GMV 5

THE 5TH GENERATION OF

GREE MULTI VRF SYSTEM

GMV5 Installation Guide

Overseas Sales Co, GREE

CONTENTS

1

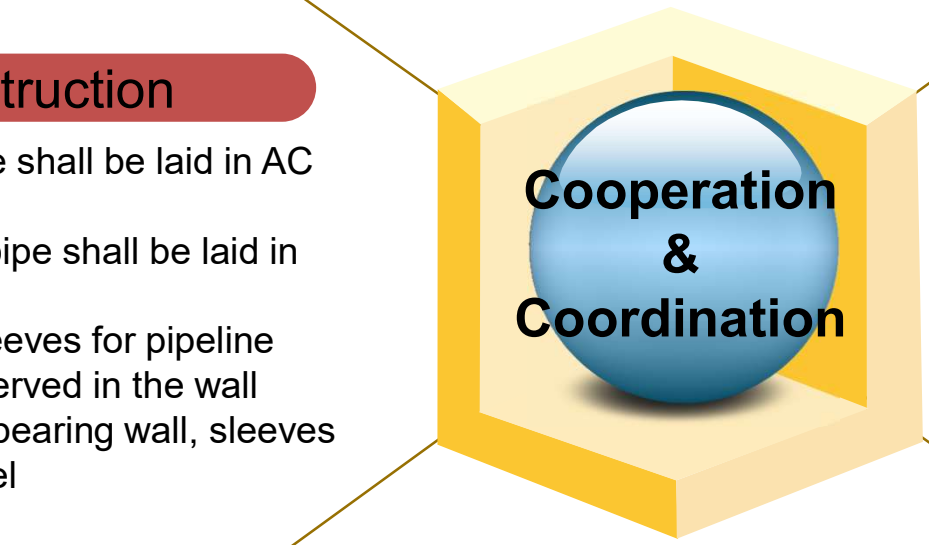
- Preparation

Preparation

Safety

- Priority during installation
- Safety assessment should be arranged to all personnel involved in the installation.
- Relevant national safety regulation should be obeyed to avoid personal injury or property loss.

Cooperation & Coordination



Construction

- Vertical pipe shall be laid in AC tube well
- Horizontal pipe shall be laid in the ceiling
- Holes & sleeves for pipeline should be reserved in the wall
- In the load-bearing wall, sleeves should be steel

Electrical Wiring

- Whether the electrical load design can meet the unit requirement?
- Whether the power cord and air switch meet the unit requirement?
- Whether the regional power supply meets the national?

Once any nonconformity found, solve the problem immediately!

Optional Component

Category		Model	Remarks
Branch Pipe	ODU	ML01	Detailed information can be found in 《Piping System》
	IDU	FQ01A，01B，02,03,04	
Receiving Plate for Remote Control		JS03	Suitable for Duct type IDU
Wireless Remote Controller		YV0L	With Debugging function, can be used for IDU function setting
Commission Software		DG40-33/A(C)	Suitable for Units with CANBUS communication protocol
Remote Monitoring System	Software	FC31-00/AD(BM)	
	Photoelectric isolating converter	GD01	
	MODbus gateway	MC30-24/E4(M)	
	BACnet gateway	MG30-24/D2(B)	

Typical Problems

No.	Typical problems	Influence and potential hazards
1	Dust and impurities get into the system	The pipeline blocking probability increases; unit performance decreases; in serious situation, the system cannot work normally or even the compressor will be burnt down
2	Welding without charging nitrogen or charging is insufficient	
3	The vacuum degree in the refrigerant pipe is insufficient	Cooling performance decreases; the system occurs protection frequently and cannot work normally; in serious situation, the compressor and other important parts may be damaged
4	Water gets into the refrigeration system	The compressor may be copperized, which may affect efficiency and produce abnormal noise; the system may be blocked by ice and cannot work normally
5	The pipeline specification does not accord with the configuration requirement	If the configuration is too small, the resistance of system pipeline will increase, which may affect the cooling performance; if the configuration is too big, it is a waste and also the cooling performance may decrease

No.	Typical problems	Influence and potential hazards
6	Blocking of refrigerant pipe	Cooling performance decreases; in serious situation, the compressor will be in overheating operation for a long time; if the impurities get into the lubricant, the lubrication effect may be affected, or even burning down the compressor
7	Refrigerant pipe exceeds the limitation	The pipeline depletion is too big and the energy efficiency ratio will decreases; bad for long time operation of the system
8	The charging amount of refrigerant is wrong	The system cannot allocate the flow properly; the compressor may occur humidity operation or overheating operation
9	Leakage in the refrigerant pipeline	The system circulating refrigerant is not sufficient, cooling performance will decrease; if running for a long time, the compressor may have overheating, or even burn down
10	Condensation pipeline cannot drain smoothly	Water will accumulate in the indoor unit and affect the normal operation of system; if there is water leakage, the decoration may be affected

No.	Typical installation problems	Influence and potential hazards
11	The gradient of condensate pipe is not sufficient or the connection is wrong	If there is overhanging slope or inconsistent slope direction, there may be water accumulation or water leakage in the indoor unit
12	The location of IDU or air outlet or air return is wrong	Air outlet or air return short-circuit may be caused, which affects the performance of unit
13	Air duct is not properly fixed	Air duct is deformed; there are vibration and noise during operation
14	The guide plate of air duct has not been made properly	Air volume allocation in air conditioning area is not even, which affect the air conditioning performance
15	Insulation of refrigerant pipe or condensation pipe does not meet the requirement	Water dropping may occur and affect the decoration; in serious situation, the system may have overheating protection
16	Power connection wire is wrong	Damage the electrical parts; have potential hazards
17	Communication wire is wrong or not properly connected	The system cannot communicate normally or the control of IDU and ODU is in a mess

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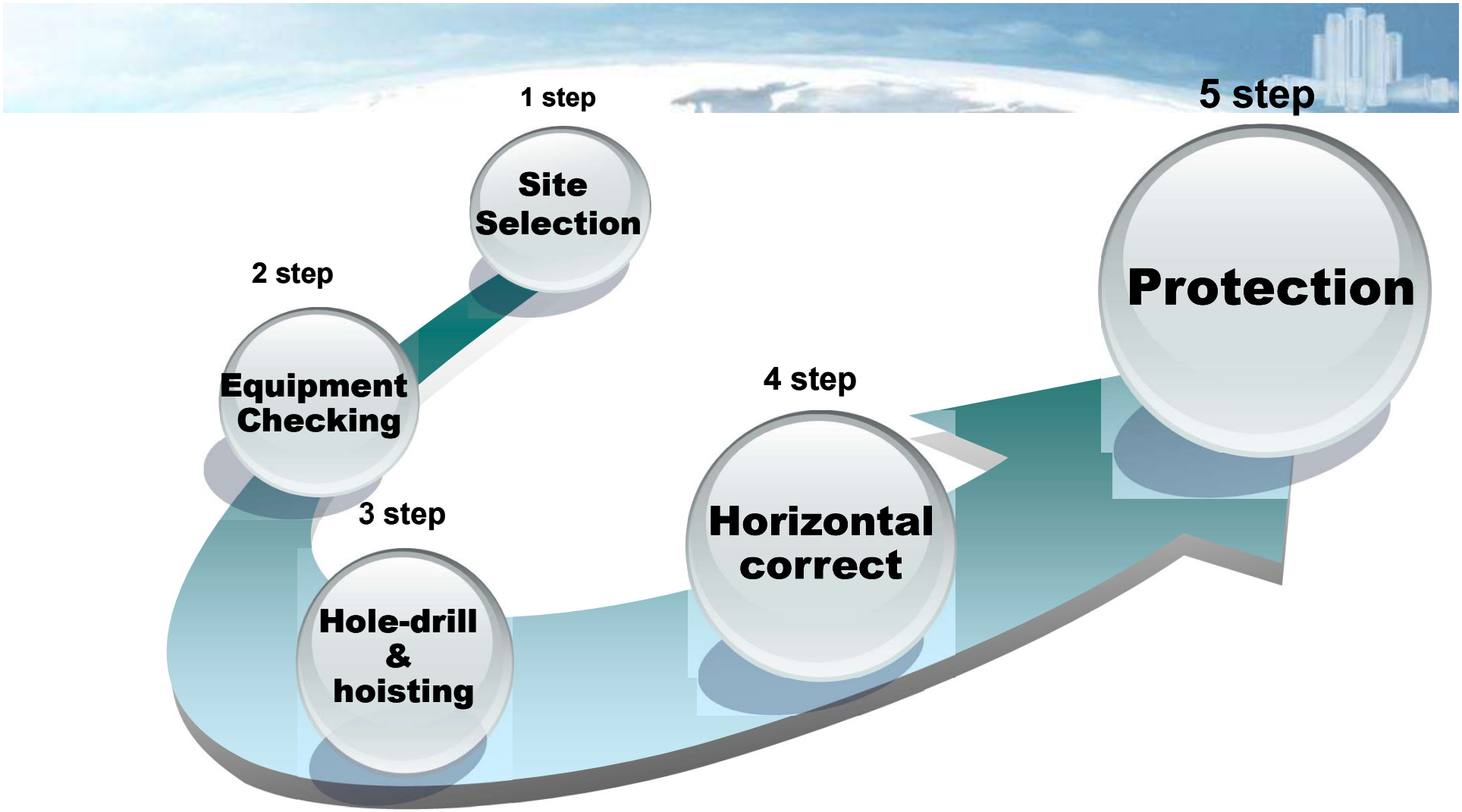
•IDU Installation


1 step
Site Selection
2 step
Equipment Checking
3 step
Hole-drill & hoisting
4 step
Horizontal correct
5 step
Protection

Site Selection

Details:

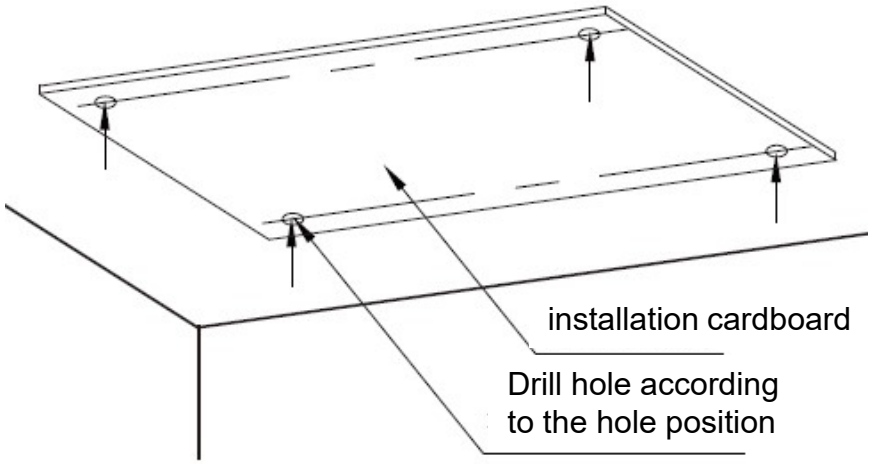
- Make sure the suspender can bear the weight of the unit.
- Make sure the water drainage is effective.
- No obstacle around the air inlet and outlet to maintain good air circulation.
- Keep the IDU, ODU, power cord and connection wire at least 1m away from the TV set and radio.

Equipment Checking

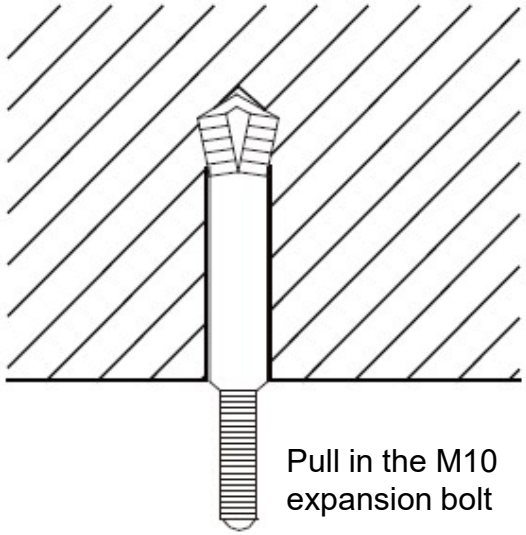
3.0kgf/cm² *nitrogen* is charged in the IDU for airproof protection before Ex-factory.

Check if there is gas inside the indoor unit. *If not, charge the unit with nitrogen for a leakage detection*.

Hole-drilling & hoisting



A *Cardboard* is provided for hole-drilling.



✷Attention✷

- *An access port*(no less than 400*400mm) must be reserved under the bottom of the IDU.
- The access port should be *located near the electric box* for convenient maintenance.

Horizontal correct

➢the *drainage pipe should slant 1%* following the drainage direction.

✶ Running in horizontal level can reduce the noise and prevent the condensation overflowing✶

Protection

The IDU should be wrapped after installation.

Benefits:

- Prevent dust getting into the unit.
- Less corruption on the internal electronic parts of the unit caused by corrosive gas during decoration.

3

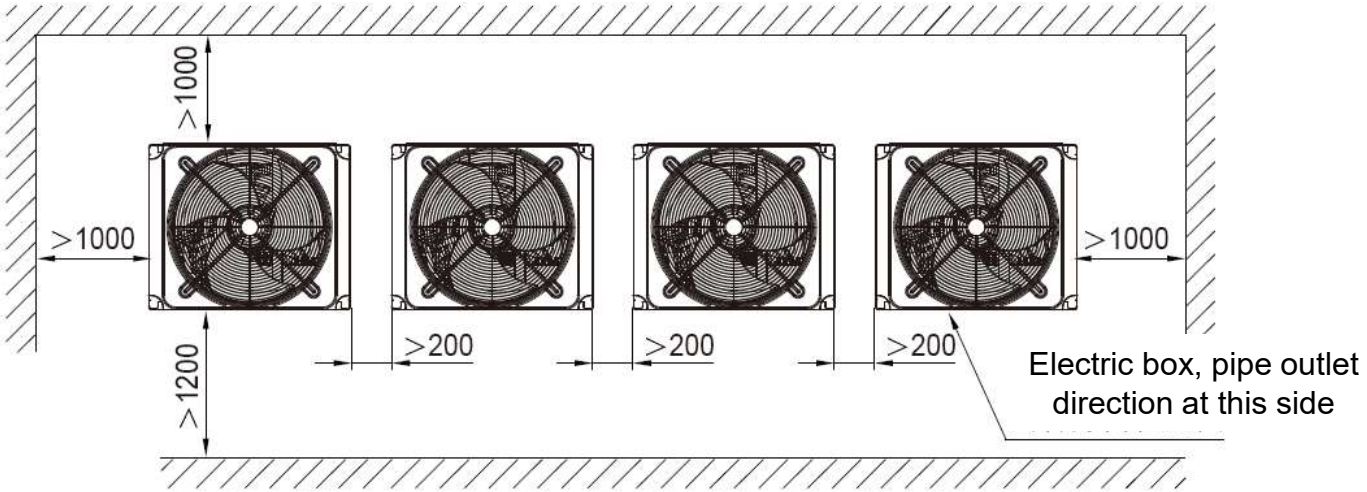
•ODU Installation

foundation Installation

The foundation must be flat and higher than 200mm, so that water and snow can be avoided.
Reserve bolts on the foundation, diameter is 12mm.

The foundation must be concrete and hard enough.
Ensure the smooth drainage and do not affect drainage downstairs.

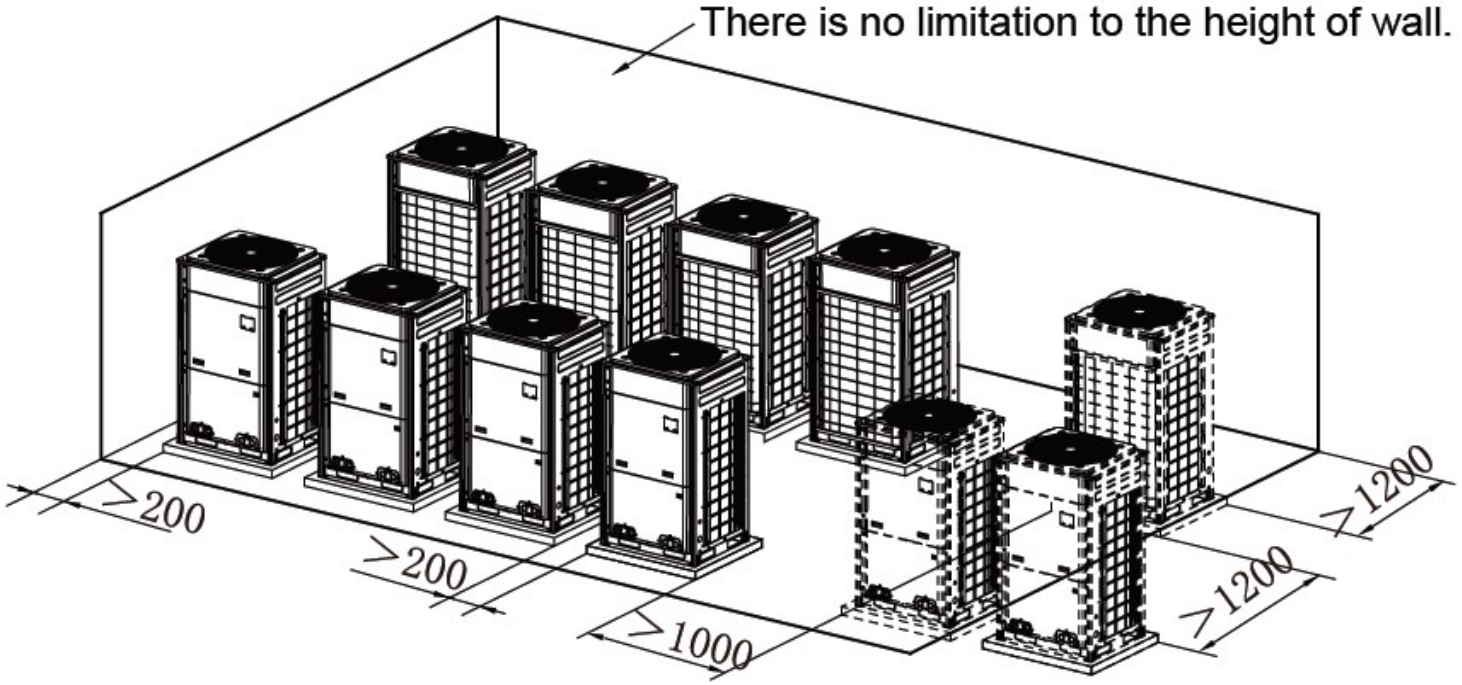
Space Requirement



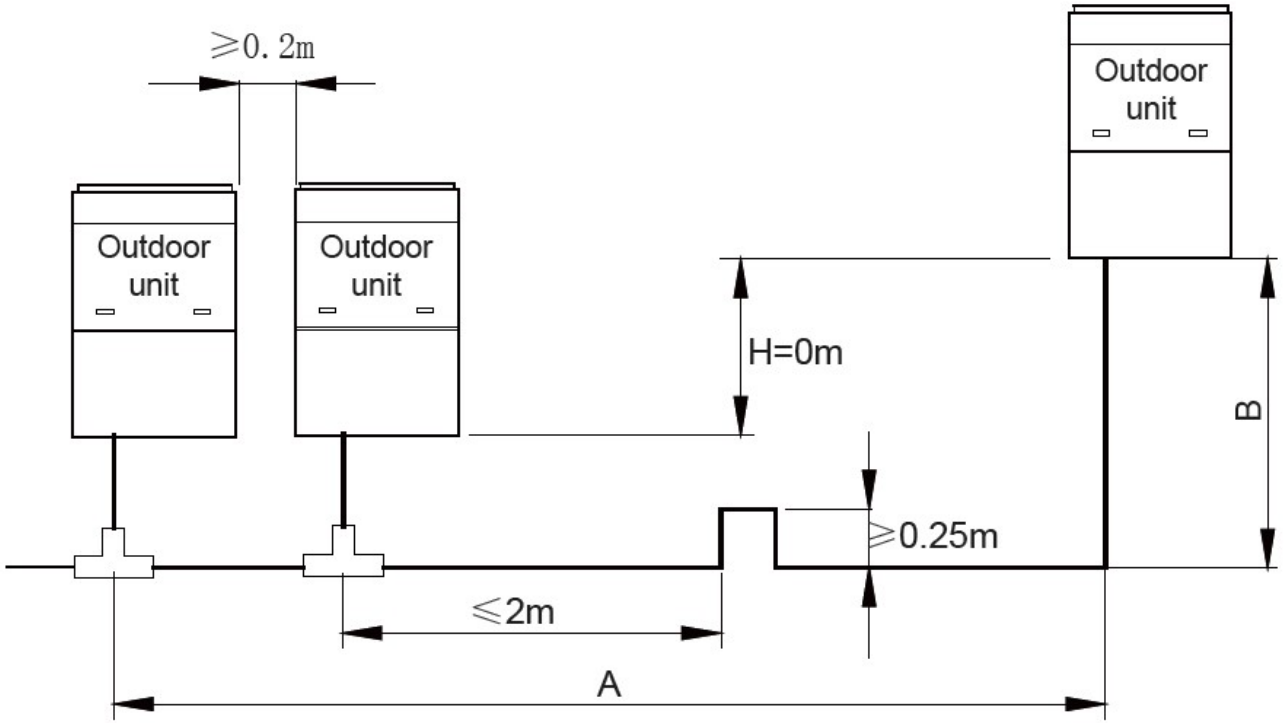
In an open space, *the distance* between the top of the unit and the upper wall *should exceed 1500mm*.
In an not-open-enough space or the distance above the unit is below 1500mm, *an air exhaust duct is necessary* to afford a good ventilation.

✶ Do not open the seal cap and cut-off valve in ODU before debugging finished. ✶

Space Requirement

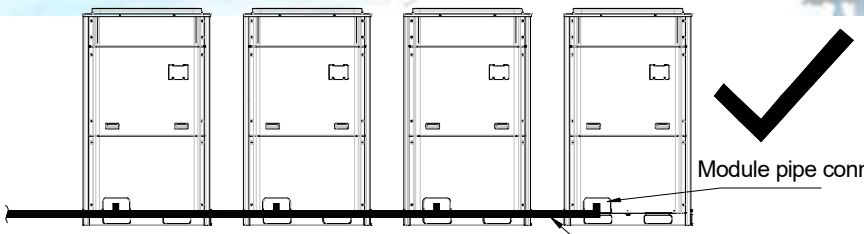


ODU Connection

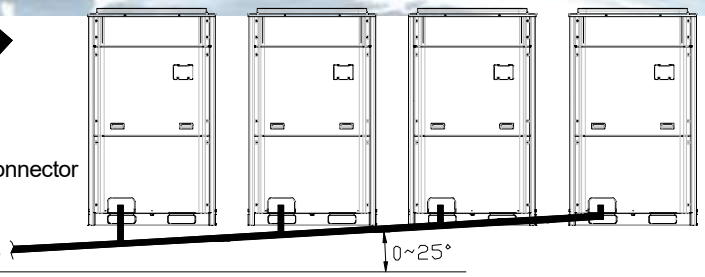


When the distance between outdoor units exceeds 2m, U-type oil trap should be added at low-pressure gas pipe. A+B≤10m.

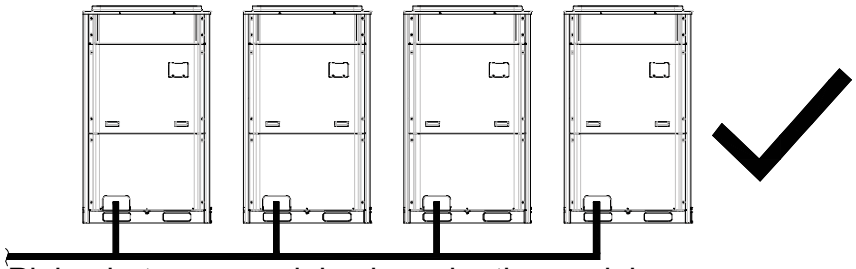
ODU Connection



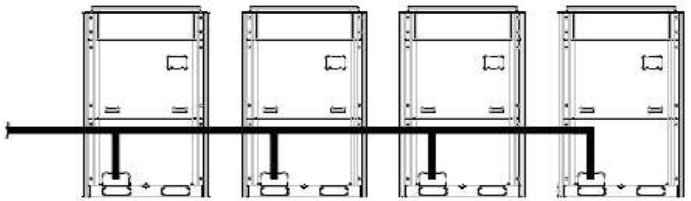
Piping between modules is at the same level with the module pipe connector.



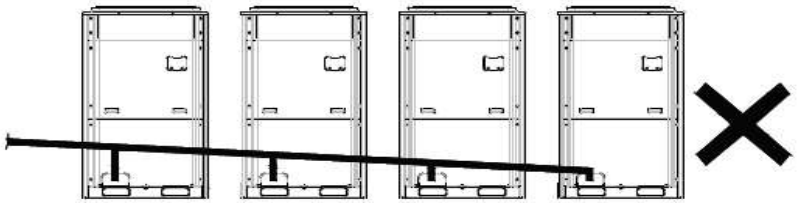
Piping between modules is under the module pipe connector and inclines upwards with an angle of 0 to 25 degree.



Piping between modules is under the module pipe connector and does not incline.



Piping between modules is above the module pipe connector.



Piping between modules is above the module pipe connector.

4

- Pipe Connection

Copper Pipe Process

Copper Pipe Selection

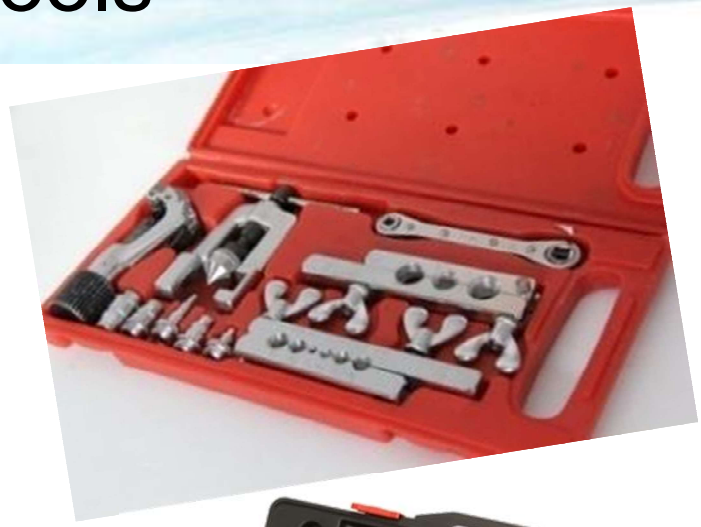
✷Attention✷

- The inner surface must be clean and dry.
- Dephosphorization drawing copper pipe for air conditioners.
- A quality certification should be provided for all the pipes.

The Select Reference shown as follows:

No.	Outer Diameter(mm)	Thickness(mm)	Material State
1	Φ6.35~12.7	0.8	O (Soft)
2	Φ15.9	1.0	O (Soft)
3	Φ19.05	1.0	1/2H (Half-hard)
4	Φ22.2~28.6	1.2	1/2H (Half-hard)
5	Φ31.8~34.9	1.3	1/2H (Half-hard)
6	Φ38.1~54.1	1.5	1/2H (Half-hard)

Tools



Cutting

✷Attention✷

➢Do the work with a specialized pipe cutter!

➢The cutting port should be flat without burrs.

Cleaning

Tools: gauze, steel wire, trichloroethylene, nitrogen

Method:

- *Wet the gauze* with trichloroethylene and wrap the steel wire with the gauze.
- *Pull the steel wire through the pipe* from one end to the other, and repeat the action until no dust and impurity inside.
- *For coil pipe, clean it with nitrogen*.

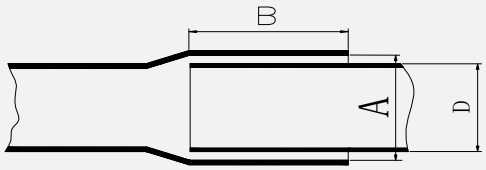
Bending

✷Attention✷

➢*No crimple and deformation* inside the copper pipe during bending.

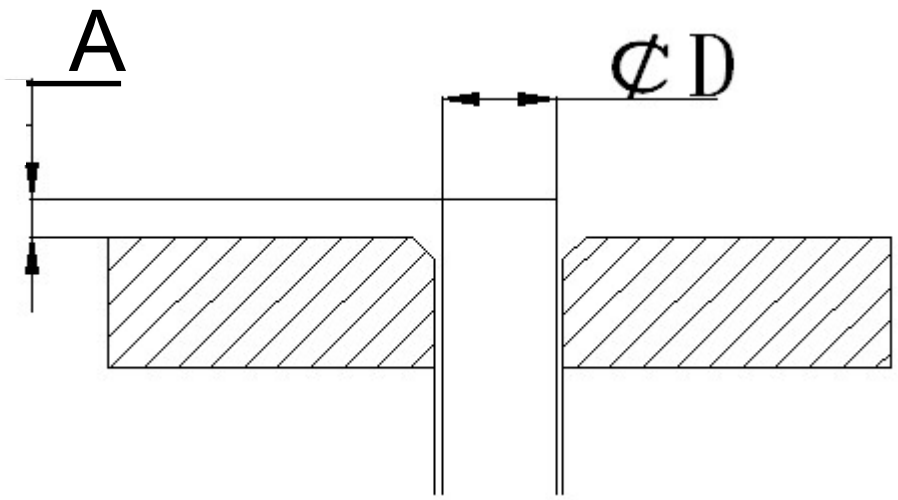
➢*The distance should be larger than 10cm* between the welding interface and the bending.

Expanding



Pipe outer diameter D(mm)	Depth B	Gap A-D
ф6.35	6	0.05 ~ 0.21
ф9.52，ф12.7	7	
ф15.8	8	0.05 ~ 0.27
ф19.05，ф22.2，ф25.4	10	
ф28.6，ф31.8	12	0.05 ~ 0.35
Above Φ35	14	

Flaring



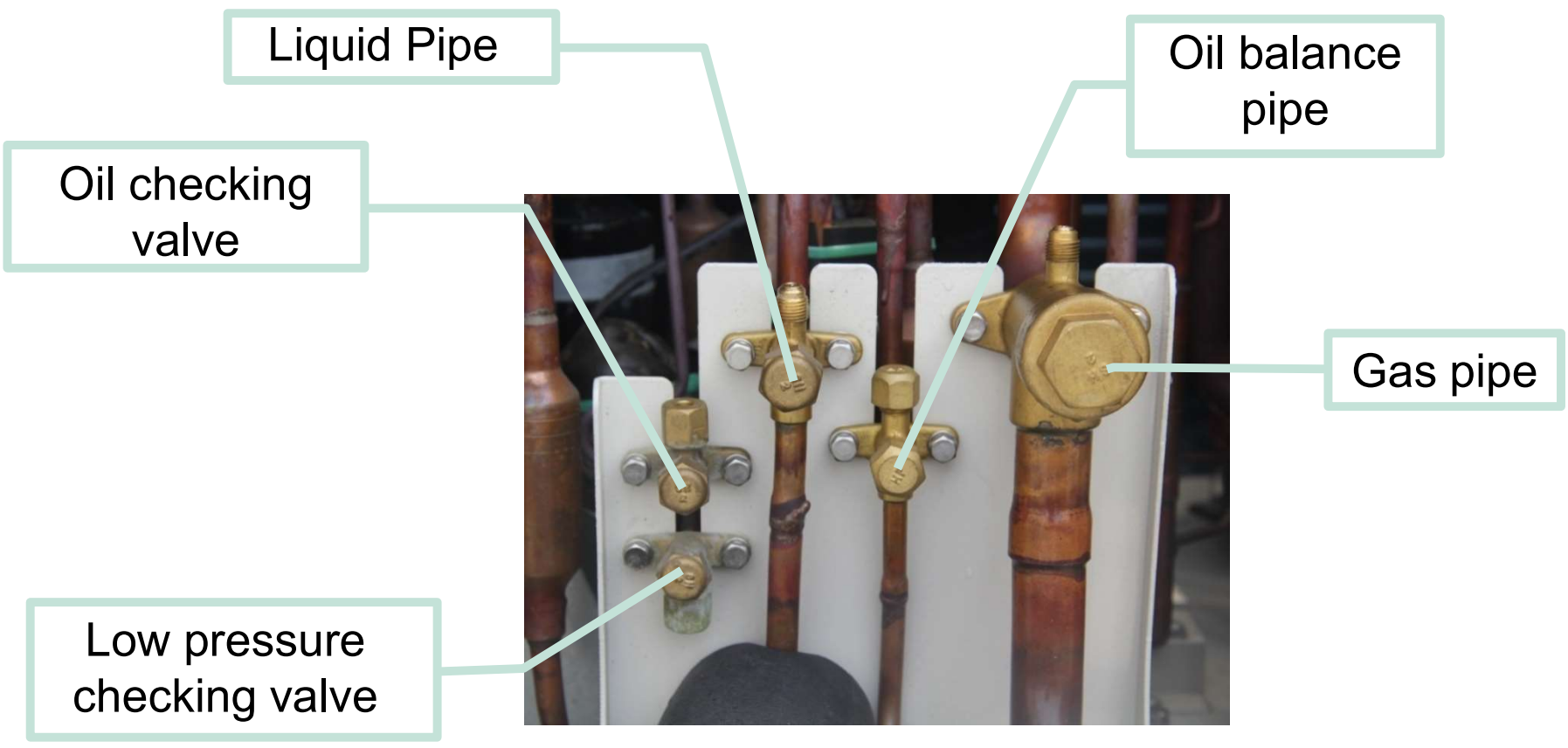
the standard distance A between profiling and copper pipe port:

Copper pipe (outer diameter)	ф6.35	ф9.52	ф12.7	ф15.9	≥ф19.05
A's value	1.0mm				1.5mm

Flaring

Once *slant, double edges, or crack* happens, the pipe should be cut and reprocessed.

Piping Design


Liquid Pipe
Oil balance pipe
Oil checking valve
Gas pipe
Low pressure checking valve

Pipe Dimension

For a multi modular system, the connection pipe dimension of branch pipe between each module and ODU is equal to the connection pipe dimension of basic module ODU.

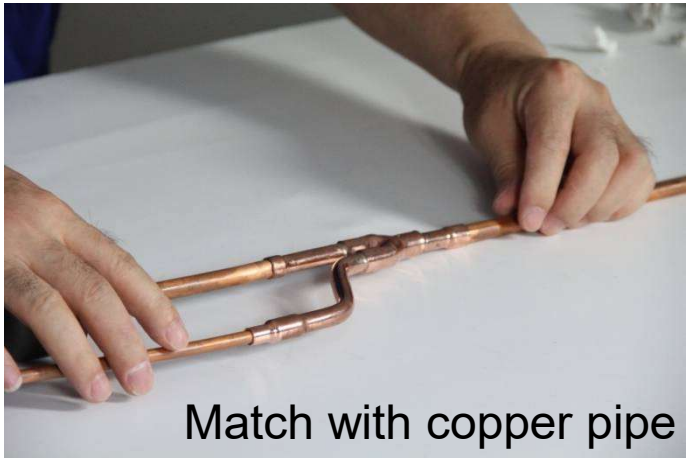
The connection pipe dimension of basic module ODU is as below:

Basic module	Connection pipe dimension between module and branch pipe	
	Gas pipe(mm)	Liquid pipe(mm)
GMV-224WM/B	Φ19.05	Φ9.52
GMV-280WM/B	Φ22.2	Φ9.52
GMV-335WM/B	Φ25.4	Φ12.7
GMV-400WM/B	Φ25.4	Φ12.7
GMV-450WM/B	Φ28.6	Φ12.7

- In the oil balanced pipeline, *copper pipes(Φ9.52)* are adopted for connection.
- In the oil balanced pipeline, *an oil balanced 3-way connector with each joint inner diameter of Φ9.7* should be applied if 3 modules in parallel connection.
- *ML01* is the connector model adopted between modules.

Branch

Qualified branch

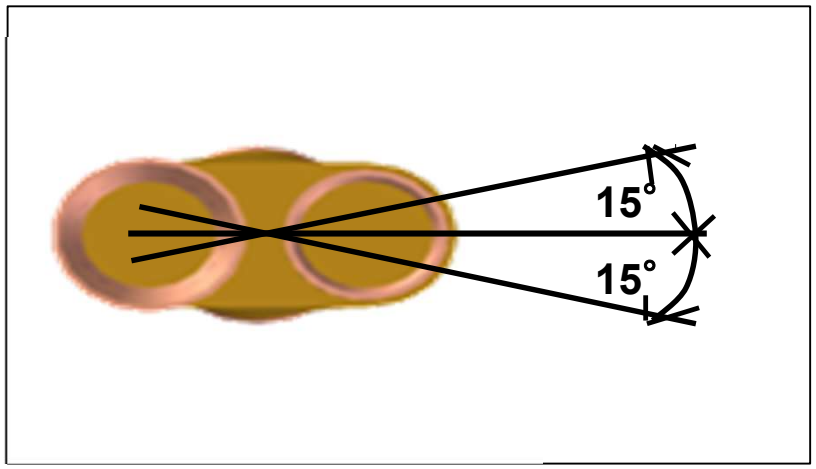


Match with copper pipe

- Branch pipes must match with the unit, and *only the one required by GREE can be adopted*.
- The closer to the IDU, the less influence on refrigerant flow.

Branch

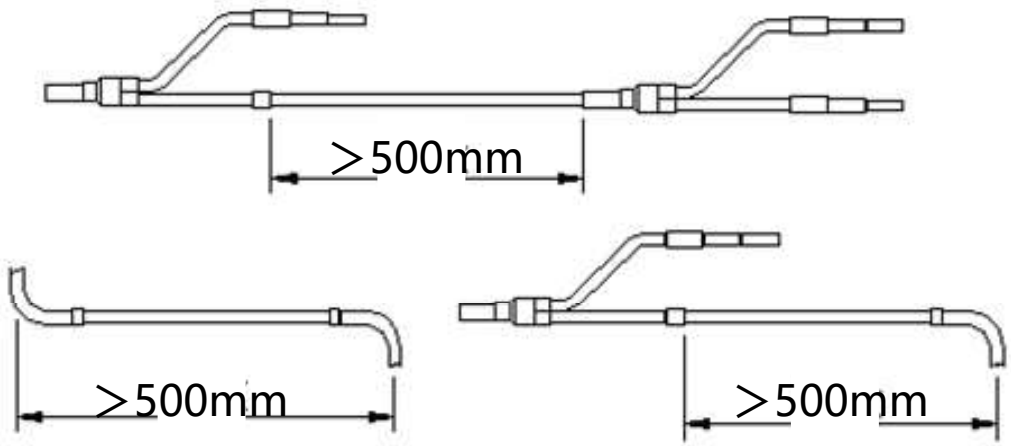
Horizontal Connection(prefer)	Vertical Connection
Three ports should be in the same horizontal plane while the angle must below 15°.	Three ports should be in the same vertical level which inclination is forbidden.



Branch

Placement of branch pipe:

- The straight pipe between two branches should be longer than 500mm;
- The straight pipe before the main pipe port of the branch should be longer than 500mm;
- The straight pipe between branch and IDU should be longer than 500mm.



Branch

Selection of branch:

Y-Type Branch	Total Capacity of the Downstream Indoor Unit X(kW)	Model
	X≤20.0	FQ01A
	20.0 < X≤30.0	FQ01B
	30.0 < X≤70.0	FQ02
	70.0 < X≤135.0	FQ03
	135.0 < X	FQ04

Braze welding

- *Ensure an even seam welding surface and* no rosin joint, gas hole or weld beading.
- *Use the solder without additive* as the additive may corrupt copper pipe and damage the oil.

Braze welding

No-nitrogen-charged welding

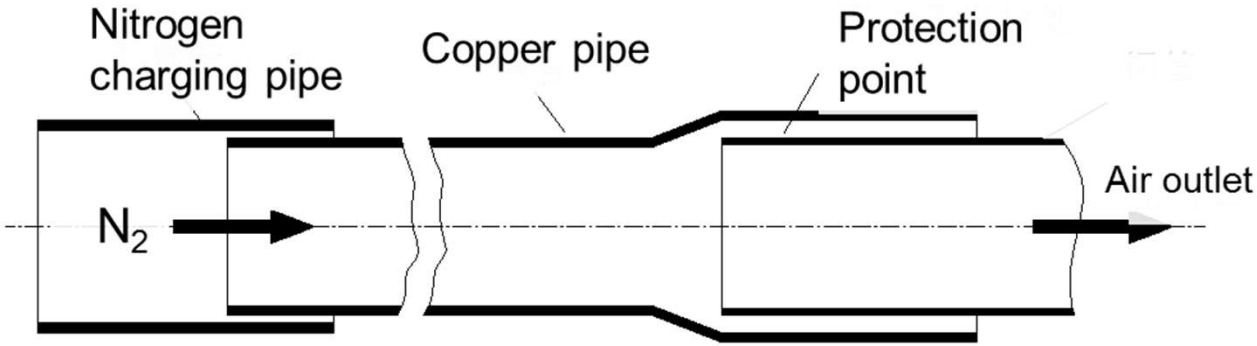
Nitrogen-charged welding

If no or insufficient nitrogen is charged during welding, oxide will be generated on the surface of copper pipe, which may cause:

- *Blocking of refrigerant system*.
- *Poor performance, compressors break down*, and so on.

✷ Do not close the nitrogen immediately after finishing welding, or the air will be recharged. ✷

Braze welding

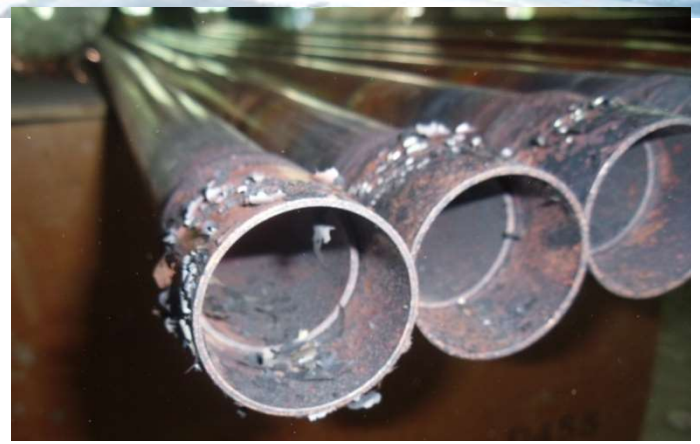


Key Points of nitrogen-charged welding:

- Pressure should be *0.2~0.5kgf/cm2* (relative pressure).
- To prevent leakage, *wrap the connecting part* between nitrogen pipe and copper pipe.
- *Charge nitrogen to refrigerant pipe for more than 10s* until the copper pipe cools down completely after finishing welding.

Flushing

Flush with nitrogen



Oxide generated during welding

Main purposes:

- To eliminate oxide caused by nitrogen-insufficiency during pipe welding.
- To remove impurity and water that may enter the pipe when the pipe cover is not properly sealed.

✷ Flushing must be done before connected to IDU, with a nitrogen charge pressure of 0.4~0.6MPa. ✷

Pressurization

Key points of airtight test:

- Apply pressure *at both sides* of gas pipe and liquid pipe for each refrigerant system to avoid damage to valves inside IDU;
- Use *dry nitrogen* in airtight test.

✷The valves on ODU mustn't be connected during pressurization.✷

✷ only passed the nitrogen pressure retain test, a vacuum pumping can be applied. ✷

Pressurization

Pressurization procedures of refrigerant cooper pipe:

No.	Procedures	Standard
1	Level 1: apply pressure of 3.0 kgf/cm2 for over 3min, big leakage point can be found	No pressure decreasing after modification
2	Level 2: apply pressure of 15.0 kgf/cm2 for over 3min, relatively big leakage point can be found	
3	Level 3: apply pressure of 40.0 kgf/cm2 for over 24h, tiny leakage point can be found	

- Every ± 1℃ temperature difference, ±0.1 kgf/cm^2 pressure difference happens.
- If pressure drop is within *0.2 kgf/cm^2* in 24h, the test is passed

✷ actual value=pressure applied-(temp when applying pressure-temp when observing)×0.1 kgf/cm2✷

Pressurization

Record nitrogen charging time, temperature and pressure, in order to modify after 24h.

Detection method:

- With ears: listen to the main leakage sound;
- With hands: touch the connection joint to see if there is leakage;
- With soap water: soap bubbles will show the leakage position;
- Use detector for leakage detection, such as halide detector.

Condensate Pipe Installation

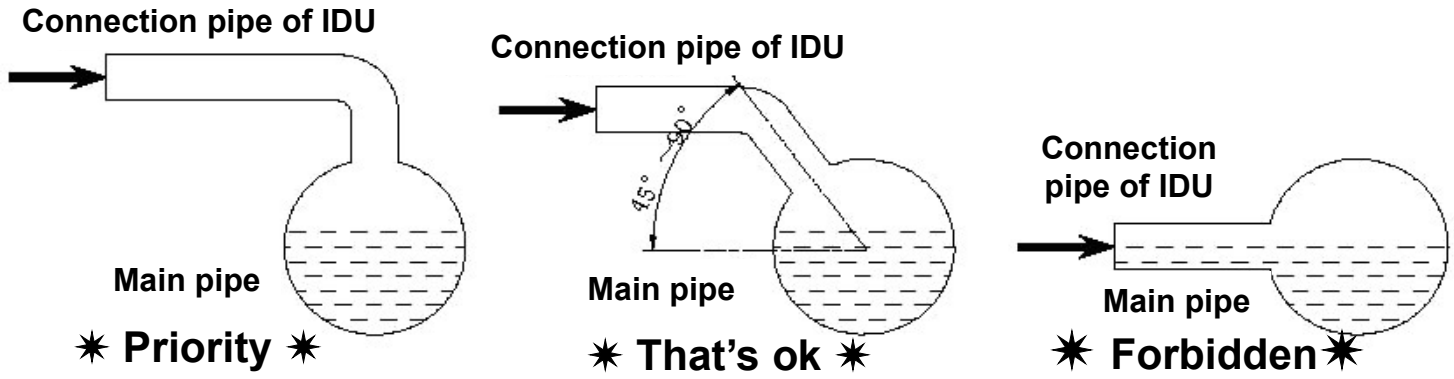
Pipe Material

➢*U-PVC pipe* for water supply, adhered with special glue, is generally used as the condensate pipe.

➢*PP-R pipe, PP-C pipe and hot-dipped galvanized steel pipe* are available.

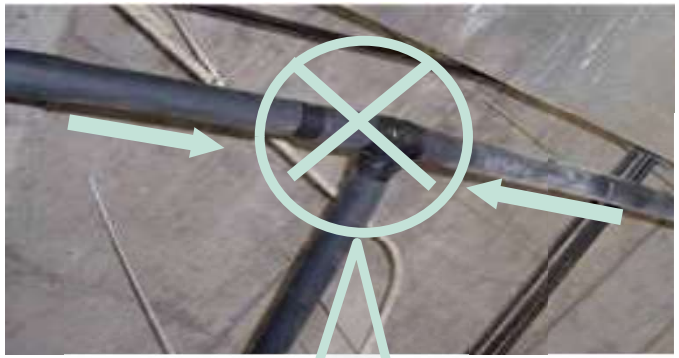
✷ aluminum plastic composite pipe is forbidden. ✷

Pipe Gradient



- The height of the clamp fixing the pipe hanger frame should be adjustable and fixed from the outer of thermal insulation.
- The gradient of condensate pipe should be *above 1%*;
- The gradient of main pipe shall not be *less than 0.3% .*

Condensate Pipes Hedging



Hedging may occur

avoid hedging of condensate pipes

✷Attention✷

Do not hedge the condensate pipes with each other to avoid poor drainage.

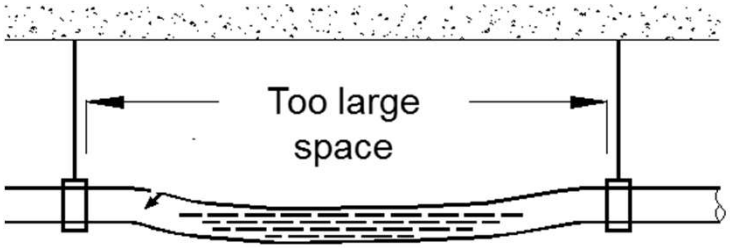
Ventilation hole

- At the top of drainage pipe, *a ventilation hole should be set* to ensure smooth drainage of condensate.
- The air exhaust *opening must face downwards* to avoid foreign objects getting into it.

Distance Requirement

Distance reference shown as follows:

Outer diameter of water pipe (mm)	Φ≤25	25≤Φ < 32	Φ≥32
Spacing between horizontal pipes (mm)	800	1000	1500
Spacing between vertical pipes (mm)	1500		2000



Straight pipes ensures smooth drainage

Water Pipe Connection

- *Water flow test and full water test*: A water flow test and full water test should be applied after the pipe connection is completed, in order to check if the drainage is smooth and if any leakage in the pipe system.
- *Insulation of water pipe:* The joint of thermal insulation materials must be adhered with special glue and then wrapped with plastic tape .

✷ Drainage pipes for the unit must be installed separately from other drainage pipes. ✷

Connecting water pipe

When connected to the IDU, drainage pipes should be *fixed with pipe clamp instead of glue* to ensure easy maintenance.

- For centralized drainage, the drainage pipe of each IDU must be higher than the general pipe;
- Install the pipelines from top to foot;
- There is one condensate outlet on both sides of IDU. When the condensate outlet is confirmed, block the other one with cork to avoid leakage and then wrap it with thermal insulation material.

Frames Fixing

Frame Requirement:

- Frame should be fixed tightly and in good order .
- A pipe sleeve is necessary if the pipeline goes through a wall.

Fixing procedures:

Confirm location of frame → Make ink lines → Install frame auxiliaries

Distance Requirements

- For pipeline crossing the wall and girder, frame, hanger or bracket must be fixed *within 300mm from the hole* on both ends.

Installation Effect

Maximum distance shown as follows:

Outer diameter of copper pipe (mm)	ϕ≤16	19.05≤ϕ < 40	ϕ≥40
distance between horizontal pipes (mm)	1000	1500	2000
distance between vertical pipes (mm)	1500	2000	2500

Pipelines Fixing

Copper Pipe Connection Requirements:

- *Correct Direction*, *Rational Branches*, and *Shortest Length*.
- *Keep Least Use of Braze Welding Joints and Corners* for easier installation and saving pipe.
- *No Affect to the Location and Height* during adjusting and insulating to prevent water leakage.
- *No Compress for Insulation Materials* to ensure its effect.
- *Fix the Pipeline OUTSIDE the Insulation Layer*.

✷ Fix auxiliaries: steel angel frame, bracket/round steel hanger, U-shaped pipe clamp and flat steel.✷

Pipeline Insulation

Material Requirements:

- Under the average temperature of 0 ℃, the *thermal conductivity should be under 0.035w /(m·k).*

- Specification of thermal insulation materials shown as follows:

Pipe Diameter	Insulation Thickness
Φ6.35~12.7mm	≥15mm
>Φ15.9mm	≥20mm

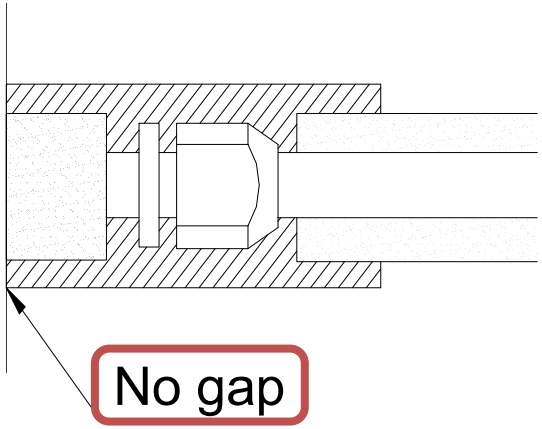
✷ The insulation can not be weared until no leakage in the pipeline system. ✷

✷Wear the insulation sleeve before connecting refrigerant pipes. ✷

Pipeline Insulation

Key Points:

- *The chosen material must be qualifies* according to the design requirement.
- *Specification of insulation sleeve* should be matched with refrigerant pipeline.
- *The joints* of IDU and ODU should be *wrapped with thermal insulation material with no gap* between the surface of IDU and ODU.



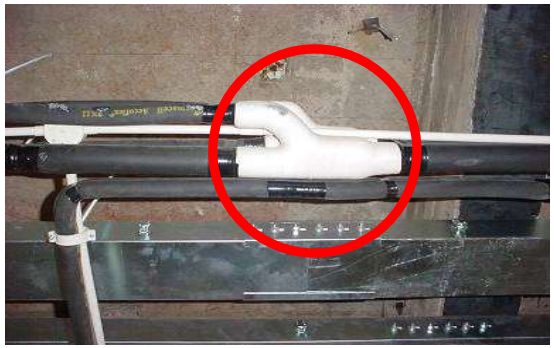
✷ No fracture on insulation layer is allowed during installation.✷

Pipeline Insulation

- The insulation for the IDU joints, ODU joints and welding joints *must be applied after passing airtight test*.

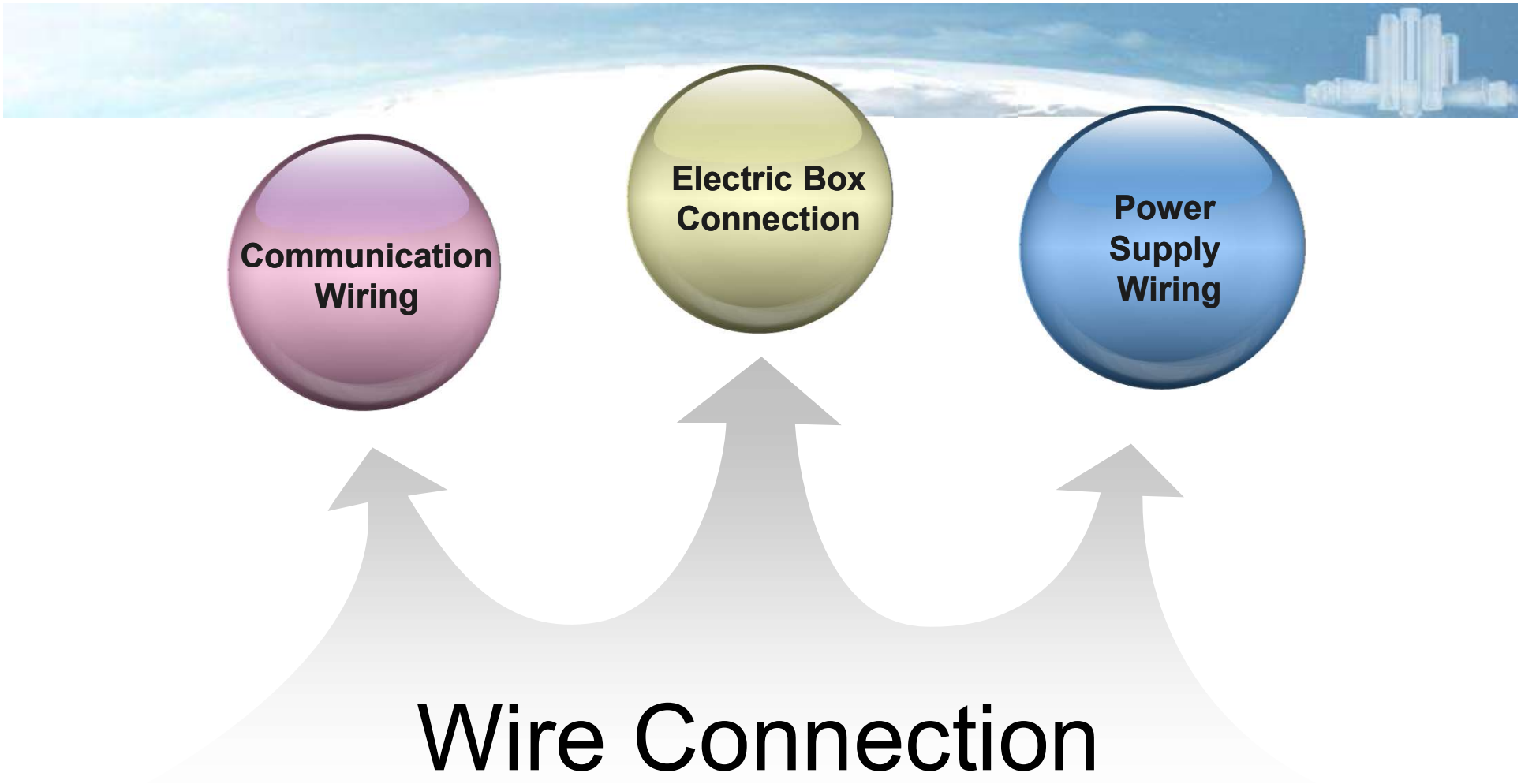
✷ The straight pipes should be covered with insulation material before joint-welding. ✷

- Only *proper material* can be applied for the insulation of branches and *no gap is allowed*.

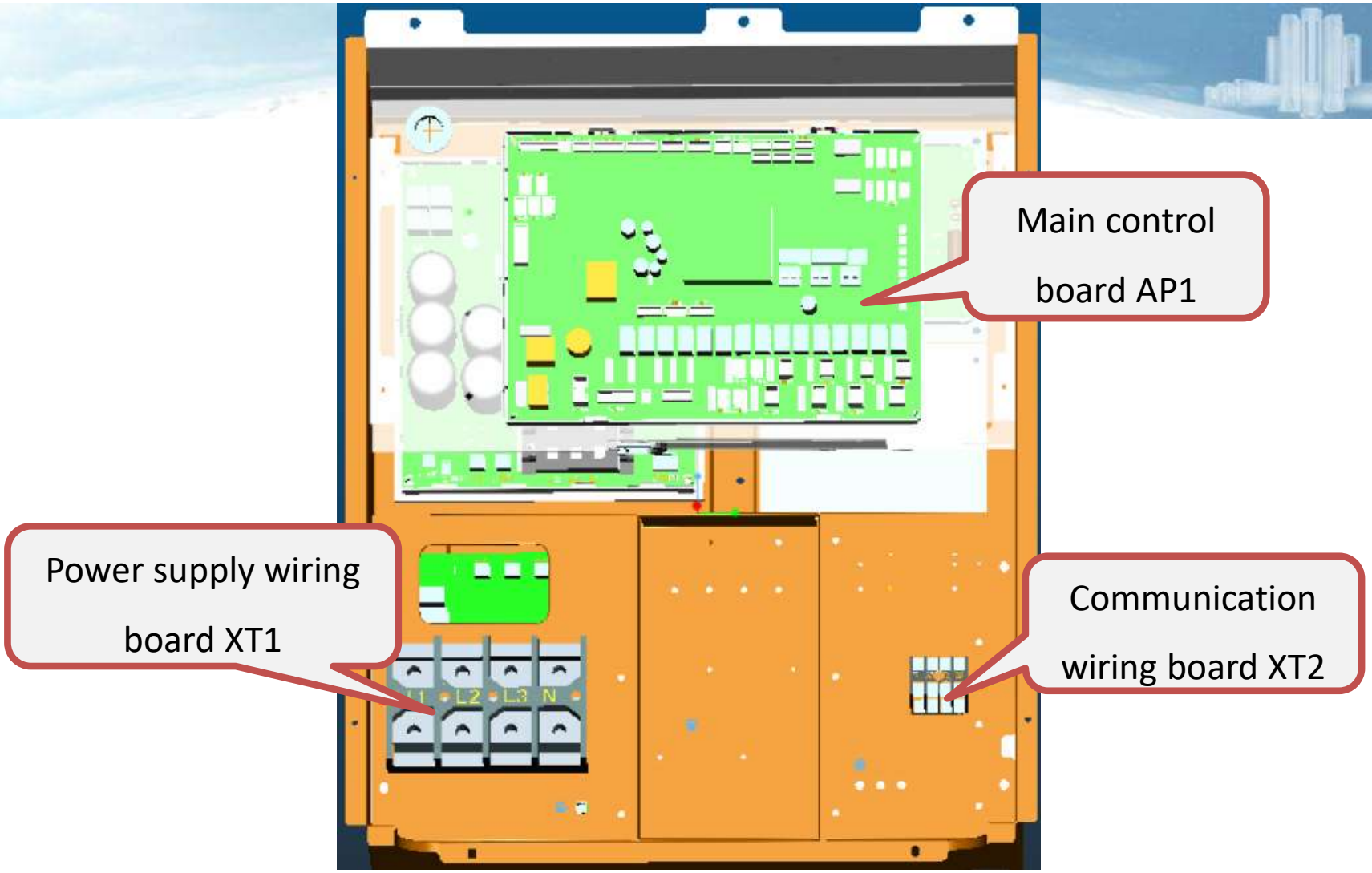


5

- Wire Connection

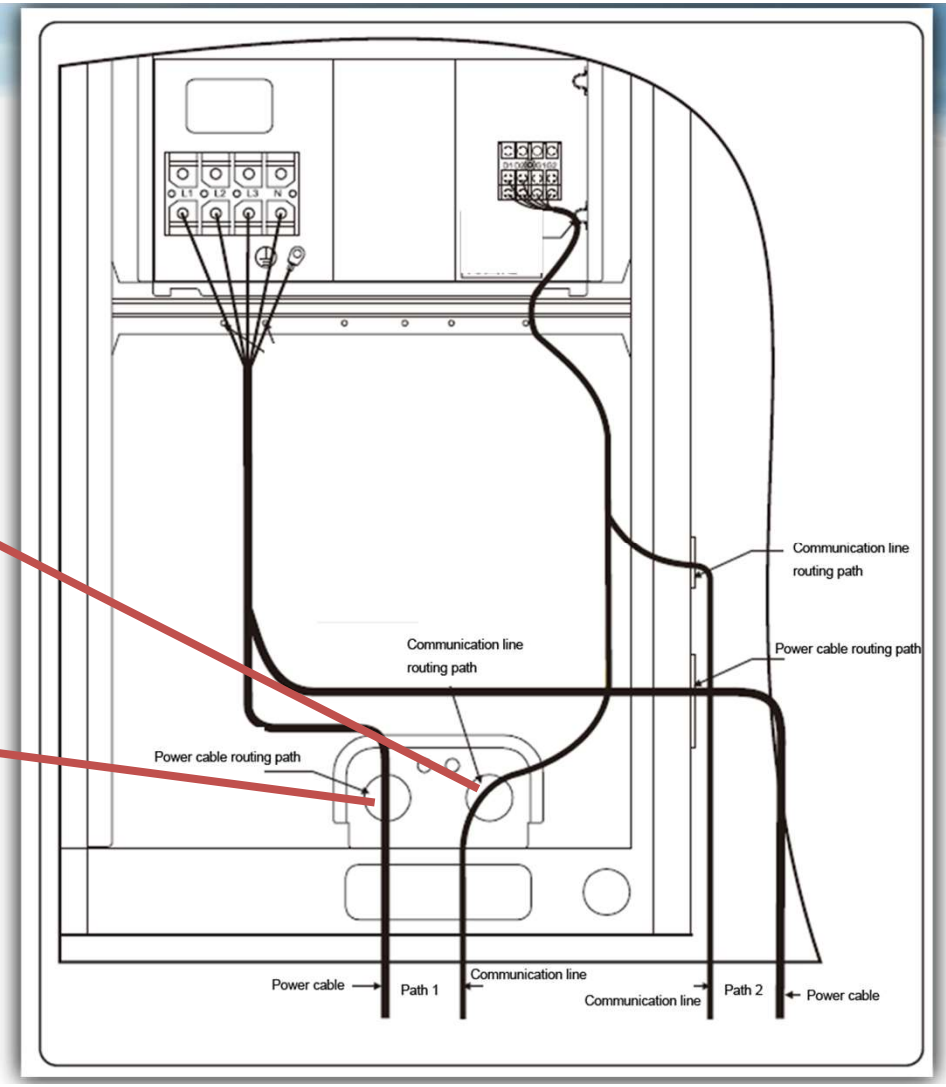

Communication Wiring
Electric Box Connection
Power Supply Wiring
Wire Connection

Electric Box Connection


Main control board AP1
Power supply wiring board XT1
Communication wiring board XT2
L2
L3
N

cross Communication wire through this hole

Cross power line through this hole

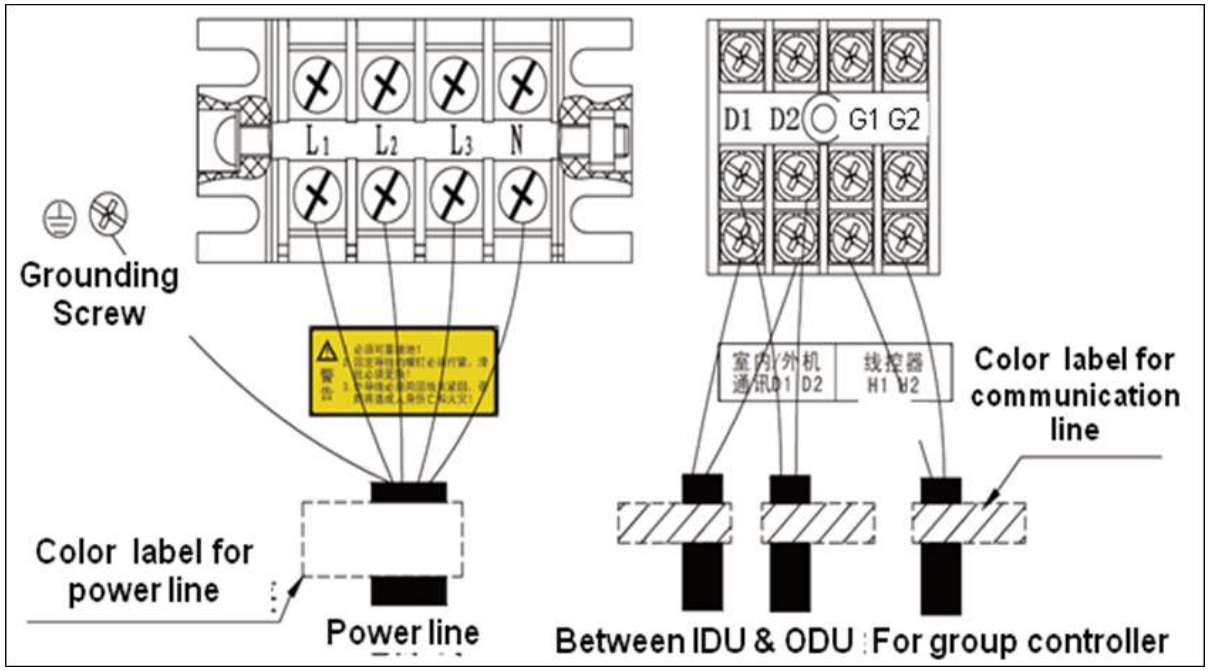


Communication Wire Connection

Wire Identification

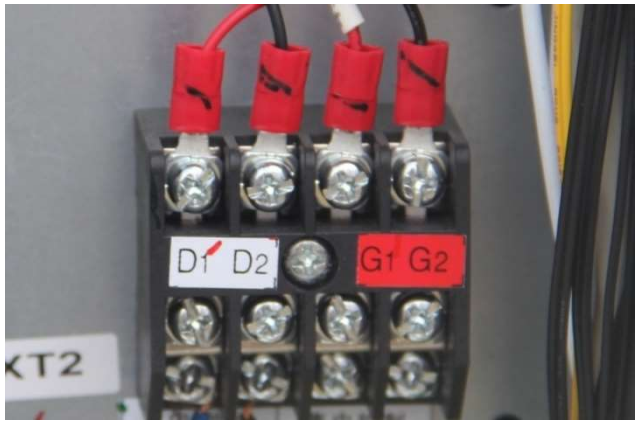
Do not mistake the power line for communication wire, or the main board will be ruined.

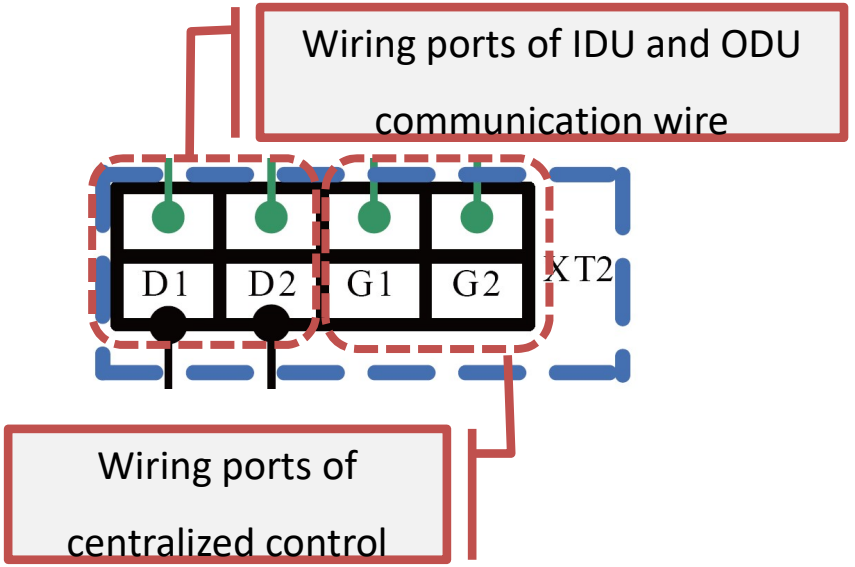
We can use sheaths in different colours .



Wire Terminal

New generation of CAN communication network is adopted in the control system to achieve auto addressing and nonpolarity communication.



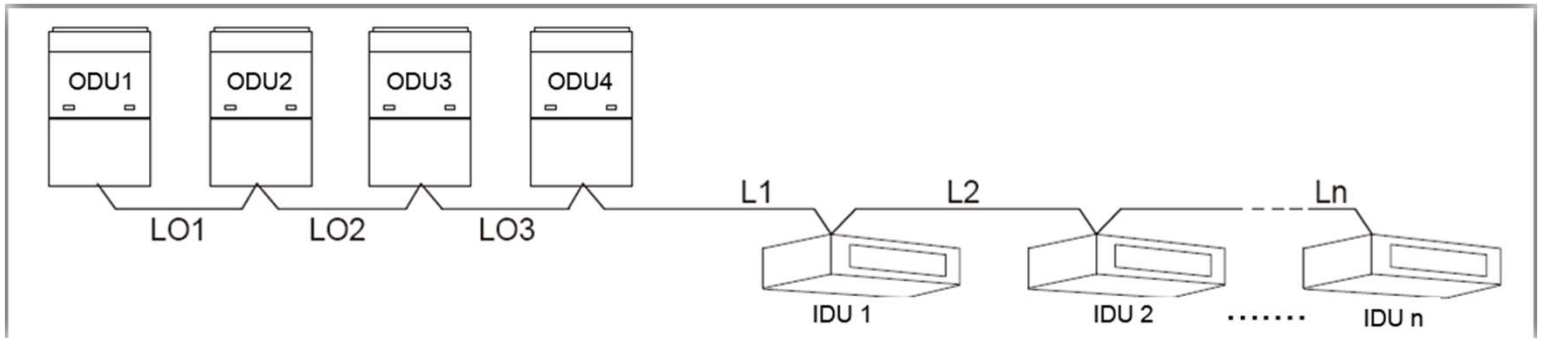


✷ If installed in an electromagnetic interfered place, the communication line between IDU and WRC must be shielded line. and the communication line between IDU and ODU must be twisted pair shielded line.✷

Wire Requirements

Requirements of communication wire between ODU and IDU

Wire Type	Total Length	Wire Diameter	Standard	Remark
RVV	L≤1000m	≥2×0.75 (mm^2)	GB/T 5023.3-2008	If the wire diameter is 2×1 mm^2, the communication length can be increased to 1500m in maximum.

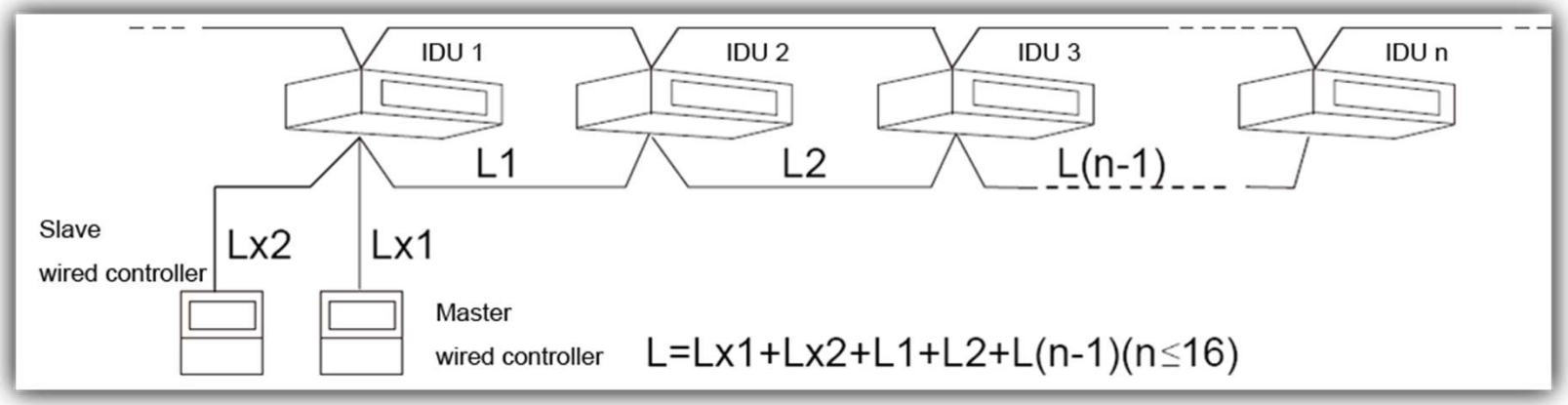


✷L=L01+L02+L03+L1+L2+……+Ln(n≤80) ✷

Wire Requirements

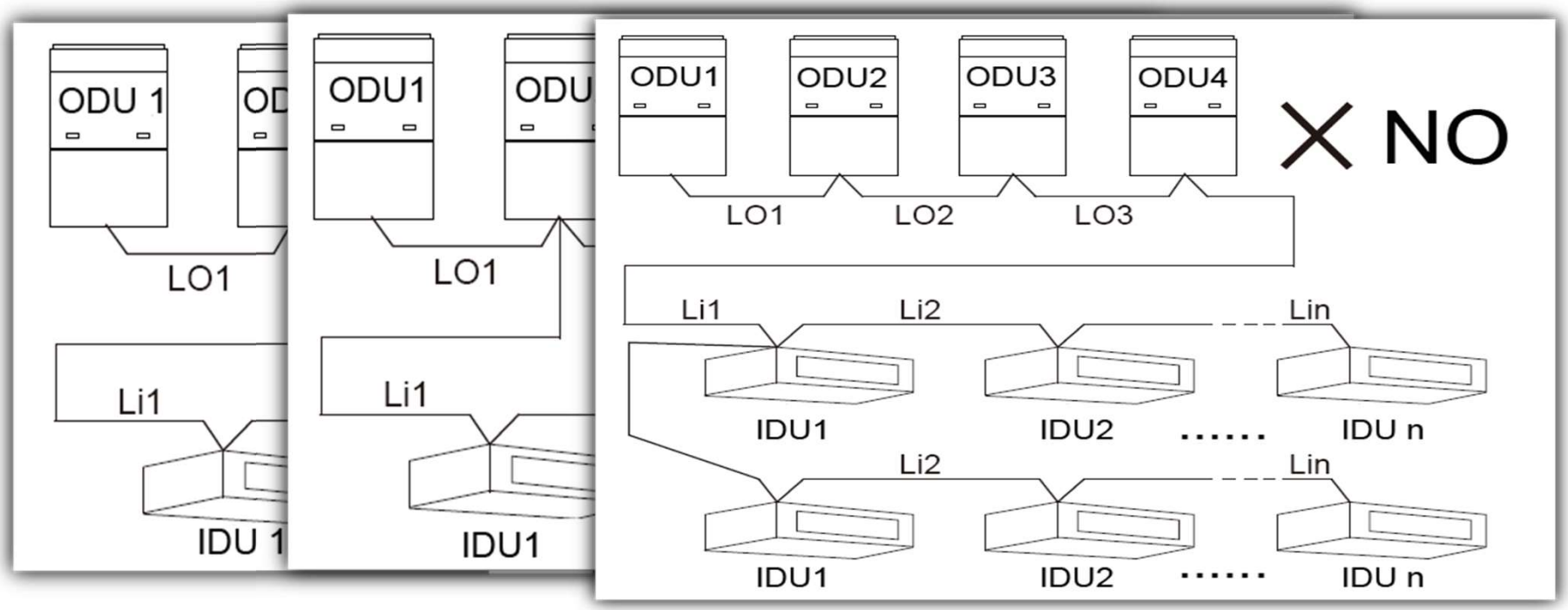
Requirements of communication wire between IDU and WRC

Wire Type	Total Length	Wire Diameter	Standard	Remark
RVV	L≤250m	≥2×0.75 (mm²)	GB/T 5023.3-2008	Total length of communication wire cannot exceed 250m

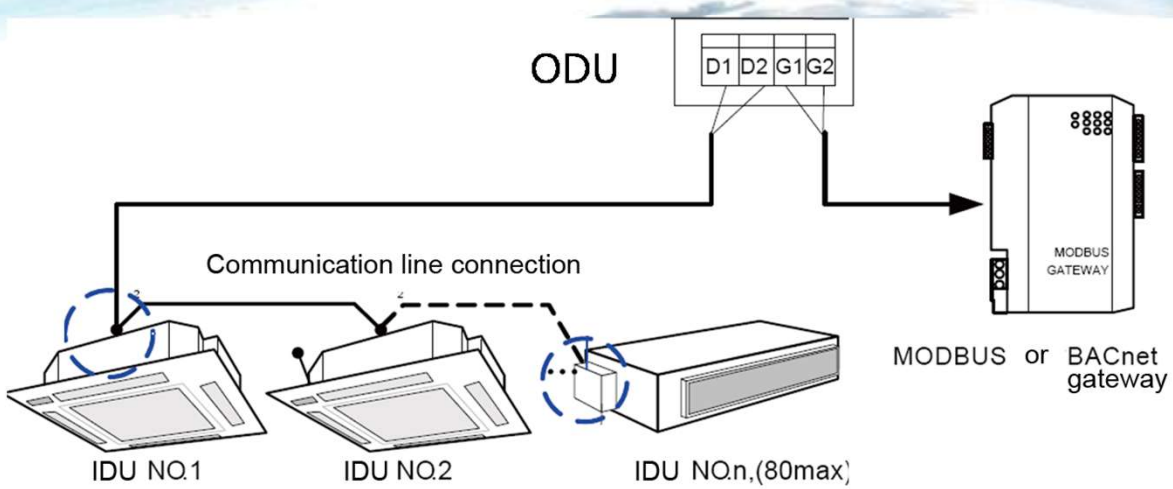


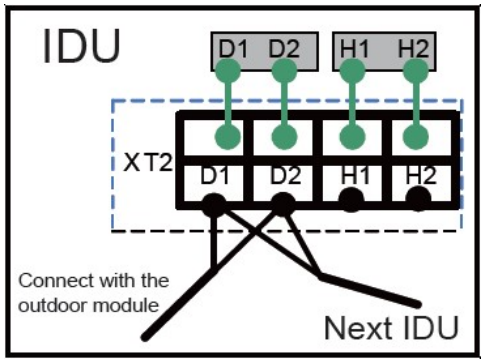
Wiring Method

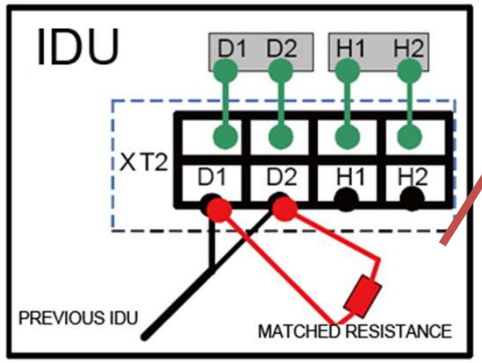
The communication bus of indoor and ODUs must be connected in series instead of in star mode .



Wiring Method





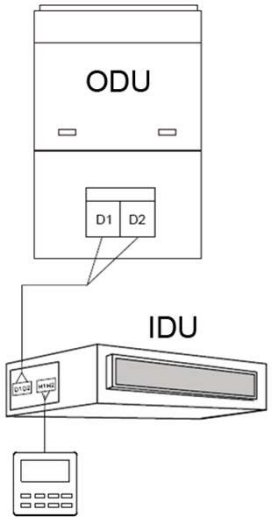


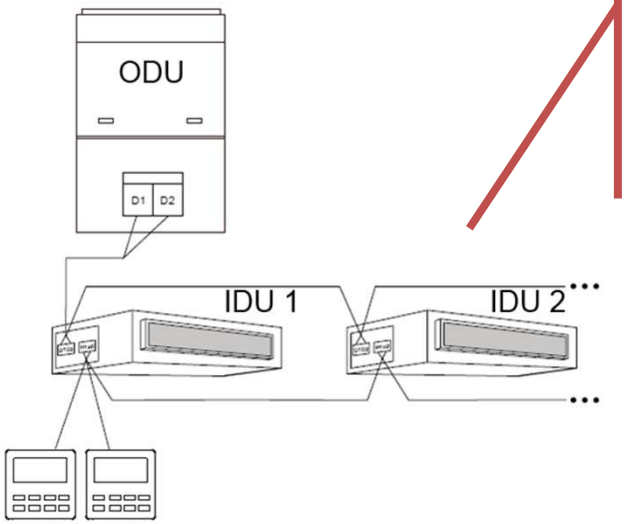
Build-out resistance is equipped with the ODU; H1 and H2 terminals connects with WRC

Wire Connection Notice

- For modular outdoor units, if there are several outdoor unit modules, *the master ODU must be the first ODU module in the communication wire and cannot connect with indoor units* (master ODU is set on SA8 of outdoor mainboard).
- For modular outdoor units, if there are several outdoor unit modules, *the indoor units must be connected with the last slave ODU module* (slave ODU is set on SA8 of outdoor mainboard);
- The communication wire shall be separated from power cord to avoid interference;
- Select suitable length for communication wire and avoid reconnection;
- The indoor units must be in series connection; *the last IDU must be connected with communication build-out resistance*.

Wiring Method



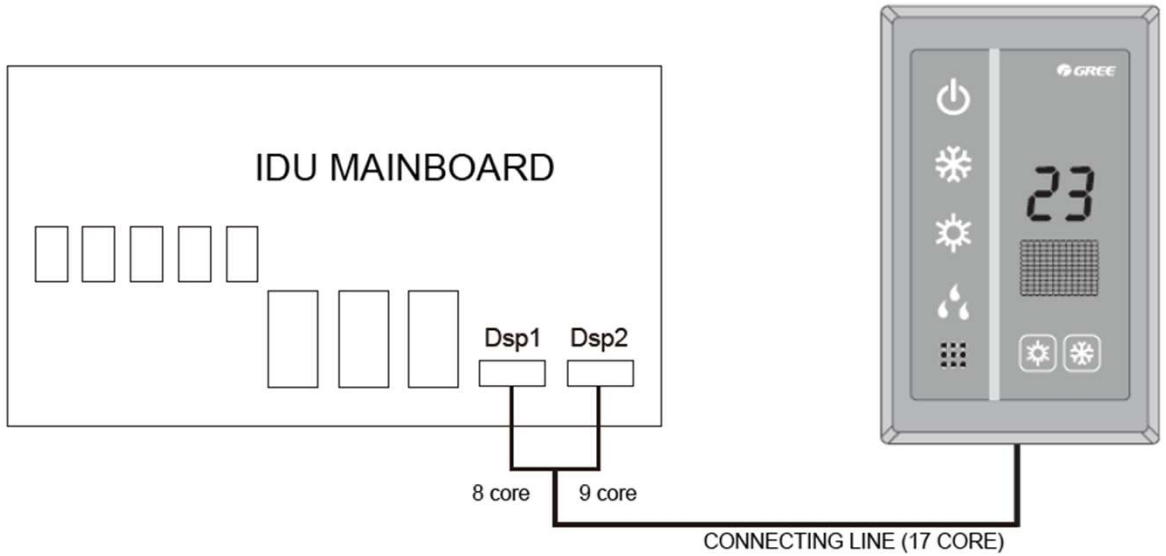


Connection of IDU and wired controller

- 4 connection ways of IDU and WRC: that is *1 for 1, 1 for N, 2 for 1, 2 for N*.
- 1 wired controller can control *16 sets of IDU in maximum*.
- *Master wired controller* and *Slave wired controller* shall be set respectively, if two wired controllers in one system.

Wiring Method

If the air duct type indoor unit shall be connected with remote receiver light board for operation, connect with Dsp1 and Dsp2 on indoor mainboard as below:



- The wired controller and remote receiver light board can be operated at the same time
- If remote receiver light board is used, remote controller shall be used at the same time

Wiring Method

Communication connection way of centralized control units

G1 and G2 on the master unit wiring board XT2 are the wiring ports of centralized controller. Please refer to the user's manual of outdoor unit for the address of centralized controller.

- The two ends of bus line of centralized control network should be connected with build-out resistance.
- In one centralized control network, 16 VRF systems can be connected in maximum.
- In one centralized control network, 255 indoor units can be connected in maximum.
- If there are several outdoor units in the same VRF system (modular unit), only need to set SA2 dial switch on master unit (refer to function setting).

Power Supply Wiring

Power Supply Wiring

Requirement of connecting power cord

- Each unit shall be equipped with circuit breaker for short-circuit and overload protection.
- The indoor units and outdoor units shall be equipped with a main circuit breaker for putting through or cutting off the main power supply of indoor units and outdoor units.

Power Supply Wiring

Requirement of connecting power cord

- Please take reliable earthing measure.
- The yellow-green wire in the unit is earthing wire. Do not use it in other way or cut it off or fix it with tapping screw for avoiding electric shock.
- The power cord shall be separated from communication wire with a distance of over 20cm.
- Knock off the hole for crossing outdoor power cord; put the rubber loop on the cable-cross hole, and then let the cable go through the hole. Connect “L1, L2, L3 and N” of power cord respectively to the “L1, L2, L3 and N” that marked on power wiring board and the earthing screw beside the power wiring board.

GREE

THANK YOU