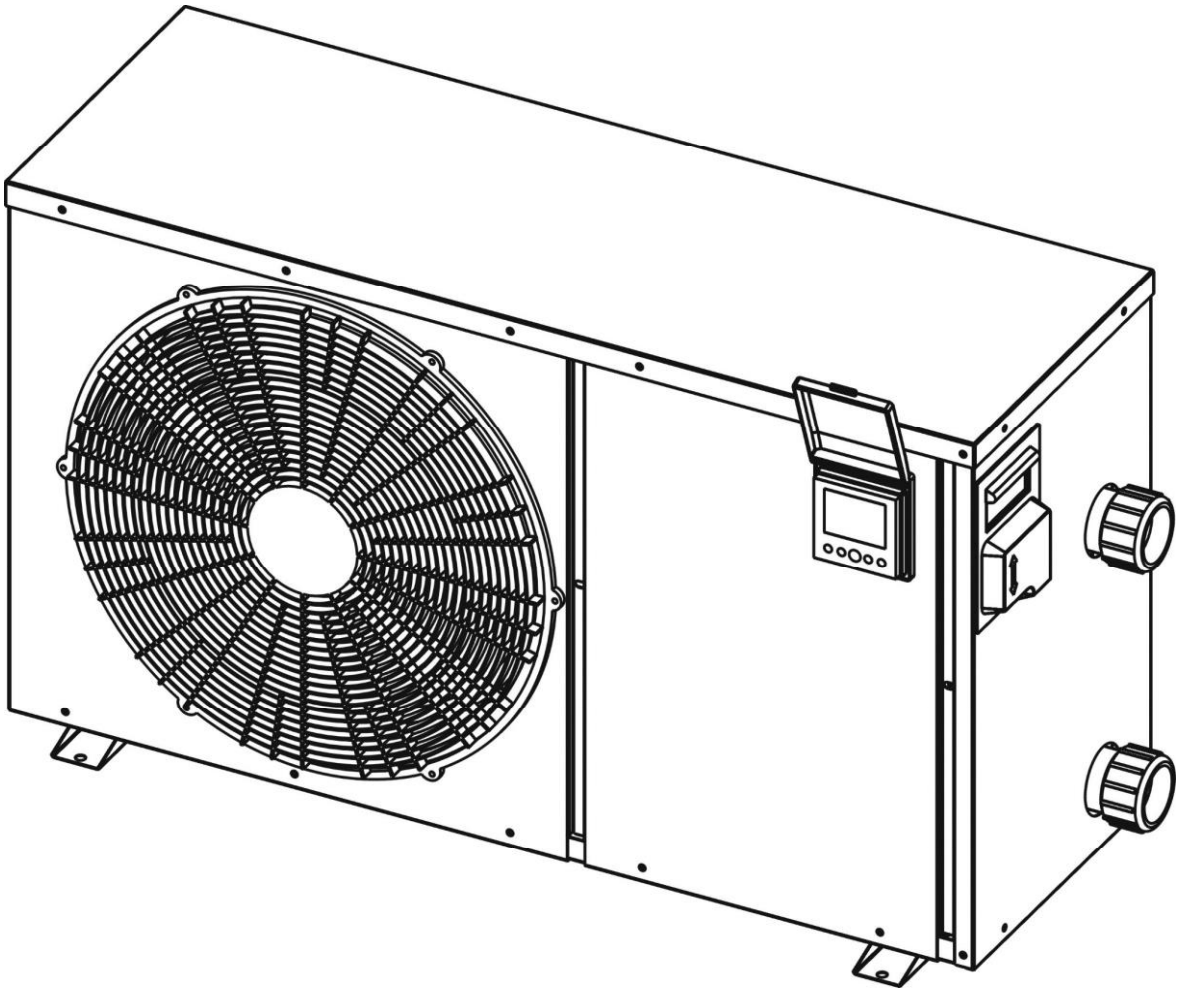
Inverter Swimming Pool Heat Pump

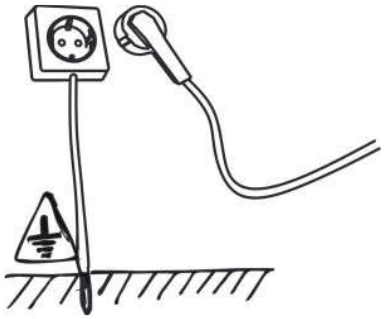
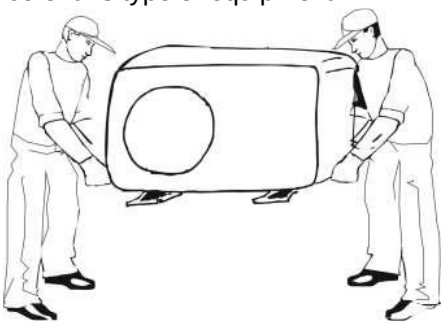
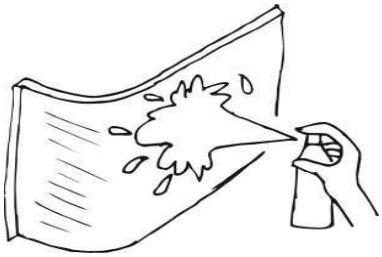
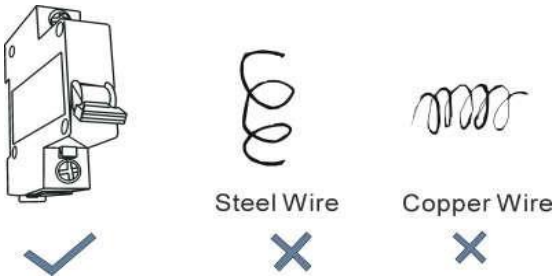
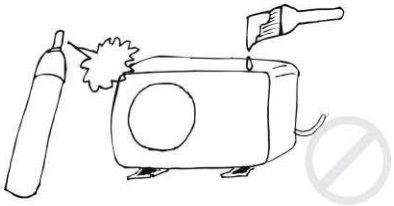
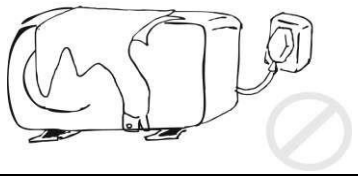
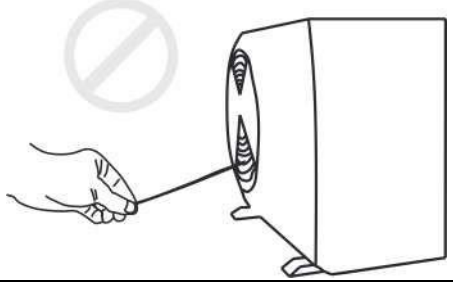
User Manual



Before operating this product, please read the instructions carefully and save this manual for future use.

1 Safety precautions

IMPORTANT Electrical power must be switched off before starting any work on heat pump.

The unit must be earthed to avoid any risks caused by insulation defects. 	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. 
Clean the machine by washing with detergent and water at low pressure, and then rinsing with clean water. 	It is the responsibility of the installer to provide circuit breaker protection, corresponding to the machine's capacity (refer to the unit electrical characteristics table), near to the machine. 
Do not spread over any paint or insecticidal material on the surface of the unit. 	Do not block the evaporator by paper or any other foreign bodies, to keep the unit well ventilated. 
Do not pour any water on the unit. 	Do not touch the air outlet grill when fan motor is running. 

2. System and Main Components

2.1 refrigerant system

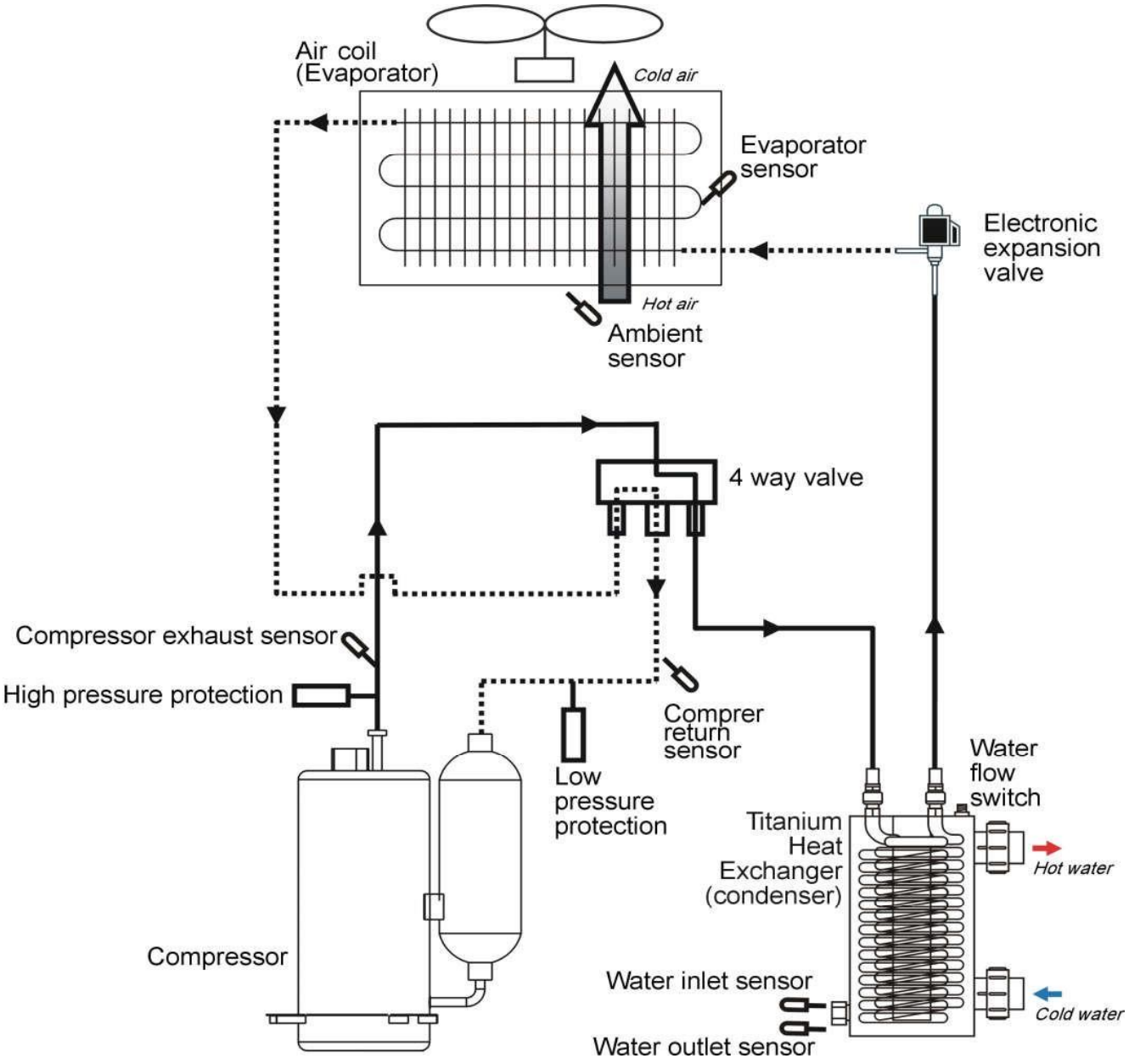
The refrigerant system consists of 5 main components:

compressor, 4-way-valve, titanium heat exchanger (condenser, refrigerant to water), electronic expansion valve(EEV), evaporator (air to refrigerant).

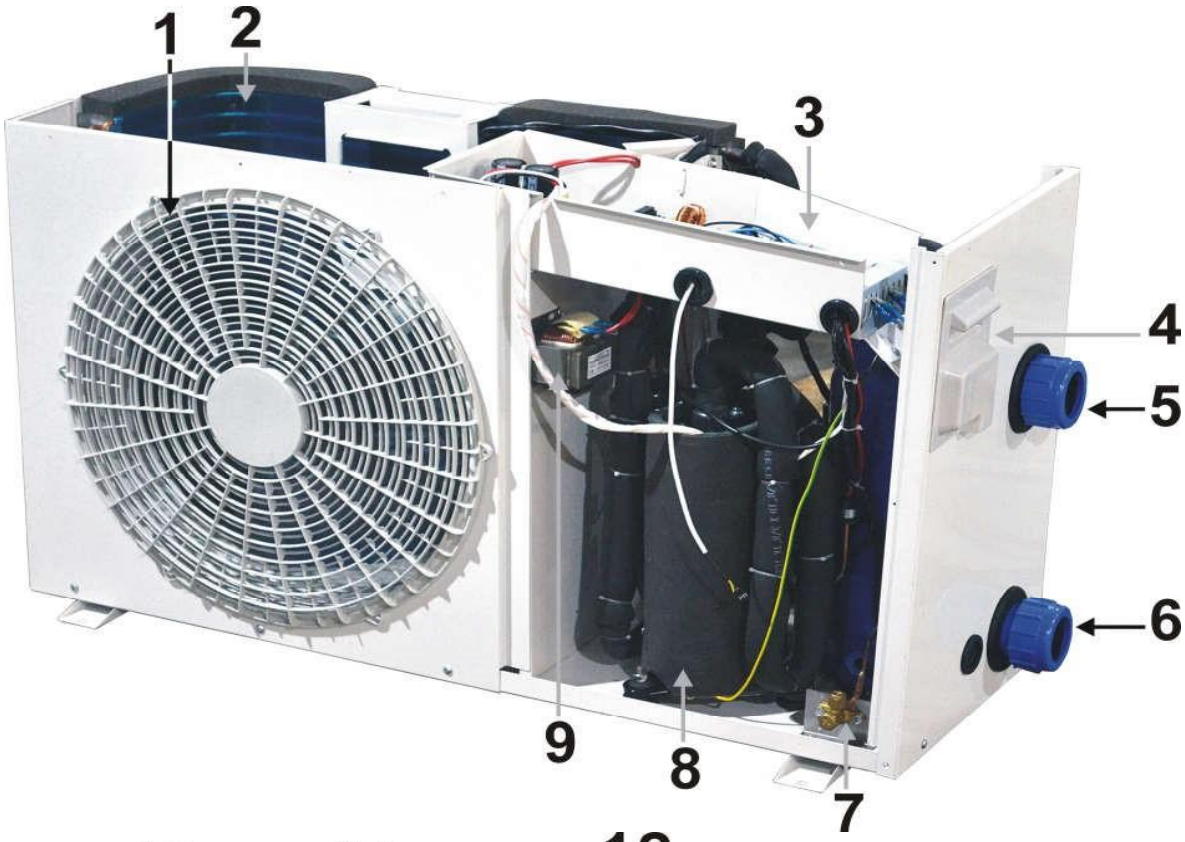
Heat pump can absorb the heating from air source. This makes the heat pump a very environmentally friendly and economically sound alternative for space heating.

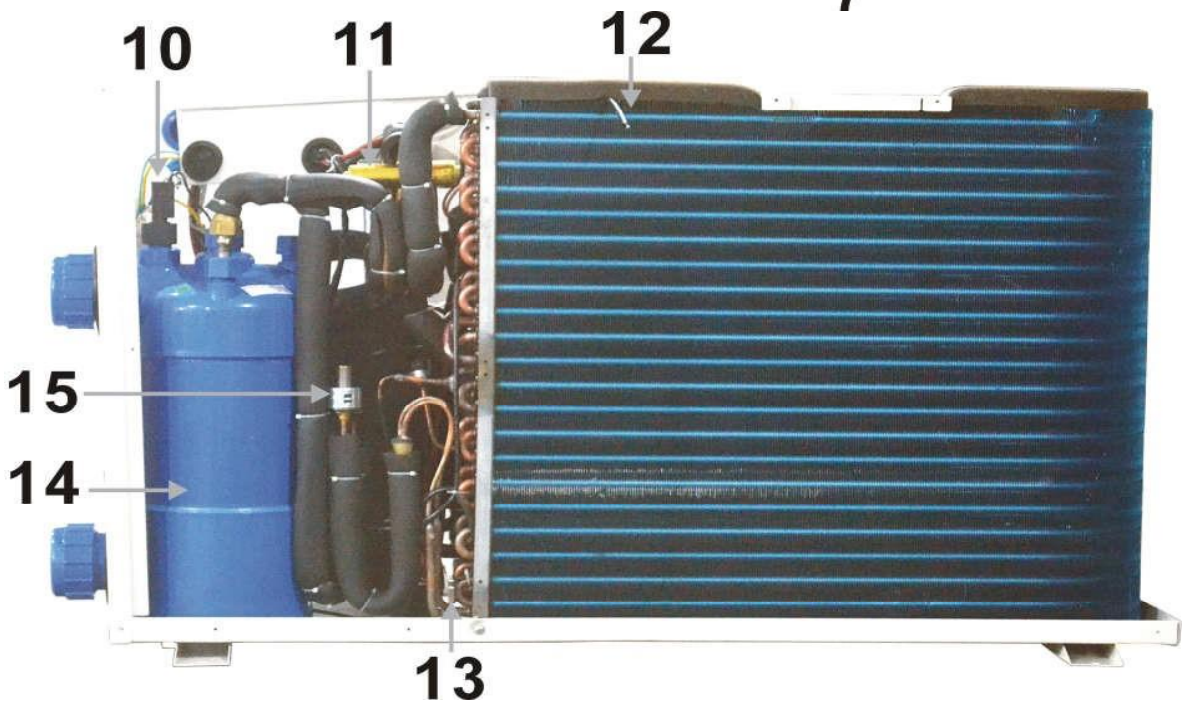
* Evaporator: low temperature, low pressure refrigerant go through evaporator, to boil and turn from liquid to gas. Refrigerant absorb heating from air source.
* Compressor: compressor absorb refrigerant, and compress to high temperature, high pressure status.
* Condenser: refrigerant release heat energy to water. Refrigerant temperature reduces, and it returns from gas status to liquid status.

The heat energy is absorbed by water, circulated by a water pump to pool.



2.3 Inside appearance:



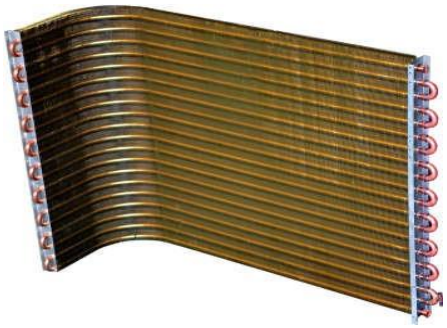


1	Plastic front net		9	reactance
2	Evaporator		10	Water-flow-switch
3	Electrical control box		11	4-way-valve
4	Plastic cover for power cable		12	Ambient air sensor
5	Water outlet		13	Evaporator sensor
6	Water inlet		14	Titanium in PVC heat exchanger
7	Service valve for vacuum, refrigerant filling		15	Electronic expansion valve (EEV)
8	compressor			

2.4 Main Components

compressor

Titanium / PVC heat exchanger



evaporator

Pressure switch

Electronic expansion valve (EEV)

4-way-valve

PCB

Wire controller

Sensor

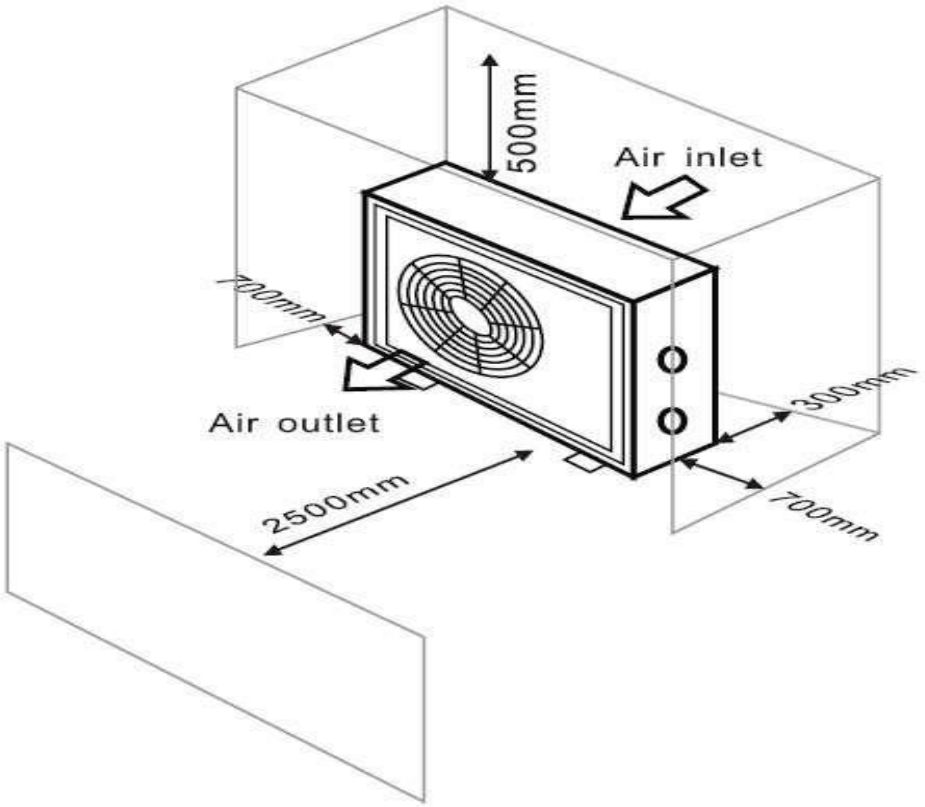
Fan blade

Motor

Water flow switch

3. Installation

3.1 Installation Location



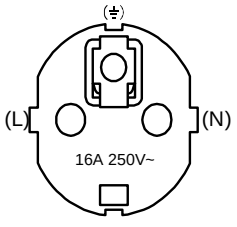
3.2 Electrical Connection

NOTE: although the unit heat exchanger is electrically insulated from the rest of the unit, this simply prevents the flow of electricity to or from the pool water. Grounding the unit is still required to protect you against short circuits inside the unit.

NOTE: ensure that the available electrical Power supply and the network frequency are matched to the required operating current, taking account of the appliance's specific location and the current required to supply any other appliances connected to the same circuit.

1) See the wiring diagram;

2) Ensure that the unit is supplied with the specified voltage. The terminal block is located on the right side of the unit. There are three connections for the Power supply and two connections for the filtering pump control (Enslavement). The Power supply line must be properly matched with a motor supply type fuse or a main circuit breaker to protect the circuit against voltage surges (refer to the nameplate for the voltage);

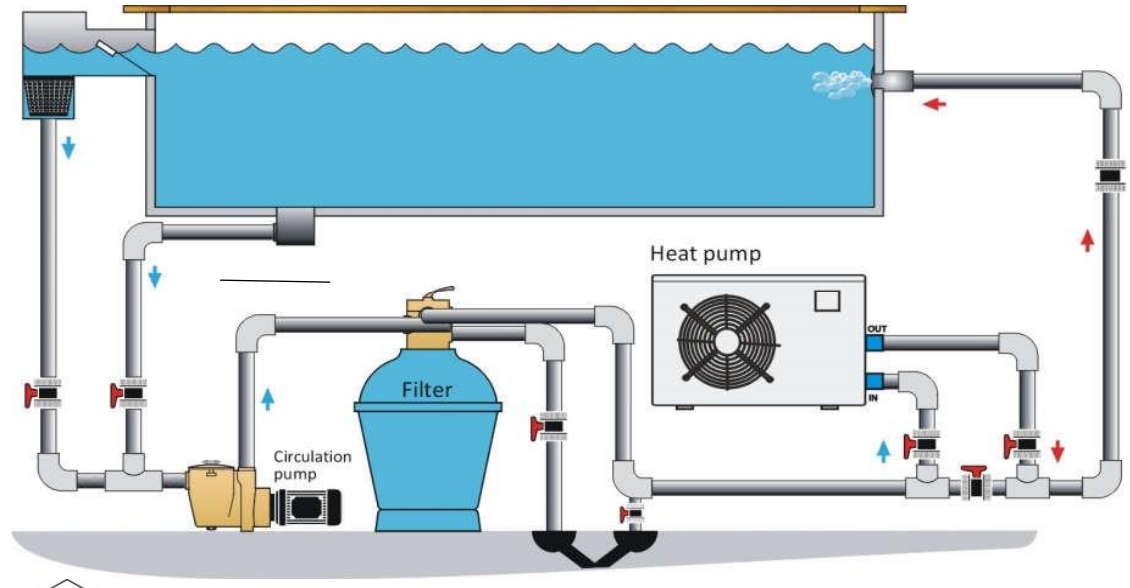


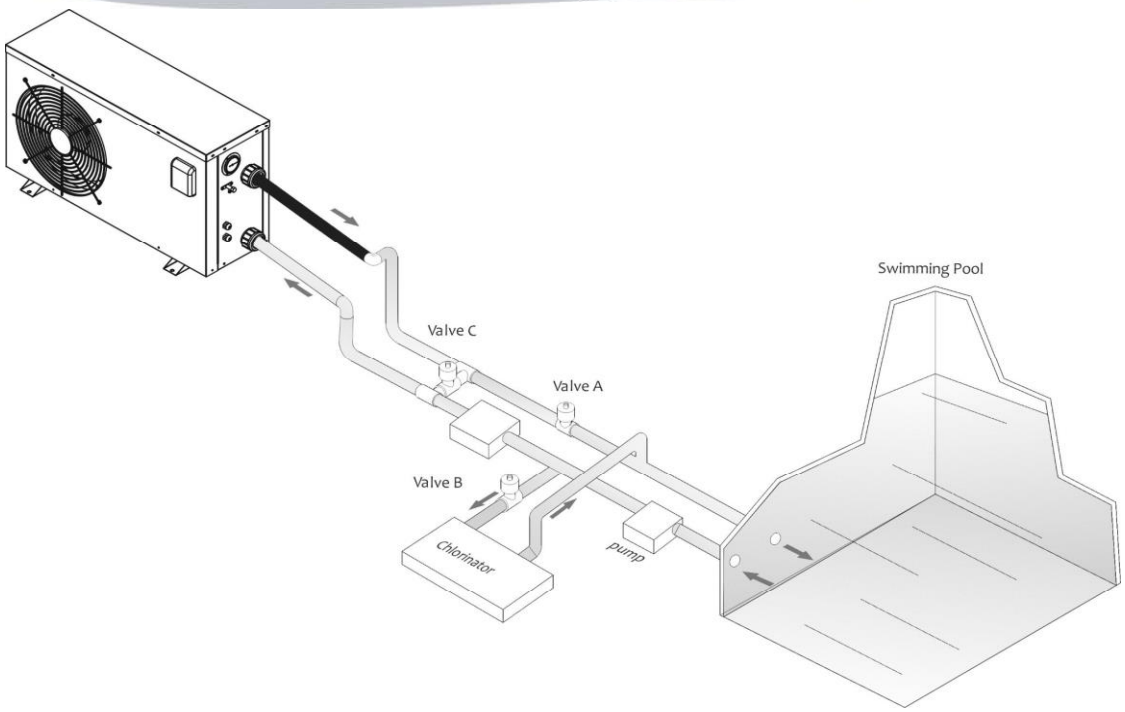
3) Always shut down the main Power supply before opening the electrical control box.

The assembly, the electric connection and the start up must be carried out by specialized and professional person.

When connect plug to socket (power supply), please make sure that live wire, neutral wire, earth wire to plug should be connected as right drawing.

3.3 Plumbing System Figure:





When heating is needed:
Make valve A open ,and then keep the water inlet and outlet Temp difference at 2℃ by adjusting the open of valve C.

When heating is not needed:
Make valve A and valve C fully open ,so the water can be circulated through the filter only.

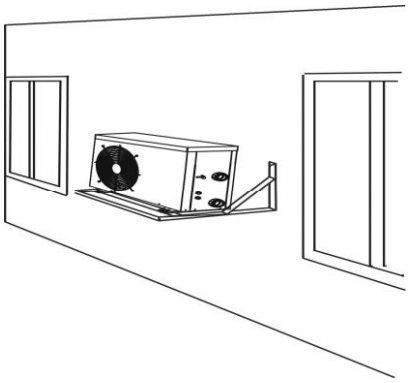
When disinfection is needed:
Make valve A closed and valve B open ,to guide the water go through the chlorine.

3.4 Terminal insulation

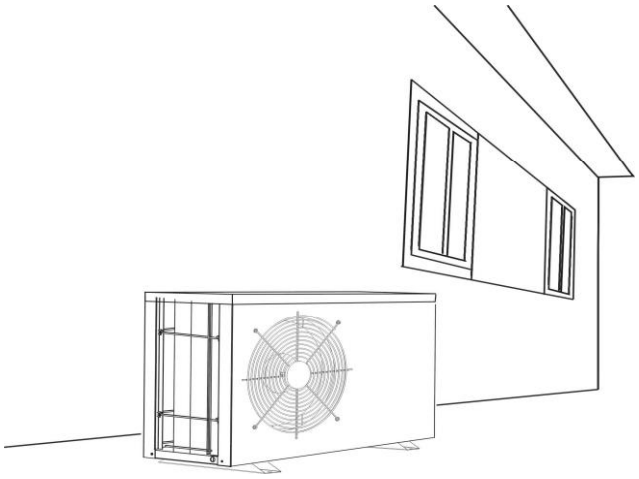
In order to proper keep power consumption low and to comply with standards in force, all hot water pipes must be insulated.

⚠WARNING Please en sure the water flow inside the unit. No smaller than80% of the rated water flow.

3.5 Location the unit

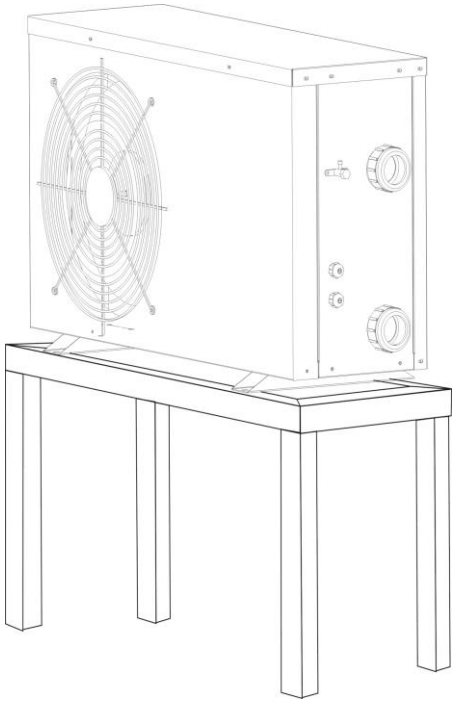


Install on wall



Install on floor

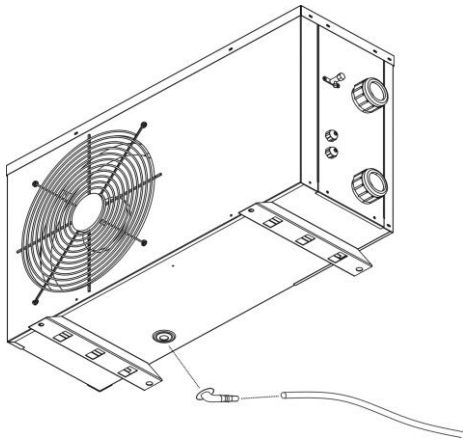
1. heat pump must install on a flat, solid, preferably cemented surface.
2. when install the heat pump in harsh climatic area, sub-zero temperatures, snow, humidity…, it is recommended to raise the unit over the ground 50cm.
3. rubber vibration absorbing mountings are recommended.
4. during installation, make sure sufficient free space around the heat pump for future maintenance.
5. the unit is air cooled. It must be installed outdoor in an area with sufficient clearance to provide enough air circulation through evaporator.
6. shield the unit from direct sunshine or rain, but never block the air ventilation.
7. the unit should be free from explosive and corrosive gas, and grease.



Install on bracket

3.6 Installation of drain

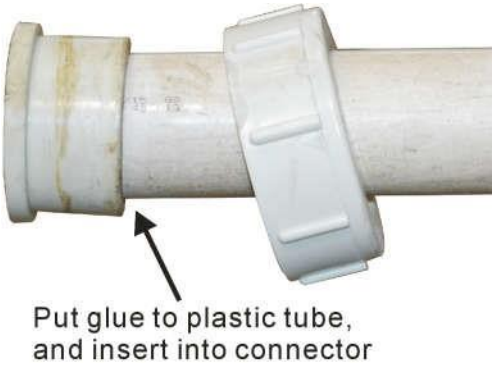
Please install the drain connector as shown in the picture when necessary. In some cold areas (ambient temperature below 0’c), please do not use the drain connector, otherwise it may clogged by ice.



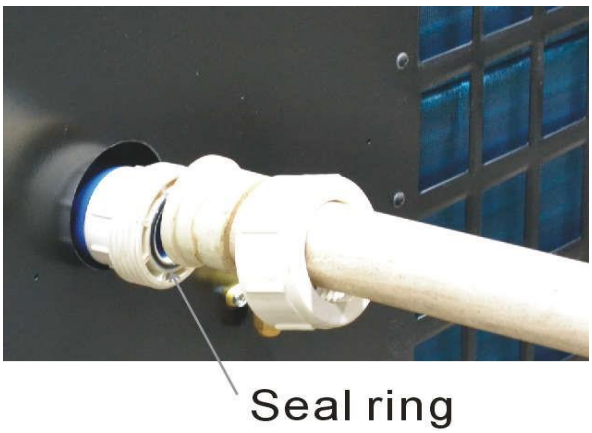
3.7 Installation of water pipe

3.7.1 connector 1

1. Put glue to plastic tube, and insert into.

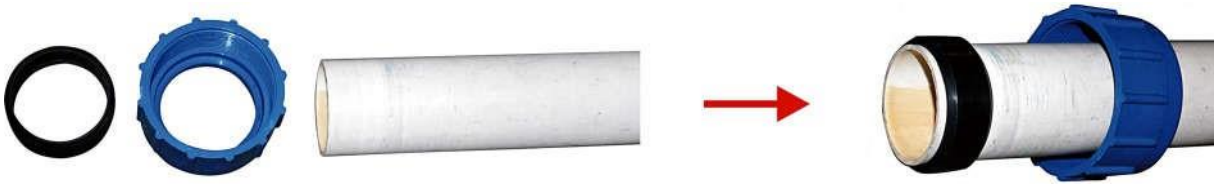


2. install the connector to heat pump connector.

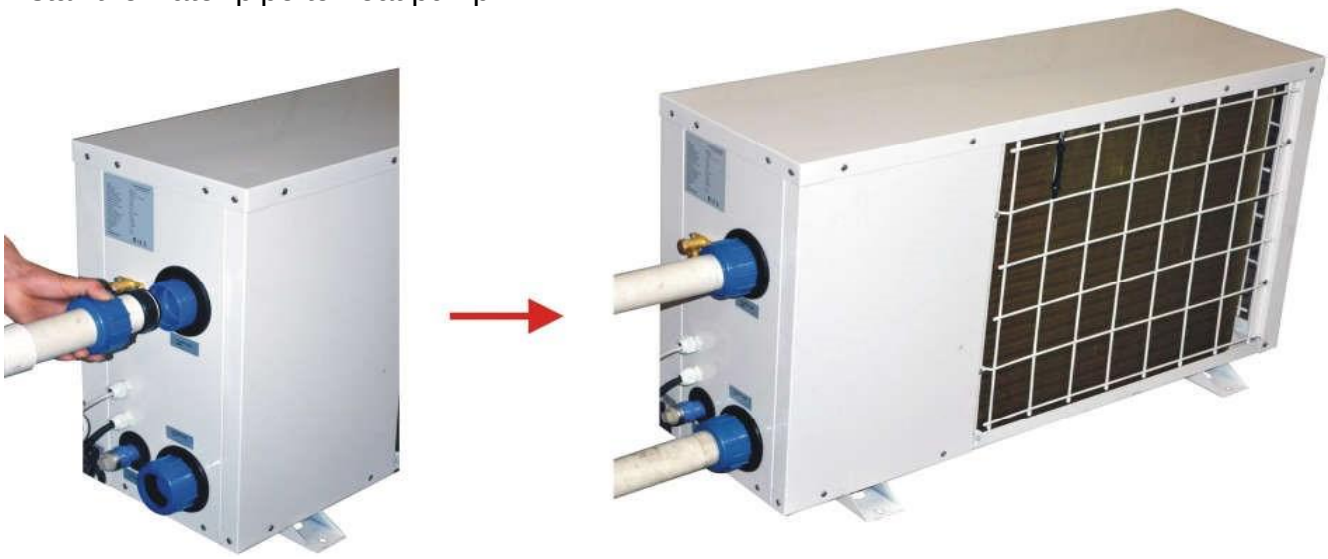


3.7.2 connector 2

1. install the rubber ring and nut to water pipe



2. install the water pipe to heat pump



⚠WARNING

the water from swimming pool heat pump should already pass by a filter before entering the unit. Some dirt perhaps damage or choke the Titanium / PVC heat exchanger and cause some failure.

4. Operation Instructions

4.1 Introduction of Wire Controller

4.1.1 Symbol

COOL function	HEAT function	WIFI connected: on WIFI disconnect: flash
water pump running	defrost	POWER mode
fan running	compressor heater	SILENT mode
compressor running	error flash	key lock

4.1.2 button

button: 1) hold 3s to switch ON/OFF unit 2) press to exist to main parameter interface
button: adjust temperature, parameter, clock, TIMER *Under main interface, hold + 3s to switch ON/OFF electrical heater (reserved)* *Under main interface, hold − 3s to unit status parameter query.*
button: hold 3s to switch COOL, HEAT function
button: 1) press to CLOCK setting 2) hold 3s to TIMER setting

4.2 Function select

Hold button  3s to switch COOL, HEAT function.

4.3 Start/stop unit

is inlet water temperature

is outlet water temperature

Compressor stop/start by water inlet temperature

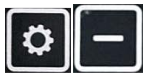
When unit is OFF, hold  3s to start unit, then 

 display.

When unit is ON, hold  3s to stop unit, then 

 disappear.

4.4 operation function:

Hold  button 3s to switch operation function: POWER, normal, SILENT.

POWER function:  display.

SILENT function:  display.

Normal : no display

4.5 clock Setting

Press  to hour of clock,  flash.

Press  or  button to change hour.

Press  to second of clock,  flash.

Press  or  button to change hour.

Press  to exist.

4.6 TIMER Setting (TIMER have 3 sets ON, OFF)

Hold button  3s to hour of TIMER ON 1

flash.

Press button  or  to change hour of TIMER ON 1

Press button  to minute of TIMER ON 1

flash.

Press  to exist.

.

Cancel TIMER : set TIMER ON and TIMER OFF same, then TIMER will cancel.

4.7 Parameter setting

Hold  3s to password interface.

 flash.

Press  or  to input password.

Press  to next.

Password 0814 is for system parameter setting

P	***parameter***
1	Setting temperature difference to restart compressor
2	Setting temperature for COOL
3	Setting temperature for HEAT
4	Water inlet temperature compensation
5	Defrost period
6	Defrost start temperature
7	Max defrost running time
8	Defrost exit temperature
9	DEFROST temperature difference between ambient and evaporator sensor
10	max ambient temperature to allow defrost
11	EEV action period
12	Normal, power mode target super-heat
13	compressor exhaust temperature to regulate EEV
14	EEV opening for defrost
15	EEV min opening
16	EEV mode : 0 manual / 1 auto
17	EEV opening for manual
18	COOL target super-heat
19	*reserved*
20	EEV working mode in COOL : 0 by water inlet sensor / 1 by super-cool
21	Water pump working mode : 1 Constant temperature continue / 2 Constant temperature stop / Intermittent run
22	DC motor working mode : 0 auto / 1 manual
23	DC motor speed in manual : 0 -99 (real speed*10)
24	Ambient temperature to switch ON electrical heater
25	DEFROST electrical heater : 0 without / 1 with
26	Min ambient temperature : 0°C ~ 30°C

Password4180 is for inverter parameter setting

F	*parameter*
1	F1 frequency
2	F2 frequency
3	F3 frequency
4	F4 frequency
5	F5 frequency
6	F6 frequency
7	F7 frequency
8	F8 frequency
9	F9 frequency
10	F10 frequency
11	F11 exhaust temperature
12	F12 exhaust temperature
13	F13 exhaust temperature
14	F14 exhaust temperature
15	F15 exhaust temperature
16	DC motor speed 1 step
17	DC motor speed 2 step
18	DC motor speed 3 step
19	DC motor speed 4 step
20	DC motor speed 5 step
21	DC motor speed 6 step
22	Silent target super-heat
23	Function select : 0 COOL HEAT / 1 HEAT only / 2 COOL only
24	Constant temperature target super-heat

4.8 Status checking:

Under main interface, hold button  3s to view unit status parameter query.

Press  or  to other parameter.

A01: Water inlet sensor
A02: water outlet sensor
A03: ambient air sensor
A04: compressor exhaust sensor
A05: compressor return sensor
A06: evaporator sensor
A07: inner coil sensor
A08: EEV opening
A09: EVI EEV opening (reserved)
A10: compressor Amp
A11: radiator temperature
A12: DC bus voltage
A13: actual compressor frequency
A14: DC motor 1 speed
A15: DC motor 2 speed (0 for single motor)

4.9 function

4.9.1 HEAT: display (4-way-valve switch OFF).

P1	Setting temperature difference to restart compressor
P3	Setting temperature for HEAT
P4	Water inlet temperature compensation

Inlet water temperature ≤ P3 - P1, then compressor start.
Inlet water temperature ≥ P3, then Constant temperature control.
Inlet water temperature ≥ P3 + 1°C, then compressor stop.

4.9.2 COOL: display (4-way-valve switch ON)

P1	Setting temperature difference to restart compressor
P2	Setting temperature for COOL
P4	Water inlet temperature compensation

Inlet water temperature ≤ P2 + P1, then compressor start.
Inlet water temperature ≤ P2, then Constant temperature control.
Inlet water temperature ≤ P2 - 1°C, then compressor stop.

4.10 Sub-Menu WiFi configure

the internet access module install at controller.
Controller connect to server by your current house WIFI.
Install controller where can access your current house WIFI.
You have to put your Mobile and controller at same place during installation.

4.10.1 App installation

Scan below to install App on your phone.

Smart Life

Maybe the installation request to install another App in advance.
You can delete it after installation finish.

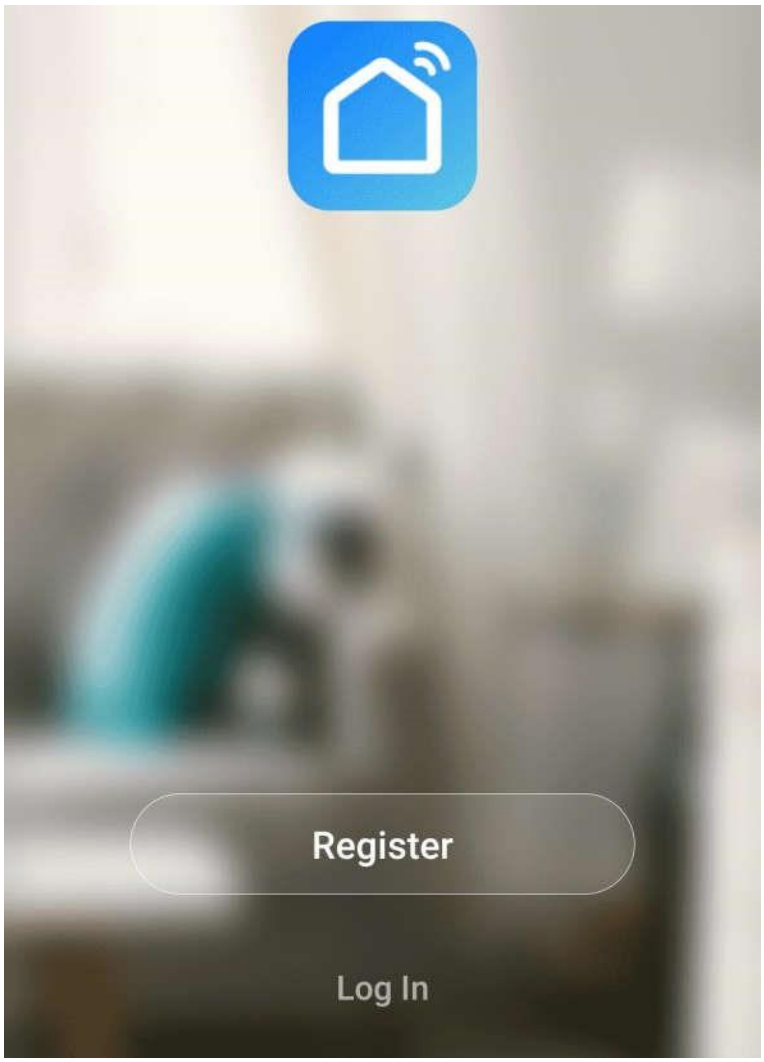
应用宝

Hold   buttons 3s,  flash quickly.

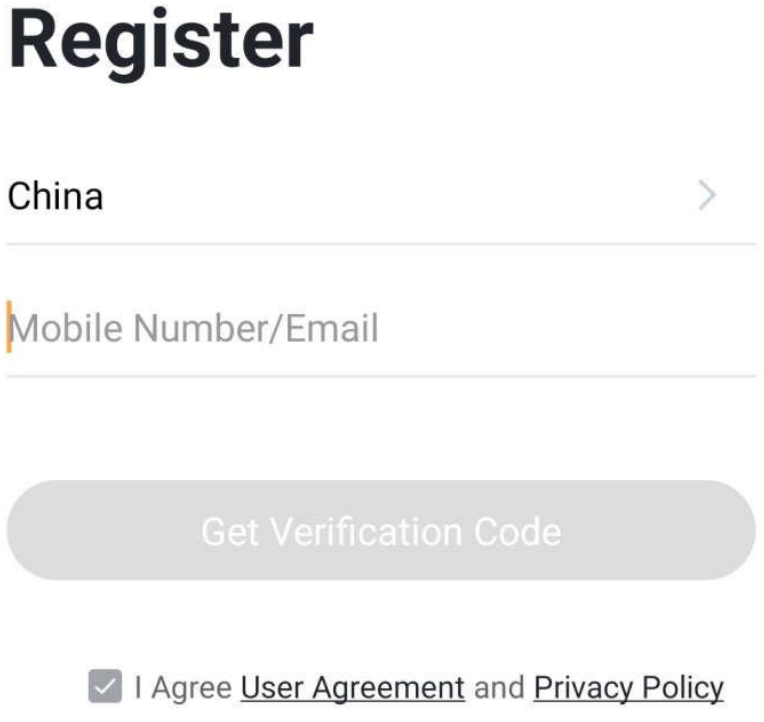
Hold   buttons 3s,  flash slowly.

4.10.2 Register

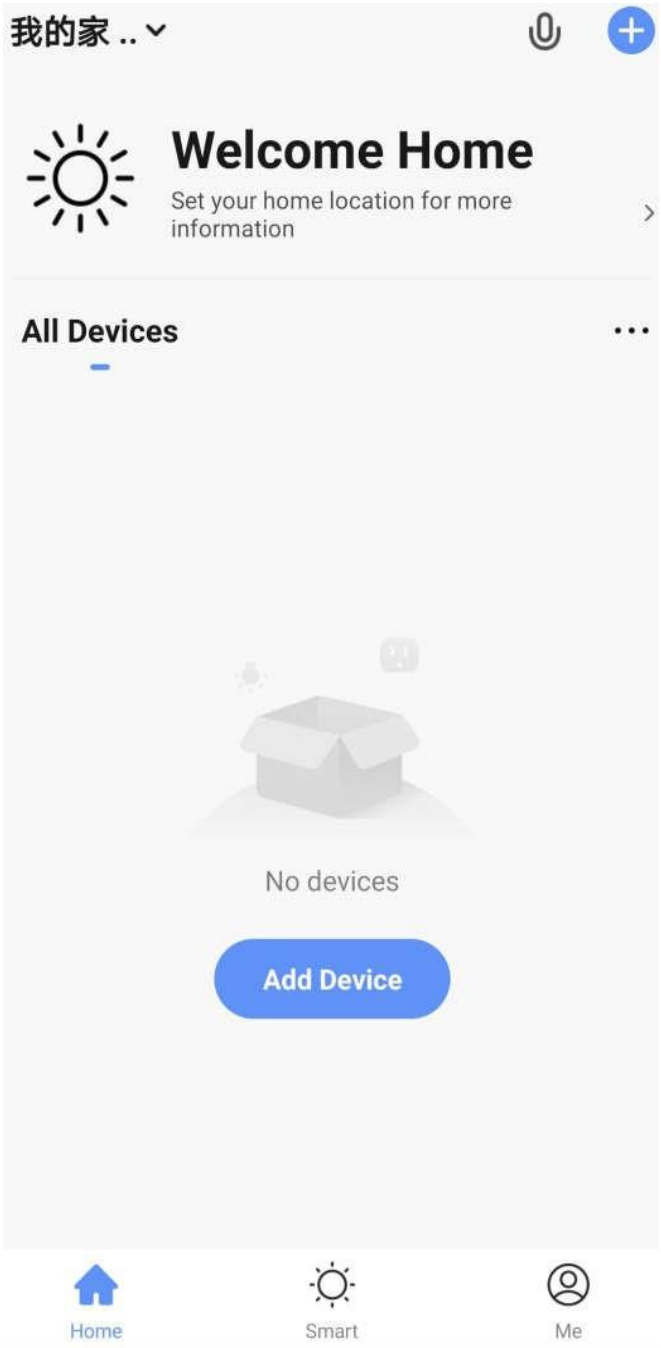
Click Register button

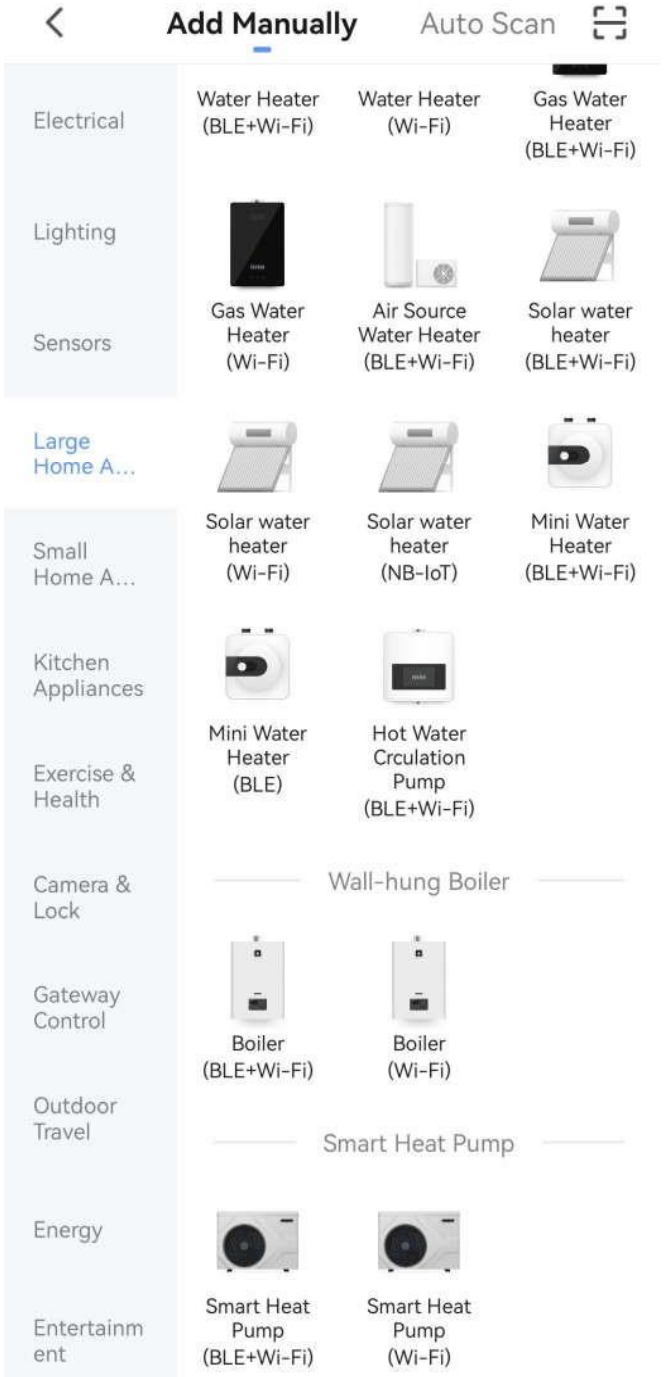


Input your Mobile Number.



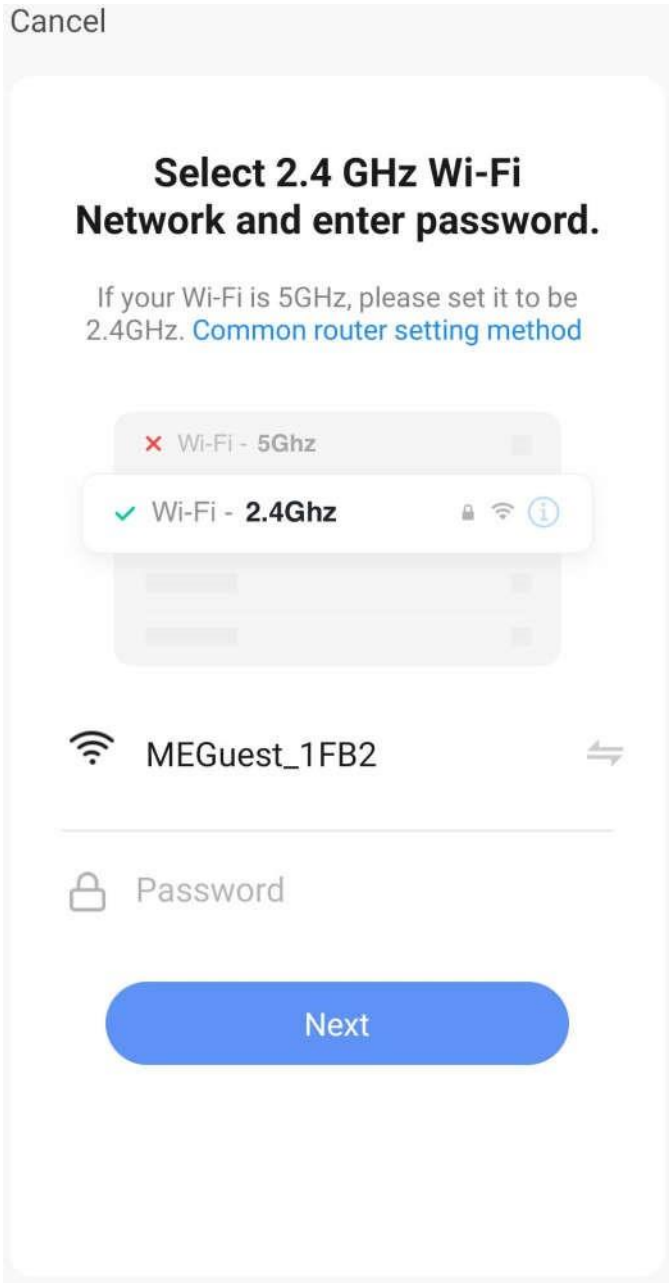
4.10.3 Add Device.





Choose
Large Home Appliances
> Smart Heat Pump (WI-FI)

4.10.4 Add Device.



Choose available WIFI accessed Internet, password

4.10.5 App wifi control.

4.11 error message:

Heat pump is equipped with regulation and safety components; when a regulation component is defective or a safety is activated, a message is posted like it's illustrated below; see the explanation of these messages in the paragraph "Error codes". Call your installation contractor for help.

Er 03	Water-flow-switch protection	**Er 20**	IPM error
Er 04	Winter anti-freeze protection	**Er 21**	Ambient sensor malfunction
Er 05	High pressure protection	**Er 22**	DC motor 2 malfunction
Er 06	Low pressure protection	**Er 23**	COOL Outlet temperature too low
Er 09	Wire control Communication error	**Er 27**	Outlet sensor malfunction
Er 10	PCB and IPM Communication error	**Er 28**	CT over-Amp protection
Er 12	Compressor over-heat protection	**Er 29**	Compressor return sensor malfunction
Er 15	Inlet sensor malfunction	**Er 32**	Outlet temperature too high in HEAT
Er 16	Evaporator sensor malfunction (defrost)	**Er 33**	Evaporator sensor ≥ 70°c in COOL
Er 18	Compressor exhaust sensor malfunction	**Er 42**	Cooling coil sensor malfunction
Er 19	DC motor 1 malfunction		

E20 error display following fault serial numbers at the same time, fault code switch every 3s;
faults 1~128 will display first，
Faults 257~384 will only be displayed when without fault 1~128.
If two or more faults of same priority at the same time,show accumulation of serial numbers.
For example, if faults 16 and 32 occur at the same time, 48 will be displayed.

Er	***name***	***description***	***solution***
1	IPM over-Amp protection	IPM module problem	replace IPM
2	Compressor synchronized abnormally	Compressor fail	Replace compressor
4	*Reserved*		
8	compressor output is out of phase	compressor wiring disconnected, poor contact	Check compressor wiring
16	DC bus voltage low	input voltage too low, PFC module fails	check input voltage, replace IPM
32	DC bus voltage high	input voltage too high, PFC module fails	replace IPM
64	IPM over-heat	host fan fails, air duct is blocked	check the fan, air duct
128	IPM sensor malfunction	heat sink sensor short circuit or open circuit failure	replace IPM
257	Communication failure	inverter module do not receive signal from function-PCB	check the communication connection between function-PCB and inverter module
258	AC input missing phase	input missing phase (3-phase module valid)	Check 3 phase power cable
260	AC input over-Amp	input 3-phase imbalance (3-phase module valid)	check input 3-phase phase voltage
264	AC input voltage low	input voltage too low	check input voltage
272	*High-voltage fault*	*high-voltage fault of compressor (reserved)*	
288	IPM temperature too high	host fan fails, air duct is blocked	check the fan, air duct
320	compressor peak Amp too high	Compressor line Amp too large, driver and compressor do not match	Change inverter PCB
384	PFC over-heat	PFC module temperature is too high	detection PFC module

5. Maintenance

5.1 defrost

defrosting only run in HEAT.

P5	Defrost period
P6	Defrost start temperature
P7	Max defrost running time
P8	Defrost exit temperature
P9	DEFROST temperature difference between ambient and evaporator temperature
P10	max ambient temperature to allow defrost

- Start of defrost:
  defrost will start when all following conditions are at the same time fulfilled:
  * evaporator temperature ≤ P6
  * compressor continue to runs P5 minutes
  (1) ambient temperature - evaporator temperature ≥ P9,
  and -7°C ≤ ambient temperature ≤ P10 continue 30s.
  (2) ambient temperature - evaporator temperature ≥ P9 + 4°C,
  and ambient temperature < -7°C continue 30s
  (**Note**: (1) and (2) only need to meet any condition)

If evaporator sensor fail, if ambient temperature ≤ 20°C, change to timer defrost, defrost running time is P7.

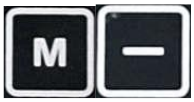
- Action of defrosting:
  * compressor stop
  * fan stop after15s.
  * 4-way-valve switch ON after 55s.
  * only compressor start 60s.
  * water pump keep running.

hot refrigerant will enter into evaporator, ice on evaporator will be melt, generated with steam

- Stop of defrost:
  The defrost stops when one of the following conditions is fulfilled:
  * evaporator temperature ≥ P8
  * compressor run totally P7 minutes.
- Action of exist defrosting:
  * compressor stop
  * 4-way-valve switch OFF after 55s
  * fan start 60s
  * compressor start 65s, resume HEAT.

⚠WARNING if not necessary, please do not change defrosting parameter setting.

5.2 coercive defrost

1. In HEAT,  hold 3s, then unit will run coercive defrost.
2. When the running time = P07, then defrost finish.

5.3 water pump

P21	Water pump working mode : 1 Constant temperature continue / 2 Constant temperature stop / Intermittent run

Unit start, water pump switch ON 30s in advance,
Unit stop, water pump switch OFF 30s after compressor stop.

constant temperature unit standby, water pump select:

* P21 = 1, water pump keep running
* P21 = 2, water pump stop
* P21 = 3, water pump Intermittent run, stop 20 minutes, run 3 minutes.

5.4 DC fan motor

P22	DC motor working mode : 0 auto / 1 manual
P23	DC motor speed in manual : 0 -99 (real speed*10)

F1	F1 frequency
F2	F2 frequency
F3	F3 frequency
F4	F4 frequency
F5	F5 frequency
F6	F6 frequency
F7	F7 frequency
F8	F8 frequency
F9	F9 frequency
F10	F10 frequency
F16	DC motor speed 1 step
F17	DC motor speed 2 step
F18	DC motor speed 3 step
F19	DC motor speed 4 step
F20	DC motor speed 5 step
F21	DC motor speed 6 step

DC motor have 2 mode:

* P22 = 1 manual, fan speed = P23
* P22 = 0 auto, DC motor control by below table:

1) *POWER, normal mode*:
COOL: fan speed = F21
HEAT: ambient temperature > 35°C, fan speed = F19
ambient temperature ≤ 35°C, fan speed= F21

2) *SILENT mode:*
HEAT: ambient temperature < 5°C, fan speed = F21
ambient temperature > 27°C, fan speed = F16
5°C ≤ ambient temperature ≤ 27°C, fan speed control by compressor frequency:

Frequency ≤ F1, fan speed = F16
F1 < frequency ≤ F3, fan speed = F11
F3 < frequency ≤ F5, fan speed = F18
F5 < frequency ≤ F7, fan speed = F19
F7 < frequency ≤ F9, fan speed = F20
Frequency > F9, fan speed = F21

COOL: ambient temperature < 15°C, fan speed = F16
ambient temperature > 35°C, fan speed = F21
15°C ≤ ambient temperature ≤ 35°C, fan speed control by compressor frequency:
Frequency ≤ F1, fan speed = F16
F1 < frequency ≤ F3, fan speed = F11
F3 < frequency ≤ F5, fan speed = F18
F5 < frequency ≤ F7, fan speed = F19
F7 < frequency ≤ F9, fan speed = F20
Frequency > F9, fan speed = F21

5.5 Frequency control

5.5.1 Normal mode

Compressor frequency control:
compressor start,frequency increase from 0Hz to target frequency.

Frequency step

step	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Hz	30	35	40	45	52	60	66	70	76	80

HEAT initial operating frequency table: by ambient sensor, inlet water sensor:

	Ambient temperature							
Inlet temperature	(-∞, -5)	[-5,0)	[0,6)	[6,12)	[12,18)	[18,24)	[24,30)	[30,+ ∞)
(- ∞,18]	F10	F10	F9	F9	F9	F9	F9	F8
(18,24]	F10	F10	F9	F9	F9	F9	F9	F8
(24,30]	F10	F10	F9	F9	F9	F9	F9	F7
(30,36]	F10	F10	F9	F9	F9	F8	F8	F7
(36, + ∞)	F9	F9	F9	F8	F8	F8	F7	F6

frequency for defrost: 60Hz

COOL initial operating frequency table: by ambient sensor, inlet water sensor:

	Ambient temperature			
Inlet temperature	Ambient ≤27°C	27°C< Ambient ≤37°C	37°C< Ambient ≤43°C	43°C< Ambient
20°C ≤ inlet	F8	F7	F6	F5
15°C≤ inlet <20°C	F8	F7	F6	F5
7°C≤ inlet <15°C	F8	F8	F7	F6

5.5.2 POWER mode

Compressor frequency control:
COOL select frequency F8.
HEAT: ambient ≥30°C or inlet ≥°C, select frequency F9.
other condition select F10.

5.5.3 SILENT mode

Compressor frequency control:
Frequency reduce by 4 step based on above normal mode table, min step is - F1.

5.5.4 Constant temperature

Compressor frequency control:

Compressor start at COOL/HEAT, initial frequency decide by inlet sensor, ambient sensor.
When compressor run to constant temperature (HEAT: inlet ≥ P3. COOL: inlet ≤ P2)

1) (Inlet - setpoint) temperature different in the range of [-0.3, 0.3], then keep original frequency.
2) HEAT:
   temperature difference < -0.3, if inlet temperature do not rise within 30s, frequency +1Hz
   temperature difference > 0.3, if inlet temperature do not drop within 30s, frequency -1hz.
3) COOL:
   temperature difference < -0.3, if inlet temperature do not rise within 30s, frequency -1Hz
   temperature difference > 0.3, if inlet temperature do not drop within 30s, frequency +1Hz.

Note: lower limit of the constant temperature frequency is 20Hz, upper limit is 120Hz.

5.6 anti-freeze function in winter

When unit standby, PCB check ambient sensor, inlet water sensor.

When inlet < 15°C and ambient < 0°C, then water pump switch ON.
When inlet > 15°C, or ambient ≥ 8°C, protection cancel.

When inlet ≤ 2°C and ambient ≤ 0°C, then unit run in HEAT .
When inlet > 15°C, or ambient ≥ 2°C, protection cancel.

If ambient sensor malfunction, only inlet sensor decide ant-freeze function.
If inlet water sensor malfunction, only ambient sensor decide.
If ambient sensor & inlet sensor malfunction, this function cancel.

5.7 evaporator cleaning

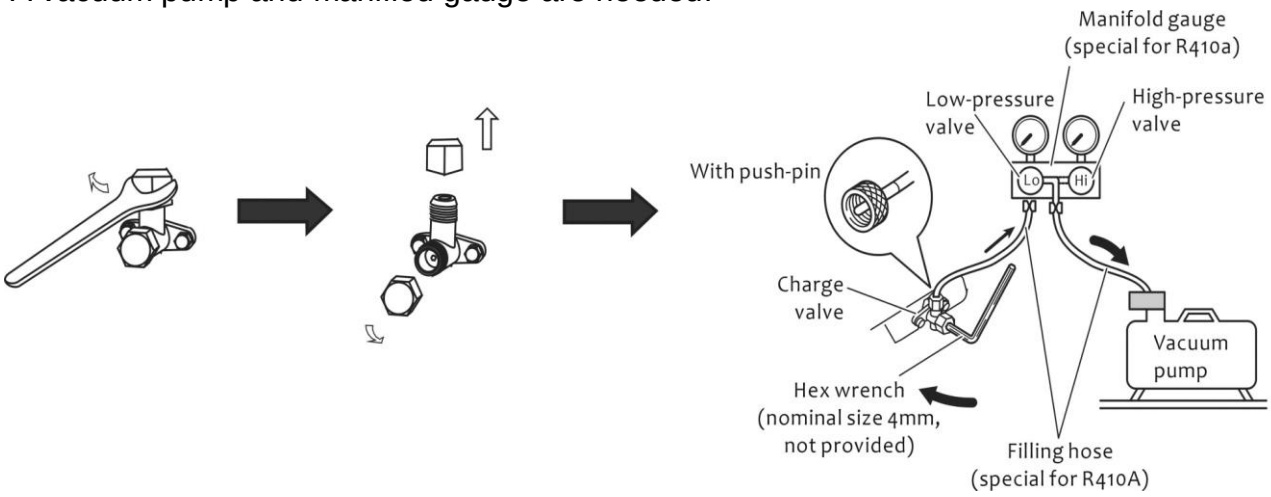
The evaporator do not require any special maintenance, except when it is clogged by paper or any other obstacle. Cleaning is by washing with detergent and water at low pressure, and the rinsing with clean water.

⚠WARNING

1. before cleaning, make sure that heat pump is power OFF.
2. inside of heat pump must be cleaned by qualified person.
3. do not use gasoline, benzene, detergent etc. to clean the heat pump. And do not spray
with insecticide, the unit may be damaged. The cleanser special made for air conditioner
cleaning is recommended.
4. spray air conditioner cleanser into the evaporator, let the cleanser sit for 5~8 minutes.
5. then, spray the evaporator by clean water.
6. an old hairbrush works well for brushing surface dirt and lint off the fins. Brush in the
same direction as the slots between the fins so the bristles go between the fins.
7. after cleaning, use a soft and dry cloth to clean the unit.

5.8 Vacuum

A vacuum pump and maniflod gauge are needed.

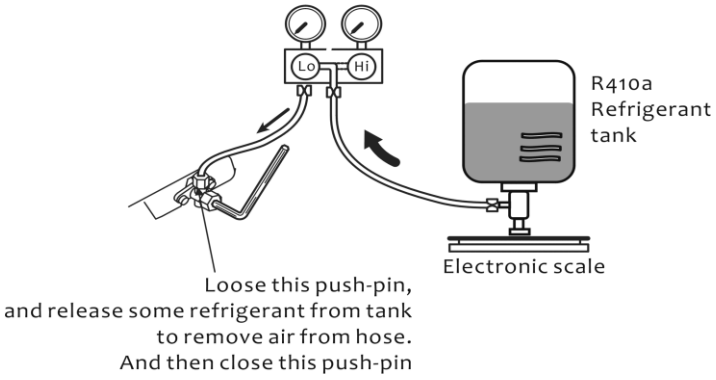


Remove the copper nut. Connect the pressure gauge to the vacuum pump.Vacuum heat pump at least 15 minutes till negative value shown on the pressure gauge, and close the charge valve.

5.9 Filling refrigerant

Refrigerant is very stable and should not degrade or break down even under severe operating conditions. If the unit has a leak in the sealed refrigeration system, please locate the leakage and repaired before charge refrigerant.

⚠WARNING refrigerant charging must be performed by qualified person.



Loose the push-pin, and release some refrigerant from tank to remove air from hose. And then close push-pin.

Open the charge valve by hex wrench, fill refrigerant into heat pump. And close the charge valve when fill enough refrigerant into heat pump.

5.10 Water Flow Failure

A water flow switch is installed as standard on the water outlet pipe to ensure adequate water flow on heat exchanger before start the compressor.

It acts if partial block, or less water flow.

The hydraulic module requires no special maintenance. Install a mesh filter by user on the water inlet pipe is strongly advised.

5.11 use in Winter

In cold winter (below 0°C), when the unit is no longer needed, please drain out all the water inside the heat pump.

Screw the water inlet connector away to drain water away from heat pump.

6. Wiring Diagram.