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Remarks:

1. The Installation and User's Manual applies to outdoor units of DC Inverter Mini VRF system .
2. When you are ready to use it, you must read the chapter Caution first to prevent you from damaging the air-conditioner or suffering other accidents due to your wrong operations.
3. Please select and use relevant parameters and directions as per the type of outdoor unit you purchase.
4. Please refer to the Installation Manual for the Indoor Units when installing the indoor units.

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Directions for Installation





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1. Precautions

Be sure not to use this comfortable air-conditioner for special places such as computer room, precise instruments, food, plants, animals or works of art.

Please read the **Installation and User's Manual** carefully before using this machine, operate it strictly as per the directions for use in the Manual. Otherwise, your operations may damage this machine or imperil others' personal and property safety.

Sign Description

Sign	Meaning of Sign	Sign	Meaning of Sign
 Warning	Wrong operations (or use) may cause death or serious injury.		The graphic symbol means prohibited. Specific prohibited content is expressed in the graphic symbol or in graphs or words nearby the graphic symbol.
 Caution	Wrong operations (or use) may cause personal injury or property loss.		The mark means forced (execution). Specific forced content is expressed in the graphic symbol or in graphs or words nearby the graphic symbol.

1. The personal injury means being injured, burned or electric shock and it is unnecessary to be hospitalized or receive long-term treatment.
2. The property loss means the loss of articles or materials.

1-1. Check before Use

- 1) Check whether or not the earth wire is under reliable connection or broken off.
- 2) It is necessary to power on for over 12 hours when starting it for the first time or restarting it after stopping it for a long time. In addition, when it is necessary to stop the air-conditioner within the time of about one day and night, please do not power the air-conditioner down (with the aim to heat the crankcase and prevent the compressor from being started with liquid).
- 3) Confirm that the air inlet and outlet of outdoor units are not blocked.
- 4) Please do not expose the air-conditioning set directly to any environment with water or damp where it easily suffers corrosion.
- 5) Please do not stamp on the air-conditioning set or place any article on the air-conditioning set.

1-2. Safety Rules

Caution

Air-conditioner installation should conform to the provisions of relevant national standards and National Electrical Code as well as meet the requirements of the **Installation and User's Manual**.

The air-conditioner should be installed by professional technical personnel and the user is not allowed to install it voluntarily. Otherwise, you or others may be hurt or the air-conditioner may be damaged.

Please use this machine as per the **Service Conditions of Air-conditioner** in the Manual in order to normally use it. Failing to do so may cause internal protection of the air-conditioner or water dropping or reduce the cooling or heating effect.

The room temperature should be set appropriately, especially when there are old men or women, children or patients in the room.

Lightning, near automobiles or mobile telephones may lead to the air-conditioner malfunction. In case of such circumstances, please manually cut off the power supply and then restart the air-conditioner.

It is necessary to power the air-conditioner off only after running it for 5 minutes at least if it is started. Otherwise, the service life of the air-conditioner may be affected.

Warnings

The master power switch of the air-conditioner should be placed out of children's reach to prevent the children from being in danger due to touching the master power switch. The master power switch of the air-conditioner should be not covered with inflammable such as curtain.

In case of a thunderstorm, please switch off the master power switch. Otherwise, lightning may damage the air-conditioner.

When the air-conditioner is not used for a long time, please switch off the master power switch. Otherwise, accidents may occur.

Before cleaning the air-conditioner or doing maintenance for it, please switch off the master power switch. Otherwise, accidents may occur.

Be sure not to use any liquid, liquefied or corrosive detergent to wipe this machine or sprinkle water or any other liquid on the machine body. Otherwise, plastic parts of the machine body may be damaged and electric shock may happen if the situation is serious.



Warnings

Do not insert objects like your hand or stick into the air outlet of the outdoor unit. Otherwise, the fan running at high speed may hurt you.

It is necessary to regularly change the air when using the air-conditioner together with any combustor. Failing to do so may cause oxygen deficiency.

Be sure not to dismantle the fan housing of the outdoor unit. Otherwise, the fan running at high speed may hurt you.

Be sure not to let a child play with the air-conditioner. Otherwise, the child may be in danger.

Do not place any combustor at the position of direct air supply of the air-conditioner. Failing to do so may cause incomplete combustion of such combustor.

Be sure not to use combustible gases or liquids such as natural gas, hair spray, paint and gasoline nearby the air-conditioner. Otherwise, a fire accident may happen.

Do not make the air outlet of this machine directly face any animal or plant. Otherwise, this machine will have an adverse impact on such animal or plant.

In case of any abnormal circumstance like abnormal noise, smell, smoke, temperature rise or leakage of electricity, please immediately switch off the power supply, being sure not to repair the air-conditioner voluntarily.

Do not place any combustible sprayer nearby the air-conditioner or directly spray the air-conditioner with any combustible sprayer because a fire accident may happen.

Do not place any container with water on the air-conditioner because water may enter the air-conditioner, weaken the insulating property of the machine and thus cause electric shock.

After using the air-conditioner for a long time, it is necessary to confirm whether or not the support suffers abrasion. If the air-conditioner is placed when its support suffers abrasion, the machine may fall and thus cause casualties.

Do not operate any switch with any wet hand because electric shock may happen.

Be sure to stop the air-conditioner from running and cut off the power supply at the time of repair or maintenance. Otherwise, the wind wheel running at high speed may hurt you.

Do not use the fuse whose capacity is other than the one stipulated in the Manual, and it is necessary to use iron wires, copper wires will cause consequences such as fire and troubles. With regard to the power supply, it is a must to use a special circuit with rated voltage for the air-conditioner.

1-3. Requirements for Electrical Safety

- 1) The wiring work must be done by a qualified electrician.
- 2) All the wiring work must conform to the electrical safety specification.
- 3) It is a must to ensure that the air-conditioner is in good ground connection and the master switch of air-conditioner has a reliable earth wire.
- 4) It is a must to equip the air-conditioner with independent power supply conforming to the rated parameter values.
- 5) The fixed wiring for connecting the air-conditioner must be installed with a device which can disconnect the power supply as per the wiring rules.
- 6) If a power line is damaged, it is a must to ask professional personnel of manufacturer, Maintenance Department or similar department to replace it in order to avoid danger.



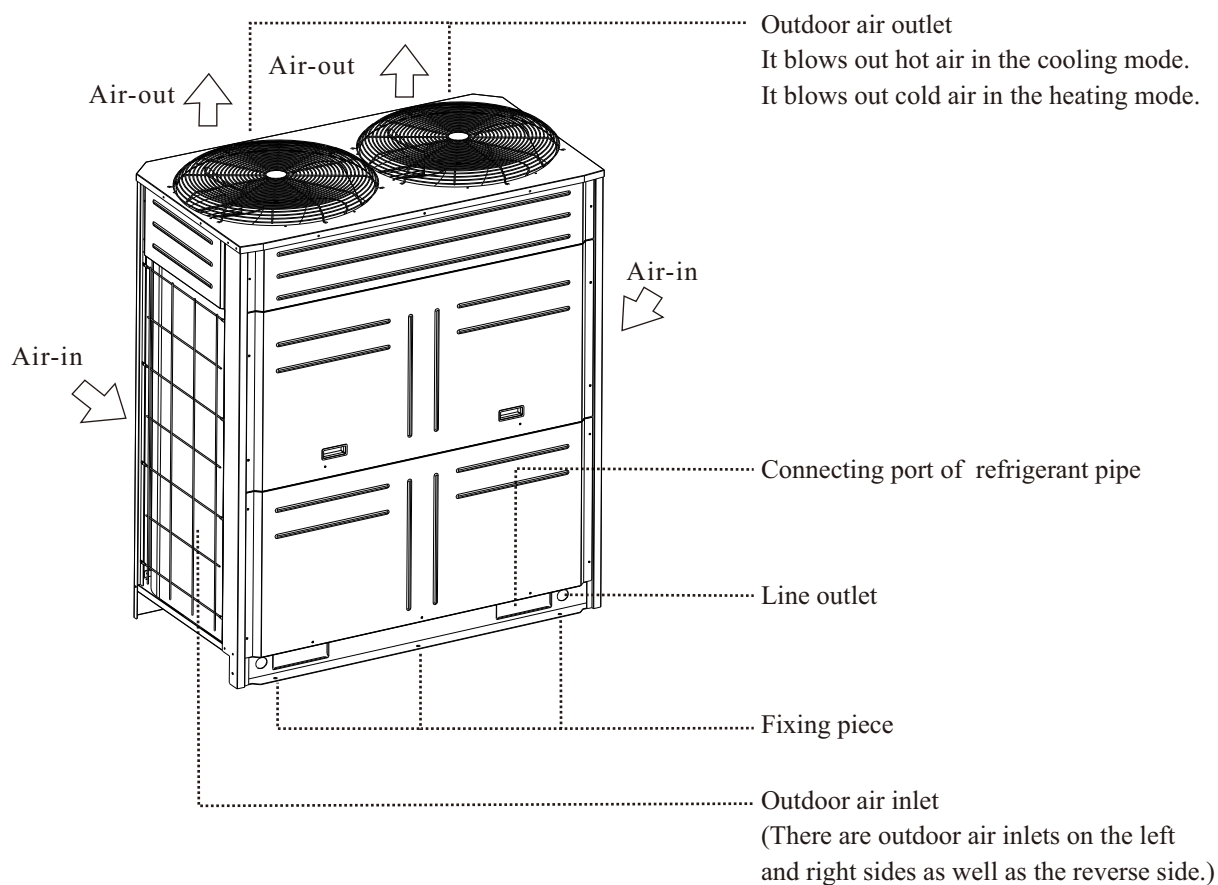
Caution

It is not allowed to disconnect the earth wire of master power switch in any case.

It is not allowed to use any damaged power line, and it is necessary to immediately replace any damaged power line after finding it.

It is not allowed to supply the power to the air-conditioner through external switch devices in order to prevent danger caused by error reset of thermal circuit breaker. For example, the air-conditioner is connected to a timer or a circuit under connection and disconnection realized as per the timing of a general component.

2. Parts and functions



All the diagrams in this Manual are used only for explanation, the appearance and functions may be inconsistent with those of the air-conditioner you buy. The appearance and functions of your air-conditioner should be subject to the actual air-conditioner model.

3. Operation and Performance of Air-conditioner

3-1. Service Conditions of Air-conditioner

Please run the air-conditioner in the following temperature conditions in order to keep its good performance.

Table 3.1

Cooling Operation	Outdoor Air Temperature	-5°C ~ 52°C
	Room Temperature	16 ~ 32
	Relative Room Humidity	Below 80% If the air-conditioner runs for a long time in the status of relative humidity exceeding 80%, the air-conditioner will condense to dew on the surfaces of the indoor units or blow out fog-like cold air from the air outlets.
Heating Operation	Outdoor Air Temperature	-20 ~ 24
	Room Temperature	15 ~ 31

If you use the air-conditioner in the conditions other than the above service conditions, the safety protection function of the air-conditioner may go into effect and the functions of air-conditioner may be abnormal.

3-2. Three-minute Protection

A compressor executes self-protection if it does not run within three minutes after immediately re-running or re-switching on the manual switch after the air-conditioner is stopped from running.

3-3. Cooling/Heating Operation

The indoor units of a DC mini VRF system air-conditioning set can be controlled independently, but the indoor units of the same system cannot be run in the cooling and heating modes. When the modes conflict, it is necessary to run the indoor units as per the preset mode having the priority. See the dial setting in the SW1 mode in Table 5.4 on Page 31 for specific setting.

Determining the running mode of complete machine as per the following rules:

- 1) If the master indoor unit is not set, there are three priority modes of cooling, heating and starting first and the running modes of outdoor units should be determined as per the aforementioned three modes. When the running modes of indoor units conflict with those of complete machine, the indoor units fail to run and display mode conflict.
- 2) If the master indoor unit is set, the running modes of outdoor units should depend on the running modes of the master indoor unit. When the running modes of the other indoor units conflict with those of complete machine, these indoor units fail to run and display mode conflict.

After the outdoor units determine the running modes of complete machine as per the running modes of the master indoor unit, or cooling, heating or starting first priority, the conflict relationship between the running modes of the other indoor units and the running modes of complete machine is as follow:

Running Mode of Indoor Unit Running Mode of Complete Machine	Cooling	Dehumidifying	Heating	Air Supply
Cooling	No	No	Yes	No
Heating	Yes	Yes	No	No

3-4. Characteristic of Heating Operation

When the air-conditioner starts to run, it will not immediately blow out hot air until the indoor heat exchanger becomes hot after 3~5 minutes (more or less as per the indoor and outdoor temperatures).

3-5. Defrosting during the Heating Operation

In the heating mode, if the outdoor units frost, the air-conditioner will automatically execute defrosting (for about 2~10 minutes) to improve the heating effect. At this moment, the outdoor units drain away water.

During the defrosting operation, the air supply motors of indoor units stop running.

3-6. Timer Interval of Quick Power-on

When debugging the outdoor units of DC mini VRF syseem air-conditioning set, it is not allowed to quickly power such machines on again when they do not discharge electricity completely. Such operation easily burns the electrical main PCB control panel out. The time interval between power-on should not be short and exceed two minutes. It is not allowed to power the machines on again until they discharge electricity completely.

3-7. Protective Device (High Pressure Switch)

This is a device which automatically stops the air-conditioner from running when the air-conditioner is in the forced-running mode. The complete machine stops from running and its indoor units show corresponding trouble codes when the protective device functions.

The protective device may start when the following circumstances occur.

In the cooling mode:

- The air inlets or outlets of the outdoor units are blocked up.

- Strong air continuously blows towards the air outlets of the outdoor units.

In the heating mode:

- The dust filters of the indoor units are covered with excessive dust and garbage.

- The air outlets of the indoor units are blocked up.

When the protective device motions, please switch off the manual power switch and restart the air-conditioner after finding out and dealing with the cause.

3-8. Power Failure

It is necessary to stop all operations if power failure occurs when the air-conditioner is running.

When re-starting up the air-conditioner for running, please re-press the ON/OFF key (remote controller or wire controller).

In case of malfunction during the operation

In case of malfunction caused by thunder, lightning and automobile radio when the air-conditioner is running, please switch off the manual power switch and re-press the ON/OFF key (remote controller or wire controller) after re-switching on the manual power switch.

3-9. Heating Capacity




The heating mode of the air-conditioner is the pump-heating mode in which the air-conditioner absorbs heat outdoor and releases heat indoor, so the heating capacity will reduce if the outdoor temperature drops.

When the outdoor air temperature is low, it is suggested using the air-conditioner together with other heating installation.

In the areas at particularly low outdoor air temperature such as extremely cold areas, the heating effect will be better if the indoor units equipped with auxiliary heating devices are used.

4. Abnormal Circumstances

In case of the following circumstances, please refer to the following table before applying for maintenance service.

	Phenomenon/Phenomena		Reason
Not faults	Outdoor Units	White cold air like fog or water appears.	<p>The air supply motors of outdoor units automatically stop for defrosting.</p> <p>The air-conditioner emits such sound due to the role of solenoid valves when the defrosting operation starts and ends.</p> <p>The air-conditioner emits a water-flowing-like sound when it is running or just stops and such sound becomes noisier when it starts to run for 2~3 minutes because this is water draining sound from refrigerant flow or dehumidification.</p> <p>The air-conditioner may emit slight pu sound which the heat exchanger emits due to slight expansion and contraction caused by temperature changes.</p> <p>Dust particles from walls, carpets, furniture, clothes, cigarette, cosmetics and other articles attach to the air-conditioner.</p> <p>The indicator light twinkles when switching on the manual power switch after power failure and re-power-on.</p> <p>When the cooling running cannot be executed due to the influence of heating running of other indoor units.</p> <p>When the set mode conflicts with the fixed cooling and heating modes.</p> <p>Stop air supply to avoid blowing out cold air.</p>
		The air-conditioner sounds pu from time to time.	
	Indoor Units 	The blown-out air is of peculiar smell.	
		The running indicator light twinkles.	
Check again	Automatic operation or stop		The timer may suffer incorrect operations.
		The air-conditioner does not run.	<p>Power failure may occur.</p> <p>The manual power switch may be not switched on.</p> <p>The fuse may be burned out.</p> <p>The protective devices may be started. (The running indicator light goes on.)</p> <p>The time set by the timer may be up. (The running indicator light goes on.)</p>
		The cooling/heating effect is not obvious.	<p>The air inlets and outlets of the outdoor units may be blocked up.</p> <p>The doors and windows may be opened.</p> <p>The dust filter may be covered with dust and garbage.</p> <p>The position of the outlet air deflector may be inappropriate.</p> <p>The FAN mode may be switched to low or the mode may be switched to FAN ONLY .</p> <p>The set temperature is improper.</p> <p>The cooling and heating modes may be selected simultaneously.</p>

In case of the following circumstances, please immediately stop the air-conditioner from running and then contact the local Customer Service Center .

The movements of the switch are not correct.

The fuse or earth leakage protective device is burned out for many times.

Foreign matters or water enters the air-conditioner by mistake.

5. Models and Main Parameters

Table 6.1

Model (capacity of outdoor unit)			25200W	28000W	33500W	40000W	45000W	50000W
Power Supply			380V 3N~50Hz					
Cooling Capacity		W	25,200	28,000	33,500	40,000	45,000	50,000
Heating Capacity		W	27,000	31,500	37,500	45,000	50,000	56,000
Dimensions (W*H*D)		mm	930 1610 780			1310 1610 780		
Compressor	Type		Scroll Compressor					
	Gas Displacement	cm³/rev	65		72	65+59	65+65	72+65
	Motor Input Power Number of Compressors	kw	6.0		7.1	6.0+5.1	6.0+5.7	7.1+5.7
	Working Frequency Range of Inverter Compressor		20~90Hz					
Fan	Type		Axial Fan					
	Air Volume	m³/h	12000			16000		
	Drive		Direct Drive					
Weight		kg	210		220	300	310	
Safety Devices			High Pressure Switch, Temperature Sensor, High Pressure transducer, Low Pressure transducer					
Capacity Control			10~100%					
Refrigerant	Type		R410A					
	Filling Amount	kg	8.5		10	11	12	13
	Control Method		Electronic Expansion Valve					
	Level of Noise	dB(A)	59			63		





Remarks:



1. The cooling and heating capacities of air-conditioner is measured in the conditions stipulated in GB/T18837-2002 and the actual cooling and heating capacities will vary with changes of ambient temperature and relative humidity;
2. The level of air-conditioner noise is measured in a semi-anechoic laboratory which is in the conditions stipulated in GB/T18837-2002, and the actual level of noise will vary with the changes of indoor and outdoor ambient temperatures;
3. The external static pressure of air-conditioner at the time of test is 0Pa;
4. The product specification should be subject to the parameters on the nameplate of this product if such specification changes due to improvement.




1. Safety Precautions

Be sure not to use this comfortable air-conditioner for special places such as computer room, precise instruments, food, plants, animals or works of art. Please read the Installation and User's Manual carefully before using this machine, strictly operate it strictly as per the directions for use in the Manual. Otherwise, your operations may damage this machine or imperil others personal and property safety.




Warnings





Installation Warnings	 Entrust professionals for installation	Please entrust professionals for installation. If the air-conditioner is installed by other personnel, incomplete installation may occur and thus cause water leakage, electric shock or fire.
	 Confirm the earth wire	Confirm whether or not the air-conditioner is in correct ground connection. Incomplete ground connection may cause electric shock.
	 Measures for not exceeding the limit concentration	When the air-conditioner is installed in a small room, it is necessary to take certain measures for preventing personnel from suffocation once the refrigerant leakage exceeds the limit concentration. Consult with the corresponding dealer for specific measures.
	 Warning	Confirm that the air-conditioner is powered on only after all the installation work is finished.

Use Warnings	 Prohibited	It is prohibited to insert your fingers, sticks or other objects into the air inlet or outlet because the internal fan running at high speed may cause personal injury and the air-conditioner may be damaged.
	 Switch off the manual power switch	In case of any abnormal circumstance (empyreumatic smell), it is necessary to immediately switch off the manual power switch, stop the air-conditioner from running and contact the local Customer Service Center or appointed technical service center . If abnormal operation continues, electric shock or fire may occur.

Moving and Repair Warnings	 Entrust	Please entrust the corresponding dealer or professionals to move or re-install the air-conditioner if it is necessary to do so. Incomplete installation may cause accidents such as electric shock, fire, personal injury and water leakage.
	 Prohibited	It is absolutely prohibited to voluntarily refit or repair the air-conditioner. Otherwise, electric shock or fire may occur easily.
	 Entrust	Please entrust the corresponding dealer or professionals to repair the air-conditioner if it is necessary to do so. Improper repair may cause accidents such as fire, electric shock, personal injury and water leakage.

Cautions

Installation Warnings	 Confirm the installation site	It is prohibited to install the air-conditioner in a place where combustible gases easily leak. In case of leakage, the combustible gases stay surrounding the outdoor units and may cause fire.
	 Confirm the fixing method	Confirm whether or not the installation base is strong. If the installation base is not strong, the outdoor units may fall and cause accidents.
	 Confirm the residual current circuit-breaker	Confirm whether or not the residual current circuit-breaker is installed. Electric shock or fire may occur if the residual current circuit-breaker is not installed.
	Confirm vacuumizing	Before the vacuumizing is finished, it is not allowed to open the high pressure valve, low pressure valve and oil balance valve. These valves cannot be opened until vacuumizing is finished.

Installation Warnings	 Check the installation platform	At the time of long-term use, it is necessary to check whether or not the installation platform is fixed firmly and in perfect condition. If the installation platform is damaged or not fixed firmly, the outdoor units may fall and cause personal injury.
	 Switch off the manual power switch	When cleaning the air-conditioner, it is a must to stop it from running and switch off the manual power switch. If the air-conditioner is not stopped from running, the internal fan running at high speed may cause personal injury.
	 Prohibited	It is necessary to use corresponding fuse. It is absolutely prohibited to substitute copper or iron wire. Otherwise, faults or fire may occur.
	 Prohibited	It is prohibited to directly spray combustible spray towards the outdoor units. Otherwise, fire may occur.

2. Key Inspection Points of Construction

2-1. Arrival of Goods and Box-opening Check

- 1) After receiving machines, it is necessary to check whether or not such machines suffer transport damage. When finding any surface or interior damage, it is necessary to report immediately to the corresponding transport company in written form.
- 2) After receiving machines, it is necessary to check whether or not the models, specifications and quantities of equipment conform to the corresponding contract.
- 3) When opening the external packing, please keep the operating manual properly and check the accessories.

2-2. Refrigerant Pipes

- 1) It is necessary to use the special refrigerant distributor (to be purchased separately) to install the supporting refrigerant pipes.
- 2) It is a must to use the refrigerant pipes with designated pipe diameters and thickness.
- 3) When welding copper pipes, it is a must to do nitrogen filled protection by filling nitrogen of 0.2kgf/cm² before welding. After finishing welding, it is necessary to keep filling nitrogen till the copper pipes cool completely.
- 4) The refrigerant pipes must be under insulation treatment.

2-3. Air Tightness Test

After installing the supporting refrigerant pipes, it is a must to fill nitrogen of 40kgf/cm² (4.0MPa) simultaneously on the gas, liquid and oil balance sides in order to do 24-hour air tightness test.

2-4. Vacuumizing

After doing the air tightness test, it is a must to do vacuumizing treatment simultaneously on the gas, liquid and oil balance sides (wherein the vacuum degree should be -0.1MPa).

2-5. Refrigerant Addition

- 1) It is necessary to calculate the refrigerant addition as per the pipe diameters and lengths (actual lengths) of liquid-side supporting pipes of the indoor and outdoor units.
- 2) It is necessary to write down the amount of refrigerant addition, liquid-side pipe diameter, length (actual length) and height difference between the indoor and outdoor units in the log sheet (on the cover of electrical control box) of outdoor unit for future use.

2-6. Electrical Wires

- 1) Please select the power capacity and the diameters of electric wires as per the design manual. The diameter of power lines for the air-conditioner should be bigger than that for ordinary motors.
- 2) Be sure not to crisscross or twine the power lines (380V, 3N) with the (low-voltage) wires connecting the indoor and outdoor units to prevent the air-conditioner from incorrect operations.
- 3) Please power on the indoor units after doing the air tightness test and vacuumizing.
- 4) Please set an outdoor unit as the master or slave via the Dial Switch SW1 on the main PCB, and set the static pressure of an outdoor unit and the number of outdoor unit modules via the Dial Switch SW2. Please refer to the wiring label or the setting of dial switches in Table 5.4 on Page 31 of this Manual for specific setting methods.

2-7. Trial Operation

The trial operation cannot be done until the outdoor unit is powered on and preheated for over 12 hours. Failing to do so may cause system damage.

3. Installation of Outdoor Units

3-1. Combinations of Outdoor Units

Capacity of Outdoor Units(HP) Combination (HP)	8	10	12	14	16	18	Admissible Maximum Number of Indoor Units	Recommended Maximum Number of Indoor Units
8	●						13	7
10		●					16	9
12			●				19	11
14				●			23	13
16					●		26	15
18						●	29	16
20		●●					33	18
22		●	●				36	20
24			●●				39	22
26		●			●		43	24
28		●				●	46	26
30			●			●	50	27
32				●		●	53	29
34					●	●	56	31
36						●●	59	32
38		●●				●	63	35
40		●	●			●	64	36
42			●●			●	65	38
44		●			●	●	66	39
46		●				●●	67	40
48			●			●●	68	41
50				●		●●	69	42
52					●	●●	70	43
54						●●●	71	44
56		●●				●●	72	45
58		●	●			●●	73	46
60			●●			●●	74	47
62		●			●	●●	75	48
64		●				●●●	76	49
66			●			●●●	77	50
68				●		●●●	78	51
70					●	●●●	79	52
72						●●●●	80	52

Notes:

If all the indoor units in one system run relatively frequently at the same time, the total capacity of indoor units in such system should be less than the combined capacity of outdoor units. Otherwise, overload operation may appear in bad working conditions or narrow running space.

The total capacity of indoor units should be less than the combined capacity of outdoor units if the system is used in a cold region (with a temperature of below -10℃) or any environment with a high heating load.

With regard to a system in which not all the indoor units run at the same time, the admissible maximum capacity of all the indoor units is less than the combined capacity of outdoor units.

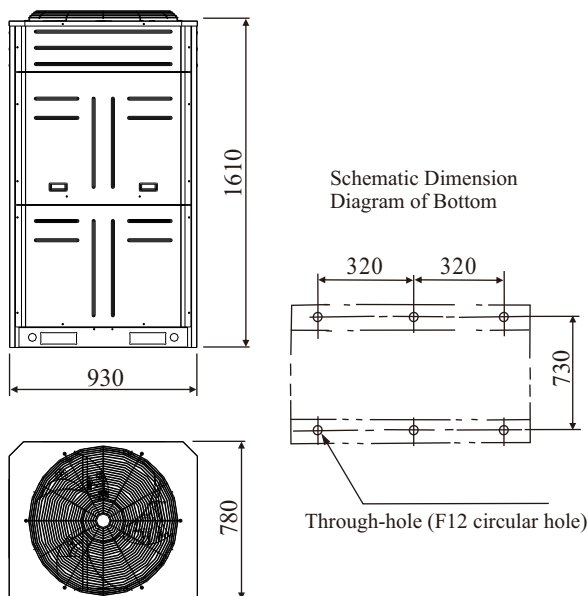
3-2. Selection of Installation Site

Warnings

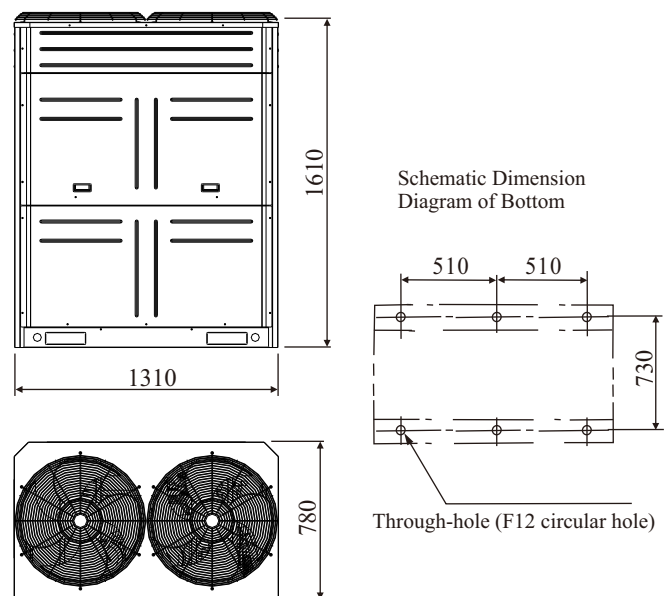
It is necessary to install the air-conditioner at a position whose strength is sufficient to support the weight of air-conditioner.
If the strength is insufficient, the machine may fall and cause personal injury.
It is necessary to do specific installation work in order to resist strong wind or earthquake.
Incomplete installation may cause an accident due to falling of machine.

- 1) The installation of air-conditioning set must conform to local or national safety standards.
- 2) The installation site can provide sufficient installation and maintenance space and should be far away from places with low noise requirement such as bedrooms.
- 3) The air inlet and outlet should be unblocked and free from strong wind.
- 4) It is necessary to install the air-conditioner in a dry and ventilated place.
- 5) The supporting surface of the installation site should be horizontal and enough to bear the weight of outdoor unit horizontally as well as will not add noise and vibration.
- 6) It is necessary to install the air-conditioner in a place where the running noise and discharged air do not affect any neighbor.
- 7) It is necessary to install the air-conditioner in a place which is free from leakage of any combustible gas.
- 8) It is necessary to install the air-conditioner in a place which is convenient for installation and connection of pipes as well as electrical connection.
- 9) It is necessary to avoid installing the air-conditioner in a place where there is much salinity or any corrosive gas.
- 10) The indoor and outdoor units should be as close as possible to each other in order to reduce the length of refrigeration pipe and number of bends as much as possible.

3-3. Dimension Diagram of an Outdoor Unit (Unit: mm)



Outdoor unit
(capacity:25200W-33500W)



Outdoor unit
(capacity:40000W-50000W)

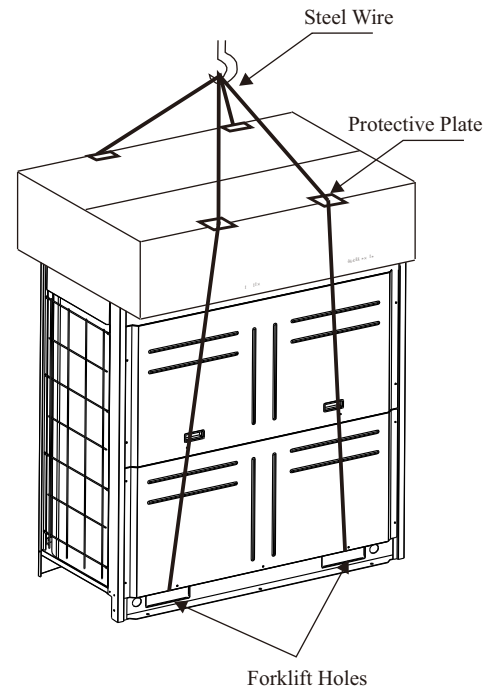
3-4. Moving-in of An Outdoor Unit

1. Use steel wires to lift an outdoor unit

When lifting an outdoor unit, it is not allowed to take any package apart, and it is necessary to use two ropes with the single length of over 8 meters to lift such packaged outdoor unit safely and stably while keeping balance of the machine. When the outdoor unit is not packaged or its package is damaged, it is necessary to use protective plates or packages for protection.

When moving and lifting an outdoor unit, it is necessary to make the outdoor unit keep vertical with the inclination of not more than 30° and pay attention to safety in the course of moving and lifting.

2. Use a forklift to horizontally move an outdoor unit



3-5. Base of an Outdoor Unit

1) Providing a firm and right base has the following effects:

The outdoor unit will not subside.

The outdoor unit will not produce abnormal noise caused by the base.

2) Type of Bases

Steel-structured base

Concrete base (with common making method as shown in the following picture)

Key Points of Base Making:

With regard to the base of master, it is necessary to make a concrete base on the firm cement ground. The common method of making a concrete base is shown in the right picture or it is allowed to make the concrete base after field measurement on the site.

The base should be horizontal completely to ensure that every point is under even contact.

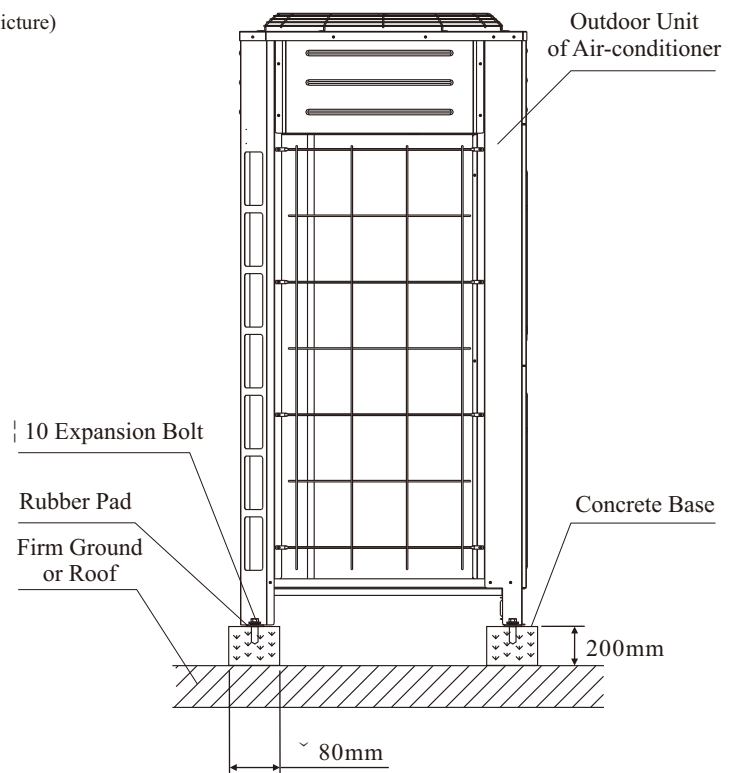
When making an installing base of a machine, please ensure that the base directly supports the folded vertical edges of front and back base-plates of chassis because the folded vertical edges of front and back base-plates are the actual weight-bearing positions of such machine.

When the base is made on a roof, the gravel layer is unnecessary but the concrete surface must be knocked to be rough. The standard concrete proportion is 1 (cement): 2 (sand): 4 (cobble stones). It is necessary to add 10 reinforced steel bars, level the surface of cement mortar and chamfer the upper edges of base.

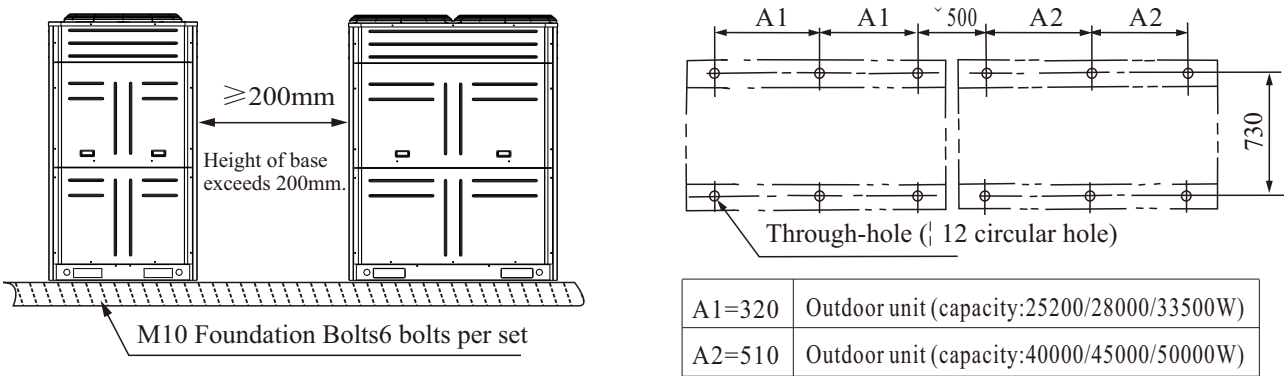
It is necessary to set drainage ditches surrounding the base in order to discharge the accumulated water surrounding the equipment.

Please check the weight-bearing capacity of roof to ensure the load capacity.

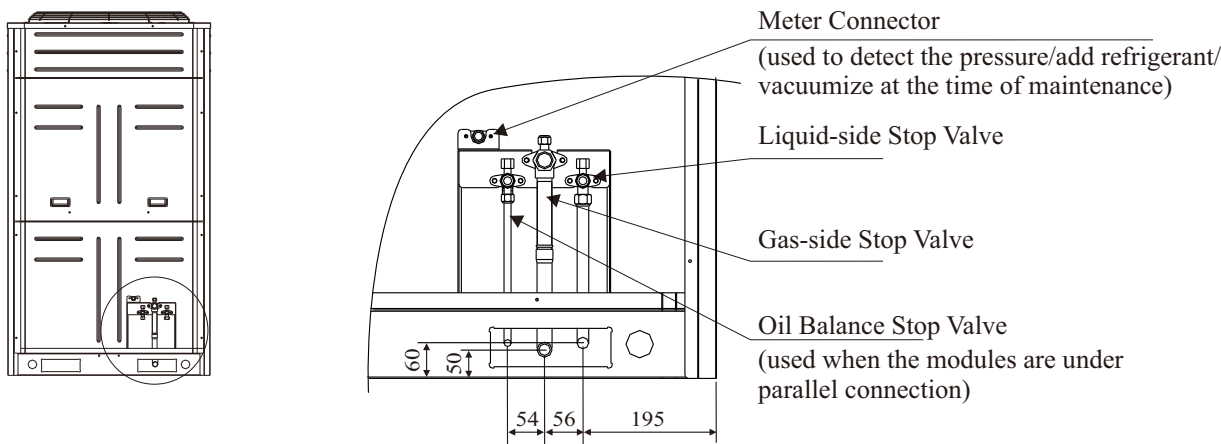
When deciding to pipe a machine from its bottom, it is necessary to ensure that the height of base exceeds 200mm.



3-6. Diagrams of Installation Position of Foundation Bolts



3-7. Diagrams of Central Position of Connecting Pipes (Unit: mm)

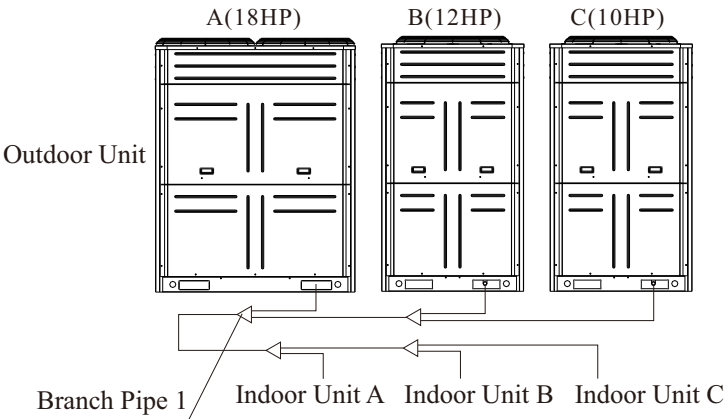


3-8. Key Installation Points of an Outdoor Unit

- 1) It is necessary to install a vibration isolator or pad between the set and the base as per the design requirements.
- 2) The contact between the outdoor unit and the base should be close. Otherwise, much vibration and noise will appear.
- 3) The outdoor unit must be in reliable ground connection.
- 4) Before debugging the outdoor unit, it is prohibited to open the valves of gas-side, liquid-side and oil balance pipes of such outdoor unit.
- 5) It is necessary to ensure that the installation site has sufficient maintenance space.

3-9. Arrangement Sequence of Outdoor Units

When a system has more than two outdoor units, it is necessary to install these outdoor units as per the following method: arrange the outdoor units in the system in descending order (for example, in the right picture, capacity of Outdoor Unit A > capacity of Outdoor Unit B > capacity of Outdoor Unit C) and place the largest Outdoor Unit A at the Branch Pipe 1.



3-10. Installation Space of Outdoor Units

- 1) Please ensure necessary installation and overhaul space and place the modules in the same system at the positions of same height. (Refer to Figure 3-10.1).
- 2) After leaving the overhaul space as shown in Figure 3-10.2, install the outdoor units and then install the power-supply equipment on the sides of the outdoor units. Please refer to the Manual for Installation of Power-supply Equipment for the installation method.
- 3) Please refer to Figure 3-10.3 when the outdoor units are higher than surrounding obstacles and arrange in one line.
- 4) Please refer to Figure 3-10.4 when the outdoor units are higher than surrounding obstacles and arrange in two lines.
- 5) Please refer to Figure 3-10.5 when the outdoor units are higher than surrounding obstacles and arrange in more than two lines.
- 6) Please refer to Figure 3-10.6 when the outdoor units are lower than surrounding obstacles. Please refer to the circumstance in which the outdoor units are higher than surrounding obstacles for arranging these outdoor units. However, please add air scoopers to the heat dissipation hoods of these outdoor units to strengthen the heat dissipation effect, prevent the outdoor hot air from moving around and thus affecting the heat exchange effect. In the schematic Figure 3-10.6, H-h represents the height of an air scooper. Please make the air scoopers on the installation site.
- 7) Please refer to Figure 3-10.7 when there is any obstacle above the outdoor units. If the outdoor units are surrounded by piled-up objects, the height of such objects should be less than 800mm away from the top of an outdoor unit. If such height is less than the required dimension in the picture, it is a must to add a mechanical air exhaust device.

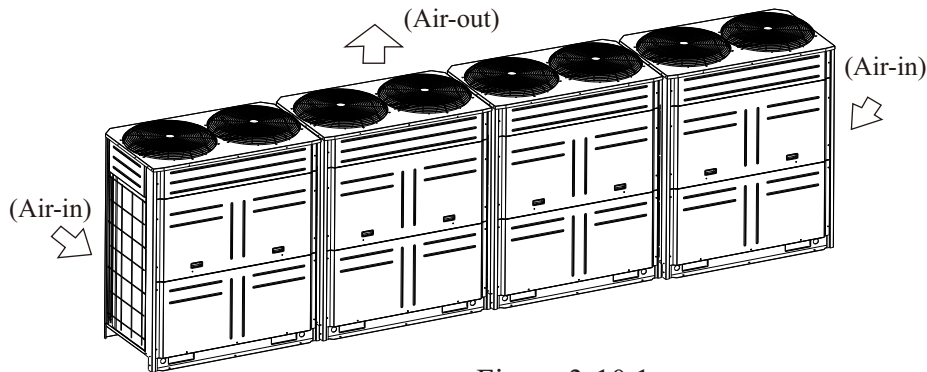


Figure 3-10.1

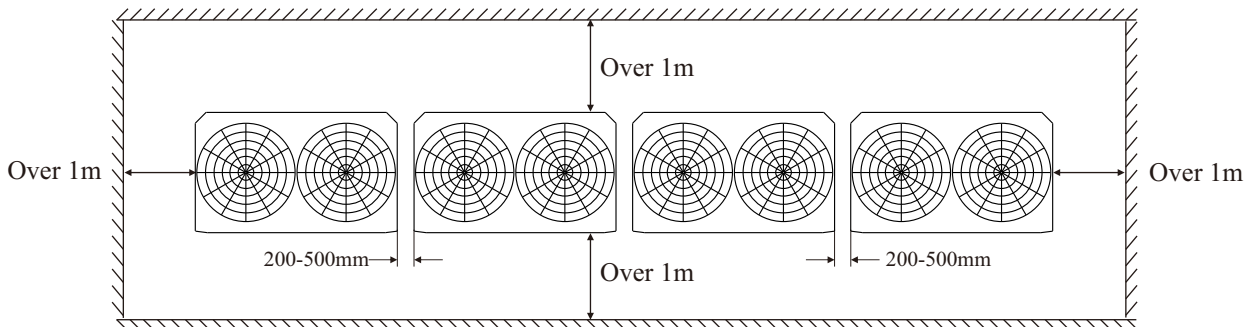


Figure 3-10.2

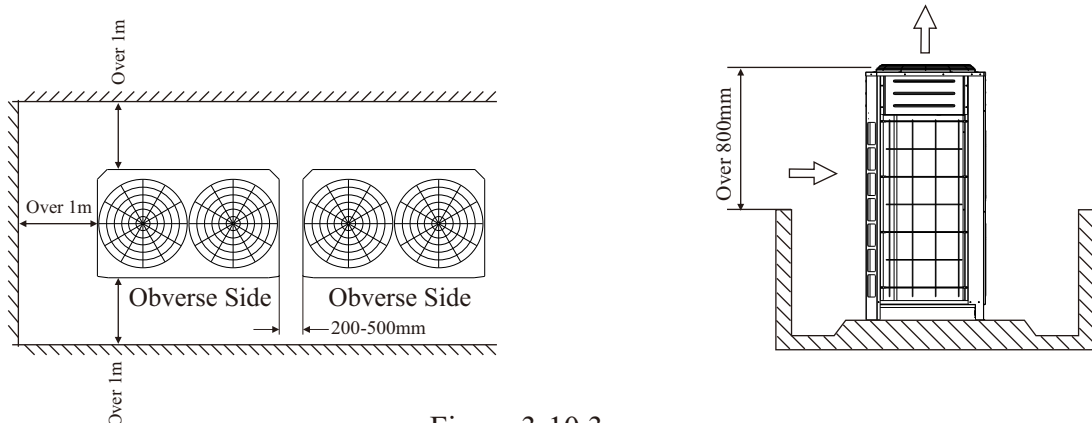


Figure 3-10.3

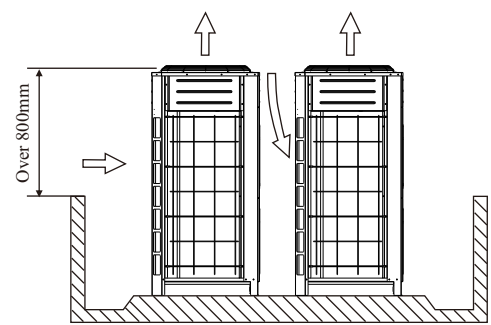
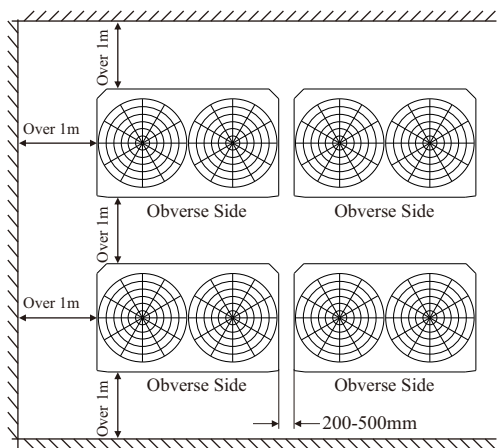


Figure 3-10.4

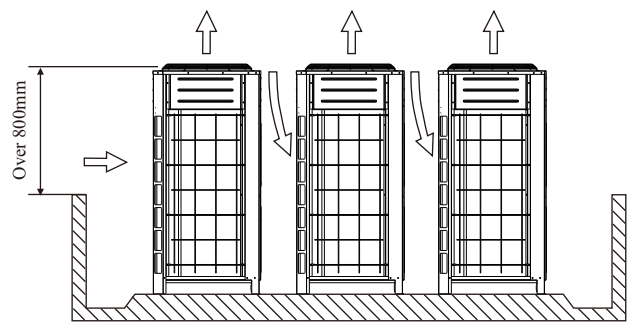
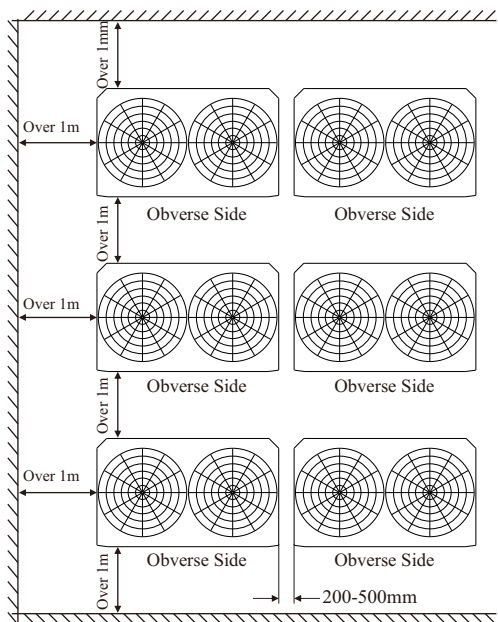


Figure 3-10.5

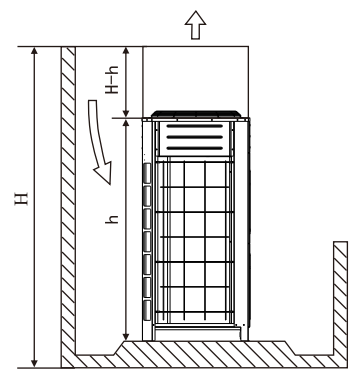
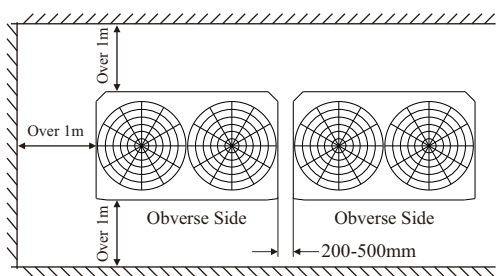
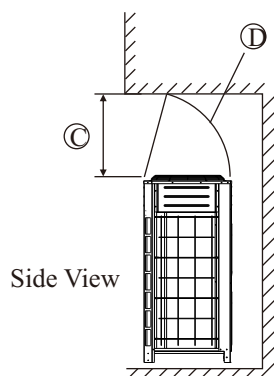
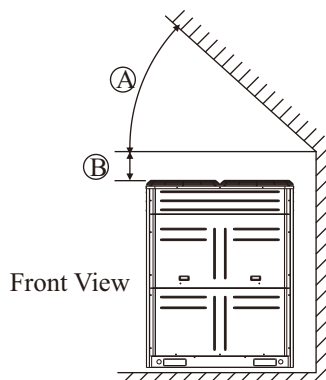


Figure 3-10.6



- A. Over 45
- B. Over 300mm
- C. Over 1,000mm
- D. Flow deflector

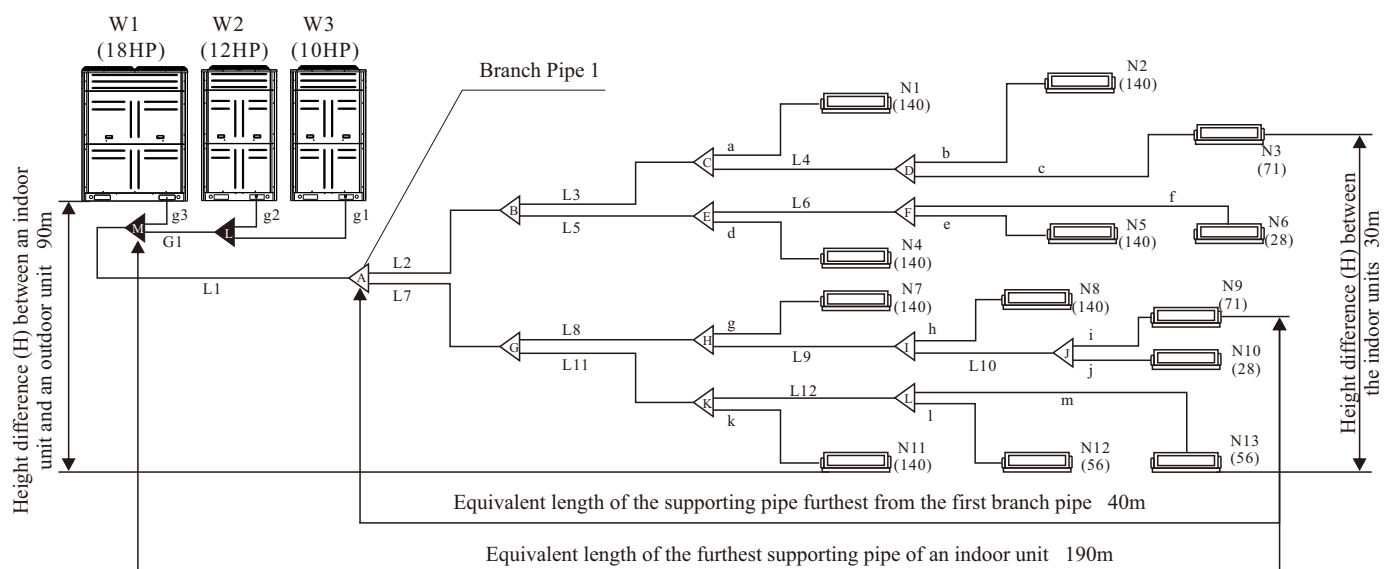
Figure 3-10.7

4. Refrigerant Pipes connection

4-1. Admissible Length and Height Difference of Supporting Refrigerant Pipes

Table 4.1

			Admissible Value	Pipes
Length of Supporting Pipe	Total Length of Refrigerant Pipes (Total extended length)		1000m (See Condition 2 of Remark 5)	$L1 + (L2+L3+L4+L5+L6+L7+L8+L9+L10+L11+L12) \times 2 + a+b+c+d+e+f+g+h+i+j+k+l+m$
	Length of the farthest supporting pipe (L)	True length	165m	$L1+L7+L8+L9+L10+I$
		Equivalent length	190m (See Remark 1)	
	Length of the supporting pipe furthest from the first branch pipe (L)		40m (See Remark 5)	$L7+L8+L9+L10+I$
Height Difference	Height difference (H) between an indoor unit and an outdoor unit	When the outdoor unit is on top	90m	(See Remark 3)
		When the outdoor unit is underneath	110m	(See Remark 4)
	Height difference (H) between the indoor units		30m	



(Figure 4-1.1)

⚠ Remarks

1. The equivalent length of a branch pipe is the length of an equivalent supporting pipe, namely 0.5m.
2. It is necessary to install the indoor units equidistantly on two sides of a U-shaped branch pipe.
3. See the relevant content on Page 22 for the setting of oil return bends.
4. When an outdoor unit is underneath, the liquid-side pipe of master pipe with height of over 40m needs to be enlarged by one size.
5. The admissible length of the first branch pipe connected to the indoor unit should be equivalent to or less than 40 meters. However, when all the following conditions are met, such admissible length can be extended to 90 meters.

Needed Condition	Legend	
1. It is necessary to increase the pipe diameters of all master supporting pipes between the first branch pipe and the last branch pipe. (Please make the variable-diameter pipes on the site.) It is not necessary to increase the pipe diameter of the master supporting pipes if such diameter is the same as that of the master pipe.	$\boxed{N9} L7+L8+L9+L10+i=90m$ Pipe diameters of supporting pipes L2, L3, L4, L5, L6, L7, L8, L9, L10, L11 and L12 needs to be increased.	Dimensions of supporting pipes are increased as follows: 9.5 12.7 15.9 19.1 22.2 25.4 28.6 31.8 38.1 41.2 44.5 54.0
2. When calculating the total extended length, it is a must to double the actual length of the above supporting pipes (excluding the master pipe and the supporting pipes whose pipe diameters are not increased).	$L1+(L2+L3+L4+L5+L6+L7+L8+L9+L10+L11+L12) \times 2 + a+b+c+d+e+f+g+h+i+j+k+l+m$ 1000m	Refer to Figure 4-1.1
3. The distance from the indoor units to the nearest branch pipe is 20 meters at most.	A,b,c,m 20m(Refer to Table 4.7 for the requirements for pipe diameters.)	
4. The difference between the distance from the outdoor units to the furthest indoor unit and the distance from the outdoor units to the nearest indoor unit is 40 meters at most.	The furthest indoor unit N9 The nearest indoor unit N1 $(L1+L7+L8+L9+L10+I)-(L1+L2+L3+a)$ 40m	

4-2. Specifications of Branch Pipe Connectors

Table 4.2

Liquid-side Branch Pipes	Gas-side Branch Pipes
<p>L01: (φ 9.5- φ 12.7)——2×(φ 12.7- φ 6.4)</p>	<p>G01: (φ 25.4- φ 19.1)——2×(φ 22.2- φ 6.4)</p>
<p>L02: (φ 15.9- φ 19.1)—— (φ 19.1- φ 12.7)+(φ 19.1- φ 6.4)</p>	<p>G02: (φ 31.8- φ 25.4)—— (φ 28.6- φ 19.1)+(φ 28.6- φ 9.5)</p>
<p>L03: (φ 19.1- φ 25.4)—— (φ 22.2- φ 12.7)+(φ 22.2- φ 6.4)</p>	<p>G03: (φ 31.8- φ 38.1)—— (φ 34.9- φ 25.4)+(φ 38.1- φ 9.5)</p>
<p>T-shaped Three-way Branch Pipe</p>	<p>G04: (φ 41.3- φ 44.5)—— (φ 44.5- φ 34.9)+(φ 41.3- φ 9.5)</p>

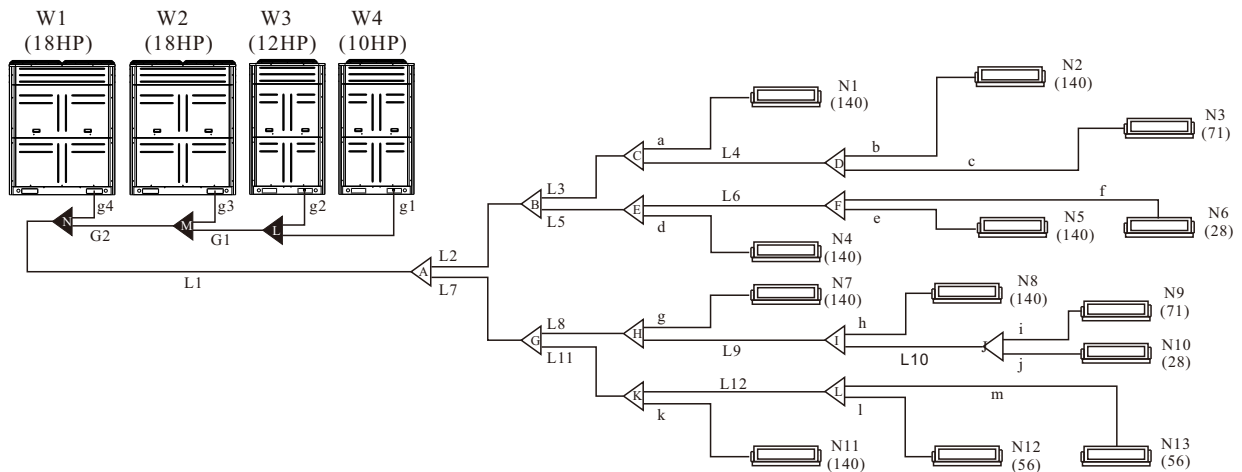
Assembly	Included Parts	Assembly	Included Parts
Branch Pipe Assembly By01	G01, L01	Branch Pipe Assembly By02	G02, L01
Branch Pipe Assembly By03	G02, L02	Branch Pipe Assembly By04	G03, L02
Branch Pipe Assembly By05	G04, L03	Branch Pipe Assembly By06	G01, L01
Branch Pipe Assembly By07	L01, L02		
Branch Pipe Assembly By02	G03, L02, TXST-10	Branch Pipe Assembly By03	G04, L03, TXST-10

Remark: Some liquid-side and gas-side branch pipe assemblies in the above table consist of Y-shaped branch pipes and one to two variable-diameter pipes. Please decide whether or not to weld the pipes as per the actual situation at the time of construction.

4-3. Classification of Supporting Pipes

Table 4.3

Name of Supporting Pipe	Connection Position of Supporting Pipe	Code (as per Figure 4-3.1)
Master Pipe	The Supporting pipe between the outdoor unit and the indoor first branch pipe	L1
Master Supporting Pipes of Indoor Units	The supporting pipes behind the indoor first branch pipe and not directly connected to the indoor units	L2, L3, L4, L12
Slave Supporting Pipes of Indoor Units	The supporting pipes behind the branch pipes and directly connected to the indoor units	a, b, c, d, m
Branch Pipe Assemblies of Indoor Units	The supporting pipe assemblies connecting the master pipe, master supporting pipes and slave supporting pipes	A,B,C,D,E,F,G,H,I,J,K,L
Branch Pipe Assemblies of Outdoor Units	The supporting pipe assemblies connecting the outdoor unit connecting pipes and among the master supporting pipes	L,M
Outdoor Unit Connecting Pipes	The supporting pipes connecting the outdoor units and among the outdoor unit branch pipe assemblies	g1, g2, g3, g4, G1, G2



(Figure 4-3.1)

4-4. Determining the Pipe Diameters of Supporting Pipes Connecting Indoor Units

1) Pipe Diameters of Slave Supporting Pipes Connecting Indoor Units (Graphical Number: a, b, c, d, m)

Table 4.4

Indoor unit Model	Gas-side	Liquid-side
Capacity: 1800~2200W	∅ 9.52 (flared nut)	∅ 6.35 (flared nut)
Capacity: 2800~5600W	∅ 12.7 (flared nut)	∅ 6.35 (flared nut)
Capacity: 6300~8000W	∅ 15.9 (flared nut)	∅ 9.52 (flared nut)
Capacity: 9000~14000W	∅ 19.1 (flared nut)	∅ 9.52 (flared nut)

Note: 2800W (F5 ducted type indoor unit): gas-side, ∅ 9.52 (flared nut), liquid-side, ∅ 6.35 (flared nut)
 2800/3600W (wall mounted type indoor unit): gas-side, ∅ 9.52 (flared nut), liquid-side, ∅ 6.35 (flared nut)

2) Master Supporting Pipes and Branch Pipe Assemblies of Indoor Units (Graphical Number: L2, L3, L4, L12; A, B, C, L)

Table 4.5

Capacity of Downstream Indoor Units (A) (100W)	Dimensions of Master Supporting Pipe (Gas/Liquid-side Pipe)	Applicable Branch Pipe (Gas/Liquid-side)
A<63	∅ 12.7/∅ 6.35	Assembly BY06 (L01/L01)
63 A<80	∅ 15.9/∅ 9.52	Assembly BY07 (L01/L02)
80 A<224	∅ 19.1/∅ 9.52	Assembly BY07 (L01/L02)
224 A<400	∅ 25.4/∅ 12.7	Assembly BY01 (G01/L01)
400 A<560	∅ 28.6/∅ 12.7	Assembly BY02 (G02/L01)
560 A<730	∅ 31.8/∅ 15.9	Assembly BY03 (G02/L02)
730 A<1060	∅ 34.9/∅ 15.9	Assembly BY04 (G03/L02)
1060 A<1230	∅ 38.1/∅ 19.1	Assembly BY04 (G03/L02)
1230 A<1400	∅ 38.1/∅ 19.1	Assembly BY04 (G03/L02)
1400 A<1740	∅ 41.2/∅ 22.2	Assembly BY05 (G04/L03)
1740 A	∅ 44.5/∅ 22.2	Assembly BY05 (G04/L03)

Example: The capacity of downstream indoor units connected by L4 in Figure 4-3.1 is 211 (140+71) and the pipe diameter on the gas/liquid side of L4 is ∅ 19.1/∅ 9.5.

4-5. Determining the Pipe Diameters of Supporting Pipes Connecting Outdoor Units

1) Pipe Diameters of Stop Valve Connectors of Outdoor Units (Graphical Number: g1, g2, g3, g4)

Table 4.6

Outdoor unit Model	Gas-side	Liquid-side
Capacity: 25200/28000/33500W	┘ 25.4 (welding)	┘ 12.7 (flared nut)
Capacity: 40000/45000/50000W	┘ 28.6 (welding)	┘ 12.7 (flared nut)

2) Master Supporting Pipes and Branch Pipe Assemblies of Outdoor Units (Graphical Number: L1; A)

Table 4.7

Capacity of Outdoor Units	Dimensions of Master Pipe, when the equivalent length of all supporting pipes is less than 90 meters		Dimensions of Master Pipe, when the equivalent length of all supporting pipes is 90 meters at least	
	Gas/Liquid-side	Indoor Branch Pipe 1 (Gas/Liquid-side)	Gas/Liquid-side	Indoor Branch Pipe 1 (Gas/Liquid-side)
8~12HP	┘ 25.4/┘ 12.7	Assembly BY01 (G01/L01)	┘ 28.6/┘ 12.7	Assembly BY02 (G02/L01)
14~18HP	┘ 28.6/┘ 12.7	Assembly BY02 (G02/L01)	┘ 31.8/┘ 15.9	Assembly BY03 (G02/L02)
20~24HP	┘ 31.8/┘ 15.9	Assembly BY03 (G02/L02)	┘ 34.9/┘ 15.9	Assembly BY04 (G03/L02)
26~30HP	┘ 34.9/┘ 15.9	Assembly BY04 (G03/L02)	┘ 34.9/┘ 19.1	Assembly BY04 (G03/L02)
32~36HP	┘ 34.9/┘ 19.1	Assembly BY04 (G03/L02)	┘ 38.1/┘ 19.1	Assembly BY04 (G03/L02)
38~42HP	┘ 38.1/┘ 19.1	Assembly BY04 (G03/L02)	┘ 38.1/┘ 19.1	Assembly BY04 (G03/L02)
44~48HP	┘ 38.1/┘ 19.1	Assembly BY04 (G03/L02)	┘ 41.2/┘ 19.1	Assembly BY05 (G04/L03)
50~54HP	┘ 41.2/┘ 19.1	Assembly BY05 (G04/L03)	┘ 41.2/┘ 22.2	Assembly BY05 (G04/L03)
56~60HP	┘ 41.2/┘ 22.2	Assembly BY05 (G04/L03)	┘ 44.5/┘ 22.2	Assembly BY05 (G04/L03)
62~66HP	┘ 44.5/┘ 22.2	Assembly BY05 (G04/L03)	┘ 44.5/┘ 22.2	Assembly BY05 (G04/L03)
68~72HP	┘ 44.5/┘ 22.2	Assembly BY05 (G04/L03)	┘ 47.6/┘ 22.2	Assembly BY05 (G04/L03)

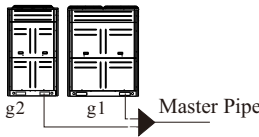
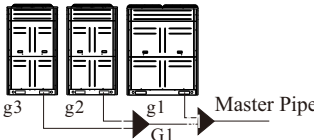

Please choose the pipe diameter of master pipe of outdoor units as per the above table. If the diameter of master supporting pipes is more than that of the master pipe, please choose the master pipe as per the dimensions of the master supporting pipes, namely the principle of preferring the bigger one. For

Example, if two outdoor units (12HP+18HP) are under parallel connection, the total capacity will be 30HP. Supposing that the equivalent length of all the supporting pipes is 90 meters at least, the pipe diameter of master pipe looked up in Table 4.7 as per 30HP (the total capacity of outdoor units) will be ┘ 34.9/┘ 19.1; supposing the total capacity of all the indoor units is 840HP, the pipe diameter of master pipe looked up in Table 4.5 will be ┘ 34.9/┘ 15.9. In accordance with the principle of preferring the bigger one, the specification of master pipe is determined finally to be ┘ 34.9/┘ 19.1.

4-6. Connection of Outdoor Unit Modules

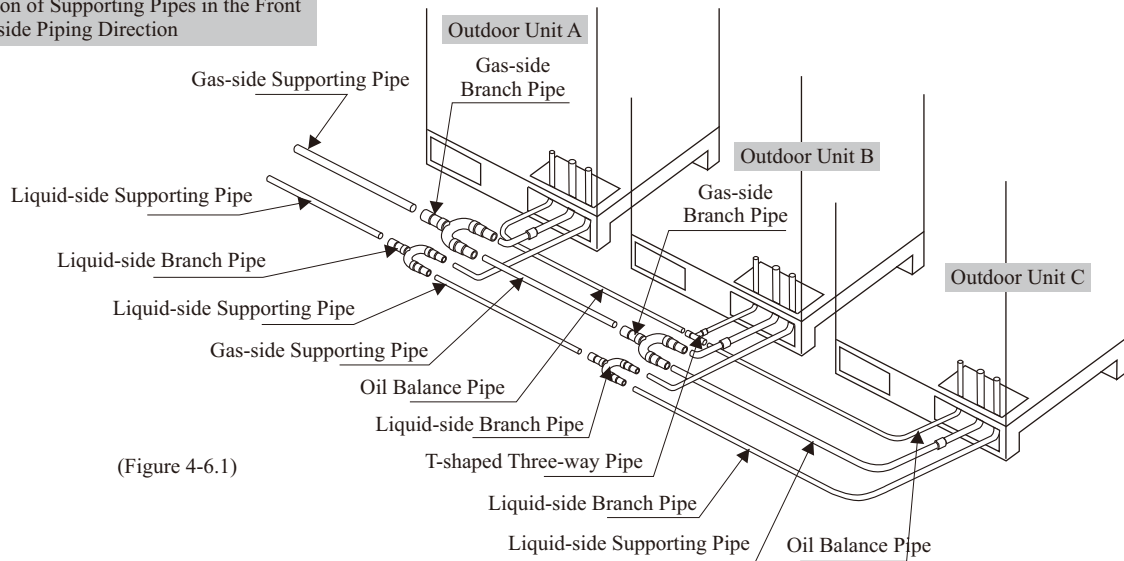
1) Supporting Pipes Connecting Outdoor Unit Modules

Table 4.8

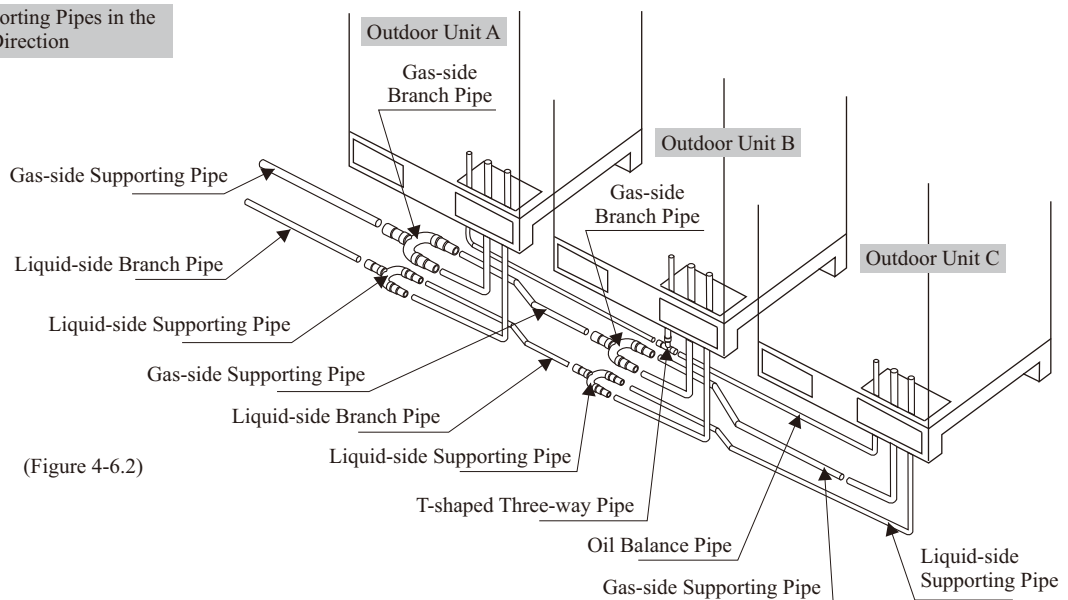
Number of Outdoor Units	Schematic Diagram	Dimensions of Outdoor Unit Connecting Pipes (mm)	Branch Assemblies in Parallel
2		g1, g2: 8~12HP: ┘ 25.4/┘ 12.7 14~18HP: ┘ 28.6/┘ 12.7	L: Assembly AY02 (Refer to Table 4.2)
3		g1, g2, g3: 8~12HP: ┘ 25.4/┘ 12.7 14~18HP: ┘ 28.6/┘ 12.7 G1: ┘ 34.9/┘ 15.9	L: Assembly AY02 M: Assembly AY03 (Refer to Table 4.2)
4		g1, g2, g3, g4: 8~12HP: ┘ 25.4/┘ 12.7 14~18HP: ┘ 28.6/┘ 12.7 G1: ┘ 34.9/┘ 15.9 G2: ┘ 41.2/┘ 19.1	L: Assembly AY02 M: Assembly AY03 N: Assembly AY03 (Refer to Table 4.2)

2) Piping Direction of Module Connection

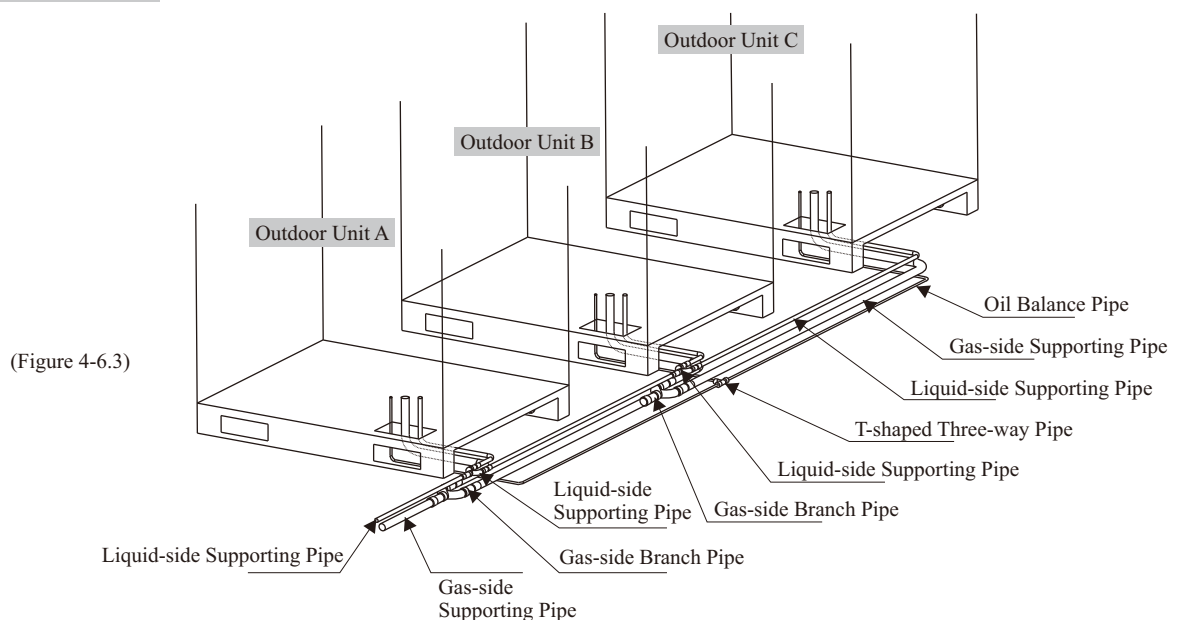
Connection of Supporting Pipes in the Front or Back-side Piping Direction



Connection of Supporting Pipes in the Down-side Piping Direction

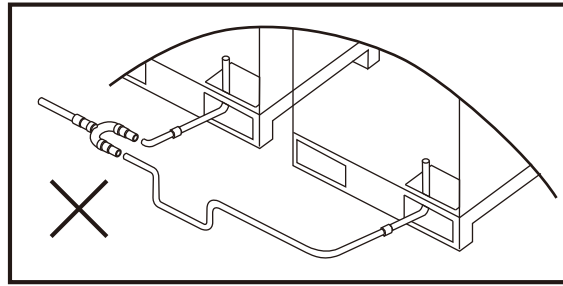


Connection of Supporting Pipes in the Side Piping Direction



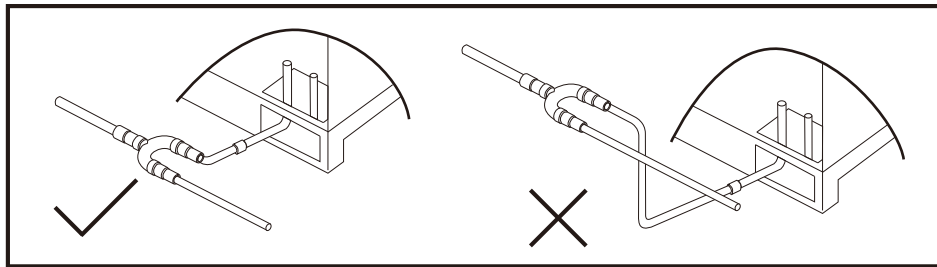
3) Key Installation Points of Supporting Pipes among Outdoor Modules

It is a must to horizontally place the supporting pipes connecting the outdoor units and it is not allowed to make the middle connecting section being sunken, as shown in Figure 4-6.4.



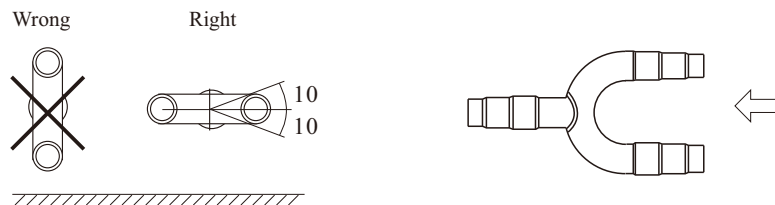
(Figure 4-6.4)

It is necessary to make all the supporting pipes connecting the outdoor units lower than the height of exhaust pipes of the machines in order to prevent the outdoor units from accumulating oil, as shown in Figure 4-6.5.



(Figure 4-6.5)

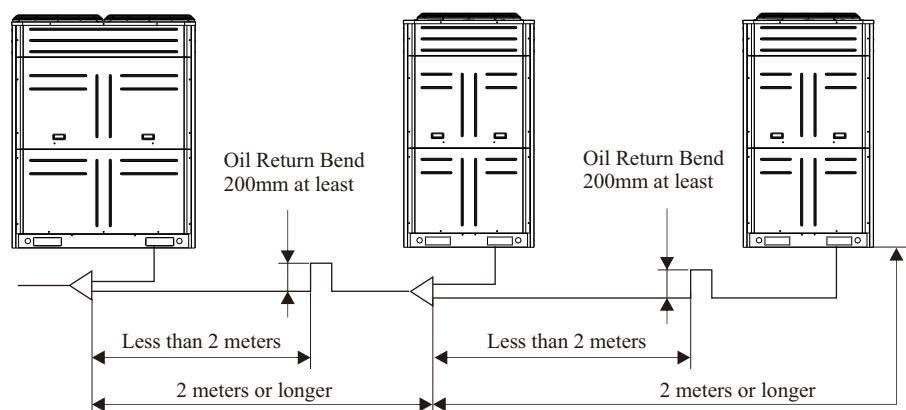
It is necessary to horizontally install the branch pipes with the error angle of not more than 10°. Incorrect installation may cause troubles, as shown in Figure 4-6.6.



(Figure 4-6.6)

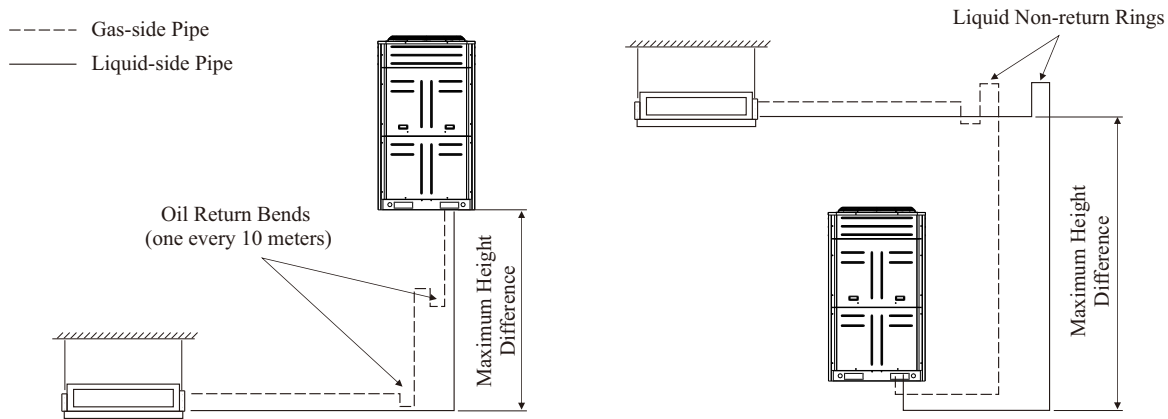
4) Setting of Oil Return Bends

If the length of a supporting pipe between two outdoor units exceeds 2 meters, it is necessary to set an oil return bend above the gas-side pipe in order to prevent the refrigeration oil in the system from accumulating in single outdoor units.



(Figure 4-6.7)

When the height difference between indoor and outdoor units exceeds 10 meters, it is necessary to set one oil return bend every 10 meters of height difference of pipes connecting the indoor and outdoor units in order to ensure normal oil return of compressors. The height of one oil return bend is 10cm or 3~5 times as much as external diameter of a copper pipe. When the indoor unit is above the outdoor unit, it is also necessary to set liquid non-return rings if there is a very large height difference between the indoor and outdoor units.



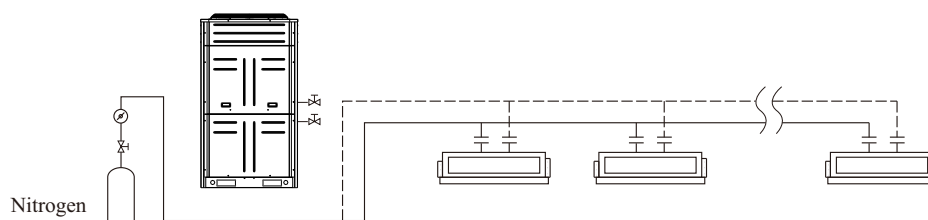
(Figure 4-6.8)

Caution

When connecting the supporting pipes, it is necessary to often check whether or not the supporting refrigerant pipes are connected to one refrigerant circulating system in order to avoid much rework. When finishing the connection, it is necessary to confirm the situation again.

4-7. Removing Refuse and Water in Supporting Pipes

After welding the supporting pipes, it is necessary to use dry nitrogen to remove the refuse and water in the gas and liquid-side pipes respectively before connecting the supporting pipes to the indoor and outdoor units. As shown in the following picture, please do not open the sealing plug on the pipe of an indoor unit. Otherwise, dirt will be blown in. when the pipe is relatively long, it is necessary to preliminarily blow it by sections.



(Figure 4-6.9)

- 1) Use blind plugs to plug up all the pipe orifices, opening one pipe orifice to blow.
- 2) Open the valve of nitrogen cylinder and place the pressure regulating valve at the position of 5kg/cm², and then check whether or not nitrogen passes through the open pipe orifice.
- 3) Use the insulating material in your hand to prop up the open pipe orifice. When the pressure is so high that you fail to prop up the open pipe orifice, you should quickly release the insulating material and then repeat this step to blow the pipe for the second time.
- 4) Place a piece of light-color cloth or white paper at the open pipe orifice to check till no damp or impurity appears again. If you do not intend to connect the pipe immediately, you should do the sealing work well.
- 5) Blow other pipes as per the same steps.

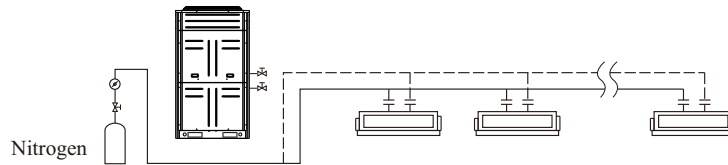
Caution

When connecting the modules, it is also necessary to blow and dry the oil balance pipe between the outdoor units.

4-8. Gas Tightness Test

4-8-1. Testing Stages

- 1) Stage I: The supporting pipes have been connected to the indoor units but not connected to the outdoor unit. It is necessary to check the air tightness of the indoor supporting pipes.



(Figure 4-6.9)

- 2) Stage II: Connect the indoor supporting pipes to the outdoor units after confirming that the air tightness at Stage I is qualified upon check, and then fill about 0.4MPa mixture of refrigerant and nitrogen (wherein the pressure of mixture should be not higher than the pressure of refrigerant in the outdoor units), and finally use a halogen leak detector to detect the leakage at the mouth of pipe connecting the outdoor units.

4-8-2. Operating Steps

- 1) Slowly fill dry nitrogen in the piping system. When the pressure reaches 1.5MPa, keep such pressure for 3 minutes. Enter Step 2 if the pressure gauge shows that the pressure does not decrease obviously; otherwise, it is necessary to check the leakage point(s);
- 2) Continue filling the dry nitrogen. When the pressure reaches 3.0MPa, keep such pressure for 3 minutes. Enter Step 3 if the pressure gauge shows that the pressure does not decrease obviously; otherwise, it is necessary to check the leakage point(s);
- 3) Continue filling the dry nitrogen. When the pressure reaches 4.0MPa, keep such pressure for 10 minutes. Start to time 3 if the pressure gauge shows that the pressure does not decrease obviously; otherwise, it is necessary to check the leakage point(s); when starting to time, it is necessary to record the current temperature and pressure value. 24 hours later, record the temperature and pressure value again. The air tightness is deemed to be qualified when the pressure does not decrease for about more or less 24 hours, excluding the pressure change caused by temperature change. Otherwise, it is necessary to check the leakage point(s) and re-do the air tightness test till the air tightness is qualified.

4-8-3. Operating Instructions

- 1) Doing the air tightness test by stages can reduce the complexity of checking the leakage point(s).
- 2) It is necessary to note whether or not the range and precision of pressure gauge meet the relevant requirements when using it. The precision of a pressure gauge should be Grade 1.5 at least and the maximum pressure of a pressure gauge qualified upon check must be greater than the test pressure and the recommended maximum pressure of a pressure gauge is 1.5~2.0 times as much as the test pressure.
- 3) When combining the modules, it is also necessary to do the air tightness test and pressure maintaining treatment for the oil balance pipes among the outdoor units. If the air tightness is good, it is also necessary to do the vacuumizing operation in Item 4-9 on the next page for the pipes on the side of oil balance. Otherwise, the refrigerating system will run abnormally if any other gas enters it.
- 4) After doing the air tightness test, it is a must to reduce the pressure in order to prevent the high pressure from damaging the equipment if it is necessary to place the tested equipment for a period of time; meanwhile, the pressure must be greater than the atmosphere pressure in order to prevent air from entering the system. It is suggested that the pressure should be reduced to about 0.4MPa.
- 5) After installation, it is a must to tighten the nuts of stop valves for playing a sealing role and relieving the component ageing.

Warnings

It is a must to slowly fill the nitrogen and pressurize the gas and liquid-side pipes simultaneously in order to avoid damaging the valves.
It is not allowed to screw off the valve rod of stop valves.

Caution

The pressure of nitrogen varies with the change of ambient temperature. It is not allowed to mix water or any other gas with the nitrogen. It is necessary to record the temperatures at the time of pressure test and confirmation in order to make adjustment by comparing the temperature change.
It is necessary to do the vacuumizing operation before checking the air tightness in order to eliminate the influence of air and moisture on the pressure change of nitrogen and judge whether or not the outdoor units suffer refrigerant leakage.
When connecting the system pipeline to the outdoor units, it is necessary to note that the stop valves cannot be damaged. Otherwise, leakage will occur easily.

4-9. Vacuumizing

- 1) Use a vacuum pump with the relative vacuum degree of -0.1MPa and air displacement of 4L/s .
- 2) The outdoor units do not need to be vacuumized. Be sure not to open the stop valves on the sides of gas, liquid and oil balance of the outdoor units.
- 3) The sides of gas, liquid and oil balance of the outdoor units need to be vacuumized.
- 4) Setting the system vacuumizing mode:

The vacuumizing operation can be done after the power and communication lines of outdoor units are connected. When using the vacuumizing mode, it is allowed to do the vacuumizing operation on the liquid or gas side. However, it is recommended that the vacuumizing operation be done on the liquid and gas sides in order to quickly realize the vacuumizing effect. Specific methods are as follows: (See the relevant content on Page 29 of this Manual for introduction to keys and display content.)

- a. When you momentarily press the functional key KEY1 (Menu) on the master control panel, the letters on the Nixie tube DS1 twinkle and the system enters the state of waiting for function selection. At this moment, you can select the corresponding functions via the upward selection key (Up) on KEY3 and the downward selection key (Down) on KEY4 and stop when the Nixie tube DS1 displays A9 ;

DS1 88		DS2 88		DS3 88	
Function Code	Display Mode	Current State	Display Mode	Current State	Display Mode
A9	Twinkling	00	Twinkling	00	Twinkling

- b. When you momentarily press the functional key KEY5 (Enter) for confirmation, A9 displays Normally Going On, confirming that you enter the function setting of the vacuumizing mode;

DS1 88		DS2 88		DS3 88	
Function Code	Display Mode	Current State	Display Mode	Current State	Display Mode
A9	Normally Going On	00	Twinkling	0C	Twinkling

- c. When all the Nixie tubes display the content as shown in the above picture, you enter the state of waiting for conforming the system vacuumizing mode . When you momentarily press the functional key KEY5 (Enter) for confirmation, the final display content is as follow:

DS1 88		DS2 88		DS3 88	
Function Code	Display Mode	Current State	Display Mode	Current State	Display Mode
A9	Normally Going On	00	Twinkling	0C	Twinkling

At this moment, the oil balance valves of all the modules are opened, the master electronic expansion valve of the outdoor units is adjusted to 480PLS, the sub-cooler electronic expansion valves are adjusted to 480PLS, the electronic expansion valves of all the indoor units are adjusted to 480PLS and the complete machine fails to start for running.

At this moment, the complete machine exits from the vacuumizing state after you momentarily press the exit key KEY2 on the master control panel or keep the vacuumizing state for 24 hours.

- 5) Confirm whether or not the relative vacuum degree reaches below -0.1MPa after the vacuum pump works for more than 2 hours. It means that there is moisture or leakage in the system if the relative vacuum degree fails to be below -0.1MPa when the vacuum pump works for more than 3 hours.
- 6) After finishing the vacuumizing and drying operations, keep the vacuumizing state for one hour and use a vacuum gauge to monitor whether or not the pressure goes up.

⚠ Caution

Do not use the tools and measuring instruments used for different refrigerants and in direct contact with refrigerants.
Be sure not to use refrigerant for removing air.
Please consider whether or not there is leakage when the relative vacuum degree fails to be below -0.1MPa . Please run the vacuum pump for more one to two hours if there is no leakage.

4-10. Refrigerant Addition

It is allowed to add the refrigerant manually or automatically (See the content of engineering commissioning on Page 38)

Calculate the refrigerant adding amount as per the diameter and length of liquid-side pipes connecting the indoor and outdoor units wherein the added refrigerant is R410A.

Diameter of Liquid-side Pipe	Refrigerant Addition Amount Equivalent to One-meter-length Pipe (Unit: kg)	Diameter of Liquid-side Pipe	Refrigerant Addition Amount Equivalent to One-meter-length Pipe (Unit: kg)	Diameter of Liquid-side Pipe	Refrigerant Addition Amount Equivalent to One-meter-length Pipe (Unit: kg)	Diameter of Liquid-side Pipe	Refrigerant Addition Amount Equivalent to One-meter-length Pipe (Unit: kg)
φ 6.35	0.022	φ 12.7	0.110	φ 19.1	0.250	φ 25.4	0.550
φ 9.52	0.054	φ 15.9	0.170	φ 22.2	0.350	φ 28.6	0.680

Notice: On the premise of strictly following the refrigerant adding method in the above table, it is necessary to make sure that the total refrigerant adding amount of system does not exceed the maximum refrigerant adding & filling amount in the following table. If the refrigerant adding & filling amount exceeds the range in the following table upon calculation, it is necessary to shorten the total length in the piping construction scheme and re-calculate the refrigerant adding & filling amount in order to meet the requirements in the following table.

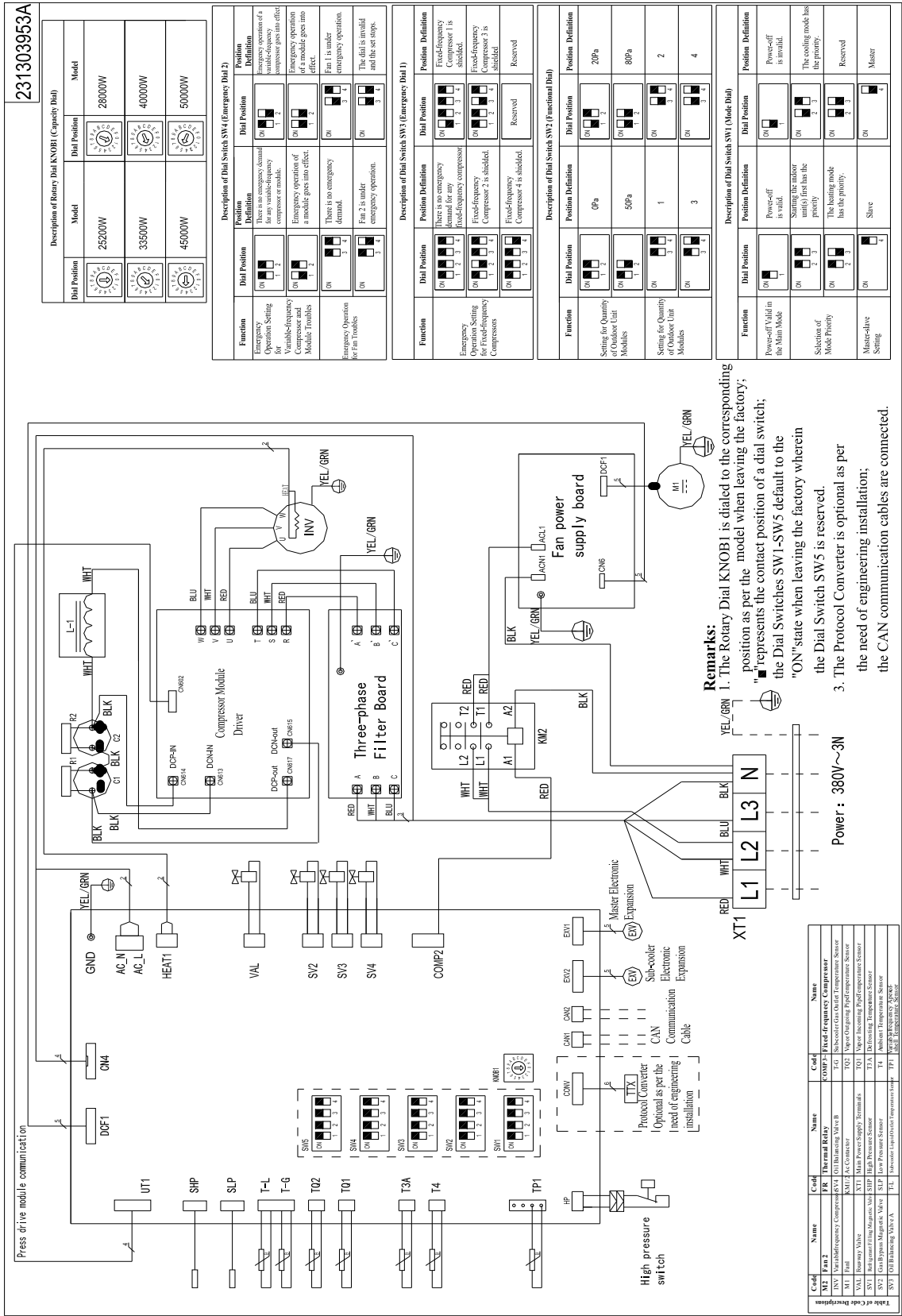
<Maximum Refrigerant Adding & Filling Amount>

Capacity of Outdoor Units	8~10HP	12HP	14HP	16~18HP	20~24HP	26~54HP	56~72HP
Maximum Refrigerant Adding & Filling Amount (kg)	18	24	30	36	44	52	62

Notice: Refrigerant R410A must be filled quantitatively in liquid state via an electronic scale.

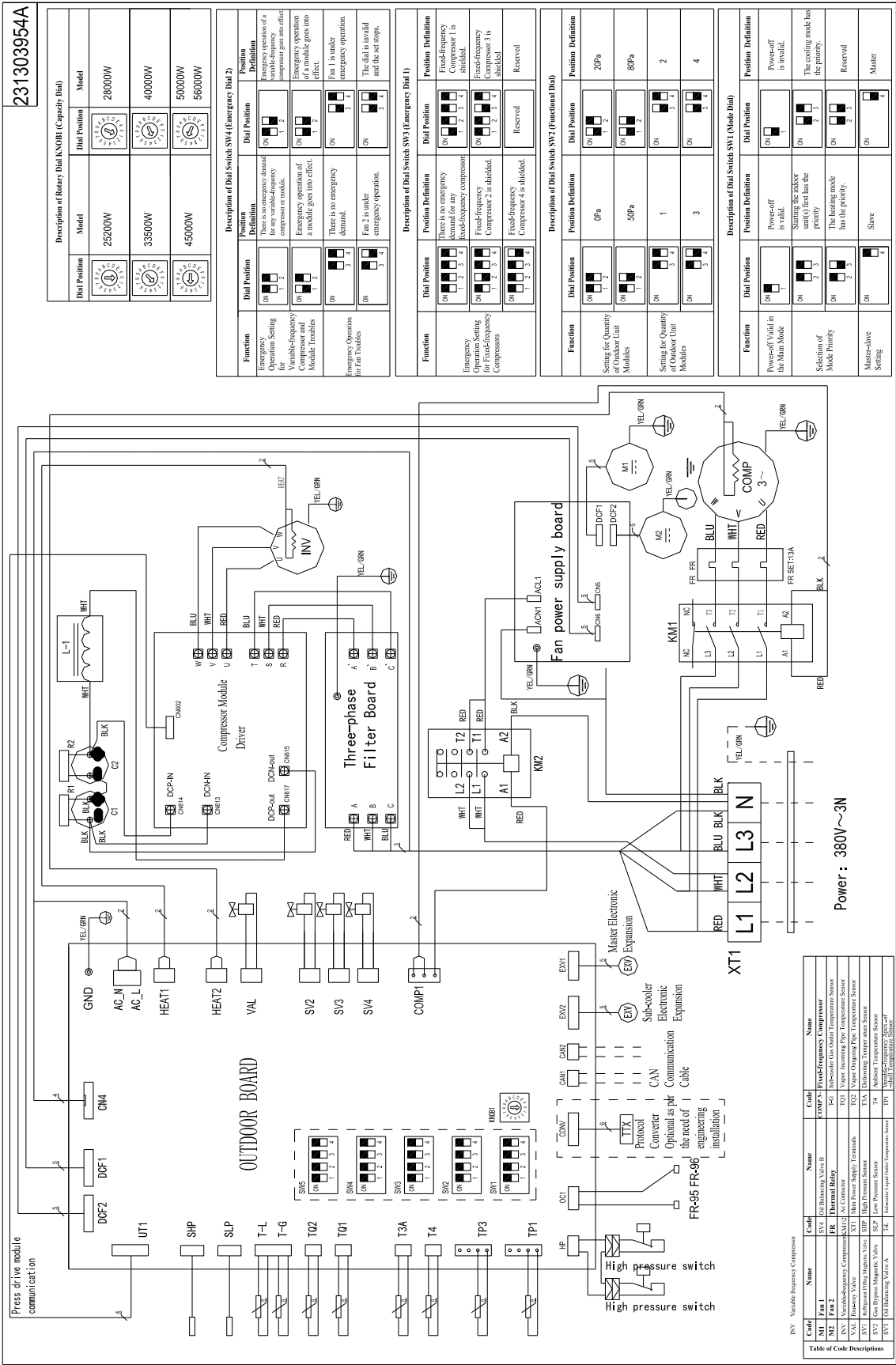
5.1. Electrical Wiring

1) Outdoor unit mode (25200/28000/33500W)



Note: this wiring diagram is for reference only, please refer to the wiring diagram on the unit.

2) Outdoor unit mode (40000/45000/50000W)



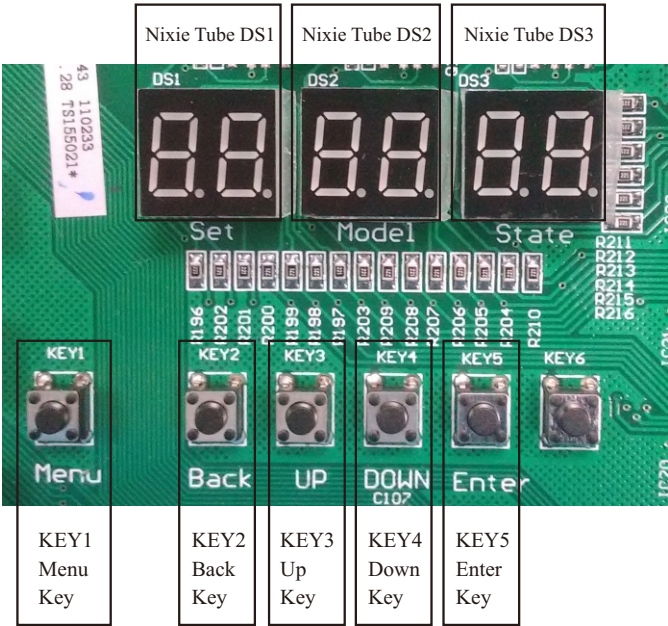
5-2. Description of Point Inspections of the Outdoor Units

1) Table of Troubles, Protection and States

Table 5.1

Display Content	Definition of Code	Display Content	Definition of Code	Display Content	Definition of Code
Troubles of Outdoor Units		Others		System State	
L1	Exhaust Temperature Sensor TP1 goes wrong.	U0	Fan 1 suffers running troubles.	A0	System is not debugged.
L2	Exhaust Temperature Sensor TP2 goes wrong.	U1	Fan 2 suffers running troubles.	A1	System is defrosted.
L3	Exhaust Temperature Sensor TP3 goes wrong.	U2	Modules are in emergency state.	A2	System suffers oil return.
L4	Exhaust Temperature Sensor TP4 goes wrong.	U3	Variable-frequency compressors are in emergency state.	A3	System Query
L5	Exhaust Temperature Sensor TP5 goes wrong.	U4	Fixed-frequency compressors are in emergency state.	A4	Rated Capacity Test
L6	Exhaust Temperature Sensor TP6 goes wrong.	U5	Variable-frequency fans are in emergency state.	A5	IPLV1 Test
L7	Exhaust Temperature Sensor TP7 goes wrong.	U6	Rated capacity configuration rate is excessively low.	A6	IPLV2 Test (Displayed by outdoor units)
L8	Outdoor Ambient Temperature Sensor goes wrong.	U7	Rated capacity configuration rate is excessively high.	A7	Refrigerant recovery of indoor units
L9	Defrosting Sensor T3A goes wrong.	U8	Compressor preheat is insufficient.	A8	Refrigerant recovery of modules
LA	Sensor T3B goes wrong.	U9	Valves/pipes of outdoor units are abnormal.	A9	Vacuumizing Mode
LH	Vapor Incoming Pipe Temperature Sensor goes wrong.	UA	Valves/pipes of indoor units are abnormal.	AA	System is set.
LC	Vapor Outgoing Pipe Temperature Sensor goes wrong.	UH	Four-way valves are under commutation failure protection.	AH	Heating Mode
LL	Sub-cooler Gas Outgoing Sensor goes wrong.	Detailed Troubles about Compressor Drive		AC	Cooling Mode
LE	Sub-cooler Liquid Outgoing Sensor goes wrong.	J0	Variable-frequency compressors suffer total running malfunction.	AL	Automatic Filling
LF	High-pressure Sensor goes wrong.	J1	IPM over-current	AE	Manual Filling
LJ	Low Pressure Sensor goes wrong.	J2	Compressor drive fails.	AF	Air Supply Mode
LP	MAC Address of outdoor units is abnormal.	J3	Compressors are under over-current.	AJ	Main-board Hardware Self-checking
LU	Outdoor EEPROM goes wrong.	J4	Input voltage suffers a default phase.	System State	
System Protection		J5	IPM current sampling goes wrong.	n0	Historical set fault querying
H0	Outdoor units go wrong/are protected.	J6	Radiators stop due to overheat.	n1	Set system parameter querying
H1	High-pressure Protection	J7	Precharge fails.	n2	Set set-state querying
H2	Low-pressure Protection	J8	DC bus is of over-voltage.	n3	Engineering number querying
H3	System is under exhaust high-temperature protection.	J9	DC bus is of under-voltage.	n4	Cooling/heating function setting
H4	Pressure ratio is under excessively high protection.	JA	AC input is of undercurrent.	n5	Silent mode setting
H5	Pressure ratio is under excessively low protection.	JH	DC input is of over-current.	n6	System energy-saving operation setting
H6	System is under refrigerant deficiency protection	JC	Input voltage sampling goes wrong.	n7	Defrosting cycle (K1) setting
H7	Degree of system exhaust superheat is under excessively low protection.	JL	Communication between DSP and PFC goes wrong.	n8	Forced defrosting
H8	Fixed-frequency Compressor 1 is under over-current protection.	JE	Temperature sensors go wrong.	n9	Upper limit setting of capacity configuration rates of indoor and outdoor units
H9	Fixed-frequency Compressor 2 is under over-current protection.	JF	Communication between DSP and communication board goes wrong.	nA	Cooling/Heating Type
HA	Fixed-frequency Compressor 3 is under over-current protection.	Communication Troubles		nH	Single-heating Type
HH	Fixed-frequency Compressor 4 is under over-current protection.	C0	CAN communication cables suffer total communication malfunction.	nC	Single-cooling Type
HC	Fixed-frequency Compressor 5 is under over-current protection.	C1	Multiple master control troubles	nL	Capacity limit setting of maximum capacity input
HL	High-voltage Switches of Modules are protected.	C2	Number of outdoor unit modules is abnormal (less/more)	nF	Type of Air Supply
HE	Power supply is under phase sequence protection.	C3	Communication between master controller and variable-frequency compressor drives goes wrong (displayed by outdoor units)	A5	
		C4	Communication between master controller and variable-frequency fan drives goes wrong (displayed by outdoor units)	A5	
		C5	Communication between indoor units and wire controllers goes wrong (displayed by indoor units)	A5	

2) Point-inspection Keys and Display



3) Historical Fault Querying of Outdoor Units

1. When you momentarily press the functional key KEY1 (Menu) on the master control panel, the display content is as follows:

DS1 88		DS2 88		DS3 88	
Function Code	Display Mode	Current State	Display Mode	Current State	Display Mode
A3	Twinkling	00	Twinkling	00	Twinkling

2. When you momentarily press the functional key KEY5 (Enter) on the master control panel, the display content is as follows:

DS1 88		DS2 88		DS3 88	
Function Code	Display Mode	Current State	Display Mode	Current State	Display Mode
A3	Normally Going On	n0	Twinkling	00	Twinkling

3. When you momentarily press the functional key KEY5 (Enter) on the master control panel, the display content is as follows:

DS1 88		DS2 88		DS3 88	
Function Code	Display Mode	Current State	Display Mode	Current State	Display Mode
n0	Twinkling	00	Twinkling	00	Twinkling

4. When you momentarily press the upward selection key (Up) on KEY3 or the downward selection key (Down) on KEY4 on the master control panel to query various groups of trouble codes, DS3 will display the historical trouble codes of such module in recording chronological order where in the default display serial number is 00 . Five latest historical troubles at most can be queried.

4) Point Inspection Methods and Parameter Description for Outdoor Units

1. When you momentarily press the functional key KEY1 (Menu) on the master control panel, the display content is as follows:

DS1 88		DS2 88		DS3 88	
Function Code	Display Mode	Current State	Display Mode	Current State	Display Mode
A3	Twinkling	00	Twinkling	00	Twinkling

2. When you momentarily press the functional key KEY5 (Enter) on the master control panel, the display content is as follows:

DS1 88		DS2 88		DS3 88	
Function Code	Display Mode	Current State	Display Mode	Current State	Display Mode
A3	Normally Going On	n0	Twinkling	00	Twinkling

3. When you momentarily press the upward selection key (Up) on KEY3 or the downward selection key (Down) on KEY4 on the master control panel, the display content is as shown in the following table. Please choose the parameters to query n1

DS1 88		DS2 88		DS3 88	
Function Code	Display Mode	Current State	Display Mode	Current State	Display Mode
A3	Normally Going On	n0	Twinkling	00	Twinkling
A3	Normally Going On	n1	Twinkling	00	Twinkling
A3	Normally Going On	n2	Twinkling	00	Twinkling
A3	Normally Going On	n3	Twinkling	00	Twinkling

4. When you momentarily press the functional key KEY5 (Enter) on the master control panel to enter parameter query: the default display serial number is 00 and corresponding parameter value.

When you momentarily press the upward selection key (Up) on KEY3 or the downward selection key (Down) on KEY4 on the master control panel, you can take turns to query various groups of parameters.

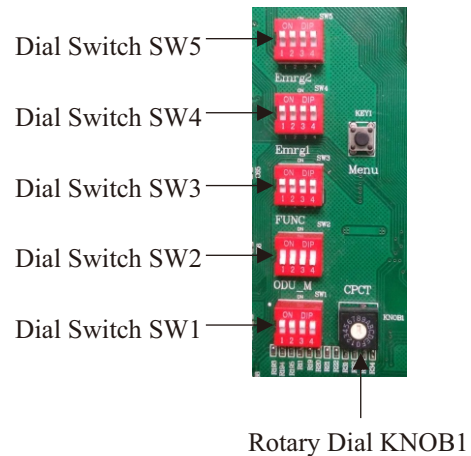
Table 5.2

DS1 88	DS2 88	DS3 88	DS1 88	DS2 88	DS3 88
Parameter Code (Twinkling)	The last three digits of a combination show the real-time parameter of a module.		Parameter Code (Twinkling)	The last three digits of a combination show the real-time parameter of a module.	
	(Parameter Range)	(Parameter Name)		(Parameter Range)	(Parameter Name)
00	(10~120) Hz	Frequency of Variable-frequency Compressor 1	16	(-30~150)	Gas Outlet Temperature of Sub-cooler
01	(10~120) Hz	Master Electronic Expansion Valve of Outdoor Unit	17	(-30~150)	Liquid Outlet Temperature of Sub-cooler
02	(0~480)PLS	Frequency of Variable-frequency Compressor 1	18	(-30~150)	Exhaust Temperature of Variable-frequency Compressor 1
03	(0~480)PLS	Electronic Expansion Valve of Sub-cooler	19	(-30~150)	Exhaust Temperature of Variable-frequency Compressor 2
04	(0~70)Hz	Frequency of Fan 1	20	(-30~150)	Exhaust Temperature of Fixed-frequency Compressor 1
05	(0~4.60)MPa	High Pressure of Module	21	(-30~150)	Exhaust Temperature of Fixed-frequency Compressor 2
06	(0~2.00)MPa	Low Pressure of Module	22	(-30~150)	Exhaust Temperature of Fixed-frequency Compressor 3
07	(0~70)	Tc	23	(0~30)A	Electric Current of Variable-frequency Compressor 1
08	(-55~25)	Te	24	(0~30)A	Electric Current of Variable-frequency Compressor 2
09	(0~2000) ℃ 100W	Demand for Total Capacity of All Indoor Units	25	(0~100)	IPM Temperature of Variable-frequency Compressor 1
10	(0~2000) ℃ 100W	Demand for Revised Total Actual Operation Capacity	26	(0~100)	IPM Temperature of Variable-frequency Compressor 2
11	(0~2000) ℃ 100W	Total Capacity of All Outdoor Units	27	(10~120) Hz	Reserved
12	(-30~150)	Outdoor Ambient Temperature (T4)	28	(10~120) Hz	Reserved
13	(-30~150)	Condenser Outlet Pipe Temperature (T3A)	29	(10~120) Hz	Reserved
14	(-30~150)	Vapor Incoming Pipe Temperature (TQ1)	30	(10~120) Hz	Reserved
15	(-30~150)	Vapor Outgoing Pipe Temperature (TQ2)			

5-3. Settings of Dial Switches

1) Description of Dial Switches

1. The Rotary Dial KNOB1 has been dialed to the corresponding position as per the model when leaving the factory, so the user is required to not change. Wrong setting will cause wrong operation of machine.
2. represents the contact position of a dial switch; the Dial Switches SW1-SW5 default to the ON state when leaving the factory wherein the Dial Switch SW5 is reserved.
3. Please set the dial switches as per the following rules in accordance with the use situation of set on the premise that the set is electrically neutral. The setting of changing the dial is invalid when the set is electriferous. The changed dial cannot go into effect until the set is re-powered on.



2) Settings of Dial Switches

1. Capacity Dial KNOB1

Table 5.3

Dial Position	Model	Dial Position	Model	Dial Position	Model
	Outdoor unit (25200W)		Outdoor unit (28000W)		Outdoor unit (33500W)
	Outdoor unit (40000W)		Outdoor unit (45000W)		Outdoor unit (50000W)

2. Dial Switches SW1~SW4

Table 5.4

Description of Dial Switch SW1 (Mode Dial)					Description of Dial Switch SW2 (Functional Dial)				
Function	Dial Position	Position Definition	Dial Position	Position Definition	Function	Dial Position	Position Definition	Dial Position	Position Definition
Indoor Unit Power-off Valid in the Main Mode		Power-off is valid.		Power-off is valid.	Static Pressure Setting for Outdoor Units		0MPa		20MPa
Selection of Mode Priority		Starting the indoor unit(s) first has the priority.		The cooling mode has the priority.			50MPa		80MPa
		The heating mode has the priority.		Reserved	Setting for Quantity of Outdoor Unit Modules		1		2
Master-slave Setting		Slave		Master			3		4

Remark: The same system only can has one machine as its master.

Description of Dial Switch SW3 (Emergency Dial 1)					Description of Dial Switch SW4 (Emergency Dial 2)				
Function	Dial Position	Position Definition	Dial Position	Position Definition	Function	Dial Position	Position Definition	Dial Position	Position Definition
Emergency Operation Setting for Fixed-frequency Compressors		There is no emergency demand for any fixed-frequency compressor.		Fixed-frequency Compressor 1 is shielded.	Emergency Operation Setting for Variable-frequency Compressor and Module Troubles		There is no emergency demand for any variable-frequency compressor or module.		Emergency operation of a variable-frequency compressor goes into effect.
		Fixed-frequency Compressor 2 is shielded.		Fixed-frequency Compressor 3 is shielded.			Emergency operation of a module goes into effect.		Emergency operation of a module goes into effect.
		Fixed-frequency Compressor 4 is shielded.		Reserved	Emergency Operation for Fan Troubles		There is no emergency demand.		Fan 1 is under emergency operation.
							Fan 2 is under emergency operation.		The dial is invalid and the set stops.

5-4. Electrical System and Installation

5-4-1. Electrical Wiring Matters Needing Attention

- 1) Please design the special power supply respectively for indoor and outdoor units.
- 2) It is necessary to use branch return circuits for the power supply as well as install electrical leakage protectors and manual switches.
- 3) The power supply, electrical leakage protectors and manual switches of indoor units connected to the same outdoor unit are required to be universal. (Please use the same return circuit for the power supply of indoor units in the same system; it is a must to power on and off at the same time. Otherwise, the service life of such system will be affected and unforeseen circumstances may appear.)
- 4) Please classify the indoor and outdoor unit connecting pipe system and the refrigerant pipe system as the same system.
- 5) With regard to the signal lines for the indoor and outdoor units, 3-core shielded lines are recommended in order to reduce the interference. Please do not use unshielded multi-core lines.
- 6) At the time of installation, it is not allowed to intertwine the communication lines with the power lines. It is a must to arrange the lines separately. The minimum distance should exceed 20cm. Failing to do so may cause abnormal set communication.
- 7) It is necessary to follow relevant national electrical standards.
- 8) It is a must to entrust professional electricians to install the power lines.

5-4-2. Power Lines of Outdoor Units

- 1) A single outdoor machine independent power supply, the power supply connection refer to Figure 5-4.1

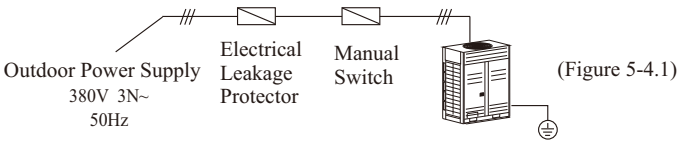


Table 5.5

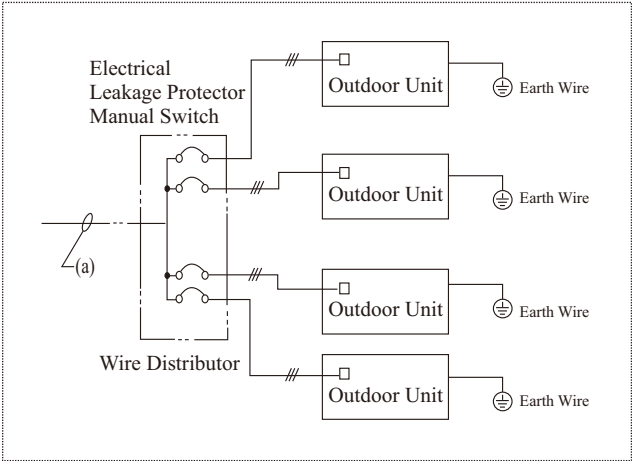
Model	Item	Power Supply	Diameter of the Thinnest Line (mm2) (lines for metal tubes and synthetic resin tubes)			Manual Switch (A)		Electric Leakage Protector
			Below 20m	Below 50m	Earth Wire	Capacity	Fuse	
Outdoor unit(25200W)		380V 3N~ 50Hz	4 10mm ²	4 16mm ²	10mm ²	32	25	100mA 0.1sec T II
Outdoor unit(28000W)			4 10mm ²	4 16mm ²	10mm ²	40	30	
Outdoor unit(33500W)			4 10mm ²	4 16mm ²	10mm ²	40	35	
Outdoor unit(40000W)			4 10mm ²	4 16mm ²	10mm ²	40	35	
Outdoor unit(50000W)			4 16mm ²	4 25mm ²	16mm ²	50	40	

Remark: Every unit has separate power supply. Therefore, it is necessary to set the power lines for every unit as per the relevant standards in Table 5.5.

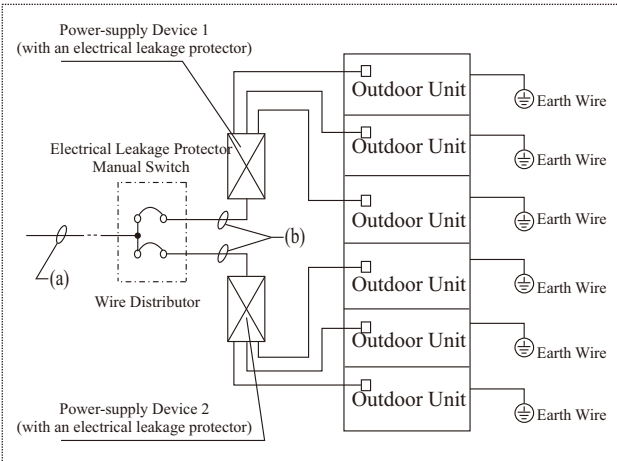
⚠ Caution

The wire diameters and continuous lengths in this table express the situation in which the voltage reduces by less than 2%. When the continuous wire length exceeds the values in this table, it is necessary to select the electrical wire diameters as per relevant regulations.

- 2) A plurality of outdoor machine combined power supply, power supply connection refer to Figure 5-4.2 and Figure 5-4.3.



(Figure 5-4.2)



(Figure 5-4.3)

● Selection of Electric Wire Diameters

The power lines refer to the trunk line (a) to the wire distributor and the wires (b) from the wire distributor to the power-supply device. Please select the thickness of wires as per the following methods.

The diameter of the trunk line (a) is gotten from the following table as per the total capacity of outdoor units:

Example: Under the circumstance of (18 HP 2 set+ 10HP 2 set), the total capacity is 56HP. If the length (L) of the trunk line (a) is greater than 20m but 50m at most, the diameter of line will be 70mm² as per Table 5.6.

Diameter of the wires (b) from the wire distributor to the power-supply device

When there are less than 5 outdoor units, the wire diameter is the same as that of the trunk line (a); when there are 6 outdoor units and more, there are two control switches for the power-supply device and the wire diameter is seen in Table 5.6 as per the total capacity of outdoor units connected to every control switch.

Example: In Figure 5-4.3, Power-supply Device 1 supplies the power for 3 outdoor units whose capacities are 18HP, 16HP and 10HP, so the total capacity is 44HP (18HP+16HP+10HP). If the length (L) of the trunk line (a) is below 20M, the diameter of line will be 35mm² as per Table 5.6. In other words, the diameter of line from the wire distributor to Power-supply Device 1 is 35mm².

Selection of Electric Wire Diameters (at least) is seen in Table 5.6.

(Unit: mm²)

Table 5.6

Total Capacity (HP)	Wire Diameter (Below 20m)	Total Capacity (HP)	Total Capacity (HP)	Wire Diameter (Below 20m)	Total Capacity (HP)	Total Capacity (HP)	Wire Diameter (Below 20m)	Total Capacity (HP)
8	10	16	30	25	35	52	50	70
10	10	16	32	25	35	54	50	70
12	10	16	34	25	35	56	50	70
14	10	16	36	25	35	58	50	70
16	10	16	38	25	35	60	70	95
18	16	25	40	35	50	62	70	95
20	16	25	42	35	50	64	70	95
22	16	25	44	35	50	66	70	95
24	16	25	46	35	50	68	70	95
26	16	25	48	35	50	70	95	120
28	25	35	50	50	70	72	95	120

Selection of manual switch and fuse capacity of the wire distributor

- When the power-supply device is not used, the manual switch and fuse capacity of the wire distributor depend on the connected outdoor units. See the following table.
- When the power-supply device is used, the manual switch and fuse capacity of the wire distributor are gotten from the following table as per the total capacity of the outdoor units.

Total Capacity, Manual Switches and Fuse Capacities

Table 5.7

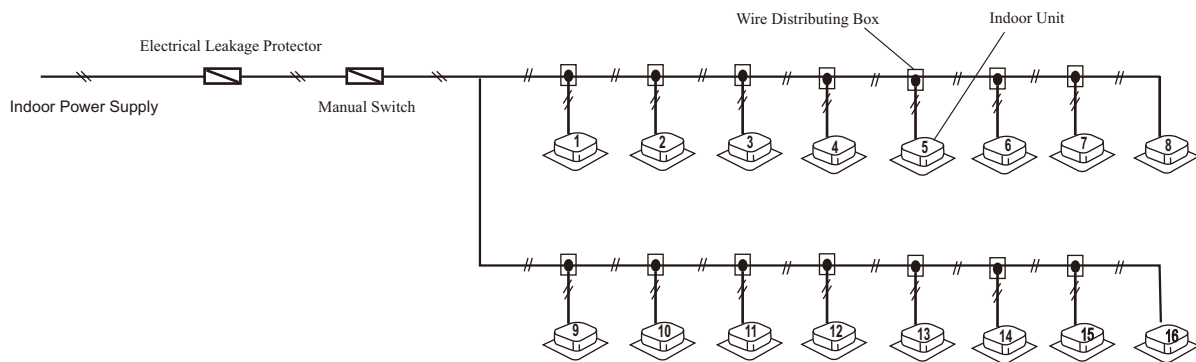
Total Capacity (HP)	Manual Switch (A)	Fuse Capacity (A)	Total Capacity (HP)	Manual Switch (A)	Fuse Capacity (A)
8~12	32	25	36~40	125	100
14~16	40	35	42~44	125	110
18	50	40	46~50	150	125
20~22	63	50	52~60	200	150
24~28	80	70	62~72	250	200
30~34	100	80			

5-4-3. Power Lines of Indoor Units

Table 5.8

Type \ Item		Power Supply	Diameter of the Thinnest Line (mm ²)			Manual Switch (A)		Electrical Leakage Protector
			Dimension (continuous length)	Dimension (continuous length)	Earth Wire	Capacity	Fuse	
All types of indoor units	electrical auxiliary heating type	380V 3N~50Hz	2.5 (30m)	4.0 (50m)	1.6mm	30	15	20A, 30mA Below 0.1sec
	Other indoor units	220V-50Hz						

Note: The wire diameters and continuous lengths in this table represent the situation in which the voltage reduces by less than 2%. When the continuous wire length exceeds the values in this table, it is necessary to select the electrical wire diameters as per relevant regulations.



⚠ Caution

Please take the refrigerant piping system, the signal lines between the indoor units and the signal lines between the indoor and outdoor units as the same system.

All the indoor units in the same system must be under unified power supply.

When the power lines and the signal lines are parallel, it is necessary to place the lines in respective line pipes and reserve an appropriate distance between the lines. (Distance between power lines: 300 mm for current less than 10 A and 500 mm for current less than 50 A)

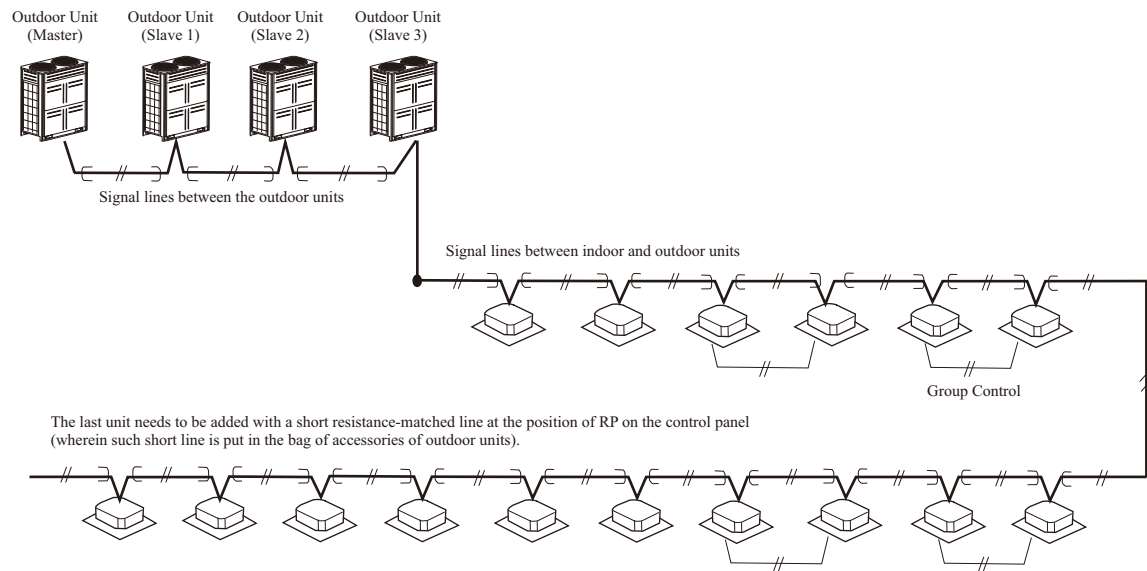
When two or more outdoor units are under parallel connection, it is a must to set their addresses. (Refer to the settings of dial switches)

5-5. Control System and Installation

- 1) It is a must to use shielded signal lines. Using other guide lines may produce signal interference and thus cause malfunction.
- 2) The shielding nets at two ends of any shielded line must be in ground connection or the shielding nets of all the shielded lines must be connected to each other and finally in ground connection at one connected metal plate.
- 3) It is prohibited to bind the signal lines, refrigerant pipes and power lines together. When the power lines and the signal lines are laid in parallel, it is necessary to keep the distance of over 300mm between the lines in order to avoid signal interference.
- 4) The signal lines are required to not form a closed loop circuit.
- 5) It is not necessary to distinguish the signal lines when connecting them because they do not have polarity.

5-6. Signal Lines for Indoor and Outdoor Units

It is necessary to use shielded polarity-free two-core signal lines (equal to or more than 0.75mm²) for indoor and outdoor units and lead such signal lines out from the top of the furthest outdoor unit for connection.



6. Operator Guide and Unit Commissioning

6-1. Check and Confirmation Work before Unit Commissioning

- 1) Check and confirm that the refrigeration pipes and communication lines connecting the indoor and outdoor units have been connected to the same refrigerating system. Otherwise, operation troubles may appear.
- 2) Power supply voltage is within the scope of plus or minus 10% of rated voltage.
- 3) Check and confirm that the power lines and the control lines are connected correctly.
- 4) Confirm that no line is in short circuit before powering the units on.
- 5) Check and confirm whether or not all the units have passed the test on 24-hour nitrogen protection (40kgf/cm²).
- 6) Confirm whether or not the system to be debugged has been vacuumized and dried as well as filled with refrigerant as per the corresponding requirements.

6-2. Preparations before Unit Commissioning

- 1) Calculate the refrigerant adding amount of every unit as per the length of liquid-side pipe on the site.
- 2) Prepare the needed refrigerant.
- 3) Prepare the system plan, system piping diagram and control wiring diagram.
- 4) Recorded the preset address codes on the system plan.
- 5) Switch on the outdoor units in advance and ensure that the outdoor units are powered on for over 12 hours so that the heaters can heat the engine oil of compressors.
- 6) Completely open the gas-side, liquid-side and oil balance stop valves of an outdoor unit. Otherwise, the machine will be damaged.
- 7) Check whether or not the power supply phase sequence of an outdoor unit is correct.
- 8) Check whether or not all the dial switches of the indoor and outdoor units have been set as per the product technical requirements.

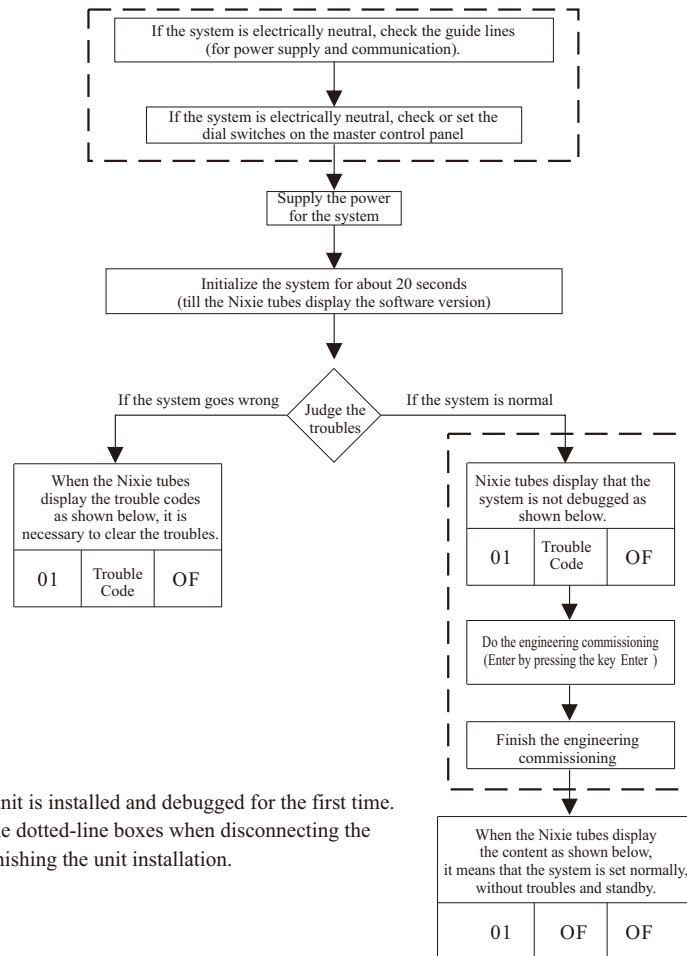
6-3. Unit Commissioning

6-3-1. Warnings

- 1) It is strictly prohibited to do any maintenance operation for the power-supply board and the driver board when the power light goes on!
- 2) It is a must to discharge the electricity of capacitance first before replacing the capacitance!
- 3) It is strictly prohibited to plug in and pull out the amphenol connectors of fan motor wires when they are electrified!
- 4) It is strictly prohibited to do any operation for the power-supply board when the fans are running!

6-3. Unit Commissioning

6-3-2. Electrical Commissioning Process



Remarks:

1. It is necessary to execute all the steps if a unit is installed and debugged for the first time.
2. It is not necessary to execute the steps in the dotted-line boxes when disconnecting the power supply and restarting such unit after finishing the unit installation.

6-3-3. Dial Setting

See the content Section 5-3 Dial Switch Setting on Page 31 of this Manual.

6-3-4. Engineering Commissioning

1) Engineering Commissioning Commands

Table 6.1

Engineering Commissioning Command	Operating Method
Start the engineering commissioning	Momently press the confirmation key key5 automatic debugging and then execute the control as per the engineering commissioning requirements.
Return the engineering commissioning	Momently press the return key KEY2 on the master control panel to make the system keep the state of finishing the engineering commissioning before the current engineering commissioning stage. For example, the system will return to Engineering Commissioning Step 5 named 5. Stage of Judging the Refrigerant before Starting for finishing the waiting stage if the system receives the signal suspend the engineering commissioning when executing Step 6 named 6. Stage of Judging the States of Outdoor Unit Valves before Starting .
Confirm the engineering commissioning	Momently press the confirmation key key5 of engineering commissioning to be confirmed and continue executing the engineering commissioning when the system is in the current state.

2) Engineering Commissioning Steps

Table 6.2

Step	Step Name	Operations	Display
0	Start the engineering commissioning	Momently press the confirmation key KEY5 on the master control panel displaying A0 to enter the stage of automatic debugging.	01 A0 OC
1	Determine the number of outdoor unit modules	After you momently press the confirmation key KEY5 on the master control panel to enter the stage of automatic engineering commissioning, the system will automatically switch to the Stage of Confirming the Number of Outdoor Unit Modules and then the Nixie tubes of all the modules will display the content as shown in the subtable on the right, displaying the number of actually online outdoor units; If the displayed online quantity is inconsistent with the engineering quantity, it is necessary to manually check the connection of outdoor unit communication lines and re-confirm the engineering commissioning after eliminating any abnormal phenomena. If the displayed online quantity is consistent with the engineering quantity, it is necessary to manually press the confirmation key KEY5 for confirmation and after that, the system will automatically enter the Stage of Confirming the Number of Indoor Units .	db 01 01~04
2	Confirm the number of indoor units	After the number of outdoor units is confirmed, the system will automatically enter the Stage of Confirming the Number of Indoor Units and then the Nixie tubes and state lights of all the modules will display the content as shown in the sub-table on the right, displaying the number of actually online indoor units; If the displayed online quantity is inconsistent with the engineering quantity, it is necessary to manually check the connection of indoor unit communication lines and re-confirm the engineering commissioning after eliminating any abnormal phenomena. If the displayed online quantity is consistent with the engineering quantity, it is necessary to manually press the confirmation key KEY5 for confirmation and after that, the system will automatically enter the Stage of Confirming the Troubles inside Modules	db 02 01~08
3	Confirm the troubles inside modules	Every module automatically detects the components and communication load state inside it: If the Nixie tube of such module displays the content as shown in the first sub-table on the right, it means that such module has no trouble inside it and it is waiting for entering next stage. If the components inside all the modules have no troubles, the system will automatically enter the Stage of Confirming and Judging the Compressor Preheating . If the Nixie tube of such module displays the content as shown in the second sub-table on the right, it means that such module has a trouble inside it. When any trouble appears in any module, the system will fail to enter next stage of engineering commissioning until the corresponding trouble(s) is/are removed. See the part of Troubleshooting Methods of the Maintenance Manual for the troubleshooting methods for the above corresponding troubles.	db 03 OC db 03 Code of troubles
4	Confirm and judge the compressor preheating	Before starting to do the unit commissioning, it is a must to preheat a unit for over 8 hours. If the Nixie tube of such module displays the content as shown in the first sub-table on the right, it means that the unit preheating time meets the requirement and the system will enter the Stage of Judging the Refrigerant before Starting after 5seconds. If the Nixie tube of such module displays the content as shown in the second sub-table on the right, it means that the unit preheating time is insufficient and the unit will continue being standby for preheating and it is not allowed to start the unit at the moment; In consideration of the actual situation of some engineering, it is allowed to select long pressing the confirmation key KEY5 for 5 seconds to skip the waiting time and thus make the system automatically enter next step. However, such operation may damage the compressors.	db 04 OC db 04 U8
5	Stage of judging the refrigerant before starting	If the Nixie tube of such module displays the content as shown in the first sub-table on the right, it means that the unit refrigerant meets the requirement and the system will enter next stage after 5seconds. If the Nixie tube of such module displays the content as shown in the second sub-table on the right, it means that the amount of system refrigerant fails to meet the starting requirement and at the moment, it is necessary to check whether or not leakage exists or add some refrigerant till the abnormal phenomena is eliminated. After such trouble is eliminated, the unit will display OC and the system will automatically enter next stage.	db 05 OC db 05 H2
6	Stage of judging the states of outdoor unit valves before starting	After entering this stage, the system will start trial operation for a period of time and the Nixie tubes of modules will display the content as shown in the first sub-table on the right; If the Nixie tubes of certain modules display the content as shown in the second sub-table on the right, it means that the valves are started normally and the system will enter next stage after 5 seconds; If the Nixie tubes of certain modules display the content as shown in the third sub-table on the right, it means that the valves are started abnormally and it is necessary to check whether or not all the valves are opened and then press the return key KEY2 to return to the previous step for re-confirming the state of valves after confirming that all the valves are opened. It is allowed to confirm entering next stage by long pressing the confirmation key KEY5 for 5 seconds when you can manually confirm that all the valves are opened and the program detection makes a wrong judgment.	db 06 ON db 06 OC db 06 U9

2) Engineering Commissioning Steps (Continued Table)

Table 6.2

Step	Step Name	Operations	Display												
7	Stage of confirming the automatic /manual filling method	<p>You can choose the automatic or manual filling method via SW1 (↑ upward selection key) and KEY2 (↓ downward selection key) wherein the code of automatic filling is AL and the code of manual filling is AE .</p> <p>The default display content of system is the state of Waiting for choosing the automatic filling ;</p> <p>Pressing the confirmation key KEY5 can confirm choosing the automatic or manual filling.</p> <p>When the automatic filling is chosen, the Nixie tubes and state lights of all the modules will display the content as shown in the first sub-table on the right: The system will automatically choose the engineering commissioning mode as per Outdoor Ambient Temperature T4 after 5 seconds:</p> <p>If the master Outdoor Ambient Temperature T4 is 0 ,automatically enter the Stage of Automatic Filling for Refrigeration Operation in Step 8.</p> <p>If the master Outdoor Ambient Temperature T4 is lower than 0 ,automatically enter the Stage of Automatic Filling for Heating Operation in Step 9.</p> <p>When the manual filling is chosen, the Nixie tubes and state lights of all the modules will display the content as shown in the second sub-table on the right: The system will automatically choose the engineering commissioning mode as per Outdoor Ambient Temperature T4 after 5 seconds:</p> <p>If the master Outdoor Ambient Temperature T4 is 20 ,automatically enter the Stage of Manual Filling for Refrigeration Operation in Step 10.</p> <p>If the master Outdoor Ambient Temperature T4 is lower than 20 ,automatically enter the Stage of Manual Filling for Heating Operation in Step 11.</p>	<table><tr><td>db</td><td>07</td><td>AL</td></tr></table> <table><tr><td>db</td><td>07</td><td>AE</td></tr></table>	db	07	AL	db	07	AE						
db	07	AL													
db	07	AE													
8	Stage of Automatic Filling for Refrigeration Operation	<p>After the system enters this stage, the Nixie tubes of all the modules display the content as shown in the first sub-table on the right, meaning that the system is executing the automatic filling for refrigeration operation at the moment;</p> <p>If the Nixie tubes of certain modules display the content as shown in the second sub-table on the right, it means that the system does not possess the automatic filling conditions and at the moment, it is necessary to press the return key KEY2 to return to Step 7 and choose the manual filling method for engineering commissioning;</p> <p>If the Nixie tubes of certain modules display the content as shown in the third sub-table on the right, it means that the modules are abnormal and at the moment, the system will stop automatic filling and cannot continue the engineering commissioning until the corresponding troubles are eliminated.</p> <p>See the part of Troubleshooting Methods of the Maintenance Manual for the troubleshooting methods for the above corresponding troubles.</p> <p>If the Nixie tubes of certain modules display the content as shown in the fourth sub-table on the right, it means that the system has finished the automatic filling for refrigeration operation and will automatically enter the Stage of Confirming the Completion of Engineering Commissioning in Step 12.</p>	<table><tr><td>db</td><td>08</td><td>AL</td></tr></table> <table><tr><td>db</td><td>08</td><td>UL</td></tr></table> <table><tr><td>db</td><td>08</td><td>Code of troubles</td></tr></table> <table><tr><td>db</td><td>08</td><td>AL (Twinking)</td></tr></table>	db	08	AL	db	08	UL	db	08	Code of troubles	db	08	AL (Twinking)
db	08	AL													
db	08	UL													
db	08	Code of troubles													
db	08	AL (Twinking)													
9	Stage of Automatic Filling for Heating Operation	<p>After the system enters this stage, the Nixie tubes of all the modules display the content as shown in the first sub-table on the right, meaning that the system is executing the automatic filling for heating operation at the moment;</p> <p>If the Nixie tubes of certain modules display the content as shown in the second sub-table on the right, it means that the system does not possess the automatic filling conditions and at the moment, it is necessary to press the return key KEY2 to return to Step 7 and choose the manual filling method for engineering commissioning;</p> <p>If the Nixie tubes of certain modules display the content as shown in the third sub-table on the right, it means that the modules are abnormal and at the moment, the system will stop automatic filling and cannot continue the engineering commissioning until the corresponding troubles are eliminated.</p> <p>See the part of Troubleshooting Methods of the Maintenance Manual for the troubleshooting methods for the above corresponding troubles.</p> <p>If the Nixie tubes of certain modules display the content as shown in the fourth sub-table on the right, it means that the system has finished the automatic filling for heating operation and will automatically enter the Stage of Confirming the Completion of Engineering Commissioning in Step 12.</p>	<table><tr><td>db</td><td>09</td><td>AL</td></tr></table> <table><tr><td>db</td><td>09</td><td>UL</td></tr></table> <table><tr><td>db</td><td>09</td><td>Code of troubles</td></tr></table> <table><tr><td>db</td><td>09</td><td>AL (Twinking)</td></tr></table>	db	09	AL	db	09	UL	db	09	Code of troubles	db	09	AL (Twinking)
db	09	AL													
db	09	UL													
db	09	Code of troubles													
db	09	AL (Twinking)													
10	Stage of Manual Filling for Refrigeration Operation	<p>After the system enters this stage, the Nixie tubes of all the modules display the content as shown in the first sub-table on the right, meaning that the system is executing the manual filling for refrigeration operation at the moment;</p> <p>If the Nixie tubes of certain modules display the content as shown in the second sub-table on the right, it means that the modules become abnormal and at the moment, the system stops running and cannot continue the engineering commissioning until the corresponding troubles are eliminated. See the part of Troubleshooting Methods of the Maintenance Manual for the troubleshooting methods for the above corresponding troubles.</p> <p>If the Nixie tubes of certain modules display the content as shown in the third sub-table on the right, it means that the system has finished the manual filling for refrigeration operation and will automatically enter the Stage of Confirming the Completion of Engineering Commissioning in Step 12.</p> <p>If you can manually confirm that the system refrigerant is sufficient and the running parameters are normal, you can long press the confirmation key KEY5 for 5 seconds to skip this stage and then the system will automatically enter the Stage of Confirming the Completion of Engineering Commissioning in Step 12.</p>	<table><tr><td>db</td><td>10</td><td>AE</td></tr></table> <table><tr><td>db</td><td>10</td><td>Code of troubles</td></tr></table> <table><tr><td>db</td><td>10</td><td>AE (Twinking)</td></tr></table>	db	10	AE	db	10	Code of troubles	db	10	AE (Twinking)			
db	10	AE													
db	10	Code of troubles													
db	10	AE (Twinking)													
11	Stage of Manual Filling for Heating Operation	<p>After the system enters this stage, the Nixie tubes of all the modules display the content as shown in the first sub-table on the right, meaning that the system is executing the manual filling for heating operation at the moment;</p> <p>If the Nixie tubes of certain modules display the content as shown in the second sub-table on the right, it means that the modules become abnormal and at the moment, the system stops running and cannot continue the engineering commissioning until the corresponding troubles are eliminated. See the part of Troubleshooting Methods of the Maintenance Manual for the troubleshooting methods for the above corresponding troubles.</p> <p>If the Nixie tubes of certain modules display the content as shown in the third sub-table on the right, it means that the system has finished the manual filling for heating operation and will automatically enter the Stage of Confirming the Completion of Engineering Commissioning in Step 12.</p> <p>If you can manually confirm that the system refrigerant is sufficient and the running parameters are normal, you can long press the confirmation key KEY5 for 5 seconds to skip this stage and then the system will automatically enter the Stage of Confirming the Completion of Engineering Commissioning in Step 12.</p>	<table><tr><td>db</td><td>11</td><td>AE</td></tr></table> <table><tr><td>db</td><td>11</td><td>Code of troubles</td></tr></table> <table><tr><td>db</td><td>11</td><td>AE (Twinking)</td></tr></table>	db	11	AE	db	11	Code of troubles	db	11	AE (Twinking)			
db	11	AE													
db	11	Code of troubles													
db	11	AE (Twinking)													
12	Stage of Confirming the Completion of Engineering Commissioning	<p>The Nixie tubes and state lights of all the modules display the content as shown in the sub-table on the right;</p> <p>The engineering commissioning personnel should confirm whether or not it is necessary to do the engineering commissioning again: If it is necessary, please press the return key KEY2 and then the system will return to Engineering Commissioning Step 1 and start the engineering commissioning again. Otherwise, please press the confirmation key KEY5 to finishing the engineering commissioning. When the mark of finishing the engineering commissioning is placed at the position of 1 , the complete machine will stop and the system will enter the standby state.</p>	<table><tr><td>db</td><td>12</td><td>OC</td></tr></table>	db	12	OC									
db	12	OC													

7. Test Run

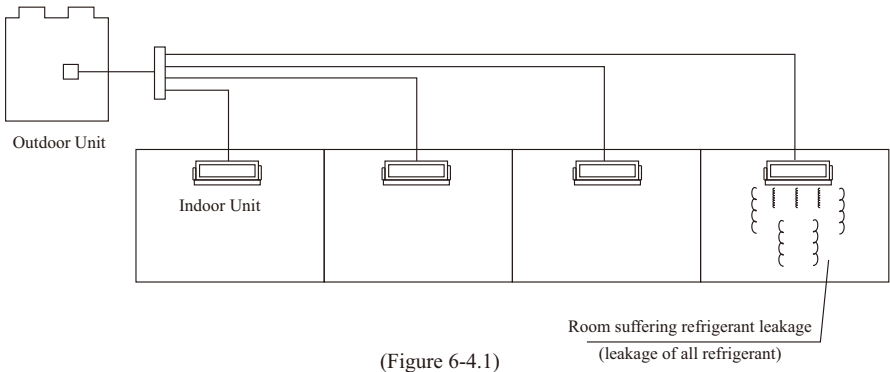
7-1. Name Filling of Connecting Systems

When setting two or more indoor units, name and record every system connecting the indoor and outdoor units and then fill as per the following table.

Type of Indoor Unit	
Room Name: Example: The indoor unit (A) of the first system on the second floor is recorded as ---2F---1A	

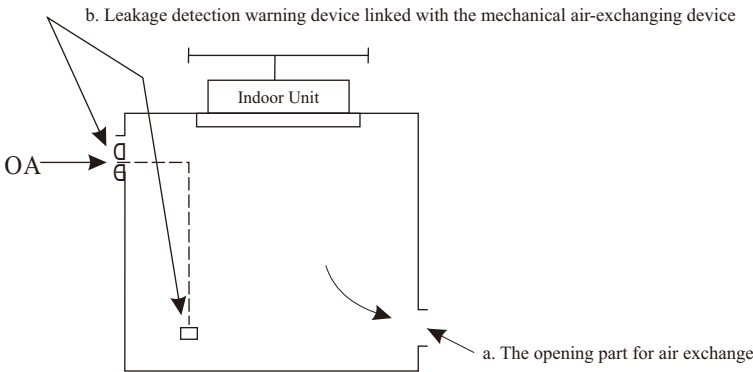
7-2. Refrigerant Leakage Matters Needing Attention

- 1) The refrigerant used for this air-conditioner is harmless and noncombustible.
- 2) The room used to place the air-conditioner should be of appropriate size and not exceed the limit concentration even if refrigerant leakage occurs. In addition, necessary measures can be taken.
- 3) Concentration of gas limit causing no harm to human body is 0.42[kg/m3].
- 4) Confirm the limit concentration as per the following sequence and take corresponding necessary measures.
- a). Calculate the total refrigerant filling volume (A[kg])
- Total refrigerant volume = refrigerant filling volume at the time of shipment (see the nameplate of the outdoor unit) + refrigerant adding volume corresponding to the piping length
- b). Calculate the indoor volume (B[m3] (as per the minimum volume)
- c). Calculate the refrigerant concentration (A[kg]/B[m3] limit concentration: 0.3[kg/m3])



(Figure 6-4.1)

- 5) Countermeasures to prevent the refrigerant concentration from exceeding the limit concentration
- a). Please install a mechanical air-exchanging device in order to reduce the refrigerant concentration to be less than the limit concentration (frequent air exchange)
- b). Please install a leakage detection warning device linked with the mechanical air-exchanging device if it is impossible to achieve frequent air exchange.



(The leakage detection warning device should be installed at the position where the refrigerant easily suffers retention.)

(Figure 6-4.2)

7-3. Handover to the Client

Be sure to hand the Installation and User's Manual for indoor units, the 『Installation and User's Manual』 for outdoor units to the client.
Give the client detailed description of the content of directions for use in the 『Installation and User's Manual』.