POWER - ALL

User manual

inverter air-cooled precision air conditioner manual

Preface——About Products and the Manual

[Manual Use]

The manual introduces the product overview, installation guide, controller, commissioning, maintenance and troubleshooting of the air-cooled variable frequency in-row air conditioner, and provides users with information on use, operation and maintenance.

[Use Objects]

- ✧ Technical support engineer
- ✧ Service engineer
- ✧ Marketing engineer
- ✧ Commissioning engineer

[Exemption Clauses]

1. Beyond the free warranty period;
2. Dismantling or modifying products without authorization;
3. Violation of product operation or use specifications;
4. Man-made fault;
5. Loss caused by force majeure or other external factors on the client side.

✧ **Note: Any of the above exemption clauses will not be covered by warranty.**

[Related Descriptions]

1. This manual is provided with the product. Please keep it properly so that you can check it at any time when necessary. In case this manual is accidentally lost or damaged, please ask the manufacturer or local distributor directly.

1. 2. Due to product version upgrade or other reasons, the contents of this manual will be updated irregularly. Unless otherwise agreed, this manual is only used as a guide, and all statements, information and suggestions in this manual do not constitute any express or implied guarantee.

Contents

Chapter1. General Introduction

1.1 Product Introduction

About the Product

In-row precision air conditioner is a kind of intelligent temperature control product especially suitable for modular data center. It is usually deployed in the cabinet arrangement, installed side by side with the server cabinet, combined with enclosed hot and cold aisle, close to the heat source and efficient cooling, creating an ideal operating environment for the key infrastructure of the data center.

Model

This product is divided into two 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.

Cooling Capacity

Cooling capacity range：20.5kW～60kW.

1.2 Main component

The indoor unit is mainly composed of compressor, evaporator, expansion valve, EC fan, controller, heater, humidifier, air filter, oil separator, dry filter, etc.

1. Compressor——Adopting DC inverter compressor, high efficiency and energy saving; using R410A refrigerant, green and pollution-free.
2. Evaporator——Adopt a fin-tube heat exchanger with high-efficiency internally threaded copper tubes and aluminum fins coated with a hydrophilic layer. The application of flow field analysis and optimization matching has greatly improved the heat exchange efficiency. Direct expansion.
3. Expansion valve——Adopt electronic expansion valve, which has the characteristics of fast response speed, high adjustment accuracy and high efficiency and energy saving.
4. EC Fan——Adopt backward-inclined centrifugal EC fan, which saves more than 40% of energy than ordinary fans.
5. Controller——Adopt high-end capacitive touch LCD screen, simple atmosphere, supports temperature

and humidity curve and graphic status display; has linkage and group control functions, group control adopts high-speed and flexible CAN communication protocol, and no less than 64 units can be operated in the same area Unified control and management.

6. Heater——PTC heater has the characteristics of fast heating start, large heating capacity and uniform heat dissipation.
7. Humidifier——Standard wet film humidifier, can adaptively adjust the humidification amount, energy-saving, water-saving, clean and hygienic, convenient maintenance.
8. Air filter——Filter dust and impurities in the air to ensure the cleanliness of the environment.
9. Oil separator——The oil-gas separation element separates the lubricating oil in the compressor exhaust and re-introduces it into the compressor to meet the lubrication requirements of the compressor.
10. Dry filter——It can remove the moisture in the refrigerant pipeline, filter impurities, effectively reduce the probability of damage to the system components, and ensure the efficient and reliable operation of the components.
11. Compressor heating belt——It is used to heat the oil sump of the compressor crankcase. The heating belt must be energized for at least 12 hours before starting.
12. Check valve——It can effectively control the backflow of gas or liquid.
13. Differential pressure switch——When the filter screen is blocked, the differential pressure sensor can trigger an alarm to prompt cleaning and replacement.
14. Temperature and humidity sensor——Built-in supply air temperature sensor and return air temperature and humidity sensor.

1.3 Product Specifications

1. 3. 1 External Specification and Net Weight

Table 1-1 Appearance Specification and Net Weight

Type	Cooling capacity	Size(mm)W ×H ×D	Net Weight (kg)
Indoor unit	20.5kW (1400mm deep)	300×2000×1400	220
Indoor unit	20.5 kW (300mm Wide Standard)	300×2000×1200	210
Indoor unit	25 kW (300mm Wide Standard)	300×2000×1200	230
Indoor unit	30 kW (300mm Wide Standard)	300×2000×1200	240
Indoor unit	40 kW (600mm Wide Standard)	600×2000×1200	310
Indoor unit	50 kW (600mm Wide Standard)	600×2000×1200	340
Indoor unit	60 kW (600mm Wide Standard)	600×2000×1200	345
Outdoor unit	038KW (Normal-Temp type)	1200×1560×400	90

[**Note:** W-width；H-height；D-depth]

1.3.2 External Structure

The external structure of the 20.5kW indoor unit is shown as the following figure.

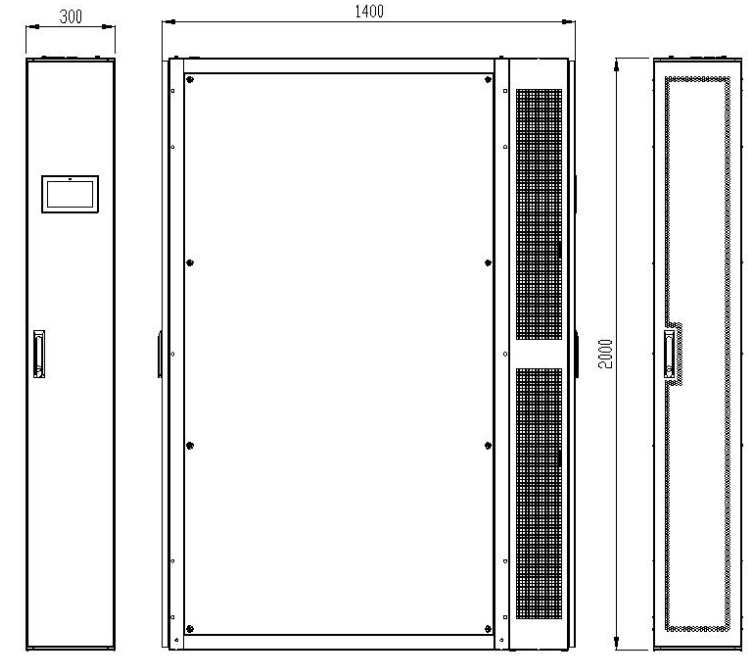
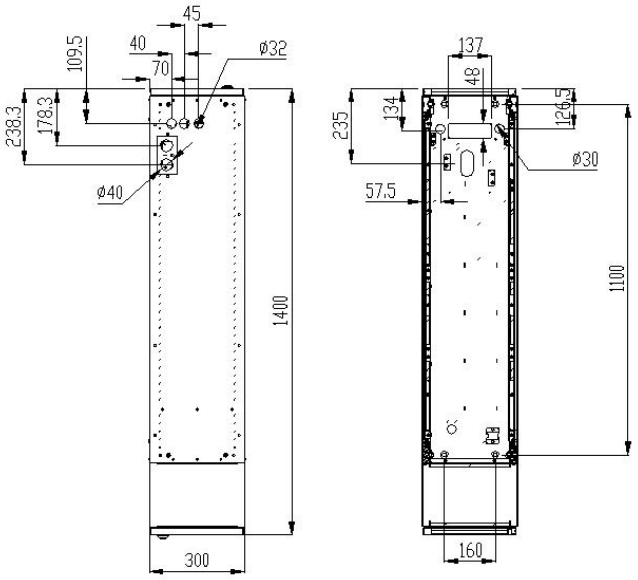


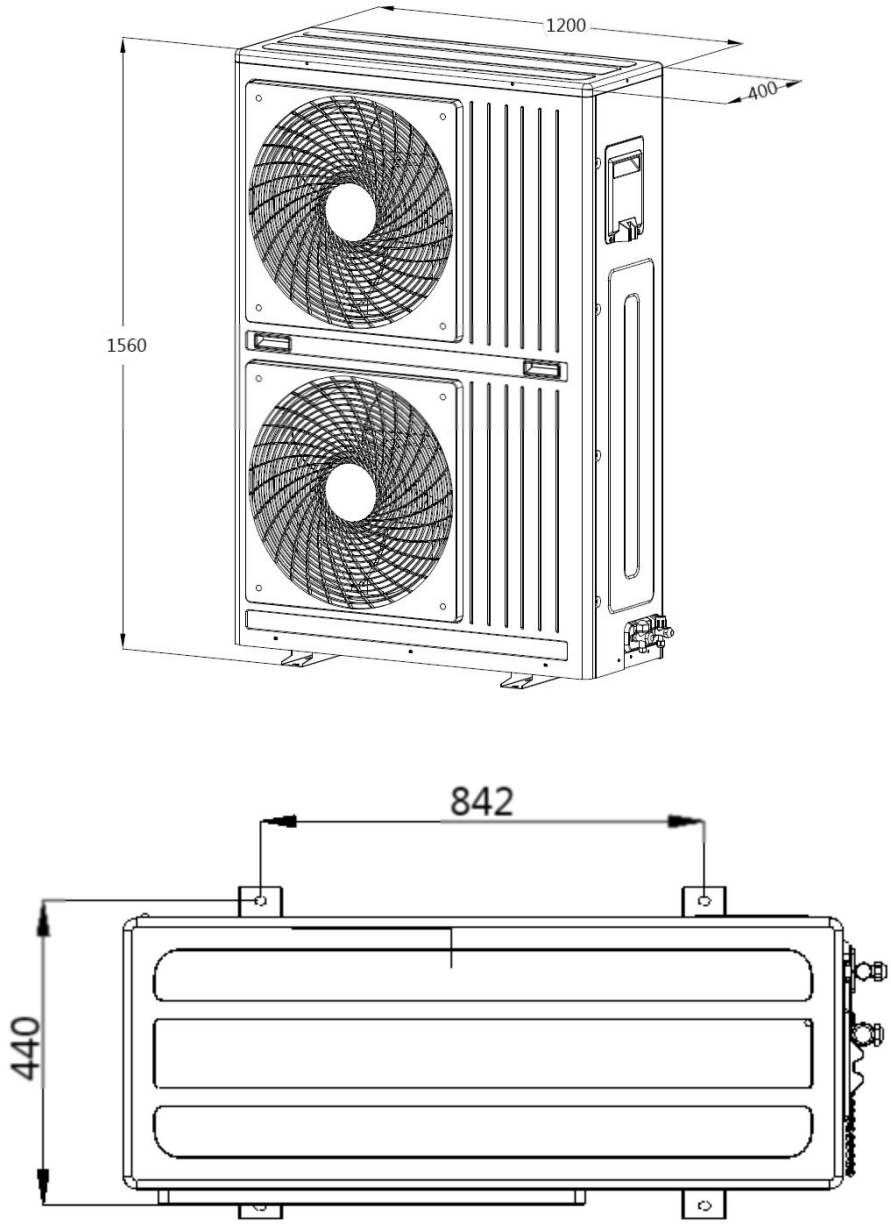
Figure 1-1 External size of 20.5kW indoor unit (1400mm deep)



No.	Description
1	Top hole for gas pipe
2	Top hole for liquid pipe
3	Top hole for humidifier inlet
4	Top hole for humidifier outlet
5	Top hole for power cable
6	Bottom hole for humidifier inlet
7	Bottom hole for humidifier outlet
8	Bottom hole for power cable
9	Bottom hole for liquid pipe
10	Bottom hole for gas pipe
11	Bottom fixing hole 4×M12

Figure 1-2 Hole Size Diagram for 20.5kW (1400mm deep)

The outline structural dimensions and hole dimensions of the outdoor unit 18kW ambient temperature model and 18kW low temperature model are shown in Figure 1-3.



No.	Description
1	Bottom fixing hole 4 ×M8

Figure 1-3 External Dimensions and Hole Dimensions of 38kW outdoor unit

The outline structure and hole dimensions of the indoor unit 300 wide standard model are shown schematically in Figure 1-4 and Figure 1-5.

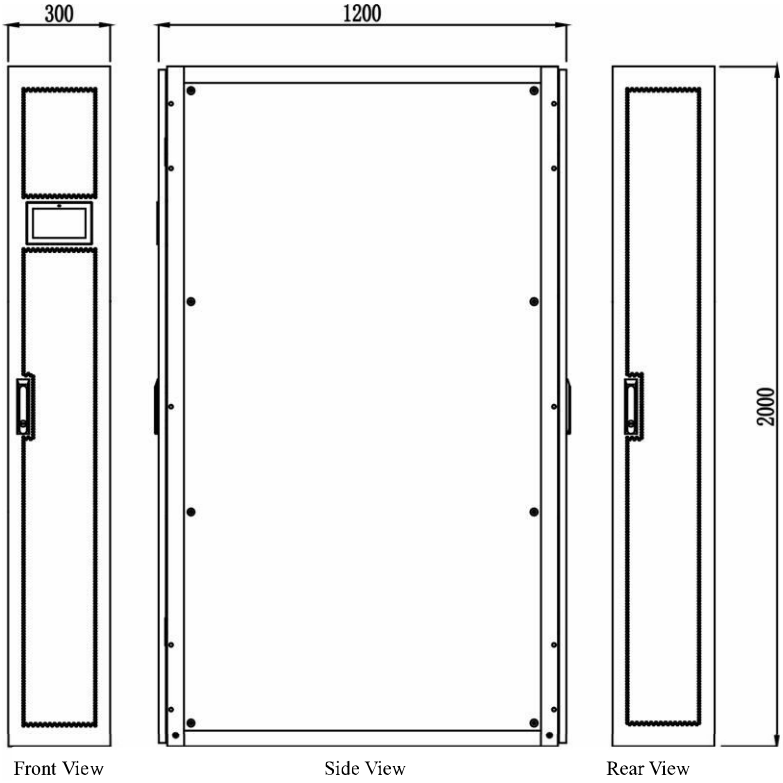
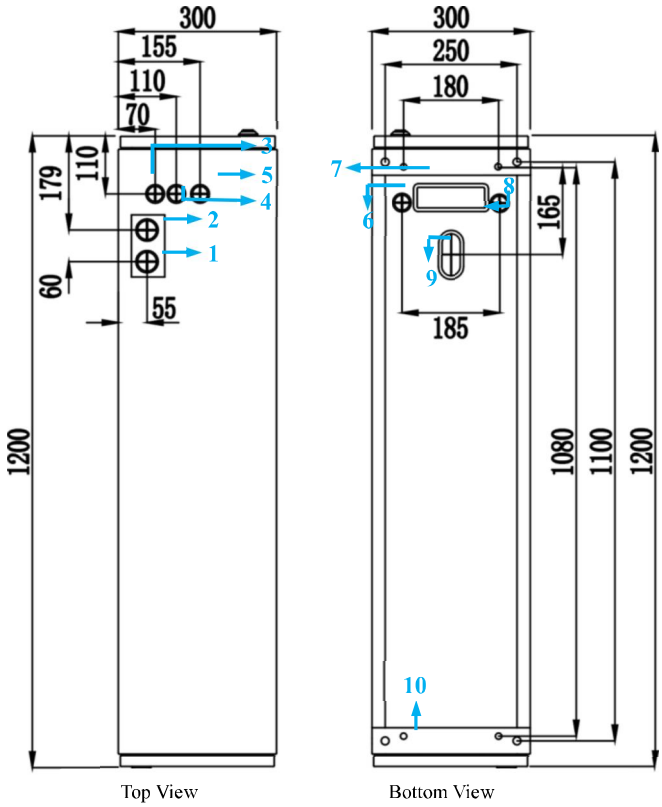


Figure 1-4 Exterior Dimensions of Indoor Unit 300 Wide Standard Model



No.	Description
1	Top hole for gas pipe
2	Top hole for liquid pipe
3	Top hole for humidifier inlet
4	Top hole for humidifier outlet
5	Top hole for power cable
6	Bottom hole for humidifier inlet
7	Bottom hole for gas and liquid pipe
8	Bottom hole for power cable
9	Bottom hole for humidifier outlet
10	Bottom fixing hole 4×M12

Figure 1-5 Hole Size Diagram for Indoor Unit 300 Wide Standard Model

The outline structure and hole dimensions of the indoor unit 600 wide standard model are shown schematically in Figure 1-6 and Figure 1-7.

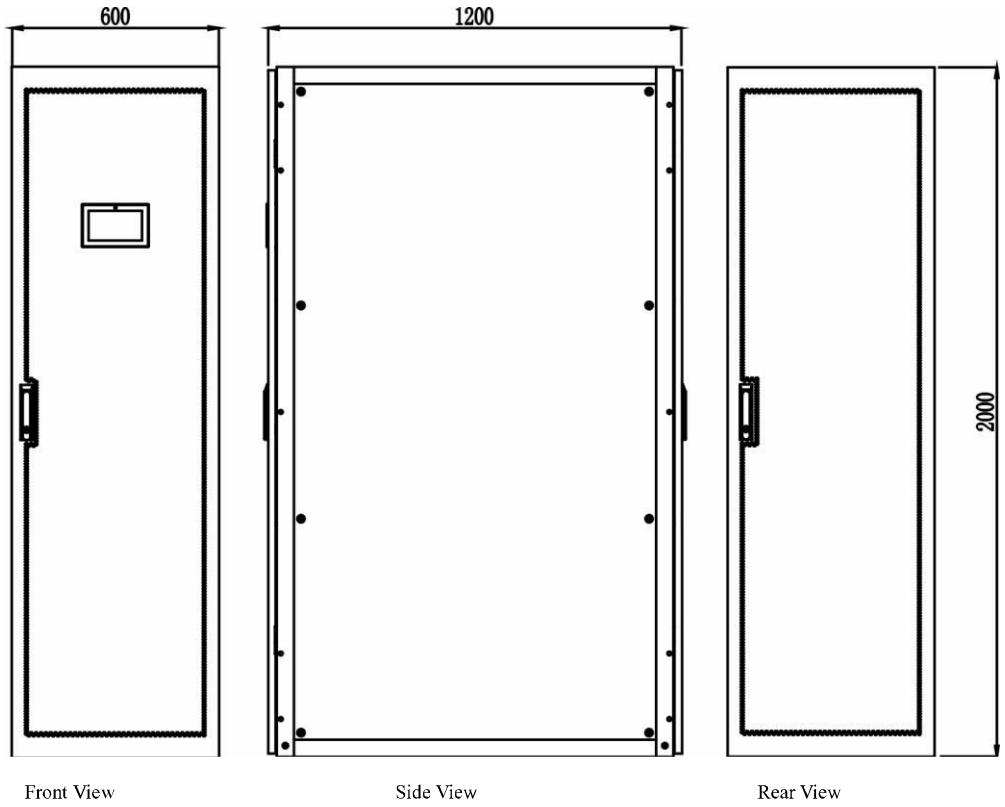
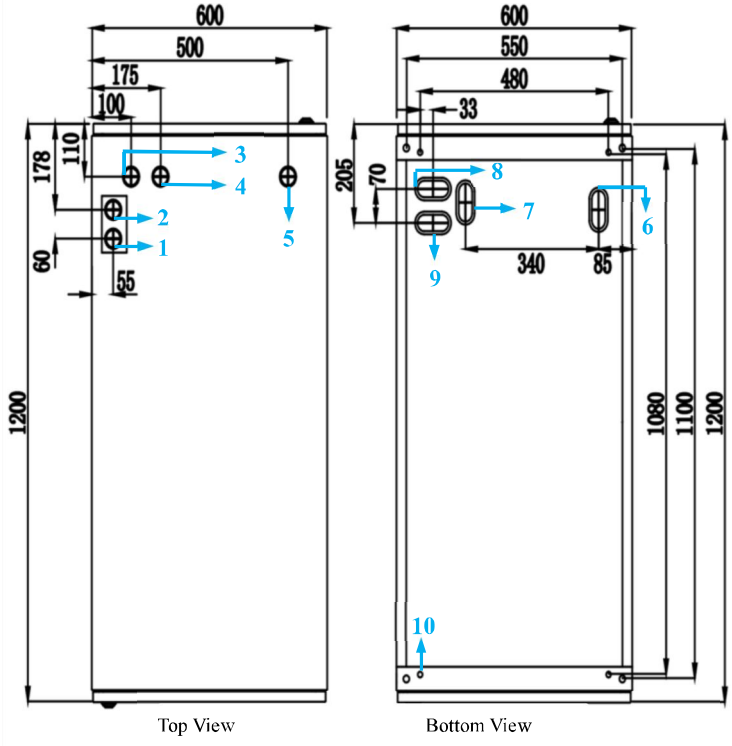


Figure 1-6 Exterior Dimensions of Indoor Unit 600 Wide Standard Model



No.	Description
1	Top hole for gas pipe
2	Top hole for liquid pipe
3	Top hole for humidifier inlet
4	Top hole for humidifier outlet
5	Top hole for power cable
6	Bottom hole for power cable
7	Bottom hole for humidifier outlet
8	Bottom hole for liquid pipe and humidifier inlet
9	Bottom hole for gas pipe and wet humidifier inlet
10	Bottom fixing hole 4 ×M12

Figure 1-7 Hole Size Diagram for Indoor Unit 600 Wide Standard Model

1.4 Environment requirements

1. 4. 1 Operating environment requirements

The operating parameter requirements are shown in Table 1-2:

Table 1-2 Operating environment and requirements

	Content	Indoor side	Outdoor side
Operating parameters	Temperature	18℃～45℃	-20℃~+45℃ （Regular type） -40℃~+45℃（Low temperature type）
	Humidity	20%～80%	——
Operational requirements	Altitude	Altitude ≤1000m, more than 1000m need to be derated	
	Power supply	Voltage 480V±10%, frequency 60 Hz±2Hz, 3F-4H	

1. 4. 2 Storage environment requirements

The storage environment requirements are shown in Table 1-3:

Table 1-3 Storage environment and requirements

Content	Requirement
Storage environment	Safe and clean
Temperature	-40℃～70℃
Humidity	＜95%RH（No condensation）
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.

Chapter2. Mechanical installation

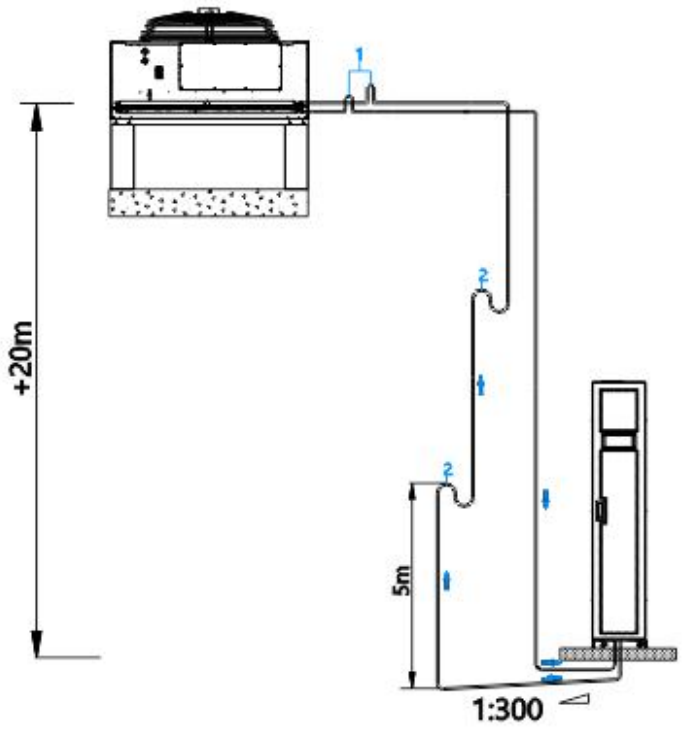
2.1 Principles of Installation Layout

The installation layout should follow the following principles:

1. When the outdoor unit is higher than the indoor unit: the vertical installation height difference between the indoor and outdoor units should not exceed 20m. In order to ensure the reliability of the system, it is necessary to set up an oil trap every 5m in the vertical height of the air pipe, and set up a inverted trap at the inlet and outlet of the outdoor unit.
2. When the indoor unit is higher than the outdoor unit: the vertical height difference between the indoor and outdoor units should not exceed 5m.

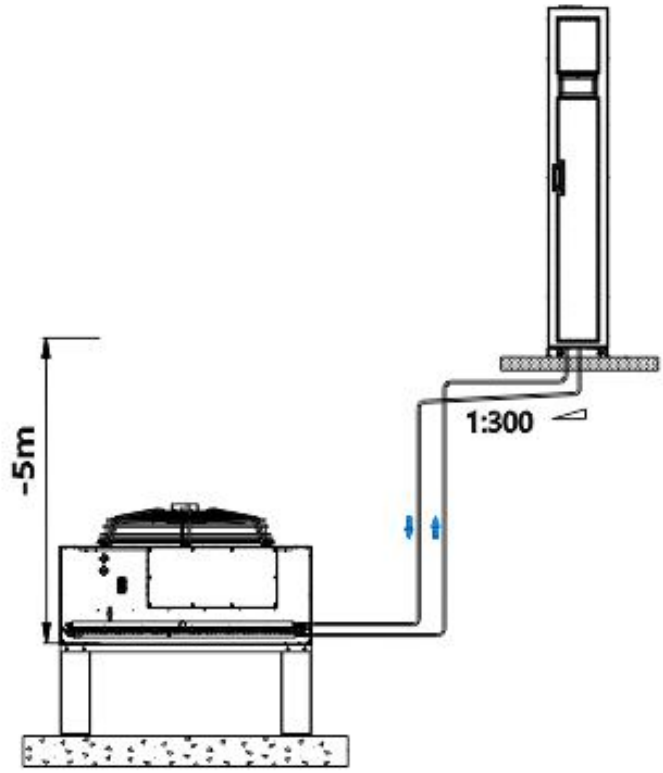
Matters needing attention:

1. When calculating the height difference, the indoor unit is based on the bottom of the compressor, and the outdoor unit is based on the top of the condenser.
2. When the height of the indoor unit is lower than that of the outdoor unit, a reverse U-shaped bend should be added.
3. The height of the inverted trap must be higher than the height of the copper pipe on the highest layer of the condenser。
4. The figure  is a tilt icon，The inclination direction of the pipeline should be the same as the hypotenuse of the right angle, and the inclination of the pipeline should be at least 1:300.
5. The pipes should be equipped with sleeves where they pass through the walls and floor slabs of the main engine room, and sealing measures should be taken between the pipes and the sleeves.



No.	Illustrate
1	Inverted trap
2	Oil trap

（a）Installation diagram of condenser higher than compressor



（b）Installation diagram of compressor higher than condenser

Figure 2-1 Schematic diagram of the installation form of the bottom entry pipe

2.2 Outside inspection

Transport inspection

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

Transportation requirements:

1. Keep away from rain
2. Stand upright
3. Not stackable
4. Be careful of collisions

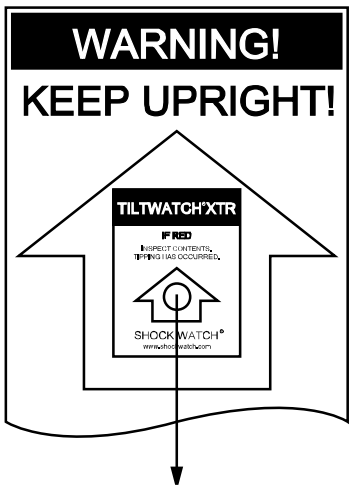
✧ **Note: Specific requirements other than packaging requirements shall prevail.**

External inspection

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 there are obvious damage and collision marks on the outer packaging.
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.
4. Whether the anti-tilt label turns red.



Observe whether the color of this circle turns red

Figure 2-2 Schematic diagram of anti-tilt label

Related tips

1. If you find that it has been opened or the anti-tilting label has turned red, 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 product equipment and make the product unable to be used normally. Please check carefully. If there is any problem, please contact service department.

2.3 Unboxing

Suggest

Try to move the equipment to the place as close as possible to its final installation site before unpacking it.

Unpacking steps

1. Remove the packaging materials

   The high-strength environmentally-friendly paper packaging is used by the unit, the paper packaging, wrapping film, protective materials, etc., are removed on site in sequence.

2. Remove the bottom tray

   The unit is fixed on the bottom tray of the package with M8 bolts, and can be disassembled with M8 wrenches, ratchet wrenches or sockets.

2.4 Install indoor unit

2. 4. 1 Check the Nitrogen

Steps:

1. Use the key to unlock the cabinet door lock and open the back door.
2. Unscrew the filter rotating baffle and take out the air filter.

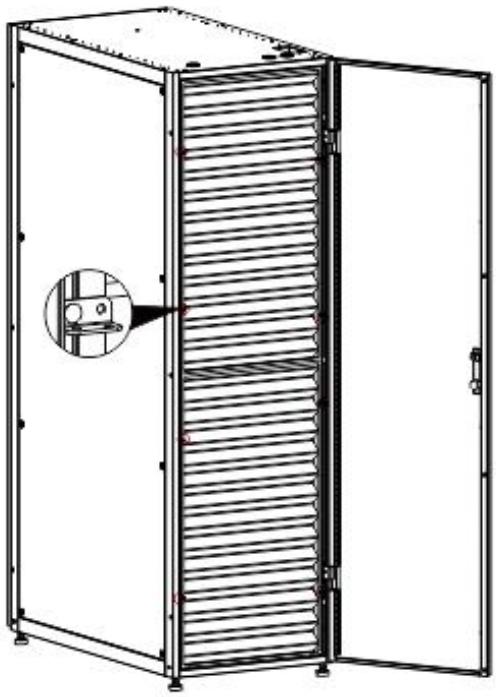
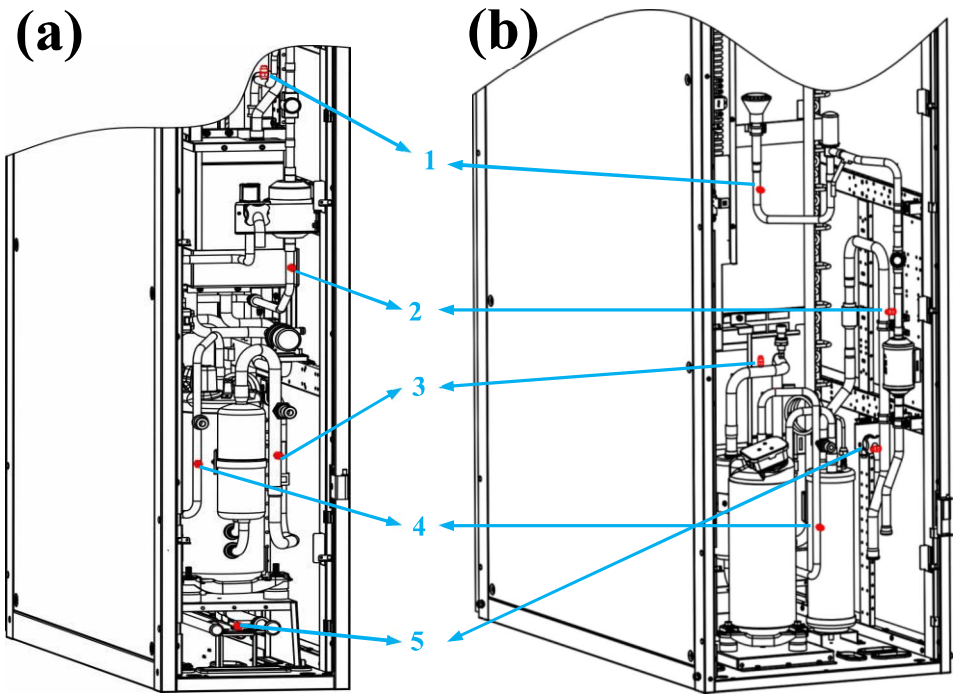


Figure 2-3 Removing the Filter

3. Remove the desiccant.
4. Check successively whether the needle valve cap in Figure 2-4 is missing.
    1. If there is no needle valve cap, please contact Customer Service Department.
    2. If there is a needle valve cap, remove the valve needle cap and press the valve core with the valve cap one by one. If there is gas exhaust, the system is normal; if there is no gas exhaust, please contact customer service department.



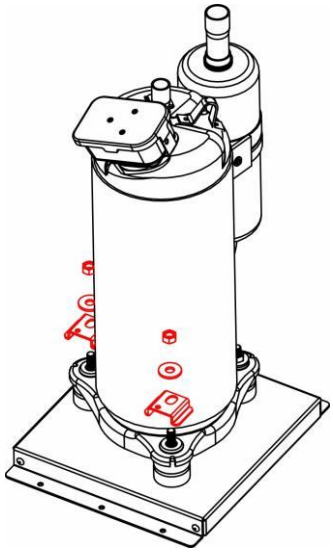
No.	Illustrate
1	Needle valve
2	Liquid pipe needle valve
3	Low pressure needle valve
4	Exhaust pipe needle valve 1
5	Exhaust pipe needle valve 2

Figure 2-4 Needle valve position:（a）300 wide model;（b）300 wide model

2. 4. 2 Remove the fixed sheet metal parts of the compressor for transportation

Steps:

1. Use a wrench to loosen the transportation fixing bolts of the compressor.



Noted

- Compressor form 20.5kW -50Kw are fixed with 3 feet, while 60kW compressor are fixed with 4 feet

Figure 2-5 Removing the fixed sheet metal parts of the compressor

2. Remove the fixed sheet metal parts.
3. Retighten the compressor fixing bolts with a torque wrench.

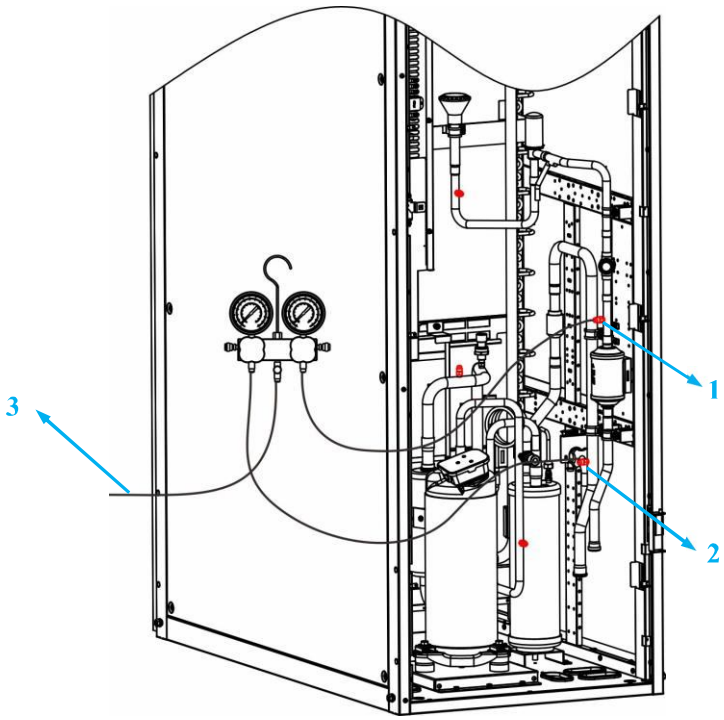
2. 4. 3 Exhaust nitrogen

Before welding, please completely release the nitrogen in the refrigerant pipeline to avoid pipe bursting, resulting in personal injury and equipment loss.

The following illustrations are based on the 600-width standard model, while the 300-width standard model can be referred to the corresponding illustrations.

Steps:

1. Remove the bonnet of the low pressure needle valve shown in Figure 2-6, and connect the needle valve with a hose with a pressure gauge.



No.	Illustrate
1	Liquid pipe needle valve
2	Exhaust pipe needle valve 2
3	Nitrogen evacuation

Figure 2-6 Schematic diagram of nitrogen exhaust

2. Open the pressure gauge valve, there will be a loud airflow sound at the beginning, and then the airflow gradually disappears.
3. After the airflow sound disappears, the hose can be removed and the bonnet can be installed.

2.5 Connect the pipeline

The in-row air conditioners require the following pipes to be connected at the completion of the installation as follows:

1. Condensate drain for indoor unit.

2. Humidifier inlet pipe (configure the humidifier).
3. Copper pipes connecting the indoor unit to the outdoor unit (Exhaust & Fluid Return Pipes).
4. Add extension kit (optional).

2.5.1 Connecting the condensate drain of the indoor unit

1. For units without a condensate pump, the reserved drain hose specification is ID15×OD22mm.
2. For units equipped with condensate pumps, the reserved drain hose specification is ID10×OD14mm.

✧ **Note: For units equipped with electrode humidifiers, the humidifier drain and the condensed water from the evaporator are collected through the drain pan and discharged through the drain pipe. Due to the high-temperature water flowing in the electrode humidifier, the drain pipe must be made of materials with a temperature resistance of more than 100℃, generally steel pipe, copper pipe, PPR pipe, and PVC pipe is absolutely not allowed.**

2.5.2 Connect the water inlet pipe of the humidifier

1. Connect the water inlet pipe of the wet film humidifier

Configuration of wet film humidifier unit, the wet film humidification system for the circulating water humidification mode, wet film water tray as part of the wet film humidifier system of circulating water, no separate drain. Only the water inlet pipe of the water inlet solenoid valve needs to be connected on site, and the following matters need to be noted when connecting the wet film humidification water inlet pipe:

1. The connection between the humidification inlet pipe and the water inlet side is a G1/2 (female thread) connector, the inlet pipe needs to be installed with a filter /check isolation valve, and the connection pipe needs to be sealed against water leakage;
2. Pressure reducers shall be installed where the main line pressure may exceed 0.4 MPa. Where the pressure of the main pipe is less than 0.1MPa, water collection tank and pump system should be installed.
3. Water supply requirements:
   - Water supply temperature: 1℃～40℃
   - No icing and turbidity (Scattered Turbidity Units)/NTU <3
   - Visible to the naked eye: none；
   - PH value：6.5≤PH≤8.5；
   - Total hardness（as $CaCO_3$）≤450mg/L

2. Connect the water inlet pipe of the electrode humidifier

The electrode humidifier needs to be connected to a water pipe. In order to facilitate maintenance, a filter/check isolation valve should be installed in the water inlet pipe. The humidification inlet pipe joint is a G1/2 (internal thread) joint, and the connection must be sealed to prevent water leakage. The main pipe pressure range is 0.1MPa to 0.4MPa.

Where the pressure of the main pipeline may exceed 0.4MPa, a pressure reducer should be installed. Where the pressure of the main pipeline is lower than 0.1MPa, there should be a collection tank and a water pump system.

✧ **Note: The main road inlet pipe must be made in accordance with local regulations.**

The electrode humidifier can use tap water, it is recommended to use softened water or purified water (deionized water, distilled water cannot be used), specific requirements:

- Inlet water temperature: 4~40°C
- Water inlet pressure: 0.1~0.4Mpa
- Conductivity: 350～750μs/cm;

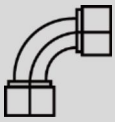
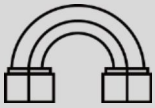
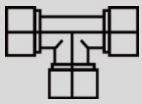
2.5.3 Copper pipe connecting the indoor to the outdoor unit (exhaust pipe and liquid pipe)

The indoor and outdoor units of the 020kW series are connected by soldering copper tubes (020kW models use threaded connections). There are refrigeration line fittings and labels on the top and bottom of the unit, and you can choose to connect the pipes from the top or from the bottom according to the needs of the project. When welding, follow the label instructions to connect the indoor unit gas and liquid pipe lines correctly, and pay attention to protect the label and insulation cotton.

All refrigeration pipe joints shall be silver welded, and the selection, arrangement and fixing of piping shall be operated in accordance with industry standards. The design and construction process shall take into account the pressure drop of piping, compressor oil return, noise and vibration reduction. The recommended piping dimensions in this article are "equivalent lengths" (see Table 2-1 for the equivalent lengths of each local component), including the calculation of resistance losses due to elbows. The installer should check the suitability according to the site conditions.

1. If the equivalent length of the one-way piping exceeds 30 m, or if the outdoor unit is installed at a height of more than 10 m higher than the indoor unit, or if the indoor unit is installed at a height of more than 5 m higher than the outdoor unit, consult with the manufacturer to confirm the need for additional options or other measures before installation.
2. The pipe size recommended in Table 2-1 is the equivalent length, and the resistance loss caused by the elbow and the valve has been calculated. The installer should confirm whether it is appropriate according to the on-site situation.

Table 2-1 Equivalent length of each partial component

Copper tube outer diameter（inch）	45° bend （Unit：m）	90° bend （Unit：m）	180° bend （Unit：m）	Triple valve （Unit：m）
				
3/8	0.12	0.2	0.4	0.6
1/2	0.14	0.25	0.5	0.65
5/8	0.17	0.3	0.6	0.7
3/4	0.2	0.35	0.7	0.8
7/8	0.24	0.42	0.8	1.2
1	0.28	0.5	1	1.3
1-1/8	0.32	0.6	1.2	1.4

✧ **Noted:**

1. The piping connections for both the 20.5kW indoor unit and the outdoor unit are male threaded fittings, and the location of the shut-off valves for the indoor and outdoor units is shown in Figure 2-7. 20.5kW will be equipped with a standard 5m copper pipe, field installation, the indoor and outdoor unit connecting pipe corresponding to the indoor and outdoor unit connected to the corresponding pipe interface can be. If the length of the pipe exceeds the standard piping length of 5m, it is necessary to use the welding method to connect the additional copper pipe.
2. 25-60kW units are filled with 0.3~1.0bar nitrogen for pressure holding at the factory, please empty the nitrogen in the system before welding.
3. Do not leave the system piping open for more than 15 minutes, otherwise it will cause the compressor lubricant to absorb moisture affecting the service life of key system components and the stability of system operation.

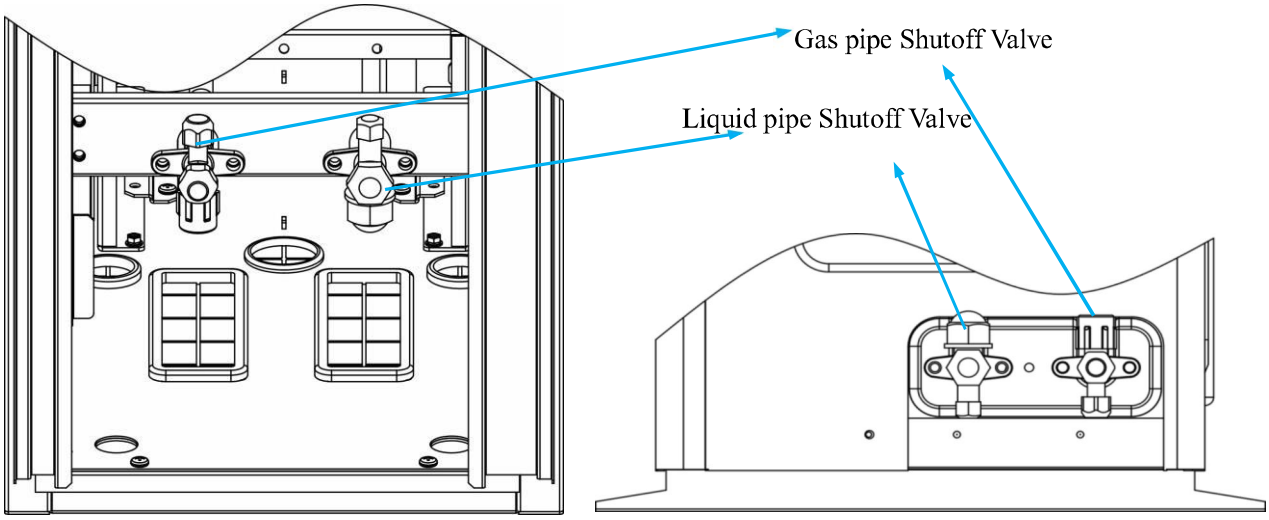


Figure 2-7 Schematic of 20.5kW Indoor and Outdoor Unit Shutoff Valve Location

Be especially careful when installing quick threaded joints. Before operation, please read the following precautions carefully:

1) Remove the dust cover of the valve joint;

2) Carefully wipe the connecting seat and threaded surface with a clean cloth;

3) Lubricate the mating surface of the joint with refrigerant oil;

4) Screw the connecting nut onto the joint and ensure that the front of the thread is matched;

5) Tighten the hexagon nut of the connector and the connecting valve until you feel obvious resistance;

6) During the installation process, two wrenches must be used to cooperate with the operation. The operation of one wrench can easily damage the connecting copper pipe of the valve. Refer to Table 2-2 for the recommended tightening torque value.

Table 2-2 Recommended Tightening Torque Values for Quick Threaded Joints

Threaded joint dimension	Torque value (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

The horizontal part of the exhaust pipe should be inclined downwards after being led out from the compressor, and its inclination should be at least 1:300 (it should be lowered by 6mm per 1m). If the exhaust pipe is affected by the cooling equipment (including under the raised floor), it should be insulated. Considering the influence of the pipe diameter on the system pressure drop, the pipe diameter of the connecting copper pipe of the indoor and outdoor units should be selected according to the recommended pipe size in Table 2-3.

Table 2-3 Recommended pipe size (mm)

Model	20.5kW		25kW		30 kW		40 kW		50 kW		60 kW	
Tube length	Gas pipe	Liquid pipe	Gas pipe	Liquid pipe	Gas pipe	Liquid pipe	Gas pipe	Liquid pipe	Gas pipe	Liquid pipe	Gas pipe	Liquid pipe
10m	19	16	19	16	19	16	22	19	22	19	22	19
20m	19	16	19	16	22	19	22	19	25	19	25	22
30m	19	16	19	16	22	19	25	19	28	19	28	22
40m	22	16	22	16	25	19	25	19	28	22	28	22
50m	22	19	22	19	25	19	25	22	28	22	28	22
60m	22	19	22	19	25	19	25	22	28	22	28	22

2.5.4 Add extension components

When the equivalent length of the pipeline exceeds 30m, or the vertical height difference between the indoor unit and the outdoor unit exceeds the value specified in section 2.1, an extension component is required, and the solenoid valve body is installed on the engineering pipeline outside the equipment.

✧ **Note: When installing the extension assembly on site, please note that the flow direction of the refrigerant must be consistent with the direction marked on the valve body.**

2.6 Nitrogen filling to maintain pressure

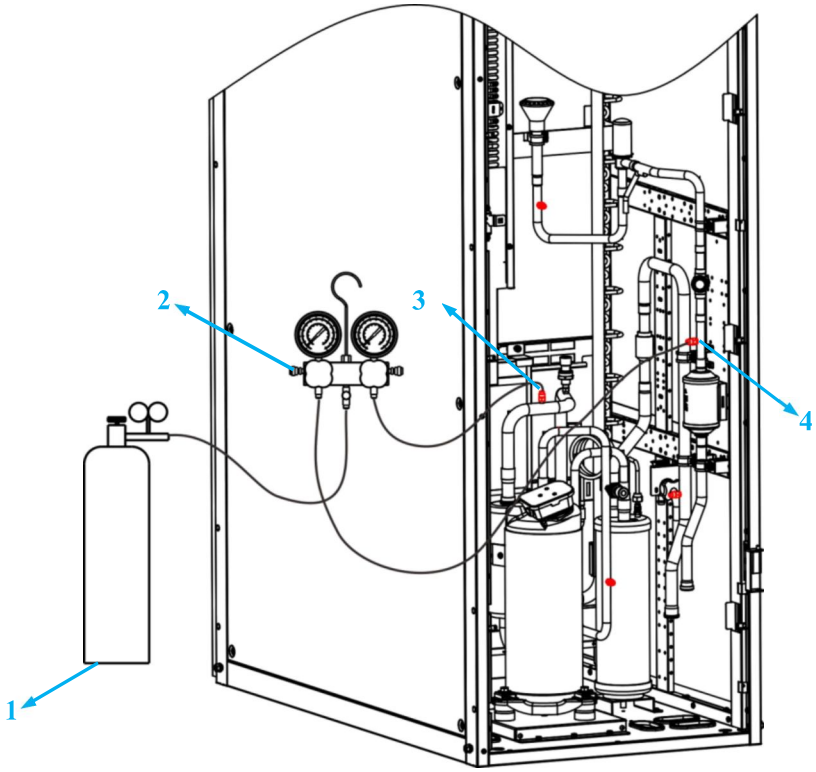
Matters needing attention

1. The indoor and outdoor units of the 20.5kW are factory precharged with refrigerant. Therefore, after ensuring that the shut-off valves of the indoor and outdoor units are closed, it is only necessary to charge the connecting pipelines with nitrogen to maintain pressure and evacuate the vacuum;
2. The indoor and outdoor unit pipelines of 25-60kW have been welded.

3. The spool of the needle valve is not lost.
4. The range of the pressure gauge is not less than 4.0Mpa, and the pressure resistance of the leather tube is not less than 4.5Mpa.
5. Only nitrogen can be used to maintain pressure and detect leaks.
6. Do not remove the hose and pressure gauge when maintaining pressure to prevent nitrogen from leaking at the connection.
7. The following illustrations and procedures are based on the 40kW-60kW models and may be used for reference for the 25kW and 30kW models.

Steps

1. Connect the leather tube, pressure gauge, pressure reducing valve and nitrogen cylinder to the equipment, and the pressure gauge and pressure reducing valve are closed.
2. As shown in Figure 2-8, charge nitrogen gas from the low pressure needle valve and the liquid path needle valve at the same time.



No.	Illustrate
1	Nitrogen cylinder
2	Pressure gauge
3	Low pressure needle valve
4	Liquid pipe needle valve

Figure 2-8 Schematic diagram of nitrogen filling and pressure maintaining

3. Open the pressure gauge and the pressure reducing valve, fill with nitrogen 3.0Mpa, and maintain the

pressure for 24 hours. The system pressure should not decrease when the ambient temperature before and after the pressure is similar; if the ambient temperature has a large change, it is recommended to do the pressure again test.

- ✧ **Note: The outlet pressure of the pressure reducing valve should not be greater than 3.0MPa, otherwise it may cause damage to the device.**

4. If the pressure value drops, soapy water must be used to find and repair the leak; if the pressure is well maintained, please discharge nitrogen at the filled needle valve.

2.7 Vacuumizing

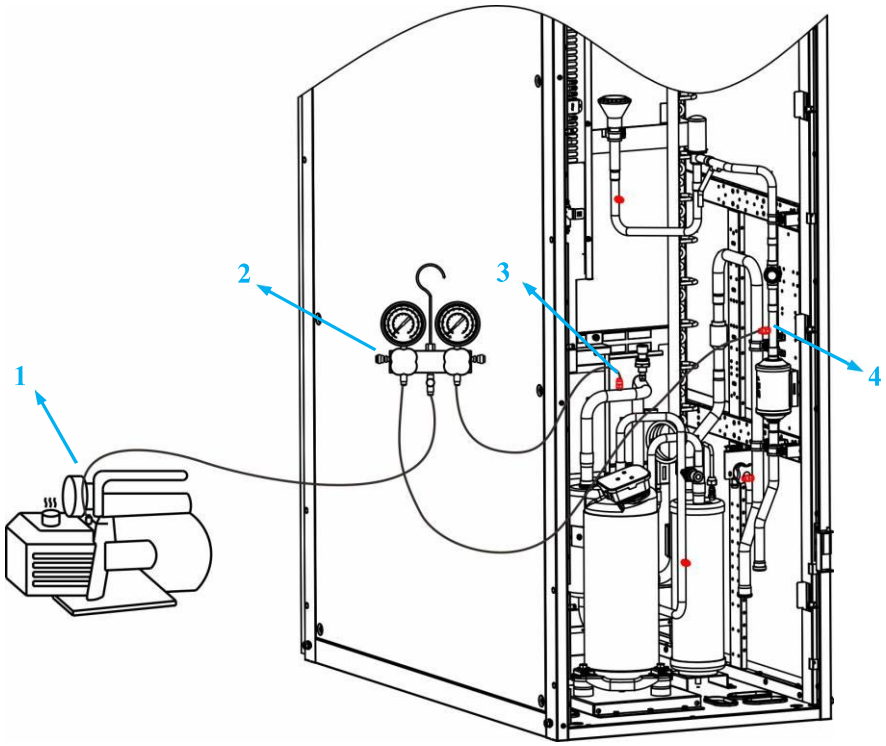
Matters needing attention

1. Before vacuuming, check that the refrigerant piping system has passed the air tightness test and there is no leakage.
2. Before vacuuming, make sure that the connectors on the equipment have been tightened.
3. Failure to vacuum or unclean vacuum may cause high-pressure failure/system failure. Please ensure that the vacuum meets the requirements when vacuuming

Steps

1. Confirm whether the unit is equipped with solenoid valve

- If there is no solenoid valve installed, connect the pressure gauge and vacuum pump from the two positions of the low-pressure needle valve and the liquid path needle valve, and start vacuuming at the same time. As shown in Figure 2-9:



No.	Illustrate
1	Vacuum pump
2	Pressure gauge
3	Low pressure needle valve
4	Liquid pipe needle valve

Figure 2-9 Schematic diagram of vacuum pumping

- If a solenoid valve is installed, connect the pressure gauge and the vacuum pump from the two positions of the low pressure needle valve and the liquid path needle valve. Vacuuming is performed at the same time, and the vacuuming mode is enabled, so that the electronic expansion valve and the liquid circuit solenoid valve are kept open.
- When starting to vacuum, the vacuum pump sounds louder and there is "white smoke" coming out of the discharge port. If there is still "white smoke" coming out after 10 minutes, it may be due to poor sealing of the refrigeration system, or too much refrigerant and moisture remaining in the refrigeration system. It should be observed for 10 minutes.
- After 20 minutes, the pointer of the pressure gauge should be in the negative value area, and the vacuum pump sound is quiet. At this time, you can repeatedly close and open the vacuum pressure gauge several times. The position of the pressure gauge pointer before and after closing, the sound of the vacuum pump

has no obvious change. Otherwise, the refrigeration system may be poorly sealed.

- After confirming that there is no leakage in the refrigeration system, the vacuuming time should generally not be less than 90 minutes, and the final pressure displayed by the vacuum pump should not be greater than 60pa (absolute pressure). When the final pressure no longer drops, continue pumping for 10 minutes, and the moisture indicator of the night vision goggles should show dry (green).
- After vacuuming, close all the valves of the pressure gauge and the vacuum pump without removing the connection. Keep the pressure for 10 minutes. The refrigeration system pressure should not exceed 90pa (absolute pressure).
- **Note: If the pressure gauge cannot accurately display to 60pa (absolute pressure), the vacuum should make the pressure gauge stay at the minimum scale, and the pressure holding time should be delayed to 1h, and the pressure gauge should not rise significantly.**

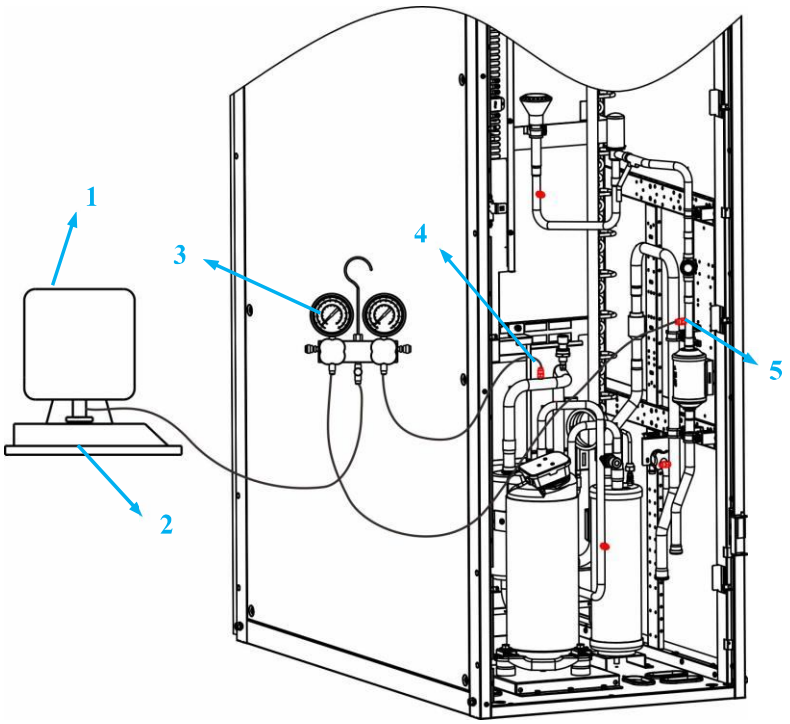
2.8 Charge refrigerant

Matters needing attention

1. It is recommended to use a safety valve when charging refrigerant to prevent frostbite caused by refrigerant leakage when the hose is removed.
2. When performing operations related to refrigerants, antifreeze gloves must be worn at all times.
3. After confirming that there is no leakage in the refrigeration system and the vacuum degree meets the requirements, the refrigerant R410a should be charged immediately.
4. Please do not use inferior refrigerants. Inferior refrigerants will seriously damage the system. The company will not be responsible for any consequences caused by the use of inferior refrigerants.

Steps:

1. On the basis of the vacuum equipment, remove the vacuum pump and replace it with a refrigerant cylinder, as shown in Figure 2-10.



No.	Illustrate
1	Refrigerant
2	Electronic scale
3	Pressure gauge
4	Low pressure needle valve
5	Liquid pipe needle valve

Figure 2-10 Schematic diagram of refrigerant charging

2. Slightly open the refrigerant cylinder valve and the connecting nut between the pressure gauge and the hose. When you feel the cold air coming out of the connecting nut, tighten the connecting nut.
3. Put the refrigerant cylinder upside down on the electronic scale and clear the reading on the electronic scale.
4. Open all pressure gauge valves and refrigerant cylinder valves to charge refrigerant. Based on the system configuration and the length of the system's one-way connecting pipe, the refrigerant charge in the system is determined as described in Section 2.8.1.
5. The pre-charged amount of refrigerant cannot be less than half of the calculated total charge and cannot be greater than the total charge. If the pre-charge volume cannot complete the total charge volume, the remaining refrigerant needs to be charged during startup and commissioning.
6. After filling is complete, close all pressure gauge valves and refrigerant cylinder valves.

2.8.1 System refrigerant charge

Matching different air-cooled condensers, the system charge is also different. For indoor and outdoor units with the length of one-way connecting pipe, additional refrigerant and compressor refrigeration oil are also required to ensure the unit's cooling capacity and operational reliability.

- 20.5kW in-row air conditioner has been pre-charged with the standard refrigerant charge in

the factory. If the unit is equipped with low-temperature components, the low-temperature components will also be pre-charged with refrigerant from the factory, and the corresponding pre-charged refrigerant amount is shown in Table 2-4. Therefore, after ensuring that the shut-off valves of the indoor and outdoor units are in a closed state, it is only necessary to charge nitrogen to maintain pressure and vacuumizing.

- 20.5kW in-row air conditioner is equipped with 5m-long connecting pipe as standard. When the one-way connecting pipe of indoor and outdoor units on site exceeds 5m, it is necessary to supplement refrigerant. Refrigerant replenishment can refer to the following calculation formula:

Refrigerant supplement (kg) = refrigerant addition in liquid pipe (kg/m) × extended liquid pipe length (m)

Extended liquid pipe length (m) = system one-way liquid pipe length - 5m;

(Refrigerant charge per unit length of liquid pipe, see Table 2-6 Refrigerant charge per unit length of liquid pipe of different pipe diameters)

Table 2-4 Refrigerant Charge of 20.5kW

Model	Outdoor unit	Refrigerant charge of indoor unit (kg)	Refrigerant charge of outdoor unit (kg)
20.5kW	38kW (Normal type)	1.2	5

For 25-60kW models, Table 2-5 gives the standard refrigerant charging quantity for 10m connecting pipe system. If the length of one-way connecting pipe of the system is within 10m, after vacuum pumping on site, it is only necessary to charge the refrigerant according to the refrigerant charging quantity in Table 2-5; if the length of one-way connecting pipe of the system is more than 10m, the calculation of the refrigerant charging quantity of the unit is based on the following public notice:

Refrigerant Charge = Standard Charge + Refrigerant Additional Charge

The additional amount of refrigerant is calculated according to the following formula:

Additional amount of refrigerant (kg) = additional amount of refrigerant per unit length of liquid pipe (kg/m) × length of extension liquid pipe (m) + additional amount of low-temperature components or additional amount of energy-saving modules

Extended liquid pipe length (m) = system one-way liquid pipe length -10m;

（The amount of refrigerant added per unit length of liquid pipe, see Table 2-6 The amount of

refrigerant added per unit length of liquid pipe of different pipe diameters.）

Table 2-5 Refrigerant charge amount of 10m connecting pipe system

Indoor unit model	Supporting outdoor unit model	Standard charge （kg）	Low-temp components Additional amount of refrigerant（kg）	Energy saving module Additional amount of refrigerant（kg）
25kW	Outdoor unit 38 kW	6.7	8.0	16.8
30 kW	Outdoor unit 45 kW	8.3	8.0	16.8
40 kW	Outdoor unit 56 kW	11.0	8.0	16.8
50 kW	Outdoor unit 76 kW	13.3	18.6	16.8
60 kW	Outdoor unit 88 kW	14.0	18.6	16.8

Table 2-6 The amount of refrigerant added per unit length of liquid pipes with different diameters

Outer diameter of liquid pipe (mm)	Refrigerant added amount (kg/m)
6	0.020
9	0.060
13	0.112
16	0.181
19	0.261
22	0.362
28	0.618

✧ **Note: The above refrigerant charge can be used as a preliminary budget before installation and as a guide for charging refrigerant after installation, the actual charge for project installation is subject to the final commissioning results.**

2.9 Replenish refrigeration oil

The addition of refrigerant will cause the dilution of the refrigerating oil in the system and affect the lubrication and cooling effect of the refrigerating oil, so refrigerating oil needs to be added.

- For 20.5kW models, the type of refrigeration oil used is shown in Table 2-7, and the formula for refrigeration oil addition is as follows:

1. The one-way connecting pipe length of the system exceeds 30m:

Refilling amount of refrigerating oil (L)=[(System one-way connecting pipe length -30m)×Additional

amount of liquid pipe refrigerant per unit length] ×15%

- For 25-60kW models, the type of refrigeration oil used is shown in Table 2-7, and the formula for refrigeration oil addition is as follows:

1. The one-way connecting pipe length of the system is within 30m (If the unit is configured with a low-temperature component or energy-saving module, we don't need to add refrigerating oil if it is not configured):

Refrigeration oil replenishment amount (L) = (additional amount of low-temperature component refrigerant or additional amount of energy-saving module refrigerant) × 15%

2. The one-way connecting pipe length of the system exceeds 30m: **(Units are not configured with low-temperature components or energy-saving modules):**

Refilling amount of refrigerating oil (L)=[(System one-way connecting pipe length -30m) ×Additional amount of liquid pipe refrigerant per unit length] ×15%

3. The one-way connecting pipe length of the system exceeds 30m: **(Units are configured with low-temperature components or energy-saving modules):**

Refilling amount of refrigerating oil (L)=[(System one-way connecting pipe length -30m) ×Additional amount of liquid pipe refrigerant per unit length+(Additional amount of low-temperature component refrigerant or additional amount of energy-saving module refrigerant)] ×10%

Table 2-7 Types of refrigerating oil

Unit model (indoor)	Type of refrigerating oil
20.5kW	POE type（VG74）
25kW	Rotor Compressors: PVE type（FV68H）
	Scroll compressor: POE type（32-3MAF）
30kW	Rotor Compressors: PVE type（FV68H）
	Scroll compressor: POE type（32-3MAF）
40kW	Rotor Compressors: PVE type（FV68H）
	Scroll compressor: PVE type（FV68H）

50kW	Rotor Compressors: PVE type（FV68H）
	Scroll compressor: PVE type（FV68H）
60kW	PVE type（FV68H）

2.10 Installation check

Check item

1. Whether there is a certain space for equipment maintenance around the unit.
2. The equipment is placed upright, and the installed fastening parts have been firmly installed.
3. The drain pipe is connected.
4. The water supply pipe of the humidifier is connected (when the humidifier is configured).
5. All connecting 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.

After all the contents are checked and confirmed to be correct, the electrical installation can be carried out.

Chapter3. Electrical Installation

3.1 Wiring content

Lines that need to be connected at the installation site

1. Indoor unit power cable;
2. Outdoor unit power cable;
3. Unit input and output control lines;

Installation Precautions

1. All wiring connections must comply with the regulations of the country and local electrician regulations.
2. For the full load current of the relevant unit, please refer to the equipment nameplate. The cable size should comply with local wiring regulations.
3. The main power supply meets the requirements of the unit, please refer to the equipment nameplate.
4. Electrical installation work must be carried out by trained professional installers.
5. Before connecting the circuit, use a voltmeter to measure the input power voltage and make sure that the power is off.

3.2 Indoor unit wiring

The unit has user inlet holes at the top and bottom. You can choose to wire from the top or from the bottom according to the needs of the project.

3. 2. 1 Location of electrical interface of indoor unit

Open the back door of the indoor unit, you can see the interfaces of the electric control box. There are certain differences in the layout of the electric control box of different units. Please check the circuit diagram and indication label for details.

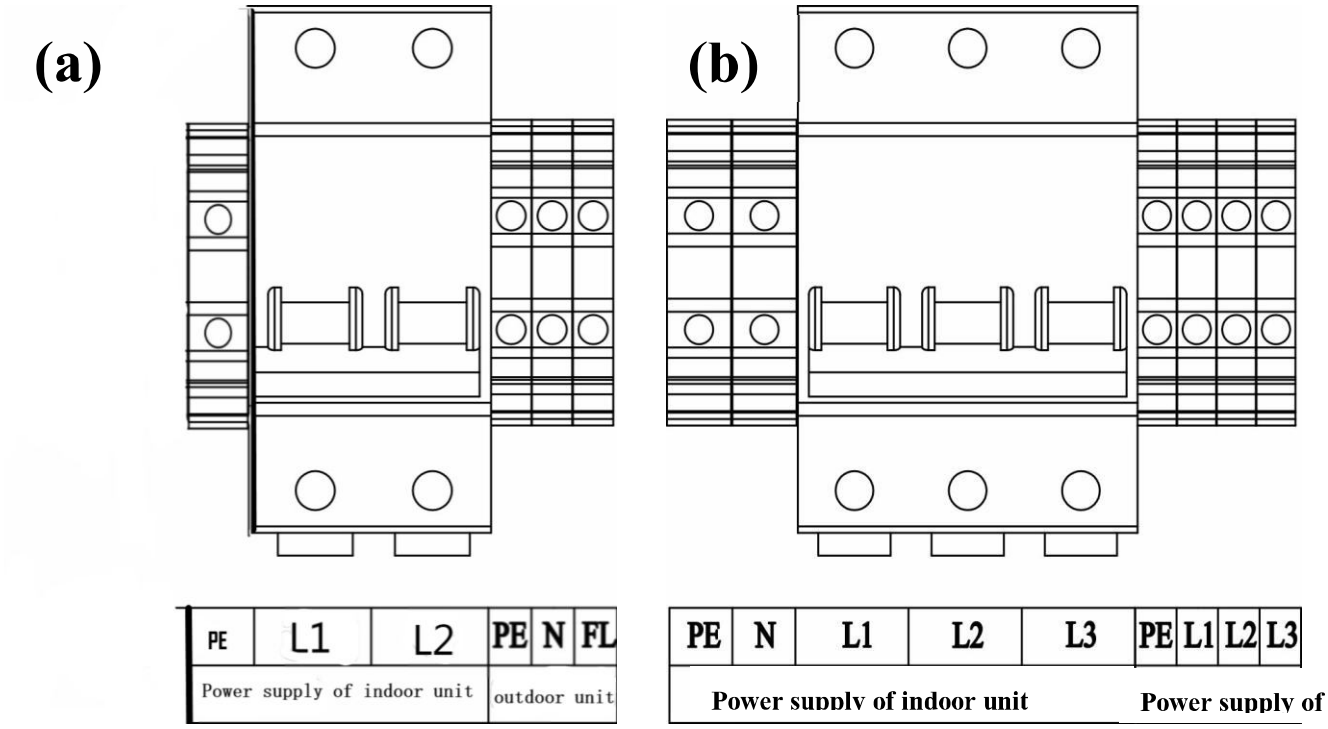


Figure 3-1 Internal and external machine power terminals

（a）20.5kW; （b）25-60Kw

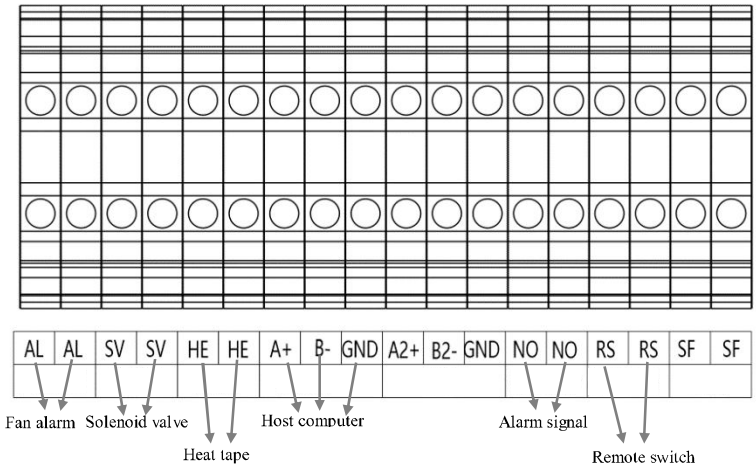


Figure 3-2 Signal wire connection terminal

3. 2. 2 Connect the indoor unit power cable

The specifications of the power cord are recommended to be selected according to the national standard, as shown in the table below.

Table 3-1 Unit power cord parameter list

Model	Maximum operating current（A）	Recommended power cable specifications（mm^2）
20.5kW	36. 7	3×6. 0
25kW	35. 2	5×6. 0
30kW	40. 7	5×6. 0
40kW	41. 6	5×6. 0
50kW	53. 9	5×10. 0
60kW	57. 6	5×10. 0

3. 2. 3 Connect the control cable

Refer to the circuit diagram and indication label to complete the connection of the control line. The model specifications of the control line are shown in the table below.

Table 3-2 Control wire specification table

Signal cable type	Recommended signal line cross-sectional area /mm^2
Outdoor unit fan alarm signal cable	2×0.5
Low temperature component solenoid valve power cable	2×1.0
Low temperature component heating with power cable	2×1.0
Dynamic ring monitoring communication cable	2×0.5
Group control communication cable	3×0.5
Compressor power cable	2×2. 5
Crankcase heater	2×0.5

（1）Alarm signal terminal

The alarm signal terminal is controlled by the controller's common alarm relay, and the output is used to

connect to external alarm devices, such as alarm lights. As long as an alarm occurs and the electric shock is closed, it can be used to issue a remote alarm, signal to the building management system or automatically dial the paging system.

（2）Remote switch

The remote switch terminal can be connected to the remote switch. When a remote shutdown is required, short the remote switch terminal.

（3）Pyrotechnic alarm terminal

It can be connected to the external pyrotechnic alarm switch signal. When the external switch is disconnected, the controller will automatically shut down the unit.

3.3 Installation check

After the electrical installation is completed, check to confirm:

1. The power supply voltage is the same as the rated voltage on the device nameplate.
2. There is no open circuit or short circuit in the electrical circuit of the system.
3. The power cables and ground cables to the disconnect switch, indoor unit and outdoor unit have been connected.
4. The rating of the circuit breaker or fuse is correct.
5. The control cable has been connected.
6. All cables and circuit connectors have been tightened, and the tightening screws are not loose.

Chapter4. Controller

4.1 Display and Description

4.1.1 LCD main interface

Figure 4-1 Schematic Diagram of Main Interface of LCD Screen

The main LCD Screen interface is mainly divided into three parts: menu bar, label bar and display area.

1. Menu bar: located at the bottom of the main interface, including 6 icons, such as home page, running status, data management, alarm management, system settings and startup/shutdown .

2. Label bar: located at the top of the main interface, showing the current state of the unit and alarm information; when the alarm beeps, click the alarm mute to cancel the alarm.

3. Display area: divided into equipment operation mode and current temperature and humidity. For example, the refrigeration is on, indicating that the unit is currently in the refrigeration mode.

4.1.2 Navigation Picture of LCD Screen

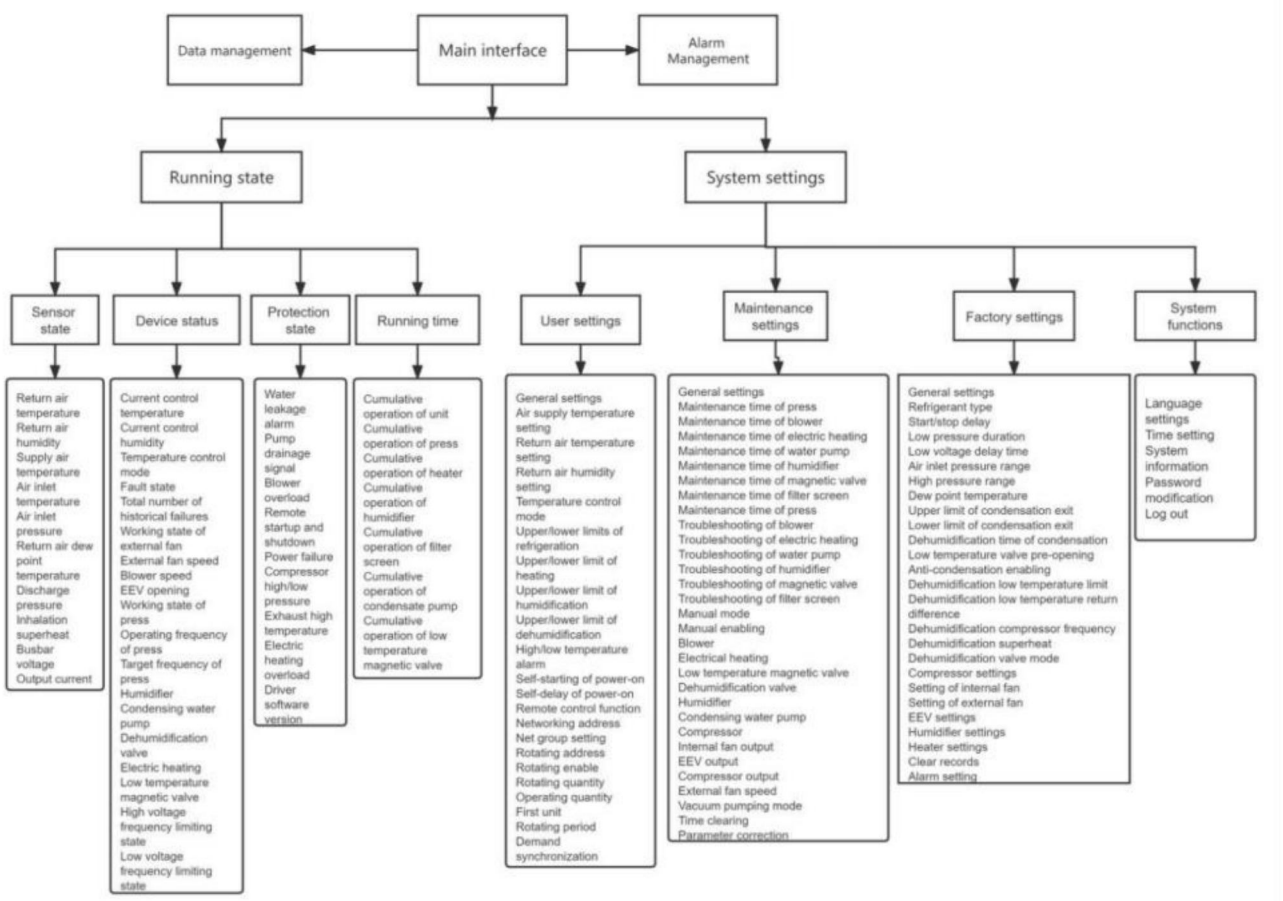


Figure 4-2 Navigation Picture of LCD Screen

4. 1. 3 Running State

Click the “Running State” option in the menu bar of the main interface of the LCD Screen to view the “Sensor State”, “Equipment State”, “Protection State” and “Running Time”.

Click “Sensor State”, “Equipment State”, “Protection State” and “Running Time” to view the corresponding state parameter values. For example, click “Sensor State” to view the state parameters such as return air temperature/humidity, supply air temperature, air inlet temperature/pressure and exhaust pressure, etc. Click ⇨ to turn the page to view the state parameters of the next page, and click ⇦ to return to the previous page.

Figure 4-3 Diagrammatic Sketch of Sensor State

Figure 4-4 Diagrammatic Sketch of Equipment State

Figure 4-5 Diagrammatic Sketch of Switch State

4. 1. 4 Data Management

Click the “Data Management” option in the menu bar of the main interface of the LCD Screen to view the “Temperature and Humidity Curve” and “Historical Data”.

“Temperature and Humidity Curve” shows the return air temperature, supply air temperature and return air humidity curve of the day. Select the date to view at “Date and Time” and click OK to view the temperature and humidity curve of the specified date. Click “Today” to return to view the temperature and humidity curve of that day. Click ⇦ or ⇨ to view the historical temperature and humidity curve.

“Historical Data” displays the temperature and humidity parameters in a certain time period in the past. Select the specified time period in “Date and Time” and click “Query” to view the temperature and humidity parameters in the specified time period.

Figure 4-6 Diagrammatic Sketch of Temperature and Humidity Curve

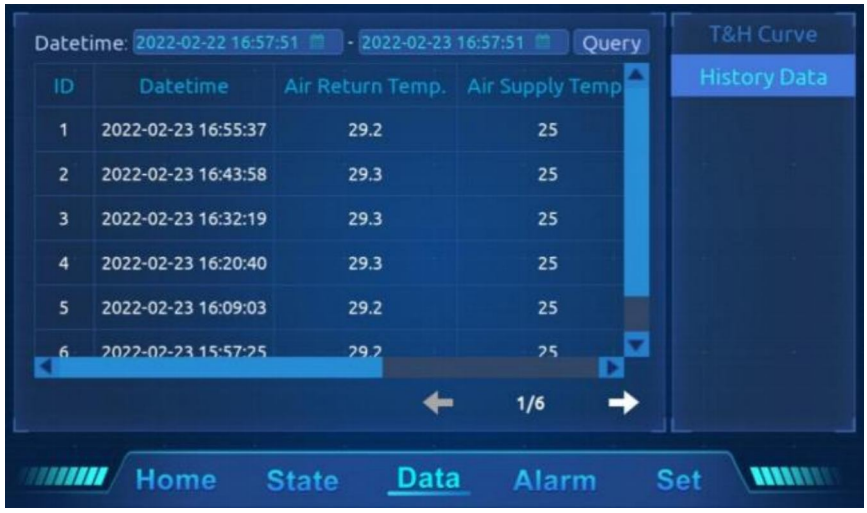


Figure 4-7 Diagrammatic Sketch of Historical Data

4.1.5 Alarm Management

Click the "Alarm Management" option in the menu bar of the main interface of the LCD Screen to view the "Current Alarm" and "Historical Alarm". "Current Alarm" displays the current alarm events and their occurrence time. After the alarm is cleared, the alarm that can be reset automatically will not be displayed in the current alarm. For the alarm that needs to be reset manually, click the "Alarm Reset" button to reset it manually.

"Historical Alarm" displays the alarm events and their occurrence times in the past time period, in which the red column is the alarm events and their occurrence times, and the green column is the alarm reset and reset time.

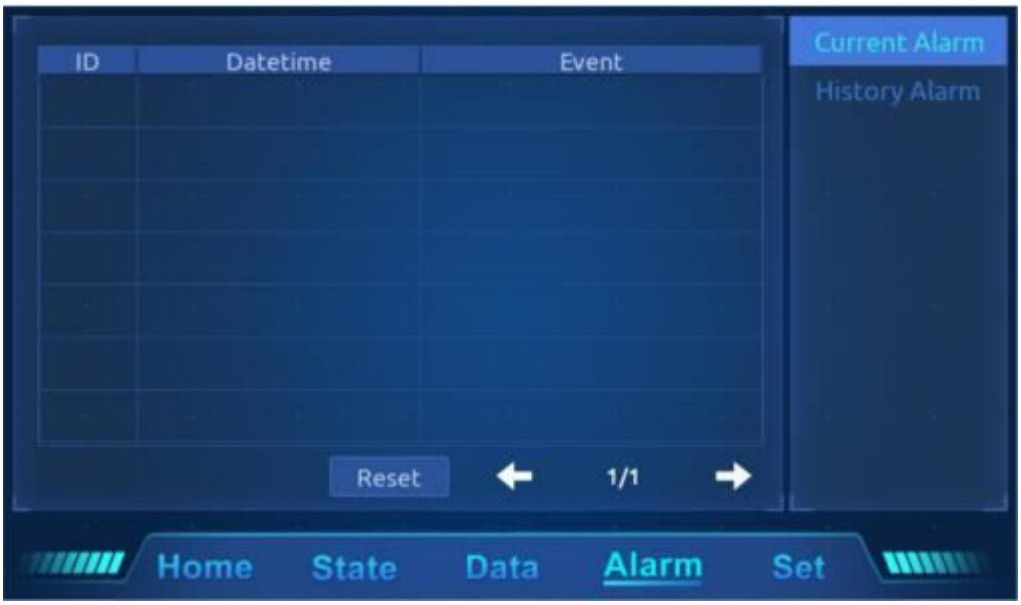


Figure 4-8 Diagrammatic Sketch of Current Alarm and Historical Alarm

4.1.6 System Settings

Users can enter “System Settings” by clicking “System Settings” and entering the password 515800, and can view and modify functions such as “User Settings”, “System Functions”, “Password Modification” and “Login Exit”.

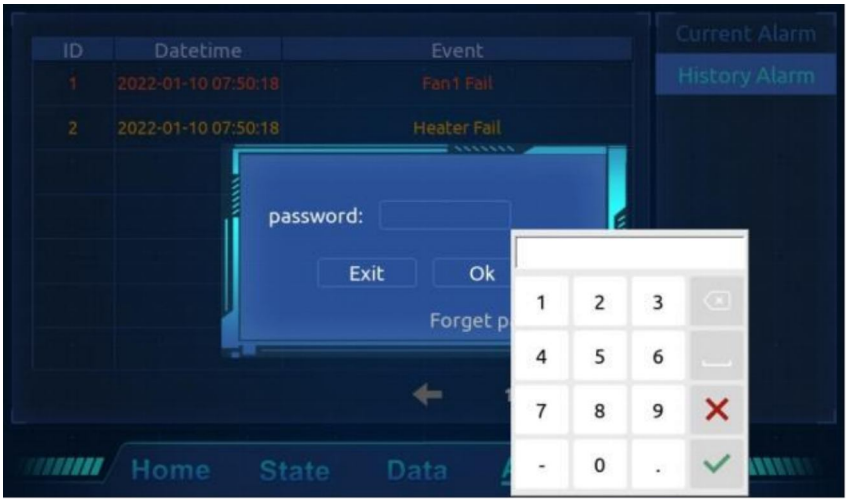


Figure 4-9 Diagrammatic Sketch of Password Entry of System Settings

Figure 4-10 Diagrammatic Sketch of System Settings Interface

Click “User Settings” to perform “General Settings” and “Networking Settings”.

Figure 4-11 Diagrammatic Sketch of User Settings

Click “System Function” to carry out “Time Settings” and view “System Information”.

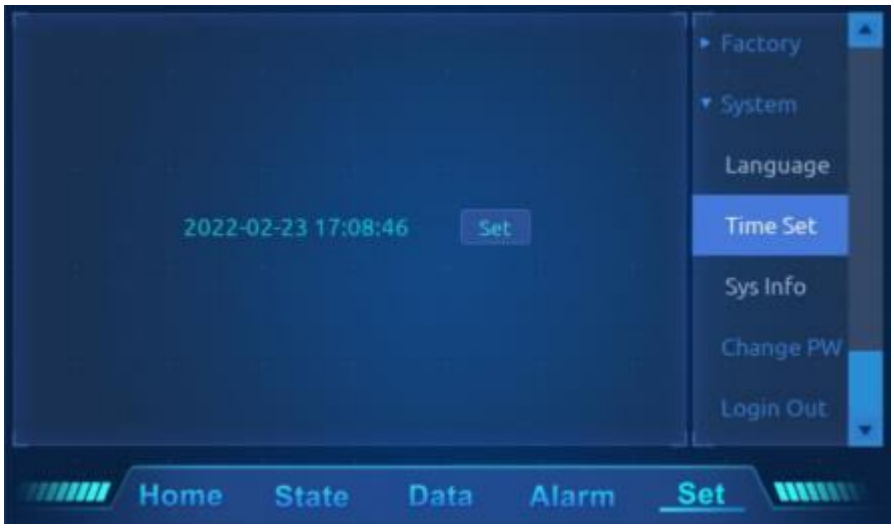


Figure 4-12 Diagrammatic Sketch of System Function

For example, after logging in the system settings with the user password, enter the user password with the original password, enter the password you want to set with the new password, enter a duplicate new password, and click OK to modify the password, and the user password will be successfully modified to the new password.

Figure 4-13 Diagrammatic Sketch of Password Modification

Click “Login Exit” and then click “√” to exit the system settings.

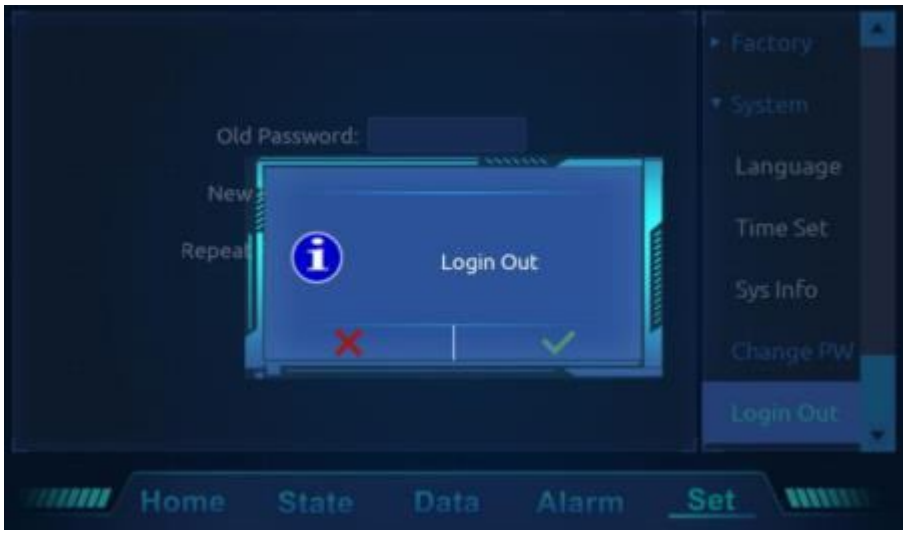


Figure 4-14 Diagrammatic Sketch of Login Exit

4.2 Introduction and Control of Monitoring Function

The in-row air conditioner can realize remote monitoring with the computer through the communication interface. The controller is equipped with RS485 communication interface. The twisted-pair shielded wires are used to connect the user terminals A+ and B- to the upper monitor. At the same time, the "Communication Address" and "Baud Rate" in the "Communication Settings" interface are modified.

Figure 4-15 Diagrammatic Sketch of Communication Settings

4.3 Introduction and Control of Group Control Function

Introduction to group control function:

Time rotating: Starting from the "rotating time", every "rotating period" automatically switches the units according to the "rotating number", so that the number of running units and the "running number" are consistent.

Alarm rotating: When the running unit has a serious alarm, the same number of standby units will be turned on. If the turned-on standby unit also has a serious alarm, the same number of standby units will be turned on until the number of units without serious alarm reaches the set "running number". When the running unit is shut down, the same number of standby units will be turned on.

✧ Note: Stop all units in case of fireworks alarm.

Demand synchronization:

The demand synchronization can be set to be enabled or not. When enabled (the demand synchronization can only be enabled if the running number is ≥3), it has the following functions:

When networking units are in the refrigeration mode, other units are restricted from entering heating mode.

When networking units in the network are in dehumidification mode, other units are restricted from entering humidification mode.

Group Control Function Setting:

Enter the networking setting parameter interface and the parameters to be set are as follows.

Figure 4-16 Diagrammatic Sketch of Networking Settings

Parameter Definition:

Networking enabling: The units participating in networking need to enable this function;

Networking address: The address of each unit during networking rotating, and the address setting must start from 0 and be continuous;

Number of networking: The total number of all networking units K (including main unit and standby unit), 1-64, automatically synchronize the parameter settings of main unit;

Switch number: Switch the number of units when the rotating time is up. If the rotating time is set to 2, when the rotating time is up, two running units will stop, and two standby units will start, and automatically synchronize the parameter settings of the main unit.

Rotating period: Set the rotating time, and how often it is rotated. When it is set to 0, the rotating will enter the test mode, and it will rotate every 8 minutes according to the set parameters, and automatically synchronize the parameter settings of the main unit;

Running number: Set the number of enabled units N, 0-63, N≤K-1, and automatically synchronize the parameter settings of the main unit;

Demand synchronization: Manage the operation modes of all units in a unified way to avoid competitive operation;

Cascading function: When the running units can't meet the requirements of the computer room, the number of operating units will be automatically increased;

Chapter5. Commissioning

5.1 Preliminary Preparation for Commissioning

Mechanical part

1. Make sure that the protective materials during the transportation of the device have been removed.
2. The refrigeration piping system has passed the pressure leak test and confirmed to be qualified.
3. The total charge of the refrigeration system has been roughly calculated, and the refrigerating oil has been added to the system.
4. The water supply pipeline of the humidification system (when configured) has been reliably connected and leak-checked in accordance with the specified material requirements.
5. After the refrigerant is statically charged, the compressor heating belt has been preheated for more than 12 hours.
6. Ensure that the temperature of the equipment room is above 20 ℃ and has a certain heat load. If it is not available, first use other heating devices or manually forcibly operate the unit itself and adjacent equipment heaters to preheat the environment of the machine room to ensure the rated heat load necessary for commissioning.
7. In some cases in winter, it is necessary to cover part of the condensing area artificially to increase the condensing pressure to 26 Bar.

Electrical parts

1. Confirm that the main power input voltage is within ±10% of the nominal range of the rated voltage; the outdoor unit condenser power isolation switch is closed.
2. Confirm that all electrical or control connections are correct, and tighten all electrical and control connections.

5.2 Commissioning Steps

1. Disconnect the breaker corresponding to each component, close the isolating switch and the control breaker, and check the control voltage.
2. Fan commissioning

Turn on the breaker of the fan, click to start on the touch screen, after the fan is running, enter heating mode and feel the temperature whether it is rising or not, check whether each fan is operating normally.

3. Electric heating commissioning:

When configuring the heater, close the fan circuit breaker and the electric heating circuit breaker, click the switch on the touch screen to enter the heating mode, and use your hand to sense whether the air supply temperature rises to determine whether the electric heating is working.

How to trigger the heating mode:

Enter the "User Settings" page and set the "Temperature Setting Value" to 5 ℃ higher than the current ambient temperature.

4. Humidifier commissioning:

Humidification mode trigger method:

Adjust the humidity setting so that it is 10% higher than the indoor relative humidity. At this time, the control system should be able to trigger the humidification demand, and the humidifier starts to work. When the set value is lower than the humidity in the computer room, if the humidifier stops working, it indicates that the humidification function is normal.

5. Compressor commissioning:

（1）If the static charging of the refrigerant does not reach the calculated charging amount, dynamic charging is required.

Proceed as follows:

a. Connect the refrigerant bottle, the pressure gauge and the needle valve on the compressor suction pipe through the refrigerant hose.

b. Ensure that the outdoor unit is powered on, turn on the internal unit fan and compressor circuit breaker, then enter the "User Settings" page, set the "Temperature Setting Value" to the lowest value, return to the main page of the touch screen, click Power on to run the cooling mode, When the compressor is turned on for 5 minutes, slightly open the valve on the pressure gauge to slowly charge the refrigerant until the total refrigerant charge reaches the calculated charge, then close the pressure gauge valve, if the compressor runs continuously for 10 minutes without abnormality, it can be stopped, and the compressor debugging is completed.

（2）If the refrigerant has been added before commissioning, the refrigeration is triggered as follows (the compressor is turned on):

Enter the "User Settings" page and adjust the temperature setting to make it 5 ℃ lower than the indoor computer room temperature. The control system should be able to trigger the refrigeration demand and the compressor will run. If the compressor runs for at least 6 minutes without abnormality, it indicates that the refrigeration function is normal.

✧ **Warning**

1. After the refrigerant is statically charged, it is prohibited to turn on the compressor immediately. It must be ensured that the compressor heating belt is preheated for more than 12 hours before starting up. If the preheating time is not enough, you should use other safe heat sources such as a thermoelectric hair dryer to heat the lower part of the compressor shell for about 30 minutes before starting to prevent the compressor from starting with liquid and affecting the service life of the compressor.
2. After the test is over, adjust the temperature setting value back to the default setting value or initial setting value.

5.3 Check after Commissioning

1. Confirm that all points of the unit are firmly connected and there is no leaking place.
2. Check that all output functions are automatic.
3. Check that the temperature and humidity settings and control accuracy are reasonable.
4. Check that other setting functions are reasonable.

Chapter6. Operation and Maintenance

6.1 System Diagnostic Test

Matters needing attention

1. During the operation of the air-conditioning system, there may be lethal voltage in the equipment; all notes and warnings on the component equipment and in this manual must be observed, otherwise it may cause casualties.
2. Only qualified repair and maintenance personnel can operate and handle these equipment.

6.1.1 Electronic Control Part

Electrical maintenance

Perform visual inspection and processing of electrical connections according to the following items.

1. Whole machine electrical insulation test: find and deal with unqualified contacts. During the test, care should be taken to disconnect the control part fuse or breaker to avoid damage to the control device due to high voltage.

2. Statically check whether each contactor is flexible, whether there is jamming or not.

3. Use a brush or dry compressed air to remove dust from electrical and control components.

4. Check whether the contacts of the contactors are drawn for arcing and burn marks. In severe cases, replace the corresponding contactors.

5. Fasten each electrical connection terminal.

6. Check whether the plug-in connector is in good contact, if any looseness is found, the terminal should be replaced.

Control maintenance

Perform visual inspection, simple function inspection and processing of the control part according to the following items.

1. Check the appearance of the switching power supply and check the output voltage.

2. Check whether the surface of the control interface board, display control board, etc. is obviously aging.

. Clean the dust and dirt on the electrical control components and the control panel, and clean it up with a brush and electronic dust remover.

4. Check and tighten the output and input plug interfaces of the control interface board, including the connection between the display control board and the control interface board, and the connection between the control interface board and the temperature and humidity sensor.

5. Check the connection between the user wiring terminal and the control interface board.

6. Check the output connection of the control interface board to each contactor, the input connection of the high and low pressure switch, the filter blocking switch, and the fan airflow safety switch (when configured). The plug-in terminals should be inspected mainly, and they should be replaced immediately if they are loose or in poor contact.

7. Replace the control fuse (or breaker), control board and other electrical components that have been detected with problems.

8. Check the specifications and aging of the control connection or power connection, and replace the connection if necessary.

9. Use a temperature and humidity measuring instrument with a higher level of measurement accuracy to check and calibrate the temperature and humidity sensor readings; note that the humidity control method should be selected as the relative humidity control during the process of calibrating the humidity sensor reading.

10. Adjust the set point and detect the action of each functional component according to the control logic.

11. Simulate and detect the working status of protection units such as high and low pressure alarms, high and low temperature alarms, and high water level alarms.

✧ **Warning**

1. Before tightening any assembly connections and wiring connections, you must ensure that the power supply of the control unit is turned off.

6.2 Fan Component Maintenance

Regularly check the fan components, including items: fan motor, impeller, etc. If necessary, please consult the

manufacturer for more detailed information.

6. 2. 1 Fan impeller

The fan should be checked regularly to see if it is firmly installed with the fan shaft. Rotate the fan impeller to ensure that it does not rub against the air guide ring.

6. 2. 2 Motor

When the motor fails to be replaced due to abnormal sound, burnout, etc., pay attention to safety.

6.2.3 Fan Replacement Steps

Tools: Phillips screwdriver, slotted screwdriver, diagonal pliers, cable tie;

25kW/30kW (300mm wide) series fan replacement steps:

1. Open the back door, remove the filter, and cut off the power supply of the air conditioner.
2. Unplug the fan's power cable and signal line to the plug-in terminals and cut off the cable tie corresponding to the fan's wiring harness to facilitate the following operations.
3. Use a Phillips screwdriver to loosen the screws of the fan fixing frame to take out the fan assembly.
4. Reinstall the new fan assembly according to steps 3~1.

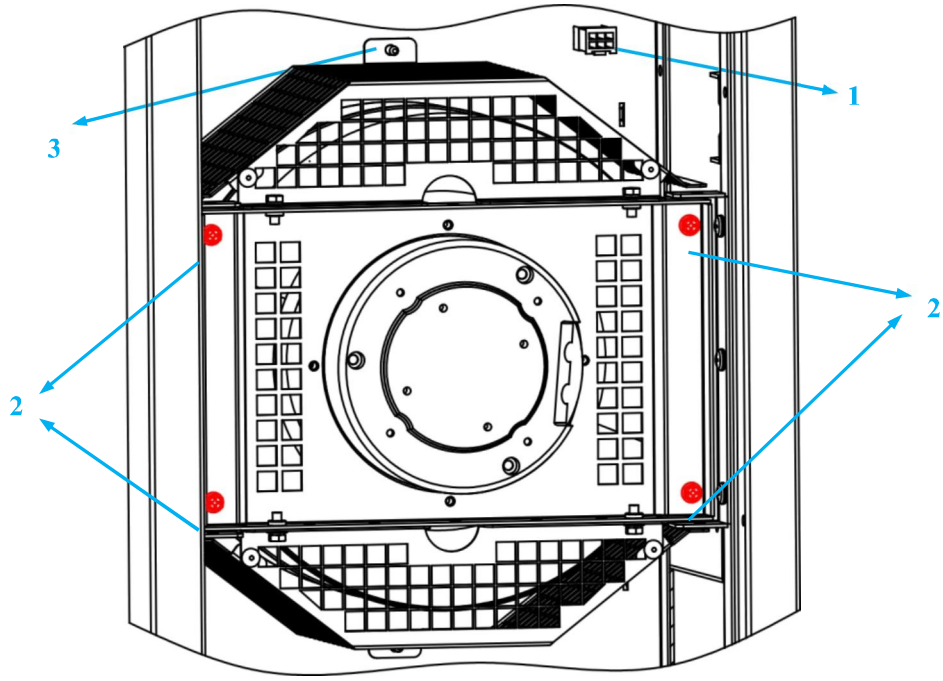


Figure 6-1 Description of fan components for 300mm wide model

No.	Illustrate
1	Fan terminal
2	Fan fixing frame screws
3	Fan guard limit point

40kW/50kW/60kW（600mm Wide）Series fan replacement steps:

1. Open the back door, remove the filter, and cut off the power supply of the air conditioner.
2. Remove the fan power cavble and control cable
3. Remove the fixing screws of the fan mounting frame to lift the fan out.
4. Reinstall the new fan assembly according to steps 3~1.

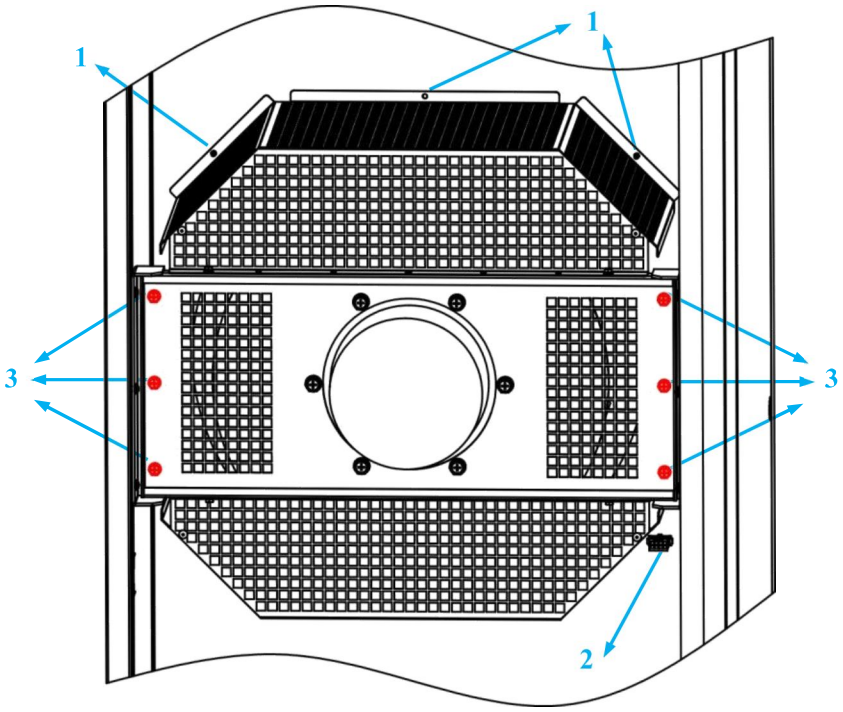


Figure 6-2 Take out the fan assembly of the 600mm wide model

No.	Illustrate
1	Fan guard limit point
2	Fan terminal
3	Fan fixing frame screws

6.3 Filter Maintenance

When the filter screen is blocked or the filter maintenance time alarm prompt appears, the filter screen needs to be removed and cleaned (washed) or replaced with a new one.

Replacement operation: Open the rear door of the unit, rotate the filter presser 90 °, and then take out the filter.

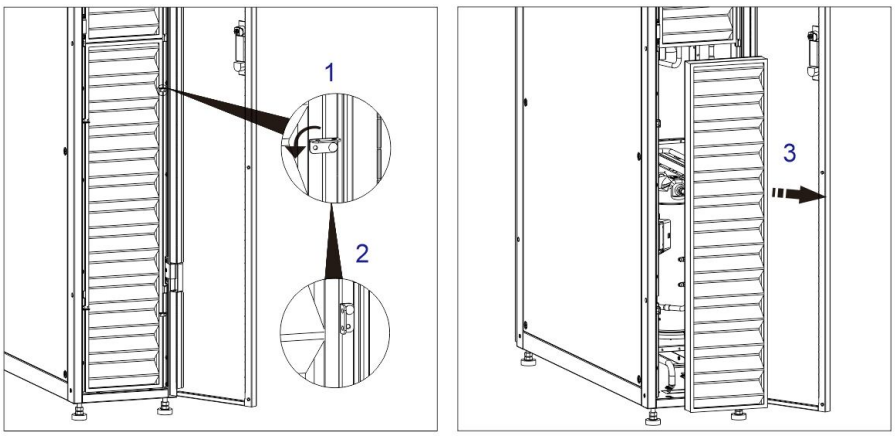


Figure 6-3 Schematic diagram of filter maintenance operation steps

6.4 Differential Pressure Switch Maintenance

1. Remove the fixing screws of the differential pressure switch wiring cover, and take out the wiring cover.
2. Loosen the screws of the terminal (1, 3), and remove the connecting wire of the differential pressure switch.
3. Remove the 4 fixing screws from the base of the differential pressure switch and pull out the pressure tube to remove the differential pressure switch.
4. Adjust the pressure difference value of the new pressure difference switch to 150Pa (turn the middle knob to "150" to align with the red arrow).

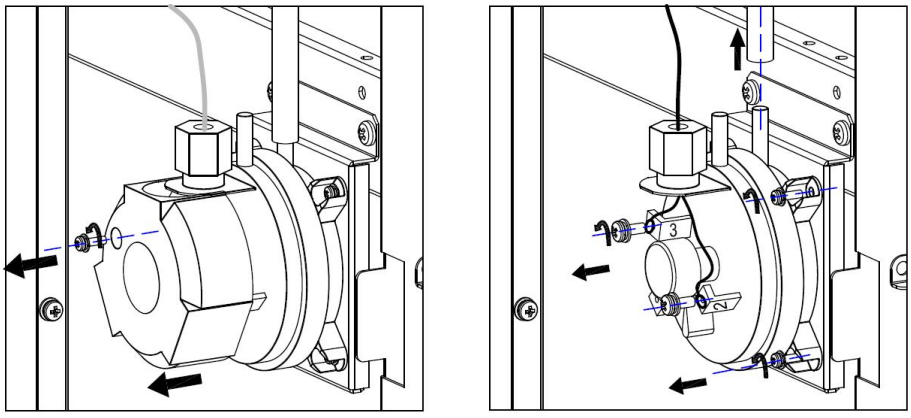


Figure 6-4 Schematic diagram of the maintenance operation steps of the differential pressure switch

6.5 Electric Heater Maintenance

1. Turn off the electric heating breaker. After the electric heating cools down, turn off the unit input power breaker.
2. Follow the steps for replacing the fan of the 300mm wide model to remove the fan 3, 4 components and the air guide ring, and you can see the PTC electric heater.

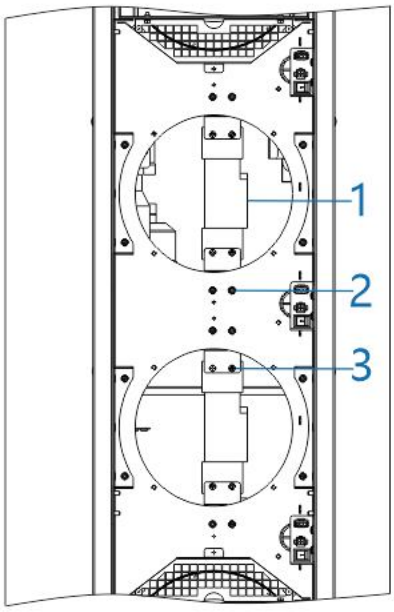


Figure 6-5 Description of electric heating for 300mm wide model

No.	Illustrate
1	Electric heaters
2	Electric heater bracket fixing screw
3	Electric heater bracket screw

3. Reach out from the removed fan installation hole to remove the electric heating wiring.
4. Remove the fixing screws of the electric heating, and then the electric heating can be taken out.

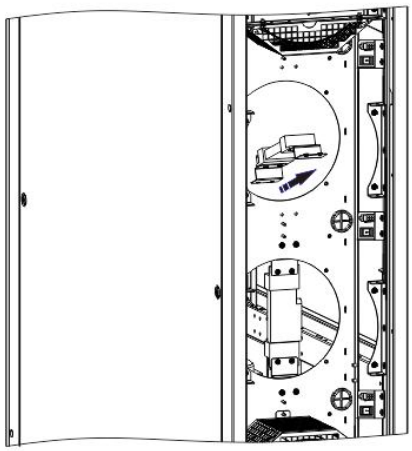


Figure 6-6 Take out the electric heating component

5. Follow the steps 4~1 above to reinstall the new electric heating components.

6.6 Electrode Humidifier Maintenance

Steps for cleaning or replacing the humidifying barrel

The humidifier components include: humidifier bracket (including water inlet solenoid valve, drain solenoid valve and other components), humidification tank, humidification water inlet pipe, humidification drain pipe, humidification steam pipe, etc., as shown in Figure 6-7.

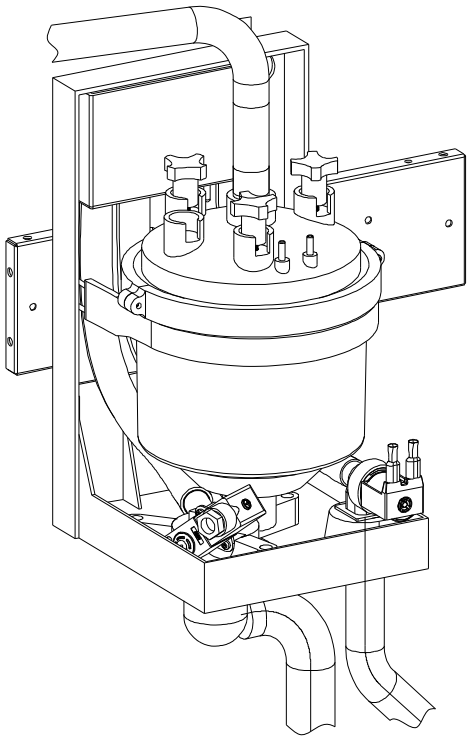


Figure 6-7 Schematic diagram of electrode humidifier

The humidifier is a consumable part and needs to be cleaned regularly. Because the humidification drainage contains some scale, in order to prevent the accumulation of scale during long-term operation and block the water collection pan and drainage pipe, the humidification water collection pan needs to be cleaned regularly. The cleaning cycle varies with water quality, humidification operation time, etc., and it is recommended to do it on a monthly basis.

If the humidifier continues to enter water, or the input voltage of the humidification electrode is normal, but the water does not boil, it means that the humidifier has reached its service life and needs to be replaced.

The specific replacement steps are as follows:

1. Disconnect the switch power supply of the unit.
2. Remove the power cable of the electrode humidifier.
3. Remove the fixing strap that fixes the humidifier, and take out the humidifier directly.

4. Check the condition of the electrodes in the humidifying barrel. If the corrosion is serious, replace them.
5. Re-assemble the humidifier according to the reverse process of steps 1~4.

6.7 Wet Film Humidifier Maintenance

A wet film humidifier consists of a wet film, a humidifying water inlet pipe, a humidifying drainage pipe, and a humidifying circulating water pump. Figure 6-8 shows a 600-wide standard wet film humidifier.

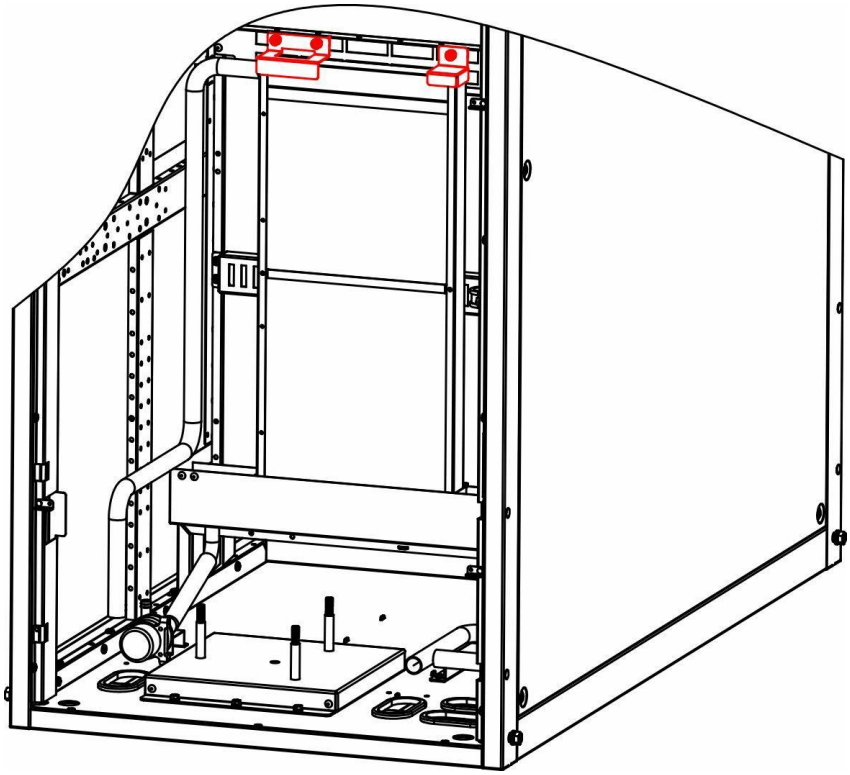


Figure 6-8 Schematic diagram of wet film humidifier

The wet film humidifier is a consumable component and needs to be cleaned regularly. Dust is easily absorbed on the surface of the wet film humidifier, and long-term operation may cause accumulation, which in turn blocks the wet film circulation pipes and circulating pumps. The cleaning period varies with the water quality and the humidification operation time. It is recommended to check the surface cleanliness of the wet film humidifier every month. If the situation is serious, replace the wet film humidifier.

The specific replacement steps are as follows:

1. Disconnect the switch power supply of the unit.
2. Remove the sheet metal above the wet film humidifier, remove the hose collar of the water inlet pipe, and take out the wet film humidifier directly.
3. Re-assemble the humidifier according to the reverse process of steps 1~2.

6.8 Refrigeration System Maintenance

The components of the refrigeration system must be inspected monthly to see if the system is functioning properly and for signs of wear. As the device fails or is damaged, it is often accompanied by corresponding failures, so regular inspection is the main means to prevent most system failures. The refrigerant pipeline must have proper support, and it is not allowed to lean against the ceiling, floor or fixed frame vibration. Check the refrigerant pipelines every six months to confirm whether they are worn or the existing fixed structure is loose.

When the system pipeline is equipped with a sight glass, the flow rate of the liquid refrigerant and the water content of the system can be observed through the sight glass. The background color of the sight glass can be used to judge whether the water content in the system exceeds the standard.

When the refrigeration system fails, the fault can be judged according to some parameters of the system operation.

6.8.1 Suction Pressure

When the suction pressure drops below the low pressure protection action value, it may cause the compressor to shut down. On the other hand, too high suction pressure will also reduce the cooling of the compressor motor by the refrigerant, which may cause damage to the compressor. The minimum (low pressure protection action value) or maximum (design operation) suction pressure value is shown in Table 6-1.

Table 6-1 Suction Pressure

System	Minimum pressure bar，R410A	Maximum pressure bar，R410A
25kW/30kW	4.0	12.0
40kW/50kW/60kW	4.0	15.5

6.8.2 Discharge Pressure

The discharge pressure may increase or decrease due to load conditions or condenser efficiency. When the discharge pressure reaches the high-pressure protection action value, the compressor will shut down. Please refer to Table 6-2 for details.

Table 6-2 Discharge Pressure

System	System setting high voltage switch action value bar
25 kW /30 kW /40 kW /50 kW /60 kW	40

6.8.3 Expansion Valve

The automatic adjustment of the electronic expansion valve ensures that sufficient refrigerant is supplied to the evaporator to meet the needs of load conditions. By measuring the degree of superheat, it can be judged whether the operation of the electronic expansion valve is normal. If too little refrigerant is supplied to the evaporator, the suction superheat will be very high; if too much refrigerant is supplied to the evaporator, the suction superheat will be very low.

✧ **Note**

1. The degree of suction superheat has a greater impact on the life of the compressor. If the compressor is operated for a long time with little or no suction superheat, it may cause the compressor to produce "liquid hammer" and cause damage to the compressor.
2. Customers are not recommended to adjust the electronic expansion valve by themselves on site. If you need to adjust, please contact the technical support engineer.

6.8.4 Compressor

The precision air conditioners use DC variable frequency scroll compressors, which are highly reliable and require engineering construction to strictly follow the correct procedures.

Compressor motor is rarely burned out due to insulation failure. In the event that the motor is indeed burned out, most are caused by mechanical or poor lubrication, that is, caused by high temperature and overheating. If the problems that may cause compressor failure can be detected and corrected early, most compressor failures can be avoided. Maintenance personnel regularly conduct maintenance and inspections for possible abnormal operation. Instead of replacing the compressor after a failure, it is better to take necessary steps to prevent it.

Check the electrical part

When diagnosing the compressor, check whether all the electrical components of the compressor are operating normally:

- ✧ Check the circuit breaker.
- ✧ Check the operation of the high-pressure switch, high-pressure sensor, and low-pressure sensor.
- ✧ If the compressor fails, find out whether the compressor failure is caused by an electrical failure or a mechanical failure.
- ✧ Check related historical alarm information and historical operation records.
- ✧ **Note**

1. Replace the compressor only with professional guidance. If you need to replace, please contact the technical support engineer.
2. Damage to the compressor caused by improper cleaning behavior, which belongs to the improper use referred to in the warranty terms, will not be guaranteed

When the compressor is completely burned, the compressor should also be replaced by replacing the filter dryer, and the expansion valve should be checked, if there is a fault, it should also be replaced. Before replacement, the cleaning system is necessary, if you are not clear about the cleaning method, please consult the professional and technical personnel.

Compressor replacement steps

- ■ Turn off the power supply.
- ■ Use standard procedures to recover the remaining refrigerant in the system.
- ■ Remove the damaged compressor, remove the filter drier, and clean the system according to the instructions of the cleaning tool.

Disassembly procedure of remove the compressor for the 20.5kW model as follows:

a) The suction pipe 2 and discharge pipe 1 of the compressor are de-welded;

b) Remove the screws fixing the compressor base, and remove the check valve fasteners of the gas pipe and liquid pipe of the unit;

c) Drag the compressor out with the base;

d) Then de-welded the compressor suction pipe 1 from the suction pipe mouth of the compressor;

e) Replace the compressor with a new one, reinstall it according to the reverse steps ① to ④, and replace the new filter dryer.

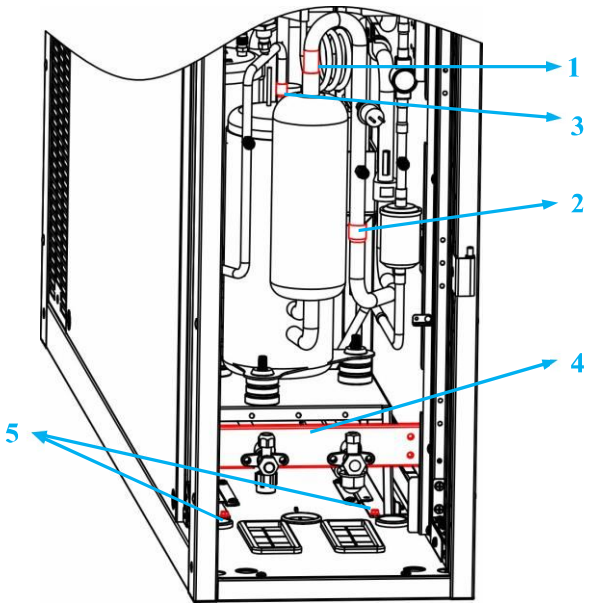


Figure 6-9 Schematic diagram of Remove compressor for 20.5 kW model

No.	Illustrate
1	Suction pipe 1
2	Suction pipe 2
3	Discharge pipe 1
4	Check valve fasten sheet metal
5	Screws for securing the compressor base

Disassembly procedure of remove the compressor for the 25-30kW 300mm width model as follows:

① The suction pipe 2 and discharge pipe 1 of the compressor are de-welded;

② Remove the screws fixing the compressor base, and drag the compressor out with the base;

③ Then de-welded the compressor suction pipe 2 from the suction pipe mouth of the compressor;

④ Replace the compressor with a new one, reinstall it according to the reverse steps ① to ③, and replace the new filter dryer.

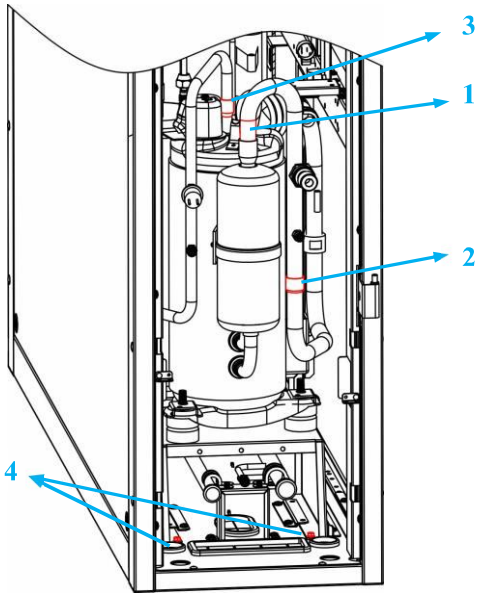


Figure 6-10 Schematic diagram of Remove compressor for 25-30 kW model

No.	Illustrate
1	Suction pipe 1
2	Suction pipe 2
3	Discharge pipe 1
4	Screws for securing the compressor base

Disassembly procedure of remove the compressor for the 25-30Kw 300mm width model as follows:

① The suction pipe 1 and discharge pipe 1 of the compressor are de-welded;

② Remove the compressor fixing bolts and remove the compressor;

③ Replace the compressor with a new one, reinstall it according to the reverse steps ① to ②, and replace the new filter dryer.

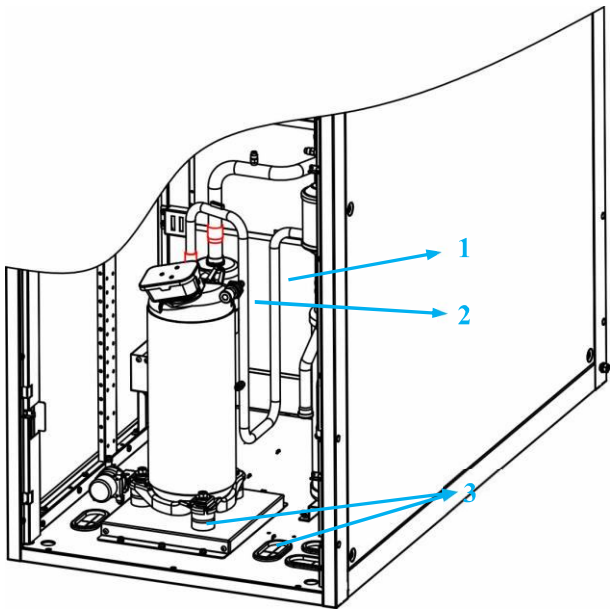


Figure 6-11 Schematic diagram of Remove compressor for 40-60 kW model

No.	Illustrate
1	Suction pipe 1
2	Discharge pipe 1
3	Compressor fixing bolts

1. The pressure leak detection test is carried out on the system, and the leak detection pressure is 30bar. If there is no problem, the system will be vacuumed.
2. Refrigerant is charged to the system according to the required charge amount of the evaporator, condenser and refrigeration pipeline.
3. Turn on the power and run the air conditioning unit. Check whether the cooling works normally. Dynamically charge a certain amount of refrigerant according to the suction and discharge pressure range of the normal cooling cycle.

✧ **Note**

1. For the remaining refrigerant in the system, a standard device should be used to recover it before maintenance.
2. The discharge of refrigerant into the air will cause environmental pollution. The discharge of refrigerant must comply with national and local laws and regulations

Chapter7. Troubleshooting

✧ **Note**

When using the jumper for troubleshooting, always remember to remove the jumper after the repair work is completed. The remaining connected jumpers may overrun the control function and cause damage to the equipment.

✧ **Warning**

Certain circuits have fatal high voltages, and only professional technicians are allowed to perform maintenance operations on the unit. You must be especially careful when troubleshooting live faults.

Refer to Table 7-1 to Table 7-5 for fault diagnosis and treatment of each component.

Table 7-1 Fan troubleshooting

Failure	Possible Causes	Items to be checked or treatment methods
Can't start fan	No main power	Check the rated voltage of L1, L2 and L3
	Circuit breaker tripped	Check the circuit breaker
	Overload, breaker tripped	Manual reset, check the average current
	Control board failure	According to the content of the circuit diagram, check whether there is output from the control end of the motherboard
	The fan itself fails	Replace the fan

Table 7-2 Troubleshooting of compressor and refrigeration system

Failure	Possible Causes	Items to be checked or treatment methods
Compressor cannot start	Power is not turned on (shut down)	Check the main power switch, circuit breaker and connecting wires
	Power overload, tripped	Replace compressor drive
	Loose circuit connection	Fasten the circuit connector
	Compressor coil is short-circuited and burned	Check the motor, if any defect is found, replace it immediately
Compressor is not	No cooling demand	Check controller status

running	High voltage protection action	Check the high pressure sensor and high pressure value
High discharge pressure	Condenser blocked	Clean the condenser
	Condensing equipment does not operate	Check the condensing fan
	Excessive refrigerant charge	Check if the degree of subcooling is too high
Low exhaust pressure	Refrigerant leak	Check for leaks and repair and add refrigerant
	The outdoor fan speed controller is faulty, and the output voltage is always full load voltage and does not change with the change of condensing pressure.	If defects are found, replace the speed controller immediately
No change in suction and discharge pressure after starting	Compressor reversal or internal air blistering	If the compressor is reversed, replace any two L lines of the compressor, and rep lace the compressor if the internal air is blown.
Low suction pressure or liquid back	Insufficient refrigerant in the system	Check for leaks, repair and add refrigerant
	The air filter is dirty	Replace the filter
	Clogged filter drier	Replace the filter
	Improper regulation of superheat	Strictly follow the adjustment steps of the expansion valve to adjust
	Poor air distribution	Check the air supply and return air system
	Condensing pressure is too low	Check condenser failure
Compressor noise is too loud	Liquid flood back	See "Low suction pressure or liquid back" treatment method
	Lubricating oil loss causes bearing wear	Add lubricating oil
	Compressor or pipeline is loosely fixed	Fasten the fixing clip

Compressor overheated	Compression ratio is too high	Check the settings of the high and low pressure protection values, check whether the condenser is blocked, check whether all evaporators and condenser fans are operating normally
	Suction temperature is too high	Adjust expansion valve or add proper amount of refrigerant

Table 7-3 Troubleshooting of the dehumidification system

Failure	Possible Causes	Items to be checked or treatment methods
No dehumidification effect	The control system does not require the dehumidification function	Check control system status
	The compressor does not run and the circuit breaker trips	Please refer to Table 7-2 Check the circuit breaker and its contacts, check the line voltage

Table 7-4 Troubleshooting of electrode humidifier

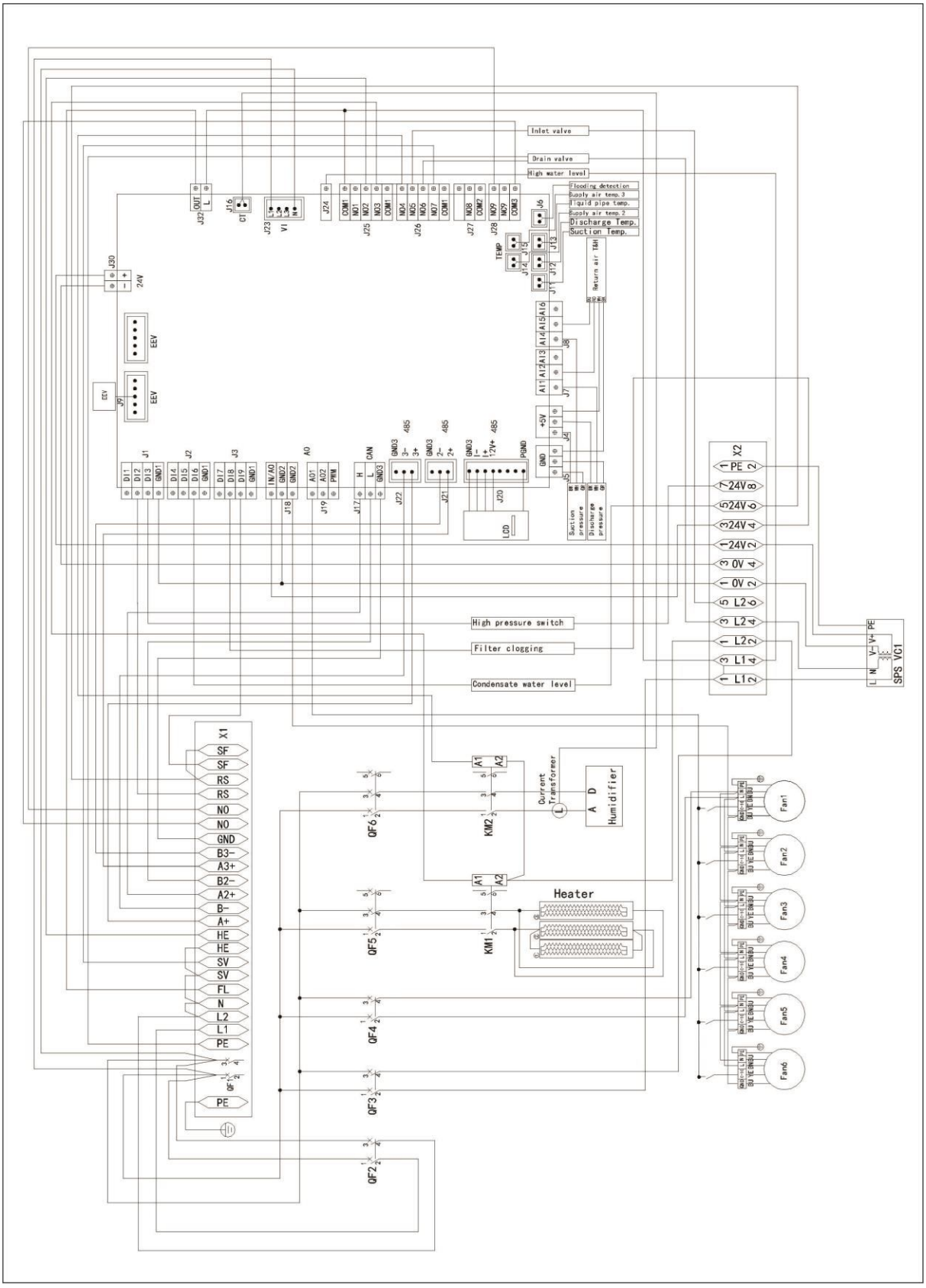
Failure	Possible Causes	Items to be checked or treatment methods
No humidification effect	No water injection	Check water source Check whether the water filling solenoid valve is working Check if the water inlet pipe is blocked
	No humidification requirement	Check controller status

Table 7-5 Troubleshooting of the heating system

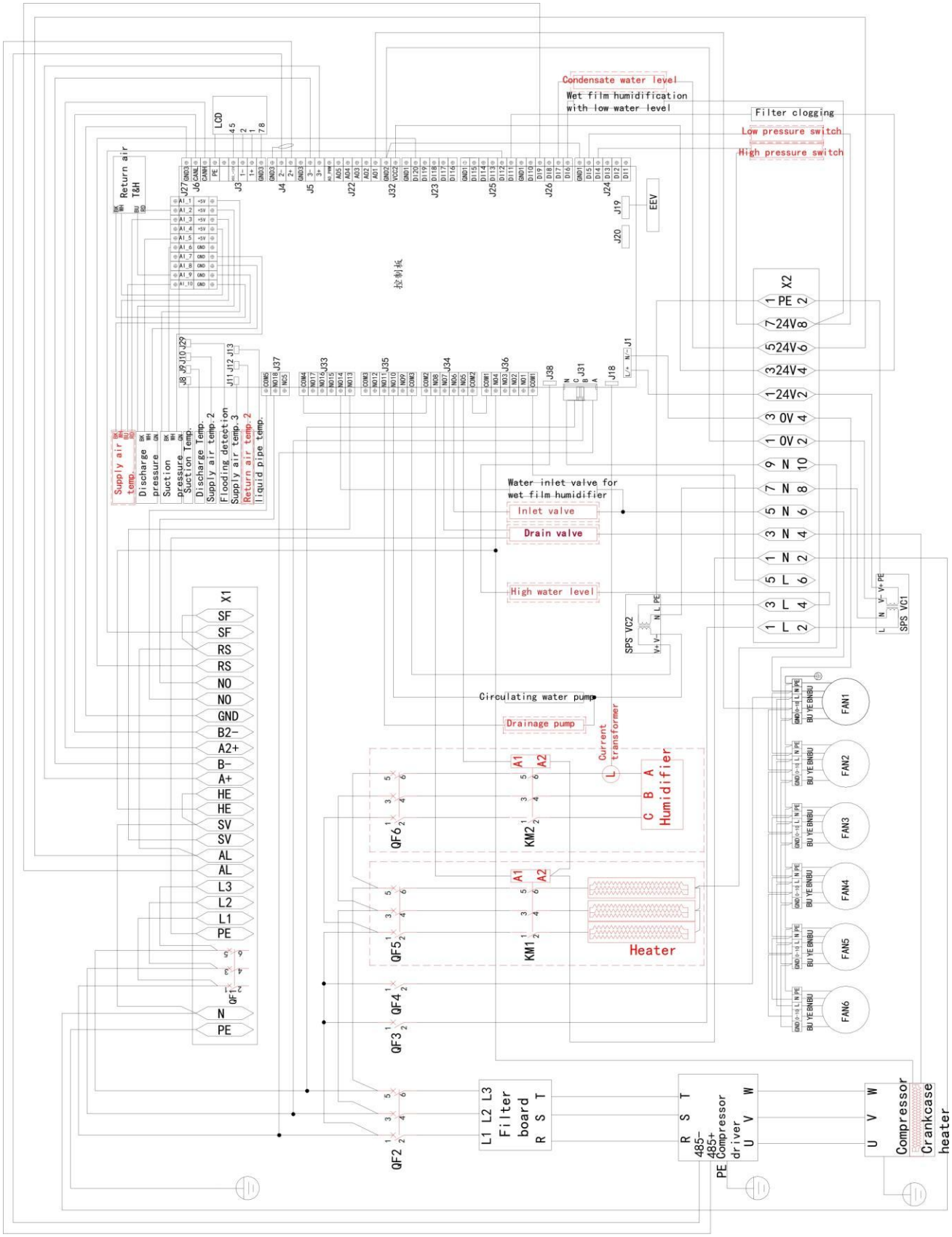
Failure	Possible Causes	Items to be checked or treatment methods
The heating system does not operate, and the contactor does not engage	The heating start condition is not reached	Check the status of the controller

The contactor is closed without heating effect	Heater burned out	Cut off the power and use an ohmmeter to check the resistance characteristics of the heater

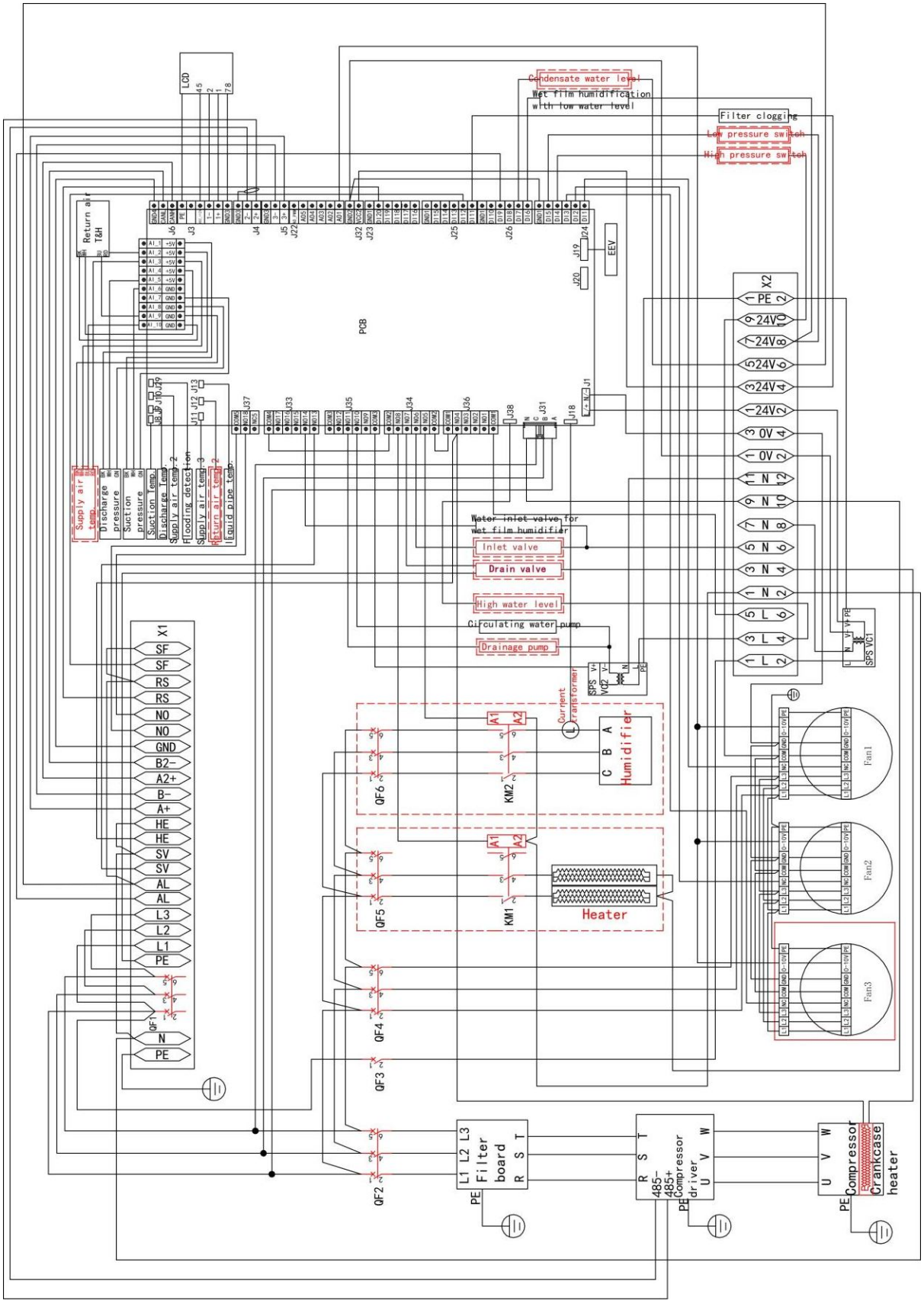
Annex 1 Electrical schematic diagram of 20.5 kW indoor unit



Annex 2 Electrical schematic diagram of 25-30 kW indoor unit



Annex 3 Electrical schematic diagram of 40/50/60 kW indoor unit



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