ductwork pressure testing should be made alone, it is not allowed to test together with the unit
4. Expansion tank should be installed at the top of ductwork, the water surface in the expansion tank need to be higher by 0.5m than the top of ductwork.
5. Water outlet outside the unit should install water flow switch, ensure that there is water in the pipe when the unit are running. Controlling line of the water flow switch should connect to terminal blocks accordingly into the control box, and to be control together with the unit
6. It should be avoided that air lies in the water pipe, at the top of the pipe, it should install a auto drain tap
7. By the side of water inlet and water outlet, thermometer and pressure gauge should be installed, so that it will be check easily during the operation.

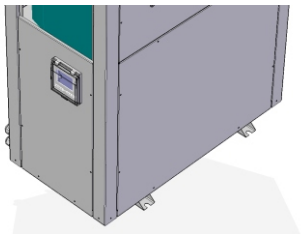
6.7 System installation drawing



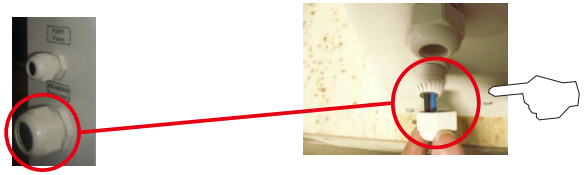
Attention: the pictures above is only for reference, the practical project must be carried out by professionals according to the standard and design requirement.

6. 8. Electric circuit connection processure.

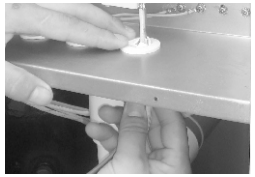
1. see the follow figure, take off four screws from the maintenance panel and then take off the panel as the instruction figure do.



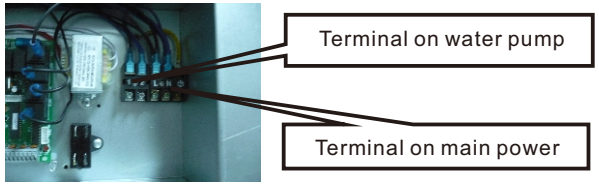
2. Go in for the operation of wiring connection. Wring the connector of power line under the unit loosely, then thread the power line through the connector and enter into the unit. at last, wring the connector tightly. See the follow figure



3. Thread the power line through a rubber jacket under electrical box and to the inner electrical box. See the follow figure.



4. Connect the power lines to the terminals according to the fixed phase. Live line connect “L”, neutral line connect “N”, earth line connect “ ⏚ ”.See the follow figure .



7.3.7 Timing on/off setting

In the main interface, press “timer” key to enter into the timing group setting interface. Then press up or down key to set the timing group. There is totally 4 timing groups. When the No.1 timing group is flashing, press “timer” key to enter into the hour setting interface, the number of the hour will flashing, at this time, press up and down key to set the hour. After the hour is set, press “timer”, then the number of the minute will flashing, then press up or down key to set the minute.

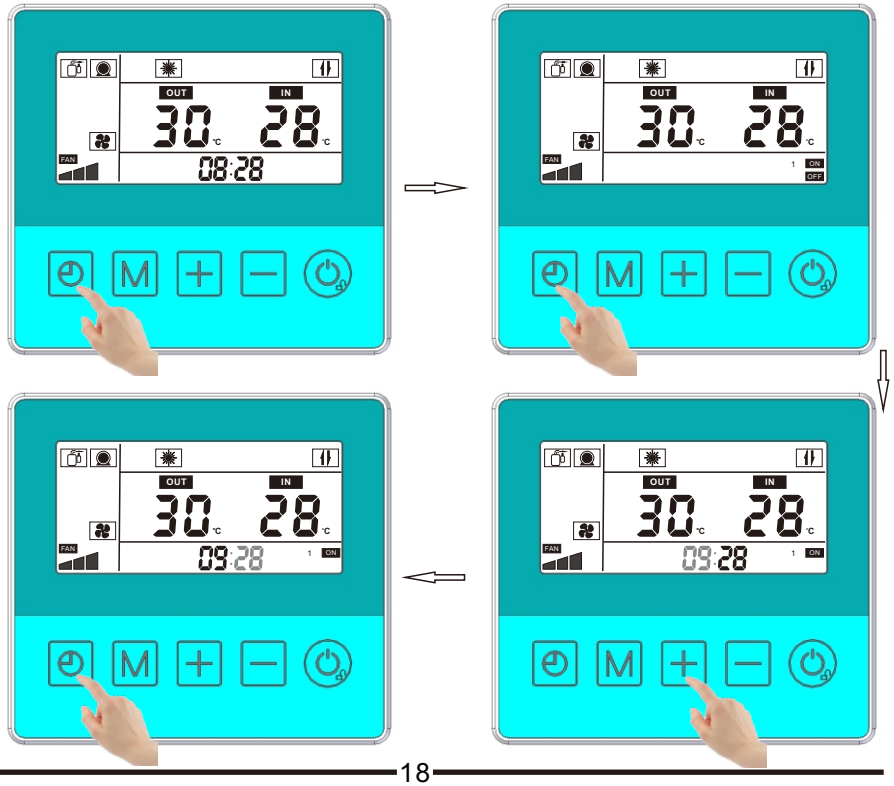
After the startup time of the No.1 timing group is set, press “timer” key to enter into the setting of the shutdown time of the No.1 timing group. The setting way is the same as the above.

After the shutdown time is set, press “timer” key to confirm the current setting and enter into the setting for the No.2 timing group. The setting way is the same as that for the No.1 timing group.

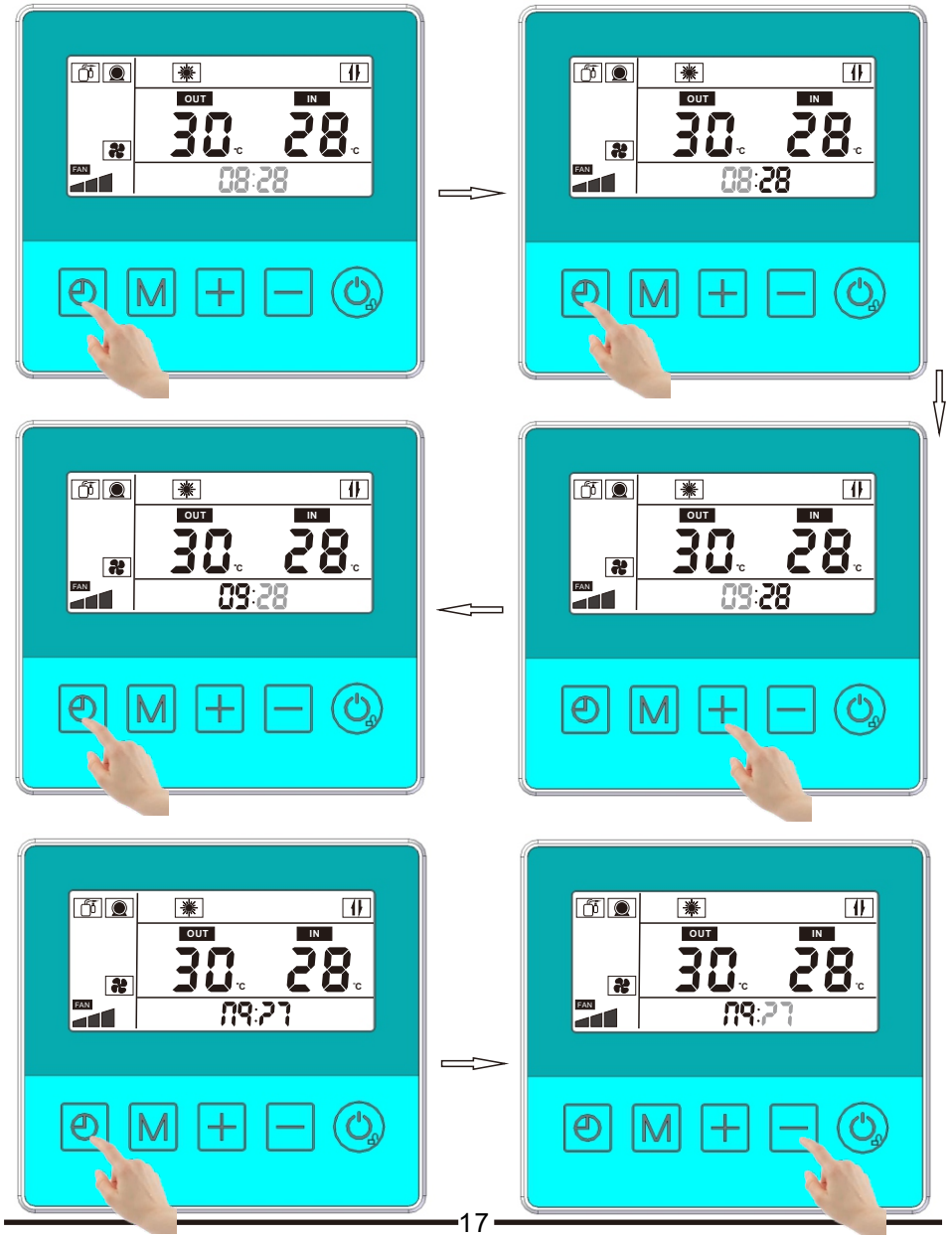
After the setting is done, press on/off key to confirm the current time and back to the main interface.

In the timing setting interface, if there is no operation on the keys for 30s, the current setting time will be confirmed and it will back to the main interface. (there is power down memory on the timer setting) .

In the timing interface, press on/off key to confirm the current setting time and back to the main interface. The setting for other timing group is the same as for the No.1 timing group.



In the current time setting interface, press on/off key to confirm the current clock setting and back to the main interface; or if there is no operation within 30s, the current clock setting will be confirmed by default and the screen will back to the main interface.



5. If water pump is required, connect the water pump power line to the right terminal in the electrical box. (note: water pump rated current ＜3A; if current ≥3A,must use AC contactor）.

6. After verifying the connection is right, the power can be on.

6. 9. 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.

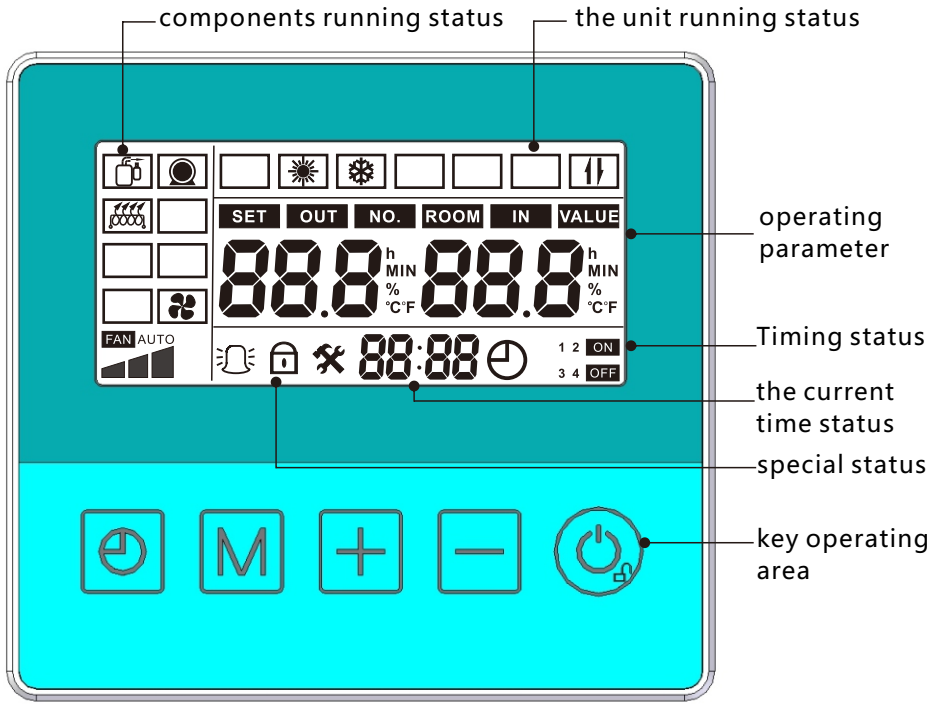
2.Try to run the unit
The compressor will start. Check whether the unit sounds unregularly by hearing, switch off and check if it has. If it doesn't have, keep it running, at the same time pay attention to whether the cooling system pressure is regular. And then check whether the power input and current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

7.1 The appearance of the wire controller and its key functions



7.2 Key function

on/off key

When the screen is unlocked, press this key to switch between on and off In the parameter setting status, press it to back to the main interface. When the screen is locked, press it for 5s to unclock the screen.

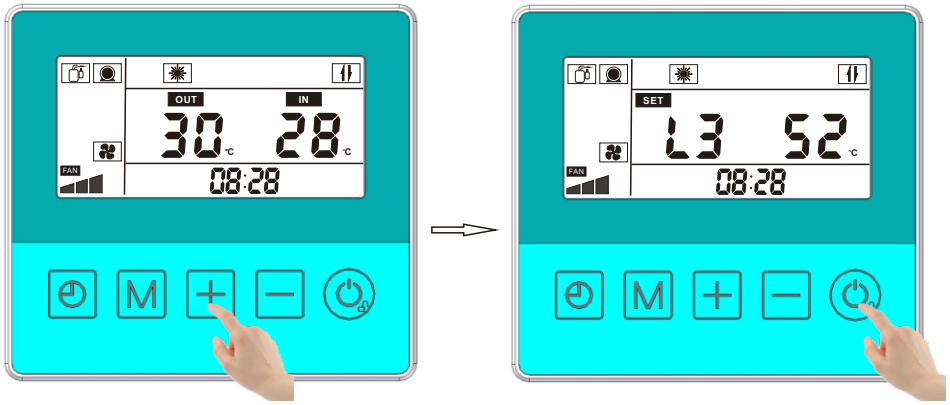
Function key M

In the main interface, press it to enter in to the unit status query

table 7-2 Parameter

Code	Parameter name	Adjustment range	Initial value
L2	The delta temperature for restart	2°C~18°C	2°C
L3	Heating temperature setting	20°C~99°C	55°C
L4	Cooling temperature setting	7°C~30°C	12°C
L5	The ambient temperature to allow the electrical heater to start	0°C~35°C	5°C
L6	Standby	/	/
L7	Standby	/	/
L8	Standby	0~40	0

In the standby mode or running mode, press the “+” key can adjust the temp. of water directly, screen displays as the following, press “on/off” key can confirm the temp. setting.



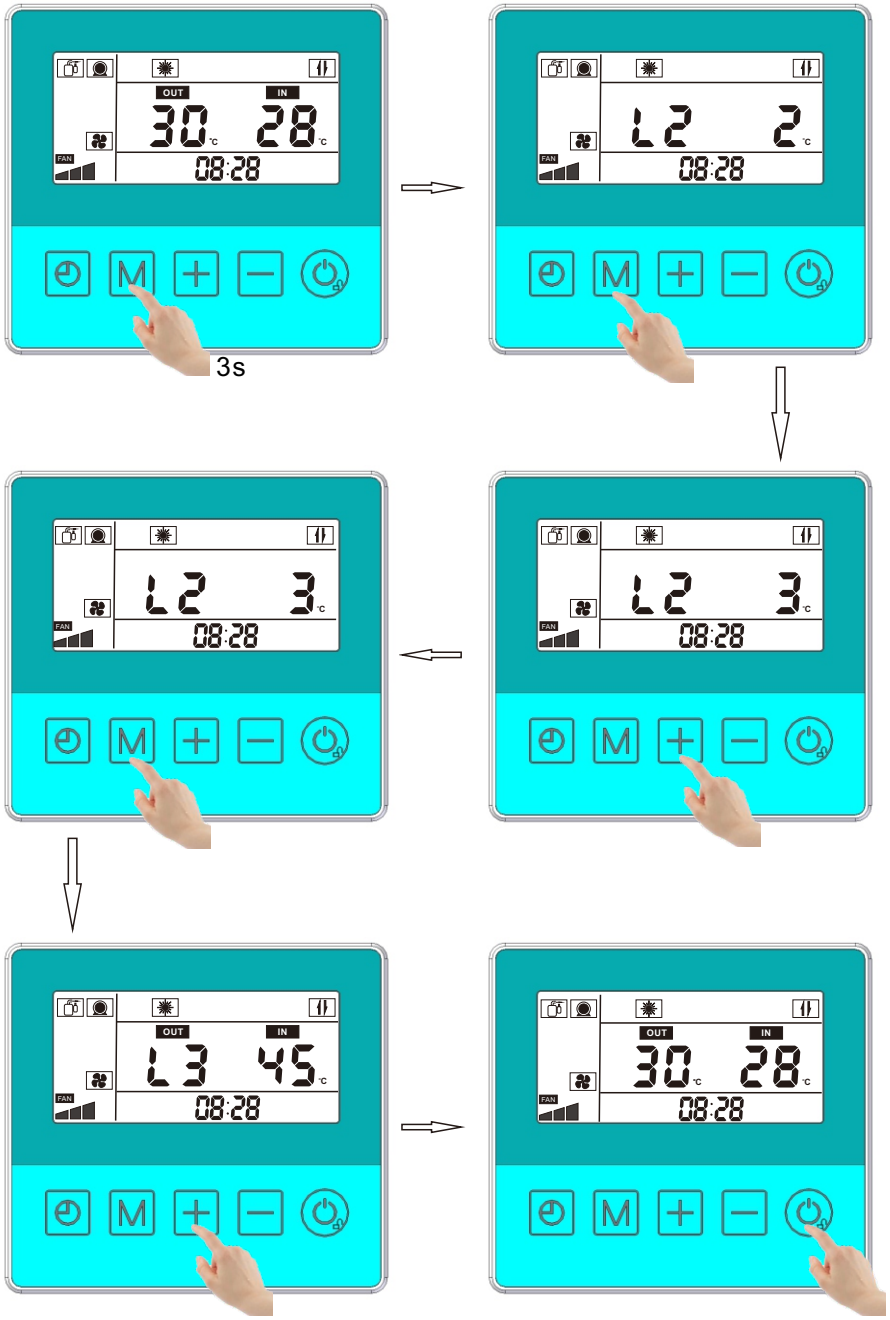
7.3.6 The current clock setting

In the main interface, press “timer” key for 5s to enter into the current clock setting interface.

In the current clock interface, press “timer” key, then the number of the hour will flash, then press up or down key to set the hour.

After the hour is set, press timer key, then the number of the minute will flash, then press up or down key to set the minute.

After the minute is set, press timer key to confirm the current clock setting and back to the main interface.



"Up" key [+] and "down" key [−]

In the parameter query or setting page, press this two keys to turn the page up and down, and combine with the function key to check or set each parameter.
In the main interface, press those two keys to modify the temperature setting in the current mode.

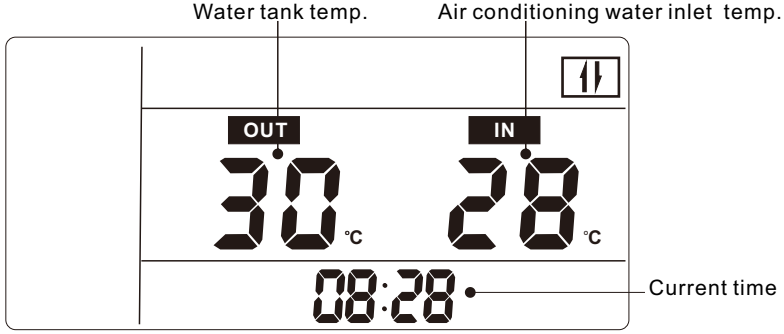
Timing key

Press this key for 5s to enter into the clock setting status, modify and set the current time via the up and down keys. Press this key to enter into the status of the timing on/ off setting and set 4 groups of on/off time via the up and down keys.

7.3 Controller operation

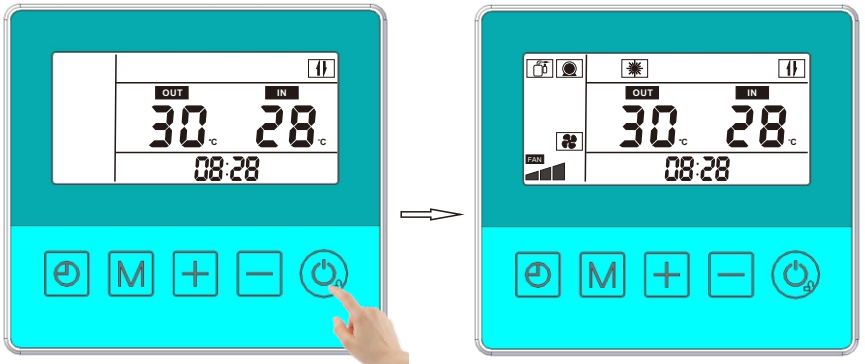
7.3.1 Standby

In the standby mode, the screen displays as the following



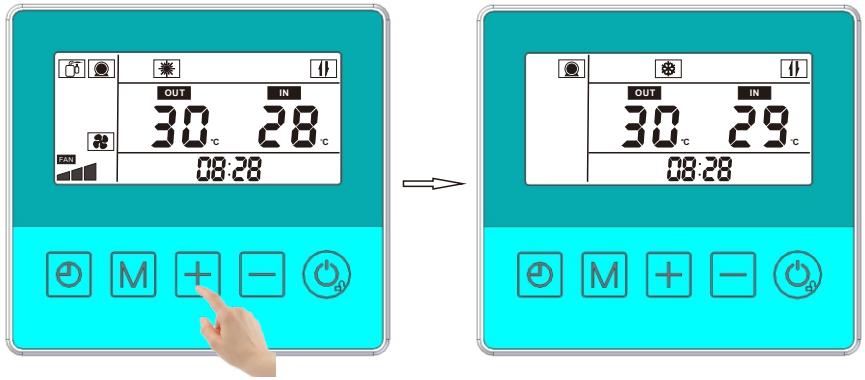
7.3.2 Startup & Shutdown

In the standby mode, press on/off key for 1s, the unit will enter into the startup status and run in the set mode.
In the running status, press on/off key for 1s, the unit will stop running.
If the screen is locked, press on/off key for 5s; press the key to start or stop the unit after the screen is unlocked.



7.3.3 Mode setting

In the standby or on status, press key"+" for 5s to switch the running mode between "cooling-heating-hot water-cooling+hot water-heating+hot water"



7.3.4 Parameter query

In the main interface, press function key to enter into the parameter query page, press "+" or "-" to check each running parameter. Press "on/off" key to return to the main interface.(follow as table 7-1)

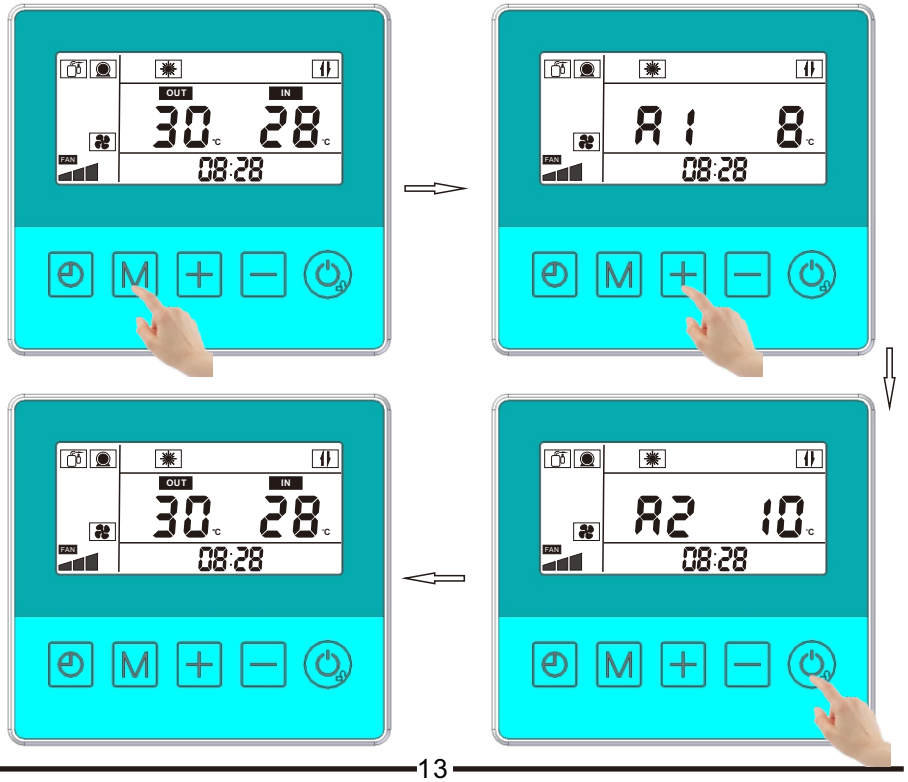


table 7-1 Query code

Code	Meaning
A1	Coil temperature
A2	Suction temperature
A3	Discharge temperature
A4	Ambient temperature
A5	Outlet water temperature
A6	Return water temperature
A7	Standby
A8	Standby
A9	Opening of the expansion valve
A10	Standby
E1	Error code
E2	Error code
E3	Error code
E4	Error code
E5	Error code
E6	Error code

7.3.5 Parameter setting

In the parameter query interface, press function key for 3s to enter into the currentuser parameter setting page. Press function key again, the parameter will flash, then press "+" or "-" key to modify the parameter value; press function key again to confirm the parameter. In the user parameter query or setting interface, if there is no key operation for 30s, it will automatically exit from the user parameter query or setting interface and back to the main interface. Or press "on/off" key to back to the main interface. (follow as table 7-2)