

# ▶ User Manual

▶ EMW25HDNC1A Air-cooled Chiller



Shenzhen Envicool Technology Co., Ltd.

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# Chapter I Introduction

## 1.1 Introduction

### Safety note:

Please read this "safety note" carefully before assembly, installation, electrical engineering and maintenance.

The notes described here are divided into "Warning" and "Attention". Both of them set forth the safety notes, which must be strictly observed. Its expression and meaning are as follows:

Warning: when the operation is wrong, the user may be injured or even killed.

Attention: when the operation is wrong, the user may be injured or physically injured.

### Warning:

Please entrust professional personnel for assembly, installation, electrical engineering and maintenance. If you install it yourself, it may cause water leakage, electric shock or fire accidents; People and children with limited cognitive and coordination ability shall not operate, maintain, clean the equipment or use it as toys; Use only original spare parts and accessories authorized by the manufacturer to ensure the stability and safety of the chiller. If other parts are used, the warranty right will be invalid; No changes to the chiller shall be made without agreement with and consent of the manufacturer; The installation works shall be carried out in strict accordance with the relevant local laws and regulations. At the same time, please be sure to follow the relevant special safety tips listed in each chapter for the corresponding operation.



### Tips

Professionals refer to those who have professional training, experience and skills and are familiar with regulations, regulations and measures related to accident prevention and operation requirements. The operator or the person in charge authorizes the person to ensure the safety of the equipment, carry out all necessary operations, and the person has the ability to discover and avoid all potential hazards.

## 1.2 Description of air-cooled chiller

EMW25HDNC1A integrated air-cooled chiller is generally used in air conditioning unit, industrial cooling or energy storage and heat dissipation industry, with centralized and economic cooling and supply of cooling medium.

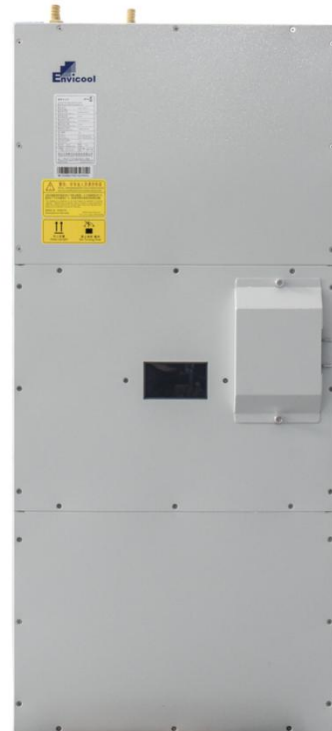


Figure 1.2 Appearance of water chiller

Integrated air-cooled chiller is a product that integrates indoor and outdoor units. The overall dimension is only 549 × 220 × 1176 (W×D×H), and the structure is compact. EMW series water chiller is a refrigeration product developed for energy storage battery cooling and other application environments. The utility model is suitable for the application occasions where the internal battery of the energy storage container has large heat output and the internal equipment is sensitive to the ambient temperature. The product has complete functions, integrating upper

computer communication, display operation, alarm and other functions. It has the advantages of high reliability, simple and convenient installation without complex debugging.

The standard configuration is as follows:

- Chiller
- User manual

Complete machine accessories

The optional configuration is as follows:

- Fluid infusion device
- Temperature and humidity sensor

### 1.2.1 Working principle

The chiller system consists of inner circulating water pump, outer circulating fan, compressor, plate heat exchanger, condenser, electronic expansion valve and control module.

Liquid refrigerant is converted to gaseous form in plate heat exchanger (No. 4). In the plate heat exchanger, the heat needed in the conversion process is absorbed and the cooling medium is cooled. In the compressor (No. 1), after the refrigerant is compressed, its temperature will be higher than the ambient air temperature. At the same time, according to the water temperature or the demand of the upper computer, the DC frequency conversion technology is used to adjust the speed of the compressor motor related to the load, so as to realize the control of the whole machine power and water temperature. This heat is dissipated through the surface of the condenser (No. 2) into the ambient air and the refrigerant is thus changed from gaseous state to liquid state. Fill the plate heat exchanger (No. 4) with refrigerant through the electronic expansion valve (No. 3). The refrigerant evaporates in the plate heat exchanger and absorbs the heat of the cooling medium (water or water ethanol mixture). In the other cycle, the cooling medium is delivered to the equipment to be cooled by the internal circulating water pump (No. 6). The inlet temperature of the cooling medium (water or water ethanol mixture) is adjusted by a temperature sensor located at the water outlet.

The internal circulating water pump uses frequency conversion pump, so the cooling medium flow can be adjusted. Please refer to figure 1.2.1 for the schematic description of the chiller.

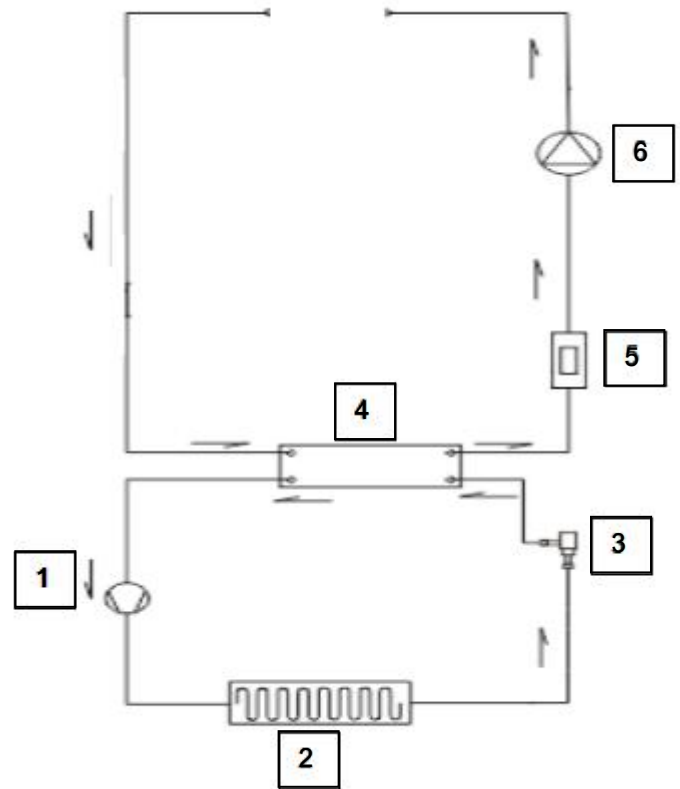


Figure 1.2.1 Schematic diagram of chiller

#### Legend

- 1 Variable frequency compressor
- 2 Condenser
- 3 Electronic expansion valve
- 4 Plate heat exchanger
- 5 Electric heating tube
- 6 Internal circulating water pump

### 1.2.2 Operation conditions

#### ● Power grid

1) 1 ~, 220V  $\pm$  15%, 50 / 60Hz (support double live wire input 1 ~ 110V, 60Hz) voltage;

#### ● External circulation temperature

1) Environmental scope:

Indoor: - 30  $^{\circ}$ C ~ + 55  $^{\circ}$ C, 5% ~ 95% RH (no condensation)

Outdoor: max. + 55 °C

**Note: please read the nameplate parameters on the chiller carefully. The actual technical parameters shall be subject to the nameplate.**

## 1.3 Compliance with standards

Table 1.3 Applicable standards of products

Standards	Standard description
GB/T 17626.7-1998	Electromagnetic compatibility
GB4706.1	Safety of household and similar electrical appliances
GB4798.1	Environmental conditions for application of electric and electronic products - storage
GB4798.2	Environmental conditions for application of electric and electronic products - Transportation
GB4798.3	Environmental conditions for application of electric and electronic products - Use

## Chapter II Site preparation and installation

### 2.1 Note

In order to achieve the design performance of the chiller and extend its service life to the maximum extent, it is very important to install it correctly. Please install in strict accordance with the machine drawing during installation. The reserved installation and maintenance space can refer to the engineering dimension drawing provided by the manufacturer.

The installation shall be in accordance with the mechanical and electrical installation rules.

#### 2.1.1 Transportation and handling

- Each chiller has been strictly inspected and tested before delivery. During transportation and handling, take great care to avoid

damage to the control system and piping components.

- Before unpacking, transport the chiller as close as possible to the installation site.
- When handling and placing, the chiller must be kept upright. At the same time, pay attention to the liquid make-up port and rain inlet protruding from the bottom of the water chiller to avoid bumping against the liquid make-up port and rain inlet. See Fig. 2.2.1 for the location of make-up port and rain inlet protruding from the bottom of the chiller.
- When handling the bare machine of the unit, it is forbidden to lift the power supply wire guard, and the wire guard cannot be used as a stress support.

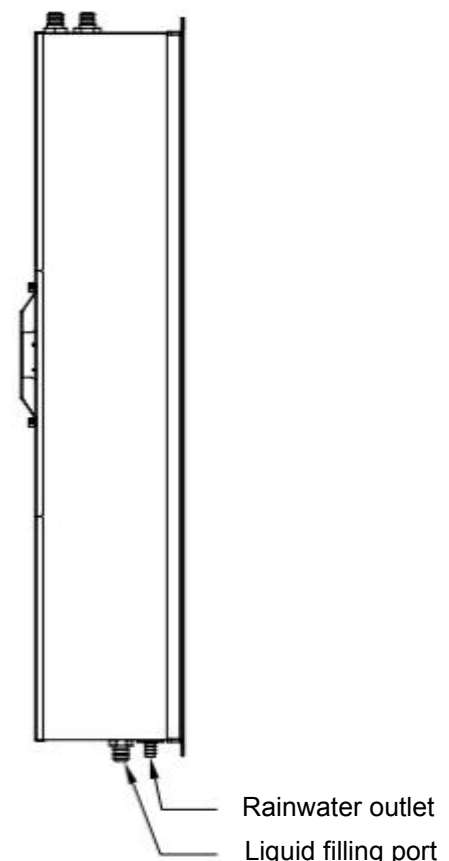


Fig. 2.2.1 location of rainwater inlet and liquid filling port of chiller

#### 2.1.2 Storage

- Temperature range of storage environment: - 30 ~ 70 °C.

- During storage, the chiller must be kept upright. It is forbidden to place the chiller upside down or lying on its back.

### 2.1.2 Unpacking and inspection

- Before unpacking, check the water chiller carefully to see if there is any damage caused by transportation, especially if there are loose parts, pits, scratches and oil leakage. If any damage is found, please report to the vendor with the barcode number on the outside of the package within one week.
- After removing the package, make sure that the water chiller is placed upright, not horizontally or upside down.
- Check the packing list and accessory package in the package.
- Before handling packaging materials, make sure that there are no loose parts inside. In order to protect the environment, we suggest recycling the cartons.
- If the product is not installed immediately or needs to be transferred to other areas, please repack the chiller after inspection.

### 2.1.3 Installation environment

Before installation, it must be determined that the installation environment meets the requirements. Preparation of application space equipment such as energy storage containers:

The room should be well insulated and have a closed damp proof layer. The ceiling and wall must have a damp proof layer.

The room shall minimize the entrance of outdoor air, which will increase the heating and cooling load of the system. All doors shall be fully enclosed, and the sealing gap between door joints shall be as small as possible.

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#### Warning

- 1) It is necessary to avoid the influence of external climate factors on chillers;
- 2) If the dust concentration or oil substance concentration of the ambient air is high, pay

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attention to equip a metal filter when the cooling medium is supplemented for the water chiller. Prevent dust and other impurities in the cooling medium from entering the whole cold water system. Due to the poor operation of the water chiller, the leakage of the cooling medium may cause damage to the precision equipment under it. Do not install chillers over precision equipment. Drainage pipeline must be provided at the equipment installation site and installed under the water chiller.

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#### Note

Do not install the equipment in the place that will affect the working and living environment, because the normal operation of the equipment will produce sound.

In order to ensure the normal operation of the chiller, a spacious area should be selected as the installation site of the chiller. Avoid placing it in a narrow place, otherwise it will affect the air flow structure of the air, resulting in short circuit of the outdoor air inlet and return and air noise. Avoid placing in recesses or at the end of narrow rooms. It is necessary to avoid the installation of multiple units close to each other, which will lead to the cross of outdoor return air and outlet air flow between different units and affect the cooling capacity of the chiller. Do not add additional devices to the unit (such as smoke detector, etc.), which will hinder daily maintenance.

### 2.1.4 Installation mode and space

1. The chiller adopts integrated design, with compressor, condenser, plate heat exchanger, throttling device, control module, internal circulating water pump, external circulating fan and other components as a whole. Before delivery, the pipeline has been welded and the refrigerant has been charged. Before delivery, the refrigerant has been added according to the standard, and has been adjusted. During installation, there is no need to connect pipes and charge refrigerant on site.
2. The chiller shall be installed in the way of door or embedded. In order to ensure the normal operation of the chiller, no objects shall be placed at the external circulation air outlet of the chiller to block the air flow. The brief introduction of the air



path and cooling medium flow path of the water chiller is shown in figure 2.1.4.1. The recommended distance and necessary maintenance space between the external circulation air outlet and the obstacles of the water chiller are shown in figure 2.1.4.2. The front surface shall be reserved with necessary maintenance space above 800×500×1700mm(W×D×H) to enable the unit to carry out cover removal maintenance or complete machine replacement. It is recommended that the distance between the inlet and outlet of cooling medium at the top of the water chiller and obstacles be ≥400mm, the distance between the front of outdoor air return outlet and obstacles be ≥800mm, and the distance between outdoor air return outlet and obstacles below be ≥ 500 mm. The distance between the left and right sides of the water chiller and the wall surface shall be ≥ 300 mm.

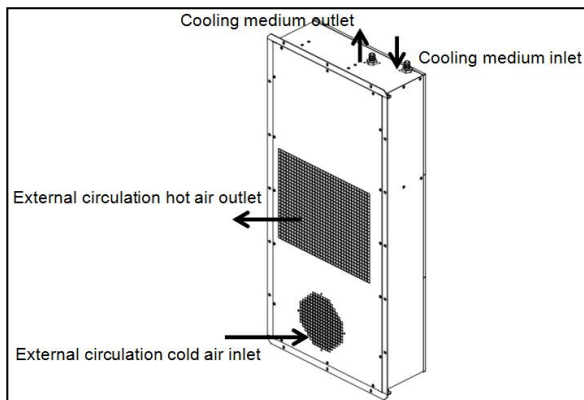


Figure 2.1.4.1 Brief introduction of outdoor side air passage of chillers

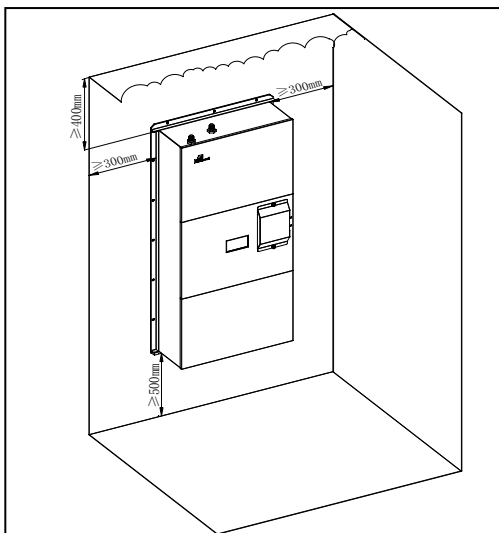


Figure 2.1.4.2 Recommended distance between chiller room and obstacle and necessary maintenance space (unit: mm)

3. Opening of wall. ①The opening of the external circulation air return port should be larger than the outdoor circulation air return port of the water chiller (418×334 mm); ②The opening of the external circulation air outlet shall be larger than that of the water chiller (194×194 mm); ③For other installation requirements, the wall needs to be pre-configured with water chiller installation fixing nuts, etc. The specifications and location are shown in Figure 2.1.4.3.

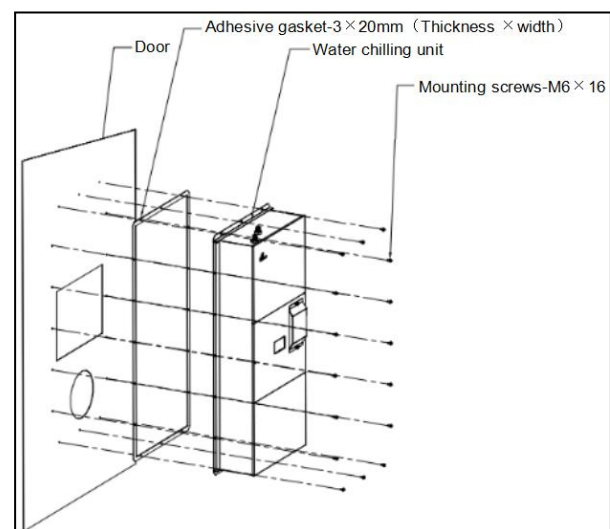
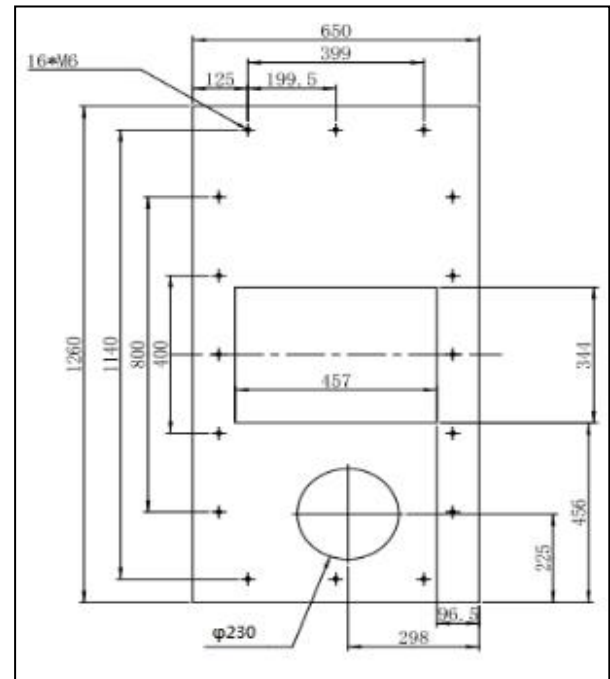


Figure 2.1.4.3 chiller installation drawing and wall opening size drawing (unit: mm)

## **Note**

The dimensions of outdoor circulating return air and air outlet openings of the water chiller from the ground shall take into account the operation space when the water chiller is filled or drained. Figure 2.1.4.3 the air vent opening shown is a schematic opening diagram for reference only

## **2.2 Installation step**

### **2.2.1 Mechanical installation**

The outline dimensions of the water chiller are shown in Figure 2.2.1.1

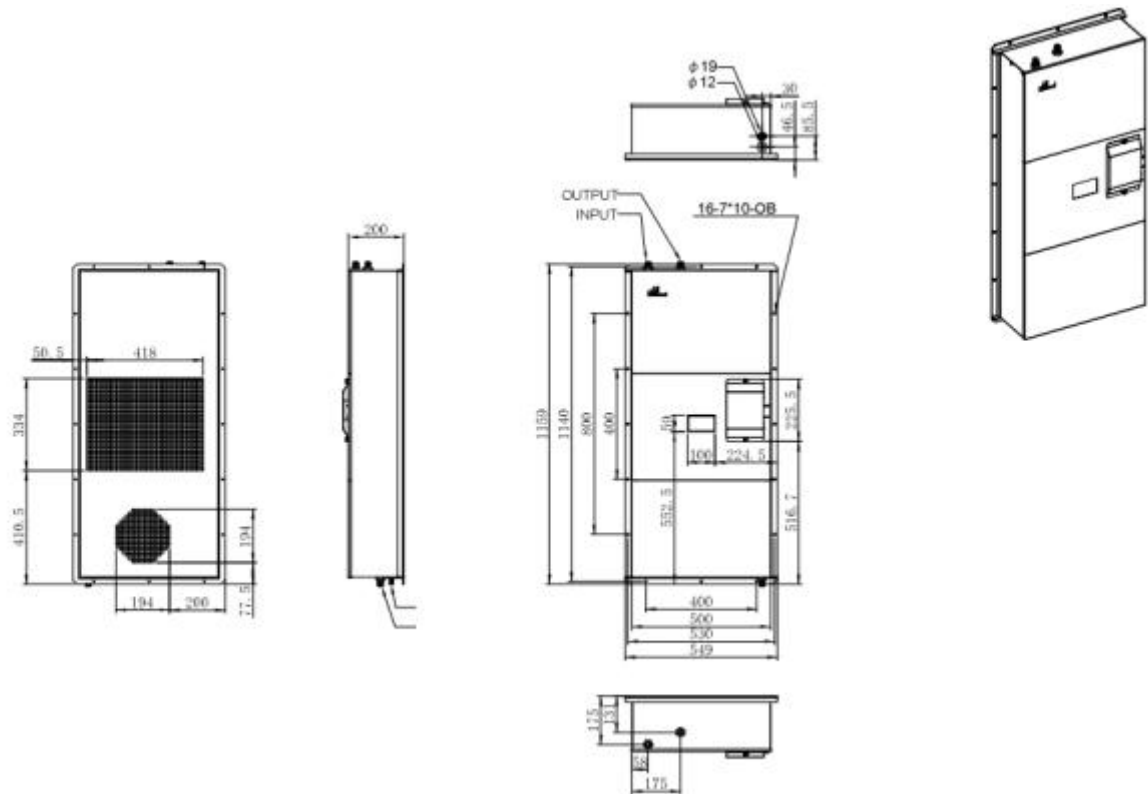


Figure 2.2.1.1 Overall dimension drawing of water chiller (unit: mm)

Mechanical installation of water chillers includes the following work:

Prepare installation tools: Phillips screwdriver, large screwdriver and small screwdriver.

1. After dismantling the packaging materials such as the peripheral wooden cases and buffer pads, attach them according to the attachment list.
2. Place the water chiller at a predetermined position to ensure that the air inlet and outlet of the water chiller's external circulation are aligned with the outdoor air inlet and outlet openings on the wall or door.

3. Use a Phillips screwdriver and M6×16 combined screws to fix the chiller to the wall or door.

## **Note**

If the user can't make holes in the wall or door and install fixing nuts in advance, he can buy the corresponding mounting bracket from the manufacturer or ask for the drawings to make his own.

4. Installation of water replenishing device and drain pipe. The water replenishing device and the water chiller are delivered separately from the factory, and the drain pipe is coiled in the delivery accessories of the water chiller. After installing and fixing the water chiller unit, the user uses a



large screwdriver to fix the drain pipe and hose clamp in the accessories of the water chiller unit on the rainwater inlet at the bottom of the unit, and the unit drainage is discharged from the bottom. At the same time, when the water chiller is used for the first time or cooling medium needs to be added to the water chiller system, one end of the water replenishing pipe and the throat band in the water replenishing device need to be fixed at the water replenishing port at the bottom of the chiller, and the positions of the water replenishing port and the rain water port are shown in Figure 2.2.1.2.

5. Installation of water inlet and outlet pipes of water chillers. The cooling medium outlet of the chiller (as shown in Figure 2.2.1.2) must be connected with the cooling medium inlet of the equipment to be cooled. At the same time, the cooling medium inlet of the chiller (as shown in Figure 2.2.1.2) must be connected with the cooling medium outlet of the equipment to be cooled. The water inlet and outlet of the water chiller are equipped with pagoda heads, which can be connected to pipes with slightly smaller inner diameter than 19mm and certain flexibility (e.g. EPDM rubber hose with inner diameter of 18.9mm). After connection, the hose clamps shall be used for locking.

### Note

1. To avoid condensed water, only use insulated or insulated pipes or insulated or insulated hoses to connect the equipment to be cooled.
2. The nominal width of the connecting pipe between the water chiller and the equipment to be cooled must conform to the nominal width of the cooling medium inlet and outlet pipes in the water chiller.
3. Chillers shall not be connected to drinking water supply pipes.
4. The piping must be able to withstand the highest pressure designed for the chiller.
5. It is recommended to install a stop valve between the water chiller and the inlet and outlet connecting pipes of the equipment to be cooled, so as to facilitate the maintenance of the water chiller or the equipment to be cooled.

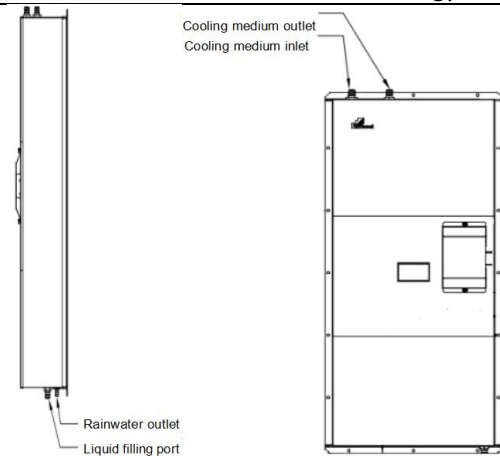


Figure 2.2.1.2 Location of rainwater inlet, liquid replenishment outlet and water inlet and outlet of water chiller

### Note

- ① The whole vertical height of the drain pipe shall not be higher than the drain nozzle of the water chiller, and the drain pipe shall have a downward trend, so that rainwater can be discharged smoothly.

## 2.2.2 Electrical connection

### ➤ Power connection:

After the mechanical installation is completed, the power line of the water chiller shall be connected. Main power supply requirements: 220VAC, 50/60Hz voltage. Please read the precautions carefully before installation.

### Note

1. Electrical connections must be made by trained professionals.
2. When connecting the power cord, no live operation is allowed.
3. Please install the disconnect switch before the power input. When connecting, connect one end of the power cord to the disconnect switch and the other end to the water chiller.
4. Excessive voltage may cause damage to the chiller. Please switch on according to the voltage requirement indicated on the nameplate.
5. In order to avoid any destructive influence, the water chiller must be reliably grounded before switching on the power supply.
6. All electrical connections must conform to the requirements of national and local electrical codes. Disconnect all water chillers before installation.

The connection steps are as follows:

1. Confirm that the water chiller is powered off, and open the electric control protection cover on the front of the water chiller, as shown in Figure 2.2.2.1.
2. According to the definition of electric screen printing for water chillers (as shown in Table 2.2.2), connect the power cord in the accessories of water chillers reliably to the INPUT power plug of water chillers, and tighten the fixing screws. The electric screen printing for water chillers is shown in Figure 2.2.2.2.
3. The other end of that pow cord is connected to the correspond power distribution switch according to the definition;
4. When the water chiller is used for the first time or cooling medium needs to be added to the water chiller system, first check whether the power cord of the water replenishing device and the input terminal are connected reliably, then insert the input terminal into the OUTPUT power plug of the unit, and at the same time tighten the screws at both ends of the input terminal with a small screwdriver to fix it on the unit.
5. After the cooling medium is added to the water machine system, the power input terminal of the water replenishing device needs to be removed with a small screwdriver.
6. If the function of detecting indoor temperature and humidity is selected, the temperature and humidity sensor and the temperature and humidity

Table 2.2.2 Definition of Electronic Screen Printing

sensor connection cable are taken out from the accessories of the whole machine, one end of the temperature and humidity sensor connection cable is plugged to the humidity sensor, and the other end is connected to the THS interface of the unit.

#### Note

The function of checking indoor temperature and humidity is optional.

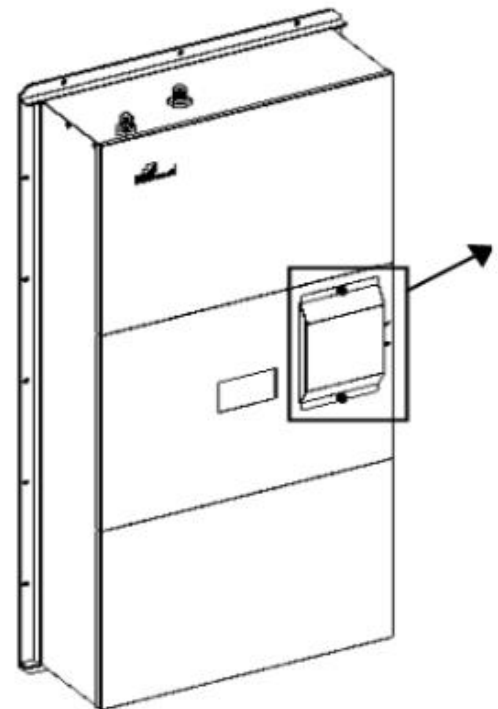


Figure 2.2.2.1 Location of power wire guard of water chiller

Port	Definition
L	220 live wire
N	220 V Zero line
PE	Ground wire
THS	Interface of external temperature and humidity sensor
NC	The first public alarm relay dry contact output NC contact
COM	The first public alarm relay dry contact output COM contact
NO	The first public alarm relay dry contact output NO contact
1	CAN+
2	CAN-
3	Remote switch
4	
5	N/A
6	N/A
7	N/A
8	N/A
RS485+	RS485 Interface D+ (PC Monitoring Interface)
RS485-	RS485 Interface D- (PC Monitoring Interface)

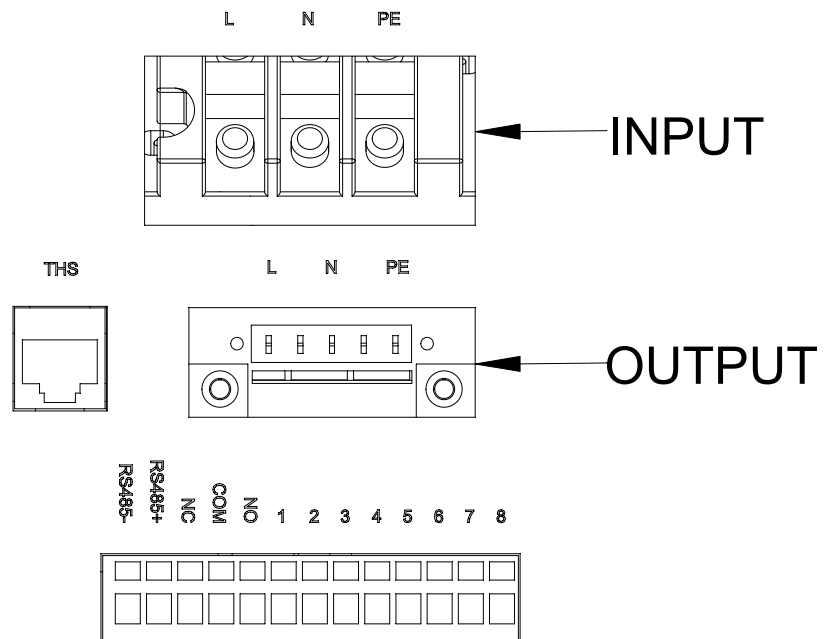


Figure 2.2.2.2 terminal block and terminal silk screen

### Note

1. The power cord specification is recommended to be  $3 \times 2.5 \text{ mm}^2$ , only copper cables can be used.
2. All connections must be secured when wiring.
3. Note that after the wiring is completed, cables such as power supply shall be fixed on the convex platform at the electric control position of the water chiller with cable ties, and the electric control protective cover shall be reinstalled.
4. Select C16 or C20 when the water chiller power input is blank.

7. Users can choose to access each communication line according to the required functions.

#### ➤ Remote switch

The remote switch-on and switch-off interface allows the user to connect the unit with fire fighting or other systems to control the operation of the water chiller. This input opens the unit and stops the closed unit. It is suggested that the remote switch-on and switch-off control cable should use double stranded shielded cable with a

cable diameter of  $2 \times 0.5 \text{ mm}^2$ . The access location is shown in Figure 2.2.2.2.

### Note

The access point only receives the passive (non-live) switch signal. If the active (live) signal is connected, the internal components of the unit will be burned down.

#### ➤ Remote monitoring

The unit can be monitored and controlled through RS485 interface and background software. It is recommended to use twisted pair shielded cables for communication cables. The cable diameter is  $2 \times 0.5 \text{ mm}^2$ , and the access location is shown in Figure 2.2.2.2.

## ➤ Public alarm output

The unit provides a common alarm output dry contact port. The user can choose the normally open and normally closed outputs by himself. It is suggested that the public alarm output cable should be shielded cable with a cable diameter of  $2 \times 0.5 \text{ mm}^2$  (or use the announcement alarm cable in the accessories of the water turbine). The access location is shown in Figure 2.2.2.3.

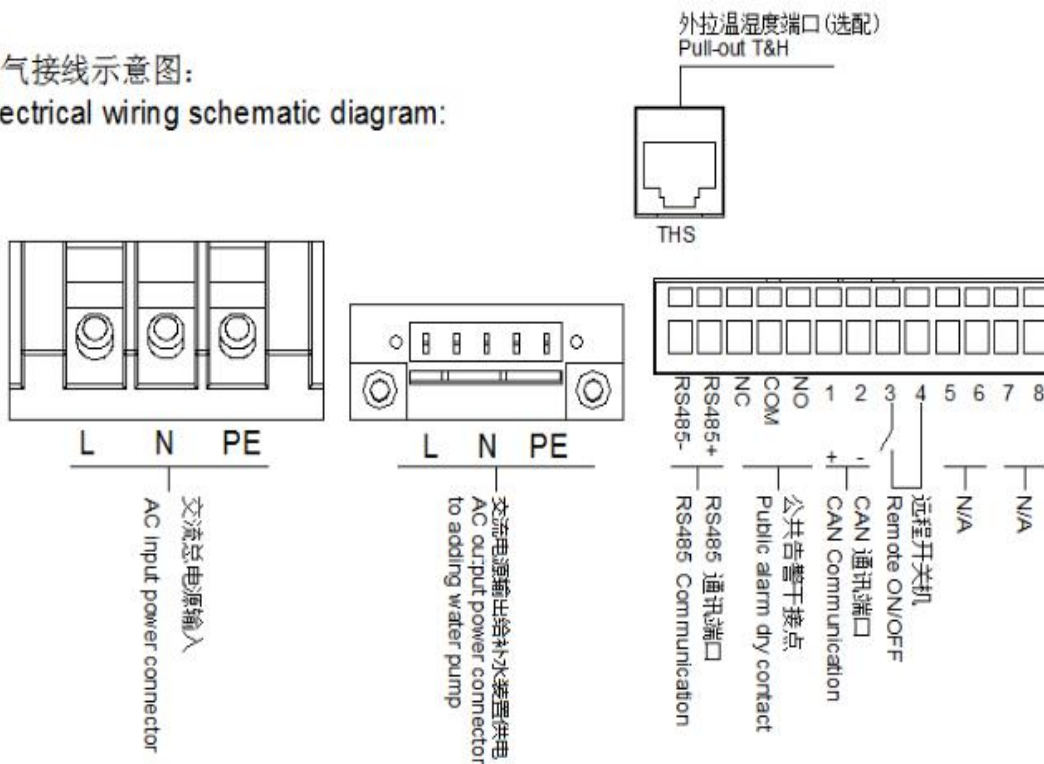
### ❶ Note

The access point only receives the passive (non-live) switch signal. If the active (live) signal is connected, the internal components of the unit will be burned down.

### ❶ Note

For signal cables such as remote on/off input, monitoring input and forced ventilation signal input, Shielded cables are recommended and reliable grounding is ensured.

电气接线示意图:  
Electrical wiring schematic diagram:



## Chapter III Controller

The chiller is equipped with a controller. The control layout is displayed on a 4.3 inch touch screen, and parameters are set through the touch screen. The touch screen can display the water inlet and outlet temperature, water inlet and outlet pressure, system operation mode, set values and alarms. The system can be operated by touching and clicking the screen to adjust the cooling or heating and alarm control set values, which is convenient to use. This chapter introduces the menu operation and control characteristics.

### 3.1 Unit Display

The unit can provide the following information through the touch screen interface: parameter setting, alarm record, alarm history, system operation status, etc.

## 3.2 System interface structure

### 3.2.1 System initialization interface











Figure 3.2.1 System Initialization Interface

After power-on, the system initializes for 10s to enter the normal display interface, which is shown in Figure 3.2.1.







If the system calls again after power failure, the system will not automatically enter the state before power failure. See Table 3.2.1 for the definition of each icon in the water chiller interface. (For example: If the system is in a startup state before power failure, the system will not automatically start up and enter the normal display interface.

Table 3.2.1 Definition of Electronic Screen Printing

Interface icon shape	Interface icon definition
	The on/off button icon can be clicked to change the current working state of the water chiller
	Display language icon, current interface language, click to switch back and forth to Chinese or English language
	The working status icon displays the current working status of the water chiller in the form of an indicator lamp, which is green when running and red when stopping.
	The water outlet temperature icon shows the current water outlet temperature of the water chiller in °C
	The current time icon displays the current time of the crew.
	The water outlet pressure icon displays the current water outlet pressure of the water turbine in the form of a dial, unit is bar.
	The system mode icon displays the current operation mode of the system, including stop, self-circulation, cooling, heating and automatic. Click on the current mode to switch to the next mode.
	The system home page icon, click on the screen interface to enter the system home page interface, where you can view the current time,

	current operation mode of the water turbine, outlet temperature, outlet pressure, working state of the water turbine and interface language.
	System status icon, click on the screen to enter the system status interface, including environment status, operation status and group control status. The current outlet water temperature, return water temperature, indoor temperature and humidity, maximum battery temperature, minimum battery temperature, outlet water pressure, return water pressure and current grid voltage can be viewed in the environment status interface. In the operation status interface, you can view the working status of circulating pump, compressor, external fan, makeup water pump and electric heating, as well as the current rotating speeds of circulating pump, compressor and external fan. In the group control status interface, the working status of each on-line unit can be viewed.
	After clicking on the system operation record icon, the screen will enter the system operation record interface, which includes operation record and operation log. In the operation record interface, you can view the total operation duration and times of the water chiller in the cooling and heating modes, as well as the total operation duration and times of the circulating pump and the external fan. In the operation log interface, you can view the time points of each startup and shutdown of the water chiller, and also the alarm contents triggered during each operation.
	After clicking on the icon of operation curve, the screen will enter the interface of system operation curve, which can display the set temperature, actual temperature (actual outlet water temperature), outlet water pressure and return water pressure of the water chiller as a function of time. In this interface, you can choose whether to display the operation curves of set temperature, actual temperature, outlet pressure and return pressure.
	System alarm icon, click on the screen to enter the system alarm interface, including current alarm and historical alarm. The alarm start time point and alarm content can be viewed in the current alarm interface, and the alarm start point, alarm recovery time point and alarm content can be viewed in the historical alarm interface.
	System Settings icon, click on the screen to enter the system settings interface, including temperature settings, group control settings, system configuration, account settings and time settings. In the temperature setting interface, the cooling set point, cooling sensitivity, heating set point, heating sensitivity, outlet high temperature set point and outlet low temperature set point can be changed, and the control temperature can be selected (with the return water temperature or the cell temperature as the control temperature). In the group control setting interface, the group control mode, number of standby machines, local address, round trip time, main standby mode, number of members and working status of each unit can be changed. In the system configuration interface, the monitoring address and on/off mode can be changed. In the account setting interface, you can change the control password. In the time setting interface, you can change the time of the control system.
	After clicking the system maintenance icon, the screen will enter the system maintenance interface, where you can manually turn on the



	system water supplement, and also set parameters such as delayed circulation pump startup, delayed water supplement shutdown and grid frequency.
	The system more function icon, click on the screen to enter the system more function interface, can enter the user password. After clicking the password input, you can modify the system operating parameters of the chiller.
	The water circulation icon indicates that the unit is in a water circulation state and the circulating pump is in a working state.
	Refrigeration icon indicates that the unit is in refrigeration state and the compressor is in working state.
	The heating icon indicates that the unit is in a heating state and the water heater is in a working state.
	Water replenishment icon indicates that the unit is in a water replenishment state.
	Alarm icon indicates that the current unit has an alarm,



### 3.2.2 Main interface



Figure 3.2.2.1 System main interface

The main interface of the system is as shown in figure 3.2.2.1. Click the power on button at the bottom right of the main page to power on. After startup, the status of the whole machine on the upper left will change from "off" to "running". There is a mode in the middle of the main page, including: stop, self cycle, refrigeration, heating and full-automatic mode. Click the current mode to switch to the next mode. The unit must be switched to the corresponding mode before it can work normally. In the start-up state, press the switch button on the main interface, and the system will shut down, as shown in figure 3.2.2.2.



Figure 3.2.2.2 System shutdown interface

The main menu will display the outlet water temperature and pressure of the unit currently running. The upper right display shows the current system time. Click time, the interface will switch to the time setting interface, and then can change the system time.

The main menu includes the following:

Home page, operation status, operation record, curve, alarm record, system setting, maintenance, more.

The main page interface can display the outlet water temperature and pressure. Press the corresponding button on the main page to enter the corresponding interface.

After power on, in any interface, if there is no keyboard operation for 180s, it will automatically return to the normal display interface.

After the system is powered on, press any key, and the backlight will be on. If there is no keyboard operation for 60s, the backlight will be dimmed.

### 3.2.3 More system interfaces



Figure 3.2.3.1 More system interfaces

Click "more" on the main menu to enter the system more interface as shown in figure 3.2.3.1, and click "password input". Click the input box and input the password, as shown in figure 3.2.3.2.



Figure 3.2.3.2 Password input interface

The password is "0001" by default. The user can change the outlet water temperature setting point and outlet water temperature alarm point, view the alarm record, alarm history and system operation status. If the user does not enter the password before entering the parameter, the password

interface will automatically jump to when clicking the corresponding parameter input box. The parameters can only be changed after the password is entered correctly. As shown in figure 3.2.3.3.



Figure 3.2.3.3 System parameter modification interface

### 3.2.4 Operation status

The operation status includes: the environmental status of the current unit, the operation status of the current unit, and the group control status of the current unit. The user can click and switch at the top of the "system status" interface, and the operation status interface is shown in Figure 3.2.4.

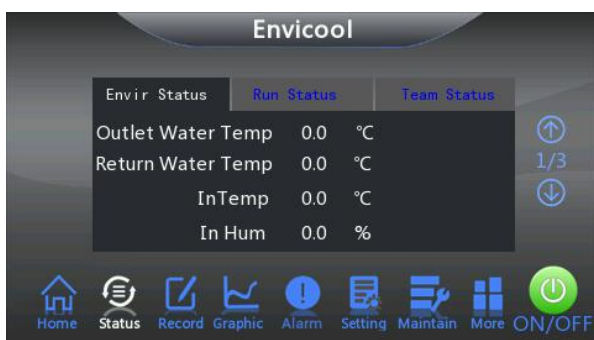


Figure 3.2.4 System operation status interface

### 3.2.5 Alarm record

The alarm record includes the alarm status of the current unit and the historical alarm record of the unit. The user can independently click on the top of the "alarm" interface to switch and view, and the alarm record interface is shown in figure 3.2.5.



Figure 3.2.5 System alarm recording interface

### 3.2.6 Operation records

Operation records include: operation time and action times of the unit, and operation log of the unit. The user can click and switch at the top of the "record" interface, and the operation record interface is shown in figure 3.2.6.

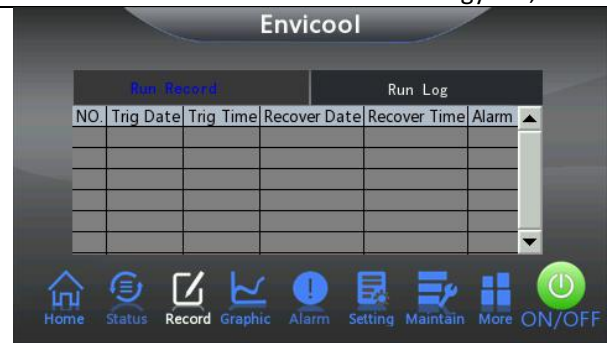


Figure 3.2.6 System operation record interface

### 3.2.7 Operation curve

The operation curve includes: the refrigeration point temperature, actual return water temperature, outlet water pressure and return water pressure curve set by the unit. The user can click and switch at the top of the "curve" interface. It can also select whether the refrigeration point temperature, actual return water temperature, outlet pressure and return water pressure curve set by the unit are displayed. The operation curve interface is shown in figure 3.2.7.

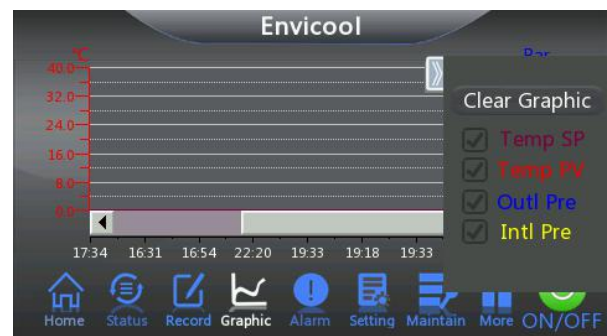


Figure 3.2.7 System operation curve interface



### 3.2.8 System settings

1. System settings include: temperature setting, group control configuration setting, system setting, account management setting (change password), time setting. If the group control mode displays \* \*, then this function is not selected. There are two modes in the system setting: local mode and remote mode. If local mode is selected, the priority of local mode is the highest; if remote mode is selected, the priority of remote mode is the highest. The system setting interface is shown in figure 3.2.8.1.



Figure 3.2.8.1 System setting interface

2. The system parameter setting mode is: click the corresponding input box to automatically jump out of the input keyboard and enter the required value. As shown in figure 3.2.8.2..

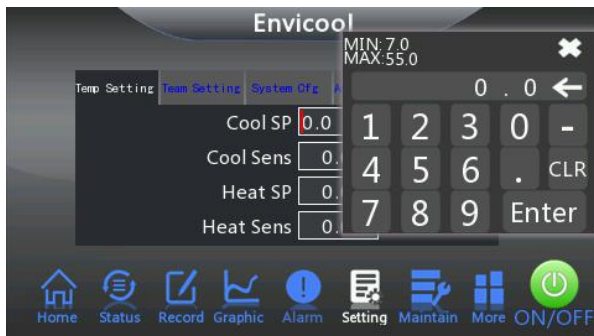


Figure 3.2.8.2 System parameter setting interface

3. Set the dual computer switching function (group control), and the group control setting interface is shown in figure 3.2.8.3.

Group control mode: select "group control" to enter the group control operation mode;

Local address: if the number of units to be controlled by cluster is 2 (i.e. the two units are backup to each other). If the address of this unit is selected as 1, the other unit it backs up must be selected as 2.

Active standby mode: select "automatic"

Number of members: 2, number of standby machines: 1

Rotation training time: 24h (user can set it according to actual needs, default value: 24)

#### Note

When the unit is powered on for the first time for normal operation, the user must carry out corresponding group control settings. Otherwise, the group control function will not be realized and will return to the independent operation control mode.



Figure 3.2.8.3 System group control setting interface

4. The system configuration setting interface is shown in figure 3.2.8.4.

Monitoring address: select "0" to enter "local mode". The chiller is controlled by Modbus protocol and touch screen;

Select "1" to enter "monitoring mode", and the chiller is controlled by CAN protocol;



Figure 3.2.8.4 System configuration setting interface

## 3.2.9 System maintenance

The system maintenance interface includes system make-up water, delay to open circulating pump, delay to close make-up water and grid frequency, as shown in figure 3.2.9.

System water make-up: when the chiller operates for the first time or needs to supplement cooling medium, the system water make-up function needs to be manually turned on in the system maintenance interface.

The default time of delay opening circulating pump is 30s, and the default time of delay closing make-up water is 180s. The user can adjust the time of delay closing and water

replenishing according to the size of the cooling medium circulation system.

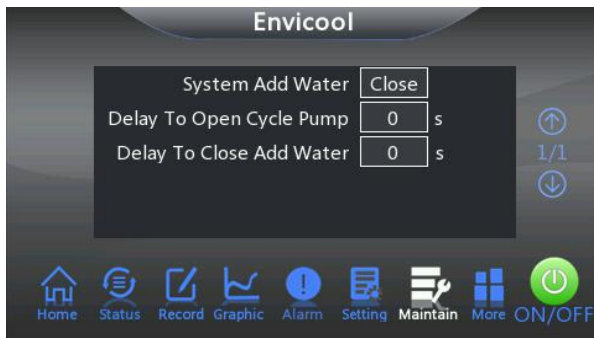


Figure 3.2.9 System maintenance interface

## Chapter 4 System operation

This chapter describes in detail the control operation of the chiller and the control process of the inlet and outlet water temperature.

### 4.1 Supplement cooling medium

When the chiller is connected to the cooling equipment for the first time, the whole cooling medium circulation system needs to supplement the cooling medium before the chiller can operate normally.

#### 4.1.1 Connect the liquid replenishing device

Take out the liquid replenishing device (as shown in Figure 4.1.1) and the liquid replenishing pipe fittings from the accessories, fix one end of the liquid replenishing pipe fittings at the liquid replenishing inlet of the water chiller, connect the other end of the liquid replenishing pipe fittings to the liquid replenishing pump, and fix both ends firmly with the hose clamps. At the same time, check that the power input terminal of the make-up pump is plugged into the power output port "output" of the water chiller, and use a small slotted screwdriver to tighten the screws at both ends of the power input terminal of the make-up pump to fix it on the water chiller.

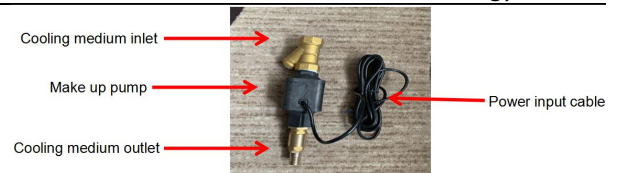


Fig. 4.1.1 Filling device

#### 4.1.2 Requirements for cooling medium

1. When using water ethanol mixture for cooling, it is necessary to observe whether the water chiller has algae, precipitation and corrosion.

The presence of residues will limit the performance of the chiller. Without water treatment, it will be difficult to achieve satisfactory results. The quality of the cooling medium must be regularly monitored and treated to ensure that precipitation and corrosion can be avoided even under extreme conditions.

2. The cooling medium shall not cause scale deposition or loose stratification. That is to say, the cooling medium has low hardness, especially calcium hardness. In particular, the hardness of calcium shall not be too high when cooling is carried out in cyclic operation. In addition, the cooling medium shall not be soft water and corrode the material. When the cooling medium is cooled twice, the salt content may rise due to a large amount of water evaporation. As the concentration of dissolved substances will increase, the conductivity will increase and the cooling medium will be more corrosive. Therefore, it is not only necessary to add appropriate amount of fresh water, but also to discharge part of the concentrated cooling medium.

In addition, the nature of the type of cooling medium used shall not deviate from the description in the following parameters (see table 4.1.2):

### Note

1. In the long-term use of the chiller, the concentration of the cooling medium may become higher, which will reduce the cooling efficiency of the chiller. Please check the concentration of cooling medium in the water turbine system every 3 months. If the concentration of cooling medium is too high, replace the cooling medium completely to restore the value to the common range.
2. When the cooling medium is water, tap water can not be used directly, only distilled water or deionized water can be used.
3. In the long-term use of chiller, the cooling medium may have mechanical dirt, high hardness, high content of chemical dirt, biological dirt, slime bacteria and algae. Therefore, it is necessary to inspect, purify and maintain the cooling medium in the water turbine system every three months..
4. Ethanol belongs to the substance that pollutes groundwater. The equipment operator must comply with the relevant provisions of the state on the protection of groundwater resources.

Table 4.1.2 Water quality parameters

Characteristic	Numerical value
PH value	(7) 7.5-8.5
Conductivity	200-1000 $\mu\text{S}/\text{cm}$
Evaporation residue	< 500 $\text{mg}/\text{dm}^3$
Sedimentary material	< 3 $\text{mg}/\text{dm}^3$
Hardness	3-8°dH (for German speaking areas)
Ca + Mg	0.5-2 $\text{mmol}/\text{l}$ (for international areas)
Bicarbonate	1-5 $\text{mmol}/\text{dm}^3$ (60-300 $\text{mg}/\text{dm}^3$ )
Free carbon monoxide	< 10 $\text{mg}/\text{dm}^3$
Sulfide	< 0.01 $\text{mg}/\text{dm}^3$
chloride	< 50 $\text{mg}/\text{dm}^3$
Sulfate	< 250 $\text{mg}/\text{dm}^3$
Nitrate	< 25 $\text{mg}/\text{dm}^3$
Nitrite	< 0.1 $\text{mg}/\text{m}^3$
CSB	< 7 $\text{mg}/\text{dm}^3$
NH4	< 0.05 $\text{mg}/\text{dm}^3$
Fe	< 0.1 $\text{mg}/\text{dm}^3$
Mn	< 0.1 $\text{mg}/\text{dm}^3$
Cu	< 0.1 $\text{mg}/\text{dm}$

### 4.1.3 Manual start fluid replenishment

1. Put the make-up pump in the container containing the cooling medium;
2. After checking the power wiring of the water chiller, power on the whole machine;
3. Open the front lower cover plate of the water chiller, find and open the ball valve of the liquid filling port, as shown in Figure 4.1.3;
4. Enter the password "0001" in the system more interface, and then click the maintenance icon to enter the system maintenance interface. After setting the time delay for opening the circulating pump and closing the make-up water, the cooling medium can be supplemented to the cooling medium circulating system by manually turning on the make-up water function of the system.
5. After the cooling medium is replenished, close the ball valve at the filling port and install the front lower cover plate of the water chiller. Remove the components of the liquid replenishing device from the water chiller, clean and wipe the liquid replenishing pump and the liquid replenishing pipe fittings just, and place them for the next use.

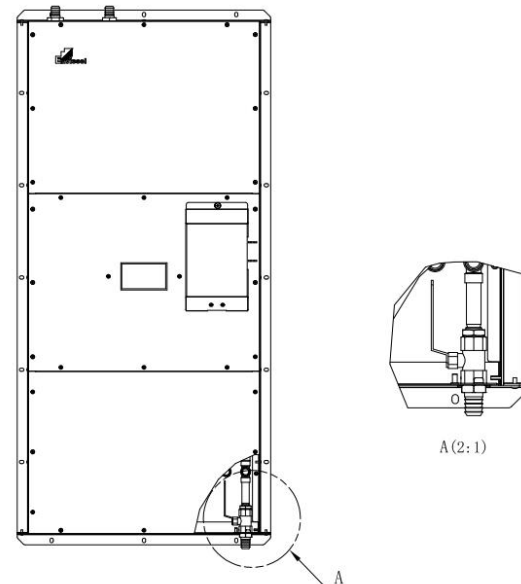


Fig. 4.1.3 Ball valve of make-up port of water chiller

### Note

1. It is strictly prohibited to impact or roll the power cable of the make-up pump, not to mention as the lifting rope. During the operation of the make-up



pump, do not pull the power cable at will to avoid electric shock due to the damage of the power cable.

2. When the make-up pump is immersed in the cooling medium, its depth shall not exceed 3M, and it shall be more than 0.5m away from the bottom of the cooling medium liquid. In the process of water replenishment, pay attention to check the liquid level frequently, and do not let the make-up pump work above the water surface.

3. There shall be no sundries in the container containing cooling medium to block the impeller of the make-up pump, so that the make-up pump can not work normally.

4. When the make-up pump is working, a safety warning sign of "a little dangerous, people and animals are not allowed to enter" shall be set up at the use site to prevent accidents.

5. If the user cannot evaluate the operation time of the make-up pump, the operation of making up the cooling medium cannot be completed at one time. Please supplement the cooling medium several times according to the actual situation.

6. Since the one-way valve is used in the filling device, the cooling medium remains in the pipeline between the one-way valve and the water chiller after the water filling is stopped. When disassembling this section of pipe, be careful not to let the cooling medium in the pipe scatter on the ground or other equipment.

Parameter	Default value	Set range	Set point description
Refrigeration set point	18℃	[7~55]℃	Refrigeration on point
Refrigeration sensitivity	3℃	[1~10]℃	Sensitivity of temperature control
Heating set point	10℃	[-4~20]℃	Temperature point of heating operation
Heating sensitivity	3℃	[1~10]℃	Sensitivity of temperature control
Outlet high temperature point	10℃	[-4~20]℃	Set point of outlet high temperature
Outlet low temperature point	5℃	[-4~20]℃	Set point of outlet low temperature

#### Note:

In order to ensure reliable operation and maximum energy efficiency of the unit, it is not recommended that the user change the temperature set point at will.

For individual different models, the default value of refrigeration parameter setting is subject to the factory default value setting.

Heating is an optional function.

### 4.2.2 Refrigeration operation

Refrigeration stop point = refrigeration set point - refrigeration sensitivity. When the water outlet temperature or the average temperature of the electric core of the water chiller is lower than the refrigeration stop point, the refrigeration operation stops. When the water outlet temperature or the average temperature of the electric core of the water chiller is higher than the refrigeration set point, the refrigeration operation is started.

### 4.2.3 Heating operation

Heating stop point = heating set point + heating sensitivity. When the water outlet temperature or the average temperature of the electric core of the water chiller is higher than the heating stop point, the heating operation stops. When the water outlet temperature or the average temperature of

## 4.2 Temperature control

### 4.2.1 Refrigeration or heating

According to the refrigeration or heating requirements, the microprocessor of the water chiller controls the temperature (the control mode is selected as: outlet water temperature or average temperature of the electric core).

the electric core of the water chiller is lower than the heating set point, the heating operation is started.

### 4.3 Cooling mode

In cooling mode:

1. When the chiller has refrigeration demand, start refrigeration operation, internal circulation water pump and compressor operate, and the water pump operates at high speed. The system has no refrigeration demand, the internal circulating water pump operates at low speed, and the compressor is closed;
2. During refrigeration operation, start the internal circulating water pump first, and then start the compressor after 30s;
3. When the system has heating demand, only the internal circulating water pump is opened. When the pump is running at low speed, the electric heating tube and other devices are not running.

### 4.4 Heating mode

In heating mode:

1. When the chiller has heating demand, please turn on heating operation, internal circulating water pump and electric heating pipe, and the water pump operates at high speed. The system has no heating demand, the internal circulating water pump operates at low speed, and the electric heating pipe is closed;
2. During heating operation, turn on the internal circulating water pump first, and then turn on the electric heating pipe after 30s;
3. When the system has refrigeration demand, only the internal circulation water pump is opened, and the water pump runs at low speed. The compressor and other devices do not operate.

### 4.5 Self cycling mode

In the self circulation mode, the chiller only operates the internal circulation pump. The water pump operates at low speed, and other devices do not operate.

### 4.6 Full automatic mode

In the fully automatic mode, the chiller can be cooled and heated. In the absence of refrigeration and heating demand, keep self circulation operation.

### 4.7 Stop mode

In the stop mode, except for the electronic control part of the chiller, the internal circulating water pump and other devices do not operate.

### 4.8 Communication

The control system uses RS485 or CAN interface to communicate with the equipment through MODBUS or can protocol. Please refer to the communication protocol for more details.

#### Note

The chiller supports CAN communication protocol as optional function.

## Chapter V Alarm

The control system has the function of displaying alarm information. After the alarm condition is restored, some alarms will be automatically removed, and some alarms need to be reset manually.

When the unit gives an alarm, the chiller will send out an alarm beep, and the alarm icon will appear on the top of the home page and blink continuously. When the alarm beep sounds, click anywhere on the display screen to eliminate this alarm beep. In the "alarm" interface, the "current alarm" menu page, you can view the current alarm, as shown in Figure 5 below.



Figure 5 Current alarm interface

## 5.1 Alarm: explanation and troubleshooting

The following chapters describe the possible causes of each alarm and the troubleshooting methods.

### 5.1.1 High water temperature alarm

When the outlet water temperature - refrigeration set point > outlet water high temperature set point, the controller will give an alarm. When the outlet water temperature - refrigeration set point is less than the outlet water high temperature set point, the alarm will be automatically eliminated.

In case of high water temperature alarm, please check whether the water temperature probe of the water chiller is in fault, whether the compressor, electronic expansion valve, internal circulating water pump and external fan of the water chiller are in normal operation, whether the load of the equipment to be cooled exceeds the designed cooling capacity of the water chiller, and whether the cooling medium circulation system of the water chiller is lack of cooling medium due to leakage.

### 5.1.2 Low water temperature alarm

When the outlet water temperature is lower than the outlet water low temperature set point, the controller will give an alarm. When the outlet water temperature is higher than the outlet water low temperature set point, the alarm will be automatically eliminated.

In case of low water temperature alarm, please check whether the water temperature probe of the water chiller is in fault, whether the electric heating pipe and internal circulation pump of the water chiller are in fault, and whether the heat leakage of the equipment to be cooled exceeds the designed heating capacity of the water chiller.

### 5.1.3 Temperature sensor failure alarm

The temperature sensor failure alarm includes the failure of water temperature sensor, water temperature sensor, suction temperature

sensor, condensation temperature sensor and exhaust temperature sensor.

When the temperature sensor cannot detect the real-time temperature, the temperature value on the screen is "\*\* \*\*", the controller will give an alarm. Until the temperature sensor can detect the real-time temperature, the alarm will automatically cancel.

In case of temperature sensor failure alarm, please check whether the electric control wiring of temperature sensor is loose and whether the cable is damaged. If it is loose or damaged, replace it with a new temperature sensor.

### 5.1.4 Low pressure sensor failure

When the chiller fails to detect the pressure at the low-pressure side of the refrigeration system, the controller will give an alarm until the pressure at the low-pressure side can be detected, and the alarm will be automatically cancelled.

In case of failure alarm of low-voltage sensor, please check whether the electric control wiring of low-voltage sensor is loose and whether the cable is damaged. If it is loose or damaged, replace it with a new low-pressure sensor.

### 5.1.5 Electric heating alarm

Electric heating alarm includes electric heating fault alarm and electric heating fault locking alarm.

When there is heating demand and the electric heating pipe of the water chiller cannot be started and operated normally, the controller will send out the electric heating fault alarm until the alarm is cancelled automatically after the electric heating pipe can be started and operated normally.

When the water chiller has 3 electric heating alarms in 1 hour, the controller will send out electric heating fault locking alarm. The water chiller can only be restored after it is powered off and reset manually.

In case of electric heating failure alarm and electric heating failure locking alarm, please check

whether the electric control wiring of electric heating pipe is loose and whether the cable is damaged. If there is no looseness or damage, it is necessary to replace a new electric heating pipe.

### **5.1.6 Side pipe anti freezing alarm**

When the temperature of the bypass pipe is too low for more than 5min, the controller will give an alarm until the alarm is automatically cancelled after the temperature of the bypass pipe rises.

In case of side pipe anti freezing alarm, please check whether there is refrigerant leakage in the water chiller. If not, please contact after-sales service.

### **5.1.7 Water pump fault alarm**

When the internal circulating water pump of the water chiller cannot operate normally according to the logic, the controller will give an alarm until the alarm is cancelled automatically after the water pump can operate normally.

In case of water pump failure alarm, please check whether there is air in the cooling medium circulating in the water chiller or there is no cooling medium that causes the self-protection of the water pump, whether the electric control wiring of the water pump is loose and whether the cable is damaged. If none of the above conditions exist, please contact after-sales service.

### **5.1.8 Frequency converter fault alarm**

The frequency converter fault includes the frequency converter communication fault, frequency converter over-current, frequency converter over-temperature, frequency converter over-voltage, frequency converter under voltage, frequency converter phase loss, frequency converter other faults, frequency converter over-current locking, frequency converter over temperature locking, frequency converter over-voltage locking, frequency converter under

voltage locking, frequency converter phase loss locking and frequency converter other fault locking.

When the frequency converter fails to work normally, the controller will give an alarm until the alarm is cancelled automatically after the frequency converter can operate normally.

In case of fault alarm of frequency converter, please check whether the electric control wiring of frequency converter is loose and whether the cable is damaged. If there is no looseness or damage, please contact after-sales service.

### **5.1.9 System pressure alarm**

System pressure alarm includes system high pressure alarm, system high pressure alarm locking, system low pressure alarm and system low pressure alarm locking.

When the chiller detects that the high-pressure measuring pressure of the system is higher than 27bar, the controller will send out a high-pressure alarm. When the pressure at the low-pressure side of the water chiller detection system is lower than 0.5bar, the controller will send out a low-pressure alarm until the system pressure is normal, and the alarm will be automatically cancelled.

When the chiller has three high-pressure alarms within one hour or three low-pressure alarms within one hour, the controller will send out the system high-pressure alarm locking alarm or the system low-pressure alarm locking alarm, which needs to be manually released.

In case of high-pressure alarm and system high-pressure alarm locking alarm, please check whether the external circulation fan is powered off, whether it works normally, whether the high-pressure switch wiring is loose or damaged, whether the condenser is seriously dirty and blocked, whether there are sundries in front of the air return outlet on the outdoor side of the water

chiller and whether the outdoor side temperature is too high.

In case of low pressure alarm and system low pressure alarm locking alarm, please check whether the refrigerant leaks and whether the electronic expansion valve is normal. Please contact after-sales service.

#### **5.1.10 CAN communication fault alarm (optional)**

When CAN communication protocol is used and the communication between chiller and upper computer is not available, the controller will send out CAN communication fault until the alarm is cancelled automatically after the communication is normal.

In case of CAN communication failure, please check whether the communication line is connected to the correct port, whether the communication line is intact, whether the communication address is correct, and whether the communication baud rate of the water chiller is the same as that of the upper computer.

#### **5.1.11 Water immersion fault alarm**

When the cooling medium leakage occurs in the internal pipeline of the water chiller, the controller will send out water immersion fault until the leakage point is repaired and the alarm will be automatically cancelled.

In case of water immersion failure, please open the front cover plate of the water chiller, check whether there is cooling medium leakage inside the water chiller, and then contact the after-sales maintenance service.

#### **5.1.12 Fault alarm of system inlet and outlet water pressure**

The system inlet and outlet pressure fault alarm includes outlet pressure fault, inlet pressure fault and excessive outlet pressure.

When the water outlet pressure and the water inlet pressure sensor cannot detect the pressure normally, and the value of the water inlet and

outlet pressure on the screen is displayed as "\*\* \*\*", the controller will send out the water outlet pressure fault and the water inlet pressure fault alarm, until the water outlet pressure and the water inlet pressure sensor can detect the pressure normally, the alarm will be automatically cancelled.

When the outlet pressure is too high, greater than 2.2bar, the controller will send out the alarm of too high outlet pressure until the alarm is automatically cancelled when the outlet pressure is less than 2.2bar.

In case of water outlet pressure fault and water inlet pressure fault, please check whether the electric control wiring of water outlet pressure and water inlet pressure sensor is loose or damaged. Please contact after-sales service.

When there is a high water outlet pressure alarm, please make the whole machine in a state of power failure, open the front cover plate of the water chiller, find the safety valve and loosen it, properly discharge part of the cooling medium, and relieve the pressure of the water chiller system.

#### **5.1.13 Make up water alarm**

When the water inlet pressure in the chiller system is lower than 0.3bar, the controller will send out a water make-up alarm, until the water inlet pressure is higher than 0.3bar, the alarm will be automatically cancelled.

In case of water make-up alarm, please connect the water make-up device and manually turn on the water make-up function of the water chiller to supplement the cooling medium for the water chiller (see Chapter 4.1 "supplement the cooling medium" for specific operation).

#### **5.1.14 AC over voltage and AC under voltage alarm**

When the input power voltage of the chiller is higher than 253v, the controller will send out an AC over-voltage alarm. Until the input power



voltage is lower than 253v, the alarm will be cancelled automatically.

When the input power voltage of the chiller is lower than 187v, the controller will send out an AC undervoltage alarm. Until the input power voltage is higher than 187v, the alarm will be cancelled automatically.

In case of AC over-voltage and AC under voltage alarm, please check the input power supply voltage. It is recommended that the chiller be equipped with a power supply regulator for the alarm of AC over-voltage and AC under voltage due to the fluctuation of grid voltage.

### **5.1.15 Condensation over temperature alarm**

When the condensation temperature of the chiller is higher than 88.5 °C, the controller will send out the condensation over temperature alarm. Until the condensation temperature is lower than 88.5 °C, the alarm will be cancelled automatically.

When the condensation over temperature alarm occurs, please check whether the external circulation fan is powered off, whether it works normally, whether the condenser is seriously dirty and blocked, whether there are sundries in front of the air return outlet on the outdoor side of the water chiller and whether the outdoor side temperature is too high.

### **5.1.16 Exhaust temperature alarm**

Exhaust temperature alarm includes exhaust over temperature alarm and exhaust over temperature lock alarm.

When the exhaust temperature of the chiller is higher than 105 °C, the controller will send out the exhaust over temperature alarm. Until the exhaust temperature is lower than 105 °C, the alarm will be cancelled automatically.

When the chiller has three exhaust over temperature alarms within one hour, the controller will send out the exhaust over temperature locking alarm and need to manually release the alarm.

When the exhaust over temperature alarm or exhaust over temperature locking alarm occurs, please check whether the external circulation fan is powered off, whether it works normally, whether the condenser is seriously dirty and blocked, whether there are sundries in front of the air return outlet on the outdoor side of the water chiller and whether the outdoor side temperature is too high.

### **5.1.17 CAN life signal stop alarm (optional)**

When the user selects the can communication protocol and the can communication signal between the water chiller and the upper computer is interrupted, the controller will send the can life signal stop alarm until the communication is normal and the alarm will be automatically cancelled.

When the CAN life signal stop alarm occurs, please check whether the can communication line is connected to the correct port, whether the communication line is intact, whether the communication address is correct, and whether the communication baud rate of the water chiller is the same as that of the upper computer.

## **Chapter VI Maintenance**

Regular maintenance is very important for the performance and service life of water chillers. If you need to replace the device, please use the original accessories.

The power supply of the unit shall be cut off during maintenance, unless it is required for commissioning project.

### **6.1 Electrical maintenance**

Conduct appearance inspection every three months to check whether the circuit connection falls off and whether the circuit is rusted.

Check the following during maintenance:

1. Carry out the electrical insulation test of the whole machine and find out the unqualified contacts;
2. Check whether the contact is flexible and whether the contact is arcing or burning;
3. Use clean brush or dry compressed air to remove dust from electrical and control components;
4. Fasten all electrical contacts;
5. Check the temperature rise of each air switch and contactor contact.

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### **① Note**

1. It is forbidden to plug and unplug all circuit boards with power. The plug and unplug with power will generate a large instantaneous current, which may cause irreparable damage to the circuit.
  2. When maintaining the control board, make sure that the controller is powered off.
  3. The water chiller has high voltage. All power must be cut off before maintenance.
- 

## **6.2 Component maintenance**

### **6.2.1 Pipeline maintenance**

Every three months, it is necessary to check the tightness of the connecting pipes of the water chiller system. First disconnect the cold water power supply, remove the front cover plate of the water chiller, and then carefully check the cooling medium pipe inside the water chiller for leakage. If leakage is found, please contact the water chiller manufacturer to provide after-sales maintenance service.

### **6.2.2 Fans**

Check the outdoor fan every three months. First, disconnect the power supply of the water chiller, remove the maintenance guard board of the lower fan, and observe that the fan blade is not damaged. Gently move the fan blade with your hand. There is no obvious resistance change and friction wind guide ring during the fan blade rotation. After power on, the fan works normally without abnormal noise and vibration, which is normal, otherwise it is abnormal. Because the water chiller is designed for uninterrupted large amount of air circulation, any

obstacles affecting air flow near the air inlet and outlet of outdoor circulation shall be removed immediately.

If it is judged that the fan cannot operate normally and needs to be replaced, please contact the chiller manufacturer to provide after-sales maintenance service.

### **6.2.3 Drainage pipe**

In order to ensure the normal operation of the drain pipe, it is necessary to check the drain pipe every month. Ensure that there is no fine debris and leakage in the drainage pipe.

## **6.3 Maintenance of refrigeration system**

The components of the refrigeration system must be checked monthly to see whether the system functions normally and whether there are signs of wear. Due to the failure or damage of devices often accompanied by corresponding failures, regular inspection is the main means to prevent most system failures.

Check the refrigerant pipeline every six months to see if it is worn or if the existing fixed structure is loose.

When the refrigeration system is in failure, the failure can be determined according to some parameters of the system operation.

### **6.3.1 Compressor maintenance**

Compressor faults are generally divided into the following two categories:

1. Motor fault (such as coil burnout, insulation damage, turn to turn short circuit, etc.)
2. Mechanical failure (such as compression failure, pressure relief valve failure, heat sensitive disk failure, etc.)

The main performance of compression failure is that the operating pressure cannot be established. After the start of suction pressure and discharge pressure, please keep balance. After eliminating the cause of inversion, it can be determined as compression failure.



The control system of water chiller has strong alarm function and protection function to ensure the operation safety of compressor. In the periodic maintenance and detection process, the maintenance personnel shall record the historical fault alarm, the whole machine operation record and operation log, the low pressure value and confirm the cause of the fault alarm protection in time.

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**i Note**

1. Avoid direct contact of human skin with residual gas and lubricating oil in the compressor system.
  2. Wear long rubber gloves when handling contaminated parts.
- 

If the compressor needs to be replaced, the following tests shall be carried out first:

1. Check all fuses and circuit breakers.
  2. Check the status of pressure switch.
  3. Check the relevant historical alarm information.
  4. Check the operation history of the compressor.
  5. Check the electrical characteristics of the motor.
- 

**i Note**

For the remaining refrigerant, the standard recovery device shall be used for recovery before maintenance.

The methods of removing and replacing the compressor are as follows:

1. Cut off the power supply.
  2. Connect the composite pressure gauge to the compressor connector.
  3. Use standard steps to recover the remaining refrigerant in the system.
- 

**i Note**

Discharging refrigerant into the air can cause environmental pollution. The discharge of refrigerant must comply with national and local laws and regulations.

4. Remove the damaged compressor.
5. When cleaning the system, please follow the instructions of the cleaning tool.
6. Install the replacement compressor and connect all connector parts. Pressurize and leak test the system.
7. Vacuum the system.

8. Charge the system with refrigerant according to the charging capacity requirements of the whole machine.

9. Turn on the power and run the chiller. Check whether the refrigeration operation is normal.

Please refer to the suction and discharge pressure range of normal refrigeration cycle, and supplement a certain amount of refrigerant dynamically if necessary.

### 6.3.3 Condenser maintenance

The outdoor side condenser of the chiller shall be cleaned every 3 months. Because the condenser is easy to accumulate ash, which affects the heat dissipation of the condenser. Please use compressed air or vacuum cleaner equipped with brush head to remove dust and other sundries on the surface of condenser. When the fins are cleaned by compressed air, the blowing direction shall be in the direction of reverse air flow. Snow accumulation around the condenser should be avoided in winter. Check whether the fins are inverted or damaged. Simple repairs can be carried out if necessary.

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**i Note**

1. Please clean the condenser when the chiller is powered off to ensure safety;
  2. The temperature inside the chiller may be as high as about 60 ° C. Wait for about 10 minutes after turning off the chiller to ensure that all components are fully cooled;
  3. Sharp edge of condenser blade! Wear gloves as personal protective equipment;
  4. Too strong water gun or compressed air will cause damage to condenser blades! Carefully select the strength of compressed air and water gun to avoid damage.
  5. Generally, it is not allowed to wash the condenser directly with water gun. If it is necessary to wash the condenser with water gun, the unit shall be moved to the maintenance space for washing. Prevent the water leakage of the chiller caused by flushing the condenser from affecting the use of other equipment. After the completion of flushing, it is necessary to clean up the water accumulated in the chiller in time.
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## 6.4 Maintenance of cooling medium

In the long-term use of the chiller, the concentration of the cooling medium may become higher, which will reduce the cooling efficiency of the chiller. Please check the concentration of cooling medium in the water turbine system every 1 year. If the concentration of cooling medium is too high, the value will be restored to the common range by completely replacing the cooling medium. In the long-term use of chiller, the cooling medium may have mechanical dirt, high hardness, high content of chemical dirt, biological dirt, slime bacteria and algae. Therefore, it is necessary to inspect, purify and maintain the cooling medium in the water turbine system every other year. In case of algae, precipitation and corrosion in the chiller, the cooling medium in the system shall be replaced. After draining the cooling medium in the system, it is necessary to use a spanner wrench to remove the filter element of the Y-type filter in the water chiller, clean or replace it (see Figure 6.4 for the location of the Y-type filter), and then supplement the cooling medium to the water chiller system (see Chapter 4.1 "supplementary cooling medium" for specific operation).

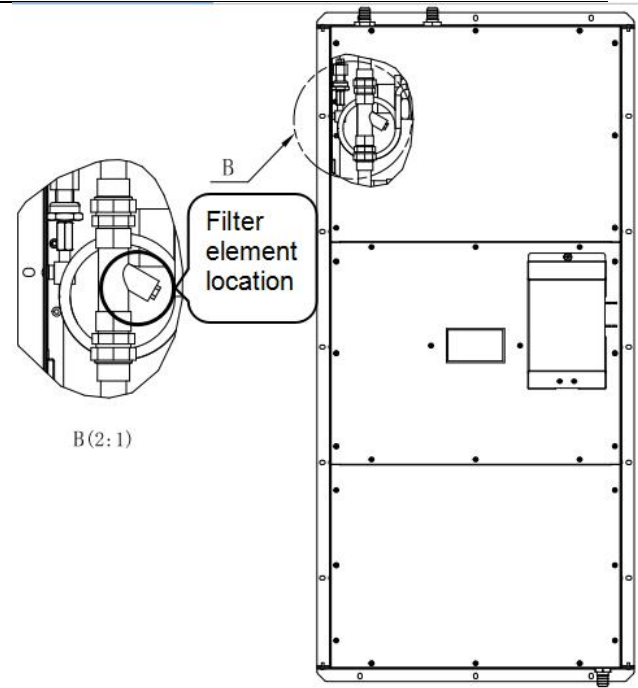


Figure 6.4 Y-type filter and its filter element location



### Note

1. The better the stability of the cooling medium used in the chiller, the longer the time interval of detection. For example, with the configured cooling medium, the detection period can be extended to 1.5 years or even longer.
2. To avoid the generation of fungi or algae, the cooling medium must be tested at least every 3 years. Fungi or algae may be present even when purified water is used.
3. Ethanol belongs to the substance that pollutes groundwater. The equipment operator must comply with the relevant provisions of the state on the protection of groundwater resources.

## Chapter VII Troubleshooting

### 7.1 Fan failure

Phenomenon	Possible causes	Inspection items or handling methods
External circulation fan does not operate	1. The water chiller is not powered on 2. The circuit breaker is tripped due to lightning stroke	1. Check whether the power input terminal of water chiller is powered; 2. Check whether the circuit breaker inside the water chiller is closed.
	Abnormal power input of water chiller, such as over-voltage and under voltage of power supply.	Through RS485/CAN communication interface display, determine whether there is corresponding alarm in the water chiller and correct it.
	The chiller is in standby mode.	If it is a normal phenomenon, the water chiller is powered on and enters the automatic control logic after 30s standby.
	Fan stuck	Check whether there is any foreign matter stuck in the fan.
	Loose terminal	Check whether the connecting terminal of fan is loose.
	Compressor are not started	The external fan will not start until the compressor is started.
Abnormal noise of external circulation fan	Fan bearing wear	Replace the fan.
	Fan blades scratch other objects	Check whether there is interference between cables and fan blades.

### 7.2 Refrigeration system failure

Phenomenon	Possible causes	Inspection items or handling methods
Compressor does not start	Power not on (standby)	Check the main power switch, and check whether the operation display interface has been turned on.
	Loose circuit connection	Tighten the circuit connector.
	Compressor motor burned out	Check the motor and replace it immediately if any defect is found.
Compressor does not work	No cooling demand	Check the indoor return air temperature display and the output status of the compressor in the operation interface.
	Stop delay	The compressor has the shortest shutdown time under normal condition. If the temperature rises to the opening point again during this period, the compressor will still delay to start.
High exhaust pressure	Dirty condenser	Clean the condenser.
	External circulation fan does not operate	Refer to the table above.

### 7.3 Failure of cooling medium circulation system

Phenomenon	Possible causes	Inspection items or handling methods
Internal circulating water ring pump does not start	Power not on (standby)	Check the main power switch, and check whether the operation display interface has been turned on.
	Loose circuit connection	Tighten the circuit connector.
	Pump body burned out	Check the water pump and replace it immediately if it is found to be burnt out.
	There is air or no cooling medium in the cooling medium, which causes the water pump to protect itself.	Check whether there is air or cooling medium in the system. If there is air or no cooling medium in the system, it is necessary to empty or supplement the cooling medium.
Electric heating tube does not work	No heating demand	Check whether the outlet water temperature and heating set point are set properly.
	Loose circuit connection	Tighten the circuit connector.
	Electric heating pipe is burnt out.	Check the electric heating pipe. If it is found that it has been burnt out, replace it immediately.

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