Make life comfortable

Heat Pump Installation & Operation Manual

Indoor Swimming Pool Environmental Control System

Important Note

Before starting the installation or maintenance of heat pump system, please read this manual, it can save your time and money.

Due to product improvements, the heat pump that you get may not be in conformity with the specifications as shown, hereby apologize.

The User Instructions

●To make the equipment can achieve good condition, please install according to the described requirements of the manual.

●When the equipment is arrived, please carefully check the outside packing of the equipment, the breakage of outer packing may cause damage to the equipment itself.

●Because of improper handling, violations of installation, violations of operation, which cause the damage of equipment, as to such kind of non-quality problems, the manufacturer does not assume any responsibility.

●Engineering installations meet requirements, which is the premise of equipment will be operating much stably and much safely.

●Once finish the installation, the equipment can be handed over and used after professional technician inspecting, debugging and operating.

●Equipment operator must accept specialized training and be qualified before perform operation of the equipment, non-professional technician can not operate, uninstall and maintain the equipment.

●It is forbidden to open the access door during normal use.

Catalogue

1. Overview of heat pump

1.1 heat pump

1) BHP indoor swimming pool heat pump is designed specifically for the indoor swimming pool with comfort requirements, it can be divided into universal and energy-saving series according to application requirement, which can be designed and manufactured according to clients' different choices.

2) The design of host machine's outer box adopts interlayers filled PU foam, shell surface adopts EFI paint anti-corrosion treatment. The well-structured leakproofness of Metal box, which can effectively prevent leakage of heat and noise. The combination of air supply and air return units may have various airflow patterns, and guarantee the indoor air keep negative pressure.

3) There are several different models of units for different sizes of swimming pool. The design method of double fans can reduce time of compressor operation through all fresh air operation pattern, which also can achieve the goal of indoor dehumidification. Only the dehumidification heat pump with one air supply without energy-saving operation mode, but these two types of heat pumps can achieve the same effect of indoor dehumidification purpose.

1.2 Usual dehumidification problems

1) High corrosive environment of indoor swimming pool needs to keep indoor air humidity, indoor air temperature, water temperature and ventilation in good balance.

2) Indoor swimming pool's water heat loss is mainly caused by the surface of the pool water evaporation, while air humidity and air temperature of indoor swimming pool space are getting lower, the heat loss and evaporation capacity will be larger. Once the air humidity of indoor swimming pool can not be controlled in ideal scope, high wet air will lead to serious corrosion problems of swimming pool, like severe corrosion of ceiling and metope, of course, the swimmer will also feel uncomfortable at such an environment.

3) When the heat pump technology has not developed yet, the most common use of humidity control solution is: discharges high wet humidity of indoor air, supply dry air from outdoor. This solution needs to heat lots of air in winter , high energy consumption, also needs electrical heating or gas boiler heating for heating the pool water, add heat that lost by heat conduction of surface evaporation and pool wall heat.

4) BHP series heat pumps dehumidify through the air of indoor swimming pool, restore the xerantic energy back to air and water, while the operating cost is very cheap.

5) BHP series heat pump is a whole box structure, it can be 100% of the desiccant heat that used to heat water, its operating cost saving in 25% ~ 50%. Heat pump can be turned out to the pool surface evaporation heat loss all returned to the water. This energy condenses lots of moisture during repair process, which reduces the requirements of fresh air, also greatly reduces the cost of heating fresh air in winter.

1.3 Design conditions of indoor swimming pool

1) The proper water temperature for swimmers is 26 ~ 28 ℃, as to the swimmers when out of water, the required air temperature has to be higher than the water by 2 ℃, thus, the proper air temperature of indoor swimming pool is 28 ~ 30 ℃, relative humidity is 60 ~ 65%.

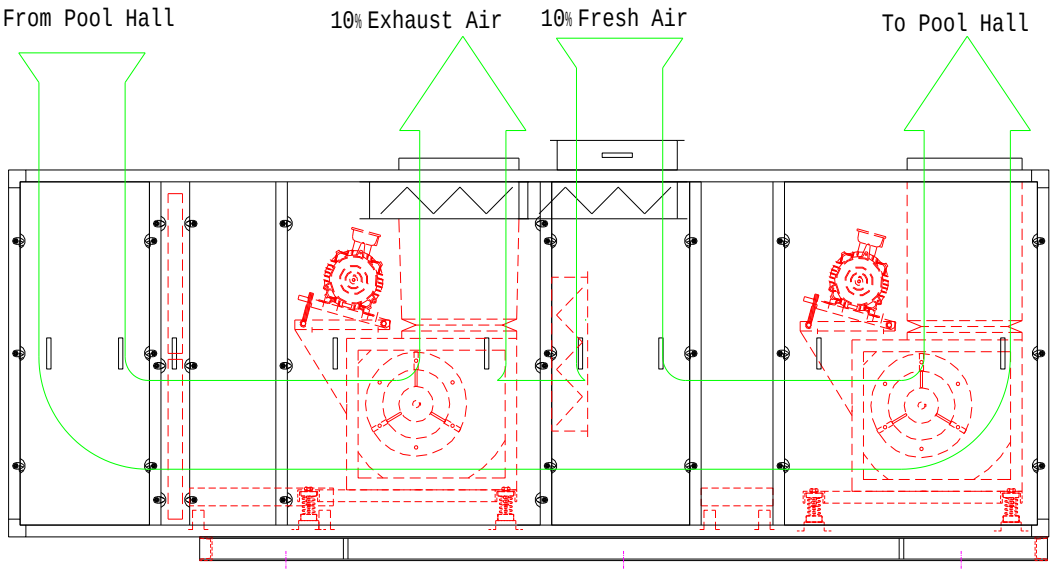
2) Indoor swimming pool area should maintain negative pressure, on one hand, it can reduce water steam pressure, avoid excessive water evaporation, and prevent the construction materials fully filled with moisture, on the other hand, it can also prevent wet air spread to other areas of the building.

1.4 How does the BHP work

1) BHP series heat pump's water heating and dehumidification system, recycle the heat loss by water evaporation. Heat recovery refers to the high humidity air condenses the energy transferred to the pool water, and keep in an ideal temperature, waste heat is mainly used for heating the cooled air by dehumidification.

2) Figure 1 is a BHP series double draught fans heat pump. Its working principle: return air vent will come from the high humidity of indoor swimming pool, which will be sent to machine's evaporator throuth air filtering program, the moisture will be separated out during air condensing. The treated air will reheating through machine's condenser, the exporting heat from compressor will be released once it meets the swimming pool temperature. Air supply will deliver dry air to windows and ceiling where are easy to frost by optional auxiliary heater and air hose.

Figure 1

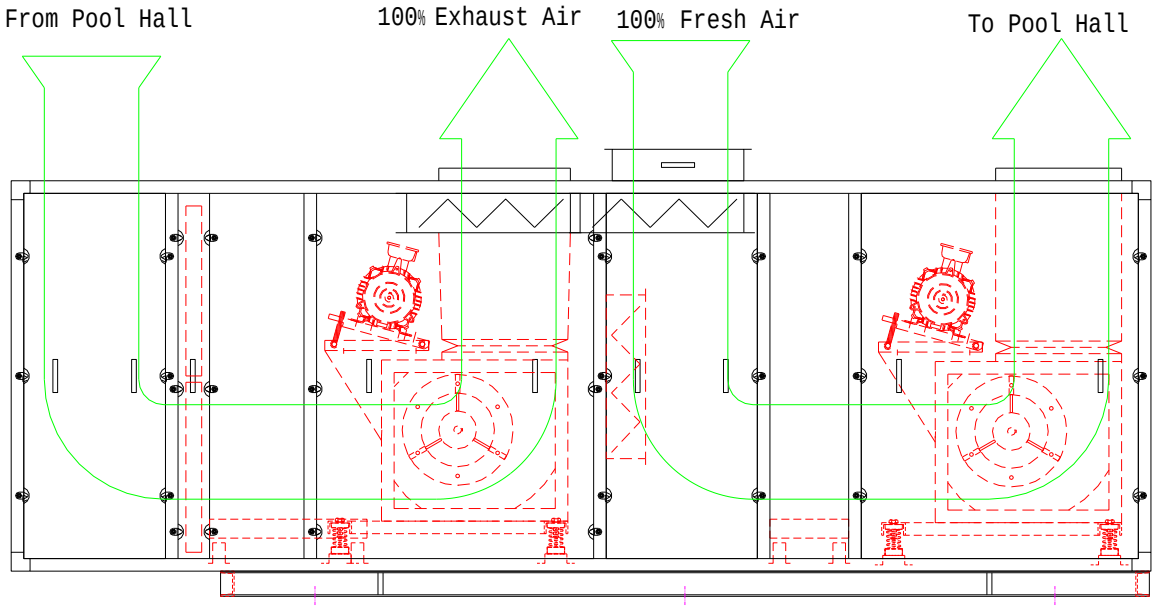


Normal Dehumidification Mode

3) Figure 2 is a BHP series double draught fans heat pump - fresh air running mode

Humid air of indoor swimming pool will be delivered to filtering program and sent out to outdoor, fresh air will be sent to indoor swimming pool by air supply draught fan, only under the circumstance of outdoor air is completely suitable to the requirements of indoor air of this model will be adopted (outdoor air temperature at 15 ℃ ~ 26 ℃, relative humidity is less than 60%).

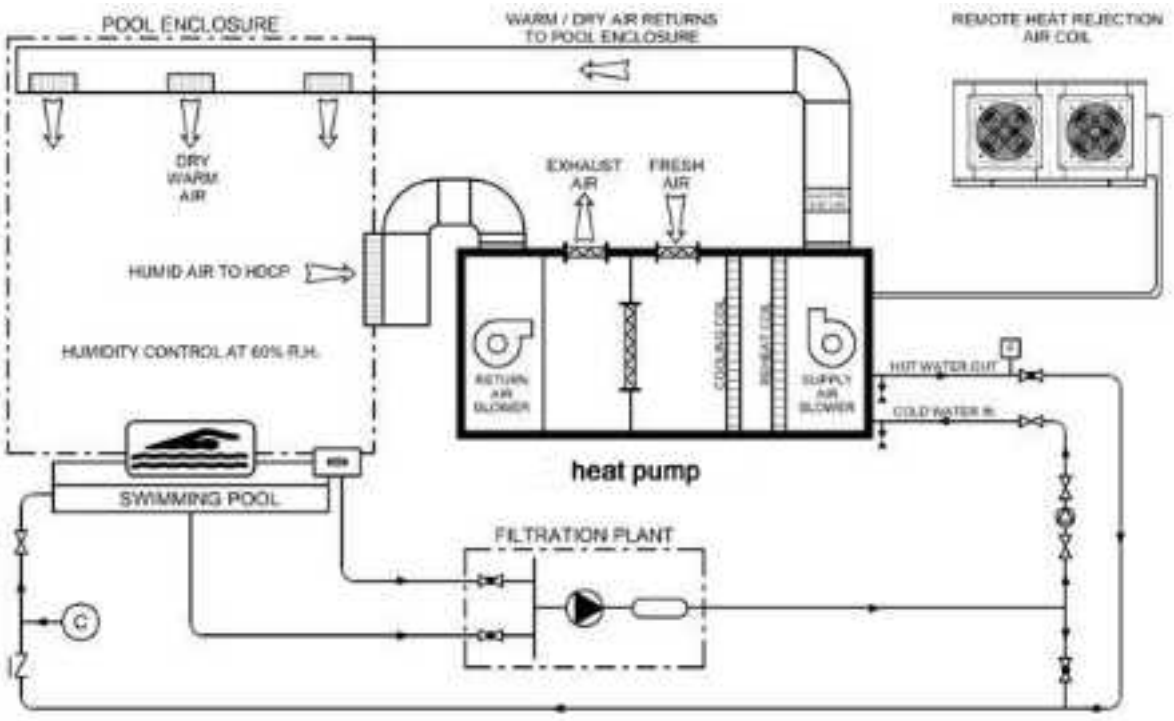
Figure 2



Total Air Change Mode

4) Figure 3 is a typical indoor swimming pool heat pump installation application diagram: the exporting heat from compressor firstly meets the demand of heating pool water by heat exchanger; when the swimming pool water temperature reaches to set value, if the temperature/humidity of the indoor air don't reaches to set value, the heat will be delivered to heat the indoor air. Only completely under the circumstance of indoor swimming pool water temperature, air temperature and humidity will the compressor stop working. Air supply and air return draught fans will continue running in order to keep the hall well-ventilated. In winter, when indoor air temperature is lower than the set value, additional configuration of auxiliary electrical heater or other air heating modes should be put into operation. (Only under the circumstance of exporting heat from heat pump in winter can not meet the heat loss of hall, replenish fresh air and air heat transfer will the auxiliary electrical heater run).

Figure 3



Indoor Pool System

1.5 Energy-saving operation(Standard manual)

1) When the difference between indoor and outdoor temperature is not large, and indoor humidity is higher than outdoor humidity and standard value, open the exhaust air, fresh air, which make its

energy-saving mode run.

2）The advantage of using BHP heat pump than exhause air and reheat air of traditional method:

① Total fresh air is under strictly controlled, its quantity is suitable for dehumidification, but far less than the traditional reheated quantity of tradition type.

② Most of the heat is recycled, only small amount wasted.

③ Recyclable heat is used for heating the pool water heating and fresh air.

3) Obviously, when outdoor air temperature and humidity is higher, fresh air dehumidification effect is difficult to achieve.

4) It is recommended to install an exhaust air heat recovery equipment.

1.6 Restriction

1) Heat pump can not be like air heater instantaneously output high heat, so it usually takes several days to heat a cold pool for the initial heating. Can not choose the excess type of heat pump, but should be designed for continuous operation to achieve uniform moisture. We suggest that use a swimming pool cover plate on the night during the heating season. No matter which kind of swimming pool heater, using the pool cover plate can greatly reduce the cost of heating and dehumidification.

2) Swimming pool heat pump should run continuously for maintaining uniform dehumidifying effect. Heat pump can stop the running in the evening in the summer.Installation personnel should provide all the control to prevent the equipment still play a role in heat pump is not running.

1.7 Air distribution

1) The best air distribution from the floor at the bottom of the duct system on the shutter tuyere air blow to the outer walls and windows. In some of the old buildings for duct generally along the wall, and the air shutter blowing straight down walls and Windows or vertical to the skylight.

2) Return duct of BHP unit should decorate house ceiling as close as possible.

3) All of the air duct, ventilation, and air heater, return air grille should have anticorrosive function, the duct must also have heat preservation function at the same time.

4) The fresh air and exhaust duct should be as short as possible, in addition, the installation personnel should install a filtering program in the inlet of the air pipe.

1.8 How to prevent corrosion

1) CUPRO - TITANIUM bushing heat exchanger constantly contacts with the pool water, CUPRO - TITANIUM with high anti-corrosion performance. If the PH of the water in a 7.2 to 7.8, and the chlorine concentration is less than 5 PPM, heat exchanger will not be corrosion. Unfortunately, some automatic chlorine opportunity to result in high chlorine concentration cause corrosion.

2) Automatic chlorine machine：
Commonly used chlorine machine points of the pipeline and pressure type, pipeline chlorine machine installed in the swimming pool heating loops on the pipeline, pressure type chlorine machine imported from high voltage side of the pump a small amount of water, and chemicals, and dilution and then back to pump into the pool. When the pump is running and the system will not have any problems at work. But it is worth noticing: when the pump stop running, a large number of high concentration of chlorine gas will fill the chlorine machine and the connection pipes back into the heat exchanger. Need for automatic chlorine machine take the necessary precautions, otherwise, it will lead to pump damage. Following the guidance of the operation is very important. By using chemical equipment damage caused by improper, which is not in the scope of product warranty.

3) Pressure type chlorine machine：
This type of chlorine machine need in chlorine into the tube of setting up a maintenance valve, prevent the pump stop running chemical transferred to the heat exchanger.Repair valve must have high corrosion resistance, the general will recommend or provide that such products.

4) Pipeline chlorine machine：
This type of chlorine machine is being installed in return water pipe between heat exchanger and the swimming pool.Usually, it is recommended that the chlorine machine placed in heat exchanger as far as possible, and requires repair valve is installed between the heat exchanger and the chlorine machine.

5) Input type chlorine machine：
As long as according to the manufacturer to provide instruction to do, adhesion ochemical of dosing machine does not cause any problems.Should avoid liquid or granular chemicals added to the separator directly, these granular material inhaled screening programs and high levels of chemicals in this formation, to destroy the screening program and heat exchanger.

6) Artificial processing：

The safest water treatment method is manual operation, it is far from fluid and the pipe at the bottom of the regular use of chemicals.Containers for chemicals in flowing water is very safe and simple.

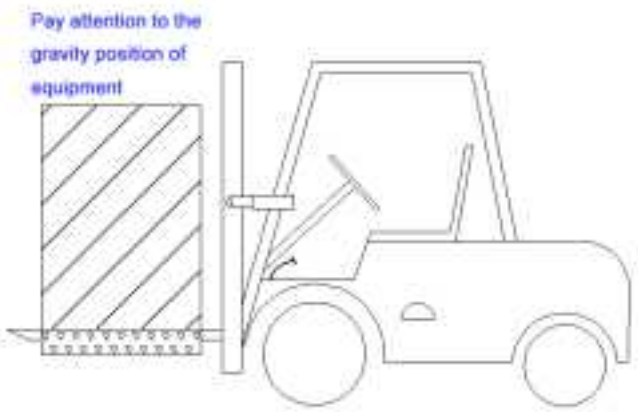
7) Water tests on a regular basis：

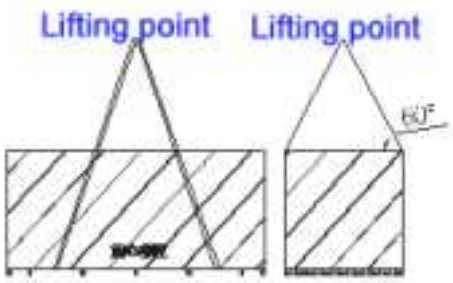
No matter use what kind of water treatment methods, there are many factors, need to do water testing on a regular basis.

2 · Installation Instructions

2.1 Equipment move

1) Lifting rope and wooden boxes at the top of the point of view when lifting, to prevent the lifting, the lifting rope damages to the top of the wooden case to extrusion the wooden cases and equipment.

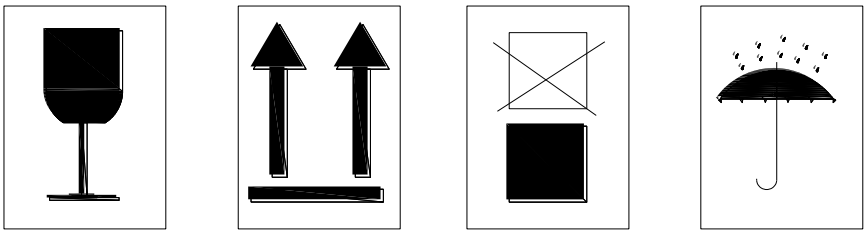




2) When using a forklift or crane handling equipment, pay attention to the gravity location of the equipment.

3) Equipment in transit it is forbidden to run backward and sideways,the overlying weight of boxes shall be strictly prohibited.

4) Equipment in transit must be sufficiently prepared to accessory tools and rainproof facility.



2.2 Site equipment protection

1) When they arrived at the scene, if need temporary place, should choose the ground that is more smooth and can bear its weight.

2) If the equipment needs to be temporary placed for a long time, make protection against wind, rain and sun.

3) After the removal of packaging, protection equipment should be coated canvas and other materials, prevent the construction of the cut on the surface of the unit.

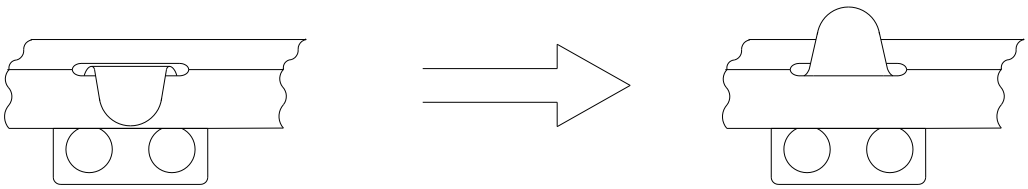
4) Any hot work, near the equipment surface and the valve should be flame burning equipment, avoid hot being near around the equipment.

2.3 Package disassembly

It is forbidden to use the method of damaging wooden cases for opening the package, otherwise, it may cause damage to the equipment.

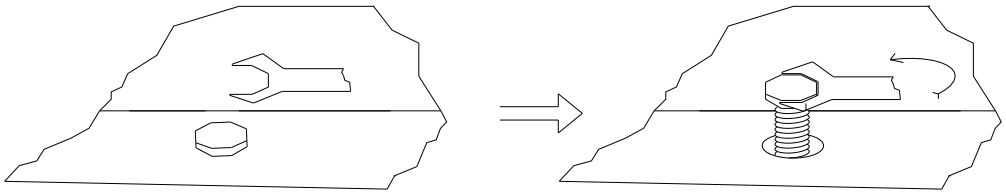
1) When the equipment is moved to the basis of installation as much as possible, then open the packing cases, prevent the damage in the process of handling equipment.

2) Each edge of wooden cases distributes with metal buckle, firstly turn on the button at the top of the metal bending straight, remove the roof, in the same way, in turn, open the four side boards.



3) Lower part equipment installs in the channel steel anchor hole with wooden plate fixed screw，after

dismantling the side panel, with wrench screw loosening.



4)With the hoist and other lifting equipment, draining boxes on plate, placed the equipment in the correct direction and location. There are four lifting holes at the bottom of the equipment, it is forbidden to use metal wire when equipment is being lifted, and must pay attention to whether the sling rope causes damage to the parts of equipment, and make protection for preventing friction between sling roge and equipment.

2.4 Equipment installation conditions

1) Equipment must be installed in clean, dry, air clean equipment room, so as to prevent affecting the normal operation of the equipment and service life from rain and the sun.

2) Equipment placed in enough to sustain the weight of the unit and force uniform, won't produce big vibration and noise based on the whole level of concrete.

3) Installation options do not close to the source of heat, steam, gas source, is not affected by rain and direct sunlight and dry place.

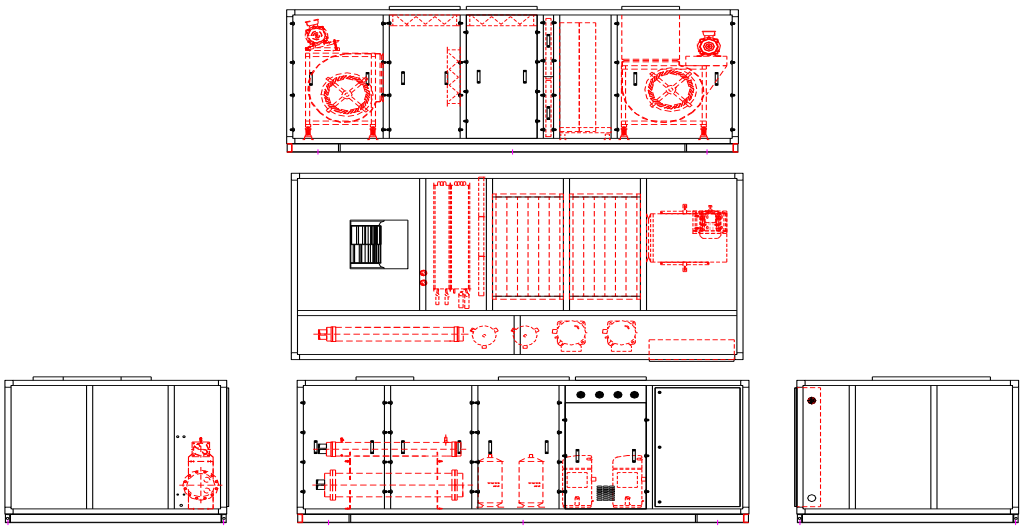
4) Around the equipment should be set aside enough space of the daily maintenance and maintenance.

5) In order to reduce vibration to the machine, please be sure to install the anti-vibration pads and footing retaining screw.

6) After immobilization of the equipment, and before debugging, take down fixed plate under the draught fan, then the draught fan damper can play a role.

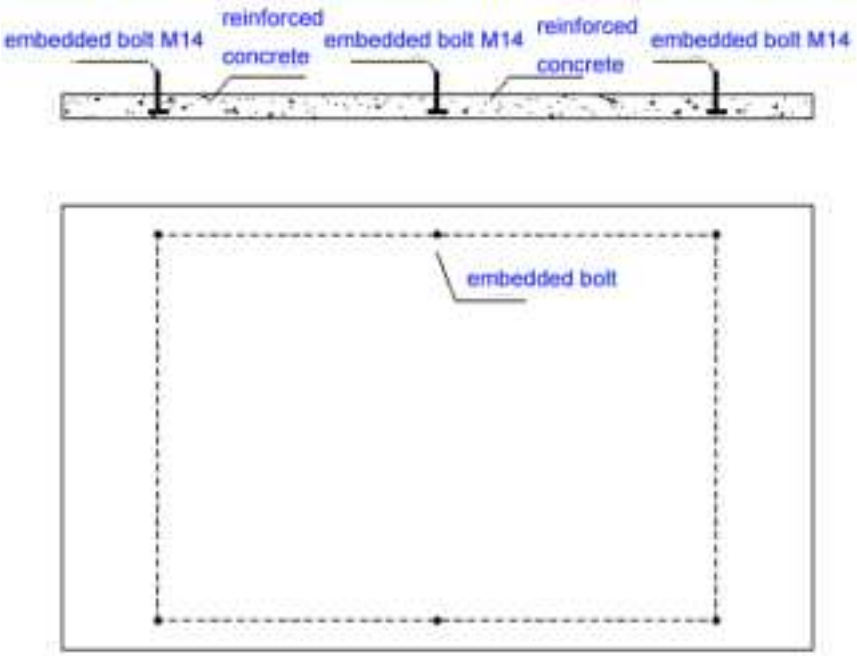
2.5 Plane graph of host plan

1) Configuration of host machine



This figure is for reference only, specific overall dimensions are subject to the ordered equipment

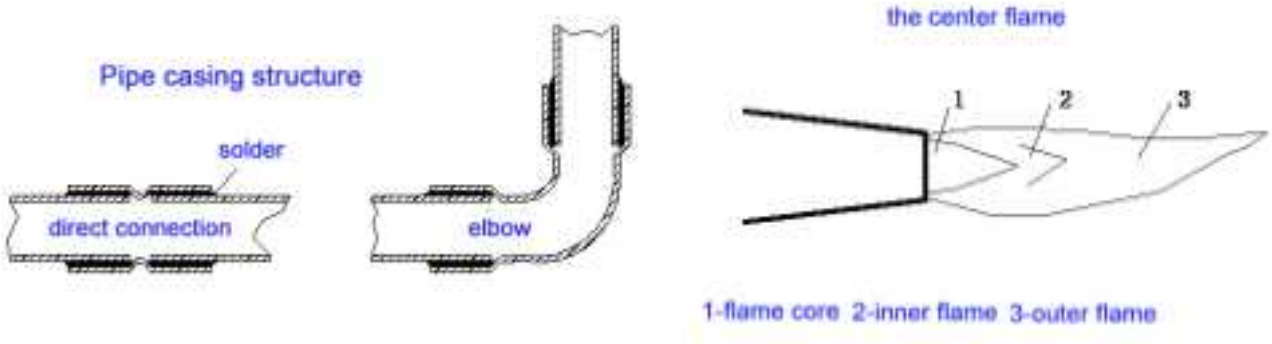
2) The host foundation drawing



This figure is for reference only, specific overall dimensions are subject to the ordered equipment

2.6 Refrigerant pipe connection

1) Cold media pipeline adopts special refrigeration air conditioner copper tube, brazing (hereinafter referred to as brazing) plug-in connection mode, all the brazing by refrigeration industry, has a mainland professional qualifications and shall, in accordance with the relevant regulations and standards for installation.



2) Please refer to the unit or the copper pipe diameter of condenser pipe diameter size to choose connection.

3) The refrigerant pipe should use the high quality of copper tube and pipe inside and outside wall should be clean, dry, polish interface part of the internal and external surface with a gauze form, there shall be no rust.

4) Copper tube incision should level off, can not have burrs, concave and convex inequality

5) Welding method: first of all to be welded pipe in outer flame preheating, and perpendicular to the pipe. Heating evenly to aim at the joint of the pipe welding heat.The heating time shoulds not be too long, so as to avoid oxidation of combining site.When the copper tube heat until golden brown, immediately put solder in the welding place continue to heat, until the solder full capacity, the flow between two pipe, and firmly attached on the pipe, remove the flame.

6) When welding, solder not completely frozen, absolutely not to sway the brass or vibration, or welding parts will produce cracks, also do not use water cooling.After welding joint must be cleaned of residual flux, slag.

7) Insert fitting clearance length and tolerance clearance (mm)

Adapter tube outer diameter	5~8	8~12	12~16	16~25	25~35	35~45
Insertion length	6	7	8	10	12	14
Tolerance clearance	0.05~0.35	0.05~0.35	0.05~0.45	0.05~0.45	0.05~0.55	0.05~0.55

8) Mainland common brazing solder brand and performance

solder	brand	T/℃ welding temperature	scope of application
copper phosphorus solder	Material 909	715~730	copper to copper
	Material 204	640~815	
	Material 203	650~700	

9) Engineering requirements of refrigerant pipe

Refrigerant pipe between hosts connected to the condenser tube single length should be less than 30 m, condenser installation should be higher than that of the host, height difference should be less than 5m.

10) Refrigerant liquid pipeline can not have "studying", gas pipeline can not have "∪" (except special return pipe).

11) Refrigeration copper tube on both ends of the unit connection must first with nitrogen pollution, in the process of the purge, nitrogen purge downwards from a height, to stain the cleaner.

12) Refrigerant pipe connected to the host, connection of condenser must install with soft connection.

13) In order to prevent pressure airflow impact to host valve, copper pipe after installation, first do not connect to the unit, only tast pressure of the sealing pipe (test pressure is 350 psi, the holding time of 24 h). To connect with the host after test.

14) Connected to the equipment or welding valve must pay attention to the valve of cooling, otherwise, it may burn out the valve. Equipment debugging before pumping air into vacuum state, according to the refrigerant piping length, system pressure, and so on and so forth appropriate supplementary refrigerant.

2.7 Pipe connection

Heat preservation is needed to all pipes, make protection against water, sun and corrosion on the outer of heat presevation.

Host (the cold water inlet pipe----the hot water outlet pipe----condensate drain)

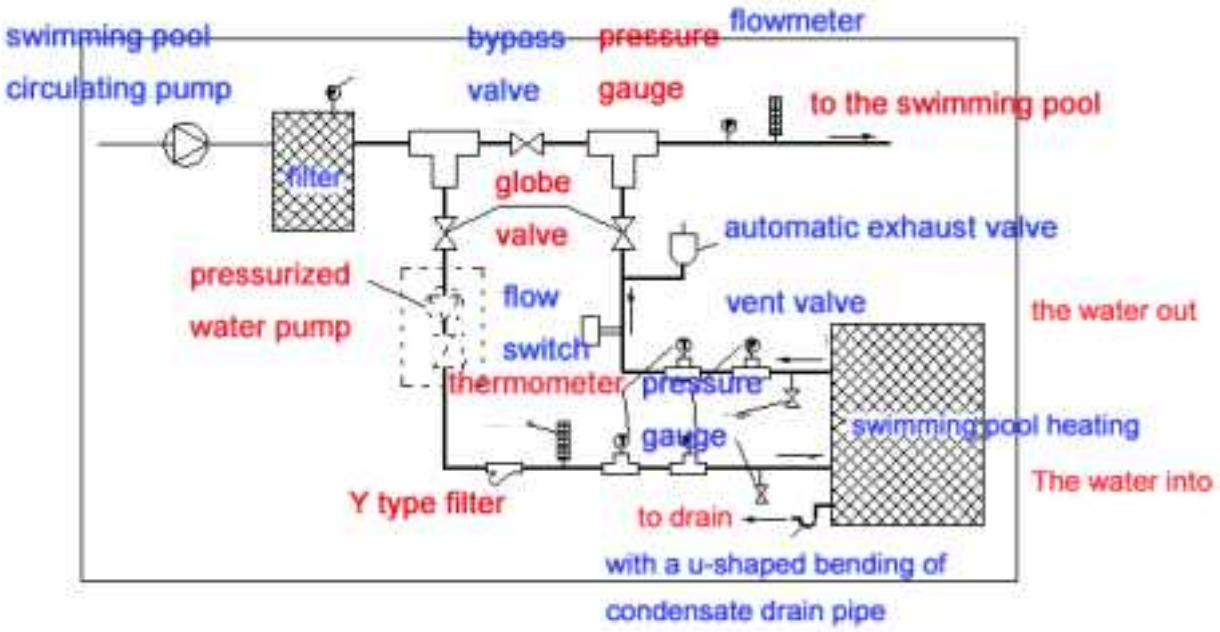
1) If loop pump of the pool could not provide enough pressure, so needs to install pressure pump in figure

dashed line position .

2) Installed in the end of the condensate drain a u-shaped trap and the drainage pump and so on, if it's gravity drainage pumps that will not be necessary.

3) In the outlet pipe installation with contacts (220 V 5 A) flow switch.

4) The correct use of pipe connection to auxiliary material, correct operation pipe connection.



2.8 Air hose connection

1) All duct construction must be conducted with reference to the relevant provisions of the mainland.

2) Air hose or its bracket, it is forbidden to directly fall on the equipment.

3) Right above of the equipment can not adopt glass steel air hose, but can use galvanized steel or composite panels, etc.

4) Host with heat pump or blower fan duct and so on vibration device to connect, must install a soft

answer.

5) Heat pump host return air, air supply must be installed in plenum with the drawings design requirements, according to the noise reduction processing needs to be done.

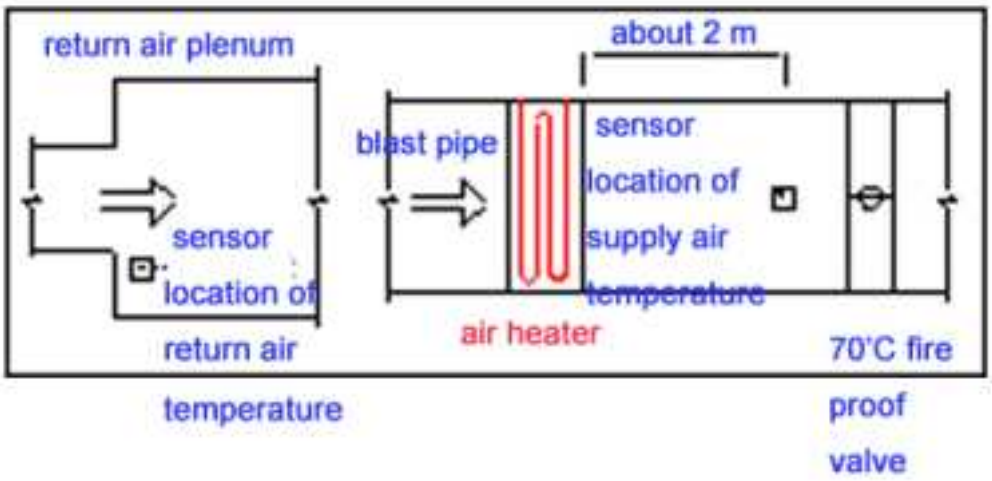
6) Elbow bend of the blast pipe must do deflector according to requirements.

7) Air hose is longer, bend the consequences wind resistance increases, can not meet the ventilation requirements, which needs to design and install a booster fan.

8) Air hose to install air volume control valve as required.

9) Air host should install fire valve and other fire-fighting measures according to fire regulations.

10) Auxiliary air heater is installed on the air supply pipe, and installs surface coolinger heating control probe on the air supply and air return duct, the specific location as follows.



11) Fresh air inlet should choose in the location of the outdoor air is clean, to avoid inhaling dust ground outside, at the bottom of the inlet is apart from the ground outside should not be less than 2m (green belt conditions should not be less than 1m). When there is fresh air inlet and air outlet at the same time, should

make fresh air port is located in the upper side of the dominant wind, air inlet outlet should be less than 3m above and level distance should not be less than 5m.Tuyere should down of the design installation, Fresh air and air outlet, rainproof measures must be done.

12) Duct construction as far as possible keep the duct wall clean, after the completion of construction to the duct for cleaning both inside and outside wall.

2.9 Electric wire connection

1) Power supply voltage of number of devices , phase, frequency, capacity must be consistent with unit requirements.

2) The equipment needs to be equipped with 4p leakage circuit breaker.

3) Equipment do not contain auxiliary heater, water heater, fire prevention, ventilation and pressurization of the power distribution, control, need to be designed and installed additionally.

4)All circuit by a mainland professional qualified electrician, and shall, in accordance with the relevant regulations and standards for installation.

5) With full not connected the power supply cord to the national standard of copper wire, choose according to the highest load and wiring environment suitable for the power cord.

6) Completes the protection measures when the power cord perforation to prevent the sharp metal edge scraping the broken power supply cord.

7) For electrical box construction, pay attention to prevent any remaining impurities to the circuit breaker, contactor and other electrical equipment.

8) Equipment distribution box reserved has power terminal blocks, wiring according to the terminal line of specifications to choose the appropriate terminal blocks.

9) Wire connection is strong, good conductive, operation should be carried out according to the provisions specified in the technical requirements.

10) Circuit wiring should choose higher than that of the pipe and avoid moisture, water, to prevent water along the wire into the equipment electrical box, distribution box into the water, be affected with damp and hidden dangers for safety.

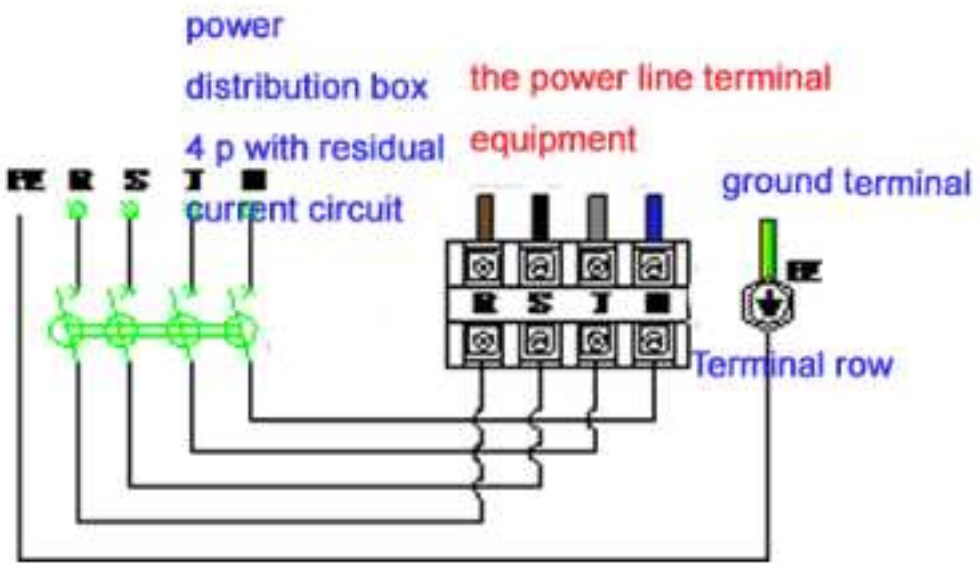
11) Equipment distribution box reserved water flow switch contacts, to be connected to water flow switch.

12) Equipment must be reliable grounding, and the equipment shell, metal trough line pipe, stand,support for potential grounded.

13) Before electricity of wiring, should measure the insulation resistance of the conductor , short circuit conditions. After electrify, shall confirm the terminal of voltage, phase sequence rear can normal boot debugging.

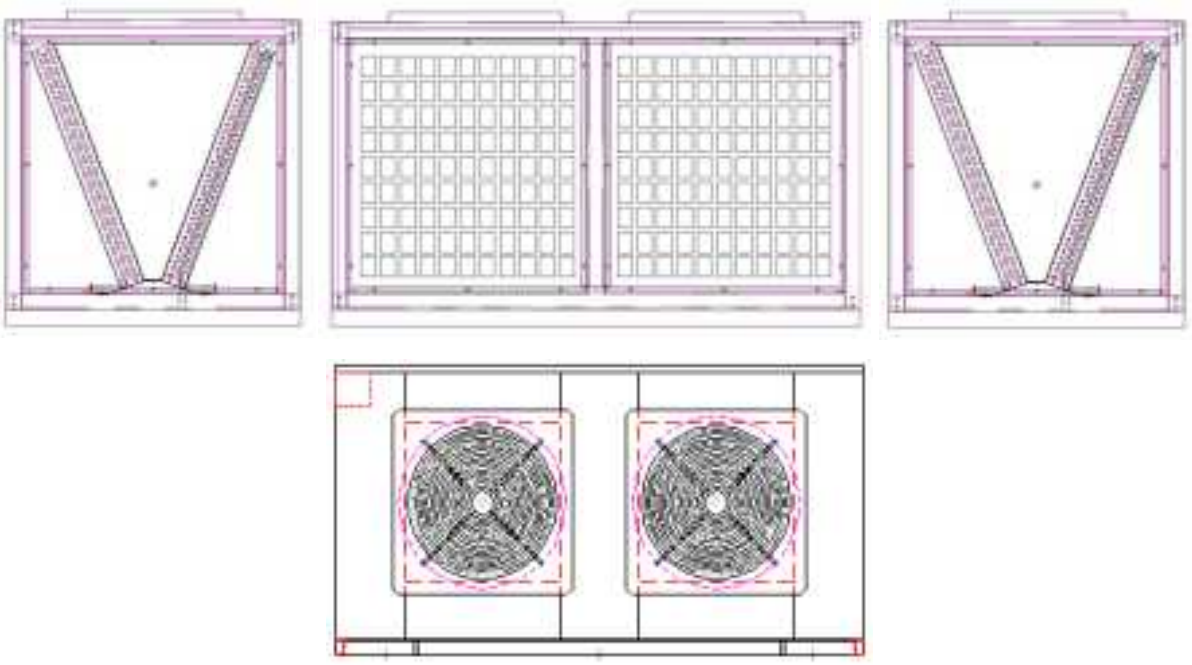
2.10 Circuit diagram of heat pump

----Internal circuitry in the host electrical box



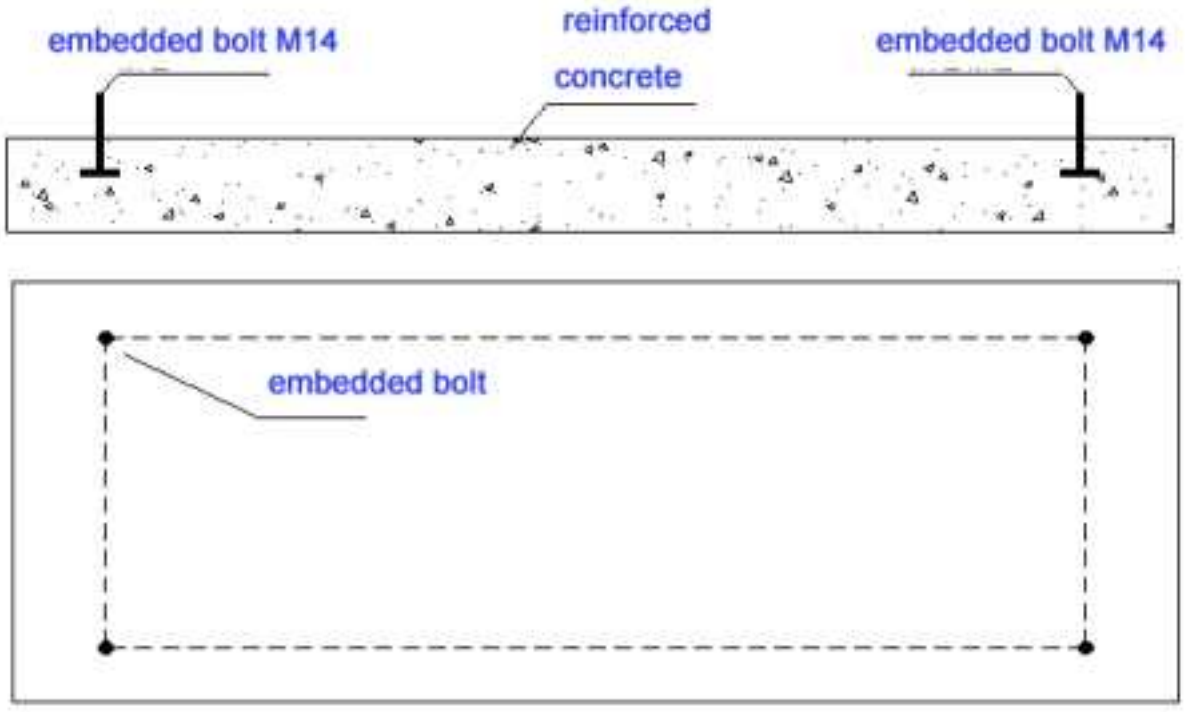
2.11 The Outdoor air cooling condenser

1) The structure shape of outdoor air cooling condenser



This figure is for reference only, specific overall dimensions are subject to the ordered equipment

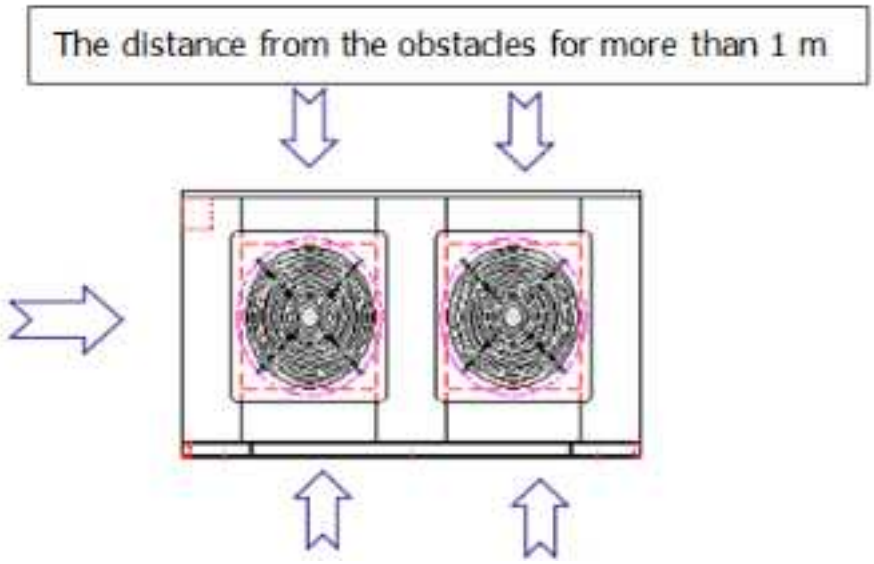
2) Foundation drawing of outdoor air cooling condenser



This figure is for reference only, specific overall dimensions are subject to the ordered equipment

3) Installation requirements of outdoor air cooling condenser

In order to achieve the cooling and ventilation requirements, inlet air side of condenser is more than 1 m distant from obstacles, condenser exhaust air side is more than 3 m distant from obstacles, and ensure that it is not a closed space, and there is plenty of ventilation rate.



This figure is for reference only, specific overall dimensions are subject to the ordered equipment

4) wires connection of the outdoor air cooling condenser

----Entering the power cord of condenser the through the outdoor rain measures to do well.

----Every mechanical and electrical machine to separate grounding line.

---Please refer to manual of 2.9.

5) outdoor air cooling refrigerant pipe of condenser connection

----Please refer to manual of 2.6.

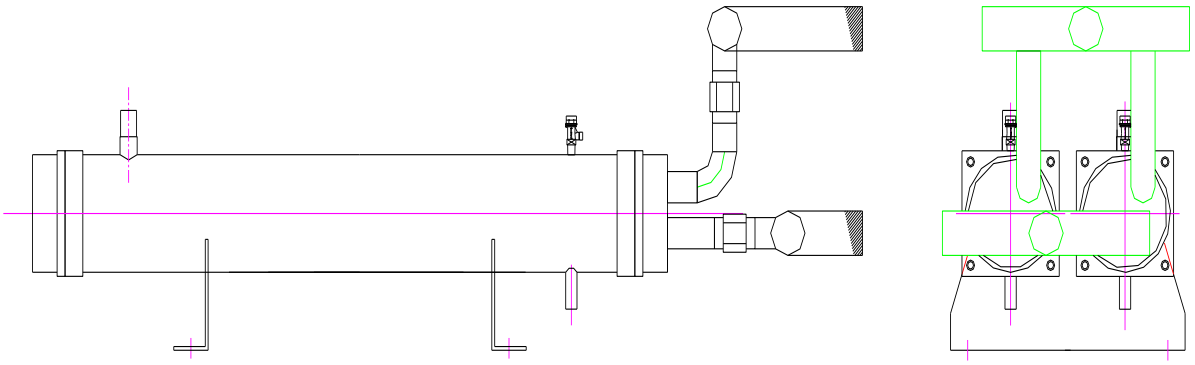
6) fan operation of the external air cooling condenser

◇Equipment in the return water temperature reaches to set value, open the outer condenser fan.

◇Any one of the systems' pressure reaches to the pressure set value that open two groups of fans, two groups of fans will run at the same time, if only need to open one group of fans, so #1 and #2 group will run in turn.

2.12 External water-cooled condenser

1) structure shape of the external water-cooled condenser

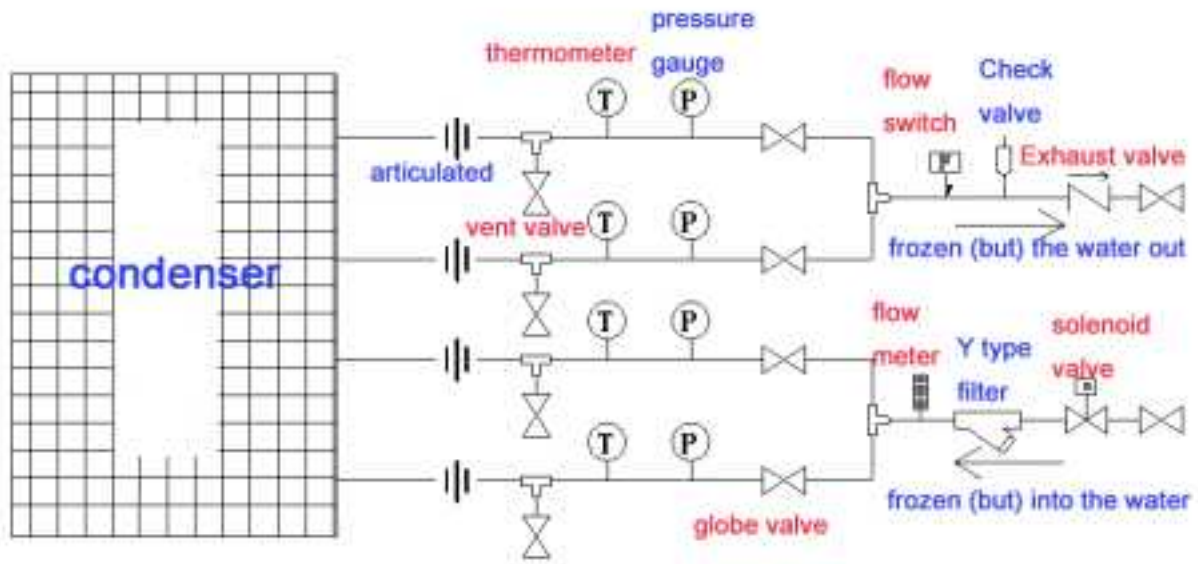


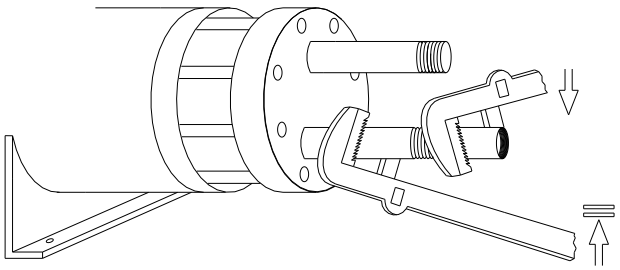
This figure is for reference only, specific overall dimensions are subject to the ordered equipment

2) installation requirements of the external water cooled condenser

Installation requirements of external water-cooled condenser are higher than the heat pump host, the host shall not exceed 5 meters, the distance from host machine of heat pump is as close as possible. External water cooled condenser shall not tilt installation. Required to install tightly.

3) pipe connection of the external water-cooled condenser: please refer to manual of 2.7





----Connection order of Pipe is from inside to outside, from bottom to top.

----When connected to the condenser, must use a pipe wrench and solid settle the condenser end pipe interface, the other end to work.

----Pipe connection, pay attention to the residual on the inner wall of the pipeline.

Have antirust paint, hemp material such as silk, ribbons, to prevent plugging the condenser.

4) refrigerant pipe connection of external water-cooled condenser: please refer to manual 2.6

5) flow switch of the external water-cooled condenser

----The outlet pipe installation with contacts (220V 5A) flow switch

3 · Operating Instructions

3.1 Brief introduction of control system

The machine adopts advanced PLC and touch screen control, windowing operation, quite easy to use and simple to operate.

Unit is powered on, automatically switch to the operation screen, standby mode.

picture shows:

Pool temperature is air return temperature, the temperature of air supply temperature is the swimming pool air after unit, swimming pool air humidity is return air humidity;

When setting the function of water is heated, the picture shows the return water temperature and water temperature, if there does no set water heating function, and the two parameters will not show.

The return water temperature is equal to the swimming pool water temperature, water temperature is equal to the water temperature after titanium heat exchanger;

The red fonts is scrolling below means alarm output, can query according to the " malfunction", it do not show under normal circumstance;

Air return draught fan and compressor in the interface will have dynamic display after corresponding start-up;

3.2 Operation method

1, the boot panel show as below.

2, Turn the unit on

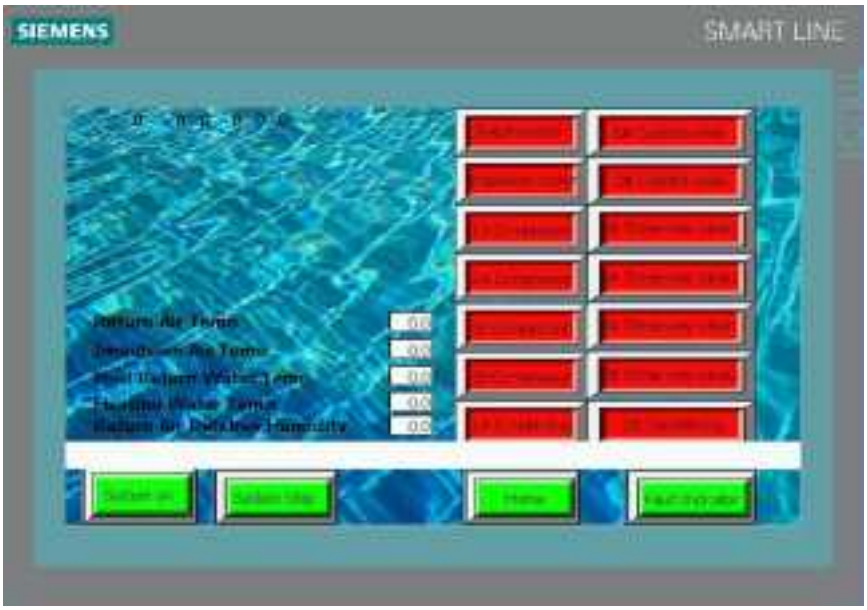
Touch the "system start" buttom.

3, turn it off

Touch the "system stop" buttom.

4, set the operation parameters and operation mode

A.Enter the main page, press the "Home" button.



B.According to the "user login".

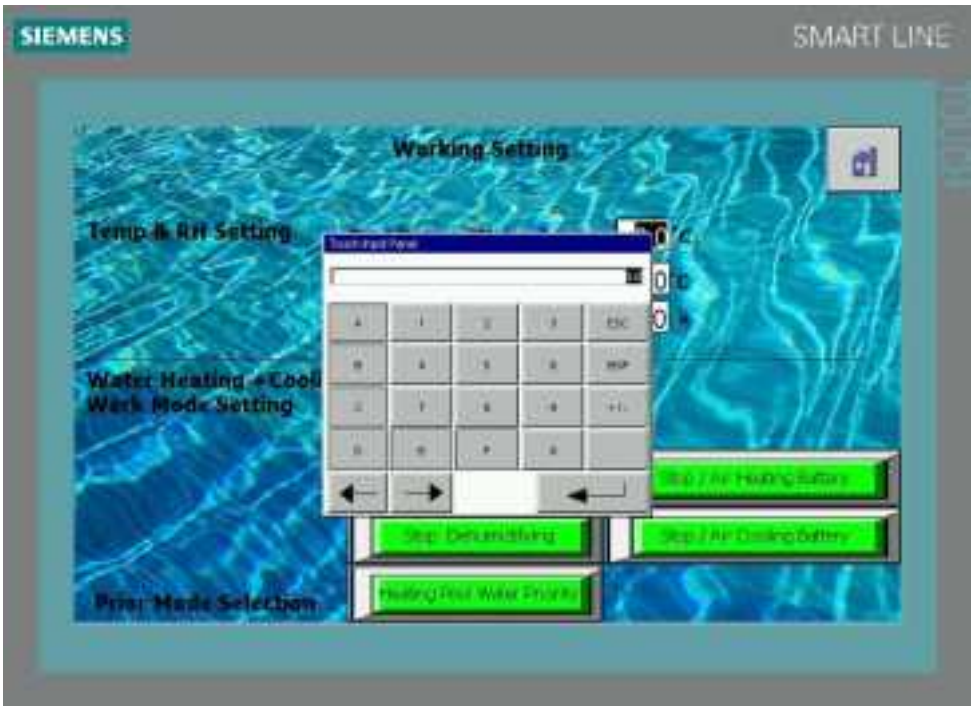
C. And enter the password, than click “Working Setting” in the bottom right corner on the home screen.

D. Small keyboard will appear when click where need to set values, make cursor flash on the set value. The unit allow “pool heating”, “air cooling”, “dehumidifying” function according customer requirement, if you need to turn on or off these function, please touch the corresponding key, for example, touch “Running cooling”, it will show as ”stop cooling”, the means stop the “cooling function”, and you touch “Stop cooling” again, the key will show “Running cooling” again, means the “cooling function” is activation.

Input range of water temperature limit: 18 to 30 ℃;

Input range of air temperature limit: 18-32 ℃;

Input range of humidity limit: 30-85%;



F. Air auxiliary heating setting: In winter, touch “Stop/Air Heating Battery, and enter another control panel, please refer below fig.

And touch “number” to set “set air temperature” & “Return air temperature is lower than the set temperature”, when the “return air temperature” reach the “Set air temperature”, will stop air auxiliary heating; if the “return air temperature” less than [“Set air temperature” - “Return air temperature is

lower than the set temperature"], will start auxiliary heating.

G. Air auxiliary cooling setting is similar heating setting, but when the "return air temperature" less the "Set air temperature", will stop air auxiliary cooling; if the "return air temperature" reach ["Set air temperature" + "Return air temperature is lower than the set temperature"], will start auxiliary cooling.

G. Shift setting: please touch "Home" key, then click the "user login" , enter the password and click "Shift setting".

Then come to another frame, touch the number to set timer, and touch the lower right coner key to turn the timer on or off.

H: Fault indicator

Touch “Fault Indicator” key in the monitor screen, can check the historical record of failure. When the unit is stop for some trouble, please check and remedying faults, then click the “failure reset” to

fault reset, and click “system on” key to running the unit in the monitor screen.

I. Press the upper right corner of "home page" back to the main page, then click "running display" into the monitor screen.

Note: the touch screen will close the backlight and enter into standby state after a period of time, it will light up automatically and back to standby.

3.3 Heat pump valve on-state in different seasons

1) Spring and autumn season, when outdoor temperature is 28 ℃ - 29 ℃, humidity is around 60% RH, which will not have a large different from indoor swimming pool, run all fresh air is acceptable. Fresh air valve open. Air valve and exhaust valve opening, bypass-valve closing.

2) In the summer, outdoor temperature, humidity is high, indoor swimming pool also need to remove excess heat, not easy to run full fresh air. Shut off air valve and exhaust valve close, bypass-valve to open.

3) In winter, the outside temperature is very low, indoor swimming pool need to increase the quantity of heat, not can run full fresh air. Shut off air valve and exhaust valve close, bypass-valve to open.

3.4 BHP series flow chart of first start-up

series models_____ fuselage serial number_____

installation date_____ commissioning date_____

1) An overhaul of equipment to ensure that no damage in transit.

2) Electricity to start the crankcase heater, after 24 hours, just can start the heat pump equipment.

3) Record refrigerant to steady static pressure value_____.

4) Input voltage of measure equipment_____.

5) Check the line of fire, the zero line and connection of ground whether meet the requirements of the local standard.

6) Check phase, determine whether agree with phase protector set by phase

7) Set the right air flow that through the equipment

8) Check the water flow switch, the temperature of the water temperature controller is set to the temperature of the swimming pool water temperature requirements

9) Start loop pumps, start equipment

10) compressor pressure operation equipment, records：

suction_____ exhaust_____

Record the running status of each part, sure they are in the correct direction.

compressor AMPS： _____

blower AMPS：_____

11) Equipment operation after 10 minutes, record the following parameters of temperature (℃)：

ambient air：_____ exhaust air：_____

air supply：_____ air return：_____

water inlet：_____ water outlet：_____

12) Record in difference of the temperature of air supply and air return（℃）：_____

Record in difference of the temperature of inflow and effluent（℃）：_____

13) check the high voltage switch

(1) Closed loop water pump.

(2) To observe the refrigerant pressure table, 1 to 2 minutes, the pressure increases to the_____ bar, the equipment should be stopped, check whether to stop because of high voltage protection.

14) check the low voltage switch

(1) Close fluid tube hand valve.

(2) To observe the refrigerant low pressure table, 1 to 2 minutes, the pressure is reduced to the _____ bar, before the equipment should be stopped, check whether to stop because of high voltage protection.

4 · Daily care and maintenance

4.1 Engineering maintenance

BHP filtering program - backwash process

Unreasonable backwash process of the swimming pool filtration system leads to failure of BHP equipment operation . To avoid such failure, please read the following instructions carefully:

Ready to back flush：

1) First shut down its equipment

2) Close inlet and outlet valves of BHP

3) Refer to the swimming pool, startup and operation back flush

4) Reset the normal of water loop, need operation for 10 minutes in order to reduce the air in the system

5) Open two water valves of BHP equipment

6) Water pressure of filtering program should be in 15 psi or larger

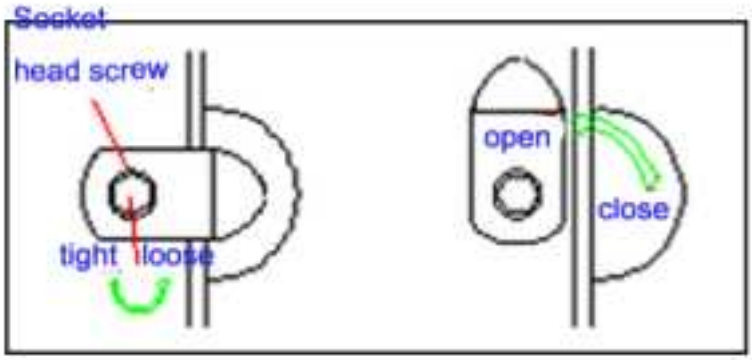
7) Open air outlet of outlet pipe, check whether the BHP equipment's water loop is finished

8) Check the setting suitable water flow

9) Start the BHP

4.2 Equipment maintenance

1) Equipment with all the access door installed metal lock, when open the access door, use Allen key first lock within the socket head screw loosening, and then put the lock to the right to rotate 90 ° , close the access door, on the other hand.



2) Clean air filter regularly

The host the front or the back, have a smaller access door, can take out filter after the stop of open. The screen to get the faucet in the opposite direction of the windward surface irrigation.

It is forbidden to knock filter net.

3) Check the disconnect performance of heat pump total power leakage open regularly.

Press the leakage switch after the leakage test button above, switch are likely to be disconnected by the closed state.

This action should be in stop state, under the condition of no load tests.

4) Regularly check the flow switch off performance

In stop state and to cut off the power supply case, open the lid of the flow switch, and then to start,stop the water pump, check whether the flow switch would be closed with the pump start-up, with the pump stopped and disconnected.

5) Regular cleaning air cooling condenser fin

Fin on spray corrosion protective film, acid alkali or forcibly cut can cause damage in corrosion protective film, it is strictly prohibited by acid alkali or forcibly cut method to clean the condenser.

Use detergent in warm water washing and using a soft brush scrub fin gently . Fin is easy to damage, need to be very careful when cleaning.

6) Timely processing weeds around air-cooled condenser, garbage, etc., to prevent debris in the air condenser, block into the wind, thus affect the heat dissipation seriously.

7) Cleaning the filter cotton of the air inlet in electric box regularly

8) Regular cleaning water Y type screening programs in water condenser.

4.3 Malfunction analysis table

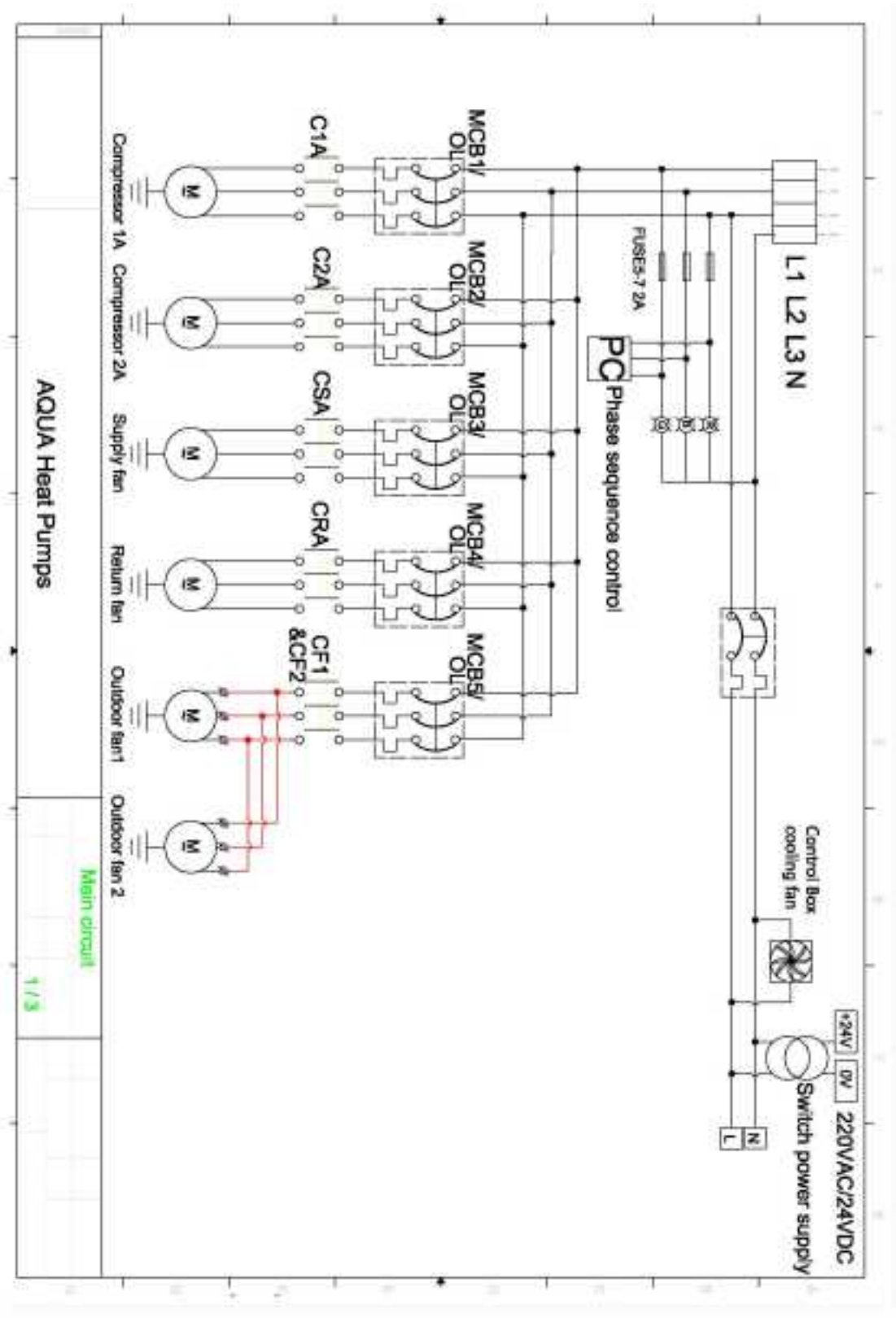
Troubleshooting guide

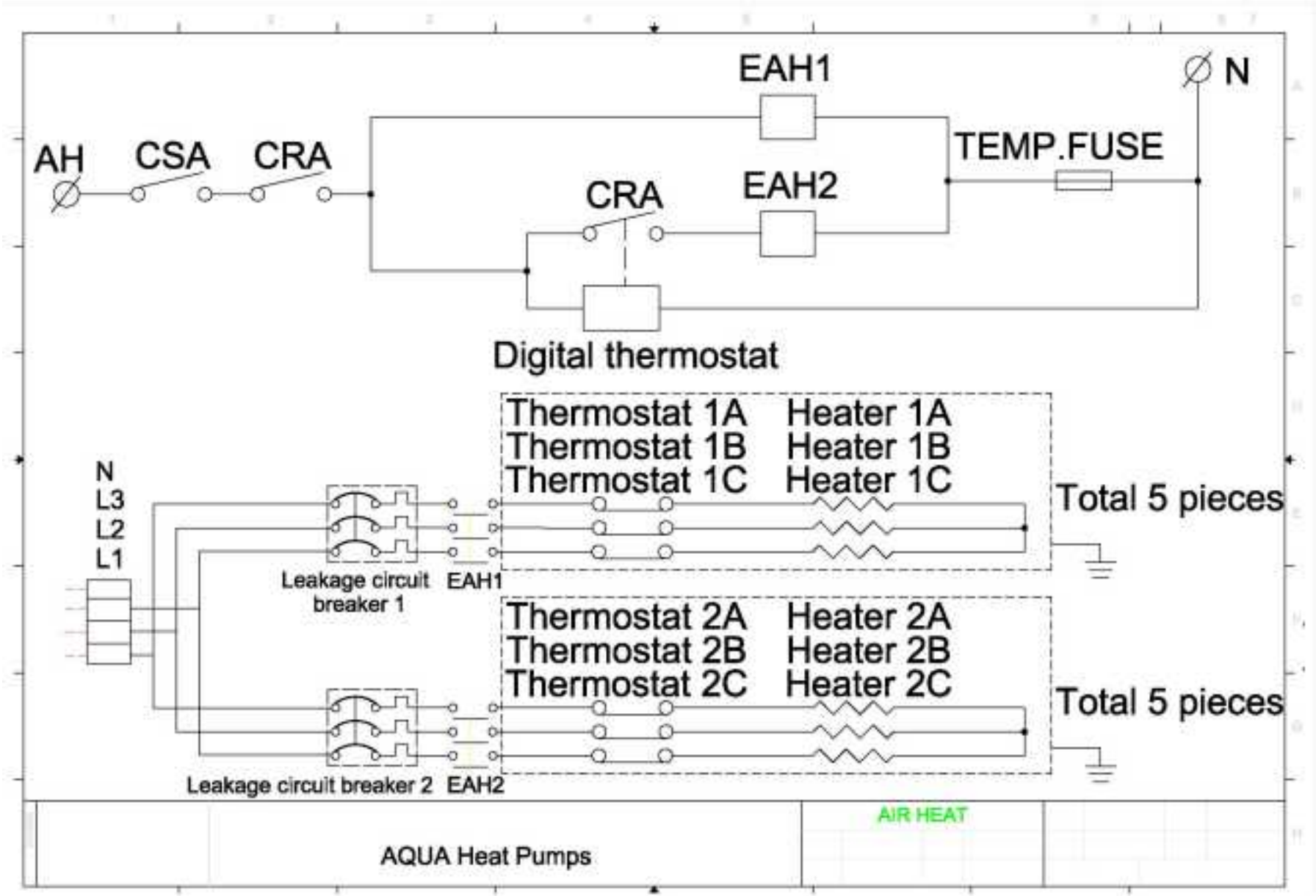
fault phenomenon	reason	handling method
stop	lock the stop button	open the stop button
fire alarm	a fire alarm signal	eliminate fire
air supply overload	air supply of Motor current is too large	check the Air supply
air return overload	air return of motor current is too large	check the Air return
compressor overload	corresponding to the compressor current is too large	check the corresponding to the compressor
humidity sensor alarm	the humidity sensor be affected with damp , has been bad	replace the humidity sensor
temperature sensor of the air return alarm	temperature sensor is bad	replace the temperature sensor
temperature sensor of the Air supply alarm	temperature sensor is bad	temperature sensor is bad
temperature sensor of Inflow alarm	temperature sensor is bad	temperature sensor is bad
temperature sensor of the effluent alarm	temperature sensor is bad	temperature sensor is bad

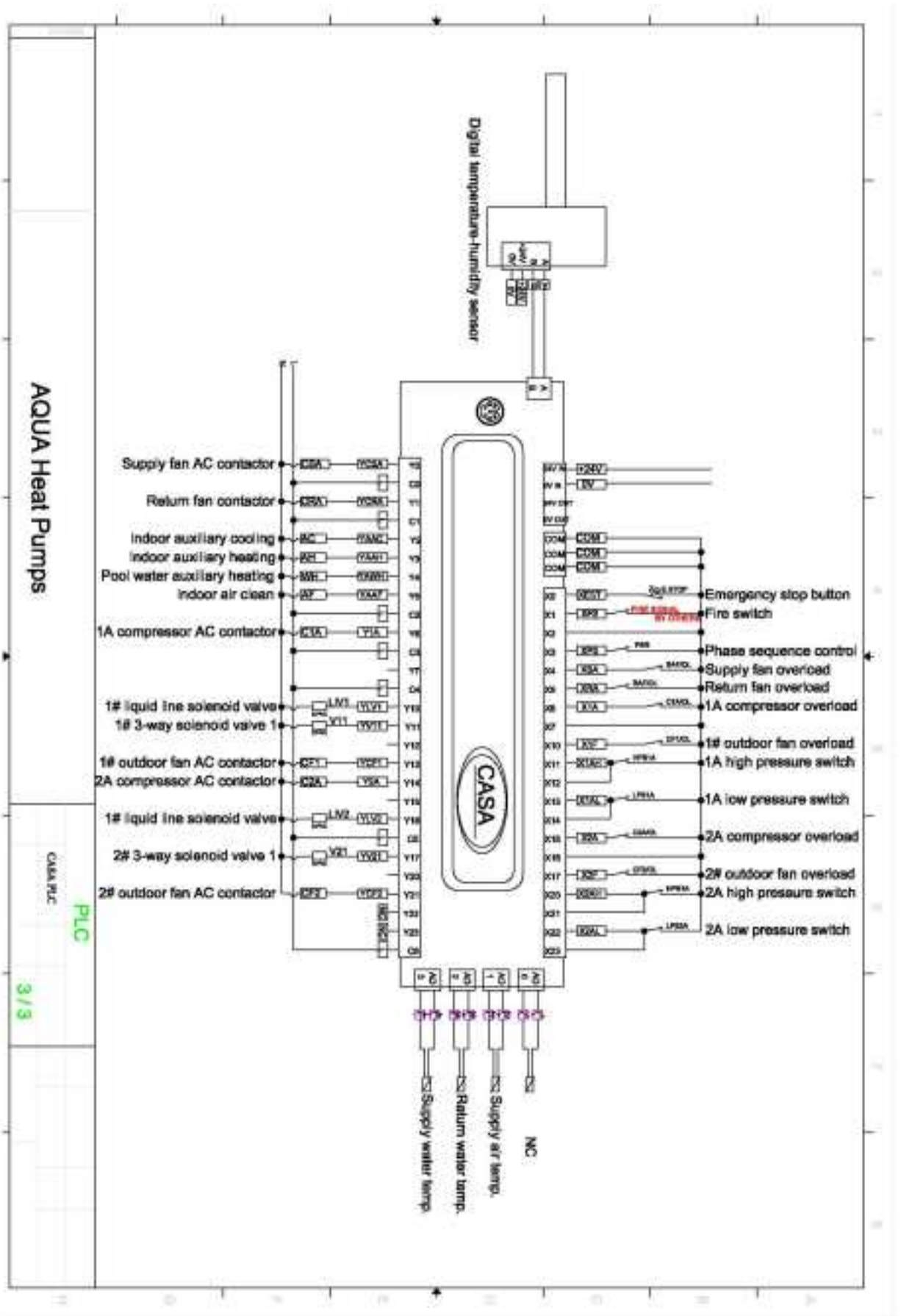
low pressure sensor of the compressor alarm	Pressure sensor is bad	replace the pressure sensor
	Or the low pressure alarm	finned of the evaporator dirty
		air filter dust thick jam
		temperature of the air Return is too low
		refrigerant leakage
high pressure sensor of the compressor alarm	pressure sensor is bad	replace the pressure sensor
	Or high pressure alarm	condenser dirty
		air filter dust thick jam
		cooling fan flow
		cooling fan stalling
		Water inlet temperature is too high
water flow of the internal condenser alarm ban water heating	the loop pump of the pool do not work	loop pump of the pool operation
	filter clogging	clean the filter
	water flow switch setting error	adjust the water flow switch contact
water flow of the outside condenser alarm	no water outside condenser	detection of the condenser water pipe valve
fan of the Outside condenser overload	cooling fan current is too large	detection of the cooling fan motor
compressor internal protection	air compressor exhaust, back pressure is too high	reduce the high and low pressure
	internal temperature is too high	decrease the temperature of the compressor
alarm clock board	clock setting error	set the clock; or cancel the clock
limit of the compressor running time alarm	more than the compressor running time	looking for the equipment suppliers
indicator light of the power is not bright	power supply off	close the power supply
	power supply without power	looking for the power distribution unit
	safety fuse fusing	to test whether Safety fuse short circuit; Replacing the fuse
	Inverse phase or lack of the phase sequence	inverse phase, change the phase sequence. Lack of phase, testing phase
the equipment will not be able to restart immediately after stop	three minutes of time delay	Wait for more than three minutes
	without connect to a drain	Connect the condensate drain pipe

around on the equipment with water	condensed water has a leak	Leakage detection and repair
	condensate water pipe above equipment dish installed	reduce height for the the condensate drain
Equipment vibration and noise loudly	fan shock absorber plate did not take off	remove the fan shock absorber plate
	air pressure is too large,the wind leaf is out of shape	repair the fan blades, lower air pressure
	fan bearing damage	replace the fan bearing
	vibration damping glue of the compressor failure	replace the vibration damping glue
	compressor liquid impact	temperature of the air return is too low
		crankcase oil heater failure
		evaporator frosting
		switch on or off the machine frequently

X Circuit diagram


AQUA Heat Pumps
Main circuit
1 / 3
L1 L2 L3 N
FUSES-7.2A
PC Phase sequence control
220VAC/24VDC
Switch power supply
+24V
0V
Control Box cooling fan
MCB1/ OL
MCB2/ OL
MCB3/ OL
MCB4/ OL
MCB5/ OL
C1A
C2A
CSA
CRA
CF1 &CF2
Compressor 1A
Compressor 2A
Supply fan
Return fan
Outdoor fan1
Outdoor fan 2


EAH1
N
AH
CSA
CRA
CRA
EAH2
TEMP.FUSE
Digital thermostat
Thermostat 1A Heater 1A
Thermostat 1B Heater 1B
Thermostat 1C Heater 1C
Total 5 pieces
N
L3
L2
L1
Leakage circuit breaker 1
EAH1
Thermostat 2A Heater 2A
Thermostat 2B Heater 2B
Thermostat 2C Heater 2C
Total 5 pieces
Leakage circuit breaker 2
EAH2
AIR HEAT
AQUA Heat Pumps


AQUA Heat Pumps
CASA PLC
PLC
3 / 3
Digital temperature-humidity sensor
Supply fan AC contactor
Return fan contactor
Indoor auxiliary cooling
Indoor auxiliary heating
Pool water auxiliary heating
Indoor air clean
1A compressor AC contactor
1# liquid line solenoid valve
1# 3-way solenoid valve 1
1# outdoor fan AC contactor
2A compressor AC contactor
1# liquid line solenoid valve
2# 3-way solenoid valve 1
2# outdoor fan AC contactor
Emergency stop button
Fire switch
Phase sequence control
Supply fan overload
Return fan overload
1A compressor overload
1# outdoor fan overload
1A high pressure switch
1A low pressure switch
2A compressor overload
2# outdoor fan overload
2A high pressure switch
2A low pressure switch
Supply water temp.
Return water temp.
Supply air temp.
NC
CASA