



Just feel well



Installation Manual

ODU VRF (VVWO Series)

R410A

English *Manual*

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VVWO-220R-01T32

VVWO-280R-01T32

VVWO-335R-01T32

IMPORTANT NOTE:

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User Manual

This VRF series adopts “mode consistence” control method, which means all the indoor units can only operate cooling or heating at one time.

To protect compressor, before startup, the unit should be powered on over 12 hours or oil superheat should be over 20°C. If the unit is not used for a long time, please cut off the power to save energy, or the unit will consume the power. When the environment temperature may be lower than 0°C, drain off water in the system, prevent frost crack system.

The waterproof rating of the machine is IPX0, pay attention to the protection

The minimum heating water temperature for this unit is 7 degrees Celsius, if lower temperature heating is required, please choose other low-temperature products

Operation condition:

Operating Range of Air Conditioner

Condition	Cooling	Heating
The outdoor environment temperature	0-40°C	
The outdoor environment humidity	<80%	
Indoor temperature	17-32°C	15-30°C
Water inlet temperature	7-45°C	
Rated water flow	8HP: 4.8m ³ /h; 10HP: 6.0m ³ /h; 12HP:7.2m ³ /h	

If some failures often occurs in the unit, such as low pressure failure, low outlet water temperature failure, low pressure difference failure or low discharge temperature failure, it may be due to the very low inlet water temperature, or the very low water flow rate, or the very low indoor temperature. If it is confirmed that the cause of the failure is among the above factors, the inlet water temperature or the inlet water flow rate must be increased.

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Warning

- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.
- The appliances are not intended to be operated by means of an external timer or separate remote-control system.
- Keep the appliance and its cord out of reach of children less than 8 years.

Safety

- This manual should always be accessible and close to this air condition equipment.
- There are two types of indications, "△WARNING" and "△CAUTION". The indication preventing from death or heavy injury is listed as "△WARNING". Even the indication listed as "△CAUTION" may also cause serious accident. Both of them are related to safety, and should be strictly followed.
- After installation and start-up commissioning, please handover the manual to the user. The manual should be well kept in safety place and close to the unit.

WARNING

- The installation or the maintenance should be performed by an authorized agency. The wrong operation of this air condition equipment may cause water leakage, electric shock, fire, etc.
- Please install the unit on the top of a solid foundation or structure which is strong enough to support the unit.
- The installation of this air condition equipment should follow local construction codes.
- Use the right cable size, secure the terminal firmly, organize the cables well and make sure no tension is added on cables. Cable insulation should not be damaged. The incorrect installation may lead to overheat or fire.
- The circuit should be installed leakage protector, or it will cause electric shock.
- The flow switch in the accessory should be installed on the outlet water pipe.
- In winter, if you do not use for short periods of time, please ensure the machine 24 hours power on, if you do not use for a long time, drain off the water in the system, prevent frost crack system.
- When installing or moving the unit, the refrigerant system should be vacuumed and recharged with R-410A refrigerant. If any other gas enters the system, it may lead to abnormal high pressure which may cause damage or injury.
- Please use the proper manifolds or accessories during the system installation. The wrong parts may cause refrigerant leakage.
- Keep the drain pipe away from toxic gas vents to prevent possible pollution of indoor environment.
- During or after the installation, please check whether there is refrigerant leakage. If any leakage, please take any measures for ventilation. The refrigerant may be toxic at some concentration levels.
- The unit should be connected with closed water system.
- The unit is not explosion-proof. Please keep it away from flammable gases.
- The water pipe should be installed in accordance with this manual to ensure proper drainage. The pipe should be well insulated to avoid condensation. Wrong installation may lead to water leakage.
- Both liquid pipe and the gas pipe should also be well insulated. Defective insulation may lead to system performance deterioration or humidity formation.
- Please keep children away from this air condition equipment.

Safety

CAUTION

- Grounding wire should be connected with the grounding bar. The grounding wire cannot be connected to the gas pipe, water pipe, lightning rod or the telephone grounding wire. Improper grounding may cause electric shock.
- Use the wrench to fasten the nut and flare at proper torque. Excessive torque may cause flared section to break, leading to refrigerant leakage.
- After refrigerant pipe installation, please take nitrogen leakage test to avoid refrigerant leakage.
- R-410A is the only permitted refrigerant.
- To avoid charging wrong refrigerant, the diameter of check valve is changed for R-410A. To strengthen the pipe, the dimension of flared pipe is also changed. Please use R-410A specified tools as shown below.

	R-410A specified tools	Remarks
1	Gauge manifold	Range: HP > 4.5MPa, LP > 2MPa
2	Charge hose	Pressure: HP: 5.3MPa, LP: 3.5MPa
3	Electronic weight meter for charging R-410A	No other means are permitted
4	Torque wrench	
5	Flaring tool	
6	Copper pipe gauge for adjusting projecting margin	
7	Vacuum pump fitting	Vacuum pump must be equipped with check valve
8	Leakage detector	Only helium detector is permitted

Safety

- When charging refrigerant, the refrigerant must be in liquid state from the tank.
- To prevent EMC from interfering other appliances, please keep indoor unit, outdoor unit, power cable and connecting wire at least 1m away from those appliances .
- Fluorescent lamp (reverse phase or rapid start type) may interfere the remote controller's signal. Please install indoor unit away from fluorescent lamp. The farther, the better.
- The temperature and flow of the outdoor unit inlet water need to conform to the requirements of the specification, the water temperature is too low or the water flow is too small will cause the unit malfunction.
- The quality of the circulating water must conform to the specifications. otherwise it will decrease the system life.
- The pipe for external devices water system should use corrosion resistant materials, otherwise may cause corrosion.
- Water system Max. pressure is 1.6MPa, if the water pressure for the target flow switch is greater than 1.6MPa, may affect the target flow work.
- Water flows too small protection, after the compressor operation, if the temp. difference between T_{wi} and T_{wo} is too large, the unit will standby and alarm, 100 seconds later resume automatically, if it occurs three times in an hour, confirm the failure.
- If the inlet water temperature is below 10°C or the outlet water temperature is below 4°C, in order to avoid the heat exchanger cracking due to the freezing water, the following measures must be implemented:
 - The least inlet water flow rate must be over 70% of the rated value.
 - Add antifreeze such as ethylene glycol into the water system, and use corrosion inhibitors to ensure the PH value of the water is about 7.5, or it will cause the heat exchanger corrosion cracking.
 - Inform the technical personnel to carry out the necessary inspection and setting for the unit.
- If the outdoor unit is lower than the indoor units and the high drop is less than 25 meters, inlet water temperature can reach 7°C when cooling.
 - When heating , if inlet water is groundwater type, when the master unit has the maximum water flow rate (1.5 times the rated value), the lowest inlet water temperature can be down to 5°C .
 - When heating , if the cooling capacity of the smallest indoor unit in the system is not less than 3.6kW, and the inlet water flow rate is not exceed the rated value, the maximum inlet water temperature can be up to 50°C.

Installation instruction

Installation & Startup Quick Guides

1. Installation Procedure

1.1 Drafting of diagram, select the installing place including the wiring and piping

1.2 Pre-installation, including pipe protective sleeves, hooks, supports, etc.

1.3 Indoor installation

1.3.1 Indoor DIP switch settings

1.3.2 Indoor unit installation

1.3.3 Refrigerant piping installation

1.3.4 Drain piping installation

1.3.5 Duct work when install the duct indoor unit

1.3.6 Heat insulation work, including refrigerant pipe and drain pipe

1.3.7 Electric wiring work

1.4 Outdoor installation

1.4.1 Outdoor unit foundation work

1.4.2 Outdoor unit installation

1.4.3 Refrigerant piping connection

1.4.4 Leakage test

1.4.5 Vacuum drying

1.4.6 Additional refrigerant charging

1.4.7 Outdoor maintenance panel installation

1.5 Water system installation

1.5.1 Piping connection

1.5.2 Water leak detection

1.5.3 System flushing

2. Startup Procedure

2.1 Check the power cables connection of each indoor unit

2.2 Check the communication wires connection of each indoor unit

2.3 Check the wired controller wires connection of each indoor unit

2.4 Set Protocol translator DIP switches if connected with central controller or BMS system

2.5 Check the central controller or BMS setting if the central controller or BMS device is used

2.6 Check the power cables connection of each outdoor unit

2.7 Check the P,Q connection and the communication among outdoors A,B,C connection

2.8 Check the indoor control type

2.9 Check the indoor communication address when in central control

2.10 Check the indoor central control address when in central control

2.11 Check the indoor group control address when in group control

2.12 Check the outdoor pipe length switch on outdoor PCB

2.13 Check the outdoor capacity over match switch setting on outdoor PCB

2.14 Check the outdoor unit address: the master unit must be No. 1

2.15 Check the outdoor units searching when multi units in combination

2.16 Check the outdoor capacity

2.17 Start commissioning according to the rotary switch function

2.18 Check if the pump and valve is open

Warning:

Please set DIP switches of indoor units before installing indoor units into their final position

Installation instruction

For installation, please review the items below:

- Are the connected units quantity and the total capacity in the allowable range?
- Is the refrigerant pipe length in the limited range?
- Is the pipe size proper? And if the pipe is installed horizontally?
- Is the branch pipe installed horizontally or vertically?
- Is the additional refrigerant counted correctly and weighed by the standard balance?
- Is there refrigerant leakage?
- Can all the indoor power supplies be on/off simultaneously?
- Is the power voltage in compliance with the data marked on the rating label?
- Have the address of indoors and outdoors been set?
- If the control line of the target flow switch connect well?
- If the control line of the pump connect well?
- If the inlet and outlet water pipe install correctly?
- If the water temperature is within the scope of the restrictions?
- If the water flow is within the scope of the restrictions?

(1) Accessories

No.	Name	Quantity
1	Flow switch	1
2	Installation manual	1
3	T shape pipe, only use for multiple modules	1
4	Pipe adaptor	1 (10HP: 2)

(2) Before installation

1) Before installation, check respectively if the model, power supply, pipes, wires and accessories purchased are correct.

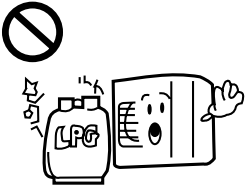

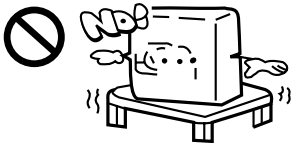

2) Check if the indoors and outdoors can be combined as the following.

Name	Model	Function	For what units
Outdoor branch pipe	TAS20	Refrigerant gathering	2 Modules
	TAS30		3 Modules

Outdoor		Indoor		Gather pipe
Capacity (100W)	Combination type	Indoor Qty	Total indoor capacity (100W)	
224	Single (8HP)	13	112-291	
280	Single (10HP)	16	140-364	
335	Single (12HP)	19	168-436	
448	Combination (8HP+8HP)	23	224-582	TAS20
504	Combination (8HP+10HP)	29	252-655	TAS20
560	Combination (10HP+10HP)	33	280-728	TAS20
615	Combination (10HP+12HP)	36	307-800	TAS20
670	Combination (12HP+12HP)	39	335-871	TAS20
728	Combination (8HP+8HP+10HP)	43	364-946	TAS30
784	Combination (8HP+10HP+10HP)	46	392-1019	TAS30
840	Combination (10HP+10HP+10HP)	50	420-1092	TAS30
895	Combination (10HP+10HP+12HP)	53	448-1164	TAS30
950	Combination (10HP+12HP+12HP)	56	475-1235	TAS30
1005	Combination (12HP+12HP+12HP)	59	503-1307	TAS30

Installation instruction

(3) Installation place selection

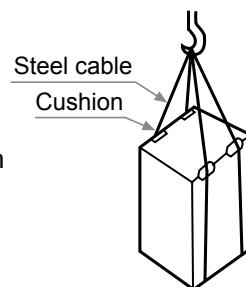
<p>Air-conditioner can't be installed in the place with flammable gas. Or it will cause fire hazard.</p> 	<p>The outdoor unit should not be installed at the place where much water can drop in.</p> 	<p>The unit should be installed at the strong enough place. Or it will cause vibration and noise.</p> 
<p>The outdoor unit should not be installed next to living rooms.</p> 	<ul style="list-style-type: none">• During installation, install the anti-vibration rubber between the unit and the bracket.	<ul style="list-style-type: none">• It is better not install the unit at the below places, or it will cause damage.• The place where there is corrosive gas (spring area, etc).• The place blowing salty air (seaside, etc).• The place existing strong coal smoke.• The place with high humidity.• The place where there is device emitting Hertzian waves.• The place where voltage changes greatly.

Note:

1. Do not install the unit at the place where the flammable gas will leak.
2. Install the unit at the strong enough place.
3. Install the unit at the flat place.
4. After opening the electric box cover for maintenance, please fix the cover with screw firmly.

(4) Transportation

- During transportation, please don't unwrap the packaging, and move the unit to the installation location as closely as possible.
- Don't hang the unit only at two points. When hanging the unit, don't sit on the unit. The unit should be upright.
- When removing the unit with the forklift, put the fork into the special hole at the bottom of the unit. When being hanged, the rope should be 4 pieces of steel cable with over 6mm diameter.
- Put the cushion at the contact section between steel cable and the unit against the distortion or damage.
- Forbid lifting the unit by lifting the wood bottom seat.



Note:

When multiple modules are installed, the outdoor unit should be ranked by capacity, the larger capacity is closer to the main pipe of gather pipe.

Product introduction

Product introduction

- Water Cooled VRF is a water-air heat pump air condition equipment which can deliver cooling and heating by taking water as its heat source. Water acts as the heat-extraction source when heating, while heat-absorption source when cooling. Thus there is no risk of frost formation on condenser's surface.
- Water Cooled VRF takes a water circulating loop as its heat and heat-extraction source. When the water's temperature in the loop is higher than the rated value because of the heat release of the Water Cooled VRF (Cooling), the water will exchange the heat into the air through the cooling tower. When the temperature is lower than the rated value, water heating is usually utilized by the heating equipment or the waste heat.
- In a case of there are more than one Water Cooled VRF being installed, the whole system can have some units running in cooling and other units running in heating, to realize the energy saving of water side heat recovery.

Advantages

Energy-saving

The Water Cooled VRF delivers higher efficiency compared with the air-air heat pump series because of its low condensing temperature. Individual measure of electricity consumption on this VRF equipment is available. For example, when the building is occupied by different tenants, the electricity charge and maintenance cost can be counted separately. Cooling and heating simultaneously in combination system can achieve inner balance of the energy, save the operating time of the cooling tower and heating equipment, and achieve the purpose of energy saving.

Flexible Application

As the efficiency of the water system will not be affected by ambient temperature, users can choose cooling or heating mode flexibly in different seasons or based on practical requirements.

Attentions

This Water Cooled VRF uses "Mode Consistence" control method without refrigeration side heat recovery function, which means all the indoor units under same outdoor system can only run either cooling or heating at one time.

Main Components

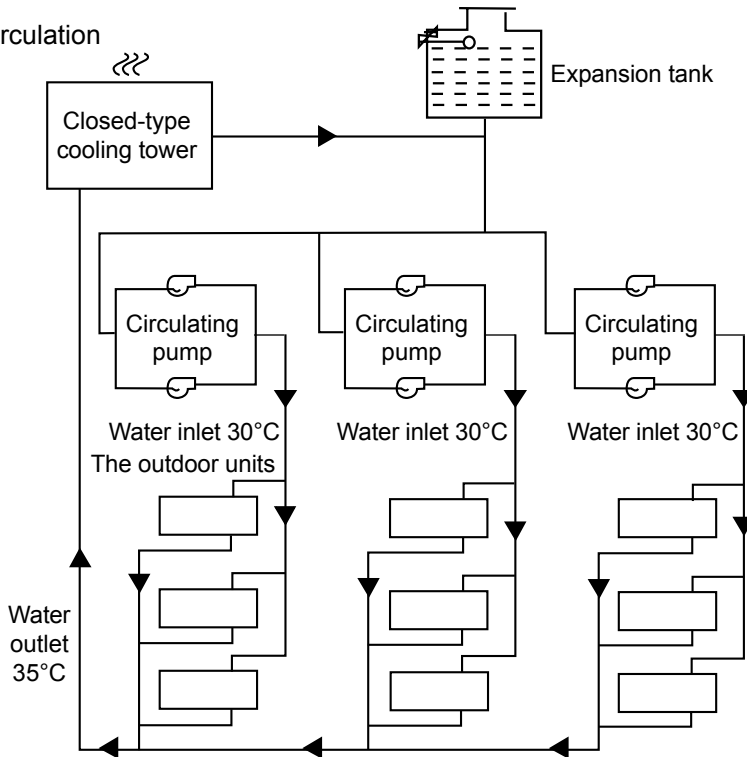
The Water Cooled VRF is composed of two parts, parallel connected Water Cooled sets and dual circulating pipes.

The main equipment and accessories include the following: cooling equipment; heating equipment (heat exchanger unit or boiler); water treatment equipment; expansion tank; water circulating pump; water flow switch.

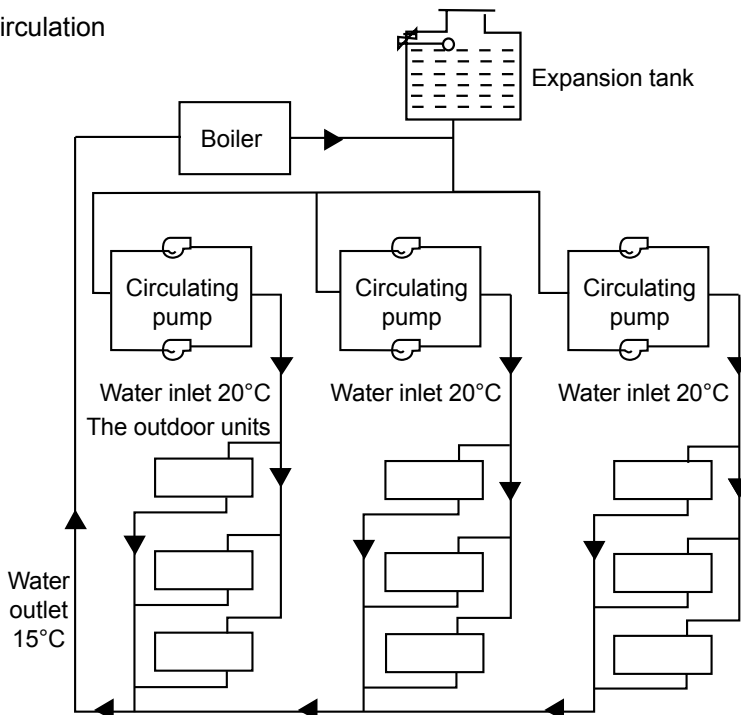
Product introduction

Operation chart

a. Cooling circulation



b. Heating circulation



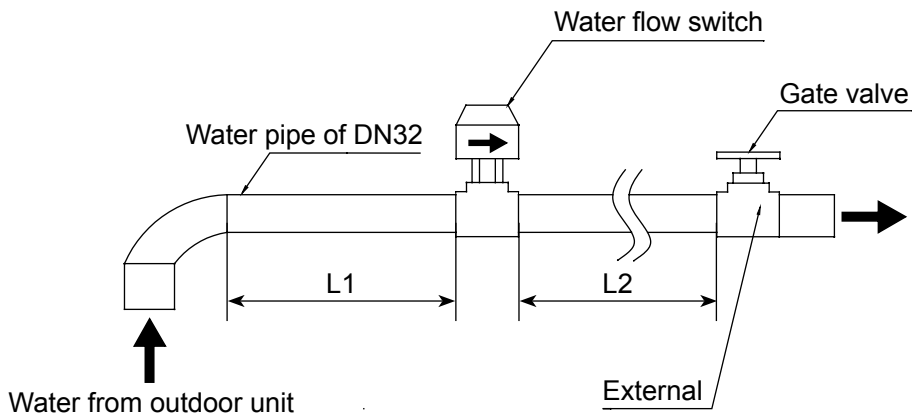
Product introduction

Water system

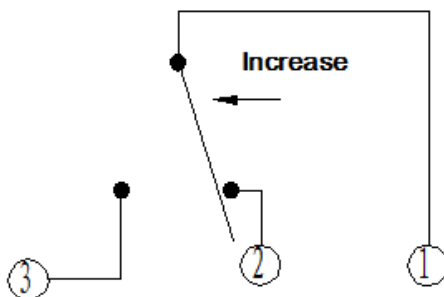
Cooling water system guarantees Water Cooled VRF reliable operation. Water volume and water temperature should reach the design index (see the technical parameter) during the designing of VRF water system in order to not cause cooling volume dropping or tripping protection because of inadequate water or lack water or water temperature too high.

① System water volume and water temperature .

The total water flow volume is the sum of each Water Cooled VRF flow volume referring to technical specs. for each individual unit rated water flow volume. Temperature of water inlet is 7-45°C. When system uses electrical two way valve to control water flow volume, the total water flow volume can be counted by the units working ratio.



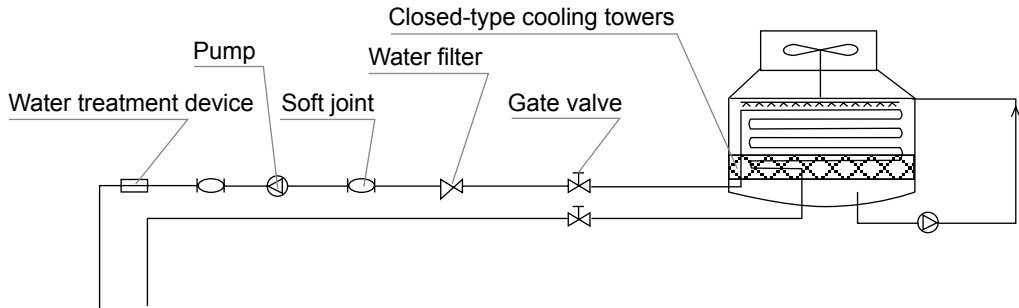
- The flow switch is placed below the electrical box, please out during installation .
- Note the direction of the flow switch, can't install vertical downward.
- The straight pipe length L1 and L2 should be not less than 160 mm, or it will affect the control precision.
- When connect wiring, please cut off power supply.
- Prohibit change flow switch settings.
- Please connect to the earth, after connect wiring, don't forget install the flow switch shell.
- Flow switch should be installed by connecting the terminal 1, 3 with K1, K2 of outdoor unit.



Product introduction

② Cooling towers and pumps

- a) Select the cooling tower capacity based on the system's water circulation volume.
- b) The unit water system must select the closed cooling tower.
- c) Circulating Pump is generally vertical pipeline pump. It is according to the length of the pipe and drag to select a pump head. To ensure system security, water pump should remain a standby pump.



③ Water treatment and control

When the Circulating cooling water runs for a long time, it will produce algae, and salinity will rise, resulting in heat exchanger fouling, which will affect the heat transfer efficiency. It is better to process timely. Electronic water treatment meters should be included for scale resistance protection and water quality stabilization. They have been widely applied in engineering now. Therefore the electronic water treatment meter is preferred in the cooling water system design. You will experience accumulation of sludge in the Water Cooled VRF water system after operation (caused by dust in the air), which needs regular cleaning (generally one time a year). Professional central AC water system cleaning agent is recommended.

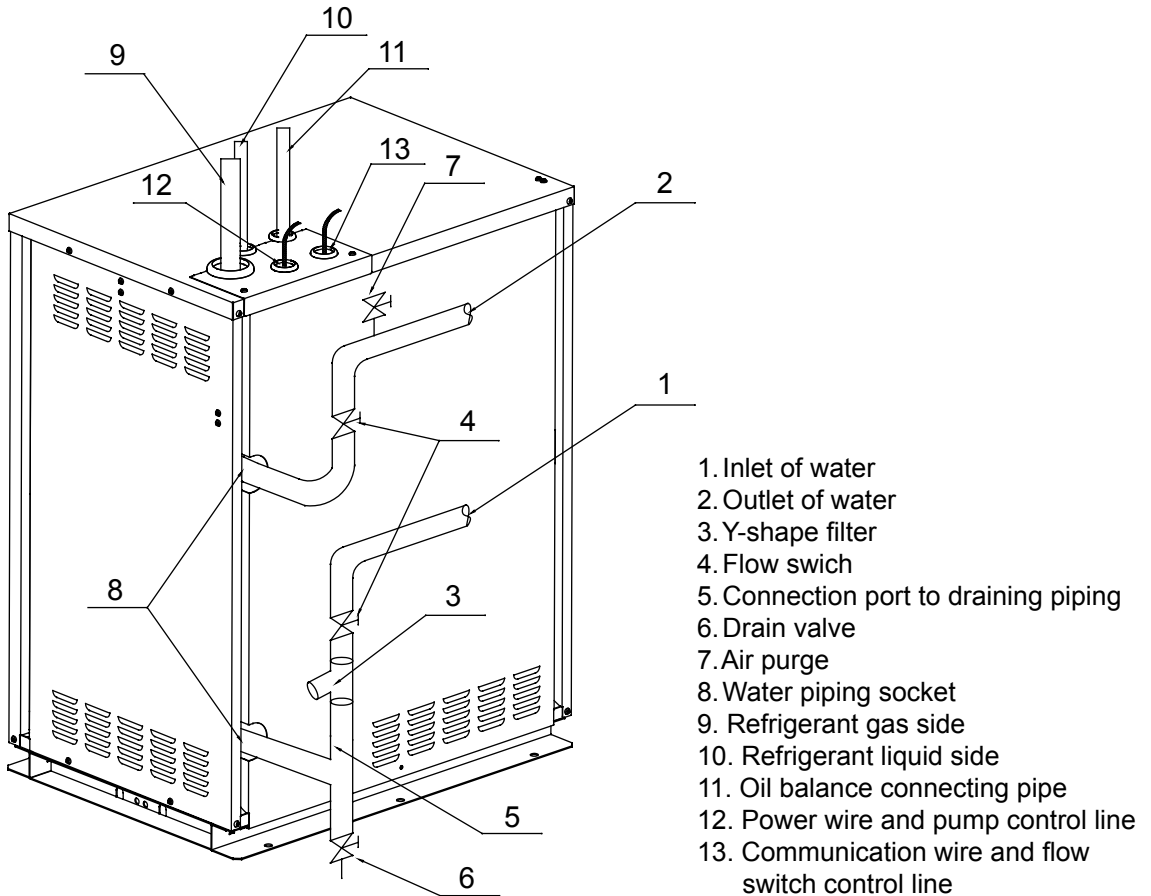
Water quality control

	Item	Standard requirements	Influencing factors
Standard	PH	7.5-9.0	○/□
	Conductivity	≤200uv/cm(25°C)	○/□
	Chlorine ion	≤50ppm	□
	Sulfate ion	≤50ppm	□
	Total iron	≤0.3ppm	□
	Alkali ion	≤50ppm	□
	Total hardness	≤50ppm	○
Reference	Sulfion	/	□
	Ammonium ion	/	□
	Silicon	≤30ppm	○

Notes: ○: scaling □: erosion

Product introduction

④ Cooling water pipe system

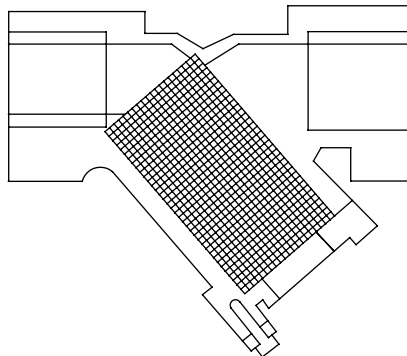


- 1. Inlet of water
- 2. Outlet of water
- 3. Y-shape filter
- 4. Flow switch
- 5. Connection port to draining piping
- 6. Drain valve
- 7. Air purge
- 8. Water piping socket
- 9. Refrigerant gas side
- 10. Refrigerant liquid side
- 11. Oil balance connecting pipe
- 12. Power wire and pump control line
- 13. Communication wire and flow switch control line

Attention:

1. Install a Y-shape water filter in the inlet of water piping within a distance of 1.5 m from the outside unit.

Recommend Y-Water filter



Filter demand

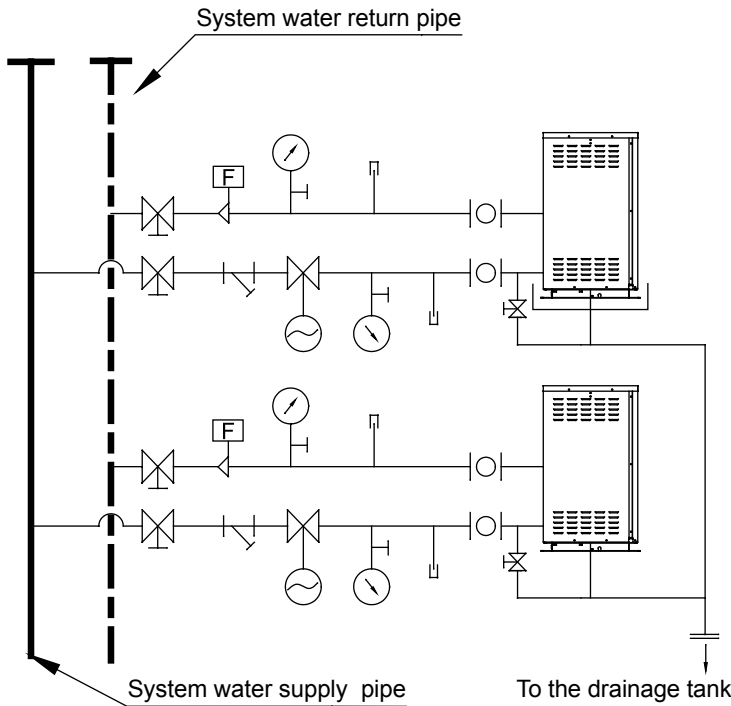
Water pipe	Pipe size of filter	Liquid	Max. pressure	recommended mesh
DN32	1 1/4 inch	Water	1.6 MPa	40/inch

Product introduction

2. Insulation should be installed on the water inlet/outlet to prevent condensate water or icing;
3. Water in heat exchanger should all be drained out during long shutdown in the winter to avoid icing;
4. The diameter of water pipe should be the same as the diameter of unit connection (1-1/4 inch) or larger.
5. Water flow switch should be installed on the heat exchanger water outlet pipe to operate cut-off protection.
6. When there are many units in the Water Cooled VRF, in order to guarantee an equalized water allocation among each unit, reversed return system should be used in water supply and water return;
7. Install a gate valve for chemical cleaning in an easy position to handle.
8. Run the water pump to flush inside of water piping. Then, clean the strainer.
9. When install the unit, the upper unit must add water pans, prevent water flowing into the lower unit.
10. When connect the water pipe, the water must through the water inlet into the double-pipe heat exchange, otherwise the unit performance will become worse.
11. The pump is installed in the water system need starter. The unit only offers the pump control signal, doesn't offer the pump power supply.
12. Between the welding mouth of double-pipe heat exchanger and site pipe should use flexible joint, to reduce the vibration.
13. For the convenience of maintenance and repair, install the hydraulic pressure gauge and thermometer at the inlet and outlet pipe mouth.
14. The pipe and the joint need independent supporting, the supporting is not the unit.
15. All the connection pipes connected to the double-pipe heat exchanger should separate cleaning before connecting, in order to avoid the foreign body into the heat exchanger.
16. In the system all may freeze pipes shall be heat preservation.
17. Pipe connecting need follow corresponding installation procedures. All pipes must be in line with the local plumbing codes and regulations.
18. Pipe size should be equal to or greater than the interface unit size (DN32).
19. All the low position of the water system need to install drain valve, the water in the double-pipe heat exchanger and the system can be completely ruled out.
20. Water flow should not exceed the range in the following table, or failures may occur.

Capacity	Water flow range (m ³ /h)
8HP	2.4-7.2
10HP	3.0-9.0
12HP	3.6-10.8

Product introduction

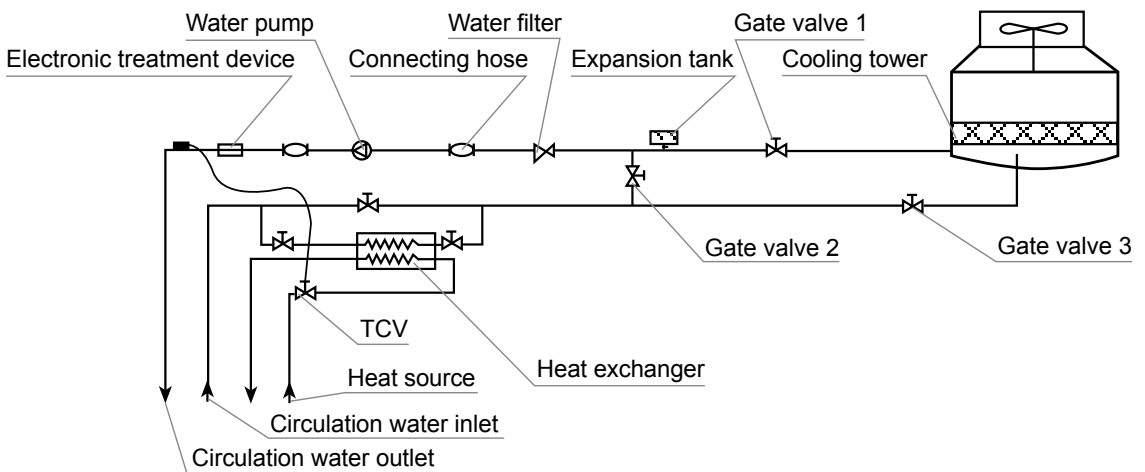


	Gate valve
	Pressure gauge
	Flexible connection
	Drainage valve
	Motorized valve
	Y-shape filter
	Thermometer
	Flow switch
	water pan

⑤ Auxiliary Thermal Source:

In winter, circulating water temperature is maintained from 15 to 25°C. When in heating mode, the water temperature will drop down gradually, so there should have auxiliary heating source to maintain the water temperature in rating range. There are many types of auxiliary heating source, such as boiler, wasted heating source from factory, or civilian steam system. Below diagram shows the piping work when system runs in heating mode in winter.

The connection of thermal source and cooling tower:



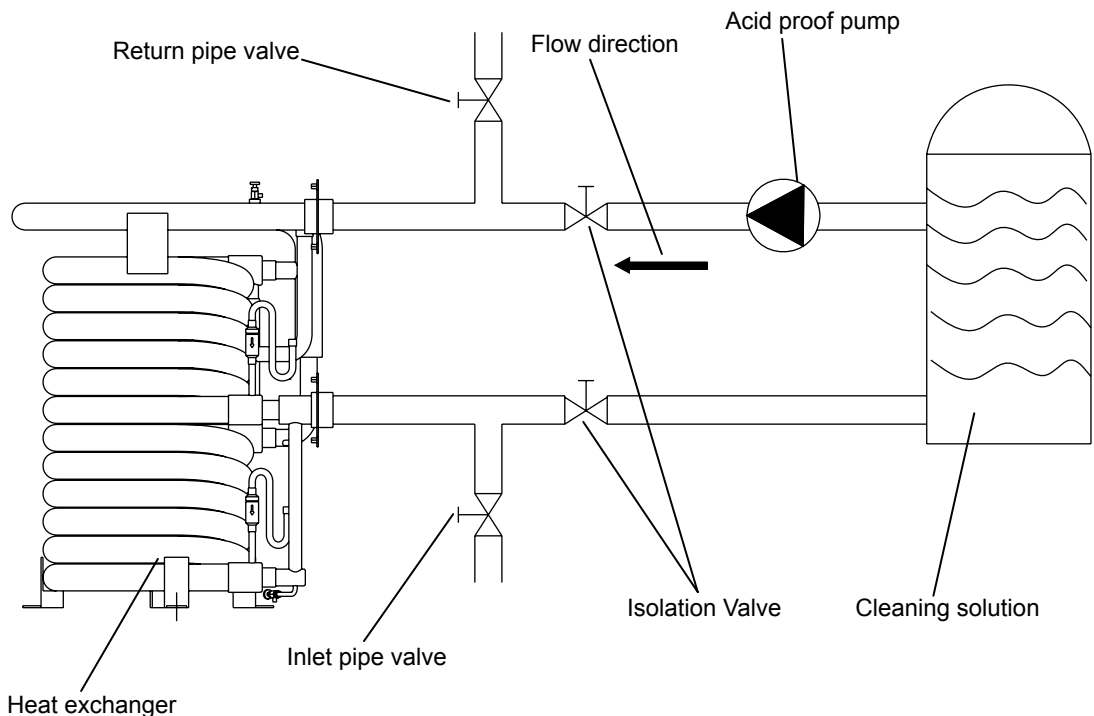
Product introduction

⑥ Use guide and maintenance of tube-in-tube heat exchanger

Cautions in the process of using tube-in-tube:

1. The thread specification for inlet and outlet water pipe is G1-1/4.
2. To avoid foreign body into the system impacting performance and even leading to the corrosion of the double-pipe heat exchanger, must connect water filter unit in the feed line attachment, recommend mesh is 40 mesh per inch. And please according to the situation of water quality, regular cleaning filter.
3. Should be used water pipe in accordance with local and national laws and regulations, water pipe size is not less than double-pipe heat exchanger interface size (DN32).
4. In winter, if you don't use for long time, be sure to discharge all the water in the system to prevent frost crack system and close the power supply.
5. The water inside the double-pipe heat exchanger can be discharged through drain valve near inlet water of the double-pipe heat exchanger.
6. According to the different tube heat exchanger and pipe scaling of water system, regular clean the heat exchanger and water system to remove scale.
Suggestion: the water system set isolation valves in the appropriate position; it is convenient to connect cleaning system.

Cleaning of heat exchanger



Product introduction

7. The configuration of the cleaning solution

Recommended acid lotion: oxalic acid 5%, relievers 1.2%, surfactant 0.8%, acid pickling temperature 60°C, in this condition the cleaning effect is better.

When use hydrochloric acid to clean the system, in order to avoid corrosion and shorten the life of the heat exchanger, the concentration of hydrochloric acid should be limited to 3% -5%, and added at a concentration of 0.2% -0.3% of the release agent. When cleaning, the timely detection of PH value, when PH = 8, immediately stop cleaning, and then replace it by water.

8. Cleaning method

- a) Before connecting the cleaning system must stop unit, turn off the water system circulating pump, shut down the sluice valve on inlet and return water pipe, shut down the drain valve and vent valve of the heat exchanger.
- b) The flow directions of cleaning solvent and heat exchanger refrigerant are opposite.
- c) Pickling: check the system is leak-free, Open the water pump and fill acid solution, turn off the pump, soaked 2h. open the pump runs continuously and stop 3-4 times. During start the water pump 0.5h /time. In the pickling process should be timely testing acid concentration, when the difference value between two adjacent test concentrations below 0.2%, stop pickling and discharge the waste pickling liquid into the waste tank.
- d) Neutralizing: after pickling, mixed NaOH, Na_3PO_4 , and softened water in certain proportion, using dynamic circulation method to alkali wash the heat exchanger reach neutralization. Discharge the neutralized waste discharged into the waste tank.
- e) Water washing: After neutralization, with clean softened water repeatedly flush the heat exchanger 0.5h, and rinse residue inside the heat exchanger thoroughly. Discharge the waste water into the waste tank.
- f) Passivating: the casing heat exchanger is exposed to air for 3-4 h, or use the high-pressure air purging 2 h. generate passivation layer on surface.
- g) After finish the cleaning, close the isolation valve, dismantling cleaning systems and equipment, and keep it aside.
- h) Please contact the waste collection company to disposal the waste liquid.
- i) Reconnect the unit water system, and then check if the unit can work normally.

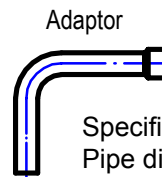
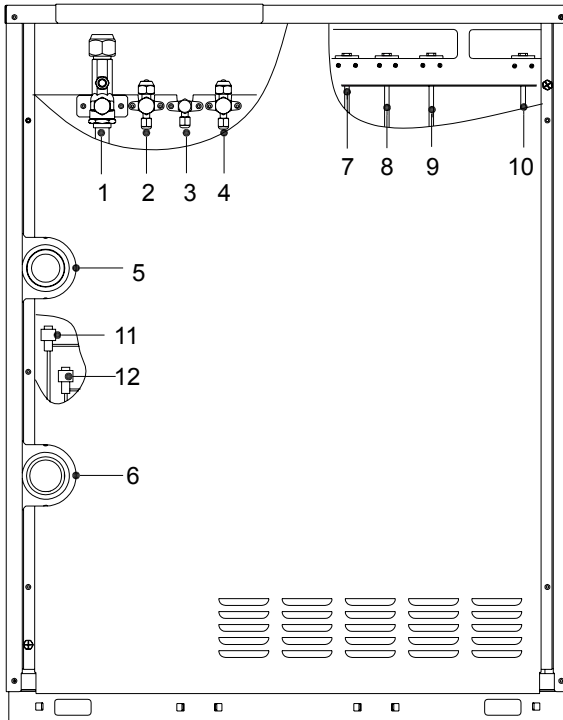
9. Warning about the cleaning

- a) The flow direction of the cleaning solution must be the same as requirement.
- b) Because the water quality and heat exchangers are used in of different occasions, the cleaning methods and periodicity may differ, this method is only for reference
- c) You can not use nitric acid as a cleaning agent.
- d) Cleaning solution and chemical solution is bad for eyes and skin, cleaning process needs good protection.
- e) Please invite professional cleaning personnel to operate.

10. The quantity of circulating water should meet the requirement, If antifreeze added , the one reactive with Zn (e.g. antifreeze with ethylene glycol) should not be chosen, or it will accelerate corrosion.

Product introduction

⑦ Refrigerant piping system



Adaptor

Specifications
 Pipe diameter:19.05mm
 Flared inner diameter:22.4mm
 Total length:200mm

1. Gas pipe valve
2. Liquid pipe valve
3. Service valve
4. oil pipe valve
5. Water outlet connection
6. water inlet connection
7. SV11
8. SV1
9. SV10
10. SV9
11. LEVA1
12. LEVA2

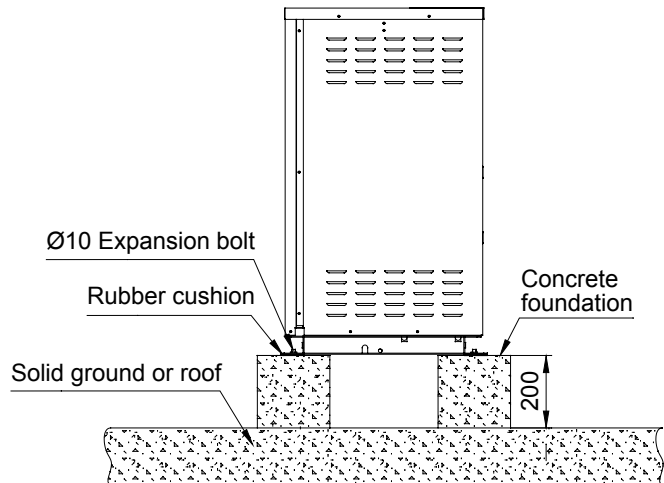
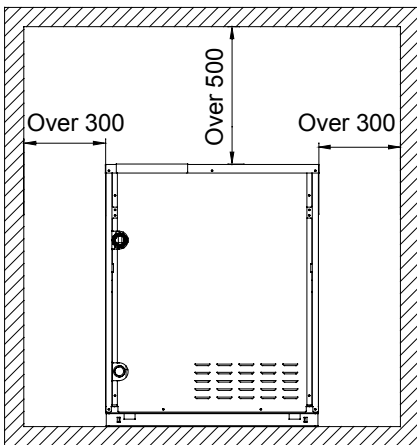
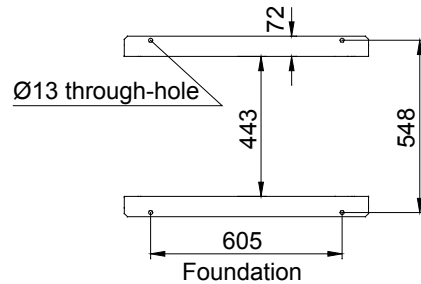
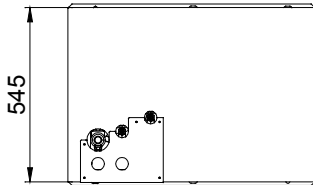
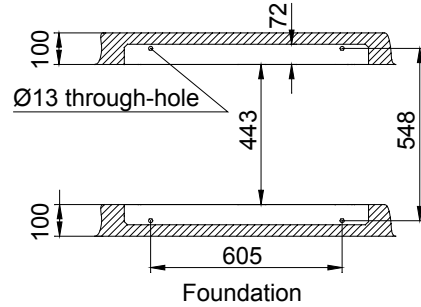
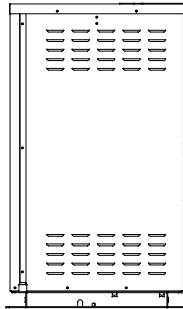
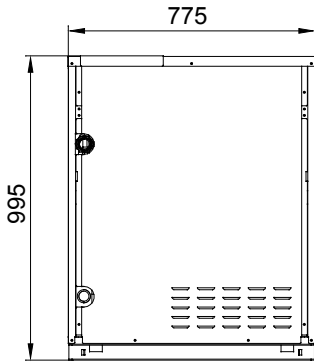
Adaptor should be fixed on the gas stop valve except 8HP model, and the Maximum length should be below 500mm, or it will affect the capacity, and adaptor on liquid stop valve need be made on site.

Model	Standard pipe size		Stop valve size		Adaptor	
	Gas	Liquid	Gas	Liquid	Gas	Liquid
8HP	∅19.05mm	∅9.52mm	∅19.05mm	∅12.7mm	/	Optional
10HP	∅22.2mm	∅9.52mm	∅19.05mm	∅12.7mm	Required	Optional
12HP	∅25.4mm	∅12.7mm	∅19.05mm	∅12.7mm	Required	/

Attention should be paid to the location of electronic expansion valve and solenoid valve during maintenance.

Exterior and installation dimensions

1. 8~12HP exterior and installation dimensions

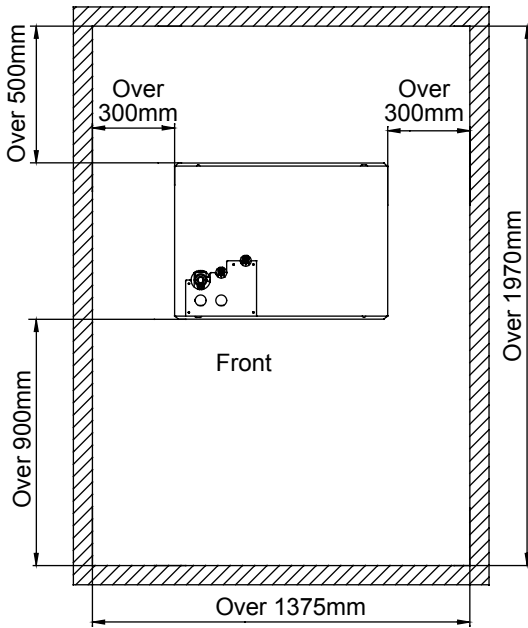


Note:

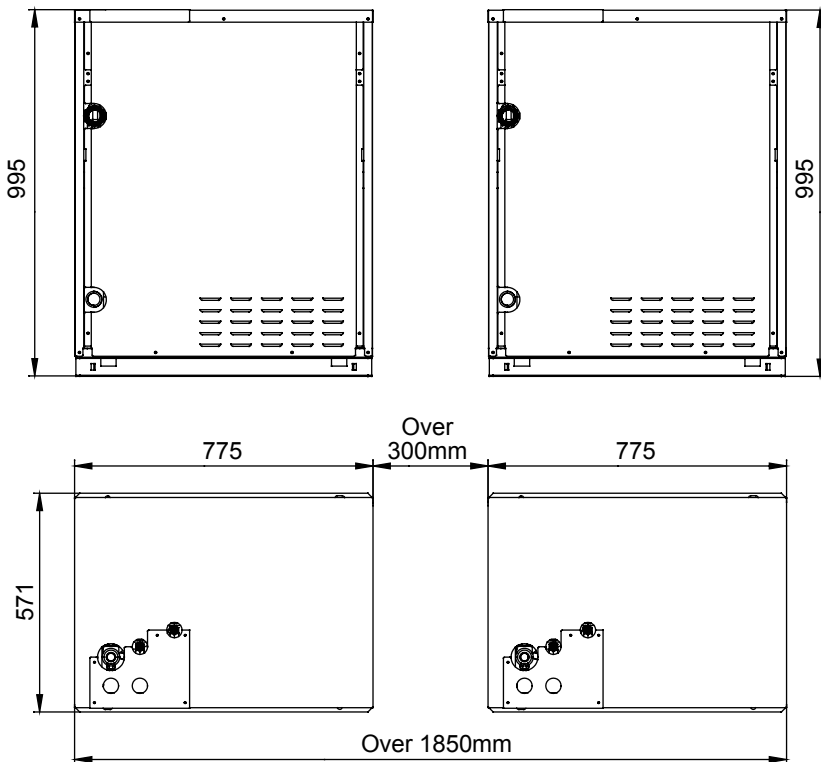
Rubber cushion's cross sectional area should be greater than 3cm^2 or may lead to sheet metal deformation.

Exterior and installation dimensions

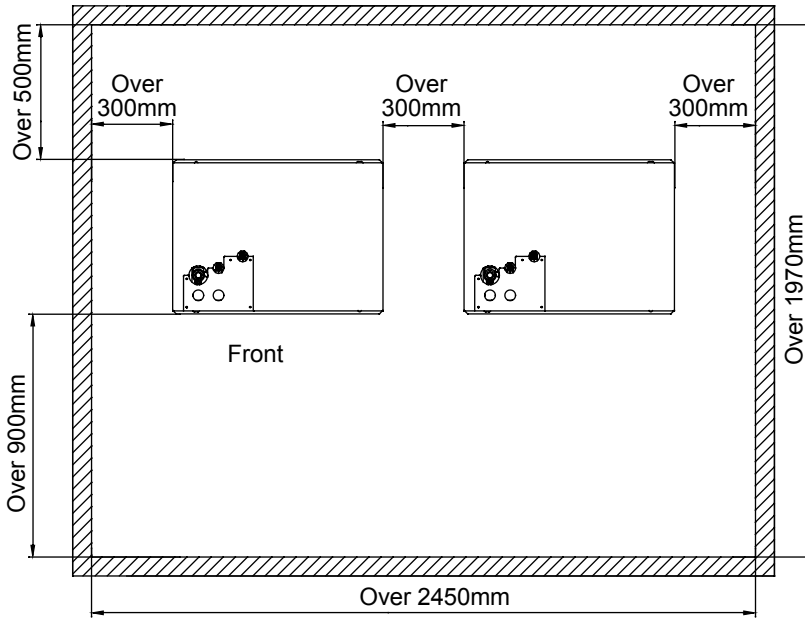
A. Sites for one outdoor unit



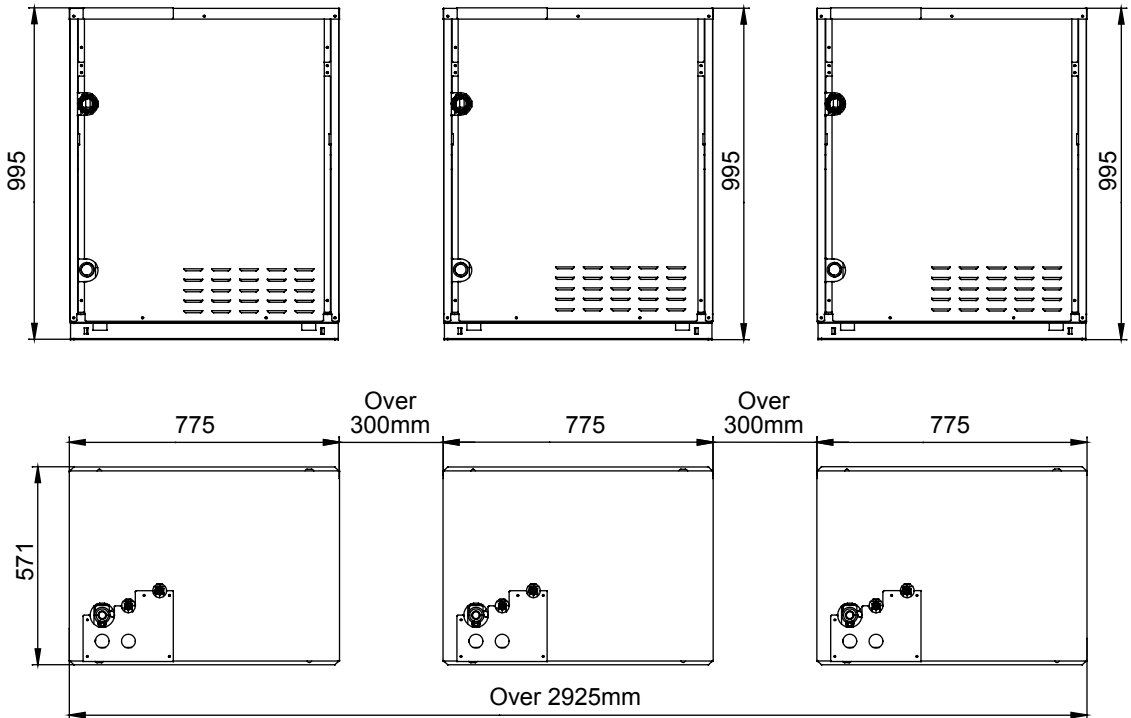
B. Sites for two outdoor units



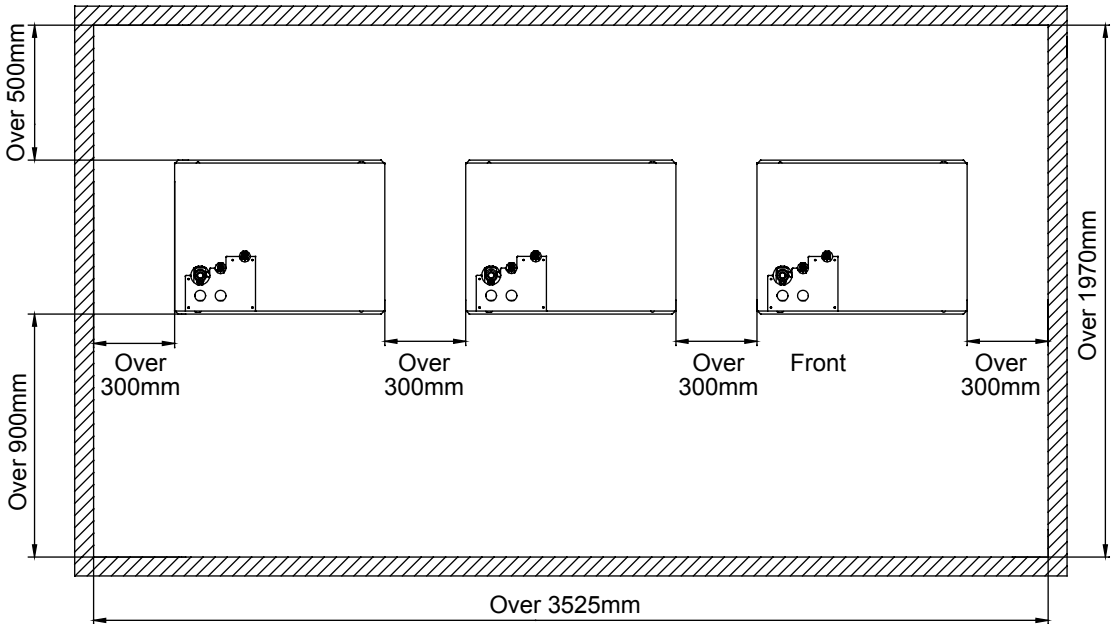
Exterior and installation dimensions



C. Sites for three outdoor units



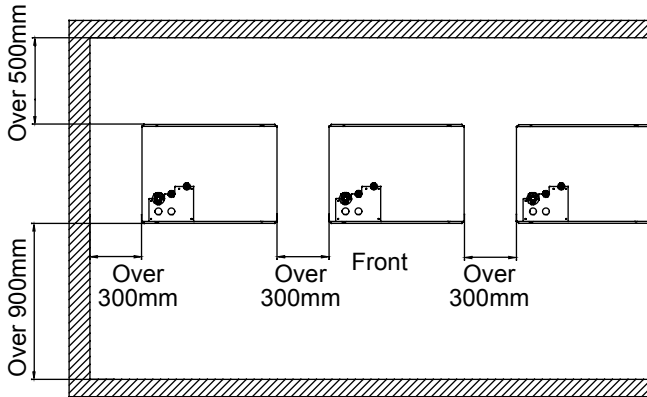
Exterior and installation dimensions



2. Combination installation dimensions

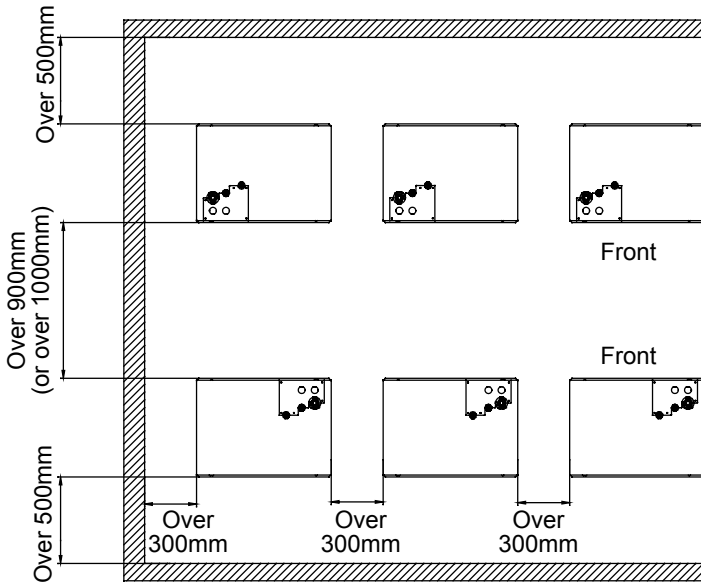
When there are walls around the outdoor units:

A. Sites for one-row layout

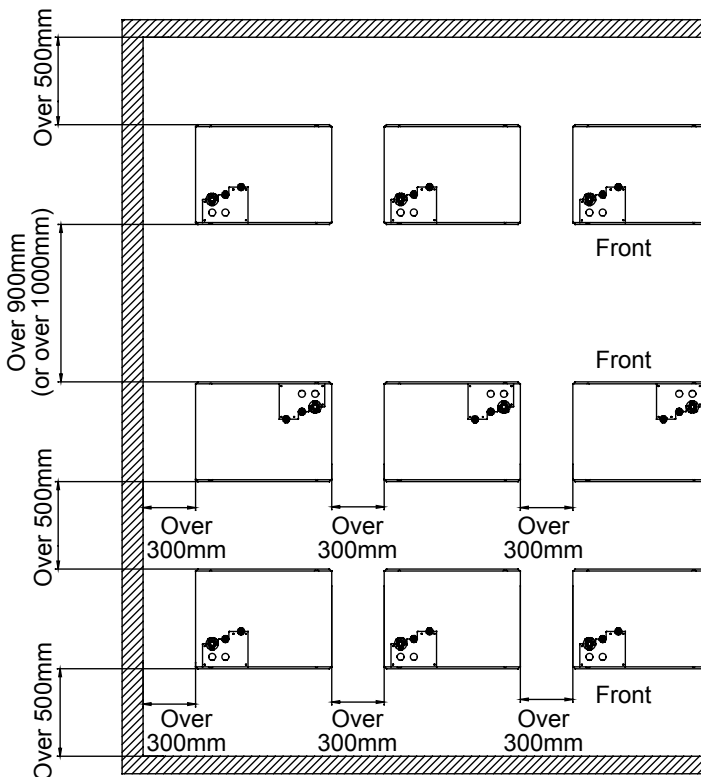


Exterior and installation dimensions

B. Sites for two-row layout



C. Sites for three-row layout



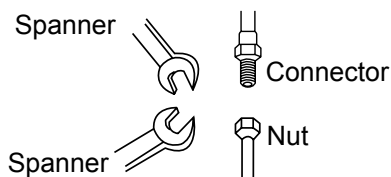
Installation procedure

A. Refrigerant pipe connection

Pipe connection method

- To ensure the efficiency, the pipe should be as short as possible.
- Daub the refrigerant oil on the connector and the flared nut.
- When bending the pipe, the bending semi-diameter should be as large as possible against the pipe being broken or bent.
- When connecting the pipe, aim at the center to thread the nut by hand and tighten it with the double spanners.
- Fastening torque please refers to "pipe specs and fastening torque" on page 30.
- Don't let the impurity such as sand, water goes into the pipe. Antifouling measures refer to Page 30.

When fastening and loosing the nut, operate with double spanners, because only one spanner cannot execute firmly.



If threading the nut without aiming at the center, the screw thread will be damaged, further it will cause leakage.

Cautions in piping installation:

1. When welding the pipe with hard solder, charge nitrogen into the pipe against oxidation. The pressure gauge should be set at 0.02MPa. Perform the procedure with good nitrogen circulation. Otherwise, the oxide film in the pipe may clog the capillary and expansion valve resulting in accident.
2. The refrigerant pipe should be clean. If the water and the other impurity enter the pipe, charge the nitrogen to clean the pipe. The nitrogen should flow under the pressure of about 0.5MPa and when charging the nitrogen, stop up the end of the pipe by hand to enhance the pressure in the pipe, then loose the hand (Meanwhile stop up the other end).
3. The piping installation should be executed after the check valves are closed.
4. When welding the valve and the pipe, cool down the valve with wet towel.
5. When the connection pipe and the branch pipe need to be cut down, please use the special shears and do not use the saw.
6. When welding copper pipe, use the phosphor copper welding rod without any welding flux. (Welding flux will damage the piping system. The welding flux containing chlorine will corrode pipe. Especially, the welding flux with fluorine will damage refrigeration oil.)

Pipe material and specs selection

1. Please select the refrigerant pipe according to the below material.
Material: the phosphoric oxidize seamless copper pipe, model: C1220T-1/2H (diameter is over 19.05); C1220T-O (diameter is below 15.88).
2. Thickness and specifications: The unit is charged with R-410A.
O-type should not be used for the pipe which diameter is over 19.05, or poor pressure resistance will happen. Therefore, 1/2H type with its thickness over min. regulation should be chosen.
3. The manifold pipe and branch pipe must be from AIRWELL.
4. When installing the check valve, refer to the relative operation instruction.
5. The pipe installation should be in the allowable range.
6. The installation of manifold pipe and branch pipe should be performed according to the relative manual.

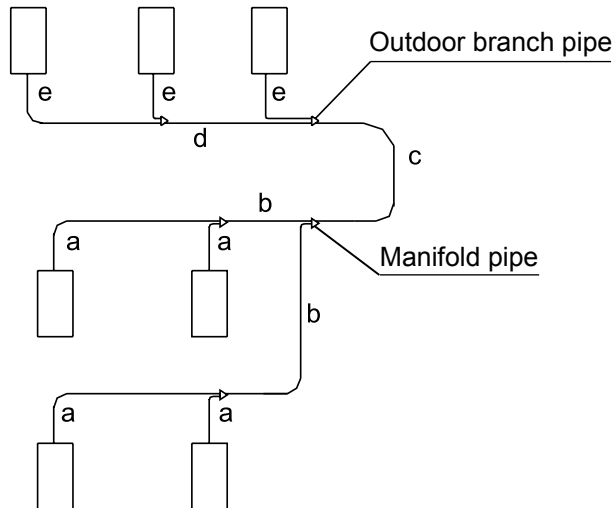
Installation procedure

Antifouling measures

First, clean the pipe.

Position	Installation period	Measures
Outdoor	More than 1 month	Flat the pipe end
	Less than 1 month	Flat the pipe end or seal with adhesive tape
Indoor	Nothing to do with period	

Pipe specification:



1. Pipe “a” diameter (between indoor and manifold pipe) (depends on indoor pipe)

Model Capacity (kBtu/h)	Gas pipe		Liquid pipe	
	Diameter (mm)	Connecting method	Diameter (mm)	Connecting method
07	Ø9.52	Flared	Ø6.35	Flared
09	Ø9.52		Ø6.35	
12	Ø12.7		Ø6.35	
16	Ø12.7		Ø6.35	
18	Ø12.7		Ø6.35	
24	Ø15.88		Ø9.52	
28	Ø15.88		Ø9.52	
30	Ø15.88		Ø9.52	
38	Ø15.88		Ø9.52	
48	Ø15.88		Ø9.52	
72	Ø25.4	Braze	Ø9.52	
96	Ø25.4		Ø9.52	

Note:

High Wall AWSI-HBV007 AWSI-HBV009 gas pipe: Ø12.7mm

High Wall AWSI-HBV018 gas pipe/ liquid pipe: Ø15.88mm/9.52mm

Installation procedure

2. Pipe "b" diameter (between manifold pipes)

Total indoor capacity after the manifold pipe (kW)	Gas pipe (mm)	Liquid pipe (mm)
<16.8kW	Ø 15.88	Ø9.52
16.8KW≤X<22.4kW	Ø19.05	Ø9.52
22.4KW≤X<33.0kW	Ø22.22	Ø9.52
33.0KW≤X<47.0kW	Ø28.58	Ø12.7
47.0KW≤X<71.0kW	Ø28.58	Ø15.88
71.0KW≤X<101.0kW	Ø31.8	Ø19.05
≥101.0kW	Ø38.1	Ø19.05

Note: Adjust the diameter on job site (changing pipe is needed)

When the latter indoor total capacity is less than 14.0kw, pipe b will use the specification as the pipe a.

3. Pipe "c" diameter (main pipe, between outdoor branch pipe and the first manifold pipe)

Outdoor capacity	Main pipe		Enlarged main pipe	
	Gas pipe (mm)	Liquid pipe (mm)	Gas pipe (mm)	Liquid pipe (mm)
22.4kW	Ø19.05	Ø9.52	Ø22.2	Ø12.7
28.0kW	Ø22.2	Ø9.52	Ø25.4	Ø12.7
33.5kW	Ø25.4	Ø12.7	Ø28.58	Ø12.7
44.8kW	Ø28.58	Ø15.88	Ø31.8	Ø15.88
50.4kW	Ø28.58	Ø15.88	Ø31.8	Ø15.88
56.0kW	Ø28.58	Ø15.88	Ø31.8	Ø15.88
61.5kW	Ø28.58	Ø15.88	Ø31.8	Ø15.88
67.0kW	Ø31.8	Ø19.05	Ø38.1	Ø19.05
78.0kW	Ø31.8	Ø19.05	Ø38.1	Ø19.05
78.4kW	Ø31.8	Ø19.05	Ø38.1	Ø19.05
84.0kW	Ø31.8	Ø19.05	Ø38.1	Ø19.05
89.5kW	Ø31.8	Ø19.05	Ø38.1	Ø19.05
96.0kW	Ø31.8	Ø19.05	Ø38.1	Ø19.05
100.5kW	Ø38.1	Ø19.05	Ø38.1	Ø22.22

Note: When the distance from outdoor to the farthest indoor is over 80m, the enlarged diameter should be chosen for the main pipe.

Installation procedure

4. Pipe “d” diameter (between outdoor branch pipe)

Total outdoor capacity before the branch pipe	Liquid pipe(a,c) (mm)	Gas pipe(b,d) (mm)
~68.0kW	Ø15.88	Ø28.58
69.0~90.0kW	Ø19.05	Ø31.8

5. Pipe “e” diameter (between outdoor and the outdoor branch pipe)

Model	Gas pipe		Liquid pipe		Oil pipe	
	Diameter (mm)	Connecting method	Diameter (mm)	Connecting method	Diameter (mm)	Connecting method
VVWO-220R-01T32	Ø19.05	Flared	Ø9.52	Flared (Pipe adaptor)	Ø9.52	Flared
VVWO-280R-01T32	Ø22.22	Flared (Pipe adaptor)	Ø9.52		Ø9.52	
VVWO-335R-01T32	Ø25.4		Ø12.7	Flared	Ø9.52	

Copper pipe selection:

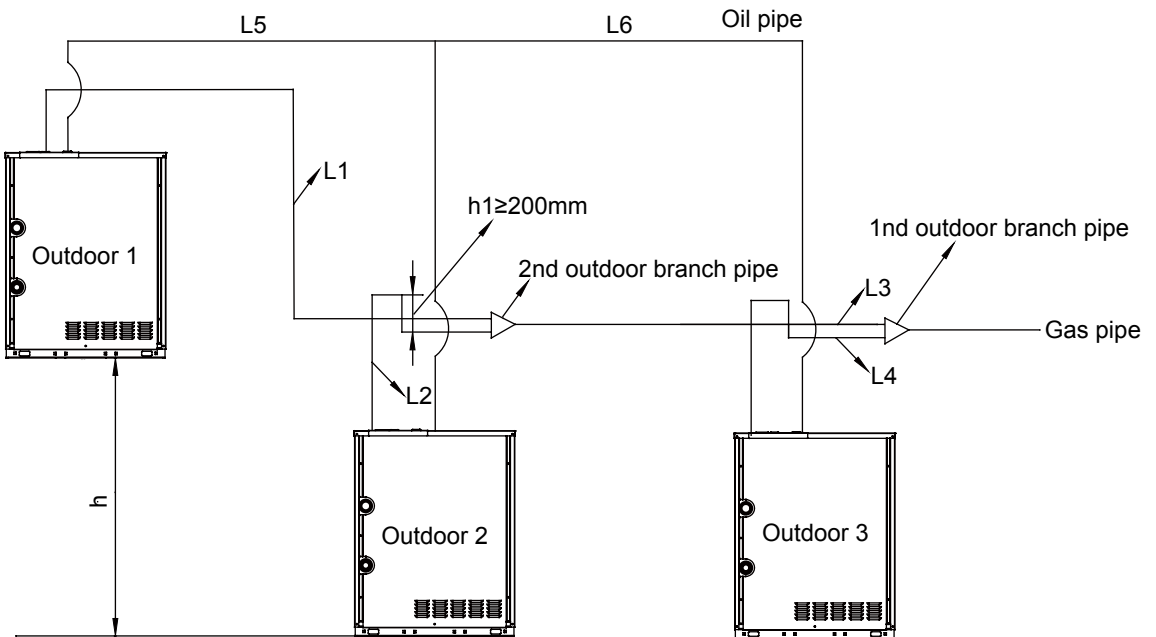
Material	O type pipe: soft pipe				
	Pipe diameter (mm)	Ø6.35	Ø9.52	Ø12.7	Ø15.88
Thickness (mm)	0.8	0.8	1.0	1.0	1.1

Material	Hard pipe							
	Pipe diameter (mm)	Ø19.05	Ø22.2	Ø25.4	Ø28.58	Ø31.8	Ø34.9	Ø38.1
Thickness (mm)	1.0	1.0	1.0	1.0	1.1	1.3	1.4	1.5

Installation procedure

Pipe length and height difference

1. Pipe length between outdoors

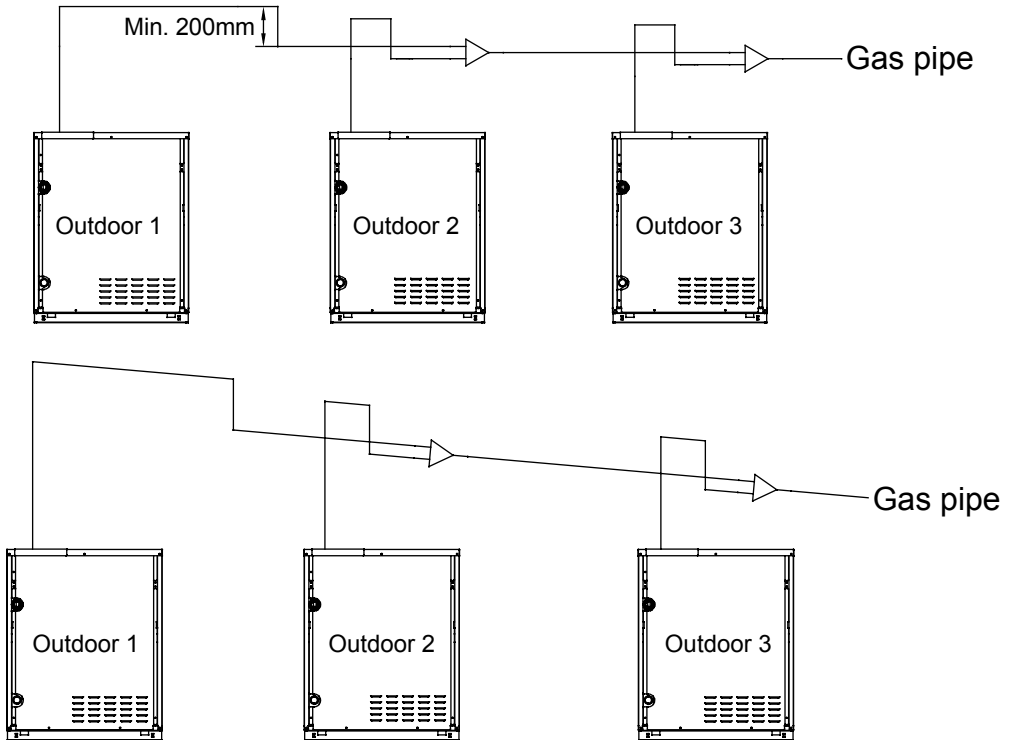


Gas/liquid pipe: $L1+L3 < 10\text{m}$, $L2+L3 < 10\text{m}$
Oil equalization pipe: $L5+L6 < 10\text{m}$
Height difference between outdoors: $h < 5\text{m}$

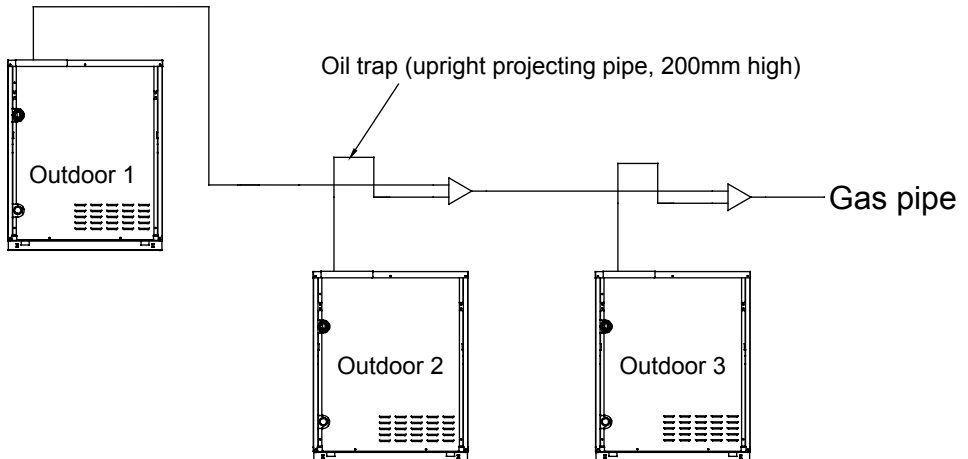
Installation procedure

Note:

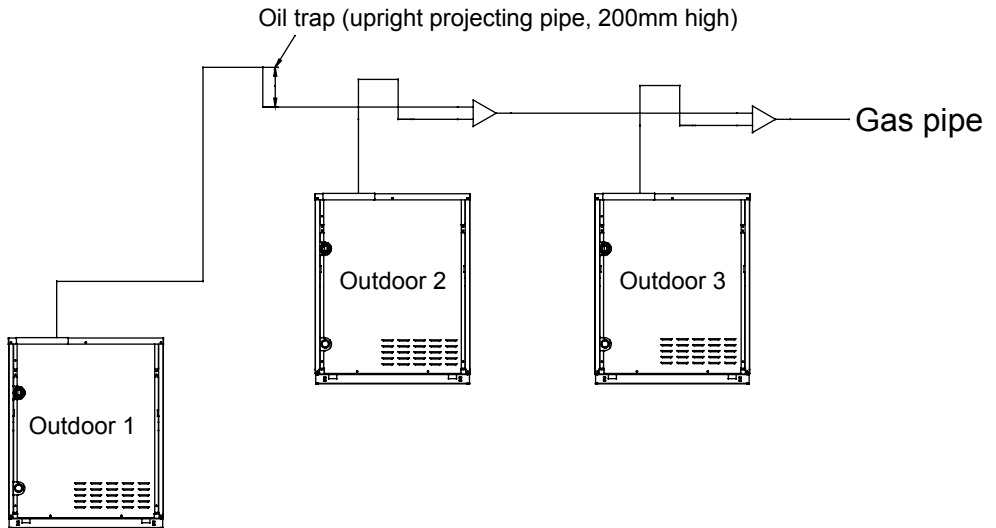
- TAS30 includes TAS20;
- The gas pipe should be installed horizontal or with slope toward the interior units (less than 15degree).
- Oil trap should be installed on gas pipe upright higher more than 200mm when gas pipe is higher than the outdoor units.



d. For installations with outdoors at different heights, please follow either of the layouts below:

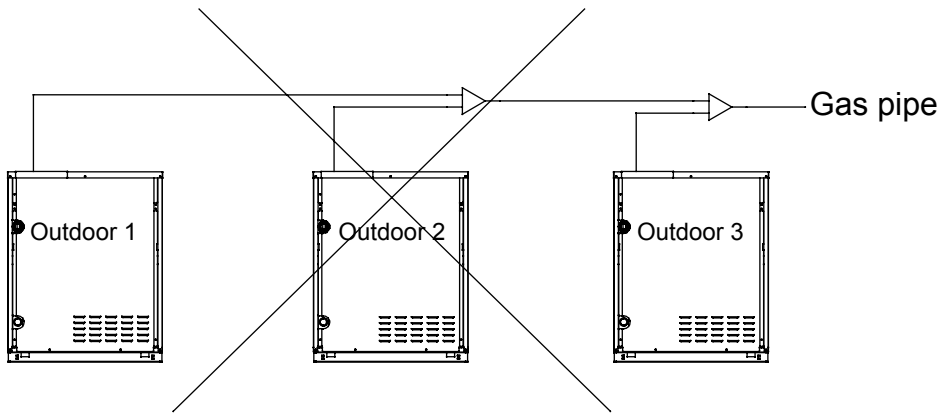


Installation procedure

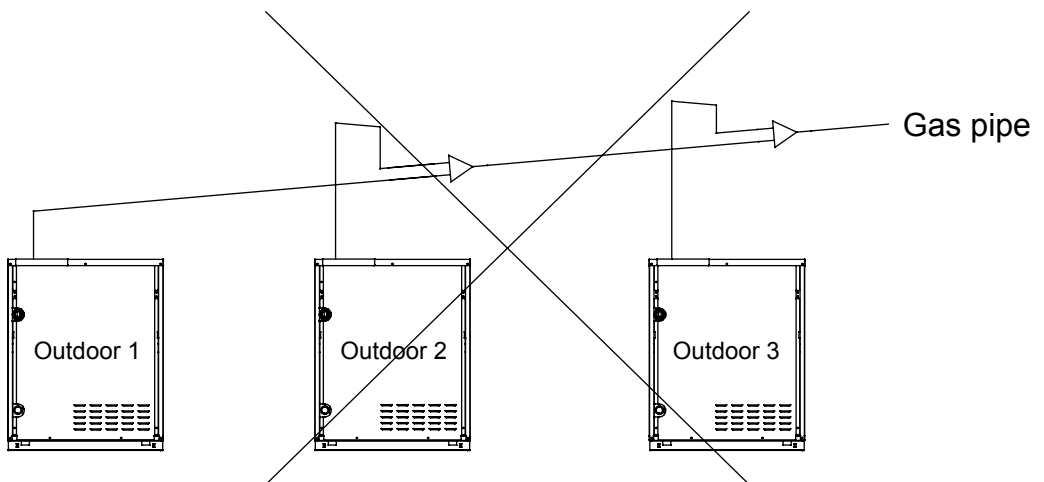


e. Incorrect method of installation

1) No oil trap

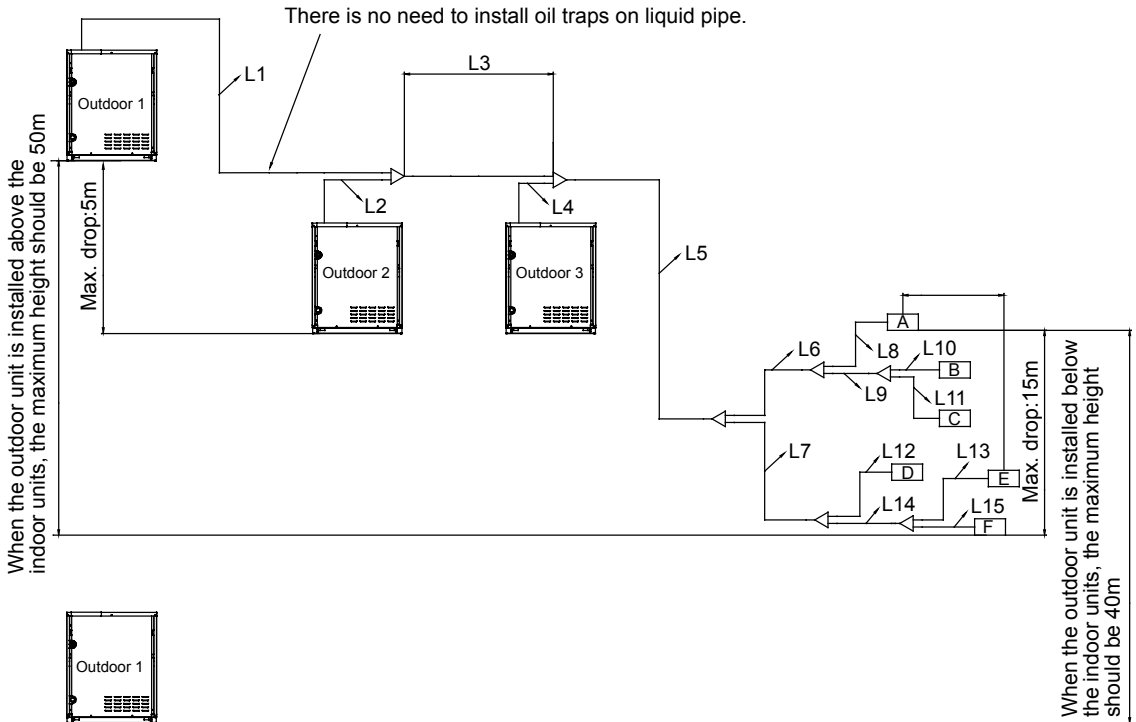


2) Installation below is not allowed (compressor oil will flow into the lowest outdoor).



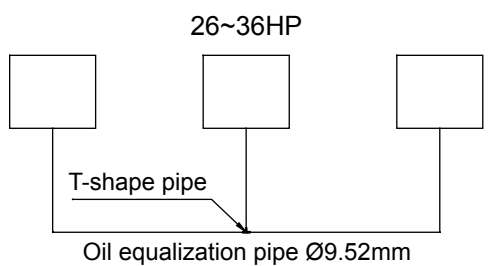
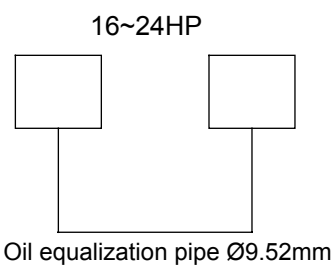
Installation procedure

2. Allowable piping length and height difference between indoor and outdoor



	Max. length	Pipe in above figure
Single way total pipe length	300	L1+L2+ L3+ L4+ L5+ L6+ L7+L8+ L9+ L10+ L11+ L12+ L13+ L14+ L15
Single way max. pipe equivalent length	150	L1+ L3+ L5+ L7+ L14+ L13
Max. pipe length after 1st branch pipe	40	L7+L13+L14
Main pipe length	80	L5
Height difference between indoors	15	--
Height difference between outdoors	5	--
Pipe length between outdoors	10	L1, L2, L3

Oil equalization pipe connection



Installation procedure

Manifold pipe

Manifold pipe selection:

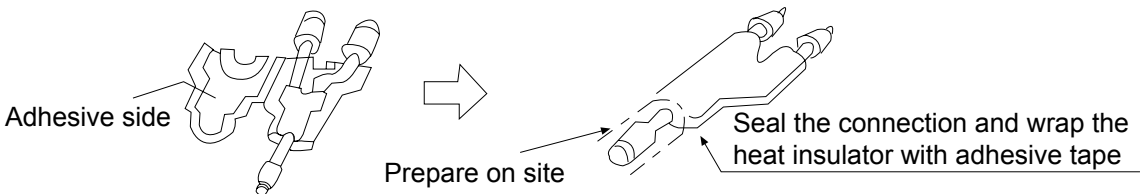
Total indoor capacity(100W)	Model(optional)
Less than 335	TAU335HR
More than 335, less than 506	TAU506HR
More than 506, less than 730	TAU730HR
More than 730	TAU1350HR

Outdoor unit type

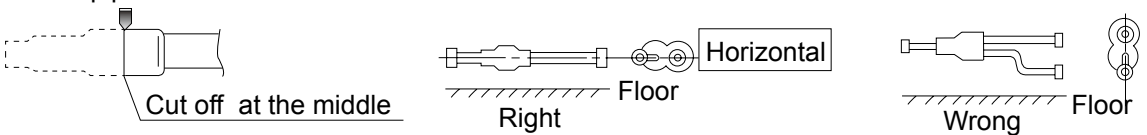
The closest outdoor unit to the 1st manifold pipe will be the master unit.

Note:

1. When connecting the outdoor branch pipe and the outdoor, please pay attention to the outdoor pipe dimension.
2. When adjusting the diameter among outdoor branch pipes and among the units, please do execute at the branch pipe side.
3. Please install the outdoor branch pipe (gas/liquid side) in horizontal or vertical direction.
4. When welding with hard solder, please do blow nitrogen. If not, a number of oxides will be produced and cause heavy damage. Besides, to prevent water and dust going into the pipe, please make the brim as outer roll.



Cut off pipe with the cutter



Pipe installation

When doing the piping connection, please do the following:

- Please don't let the pipe and the parts in the unit collide each other.
- When connecting the pipes, close the valves fully.
- Protect the pipe end against water and impurity going into the pipes (Weld after being flatted or sealed with adhesive tape).
- Bend the pipe as large semi-diameter as possible (over 4 times of the pipe diameter).
- The connection between outdoor liquid pipe and the distributing pipe is flared type. Please expand the pipe with the special tool for R-410A after installing the flared nut. But if the projecting pipe length has been adjusted with the copper pipe gauge, you can use the original tool to expand the pipe.
- Since the unit is charged with R-410A, the expanding oil must be ester oil, not the mineral oil.

Installation procedure

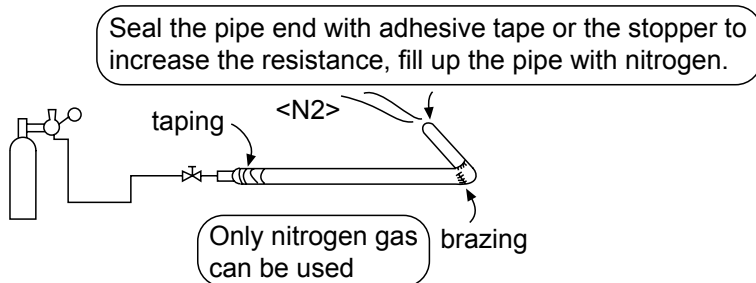
- When doing the flare connection, please do the following: When connecting the expanding pipes, fasten the pipes with double spanners. The torque refers to the former info.

Expanding pipe:A(mm)		Projecting length of pipe to be expanded:B(mm)		
Pipe outer diameter (mm)	A	0	When it is hard pipe	
		-0.4	Special tool for R-410A	The former tool
Ø6.35	9.1		0-0.5	1.0-1.5
Ø9.52	13.2			
Ø12.7	16.6			
Ø15.88	19.7			

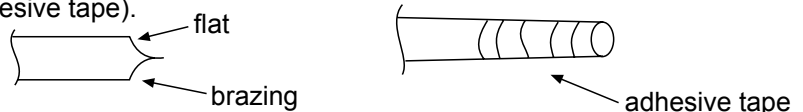
- The connection of outdoor gas pipe and the refrigerant distributing pipe, as well as the connection of refrigerant distributing pipe and the branch pipe should be welded with hard solder.
- When doing the braze connection, please do the following: Charge nitrogen when brazing the pipe, or it will cause a number of impurities (a film of oxidation) to clog the capillary and the expansion valve, further cause the deadly failure.

Operation procedure

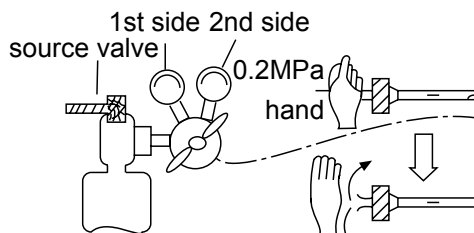
- Charge nitrogen when brazing the pipe, or it will cause a number of impurities (a film of oxidation) to clog the capillary and the expansion valve, further cause the deadly failure.



- Protect the pipe end against the water and impurity going into the pipes (brazing after being flatted, or sealed with adhesive tape).



- The refrigerant pipe should be clean. The nitrogen should be charged under the pressure of about 0.5MPa and when charging the nitrogen, stop up the end of the pipe by hand to enhance the pressure in the pipe, then loose the hand (meanwhile stop up the other end).

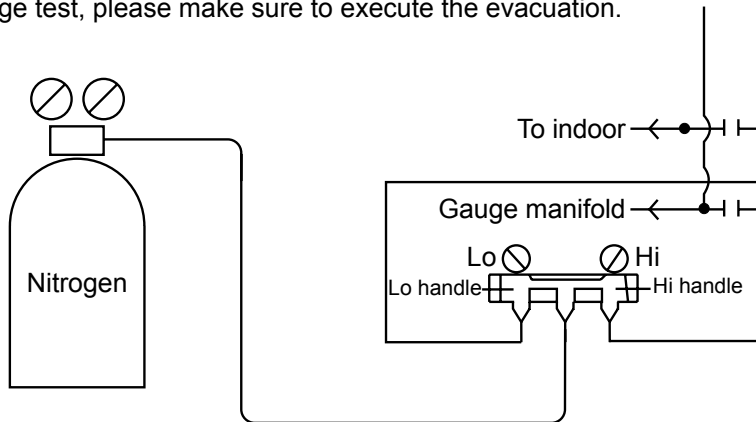


- When connecting the pipes, close the valves fully.
- When welding the valve and the pipes, use the wet cloth to cool down the special valve and the pipes.

Installation procedure

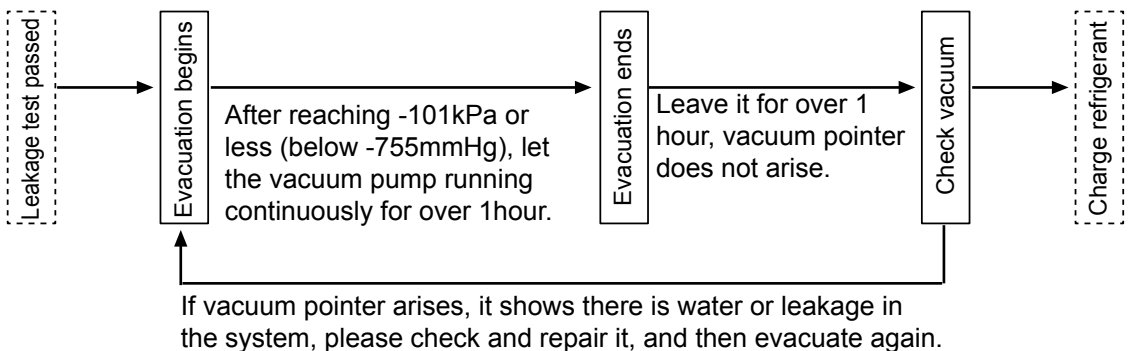
B. Leakage test

1. The outdoor unit has been executed the leakage test in the factory. The pipe should be executed leakage test individually and forbidden to test after connecting with check valve.
2. Refer to the below figure to charge the nitrogen into the unit to take a test. Never use the chlorine, oxygen and flammable gas in the leakage test. Apply pressure on both gas pipe and liquid pipe.
3. Applying pressure step by step.
 - a. Apply the pressure to 0.5MPa for more than 5 minutes, then confirm if pressure goes down.
 - b. Apply the pressure again to 1.5MPa for more than 5 minutes, then confirm if pressure goes down.
 - c. Apply the pressure finally to the target pressure (4.15MPa), record the temp. and the pressure.
 - d. Leave it at 4.15MPa for over 1 day, if pressure does not go down, the test is passed. Meanwhile, when the temp. changes for 1degree, pressure will change 0.01MPa as well. Correct the pressure.
 - e. After confirmation of a~d, if pressure goes down, there is leakage. Check the brazing position and flaring position with soap. Repair the leakage point and take another leakage test.
4. After leakage test, please make sure to execute the evacuation.



C. Evacuation

Evacuate at the check valve of liquid side and both gas sides. The oil equalization pipe also must be vacuumed (executed at the oil equalization pipe check valve respectively).



Installation procedure

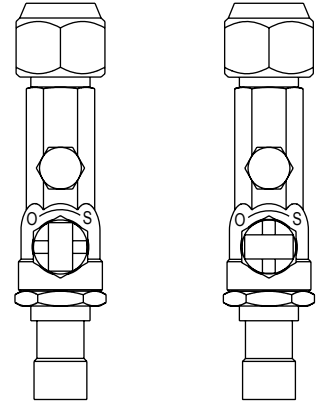
Because the unit is charged with refrigerant R-410A, the below issues should be paid attention:

- To prevent the different oil going into the pipe, please use the special tool for R-410A, especially for gauge manifold and charging hose.
- When maintaining the outdoor, release refrigerant from check valve. Set the relative DIP switch when vacuuming and the details refer to Page 44.

D. Check valve operation

Open/close method:

- Remove the valve cap, gas pipe valve turns to "open" state as right figure.
- Turn the liquid pipe valve and the oil equalization pipe valve with hexangular spanner until the shaft stops. If opening the valve strongly, the valve will be damaged.
- Tighten the valve cap.
- 10HP, 12HP models, please refer the specification to choose gas pipe, in stop valve of gas pipe need connect the pipe adaptor.



"close" state

"open" state

Tighten torque as the table below:

Tighten torque N·m			
	Shaft (valve body)	Cap (cover)	T-shape nut (check joint)
For gas pipe	Less than 7	Less than 30	13
For liquid pipe	7.85 (MAX15.7)	29.4 (MAX39.2)	8.8 (MAX14.7)
For oil equalization pipe	4.9 (MAX11.8)	16.2 (MAX24.5)	8.8 (MAX14.7)

Note:

Rotate the rod clockwise totally, the valve is close; rotate the rod counterclockwise totally, the valve is open; if the rod is not totally rotated clockwise or counterclockwise, the check valves of indoor, outdoor and the check valve will be connected.

E. Additional refrigerant charging

Charge the additional refrigerant as liquid state with the gauge.

If the additional refrigerant cannot be charged totally when the outdoor stops, charge it at the trial mode.

If the unit runs for a long period in the state of lack of refrigerant, compressor will occur failure. (the charging must be finished within 30 minutes especially when the unit is running, meanwhile charging the refrigerant).

The unit is charged only part of the refrigerant at the factory, also need additional refrigerant at the installation site.

W1: Refrigerant charging volume to outdoor unit at factory.

W2: Refrigerant charging volume to outdoor unit on site.

W3: Refrigerant charging volume to liquid pipe based on different piping length calculation.

W3 = actual length of liquid pipe × additional amount per meter liquid pipe
 = L1 × 0.35 + L2 × 0.25 + L3 × 0.17 + L4 × 0.11 + L5 × 0.054 + L6 × 0.022

Installation procedure

L1: Liquid pipe with the total length of 22.22; L2: Liquid pipe with the total length of 19.05;
 L3: Liquid pipe with the total length of 15.88; L4: Liquid pipe with the total length of 12.7;
 L5: Liquid pipe with the total length of 9.52; L6: Liquid pipe with the total length of 6.35;
 Total refrigerant charging volume on site during installation=W2+W3
 W: Total refrigerant charging volume on site for maintenance.

Refrigerant record form						
Model	W1: Refrigerant charging volume to outdoor unit in factory	W2: Refrigerant charging volume to outdoor unit on site	W3: Refrigerant charging volume to liquid pipe based on different piping length calculation		Total refrigerant charging volume on site during installation	W: Total refrigerant charging volume on site for maintenance
			Liquid pipe diameter (mm)	Additional refrigerant amount (kg)		
VVWO-220R-01T32	2kg	2.6kg	Ø6.35	0.022kg/m×_m=_kg	W2+W3=____kg	W1+W2+W3=____kg
VVWO-280R-01T32	2kg	2.6kg	Ø9.52	0.054kg/m×_m=_kg		
VVWO-335R-01T32	2kg	2.6kg	Ø12.7	0.11kg/m×_m=_kg		
			Ø15.88	0.17kg/m×_m=_kg		
			Ø19.05	0.25kg/m×_m=_kg		
			Ø22.22	0.35kg/m×_m=_kg		
			W3=____kg			

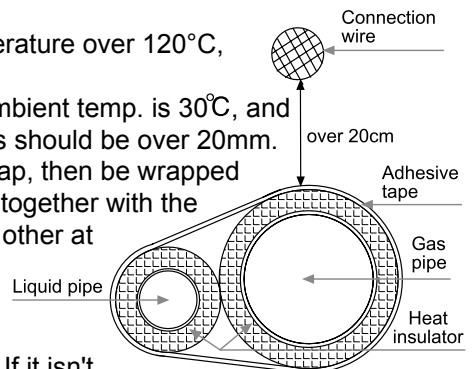
Note:

- To prevent the oil going into the pipe, please use the special tool for R-410A, especially for gauge manifold and charging hose.
- Mark the refrigerant type in different colours on the tank. R-410A is pink.
- Do not use the charging cylinder, because the R-410A will change when transferring to the cylinder.
- When charging refrigerant, the refrigerant should be taken out from the tank as liquid state.
- Mark the counted refrigerant volume due to the distributing pipe length on the label.

GWP: 2088
 The product contains fluorinated greenhouse gases and its functioning relies upon such gases.

Heat insulation

- Gas pipe and liquid pipe should be heat insulated separately. Liquid pipe shall be heat insulated all the time and the only exception is when the customer is totally sure the unit will only deliver COOLING.
- The material for gas pipe should endure the high temperature over 120°C, which for liquid pipe should be over 70°C.
- The material thickness should be over 10mm. When ambient temp. is 30°C, and the relative humidity is over 80%, the material thickness should be over 20mm.
- The material should cling the pipe adhesively without gap, then be wrapped with adhesive tape. The connection wire cannot be put together with the heat insulation material and should be away from each other at least 20cm.

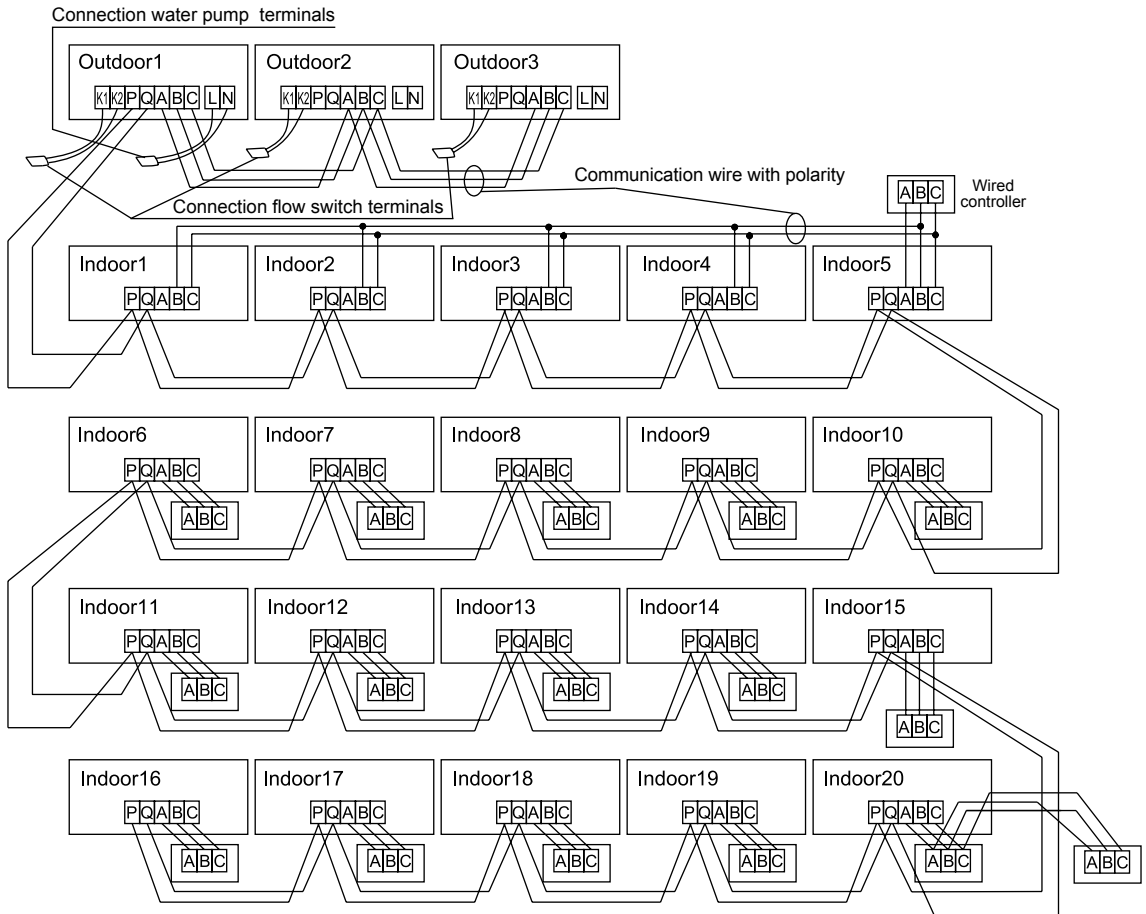


Fix the refrigerant pipe

- In operation, the pipe will vibrate and expand or shrink. If it isn't fixed, the refrigerant will focus on one part, which will cause the pipe broken.
- To prevent the central stress, fix the pipe for every 2-3m.

Electric wiring and the application

Communication wiring figure



Outdoor units are in parallel through 3 polar wires. The outdoor and all indoor units are in parallel through 2 non-polar wires.

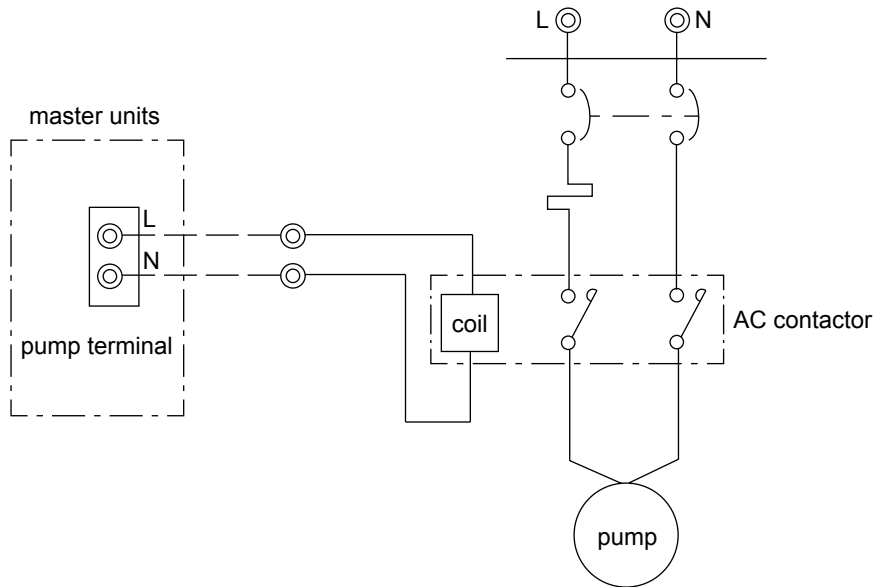
Three wiring methods between wired controller and indoor unit:

- A. 1 to multi (group control): one wired controller controls 2~16 indoors, as shown in above figure, indoor 1~indoor 5: indoor 5 is wired control master unit, the others are wired control slave units. Wired controller and the master indoor (directly connected to wired controller) are connected by 3 polar wires; the other indoors and the master indoor are connected by 2 polar wires.
- B. 1 to 1 (one wired controller controls one indoor): as shown in above figure, indoor 6~ indoor 19, indoor and wired controllers are connected by 3 polar wires.
- C. 2 to 1 (two wired controllers control one indoor): as shown in above figure, indoor 20. Either of wired controllers can be set as master wired controller, and the other is slave wired controller. Master/slave wired controller, and master wired controller/indoor are connected by 3 polar wires.

When indoor is controlled by remote controller, refer to the "wired control master unit/wired control slave unit/remote control unit table". A, B, C on signal terminal block do not need wires or connecting with the wired controller.

Electric wiring and the application

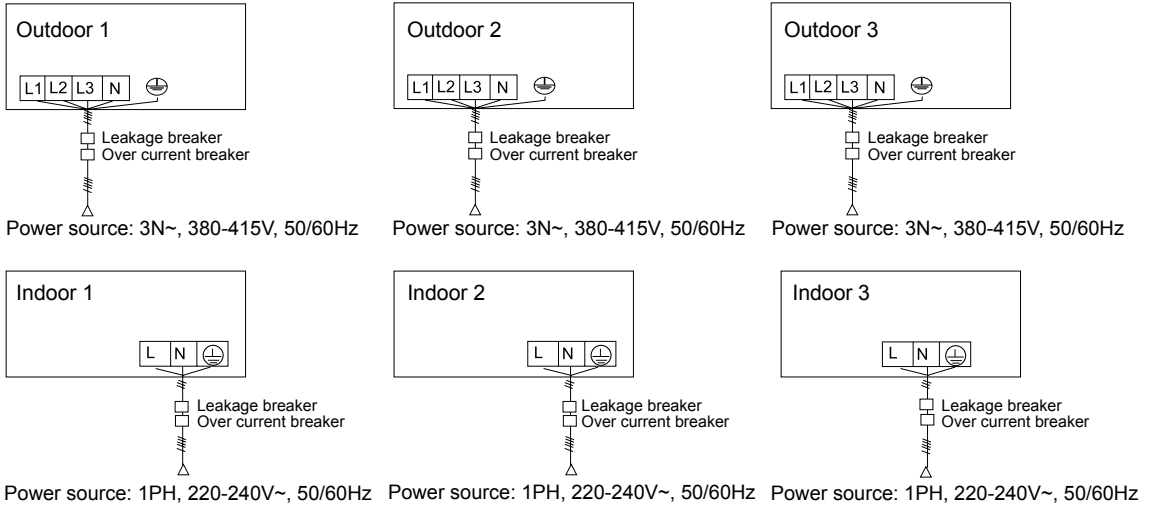
- D. Every outdoor unit must install the flow switch.
- E. Water pump for water system must connect with starter, the unit offer start signal from pump terminal. If the water system matches with only one set of units, the pump control signal of physical master unit can be connected to the pump starter. It is not recommended that multiple control lines control one pump starter.
- F. The following is an example that wire connection method for one water system connects with one set of units.



Electric wiring and the application

Power wiring figure

Please make sure that when the unit is running, the input voltage is no less than 380V; if it is lower than 380V, the unit may run abnormal.



- Indoor and outdoor use their individual power source.
- All indoors use one power source.
- Install the leakage breaker and the over current breaker, or electric shock will occur.

Outdoor power source and power cable

Item		Power source	Power cable section (mm ²)	Wire length (m)	Circuit breaker (A)	Rated current of residual circuit breaker (A) Ground fault interrupter (mA) response time (S)	Ground wire	
							Section (mm ²)	Screw
Model								
Individual power	VVWO-220R-01T32	3N~, 380-415V, 50/60 Hz	6	20	25	25A 30mA below 0.1S	3.5	M5
	VVWO-280R-01T32		10	20	32	32A 30mA below 0.1S	3.5	M5
	VVWO-335R-01T32		10	20	32	32A 30mA below 0.1S	3.5	M5

- Power cable must be fixed firmly.
- Each outdoor must be earthed well.
- When power cable exceeds the range, thicken it appropriately.
- The Power cable section is recommended for copper wire, if used for aluminum wire or other wire, please increase the section.

Electric wiring and the application

Requirements for pulse ammeter

1. Three-phase four-line active pulse ammeter

- A. The ammeter shall be suitable for metering three-phase AC active electric energy at a rated frequency of 50 Hz.
- B. The number of pulses outputted by the ammeter for one kWh of electricity shall be constant.
- C. The amplitude of the pulse signal shall be 5 Vdc and the width of every pulse shall not be less than 80 ms.
- D. The pulse signal from the ammeter shall be passive, that is, an external pulse signal is required for the ammeter to generate the required control power supply.

2. Both mechanical and electronic ammeters shall be used as long as they meet the above requirements. According to the total power input of all the outdoor units, the parameters of ammeter shall be defined such as rating current.

The wiring of ammeter includes 3 methods:

- Direct connection;
- Connection via current transformer;
- Connection via current and voltage transformers (seldom used).

Direct connection method has low cost as there are no current and voltage transformers employed. However, if the operation current is out of ammeter current range, the transformers are required.

3. The recommended ranges of ammeter for different horsepower of outdoor unit are shown in the following table; if the range of ammeter is insufficient in direct connection method, transformer method shall be used.

Total horsepower of outdoor units	Range of ammeter
≤20	10-60A
≤30	20-80A
≤40	30-100A
≤48	30-120A

4. Example of ammeter used in China

For total 36 Horsepower outdoor units system:

If the ammeter capacity is 30(100)A, 200Pulse/kWh, pulse width 80+/-20ms, Direct Connection type is feasible.

If the ammeter capacity is 20(80)A, current transformers are required.



Electric wiring and the application

Indoor power source and communication wiring

Indoor total current (A)	Item	Power cable section (mm ²)	Wire length (m)	Rated current of overcurrent breaker (A)	Rated current of residual circuit breaker (A) Ground fault interrupter (mA) response time (S)	Communication wire section	
						Outdoor/indoor (mm ²)	Indoor/indoor (mm ²)
<10		2	23	20	20A, 30mA, below 0.1s	2-core × (0.75-2.0mm ²) shielded wire	
≥10 and <15		3.5	24	30	30A, 30mA, below 0.1s		
≥15 and <22		5.5	27	40	40A, 30mA, below 0.1s		
≥22 and <27		10	42	50	50A, 30mA, below 0.1s		

Power cable and communication wire must be fixed firmly.

Each indoor must be grounded well.

When power cable exceeds the range, increase the gauge appropriately.

Shielded layer of communication wires must be connected together and be earthed at single point.

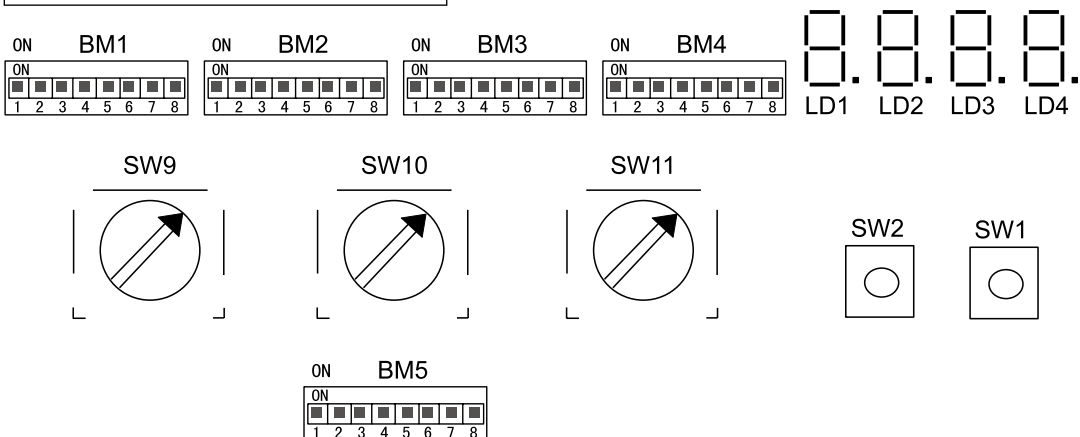
The total length of communication wire cannot exceed 1000m.

Communication wire for wired controller

Length of Signal Line (m)	Wiring Dimensions
≤250	0.75mm ² × 3 core shielding line

- The shielding lay of the signal line must be grounded at one end.
- The total length of the signal line shall not be more than 250m.

Selection switch and the display



Introduction of DIP switch on outdoor connecting board:
BM1, BM2, BM3, BM4, BM5: 8-bit DIP switch

Electric wiring and the application

Identification:

- Master unit: by setting DIP switch, the unit number is 0. It is used to communicate with indoor unit, and it is the organizer of outdoor communications as communication master unit.
- Slave unit: by setting DIP switch, the unit number is not 0.
- DIP switch definition:

BM1 is usually set by the personnel on site; BM2, BM3, BM4 are pre-set in the factory.

BM1_1: Master outdoor unit searches the total outdoor units after powered on at first time.

The quantity of total outdoor units is floating from right to left on LED. "1=0" is one outdoor unit, "2=01" is two outdoor units, "3=012" is three outdoor units.

BM1_2: Master outdoor unit searches the total indoor units after powered on at first time. The quantity of total indoor units is floating from right to left on LED. "-04-" is 4 indoor units, "-06-" is 6 indoor units, "-15-" is 15 indoor units.

BM1_3: The setting is 0 or 1. Default is 0. Once powered off, unit software shall reset to "OFF" automatically ignoring BM1_3 setting.

① BM1 introduction

BM1-1	Outdoor searching after startup	0	Begin to search outdoor	
		1	Stop searching outdoor and lock the quantity	
BM1-2	Indoor searching after startup	0	Begin to search indoor	
		1	Stop searching indoor and lock the quantity	
BM1-3	Start up	Power on, no action		Default condition: Unit shall startup after 6 hours preheat or oil superheat above 20°C. (Oil Superheat=Oil temperature of compressor sink-Refrigerant saturation temperature of ambient)
		Power on, change 0 to 1 or change from 1 to 0 then to 1		Unit shall startup after 6 hours preheating or oil superheat above 15°C.
BM1-4	Range of Water Temp. Setting	0	Inlet water < 5°C, running forbidden	
		1	Inlet water < 5°C or >45°C, running forbidden	
BM1-5	Over match setting	0	Indoor capacity divinity >130%, system functions normally	
		1	Indoor capacity>130%, system alarms	
BM1-6	Communication protocol selection between indoor and outdoor unit	0	New protocol	
		1	Old protocol	
BM1-7 BM1-8	Address setting	BM1-7	BM1-8	unit number
		0	0	0# (physical master unit)
		0	1	1#
		1	0	2#
		1	1	3#

Note:

Oil temperature too low protection

See BM1-3 (BM1 introduction table).

Electric wiring and the application

② BM2 introduction

BM2-1	Quiet running function	0	System functions normally without quiet function	
		1	Quiet running functions	
BM2-2	NO definition	0	Default is 0, 1 is forbidden	
BM2-3 BM2-4	Power suppression operation setting	BM2_3	BM2_4	Maximum allowable output capacity
		0	0	100%
		0	1	70%
		1	0	40%
BM2-5	Water temperature operating range	1	1	0%
		0	Standard	
		1	The extremely low temperature type	
		0	Default is 0, 1 is forbidden	
BM2-7 BM2-8	Piping length selection	BM2-7	BM2-8	Piping length selection
		0	0	Default setting (Medium piping length)
		0	1	Long piping length
		1	0	Short piping length
BM2-8	Piping length selection	1	1	Default setting (Medium piping length)
		1	1	Default setting (Medium piping length)

Electric wiring and the application

③ BM3 introduction

BM3-1 BM3-2 BM3-3	Outdoor model setting	BM3-1	BM3-2	BM3-3	Outdoor model	
		0	0	0	Reserved	
		0	0	1	Reserved	
		0	1	0	Water Cooled VRF model (applied to 084C PCB)	
		0	1	1	Reserved	
		1	0	0	Reserved	
		1	0	1	Reserved	
		1	1	0	Reserved	
1	1	1	Reserved			
BM3-4	3Ph, 50Hz/60Hz selection	0	50Hz			Single class
		1	60Hz			
BM3-5 BM3-6 BM3-7 BM3-8	Outdoor HP setting	BM3-5	BM3-6	BM3-7	BM3-8	Outdoor HP
		0	0	0	0	6HP
		0	0	0	1	8HP
		0	0	1	0	10HP
		0	0	1	1	12HP
		0	1	0	0	14HP
		0	1	0	1	16HP
		0	1	1	0	18HP
		0	1	1	1	20HP
		1	0	0	0	22HP
		1	0	0	1	24HP
		1	0	1	0	26HP
		1	0	1	1	28HP
		Other's reserved				

Electric wiring and the application

④ BM4 introduction

BM4-1	Drop selection among indoors	0	Without drop among indoors			Group class (valid for physical host)
		1	With drop among indoors			
BM4-2	NO definition	0	Default is 0, 1 is forbidden			Single class
BM4-3	NO definition	0	Default is 0, 1 is forbidden			Single class
BM4-4 BM4-5	Outdoor mode setting (not suitable for 3 pipes model)	BM4-4	BM4-5	Mode setting		Group class (valid for physical host)
		0	0	Normal		
		0	1	Cooling only		
		1	0	Heating only		
		1	1	VIP		
BM4-6 BM4-7 BM4-8	Indoor units priority setting (Not suitable for 3 pipes model. Available when the outdoors are set in normal or VIP mode)	BM4-6	BM4-7	BM4-8	Priority setting	Group class (valid for physical host)
		0	0	0	First priority	
		0	0	1	Last priority	
		0	1	0	Cooling priority	
		0	1	1	Heating priority	
		1	0	0	Majority priority	
		1	0	1	Reserved (first priority)	
		1	1	0	Reserved (first priority)	
		1	1	1	Reserved (first priority)	

⑤ BM5 introduction

BM5-1 ~ BM5-4	No definition	BM5-1	BM5-2	BM5-3	BM5-4	Selection item
		0	0	0	0	preset
BM5-5 ~ BM5-8	Inverter board selection	BM5-5	BM5-6	BM5-7	BM5-8	Selection item
		0	0	1	1	Self-made inverter board

Electric wiring and the application

Monitor tools

The following switches are included in the master PCB board of the outdoor unit.

Press button: SW2, SW1 are the button switches.

Rotary switch: SW9, SW10, SW11, 0~15 can be set.

Display section: LD1, LD2, LD3, LD4, digital tube. During startup and commissioning, you can identify failures in the system by selecting the indoor unit to review with switch SW9 and SW10, and selecting the function to review with SW11.

① Indoor parameter

Check the parameters of indoor whose address is from 1 to 64.

SW11 is set from 3~15 to check indoor parameter.

SW9 and SW10 show indoor unit number.

SW9	SW10	System address
0	0-15	1- 16 units (indoor PCB address DIP switch 0#-15#)
1		17- 32 units (indoor PCB address DIP switch 16#-31#)
2		33- 48 units (indoor PCB address DIP switch 32#-47#)
3		49- 64 units (indoor PCB address DIP switch 48#-63#)

SW11	Function	Digital tube LD1~4 display
3	Communicates in inspection and program version	Communication normal display program version; Communication gap normal display 0000, communication has been display - not normal
4	Indoor abnormal	Display indoor failure code; no failure, display 0
5	Indoor capacity	Indoor capacity, 1.5HP displays 1.5
6	Indoor EEV opening angle	Electronic expansion valve(EEV) opening angle
7	Indoor ambient temp. Tai	Ambient temperature -2 degree displays -2
8	Indoor gas pipe temp. Tc1	Gas pipe temperature -2 degree displays -2
9	Indoor liquid pipe temp. Tc2	Liquid pipe temperature -2 degree displays -2
10	Indoor startup mode, actual fan speed, SCODE code	LD1: startup mode. 0: stop C: cooling H: heating LD2: actual indoor fan speed (0- stop, 1- low, 2- middle, 3- high) LD3 and LD4: SCODE code (0 -15). Eg. C311 means cooling, high speed SCODE is 11.
11	Indoor set temp. Tset	Set temperature, 16 degree displays 16
12	Wiring malfunction check	0: normal 79: wiring connection failure (no display on indoor)
13	NO definition	insignificance
14	NO definition	insignificance
15	No definition	Insignificance

Electric wiring and the application

② Outdoor parameter

SW9 is used to select outdoor unit number, SW10 and SW11 working together to show outdoor parameter.

For example, SW9 is set as 0, that shows No.0 outdoor parameter; set as 1, that shows No.1 outdoor parameter...

(Master unit can display the other outdoor parameter and indoor parameter, but the slave unit only displays its own parameter).

Start up for commissioning, search slave units and display flashing 0 from left to right. If one slave unit is found, display 1; two slave units are found, display 2; and so on, the max. number is 8. After searching slave units, display outdoor failure code; if no failure, display 0. 0~2 of SW9 are used to select outdoor unit number.

SW9	SW10	SW11	Function	Digital tube LD1- 4 display
Unit No. 0-3	0	0	Display outdoor failure code	Failure code is transmitted by outdoor bus data. If no failure, display the time in stopwatch counting down from the 6 th hour for electrical heating. Press SW2(UP) for 2 secs continuously, displaying 1111, then come into historical failure inquiry state. 10 failures happened recently can be checked. Blinking display the failure number and code. Press SW2(UP) once to show the next one and press SW1(DOWN) once to show the previous one. Exit the setting mode automatically after 2 mins. Press SW1(DOWN) for 2 secs continuously, displaying 0000 to exit the inquiry state and stop blinking; DIP switch plate shows 13,0,0. Press SW2(UP) for 2 secs continuously, displaying "1111" can eliminate the historical failure records.
	1	0	Display priority and capacity of outdoor units	LD1 displays the priority of outdoor units LD2 displays "-" LD3-4 displays the capacity of outdoor units (unit: HP)
	2	0	Display priority and capacity of outdoor units	LD1: 0: stop C: cooling H: heating LD2-LD4: 60 represents 60% of capacity output
	5	0	Current frequency of INV compressor	110.0: 110.0Hz Press SW2(UP) for 2 secs continuously, display 1111 then come into the setting state with blinking display: press SW2(UP) once and the frequency will increase 1Hz; press SW1(DOWN) once and the frequency will decrease 1Hz; exit the setting state automatically after 5 mins. Press SW1(DOWN) for 2 secs continuously, displaying 0000 to exit the setting state and stop blinking. (Compressor is forbidden to start up when there are system failures)

Electric wiring and the application

SW9	SW10	SW11	Function	Digital tube LD1- 4 display
	7	0	Outdoor LEVa1 valve open angle	0---470 steps Press SW2(UP) for 2 secs continuously, displaying 1111 then come into the setting state with blinking display: press SW2(UP)and the valve is fully opened; press SW1(DOWN) and the valve is fully closed; exit the setting state automatically after 2 mins. Press SW1(DOWN) for 2 secs continuously, displaying 0000 to exit the setting state and stop blinking.
	8	0	Outdoor LEVa2 valve open angle	
	9	0	Outdoor LEVb1 valve open angle	
	10	0	NO use	
	11	0	Outdoor solenoid valve output indication	LD1: 4WV : 1 on 0 off——the far left side of the high position LD2: SV1 : 1 on 0 off
	12	0	Outdoor solenoid valve output indication	LD1: SV6: 1 on 0 off——the far left side of the high position LD2: SV9: 1 on 0 off LD3: SV10: 1 on 0 off LD4: SV11: 1 on 0 off
	13	0	NO use	NO use
	14	0	Heater output	LD1: CHi: 1 on 0 off——the far left side of the high position LD4: Cha: 1 on 0 off
	15	0	Program version	1.0: Ver1.0

Electric wiring and the application

SW9	SW10	SW11	Function	Digital tube LD1- 4 display
Unit No. 0-3	0	1	Pd pressure	Unit:kg, 2 decimals
	1	1	Ps Pressure	
	2	1	Tdi discharging temp.	Unit: degree
	5	1	Two1 water inlet temp. of the water heat exchanger	
	6	1	Two2 water outlet temp. of the water heat exchanger	
	7	1	Toil temp.	
	8	1	Tao ambient temp.	
	9	1	Toci1 temp.	
	10	1	Toci2 temp.	
	11	1	Tsi temp.	
	12	1	Reserved	
	13	1	Tdp/Tsuc temp.	
	14	1	Two1 temp	
	15	1	Toilp temp.	

SW9	SW10	SW11	Function	Digital tube LD1- 4 display
Unit No. 0-3	0	15	P1 pressure	Unit: kg, 2 decimals
	1	15	PI_temp pressure temp.	25 Unit: degree
	2	15	Pd_temp pressure temp.	
	3	15	Ps_temp pressure temp.	
	4	15	Tliqsc temp.	
	5	15	Tsco temp.	
	6	15	INV compressor ON/OFF time	Unit: minute
	7	15	Inverter power supply current	Unit: A, 1 decimal
	8	15	inv compressor current	
	9	15	Fixed frequency compressor 1# current	
	10	15	Fixed frequency compressor 2# current	
	11	15	INV compressor DC voltage	Unit: V
	12	15	Inverter compressor module temp.	Unit: degree
	13	15	Inverter compressor working state and stop cause	LD1/ LD2: Inverter compressor working state (hexadecimal) LD3/ LD4: Inverter compressor stop cause (hexadecimal)

Electric wiring and the application

③ Master unit information center: display parameters of the whole system

SW9	SW10	SW11	Function	Operation
0	0	2	Refrigerant type	410A: R-410A refrigerant
0	1	2	Total qty and capacity of outdoor units in the same system	LD1: qty of outdoor LD2: displays“-” LD3/ LD4: total capacity of outdoor (unit: Hp) Eg, 3-48 represents 3 outdoors with total capacity of 48Hp
0	2	2	Total capacity of indoors	50.0: 50Hp
0	3	2	Qty of VB and indoors in the same system	LD1/ LD2: Qty of VB (3 pipes model) LD3/ LD4: Qty of indoor units Eg, 0206 represents 2 VB and 6 indoor units
0	4	2	The number and total capacity of indoors with temp. sensors ON under cooling	LD1/ LD2: the qty of indoors with temp. sensors ON under cooling LD3/ LD4: total capacity of indoors with temp. sensors ON under cooling (unit: Hp) Eg, 0312 represents 3 indoors with temp. sensors ON under cooling and total capacity is 12Hp.
0	5	2	The number and total capacity of indoors with temp. sensors ON under heating	LD1/ LD2: the qty of indoors with temp. sensors ON under heating LD3/ LD4: total capacity of indoors with temp. sensors ON under heating (excluding capacity correction of closed temp. sensors) (unit: Hp) Eg, 0624 represents 6 indoors with temp. sensors ON under heating and total capacity is 24Hp. (excluding capacity correction of closed temp. sensors)
0	6	2	Target cooling temp.	Unit: degree
0	7	2	Target heating temp.	
0	8	2	Refrigerant evacuation Setting *Only for outdoor evacuation. For indoor evacuation, do not set. When it finishes, cancel the setting or re-electricity.	Press SW2(UP) for 2 secs continuously, display 1111 and start up; digital tube displays "YES", detailed response: SV9, SV10, SV11 open; LEVa1,2, LEVb open for 100pls, the other valves close compulsorily. Press SW1(DN) for 2 secs continuously, display 0000 and stop (setting is invalid when unit is running)
0	9	2	Refrigerant charging Setting *Only for gas charged outdoor. For indoor is charged, do not set. When it finishes, Cancel the setting or re-electricity.	Press SW2(UP) for 2 secs continuously, display 1111 and start up; digital tube displays "YES", detailed response: LEVa1, 2 open for 500pls, the other valves close compulsorily. Press SW1(DN) for 2 secs continuously, display 0000 and stop (setting is invalid when unit is running)

Electric wiring and the application

SW9	SW10	SW11	Function	Operation
0	10	2	Wrong wiring inspection in cooling	Press SW2(UP) for 2 secs continuously, display 1111 and start up; digital tube counts down judging time by second; after time arrives, display the result: "00.00" shows the result is in conformity with the actual connection; "01.05" shows one outdoor and 5 indoors are abnormal, to check the abnormal units by digital tube (indoor: X_X_13, outdoor X_0_0); Press SW1(DN) for 2 secs continuously, display 0000 and stop.
0	11	2	Wrong wiring inspection in heating	
0	12	2	Indoor expansion valve open fully	Press SW2(UP) for 2 secs continuously, display 1111 and indoor valves open fully for 2 minutes, then indoor valves close automatically.
0	13	2	All indoor units running in cooling	Press SW2(UP) for 2 secs continuously, display 1111 and start up; Press SW1(DN) for 2 secs continuously, display 0000 and stop.
0	14	2	All indoor units running in heating	Press SW2(UP) for 2 secs continuously, display 1111 and start up; Press SW1(DN) for 2 secs continuously, display 0000 and stop.
0	15	2	Cancel all manual controls(running type)	Press SW2(UP) for 2 secs continuously, display 1111 and start up; Press SW1(DN) for 2 secs continuously, display 0000 and stop. Cancel items: wrong wiring inspection in cooling/heating mode; indoor unit running/stop totally; compulsory operation; rated operation, etc.
15	0	2	BM1 and BM2 setting state	Hexadecimal display. BM1: represented by LD1 and LD2; BM2: represented by LD3 and LD4.
15	1	2	BM3 and BM4 setting state	Hexadecimal display. BM3: represented by LD1 and LD2; BM4: represented by LD3 and LD4;
15	2	2	Capacity correction class	0 shows short piping length; 1 shows medium piping length; 3 shows long piping length;
15	3	2	Defrosting compensation α	10、8、6
15	4	2	BM5 setting state (reserved)	Hexadecimal display. Represented by LD3 and LD4;
15	5	2	Volume overload check	135: limited 0: no limit
15	6	2	Inlet water temperature 7-45°C	1: limit 0: unlimited
15	7	2	Silent running setting	0: without silent running 1: with silent running
15	8	2	Snow prevention running setting	0: without snow prevention running 1: with snow prevention running

Electric wiring and the application

SW9	SW10	SW11	Function	Operation
15	9	2	When master unit is operating in heating mode, the fan speed setting of Thermo OFF slave units	0: not running 1: running
15	10	2	Drop selection between outdoor and indoor	0: no drop 1: with drop
15	11	2	Setting of outdoor mode and indoor priority (not available for 3 pipes mode)	LD1: outdoor mode 0- normal, C- cooling only, H- heating only, U-VIP LD2: “_” LD3/LD4: indoor priority setting (valid when outdoor mode is normal or VIP) 00--First in first out 01--Last in first out 02--Cooling priority 03--Heating priority 04--Majority priority Eg, “0-03”: heating priority “C---”: cooling only
15	12	2	Power supply check 50Hz/60Hz setting	50: 50Hz 60: 60Hz
15	13	2	Inverter board selection	0: self-made 1: APY
15	14	2	Outdoor model setting	0- 3 pipes model 1-MX6-S model 2- Water Cooled VRF
15	15	2	Reserved	
1	0	2	Communication baud rate of indoor and outdoor units	9600bps
1	1	2	1 round circulating VB and correct communicating qty of indoor units	LD1/ LD2: qty of VB (3 pipes model) LD3/ LD4: qty of indoor units Eg, 0206 represents 2 VB and 6 indoor units
1	2	2	2 MSB: percentage of inconsistent qty between indoor and E2 2 LSB: qty of actual indoors	Eg,0522: qty of actual indoors is 22; communicating inconsistent percentage between indoor and E2 is 5%
1	3	2	Qty of indoors which can communicate with VB (indoors failed 5 successive rounds are excluded)	LD1/ LD2: qty of VB (3 pipes model) LD3/ LD4: qty of indoor units Eg: 0206 represents 2 VB and 6 indoor units.
1	4-15	2	Reserved	

Electric wiring and the application

④ Outdoor valves' spare parts control

SW9	SW10	SW11	Function	Operation
6	0	2	Manual control 4WV switch	Display current state of spare parts, 1: On, 0: Off Press SW2(UP) for 2 secs continuously, displaying 1111 then come into the setting state with blinking display: press SW2(UP) to open; press SW1(DOWN) to close; exit the setting state automatically after 2 mins. Press SW1(DOWN) for 2 secs continuously, displaying 0000 to exit the setting state and stop blinking. (Compressor is forbidden to start up when there are system failures)
6	1	2	Manual control SV1 switch	
6	2	2	Manual control SV3i switch	
6	3	2	Manual control SV31 switch	
6	4	2	Manual control SV6 switch	
6	5	2	Manual control SV9 switch	
6	6	2	Control SV10 switch	
6	7	2	Manual control SV11 switch	
6	8	2	Manual control SV18i switch	
6	9	2	Manual control SV181 switch	
6	10	2	Manual control SV21 switch	
6	13	2	Manual control CHi switch	
6	14	2	Manual control 4WV2 switch	
6	15	2	Cancel all the manual control (spare parts)	Press SW2(UP) for 2 secs continuously, displaying 1111 to cancel or press SW1(DOWN) for 2 secs continuously, displaying 0000 to cancel Cancelled items: The manual control of compressor, fan motor, EEV LEV, Solenoid valve and all the other outdoor active spare parts. (including air evacuating and charging setting; excluding running modes: rated or forced ON/OFF of indoors and outdoors, etc)

⑤ Phase detect parameter

SW9	SW10	SW11	Function	Operation
11	0	0	OK times of S phase 20 times: normal; less than 16 times: alarm 37-1)	
11	1-10	0	Observe S phase low level's time 10ms; unit:0.1ms	
11	0	1	OK times of S phase 20 times: normal; less than 16 times: alarm 37-1)	
11	1-10	1	OK times of S phase 20 times: normal; less than 16 times: alarm 37-1)	
11	0	2	OK times of T phase 20 times: normal; less than 16 times: alarm 37-2)	
11	1-10	2	Observe T phase low level's time 10ms; unit:0.1ms	
11	0	3	OK times of T phase 20 times: normal; less than 16 times: alarm 37-2)	
11	1-10	3	0.1ms Observe T phase's cyclic period 20ms. Unit: 0.1ms	
11	0	4	OK times of S/T phase 10 times: normal; less than 7 times: alarm 37-3)	

Electric wiring and the application

⑥ EE data inquiry

SW9	SW10	SW11	Function	Digital tube LD1-4 display
12	0	0	000H address's EE data (E2 version)	EE's previous 256 byte data display (system parameter info) Address calculating method: $\text{addr.} = \text{SW10} \times 16 + \text{SW11}$ Data display: hexadecimal; H represents hexadecimal number
	0	1	001H address's EE data	
	
	0	15	00FH address's EE data	
	1	0	010H address's EE data	
	
	1	15	01FH address's EE data	
	
	15	15	FFH address's EE data	
13	0	0	100H address's EE data	EE's later 256 byte data display (malfunction info) Address calculating method: $\text{addr.} = \text{SW10} \times 16 + \text{SW11}$ Data display: hexadecimal; H represents hexadecimal number Dial plate shows 13,0,0. Press SW2 (UP) for 2 secs continuously to eliminate EE's later 256 byte data.
	0	1	101H address's EE data	
	
	1	15	11FH address's EE data	
	
	15	15	1FFH address's EE data	

⑦ PCB Special No. Description

SW9	SW10	SW11	Description
15	0	0	084D
15	0	1	75-0 /75-4 Temporary shielding failure. (1) Press SW2 (UP) for 2 s, display 1111, Enter the fault block, Automatically cancelled after 30 minutes; (2) Press SW1 (DOWN)
15	0	3	Last 2 s show----- Exit back to normal Press the UP key display INV historical fault data communication module.

⑧ Others reserved

Failure code

Failure code

Failure code description: (failure code of the whole system is showed as 8 bits, so totally 256 codes. Indoor failure code should be judged by the table and the unit number)

- Outdoor failure code exists in EEPROM, in which 5 failure codes can be kept.
- Indoor failure code exists in EEPROM, in which 5 failure codes can be kept.

Failure codes are distributed as following:

- 0~19: indoor failure code
- 20~99: outdoor failure code
- 100~109: DC motor failure code
- 110~125: inverter module failure code
- 126~127: software auto-check failure code

Physical master unit:

DIP switch SW9, SW10, SW11 are at 0, 0, 0, LD displays failure code 20~127, it is the master failure code.

DIP switch SW9, SW10, SW11 are 1, 0, 0, LD displays failure code 20~127, it is failure code of No. 1 slave unit.

DIP switch SW9, SW10, SW11 are 2, 0, 0, LD displays failure code 20~127, it is failure code of No. 2 slave unit.

Physical slave unit:

DIP switch SW9, SW10, SW11 are at 0, 0, 0, LD displays failure code 20~127, it is single slave unit failure code.

Outdoor failure code display principle on wired controller:

When outdoor compressor is running, indoor wired controller will display the failure code of outdoor with higher priority. When compressor stops, it displays all indoor failures. The indoor failures will be classified as below: sensor failure, inverter board failure, fan motor driving board failure, any protections.

Outdoor unit failure code

LD indication on master unit	Indication on wired controller (hex)	Failure code definition	Failure description	Remarks
20-0	14	Two water inlet temp. failure of the water heat exchanger	AD value is detected below 11 (open circuit) or above 1012 (short circuit) for 60 secs. No handling of this abnormal sensor when cooling mode is operating.	Resumable
20-1	14	Two2 water outlet temp. failure of the water heat exchanger		
21	15	Ambient temp. sensor Tao failure	AD value is detected below 11(open circuit) or above 1012 (short circuit) for 60 secs.	Resumable
22-0	16	Suction temp. sensor Tsi failure		

Failure code

LD indication on master unit	Indication on wired controller (hex)	Failure code definition	Failure description	Remarks
22-1	16	Two1 water heat exchanger outlet water temperature 1 failure	AD value is detected below 11(open circuit) or above 1012 (short circuit) for 60 secs.	Resumable
22-2	16	The trachea outdoor sensor Tsuc fault		
23-0	17	Discharging sensor Tdi failure	AD value is detected below 11(open circuit) or above 1012 (short circuit) for 60 secs. If $t_{ao} \leq 0^{\circ}\text{C}$, no detect of the open circuit (ad value is blow 11).	Resumable
23-1	17	Discharging sensor Td1 failure		
23-2	17	Outdoor gas pipe temp, sensor Tdp/ Tsuc failure		
24-0	18	Oil temp. sensor Toilp failure	AD value is below 11(open circuit) or above 1012(short circuit), alarm. If $T_{ao} < 0^{\circ}\text{C}$, no open circuit failure alarm; if $T_{ao} \geq 0^{\circ}\text{C}$ and $ET \geq 0^{\circ}\text{C}$, no open circuit failure alarm in 5 minutes	Resumable
24-1	18	Oil temp. sensor Toili failure	AD value is below 11(open circuit) or above 1012(short circuit), alarm. If $T_{ao} < 0^{\circ}\text{C}$ or not in the normal running condition, no open circuit failure alarm;	
25-0	19	Inlet temp. of heat exchanger toci1 failure	AD value is below 11(open circuit) or above 1012(short circuit), alarm. No handling of this abnormal sensor when cooling mode is operating.	Resumable
25-1	19	The outlet temperature of the heat exchanger Toci2 fault		
26-0	1A	Outdoor and indoor communication failure	For continuous 200 cycles' detection, connected indoors cannot found.	Resumable
26-1			For continuous 270 secs detection, qty of indoors is less than the set qty.	
26-2			For continuous 170 secs detection, qty of indoors is more than the set qty.	

Failure code

LD indication on master unit	Indication on wired controller (hex)	Failure code definition	Failure description	Remarks
27	1B	Oil temp. too high protection (Toil)	Toil \geq 120degree(E) at interval of 25msec for twice continuously, and over the set value, then stop and alarm; 3 minutes later, resume automatically. If it occurs 3 times in an hour, confirm the failure.	Once confirmation, Un-Resumable
28	1C	High pressure sensor Pd failure	AD value is below 11(open circuit) or over 1012(short circuit) for 30 seconds, in defrosting and within 3 minutes after defrosting, no alarm	Resumable
29	1D	Low pressure sensor Ps failure	AD value is below 11(open circuit) or over 1012(short circuit) for 30 seconds, in defrosting and within 3 minutes after defrosting, no alarm	Resumable
30-0	1E	High pressure switch HPSi failure	Power on, OFF is confirmed for 2 secs continuously, alarm.	Once confirmation, Un-Resumable
30-1	1E	High pressure switch HPS1 failure		
30-2	1E	High pressure switch HPS2 failure		
30-3	1E	Water flow switch WQS failure (Water Cooled VRF)	Disconnected for 10 secs continuously, alarm. Three times an hour, failure confirmed.	
32-0	20	Outlet temp.Of subcooler tSCO failure	AD value is below 11(open circuit) or over 1012(short circuit) for 30 seconds, in defrosting and within 3 minutes after defrosting, no alarm	Resumable
32-1	20	Liquid pipe SC temp.of subcooler Tliqsc failure		
33-0	21	EEPROM (AT24C04) failure	EEPROM communication failure	Once confirmation, Un-Resumable
33-1	21		EEPROM data check failure(model code, check sum etc.)	
33-2	21		EEPROM data check failure(data beyond limit, reverse sequence etc.)	

Failure code

LD indication on master unit	Indication on wired controller (hex)	Failure code definition	Failure description	Remarks
34-0	22	Discharging temp. over heat protection (Tdi)	Tdi / Td1 \geq 130°C (E). Stop and alarm if it is over the set value for 2 secs continuously at interval of 25msec. Resume automatically if the discharging temp. is 10 degree lower than the alarm condition after stopped for 3 mins. Four times an hour, failure confirmed.	Once confirmation, Un-Resumable
35-0	23	4WV reversing failure	Reversion is successful if the following condition is satisfied for continuous 10 secs after 4WV is electrified for 30sec. T _{suc} /B-T _{suc} /A \geq 10°C or Pd-Ps 30sec after 4WV ON minus the minimum of Pd-Ps from 4MV ON to 15sec \geq 0.2MPa. If not satisfied, protect and stop. * 4WV OFF restart after 3 mins * Thermo OFF for 2 times in one hour continuously, Error and stop	Once confirmation, Un-Resumable
35-1	23	4WV reversing failure	Master unit checks heating mode operation. If some slave units' 4WV still can't electrified after starting up for 20 mins, failure 35-1 is shown.	
36	24	Oil temp. sub-cooling protection (Toili)	Normally in operation (excluding startup, deforest, oil return, remains, stop), detect Toil < CT+10°C for continuous 5 mins, stop and alarm. Resume automatically after 170 secs; Lock if alarming three times an hour. The same as Td sub-cooling protection	Once confirmation, Un-Resumable
37-0	25	Default phase of 3-phase power supply or phase sequence error	S phase default	Once confirmation, Un-Resumable
37-1	25		T phase default	
37-2	25		S phase and T phase are normal ,but sequence (phase reversion) is wrong	
39-0	27	Low pressure sensor Ps protection against too low pressure	After compressor starts up (excluding the remains operation), too low pressure is detected for 5 mins continuously (cooling: Ps< 0.10MPa; heating: Ps< 0.55MPa; oil return: Ps<0.03MPa), stop and alarm. Resume automatically after 170 secs. Three times an hour, failure confirmed.	Once confirmation, Un-Resumable

Failure code

LD indication on master unit	Indication on wired controller (hex)	Failure code definition	Failure description	Remarks
39-1	27	Compression ratio ϵ protection against too high ratio	After compressor starts up, $\epsilon > 8.0$ is detected for 5 mins continuously, stop and alarm; $\epsilon > 9.0$ is detected for 1min continuously under cooling or $\epsilon > 8.5$ under heating, stop and alarm. Resume automatically after 170 secs. Four times an hour, failure confirmed.	Once confirmation, Un-Resumable
40	28	High pressure sensor Pd protection against too high pressure	After compressor starts up, $P_d \geq 4.15$ MPa continues for 2 secs, stop and alarm. Resume automatically after 170 secs. Four times an hour, failure confirmed. (similar to high pressure switch alarm)	Once confirmation, Un-Resumable
41-0	29	Water inlet temp. Twi protection against too low temp. (Water Cooled VRF)	Water Cooled VRF, after compressor starts up, water inlet temp. $T_{wi} < 5$ degree continues for 60 secs, stop and alarm. Resume automatically after 170 secs. Three times an hour, failure confirmed.	Once confirmation, Un-Resumable
41-1	29	Water inlet temp. Twi protection against too high temp. (Water Cooled VRF)	When BM1-4 ON setting. Water Cooled VRF, after compressor starts up, water inlet temp. $T_{wi} > 45$ degree continues for 60 secs, stop and alarm. Resume automatically after 170 secs. Three times an hour, failure confirmed.	
42-0	2A	Water system outlet antifreeze protection (Water Cooled VRF)	Water Cooled VRF, after compressor starts up, water outlet temp. $T_{wo} < 3$ degree continues for 180 secs, stop and alarm. $T_{wo} > 7$ degree for 60 secs continuously, resume. No lock.	Once confirmation, Un-Resumable
42-1	2A	Water system low pressure antifreeze protection (Water Cooled VRF)	Water Cooled VRF, $T_{wo} < T_{ao} + 5^\circ\text{C}$ continues for 60 secs when the compressor stops in protection for low ambient temp. $T_{ao} < 4^\circ\text{C}$. No lock.	
42-2	2A	The water flow too small protection (MRV W)	After the compressor running, if the temp. difference between Twi and Two too large, the unit stop and alarm. 2 minutes and 50 seconds later resume automatically, it occurs 3 times in an hour, confirms the failure.	

Failure code

LD indication on master unit	Indication on wired controller (hex)	Failure code definition	Failure description	Remarks
43-0	2B	Discharging temp. sensor Tdi too low protection	In normal operation, if $T_d < CT + 10^{\circ}C$ for continuous 5 minutes, the unit stops and alarms. 2 minutes and 50 seconds later, resume automatically. If it occurs 3 times in an hour, confirm the failure. After fixed frequency compressor alarms, inverter compressor will continue to run. If fixed frequency compressor has been locked for 3 times, the unit will stop and alarm.	Once confirmation, Un-Resumable
45	2D	Communication among outdoors failure	No communication within 3 minutes continuously	Resumable
46	2E	Communication with inverter module failure	No communication within 30 seconds continuously	Resumable
50	32	The LEV is leakage	When the unit system running in heating mode, the LEV of the stop unit is leakage	Un-Resumable
75-0	4B	Small drop between high pressure and low pressure	If $P_d - P_s \leq 0.35MPa$ continues for 3 mins, this outdoor will be stopped for protection. Restart in 5 mins after the protection stop. If the protection stop occurs over 9 times in three hours, Error stop.	Once confirmation, Un-Resumable
76-0	4C	Incorrect outdoor qty, address and capacity setting	Slave unit qty setting is not in conformance with indoor EEPROM data	Reset
76-1	4C		Slave unit address setting is not in conformance with indoor EEPROM data	
76-2	4C		Slave unit Hp setting is not in conformance with indoor EEPROM data	

Failure code

LD indication on master unit	Indication on wired controller (hex)	Failure code definition	Failure description	Remarks
77	4D	Oil equalization protection among outdoors	ToilpB-ToilpA \leq 10°C, unit alarms and stops. No detection in and 10 mins after the startup, defrosting and oil return control. Resume automatically after 170 secs. Two times an hour, failure confirmed.	Once confirmation, un-resumable
78-0	4E	Refrigerant shortage alarm in cooling	Compressor running in cooling mode, Ps $<$ 0.1MPa continues for 30 mins	--
78-1	4F	Refrigerant shortage alarm in heating	Compressor running in heating mode, Ts1-ET $>$ 20 & Ts1-ET $>$ 20 & LEV are fully opened for 60 mins. Alarm signal is output without stopping the unit.	
80	50	Unmatch combination of outdoors	In VRF system, alarm if the capacity difference between slave and master units is larger than 6Hp.	
83	53	Outdoor DIP switch setting failure	According to PCB special No., outdoor model DIP switch errors are detected.	
99-X	63	Program errors self-check	X=0~5	Once confirmation, un-resumable
110	6E	IPM module protection (FO)	There are over current(hardware type), short circuit, over heat and under voltage of IPM module	Four times an hour, then failure confirmed. Once confirmation, un-resumable
111	6F	Inverter compressor out of step	when for 6 times of failed detection of rotor position in startup or running process, INV control board will automatically recover after 5 secs of stop	
112	70	Module cooling fin temp. too high	Temp $>$ 94°C, alarm for error Temp \leq 94°C, auto INV control board will automatically resume	
113	71	Inverter controller: overload	Inverter controller outputs too high current	
114	72	Module DC under voltage	Power supply voltage $<$ DC420V, error be alarmed Voltage \geq DC420V, INV control board automatically resume	
115	73	Module DC over voltage	Power supply voltage $>$ DC642V, error be alarmed Voltage \leq DC642V, INV control board automatically resume	

Failure code

LD indication on master unit	Indication on wired controller (hex)	Failure code definition	Failure description	Remarks
116	74	Abnormal communication with module	If failed to detect the communication signal for 30 secs, error alarms. INV control board will promptly resume when detecting that.	Four times an hour, then failure confirmed. Once confirmation, un-resumable
117	75	Module software: over current	Module software over current	
118	76	Module: start up failed	Compressor startup failed for 5 consecutive times	
119	77	Inverter controller current detection: circuit abnormal	Malfunction of INV controller current detecting sensor Non connection or wrong connection	
120	78	Inverter controller power supply abnormal	INV controller power supply suddenly cut off when supplying power	
121	79	Power supply of inverter board is abnormal	Power supply of inverter board is broken down instantly	3 times in an hour, confirm failure; once confirmation, un-resumable
122	7A	Radiator temp. Sensor of transducer abnormal	Resistor of temp. sensor abnormal or temp. sensor disconnected	
125	7D	Compressor frequency unmatch	(Current frequency \geq INV; target frequency+3Hz) or (target frequency $>$ 0 & actual frequency=0) continues 2 mins	Resumable
127	7F	MCU reset abnormal	If master unit inspects that MCU of slave unit is reset, and the slave unit is running, master unit will alarm MCU reset failure, then the whole system will stop; if in heating mode, when restart up, 4-way valve will not be electrified, the whole system will execute 4-way valve reversing operation again. if it occurs three times in an hour, alarm and confirm the failure.	Once confirmation, un-Resumable
128	80	MCU requires upgrade	VRF system program version is incompatible. Prompt to upgrade the program.	Once confirmation, un-Resumable

Failure code

When there is no failure, if the starting condition cannot be met, digital tube on master unit will display stand-by code:

555.0	Standby state of capacity overmatch	When capacity is over 135% or lower than 50%, the system is standby.
555.1	Inlet water temperature abnormal	When inlet water temperature is less than 5°C or over 45°C, the system is standby.
555.2	Standby state of super low pressure (lack of refrigerant)	When the unit starts in cooling with $P_s < 0.23\text{MPa}$ or heating with $P_s < 0.12\text{MPa}$, the system is standby.
555.3	54 Degree cooling standby	High ambient models, the unit can't open if ambient temp. above 54 degree, 7- segment board display: "555.3"

Indoor failure code list

Indication on master unit	Indication on wired controller	Flash times of LED5 on indoor PCB/timer LED on remote receiver	Failure code definition
01	01	1	Indoor ambient temp. sensor Ta failure
02	02	2	Indoor coil temp. sensor Tc1 failure
03	03	3	Indoor coil temp. sensor Tc2 failure
04	04	4	Indoor TES sensor failure
05	05	5	Indoor EEPROM failure
06	06	6	Communication between indoor and outdoor failure
07	07	7	Communication between indoor and wired controller failure
08	08	8	Indoor drainage failure
09	09	9	Indoor repeated address
0A	0A	10	Indoor repeated central control address
Outdoor failure code	Outdoor failure code	20	Outdoor corresponding failure

Commissioning and the performance

5-minute delay function

- If starting up the unit after being powered off, the compressor will run about 5 minutes later against being damaged.

Cooling/heating operation

- Indoor units in same refrigeration system can be controlled individually, but cannot run in cooling and heating mode simultaneously. If both cooling mode and heating mode are set in one refrigeration system, system will execute the first command and ignore latter conflicting command. To change to other mode, it is a must to reset the running mode of all the indoor units in the system.
- If the A/C manager sets the unit in cooling or heating mode fixedly, the unit cannot run in the other modes.

Heating mode characteristic

- In operation if outdoor temp. arises, indoor fan motor will turn to low speed or stop.

Unit operation condition

- To use the unit properly, please operate the unit under the allowed condition range. If operating beyond the range, the protection device will act.
- The relative humidity should be lower than 80%. If the unit runs at the humidity over 80% for a long period, the dew on the unit will drop down and the vapour will be blown from air outlet.

Protection device (such as high pressure switch)

- High pressure switch is the device which can stop the unit automatically when the unit runs abnormally.
When the high pressure switch acts, the cooling/heating mode will stop but the running LED on wired controller will still be light. The wired controller will display failure code.
- When the following cases occur, the protection device will act:
In cooling mode, air outlet and air inlet of outdoor are clogged.
In heating mode, indoor filter is stucked with duct; indoor air outlet is clogged.
When protection device acts, please cut off the power source and re-start up after eliminating the trouble.

Commissioning and the performance

When power failure

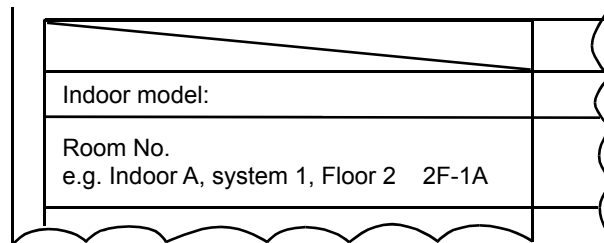
- When power is failure in running, all the operations will stop.
- After being electrified again, if with re-start up function, the unit can resume to the state before power off automatically; if without re-start up function, the unit needs to be switched on again.
- When abnormal occurs in running because of the thunder, the lightning, the interference of car or radio, etc, please cut off the power source, after eliminating the failure, press "ON/OFF" button to start up the unit.

Heating capacity

- The heating mode adopts the heat pump type that absorbs outdoor heat energy and releases into indoor. So if outdoor temperature goes down, the heating capacity will decrease.

System marks

- On the condition that multi VRF systems are installed, in order to confirm the relationship between outdoor and indoor, please make marks on outdoor electric control box cover to indicate the connected indoor unit. As the below figure:

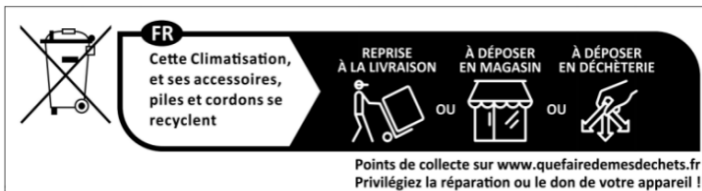


Commissioning

- Before trial operation:
Before being energized, measure the resistor between power terminal block (live wire and neutral wire) and the grounded point with a multimeter, and check if it is over $1M\Omega$. If not, the unit cannot be operated.
To protect compressor, energize the outdoor unit for at least 12 hours before the unit runs. If the crankcase heater is not energized for 6 hours, the compressor will not work.
Confirm the compressor bottom getting hot.
Except for the condition that there is only one master unit connected (no slave unit), under the other conditions, fully open the outdoor operating valves (gas side, liquid side, oil equalization pipe). If operating the unit without opening the valves, compressor failure will occur.
Confirm all indoor units being electrified. If not, water leakage will occur.
Measure the system pressure with pressure gauge, at the same time, operate the unit.
- Trial operation
In trial operation, refer to the information of performance section.
When the unit cannot start up at the room temperature, make trial operation for outdoor.

Move and scrap the air conditioning

- When moving, to disassemble and re-install the air conditioning, please contact your dealer for technical support.
- In the composition material of air conditioning, the content of lead, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers are not more than 0.1% (mass fraction) and cadmium is not more than 0.01% (mass fraction).
- Please recycle the refrigerant before scrapping, moving, setting and repairing the air conditioning; for the air conditioning scrapping, should be dealt with by the qualified enterprises.



Airwell

Just feel well

WARNING :

The design and specifications are subject to change without prior notice for product improvement. Consult with the sales agency or manufacturer for details.

ATTENTION :

Le design et les données techniques sont donnés à titre indicatif et peuvent être modifiés sans préavis.



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