



Low temperature air source heat pump module unit

Operation and Installation Manual

Standards for products: GB/T 25127.1-2010
GB/T 25127.2-2010

Applicable model: CAM-E350C-3F
CAM-E750C-3F
CAM-E1550C-3F

Please read this Manual carefully before use, and keep it properly for your convenience. In order to protect your legitimate rights and interests, please install it by professionals.

Dear users:

Thank you for choosing our air conditioner!

This Manual is the general version of low temperature air source heat pump module unit of our company. The appearance of the air conditioner you choose may not be consistent with that described in this Manual, but it does not affect your operation and use.

Please read this Manual carefully before use, and keep it properly for your convenience. What you are using is water system products, which need to be cleaned and maintained on regular basis. If your air conditioner is not properly cleaned and maintained, its failure rate will be increased and its service life will be greatly reduced; at the same time, in-depth cleaning can remove the accumulated dust inside the air conditioner, effectively improve indoor air quality, and reduce the power consumption of the air conditioning system.

In order to protect your legitimate rights and interests, please install it by professionals.

When the unit is out of service if the ambient temperature is below 2°C, please drain the water in the water system of the unit before cutting off the power supply. Please contact the local air conditioning product management center one month before cooling in summer and heating in winter. We will assign professional personnel to carry out paid inspection, water drainage, water filling, debugging, cleaning and maintenance services. Just in case, it will bring inconvenience to your life and work because of the air conditioner fault.

Table of Contents

| | |
|---------------------------------------|----|
| Notice to Users..... | 1 |
| Unit Introduction..... | 2 |
| Introduction of Wire Controller | 6 |
| Unit Installation..... | 15 |
| Arrangement of Water Pipes | 20 |
| Electrical Connection | 29 |
| Test Running..... | 32 |
| Care and Maintenance..... | 34 |
| Technical Parameters..... | 40 |

Annex: *Trial Operation and Maintenance Record*

Daily Operation Record

Figure (I): CAM-E350C-3F (EVI) wiring nameplate;

Figure (II): CAM-E750C-3F (EVI) wiring nameplate;

Figure (III): CAM-E1550C-3F (EVI) wiring nameplate;

Figure (V): Schematic diagram of network communication between the host and the slave;

Parts Purchased from Local Source

Names and Contents of Hazardous Substances in the Product

Notice to Users:



Warning

- Please entrust a dealer or a professional for installation.
The installation personnel must have relevant professional knowledge. If the user installs it by itself, the wrong operation will lead to fire, electric shock, injury, water leakage, etc.
- If you need to purchase from the local source, you must use the products specified by our company.
- The use of products other than those specified may lead to fire, electric shock, water leakage, etc. So please entrust professional personnel to install the retail items.
- The regulations of local electric company shall be observed while connecting the power.
- According to the law, reliable grounding engineering must be carried out. If the grounding is not perfect, electric shock might be caused.
When the module unit needs to be moved or reinstalled, please entrust the dealer or professional personnel to operate.
- Improper installation will lead to accidents like fire, electric shock, injury, water leakage, etc.
The self refurbishment and repair is strictly forbidden.
- Improper repair will lead to fire, electric shock, injury, water leakage and other accidents. The dealer or professional personnel shall be entrusted for repair.



Attention

- Confirm whether leakage protection switch is installed.
Leakage protection switch must be installed, if not, the person might get electric shock.
- Connect the cable correctly.
If the cable is connected in the wrong way, the electrical components may be damaged.
- The unit shall not be operated near combustibles (paint, coating, gasoline, chemical agent, etc.) to prevent fire or explosion.
If there is an outbreak of fire, turn off the main power supply immediately and put out the fire with fire extinguisher.
- Do not touch the refrigerant exhaust parts with hands to prevent scalding.
- Please maintain the unit on regular basis according to the requirements of this Manual to ensure running in good condition.
- In case of leakage of refrigerant or chilled water (cooling water), all switches shall be turned off immediately. If the unit cannot be shut down through the controller switch, the main power supply must be turned off to make it stop.
- Please use the fuse with specified capacity. No iron wire or copper wire shall be used. Otherwise, the unit will be seriously damaged or fire will occur.

Unit Introduction

I. Name and function of main components of the unit

1) Schematic diagram of 35 kW module unit

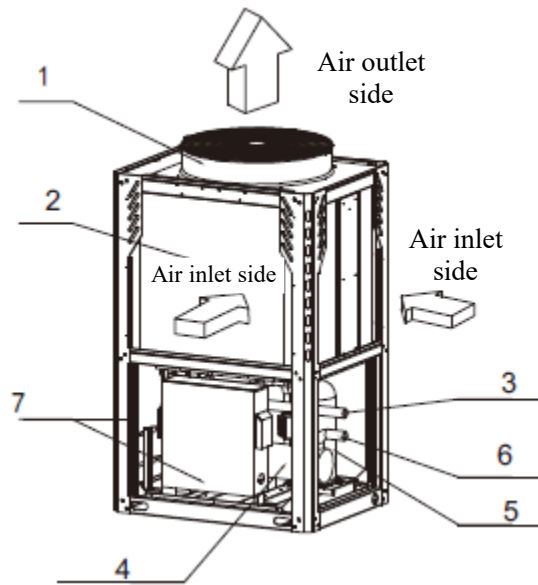


Figure 1

2) Schematic diagram of 75 kW module unit

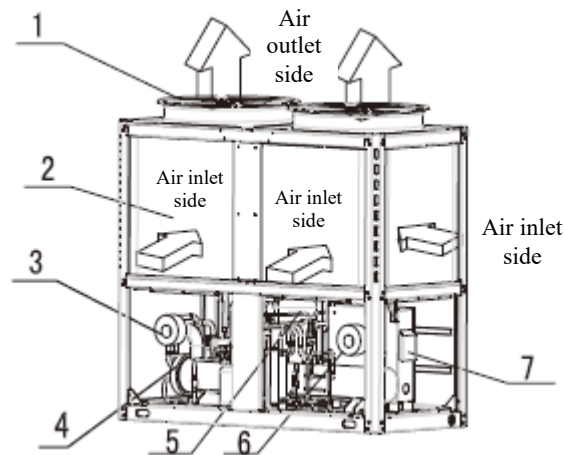


Figure 2

3) Schematic diagram of 155 kW (EVI) module unit

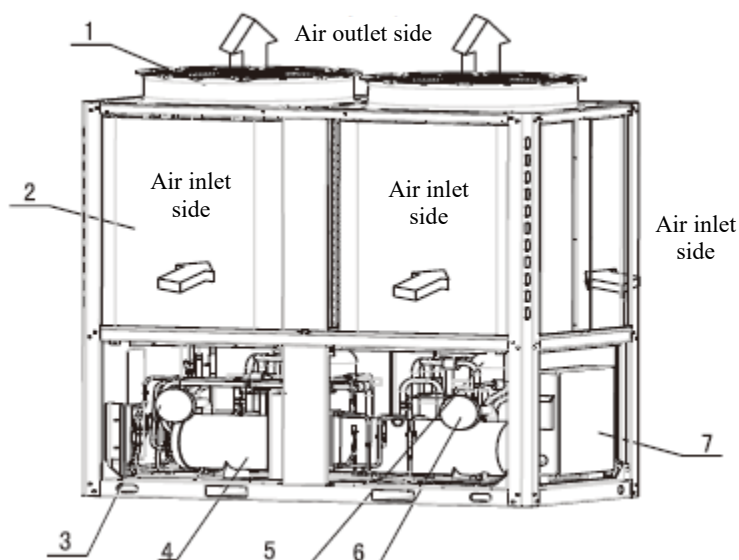


Figure 3

Table 1 Product parts and components

| Item No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------|-----------|-----------|-------------|---------------------------|------------|--------------|----------------------|
| Name | Top cover | Condenser | Water inlet | Shell and tube evaporator | Compressor | Water outlet | Electric control box |

Note: All the illustrations in this Manual are for the purpose of explanation only. Its appearance and function may not be completely consistent with that of the air conditioner you purchased. Please refer to the actual model.

II. Performance features of the unit

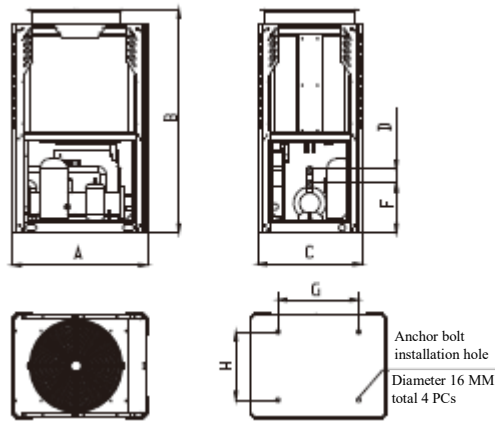
The air-cooled heat pump module unit is composed of one or more modules, each of which has its own independent electronic control unit. The electronic control units of each module are connected by communication network for information exchange. The air-cooled heat pump module unit is compact in structure, easy for transportation and hoisting. At the same time, it saves the cooling tower, cooling water pump and other facilities for users and reduces the installation cost.

The air-cooled heat pump module unit of our company provides chilled water or hot water for the centralized air handling equipment or terminal equipment for central air-conditioning project. The unit is a completely independent self-contained unit. It is designed to be installed outdoors (roof or ground) and each unit includes the main components such as high efficiency and low noise scroll compressor, air cooled condenser, shell and tube type (or plate type or tube type) evaporator and microcomputer control center, all of which are installed on the steel structure base, which is solid and durable.

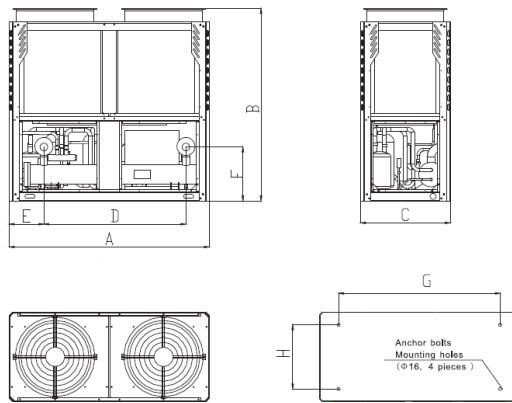
This unit adopts Chinese microcomputer controlling systems, which can automatically control the energy according to the load to achieve the best matching and truly realize the best energy-saving operation. This product is a modular unit, with a maximum of 32 modules in parallel, and users can make independent combination according to their needs. It can be widely used in air conditioning projects of new and rebuilt industrial and civil buildings, such as guesthouses, hotels, apartments, office buildings, hospitals and industrial factory buildings. Especially for the occasion with high requirements for noise and surrounding environment and occasion of water deficiency, air-cooled heat pump module unit is the best choice.

III. Overall dimension of the unit

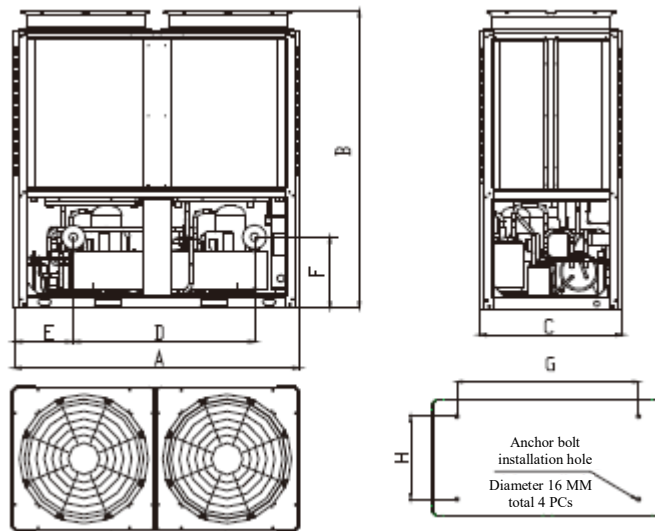
- 1) Outline dimension drawing (unit: mm)



(A) Applicable for 35 kW model



(B) Applicable for 75 kW model



(D) Applicable for 155 kW (EVI) model

Table 2 Unit outline dimension and parameters

| Model | A | B | C | D | E | F | G | H |
|-------|-------|-------|-------|-------|-----|-----|-------|-------|
| 35 | 1,160 | 1,920 | 900 | 120 | -- | 426 | 840 | 850 |
| 75 | 2,000 | 1,920 | 900 | 1,420 | 346 | 538 | 1,586 | 850 |
| 155 | 2,200 | 2,280 | 1,100 | 1,390 | 458 | 539 | 1,724 | 1,054 |

▲ Attention Installing the spring shock absorber will increase the total height of the unit by approximately 135 mm.

IV. Operating conditions of the unit

- 1) The power supply voltage standard is 380 V 3N~50 Hz, the minimum allowable voltage is 342 V, and the maximum allowable voltage is 418 V.
- 2) In order to maintain good performance, please operate the unit under the following outdoor temperature:

Table 3 Operating range

| Model | Operating range for cooling | Operating range for heating |
|-------|-----------------------------|-----------------------------|
| 35 | 5°C to 46°C | -30°C to 45°C |
| 75 | 5°C to 46°C | |
| 155 | 10°C to 43°C | |

- 3) The unit is in return water temperature control mode:

Table 4 Return water temperature control mode

| Model | Setting temperature of cooling | Setting temperature of heating | Setting temperature in default after power on |
|-------|--------------------------------|--------------------------------|---|
| 35 | 9°C to 25°C | 20°C to 55°C | 12°C |
| 75 | | | |
| 155 | | | |

If low temperature return water unit is needed, special customization is needed.



Attention

If the user needs the return water temperature of the unit to be lower than the above minimum setting value, please make sure to ask the dealer or management center of our company for central air conditioning product, and take necessary guarantee measures before use.

Introduction of Wire Controller

I: Overview of wire controller

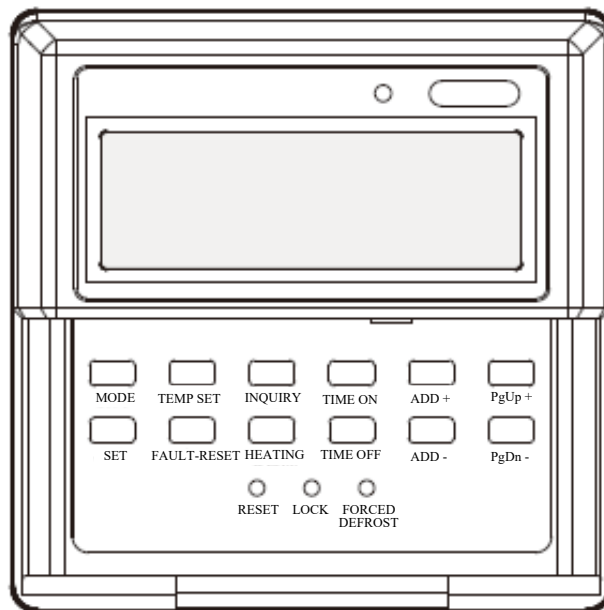
1. The basic conditions of using the controller by wire

- 1) Applicable scope of power supply voltage: The power supply voltage is AC220 V \pm 10%. The power adapter (AC220 V/DC12 V) will supply the power to the wire controller.
- 2) Working environment temperature of wire controller: -15°C to +43°C
- 3) Working environment humidity of wire controller: RH40% to RH90%
- 4) Electric control safety complies with: GB4706.32-2012 and GB/T7725-2004

2. Overview of the function

The main functions of the wire controller are as follows:

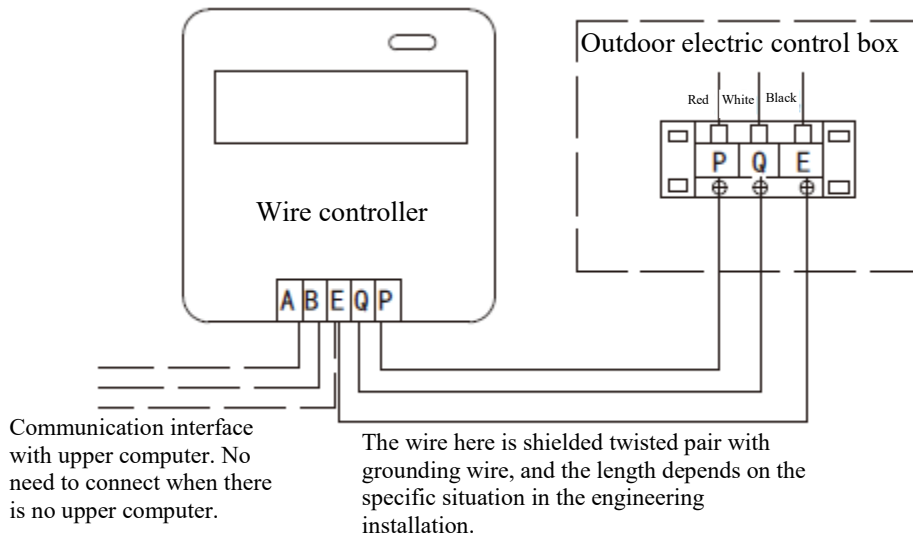
- 1) It is connected with outdoor unit through P, Q and E terminals; it is connected with the upper computer through A, B and E;
- 2) Set the working mode by key operation;
- 3) LCD display function;
- 4) Timing switch function;
- 5) Optional memory function for power failure;



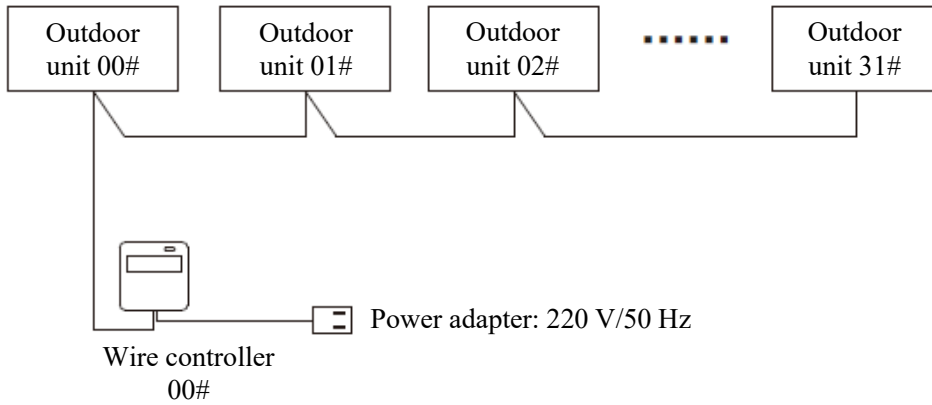
3. Installation method:

When installing and connecting the wire controller, connect the wire controller with P, Q and E on the host. At the same time, use the power adapter in the accessory to connect with the black plug at the lower end of the wire controller.

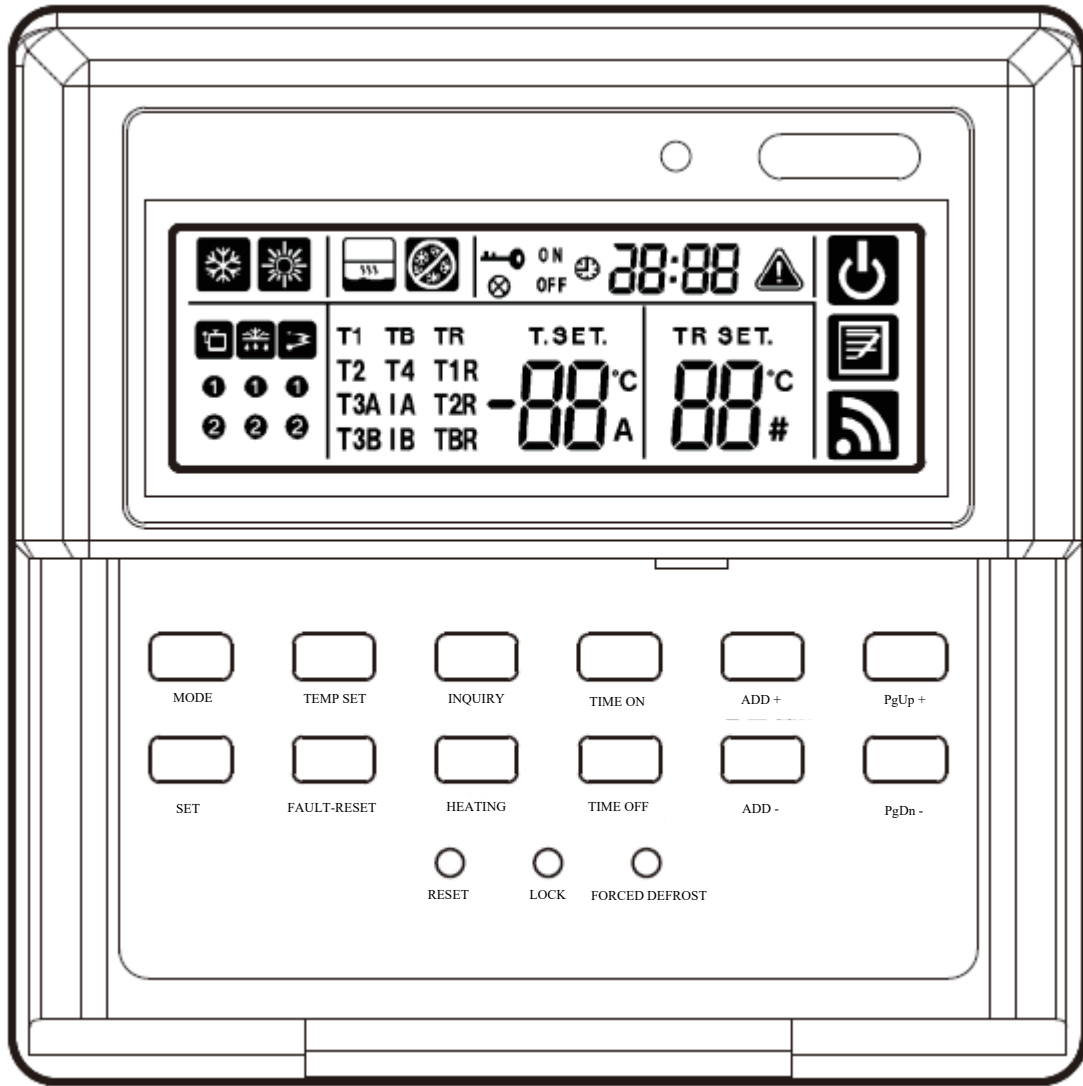
The communication line is twisted pair 2x(0.75-1.0)mm Shielded wire P,Q,E ("E" is the shield connect)
(When the unit is far away from the wired controller, 120 Ω matching resistor may be connected with P and Q at the side of main board in parallel.)
(The max length 50m)



4.The installation diagram is as follows:



Please refer to the *Operation and Installation Manual of the Wire Controller* for the LCD display contents and key instructions of the wire controller



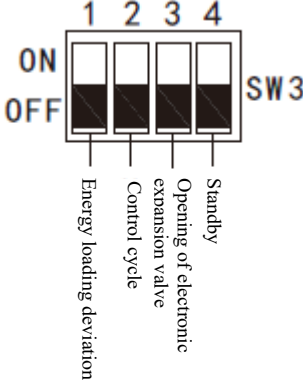
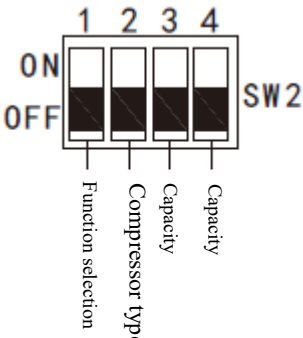
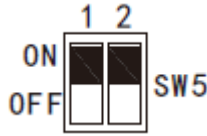
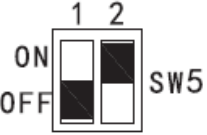
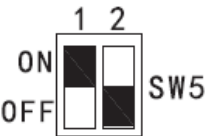
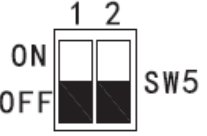
IV. Overview of mainboard function

Address DIP switch description

| Dialing address to OFF at the same time, and address setting range of the model is 00 # to 15 # (black indicates two digit dialing entity) | | Dialing address to ON at the same time, and address setting range of the model is 16# to 31# (black indicates two digit dialing entity) | |
|--|-------------------------|---|-------------------------|
| SR1 | Description | SR1 | Description |
| 0 | Host (00# module unit) | 0 | Slave (16# module unit) |
| 1 | Slave (01# module unit) | 1 | Slave (17# module unit) |
| 2 | Slave (02# module unit) | 2 | Slave (18# module unit) |
| 3 | Slave (03# module unit) | 3 | Slave (19# module unit) |
| 4 | Slave (04# module unit) | 4 | Slave (20# module unit) |
| 5 | Slave (05# module unit) | 5 | Slave (21# module unit) |
| 6 | Slave (06# module unit) | 6 | Slave (22# module unit) |
| 7 | Slave (07# module unit) | 7 | Slave (23# module unit) |

| | | | |
|---|-------------------------|---|-------------------------|
| 8 | Slave (08# module unit) | 8 | Slave (24# module unit) |
| 9 | Slave (09# module unit) | 9 | Slave (25# module unit) |
| A | Slave (10# module unit) | A | Slave (26# module unit) |
| B | Slave (11# module unit) | B | Slave (27# module unit) |
| C | Slave (12# module unit) | C | Slave (28# module unit) |
| D | Slave (13# module unit) | D | Slave (29# module unit) |
| E | Slave (14# module unit) | E | Slave (30# module unit) |
| F | Slave (15# module unit) | F | Slave (31# module unit) |

V. Description of DIP switch (detect only once for power on)

| | | |
|---|---|--|
| <p>Energy regulation DIP switch (black indicates dial entity)</p> |  | <p>1-ON: +4°C 1-OFF: +2°C</p> <p>2-ON: 60s 2-OFF: 30s</p> <p>3-ON: 480 steps 3-OFF: Normal regulating</p> |
| <p>Model selection DIP switch</p> |  | <p>1-ON: only heating 1-OFF: cooling and heating</p> <p>2-ON: Danfoss 2-OFF: Copeland</p> <p>3-ON,4-ON: reserved 3-OFF,4-ON: 35 KW 3-OFF,4-OFF: 75 KW 3-ON,4-OFF: 155 KW</p> |
| <p>Defrosting DIP switch (black indicates dial entity)</p> |  | <p>Defrosting interval 20min for 35&75kW, 50min for 155kW chiller</p> |
| |  | <p>Defrosting terminal 25min for 35&75kW, 45min for 155kW chiller</p> |
| |  | <p>Defrosting terminal 30min for 35&75kW, 35min for 155kW chiller</p> |
| |  | <p>Defrosting terminal 35min for 35&75kW, 40min for 155kW chiller</p> |

VI. Protection function (See "Care and Maintenance" for detailed code)

1). Power supply protection

Three phase electrical fault and missing phase detection (judge only once for power on).

When the host is under power protection, stop all units; in case of power supply protection of the slave, stop the corresponding units.

2). Pump overload protection

When the water pump overload protection is detected, stop all units.

3). Insufficient water flow protection

30 seconds after the start of the water pump, it will start to detect the lack of water flow; when the switch is continuously disconnected for 15 seconds, the alarm "insufficient air conditioning water flow" will be given. The host stops the water pump, stops the whole unit, then starts the water pump, automatically recovers, and the slave stops the module, and automatically recovers.

Each module shall be detected. When the main module gives an alarm of insufficient water flow, all units will be stopped; when the slave module detects the alarm of insufficient water flow, the slave module will be stopped.

4). Protection against excessive water temperature difference between inlet and outlet

The normal water flow rate of the unit = refrigerating capacity * 0.172m³/h, and the difference between the outlet water temperature T2 and the total inlet water TBS of the unit is 5°C. If the actual water flow of the unit is too small, the temperature difference ΔT between T2 and TB is greater than 5°C. When ΔT is greater than or equal to 10°C, the unit will report excessive water temperature for protection.

5). Compressor operation protection

When the compressor starts again, it will delay 180 seconds.

6). Communication fault

When the communication failure between the main board and the wire controller lasts for two minutes, the party who cannot communicate will alarm L4 "communication fault between the host and the wire controller", and stop the operation of all units until the communication between the main board and the wire controller can be connected, and then the power on will be automatically resumed.

When the communication fault between the main board and the slave lasts for two minutes, the slave will alarm L1 "communication fault between modules", and stop the operation of the slave that cannot communicate.

When the main board detects that the number of connected units is reduced, it will alarm L2 "the number of modules is reduced", and the slave that loses communication with the host will stop running.

When the main board detects that the maximum number of addresses is greater than or equal to the number of connected units, the unit can control and operate normally, but alarm L3 "address error" will be given.

7). High pressure/overload protection

During the operation of the compressor, it is detected that the "high pressure/overload" switch of the compressor is continuously disconnected for 3 seconds;

For defrosting system, stop the corresponding compressor; in other cases, the alarm "high pressure/overload" will be given and the corresponding system will be shut down (the fan shall follow the principle of simultaneous start and stop).

8). Low pressure protection

60 seconds after the compressor starts, start to detect the "compressor low pressure" switch, when the switch disconnection continues for a period of time;

If the compressor is defrosting, no alarm will be given; after defrosting, the low pressure switch will be redetected after 60 seconds delay;

If the compressor is not defrosting, the alarm "compressor low pressure" will be sent and the

corresponding system will shutdown.

Determine the duration of low-pressure switch disconnection when the low pressure alarm occurs:

Alarm will be sent if it is disconnected for 5 seconds during cooling;

Alarm will be sent if it is disconnected for 30 seconds during heating;

9). Protection of fin over-temperature

When the unit is powered on, the temperature of fins is detected under cooling mode and if there is no fault of fin temperature probe:

When fin temperature $> 65^{\circ}\text{C}$, the alarm for fin over-temperature will be sent;

When fin temperature $\leq 55^{\circ}\text{C}$, the protection of fin over-temperature will exit.

When the fin temperature is too high, stop the corresponding systems (the fan follows the principle of simultaneous start and stop);

It took 3 seconds for the chattering before alarm.

10). Module outlet water temperature protection

After the module is selected to run for the first time, it will start to detect:

The alarm will be sent for the subcooling of the corresponding module outlet water under cooling mode and when the outlet water temperature of the module $T_2 \leq 4^{\circ}\text{C}$;

When outlet water temperature $T_2 \geq 7^{\circ}\text{C}$, the outlet water supercooling protection of the module will exit. The work of the corresponding module will stop in case of subcooling (superheat) protection. It is allowed the module to work again automatically after reset, and give an alarm after 3 seconds to eliminate the chattering.

In the heating mode, when the outlet water temperature of the module is more than or equal to Copeland 63°C (Danfoss 68°C), the alarm for superheat of the module outlet water will be sent;

When the outlet water temperature of the module is less than (Copeland 52°C and Danfoss 57°C), the module outlet water superheat protection will exit;

In case of subcooling (superheat) protection, the corresponding module will be stopped. It is allowed to start the module again automatically after resetting; After 3 seconds, the alarm will be given;

11). Current protection

I: measured current;

IP: compressor protection current is set to 34A (3 kW EVI, 75 kW EVI set to 62A (155 kW EVI));

When the measured current I of a system is greater than or equal to the protection current IP, stop the corresponding systems (the fan follows the principle of simultaneous start and stop). The alarm of too high current will be sent for protection.

12). Exhaust temperature protection

1. The unit has temperature control switch and high pressure switch in series (alarm P2 and P8);

2. High temperature protection of TP temperature sensor (F6 and F7 alarm from main control board and PF alarm from wire controller).

13). Fan overload protection

P5 and PB: when the fan overload occurs during the operation of the unit, the unit will stop running until the fault is eliminated to avoid running in the state without fan and damaging the unit. The unit will start for normal operation after the fan is restored to normal operation.

14). Remote switch control function

Remote control switch controls the unit start-up and stop of the system unit in priority. When the remote switch interface of the system host is closed, the system runs under the control of the online controller; when the remote control interface is disconnected, the system stops working. The anti-freezing operation of the system is not controlled by the remote switch.

15). Shell and tube anti-icing protection

It works only in cooling mode. When the temperature detected by the shell and tube anti-icing sensor for 10 seconds is $TC < 4^{\circ}C$, PE alarm will be sent (protection for anti-icing temperature too low and it is different from the fault code of the unit outlet water). Then stop the two systems of this board; when the anti-icing temperature $\geq 7^{\circ}C$, the fault will be eliminated and the refrigerant system will be put into operation again.

VII. Main board spot check function

1. Applicable model: 35kW EVI 75kW EVI

Contents normally displayed by nixie tube:

1). The number of connected units (number of electric control boards) will be displayed in standby mode.

Before starting up, the compressor will display 0 before starting up;

After power on, the compressor opening percentage of the module will be displayed (50 means 1 compressor and 100 means 2 compressors).

2). After the system is started, the number of units started will be displayed.

The key of spot check is set on the outdoor system chip to observe the operation status of the outdoor system through spot check, so that the engineering and technical personnel can make the maintenance. Contents displayed by specific spot check:

| Contents of spot check | | |
|------------------------|--|--|
| Sr. No. | Contents of the unit spot check | Remarks |
| 1 | Address of main board | 0--31 |
| 2 | Capacity of this machine | 35 KW/75 KW/155 KW |
| 3 | Operation mode of this machine | 1-Cooling, 2-Heating, 4-Hot water, 8-standby |
| 4 | Number of outdoor unit | 1-32 units |
| 5 | T1 Total outlet water temperature | |
| 6 | T2 Unit outlet water temperature | |
| 7 | T4 Environment temperature | |
| 8 | TB Total return water temperature | |
| 9 | TC Shell and tube anti-icing temperature | |
| 10 | T3A Condenser outlet temperature | |
| 11 | T3B Condenser inlet temperature | |
| 12 | T5A Evaporator inlet temperature | |
| 13 | T5B Evaporator inlet temperature | |
| 14 | THA Compressor return air temperature | |
| 15 | THB Compressor return air temperature | |
| 16 | T6A injection bypass inlet temperature | |
| 17 | T6B injection bypass inlet temperature | |
| 18 | T7A injection bypass outlet temperature | |
| 19 | T7B injection bypass outlet temperature | |

| | | |
|----|--|--|
| 20 | TPA Compressor exhaust temperature | |
| 21 | TPB Compressor exhaust temperature | |
| 22 | A Compressor current value | |
| 23 | B Compressor current value | |
| 24 | Opening of main circuit electronic expansion valve A1 | The actual opening is the query value*8 |
| 25 | Opening of auxiliary circuit electronic expansion valve A2 | The actual opening is the query value*8 |
| 26 | Opening of main circuit electronic expansion valve B1 | The actual opening is the query value*8 |
| 27 | Opening of auxiliary circuit electronic expansion valve B2 | The actual opening is the query value*8 |
| 28 | Number of started units | Number of started compressor |
| 29 | Previous protection/ fault | No fault displayed E-/P-/L-/F- |
| 30 | Running time of compressor A | Spot check parameter ×100 hours |
| 31 | Running time of compressor B | Spot check parameter ×100 hours |
| 32 | Compressor type | "PP1" stands for Copeland compressor (black) "PP2" stands for Danfoss compressor (blue) |
| 33 | --- | Exit spot check after display "---" |

2. Applicable model:

155 kE EVI

Contents normally displayed by nixie tube:

- 1). Display the number of connected units (number of electric control boards) in the standby mode.

Before starting up, the compressor will display 0 before starting up;

After power on, the compressor opening percentage of the module will be displayed (50 means 1 compressor and 100 means 2 compressors).

- 2). After the system is started, the number of units started will be displayed.

The key of spot check is set on the outdoor system chip to observe the operation status of the outdoor system through spot check, so that the engineering and technical personnel can make the maintenance. Contents displayed by specific spot check:

| Contents of spot check | | |
|------------------------|--|--|
| Sr. No. | Contents of the unit spot check | Remarks |
| 1 | Address of main board | 0--31 |
| 2 | Capacity of this machine | 75 KW/155 KW |
| 3 | Operation mode of this machine | 1-Cooling, 2-Heating, 4-Hot water, 8-standby |
| 4 | Number of outdoor unit | 1-32 units |
| 5 | T1 Total outlet water temperature | |
| 6 | Outlet water temperature of T2 | |
| 7 | T4 Environment temperature | |
| 8 | TB Total return water temperature | |
| 9 | TC Shell and tube anti-icing temperature | |

| | | |
|----|--|--|
| 10 | T3A Condenser outlet temperature | |
| 11 | T3B Condenser inlet temperature | |
| 12 | Reserved | |
| 13 | Reserved | |
| 14 | THA Compressor return air temperature | |
| 15 | THB Compressor return air temperature | |
| 16 | T6A injection bypass inlet temperature | |
| 17 | T6B injection bypass inlet temperature | |
| 18 | T7A injection bypass outlet temperature | |
| 19 | T7B injection bypass outlet temperature | |
| 20 | TPA Compressor exhaust temperature | |
| 21 | TPB Compressor exhaust temperature | |
| 22 | A compressor current value IA | |
| 23 | B compressor current value IB | |
| 24 | Opening of main circuit electronic expansion valve A1 | The actual opening is the query value*8 |
| 25 | Opening of auxiliary circuit electronic expansion valve A2 | The actual opening is the query value*8 |
| 26 | Opening of main circuit electronic expansion valve B1 | The actual opening is the query value*8 |
| 27 | Opening of auxiliary circuit electronic expansion valve B2 | The actual opening is the query value*8 |
| 28 | Number of started units | Number of started compressor |
| 29 | Previous protection/ fault | No fault displayed E-/P-/L-/F- |
| 30 | Running time of compressor A | Spot check parameter ×100 hours |
| 31 | Running time of compressor B | Spot check parameter ×100 hours |
| 32 | Compressor type | "PP1" stands for Copeland compressor (black) |
| 33 | --- | Exit spot check after display "---" |

Unit Installation



Attention

- When the unit is installed in a new place or moved to another place, it must be installed by professional installation technicians. It is not allowed for users to install by themselves.
- If the user does not install the air conditioner as required, electric shock or fire will occur.
- The user shall have qualified power supply consistent with the nameplate of the unit.
- The power line shall be installed with protective devices such as leakage protector or air switch.
- Please use the fuse or circuit breaker specified in this Manual.
- Wiring work must be carried out by qualified electricians, and the electrical safety requirements must be complied with.
- The unit shall be ensured to be well grounded, that is, the main switch of the air conditioner must have a reliable grounding wire.
- The power cord replacement must be operated by the local professional of central air conditioning product management center of this company.



I. Handling of the unit

In the process of handling, the tilt angle of the unit shall not be greater than 15° to prevent the unit from overturning.

- 1) Rolling transportation: put several rollers of the same size under the base of the unit, each roller must be a little longer than the outer frame of the base, and suitable for the balance of the unit.
- 2) Hoisting: the strength of the lifting rope (belt) shall be 3 times greater than the weight of the unit. Check and ensure that the lifting hook is fastened to the unit, and the hoisting angle shall be greater than 60° . In order to prevent damage to the unit, wood blocks, cloth or hard paper with a thickness of at least 50 mm shall be added at the contact between the unit and the lifting rope. Do not stand under the unit when lifting.

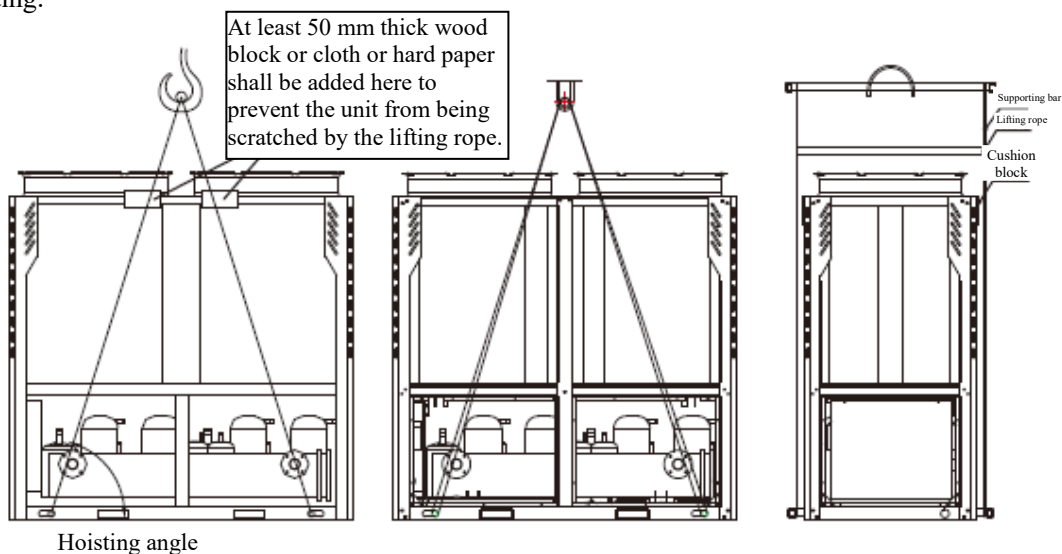


Figure 1

II. Requirements for unit layout spacing

1. Requirements for unit layout spacing

- 1) In order to ensure enough air flow into the condenser, the influence of downdraft caused by tall buildings around the unit shall also be considered during installation.
- 2) If the unit is installed in a place with strong air flow, such as exposed roof, measures such as parapet or shutter can be considered to prevent turbulence from interfering with the air into the unit. If the unit needs to set a parapet, its height shall not exceed 1.5m; If the shutter is used, the total static pressure loss shall be less than the external static pressure of the fan. The distance between the unit and the parapet or shutter shall also meet the minimum distance requirement for unit installation.
- 3) If the unit needs to operate in winter and the installation site may be covered with snow, the unit shall be higher than the snow surface to ensure the smooth flow of air through the coil.

2. Diagram of unit arrangement spacing

- 1) Diagram of recommended spacing of unit installation

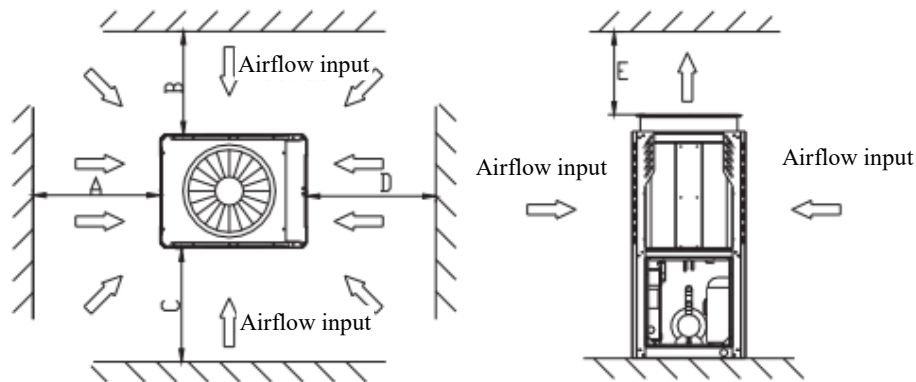


Figure 2(a) Applicable for 35 kW module unit

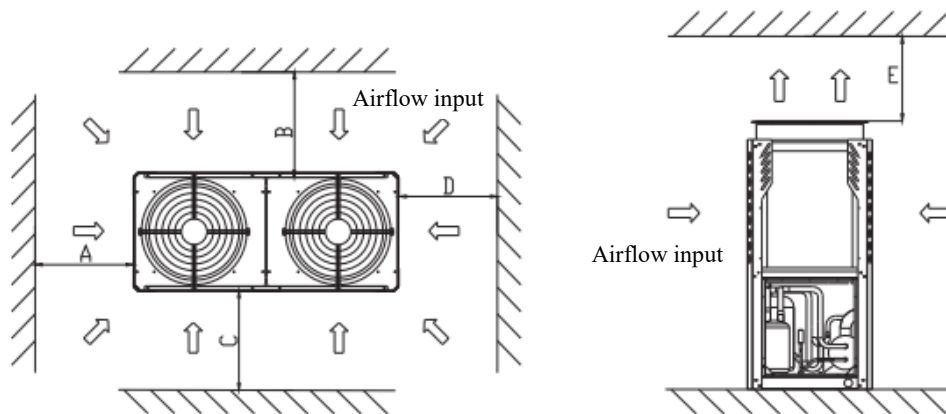


Figure 2(b) Applicable for 75 kW module unit

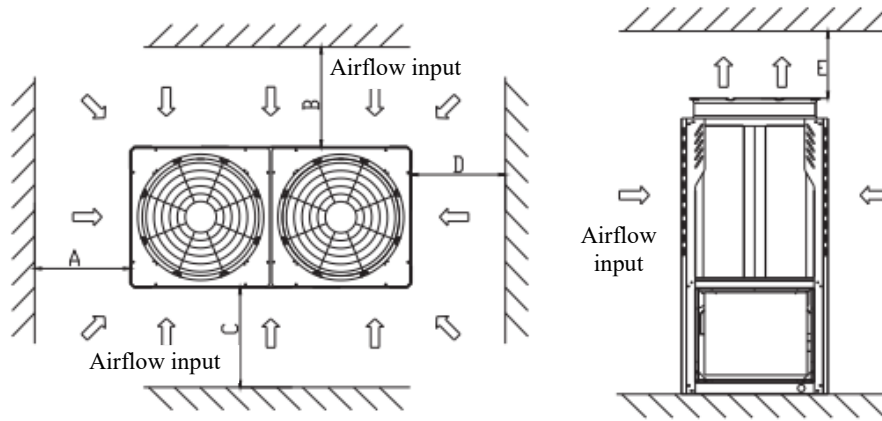


Figure 2(c) Applicable for 155 kW module unit

Table 1 Parameters table for recommended spacing of unit installation

| Installation spacing (mm) | | | | |
|---------------------------|--------|--------|--------|--------|
| A | B | C | D | E |
| >1,500 | >2,000 | >2,000 | >1,500 | >8,000 |

3) Parameters table for recommended spacing of unit installation

In order to prevent condenser exhaust backflow and avoid operation fault of the unit, when multi module units are installed in parallel, the installation mode shall be A and D directions in Figure 2, and the distance between units and obstacles shall be the same as Table 1; the distance between adjacent modules shall not be less than 600 mm, or modules can be installed in parallel according to B and C directions in Figure 2; the distance between units and obstacles shall be the same as Table 1, and the distance between adjacent modules shall not be less than 1,000 mm or according to A and D directions combining B and C directions; the distance between unit and obstacle is the same as table 1, and the distance between adjacent modules in A and D direction is not less than 600 mm, and that in B and c direction is not less than 1,000 mm. If the above spacing cannot be guaranteed, the air passing through the coil of the unit will be limited, or the exhaust backflow will occur, the performance of the unit may be affected, or the operation and shutdown fault may occur.

III. Installation foundation

- 1) The unit shall be placed on the horizontal foundation, ground floor or roof which can bear the operating weight of the whole set of equipment and the weight of maintenance personnel. Please refer to *Technical Parameters* for the operating weight.
- 2) If the position of the unit is too high for the maintenance personnel to repair, appropriate scaffolds can be erected around the unit.
- 3) The scaffold must be able to bear the weight of maintenance personnel and the equipment.
- 4) It is strictly forbidden to bury the underframe of the unit in the concrete of the installation foundation.

Location of unit installation foundation: (unit: mm)

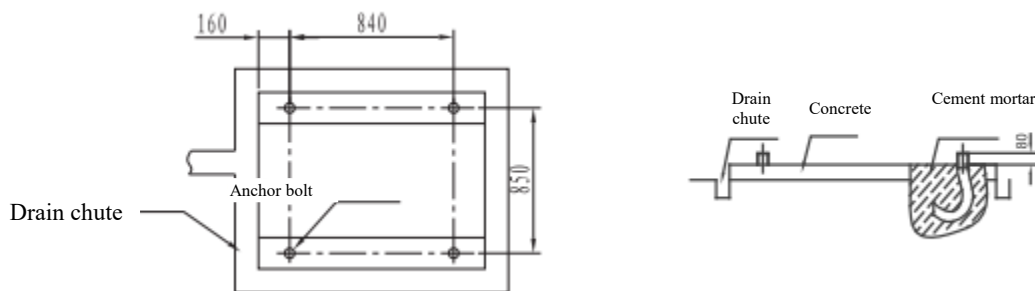


Figure 3(a) Applicable for 35 kW unit

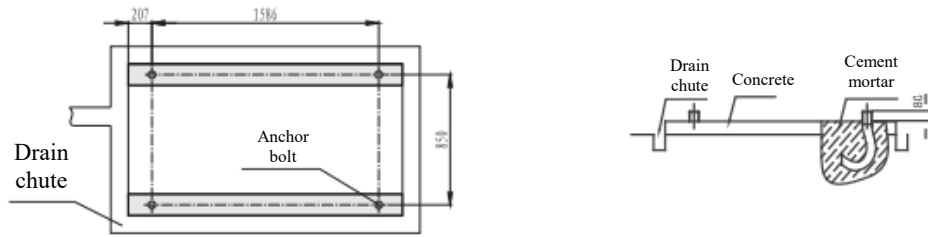


Figure 3(b) Applicable for 75 kW unit

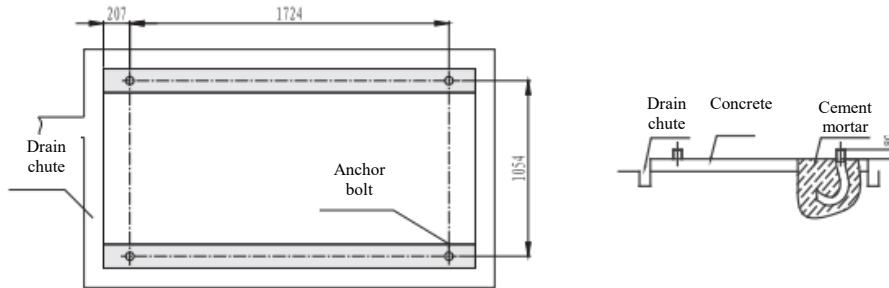


Figure 3(c) Applicable for 155 kW unit

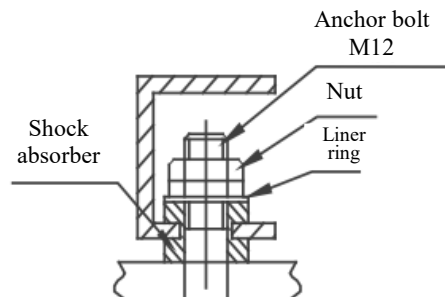
IV. Installation of vibration damper

A. Vibration damper must be installed between the unit and the foundation.

The unit can be fixed on the foundation through spring vibration damper by the mounting holes on the steel frame of the unit base with diameter of $\Phi 15$ mm. The center distance of installation hole is shown in Figure 3 (schematic diagram of unit installation dimension). No shock absorber is provided for this unit. Users can choose according to the relevant requirements. For the installation on the top of high-rise buildings or vibration sensitive areas, please consult us while selecting the shock absorber.

B. Installation steps for shock absorber:

- 1) Ensure that the flatness of concrete foundation is within ± 3 mm. Then place the unit on the cushion block.
- 2) Raise the unit to a suitable height for installing the shock absorbers.
- 3) Remove the fastening nut of the shock absorber.
- 4) Place the unit on the shock absorber so that the fixing bolt hole of the shock absorber can be aligned with the fixing hole on the base.
- 5) Reinstall the fastening nut of the shock absorber into the fixing hole on the base and screw it into the shock absorber.
- 6) While adjusting the working height of the shock absorber seat and screwing in the leveling bolts, the bolts must be tightened one circle along the peripheral sequence to make the adjusted deformation of the shock absorber height equal.
- 7) After the correct working height is reached, the lock nut can be tightened.



**Attention**

It is recommended that the shock absorber be fixed to the foundation by the holes provided. After the unit is located on the foundation, do not move the connected shock absorber, and do not tighten the central fixing nut before the shock absorber is loaded.

Arrangement of Water Pipes

I. Basic requirements for connection of chilled water pipes



Attention

- When the unit is installed in place, the chilled water pipes can be connected.
- The connection of water pipes shall comply with relevant installation regulations.
- There shall be no foreign matters in the pipes, and all chilled water pipes must comply with local pipeline engineering codes and regulations.

1. Connection requirements of chilled water pipes

- 1) Before the operation of the unit, all chilled water pipes shall be washed thoroughly to make them free of foreign matters. It shall be noted that the pipes shall be flushed separately, and the unit shall not be connected and flushed together to avoid flushing any foreign matters into or to the heat exchanger.
- 2) The water flow must enter the heat exchanger through the water inlet. If the direction of water flow through the heat exchanger is opposite, the performance of the unit will be worse.
- 3) The unit is equipped with a target flow switch to realize the cut-off protection of the unit. There must be horizontal straight pipe sections with diameter of 5 times at the direction of the target flow switch. The working pressure of the target flow switch controller is 1 MPa, and the interface is 1 inch (2.54 cm). Do not short circuit the target flow switch. Otherwise the heat exchanger of the unit may be seriously damaged.
- 4) The water pump installed in the water pipe system shall be equipped with starter and controlled by the unit. The water pump directly press the water into the heat exchanger of the water system.
- 5) Piping and pipe joints must be supported independently and shall not be supported on the unit.
- 6) The connecting pipe and pipe joint of heat exchanger shall be easy to be detached, and easy to be operated and cleaned. It shall be easy to check the evaporator interface pipe.
- 7) The evaporator shall be equipped with a filter with more than 40 mesh per inch on site, and the filter shall be installed as close to the water inlet interface as possible, and shall be insulated.
- 8) The heat exchanger by-pass pipe and by-pass valve as shown in Figure 5 must be installed to facilitate the cleaning of external water system before unit commissioning. During maintenance, the water path of heat exchanger can be cut off without disturbing other heat exchangers.
- 9) Flexible joint should be used between heat exchanger interface and field pipeline to reduce vibration transmission to buildings.
- 10) For the convenience of maintenance, thermometer or pressure gauge shall be installed on the inlet and outlet pipeline. No pressure and temperature instruments are supplied for this unit and the user need to purchase them by itself.
- 11) All low points of the water system shall be equipped with drainage interfaces, so that the water in the evaporator and the system can be completely discharged; vent valves shall be provided at all high points to remove air from the pipeline. The air discharge valve and water outlet are not insulated to facilitate maintenance.
- 12) All water pipes that may freeze in the system shall be insulated, including the connecting pipe and flange of heat exchanger.
- 13) The outdoor chilled water pipeline shall be wrapped with an auxiliary heating belt and insulated with PE, EDPM and other materials with a thickness of 20 mm to prevent the pipeline from freezing and cracking at low temperature. The power supply of heating belt shall be equipped with independent fuse.
- 14) When the ambient temperature is below 2°C and when the unit is out of service for a long time, please drain the water inside the unit and cut off the power supply of the unit. If the unit does not discharge water in winter, do not cut off the power supply of the unit. The fan coil in the water system must be installed with a three-way valve to ensure smooth circulation of the system after the

anti-freezing water pump is started in winter.

- 15) For on-line units, the total outlet water sensor corresponding to address unit 0 (main module) shall be moved to the main outlet pipe of the system waterway.



Warning

- The water pipe network including filter and heat exchanger will be seriously damaged by dregs.
- Installers and users must ensure the quality of chilled water, do not use salt anti-icing mixture, and do not allow air into the water system, because salt and air will cause oxidation and corrosion of steel parts inside the heat exchanger.

2. Schematic diagram of pipeline connection in the system

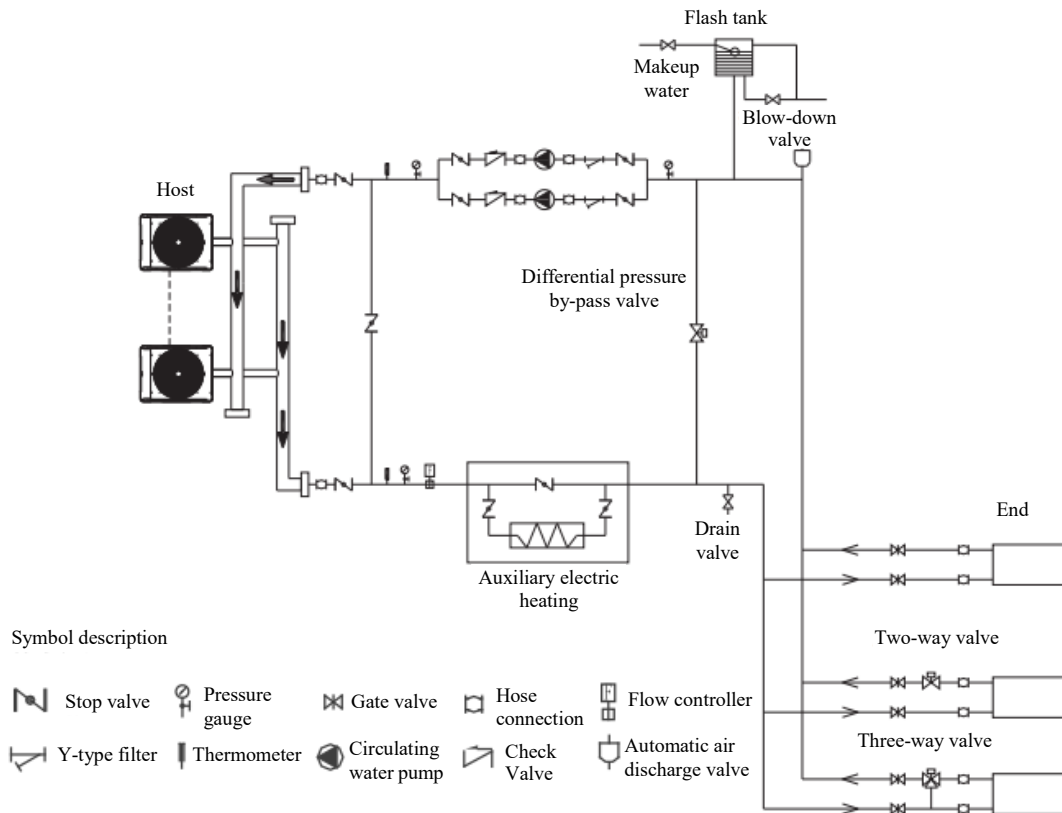


Figure 5(a) Applicable for 35 kW module unit

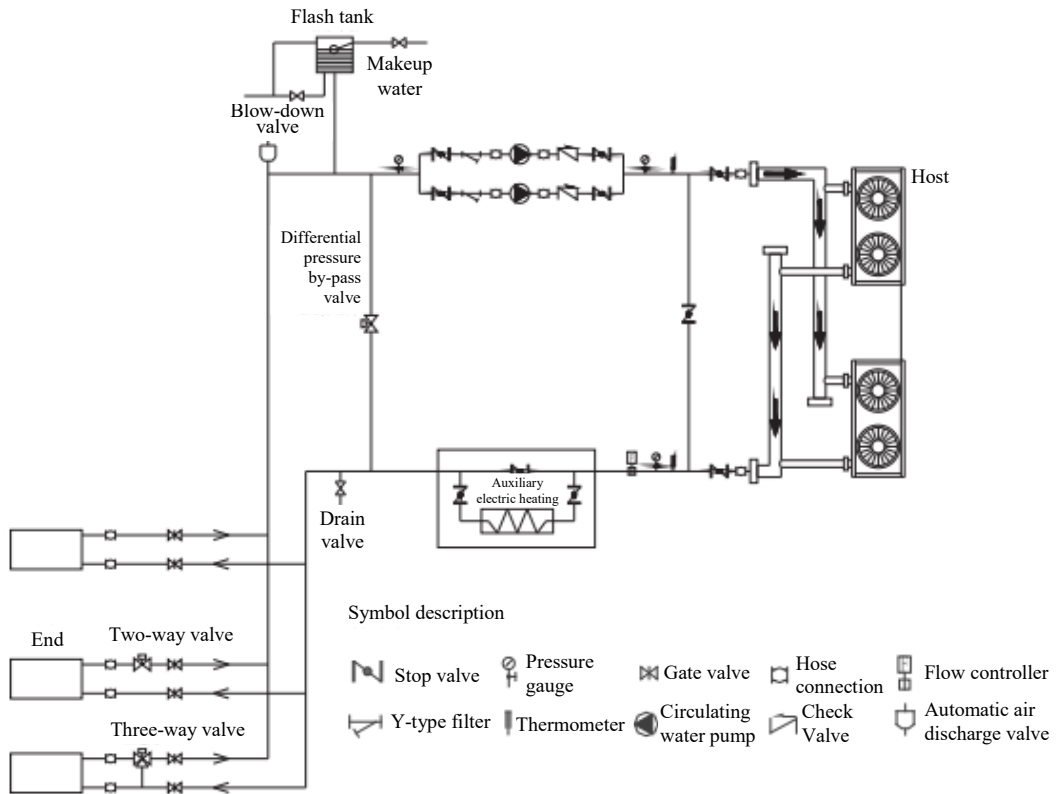


Figure 5(b) Applicable for 75 kW module unit

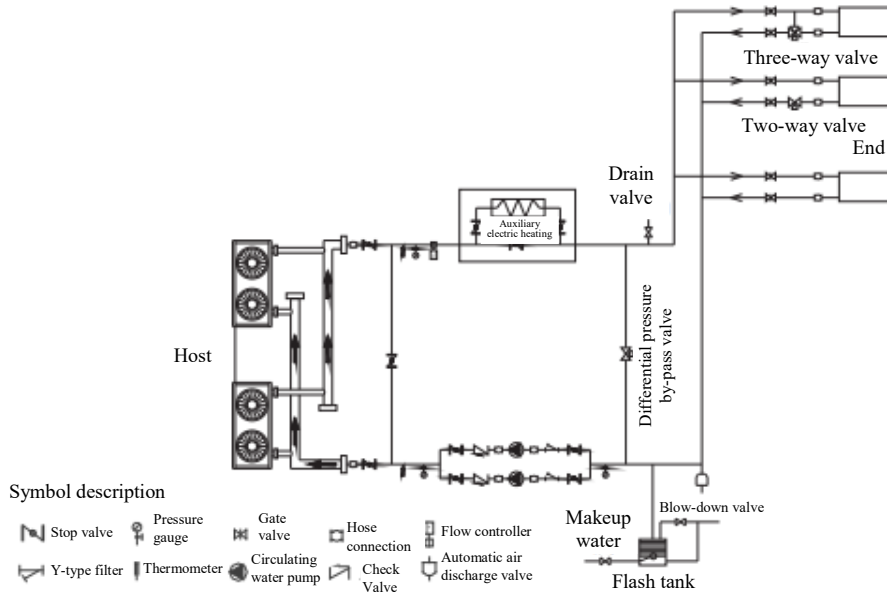


Figure 5(c) Applicable for 155 kW module unit

II. Control of water quality

1. Control of water quality

When industrial water is used for chilled water, scale is rarely produced, but when well water or river water is used, more settlements such as scale and sand will be produced. Therefore, the water that does not meet the water quality requirements must be filtered and softened with softened water equipment before flowing into the chilled water system. If sand and soil settles in the evaporator, they will block the flow of chilled water and cause freezing accident; if the hardness of chilled water is too high, it is easy to cause scale and corrosion in the equipment, so the water quality shall be analyzed before use, such as PH value, conductivity, chloride ion concentration, sulfur ion concentration, etc.

2. Water quality standards applicable to the unit

Table 7

| PH value | Total hardness | Electrical conductivity | Sulfur ion | Chloridion | Ammonia ion |
|-------------|----------------|-------------------------|----------------|-------------|-------------|
| 7-8.5 | <50ppm | <200 μ v/cm (25°C) | None | <50ppm | None |
| Sulfate ion | Silicon | Fe content | Sodium ion | Calcium ion | |
| <50ppm | <30 ppm | <0.3 ppm | No requirement | <50ppm | |

III. Guidance for replacement, installation and debugging of damaged target flow controller

1. Please check the flow switch carefully before installation. The package shall be in good condition and the appearance shall be free of damage and deformation. If you have any questions, please contact the manufacturer.
2. For the target flow controller, it must be noted that the liquid flow direction in the pipeline must be consistent with the direction of the arrow on the controller. The wiring terminal shall be located for easy connection.
3. Please pay attention to the following items during installation and wiring:
 - 1) It is absolutely forbidden for the wrench to collide with the bottom plate of the flow switch, resulting in the deformation and failure of the flow switch.
 - 2) In order to avoid electric shock and damage to the equipment, cut off the power supply during wiring or debugging.
 - 3) It is absolutely forbidden to adjust other screws during wiring except the inching switch wiring terminal and grounding screw. It shall be noted that the inching switch wiring shall not be made with too much fore. Otherwise it will make the inching switch itself displacement to result in the failure of the flow switch.
 - 4) The special grounding screw must be used for grounding, and the installation screw cannot be disassembled at will. Otherwise the switch will be deformed and invalid.
 - 5) The flow switch has been set to the minimum flow value before leaving the factory. It is not allowed to set a lower than the factory setting. Otherwise the switch may become invalid. After installation, please check by pressing the lever of the flow switch several times. Once it is found there is no "clatter" sound when the lever returns, turn the adjusting screw clockwise until there is a "clatter" sound when the lever returns.
 - 6) The model of the target must be determined according to the rated flow of the unit, the diameter of the outlet pipe and the target adjustment range of the flow switch (please refer to the Manual), and the target must not contact with the inner wall of the pipe and other flow restrictors in the pipe. Otherwise the flow switch will not reset normally.
4. Determine whether the flow switch and the system connected with it operate normally according to the measured value of the flowmeter, that is, when the measured value of the flowmeter is less than 60% of the rated water flow of the unit, the target flow controller shall be disconnected, three working cycles shall be observed, and the shell of the flow switch shall be covered in time.

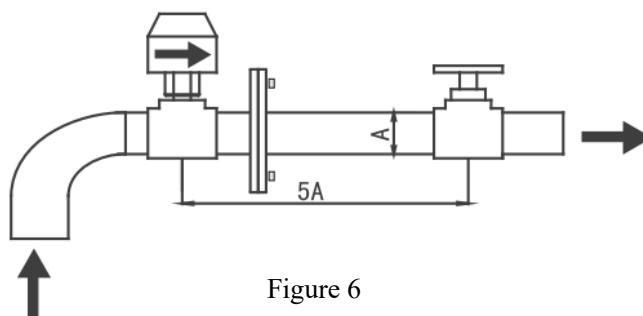


Figure 6

IV. Pipeline installation of single module water system

Schematic diagram of single module

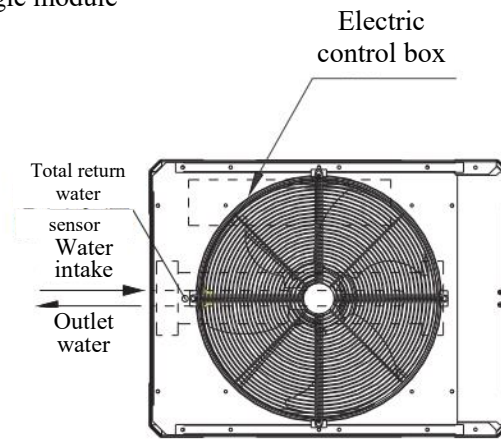


Figure 7(a) Applicable for 35 kW model

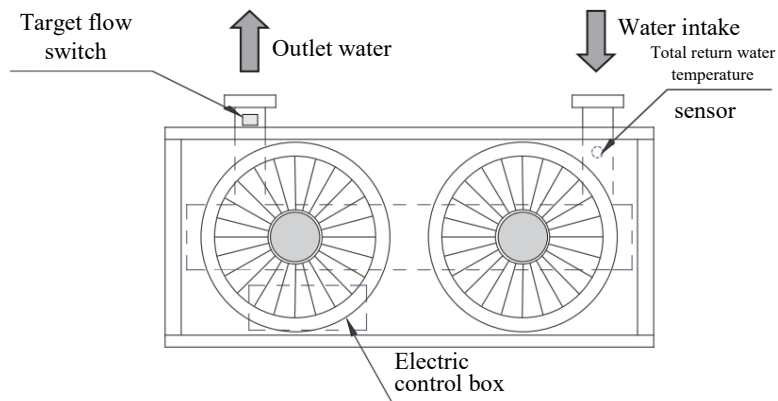


Figure 7(b) Applicable for 75 kW model

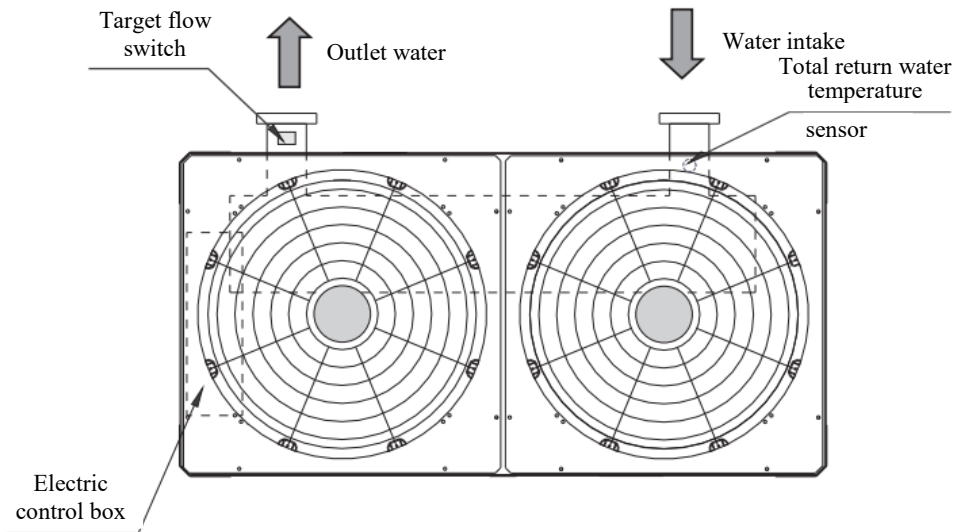


Figure 7(c) Applicable for 155 kW model

V. Pipeline installation of multi module water system

Due to the special design of the unit itself, the installation of multi module combination is described as follows.

(I). Installation form of multi module combined water pipeline

1. Installation form of water pipes of 35 kW unit

1) Installation method I (recommended method)

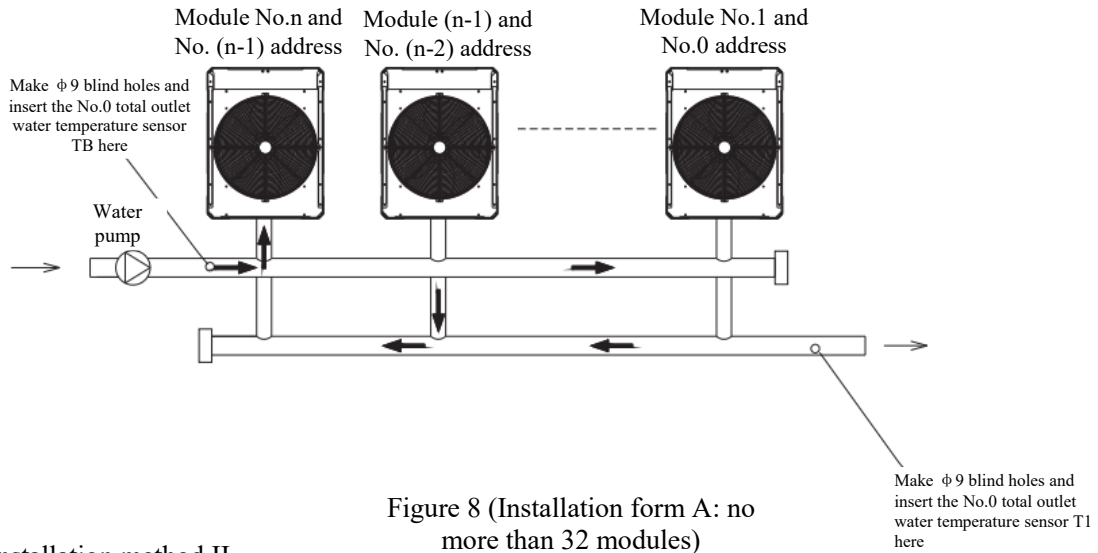


Figure 8 (Installation form A: no more than 32 modules)

2) Installation method II

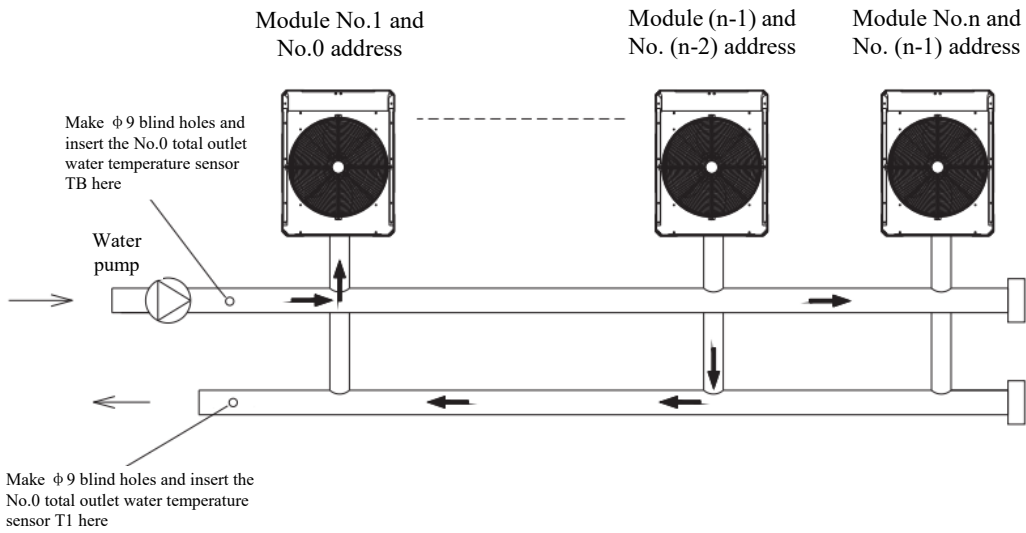


Figure 9 (Installation mode B: no more than 32 modules)

2. Installation form of water pipes of 75 kW unit

1) Installation method I (recommended method)

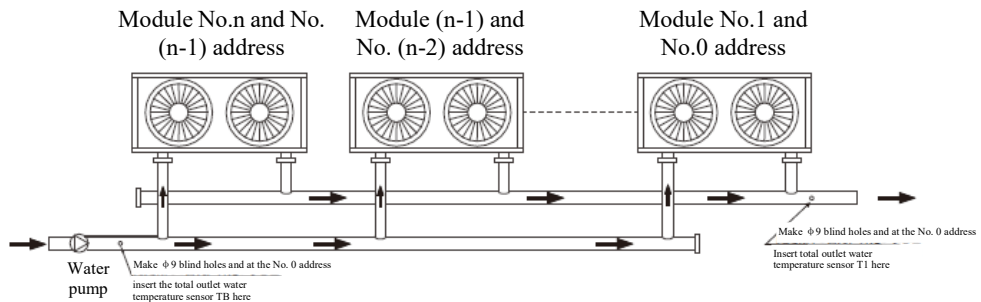


Figure 10 (Installation mode A: no more than 32 modules)

2) Installation method II

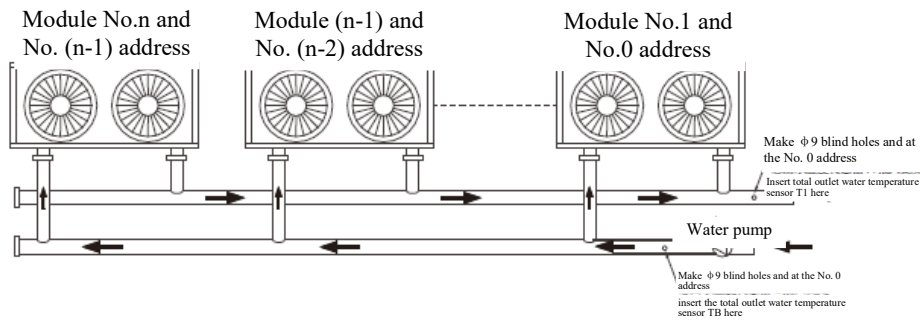


Figure 11 (Installation mode B: no more than 32 modules)

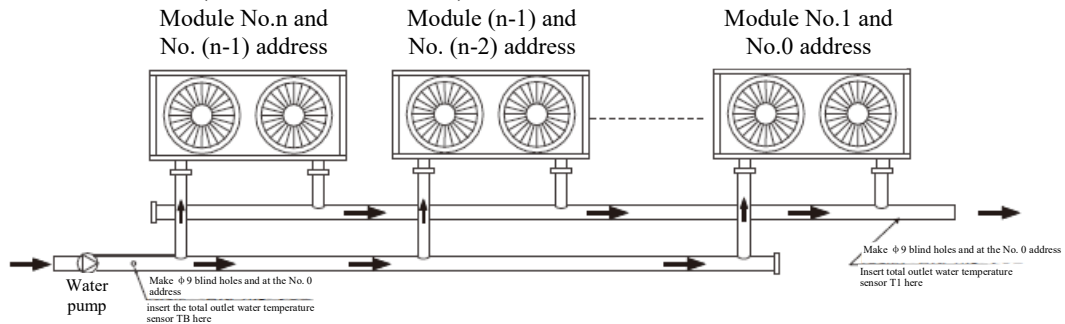


Attention

1. Please add several vent holes at the high point of the main pipe, so that the air in the pipe can be discharged quickly and completely;
2. Once the unit is set up, it is forbidden to replace the parts in the system, such as water pump, without permission;
3. It is forbidden to connect the water system pipeline with the units outside the project plan, except that the permission from the dealer is obtained;
4. Before the pipeline is cleaned, do not fill water into the unit. Otherwise the evaporator and the unit may be damaged.

3. Installation form of water pipe for 155 kw unit

1) Installation method I (recommended method) no more than 16 modules



2) Installation method II

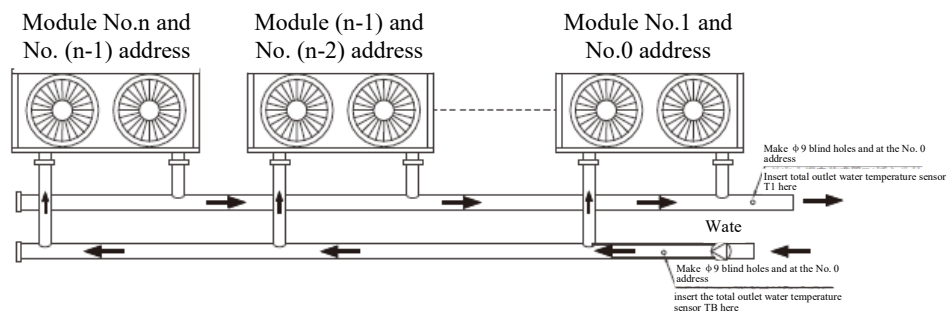


Figure 13 (Installation mode B: no more than 32 modules)



Attention

1. Please add several vent holes at the high point of the main pipe, so that the air in the pipe can be discharged quickly and completely;
2. Once the unit is set up, it is forbidden to replace the parts in the system, such as water pump, without permission;
3. It is forbidden to connect the water system pipeline with the units outside the project plan, except that

the permission from the dealer is obtained;

4. Before the pipeline is cleaned, do not fill water into the unit. Otherwise the evaporator and the unit may be damaged.

(II). Parameter table of main inlet and outlet pipe diameter

Table 2

| Total refrigerating capacity of the unit (kW) | Total inlet and outlet pipe diameter (nominal diameter) | Total refrigerating capacity of the unit (kW) | Total inlet and outlet pipe diameter (nominal diameter) |
|---|---|---|---|
| 35×1=35 | DN40 | 65×8=520 | DN125 |
| 35×2=70 | DN65 | 65×9=585 | |
| 35×3=105 | | 65×10=650 | |
| 35×4=140 | | 65×11=715 | |
| 35×5=175 | | 75×7=525 | |
| 65×1=65 | | 75×8=600 | |
| 75×1=75 | | 75×9=675 | |
| 65×2=130 | | 75×10=750 | |
| 75×2=150 | | 150×4=600 | |
| 150×1=150 | | 150×5=750 | |
| 35×6=210 | | DN80 | 65×12=780 |
| 35×7=245 | 65×13=845 | | |
| 65×3=195 | 65×14=905 | | |
| 75×3=225 | 75×11=825 | | |
| 35×8=280 | DN100 | 75×12=900 | |
| 35×9=315 | | 75×13=975 | |
| 35×10=350 | | 75×14=1050 | |
| 35×11=385 | | 150×6=900 | |
| 35×12=420 | | 150×7=1050 | |
| 35×13=455 | | 65×15=975 | DN200 |
| 65×4=260 | | 65×16=1040 | |
| 65×5=325 | | 75×15=1125 | |
| 65×6=390 | 75×16=1200 | | |
| 75×4=300 | 150×8=1200 | | |
| 75×5=375 | 150×9=1350 | | |
| 75×6=450 | 150×10=1500 | | |
| 150×2=300 | 150×11=1650 | | |
| 150×3=450 | 150×12=1800 | DN250 | |
| 35×14=490 | DN125 | | 150×13=1950 |
| 35×15=525 | | | 150×14=2100 |
| 35×16=560 | | | 150×15=2250 |

$$65 \times 7 = 455$$

$$150 \times 16 = 2400$$

**Attention**

The water outlet size of 35 kw module unit is DN40;

The water outlet size of 75 kW, and 155 kw module units is DN65;

The height of water inlet and outlet interface of three models is different.

Electrical Connection

I. Electrical connection



Attention

- The air conditioner shall use special power supply, and the power supply voltage shall meet the rated voltage.
 - Wiring construction must be carried out by professional technicians according to the wiring nameplate.
 - Only the electrical components specified by our company can be used, and the installation and technical services shall be provided to the manufacturer or authorized dealer.
- If the wiring fails to meet the electrical installation specifications, it may lead to controller failure or electric shock and other consequences.
- The connected fixed line must be equipped with an all pole breaking device with a contact opening distance of at least 3 mm.
 - According to the requirements of the relevant national technical standard for electrical equipment, set up the leakage protection devices.
 - After the completion of all wiring construction, the power supply can be connected only after careful inspection and confirmation of no mistake.
 - Please read all kinds of labels on the electric control box carefully.
 - Users are not allowed to repair by themselves. If the controller is not properly repaired, it may cause electric shock or damage to the controller. If you need any repair, please contact us by the central air conditioning service hotline.

II. Specification of power supply

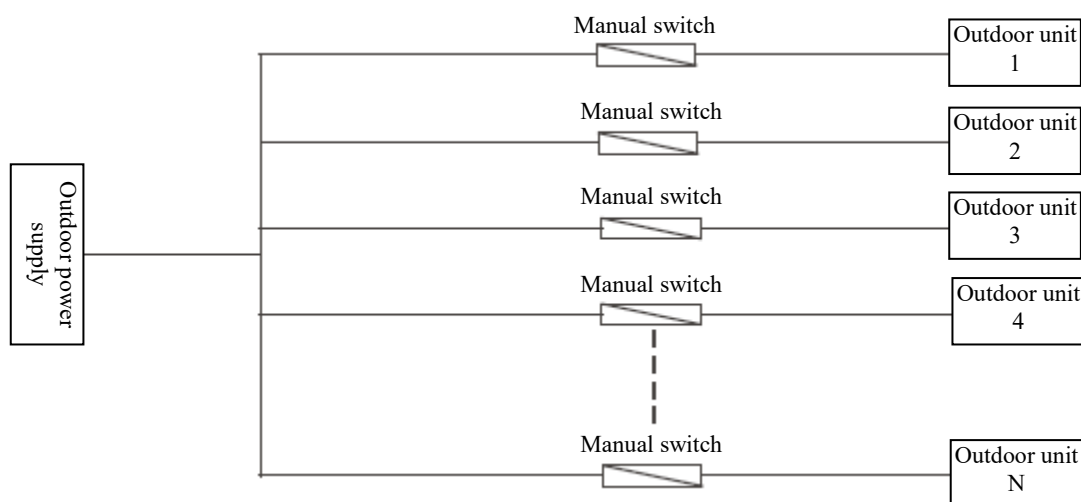
| Model | | 35 kW | 75 kW | 155 kW | |
|------------|--------------|---------------------------------|-------|--------|----|
| Power cord | Phase line | Section area (mm ²) | 10 | 35 | 70 |
| | | Number of pieces | 3 | 3 | 3 |
| | Neutral wire | Section area (mm ²) | 10 | 35 | 70 |
| | | Number of pieces | 1 | 1 | 1 |
| | Ground wire | Section area (mm ²) | 10 | 35 | 70 |
| | | Number of pieces | 1 | 1 | 1 |

Note: the above electrical and specifications are subject to change without prior notice and all shall subject to the accessories.

III. Wiring requirements

- 1) There is no need to add control elements (such as relay, etc.) in the electric control box, and it is not allowed the power supply and control circuit not connected with the electric control box to pass through the electric control box. Otherwise, electromagnetic interference may cause the unit and control device fault or even damage, and lead to protection failure.
- 2) All cables connected to the electric cabinet shall be supported independently instead of by the electric cabinet.
- 3) Generally, there are strong current circuits passing through the electric control box and 220 V AC power passing through the control panel. The principle of separating strong and weak current shall be followed during wiring. The distance between the power line and the control line shall be more than 100 mm.
- 4) The unit can only use 380 V3N/50 Hz rated power supply, and the maximum allowable voltage range is [342 v to 418 v].

- 5) All electrical wiring must comply with local wiring specifications. Proper cables shall be connected to the power terminal through the wiring hole at the bottom of the electric control box. According to the Chinese standard, the user has the responsibility to provide voltage and current protection for the input power supply of the unit. In order to prevent the wire body from loosening, please make the wiring by terminals without opening.
- 6) All power supply connected to the unit must pass through a manual switch to ensure that when the switch is disconnected, the voltage on all circuit nodes of the unit can be released.
- 7) The correct size of cable must be used to supply the power to the unit. The unit shall use independent power supply, and it is strictly forbidden to share the same power supply with other electrical appliances to avoid the danger of overload. The fuse or manual switch of the power supply shall match the working voltage and current of the unit. If multiple modules are connected in parallel, the wiring connection mode and configuration parameter requirements of the unit are shown in the figure below.
- 8) Part of the interface in the electric control box is switch signal, which needs the user to provide power supply which rated voltage shall be 220 VAC. Users must pay special attention to that all the power supply provided by themselves must be obtained through the power circuit breaker (provided by the user) to ensure that when the circuit breaker is disconnected, all the voltage on the nodes of the power circuit provided will be removed.
- 9) All inductive elements (coils for contactors, relay, etc.) provided by users themselves must be suppressed by standard resistance capacitance suppressors to avoid electromagnetic interference which might cause the fault or even damage of the unit and its controller.
- 10) All the weak current wires connected to the electric control box must be shielded, and the shielding layer must be installed with grounding wire. The shielding wire shall be separated from the power line to avoid electromagnetic interference.
- 11) The unit must be installed with grounding wire. Do not connect the grounding wire with gas fuel pipe, water pipe, lightning conductor or telephone grounding wire. Improper grounding may cause electric shock accident. Please check the grounding of the unit regularly



Attention

Maximum 32 units can be connected for 35 kW, 75 kW and 155 kW units,

IV. Wiring procedures

- 1) Check and ensure that the unit is correctly connected with the grounding wire to prevent leakage accident. The grounding device shall be constructed in strict accordance with the requirements of electrical regulations. The grounding wire can prevent electric shock.
- 2) Install the main power switch control box in proper position.

- 3) Install wire rubber pad on the main power wiring hole.
- 4) Connect the main power supply, power supply neutral wire and grounding wire to the electric control box of the unit through the wire connection hole.
- 5) The main power cord must pass through the clamp.
- 6) Firmly connect the wires to the terminals L1, L2, L3 and N.
- 7) It is required that the phase sequence must be consistent for the connection of main power line.
- 8) The main power supply shall be selected in the position that is not easy to be touched by non special maintenance personnel to avoid misoperation and improve the safety of use.
- 9) Connection of water pump control line: the control line of water pump AC contactor is connected to the terminal block of No.0 host, which must be controlled by the host, otherwise it may cause serious damage to the unit.
- 10) Connection of remote switch control line: disconnect the short circuit of the remote switch and connect it to the required control switch terminal (if the remote switch is connected, the switch and the controller by wire jointly control the start of the unit).

V. Wiring diagram

- 1) Figure (i): CAM-E350C-3F wiring nameplate;
- 2) Figure (ii): CAM-E750C-3F wiring nameplate;
- 3) Figure (iii): CAM-E1550C-3F wiring nameplate;



Attention

- 1) Fault
 - When the host fails, stop the host and all other units will stop running;
 - When the slave fails, only this unit will be stopped, and other units will not be affected.
- 2) Protection
 - When the host is protected, only the host itself will be stopped, and other units will keep running;
 - When the slave is protected, only this unit will be stopped, and other units will not be affected.

Test Running

I. Matters needing attention before test running

- 1) After the water system pipeline is washed and discharged for many times, it shall confirm that the water cleanliness meets the requirements. After the system is filled with water again and emptied, start the water pump to confirm that the water flow and outlet pressure meet the requirements.
- 2) Connect the main power supply 12 hours before the start of the unit to power on the heating belt and to preheat the compressor. If it is not heated enough, the compressor may be damaged.
- 3) Setting of the wire controller For details, please refer to the contents of this Manual about the setting of the wire controller, and basic settings such as cooling mode, heating mode and automatic adjustment mode. In general, during the test running, all kinds of parameters shall be set near the standard working conditions, and shall not be set at the extreme working conditions of the unit as far as possible.
- 4) Carefully adjust the inlet stop valve of the water system unit to make the water flow of the system is 100% complying with that required in the *Table of Technical Parameters*.

II. Inspection list after installation

According to all drawings and data, refer to the following table to inspect the installation work

Inspection list of installation work

| Items for inspection | Specific description | Yes | No |
|---|---|-----|----|
| Does the installation position meet the requirements | The unit is firmly installed on the foundation and leveled | | |
| | The air flow space of air side heat exchanger shall meet the requirements | | |
| | The maintenance workspace shall meet the requirements | | |
| | The noise and vibration shall meet the requirements | | |
| | Direct sunlight, rain and snow protection shall meet the requirements | | |
| | The appearance shall meet the requirements | | |
| Does the water system meet the requirements | Installation dimensions shall meet the requirements | | |
| | The length of the system shall meet the requirements | | |
| | The drainage shall meet the requirements | | |
| | Water quality control shall meet the requirements | | |
| | The hose connection shall meet the requirements | | |
| | The pressure control shall meet the requirements | | |
| | Thermal insulation shall meet the requirements | | |
| Does the electrical wiring system meet the requirements | The wire capacity shall meet the requirements | | |
| | The switching capacity shall meet the requirements | | |
| | The fuse capacity shall meet the requirements | | |
| | The voltage and frequency shall meet the requirements | | |
| | Fastening of connection position | | |
| | The operation of control device shall meet the requirements | | |
| | The safety device shall meet the requirements | | |
| | The interlock control shall meet the requirements | | |

| | | | |
|--|--|--|--|
| | The power supply phase sequence wiring shall meet the requirements | | |
|--|--|--|--|

III. Test running

- 1) Turn on the controller and check whether the unit has fault code display. If there is any fault, eliminate the fault first. After confirming that the unit is free of fault, and then start the unit according to the operation method in "Unit Control Instructions".
- 2) The test running shall last for 30 minutes. When the inlet and outlet water temperature is stable, adjust the water flow to the nominal value to ensure the normal operation of the unit.
- 3) After shutdown, put the unit into operation at an interval of 10 minutes to avoid frequent startup of the unit. Check whether the unit meets the requirements according to the table of *Technical Parameters*.



Attention

- Because the unit can start and stop the water pump, it is not allowed to control the operation of the water pump through the unit when the water system is being flushed.
- Do not start the unit before the water system is fully drained.
- In case of water shortage alarm during the test running of the unit, the interface of target flow switch shall not be short circuited. Whether the water pump type is too small or the pipeline design is reasonable shall be considered. Otherwise, the user shall be responsible for the fault caused by water cut-off during the operation of the unit.
- During the test running, the unit shall not be started up manually again after shutdown for less than 10 minutes.
- In the season of frequent operation, do not cut off the power supply after the unit stops running. Otherwise, the compressor will not be heated, which may cause damage to the compressor.
- If the power supply needs to be cut off due to long-term shutdown of the unit, remember to power on the unit 12 hours before restart to preheat the compressor.

Care and Maintenance

I. Control and protection function of the unit

1. The unit has the following control and protection functions:

- 1) Protection of insufficient flow in water circulation system
- 2) Power phase sequence protection
- 3) Protection for the suction pressure too low
- 4) Protection of exhaust temperature too high
- 5) Protection of overload of compressor motor
- 6) Anti-freezing protection (double protection of low shell and tube water temperature and low shell and tube inlet and outlet water temperature)
- 7) Protection for discharge temperature too high
- 8) Protection for condenser temperature too high under cooling working condition
- 9) Protection of evaporation pressure too low
- 10) Protection for fan overload

II Fault analysis and troubleshooting

| Fault | Possible causes | Detection and troubleshooting methods |
|--|--|---|
| Discharge pressure is too high (cooling operation) | There is air or other non-condensable gas in the system | Remove the air from the fluorine injection nozzle and vacuum it again if necessary |
| | The condenser fins are dirty or it is blocked by foreign matters | Clean the condenser fins |
| | Insufficient condensing air flow volume or condensing fan fault | Repair the condensing fan and resume the operation |
| | Suction pressure is too high | Please refer to "suction pressure too high" |
| | The charging of refrigerant is too much | Remove excess refrigerant |
| | The ambient temperature is too high | Check the ambient temperature |
| Discharge pressure too low (cooling operation) | Air subcooling on the side of air heat exchanger | Check the ambient temperature |
| | Refrigerant leakage or insufficient charging | Detect the leakage or fill sufficient refrigerant |
| | Suction pressure is too low | Please refer to "suction pressure is too low" |
| Suction pressure is too high (cooling operation) | The charging of refrigerant is too much | Remove excess refrigerant |
| | The inlet temperature of chilled water is too high | Check the pipe insulation and pipe insulation specification |
| Suction pressure too low (cooling operation) | Insufficient water flow | Check the temperature difference between inlet and outlet and adjust the water flow |
| | The inlet temperature of chilled water is too low | Check the installation conditions |
| | Refrigerant leakage or insufficient charging | Detect the leakage or fill sufficient refrigerant |
| | The evaporator has scale | Clean the scale |
| Discharge pressure is too high (heating) | Insufficient water flow | Check the temperature difference between inlet and outlet and adjust the water flow |

| | | |
|---|---|--|
| operation) | There is air or other non-condensable gas in the system | Remove the air from the fluorine injection nozzle and vacuum it again if necessary |
| | The water side heat exchanger has scale | Clean the scale |
| | The outlet temperature of cooling water is too high | Check the water temperature |
| | Suction pressure is too high | Please refer to "suction pressure is too high" |
| Discharge pressure is too low (heating operation) | Outlet water temperature is too low | Check the cooling water temperature |
| | Refrigerant leakage or insufficient charging | Detect the leakage or fill sufficient refrigerant |
| | Suction pressure is too low | Please refer to "suction pressure is too low" |

(cont'd)

| Fault | Possible causes | Detection and troubleshooting methods |
|--|---|--|
| Suction pressure is too high (heating operation) | The inlet air temperature of air side heat exchanger is high | Check the ambient temperature |
| | The charging of refrigerant is too much | Remove excess refrigerant |
| Suction pressure is too low (heating operation) | Insufficient refrigerant | Charge enough refrigerant |
| | Insufficient air volume | Check the fan steering |
| | Short air circuit | Eliminate the cause of air short circuit |
| Compressor shutdown due to antifreeze protection (cooling operation) | Insufficient defrosting operation | Four-way reversing valve or thermistor fault, and replace if necessary |
| | Insufficient chilled water flow | Fault of water pump or target flow controller, please check or replace |
| | There is gas in the water circuit | Exhaust the air |
| | Thermistor fault | If the fault is confirmed, replace it |
| Compressor shutdown due to high pressure protection | Discharge pressure is too high | Please refer to "discharge pressure is too high" |
| | High pressure switch fault | Check if there is any problem, repair or replace it |
| Compressor shutdown due to overload of motor | Discharge and suction pressure is too high | Please refer to "discharge pressure is too high" and "suction pressure is too low" to check that the voltage shall not exceed or be lower than 20 V of the rated voltage |
| | High or low voltage, single phase or phase imbalance | |
| | Short circuit of motor or wiring terminal | Check the corresponding resistance of motor and terminal |
| | Overload assembly fault | Replace them |
| Compressor shutdown due to built-in temperature sensor or discharge temperature protection | Voltage is too high or too low | The voltage shall not exceed or lower than 20 V of the rated voltage |
| | Discharge pressure is too high or suction pressure is too low | Please refer to "discharge pressure is too high" and "suction pressure is too low" |
| | Components fault | Check the built-in temperature sensor when the motor is cooled down |
| Compressor shutdown due to low pressure protection | The filter before (or after) the expansion valve is blocked | Replace the filter |
| | Low pressure switch fault | Replace it if there is any defect |
| | Suction pressure is too low | Please refer to "suction pressure is too low" |

| | | |
|---|--|--|
| Abnormal noise of compressor | Liquid slugging caused when liquid refrigerant from the evaporator entering the compressor | Adjust refrigerant charging |
| | Aging of compressor | Replace the compressor |
| The compressor can not be started | The over-current relay is tripped and the fuse is burnt out | Replace the damaged assembly |
| | The control circuit is not connected | Check the control system wiring |
| | High or low pressure protection | Please refer to the suction and discharge pressure fault section above |
| | Contacting coil burnt | Replace the damaged assembly |
| | Power supply phase sequence connection error | Reconnect and adjust any two of the three phases |
| | Water system fault and target flow controller is disconnected | Check the water system |
| | There is a fault signal in the wire controller | Find out the fault category and take corresponding measures |
| Excessive frosting of air side heat exchanger | Four-way reversing valve or thermistor fault | Check operation and replace if necessary |
| | Short air circuit | Eliminate the cause of air short circuit |
| | Improper placement of T4 ambient temperature probe | The probe is placed at a position where the ambient temperature can be correctly perceived |
| Noise | The fastening screws of the panel are loose | Fasten all parts |

III. Fault and cause of wire controller

If the unit is operating under abnormal condition, the fault protection code will be displayed on the wire controller, and the indicator light on the wire controller will flash at the frequency of 1 Hz. The display code is as follows:

Unit fault code:

| Unit fault | | |
|------------|--|-------------|
| Code | Definition of the fault | Description |
| E0 | Power fault (incorrect three-phase electrical input) | Each unit |
| E1 | Air conditioning water pump overload | Host |
| E2 | Insufficient water flow of air conditioning water pump | Each unit |
| E3 | (reserved) | / |
| E4 | (reserved) | / |
| E5 | Total return water temperature sensor TB fault | Host |
| E6 | Total return water temperature sensor T1 fault | Host |
| E7 | Outdoor environment temperature sensor T4 fault | Host |
| E8 | Water outlet temperature sensor T2 fault of shell and tube heat exchanger unit | Each unit |
| E9 | System A condenser outlet temperature sensor T3A fault | Each unit |
| EA | System B condenser outlet temperature sensor T3B fault | Each unit |
| Eb | Anti-icing temperature sensor TC fault of shell and tube heat exchanger | Each unit |
| EC | (reserved) | / |

| | | |
|----|--|-----------|
| Ed | (reserved) | / |
| EE | System A evaporator inlet temperature T5A sensor fault | Each unit |
| EF | System B evaporator inlet temperature T5B sensor fault | Each unit |
| L0 | EEPROM fault | Each unit |
| L1 | Communication fault between modules | Slave |
| L2 | The number of modules decreased | Host |
| L3 | Address error | Host |
| L4 | Communication fault between wire controller and main board | Host |
| L5 | On board chip communication fault | Each unit |

Protection code of the unit:

| | Unit protection | |
|------|--|-------------|
| Code | Definition of protection | Description |
| P0 | System A low pressure protection | Each unit |
| P1 | System A compressor module protection | Each unit |
| P2 | System A high pressure protection or discharge temperature protection | Each unit |
| P3 | Compressor A current too high protection | Each unit |
| P4 | System A condenser high temperature protection | Each unit |
| P5 | System A fan overload protection | Each unit |
| P6 | System B low pressure protection | Each unit |
| P7 | System B compressor module protection | Each unit |
| P8 | System B high pressure protection or discharge air temperature protection | Each unit |
| P9 | Protection for compressor B current too high | Each unit |
| PA | System B condenser high temperature protection | Each unit |
| Pb | System B fan overload protection | Each unit |
| PC | Outlet water temperature of shell and tube heat exchanger unit is too high/ too low | Each unit |
| Pd | The inlet and outlet water temperature difference of shell and tube heat exchanger is too large, and alarm will be sent when the difference between T2 and TB is greater than or equal to 10°C | Each unit |
| PE | Protection for anti-icing temperature too low | Each unit |
| PF | Other faults | Each unit |

Cont'd

| Code | Definition of protection | Description |
|------|---|-------------|
| F0 | System A return air temperature THA sensor fault | Each unit |
| F1 | System B return air temperature THB sensor fault | Each unit |
| F2 | System A injection bypass inlet temperature T6A sensor fault | Each unit |
| F3 | System A injection bypass inlet temperature T6B sensor fault | Each unit |
| F4 | System A injection bypass outlet temperature T7A sensor fault | Each unit |
| F5 | System B injection bypass outlet temperature T6B sensor fault | Each unit |
| F6 | Protection for system A discharge sensor temperature too high | Each unit |
| F7 | Protection for system B discharge sensor temperature too high | Each unit |

IV. Care and maintenance

1. Maintenance of main components

- In the process of operation, close attention shall be paid to the discharge and suction pressure of the system. If any abnormality is found, the cause shall be found in time to eliminate the fault.
- Control and protect the equipment. Do not adjust the setting point at will on site.
- Regularly check whether the electrical wiring is loose, whether the contact point is oxidized, and whether there are impurities causing poor contact, and if so, please deal with it in time. Always pay attention to the working voltage, current and phase balance.
- Timely check the reliability of electrical components, and timely replace the failed and unreliable components.

2. Remove the scale

After long-term operation, calcium oxide or other minerals will deposit on the heat transfer surface of the water side heat exchanger. When there is more scaling on the heat transfer surface, these substances will affect the heat transfer performance, resulting in increased power consumption and too high discharge pressure (or too low suction pressure). It can be cleaned with formic acid, citric acid, acetic acid and other organic acids. Never use cleaning agent containing chloric acid or fluoride, because the material of water side heat exchanger is stainless steel, which is easy to be corroded to result in refrigerant leakage. Pay attention to the following aspects in the process of cleaning and descaling:

- The cleaning of water side heat exchanger must be carried out by professionals. Otherwise, serious damage might be caused to the heat exchanger!
- After using the cleaning agent, clean the water pipe and heat exchanger with fresh water, and carry out water treatment to prevent the system from corrosion or re-adsorption of scale after cleaning.
- When cleaning agent is used, the concentration, cleaning time and temperature of cleaning agent shall be adjusted according to the condition of dirt deposition.
- After the completion of pickling cleaning, the waste liquid needs to be neutralized, and the relevant company for waste liquid treatment shall be contacted for the waste liquid.
- Cleaning agents and neutralizing agents have corrosive effects on eyes, skin, nasal mucosa, etc., so protection devices (such as goggles, protective gloves, protective mask, protective shoes, etc.) must be used in the cleaning process to prevent inhalation or contact with agents.

3. Shutdown in winter

When the unit is shut down in winter, the internal and external surfaces of the unit shall be cleaned and dried; in order to prevent dust, please cover the unit; open the drain valve to drain the water in the water system to prevent freezing accident (it is better to fill the water pipe with antifreeze). In order to prevent the pipeline from being damaged by freezing, do not cut off the power supply of the unit for short time shutdown in winter

4. Parts replacement

The replacement parts shall be the accessories provided by our company. Do not replace any different parts at will.

5. Initial start after shutdown

After any long-term shutdown, the following preparations shall be made when the unit starts up again:

- 1) Inspect and clean the unit thoroughly.
- 2) Clean the water piping system.
- 3) Check water pump, regulating valve and other equipment of water pipe system.
- 4) Tighten all wire connections.
- 5) Supply the power for 12 hours before start up.

6. Refrigeration system

Check the value of suction and discharge pressure to determine whether it is necessary to inject refrigerant and conduct leakage detection. If there is leakage or the components in the refrigeration cycle system are replaced, air tightness inspection shall be conducted. The following two situations shall be treated differently while filling the refrigerant.

- 1) Complete leakage of refrigerant. In this case, the leakage of high pressure nitrogen used in the system must be detected. If repair welding is needed, the gas in the system must be exhausted before welding. Before filling the refrigerant, the whole refrigeration system must be thoroughly dried and vacuumed.
 - The fluorine injection nozzle on the low pressure side shall be connected with the vacuum pipe.
 - Use the vacuum pump to vacuum the system pipeline for more than 3 hours, and confirm that the pressure indicated by the multimeter is within the specified range.
 - After reaching the required vacuum, fill the refrigeration system with refrigerant bottle. The appropriate refrigerant filling amount is indicated on the nameplate and in the table of main technical parameters. Refrigerant must be charged from the low pressure pipe side of the system.
 - The charge of refrigerant will be affected by the ambient temperature. If the required charge is not satisfied and it is unable to be charged again, the chilled water can be recycled and the unit can be started for charging. If necessary, the low-pressure control switch can be short circuited temporarily.
- 2) Supplement the refrigerants Connect the refrigerant filling bottle to the fluorine filling nozzle on the low pressure side, and connect the pressure gauge on the low pressure side.
 - Circulate the chilled water, start the unit, and short circuit the low pressure control switch if necessary
 - Slowly charge the system with refrigerant and check the suction and discharge pressure.



Attention

- The wiring must be restored after charging.
- During the leakage detection and air tightness test, never charge the refrigeration system with oxygen, acetylene or other flammable or toxic gases but only high-pressure nitrogen or refrigerant.

7. Disassemble the compressor

If the compressor needs to be disassembled, please follow the following steps:

- 1) Turn off the power supply of the unit.
- 2) Remove the compressor power cable.
- 3) Remove the suction and discharge pipes of the compressor.
- 4) Remove the compressor fixing bolts.
- 5) Remove the compressor.

8. Auxiliary electric heater

When the ambient temperature is below 0°C, the heating efficiency decreases with the decrease of outdoor air temperature. In order to stabilize the heating operation of air-cooled heat pump units in cold regions and supplement part of the heat lost due to defrosting, when the minimum ambient temperature of the user's region in winter is 0°C to -10°C, the auxiliary electric heater will be an option. Please consult relevant professionals for the power of the auxiliary electric heater.

9. System anti-freezing

If the flow passage of the water side heat exchanger is frozen due to not following the instructions, it will cause serious damage, that is, the heat exchanger will leak due to crack This frost crack is not in

the scope of warranty, so special attention shall be paid to anti-freezing.

- 1) When the unit is shut down for standby under low ambient temperature, and if the unit is placed outdoor environment with the temperature lower than 2℃ , the water system shall be drained.
- 2) During operation, if the chilled water target flow controller and antifreeze temperature sensor fail, the water pipe may freeze. Therefore, the target flow controller must be connected according to the wiring diagram.
- 3) During maintenance. When the unit is charged with refrigerant or discharged for maintenance, the water side heat exchanger may be cracked as a result of freezing. Whenever the pressure of refrigerant in R410A system is below 0.7MPa, pipeline icing may occur.

Therefore, when the system releases the refrigerant, the water in the heat exchanger must be kept flowing or completely drained.

Technical Parameters

| Model | | 35 kW(EVI) | 75 kW(EVI) | 155 kW(EVI) |
|-------------------------------|--------------------------------|---|------------|-------------|
| Nominal heating capacity | kW | 24 | 50 | 100 |
| Nominal heating power | kW | 9.8 | 20 | 43 |
| Nominal heating current | A | 18 | 37 | 74 |
| Rated heating capacity | kW | 36 | 77 | 155 |
| Power consumption for heating | kW | 10.3 | 22.6 | 39.52 |
| Rated heating current | A | 19 | 40 | 82 |
| Rated refrigerating capacity | kW | 30 | 60 | 138 |
| Cooling power consumption | kW | 9.5 | 20.7 | 43.1 |
| Rated cooling current | A | 18 | 38 | 78 |
| Power Supply | | 342-415 V 3 N-50 Hz | | |
| Operation control | | High and low pressure switch, anti-freezing protection device, target flow controller, overload protection devices, power phase sequence protection device, etc | | |
| Safety device | | Controlled by the wire controller. It can start the machine manually and automatically, display the running status and give an alarm for the fault. | | |
| Refrigerant | Type | R410A | | |
| | Charge volume kg | 7.5 | 6.5*2 | 12*2 |
| Water pipe system | Water flow (m ³ /h) | 6.20 | 13,2 | 26,6 |
| | Water resistance loss kPa | 30 | 30 | 69 |
| | Water side heat exchanger | Shell and tube type heat exchanger | | |

| | | | | |
|-------------------------|--------------------------------|---------------------------------|-----------------|------------------|
| | Maximum working pressure Mpa | 1.0 | | |
| | Inlet and outlet pipe diameter | 1 ¹ / ₂ " | DN65 | DN65 |
| Air side heat exchanger | Type | Fin coil type | | |
| | Air flow m ³ h | 12,000 | 24,000 | 48,000 |
| Outline dimension | Length mm | 1,160 | 2,000 | 2,200 |
| | Width mm | 900 | 900 | 1,100 |
| | Height mm | 1,920 | 1,920 | 2,280 |
| Net weight | Kg | 320 | 610 | 1,010 |
| Operating weight | Kg | 370 | 640 | 1,110 |
| Package dimension | Length×width×height mm | 1,240×950×2,060 | 2,080×950×2,060 | 2,280×1140×2,420 |

Note:

1. The above data are measured under the nominal conditions of GB/T 25127.1-2010 and GB/T 25127.2-2010.
2. Rated working condition: water flow rate 0.172 m³ (H·kW), chilled water outlet temperature 7°C and ambient temperature 35°C。
3. Rated heating mode: water flow 0.172m³ (H·kW), hot water outlet temperature 45°C and ambient temperature DB7°C/WB6°C。
4. Heating mode under nominal working condition: the water flow is according to the rated cooling flow, and the outlet water temperature is 41°C and ambient temperature is-12/-14°C.

Daily operation record

| | | | | | | | | | | | |
|--|-------------------|-----|--|--|--|--|--|--|--|--|--|
| Model: | | | | | | | | | | | |
| Date: | | | | | | | | | | | |
| Weather: | | | | | | | | | | | |
| Operation time: startup () stop () | | | | | | | | | | | |
| Outdoor temperature | Dry ball | °C | | | | | | | | | |
| | Wet ball | °C | | | | | | | | | |
| Indoor temperature | | °C | | | | | | | | | |
| Compressor | High pressure | MPa | | | | | | | | | |
| | Low pressure | MPa | | | | | | | | | |
| | Voltage | V | | | | | | | | | |
| | Current | A | | | | | | | | | |
| Air temperature of air side heat exchanger | Inlet (dry ball) | °C | | | | | | | | | |
| | Outlet (dry ball) | °C | | | | | | | | | |
| Chilled or hot water temperature | Inlet | °C | | | | | | | | | |
| | Outlet | °C | | | | | | | | | |
| Cooling water pump or hot water pump current | | °C | | | | | | | | | |
| Remarks: | | | | | | | | | | | |

Annex:

Parts Purchased from Local Source

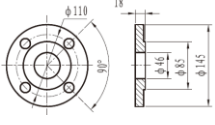
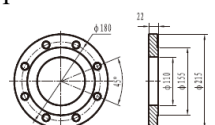
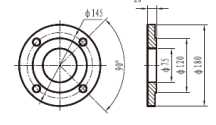
| Name | Shock absorber | Double core sheathed communication line | Flange plate | | |
|---------|---|--|--|--|--|
| Shape | - | - | DN40 flange plate  | DN100 flange plate  | DN65 flange plate  |
| Remarks | The installation hole of the steel frame of the unit base is $\Phi 15$ mm | The double core sheathed communication line with grounding wire shall be used, and the inner core specification shall be $2 \times 0.56 \text{ mm}^2$ which is in accordance with 3C certification. The length of communication line shall be determined according to the site conditions, and the maximum length shall be $\leq 1000\text{m}$. | Specification of flange plate shall refer to the above figure | Specification of flange plate shall refer to the above figure | Specification of flange plate shall refer to the above figure |

Figure (I) Wiring nameplate of 35 kW module unit (Copeland compressor)

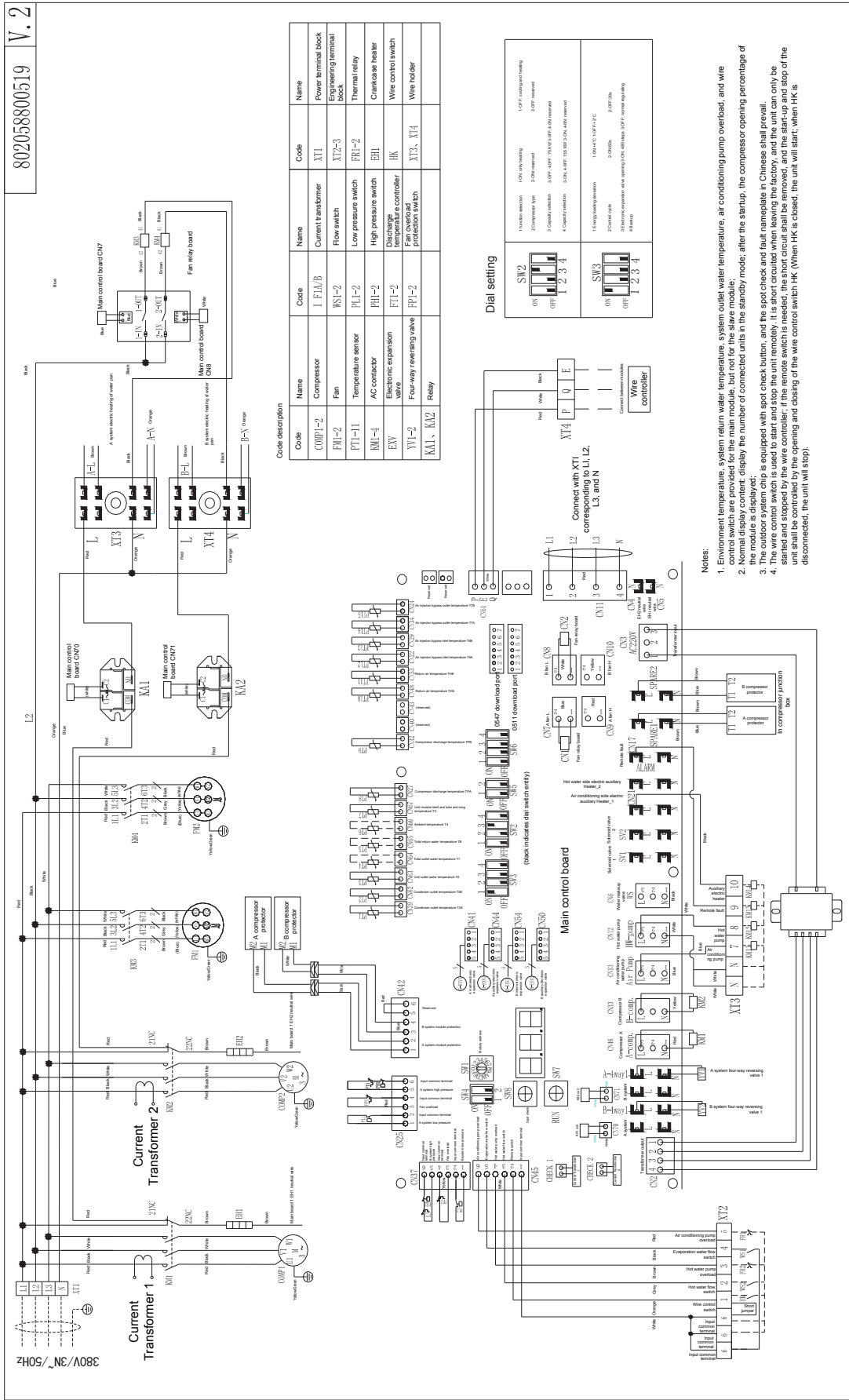


Figure (II) 75 kW module unit wiring nameplate

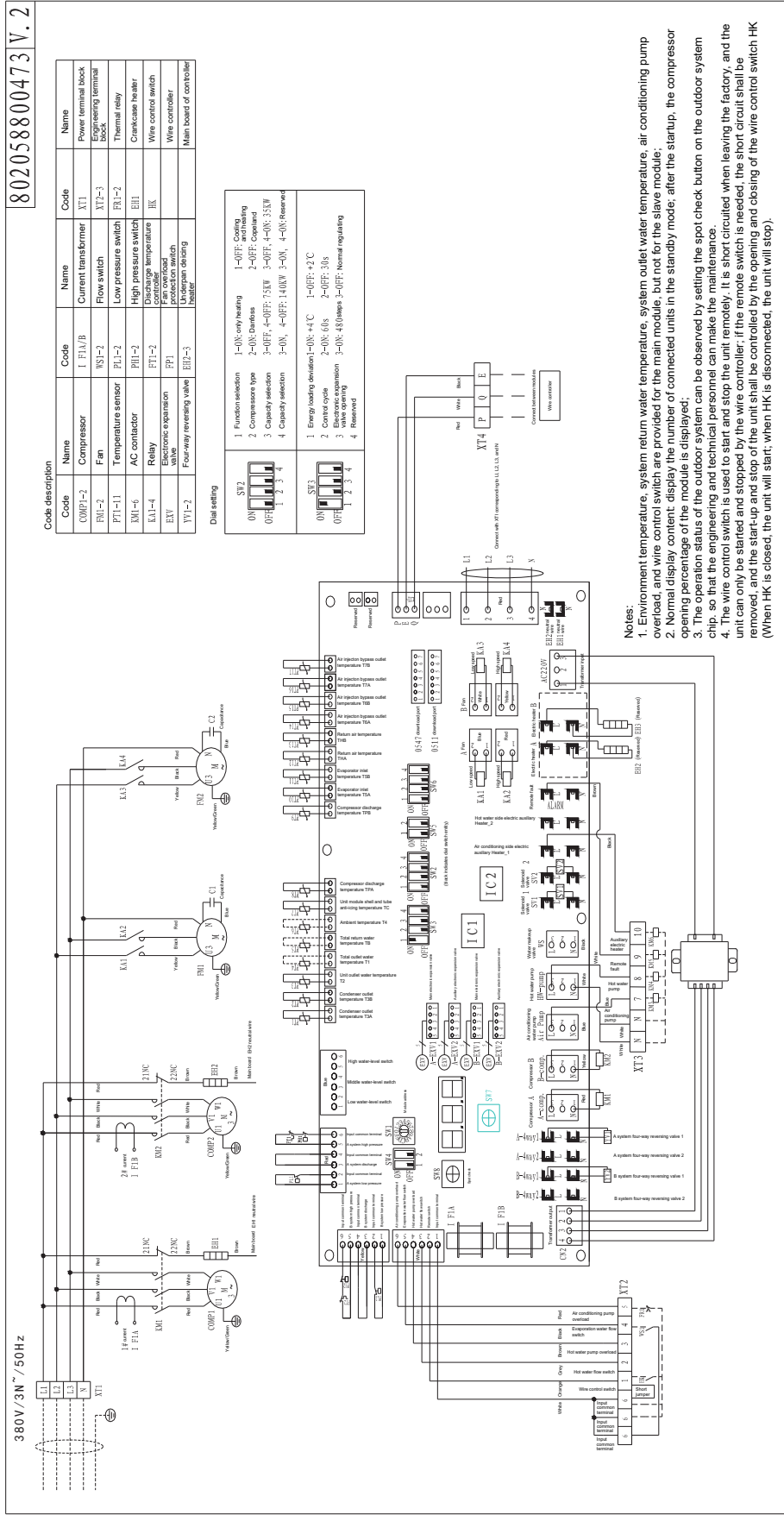


Figure (III) Wiring nameplate of 155 kW module unit

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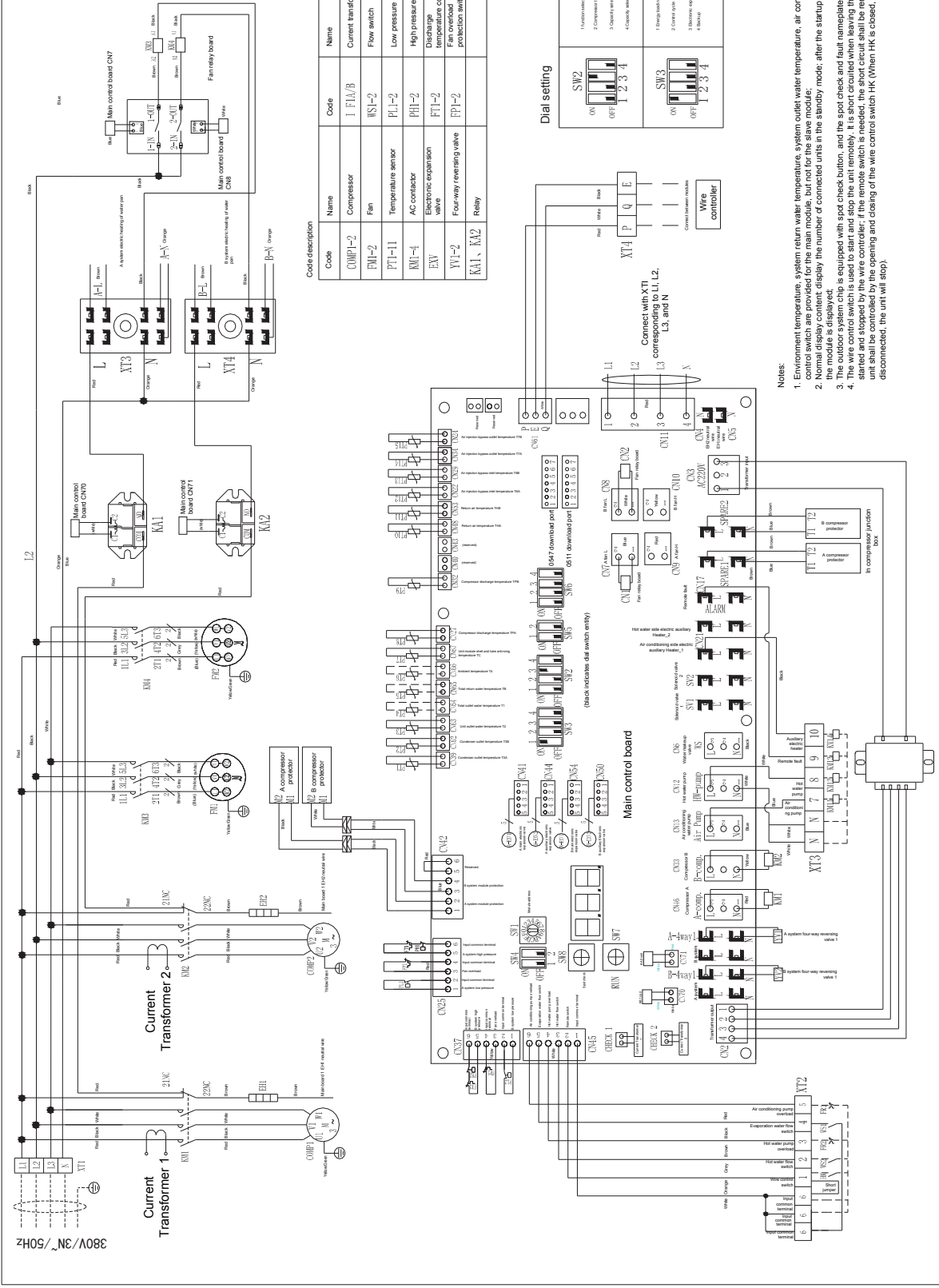
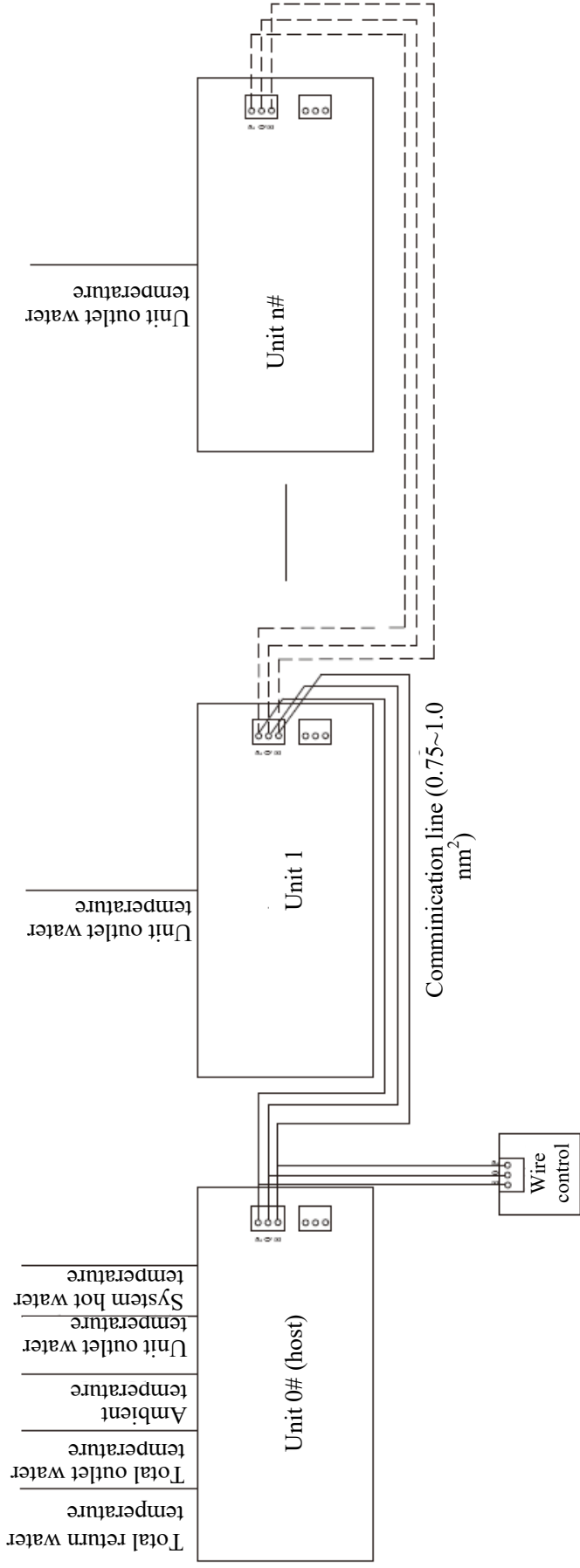


Figure (v) Schematic diagram of network communication between the host and the slave



Notes:

1. The maximum number of modules of the unit is $n \leq 32$;
2. The communication line is twisted pair $2 \times (0.75-1.0) \text{mm}^2$ Shielded wire P,Q,E ("E" is the shield connect)
3. Select the unit type through the main board dial switch

(When the unit is far away from the wired controller, 120 Ω matching resistor may be connected with P and Q at the side of main board in parallel.)
(The max length 50m)

Appendix: name and content of harmful substances in products

| Name and content of hazardous substances in the product | | | | | | |
|---|----------------------|--------------|--------------|------------------------------|--------------------------------|---------------------------------------|
| Part Name | Hazardous Substances | | | | | |
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Hexavalent chromium (Cr(VI)) | Polybrominated biphenyls (PBB) | Polybrominated diphenyl ethers (PBDE) |
| Compressor and accessories | × | ○ | × | ○ | ○ | ○ |
| Heat exchanger | ○ | ○ | ○ | ○ | ○ | ○ |
| Pipe fittings and valves | × | ○ | ○ | ○ | ○ | ○ |
| Refrigerant | ○ | ○ | ○ | ○ | ○ | ○ |
| Motor | × | ○ | × | ○ | ○ | ○ |
| Control box and electrical components | × | ○ | × | ○ | ○ | ○ |
| Power cord and connecting wire | × | ○ | ○ | ○ | ○ | ○ |
| Fasteners such as screws, bolts, etc. | × | ○ | ○ | ○ | ○ | ○ |
| Rubber parts | ○ | ○ | ○ | ○ | ○ | ○ |
| Other metal parts | ○ | ○ | ○ | ○ | ○ | ○ |
| Other plastic parts | ○ | ○ | ○ | ○ | ○ | ○ |
| Printed parts | ○ | ○ | ○ | ○ | ○ | ○ |
| Foam parts | ○ | ○ | ○ | ○ | ○ | ○ |
| Insulation cotton | ○ | ○ | ○ | ○ | ○ | ○ |

The table is prepared in accordance with SJ/T 11364.

○: It indicates that the content of the hazardous substance in all homogeneous materials of this part is below the limit specified by GB/T 26572.

×: Indicates that the content of the hazardous substance in at least one homogeneous material of the part exceeds the limit specified in GB/T26572; however, with the existing technical conditions, it is impossible to realize free of above harmful substances in the product parts. With the progress of alternative technology, the content of harmful substances will be gradually reduced.

To protect the environment and human health:

1. The packaging of this product can be recycled; after the product is scrapped, please separate it from domestic waste, and consumers have the responsibility to send it to a qualified recycling point;
2. The recycling center will recycle the materials in the reused product through appropriate methods.
3. For more information about recycling this product, please consult your local government, waste scrap center, or dealer.

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