INSTALLATION & OPERATION MANUAL

TOTAL HEAT RECOVERY MODULAR UNIT (TCA-XHR/1)

PRO
TICA PRO

TICA®

Contents

I. Overview

This manual is the customer's property and should be used together with the unit. After work, put the manual back in the technical documentation bag and keep it properly.

Please read through this manual carefully before installing the air conditioning unit, and install and maintain the unit according to the manual, ensuring normal and reliable operation of the unit. Only professionals appointed by company can install the air conditioning unit. The vendor shall not bear any responsibility if any unqualified operator installs or maintains the unit or the unit is not installed or operated according to requirements of this manual.

This manual does not cover the differences between various units or all the problems that may be met during installation, so it is impossible for it to provide instructions to all the situations that may occur during installation. If the buyer wants to get further information or meets a special problem but a detailed explanation is not provided in this manual, please contact company.

The prompts of **"Danger", "Warning",** and **"Caution"** are provided at proper parts in this manual. To ensure personal safety and normal operation of the unit, read through the content carefully and observe the related requirements.

⚠Danger: The prompt points out the potential hazard situation. Ignoring it may lead to death or serious personal injury.

⚠Warning: The prompt points out the potential hazard situation. Ignoring it may lead to minor or moderate personal injury. This prompt is also used for warning of unsafe activities.

⚠Caution: The prompt points out the potential situation of equipment damage. Ignoring it may lead to equipment damage or property loss or possible environmental pollution. It also provides useful help information, which may be good to unit operation or extension of the unit service life. However, it does not indicate that the help information is optimal or is directly related to the improvement of unit operation.

⚠Danger

Prior to installation or maintenance, lock the unit power supply and disconnecting switch in the power-off state, avoiding personal casualties caused by electric shock or contact with a moving part. All the installation procedures of the air conditioning unit must comply with the national, provincial, and local regulations.

⚠Warning

1. **Do not use unqualified refrigerant, refrigerant substitute or refrigerant additive. Incorrect using method or using unqualified refrigerant, refrigerant substitute or refrigerant additive will lead to unit damage and various safety hazards. Please select qualified refrigerant or call the 400 hotline to purchase qualified refrigerant. All the technicians operating refrigerant must have acquired qualification**

certificates, and know very well and strictly observe the technical requirements, laws and regulations related to refrigerant use, handling, recovery, and recycling.

2. If the ambient temperature is lower than 5°C and the unit is not used for a long time or a power failure occurs, be sure to thoroughly drain water from the unit and pipeline, and then disconnect the unit from the power supply. If the ambient temperature is lower than 5°C and the unit is not used temporarily, ensure that the unit is in the power-up state and the chilled water circulating pump of the air conditioner must be interlocked with the modular chiller. In this way, the modular unit can automatically control the water pump operation or heating operation, thereby implementing automatic anti-freezing protection of the air conditioning water system. The purpose is to protect facilities such as the unit and water pipeline against damage caused by freezing of water in the pipeline of the air conditioning water system.

II. Safety Precautions

- **Before operating the unit, read all the items in "Safety Precautions" carefully.**
- **"Safety Precautions" lists all important items related to safety. To prevent electric shocks, fire and other possible injuries, be sure to bear in mind and strictly abide by the following rules:**

✧ Install a leakage circuit breaker.

✧ The user cannot try to install the unit independently. Improper installation may lead to water leakage, electric shock, or fire.

✧ Be sure to install the grounding wire, which cannot be connected to the gas pipe, tap water pipe, lightning arrester, etc. Improper installation of the grounding wire easily leads to an electric shock accident.

✧ Be sure to make a foundation platform before installing the unit to ensure stable operation o the unit.

✧ Use the accessories specified by company and ask the manufacturer or authorized distributor to provide installation and technical services.

✧ The main controller must adopt the same power supply system together with the unit.

✧ The control data line must be separated from the power cord of power supply to prevent interference.

✧ Do not insert your fingers or other objects into the air outlet or inlet, lest you would be injured or the air conditioner would be damaged. The fan running at a high speed is very dangerous. Prevent kids from getting close to the fan.

✧ Do not damage the power cord or turn on/off the air conditioner by inserting/pulling out the power plug.

✧ Do not use water to flush the air conditioner directly; otherwise electric shock or other accidents are easily caused.

✧ Ensure smooth air inlet and outlet of the air conditioner.

✧ Do not turn on/off the air conditioner frequently; otherwise the air conditioner may be damaged due to frequent startup.

✧ If the unit will stop operation for a long term or in winter, drain the water from the system and then turn off the power supply.

✧ If the unit is not used temporarily in winter, ensure that the unit is in the power-up state to prevent unit freezing.

✧ If the unit will be used again after stop for a long term, first connect the power supply for the unit for preheating for 24 h.

✧ The user cannot try to repair the unit independently. Improper repair may lead to an operation failure or burnout of the unit. To have the unit repaired, the user needs to contact the local branch or authorized maintenance service provider.

⚠Caution

When charging or adding refrigerant to the unit, make sure that the charging amount and refrigerant type are consistent with the information on the unit nameplate. A refrigerant charging mistake may lead to a unit

fault or other potential safety hazards.

Acid, alkali, salt spray and other corrosive gases will damage the unit casing, pipeline or electrical components. The unit installation position must be far away from the site with corrosive gases.

The circulating water pump of the water system must be interlocked with the main control board of the unit. Otherwise, commissioning and acceptance cannot be performed. Company will not bear any responsibilities for the incurred damage of the water-side heat exchanger and other accidents.

III. Unit Description

1. Scope of Application, Purposes and Characteristics

The total heat recovery modular air-cooled chiller (heat pump) uses the innovative modular design. The entire unit is composed of one or more modules, each of which consists of one independent cooling system. The electric controls of modules are independent of one another and modules are connected through communication cables to form a control network.

TICA's total heat recovery modular air-cooled chillers (heat pumps) use R410A environment-friendly refrigerant, and combine the benefits of TICA air-cooled chillers (heat pumps) and air source heat pump water heaters. They support five modes: air-conditioner cooling, air-conditioner heating, cooling + heat recovery, hot water producing by heat pump, and air-conditioner heating + hot water producing by heat pump, which are widely applied in the places that require air conditioning and hot water, such as hotels, schools, canteens, hospitals, villas and bath centers. Since there is no need to construct dedicated equipment rooms and cooling towers, total heat recovery modular air-cooled chiller (heat pump) presents the optimal solution for busy business districts and water-stressed areas.

The unit has the following features:

Free domestic hot water

In air-conditioner cooling mode, the unit can recycle waste heat and provide free domestic hot water with temperature up to 40℃–55℃. As a substitute for boilers, the unit can address the need for hot water with less initial investment, and ensure lower energy consumption with no need for an equipment room.

Small size for saving space

The floor area of a single module is only 1.89 m^2, the best in class. The unit can replace boiler, without the need for an equipment room, thus saving initial investment and building area.

Compact structure with a full range of functions

The full-featured unit adopts compact design and supports modes of cooling, heating, cooling + heat recovery, hot water producing by heat pump, and air-conditioner heating + hot water producing by heat pump.

Efficient parts and higher energy efficiency

Equipped with an efficient shell-and-tube heat exchanger, efficient fan, and efficient heat recovery device, the unit supports comprehensive energy efficiency of up to 8.24 in cooling + heat recovery mode, with the help of the optimized pipeline design.

High-precision EXVs for throttling

The unit uses Electronic Expansion Valves (EXVs) as fine and adaptive control components for refrigerants, to implement dynamic matching between the refrigerant and compressor for

the cooling system. This fully improves the optimum efficiency of every component in the system and ensures the best operation pressure and temperature for the system.

Support for connection to the building automation system

The unit is equipped with RS485 interfaces for connecting to the centralized building control system. It can be integrated into the centralized building control system via legitimate protocols, to implement building automation.

Intelligent defrosting

The unit automatically determines the optimal defrosting time based on the ambient temperature and actual operation parameters, to prevent frost residue or frequent defrosting. In addition, intelligent defrosting can prevent air conditioning effect from being affected by large water supply temperature fluctuation during unit defrosting.

Multi-protection design

The modular design allows starting the unit in a hierarchical way, reducing the impact of the startup current on the power grid.

The unit is equipped with multiple types of protection, including compressor overload protection, water shortage protection, system overpressure protection, system under-pressure protection, compressor exhaust over-temperature protection, frequent unit startup protection, external interlock protection, water outlet under-temperature protection, and automatic winter anti-freezing protection.

Microcomputer control system

The microcomputer control system uses microcomputer centralized control to implement combined installation and control of multiple modular units. A single controller can control a maximum of 16 units, making the unit operation and management more convenient. The microcomputer control system has the following functions:

- Timed power-on/off, which allows setting the weekends and three holiday time periods for the unit operation.
- Automatic fault judgment, handling, and alarm display.
- Operation and control of auxiliary electric heaters in winter.
- Intelligent defrosting control and intelligent anti-freezing operation control.
- Fuzzy control and balanced operation of compressors to implement optimal load matching.
- Password protection permissions for parameter settings.
- Fan coil unit interlock control function.

Wide operation range

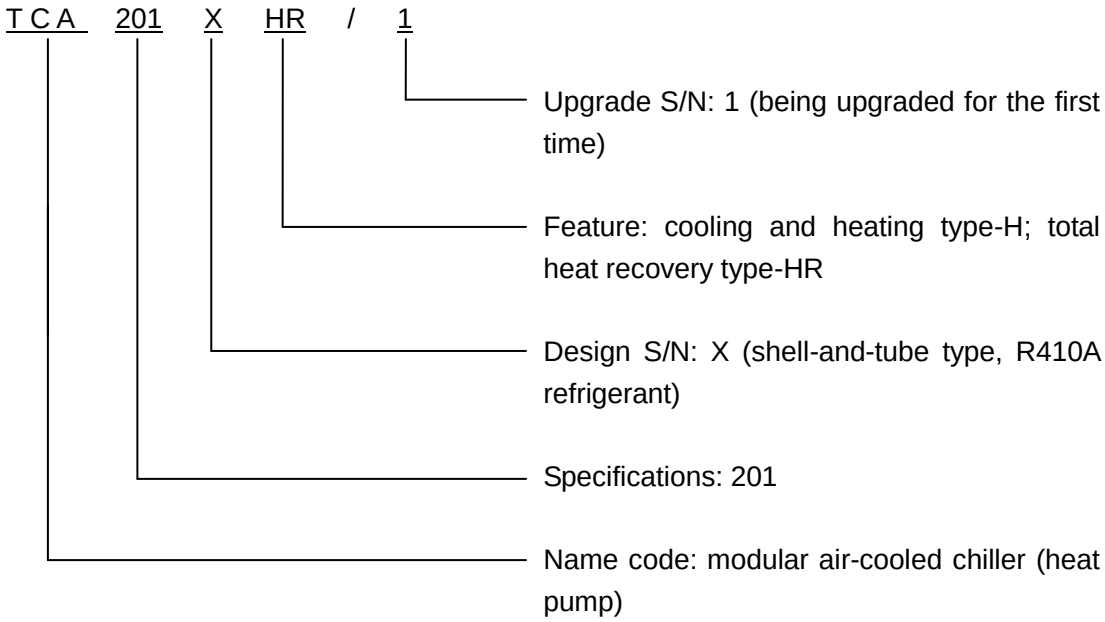
The unit can run at an ambient temperature as high as 48°C in cooling mode and hot water producing mode, and at an ambient temperature as low as -15°C in heating mode and hot water producing mode. The range of ambient temperature for unit operation is wider.

2. Standard Compliance

The unit complies with the national product standard GB/T 18430.1 *Water Chilling (Heat Pump) Packages Using the Vapor Compression Cycle Part 1: Water Chilling (Heat Pump) Packages for Industrial & Commercial and Similar Application.*

IV. Specifications

1. Model Nomenclature



2. Technical Specifications

Note: The performance parameters on the unit nameplate shall prevail if the following performance parameters differ from those on the nameplate.
Specifications:

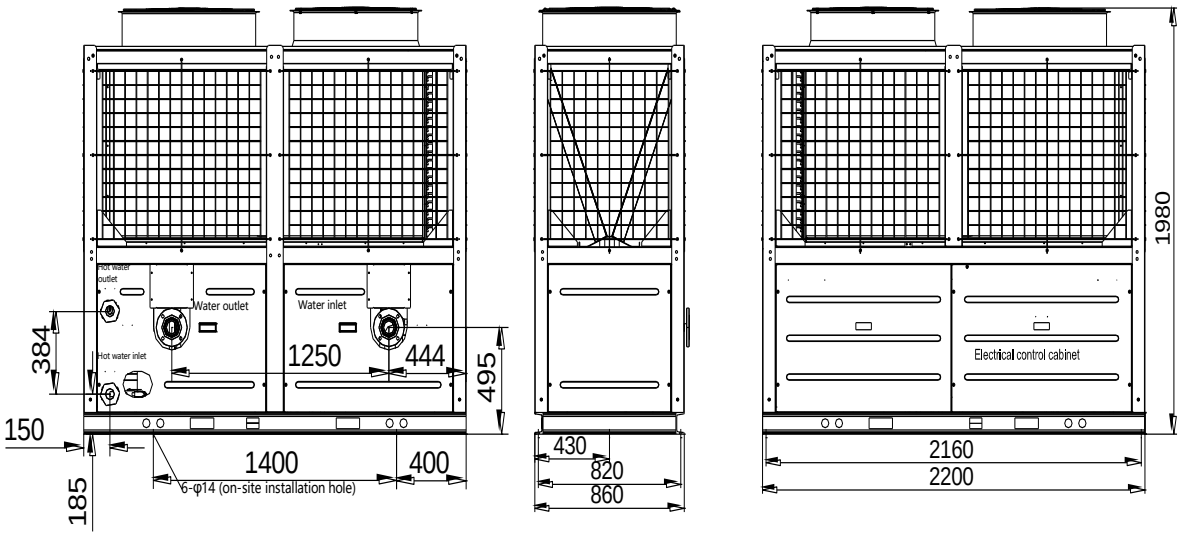
Model				TCA201XHR/1
Air-conditioning mode	Nominal cooling capacity		kW	66
	Nominal heating capacity		kW	70
	Nominal cooling power input		kW	20.0
	Nominal heating power input		kW	21.0
	Water flow		m^3/h	11.4
	COP			3.30
Domestic hot water mode	Water flow		m^3/h	13.1
	Nominal heating capacity		kW	76
	Nominal heating power input		kW	18.4
Cooling+heat recovery mode	Nominal cooling capacity		kW	60
	Nominal heat recovery capacity		kW	76
	Nominal input power		kW	16.5
	Water flow	On the chilled water side of air conditioner	m^3/h	10.3
		On the domestic hot water side	m^3/h	13.1

Power supply			380V 3N~ 50Hz
Water resistance	On the water side of air-conditioner	kPa	40
	On the domestic hot water side	kPa	50
Water inlet/outlet pipe diameter	On the water side of air-conditioner	-	DN65 (flange connection)
	On the domestic hot water side	-	DN65 (internal thread)
Operating mode	-	-	Automatic operation controlled by microcomputers
Refrigerant	Type	-	R410A
Unit weight		kg	650
Dimensions	Length	mm	2200
	Width	mm	860
	Height	mm	1980

Remarks:

1. In air-conditioning mode, the nominal cooling capacity is tested under the following conditions: the water flow is 11.4 m^3/h, water outlet temperature is 7°C, and outdoor dry-bulb temperature is 35°C. The nominal heating capacity is tested under the following conditions: the water flow is 11.4 m^3/h, water outlet temperature is 45°C, outdoor dry-bulb temperature is 7°C, and outdoor wet-bulb temperature is 6°C.
2. In domestic hot water mode, the nominal capacity is tested under the following conditions: the water flow is 13.1 m^3/h, water outlet temperature is 45°C, outdoor dry-bulb temperature is 20°C, and outdoor wet-bulb temperature is 15°C.
3. In cooling + heat recovery mode, the nominal capacity is tested under the following conditions: on the air-conditioner side, the water flow is 10.3 m^3/h, and water outlet temperature is 7°C; on the hot water side, the water flow is 13.1 m^3/h, and water outlet temperature is 45°C.
4. About 6% loss caused by system pipelines, water pumps, valves, and dirt after unit installation shall be considered for the cooling (heating) capacity in actual application.
5. The specifications above are based on a single module. Multiple modules can be used in combination. Units support the combination of a maximum of 16 modules.

3. Structure Diagrams



V. Unit Installation

1. Key Points for Installation

Acceptance

After receiving units, a customer shall carefully check whether the unit casings and internal components are in good condition. If a unit is damaged, record it in the delivery note and notify the carrier and local sales office of the damage in written form within three days.

Check whether the power supply for the unit is consistent with the information specified in the nameplates of the unit compressor, fan motor, and 4-way valve, and other components, and check whether information on the unit nameplates is correct. Ensure that the maximum voltage deviation of the power supply cannot exceed ±10%.

Handling

Use a forklift or crane with appropriate tonnage to handle units. Use canvas ropes for the handling, wind the canvas ropes around the unit bottom, and tighten the ropes.

For the external dimensions and weight of the unit, see the technical parameter lists.

Installation position

The unit can be installed on the ground or roof with prefabricated unit foundation, dedicated platform, or other places convenient for the unit installation and capable of bearing the unit operation weight. Be sure to pay attention to the following requirements:

A: Keep the unit more than 1.8 m away from surrounding objects, and ensure proper ventilation conditions for the unit.

B: When multiple units are placed side by side, keep a distance of at least 3.0 m between two adjacent units to ensure excellent heat transfer effect.

C: Install the unit close to the main power supply, to prevent unit startup exception caused by excessive voltage drop.

D: Construct drains around the unit beforehand and take account of the unit drainage in winter.

E: Install the unit more than 10 m away from residential areas to prevent noise from disturbing residents during unit operation.

⚠ Caution

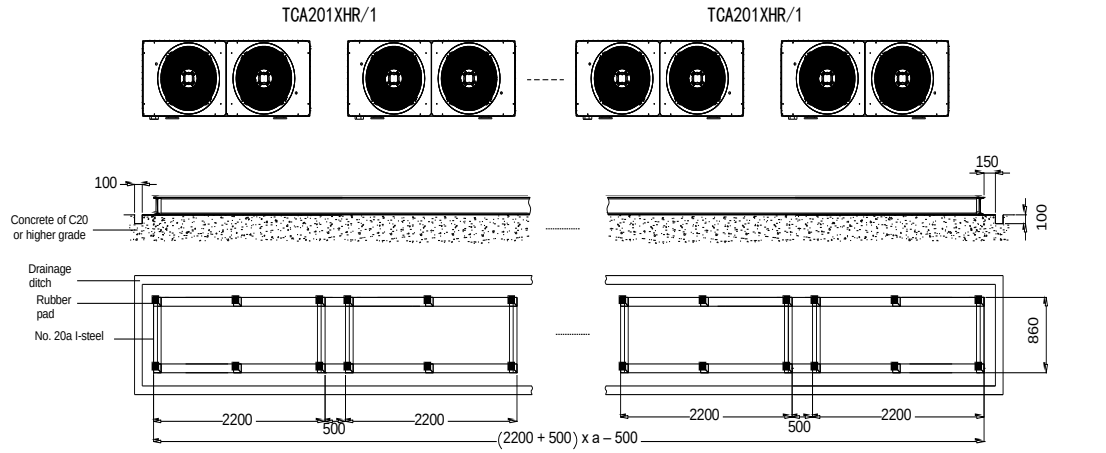
Acid, alkali, salt spray and other corrosive gases will damage the unit casing, pipeline or electrical components. The unit installation position must be far away from the site with corrosive gases.

2. Installation Diagrams

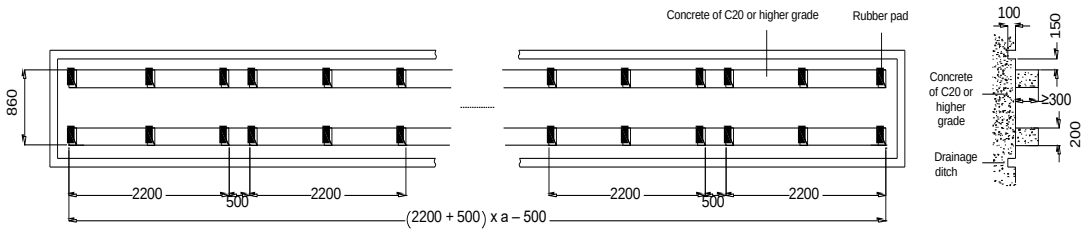
(1) Installation Foundation Diagrams

The unit can be directly placed on a base with drains reserved around. The base can be pre-casted using cement. The unit can be supported by a bracket made of angle steel, with shockproof rubber pads. It can be also placed on the ground or flat roof. The base surface must be flat and horizontal.

Installation Foundation Diagrams for Modular Combinations:



I. I-steel foundation diagram



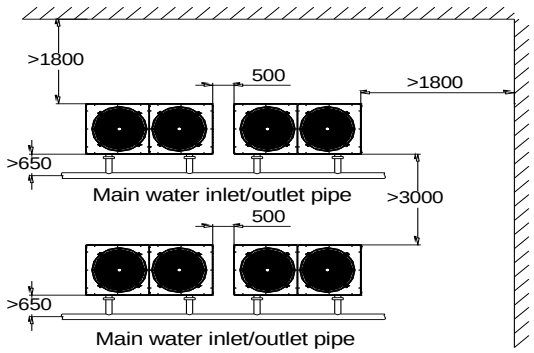
II. Concrete foundation diagram

Notes:

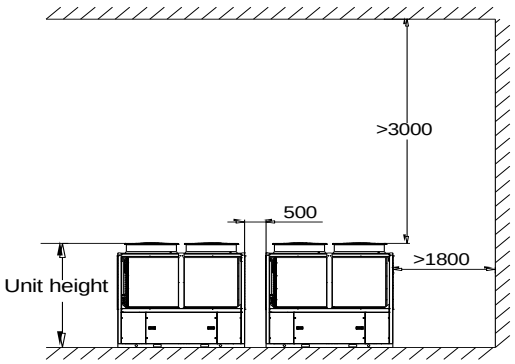
a. a indicates the number of modules of the TCA201.
b. The foundation is made of reinforced concrete or channel steel frame, and is capable of bearing the weight of no less than 500 kg/m².
c. Use rubber damping pads or shock absorbers with the thickness not smaller than 20 mm between the unit base and the foundation.
d. Use M10 bolts to fasten the unit to the foundation.
e. The foundation surface must be flat and horizontal and drains need to be reserved around the foundation.

(2) Installation Space Diagrams

The figure below shows the installation space of the TCA201XHR/1 units:



Top view



Side view

Notes:

a. The installation space of the unit must meet relevant dimension requirements for the ease of overhaul and maintenance.
b. The diameters of the main water inlet and outlet pipes of the unit must be verified by

professionals with a reference to the recommended pipe diameters in the manual.

c. Keep a certain distance between the main water inlet and outlet main pipes of the unit and the unit for the ease of installation and maintenance.

d. Install sewage valves and drain valves at the lowest positions of the main water inlet and outlet pipes. Reserve drains around the unit.

3. Unit Installation

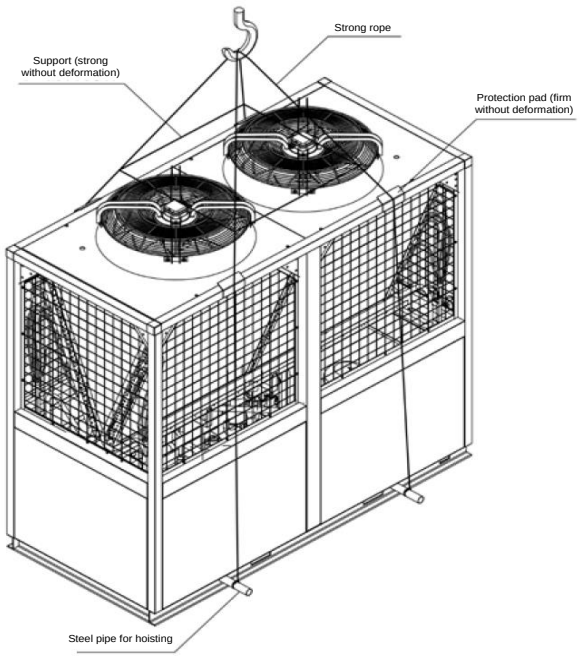
⚠ Caution

After a unit is delivered from the factory to the installation site, keep the proper package before hoisting. Pay attention to the following points during hoisting:

A: Handle the unit with care and keep the unit upright.

B: Prevent sliding caused by collision with other objects. No person is allowed to stand below or near the unit for the sake of safety. Select the round steel, rope, and crane based on the weight of the unit.

C: Use protection pads in places where steel ropes contact the unit, to prevent scratches or unit deformation. In addition, use supports between ropes to prevent the tightened ropes from damaging the unit.

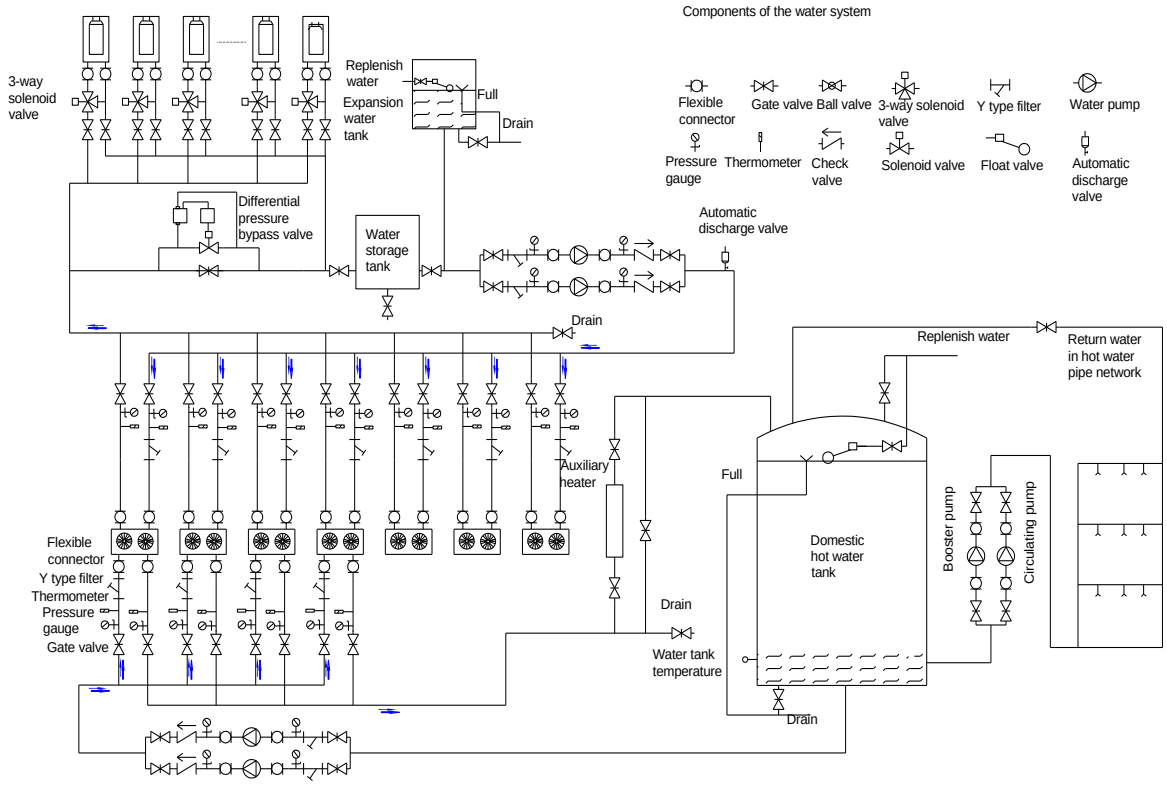


4. Installation of the Water System

Refer to the following table for the diameters of the main water inlet and outlet pipes of the unit.

Cooling capacity (refrigeration ton)	20 - 40	50 - 60	80 - 160	160 - 240	240 - 500	500 - 800
Water pipe diameter DN (mm)	80	100	125	150	200	250

(1) Unit Pipe Schematic Diagram



Notes:

a. The figure shows the installation of the water system. The installation is subject to the construction drawings of the design institute.

b. Water flow switches have been installed inside the unit and they do not need to be installed on site.

c. The water system of the unit shall ensure that water flow is evenly distributed between units.

d. The water flow of the unit shall not be smaller than the value specified on the nameplate at any time as long as the unit is running. The water flow needs to be ensured in transition seasons. The condensation temperature is low and the cooling effect is good in transition seasons, and therefore, the water flow of the unit shall be fully ensured, to prevent frequent startup and shutdown of the unit due to water outlet under-temperature. The water flow should be within the range of 90% to 110% of the value specified on the nameplate.

e. Space must be reserved between modular units to ensure smooth ventilation. Four units on the left side of the schematic diagram are all heat recovery units, which are controlled independently, and three units on the right side are ordinary units, which are controlled independently.

(2) Precautions for Construction of the Water System

a. Complete piping for the water system as per the method described in this manual, and correctly carry out the construction according to the water heating pipe construction standard.

b. Determine the diameters of trunk pipes based on pipe sizes, water flow, and cooling capacity of the unit.

c. It is recommended to connect indoor air-side devices in reversed backwater (direct turn

connection) manner, to ensure even distribution of water.

d. A Y-type water filter must be installed at the water inlet of the plate type unit, to prevent dirt in the water system from clogging the water-side heat exchanger. Pay attention to the flow direction during installation. Check valves must be installed at both ends of the Y-type water filter so that the filter can be dismounted for cleaning. For shell-and-tube units, a Y-type water filter needs to be installed only on the main water inlet pipeline of the unit.

e. Install a thermometer and a pressure gauge on the water inlet and outlet pipes of the unit so as to check the operation status of the unit conveniently.

f. Install a water flow regulating valve on each water outlet branch pipe of the unit, to regulate the flow of water entering each unit to be consistent.

g. Install drain valves on the water inlet and outlet pipes of the unit. With the drain valves, water inside the unit can be drained away when the unit is not used for long in winter, thereby preventing water from freezing in the water-side heat exchanger and water pump and damaging the unit.

h. Install water pipes horizontally or vertically. No leakage is allowed on pipelines and connection parts, and the thermal insulation effect should be good. Install an air discharge valve and a filling expansion water tank (open-type water tank) at the highest position of pipes, and install a pressure relief valve on the water outlet side of the water pump.

i. Avoid air in the system pipeline in the piping design and construction. Install automatic air discharge valves at the highest positions of water supply and return pipes, so as to discharge air in the system.

j. Water pumps must be selected based on the flow and the required head. The water pump is generally installed on the main water inlet pipe of the unit. When the outlet pressure of the water pump is greater than 0.8 MPa, it is recommended to install the water pump on the main water outlet pipe to prevent high pressure from damaging the unit.

k. The automatic differential pressure regulator can make the entire system work more stably.

l. Water supply valves and check valves must be installed indoor, lest water supply pipes and valves will crack due to water freezing in winter. And it should be checked regularly whether the domestic hot water tank can replenish water normally.

m. The indoor unit and pipeline system should be designed and installed by professionals based on the actual pipeline direction of buildings in accordance with relevant technical specifications. Avoid "U-shaped" bending and "n-shaped" bending. Otherwise, poor air discharge may be incurred and water resistance may be increased, causing air clogging.

n. If an auxiliary heat source such as an auxiliary electric heater is used, The installation height of hot water side should be lower than that of water tank.

o. After the water system is installed, test the water pressure for leakage and drain sewage in accordance with the HVAC installation specifications. Clean water filters to ensure cleanness inside pipes of the system and no rust dirt inside. Otherwise, the pipeline, water-side heat exchanger, and water pumps may be clogged, causing the unit damage.

p. Externally galvanized lining plastic tubes or stainless steel tubes are recommended to be used as hot water system tubes. PPR tubes are not recommended.

q. In the regions with high water hardness, a water treatment device must be installed on the water replenishment side.

r. The hot water circulating pump must be installed at the same plane of the hot water tank

or at the place lower than the minimum water level of the water tank.

s. The air-conditioner circulating water pump and hot water circulating water pump must interlock with the master unit and be kept in power-up status.

t. It is recommended that all the hot water pipelines adopt rubber insulation. The insulating layer thickness should not be less than 20 mm (if other materials are used for thermal insulation, the thermal insulation effect cannot be poor than that of the recommended material). The thermal insulation material of outdoor hot water tubes should be wrapped with a protective coat, which should be made of galvanized sheet iron or galvanized sheet aluminum.

u. Without affecting ventilation around the heat pump unit, the hot water tank should be installed close to the heat pump unit as much as possible, thus reducing heat loss of pipelines.

⚠Warning

Water filters need to be cleaned periodically, lest water-side heat exchanger may be clogged, causing severe damage of the unit.

⚠Caution

Install an energy storage water tank on the main return water pipe of the unit and calculate the water volume as per the method described in this manual. The energy storage water tank is used to adjust the capacity of the unit, reduce frequent compressor startup and shutdown due to load changes of the air-conditioning system, improve the operation efficiency of the system, and prolong the service life of the unit.

After the water system is installed, the main water outlet temperature sensing probe of the unit must be installed on the main water outlet pipe of the unit, so as to accurately sense changes in the water temperature of the unit and control the normal operation of the unit. In order to make the water temperature sensing probe accurately detect the water outlet temperature, it is required to open a blind hole on the main water outlet pipe, and then insert the temperature sensing probe into the blind hole. Otherwise, the unit may malfunction.

(3) Water Quality Requirements

To prevent water from corroding and clogging the water system of the unit, ensure that water filled into the water system is clean, with the pH value ranging from 7.5 to 9.0. The existence of oil, salt, acidic gas or liquid in the water system will reduce the system performance and even damage the unit, resulting in the unit operation failure. The content of calcium and magnesium ions in the water of the water system should be lower than 150 mg/L, and the content of chlorine ions should be lower than 300 mg/L (recommended). The water quality should be inspected before water is injected into the heat exchanger of the unit. If the water quality does not meet the requirements of air-conditioning water, water treatment is required. For the water treatment, see the *Code for Design of Industrial Recirculating Cooling Water Treatment* or other relevant standards.

(4) Pressure Testing and Flushing

a. The strength test pressure of the whole metal pipe network water system should be 1.5 times the design work pressure, but should not be smaller than 0.6 MPa. After the pressure is maintained for 10 minutes, the pressure drop is not greater than 0.02 MPa and no leakage, deformation, and other abnormal phenomenon occur. The pressure for the air tightness test should be the design work pressure, and no leakage occurs after the pressure is kept for 60 minutes. (Note that the pressure at the lowest point shall not exceed the bearing pressure of its components).

b. The water pressure test shall not be carried out when the atmospheric temperature is below 5°C. The pressure gauge for the testing should be qualified, the accuracy is not lower than Level 1.5, and the full-scale value is 1.5-2.0 times of the maximum measured pressure.

c. Add water from a low position and discharge air from a high position during pressure testing. Add water slowly and evenly, stop the pump operation when the pressure reaches the required pressure, and check the system. Do not carry out the repair work when pressure is not relieved.

d. After the water system passes the pressure testing, flush the water pipeline repeatedly (ensure that the water does not pass through the chiller and air-side devices of the air-conditioning system) till no silt, iron rust, and other impurities are drained from the water system and water is not turbid.

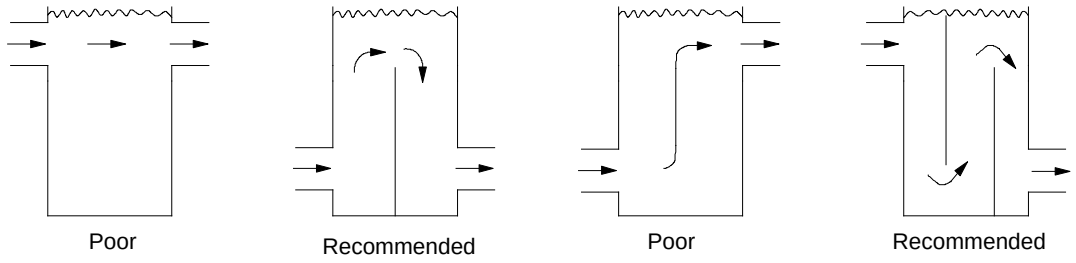
e. After the pressure testing and flushing, clean the water filter installed on the main water inlet pipe and filters at the water pump inlets, disassemble the water-side service panel of the chiller, and clean water filters provided with the water inlet branch pipes of the unit. Install the service panel and check for leakage after cleaning.

(5) Installation of the Energy Storage Water Tank

In order to ensure the control accuracy and stability of water outlet temperature as well as safe operation of the unit, the system must be equipped with a water tank with the minimum volume. The water tank can prevent frequent load increase/decrease of internal compressors in the unit and prolong the service life of the unit. The controller limits frequent unit startup and shutdown to prevent compressor damage. A compressor cannot be started for more than six times one hour.

The minimum water volume of the system can be approximated to 10 L/kW (that is, the minimum water volume of the system is 1 m^3 when the cooling capacity of the unit is 100 kW, and the water volume of the system should be at least 3 m^3 for medical purification and other technological air conditioning sites). The size of the energy storage water tank is determined based on the difference between the calculated minimum water volume and the actual water volume.

In order to meet the water volume requirements above, one energy storage water tank needs to be added for general sites, and baffle plates need to be installed in the water tank, to prevent short water flow. The figure below shows the general installation of baffle plates.



⚠Caution

For occasions with a small water capacity, an energy storage water tank must be installed to ensure stable operation of the unit. Otherwise, the unit may be damaged due to water temperature too high or too low.

(6) Model Selection and Installation of Domestic Hot Tank

The inner tank must be made of stainless steel, while the housing can be made of stainless steel or color plate. The insulating layer is made of polyurethane foam with the thickness of 50–100 mm (100 mm is recommended). The thermal insulation performance shall at least ensure that temperature is not decreased by greater than 8℃ within 24 hours. The tank withstands only the weight of water, and at the same time must be dust and germ proof.

The tank must have a proper size; otherwise, the unit performance will be compromised. The capacity for a single tank should be between 10–12 tons. In case of parallel combination of multiple modules, the capacity should be the product of this single-tank capacity and the number of parallel modules. In actual circumstances, tank capacity should be calculated according to user demands for hot water.

Requirements for Selection of Hot Water Tank

- The tank must be adequately insulated. Places for connections are shown in the following diagram.

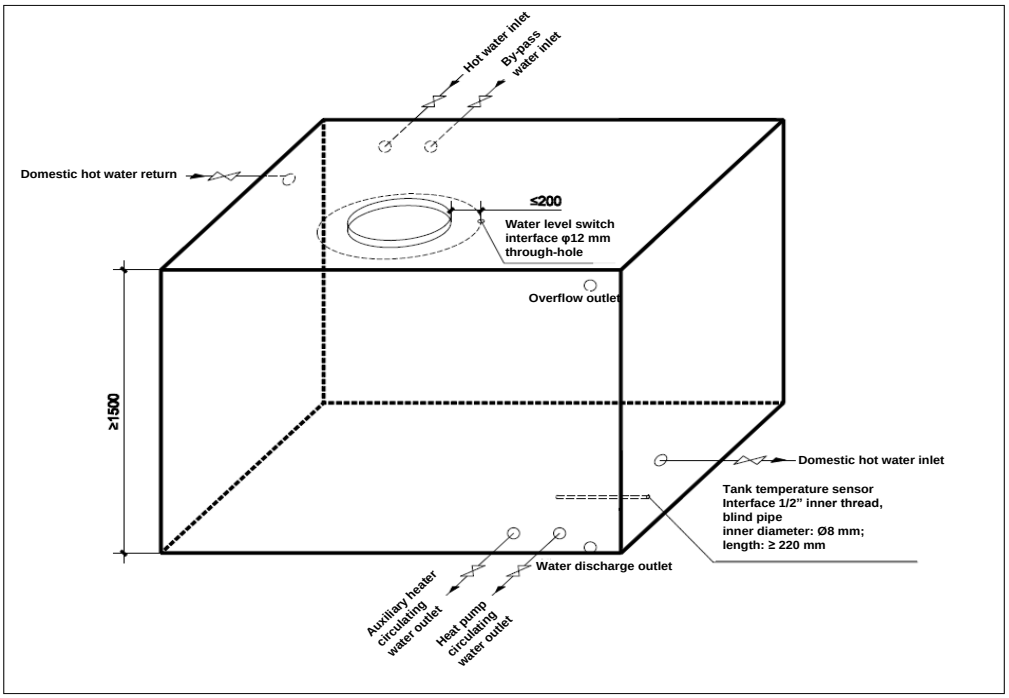
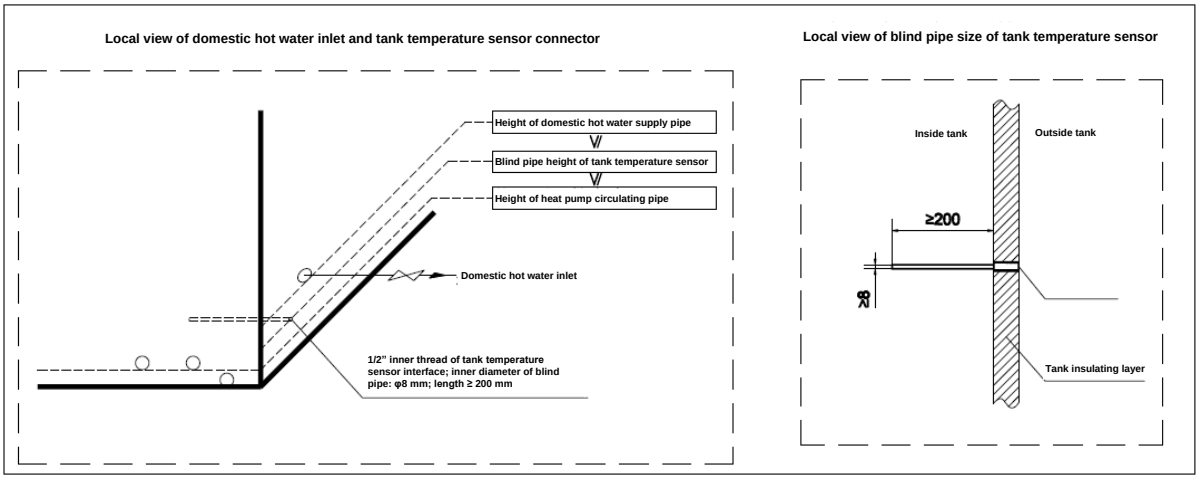


Diagram of water tank connectors

The following diagram shows the local view of feed water inlet, tank temperature sensor connector, and blind pipe size of tank temperature sensor.



Local view of sizes of tank interfaces

Notes:

- The size indicated in the diagrams is the net size from pipe to the inside tank, with the thickness of tank insulating layer excluded.
- The positions of the heat pump circulating water outlet and auxiliary heater circulating water outlet should be above the water discharge outlet but below the domestic hot water inlet. The height of the tank temperature sensor connector should be between the domestic hot water inlet and the heat pump circulating water outlet.
- The hot water inlet, domestic hot water return and by-pass water inlet should be arranged diagonally towards the domestic hot water inlet, heat pump circulating water outlet and auxiliary heater circulating water outlet. Positions of all the water pipes are determined according to the site conditions.
- Ensure that the tank access port is covered lest foreign matters or rain enter.
- The water height controlled by the float valve connected to by-pass water inlet should be lower than the overflow outlet.
- Leakage detection should be carried out after completing the tank.

Installation of the Water Tank

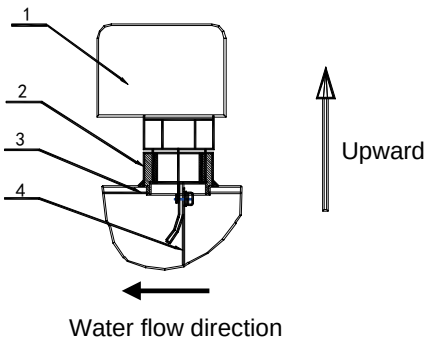
Notes: ● It is recommended to install the tank close enough to the heat recovery modular unit, as long as air circulation around the heat pump unit is ensured. Such installation method can reduce heat losses of pipelines.
● It is recommended to install the auxiliary heater (if any) below the tank.
● It is recommended to install the tank and heat recovery modular unit at the same height.

(7) Installation of Water Flow Switches

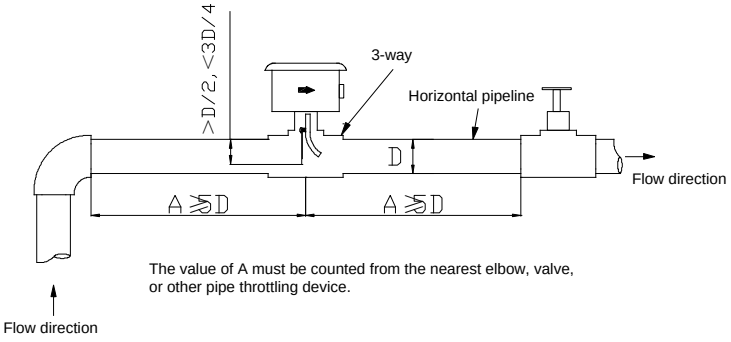
A water flow switch is 1 inch in size with external thread. Water flow switches must be upright and installed in straight pipe section. The length of the straight pipe section before and after a water flow switch must be greater than 5 times the pipe diameter. (For detailed installation method, see the manual delivered with the water flow switch.) The water flow switch of the air-cooled chiller (heat pump) must be installed on the water outlet pipeline of each unit, to ensure sufficient water circulation during the normal operation of the unit, thereby preventing the damage of the water-side heat exchanger due to insufficient water flow or no water

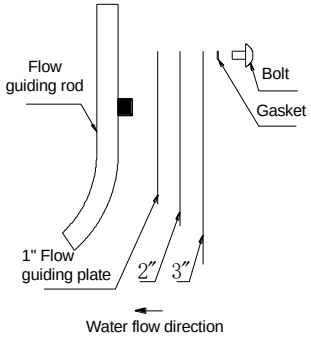
during unit operation.

As shown in the figure on the right side, a water flow switch is composed of a water flow switch controller 1, a diaphragm 4, a water flow switch connector 2, and a short tube 3. When water passes through the water flow switch, the water flow strikes the diaphragm, which drives the water flow switch to close, thereby making the circuit close. When there is no water flow or the water flow is very low, the circuit will be disconnected to protect the unit.



The figure below shows the installation method of the water flow switch and flow direction plates.





(8) Installation of Air Discharge Valves

Automatic air discharge valves are used to discharge air out of the water system so that the unit works properly. An air discharge valve is installed at the highest position of the system and air discharge valves also need to be installed at high positions of some sections. Air discharge valves aims at discharging air in the system if any.

(9) Installation of the Expansion Water Tank

The expansion water tank aims at adapting the unit to the change of the water volume caused by temperature changes, stabilizing the system pressure, and supplementing water into the system. The expansion water tank is generally installed on the low-pressure pipe (suction side of the water pump) at a height about 3 m higher than the highest position of the water pipeline, to ensure positive pressure of the pump suction inlet and make the unit work properly. The expansion water tank should be insulated against freezing caused by low ambient temperature in winter, lest it fails to function properly.

The formula for calculating the capacity of the expansion water tank is as follows:

Volume of the expansion water tank: V = (0.03~0.034) Vc

Vc indicates the water volume of the system.

(10) Installation of Water Pipelines

Water inlet and outlet collection pipes of the unit:

For the distance between water inlet and outlet collection pipes and the unit as well as the opening size, see the unit layout. Pierce openings at the water inlet and outlet of each

module, weld the DN65 water pipes, reserve threaded or flanged interfaces between the water pipes and the unit connection end so that the unit and water pipes are connected in soft connection way. After all pipelines are installed, perform the pressure test and then conduct thermal insulation.

⚠Caution

A manual gate valve for adjusting the water flow needs to be installed on the water inlet pipe of each module to ensure even water flow distribution during water pipe installation. A drainage hole needs to be installed at the lower part of the water outlet pipe of each module to facilitate water drainage in winter.

Other pipes:

The pipeline installation directly affects the use effect of air-conditioning units. Only qualified installation team is allowed to install pipelines and the installation must comply with industrial standards. The following are some suggestions on pipeline installation:

a. Water pipelines should be installed based on the hoisting height of air-side devices as well as the height of beam bottom. The installation height determines the pipeline elevation and arrangement. Pipelines can be arranged in parallel or in staggered manner. Staggered arrangement is allowed if the condition permits.

b. Pipes are generally fastened using supports or hangers. For the form and fastening method of supports and hangers, see the national installation standard atlas. Pipes should be isolated from supports and hangers via wood or other insulation materials based on the on-site conditions, to prevent the occurrence of cold bridge. The table below lists the reference spacing for supports and hangers.

Diameter mm	< DN25	DN25~DN32	DN40~DN50	DN70~DN80
Spacing m	2.0	2.5	3.0	4.0

c. Maintain the slope of 1/1000 to 3/1000 regardless of the pipeline arrangement. The sloped pipe installation is conducive to the air discharge via the end of pipelines. The spacing between two pipes should be basically the same and the insulation distance should be reserved, to ensure pipes are horizontally flat and vertically upright. Prevent "U-shaped" bending and "n-shaped" bending. Otherwise, clogging may occur in some areas, resulting in poor air discharge and affecting circulating operation of the water system.

d. Maintain the slope of 0.5% to 1% in the arrangement of condensate drain pipes. Do not elevate the condensate drain pipes regardless of the hoisting elevation of air-side devices and whether pipelines are wound around the beam. Observe the nearby drainage principle, determine the water drainage point, shorten the pipeline as much as possible, reduce the pipeline decline caused by slope, and raise the ceiling height. Strict thermal insulation is required for condensate pipes.

e. Air discharge valves on pipelines need to be set based on on-site environment. They are generally set at the end of horizontal pipeline (long pipeline), upper position of stand pipes, and elevated position of some areas, to ensure smooth air discharge of the pipeline system.

f. It is recommended to set a bypass valve for each layer of the multi-layer air-conditioning pipeline, to regulate the water flow. A drainage valve needs to be set at the lowest point of the pipeline to facilitate system overhaul and water drainage when the unit is not used

in winter, thereby preventing water pipe damage caused by frosting.

g. An open expansion water tank is recommended. The water tank should be installed about 3 m higher than the highest point of the system, and the interface of the water tank needs to be connected to the return water pipe close to the water pump (an air discharge valve is also required for the expansion water tank).

(11) Pipe Diameter

⚠Caution

The pipe diameter affects the system operation resistance at the same flow rate. Choose pipes with a larger diameter when the condition permits, to reduce the system operation resistance and pump head.

The following table lists the recommended ideal diameter design values for reference.

Ideal flow rate of water in pipes (m/s)

Position	Water Pump Outlet	Water Pump Inlet	Main Pipe	Stand Pipe	Branch Pipe
Flow rate	2.4~3.6	1.2~2.1	1.2~4.5	0.9~3.0	1.5~2.1

Maximum flow rate of water in pipes (m/s)

Annual Running Hours	1500	2000	3000	4000	5000
Flow rate	4.6	4.3	4.0	3.7	3.0

Water flow and resistance loss per unit length

Pipe diameter Dn	15	20	25	32	40	50	70	80	100	125
Flow L/s	0~ 0.14	0.12~ 0.32	0.22~ 0.60	0.46~ 1.2	0.7~ 1.8	1.4~ 3.6	2.2~ 6	4~ 11	8~ 22	15~ 18
Loss kPa/ 100 m	0~ 60	10~ 60	10~ 60	10~ 60	10~ 60	10~ 60	10~ 60	10~ 60	10~ 60	10~ 60

The table below lists the pipe diameter and required number of air-side devices (Fan Coil Units (FCUs)). The data is based on the FCU of TCR300-TCR600. Use the lower limit when the size of the FCU is large, and use the upper limit when the size of the FCU is small. For other air-side devices, determine the water pipe diameter based on the actual water flow.

A bypass valve must be installed when a 2-way valve is installed for FCUs, and the bypass valve needs to be interlocked with the 2-way valve. The purpose is to ensure that the bypass valve is open when the 2-way valve is closed, so as to prevent uneven water resistance and water flow.

Pipe diameter Dn	15	20	25	32	40	50	70	80
Number of FCUs	1	1~2	3~5	6~8	9~13	14~20	21~28	29~38

⚠ Caution

When 2-way valves are installed for air-side devices but no interlock bypass valve is installed, the number of installed 2-way valves cannot exceed 50% of the total number of air-side devices. The purpose is to prevent an excessive number of closed 2-way valves under partial load operating conditions. Otherwise, the water resistance is too large, the pump is overloaded and damaged, and the unit cannot work properly.

(12) Selection of Other Components of the Water System

A. Check valve:
Determine the valve based on the water pipe diameter. The diameter of the valve connection pipe is generally the same as that of the water pipe.

B. Water filter
A water filter is used to filter out impurities in the water system and prevent damage of the water-side heat exchanger. A water filter with denser meshes delivers a better filtering effect. 16-20 meshes are recommended.

C. Check valve:
A check valve is used to prevent water backflow from damaging water pumps. The valve caliber is the same as the diameter of the inlet and outlet of water pumps.

D. Bypass valve for air-side devices:
A bypass valve for air-side devices is used to interlock with indoor FCU 2-way valves. 2-way valves are used to adjust the water flow of the indoor FCU, and excessive chilled water flows out through the bypass valve, to prevent the evaporator damage when the total water flow is reduced because the 2-way valve is turned down.

E. Differential pressure bypass valve:
If the number of 2-way valves used for air-side devices exceeds 50% of the number of air-side devices and interlock bypass valves are not used, automatic differential pressure bypass control valves need to be installed on the main water supply and return pipes, and bypass water should first flow through the energy storage water tank and then to the unit. In this way, low-temperature water will not enter the unit and damage the evaporator.

5. Electrical Installation

(1) Power Supply and Electric Parameters of the Unit

The minimum starting voltage of the unit must be kept above 90% of the rated voltage, the voltage must be within ±10% of the rated voltage range during operation, and the voltage difference between the phases should be within the range of ±2%.

⚠ An adverse impact will be caused to the unit when the voltage is too high or too low. If the voltage is unstable, excessive current will be generated at the moment when the unit starts for operation. Consequently, the unit cannot start.

⚠ The distance (i.e., the voltage drop) between the chiller installation position and the power distribution cabinet and the current size should be considered for the conducting wire

diameter. Then, decide the power distribution line path and the main switch capacity to ensure normal operation of the unit.

⚠Caution

The main controller must adopt the same power supply system together with the unit.

It is recommended to determine the diameter of the power input wire of the unit as per the table below.

Model	Maximum operating current (A)	Minimum cross-sectional area of power wire (mm^2)			Communication connecting wire (RVVP)	Copper bar size (A x B)
		Phase line	Neutral line	GND		
TCA201	50	16	10	16	The wire for connecting the chiller and the remote controller is a 4-core communication wire and the standard length is 30 m.	The cross-sectional area of the copper bar (A x B) shall not be smaller than the square of the main power wire.

Caution:

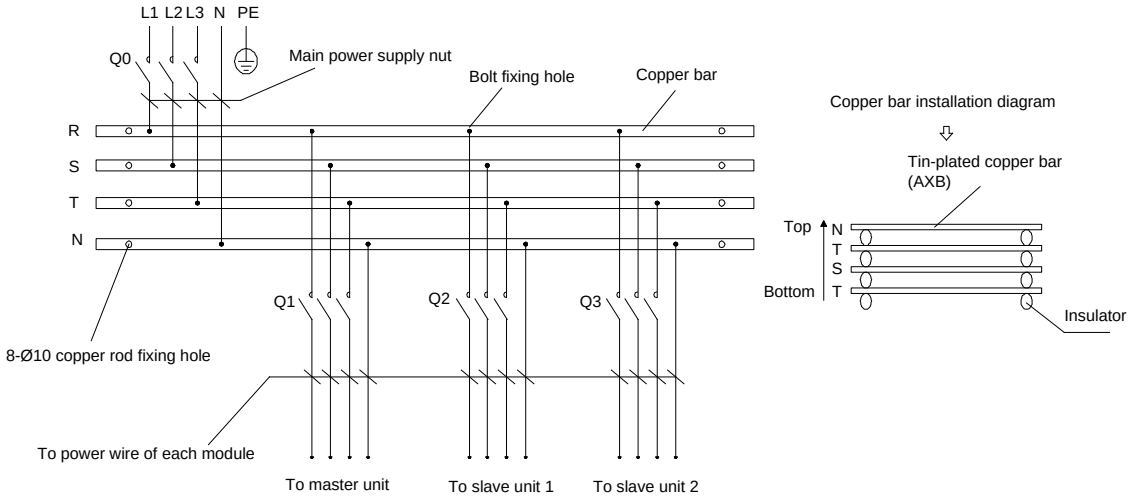
a. The recommended specification of the power wire is the copper core cable used by the 70°C multi-core PVC insulated cable passing through sleeves and laid through the insulating wall at the ambient temperature of 30°C in the air and 20°C in the ground (see the IEC_60364-5-523 *Wire and Cable Carrier Flow Standard*). If the actual installation conditions on site have changed, select a proper model based on the layout conditions by referring to the conducting wire specifications provided by the wire manufacturer.

b. The selection of power wires is closely related to the local climate, soil characteristics, cable length and layout mode. Such unit engineering projects are often designed by design institutes and the selection of power wires is subject to the design of the design institutes.

c. Shielded twisted pairs are recommended for communication wires to prevent interference. It is forbidden to lay out them with power wires together.

(2) Electrical Wiring for the Unit

The figure below uses three units an example to illustrate the on-site installation and power distribution. Other units can use the similar method.



Caution:

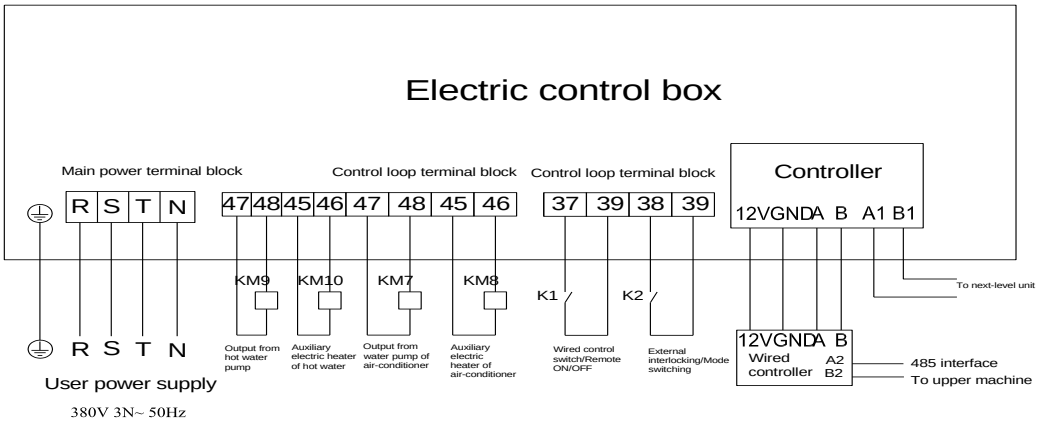
a. The standard unit power is 380 V 3N~ 50 Hz.
b. Q0 and Q1/Q2/Q3 are air switches and type D air switches are recommended.
c. Select either Q0 or (Q1/Q2/Q3). (Q1/Q2/Q3) is conducive to the maintenance of single modules.
d. Consider water pumps and other loads during installation, and select air switches, power wires, and copper bars based on actual situation.
e. Copper bars are installed vertically. See the copper bar installation diagram.
f. Copper bars are not required for less than two modules.
g. The electric wiring diagram is recommended by the manufacturer. Components shown in the figure are provided for site and are not provided at delivery.

⚠Warning

To ensure personal safety, connect ground wires for the unit in accordance with the electrical regulations.

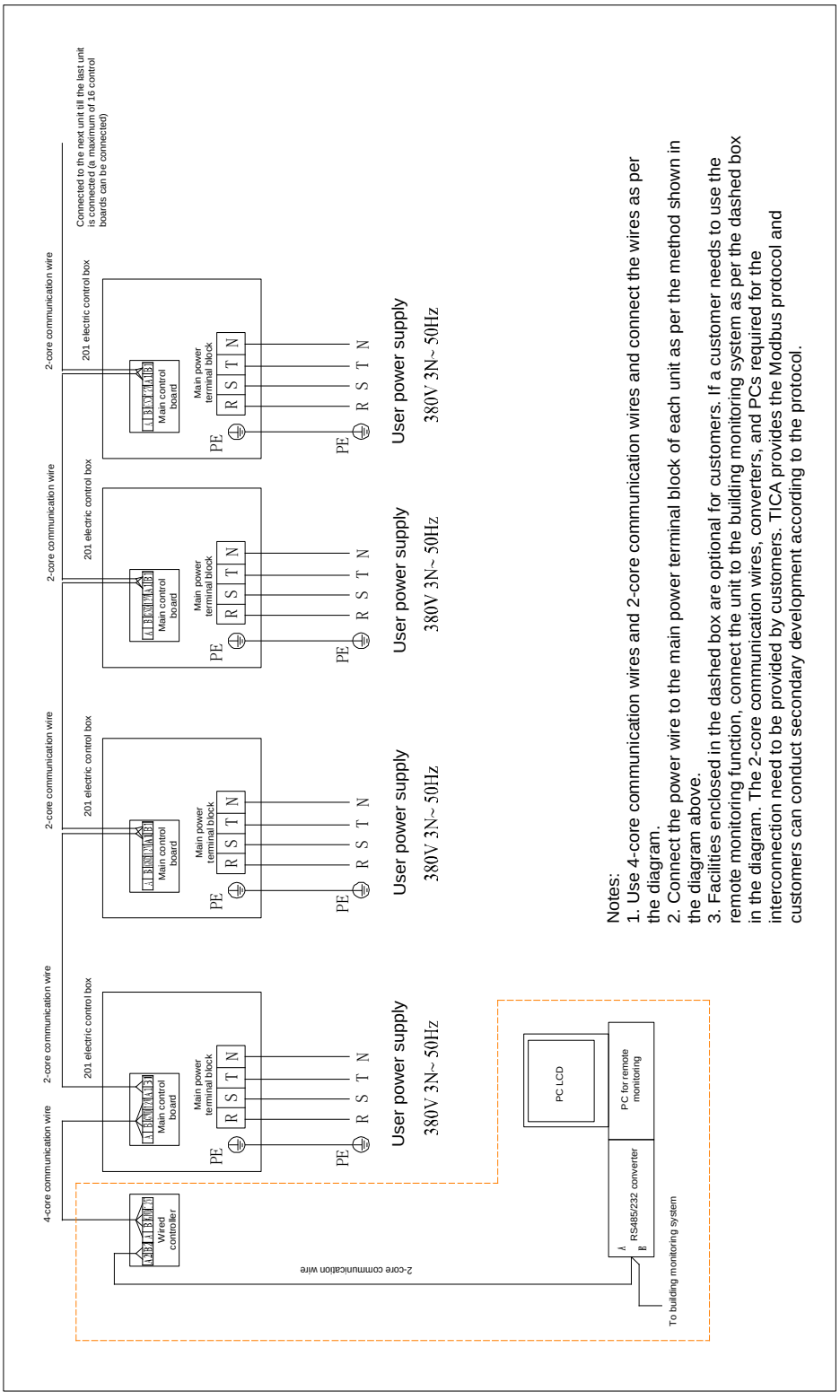
The unit uses scroll cooling compressors. It is forbidden to run the compressors in reverse direction. Check whether the power supply and electrical components of the unit work properly.

(3) Electrical Wiring Diagram of the Unit



Notes:
1. The preceding figure shows on-site wiring.
2. When the unit is set to be a master unit, connect wires according to the figure.
3. Both the mode switching and remote power-on/-off functions of a standard unit are not enabled. To enable them, set the DIP switch to remote control mode. K1 is used for power-on/-off. (When K1 is opened, it indicates power-off. When K1 is closed, it indicates power-on.) K2 is used for mode switching. (When K2 is opened, it indicates cooling mode. When K2 is closed, it indicates heating mode.) The wired controller cannot be used for power-on/-off.
4. In local control mode, group control of buildings can be performed via the RS485 interface on the wired controller. In remote control mode, the wired controller can be unconnected.
5. The non-heat-recovery unit is free from hot water pump output and auxiliary electric heater. This figure is just for reference. For details, see the circuit diagram pasted on the unit.

(4) Unit Interconnection Schematic Diagram



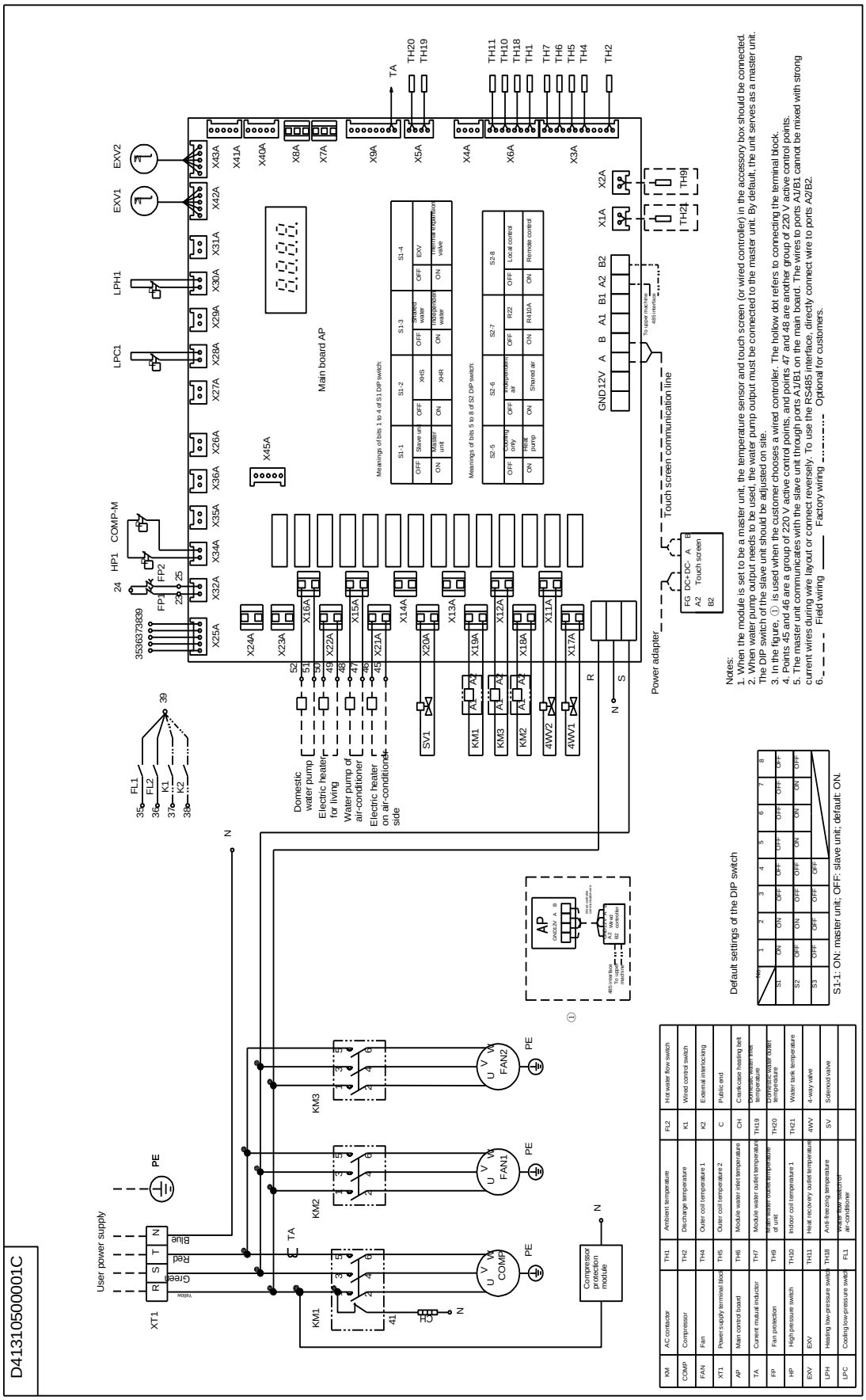
⚠Caution

The following circuit diagrams are applicable to standard units. The circuit diagram in the manual may differ from the actual circuit diagram pasted to the unit due to product innovation and improvement. The circuit diagram pasted to the unit shall prevail.

For the wiring diagrams of other non-standard units, see the circuit diagram pasted to the unit body.

(5) Electrical Schematic Diagram of the Unit

Note: The electrical schematic diagrams of units of the following models are subject to the actual components of the units.



VI. Unit Commissioning and Operation Description

⚠Caution

Be sure to check the entire air conditioning unit system before powering on for trial operation. Pay attention to the following aspects:

1. Checking the air-side devices of the air conditioner

- Check whether the power supply connections of all indoor air-side devices are correct and whether the fan runs properly.
- Check whether check valves on the inlet and outlet of indoor air-side devices are all open.
- Check whether air in the water system in indoor air-side devices is thoroughly discharged. If there is air in the FCU, open the air discharge valve to discharge the air.

2. Checking the system pipeline

- Check whether the system pipeline, water refill pipeline, pressure gauge, and thermometer are installed correctly.
- Check whether the static pressure on the water return of the unit is greater than 5.0 mH2O.
- Check whether the system pipeline is clean, whether the refrigerant in the pipeline is full, and whether air is thoroughly discharged.
- Check whether valves that should be open are all open in the system and valves that should be closed are all closed.
- Check whether proper thermal insulation and condensate drainage measures are taken for the pipeline system.
- Check whether the expansion water tank and water refill device are sensitive and whether air in the water pipes is discharged thoroughly. Before starting water pumps, open the air discharge valves to check whether water flows out. If no, air is not thoroughly discharged. In this case, do not start water pumps. Check the expansion water tank and water refill system to ensure that air is discharged thoroughly. Start water pumps after confirming that the pipeline is full of water. Do not run water pumps in the case of water shortage.
- Check whether the water system filter is clogged to ensure that the water line is smooth without blockage.
- Check whether the water flow switch is correctly installed and whether the wiring is correct.

3. Checking the power distribution system

- Check whether the power supply is consistent with that required in the manual and on the unit nameplate. The voltage fluctuation should be within ±10%.
- Check whether all the power supply lines and control lines are connected in place, whether the wires are connected correctly in accordance with the wiring diagram, whether the grounding is reliable, and whether all the wiring terminals are fastened.
- Check whether the main water outlet temperature sensing probe of the unit is installed using a blind hole, and whether the main water outlet temperature can be sensed accurately.

4. Checking the unit

- Check whether the appearance of the unit and the piping system inside the unit are in good condition after transportation and handling.
- Check whether the electrical lines of the unit are correct, whether the water flow switch is installed and connected to the control loop, whether the pump contactor is interlocked with the control loop, and whether the main water outlet temperature probe of the unit is connected to a correct position.
- Check whether the fan blades interfere with the fixed plate and guard net of the unit.

⚠Caution

Only professionals can perform trial operation of the unit. Users are not allowed to commission and run the unit. Otherwise the air conditioning system may be damaged or personal injury accidents may be incurred in severe circumstances.

Pay attention to the issues in the following aspects during trial operation:

a. After checking the entire system comprehensively and confirming that it meets the requirements, start overall trial operation. Preheat the compressor for 24 hours before trial operation.

b. Connect to a power supply, check whether the phase sequence protection is normal, and then start the main controller (the chiller starts automatically 3 minutes later). Start the water pump. After confirming that the water pump runs properly, check whether the compressor operating current is within the normal range, whether the fan rotation direction is correct, and whether abnormal sound is generated.

c. If the main controller displays a power failure, the phase sequence of the incoming power supply for the unit is incorrect. Interchange the power sequence only. Do not change the internal lines of the unit. Otherwise, important parts inside the unit will be damaged.

d. Check whether the cold and hot conversion of each unit element is normal, and whether the pressure value displayed on the pressure gauge is within the normal range. Keep the trial operation of the unit for a period of time. Put the unit into normal use only after confirming that no fault occurs.

e. Clean the water filter after trial operation, and fasten all the electrical wiring terminals again. Then, the unit can be put into normal use.

f. Do not frequently start or stop the unit to prolong the service life of the unit.

g. When the unit is faulty, find out the cause of the fault as per the fault causes displayed on the controller, and rectify the fault. After the fault is rectified, the controller will perform automatic detection and start relevant systems.

h. All the protection switches have been set properly before delivery. Do not adjust them by yourself; otherwise you should bear the responsibility for any damage caused by improper adjustment.

VII. Operation Description of the Unit Controller

1. Safety Precautions

⚠Caution

The controller of the air-cooled chiller (heat pump) is a precise assembly. Be sure to read through this controller manual carefully before performing any operation. Any misoperation may damage the unit or cause personal injury.

Pay attention to the following points during installation and use:

(1) Installation precautions

- Read through this manual carefully before installation and connect wires by referring to the wiring diagram.
- The controller must be installed on a solid plane, and keep it away from rain, static electricity, shock, or dust accumulation, which has an adverse effect on the control board and even cause the controller damage.
- Only accessories provided or specified by company can be used. Using any unauthorized accessories may result in a failure of the controller or an electric shock.
- Wiring should be conducted in accordance with the principle of separating strong electric wires from weak electric wires. The control cables should be routed separately from strong electric wires and they should be shielded. If they cannot be routed separately, keep a distance of at least 50 mm between them and take shielding measures. It is absolutely forbidden to bind strong and weak electric wires together for cabling. Otherwise, the controller may fail to work properly or may be damaged.
- Power cords must be connected reliably, they are in good contact, and the insulating layer is in good condition. Loose or broken power wires may lead to electric shocks, short circuits and even fire. Air-conditioning units must be properly grounded.

(2) Use precautions

- Do not use sharp objects when operating the unit. Do not impose strong force, lest the controller panel may be damaged. Do not twist or pull the controller's wires. Otherwise, control components may fail.
- It is necessary to use the power supply that meets requirements. The use of a substandard power supply may damage the controller.
- The controller board is supplied with a 220V AC strong power. Therefore, exercise caution when operating the controller.
- Be sure to control the running status of the air-conditioning unit through the controller. It is forbidden to insert and remove the power plug to switch on/off the unit.

(3) Maintenance precautions

- When the controller is faulty, uses are not allowed to repair it at discretion but contact the manufacturer in a timely manner.
- The unit can be maintained and repaired only when the unit is powered off and the power supply is cut off.

The controller and product mentioned in this document are those used in universal environments. If a product is to be used in a harsh environment (including harsh environments with electromagnetic interference), enhanced anti-interference products need to be specified in advance. Universal products are delivered if no requirement is specified.

2. Application Scope

Air-cooled chiller (heat pump) series are modular combined air-conditioning products of company. Their control system consists of the chiller control chip (input/output), sub-board control chip, and centralized operation control panel.
This user operation manual is applicable to heat recovery modular air-cooled chiller (heat pump) series.

3. System Characteristics

(1) Applicable air conditioning system
One output water pump, one fan, one plate type heat exchanger (or shell-and-tube heat exchanger), and one compressor compose one independent energy conversion system. One module has two completely independent systems, and 1-12 (or 1-16) modules compose a modular air-cooled chiller (heat pump).

(2) Networking control
RS485 serial buses are used. Communication cables can be connected simply to implement on-site networking.

(3) Basic functions
Information display in four lines (eight Chinese characters at most in each line) in Chinese;
Water pump mode or user-defined heating/cooling operation;
Timed power-on/off function, which allows setting the weekends and three holiday time periods for the unit operation;
Automatic fault diagnosis and handling, intelligent defrosting control, and intelligent anti-freezing operation control;
Unique fuzzy energy control method and optimal load matching.

(4) Digital filtering processing is performed on all collected input signals to ensure the reliability of input signals. Output signals are buffered in multiple levels and no misoperation or jitter occurs, thereby ensuring the reliable and stable operation of the unit.

(5) Password protection permissions are used for parameter setting. All parameters that need to be set have appropriate default values, which are used at the first startup or when default values need to be restored.

4. Unit Operation Description

(1) Screen Description

Main Screen

12/25WEN 16:29:30 Water outlet: 39.6°C/45 ☀ Water inlet: 32.6°C/40 ♀ Environment: 17.0°C ◎

The display screen displays current time information in the first line, the current water inlet and outlet temperatures and set values of the unit in the second and third lines respectively, and the ambient temperature of the main module in the fourth line. The operating mode area displays the operating mode of the unit (cooling ❄, heating ☀, hot water production 💧, cooling+hot water production ❄💧,heating+hot water production ☀💧,anti-freezing ◈). When the heating symbol blinks, the system is defrosting. In the remote control status area, ♀ is displayed if the unit is remotely controlled and the symbol is not displayed if the unit is controlled by a wired controller. In the operation status area, "Stop" is displayed if the unit is shut down. If the water pump is started, the water pump symbol (◎) is displayed; if the water pump is not started, the symbol is not displayed. If the word "Ambient" blinks, the ambient temperature for unit (including submodules) operation does not meet operating conditions.

Function Selection

[Function Selection] Operation Status Change System Parameter Error Check

On the main screen, press **Menu** to access the **Function Selection** screen. The [**Function Selection**] screen displays **Operation Status**, **Change System Parameter**, and **Error Check**.

(If one page cannot display all information, page down/up buttons will be displayed in the lower right corner.

You can click ▲ **or** ▼ to enter the next page or previous page. The selected menu item is displayed on a white background. After selecting a menu item, press **OK** to enter the selected screen or press **Menu** to return to the main screen.

Operation Status P1

[Operation Status]
System Operating Status
Module Communication Status
Module Port Status
▼

On the [**Function Selection]** screen, select **Operation Status** and press **<OK>** to enter the **[Operation Status]** screen. This screen displays **System Operating Status**, **Module Communication Status**, **Module Port Status**, and **Program Version**. You can press **<▲ or ▼>** to switch menu items. The selected menu item is displayed on a white background. After selecting a menu item, press **<OK>** to enter the lower-level menu. Press **<Menu>** to return to the **Function Selection** screen.

[Operation Status]
Program Version
▲

System Operating Status P1-1

[System Operating Status]
Electric heater: OFF
Loaded compressors: 4
↑↓↕

On the **[Unit Operating Status]** screen, select **System Operating Status** and press <**OK>** to enter the **[System Operating Status]** screen, which contains two menu items and can be switched by pressing <**▲or ▼>**.

The first menu item displays the status of the electric heater and the number of loaded compressors. The compressor status area is divided into 12 areas, which indicate modules 1-12. ↑ indicates Compressor 1 of this module is loaded, ↓ indicates Compressor 2 of this module is loaded, and ↕ indicates two compressors of this module are loaded simultaneously. If the compressor symbol of a module is blinking, the system is defrosting.

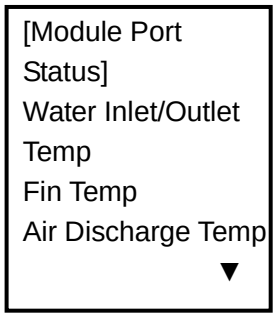
Module Communication Status P1-2

[Module Communication Status]
Normal communication modules: 7
ID of communication exception module: 12A

On the **[Unit Operating Status]** screen, select **Module Communication Status** and press **<OK>** to enter the **[Module Communication Status]** screen. This screen displays the number of normal communication modules. If a module experiences a communication exception, the module ID will be displayed for the ease of repair.

Note: Module IDs are represented in hexadecimal notation, 1-11 indicate slave modules, and the letters A and B indicate the numbers 10 and 11 respectively. (Example: 12A on the left side indicates Slave Modules 1, 2, and 10 experience a communication failure.)

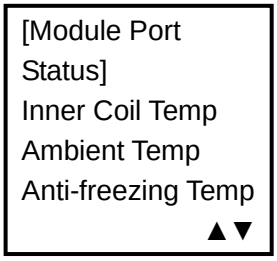
Module Port Status P1-3

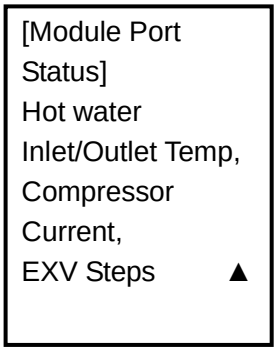


On the **[Unit Operating Status]** screen, select **Module Port Status** and press **<OK>** to enter the **[Module Port Status]** screen.

The **[Module Port Status]** screen has four sub-screens:

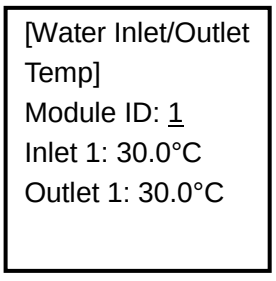
1. Water Inlet/Outlet Temp, Fin Temp, Air Discharge Temp
2. Inner Coil Temp, Ambient Temp, Anti-freezing Temp
3. Hot water Inlet/Outlet Temp, Compressor Current, EXV Steps





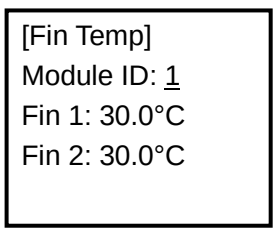
You can press **<▲ or ▼>** to switch among menu items and select a required menu item. A selected menu item is displayed on a white background. After selecting a menu item, press **<OK>** to enter the lower-level menu. Press **<Menu>** to return to the upper-level menu.

Water Inlet/Outlet Temp P1-3-1



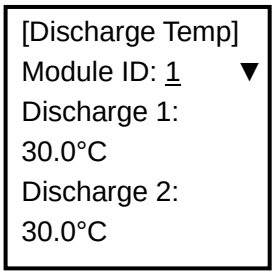
On the **[Module Port Status]** screen, select **Water Inlet/Outlet Temp** and press**<OK>** to enter the **[Water Inlet/Outlet Temp]** screen. This screen displays the water inlet/outlet temperature of each module. You can press **<◄ or ►>** to select a required module ID or press **<Menu>** to return to the upper-level menu.

Fin Temp P1-3-2



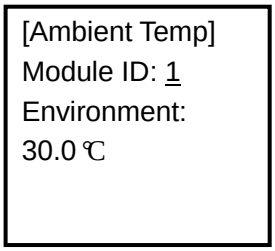
On the **[Module Port Status]** screen, select **Fin Temp** and press**<OK>** to enter the **[Fin Temp]** screen. This screen displays the fin temperature of each module. You can press **<◄ or ►>** to select a required module ID or press **<Menu>** to return to the upper-level menu.

Exhaust Temp P1-3-3



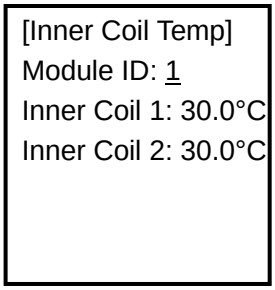
On the **[Module Port Status]** screen, select **Discharge Temp** and press**<OK>** to enter the **[Discharge Temp]** screen. This screen displays the air discharge temperature of each module. You can press **<◄ or ►>** to select a required module ID or press **<Menu>** to return to the upper-level menu.

Ambient Temp P1-3-4



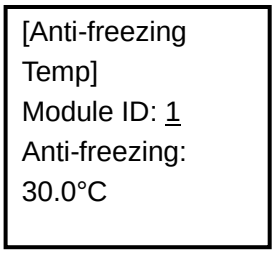
On the **[Module Port Status]** screen, select **Ambient Temp** and press**<OK>** to enter the **[Ambient Temp]** screen. This screen displays the ambient temperature of each module. You can press **<◄ or ►>** to select a required module ID or press **<Menu>** to return to the upper-level menu.

Inner Coil Temp P1-3-5



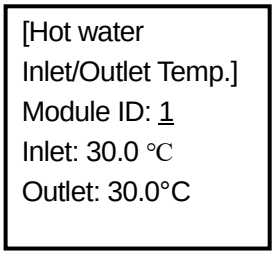
On the **[Module Port Status]** screen, select **Inner Coil Temp** and press**<OK>** to enter the **[Inner Coil Temp]** screen. This screen displays the inner coil temperature of each module. You can press **<◄ or ►>** to select a required module ID or press **<Menu>** to return to the upper-level menu.

Anti-freezing Temp P1-3-6



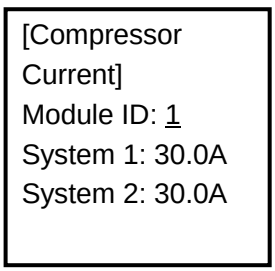
On the **[Module Port Status]** screen, select **Anti-freezing Temp** and press**<OK>** to enter the **[Anti-freezing Temp]** screen. This screen displays the low-pressure temperature of each module. You can press **<◄ or ►>** to select a required module ID or press **<Menu>** to return to the upper-level menu.

Hot water Inlet/Outlet P1-3-7



On the **[Module Port Status]** screen, select **Hot water Inlet/Outlet** and press**<OK>** to enter the **[Hot water Inlet/Outlet]** screen. This screen displays the hot water Inlet/Outlet degree of each module. You can press **<◄ or ►>** to select a required module ID or press **<Menu>** to return to the upper-level menu.

Compressor Current P1-3-8



On the **[Module Port Status]** screen, select **Compressor Current** and press**<OK>** to enter the **[Compressor Current]** screen. This screen displays the compressor current of each module. You can press **<◄ or ►>** to select a required module ID or press **<Menu>** to return to the upper-level menu.

EXV Steps P1-3-9

[EXV Steps]
Module ID: 1
EXV 1 Steps: 300
EXV 2 Steps: 300

On the **[Module Port Status]** screen, select **EXV Steps** and press**<OK>** to enter the **[EXV Steps]** screen. This screen displays the EXV steps of each module. You can press **<◄ or ►>** to select a required module ID or press **<Menu>** to return to the upper-level menu.

Program Version P1-4

[Program Version]
Module ID: 1
Main Board
Program: V1.0
Wired Controller
Program: V1.0

On the [**Unit Operating Status**] screen, select **Program Version** and press<**OK**> to enter the [**Program Version**] screen. This screen displays the main board program version and wired controller program version of each unit. You can press <◄ or ►> to select a required module ID or press <**Menu**> to return to the upper-level menu.

Change System Parameter P2

[Change System Parameter]
Modify User Parameters
Modify Service Parameters
Modify Factory Parameters

On the **[Function Selection]** screen, select **Change System Parameter** and press**<OK>** to enter the **[Change System Parameter]** screen. You can press **<▲ or▼>** to select a required menu item. The selected menu item is displayed on a white background. After selecting a menu item, press **<OK>** to enter the lower-level menu. Press <**Menu**> to return to the upper-level menu.

Modify User Parameters P2-1

[Modify User Parameters]
Operating Mode Setting
Startup/Shutdown Mode Setting
Weekend Operation Setting
▼

On the **[Change System Parameter]** screen, select **Modify User Parameters** and press**<OK>** to enter the **[Modify User Parameters]** screen.

Modify User Parameters contains three sub-screens:

1. Operating Mode Setting, Startup/Shutdown Mode Setting, Weekend Operation Setting
2. Holiday Operation Setting, Date/Time Setting, MODBUS Address
3. Manual Defrosting, Manual Reset

[Modify User Parameters]
Holiday Operation Setting
Date/Time Setting
MODBUS Address
▲▼▼

[Modify User Parameters]
Manual Defrosting
Manual Reset
▲

You can press **<▲ or ▼>** to switch among menu items and select a required menu item. A selected menu item is displayed on a white background. After selecting a menu item, press **<OK>** to enter the lower-level menu. Press **<Menu>** to return to the upper-level menu.

Operating Mode Setting P2-1-1

[Operating Mode Setting] Operating Mode: Cooling Water Outlet Temp: 7°C Water Inlet Temp: 12°C

On the **[Modify User Parameters]** screen, select **Operating Mode Setting** and press**<OK>** to enter the **[Operating Mode Setting]** screen. The cursor is displayed on the selected item. You can press **<▲, ▼, ◄, or ►>** to modify parameters.

Operating Mode: Heating - Cooling - Hot water production-Heating+ Hot water production-Cooling heat recovery (circulate).

Note: Air conditioning priority and hot water priority in heating + hot water production mode and refrigeration heat recovery mode are set.

Startup/Shutdown Mode Setting P2-1-2

[Startup/Shutdown Mode Setting] ON: 08:00 OFF: 15:00 Manual ON/OFF

On the [**Modify User Parameters**] screen, select **Startup/Shutdown Mode Setting** and press<**OK**> to enter the [**Startup/Shutdown Mode Setting**] screen. The cursor is displayed on the selected item. You can press **<▲, ▼, ◄, or ►>** to modify parameters.

Optional Mode: Manual ON/OFF - Automatic ON/OFF - Automatic ON - Automatic OFF

Note: The startup/shutdown mode is effective only to workdays. If the unit needs to run on Saturday and Sunday, set the Sunday operation time. When the startup/shutdown time conflicts with holiday operation time, the holiday operation time shall prevail.

Weekend Operation Setting P2-1-3

[Weekend Operation Setting]
Saturday Operation Setting
Sunday Operation Setting

On the [**Modify User Parameters**] screen, select **Weekend Operation Setting** and press<**OK**> to enter the [**Weekend Operation Setting**] screen. You can press <▲ or▼> to select a required menu item. The selected menu item is displayed on a white background. After selecting a menu item, press **<OK>** to enter the lower-level menu. Press <**Menu**> to return to the upper-level menu.

Weekend Operation Setting P2-1-3-1

[Saturday Operation Setting]
ON: 08:00
OFF: 15:00
Enabling Status: Disable

On the [**Weekend Operation Setting**] screen, select **Saturday (Sunday) Operation Setting** and press<**OK**> to enter the [**Saturday (Sunday) Operation Setting**] screen. The cursor is displayed on the selected item. You can press **<▲, ▼, ◄, or ►>** to modify parameters.

[Sunday Operation Setting]
ON: 08:00
OFF: 15:00
Enabling Status: Enable

You can set the power-on/off time and set **Enabling Status** to **Enable** or **Disable**.

Note: When the preset weekend operation time conflicts with the holiday operation time, the holiday operation time shall prevail.

Holiday Operation Setting P2-1-4

[Holiday Operation Setting]
Holiday Operation Setting 1
Holiday Operation Setting 2
Holiday Operation Setting 3

On the [**Modify User Parameters**] screen, select **Holiday Operation Setting** and press<**OK**> to enter the [**Holiday Operation Setting**] screen. You can press <▲ or▼> to select a required menu item. The selected menu item is displayed on a white background. After selecting a menu item, press **<OK>** to enter the lower-level menu. Press <**Menu**> to return to the upper-level menu.

Holiday Operation Setting P2-1-4-1

[Holiday Operation Setting 1]
Date: 05/01-05/03
ON: 08:00 Status
OFF: 15:00 Disable

On the [**Holiday Operation Setting**] screen, select **Holiday Operation Setting 1** and press<**OK**> to enter the [**Holiday Operation Setting** 1] screen. The cursor is displayed on the selected item. You can press **<▲, ▼, ◄, or ►>** to modify parameters.

[Holiday Operation Setting 2]
Date: 10/01-10/07
ON: 08:00 Status
OFF: 15:00 Disable

You can set the automatic operation time of the unit, power-on/off time and set **Status** to **Enable** or **Disable**. Set **Holiday Operation Setting 2** and **Holiday Operation Setting 3** by referring to the settings of **Holiday Operation Setting 1**.

[Holiday Operation Setting 3] Date: 01/01-01/03 ON: 08:00 Status OFF: 15:00 Enable

Note: When the time in the startup/shutdown mode setting and weekend operation time conflict with the holiday operation time, the holiday operation time shall prevail.

Date/Time Setting P2-1-5

[Date/Time Setting] Date: 14/01/01 Week: Wednesday Time: 12:30:30

On the [**Modify User Parameters**] screen, select **Date/Time Setting** and press<**OK**> to enter the [**Date/Time Setting**] screen. The cursor is displayed on the selected item. You can press **<▲, ▼, ◄, or ►>** to modify parameters. **Date**, **Week**, and **Time** can be set.

MODBUS Address P2-1-6

[MODBUS Address] MODBUS Address: 1 Baud Rate: 19200 Press **OK** for modification <=

On the [**Modify User Parameters**] screen, select **MODBUS Address** and press<**OK**> to enter the [**MODBUS Address**] screen. The cursor is displayed on the selected item. You can press **<▲, ▼, ◄, or ►>** to modify parameters. Move the cursor to the third line and press **OK** to immediately modify parameters. Press **Menu** to return to the upper-level menu.

Note: The MODBUS address and baud rate are used for remote monitoring.

Manual Defrosting P2-1-7

[Manual Defrosting] Module ID: 1 Defrosting System: System 01 Press **Start** to start defrosting <=

On the [**Modify User Parameters**] screen, select **Manual Defrosting** and press<**OK**> to enter the [**Manual Defrosting**] screen. The cursor is displayed on the selected item. You can press **<▲, or ▼>** to switch among parameters to be modified and <◄ or ►> to change parameter values. After modification, move the cursor to the third line and press **OK** to immediately modify parameters. Press **Menu** to return to the upper-level menu.

Note: The defrosting mode is effective only in heating mode.

Manual Reset P2-1-8

Resetting... Please wait...

On the [**Modify User Parameters**] screen, select **Manual Reset** and press<**OK**> to reset the unit. After successful resetting, the screen directly returns to <**Manual Reset**> item.

Failure Handling

Error Check P3

[Change System Parameter] Current Failure Historical Failure Clear Historical Failure

On the [**Function Selection**] screen, select **Error Check** and press<**OK**> to enter the [**Error Check**] screen. You can press <▲ or▼> to select a required menu item. The selected menu item is displayed on a white background. After selecting a menu item, press **<OK>** to enter the lower-level menu. Press <**Menu**> to return to the upper-level menu.

Current Failure P3-1

Module ID: 1
Heating water outlet Temp. is too high

On the [**Error Check**] screen, select **Current Failure** and press<**OK**> to enter the [**Current Failure**] screen. This screen displays current failures occurring on each module ("No Failure" is displayed if the current module has no failure). You can press <◄ or ►> to select a required module ID or press <**Menu**> to return to the upper-level menu.

Historical Failure P3-2

[Total 03 Failure Records
Module ID: 01
Failure 01
10/10 10:30:46
Failure 01

On the [**Error Check**] screen, select **Historical Failure** and press<**OK**> to enter the [**Historical Failure**] screen. This screen displays historical failures occurring on each module ("No Failure" is displayed if there is no historical failure). You can press <▲ or ▼> switch among failures based on the failure quantity or press <**Menu**> to return to the upper-level menu.

Clear Historical Failure P3-3

[Clear Historical Failure]
Press **OK** to clear!
Press **Menu** to return!

On the [**Error Check**] screen, select **Clear Historical Failure** and press<**OK**> to enter the [**Clear Historical Failure**] screen. Press <**OK**> to clear historical failures. Press **<Menu>** to return to the upper-level menu.

Others

Parameter Saving Prompt Box

The parameter is modified!
Are you sure you want to save?
Press **OK** to save!
Press **Menu** to exit!

Parameter Saving Output Information

The parameter modification is saved!
Press any key to continue!

Note: After a parameter is modified, a message is displayed, asking you whether to save the modified parameter when you return to the main menu. The controller saves the modified parameter only after you press OK. Otherwise, the modification is not saved.

Model: TCA (EXV)
Refrigerant: R410A
Water system: Common Air
Air system: Independent air

On the main screen, Press <**Check**>.It will appear unit information, including Model, Refrigerant, Water system and Air system. TCA (TXV) is displayed by thermal expansion valve and TCA (EXV) is displayed by electronic expansion valve.

Unit Operation Time Limit

Unit Operation Timeout!!
Unit Shutdown Protection!!
Please contact the manufacturer!

If unit operation time limit protection is enabled, the accumulated operation duration will be recorded. The unit is shut down for protection when the accumulated operation duration reaches the preset value. The unit can be put into use again only after authorized engineers modify the displayed duration or disable the display function.

(2) List of Adjustable Parameters

No.	Parameter	Range	Default Value	Remarks
1	Operating mode	Cooling-Heating-Hot water production-Cooling+heat recovery--Heating+heat recovery		It needs to be manually set.
2	Cooling water outlet temperature	5℃-20℃	7°C	
3	Cooling water inlet temperature	10℃-25℃	12°C	
4	Heating water outlet temperature	30℃-50℃	45°C	
5	Heating water inlet temperature	25℃-45℃	40°C	
6	Water tank Temp.	30℃-55℃	50°C	
7	Priority level	Cooling+heat recovery Heating+heat recovery	Water	
8	Defrosting System ID	1- Total number of units	1	
9	Defrosting System ID	1-2	No	

(3) Description of the DIP Switch on the Main Board

a. Functions of the S1 DIP Switch

S1-1		S1-2		S1-3		S1-4	
ON	Master unit	ON	Heat recovery	ON	Independent water	ON	Thermostatic expansion valve
OFF	Slave unit	OFF	Ordinary	OFF	Shared water	OFF	Electronic expansion valve

S1(5678) (slave unit quantity for the master unit, and slave unit address for the slave unit)					
S1-5	**S1-6**	**S1-7**	**S1-8**	**Address**	
OFF	OFF	OFF	OFF	0	Indicates a single unit.
OFF	OFF	OFF	ON	1	The addresses of slave units are 1-15.
OFF	OFF	ON	OFF	2	
OFF	OFF	ON	ON	3	
OFF	ON	OFF	OFF	4	
OFF	ON	OFF	ON	5	
OFF	ON	ON	OFF	6	
OFF	ON	ON	ON	7	
ON	OFF	OFF	OFF	8	
ON	OFF	OFF	ON	9	
ON	OFF	ON	OFF	10	
ON	OFF	ON	ON	11	
ON	ON	OFF	OFF	12	
ON	ON	OFF	ON	13	
ON	ON	ON	OFF	14	
ON	ON	ON	ON	15	

b. Functions of the S2 DIP Switch

S2 (Functional DIP Switch)												
S2-1	**S2-**2	**S2-**3		**S2-**4	**S2-**5		**S2-**6		**S2-**7		**S2-**8	
OFF	ON	OFF	X series	OFF	OFF	Cooling-only	ON	Shared air	ON	R410A	ON	Remote control
ON	OFF	OFF	XHE	OFF	ON	Heat pump	OFF	Independent air	OFF	R22	OFF	Local control
				ON	ON	Perennial cooling of the heat pump						

d. Functions of the S3 DIP Switch

S3-1	**S3-2**	**S3-3**	**S3-4**	
OFF	OFF	OFF	ON	Compressors in parallel connection
OFF	OFF	ON	OFF	Single compressor

(4) Unit Configuration

Model	**Refrigerant**	**Expansion Valve Type**	**Air System**	**Water System**
TCA201XHR/1	R410A	Electronic expansion valve	Shared air	Shared water

(5) Failure Code List

Failure Code List			
Failure 01	Insufficient water flow	Failure 09	Air discharge temperature high 01
Failure 02	External interlocking	Failure 10	Air discharge temperature high 02
Failure 03	Wired controller failure	Failure 11	Air discharge temperature 1#1 failure
Failure 04	Error in communication with the master unit (slave unit)	Failure 12	Air discharge temperature 2#1 failure
Failure 05	Ambient temperature failure	Failure 13	Outer coil temperature 1# failure
Failure 06	Anti-freezing temperature failure	Failure 14	Outer coil temperature 2# failure
Failure 07	Main water outlet failure (master unit)	Failure 15	System 1# overload
Failure 08	Master and slave module incompatibility	Failure 16	System 2# overload

Failure 17	1#1 current too high	Failure 25	Single-module water inlet temperature sensor failure
Failure 18	1#2 current too high	Failure 26	Single-module water outlet temperature sensor failure
Failure 19	2#1 current too high	Failure 27	The water inlet/outlet temperature is lower than the set value.
Failure 20	2#2 current too high	Failure 28	The water inlet/outlet temperature is lower than the protection value
Failure 21	Inner coil 1# temperature failure	Failure 29	The water inlet/outlet temperature is too high.
Failure 22	Inner coil 2# temperature failure	Failure 30	An unrecoverable failure occurs.
Failure 23		Failure 31	
Failure 24		Failure 32	

Failure 33	Air discharge temperature 1#2 failure	Failure 41	1# cooling pressure low
Failure 34	Air discharge temperature 2#2 failure	Failure 42	2# cooling pressure low
Failure 35	Open phase protection	Failure 43	1# heating pressure low
Failure 36	Misphase protection	Failure 44	2# heating pressure low
Failure 37	1# system current low	Failure 45	
Failure 38	2# system current low	Failure 46	
Failure 39		Failure 47	
Failure 40		Failure 48	

Failure 49	Slave module 1 communication failure	Failure 57	Slave module 9 communication failure
Failure 50	Slave module 2 communication failure	Failure 58	Slave module 10 communication failure
Failure 51	Slave module 3 communication failure	Failure 59	Slave module 11 communication failure
Failure 52	Slave module 4 communication failure	Failure 60	Slave module 12 communication failure
Failure 53	Slave module 5 communication failure	Failure 61	Slave module 13 communication failure
Failure 54	Slave module 6 communication failure	Failure 62	Slave module 14 communication failure
Failure 55	Slave module 7 communication failure	Failure 63	Slave module 15 communication failure

Failure 56	Slave module 8 communication failure	Failure 64	

VIII Unit Maintenance

Air-cooled chillers (heat pumps) are highly automated devices. Therefore, check the operation status periodically. Long-term and effective maintenance can greatly enhance the operation reliability of the unit and prolong the unit's service life.

Pay attention to the following points during maintenance and servicing:

(1) Clean the water filter installed outside the unit periodically to ensure the cleanliness of water in the system and prevent unit damage caused by clogging of the filter.

(2) Keep the surroundings around the unit clean and dry and ensure smooth ventilation for the unit. Clean the air-side heat exchanger periodically (once 1-2 months) to maintain excellent heat transfer effect and save energy.

(3) Regularly check whether the water refill and air discharge devices of the water system work properly. Air may enter the system and cause low water circulation or water circulation difficulties, affecting the cooling and heating effect of the unit as well as the reliability of the unit.

(4) Check whether wiring of the unit power supply and electrical system is secure, and whether electrical components work abnormally. If an exception occurs, repair or replace electrical components. Regularly check whether the unit is grounded reliably.

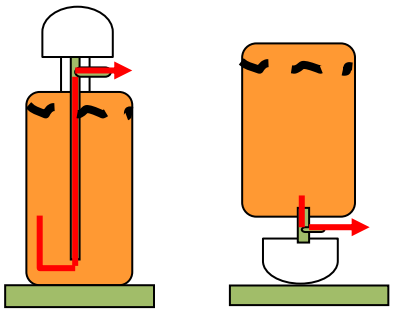
(5) If the unit is not used for long after one running period ends, drain water out of the unit pipeline and cut off power. Fill water into the system and conduct an overall check on the unit before starting the unit again. Then, electrify the unit to preheat it for more than 24 hours, and then start the unit and put it into normal operation after confirming that everything is OK.

(6) Check the working conditions of each component of the unit regularly and check whether the work pressure of the cooling system of the unit is within the normal range. Check whether there are oil dirt on the pipeline connectors and inflation valves of the unit to ensure that no refrigerant leaks out. Only professionals are allowed to add refrigerant. R22 can be filled in liquid or gas form. R410A and R407C are hybrid refrigerant and can be filled only in liquid form. Fill a refrigerant as per the figure below.

(7) Do not close the water inlet/outlet valves of indoor air-side devices at will during unit operation. Otherwise, the normal operation of the unit may be affected, and the internal heat exchanger of the chiller may be damaged.

⚠ Caution

The R410A or R407C hybrid refrigerant must be emptied completely when the system leaks. After vacuumizing the system again, add refrigerant as instructed by the figure on the right side. This prevents change of the system refrigerant components; otherwise the unit operation performance will deviate, affecting the service life of the unit.



The lubricating oil used for the R410A or R407C unit is different from that used for the R22 unit. To add lubricating oil, contact the manufacturer. Do not add lubricating oil at will; otherwise the unit may be damaged.

IX. Common Fault Analysis of the Unit and Handling Methods

The unit may get faulty to different degrees during use. The table below provides some common faults and their handling methods. If the unit gets faulty, the user needs to contact an authorized distributor or branch company of company and cannot try to repair it independently.

Common Fault	Cause	Solution
The compressor does not start properly and has no buzzing sounds	☆ The main controller has a power failure or communication cable fault ☆ The alarm indicator of the main controller lights up ☆ The unit controller is in preheating status ☆ The main controller has wrong data settings	☆ Check whether the communication indicators are on ☆ Check the unit and contact the maintenance personnel ☆ It is normal and for protection purpose ☆ Reset the parameters based on the User Operation Manual
The compressor starts but frequently stops	☆ There is too high or low refrigerant, causing too high discharge pressure or too low air suction pressure ☆ The evaporator gets frost, the water temperature declines rapidly and rises rapidly, the water circulation is poor, or the load of indoor air-side devices is low ☆ The main controller has too low temperature control cycle value	☆ Make sure the amount of refrigerant is proper; otherwise, discharge excessive refrigerant or add refrigerant ☆ If the water flow is inadequate, check whether the water line is smooth and whether the loop is too short. If the load of the air-side devices is too low, add an energy storage water tank ☆ Change the parameters on the advice of the maintenance personnel
The compressor makes a lot of noise	☆ The power phase sequence of the compressor is wrong ☆ The liquid refrigerant returns to compressor ☆ The components of the compressor are faulty	☆ Check the power cord of the main power and incoming wire of the compressor ☆ Check whether the expansion valve works normally ☆ Repair or replace the compressor
Common Fault	Cause	Solution
The cooling capacity is relatively low	☆ Insufficient refrigerant, insufficient cooling capacity and low evaporation temperature ☆ The thermal insulation of the water system is poor ☆ The condenser does not remove heat properly ☆ The expansion valve is not properly adjusted ☆ The filter is clogged	☆ Repair leaking points and add refrigerant ☆ Strengthen thermal insulation of the pipeline and expansion water tank ☆ Clean the condenser and improve condensing conditions ☆ Adjust the expansion valve ☆ Replace the filter
The intake duct of compressor is frosted	☆ The chilled water flow is too small ☆ The water line is blocked or air is not discharged thoroughly	☆ Check whether the water pump motor matches the unit ☆ Unclog the water line or empty air

Common Fault	Cause	Solution
The unit cools properly but does not heat	☆ The operating conditions of air-conditioning are improperly selected ☆ The four-way valve has loosened wires or burned or stuck coils ☆ Due to low temperature, the fin-type heat exchanger is frosted	☆ Check whether the operating conditions of air-conditioning are improperly selected ☆ Repair the four-way reversing valve ☆ Remove frost and add auxiliary heat source
The compressor rotates continuously while heating	☆ The temperature sensing probe of the water temperature controller is damaged ☆ The temperature set value is too high and the water temperature cannot reaches the set value ☆ The system has low heating efficiency	☆ Replace the temperature controller ☆ Set the hot water temperature again (45°C recommended) ☆ Add auxiliary heat source if the ambient temperature is too low
The water pump does not work when the main controller is started	☆ The power supplied to the water pump power wire in the customer control cabinet is unavailable ☆ The water pump motor burns out and the bearing is damaged	☆ Locate the line fault ☆ Replace the water pump motor, bearing, and shaft seal
Too high condensation pressure	☆ Too much refrigerant ☆ The ambient temperature is too high and the unit is not well ventilated ☆ There is air or non-condensable gas inside the refrigerant or the system	☆ Discharge excessive refrigerant ☆ Rule out other contributory factors and improve condensing conditions ☆ Discharge air or non-condensable gas through air outlet
Too low condensation pressure	☆ Insufficient refrigerant ☆ There is something wrong with the valve plate of the compressor, thus reducing efficiency	☆ Check and repair the leaks, and add refrigerant ☆ Replace the compressor
Too high air suction pressure	☆ Too much refrigerant ☆ The return water temperature is high and the heating load is high ☆ The opening of the expansion valve is too large ☆ The four-way valve leaks	☆ Discharge excessive refrigerant ☆ Reduce the chilled water flow and reduce the heating load ☆ Adjust the expansion valve ☆ Replace the four-way valve
Due to too low air suction pressure, low voltage protection frequently occurs	☆ Insufficient refrigerant ☆ The return water temperature is low and the indoor air-side device is faulty ☆ The expansion valve has too small opening or is clogged	☆ Check and repair the leaks, and add refrigerant ☆ Rectify the fault occurring on the air-side device and unclog the water line ☆ Adjust the expansion valve

⚠Caution

The following circumstances are normal phenomena:

When the temperature reaches the set value during unit operation, the unit stops running automatically. After the temperature rises, the unit re-starts automatically according to the preset operating mode.

When the outdoor temperature is low and the humidity is relatively large, the outdoor heat exchanger may frost during operation of the unit. To ensure normal operation of the unit, the microcomputer controller of the unit will make judgment according to the time and temperature and enter the defrosting process automatically. After defrosting ends, the unit will restart operation automatically according to the operating mode set by the user.

X. After-sales Service

- If repair and maintenance service is needed, call the 400 service hotline.

⚠Caution

Improper maintenance or repair may cause water leakage, electric shocks or fire. Ask authorized seller or service personnel for help when the unit needs to be moved or re-installed.

- Warranty

Warranty details are subject to the order contract.

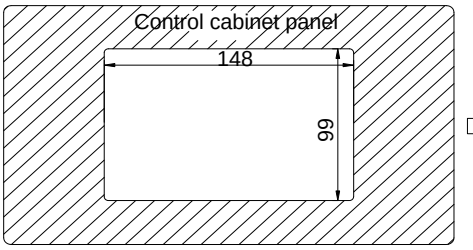
XI. Other Information

A separate "control accessory box" contains a remote controller, a remote controller communication cable, temperature sensor blind pipe, main water temperature sensor, installation operation manual, and other components. Trial operation can be carried out only after correct installation on site.

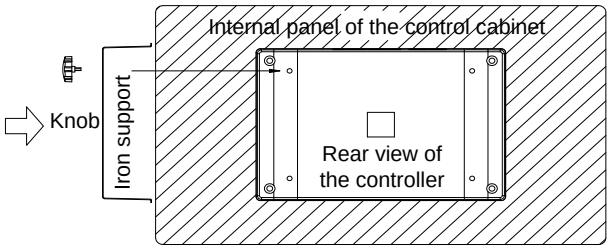
1. Installation of the Remote Controller

When the remote controller is installed inside the control cabinet in the equipment room, remove the control box of the remote controller and install the remote controller as follows:

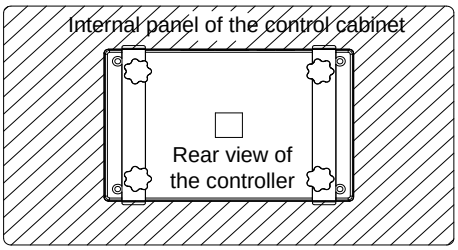
Step 1:
Open a hole on the metal panel of the control cabinet for installing the remote controller.



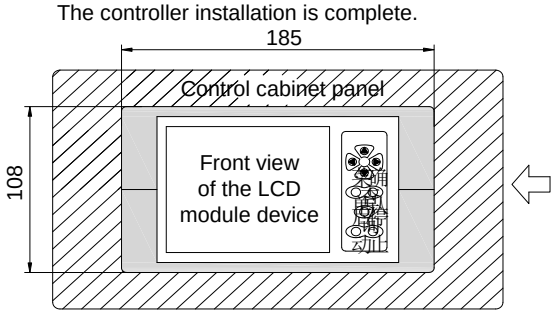
Step 2:
Put the controller into the control cabinet and close the iron support.



Step 3:
Use screws to fasten the iron support.

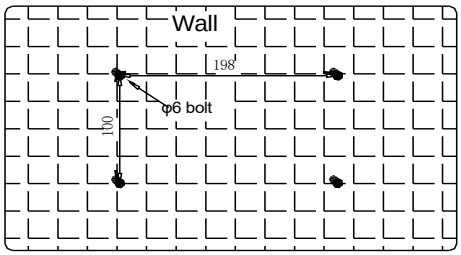


Step 4:
The controller installation is complete.

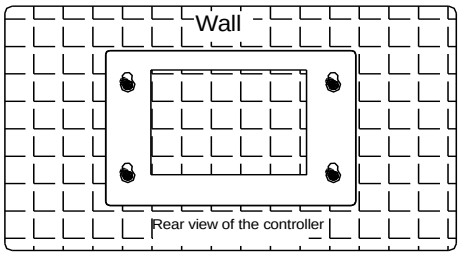


When the remote controller needs to be installed on the wall, install it as follows:

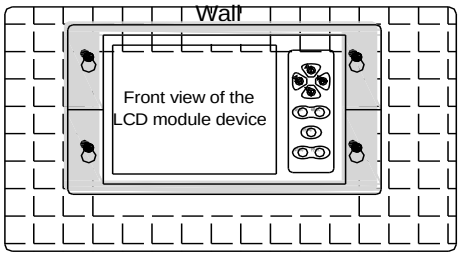
Step 1:
Select a proper position for installation, open a hole on the wall or installation board as shown in the figure below, install the M6 fastening bolts, and tighten the bolts. Ensure that the bolts protrude out of the wall for about 2 mm.



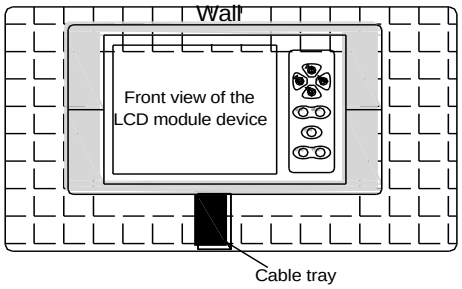
Step 2:
Align the large holes of installation holes on the rear side of the controller box with the fastening bolts.



Step 3:
Level the control box, pull down the control box, and trap the fastening bolts in the upper small holes of control box.



Step 4:
The controller installation is complete.



2. Auxiliary Electric Heater

(1) Characteristics

a. The operation of the auxiliary heater is controlled intelligently. When the ambient temperature is low, the microcomputer automatically starts the auxiliary heating program to compensate for the heating lack caused by heat attenuation due to low ambient temperature. It increases the heat output and makes the unit work in an operating condition closer to the standard operating condition, thereby improving the operation efficiency of the unit and prolonging its service life. When the indoor temperature reaches the set value, the auxiliary heater automatically stops based on the set temperature, to save energy.

b. The small-sized auxiliary electrical heater occupies less space and is easy to install.

c. The auxiliary heater is equipped with an overheating control component, which can effectively prevent damage to the heating tube in case of dry burning.

d. The operating conditions are harsh because of low water temperature in winter. After the unit is restarted, compressor slugging and oil sling may be caused easily, leading to unit faults and affecting the service life of the unit. The use of the auxiliary electric heater can raise the water temperature and ensure the normal and efficient operation of the unit.

e. The auxiliary electric heater can supplement some heat loss caused by defrosting during unit operation in winter.

The following table lists the power of the auxiliary electric heater at different atmospheric temperatures for reference (unit: kW).

Outdoor Temperature °C / Required Indoor Temperature °C	8	6	4	2	0	-2	-4	-6	-8
20					0.15	0.25	0.35	0.45	0.5
18						0.15	0.25	0.35	0.45
16							0.15	0.25	0.35
14								0.15	0.25

Remarks:

a. Auxiliary electric heaters are not required for cells left blank in the table in terms of energy balance. However, in order to ensure smooth operation of the chiller and prolong the service life of the chiller, it is recommended that auxiliary electric heaters be configured when the outdoor atmospheric temperature is lower than or equal to 2°C.

b. If an auxiliary electric heater is required, the power of the auxiliary electric heater cannot be smaller than 0.2 kW/kW. Otherwise, when the ambient temperature is low, the heat loss of the water system may be greater than the heat output of the electric heater. As a result, the heater fails to deliver the desired effect.

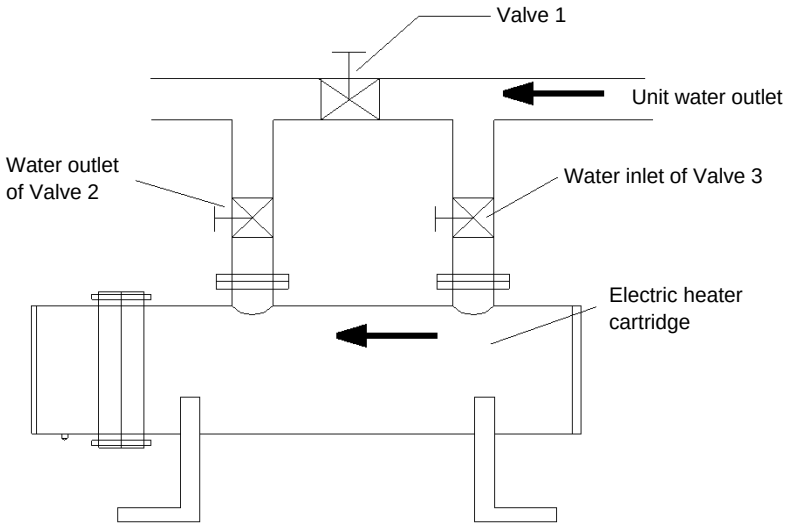
c. The data listed in the table above is the power of auxiliary electric heaters per kW heating capacity at relevant indoor and outdoor temperatures.

(2) Installation and Use Description

When the air-cooled chiller (heat pump) runs in heating mode in winter, its heating capacity declines with the drop of the outdoor ambient temperature. Auxiliary electric heaters are installed to facilitate the operation of the air-cooled chiller (heat pump). An auxiliary electric heater is connected to the water outlet pipeline in parallel during engineering project. See the figure below.

The electric control cabinet for an auxiliary electric heater is not configured at unit delivery. Only the electric heating output signal is configured and the startup cabinet needs to be provided by customers. For the wiring of the electric heater, see the circuit diagram delivered with the electric heater. One end of AC contactor coil of the electric heater needs to be connected to the electric heater terminal in the electric control cabinet of the chiller module (for details, see the wiring diagram of the unit).

Note: Company does not provide auxiliary electric heaters for standard units. Please specify the auxiliary electric heater in the order if required. The startup electric control cabinets for auxiliary electric heaters need to be provided by customers.



When the unit runs in cooling mode in summer, open Valve 1 and close Valve 2 and Valve 3 to reduce the loss of the water pressure drop on the pipeline. In this way, chilled water of the unit will not flow through the auxiliary electric heater. When the unit runs in heating mode in winter, open Valve 2 and Valve 3 and close Valve 1. In this way, hot water flowing out of the unit flows through the auxiliary electric heater, and supplements heat into the hot water of the unit to raise the water temperature after the unit is electrified. The hot water is supplied to the air-side devices.

⚠Caution

Open water valves of the unit during commissioning. Open the circulating water pump to discharge air out of the system. Then, electrify the unit for commissioning so as not to burn electric components. If the electric heater is not used, drain water out of the electric heater cartridge to prevent cartridge freezing or rust.

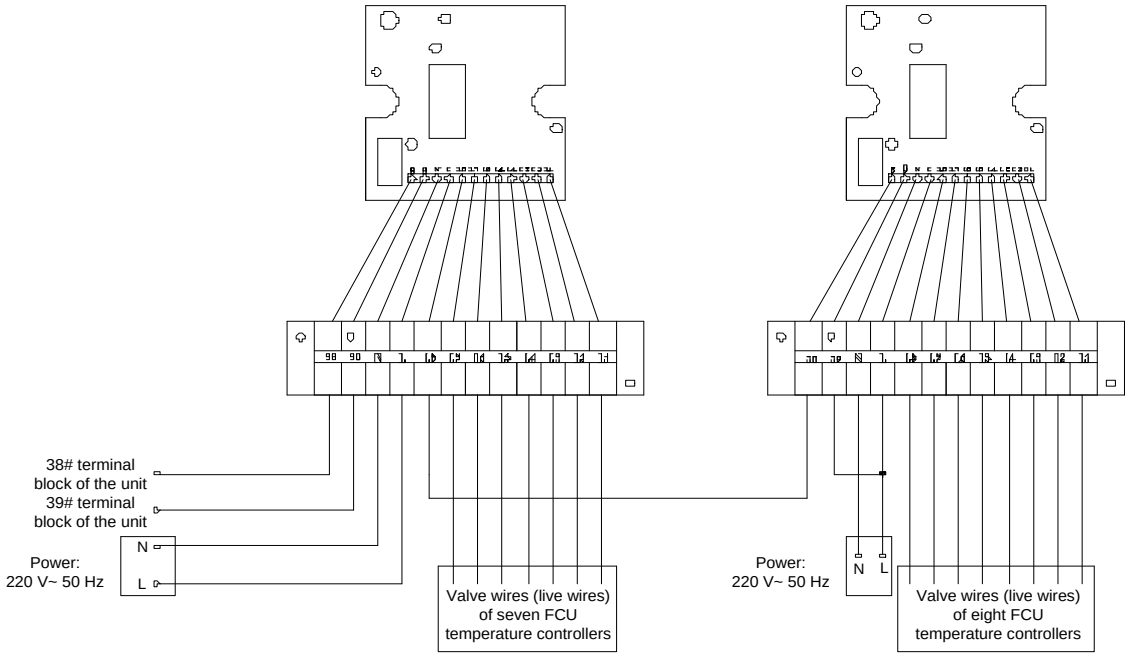
3. Interlock Controller

A standard unit is equipped with an interlock control interface at delivery. Customers can select an interlock controller and connect wires correctly to implement interlock control between indoor air-side devices and the chiller. A single interlock controller can control 8 air-side devices in an interlocked manner, two interlock controllers can accommodate 15 air-side devices, and so on.

Note: The relevant bit on the DIP switch of the unit needs to be turned to remote control position.

If an interlock controller needs to be used, a temperature controller must be used for the air-side devices.

The figure below shows the wiring between the chiller and air-side devices when an interlock controller is used to implement interlocked control between the chiller and air-side devices.



The figure above is the wiring diagram of two interlock controllers and the wiring of multiple interlock controllers is similar to the wiring in the figure above.

⚠Caution

Interlock controllers are not equipped for standard models at delivery. The wired control switch is short-connected to the common line. If an interlock controller needs to be connected, remove the short connection wire and connect wires as per the circuit diagram above.

4. Installation Description of the Main Water Outlet Temperature Sensing Probe

Currently, the main water pipe of a modular unit is installed by engineers on site. Therefore, the main water outlet temperature sensing probe must also be installed on the main water pipe on site, so as to truly reflect the water outlet temperature of the unit and make the unit work properly. The following provides details of installing a water outlet temperature sensing

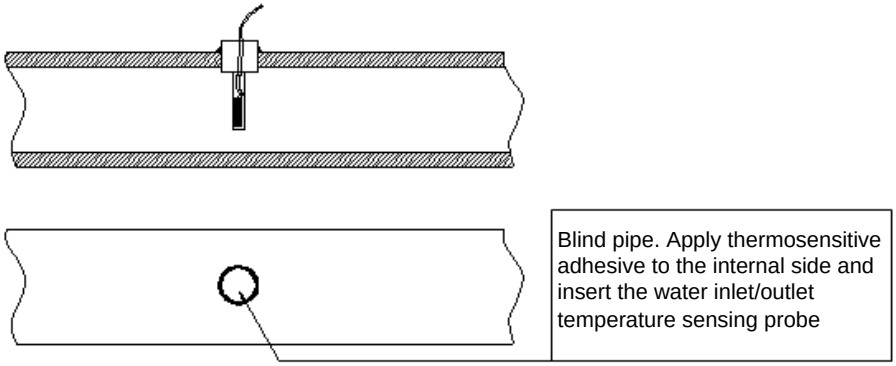
probe.

The main water outlet temperature sensing probe of the unit is in the control accessory box. Take the probe out of the box and install it correctly.

To reflect the water outlet temperature more accurately, it is necessary to open a hole on the main water outlet pipe and weld and seal the blind pipe (accessory) for heat conduction. Apply thermosensitive adhesive to the internal side of the blind pipe and insert the water outlet temperature sensing probe into the blind pipe.

After the water system is installed completely, open a hole close to the main module on the main water outlet pipe, insert the water outlet blind tube, and weld and seal the water outlet blind tube. Ensure that the temperature sensing probe can accurately sense the water temperature in a timely manner.

Schematic diagram of on-site blind tube installation



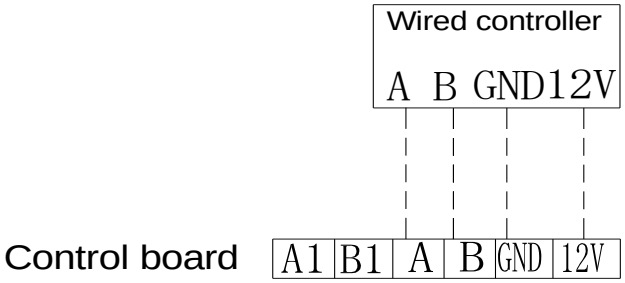
⚠Caution

Make sure that the temperature sensing part of the water outlet temperature sensing probe is deeply inserted into the bottom.

5. Description of the Connection Between the Temperature Sensing Probe/Water Pump and the Chiller

The water temperature sensor, 30 m controller connection cable, and water pump control output cable in the accessory box need to be connected to the control board of the chiller prior to commissioning. The wiring method is as follows:

A. The figure below shows the wiring between the wired controller/30 m controller connection cables and the control board in the chiller control box.



B. The water pump control point needs to be connected to Terminal 47 and Terminal 48 inside the chiller control box during on-site installation.And the hot water pump control point needs to be connected to Terminal 51 and Terminal 52.

XT3	N	N	45	46	47	48	49	50	51	52

⚠Warning

TICA PRO LLC
141014, Russia, Moscow oblast, Mytishchi,
Very Voloshinoy Ulitsa, office 705 and 805
Tel.: +7(495)822-29-00
E-mail: info@tica.ru
www.tica.ru