INSTALLATION &OPERATION INSTRUCTION MANUAL

FOR

AIR-COOLED（HEAT PUMP）MODULAR UNIT

SA-H06ENG-5

Thank you for choosing our company products!

Air conditioning facilities are valuable products. In order to protect your legitimate rights and interests, please make sure that the installations are made by professional technicians. This manual is a general-purpose version for the conditioning systems manufactured by our CO., the one that you have chosen might be a little different in appearance from the ones described in the Manual. But these differences will not have any impacts upon your operation and use of the system.

Please read the manual carefully before you operate the system and check to see if the model is identical to the one you have purchased, keep the manual properly in case you might refer to it in the future.

This product you use is Central air-conditioning water system series and needs the regular cleaning and maintenance to reduce the faults and prolong the service life. Besides, a complete cleaning can clean up the dust inside the air conditioner and provide a good air and cut down the power consumption.

Keep the unit idle when the environment temperature is lower than 2℃ and drain off the water in the water system before power failure. Please call the local central air-conditioning product service center for maintenance or troubleshooting before cooling operation in summer or the heating operation in winter.

CONTENTS PAGE

PRECAUTIONS

To prevent injury to the user or other people and property damage, the following instructions must be followed. Incorrect operation due to ignoring of instructions may cause harm or damage.

The safety precautions listed here are divided into two categories. In either case, important safety information is listed which must be read carefully.

WARNING

Failure to observe a warning may result in death.

CAUTION

Failure to observe a caution may result injury or damage to the equipment.

WARNING

- Ask your dealer for installation of the air conditioner.
  Incomplete installation performed by yourself may result in a water leakage, electric shock, and fire.
- Ask your dealer for improvement, repair, and maintenance.
  Incomplete improvement, repair, and maintenance may result in a water leakage, electric shock, and fire.
- In order to avoid electric shock, fire or injury, or if you detect any abnormality such as smell of fire, turn off the power supply and call your dealer for instructions.
- Never replace a fuse with that of wrong rated current or other wires when a fuse blows out.
  Use of wire or copper wire may cause the unit to break down or cause a fire.
- Do not insert fingers, rods or other objects into the air inlet or outlet.
  When the fan is rotating at high speed, it will cause injury.
- Never use a flammable spray such as hair spray, alcohol or paint near the unit. It may cause a fire.
- Never inspect or service the unit by yourself.
  Ask a qualified service person to perform this work.
- Do not dispose this product as unsorted municipal waster. Collection of such waste separately for special treatment is necessary.
- Keep far away from high-frequency equipment.
- Keep away from the following places: a place where it is full of oil gas; places where salty air surrounding(near the coast); a place where is caustic gas(the sulfide in hot spring). Location in the folling places may cause malfunction or shorten the life span of the machine.
- In the case of extremely strong wind, please prevent the air from flowing backwards into the outdoor unit.
- Snow canopy is necessary in snowfall places on the outdoor unit. Please consult the local dealer for details.
- In the frequent thunder struck place, lightning proof actions should be taken.

■ To prevent refrigerant leak, contact your dealer.
When the system is installed and runs in a small room, it is required to keep the concentration of the refrigerant, if by any chance coming out, below the limit. Otherwise, oxygen in the room may be affected, resulting in a serious accident.

■ The refrigerant in the air conditioner is safe and normally does not leak.
If the refrigerant leaks in the room, contact with a fire of a burner, a heater or a cooker may result in a harmful gas.

■ Turn off any combustible heating devices, ventilate the room, and contact the dealer where you purchased the unit.
Do not use the air conditioner until a service person confirms that the portion where the refrigerant leaks is repaired.

⚠ CAUTION

■ Do not use the air conditioner for other purposes.
In order to avoid any quality deterioration, do not use the unit for cooling precision instruments, food, plants, animals or works of art.

■ Before cleaning, be sure to stop the operation, turn the breaker off or pull out the supply cord. Otherwise, an electric shock and injury may result.

■ In order to avoid electric shock or fire, make sure that an earth leak detector is installed.

■ Be sure the air conditioner is grounded.
In order to avoid electric shock, make sure that the unit is grounded and that the earth wire is not connected to gas or water pipe, lightning conductor or telephone earth wire.

■ In order to avoid injury, do not remove the fan guard of the outdoor unit.

■ Do not operate the air conditioner with a wet hand. An electric shock may happen.

■ Do not touch the heat exchanger fins. These fins are sharp and could result in cutting injuries.

■ After a long use, check the unit stand and fitting for damage. If damaged, the unit may fall and result in injury.

■ To avoid oxygen deficiency, ventilate the room sufficiently if equipment with burner is used together with the air conditioner.

■ Arrange the drain hose to ensure smooth drainage.
Incomplete drainage may cause wetting of the building, furniture etc.

■ Never expose little children, plants or animals directly to the air flow.
Adverse influence to little children, animals and plants may result.

■ Notice to avoid places where operation noise may easily be spread away or be enhanced.

■ Noise can be amplified by anything blocking the air outlet of outdoor unit.

■ Choose a proper place that the noise and hot or cold wind blown out of the outdoor unit will not bring inconvenience to your neighbors and not affect the growth or animal or plant.

■ Recommending locate and operate the equipment at the altitude height not exceeded than 1000m.

- Endurable temperature during transportation is -25℃~55℃. Such equipment could endure 70℃ of the maximum temperature in 24hours.
- Do not allow a child to mount on the outdoor unit or avoid placing any object on it. Falling or tumbling may result in injury.
- Do not operate the air conditioner when using a room fumigation - type insecticide. Failure to observe could cause the chemicals to become deposited in the unit, which could endanger the health of those who are hypersensitive to chemicals.
- Do not place appliances which produce open fire in places exposed to the air flow from the unit or under the indoor unit. It may cause incomplete combustion or deformation of the unit due to the heat.
- Do not install the air conditioner at any place where flammable gas may leak out. If the gas leaks out and stays around the air conditioner, a fire may break out.
- The appliance is not intended for use by young children or infirm persons without supervision. Young children should be supervised to ensure that they do not play with the appliance.

INTRODUCTION OF THE PRODUCT

Main parts of the unit

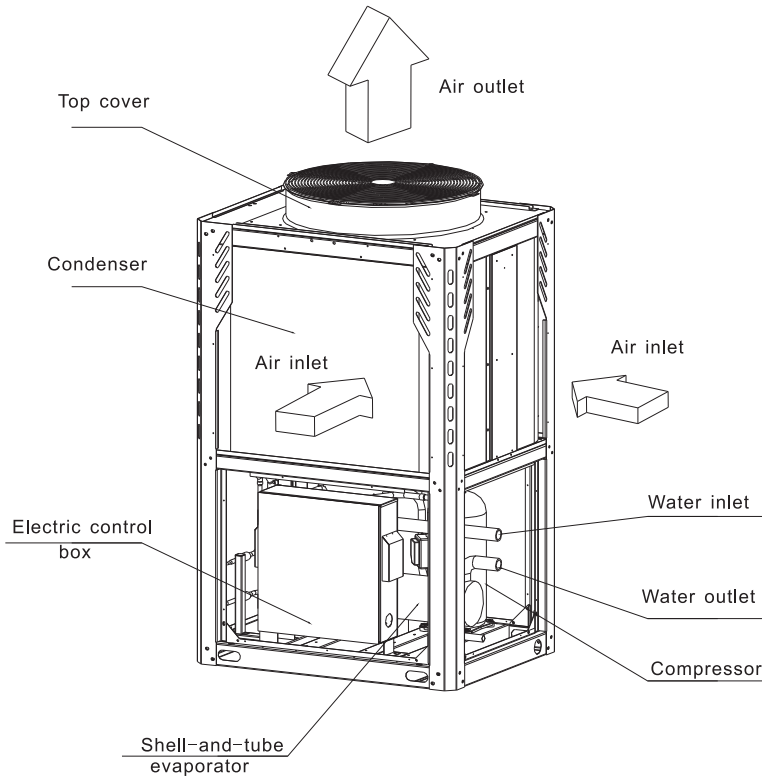


Fig 1 Applicable for 30 kW units

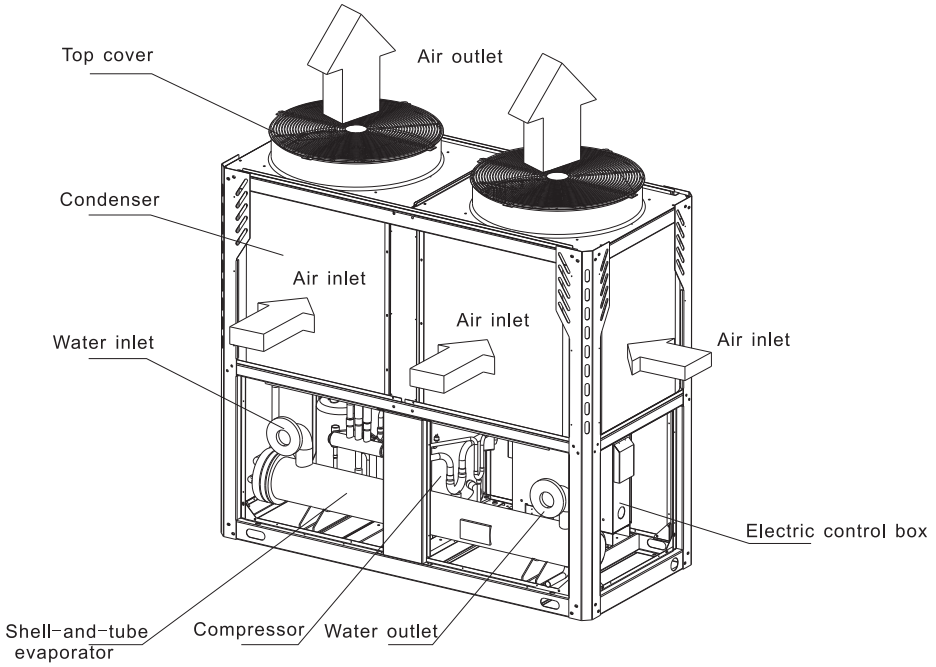


Fig 2 Applicable for 65kW units

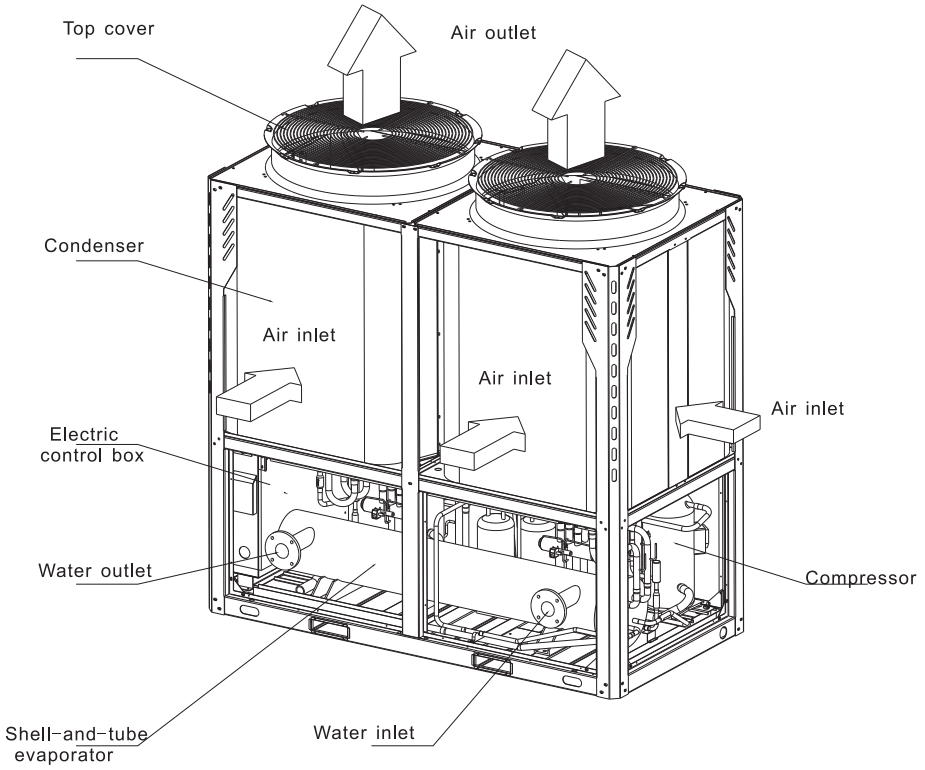


Fig 3 Applicable for 130kW units

图 2

Notes:

The sketch diagrams in this manual are just for references, the product you purchased may be different from these figures in shape or function, but it doesn't affect your use.

Operation and performance

■ Performance characteristics of the unit

The air-cooled heat pump modular unit is composed of one or more modules. Each module has its own independent electric control unit, and the electric control units of modules conduct information exchange through communication network. The air-cooled heat pump modular unit is characteristics of compact structure and easy transportation and lifting, and in the meanwhile, it also saves facilities, including cooling tower, cooling pump, and so on, for the user, and reduces installation cost.

The units provide central air handling devices or terminal equipment with chilled water or hot water. The unit is a completely independent entirety type one, which is designed to be installed outdoors (on the ground or the roof). Each unit includes such main parts as high-efficient and low-noise scroll compressor, air-cooled condenser, shell and tube (or plate) evaporator, micro-computer control center, and so on. These parts are installed on steel structure base, so they are sound and durable.

The unit applies Chinese micro-computer control system, which can automatically conduct energy control according to the magnitude of load, to achieve optimal matching and thus actually realizing optimal energy-saving operation. The product is modularized unit, and parallel connection of 16 modules can be realized at most, so the user can adopt module combination according his own demands. The product can be widely applied in air-conditioning engineering of various newly-built and rebuilt industrial and civil buildings, such as restaurant, hotel, apartment, office building, hospital, industrial plant, and so on. The air-cooled heat pump modular unit is the best choice for the place which has high requirement in noise and ambient environment and which is short of water.

■ Use conditions of the unit

a. The standard power supply is 380V, 3N~, 50Hz. The minimum allowable voltage is 342V and the maximum voltage is 418V.

Operating range under cooling mode	Operating range under heating mode
15℃～46℃	-15℃～30℃

b. The unit is of inlet water temperature control mode

Water inlet temperature control; minimum temperature 9℃, maximum temperature 25℃;

heating: minimum temperature 30℃, maximum temperature 48℃.

If low-temperature water inlet unit is required, it should specially be customized.

If the user requires the unit to operate under the outlet water temperature is lower than the minimum setting value mentioned above, be sure to make the requirement to the dealer or our maintenance center, and necessary protective measures should be taken before the unit is used.

INTRODUCTION OF WIRE CONTROLLER

I: Overview

Basic operating conditions of wired controller

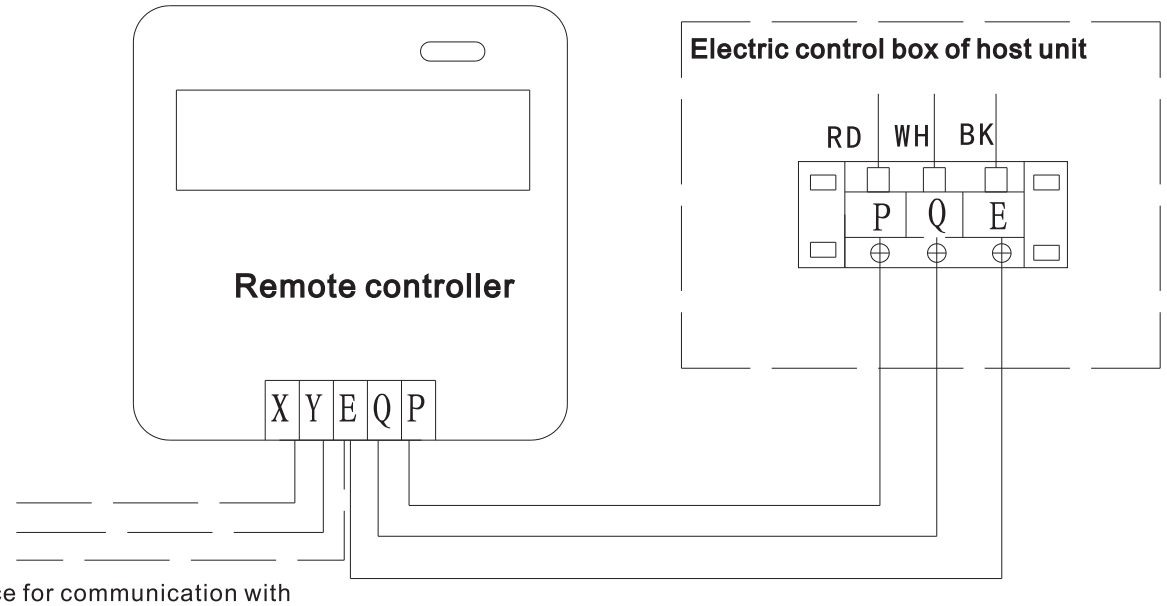
1) Applicable voltage range: AC 220V±10%, from a power adapter (AC220V/AC9.5V).
2) Ambient temperature for operating: -15℃æ+43℃æ
3) Ambient humidity for operating: RH40% - Rh90%.
4) Electric control safety in compliance with GB4706.32-2004 and GB/T7725-2004.

Features: The wired controller mainly has the following features:

1) It is connected with the master unit via the terminals P, Q and E, and is connected with host computer via the terminals X, Y and E;
2) It is operated via buttons and allows for setting of working mode;
3) It has liquid crystal display;

Installation:

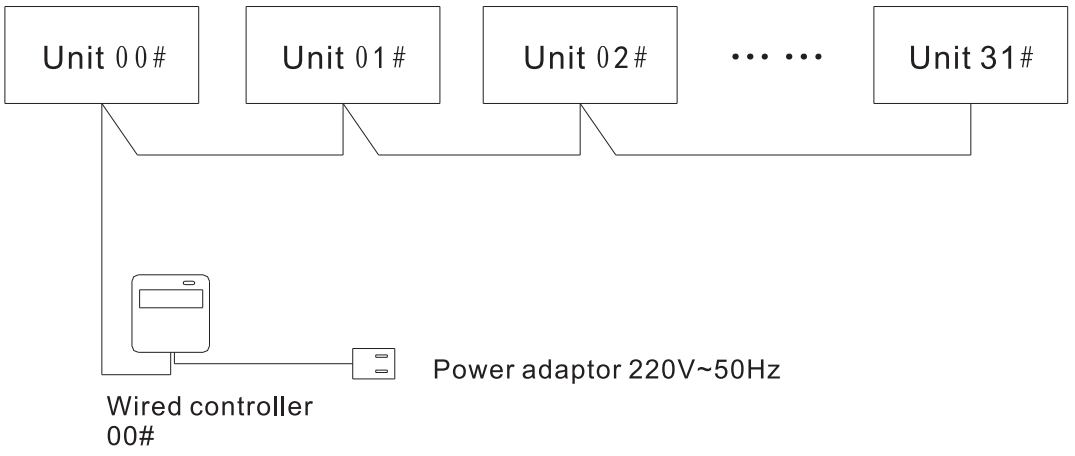
When installing the wired controller, connect it with P, Q and E on the master unit. At the same time, connect the power adaptor in accessories with the black plug at the bottom of wired controller.



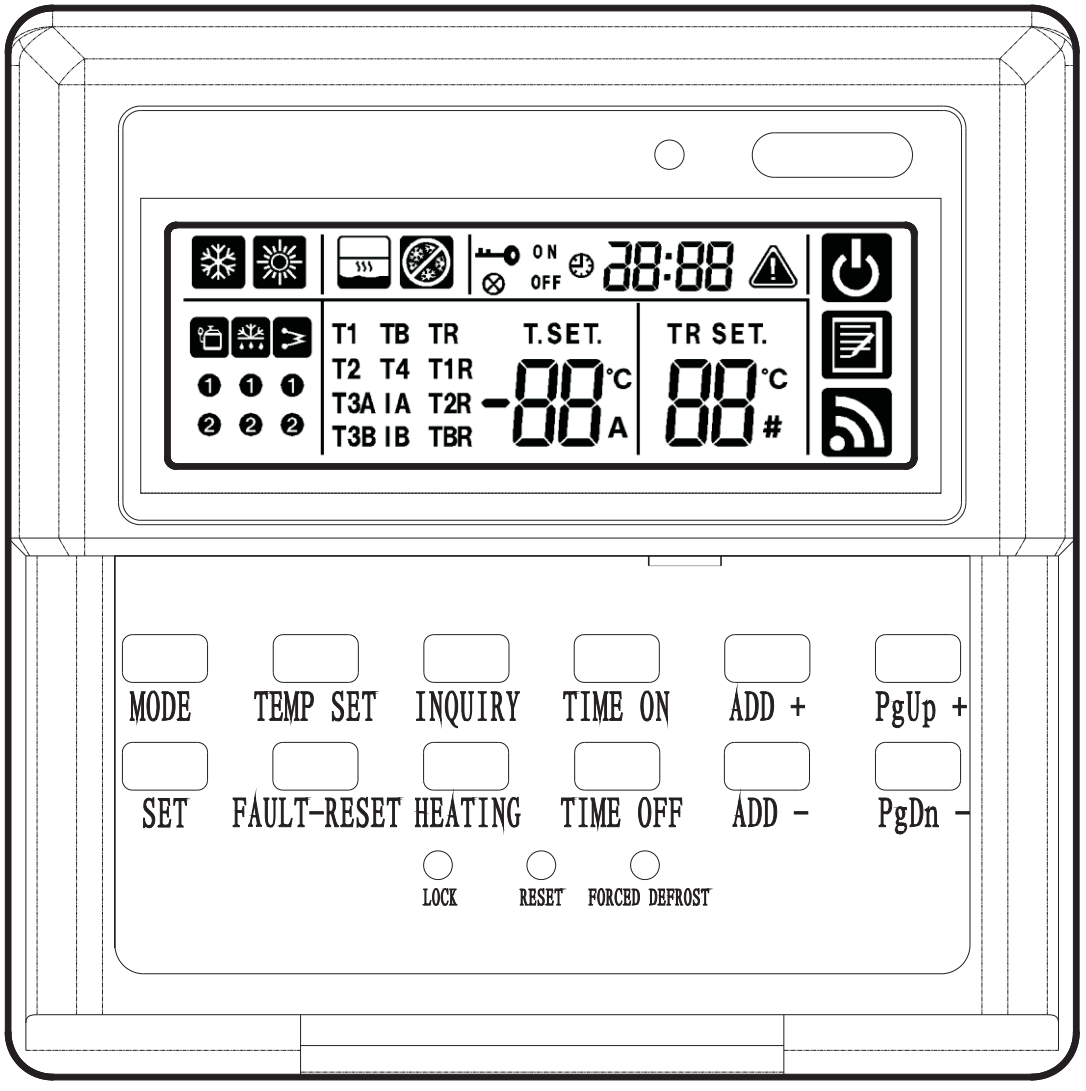
Interface for communication with host computer. No connection is required in absence of host computer

The cables used here are shielded twisted pair with earthing wires, with length determined based on the concrete conditions during installation

The installtion diagram is shown as follows:

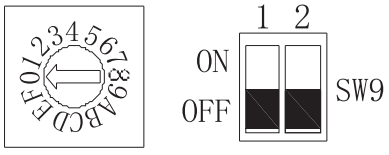
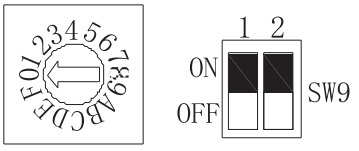


Explanations of contents on LCD of wired controller and buttons in
《 insrallation & operation instruction manual for wired controller 》

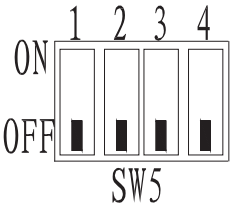
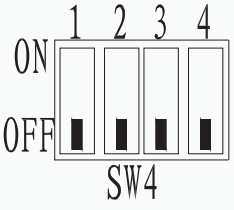


IV.Overview of main board functions

Description of address DIP switch

When the address DIP switches are at OFF position at the same time, the module address setting range is 0 0 # - 1 5 # (the black color denotes 2 DIP switch entities)		When the address DIP switches are at ON at the same time, the module address setting range is 16# - 31# (the black color denotes 2 DIP switch entities)	
			
SR1	Description	SR1	Description
0	Master unit (Unit 00#)	0	Auxiliary unit (Unit 16#)
1	Auxiliary unit (Unit 01#)	1	Auxiliary unit (Unit 17#)
2	Auxiliary unit (Unit 02#)	2	Auxiliary unit (Unit18#)
3	Auxiliary unit (Unit 03#)	3	Auxiliary unit (Unit19#)
4	Auxiliary unit (Unit 04#)	4	Auxiliary unit (Unit 20#)
5	Auxiliary unit (Unit 05#)	5	Auxiliary unit (Unit 21#)
6	Auxiliary unit (Unit 06#)	6	Auxiliary unit (Unit 22#)
7	Auxiliary unit (Unit 07#)	7	Auxiliary unit (Unit 23#)
8	Auxiliary unit (Unit 08#)	8	Auxiliary unit (Unit 24#)
9	Auxiliary unit (Unit 09#)	9	Auxiliary unit (Unit 25#)
A	Auxiliary unit (Unit 10#)	A	Auxiliary unit (Unit 26#)
B	Auxiliary unit (Unit 11#)	B	Auxiliary unit (Unit 27#)
C	Auxiliary unit (Unit 12#)	C	Auxiliary unit (Unit 28#)
D	Auxiliary unit (Unit 13#)	D	Auxiliary unit (Unit 29#)
E	Auxiliary unit (Unit 14#)	E	Auxiliary unit (Unit 30#)
F	Auxiliary unit (Unit 15#)	F	Auxiliary unit (Unit 31#)

V.Description of DIP switch (only tested at the beginning of power-on)

<table>
<tr><td>DIP switch for capacity regulation (the black color denotes the DIP switch entity)</td><td colspan="2">1-Loading deviation:
ON:+4℃
OFF: +2℃
2-Control period:
ON: 60s
OFF: 30s
3-Opening degree of EXV:
ON:480 steps
OFF: Normal regulation
4- Reserved
  </td></tr>
<tr><td>DIP switch for model selection(the black color denotes the DIP switch entity)</td><td colspan="2">1- ON: 30kW unit
OFF: Reserved
2- ON: 130kw unit
OFF: 65kw unit
3- Reserved
4- OFF: Common units
  </td></tr>
<tr><td rowspan="4">DIP switch for defrosting interval SW6 (the black color denotes the DIP switch entity)</td><td>  </td><td>Defrosting interval of 20 min</td></tr>
<tr><td>  </td><td>Defrosting interval of 25 min</td></tr>
<tr><td>  </td><td>Defrosting interval of 30 min</td></tr>
<tr><td>  </td><td>Defrosting interval of 35 min</td></tr>
</table>

VI.Protection function (refer to “Service and Maintenance” for detail codes)

1).Power supply protection

Phase loss and dislocation of 3 phase power supply (only detected during power-on).

The related unit will be stopped when power supply protection is active.

2).Water pump overload protection

All the units will be stopped when water pump overload protection is detected;

3).Insufficient water flow protection

Detection of insufficient water flow will begin after the water pump is started for 30s; when the switch is disconnected for 15s continuously, an alarm “insufficient water flow of air conditioner” will occur. All the units will be stopped in case of an alarm of insufficient water flow;

4).Compressor running protection

A time delay of 180s is needed for restart of the compressor. The running time shall reach 180s for unloading of compressor (not required for shutdown).

5).Communication fault

When the main board and the wired controller fail to communicate with each other continuously for 2 mins, the side that is unavailable for communication will trigger an alarm L4 “communication fault between master unit and wired controller”, and all the units will be stopped until the main board and wired controller can communicate with each other and then automatic startup will be enabled.

In order to avoid communication interference when possible, the communication cables shall be 0.5mm2 2-core shielded cables. When the unit is far away from the wired controller, 120Ω matching resistor may be connected with P and Q at the side of main board in parallel.

When the main board fails to communicate with the auxiliary unit continuously for 2 mins, the auxiliary unit will trigger an alarm “communication fault between modules”, and the slave suffering from a communication fault will be stopped. When the main board detects that the number of connected machines decreases, an alarm L2 “the number of modules decreases” will be triggered, and the auxiliary unit failing to communicate with the master unit will be stopped.When the main board detects that the maximum number of address equals or is larger than the number of connected machines, the unit can control and run normally, but an alarm L3 “Address fault” will occur.

6).High pressure/overload protection

During compressor running, when the unit detects high pressure switch is disconnected for 3s, if the system is in defrosting mode, the compressor will stop; in other conditions, an alarm “high pressure/overload protection” will be displayed. (The start and stop of fan motor is the same with compressor.)

7).Low pressure protection and medium pressure protection

Detection of “low pressure of compressor” and “medium pressure of compressor” will be started after the compressor has been started for 60s. After the switch has been disconnected for a period: If the compressor is in mode of defrosting, no alarm will be triggered. Re-detection of the low pressure switch will be started after a time delay of 60s after defrosting is exited. If the compressor is not in mode of defrosting, an alarm of “Low pressure of compressor” or “Medium pressure of compressor” will be triggered, and the related system will be stopped. (The rule of simultaneous startup and shutdown applies to the fan) When confirming the low pressure and medium pressure alarms, the low pressure switch and medium pressure switch will be disconnected for a certain period. In case of cooling mode, they will be disconnected for 5s continuously, and an alarm will occur. Once disconnected for 30s in heating mode, an alarm will occur;

8).Over temperature protection of fin

In the cooling mode and with the fin temperature probe at normal state, detect the temperature of fin after the unit is powered on: when the temperature of fin is ＞65℃, an alarm of over temperature will occur;when the temperature of fin is ≤55℃,the over temperature protection of fin will be disabled. The related system will be stopped when over temperature protection of fin is active. (The rule of simultaneous startup and shutdown applies to the fan) .

An alarm will occur after 3s elimination of jitter;

9).Module water outlet temperature protection

Start detection after the module is selected to run for the first time: when the module water outlet temperature is ≤4℃, an alarm will occur to warn that the water outlet temperature of related module is too low, when the module water outlet temperature is ≥7℃, the module supercooling protection will be disabled; when the module water outlet temperature is≥58℃, overheating protection is active, when the module water outlet temperature is ≤48℃, the module supercooling protection will be disabled; the related module will be stopped when supercooling (overheating) protection is active. The module will be allowed to work again after resetting.

An alarm will occur after 3s elimination of jitter;

10).Current protection

I: Measured current; IP: Compressor protection current, set at 30A;

When the measured current I of a system is ≥ the protection current IP, the related system will be stopped (the rule of simultaneous startup and shutdown applies to the fan), and an alarm will occur for over-current protection.

11). Anti-ice protection

TX2(TC): anti-ice temperature. When the unit detects -5 ℃ <TX2(TC)≤4℃ and lasts 10s, the unit will show PE error code and the unit will stop. When TX2(TC)≥7 ℃， the error eliminates and the unit will run again.

12). Fan motor overload protection

The unit will stop when fan motor is overload and show P5 or PB error code, to avoid the unit running in fan otor stop status. When the error eliminates, the fan motor will work again and the unit will restart.

VII.Enquiry of main board

Normal display contents of nixie tube:

1).In standby mode, the quantity of connected units(the quantity of main PCB) will be displayed.

0 will be displayed before the compressor runs.

The percentage of running compressor will be displayed when the compressor is running. (50 stands for 1 compressor and 100 stands for 2 compressors).

2).The number of started machines will be displayed after the system is started.

The chip of outdoor system is equipped with a button for enquiry, which allows observation of running state of the outdoor system. It also facilitates maintenance for the engineering technicians. Displayed contents of enquiry:

Check Table		
NUM	Display content	Note
Display	Check content	
1	Board address	
2	Capacity	
3	Running mode(1.refrigeration;2.heating;8.standby;4.water heating	
4	The number of outdoor unit	Host installation
5	T1 total outlet water temperature	
6	T2 unit outlet water temperature	
7	T4 environment temperature	Host installation
8	TB return water temperature	Host installation
9	TR water tank temperature	Host installation
10	T3A(T3) condenser outlet temperature	
11	T3B(T5) evaporator inlet temperature	
12	TC(TX1) unit Anti-freezing temperature	
13	TP(TX3) compressor exhaust temperature	
14	TH(TX2) compressor return temperature	
15	A compressor current	
16	B compressor current	
17	EXV opening=display NUM×8	
18	The target quantity of running compressor	
19	(Reserve)	
20	(Reserve)	
21	The last time protect/fault(only display the biggest)	
22	(Reserve)	
23	The total running hours of compressor(100hours as a unit)	
24	--(Check is over)	
25（1）	PCB address(circulation)	

TRANSPORTATION

■ Handling of the unit

The angle of inclination should not be more than 15º when carrying the unit, to avoid overturn of the unit.

a. Rolling handling: several rolling rods of the same size are placed under the base of the unit, and the length of each rod must be more than the outer frame of the base and suitable for balancing of the unit.

b. Lifting: the strength lifting rope (belt) can bear should be 3 times the weight of the unit. Check the lifting hook and ensure that it is firmly attached to the unit, and the lifting angle should be more than 60º. To avoid damages to the unit, the contact position of the unit and lifting rope should be provided with an at least 50mm thick wood block, cloth or hard paper. Any person is not allowed to stand below the unit when lifting it.

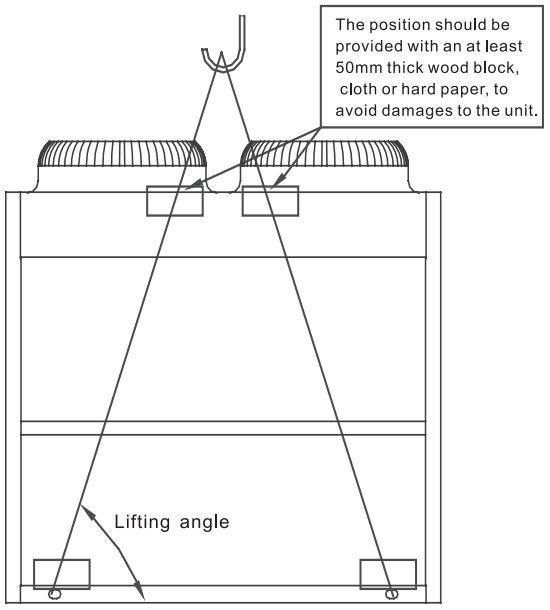


Fig 1

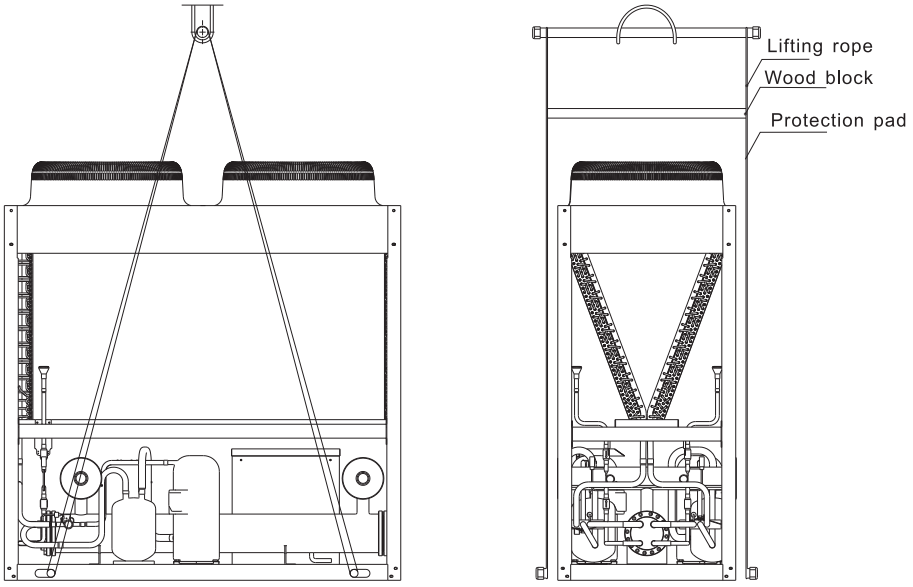


Fig 2

INSTALLATION OF THE UNIT

A. Selection of installation sites

- The unit can be installed on the ground or on the suitable roof, but enough ventilation volume should be ensured in both cases.
- The unit should not be installed where noise and vibration are required to a certain extent.
- The installed unit should be sheltered from direct sunlight as much as possible, and be far away from boiler flues and ambient air which may erode condenser coils and copper tube parts of the unit.
- If the installed unit can be approached by unauthorized persons, safety measures of isolation should be taken, such as rail guards. These measures will avoid artificial damages and accidental damages, and prevent the control boxes from being opened leading to exposure of electric components in operation.
- The height of the installation foundation for the unit should not be less than 300mm, and floor drains are required in installation sites, to ensure smooth drainage and remove any seeper.
- In case of installation on the ground, the steel base of the unit should be located on the concrete foundation, and the concrete plinth should extend below frozen soil layer. The foundation of the unit should not be connected to the foundation of the building, to avoid affecting the people due to transfer of noise and vibration. The base of the unit is provided with installation holes, which can be used to connect the unit and the foundation firmly.
- In case of installation on the roof, the roof must possess enough strength to sustain weight of the unit and maintenance personnel. The unit can be supported on concrete foundations or channel steel frames similar to those used in the unit installation on the ground. The load-bearing channel steel must be in alignment with the installation holes of the unit damper, and the channel steel should possess enough width for installing the damper.
- Consult the building contractor, the architectural designer or other specialists about the cases with special installation requirements.

NOTE

The selected installation site of the unit should facilitate connection of water pipes and wires, and be free from water inlet of oil fume, steam or other heat sources. Besides, the noise of the unit and cold and hot air should not influence the surrounding environment.

B. Outline dimensional drawing

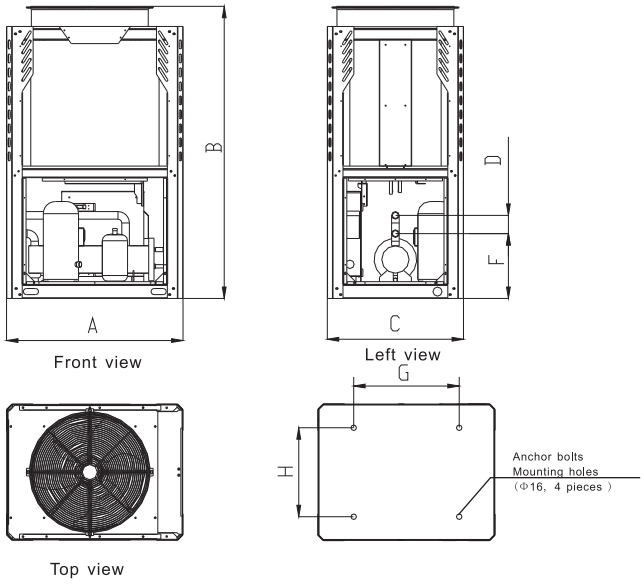
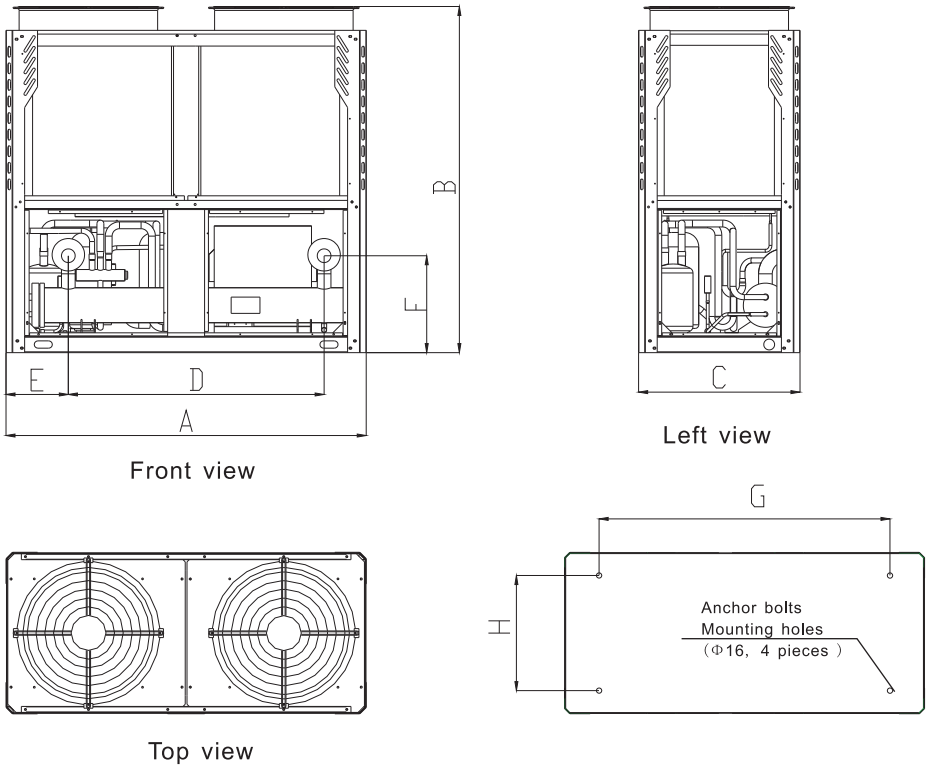


Fig 1 Applicable for 30kW units

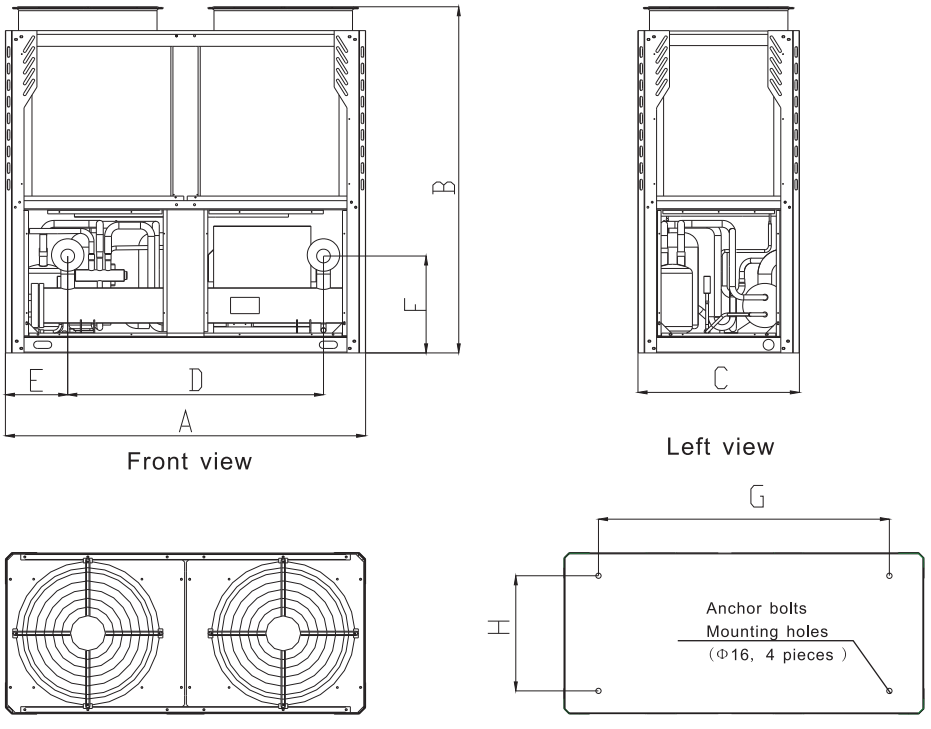


Front view

Left view

Top view

Fig 2 Applicable for 65kW units



Front view

Left view

Top view

Fig 3 Applicable for 130kW units

Table 1: unit(mm)

Rated cooling capacity(kW)	A	B	C	D	E	F	G	H
30	1160	1920	900	120	--	426	840	850
65	2000	1920	900	1420	346	538	1586	850
130	2200	2220	1100	1420	403	360	1724	1054

NOTE

- **After installing the spring damper, the total height of the unit will increase by 135mm or so.**
- **The ports of inlet and outlet pipes should be flange ports, and flanges should be hubbed slip-on-welding steel pipe flanges.**

C. Requirements of arrangement space of the unit

Requirements of arrangement space of the unit

- To ensure adequate airflow entering the condenser, the influence of descending airflow caused by the high-rise buildings around upon the unit should be taken into account when installing the unit.
- If the unit is installed where the flowing speed of air is high, such as on the exposed roof, the measures including sunk fence and Persian blinds can be taken, to prevent the turbulent flow from disturbing the air entering the unit. If the unit needs to be provided with sunk fence, the height of the latter should not be more than that of the former; if Persian blinds are required, the total loss of static pressure should be less than the static pressure outside the fan. The space between the unit and sunk fence or Persian blinds should also meet the requirement of the minimum installation space of the unit.
- If the unit needs to operate in winter, and the installation site may be covered by snow, the unit should be located higher than the snow surface, to ensure that air flows through the coils smoothly. The unit should not be installed where noise and vibration are required to a certain extent.

Arrangement space of the unit

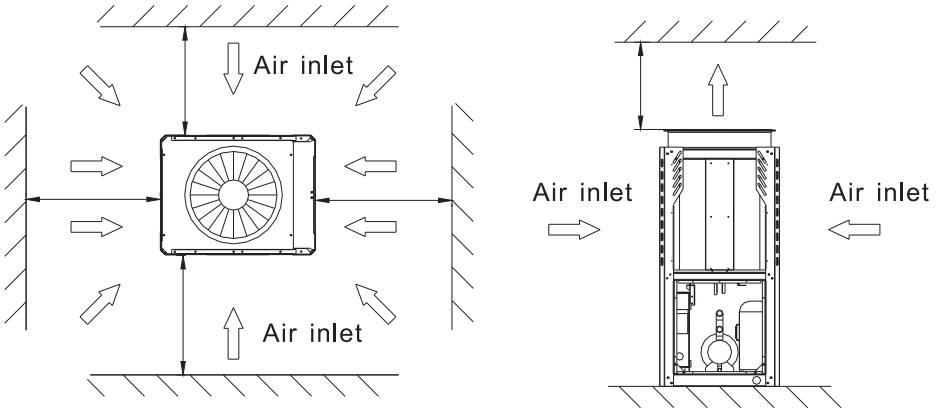


Fig 4 Applicable for 30kW units

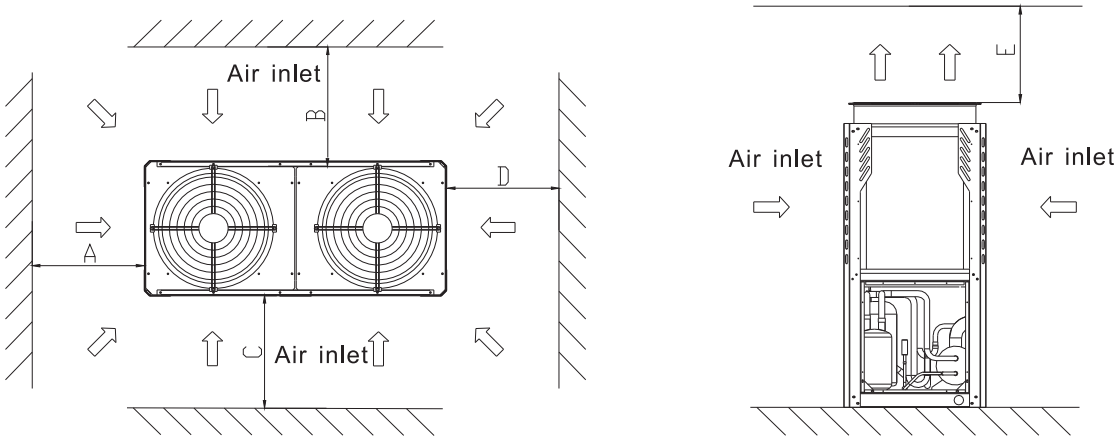


Fig 5 Applicable for 65kW units

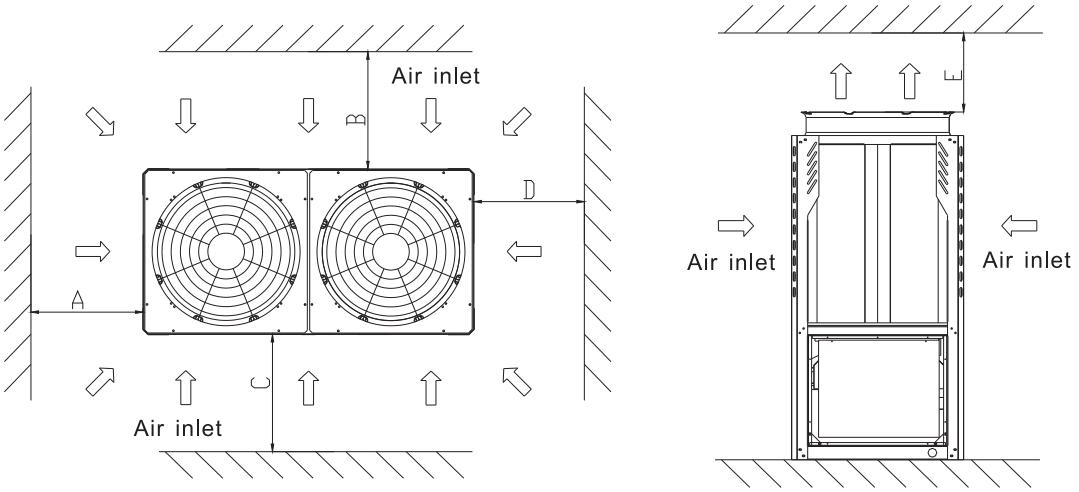


Fig 6 Applicable for 130kW units

Table 2

Installation space（mm）				
A	B	C	D	E
＞1500	＞2000	＞2000	＞1500	＞8000

Space requirements for parallel installation of multiple modular units

To avoid back flow of the air in the condenser and operational faults of the unit, the parallel installation of multiple modular units can follow the direction A and D as shown in the figure above, the spaces between the unit and the obstacle are given in the table above, and the space between adjacent modular units should not be less than 300mm; the installation can also follow the direction B and C as shown in the figure above, the spaces between the unit and the obstacle are given in Table 2, and the space between adjacent modular units should not be less than 600mm; the installation can also follow the direction combination of A and D, and B and C, the spaces between the unit and the obstacle are given in Table 2, the space between adjacent modular units in the direction A and D should not be less than 300mm, and the space between adjacent modular units in the direction B and C should not be less than 600mm. If the spaces mentioned above cannot be met, the air passing from the unit to the coils may be restricted, or back flow of air discharge may occur, and the performance of the unit may be affected, or the unit may fail to operate.

C. Installation foundation

a. The unit should be located on the horizontal foundation, the ground floor or the roof which can bear operating weight of the unit and the weight of maintenance personnel. Refer to Technical Parameters for operating weight.

b. If the unit is located so high that it is inconvenient for maintenance personnel to conduct maintenance, the suitable scaffold can be provided around the unit.

c. The scaffold must be able to bear the weight of maintenance personnel and maintenance facilities.

d. The bottom frame of the unit is not allowed to be embedded into the concrete of installation foundation.

■ Location drawing of installation foundation of the unit: (unit: mm)

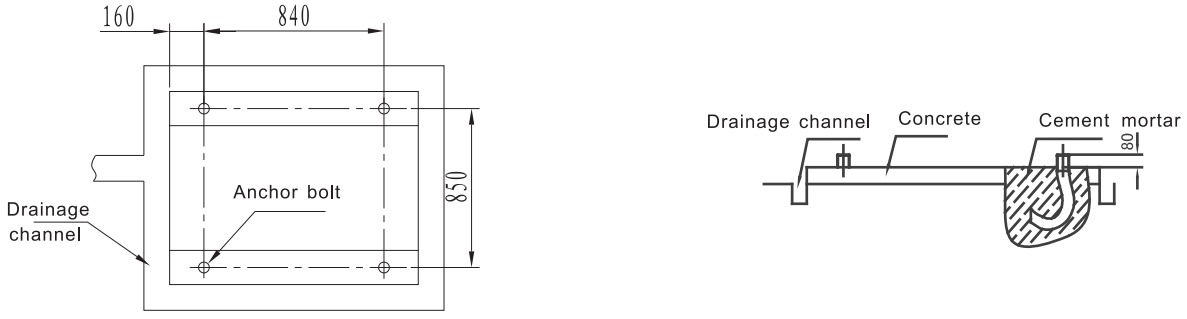


Fig 7 Applicable for 30kW units

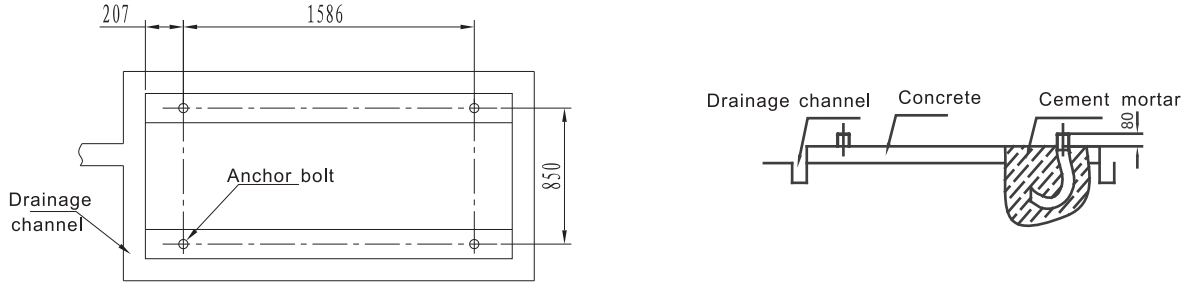


Fig 8 Applicable for 65kW units

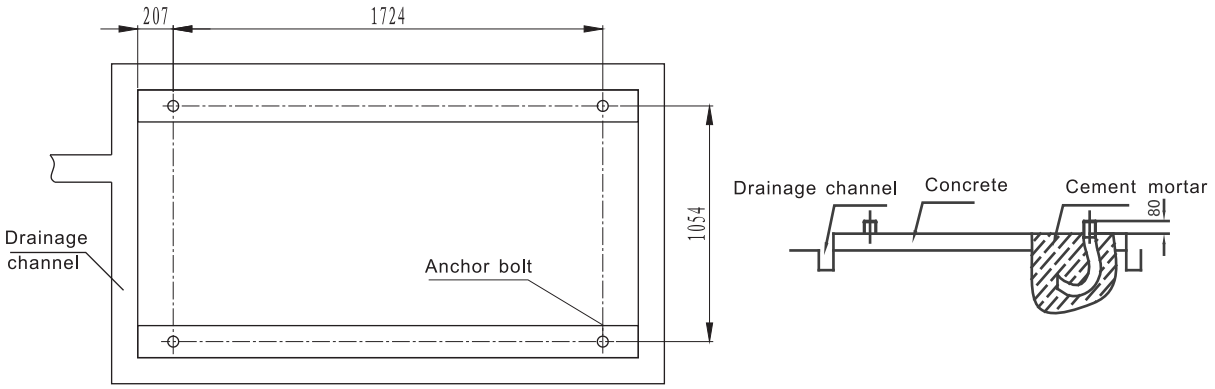


Fig 9 Applicable for 130kW units

D. Installation of damping devices

■ Damping devices must be provided between the unit and its foundation.

By means of the Φ15mm diameter installation holes on the steel frame of the unit base, the unit can be fastened on the foundation through the spring damper. See Fig 7, Fig 8 and Fig 9 (Schematic diagram of installation dimension of the unit) for details about center distance of the installation holes. The damper does not go with the unit, and the user can select the damper according to the relevant requirements. When the unit is installed on the high roof or the area sensitive to vibration, please consult the relevant persons before selecting the damper.

■ Installation steps of the damper

Step 1. Make sure that the flatness of the concrete foundation is within ±3mm, and then place the unit on the cushion block.

Step 2. Raise the unit to the height suitable for installation of the damping device.

Step 3. Remove the clamp nuts of the damper.

Step 4. Place the unit on the damper, and align the fixing bolt holes of the damper with the fixing holes on the unit base.

Step 5. Return the clamp nuts of the damper to the fixing holes on the unit base, and tighten them into the damper.

Step 6. Adjust the operational height of the damper base, and screw down the leveling bolts. Tighten the bolts by one circle to ensure equal height adjustment variance of the damper.

Step 7. The lock bolts can be tightened after the correct operational height is reached.

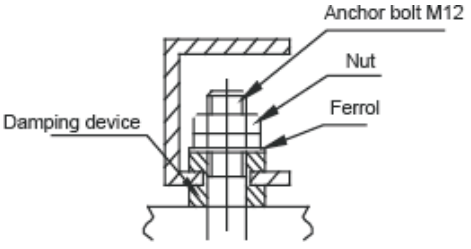


Fig 10

NOTE

It is recommended that the damper should be fastened on the foundation with the provided holes. After the unit is placed on the foundation, the damper connected with the unit should not be moved, and the central clamp nut is not allowed to be tightened before the damper sustains load.

WATER SYSTEM INSTALLATION

A. Basic requirements of connection of chilled water pipes

CAUTION

- **After the unit is in place, chilled water pipes can be laid.**
- **The relevant installation regulations should be abided with when conducting connection of water pipes.**
- **The pipelines should be free of any impurity, and all chilled water pipes must conform to local rules and regulations of pipeline engineering.**

■ Connection requirements of chilled water pipes

a. All chilled water pipelines should be thoroughly flushed, to be free of any impurity, before the unit is operated. Any impurity should not be flushed to or into the heat exchanger.

b. Water must enter the heat exchanger through the inlet; otherwise the performance of the unit will decline.

c. The inlet pipe of the evaporator must be provided with a target flow controller, to realize flow-break protection for the unit. Both ends of the target flow controller must be supplied with horizontal straight pipe sections whose diameter is 5 times that of the inlet pipe. The target flow controller must be installed in strict accordance with "Installation & Regulation Guide for Target Flow Controller" (Figure 4). The wires of the target flow controller should be led to the electric cabinet through shielded cable (see Electric Controlling Schematic Diagram for details). The working pressure of the target flow controller is 1.0MPa, and its interface is 1 inch in diameter. After the pipelines are installed, the target flow controller will be set properly according to the rated water flow of the unit.

d. The pump installed in the water pipeline system should be equipped with starter. The pump will directly press water into the heat exchanger of the water system.

e. The pipes and their ports must be independently supported but should not be supported on the unit.

f. The pipes and their ports of the heat exchanger should be easy to disassemble for operation and cleaning, as well as inspection of port pipes of the evaporator.

g. The evaporator should be provided with a filter with more than 40 meshes per inch at site. The filter should be installed near to the inlet port as much as possible, and be under heat preservation.

h. The by-pass pipes and by-pass valves as shown in Fig. 1, Fig 2 and Fig 3 must be mounted for the heat exchanger, to facilitate cleaning of the outside system of water passage before the unit is adjusted. During maintenance, the water passage of the heat exchanger can be cut off without disturbing other heat exchangers.

i. The flexible ports should be adopted between the interface of the heat exchanger and on-site pipeline, to reduce transfer of vibration to the building.

j. To facilitate maintenance, the inlet and outlet pipes should be provided with thermometer or manometer. The unit is not equipped with pressure and temperature instruments, so they need to be purchased by the user.

k. All low positions of the water system should be provided with drainage ports, to drain water in the evaporator and the system completely; and all high positions should be supplied with discharge valves, to facilitate expelling air from the pipeline. The discharge valves and drainage ports should not be under heat preservation, to facilitate maintenance.

l. All possible water pipes in the system to be chilled should be under heat preservation, including inlet pipes and flanges of the heat exchanger.

m. The outdoor chilled water pipelines should be wrapped with an auxiliary heating belt for heat preservation, and the material of the auxiliary heat belt should be PE, EDPM, etc., with thickness of 20mm, to prevent the pipelines from freezing and thus cracking under low temperature. The power supply of the heating belt should be equipped with an independent fuse.

n. When the ambient temperature is lower than 2℃, and the unit will be not used for a long time, water inside the unit should be drained. If the unit is not drained in winter, its power supply should not be cut off, and the fan coils in the water system must be provided with three-way valves, to ensure smooth circulation of the water system when the anti-freezing pump is started up in winter.

o. The common outlet pipelines of combined units should be provided with mixing water temperature sensor.

WARNING

- **For the water pipeline network including filters and heat exchangers, dreg or dirt may seriously damages the heat exchangers and water pipes.**
- **The installation persons or the users must ensure the quality of chilled water, and de-icing salt mixtures and air should be excluded from the water system, since they may oxidize and corrode steel parts inside the heat exchanger.**

■ Connection drawing of pipeline system

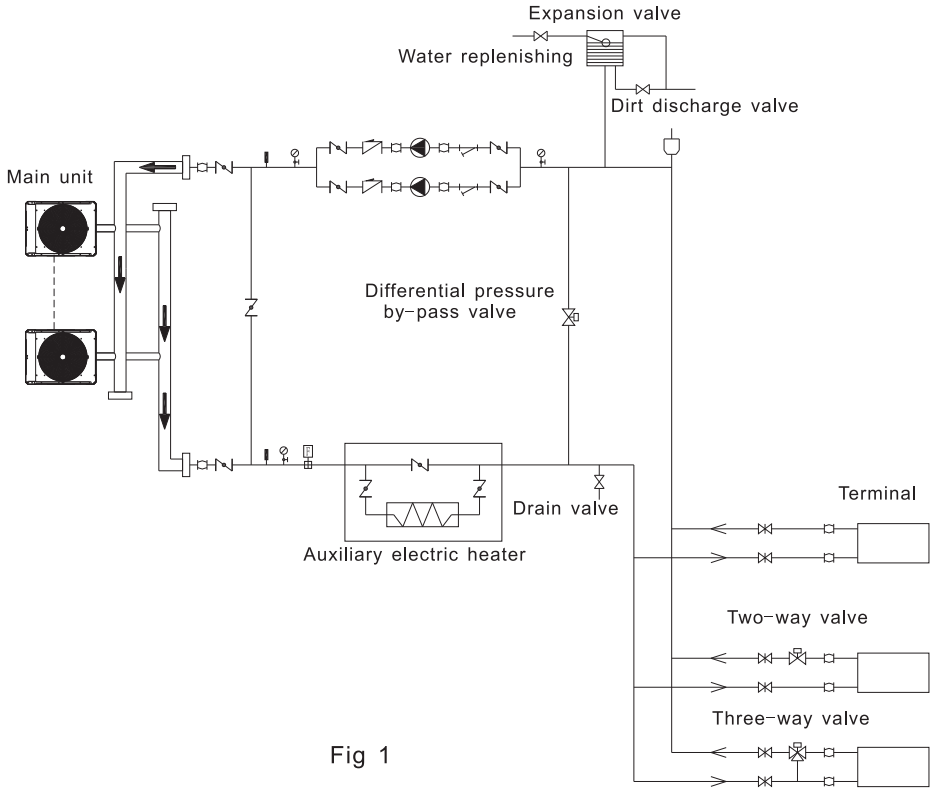


Fig 1

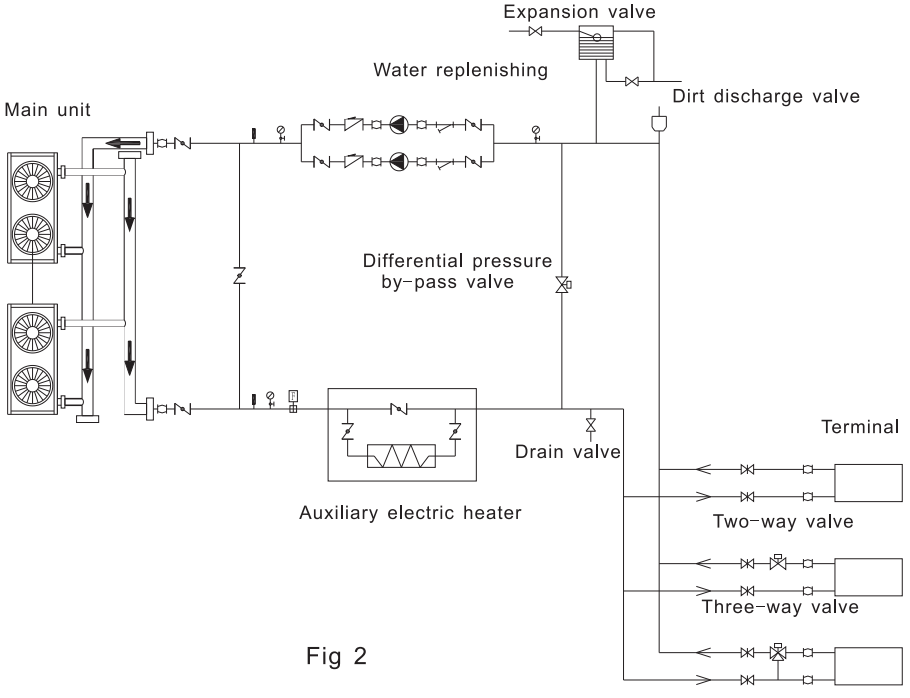


Fig 2

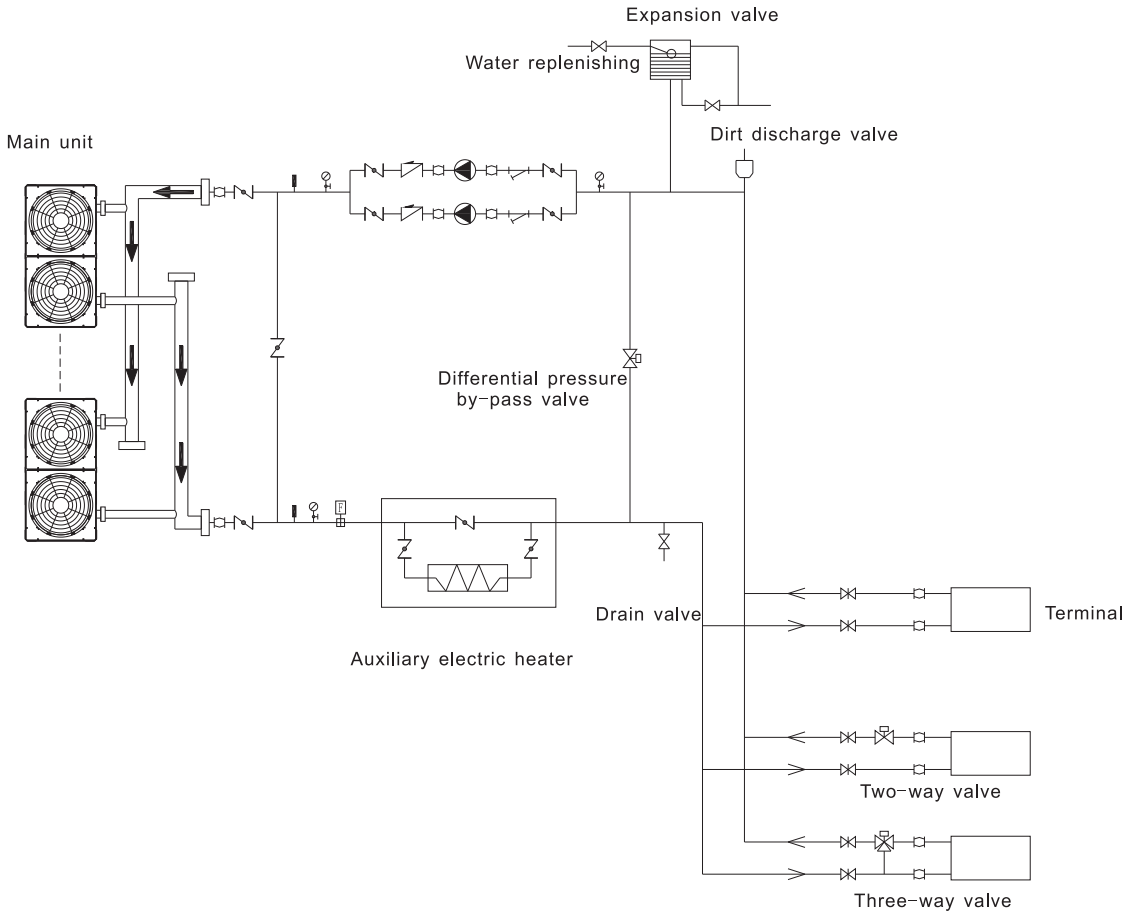


Fig 3

Symbol explanation				
Stop valve	Pressure gauge	Water flow switch	Gate valve	Flexible joint
Y-shaped filter	Thermometer	Circulating pump	Check valve	Automatic dischange valve

B. Water quality control

■ Water quality control

When industrial water is used as chilled water, little furring may occur; however, well water or river water, used as chilled water, may cause much sediment, such as furring, sand, and so on. Therefore, well water or river water must be filtered and softened in softening water equipment before flowing into chilled water system. If sand and clay settle in the evaporator, circulation of chilled water may be blocked, and thus leading to freezing accidents; if hardness of chilled water is too high, furring may occur easily, and the devices may be corroded. Therefore, the quality of chilled water should be analyzed before being used, such as PH value, conductivity, concentration of chloride ion, concentration of sulfide ion, and so on.

■ Applicable standard of water quality for the unit

Table 1

PH value	Total hardness	Conductivity	Sulfide ion	Chloride ion	Ammonia ion
7～8.5	<50ppm	<200μV/cm(25℃)	No	<50ppm	No
Sulfate ion	Silicon	Iron content	Sodium ion	Calcium ion	
<50ppm	<30ppm	<0.3ppm	No requirement	<50ppm	

C. Installation & regulation guide for target flow controller

■ **Please carefully check flow switches before conducting installation of the target flow controller. Packing should be in good condition, and the appearance should be free of damage and deformation. If any problem, please contact the manufacturer.**

■ **Flow switches can be installed in the horizontal pipeline or the vertical pipeline with upward flowing direction but cannot be mounted in the pipeline with downward flowing direction. The inlet water of gravity should be taken into account when flow switches are installed in the pipeline with upward flowing direction.**

■ **Target flow controller must be installed on a section of straight-line pipeline, and its both ends must be supplied with straight-line pipes whose length is at least 5 times diameter of the pipe. In the meanwhile, the fluid flowing direction in the pipeline must be consistent with the direction of arrow on the controller. The connection terminal should be located where wiring connectioncan be easily done.**

■ **Pay attention to the following items when conducting installation and wire connection:**

a. Collision of the wrench with the soleplate of the flow switch is prohibited, since such collision may cause deformation and failure of the flow switch.

b. To avoid electric shock and damages to the devices, the power supply should be cut off, when wires are connected or adjustment is done.

c. When wiring connection is conducted, adjustment of other screws except connection terminals of micro switches and ground screws is prohibited. In the meanwhile, over great force should not applied when wires of micro switches are connected, otherwise micro switches may suffer displacement, thus leading to failure of flow switches.

d. Special grounding screws should be used for earth connection. Bolts should not be installed or removed at will; otherwise flow switches may suffer deformation and failure.

E. Flow switches have been set at minimal flow value prior to ex-factory. They should not be adjusted below the ex-factory setting value, or they may suffer failure. After installing flow switches, please press the flow switch lever several times to check them. When the lever is found not to respond with “clatter”, rotate the screw in a clockwise direction, until “clatter” occurs.

f. Be sure to determine the model of target slice according to the rated flow of the unit, the diameter of the outlet pipe and the adjustment range of the target slice of the flow switch. Besides, the target slice should not contact with other restrictors in the pipeline or on the inner wall of the pipeline, or the flow switch cannot be reset normally.

■ **Determine whether the flow switch and the system connected with it are in good operation according to the measured value by flow meter, namely, when the measured value on flow meter is less than 60% of rated water flow of the unit, the target flow controller should be cut off and observed for 3 working periods, and it should be covered with flow switch shell timely.**

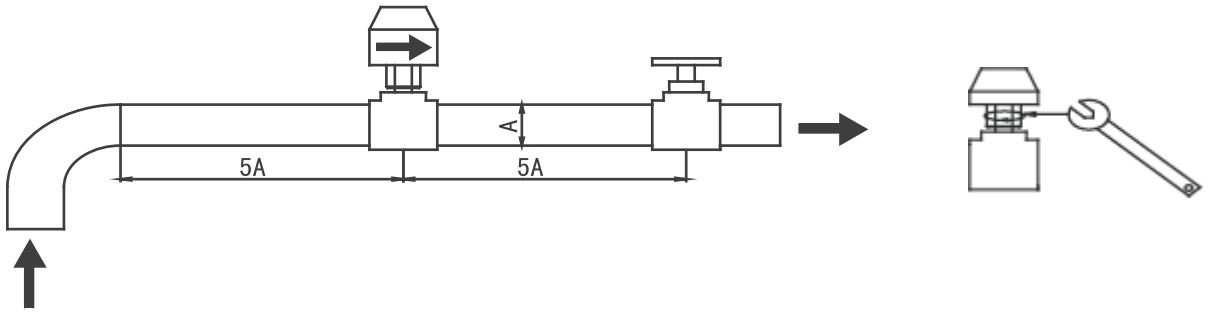


Fig 4 Schematic diagram of target flow controller

D. Installation of single-module water system pipeline

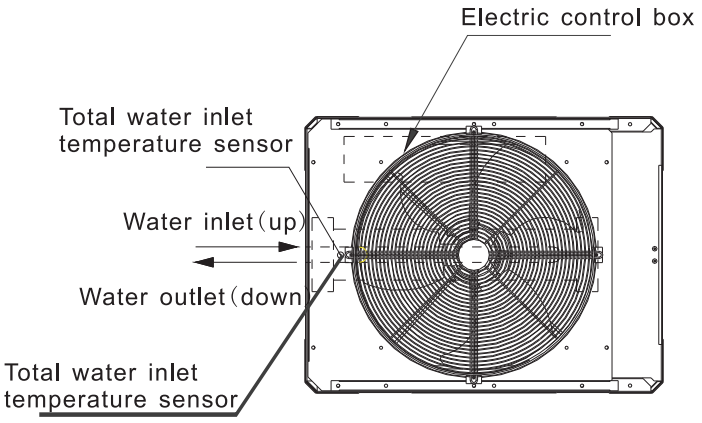


Fig 5 Applicable for 30kW units

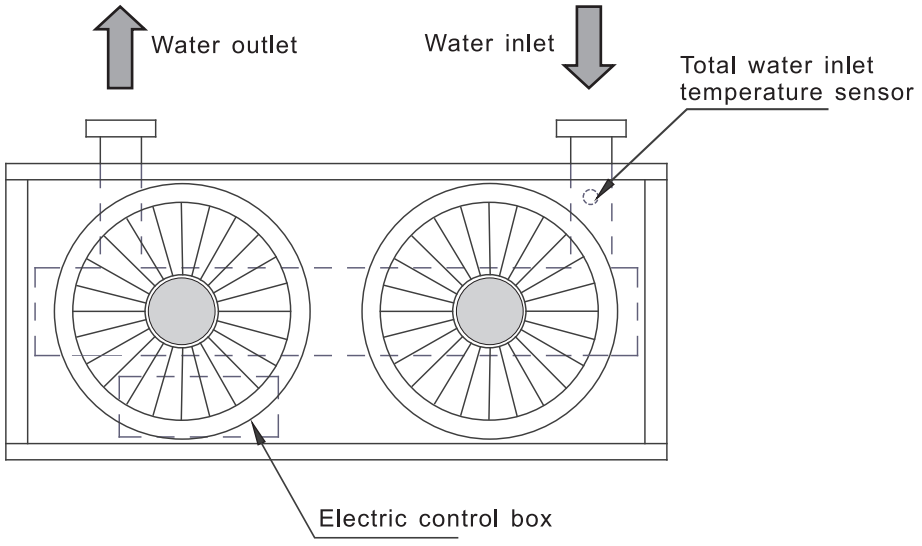


Fig 6 Applicable for 65kW units

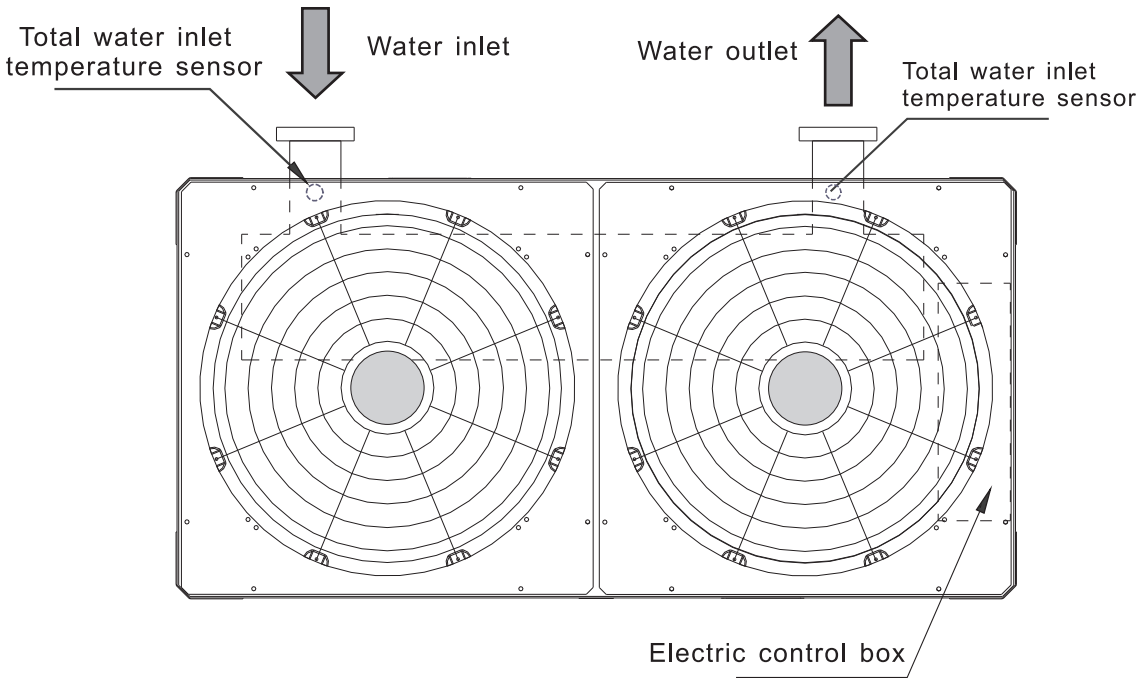


Fig 7 Applicable for 130kW units

E. Installation of multi-module water system pipeline

Multi-module combination installation involves special design of the unit, so relevant explanation is given as follows.

■ Installation mode of multi-module combination water system pipeline

1) The installation modes below are applicable for 30 kW units

a. Installation mode I (recommended installation mode)

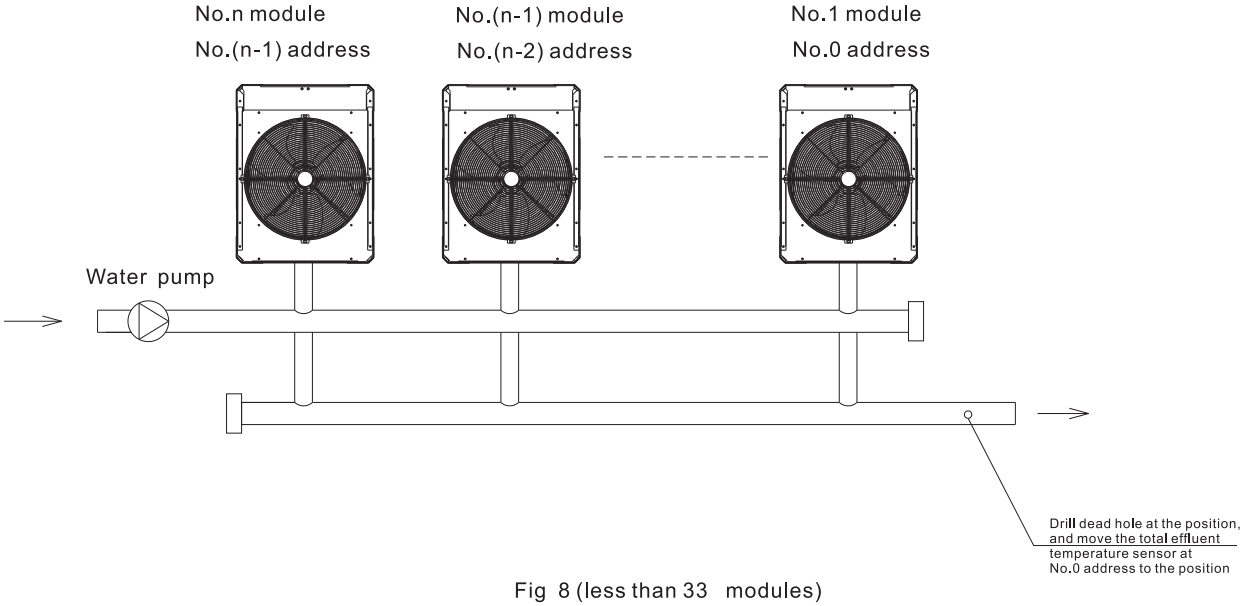


Fig 8 (less than 33 modules)

b. Installation mode II

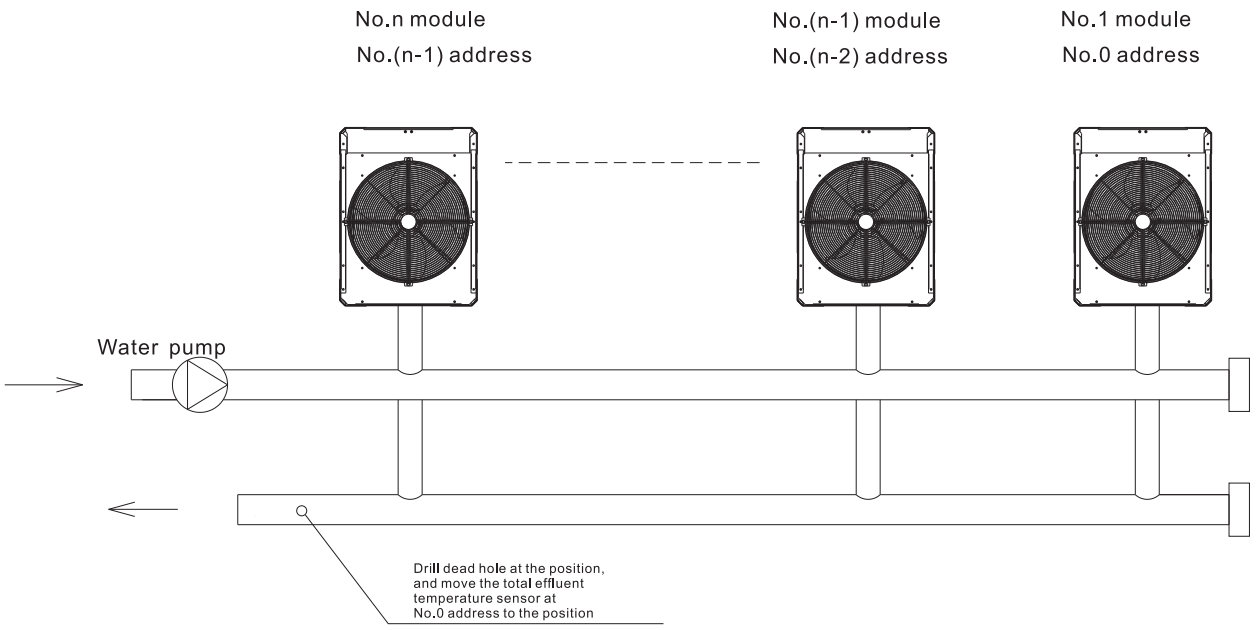


Fig 9 (less than 33 modules)

2) The installation modes below are applicable for 65kW units

a. Installation mode I (recommended installation mode)

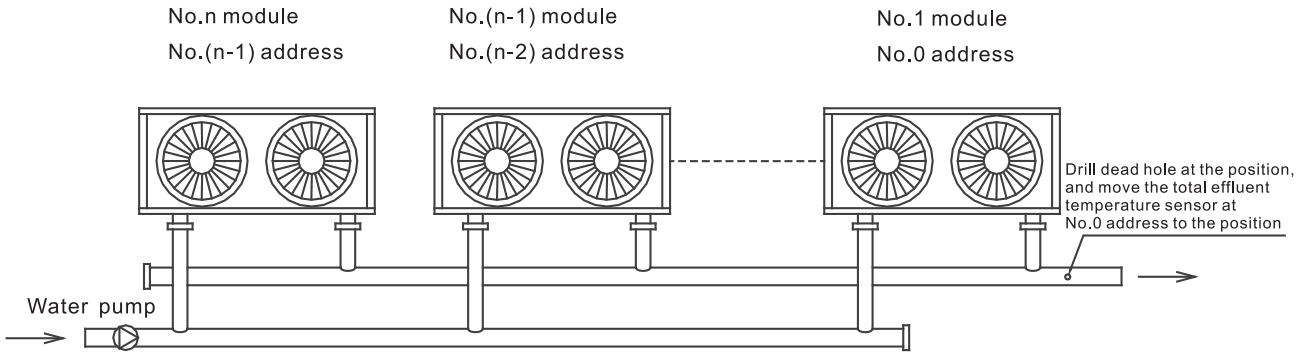


Fig10 (less than 33 modules)

b. Installation mode II

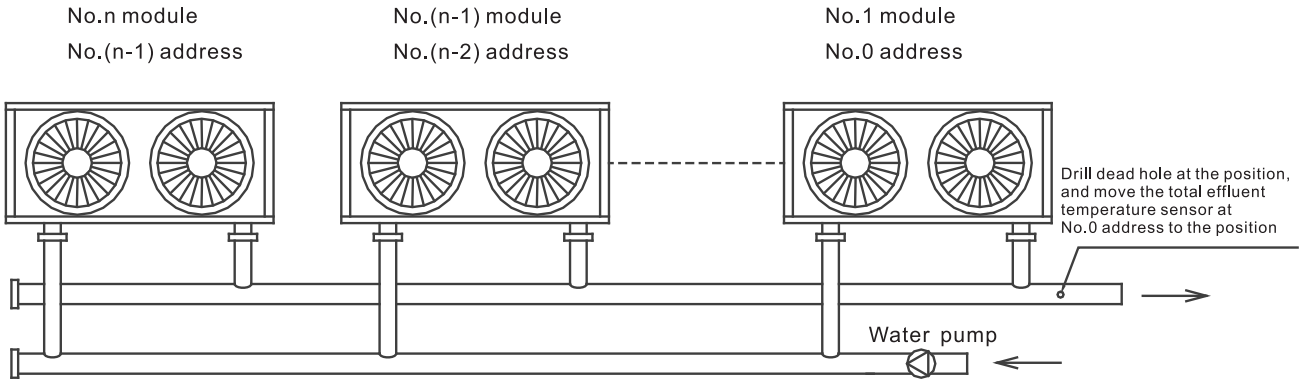


Fig 11 (less than 33 modules)

3) The installation modes below are applicable for 130kW units

a. Installation mode I (recommended installation mode)

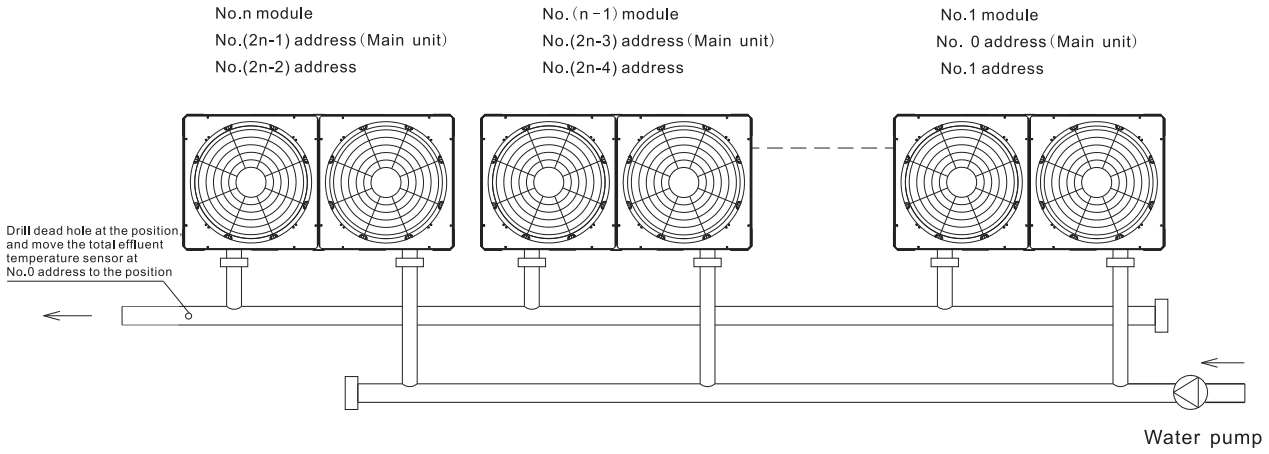


Fig 12 (less than 17 modules)

b. Installation mode II

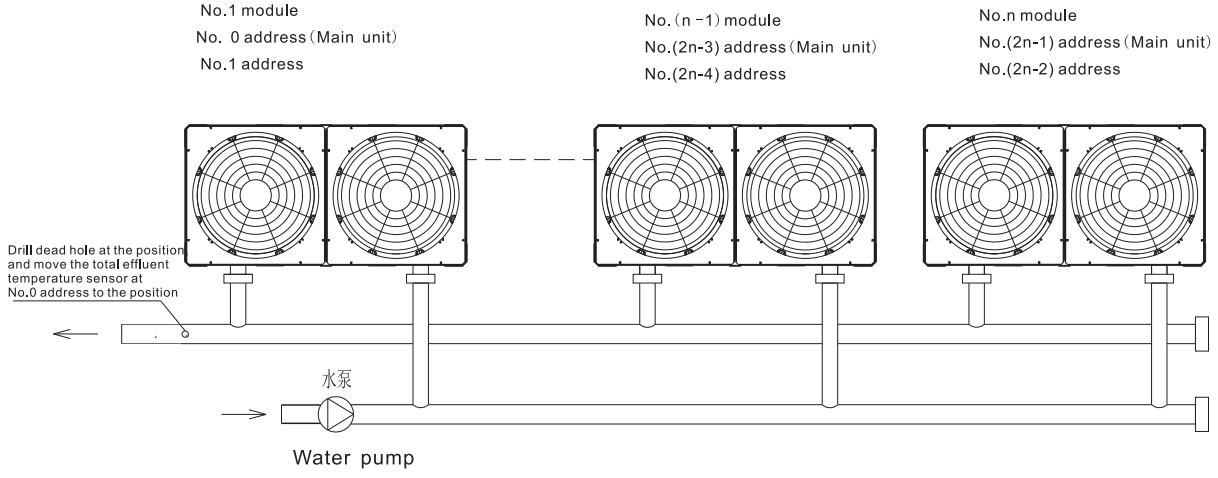


Fig 13 (less than 17 modules)

■ Table of diameter parameters of main inlet and outlet pipes

Total cooling capacity (Unit model x quantity)kW	Total inlet and outlet water pipe diameters (nominal diameter)	Total cooling capacity (Unit model x quantity)kW	Total inlet and outlet water pipe diameters (nominal diameter)
(30×1=) 30	**DN40**	(130×6=) 780	**DN150**
		(130×7=) 910	
(65×1=) 65	**DN65**	(65×11=) 715	
(130×1=) 130		(65×12=) 780	
(30×2=) 60		(65×13=) 845	
(65×2=) 130		(65×14=) 910	
(30×3=) 90		(30×23=) 690	
(30×4=) 120		(30×24=) 720	
(30×5=) 150		(30×25=) 750	
(65×3=) 195	**DN80**	(30×26=) 780	
(30×6=) 180		(30×27=) 810	
(30×7=) 210		(30×28=) 840	
(130×2=) 260	**DN100**	(30×29=) 870	
(130×3=) 390		(30×30=) 900	
(65×4=) 260		(130×8=) 1040	**DN200**
(65×5=) 325		(130×9=) 1170	
(65×6=) 390		(130×10=) 1300	
(30×8=) 240		(130×11=) 1430	
(30×9=) 270		(65×15=) 975	
(30×10=) 300		(65×16=) 1040	
(30×11=) 330		(65×17=) 1105	
(30×12=) 360		(65×18=) 1170	
(30×13=) 390		(65×19=) 1235	
(130×4=) 520	**DN125**	(65×20=) 1300	
(130×5=) 650		(65×21=) 1365	
(65×7=) 455		(65×22=) 1430	
(130×4=) 520		(30×31=) 930	
(130×5=) 650		(30×32=) 960	
(65×7=) 455		(130×12=) 1560	**DN250**
(65×8=) 520		(130×13=) 1690	
(65×9=) 585		(130×14=) 1820	
(65×10=) 650		(65×23=) 1495	
(30×14=) 420		(65×24=) 1560	
(30×15=) 450		(65×25=) 1625	
(30×16=) 480		(65×26=) 1690	
(30×17=) 510		(65×27=) 1755	
(30×18=) 540		(65×28=) 1820	
(30×19=) 570		(130×15=) 1950	**DN300**
(30×20=) 600		(130×16=) 2080	
(30×21=) 630		(65×29=) 1885	
(30×22=) 660		(65×30=) 1950	
		(65×31=) 2015	
		(65×32=) 2080	

CAUTION

Please pay attention to the following items when installing multiple modules:

- Each module corresponds to an address code which cannot be repeated.
- Main water outlet temperature sensing bulb, target flow controller and auxiliary electric heater are under control of the main module.
- One wired controller and one target flow controller are required and connected on the main module.
- The unit can be started up through the wired controller only after all addresses are set and the aforementioned items are determined. The wired controller is ≤500m away from the outdoor unit.

ELECTRIC WIRING

A. Electric wiring

CAUTION

1. The air-conditioner should apply special power supply, whose voltage should conform to rated voltage.
2. Wiring construction must be conducted by the professional technicians according to the labeling on the circuit diagram.
3. Only use the electric components specified by our company, and require installation and technical services from the manufacturer or authorized dealer. If wiring connection fails to conform to electric installation norm, failure of the controller, electronic shock, and so on may be caused.
4. The connected fixed wires must be equipped with full switching-off devices with at least 3mm contact separation.
5. Set leakage protective devices according to the requirements of national technical standard about electric equipment.
6. After completing all wiring construction, conduct careful check before connecting the power supply.
7. Please carefully read the labels on the electric cabinet.
8. The user's attempt to repair the controller is prohibited, since improper repair may cause electric shock, damages to the controller, and so on. If the user has any requirement of repair, please contact the maintenance center.

B. Power supply specification

Table 1

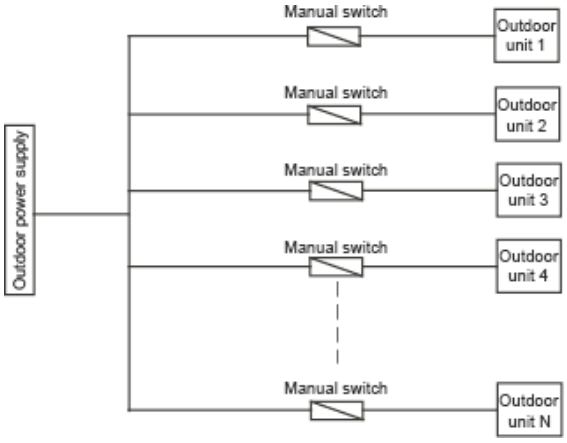
Model			30kW	65kW	130kW
Power lines	L	CSA(mm^2)	10	16	35
		number	3	3	3
	N	CSA(mm^2)	6	10	16
		number	1	1	1
	E	CSA(mm^2)	6	10	16
		number	1	1	1

Note: Above data for reference only and the models are shown by rated cooling capacity!

C. Requirements of wiring connection

■ No additional control components are required in the electric cabinet (such as relay, and so on), and the power supply and control wires not connected with the electric cabinet are not allowed to go through the electric box. Otherwise, electromagnetic interference may cause failure of the unit and control components and even damages to them, which thus lead to protective failure.

- All cables led to the electric box should be supported independently but by the electric box.
- The strong current wires generally pass the electric box, and 220-240V alternating current may also pass the control board, so wiring connection should conform to the principle of separation of strong current and weak current, and the wires of power supply should be kept more than 100 mm away from the control wires.
- All electric wires must conform to local wiring connection norm. The suitable cables should be connected to power supply terminal through wiring connection holes at the bottom of the electric cabinet. According to Chinese standard, the user is responsible for providing voltage and current protection for the input power supply of the unit.
- All power supplies connected to the unit must pass one manual switch, to ensure that the voltages on all nodes of electric circuit of the unit are released when the switch is cut off.
- The cables of correct specification must be used to supply power for the unit. The unit should use independent power supply, and the unit is not allowed to use the same power supply together with other electric devices, to avoid over-load danger. The fuse or manual switch of the power supply should be compatible with working voltage and current of the unit. In case of parallel connection of multiple modules, the requirements of wiring connection mode and configuration parameters for the unit are shown in the following figure.
- Some connection ports in the electric box are switch signals, for which the user needs to provide power, and the rated voltage of the power should be 220-240VAC. The user must be aware that all power supplies they provided should be obtained through power circuit breakers (provided by the user), to ensure that all voltages on the nodes of the provided power supply circuit are released when the circuit breakers are cut off.
- All inductive components provided by the user (such as coils of contactor, relay, and so on) must be suppressed with standard resistance-capacitance suppressors, to avoid electromagnetic interference, thus leading to failure of the unit and its controller and even damages to them.
- All weak current wires led to the electric box must apply shielded wires, which must be provided with grounding wires. The shield wires and power supply wires should be laid separately, to avoid electromagnetic interference.
- The unit must be provided with grounding wires, which are not allowed to be connected with the grounding wires of gas fuel pipelines, water pipelines, lightning conductors or telephones. Improper earth connection may cause electric shock, so please check whether earth connection of the unit is firm or not frequently.



CAUTION

For 30kW and 65kW chiller, max. 32 chillers can be connected in one system.
For 130kW chiller, max. 16 chillers can be connected in one system.

C. Wiring steps

- Step 1. Check the unit and ensure that it is connected with grounding wires correctly, to avoid leakage, and the grounding devices should be mounted in strict accordance with the requirements of electrical engineering rules. The grounding wires can prevent electric shock.
- Step 2. The control box of the main power switch must be mounted in a proper position.
- Step 3. Wiring connection holes of the main power should be provided with glue cushion.
- Step 4. The main power and neutral wires and grounding wires of power supply are led into the electric box of the unit.
- Step 5. The wires of the main power must pass the bonding clamp.
- Step 6. Wires should be connected firmly to the connection terminals L1, L2, L3 and N.
- Step 7. Phase sequences must be consistent when the wires of the main power.
- Step 8. The main power should be located out of easy reach of non-professional maintenance personnel, to avoid mal-operation and improve safety.
- Step 9. Connection of control wires of water flow switches: the wire leads (prepared by the user) of water flow switches are connected to the corresponding connection terminals of the main unit.
- Step 10. Connection of control wires of pump: the control wires of AC contactor of pump must pass the corresponding connection terminals of the main unit.

D. Electric control schematic diagram of the unit

- Electric wiring diagrams of 30 kW unit (see Attached Drawing (I))
- Electric wiring diagrams of 65 kW unit (see Attached Drawing (II))
- Electric wiring diagrams of 130 kW unit (see Attached Drawing (III))
- Schematic diagram of connection and communication of the main unit and subordinate units (see Attached Drawing (IV))

TRIAL RUN

A. Attention points before trial running

1）After washing and draining the water system pipeline for many times, confirm that the water quality and cleanliness meet the requirements. After the system is filled with water again, the water pump is turned on to confirm that the water flow and outlet pressure meet the require ments.

2)Turn on the main power supply 12 hours before the unit starts to energize the heating belt to preheat the compressor. Failure to perform sufficient pre-heating may cause damage to the compressor.

3)Setting of the remote controller. For details, refer to the content of the remote controller setting in this manual to set basic settings such as cooling, heating mode and automatic adjustment mode. Under normal circumstances, set parameters to run near the standard operating conditions during trial operation, and try not to set them under the extreme working conditions of the unit.

4)Carefully adjust the inlet stop valve of the water system to make the system water flow rate 100% of the required water flow rate in the "Technical Parameters" table.

B. Check item table after installation

Check items	Descriptions	Yes	No
Whether installing site meets the requirements	Units are fixed mounting on level base.		
	Ventilating space for heat exchanger at the air side is meeting for requirement		
	Maintenance space is meeting for requirement.		
	Noise and vibration is meeting for requirement.		
	Sun radiation and rain or snow proof measures are meeting for requirements.		
	External physical is meeting for requirement.		
Whether water system meets the requirements	Pipe diameter is meeting for requirement		
	The length of system is meeting for requirement.		
	Water discharge is meeting for requirement		
	Water quality control is meeting for requirement		
	Flexible tube's interface is meeting for requirement		
	Pressure control is meeting for requirement		
	Thermal insulation is meeting for requirement		
Whether electric wiring system meets the requirements	Wire capacity is meeting for requirement		
	Switch capacity is meeting for requirement		
	Fuse capacity is meeting for requirement		
	Voltage and frequency are meeting for requirement		
	Connecting tightly between wires		
	Operation control device is meeting for requirement		
	Safety device is meeting for requirement		
	Chained control is meeting for requirement		
	Phase sequence of power supply is meeting for requirement		

C. Trial run

- Start up the controller and check whether the unit displays a fault code. If a fault occurs, remove the fault first, and start the unit according to the operating method in the “Introduction of Wire Controller”, after determining that there is no fault existing in the unit.
- Conduct trial run for 30 min. When the influent and effluent temperature becomes stabilized, adjust the water flow to nominal value, to ensure normal operation of the unit.
- After the unit is shut down, it should be put into operation 10 min later, to avoid frequent start-up of the unit. In the end, check whether the unit meets the requirements according to the contents in Technical Parameters.

CAUTION

- **The unit can control start-up and shut-down of the unit, so when the water system is flushed, the operation of the pump should not be controlled by the unit.**
- **Do not start up the unit before draining the water system completely.**
- **The target flow controller must be installed correctly. The wires of the target flow controller must be connected according to electric control schematic diagram, or the faults caused by water breaking while the unit is in operation should be the user’s responsibility.**
- **Do not re-start the unit within 10 min after the unit is shut down during trial run.**
- **When the unit is used frequently, do not cut off the power supply after the unit is shut down; otherwise the compressor cannot be heated, thus leading to its damages.**
- **If the unit is not in service for a long time, and the power supply needs to be cut off, the unit should be connected to the power supply 12 hours prior to re-starting of the unit, to pre-heat the compressor.**

MAINTENANCE AND UPKEEP

A. Control and protection function of unit

■ The unit has the following protection functions

1) Water cycle system low flux protection(need install the water switch).
2) Power phase sequence protection
3) Low suction pressure protection.
4) High exhaust temperature protection.
5) Compressor overloads protection.
6) Anti-freezing protection
7) High exhaust pressure protection.
8) Under refrigerating condition,high condenser temperature protection.
9)Low evaporating pressure protection.
10)Fan motor overload protection.

■ The unit also has other control functions:

1) Manual test function
2) Plug and play system
3) RS-485/TS232 Standard serial communication port.

B. Failure of wired controller and its reason

In case the unit runs under abnormal condition, failure protection code will display on both control panel and wired controller, and the indicator on the wired controller will flash with1Hz. The display codes are shown in the following table:

Codes for Faults

Codes	Faults	Remarks
E0	Power supply fault	Master unit and auxiliary unit
E1	Overloaded water pump of air conditioner	Master unit
E2	Insufficient water flow of water pump for air conditioner	Master unit
E3	Overloaded hot water pump (Reserved)	Master unit
E4	Insufficient water flow of hot water pump (Reserved)	Master unit
E5	Fault of total return water temperature sensor (TB)	Master unit
E6	Fault of total water outlet temperature sensor (T1)	Master unit
E7	Fault of outdoor ambient temperature sensor (T4)	Master unit
E8	Fault of water outlet temperature sensor for shell and tube heat exchanger unit (T2)	Master unit and auxiliary unit

E9	Fault of outlet temperature sensor for condenser (T3)	Master unit and auxiliary unit
EA	Fault of water inlet temperature sensor for shell and tube heat exchanger (T5)	Master unit and auxiliary unit
EB	Fault of anti-ice temperature sensor for shell and tube heat exchanger (TC)	Master unit and auxiliary unit
EC	Fault of return water temperature sensor of living hot water in heat recovery	Master unit
ED	Fault of return gas temperature sensor	Master unit
EE	Reserved	Master unit
EF	Reserved	Master unit and auxiliary unit
L0	EEPROM fault	Master unit and auxiliary unit
L1	Communication fault between modules	Auxiliary unit
L2	Reduction of module number	Master unit
L3	Address error	Master unit
L4	Communication fault between wired controller and main board	Master unit
L5	Communication fault for main board	Master unit and auxiliary unit

Protection code of unit

Codes	Protection	Remarks
P0	Low pressure protection of System A	Master unit and auxiliary unit
P1	Medium pressure protection of System A	Master unit and auxiliary unit
P2	High pressure protection or exhaust temperature protection of System A	Master unit and auxiliary unit
P3	Over current protection of System A	Master unit and auxiliary unit
P4	High temperature protection of condenser in System A	Master unit and auxiliary unit

P5	Overload protection of fan in System A	Master unit and auxiliary unit
P6	Low pressure protection of System B	Master unit and auxiliary unit
P7	Medium pressure protection of System B	Master unit and auxiliary unit
P8	High pressure protection or exhaust temperature protection of System B	Master unit and auxiliary unit
P9	Over current protection of System B	Master unit and auxiliary unit
PA	High temperature protection of condenser in System B	Master unit and auxiliary unit
Pb	Overload protection of fan in System B	Master unit and auxiliary unit
PC	Over temperature of water outlet from shell and tube heat exchanger unit	Master unit and auxiliary unit
Pd	Low temperature of water outlet from shell and tube heat exchanger unit	Master unit and auxiliary unit
PE	Low temperature protection for anti-icing	Master unit and auxiliary unit
PF	High temperature protection for **compressor**	Master unit and auxiliary unit

CAUTION

1. Faults

When the main unit suffers faults, the main unit stops operating, and all other units also stop running;

When the subordinate unit suffers faults, only the unit stops operating, and other units are not affected.

2. Protection

When the main unit is under protection, only the unit stops operating, and other units keep running;

When the subordinate unit is under protection, only the unit stops operating, and other units are not affected.

D. Troubleshooting

Error	Possible reason	Detect and settle measure
Over high air discharge pressure (Cooling operation)	Air or other non-condensing gas still in the system	Discharge gas from fluorin charging inlet. Re-vacuum the system if necessary.
	Fins in the condenser are dirty or foreign substance blocking fins.	Clean condenser fins.
	Insufficient chilling air volume or condenser fan error	Check and repair the condenser fan, recover the normal operation
	Excessive high air suction pressure	See "Excessive high air suction pressure"
	Excessive refrigerant charging volume	Discharge the excessive refrigerant
	Over high ambient temperature	Check ambient temperature
Over low air discharge pressure (Cooling operation)	Over cool air in the side of air heat exchanger	Check ambient temperature
	Refrigerant leakage or insufficient r efrigerant volume	Test leakage or charge sufficient refrigerant to the system
	Excessive low air suction pressure	See "Excessive low air suction pressure"
Over high air suction pressure (Cooling operation)	Excessive refrigerant charging volume	Discharge the excessive refrigerant
	Over high temperature in chilling water inlet	Check thermal insulation layer of water pipe and the specification of this layer
Over low air suction pressure (Cooling operation)	Insufficient water flow volume	Check temperature difference at water inlet and outlet, and adjust the water flow volume
	Over low temperature in chilling water inlet and outlet	Check and installation state
	Refrigerant leakage or insufficient refrigerant volume	Test leakage or charge sufficient refrigerant to the system
	Incrustant in evaporator	Eliminate incrustant
Over high air discharge pressure (Heating operation)	Insufficient water flow	Check temperature difference at water inlet and outlet, and adjust the water flow volume
	Air or other non-condensing gas still in the system	Discharge gas from fluorin charging inlet. Re-vacuum the system if necessary.
	Incrustant in water side of heat exchanger	Eliminate incrustant
	Over high temperature in chilling water inlet	Check water temperature
	Excessive high air suction pressure	See "Excessive high air suction pressure"
Over low air discharge pressure (Heating operation)	Over low temperature of chilling water	Check chilling water temperature
	Refrigerant leakage or insufficient refrigerant volume	Test leakage or charge sufficient refrigerant to the system
	Excessive low air suction pressure	See "Excessive low air suction pressure"
Over high air suction pressure (Heating operation)	Over heat air in the side of air heat exchanger	Check ambient temperature around it
	Excessive refrigerant charging volume	Discharge the excessive refrigerant
Over low air suction pressure (Heating operation)	Insufficient refrigerant charging volume	Charge sufficient refrigerant to the system
	Insufficient air flow volume	Check fan rotating direction
	Air loop short-circuit	Reason about remove air short-circuit
	Insufficient frost-removal operation	Error comes out from 4-way valve or thermal resistor. Replace a new one if necessary.
Compressor stops because of freeze-proof protection (Cooling operation)	Insufficient chilling water flow volume	Error comes from pump or flow-type water volume control. Check and repair or replace a new one.
	Gas still in water loop	Discharge air
	Thermal resistor error	Upon error have been confirmed, please replace a new one.
Compressor stops because of Hi-pressure protection	Over high air expelling pressure	See "Over high air expelling pressure"
	Hi-pressure switch error	Upon error have been confirmed, please replace a new one.

Error	Possible reason	Detect and settle measure
Compressor stops because of motor Overcurrent.	Over high air expelling pressure and air suction pressure	See "Over high air expelling pressure" and "Over high air suction pressure"
	Hi-voltage or Lo-voltage, signal phase or phase unbalance	Confirm voltage not higher or lower than the rated voltage 20V
	Short circuit comes out from motor or connecting interface	Confirm resistors at motor are connected corresponding to terminals
	Overcurrent assembly error	Replace a new one
Compressor stops because of integrate temperature sensor or air discharge temperature protection.	Over high or over low voltage	Confirm voltage not higher or lower than the rated voltage 20V
	Over high air expelling pressure or excessive low air suction pressure	See "Over high air expelling pressure" and "excessive low air suction pressure "
	Component error	Check the integrated temperature sensor after motor is cool down.
Compressor stops because of Lo.-pressure protection	Filter in front (or rear) of expanding valve is blocked	Replace a new filter
	Lo-voltage switch error	If the switch is defective, please replace a new one.
	Excessive low air suction pressure	See "Excessive low air suction pressure"
Abnormal noise gives out form compressor	Liquid refrigerant flows into compressor from evaporator result in liquid slugging.	Adjust refrigerant charge volume
	Aging of compressor	Replace a new compressor
Compressor is unable to drive	Overcurrent relay trip up, fuse burnt out	Replace damaged assembly
	Control circuit without power though	Check the wring of control system
	Hi-voltage or lo-voltage protection	Reference to mention in above the parts of air suction and discharge pressure error
	Coils in contactor are burnt out	Replace damaged assembly
	Wrong connection of phase sequence	Re-connect and adjust the any 2 wires among 3 phases
	Water system error and flow type volume controller short connection	Check water system
	Error signal delivered from wire controller	Find out the error type and carry out the corresponding measure to settle
Air side heat exchanger excessive frost	4-way valve or thermal resistor error	Check the running state. Replace a new one if necessary.
	Air loop short-circuit	Settle the short-circuit of air discharge
With noise	Fixing screws at panel are loosen	Fix up all assemblies

D. Care and maintenance

■ Maintenance of main parts

- Close attention should be paid to the discharge and suction pressure during the running process. Find out reasons and eliminate the failure if abnormality is found.
- Control and protect the equipment. See to it that no random adjustment be made on the set points on site.
- Regularly check whether the electric connection is loose, and whether there is bad contact at the contact point caused by oxidation and debris etc., and take timely measures if necessary. Frequently check the work voltage, current and phase balance.
- Check the reliability of the electric elements in time. Ineffective and unreliable elements should be replaced in time.

■ Removing scale

After long-time operation, calcium oxide or other minerals will be settled in the heat transfer surface of the water-side heat exchanger. These substances will affect the heat transfer performance when there is too much scale in the heat transfer surface and sequentially cause that electricity consumption increases and the discharge pressure is too high (or suction pressure too low). Organic acids such as formic acid, citric acid and acetic acid may be used to clean the scale. But in no way should cleaning agent containing fluoroacetic acid or fluoride should be used as the water-side heat exchange is made from stainless steel and is easy to be eroded to cause refrigerant leakage. Pay attention to the following aspects during the cleaning and scale-removing process:

- Water-side heat exchanger should be done be professionals. Please contact the local air-conditioner customer service center.
- Clean the pipe and heat exchanger with clean water after cleaning agent is used. Conduct water treatment to prevent water system from being eroded or re-absorption of scale.
- In case of using cleaning agent, adjust the density of the agent, cleaning time and temperature according to the scale settlement condition.
- After pickling is completed, neutralization treatment needs to be done on the waste liquid. Contact relevant company for treating the treated waste liquid.
- Protection equipments (such as goggles, gloves, mask and shoes) must be used during the cleaning process to avoid breathing in or contacting the agent as the cleaning agent and neutralization agent is corrosive to eyes, skins and nasal mucosa.

■ Winter shutdown

For shutdown in winter, the surface of the unit outside and inside should be cleaned and dried. Cover the unit to prevent dust. Open discharge water valve to discharge the stored water in the clean water system to prevent freezing accident (it is preferable to inject antifreezer in the pipe).

■ Replacing parts

Parts to be replaced should be the ones provided by our company. Never replace any part with different part.

■ First startup after shutdown

The following preparations should be made for re-startup of unit after long-time shutdown:

1) Thoroughly check and clean the unit.
2) Clean water pipe system.
3) Check pump, control valve and other equipments of water pipe system.
4) Fix connections of all wires.
5) It is a must to electrify the machine before startup.

■ Refrigeration system

Determine whether refrigerant is needed by checking the value of suction and discharge pressure and check whether there is a leakage. Air tight test must be made if there is a leakage or parts of refrigerating system is to be replaced. Take different measures in the following two different conditions from refrigerant injection.

1) Total leakage of refrigerant. In case of such situation, leakage detection must be made on the pressurized nitrogen used for the system. If repair welding is needed, welding cannot be made until all the gas in the system is discharged. Before injecting refrigerant, the whole refrigeration system must be completely dry and of vacuum pumping.
   - Connect vacuum pumping pipe at the fluoride nozzle at low-pressure side.
   - Remove air from the system pipe with vacuum pump. The vacuum pumping lasts for above 3 hours. Confirm that the indication pressure in dial gauge is within the specified scope.
   - When the degree of vacuum is reached, inject refrigerant into the refrigeration system with refrigerant bottle. Appropriate amount of refrigerant for injection has been indicated on the nameplate and the table of main technical parameters. Refrigerant must be injected from the low pressure side of system.
   - The injection amount of refrigerant will be affected by the ambient temperature. If the required amount has not been reached but no more injection can be done, make the chilled water circulate and start up the unit for injection. Make the low pressure switch temporarily short circuit if necessary.

2) Refrigerant supplement. Connect refrigerant injection bottle on the fluoride nozzle at low-pressure side and connect pressure gauge at low pressure side.
   - Make chilled water circulate and start up unit, and make the low pressure control switch short circuit if necessary.
   - Slowly inject refrigerant into the system and check suction and exhaust pressure.

⚠ CAUTION

• Connection must be renewed after injection is completed.

• Never inject oxygen, acetylene or other flammable or poisonous gas to the refrigeration system at leakage detection and air tight test. Only pressurized nitrogen or refrigerant can be used.

■ Disassembling compressor

Follow the following procedures if compressor needs to be disassembled:

1) Cut off the power supply of unit.
2) Remove power source connection wire of compressor.
3) Remove suction and discharge pipes of compressor.
4) Remove fastening screw of compressor.
5) Move the compressor.

■ Auxiliary electric heater

When the ambient temperature is lower than 2℃, the heating efficiency decreases with the decline of the outdoor temperature. In order to make the air-cooled heat pump stably run in a relatively cold region and supplement some heat lost due to de-frosting. When the lowest ambient temperature in the user's region in winter is within 0℃~-10℃, the user may consider to use auxiliary electric heater. Please refer to relevant professionals for the power of auxiliary electric heater.

■Module outlet water temperature protection

Detect the temperature after the module first operation:

Under refrigerating mode, when the outletwater temperatureT2≤4℃， alarms the outlet water undercooling; When the outlet water temperatureT2≥7℃,exit the outlet water undercooling protection.

Under heating mode, when the outlet water temperature≥58℃， alarms the outlet water overheat; When the outlet water temperature≤48℃,exit the outlet water overheat protection.

When appear water undercooling or overheat protection, stopoperating, the module will run automatically after reset. Alarm need after 3 second.

■ System antifreezing

In case of freezing at the water-side heat exchanger interval channel, severe damage may be caused, that is, heat exchange may be broken and appears leakage. This damage of frost crack is not within the warranty scope, so attention must be paid to antifreezing.

TX2(TC):Anti-freezing temperature, when detect the Anti-freezing temperature -5℃＜TX2(TC) ≤4℃ last for 10s,alarm PE signal(PE means low Anti-freezing temperatureprotection, it is different from water fault code). Stop running, the system will rerun when the Anti-freezing temperature≥7℃.

■ Fan motor overload protection

P5、PB: When appear fan motor overload, the unit will stop running in order to avoid the fan motor damage the unit, Fan motor and the unit will rerun after clear the trouble.

RECORD TABLE OF TEST RUN AND MAINTENANCE

Model: **Code labeled on the unit:**

Customer name and address: **Date:**

1. Whether there is sufficient water flow passing waterside heat exchanger? ( )
2. Whether leakage detection has been made on all the water pipe? ( )
3. Whether pump, fan and motor are lubricated? ( )
4. Whether unit has been through 30-minute operation? ( )
5. Check temperature of chilled water or hot water
   Inlet ( ) Outlet ( )
6. check air temperature of air-side heat exchanger:
   Inlet ( ) Outlet ( )
7. Check refrigerant suction temperature and superheating temperature:
   Refrigerant suction temperature: ( ) ( ) ( ) ( ) ( )
   Superheating temperature: ( ) ( ) ( ) ( ) ( )
8. Check pressure:
   Discharge pressure: ( ) ( ) ( ) ( ) ( )
   Suction pressure: ( ) ( ) ( ) ( ) ( )
9. Check running current: ( ) ( ) ( ) ( ) ( )
10. Whether unit has been through refrigerant leakage test? ( )
11. Whether unit inside and outside is cleared? ( )
12. Check whether the main power source connection is correct. ( )

RECORD TABLE OF TEST RUN AND MAINTENANCE

Model:

Date:

Weather:

Operation time: Startup ( ) Shutdown ( )

Outdoor temperature	Dry bulb	℃										
	Wet bulb	℃										
Indoor temperature		℃										
Compressor	High pressure	MPa										
	Low pressure	MPa										
	Voltage	V										
	Current	A										
Air temperature of air-side heat exchanger	Inlet (Dry bulb)	℃										
	Outlet (Dry bulb)	℃										
Temperature of chilled water or hot water	Inlet	℃										
	Outlet	℃										
Current of cooling water pump or hot water pump		A										

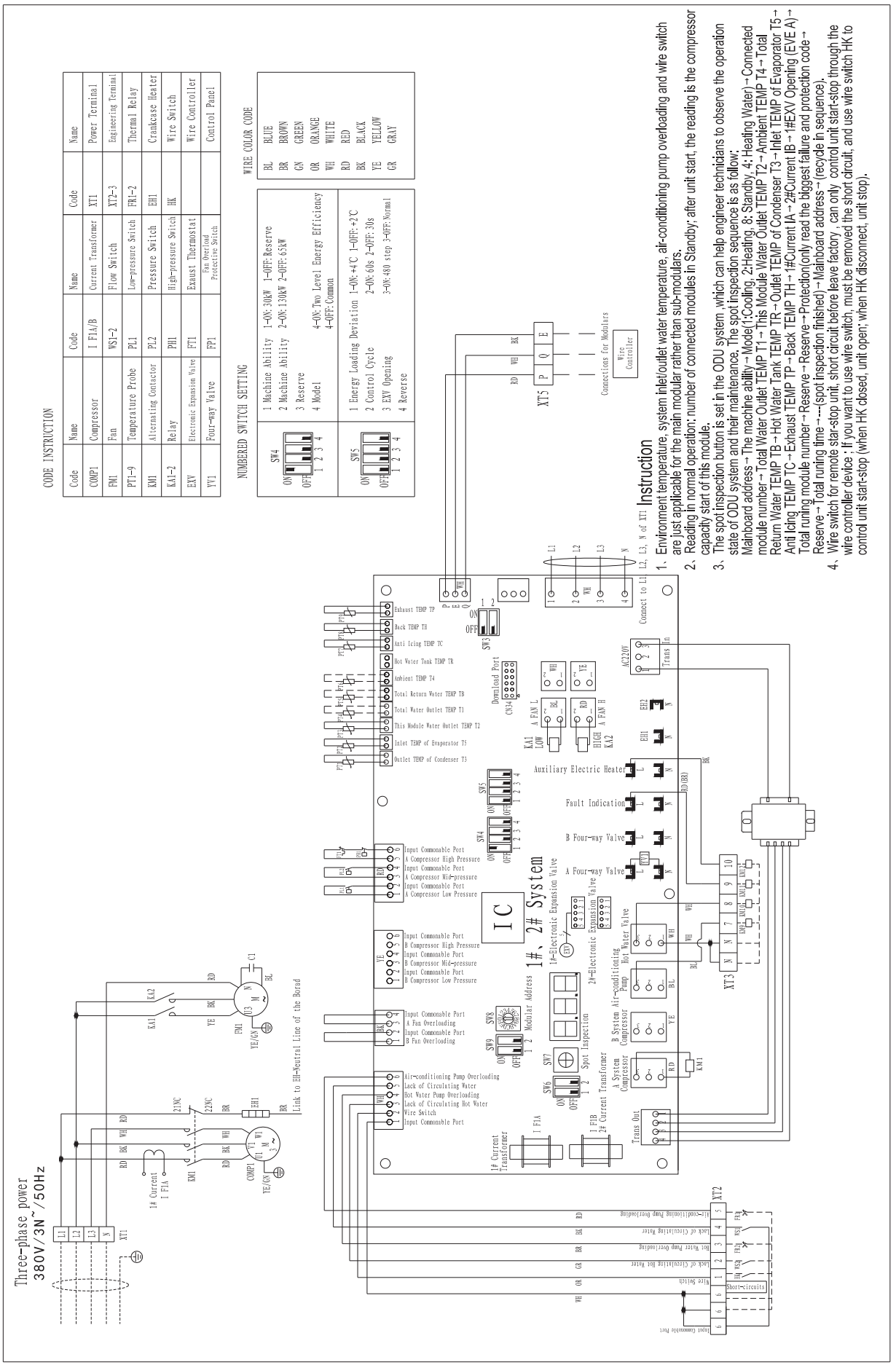
Notes:

TECHNICAL PARAMETERS

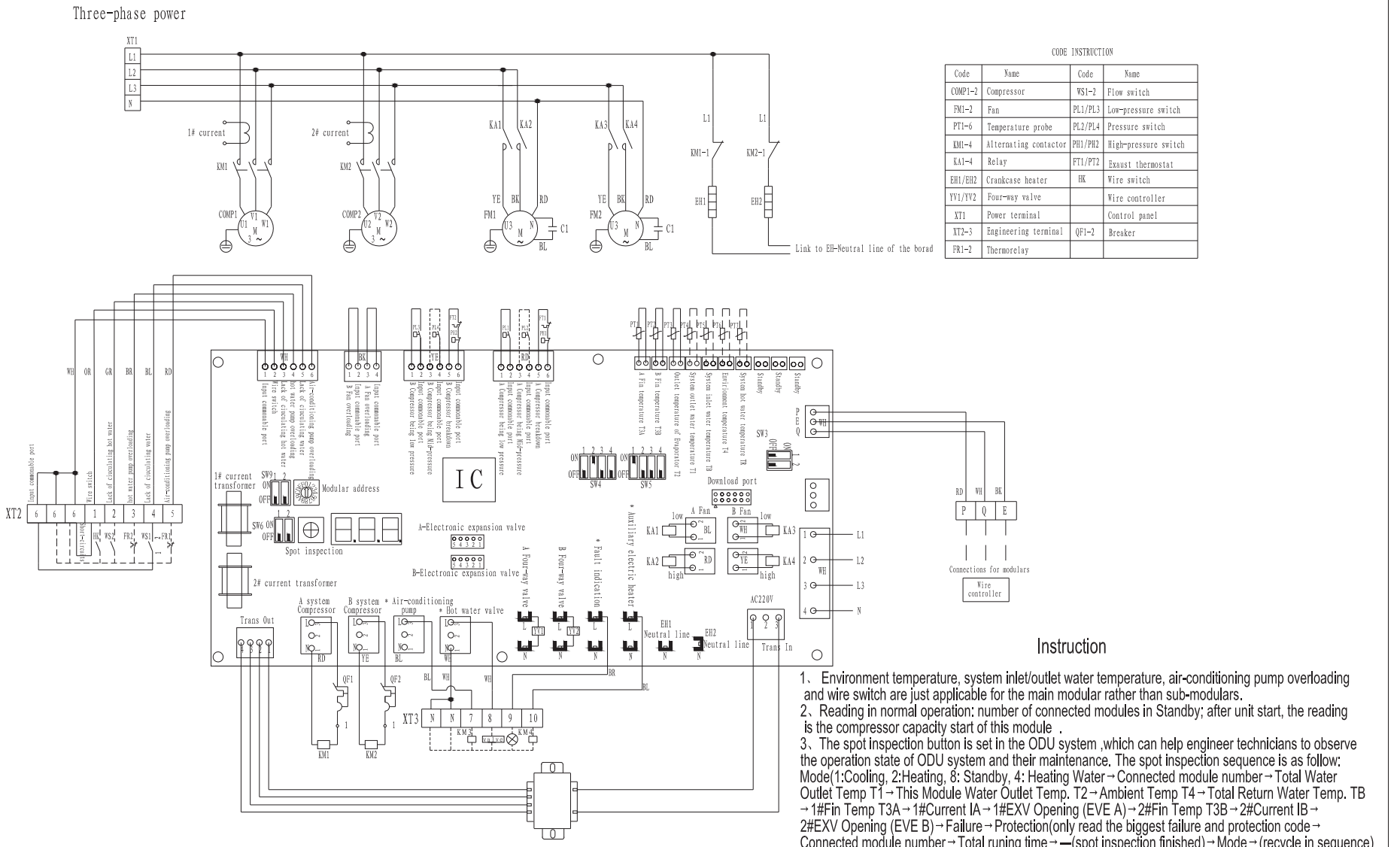
Cooling capacity	kW	30	65	130
Heating capacity	kW	35	70	132
Cooling consuming power	kW	11	20.6	39.8
Cooling rated current	A	18	38	78
Heating consuming power	kW	10.3	21.3	40.8
Heating rated current	A	17	39	80
Power supply		380-415V 3N~50Hz		
Operation control		Control of wired controller, manual/auto startup, running state display, failure alert etc.		
Safety device		High or low pressure switch, freeze-proof device, water flow protector, Over-current device, power phase sequence device etc.		
Refrigerant	Type	R410A		
	Charging Volume(kg)	6.2	13.5	15.0×2
Water pipe system	Water flux (m^3/h)	5.16	11.18	22.36
	Hydraulic resistance (kPa)	30	30	40
	Water side heat exchanger	Shell & tube type heat exchanger		
	Max. Pressure Mpa	1.0		
	Inlet and outlet pipe dia.	1 1/2″	DN65	DN65
Air side heat exchanger	Type	Fin coil model		
	Air flow volume (m^3/h)	12000	24000	48000
Outline dimensions	L (mm)	1160	2000	2200
	W (mm)	900	900	1100
	H (mm)	1920	1920	2220
Net weight	kg	320	610	1010
Operation weight	kg	370	640	1110
Packing dimension	L×W×H(mm)	1240×950×2060	2080×950×2060	2280×1140×2360

ATTACHMENTS

Attached Drawing (I) Electric wiring diagram of 30 kW unit



Attached Drawing (II) Electric wiring diagram of 65 kW unit



CODE INSTRUCTION

Code	Name	Code	Name
COMP1-2	Compressor	WS1-2	Flow switch
FM1-2	Fan	PL1/PL3	Low-pressure switch
PT1-6	Temperature probe	PL2/PL4	Pressure switch
KM1-4	Alternating contactor	PH1/PH2	High-pressure switch
KA1-4	Relay	FT1/PT2	Exaust thermostat
EH1/EH2	Crankcase heater	HK	Wire switch
YV1/YV2	Four-way valve		Wire controller
XT1	Power terminal		Control panel
XT2-3	Engineering terminal	QF1-2	Breaker
FR1-2	Thermorelay		

Instruction

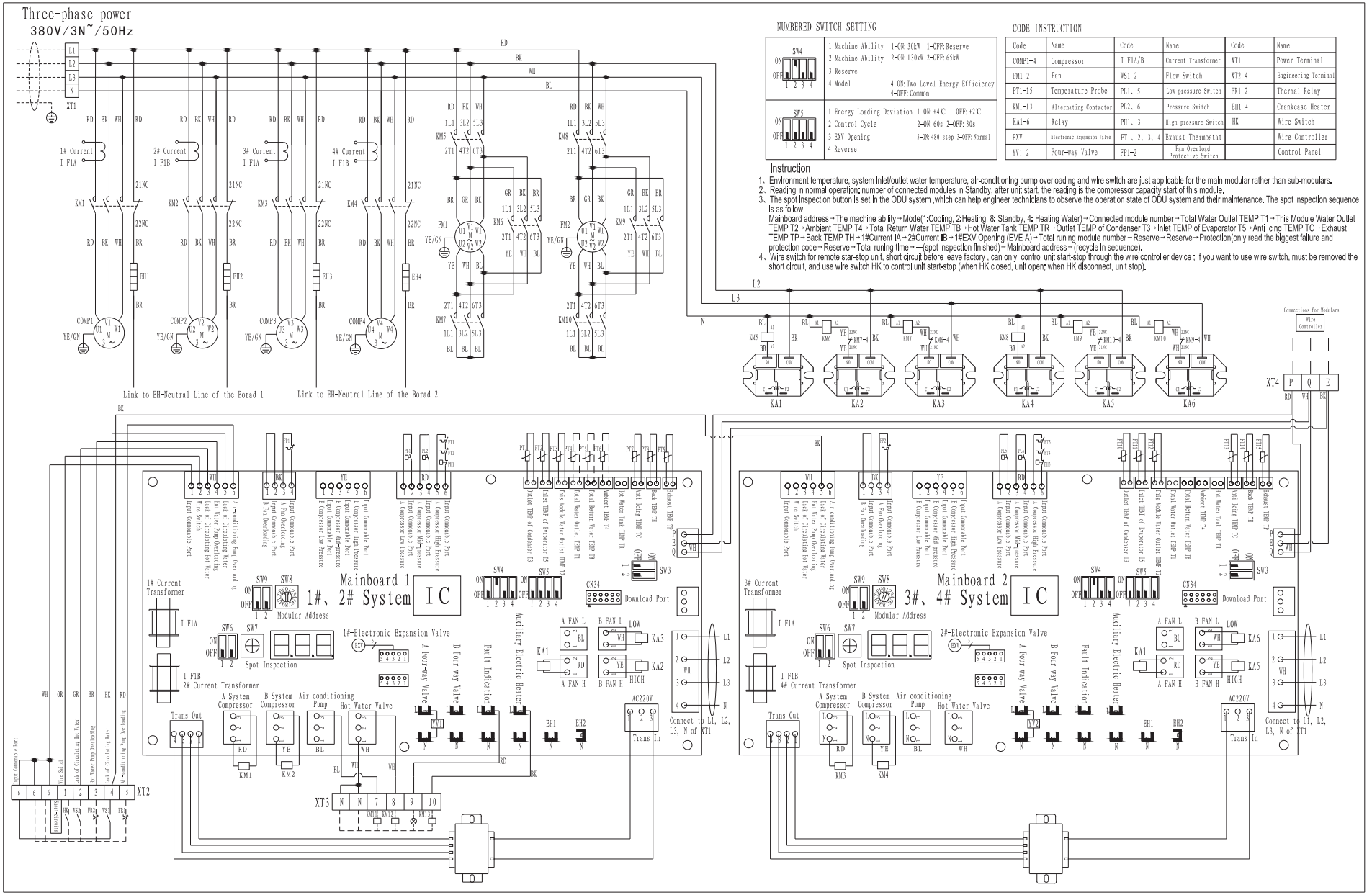
1、Environment temperature, system inlet/outlet water temperature, air-conditioning pump overloading and wire switch are just applicable for the main modular rather than sub-modulars.

2、Reading in normal operation: number of connected modules in Standby; after unit start, the reading is the compressor capacity start of this module .

3、The spot inspection button is set in the ODU system ,which can help engineer technicians to observe the operation state of ODU system and their maintenance. The spot inspection sequence is as follow: Mode(1:Cooling, 2:Heating, 8: Standby, 4: Heating Water→Connected module number→Total Water Outlet Temp T1→This Module Water Outlet Temp. T2→Ambient Temp T4→Total Return Water Temp. TB →1#Fin Temp T3A→1#Current IA→1#EXV Opening (EVE A)→2#Fin Temp T3B→2#Current IB→ 2#EXV Opening (EVE B)→Failure→Protection(only read the biggest failure and protection code→ Connected module number→Total runing time→—(spot inspection finished)→Mode→(recycle in sequence)

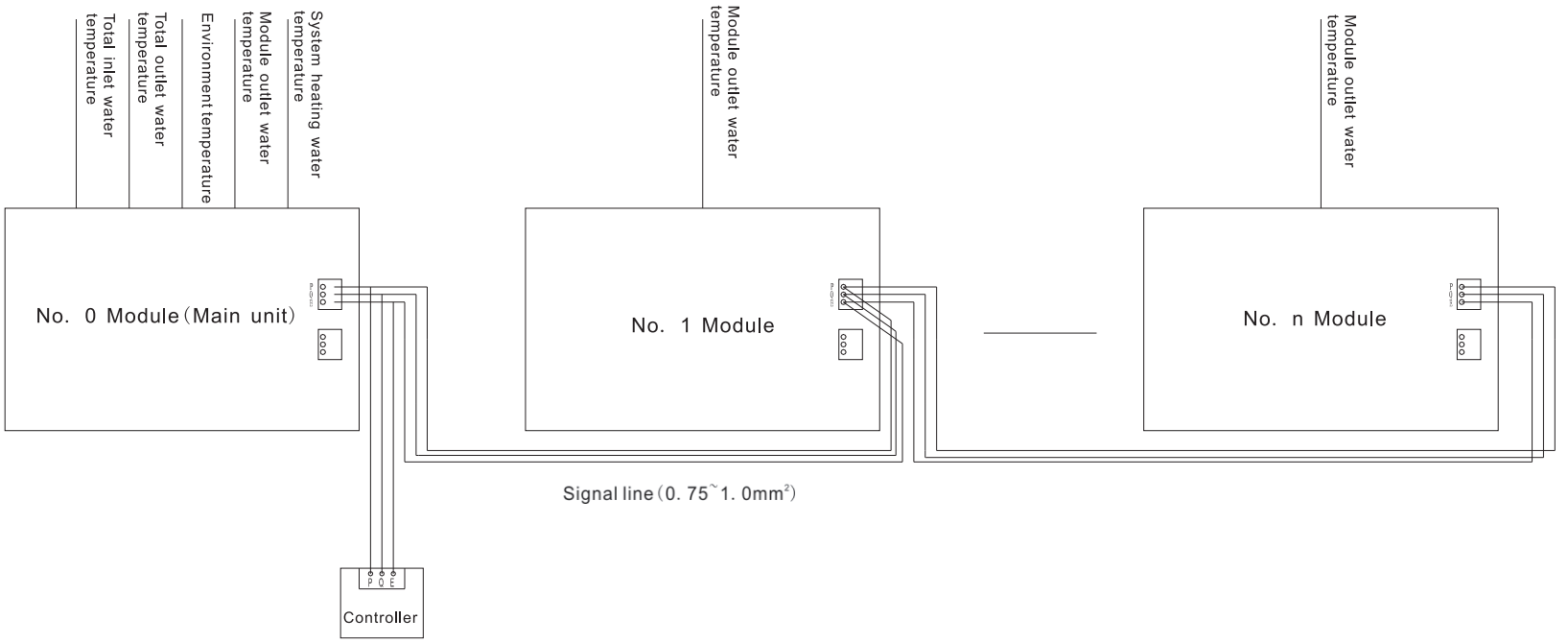
4、Wire switch for remote star-stop unit, short circuit before leave factory , can only control unit start-stop through the wire controller device ; If you want to use wire switch, must be removed the short circuit, and use wire switch HK to control unit start-stop (when HK closed, unit open; when HK disconnect, unit stop)

Attached Drawing (III) Electric wiring diagram of 130 kW unit



Code	Name	Code	Name	Code	Name
COMP1-4	Compressor	I F1A/B	Current Transformer	XT1	Power Terminal
FM1-2	Fan	WS1-2	Flow Switch	XT2-4	Engineering Terminal
PT1-15	Temperature Probe	PL1. 5	Low-pressure Switch	FR1-2	Thermal Relay
KM1-13	Alternating Contactor	PL2. 6	Pressure Switch	EH1-4	Crankcase Heater
KA1-6	Relay	PH1. 3	High-pressure Switch	HK	Wire Switch
EXV	Electronic Expansion Valve	FT1, 2, 3, 4	Exaust Thermostat		Wire Controller
YV1-2	Four-way Valve	FP1-2	Fan Overload Protective Switch		Control Panel

Attached Drawing (Ⅳ) Schematic diagram of connection and communication of the main unit and subordinate units



NOTE:

1. The number of modules in each refrigerating system is not more than 32.
2. The specification of the signal line is the two-core RVV in 2x0.75mm2.