



Installation, Operation and Maintenance Manual

COOLBLADE Modular DX-M Series



Climaveneta IT Cooling

Unit Capacity:
24.6-106.0kW

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Symbol Used in This Manual

The following symbols will be used for the manual and the unit interiors:



User



Installer



After sales



Important



Prohibit

The following symbols will be used in part of the manual.



Warning-Can ONLY be operated by professional personnel.



Prohibit-Under no circumstance can it be done.

Professional personnel (electric):

Expertise and extensive operational experience to avoid potential hazards when operating air conditioning units (IEV 826-09-01)

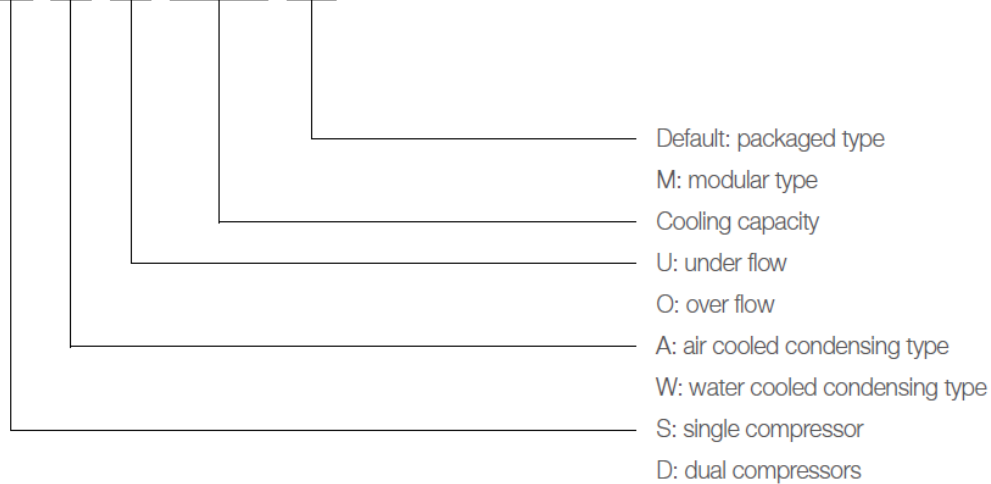
Packaging List

The following items should be found upon receiving the unit:

- Installation, Operation and Maintenance Manual
- Controller Manual
- Electric Diagram
- Spare parts shipped with the unit
- Quality certificate, conforming GB standards
- Assurance terms

Nomenclature

S A U 030 M



General

COOLBLADE overview

COOLBLADE series precision computer room air conditioner includes refrigeration system, electric heating or finned heat exchanger system, humidification system, dehumidification system and other functional components. The unit is operated by microprocessor centralized control, fully realizing high-precision, low-energy, high-quality effects, which is the excellent products for energy conservation and environmental protection. It is widely used in military, medical, financial, communication and large data processing center which is the best choice in your field.

COOLBLADE modular DX-M series adopts R410A environment friendly refrigerant. It also conforms to **Unitary air-conditioners for computer and data processing room (GB/T 19413-2010)** and passes **2006/42/CE** certificate. The unit has been tested and inspected for quality test before shipment from CLIMAVENETA.

Unit Appearance

This series of units is painted RAL7016 and the sheet metal parts are made of galvanized steel. The advanced installation process allows the unit to operate normally even when operating on the unit.

At the same time, the series has excellent quiet performance. The inner side of the panel can be equipped with double-layer soundproof panels, and the soundproof panel lining is made of special materials.

Compressor

Hermetic scroll compressor with electric heating and bearing lock feature

The rubber base is installed on the base of the compressor to reduce the vibration of the unit. The compressor is recharged with refrigerant and oil before shipment.

Fan

EC inverter fan

Single air inlet with backward blade; configured with brushless inverter motor to achieve excellent performance under low power consumption and high static pressure condition. The user can adjust the motor rotation speed to control air volume and ESP.

Air Filter

The air filter consists of a metal fence and a synthetic recycled polyester fiber filter media and a sheet metal frame, conforming G4 efficiency of CEN-EN779 standard and average separation efficiency of 90.1%. This filter is not flammable.

Air Flow Configuration

O-Over: overflow

U-Under: underflow

Evaporator

Adopts finned heat exchanger as indoor heat exchanger with large enough exchange surface; the heat exchanger consists of a heat-transfer-efficient internally-threaded copper tube and a special-shaped aluminum fin for excellent heat transfer performance. At the same time, the heat exchanger is hydrophilic, which facilitates the discharge of condensed water. The heat exchanger is mounted in front of the fan outlet with a sump and drain hose.

Electric Control Cabinet

The electrical control box is installed and wired in full compliance with IEC 204-1/EN60204-1. It is connected to the fan, the power supply junction box of the compressor and the overheat protection through the contactor, and has a total disconnect switch for electrical safety.

Control Performance

The microprocessor of the unit configuration can perfectly control the operation of the compressor and the entire unit.

Cooling capacity and alarm function, and can be connected to the building's monitoring system.

Air Flow Switch

When the air flow cannot meet the requirements of the indoor environment, or the fan fails, an alarm signal will be issued.

Electrode Humidifier

The humidifier can use untreated water as a source of steam, and the humidifier can be rooted.

According to the indoor humidity, the humidification function is turned on, and the salt in the water can be controlled at the same time.

Microprocessor control system

The system is equipped with a microprocessor that precisely controls the temperature and humidity of the indoor environment while monitoring the operation of the unit, complying (EEC directive 89/336).

Direct Expansion Unit

Hermetic scroll compressor with high efficiency, low noise and integrated overheating protection device. The cooling system includes:

- Liquid receiver
- Dry filter, sight glass
- Thermal expansion valve(electronic expansion valve)
- Shut-off valve
- High/low pressure switch (can reset manually)

SAU/O-M DAU/O-M

All the units contain at least one refrigerant circuit and some models contain two refrigerant circuits. The compressor discharges the high-temperature and high-pressure refrigerant gas to the outdoor condenser for condensation, and the refrigerant that is condensed into liquid in the outdoor unit first enters the liquid receiver (installed on the indoor side) to ensure that the refrigerant having the proper flow rate passes through the expansion valve. After the throttling, the evaporator entering the room exchanges heat with the indoor air. In the evaporator, the refrigerant will carry away the heat of the indoor air, reducing the temperature of the indoor air; the liquid refrigerant that absorbs the heat evaporates into a gas, then returns to the compressor for compression, and then continues to circulate. To ensure that the compressor's exhaust can be maintained at optimum pressure, we recommend using an outdoor unit fan speed regulator. COOLBLADE modular DX-M series can be configured with on-off regulator or stepless speed regulator fan. The scroll compressor is equipped with a check valve to prevent liquid refrigerant from flowing back into the compressor when the outdoor unit pressure is too high in the summer, and to avoid backflow of the liquid refrigerant at the start of the compressor. Another check valve is installed between the indoor unit and the outdoor unit's

liquid line connection, and is installed by the installer when the unit is installed. The purpose is to prevent the outdoor unit pressure from being too low in the winter to cause the liquid refrigerant of the liquid receiver to flow back into the condensing coil, thereby affecting the heat exchange of the condenser, and installing a condenser low-pressure alarm device to prevent the outdoor unit from being under-pressure.

Outdoor Condenser Installation

Indoor unit can be matched with different outdoor units, standard or low noise units (special treatment has been done to lower noise). Information on other outdoor unit installations is available in the manual for outdoor air-cooled condensers.

Note 1: Indoor and outdoor unit are sold separately.

Note 2: Indoor unit is recharged with 1.5bar nitrogen and outdoor unit is recharged with 8bar nitrogen.

Note 3: MUST do the indoor and outdoor unit pipe connection according to the manual, and charge refrigerant and refrigerating oil according to the length of the piping on site.

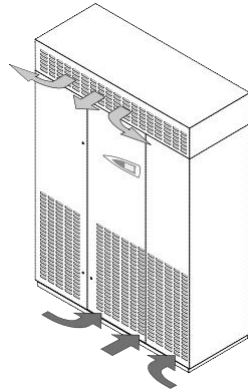
Air Flow Configuration

COOLBLADE modular DX-M series contains variety of air flow schemes depending on supply air outlet and return air inlet positions, but mainly over air flow and under flow.

Over flow is usually top supply and return from front, back or bottom. Over flow unit can connect with an air duct or configure with an air supply device.

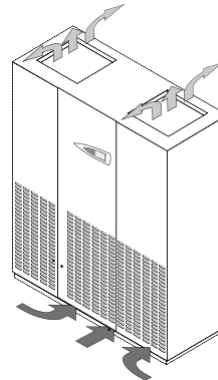
SAO/DAO-M

Fig. 1



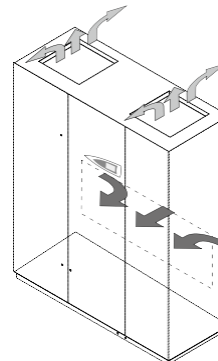
1 Up supply, front return, configure air supply device

Fig. 2



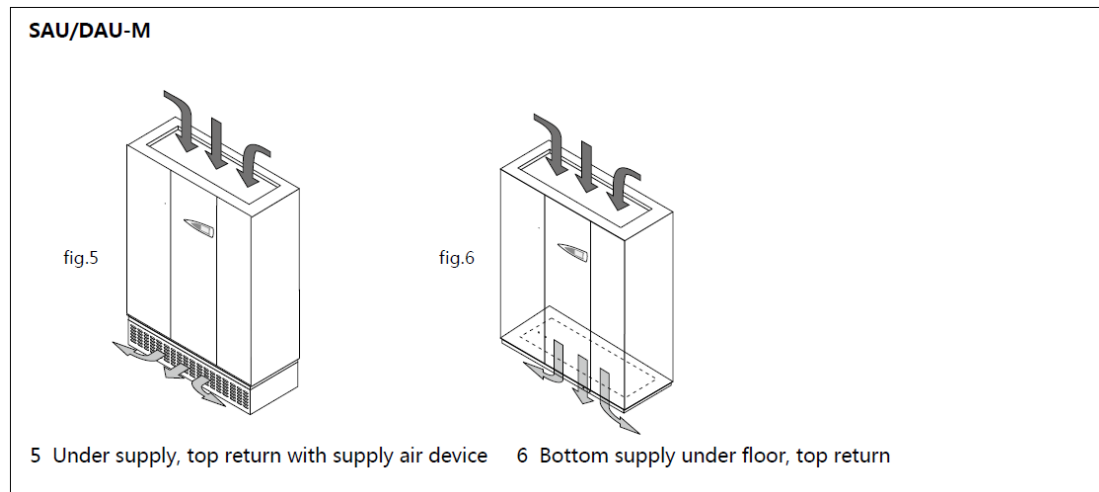
2 Top supply, front return

Fig. 3



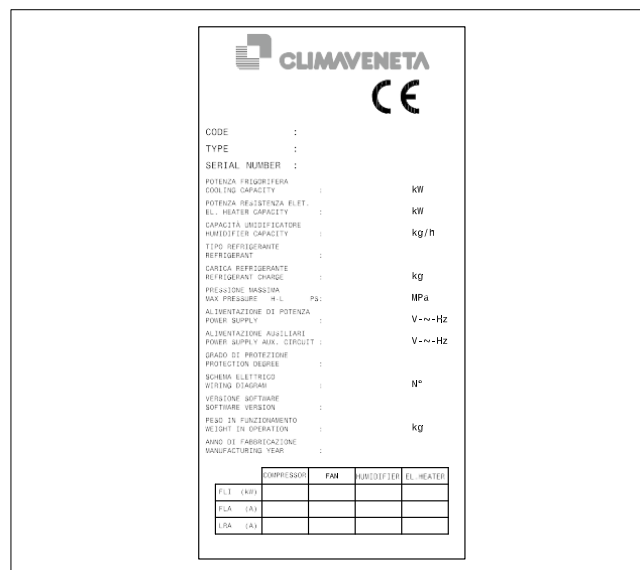
3 Top supply, back return

Down flow is usually bottom supply and top return. The return air inlet can draw in air directly from the room or through an air inlet.



Nameplate

Nameplate is on the inside cover of the unit.



Unit Interior Operation

Interior operation can be done after removing corresponding panels.

Front and side panels can be dismantled in two ways.

Font Panel

All front panels are hinged and can be switched by a lock on the door panel. The front panel can be opened or locked by a key that matches with the lock.

The unit can be operated after opening the front panel, and the unit can be inspected and repaired smoothly even in a narrow space.

After opening the front panel, all components of the unit can be operated. The number of front panels depends on the cooling capacity of the unit.

Side Panel

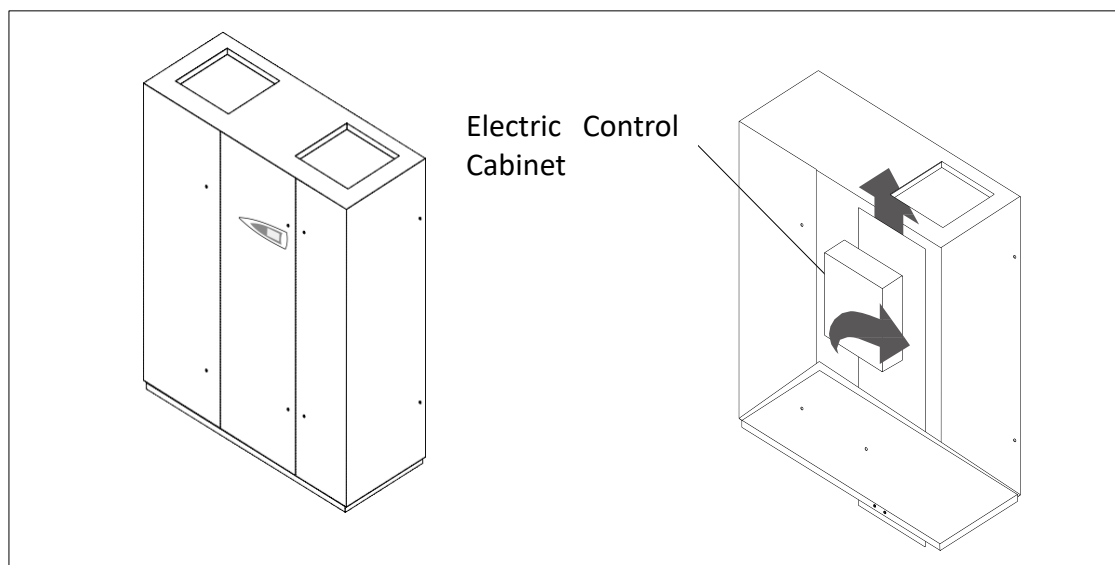
All side panels can be removed and the side panels are screwed. However, there is no need to remove the side panel during routine maintenance, which means that multiple units can be placed in close rows without regarding to the space required on the side. A black plastic sealing cover is mounted on the screw holes of the side panel.

Rear Panel

The rear panel is locked with self-tapping screws. Normally, the rear panel is mounted close to the wall, so there is no need to remove the rear panel.

Inner Panel

The high-speed fan and electric heater inside the unit are blocked by the inner panel, which can be protected by the inside panel. The inner panel cannot be removed ONLY with the unit OFF.



Warning! Before restarting the unit, be sure to check that all the outer covers have been properly installed back.

Shipping and Storage

DO NOT tilt or tilt down when moving the unit. Better unpack the unit after the unit arrives on site. Don't let the unit be exposed out door for too long.

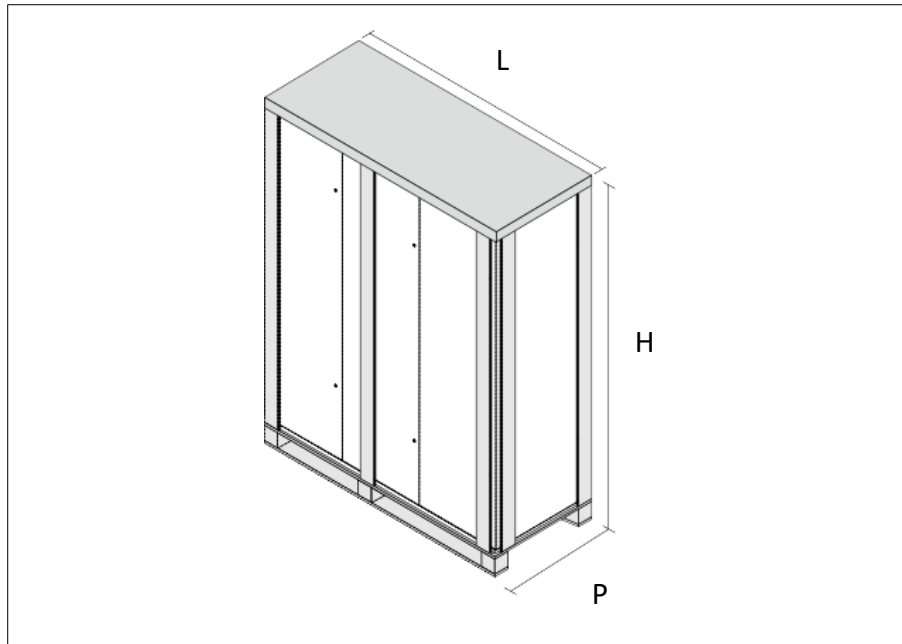
Remove the unit with the following two methods.

- With forklift: There is an opening for setting the forklift on the wooden base of

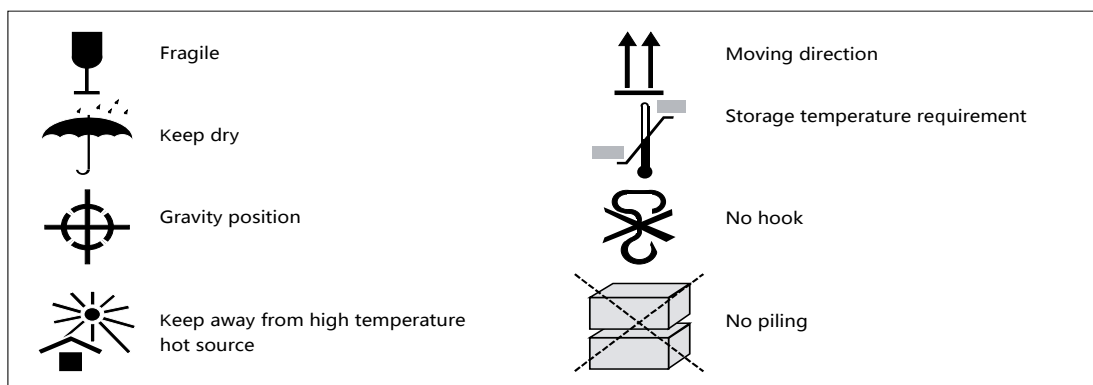
the unit.

- With sling: Pay attention not to hoist the edge area of the unit when using the sling.

The unit should be stored indoor and better with shipping package; storage environment should be under 85%, 50°C.



Model	025	030	035	040	045	035	045	050	060	070	080	090	100
	SAU/O-M					DAU/O-M							
L mm	990					1430			1840		2280		
P mm	1090					1090			1090		1090		
H mm	2190					2190			2190		2190		



Receiving the Unit

If damage is identified on receipt of the equipment, note the damage on the unit and file a damage claim with the shipping company.

Focus on checking the control panel on the front panel of the unit for damage; if the side cover is incorrectly installed, it must be installed in the correct position before installing the unit.

Installation

The air conditioning unit can be placed directly on the floor and should be no less than 5mm above the floor. Otherwise it may cause condensation leak.



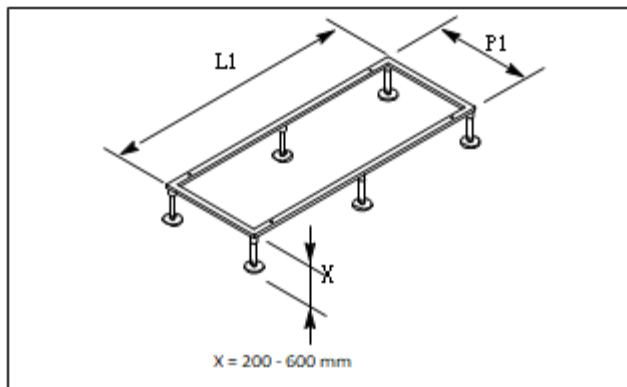
Warning! The unit **MUST** be installed indoor. The unit is not intended for use in hazardous environment. Elastic gasket is required around the bottom of the unit to reduce noise and vibration.

Installation Bracket (optional)

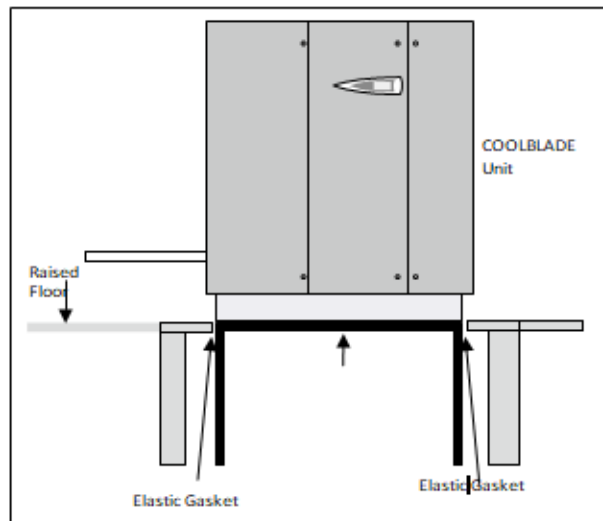
The installation is with the following advantages:

- Allows to install the unit before raised floor installation
- No mechanical vibration
- Easy piping layout

Height of installation bracket is adjustable. X stands for its height and it is better 200~600mm.



To reduce noise and vibration, elastic gasket under the unit should be no less than 5mm thick.



Supporting Bracket

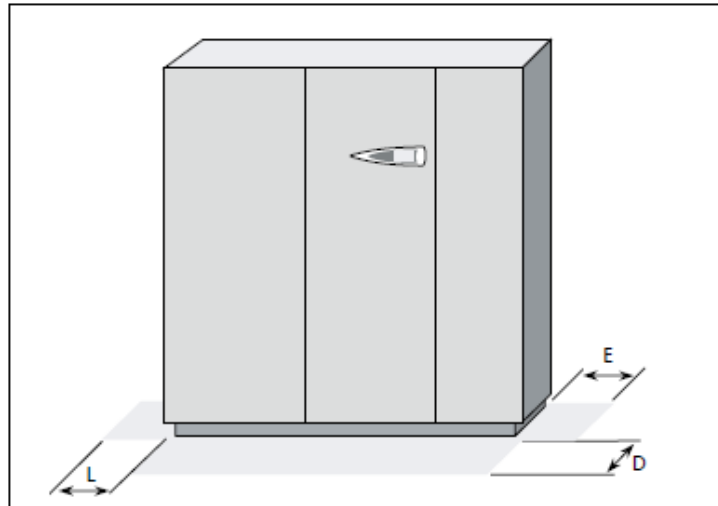
Model	025	030	035	040	045	035	045	050	060	070	080	090	100
	SAU/O-M					DAU/O-M							
L1 mm	850					1290				1700		2140	
P1 mm	950					950				950		950	

Clearance Reservation

A minimum 900mm of clear space in front of the unit is recommended for installation. It allows installation and service more convenient. Thanks to the structure features, multi units can stand side by side on the installation bracket without reserving clear space behind and on the side of the unit.

Warning! UNDER NO CIRCUSTANCES can the supply air outlet or return air inlet be partly or completely blocked.

机型	025	030	035	040	045	035	045	050	060	070	080	090	100
	SAU/O-M					DAU/O-M							
D mm						>900							
E mm						0							
L mm						0							



Operating Limit

Control Range

22~30℃ RH 45~55%

Ambient Temperature

-20.0℃~+46.0℃, available for standard units

-35.0℃~+46.0℃, need to configure low temperature kit

MUST operate in the above range to ensure the unit's normal operation.

Module Connection

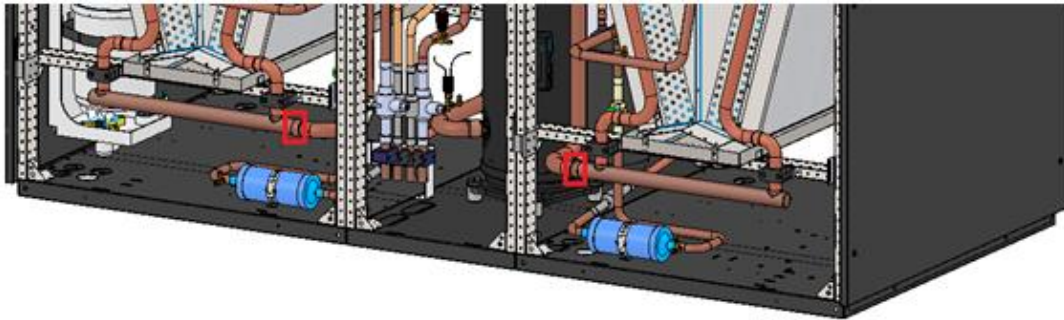
Open the front door panel, remove the inner and rear panel to separate the module.

Separate the copper tubes and wires before separating the modules.

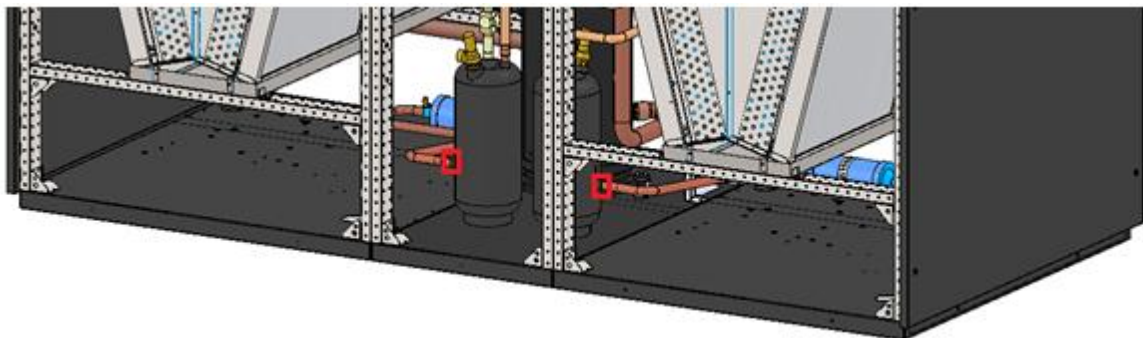
For the separation of the copper pipe, the copper pipe should be desoldered from the interface near the connection position of the module, and the correctness of the welding pipe should be noted.

Take DAO100M as an example

Front



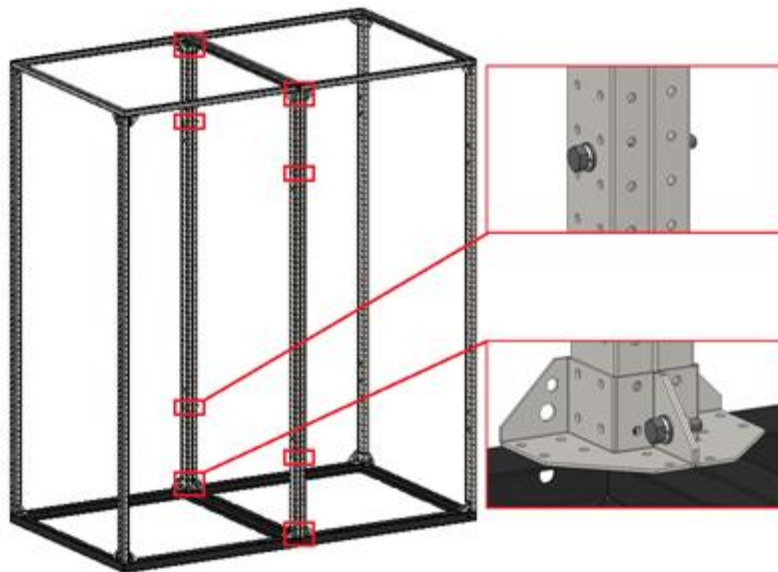
Rear



When electric components and control cabinet are not located in the same module, they need to disconnect the wiring and reconnect later. The compressor, electric heating and humidifier wiring need to be disconnected from the control cabinet. Wiring of fan, air differential switch, temperature and humidity sensor are disconnected via plugin or from vice module with clear remarks. Filter clogging, water leakage are connected via terminal.

Remove the attachment screw after the wiring disconnection.

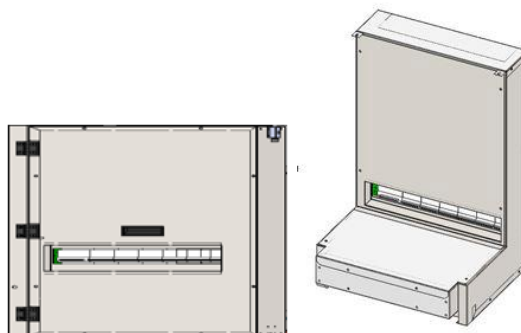
There are 8 attachment screws between each two modules, locating in the bottom connection, top connection and the column.



Control Cabinet Operation

The control cabinet is in front of the evaporator and can be rotated forward.

The left side of the electric control box is connected by a hinge, and the right side is positioned by a buckle. Pressing the button on the side of the buckle will eject the buckle to rotate the electric control cabinet.



Installation Positioning

1. Check whether onsite floor can support the unit's weight. Refer to the technical data table for weight data.
2. The unit should be installed on the even base according to the design standards. The stable bracket helps distribute weight evenly. Necessary maintenance and air supply should be considered when choosing installation location.
3. Children, unauthorized persons and animals are not allowed to enter the installation space.
4. The air conditioning unit may generate vibration when the compressor is running.

In order to avoid such vibrations, it is recommended to install the unit on the damper base, just like using a cushion to position the unit on the raised floor base.

5. Air conditioning units should not be installed in offices or other noise sensitive rooms.
6. The unit is not allowed to be installed in flammable or explosive atmosphere space.

SAU/O-M DAU/O-M Refrigeration Piping Connection

Refrigeration Piping

The following is the recommended refrigeration circuit when the equivalent length is 40 meters. In order to achieve the best running performance, the pipe thickness and diameter should be in accordance with the following table.

Model	Diameter X Thickness (mm)	
	Gas Pipe	Liquid Pipe
SA 025M	16×1	16×1
SA 030M	19×1	16×1
SA 035M	22×1.2	16×1
SA 040M	22×1.2	16×1
SA 045M	22×1.2	19×1
DA 035M	19×1	16×1
DA 045M	19×1	16×1
DA 050M	19×1	16×1
DA 060M	19×1	16×1
DA 070M	22×1.2	16×1
DA 080M	22×1.2	16×1
DA 090M	22×1.2	19×1
DA 100M	22×1.2	19×1

The refrigeration pipe near the compressor is marked with **Liquid Pipe** and **Gas Pipe** and for dual compressor unit marked with **Gas Pipe 1** and **Gas Pipe 2**. Pipes must be connected by welding. For dual-circuit units, do not weld the circuit to the external unit incorrectly.

Indoor and Outdoor Unit Connection

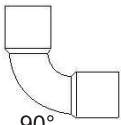
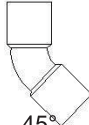
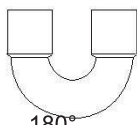
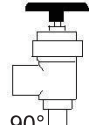
Installation Instruction						
Series	Standard Unit			Adding Length Extension Kit		
	Equivalent Length	Positive Drop	Negative Drop	Equivalent Length	Positive Drop	Negative Drop
SAO/U-M DAO/U-M	≤50m	≤25m	≤5m	≤50m~80m	≤25m	≤5m

Remarks:

1. Positive drop: the vertical distance of the outdoor unit is higher than the indoor unit; the negative drop: the vertical distance of the outdoor unit is lower than the indoor unit;
2. If the positive drop is out of range, consult the factory. If the negative drop is out of range, the unit cannot be used.
3. When there is a positive drop, an oil trap is needed on the gas pipe every 3-5m, when the positive drop is 25 meters, an oil separator is required.

Low Temperature and Length Extension Kit						
		Liquid Receiver	Oil Separator	Check Valve	Electromagnetic Valve	Remark
SAO/U-M DAO/U-M	Standard Unit	✓	✕	✕	✓	The added components are installed in the indoor unit. As a non-standard accessory, communication with technical support is required before placing the order;
	Low Temperature Kit	✓	✕	✓	✓	
	Length Extension Kit	✓	✓	✓	✓	
Remarks: ✓ indicates available configuration, ✕ indicates not available configuration						
1. The oil separator is installed at the outlet of the exhaust pipe;						
2. The liquid storage tank is installed on the liquid path from the condenser;						
3. When the unit requires both low temperature components and extended components, optional extension kits are available.						
4. If the unit is equipped with an electronic expansion valve, the solenoid valve does not need to be configured.						

Equivalent Length of Elbow, Shut-Off Valve and Check Valve

Diameter	 90°	 45°	 180°	 90°	
12	0.50	0.25	0.75	2.10	1.90
14	0.53	0.26	0.80	2.20	2.00
16	0.55	0.27	0.85	2.40	2.10
18	0.60	0.30	0.95	2.70	2.40
22	0.70	0.35	1.10	3.20	2.80
28	0.80	0.45	1.30	4.00	3.30

Electric Data

The selection of the power supply line diameter needs to consider the total length of the power line, the way the unit is installed, etc., based on the maximum input current of the air conditioning unit to select the power supply line diameter.

This can avoid too much voltage loss (the input voltage fluctuation range must be between 90% and 110% of the rated voltage).

Note: An auxiliary fuse is required before the unit power supply is connected to prevent electrical accidents caused by short-circuit of the power supply (current can be as high as 10kA).

SAU/O-M DAU/O-M Power Input

Mod.	V/Ph/Hz	B				R				H				T			
		FLI(kW)	FLA(A)	SA(A)	mm ²	FLI(kW)	FLA(A)	SA(A)	mm ²	FLI(kW)	FLA(A)	SA(A)	mm ²	FLI(kW)	FLA(A)	SA(A)	mm ²
SAU/O 025M	380/3N/50	11.0	19.2	105.2	6	20.0	32.9	105.2	10	14.8	24.8	110.8	10	20.0	32.9	110.8	10
SAU/O 030M	380/3N/50	12.7	25.2	120.2	10	21.7	38.9	120.2	10	16.4	30.8	125.8	10	21.7	38.9	125.8	10
SAU/O 035M	380/3N/50	14.4	26.2	131.2	10	23.4	39.9	131.2	10	18.1	31.8	136.8	10	23.4	39.9	136.8	10
SAU/O 040M	380/3N/50	16.3	28.0	149.2	10	25.3	41.7	149.2	16	20.0	33.6	154.8	10	25.3	41.7	154.8	16
SAU/O 045M	380/3N/50	18.3	36.4	145.4	10	27.3	50.1	145.4	16	22.0	42.1	151.1	16	27.3	50.1	151.1	16
DAU/O 035M	380/3N/50	14.5	27.8	80.0	10	17.6	29.7	80.0	10	18.3	33.4	85.6	10	18.3	33.4	85.6	10
DAU/O 045M	380/3N/50	20.2	35.4	121.4	10	20.9	34.1	121.4	10	23.9	41.1	127.1	16	23.9	41.1	127.1	16
DAU/O 050M	380/3N/50	20.8	35.4	121.4	10	21.2	34.1	121.4	10	24.5	41.1	127.1	16	24.5	41.1	127.1	16
DAU/O 060M	380/3N/50	25.3	42.9	141.6	16	33.4	53.0	141.6	16	31.3	52.0	150.7	16	33.4	53.0	150.7	16
DAU/O 070M	380/3N/50	28.7	52.3	157.3	16	35.1	57.7	157.3	16	34.7	61.4	166.4	16	35.1	61.4	166.4	16
DAU/O 080M	380/3N/50	32.5	55.9	177.1	16	37.0	59.5	177.1	16	38.5	65.0	186.2	25	38.5	65.0	186.2	25
DAU/O 090M	380/3N/50	36.5	72.8	181.8	25	39.8	69.2	181.8	25	42.5	81.9	190.9	25	42.5	81.9	190.9	25
DAU/O 100M	380/3N/50	41.1	78.8	218.8	25	42.1	72.2	218.8	25	47.1	87.9	227.9	25	47.1	87.9	227.9	25

B=Cooling only

R=Cooling only + standard electric heating (dehumidification purpose)

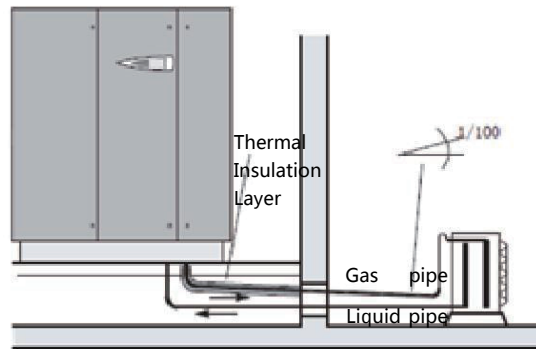
H=cooling only + humidifier

T=cooling only + standard electric heating + humidifier

Air Cooled Condenser Installation

Indoor unit pipe thermal insulation
Gas pipe: need
Liquid pipe: no need

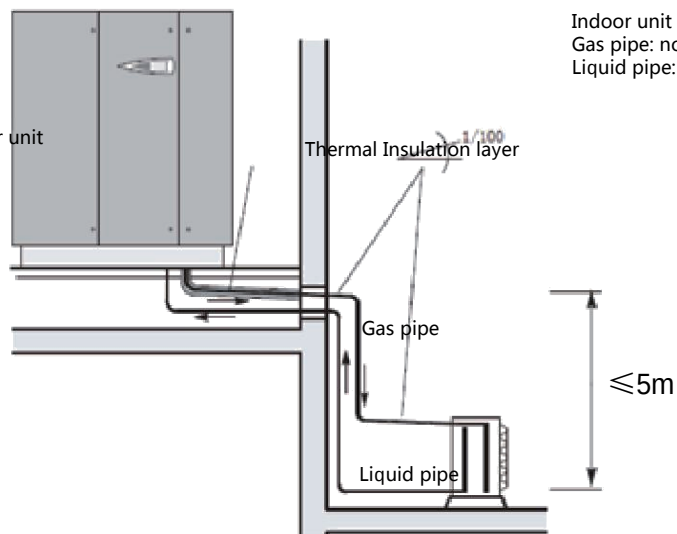
Indoor Unit



Indoor unit pipe thermal insulation
Gas pipe: no need
Liquid pipe: recommend

Indoor unit pipe thermal insulation
Gas pipe: need
Liquid pipe: no need

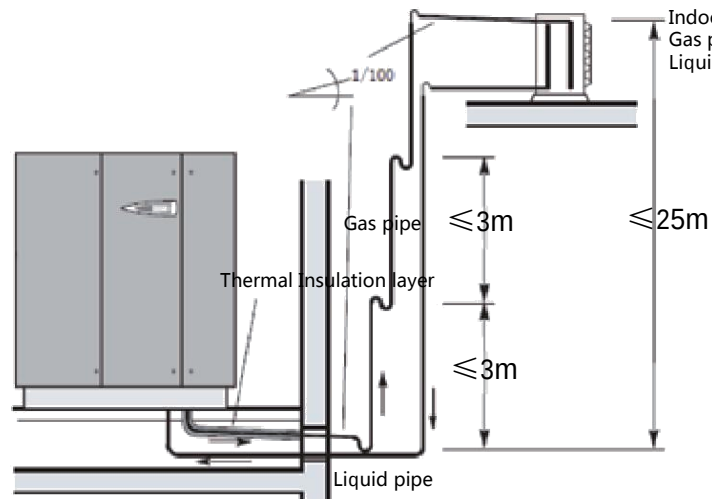
Indoor unit



Indoor unit pipe thermal insulation
Gas pipe: no need
Liquid pipe: recommend

Indoor unit pipe thermal insulation
Gas pipe: need
Liquid pipe: no need

Indoor unit



Indoor unit pipe thermal insulation
Gas pipe: no need
Liquid pipe: recommend

Note: Gas pipe is not allowed to be exposed to sunlight. The gas and liquid pipe should have a space of at least 30mm.

Vacuum and Refrigerant Charge

COOLBLADE modular DX-M series is pre-charged a small amount of refrigerant before shipment. The pre-charged small amount of refrigerant can't be used for operation or pressure holding.

Refrigerant(*)	Refrigerant Oil	
R410A(POE)	Emkarate RL32-3MAF	Emkarate RL32-3MAF

R410A
Open any valve on the unit and make sure that all parts of the system are free of internal high pressure gas.
Connect a high-efficiency vacuum pump to the filling valve of the compressor suction and exhaust line.
Connect the refrigerant charging device to the filling valve of the system.
Start vacuuming and the vacuum can be stopped only when the absolute pressure inside the unit is less than 40pa, which can eliminate the air and moisture in the system.
The vacuuming needs to be carried out slowly and needs to keep for a long time without rapidly reducing the pressure of the system to below 40Pa. When the system pressure reaches the requirement, keep 100s and confirm that the absolute pressure of the system does not exceed 50Pa.
Usually, if the system contains a lot of water, or if a large unit is vacuumed, it is necessary to repeatedly vacuum. When the absolute pressure of the system reaches the required level, high pressure nitrogen is injected into the system and the vacuum is repeated.
Charge refrigerant
Start the compressor and slowly fill the system with refrigerant. At the same time, carefully observe the state of the sight glass. When the compressor suction and discharge pressure stabilizes and the air bubble is not visible in the liquid mirror, stop charging.
Before charging the refrigerant, it is necessary to consider the requirements of the local environment for refrigerant leakage. For units equipped with a shut-off valve, when the refrigerant is charged, the shut-off valve should be closed to avoid the sudden stop of the condensing fan and affect its life. The system is determined to have a subcooling of approximately 3 to 5 ° C and a superheat of approximately 5 ° C.

(*) indicates unit configured with Copeland compressor

If it is necessary to withdraw the refrigerant of the unit, special device is needed to extract the refrigerant inside the unit, and the extracted refrigerant is transferred to

another compressor without refrigerant charging; if there is no extract device, the lubricant of the compressor can be emptied at the same time.

Evaporator and Condenser Volume and Refrigerant Charge Amount

Indoor Unit Evaporator Volume and Refrigerant Charge Amount

Model	Evaporator volume dm ³	Refrigerant Charge (kg)	Pipe length 30m	Refrigerant
SA 025M	6.8	3.4	5.34	R410A
SA 030M	6.8	3.4	5.34	R410A
SA 035M	9	4.5	5.34	R410A
SA 040M	9	4.5	5.34	R410A
SA 045M	12.2	6.1	6.81	R410A
DA 035M	9.2	4.6	5.34×2	R410A
DA 045M	12.2	6.1	5.34×2	R410A
DA 050M	12.2	6.1	5.34×2	R410A
DA 060M	13.6	6.8	5.34×2	R410A
DA 070M	18	9	5.34×2	R410A
DA 080M	18	9	5.34×2	R410A
DA 090M	24.4	12.2	6.81×2	R410A
DA 100M	24.4	12.2	6.81×2	R410A

Outdoor Unit Condenser Volume and Refrigerant Charge Amount

Model	Condenser[dm ³]	Charge [kg]	Type
C14	3.4	1.7	R410A
C17	3.4	1.7	R410A
C24	5.3	2.7	R410A
C29	7.9	4.0	R410A
C33	10.2	5.1	R410A
C42	9.6	4.8	R410A
C49	10.5	5.3	R410A
C58	15.8	7.9	R410A
C74	15.8	7.9	R410A

Note: The refrigerant charge listed in the above table is the theoretical value, and the actual charge amount is as shown on the unit nameplate.

When the distance between the inside and outside of the machine exceeds 30 meters, the additional operation of the refrigeration oil is required according to the length of the pipe.

Refrigerant/Compressor Oil Charge

Liquid line (mm)	Add refrigerant according to length kg/m) ⁽²⁾	Refrigerant oil charge ⁽¹⁾ ⁽¹⁾
10	0.070	0.05
12	0.101	0.08
14	0.137	0.12
16	0.178	0.15
18	0.227	0.19
22	0.339	0.25

- 1) When the distance between indoor and outdoor unit is longer than 30m, additional operation is needed every 10m. Recommended oil type is Emkarate RL32-3MAF.
- 2) Indicates distance between indoor and outdoor unit.

Commissioning

Procedure

Closing the auxiliary circuit breaker

Close all circuit breakers inside the electric control box

The unit is powered on and the load switch is switched on.

Check if the unit control panel is powered, check whether the two indicators related to phase sequence protection (RSF) are on, the yellow indicator is the power on indicator, and the green is the correct phase indicator.

If the green indicator light is off, disconnect the power supply of the unit and connect any two of the three-phase power lines.

The root is swapped and restarted for debugging. (only for units with oil heating belts).

At least 12 hours of power is required before the unit is officially operated. The low temperature of the compressor refrigeration oil will affect the lubrication cooling effect. When the unit is shut down, the refrigerant may leak into the oil tank of the compressor, which will cause great damage to the compressor. Therefore, even in the process of stopping the unit, the power supply of the unit cannot be cut off, so that the compressor can be prevented from being damaged due to insufficient lubrication.

Open the system's shut-off valve and check that the indoor unit and the outdoor unit are connected to the line (air cooled unit).

Oil Separator

When installing an air-cooled unit, if the length of the connecting line between the indoor unit and the outdoor unit exceeds 30m, an oil separator is required. The purpose is to prevent the compressor from being damaged due to the lack of refrigeration oil.

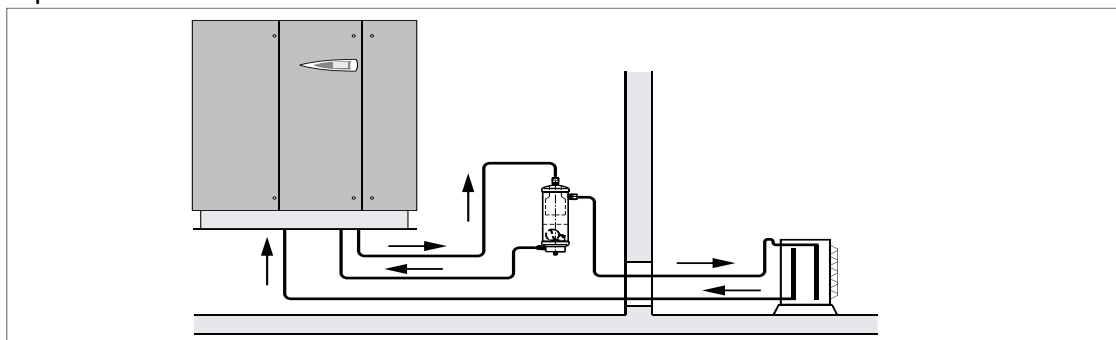
Functions of oil separator as follows:

- Extend compressor lifecycle
- The use of the oil separator enables the surface of the finned heat exchanger of the indoor unit and the outdoor unit to substantially not adsorb the refrigerating oil, which greatly improves the heat exchange performance of the heat exchanger, thereby optimizing the performance of the system and reducing the unit. Energy consumption.

The selection of the oil separator requires consideration of the following factors:

- The unit's total cooling capacity
- Refrigerant type
- The diameter of the exhaust pipe of the compressor: the diameter of the inlet of the oil separator needs to be the same as the diameter of the exhaust pipe of the compressor.

The oil separator is vertically installed between the compressor and the condenser. When the operating temperature of the oil separator is close to the exhaust temperature of the compressor, the oil separation efficiency is the best; therefore, the installation position of the oil separator is selected. When you need to keep it as far away as possible from the cold source, it may cause the gas refrigerant to condense inside the oil separator and not function to separate the frozen oil. We recommend that the oil separator surface be insulated when installing the oil separator.



As shown in the flow chart of the refrigeration system described above, the oil return

pipe of the oil separator needs to be connected to the compressor suction pipe as close as possible to the compressor.

In some cases, it may be necessary to install a sight glass on the oil separator connection line to check that the oil separator is working properly. The oil separator must be filled with part of the refrigerating oil before it is installed in the system. The type of refrigerating oil must be the same as the refrigerating oil used in the compressor.

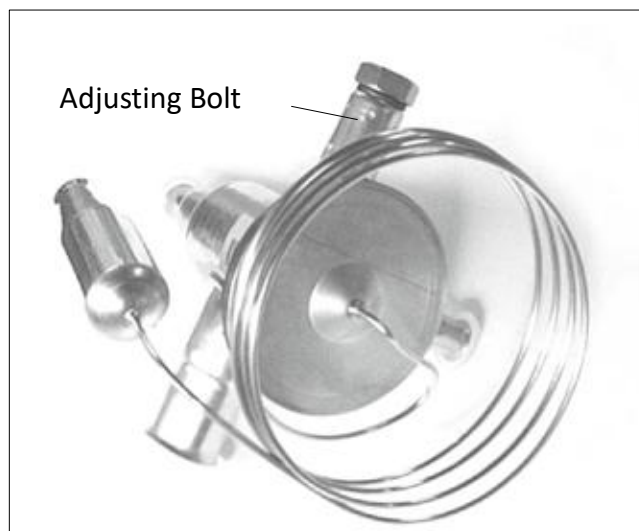
Control Operation

Thermal Expansion Valve Calibration

The thermal expansion valve can be calibrated through the adjusting bolt on the expansion valve during installation.

- Check if super cooling degree is appropriate($3\sim 5^{\circ}\text{C}$)
- Check if superheat degree is appropriate(around 5°C)
- Check if the position of the temperature sensor pack is correctly placed and wrapped with insulation material

If the actual superheat of the unit is higher than 5°C , increase the valve opening. Otherwise, reduce the valve opening.



Warning! Only qualified personnel can operate on the adjusting bolt.

Alarm Switch

The following control switches are installed on COOLBLADE modular DX-M units.

- High pressure switch F1: reset manually, configure one on each cooling circuit.
- Low pressure switch F2: reset automatically, configure one on each cooling circuit.
- Air filter clogging sensor F4 (pressure differential switch)
- Temperature sensor BT2 or indoor environment temperature and humidity BH1 (with indoor air humidity control function)

Available for certain series

Electric heating (units with electric heating function), installed on the right side of the unit, manually reset

Optional

- Flow detector, including:
 - a) FSD device mounted on a dedicated connector in the electrical control box
 - b) FLOE sensor installed at the monitoring point
- Smoke/Fire Detector SFFS/SFFF
- Hot water temperature probe for detecting the water temperature of the reheat coil
- Unit outlet temperature probe

Pressure Switch and Electric Overheating Setting Calibration

Adjust the following parameters after starting the unit:

- Indoor air temperature (cooling and heating setting point)
- Relative humidity (humidification or dehumidification setting point)
- Air filter clogging alarm setting point, refer to “air filter clogging alarm ON/OFF setting”

Note: The set values of the control and safety switches must not be changed.

Code	Description
F1	High Pressure Switch
F3	Low Pressure Switch
TH13	Electric heating overheat alarm

Code	Alarm Setting	Difference	Reset
F1	40.5bar	1.2	Manual reset33.3bar
F3	4.5bar	0.35bar	Automatic reset5.5bar
TH13	75°C/110°C	-	Automatic reset/thermal fuse

Air Filter Clogging Alarm ON/OFF Value Setting

The default value is 400Pa. The calibration of the alarm switch must consider not only the pressure drop of air inlet/outlet but also the flow rate of the air.

Calibrate the air filter clogging switch as follows:

- Install the clean air filter on the unit;
- Start the unit;
- Gradually cover the surface of the air filter with cardboard or wood, and check if the alarm switch is alarmed when 50-60% of the surface of the air filter is covered.

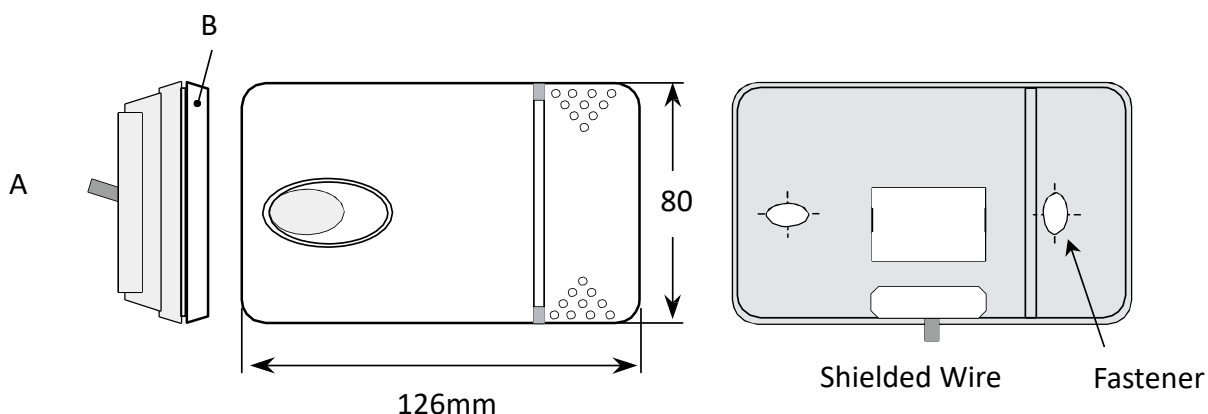
If the alarm switch does not have an alarm, the pressure value is set too high, and the set value needs to be gradually reduced; if the alarm switch has alarmed without covering 50% of the surface area, gradually increase the set value.

Indoor Air Temperature and Humidity Sensor

To replace the indoor environment temperature and humidity probe, please refer to the following figure.

Use a screwdriver to press A and remove the white plastic cover B to expose the fastening bolt C and the terminal D.

Shielded wires are required to connect the indoor environment temperature and humidity probe. The wiring method can refer to the circuit diagram.



Electric Heating

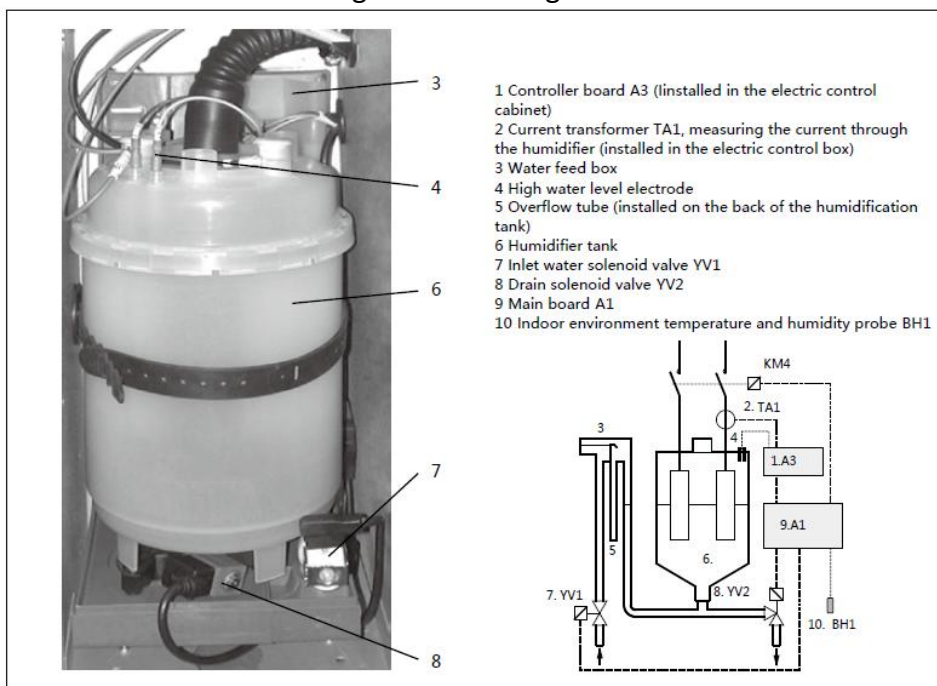
Refer to electric diagram for connection of electric heating wire to contactor. The electric heating is with two step protection. The first step is 75°C and the electric heating will stop working when reaching it and recover when lower than it. The second step is 110°C. Electric heating will stop working when reaching it but won't recover when lower than it.

If the electric heating is needed to replace, power off the unit and wait for the electric heating to cool, then replace it. Make sure the grounding wire is connected correctly after replacing the electric heating.



Humidifier

Electrode humidifier can be configured according to customer demand.



Humidifier Working Principle

The working principle of the electrode humidifier is to humidify the water inside the tank by the electric current between the electrodes, and evaporate the water to obtain water vapor. By controlling the water inlet and outlet solenoid valve to control the water level inside the humidifier and controlling the salt content inside the water, the current transformer can detect and control the current between the electrodes, thereby controlling the amount of steam generated.

When the indoor humidity is lower than the set value, the main board controls the humidifier's contactor to close (refer to the circuit diagram for details). Supply power to the humidifier, and the humidifier starts working.

When the water level in the humidifier is too low and the current value is less than the set value, the inlet valve opens to adjust the water level.

Depending on the water supplied to the humidifier, the drain valve may be activated to adjust the salt concentration in the humidifier.

The daily maintenance that the humidifier needs to do is to periodically check and clean the part of the humidifier that generates steam.

The following operations need to be annually, preferably during the summer.

Humidifier

Clean the inside of the humidifier tank regularly, remove the scale deposited on the electrode surface, and clean the water filter at the bottom of the humidifier tank.

Dismantle the humidifier as follows:

- Drain the humidifier thoroughly
- Turn off the main switch
- Remove the vapor outlet hose from the top of the humidification tank
- Remove the connector of the power cable and electrode
- Unfasten the fixing strap of the humidifying tank
- Remove the humidifying tank upwards

The humidification tank can be reused many times after being cleaned, unless the electrode is worn. The electrode needs to be replaced then. The humidification tank and the filter installed at the bottom form a complete humidification tank.

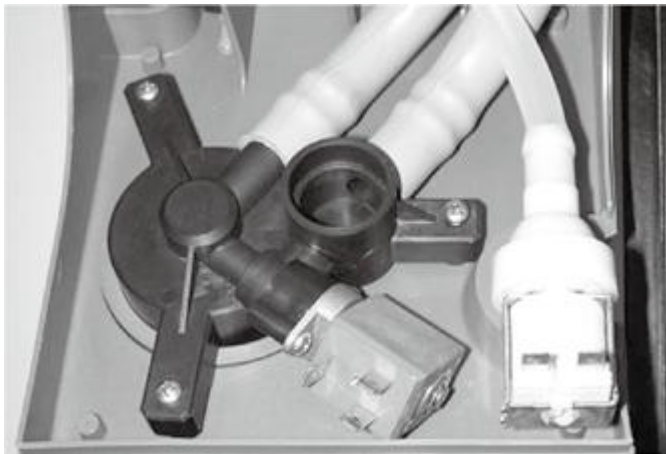
Filling and draining the humidifier

In order to ensure long-term stable operation of the humidifier, regular water injection and drainage operations are required.

Steps as follows:

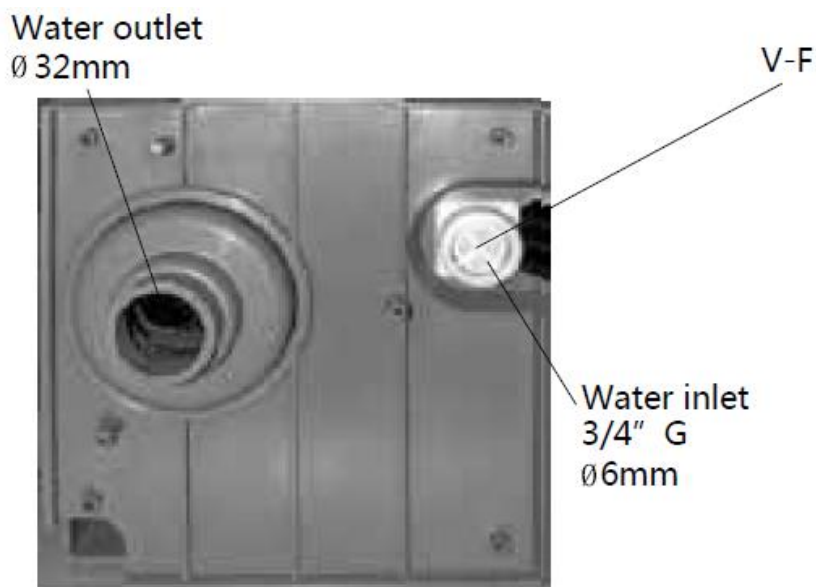
- Drain the water in the humidifier thoroughly by controller

- Turn off the main switch
- Remove the 3/4 fitting on the inlet solenoid valve
- Clean the dismantled hose
- Remove the drain as the following figure and thoroughly clean the dirt inside the drain and elbow



Humidifier Power Input

Install a 3/4"G threaded male connector in front of the water inlet solenoid valve at the bottom of the humidification tank. Connect the 6mm rubber tube. The plastic tube needs to be connected to the water supply system of the air conditioning unit onsite. Refer to the following figure.



V: water inlet solenoid valve at the bottom of the humidification tank, 3/4"G threaded male connector
F: 6mm rubber tube

Use drinking water without any chemical treatment or demineralization as a source of water for the humidifier, quality of which should meet the following requirements:

Water Quality Requirements				Range	
				Min	Max
Pressure			bar	1	8
pH		-		7	8,5
$\sigma_{20^\circ\text{C}}$		-	$\mu\text{S}/\text{cm}$	300	1250
Solubility	TDS	-	mg/l	(1)	(1)
Solid residue remaining at 180°C	R ₁₈₀	-	mg/l	(1)	(1)
Total Hardness	TH	-	$\text{mg}/\text{l CaCO}_3$	100(2)	400
Temporary hardness		-	$\text{mg}/\text{l CaCO}_3$	63(3)	300
Fe + Mn content		-	$\text{mg}/\text{l Fe + Mn}$	0	0,2
Cl content		-	ppm Cl	0	30
SiO ₂ content		-	$\text{mg}/\text{l SiO}_2$	0	20
Cl content		-	$\text{mg}/\text{l Cl}$	0	0,2
CaSO ₄ content		-	$\text{mg}/\text{l CaSO}_4$	0	100
Metal impurities		-	mg/l	0	0
		-	mg/l	0	0

(1) According to the actual conductivity, it is usually: $\text{TDS} \approx 0.93 \times \sigma_{20}$; $\text{R}_{180} \approx 0.65 \times \sigma_{20}$;

(2) Not less than 200% of the chloride content, unit: mg/l ;

(3) Not less than 300% of the chloride content, unit: mg/l .

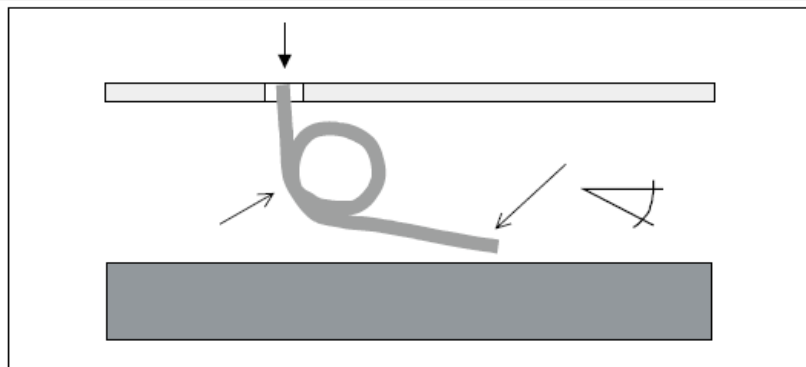
Humidifier and Condenser Drainage

The bottom of the humidifier is provided with a drain valve to eliminate the condensation water formed during the dehumidification process. The unit has been fitted with a drain hose that requires a rubber or plastic hose with a diameter of 32 mm to connect the hose to the drain system. A sink is required at the end of the pipeline to prevent odor caused by water deterioration and to prevent overflow of the humidifier tank.

During the installation process, the condensate sump is filled with water, so that the water tank outside the unit is filled with water. The water tank outside the unit should have a certain slope to facilitate drainage, with a minimum slope of 1%.

Warning! Pay attention that water discharge from the humidifier is high.

The drain hose of the humidifier must not be bundled with any other wires, and the hose needs to be directed vertically downward to prevent it from touching the cable.



Condensing and Humidifier Water Pump

Condensing and humidifier water pump can be configured for certain models. Humidifier water pump should be applicable for high temperature water.

Water pump should be installed at the downstream of the discharge water connector.

Maintenance



For replacement of key components (compressor, pressure switches, liquid receivers), refer to the packaged key component list.

Attention should be paid to this chapter to ensure correct installation on the unit.

Periodical simple maintenance on the unit can avoid serious damage to the unit.

Only qualified personnel are allowed to operate on the unit.

Preventive maintenance as follows:

- Air filter cleanness
- Check and clean condensing tray
- Check and clean the drain
- Check the humidifier system
- Check the unit's operating status

Air Filter Cleanness

As the air filter adheres to more and more dust impurities, the air flow rate and flow rate of the unit will gradually decrease, which will result in a reduction in the cooling capacity of the unit and a decrease in efficiency.

For direct expansion units, blockage of the air filter can cause low pressure switch alarms and compressor damage. Regular cleaning of the dirt from the air filter can avoid these problems. The cleaning process interval depends on the air condition of the local environment.

The following recommendations apply in all cases:

- Check if the air filter is clean weekly
- Use a vacuum cleaner to clean the air filter every two weeks
- Clean the air filter with soapy water monthly
- Replace air filter every half year

The above cleaning and maintenance intervals are not applicable to all environmental conditions and need to be cleaned and replaced more frequently if necessary.

It should be noted that it is necessary to ensure that the unit is turned off and the power is turned off before operating on the air filter.

Check and clean condensing tray

In hot climates, air conditioning units need to operate at maximum load, so it is necessary to ensure that the condenser meets the heat transfer requirements of the unit. Since the condenser is installed outdoors or in an environment that is connected to the outdoor environment, paper, leaves, or dust may be adsorbed to the surface of the coil, thereby reducing the amount of heat exchange of the condenser, so the condenser needs to be maintained regularly.

Failure to perform maintenance may result in high pressure switch alarms and unit shutdowns. When there are many floating objects in the outdoor air, or fall leaves in autumn, it is necessary to frequently clean the condenser coil, spray water or jet to the coil to clean the surface debris. Cut off the power supply before cleaning the condenser.

Check and Clean the Drain

Ensure that the condensate and humidifier drainage system is perfect to prevent condensate from seeping into the indoor floor.

When the humidifier is drained, depending on the hardness of the water, the discharged water contains a certain amount of scale. Scale deposits at the bottom of the drain and blocks the drain and elbow, so it is necessary to clean the scale regularly.

Descaling agent (acid solution) is required to clean scale.

The unit needs to be shut down and disconnected from the power supply before cleaning the drain.

Check Unit Operating Status

It is necessary to check the overall operation of the unit on a regular basis. The purpose is to compare the current operating conditions of the unit with the operating conditions of the previous inspection. It is necessary to pay attention to any differences and carefully check the reasons.

Regular inspections and cleaning of the unit ensure long-term stable operation of the unit. Under normal circumstances, a overall inspection of the unit every month will ensure the normal operation of the unit, except in special circumstances. If the unit is maintained for a long period of reasonable maintenance, it is unlikely that the unit will have a major failure or to be interrupted.

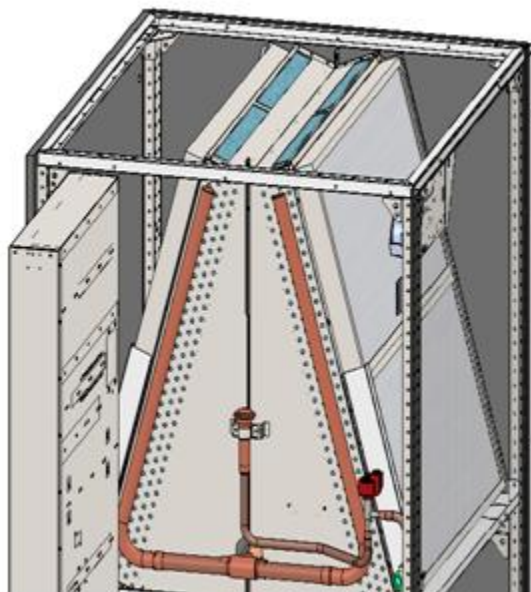
Air Filter Replacement

The air filter is different depending on whether there is electric cabinet control cabinet in front of the evaporator coil.

For the unit without electric control cabinet, there is a filter pad on each side of the cooler. After opening the front door, the filter pad can be pulled straight forward.

For the unit with electric control cabinet, there are two upper and lower filter mats on each side of the air cooler. Before taking the filter mat, you need to turn out the electric control box.

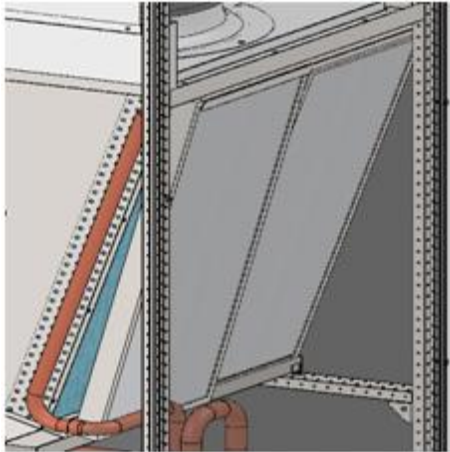
The upper filter pad can be pulled forward when pulled up above the front bezel, and the lower filter pad is pulled up and then pulled forward.



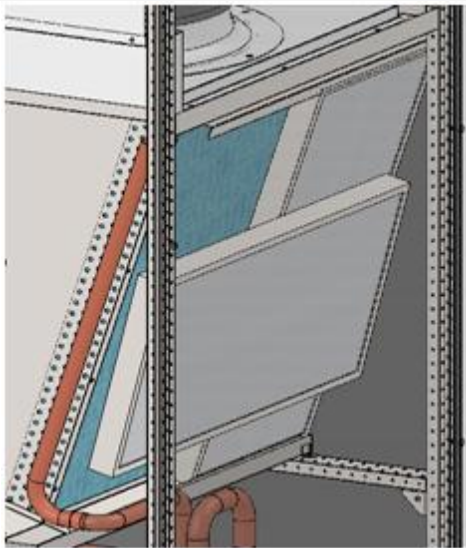
For upflow units, there are two filter mats on the two sides of the upper fan type cooler.

For models with an electric control box in front of the air cooler, the electric control box must be turned out before the filter pad is taken.

Pull up the filter pad to disengage the lower part from the slide rail and pull it outward at a certain angle to make the filter pad completely off the slide rail.



Rotate 90° in the front-rear direction and remove it forward.



Unit Disassembly



In accordance with CE2002/96/CE

If it is necessary to disassemble the air conditioning unit, it should be only operated by qualified personnel. Disassembling the unit according to the correct procedure will prevent the refrigerant from leaking and damaging the environment, and at the same time reduce unnecessary losses.

The relevant disassembly contract needs to be signed before the unit is disassembled.

Troubleshooting

Problem	Possible Cause	Corrective Action
Unit can't start	No power supply to electric control cabinet	Check power supply and close the main load switch
	No power supply to auxiliary circuit	Check auxiliary circuit and fuse on the main board
	No UNIT ON order from the main controller	Check DC power
Indoor temperature too high	Setting value on the user interface is incorrect	Check the setting value
	Indoor temperature and humidity sensor fault	Check power line of sensor and sensor connection with the board
	Heat load higher than unit cooling capacity	Check heat load
	Controller command the compressor to start but one or all failed	Refer to "compressor can't start"
Indoor temperature too low	Setting value on the user interface is incorrect	Check the setting value
	Electric heater capacity too low or doesn't work	Check if circuit of electric heater is normal; Check if there is power supply to electric heater; Check if over heating protection of electric heater is activated and confirm the cause and reset.
	Heating coil doesn't work	Check heating coil's water flow and temperature; Check if controller valve and actuator are normal.
	Reheating coil doesn't work in the dehumidifying and reheating process	Check if the hot gas bypass three-way valve is working normally; Check if reheating compressor is working normally. (refer to "compressor doesn't work")
Indoor humidity too high	Setting value on the user interface is incorrect	Check the setting value
	Latent heat load is higher than design value	Check the designed latent heat load Check air flow rate and outdoor air status Check if outdoor air flows into the room
	Compressor doesn't work during dehumidifying process	Refer to "compressor can't start"
	Dehumidify valve is not closed	Check if the dehumidification solenoid valve is working normally
	Control system doesn't work normally	Check control board status Check if control board and sensor work normally
Indoor humidity too low	Setting value on the user interface is incorrect	Check the setting value
	Latent heat load is lower than design value	Check the designed latent heat load

Problem	Possible Cause	Corrective Action
	Humidifier doesn't work	Check the pressure of the humidifier water supply Check if the control system and steam generation system are working normally
	Control system doesn't work normally	Check control board status Check if control board and sensor work normally
Electric heater overheating alarm	Electric heater overheating protection wiring damaged or cut off	Check if the cable from the electric heating overheat protection to the main board is normal.
	False alarm	Reset electric heating overheat
Compressor discharge pressure too high	Check if bubble exists in sight glass or if sub cooling degree is too high	Refill the system after emptying the system
	Charge too much refrigerant and too much left in condenser	Empty certain amount of refrigerant
	The valve part on the exhaust side of the compressor is blocked	Check valve opening
High pressure alarm(High compressor discharge pressure)	Condenser pressure control system doesn't work normally	Check if the condensing fan and protective device are working properly; repair or replace the defective fan; Check if the setting values of the pressure switch and the air speed regulator of the condenser fan are normal.
	Compressor discharge pressure too high	Refer to "Compressor discharge pressure too high"
Compressor discharge pressure too low	Condenser pressure control system doesn't work normally	Check if condenser pressure control system or condenser fan works normally
	Low suction pressure	Refer to "Compressor suction pressure too low"
Compressor suction pressure too high	Heating load higher than designed value	Check the designed latent heat load Check air flow rate and outdoor air status Check if outdoor air flows into the room
	High compressor discharge pressure	Refer to "High compressor discharge pressure"
	Charge too much refrigerant	Empty certain amount of refrigerant
	Liquid refrigerant is returned to the compressor	Check that the superheat of the thermal expansion valve is set correctly; Check that the temperature sensor package of the thermal expansion valve is installed correctly and is insulated.
Low compressor suction pressure(high probability)	Low indoor temperature	Refer to "low indoor temperature"
	The receiver outlet check	Check valve opening

Problem	Possible Cause	Corrective Action
of coil frosting)	valve is not fully open	
	Dry filter clogging	Check the desiccant filter and replace the desiccant filter if necessary. The refrigerant temperature difference between the inlet and outlet of the filter should not exceed 2 °C
	Insufficient refrigerant charge	Check if the degree of subcooling is within a reasonable range, and if necessary, charge the system with refrigerant.
Low pressure switch alarm(low suction pressure)	Thermal expansion valve setting error or malfunction	Check thermal expansion valve superheating degree (5 °C)
	Dry filter clogging	Check and replace dry filter if necessary. The refrigerant temperature difference between the inlet and outlet of the dry filter must not exceed 2 °C
	Low compressor suction pressure	Refer to "Low compressor suction pressure"

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