VCS Series Rack Air Conditioner User Manual

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Preface-About the product and manual

[Manual purpose]

This manual introduces the main features, performance, and working principle of the new generation of intelligent rack-mounted precision air conditioners and provides users with information on usage, operation, and maintenance.

[User]

Technical Support Engineer

Maintenance Engineer

[Disclaimer]

1. Outside the free warranty period;
2. Disassemble or modify the product without authorization;
3. Violation of product operation or use specifications;
4. Man-made faults;
5. The product suffered losses caused by irresistible or other external factors on the client-side.

[Note: Any of the above exemption clauses will not be covered by the warranty.]

[Related description]

1. This manual is provided with the product, please keep it in a safe place so that you can check it at any time when you need it. In case this manual is accidentally lost or damaged, please obtain it directly from the manufacturer or local distributor;
2. This manual is written for VCS series air-cooled products, and the content may not be applicable to other models;
3. Due to product version upgrades or other reasons, the content of this document will be updated from time to time.

Unless otherwise agreed, this document is only used as a guide, and all reports, information, and suggestions in this document do not constitute any express or implied guarantee.

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Chapter 1 General

Summary--This chapter mainly describes five aspects including product introduction, operating parameters and requirements, type description, system composition, and product specifications.

1.1 Products Introduction

Products

The VCS series Rack Air Conditioner is a product highly suitable for the application scenarios of micro-module products. It is embedded in a standard cabinet to achieve near-end cooling and reduce the PUE value of the data center. It has the characteristics of high efficiency and energy saving, easy installation, high integration, flexible combination, safety, and reliability.

Types

This product is divided into a variety of models with heating and humidification and without heating and humidification. The main functions of the humidifier with heating are: refrigeration, dehumidification, humidification, and heating; the humidifier without heating has only the cooling and dehumidification functions.

Refrigerating capacity

The refrigeration levels of VCS series rack air conditioners are:3.5kW～12.5kW.

Features

1. High reliability, high sensible heat ratio, large air volume;
2. High-efficiency backward-inclined centrifugal EC fan design, with large air volume, high efficiency, and low noise;
3. The well-designed and matched refrigeration system ensures optimal energy-saving operation all-weather;
4. The rack-mounted design concept makes the layout application more flexible and exquisite;
5. Adopt R410A green environmental protection refrigerant, in line with international environmental protection refrigerant requirements;
6. Adopt a large-area "V"-shaped evaporator design to make heat exchange faster and more efficient;
7. The electronic expansion valve is used to accurately control the refrigerant flow, which can save up to 30% of energy consumption;
8. Adopt international famous brand DC inverter compressor, its excellent quality guarantees the unit's high efficiency and stability;
9. The use of high-quality refrigeration valves makes the operation more reliable;

10. A variety of optional accessories, to provide users with a variety of options.

1.2 Operating Parameters and Requirements

Table 1-1 Operating parameters and requirements table

--	Item	Indoor	Outdoor
Operating Parameters	Temperature/T	0℃～45℃	-40℃～+45℃
	Humidity /RH	5%～95%	——
Operating Requirements	Altitude/M	Altitude <1000M, more than 1000M need to be derated	
	Power supply /V	220V±10%, 50±2Hz	

1.3 Type Description

E.g.：Type——VCS003AH**

Figure 1-1 Naming rules for indoor units

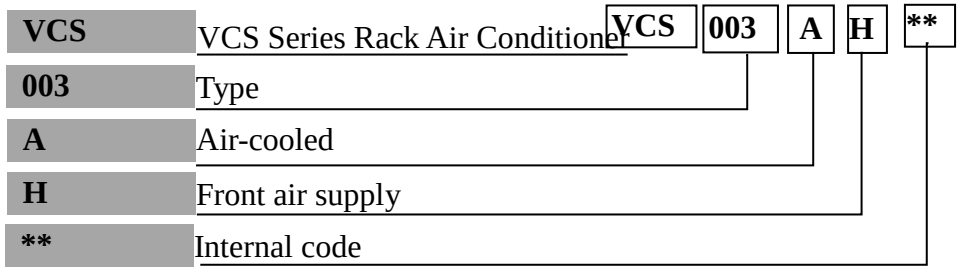
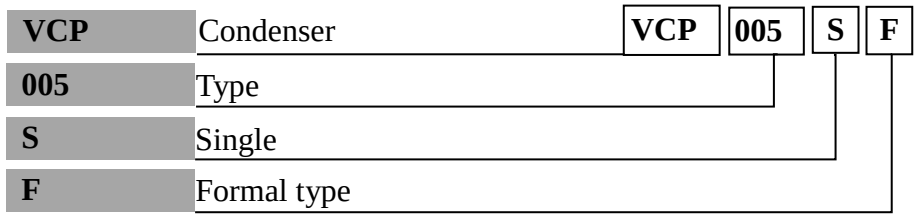


Figure 1-2 Naming rules for outdoor units



1.4 System Composition

VCS series rack air conditioners are mainly composed of refrigeration system, control system, ventilation system, humidification system, and heating system. The unit is mainly composed of the following components:

1. **Compressor**. Using high-efficiency DC inverter compressor, matched with R410A refrigerant, environmental protection and pollution-free;
2. **Evaporator**. Large area "V" or "/" type evaporator design, which makes heat exchange faster and more efficient;
3. **Expansion valve**. Electronic expansion valve, wide adjustment range, precise flow

adjustment, high reliability of operation;

4. **Heater.** PTC heater, with fast heating speed and even heat;
5. **Wet film humidification components (when optional)**. Adopt wet film evaporative cooling technology, environmental protection, and energy-saving, low maintenance cost;
6. **Filter drier**. Protect the refrigeration system, make the system free of moisture, acid, and solid impurities;
7. **Compressor heating belt**. Used to heat the oil sump of the compressor crankcase. The heating belt must be energized for at least 12 hours before starting;
8. **EC fan**. To achieve step-less speed regulation of wind speed, wide adjustment range;
9. **Air filter**. Filter dust and impurities in the air to ensure the cleanliness of the environment;
10. **Controller**. Standard RS485 communication interface, support remote centralized control, call self-start, password protection, timing on/off, etc.;

1.5 Product Specification

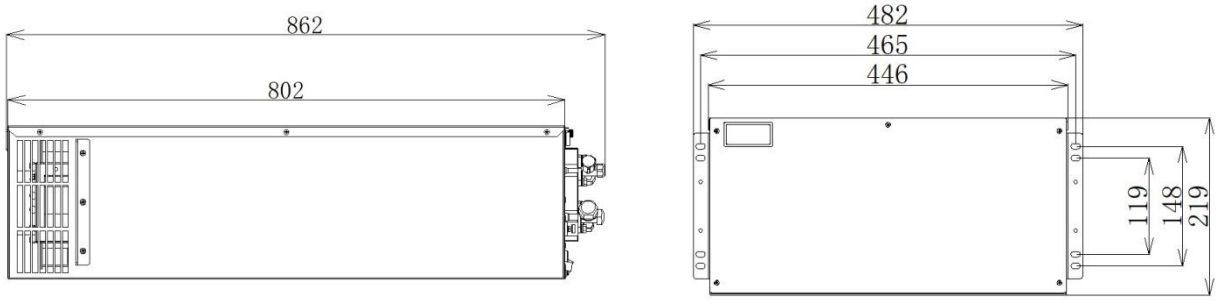
1.5.1 Dimensions and Net Weight

Table 1- 2 Dimensions and net weight

Product	Type	Dimension (mm)W×H×D	Net Weight (kg)
Indoor unit	VCS003AH**	442×220×800	26
Outdoor unit	VCP005SF	840×606×340	38

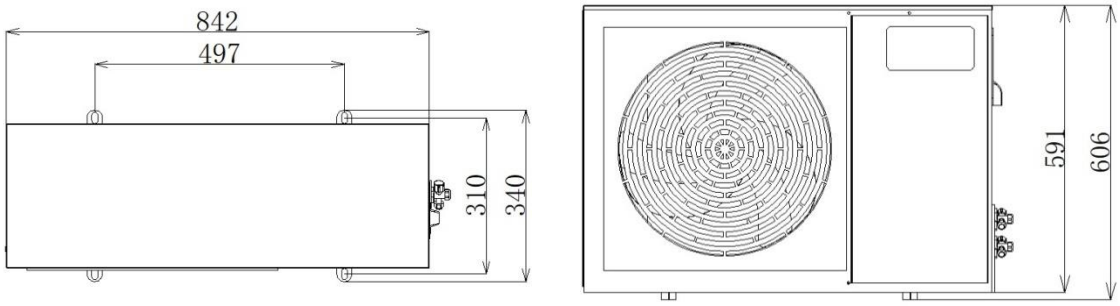
1.5.2 External Structure

The appearance and structure of the indoor unit and outdoor unit：



（Side view） （Front view）

Figure1- 1 VCS003AH



（Top view）　　（Front view）

Figure 1- 2 VCP005S

Chapter 2 Receiving

Summary--This chapter mainly introduces the process and related precautions in the process of product transportation and reception.

2.1 Transportation

Special Note

The VCS series Rack air conditioners contain mechanical, electrical and other equipment. Improper transportation and handling may cause damage to the product and cause the equipment to fail to operate normally. Please ensure the safety and quality of the product during transportation and handling.

Precautions

Precautions related to transportation and handling:

1. Please try to choose a better transportation method (such as railway transportation, shipping). When choosing automobile transportation, you should choose a road with better road conditions to prevent excessive bumps;
2. The transportation environment and placement requirements should be implemented in accordance with relevant requirements;
3. Please try to use mechanical handling tools when unloading and transporting;
4. Anti-collision, anti-drenching, etc.

Table 2- 1 Packaging dimensions and gross weight of VCS precision air conditioners

Type	Packaging Dimensions (mm)W ×D ×H	Gross Weight(kg)
VCS003AH**	650 ×450 ×1050	32
VCP005SF	870 ×960 ×550	43

2.2 Receiving

Special Note

VCS series Rack Air Conditioners have passed strict quality assurance tests and inspections before leaving the factory. Please check the equipment carefully when receiving the products to ensure that the equipment has not been damaged during transportation.

2.2.1 Receiving Process Suggestions

In view of the fact that after the product arrives, users have two situations: immediate installation and temporary non-installation. In order to provide users with a better receiving plan, the

following simulated receiving process is given for users' reference; please choose the best plan according to the specific situation.

Flow Chart

The following figure 2-1 is a schematic diagram of the simulation of the receiving process, and the specific content of each step is shown in this section.

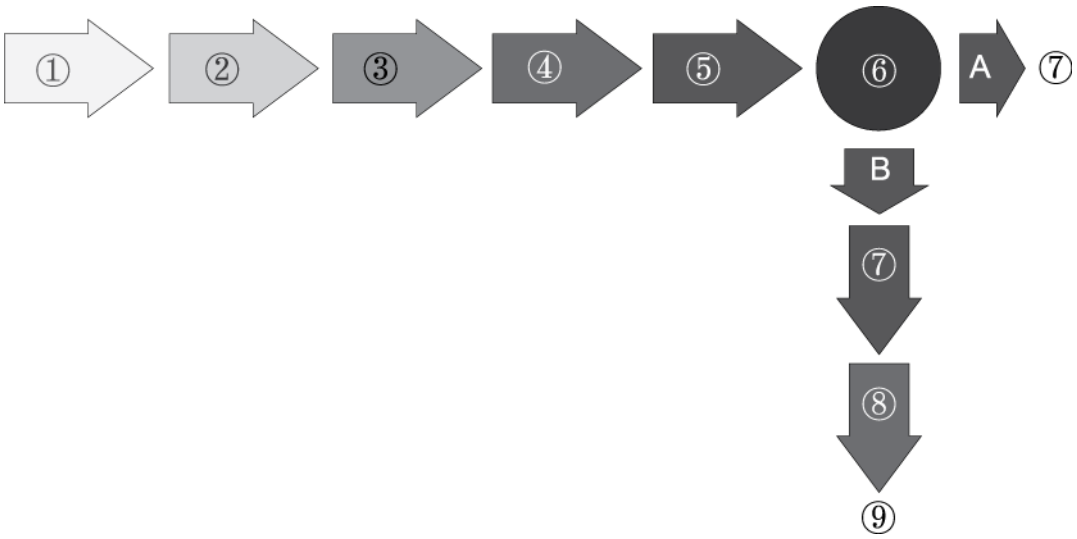


Figure 2- 1 Schematic diagram of receiving process simulation

The figure shows the receiving process under two conditions, namely, condition A and condition B:

A——Instant installation；

B——Delayed installation;

①——Arriving；

②——External Checking；

③——Carrying；

④——Unboxing；

⑤——Internal Checking；

⑥——Acceptance；

A：⑦——End Receiving.

B：⑦——Sealing；⑧——Storage；⑨——End Receiving.

2.2.2 External Checking

Transportation Checking

After arrival, check whether the transportation meets the transportation requirements.

Transportation requirements:

1. Keep out of the rain;
2. Place it upright;

3. Cannot be stacked;
4. Be careful of collisions.

[Note: The specific requirements shall prevail.]

External Checking

The content of the external inspection includes the outer packaging of the product and the exterior of the product, etc.

Check Content:

1. Whether the outer packaging has been opened;
2. Whether the outer packaging has obvious damage and collision marks;
3. Whether the exposed parts of the equipment are damaged, such as fins are recessed, the structure is deformed, and the topcoat is peeled off;

Related Tips

1. If you find that it has been opened, please check whether there is any information on the bill of lading or other aspects; if not, please contact the relevant department;
2. If damage is found, please indicate the corresponding damage on the bill of lading and submit a damage claim to the transportation company;
3. The above problems may cause damage to the production equipment and make the product unable to be used normally. Please check carefully. If there is any problem, please contact INVT service department.

2.2.3 Unboxing

Suggestion

1. It is recommended that the user move the product to a place as close as possible to the installation site (or to the storage place) before unpacking;
2. When opening the box, it is recommended that the user consider the reusability of the box.

Related Tips

3. The product is packed in a carton, and the user must be careful when opening the box to avoid damage to the equipment and malfunction due to improper operation;
4. Improper operation may cause damage to the equipment, which will invalidate the manufacturer's warranty.

2.2.4 Internal Checking

Check Content:

1. After unpacking, please carefully check whether all the internal parts of the equipment are complete and damaged;

2. Check whether the accessories are complete according to the packing list.

Related Tips

1. If any part is found to be missing or damaged during the inspection, it should be reported to the carrier immediately; if any hidden damage is found, it should also be reported to the carrier and product supplier;
2. If the packing list is not complete, please contact the relevant personnel of the product supplier immediately.

2.2.5 Storage

After the user receives the product, please store it properly according to the following requirements.

Table 2-2 Equipment storage requirements

Content	Requirements
Storage Environment	Clean、Safe
Temperature	-40℃～70℃
Humidity	<95%RH
Storage Time	The total transportation and storage time should not exceed 6 months, and the performance needs to be re-calibrated if it exceeds 6 months.

⚠ **Warning**: 1. If the equipment has been unpacked, it must be repackaged according to the original packaging requirements;

2. Exposure to the outside environment for a long time after the device is unpacked may cause damage and invalidate the manufacturer's warranty.

Chapter 3 Installation

Summary--This chapter mainly introduces the installation site, installation form, mechanical installation, and electrical installation, etc.

3.1 Installation Site

In order to make the unit easy to install and run in the best condition, before the installation of the equipment, users need to consider the relevant factors in the installation place to ensure that the room and outdoor meet the requirements of use.

Consideration

1. Whether the equipment is convenient to enter the air-conditioned place, and whether the piping and wiring are convenient;
2. Heat preservation and insulation treatment should be carried out in the air conditioning places to minimize the heat load; Maintain positive pressure, prevent dust from entering through the gap, to reduce the load of other heat and humidity, dust filtration;
3. Ensure that the air supply and return channels of air conditioning units are unobstructed;

[**Note**: The above factors are for reference only, please hire a professional engineering company to design according to the relevant specifications according to the site conditions.]

[**Note**: When the actual total load of the server corresponding to a single air conditioner is less than 50% of the cooling capacity of the air conditioner or the machine room is not well sealed, the humidity in the machine room may be too high. This situation does not belong to the category of product quality. It is suggested to add a dehumidifier in the machine room.]

3.2 Installation Form

The installation forms of VCS series rack air conditioners are divided into two forms: positive drop and negative drop. The installation layout should follow the following principles:

1. Positive drop height: the scene in which the outdoor unit is higher than the indoor unit. The vertical height difference between indoor and external machines is not more than 20M.In order to ensure the reliability of the system, an oil collecting bend is set every 5m~6m on the vertical height of the air pipe. When the vertical height of indoor and external machines exceeds 10M, extension components should be selected.
2. Negative drop height: the scene in which the indoor unit is higher than the outdoor unit. The vertical height difference between indoor and external machines should not exceed 5m.

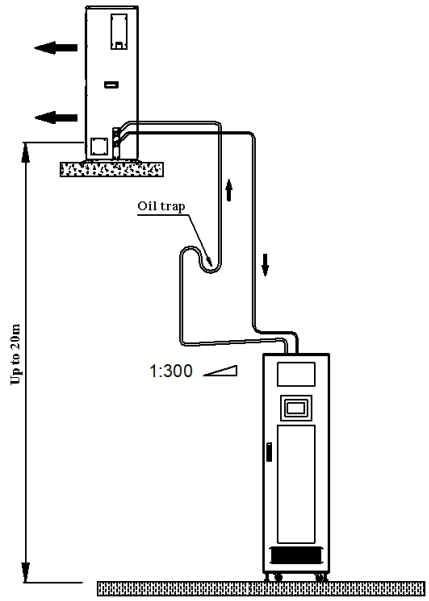


Figure 3- 1 Installation diagram of positive drop height

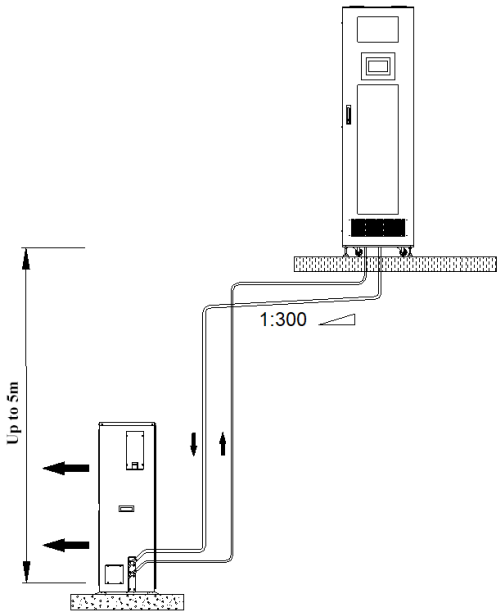


Figure 3- 2 Installation diagram of negative drop height

3.3 Mechanical Installation

3.3.1 Install Indoor Machine

1. Install the guide rail at the bottom of both sides of the cabinet respectively, and fix the front and back ends of the guide rail with screws;
2. Push the indoor machine into the bottom of the cabinet along the guide rail and fix it with screws, as shown in figure 3-3;

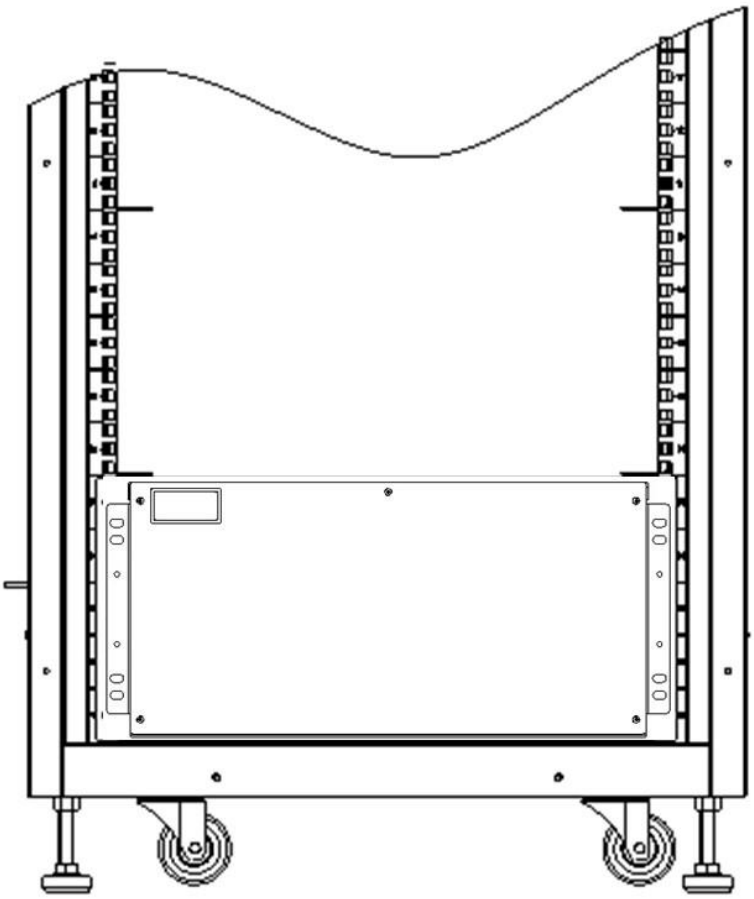


Figure 3- 3 Installation diagram of indoor machine

3.3.2 Install Outdoor Machine

1. When installing the outdoor unit, it is necessary to ensure that the inlet and outlet of the condenser have no dirty plugging, and try to install it in a clean place and as far away from residential areas as possible.
2. Should avoid installation in more salt or corrosive gas and other places.
3. The installation site should be dry and ventilated without flammable gas leakage to avoid fire disasters caused by flammable gas leakage.
4. The distance between the outdoor machine and walls, obstacles, or adjacent equipment should be kept above 250mm.
5. The outdoor unit should be installed on a base that can bear the weight of the outdoor unit (see Table 1-2 for specific weight). The base should be at least 50mm higher than the surrounding ground, and the base size should be 50mm larger than the outdoor unit.

Installation Steps

1. Place the outdoor unit on the base.
2. Fix the outdoor unit on the base with an expansion bolt, and the size of the mounting hole of the

base is shown in Figure 1-2.

◆ Note：

1. When one condenser is placed on the other condenser, the upper condenser must be installed on the bracket (as shown in Figure 3-4 below), and a cushion is installed between the unit and the bracket to play the role of shock isolation. Do not stack the two condensers directly through the screw connection!
2. If multiple outdoor units need to be overlapped, install them in accordance with the method shown in Figure 3-4.

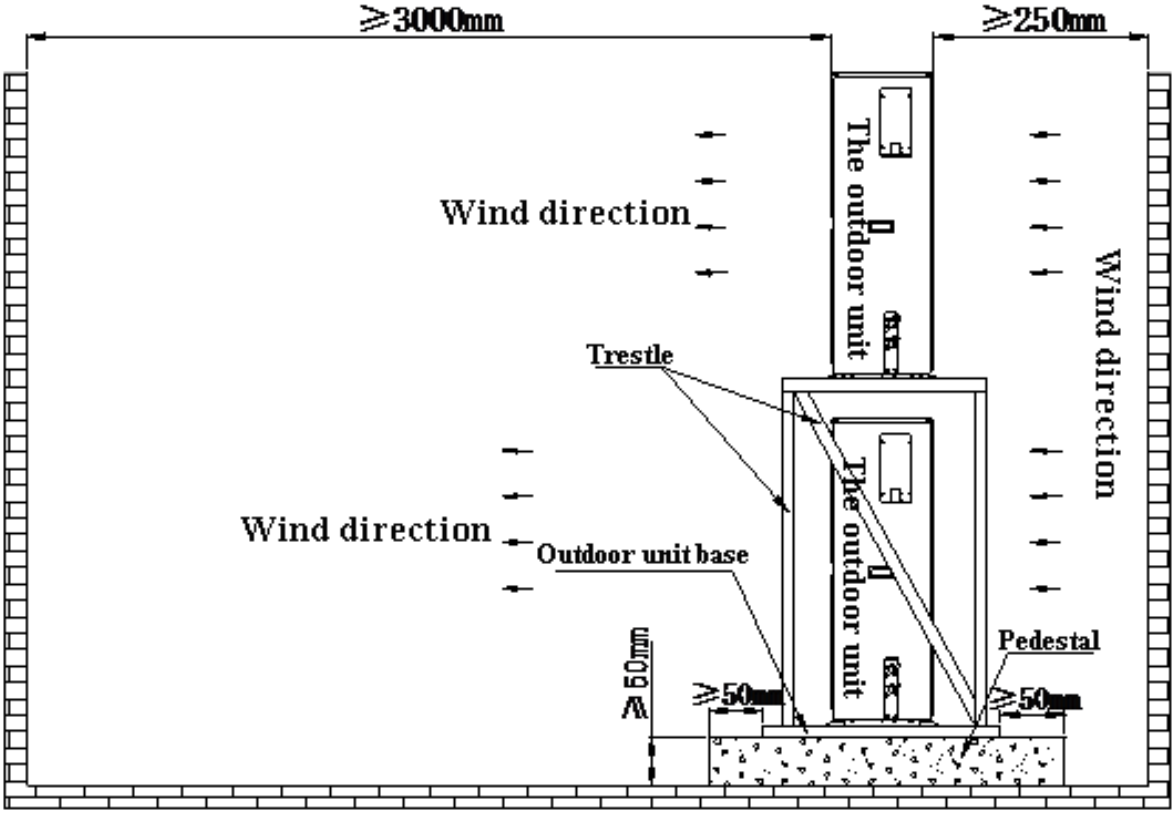


Figure 3-4. Schematic diagram of overlapping placement and installation of VCP005 outdoor unit

3.3.3 Connecting Tube

3.3.3.1 Principle

1. Copper pipe is used for connecting the indoor unit with the outdoor unit. The joints of an indoor unit and outdoor unit are quickly threaded joints of British standards (when the pipe length exceeds the standard pipe length of 5m, the increased copper pipe needs to be connected by welding).
2. The standard refrigerant is R410A, which is prefilled when leaving the factory.
3. The refrigerant pipeline should be as short as possible, beautiful, neat, horizontal and vertical, minimize the elbow, and be fixed.

4. In line with the installation requirements of positive or negative drop height.
5. The equivalent length of local components is shown in Table 3-1, and the resistance loss caused by the elbow and valve has been calculated.

Table 3-1 Local component equivalent length

Fluid Pipe Diameter（Mm）	Equivalent Length (M)		
	90 ℃Elbow	45 ℃Elbow	T Shaped Three-Way Pipe
10	0.21	0.10	0.76
13	0.24	0.12	0.76
16	0.27	0.15	0.76

3.3.3.2 Notes for Joint Installation

Extreme care should be taken when installing quick-threaded couplings. Before an operation, please read the following notes carefully:

1. Remove the dust cover of the valve joint.
2. Carefully wipe the connecting seat and the thread surface with a clean cloth.
3. Lubricate the mating surface of the joint with refrigerating oil.
4. Screw the connecting nut to the joint and make sure the thread fits on the front.
5. Tighten the hexagon nut of the connection body and connect the valve until there is significant resistance.
6. In the installation process, two wrenches must be used to cooperate with the operation, the operation of a wrench is easy to cause damage to the connecting copper pipe of the valve. Recommended tightening torque values refer to Table 3-2.

Table 3-2 Suggested tightening torque value for quick threaded joints

Thread Joint Dimensions	Torque Values（N.M）
1/4"	10~12
3/8"	15~18
1/2"	20~23
5/8"	28~32
3/4"	35~40
7/8"	45~47

3.3.3.3 Pipelines to Be Connected

Pipelines to be connected include：

1. The refrigerant pipeline between the indoor unit and the outdoor unit (suction pipe and liquid supply pipe).
2. Drain pipes for indoor units.
3. The water supply pipe of the humidifier

◆ Note：

After the installation of the project and before starting the equipment, please make sure that the above pipelines need to be connected have been installed and there is no leakage.

3.3.3.4 Connect the Refrigerant Pipeline

Matters needing attention for connection of the refrigerant pipeline

1. Care should be taken to install and remove refrigerant piping so that the piping is not twisted or damaged.
2. The refrigerant pipeline support should be arranged before the erection of the pipeline. The refrigerant pipeline and the support frame should be connected and fixed with pipe clamps and pipe hoops to avoid direct contact. See Table 3-3 for support intervals.

Table 3-3 Pipeline support interval reference table

Pipe Diameter		Maximum Distance of Fulcrum (m）
mm	inch	
6～12	1/4"～1/2"	1.2
16～22	5/8"～7/8"	1.5
28～35	1-1/8"～1-3/8"	2.0
42～54	1-5/8"～2-1/8"	2.5

1. When the refrigerant pipeline passes through the wall or other obstacles, it is necessary to avoid direct contact between the copper pipe and the wall by means of a shock-absorbing pad, so as to avoid damage to the pipeline and reduce vibration.
2. The slope of the horizontal pipeline should meet the design requirements to facilitate the oil return of the unit.
3. When the installation position of the outdoor unit is higher than 6m of the indoor unit, the gas side pipe should be installed with an oil storage bend.
4. Leak detection, pressure retention and vacuum should be carried out before the refrigerant pipeline is used, and the refrigerant pipeline should be separated from the building with an

anti-vibration isolation frame.

Indoor unit pipe interface

The pipe interface of the indoor unit is shown in the partial drawings of the unit in Figure 3-5. After the gas side pipe and liquid side pipe of the indoor unit are connected, the pipe is connected to the pipe interface of the outdoor unit. The pipe interface of the indoor unit and the outdoor unit is externally threaded joints.

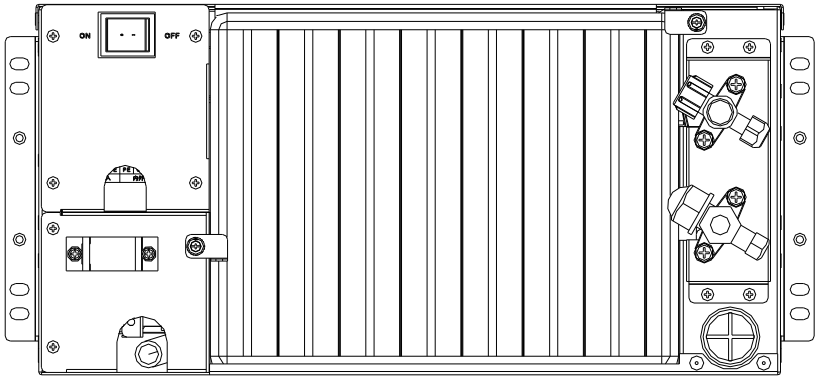


Figure 3-5 Diagram of pipe interface of the indoor unit

3.3.3.5 Insulated

The connecting pipes of the refrigeration system must be insulated, and the suction pipe and the liquid supply pipe should be insulated. Whether the insulation measures are appropriate will directly affect the refrigeration performance of the unit and the energy-saving effect of the user.

◆ Note：

The thermal insulation works should be carried out after the refrigeration system of the unit has been checked for leakage, pressure holding and vacuum pumping. For details, see 5.2

Require：

1. Please choose the insulation pipe with good heat insulation performance, suitable size and environmental protection and durability. The thickness of the insulation pipe shall be selected according to engineering design standards.

2. When pasting the insulation pipe, it is necessary to ensure that the insulation pipe is pasted, sealed, firm and close to the pipe.

3.3.3.6 Connect the Drainpipe of the Indoor Unit

Connect one end of the drainpipe to the drainpipe and fasten it with a clamp. Drains pipe should not be placed in a position where the temperature is at freezing. The size of the unit drain pipe is shown in Table 3-4.

Note:

1. Strictly ensure the pipe diameter and slope when installing the drainage pipe.

2. Do the water storage and drainage test. It is required that the drainage is smooth and the drainpipe is installed at the trap.

Table 3-4 Drain size

--	Model	Drain/Ø
VCS003AH	No optional water pump	Diameter 20mm
	Equipped with water pump	The standard configuration is 5m long 12mm outlet pipe

3.3.3.7 Connect the Water Supply Pipe of the Indoor Unit

The frame air conditioner with humidification function needs to supply water to the unit. Before the installation of the unit, please set up the water supply pipeline in advance as required.

Wet film humidifier can use tap water, recommended to use softened water or purified water, requirements:

1. Ice-free and turbidity (scattering turbidity unit) /NTU < 3;
2. Visible objects to the naked eye: none;
3. PH value: 6.5≤pH≤8.5;
4. Total hardness (CaCO3) ≤450mg/L.

3.4 Electrical Installation

3.4.1 Operating the Project

1. Main power line connection of the unit;
2. Outdoor unit line connection;
3. Communication line connection.

3.4.2 Matters Needing Attention

1. The connection of all lines must comply with national regulations;
2. For the full load current of related units, please refer to the nameplate of the equipment;
3. The main power supply meets the requirements of the unit, please refer to the nameplate of the equipment;
4. Electrical installation must be carried out by trained professional installers;
5. Before connecting the circuit, use the voltmeter to measure the input voltage to make sure the power supply is turned off.

3.4.3 Detection

1. Make sure that the indoor and outdoor cables are connected correctly.
2. The power supply voltage is consistent with the rated voltage on the nameplate;
3. Tighten all connections;
4. The rating of the air conditioning front-end circuit breaker is correct.

3.4.4 Graphical Representation

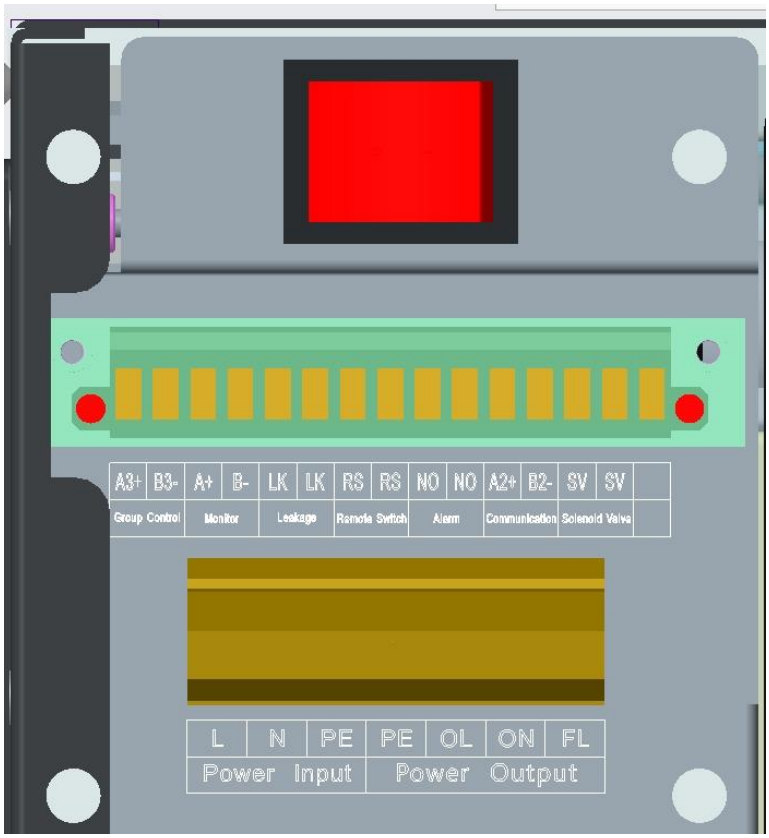


Figure 3-6 Electronic control box (take VCS003 as an example)

A——Main power interface

B——other output interfaces

Chapter 4 Controller

Summary--This chapter mainly describes the features of the controller, display screen, control keys, switch operation, status query, and user settings, etc.

4.1 Features

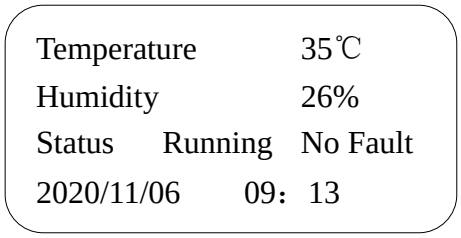
The rack air conditioner adopts an advanced micro-processing controller, which can achieve the purpose of precise temperature control and humidity control and can ensure the stable and reliable operation of the unit. The controller stores the programmable control program and all operating parameters, which can be viewed on the display screen.

Features：

1. It has the functions of self-start and delayed start after incoming calls;
2. With remote boot function;
3. With multi-level password protection to prevent misoperation;
4. Flexible main and standby machine switching function, realizing the automatic switching of the unit and the function of shifting on duty;
5. Manual operation of main components is allowed;
6. Integrated RS485 communication port, support remote monitoring, and remote on/off the group.

4.2 Display (when optional)

The display screen adopts a Chinese or English menu, and the display screen is composed of liquid crystal display and function keys. 10 seconds after power-on, the display will switch to the main page to display:



The first line shows the current temperature.

The second line shows the current humidity.

The third line displays the current system switch status and fault information. The power on and off states include: running, stopping, shut down due to failure, and standby; if the unit has a failure, "no failure" will become "fault", and "no fault" will be displayed again after the current failure is eliminated.

The fourth line shows the current date and time.

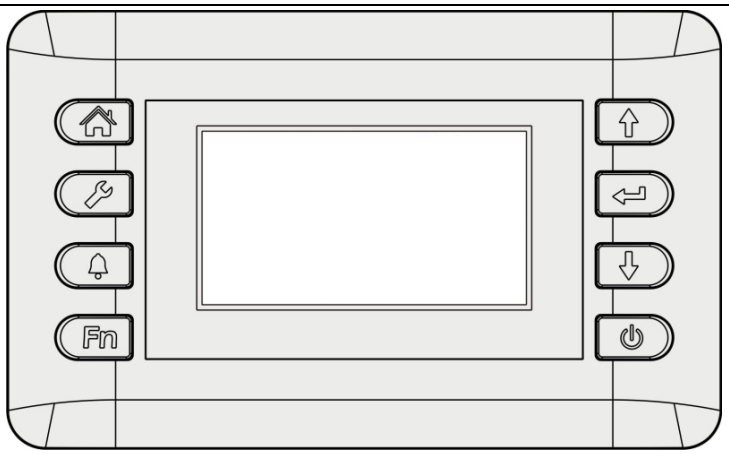


Figure 4-1 Display appearance of SL108S

4.3 Control Key

Table 4-1 Description of SL108S display control keys

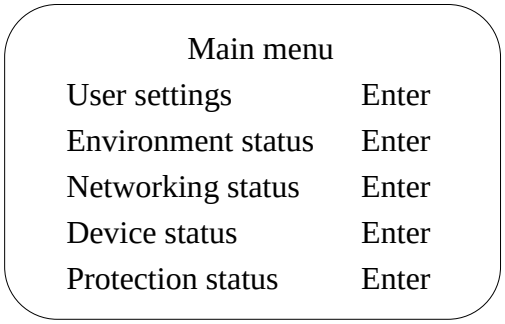
Button	Meaning	Function description
	HOME	1) In the viewing or setting page, press this key to return to the main page; 2) When setting parameters, press this key to abandon the data set; 3) Long press this button on the main page to display the main version information;
	UP	1) On any page if there is a "⇧" prompt, press this key to enter the previous page; 2) In the parameter setting state, short press this key to set the parameter to increase, long press this key to set the parameter to increase quickly;
	DOWN	1) In the main interface, press this key to enter the analog output and input, digital output, and input query page; 2) On any page if there is a "⇩" prompt, press this key to enter the next page; 3) In the parameter setting state, short press this key to set the parameter to decrease, long press this key to set the parameter to decrease quickly;
	ENT	1) When on the main page, the faults that have been eliminated outside this button can be reset; 2) When setting parameters, press this key to confirm the setting parameters and automatically skip to the next parameter setting value; 3) On the main page, press and hold "⏎" and "🔧" at the same time to enter the password page, and enter the factory setting page after entering the correct password;
	SET	1) When on the main page, short press this key to enter the user settings page; 2) In the setting parameter page, press this key to set the parameter and enter the setting state; if there is no parameter to set in the current screen, a no-operation will be performed. 3) On the main page, press and hold "⏎" and "🔧" at the same time to enter the password page, and enter the factory setting page after entering the correct password; 4) Press this key on the historical fault record page to enter the clear historical fault record page;
	ALARM	1) On the main page, short press this key to enter the current fault query page;
	POWER	1) Press this key on any page to switch the machine;

4.4 Switch Operation

Press the "⏻" key on the main page to enter the running state, the unit status display on the interface changes from "stop" to "running", press "⏻" again to shut down the unit, and "running" changes to "stop".

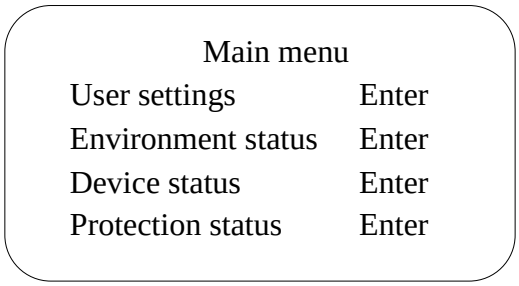
4.5 Status Query

On the "Main Menu" page, you can enter the corresponding function page to query the current environment, networking, equipment, and fault protection status, as shown in the following figure:



4.6 User Settings

On the main page, press the "🔧" key to enter the "Main Menu" page, press the "🔧" key to select user settings, the current function page option background is black, press "⏎" to enter the corresponding page, if you press "🔧" to proceed A no-operation, switch to the next function page, the "User Settings" page is as follows:



On the setting page, press the "🔧" key to enter the setting parameter state. At this time, the first setting parameter will be highlighted. Press the "⇧" and "⇩" keys to adjust the set value. Long press the "⇧" and "⇩" to quickly "increase, Decrease" to adjust the set value. After the setting is completed, press the "⏎" key to confirm the set value. If you do not press "⏎" but press "🔧", a no-operation will be executed, that is, the current setting parameter will not be saved and the next setting parameter will be automatically switched to. After finishing, you can press "🏠" to return to the main page. The specific user settings are as follows:

Table 4-2 User parameter usage range

Heading	Numerical value	Unit	default	Meaning
Return Air Temperature Setting	10.0～40.0	℃	35.0	\
Supply Air Temperature	10.0～40.0	℃	24.0	\

Setting					
Return Air Temperature Setting	0.0～80.0	%RH	26.0	\	
Way To Control	Return air/supply air	--	Return air	Choice of control temperature	
Incoming Call Self-Initiated	Disable/Enable	--	Enable	There is a delay function for the automatic start of the incoming call, refer to the factory parameter setting item	
Incoming Call Self-Start Delay	1～240	second	5	Set the delay time after the call is started	
Remote Control Function	Disable/Enable	--	Disable	//When the remote control is enabled, the remote control is turned on, and manual shutdown is prohibited. When the remote control is turned off, manual power-off is allowed //When the remote control is enabled, it can be turned off after closing and disconnecting the remote control point.	
Network Address Setting	1～32		--	1	\
Buzzer Settings	Silent/Short beep /Long beep		--	non	\
Time Setting	--		--	--	Set current time
Timing Setting	--		--	--	Set timing switch time
Contrast Setting	20～40		--	32	\
Evacuation Mode	Disable/Enable		--	Disable	When the machine is turned on for the first time, it is used under a vacuum.
Rotation Function Enable	Disable/Enable		--	Disable	Both master and slave boards need to be set
Number Of Rotations	2～12		PCS	2	Set the number of crews on duty
Rotating Address	0～11		--	0	If the address is 0, it is the master; if the address is 1～11, it is the slave;

				Both master and slave boards need to be set
Number Of Runs	1～11	PCS	1	Host settings are valid
First Unit	0～11	--	1	Host settings are valid
Rotation Period	0～720	H	24	When the duty time is 0, it is the duty test time, and the corresponding duty time is 5 minutes;
Demand Synchronization	Disable/Enable	--	Disable	

Chapter 5 Inspection and Debugging

Summary--This chapter mainly introduces the inspection, nitrogen to maintain pressure, refrigerant charging, lubricating oil supplement, functional test, and system debugging after the unit is installed.

5.1 Inspection

Mechanical installation inspection

1. The installed fastening parts have been locked;

2. The pipe connecting the indoor and outdoor units has been installed, and the shut-off valve of the indoor and outdoor units has been fully opened;

3. The drain pipe is connected;

4. The water supply pipe connected to the humidifier has been connected;

5. All pipe joints have been tightened;

6. The fasteners used for transportation have been removed;

7. After the equipment is installed, the debris in or around the equipment has been removed (such as transportation materials, structural materials, tools, etc.);

Electrical installation inspection

1. The power supply voltage is the same as the rated voltage on the equipment nameplate;

2. There is no open circuit or short circuit in the electrical circuit of the system;

3. The power cables, signal cables, and ground cables to the indoor unit and outdoor unit have been connected;

4. All cables and circuit connectors have been tightened, and the tightening screws are not loose.

5.2 Nitrogen to Maintain Pressure

Steps:

1. Connect the pressure gauge, connecting pipe and nitrogen cylinder;

2. Fill with nitrogen 3.0MPa and keep the pressure for 24 hours. The system pressure should not decrease when the ambient temperature before and after the pressure is similar; if the pressure is slightly deviated due to a large change in the ambient temperature, it is recommended to perform the pressure holding test again;

3. If it is determined that there is a welding temperature, you must find and repair the leak in time; if the pressure is good, please discharge nitrogen at the filled needle valve.

◆ Note：

1. The indoor unit and outdoor unit of the VCS series rack air conditioner are pre-charged with refrigerant at the factory, so nitrogen charging and pressure maintaining only need to be carried out for the connecting pipe part;

2. It is strictly forbidden to use oxygen or other flammable gas for air tightness test;

3. The pressure of nitrogen charged into the system for leak detection cannot exceed the maximum working pressure stated on the nameplate of the unit;

5.3 Refrigerant Charging

When the length of one-way connecting pipes of indoor and outdoor units exceeds 5 meters, the refrigerant must be supplemented on site. The amount of refrigerant replenishment can refer to the following calculation formula:

Refrigerant supplement（kg）= Liquid pipe refrigerant addition amount（kg/m）×The length of the extend liquid pipe（m）

The amount of refrigerant added per unit length of liquid pipe is shown in Table 5-2. The amount of refrigerant added per unit length of liquid pipe of different pipe diameters is shown in Table 5-2.

[**Note: Whether the refrigerant charge is appropriate will directly affect the performance of the unit, and must be operated by a professional engineer.**]

Table 5- 1 Refrigerant charge

Indoor Unit Model	Match KC Model (Standard Configuration)	Refrigerant Charge (Kg)
VCS003AH**	VCP005SF	1.3
VCS007AH**	VCP010SF	2.3
VCS012AH**	VCP018SF	3.0

Table 5-2 the amount of refrigerant added per unit length of liquid pipes with different pipe diameters

The Outer Diameter Of The Liquid Pipe (Mm)	The Amount Of Refrigerant Added (Kg/M)
6	0.020
9	0.060
12	0.112
16	0.181
19	0.261
22	0.362
28	0.618

[**Note:** The above refrigerant charge can be used as the initial budget before installation, or as a guide for a refrigerant charge after installation. The actual charge for engineering installation is subject to the final commissioning result**.**]

5.4 Lubricating Oil Supplement

When the connecting pipe between the indoor and outdoor units is long enough, the amount of lubricating oil adhering to the pipe wall along with the compressor suction and mixing in the refrigerant affects the oil return cycle, we must add lubricating oil to the refrigeration system to ensure The compressor can operate normally and efficiently. Generally, when the length of the connecting pipe exceeds 10m, it is necessary to add lubricating oil. Please consult the manufacturer for the amount of lubricating oil added to the unit.

5.5 Function Test

Reminder

Before starting the unit, please make sure that the unit has been inspected strictly as required.

Test Content

a) Detect the voltage at the power connection point, and the voltage reading shall not exceed ±10% of the rating on the nameplate;

b) Check whether the rotation of the compressor and fan is correct;

c) Control function test.

5.6 System Debugging

Reminder

The compressor heating belt must be energized and preheated for at least 12 hours before system commissioning, otherwise, it will cause irreparable damage to the compressor.

1、Accurate refrigerant charge

According to the design parameters of the unit (Subcooling, superheating degree, pressure, etc.), the refrigerant charge amount of the unit is started and operated accurately, so that the refrigerant charge amount reaches the requirement.

2、Debug content

a) Measure and record the operating parameters of the unit;

b) Compressor operation and debugging;

c) Operation and commissioning of the fan;

d) Humidifier operation and debugging;

e) Operation and debugging of an electric heater.

[**Note:** System debugging should be completed by professional engineers]

Chapter 6 Maintenance and Troubleshooting

Summary--this chapter focuses on the maintenance of the unit.

6.1 Daily Maintenance

1. Electric control system
   a) Statically test whether the suction of each contactor is flexible and whether it is stuck;
   b) Dust removal of electrical and control components with a brush or dry compressed air;
   c) Check whether the contactor contact pulling is an arc and burn mark phenomenon. When serious, replace the corresponding contactor;
   d) Fasten each electrical connection terminal;
   e) Check whether the fast connector of the socket is in good contact. If it is loose, the terminal should be replaced;
2. Indoor fan
   a) Confirm that the net cover of the indoor fan has no deformation;
   b) Confirm that there is no damage to indoor fan blades;
   c) Confirm that the running sound of the indoor fan is normal;
   d) Confirm that there is no loosening or deformation of the mounting screws of the indoor fan;
3. Humidifier
   a) Confirm that the valve on the inlet water pipe is in an open state;
   b) Check whether the humidification inlet solenoid valve works normally;
   c) Confirm that there is no scaling in the wet film;
   d) Confirm that there is no timeout alarm of humidifier operation;
4. The heater
   a) Confirm no loosening of electric heating fixation;
   b) Confirm that the electric heating surface is free from corrosion;
5. Return air filter
   a) Confirm that there is no dirty blocking on the return air filter;
   b) Confirm no damage or deformation of the return air filter;

c) Confirm that there is no timeout alarm for the return air filter;

6. Compressor

a) Confirm that the fastening of the compressor is not loose;

b) Confirm that the running sound of the compressor is normal;

c) Confirm that the refrigerant pipeline is free of oil stains and rust;

7. Outdoor unit

a) To ensure a firm connection with the ground;

b) Ensure that the fan runs without abnormal sound, abnormal vibration and blade stuck;

c) Confirm that there are no obstacles in the air inlet and outlet of the fan

6.2 Common Troubleshooting

Common faults are mainly manifested as faults of refrigeration system, control system, ventilation system and heating and humidification devices. See 6-1 Common Alarm and Measures for some common faults and treatment suggestions.

[Note: When the unit is out of order and cannot be simply eliminated, please contact the service department of the company for technical support.]

[Warning: Part of the circuit of the system is 220V/ 50HZ alternating current, only professional technicians are allowed to carry out maintenance operation on the unit, and special care must be taken during live operation.]

Table 6-1a Common fault alarm phenomena and measures

Fault Components	Fault Phenomenon	Possible Reasons	Solution
The Whole Machine	Unit not start	Power if the unit is not connected	Check the input fan
Fan	The fan is not running	No fan control signal output	Check whether the fan control signal output is normal
		Damage of fan	Replace the fan

Table 6-1b Common fault alarm phenomena and measures

Fault Components	Fault Phenomenon	Possible Reasons	Solution
Compressor	Compressor not work	There is no need to start the compressor	Check compressor demand status
		Compressor driver failure	Replace compressor driver
		Compressor damage	Replacement of compressor

	Excessive compressor noise	The liquid flow	1. Check whether the return air temperature is too low 2. Check the air supply and return system
		Bad lubrication	Add lubrication oil
		The transport fixture of the compressor has not been removed	Remove transport fixtures

Table 6-1c Common fault alarm phenomena and measures

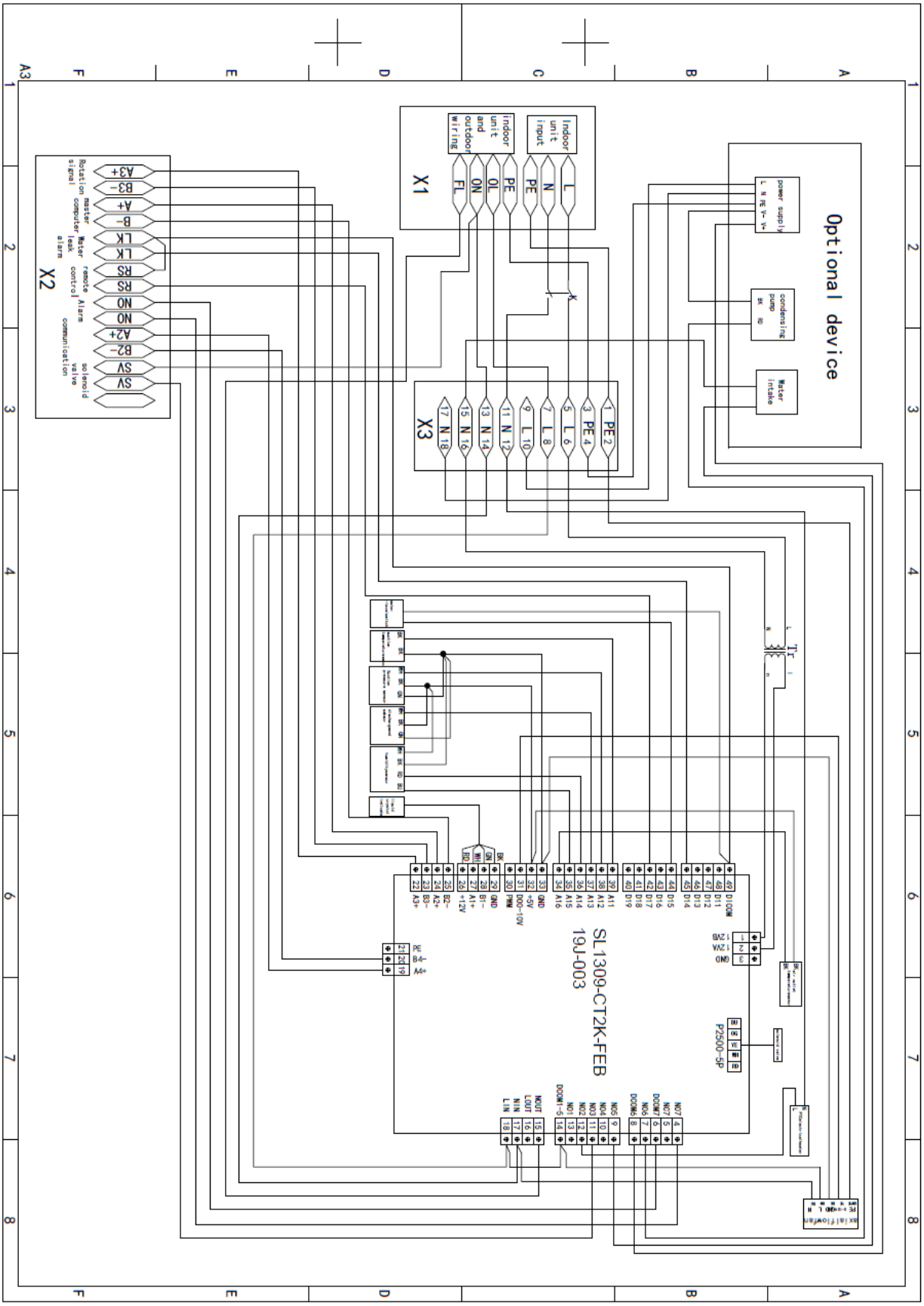
Fault Components	Fault Phenomenon	Possible Reasons	Solution
Refrigeration System	High-pressure alarm	Condenser filth blockage	Cleaning condenser
		The condensing fan does not operate	Check the static resistance and grounding resistance of the condensing fan. If the coil is burned out, the fan should be replaced
		Too much refrigerant injection	Exclude many refrigerants and control the high pressure at 2.1~3.7MPa
	Low-pressure alarm	Insufficient refrigerant charge	Increase the refrigerant charge
		Refrigerant leakage	Repair welding of leakage points
		Return air temperature is too low	Increase the return air temperature setpoint
		Air volume is too small	Increase the speed of the blower to ensure smooth ventilation
		Expansion valve coil failure	Replace the expansion valve coil
	Excessive exhaust temperature	There's a blockage in the refrigeration system	Cleaning refrigeration system
		The system mixes with air	Re-vacuum the system and fill it with refrigerant
		Too little refrigerant charge	Increase the refrigerant charge
		Failure of outdoor fan	Check the operation of the outdoor fan
		Dirty plugging of condenser leads to poor heat dissipation	Cleaning condenser
	High-temperature alarm	Temperature sensor failure	Check and calibrate the temperature sensor
		Compressor not working	Check the working state of the compressor
		The setting of high-temperature alarm value is not reasonable	Reset the high-temperature alarm value
		The unit load design is too small	Check the seal of the cabinet and add refrigeration equipment if necessary
	Low-temperature	Temperature sensor failure	Check and calibrate the temperature

	alarm		sensor
		Low-temperature alarm value setting is not reasonable	Reset the low-temperature alarm value
		The electric heating doesn't work	Check the working state of electric heating
	High humidity alarm	Humidity sensor failure	Check and calibrate the humidity sensor
		Dehumidification is not enabled	Check and enable dehumidification
		The high humidity alarm value is not set properly	Reset the high humidity alarm value
		The room was not protected against moisture	Make the room moisture-proof
	Low humidity alarm	Humidity sensor failure	Check and calibrate the humidity sensor
		The low humidity alarm value is not set properly	Reset the low humidity alarm value
		The humidifier is not working	Check the working state of the humidifier

Table 6-1d Common fault alarm phenomena and measures

Fault Components	Fault Phenomenon	Possible Reasons	Solution
The Heater	The electric heating function fails	Relays do not pull	Check the voltage between the output port of electric heating digital quantity and the zero terminal, 220VAC is normal. If normal, then relay failure, replacement relay; Otherwise, the controller relay failure, replace the controller.
		Electric heating overload	Check whether the blower works normally to ensure smooth airflow
		Electric heating fault	Replace electric heating
Humidifier	Humidification function fails	Inflow solenoid valve failure	Replace inflow solenoid valve failure
		The humidifier runs overtime	Replace the humidifier
		Failure of water supply	Check water supply source and piping and dispose of it
		The feed valve is not energized	Check the voltage between the digital output port of the water inlet valve and the zero terminal of the humidifier. 220VAC is normal

Annex Ⅰ Electrical Schematic Diagram of the Indoor Unit



Annex Ⅱ Electrical Schematic Diagram of the Outdoor Unit