Owner's Manual

Original Instructions

Commercial Air Conditioners

Water-cooled Heat Recovery DC Inverter VRF

Models:

Single unit:

GMV-WQ72WM/A-F(U)

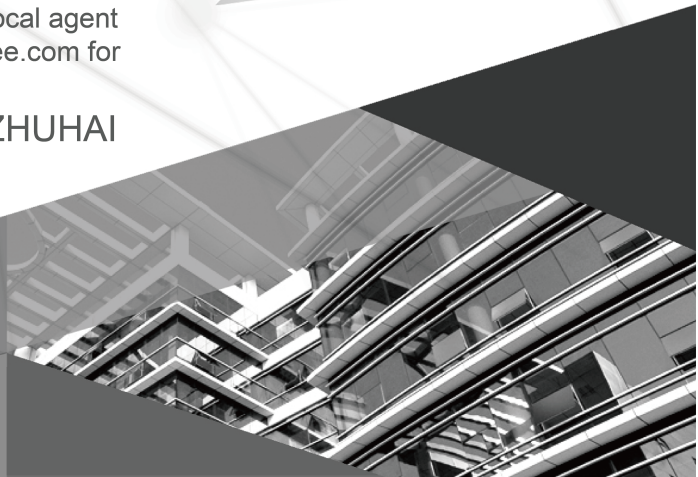
GMV-WQ96WM/A-F(U)

GMV-WQ120WM/A-F(U)

Thank you for choosing commercial air conditioners. Please read this Owner's Manual carefully before operation and retain it for future reference.

If you have lost the Owner's Manual, please contact the local agent or visit www.gree.com or send an email to global@cn.gree.com for the electronic version.

GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI



Preface

⚠ WARNING	
(1)	Instructions for installation and use of this product are provided by the manufacturer.
(2)	Installation should be performed in accordance with the requirements of NEC and CEC by authorized personnel only.
(3)	For safety operation, please strictly follow the instructions in this manual.
(4)	During operation, the gross rated capacity of working IDU should be within the gross rated capacity of ODU. Otherwise, IDU's cooling/heating performance will be reduced.
(5)	This manual should be in the hands of direct operators or maintenance men.
(6)	In case of malfunction and operation failure, please examine the following items and contact our authorized service centers as soon as possible. 1) Nameplate (model, cooling capacity, product code, ex-factory date). 2) Malfunction status (detail description of conditions before and after malfunction occurs).
(7)	All units have been strictly tested and proved to be qualified before ex-factory. To avoid unit damage or even operation failure which may be caused by improper disassembly, please do not disassemble units by yourself. If disassembly is needed, please contact our authorized serve centers for help.
(8)	All graphics and information in this manual are only for reference. Manufacturer reserves the right for changes in terms of sales or production at any time and without prior notice.
(9)	If the supply cord is damaged, it should be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

User Notice

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

DISPOSAL: Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment is necessary.

Exception Clauses	
Manufacturer will bear no responsibilities when personal injury or property loss is caused by the following reasons:	
(1)	Damage the product due to improper use or misuse of the product.
(2)	Alter, change, maintain or use the product with other equipment without abiding by the instruction manual of manufacturer.
(3)	After verification, the defect of product is directly caused by corrosive gas.
(4)	After verification, defects are due to improper operation during transportation of product.
(5)	Operate, repair, maintain the unit without abiding by instruction manual or related regulations.
(6)	After verification, the problem or dispute is caused by the quality specification or performance of parts and components that produced by other manufacturers.
(7)	The damage is caused by natural calamities, bad using environment or force majeure.

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1 Safety Notices (Please be sure to abide them)

⚠ DANGER	If not abide them strictly, it may cause severe damage to the unit or the people.
⚠WARNING	If not abide them strictly, it may cause slight or medium damage to the unit or the people.
⚠CAUTION	This sign indicates that the items must be prohibited. Improper operation may cause severe damage or death to people.
NOTICE	This sign indicates that the items must be observed. Improper operation may cause damage to people or property.

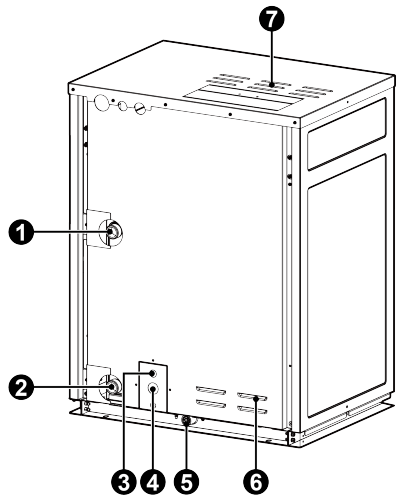
⚠WARNING	
(1)	This product can't be installed at corrosive, inflammable or explosive environment or the place with special requirements, such as kitchen. Otherwise, it will affect the normal operation or shorten the service life of the unit, or even cause fire hazard or serious injury. As for the above special places, please adopt special air conditioner with anti-corrosive or anti-explosion function.
(2)	Follow this manual to complete the installation work. Please read this manual carefully before turning on or repairing the unit.
(3)	Installation should be conducted by the dealer or qualified personnel. Please do not attempt to install the air conditioner by yourself. Improper installation may lead to water leakage, electric shock or fire hazard, etc.
(4)	Before installation, please check whether the power supply is complied with that specified on the nameplate and check the safety of the power supply.
(5)	The air conditioner must be grounded reliably for avoiding electric shock. Please do not connect the earthing wire to gas pipe, water pipe, lightning rod or telephone line.
(6)	Be sure to use special accessories and parts for installation to prevent water leakage, electric shock and fire hazard, etc.
(7)	If refrigerant leakage happens, please ventilate the room immediately.
(8)	Diameter of power cord should be large enough. The damaged power cord and connection wire must be replaced with special cables.
(9)	When the power cord is connected, please fix the electric box cover properly to avoid safety accidents.
(10)	Never fail to comply with the nitrogen-charging welding process. Do charge nitrogen when welding the pipes.
(11)	Never short circuit or cancel the pressure switch to prevent unit damage.
(12)	As for the unit controlled by the wired controller, connect the wired controller well firstly and then energize the unit; otherwise, the unit can't operate normally.
(13)	When installation is finished, please check whether the drainage pipes, pipelines and electric wires are connected correctly to avoid water leakage, refrigerant leakage, electric shock or fire, etc.
(14)	Do not insert fingers or objects into air outlet or air return grille.
(15)	Open the door and window frequently to keep good ventilation for avoiding oxygen deficit when gas heater or oil heater is used in the room.
(16)	Never plug in or unplug the power plug directly to turn on or turn off the air conditioner.
(17)	Once the air conditioner is turned on, it can be turned off only after it has operated for 5min at least; otherwise, it will affect the oil return of compressor.
(18)	Do not allow children to operate this air conditioner.
(19)	Do not operate this air conditioner with wet hands.
(20)	The air conditioner can be cleaned only when it has been turned off and the power has been cut off; otherwise, it may cause electric shock or injury.
(21)	Never spray or flush water towards the air conditioner; otherwise, malfunction or electric shock may happen.
(22)	Do not expose the air conditioner to the moist or corrosive environment.
(23)	Put through the power 8 hours in advance before operation. Do not cut off the power when the air conditioner stops operation for only about one night (protect the compressor).

⚠WARNING
(24) Volatile liquid, such as diluent or gasoline, will damage the appearance of air conditioner. Only soft dry cloth and wet cloth dipped with neutral detergent can be used to clean the outer case of air conditioner.
(25) Under cooling mode, please don't set the room temperature too low; keep the temperature difference between indoor and outdoor within 5°C (41°F).
(26) If there are any abnormal circumstances (such as burning smell, etc.), please turn off the unit and cut off the main power supply immediately, and then contact Gree appointed service center. If those abnormal circumstances still exit, the unit may be damaged and it may lead to electric shock or fire hazard.
(27) Do not repair the unit by yourself. Wrong maintenance may cause electric shock or fire hazard. Please contact Gree appointed service center for help.

2 Product Introductions

Gree Water-cooled Multi VRF System adopts inverter compressor technology. According to change the displacement of compressor, stepless capacity regulation within range of 10%-100% can be realized. Various product line up is provided with capacity range from 72kBtu/h to 120kBtu/h, which can be widely used in working area and especially applicable to the place with variable load change. Gree air conditioner is absolutely your best choice.

2.1 Names of Main Parts



❶ Water outlet
❷ Water inlet
❸ Communication cable hole
❹ Power cord inlet hole
❺ Drainage outlet
❻ Air inlet
❼ Air outlet

Fig.2.1

2.2 Combinations of Indoor and Outdoor Units

ODU Model	Max quantity of connectable IDU
GMV-WQ72WM/A-F(U)	13
GMV-WQ96WM/A-F(U)	16
GMV-WQ120WM/A-F(U)	19

The total capacity of indoor units should be within 50%~135% of that of outdoor units.

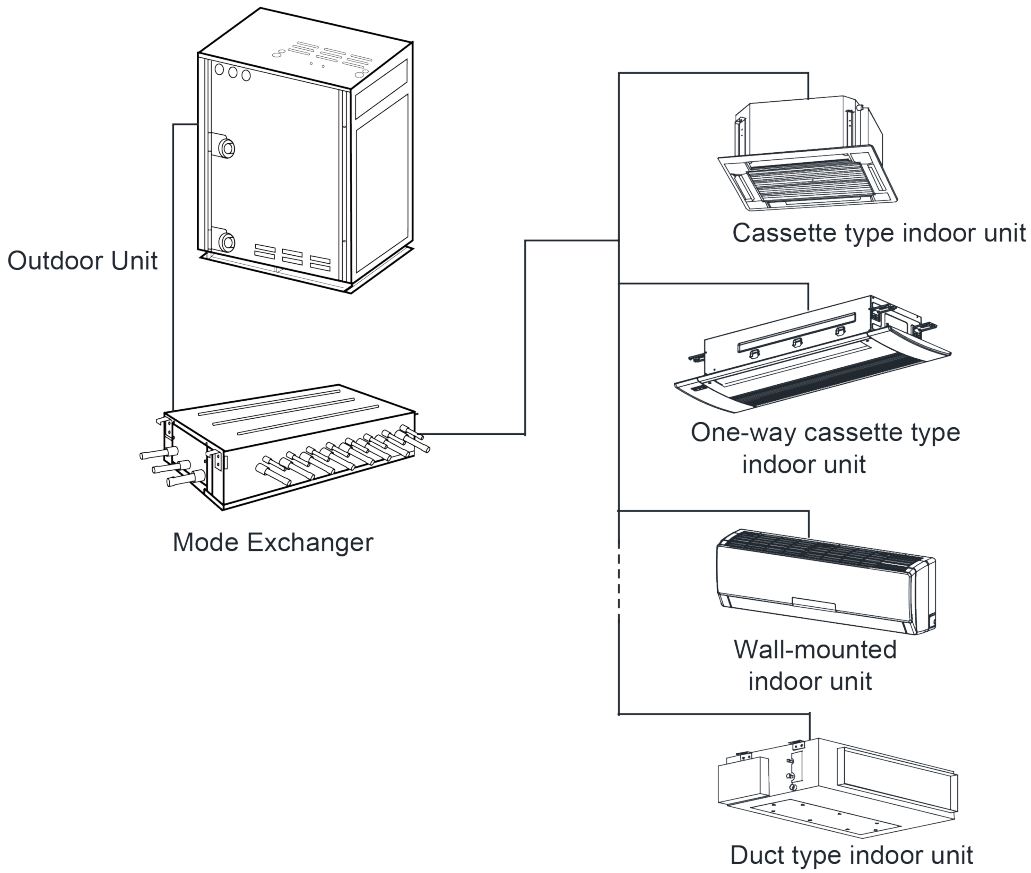


Fig.2.2

Fig.2.2 is the combination graph of Water-cooled Multi VRF System ODU and Multi VRF System IDU. IDU can be cassette type, one-way cassette type, wall-mounted type, duct type, etc. When any one IDU receives operation signal, ODU will start to work according to the capacity; when all IDUs stop, ODU will also stop.

2.3 The Range of Production Working Temperature

—	Water Temperature	Water Max. Pressure
Cooling operation	10°C(50°F)~50°C(122°F)	1.96MPa
Heating operation	10°C(50°F)~50°C(122°F)	1.96MPa
Heat recovery operation	10°C(50°F)~45°C(113°F)	1.96MPa

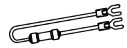
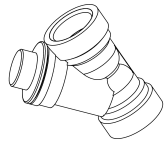
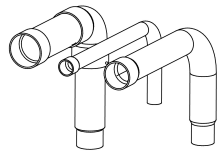
NOTICE Beyond the working Temperature Range may damage this product and will invalidate the warranty.

3 Preparations before Installation

NOTICE The product pictures are provided for reference only and the detail should refer to actual product. The unit is mm unless otherwise specified.

3.1 Standard Parts

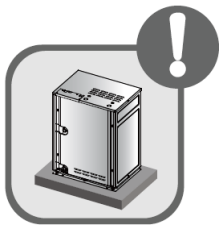
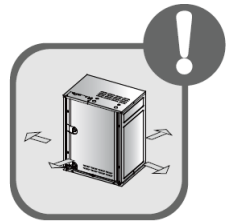
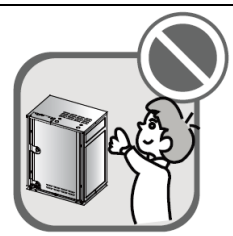
Please apply the following provided standard parts according to requirements.

Parts for Outdoor Unit				
Number	Name	Picture	Quantity	Remarks
1	Owner's Manual		1	—
2	Wiring (match with resistance)		1	Connected to the last IDU of communication connection
3	Water filter		1	Connected to water pipe
4	Pipe connectors		3	Connected to stop valves of ODU

3.2 Installation Site

Forbidden item! Improper operation might lead to personal injury or even death.

Item needs to be followed. Improper operation might lead to personal injury or property damage.

	Select a position that can bear the unit's weight for installation and fixing, prevent the unit from shaking or falling off. For avoid accident from water, the installation site should be inside the house.		Ensure a certain space for ODU and maintenance so that the unit can operate reliably.
	Try to keep the unit away from combustible, inflammable and corrosive gas or exhaust gas.		Never allow children to approach to the unit and prevent children from touching the unit.

When the outdoor unit is surrounded by walls all round, please refer to following graphs for space requirement.

3.2.1 Space requirement for single-module unit

For easy maintenance, at least one of the left side and right side of ODU should be over 500 mm away from the barrier so that maintenance person can access the rear part of the unit.

Unit:mm(in.)

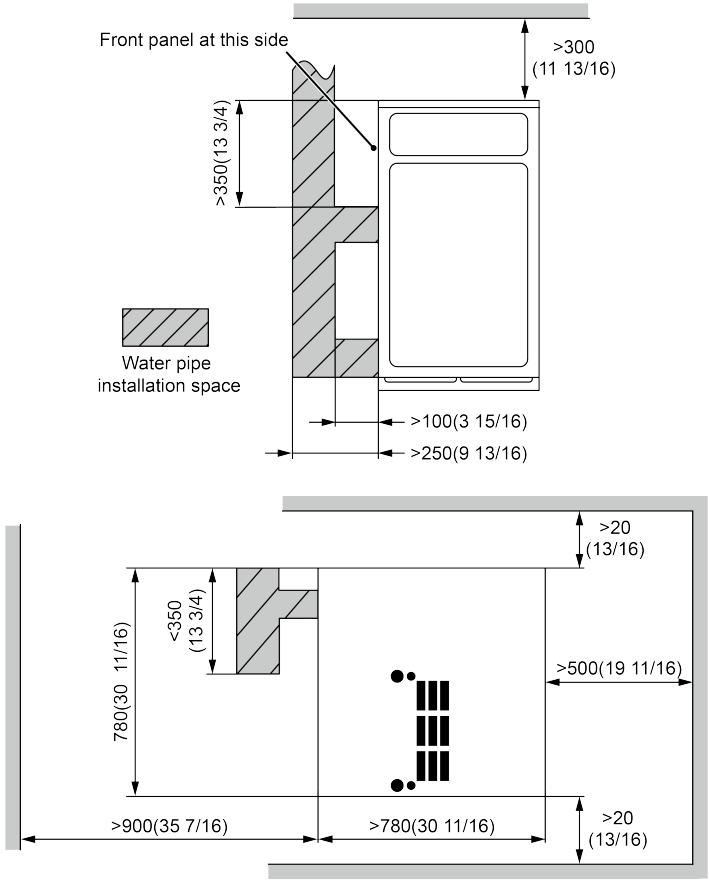


Fig.3.1

3.3 Piping Work Requirements

Requirements.

R410A Refrigerant System		
Outer diameter mm(in.)	Wall thickness mm(in.)	Type
Φ6.35(1/4)	≥0.8(1/32)	O
Φ9.52(3/8)	≥0.8(1/32)	O
Φ12.70(1/2)	≥0.8(1/32)	O
Φ15.9(5/8)	≥1.0(3/76)	O
Φ19.05(3/4)	≥1.0(3/76)	1/2H
Φ22.2(7/8)	≥1.2(1/21)	1/2H
Φ28.60(1-1/8)	≥1.2(1/21)	1/2H
Φ34.90(1-3/8)	≥1.3(2/39)	1/2H
Φ41.30(1-5/8)	≥1.5(1/17)	1/2H
Φ44.5(1-3/4)	≥1.5(1/17)	1/2H

4 Installation Instructions

4.1 External Dimensions and Mounting Holes Dimension of ODU

Outline and External Dimensions of GMV-WQ72WM/A-F(U), GMV-WQ96WM/A-F(U), and GMV-WQ120WM/A-F(U) unit.

Unit:mm(in.)

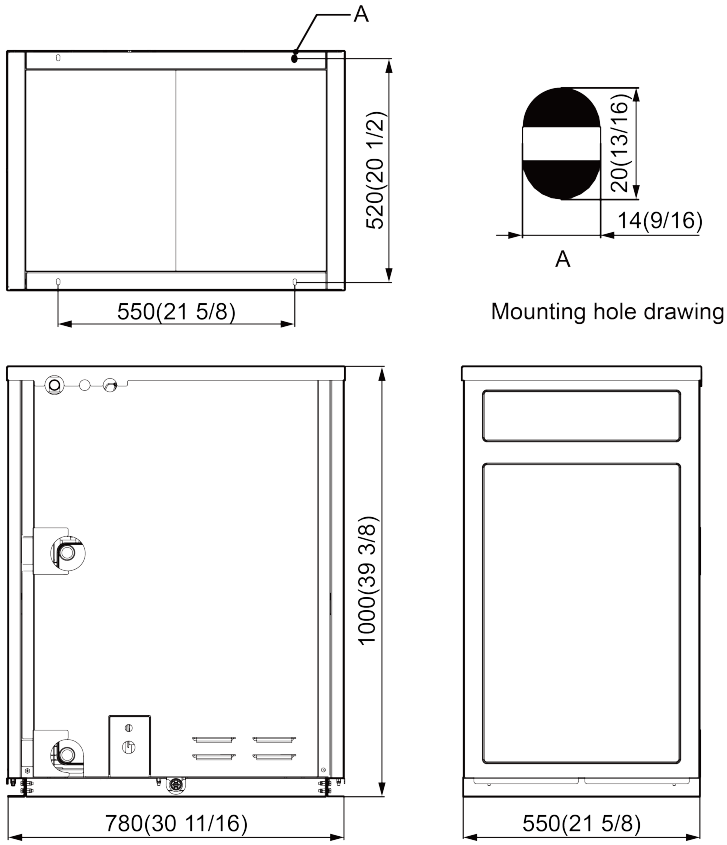


Fig.4.1.1

4.2 Connection Pipe

4.2.1 Schematic Diagram of Piping Connection

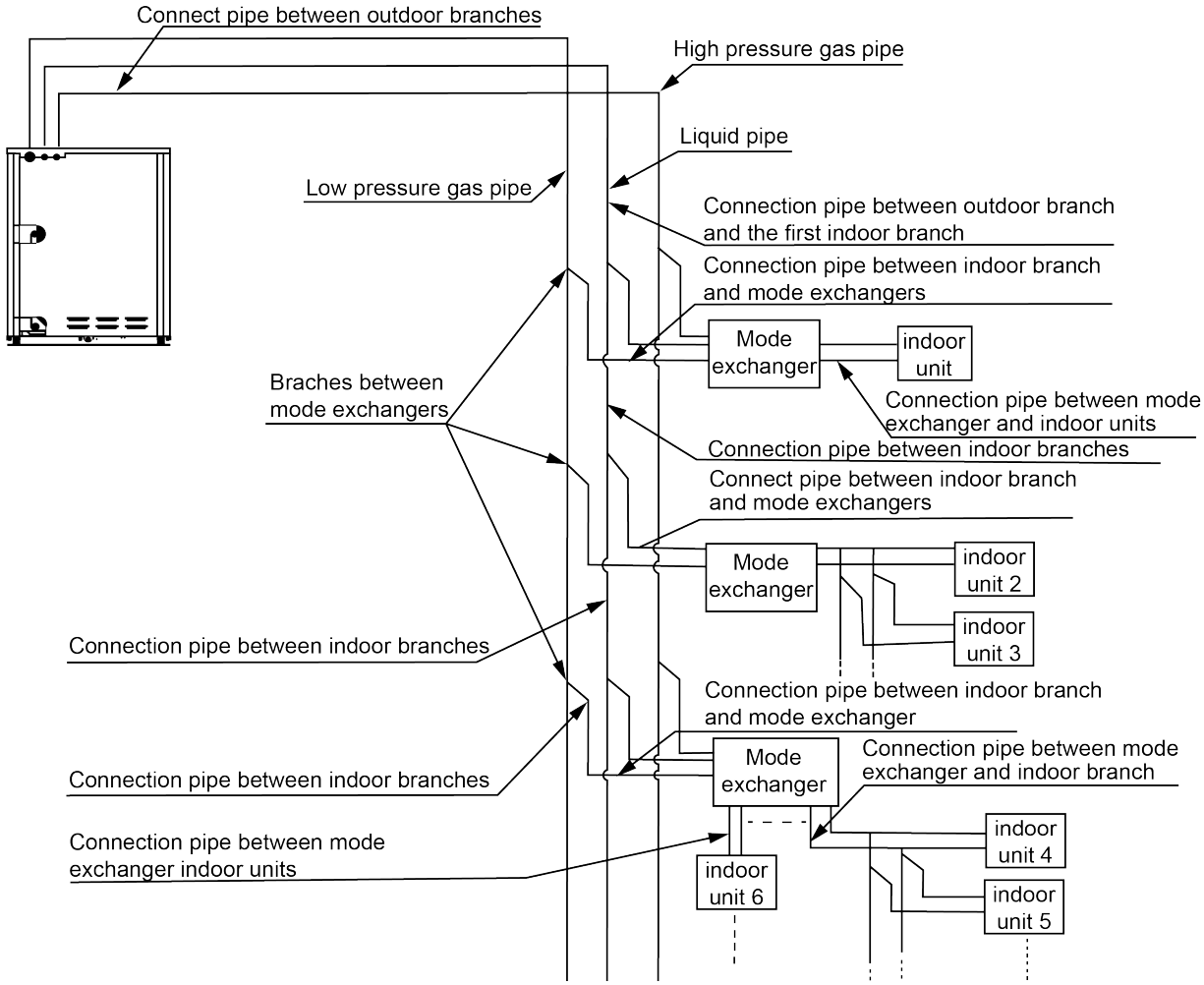


Fig.4.2.1

4.2.2 Schematic Diagram of Piping Sequence

GMV-WQ72WM/A-F(U), GMV-WQ96WM/A-F(U) and GMV-WQ120WM/A-F(U) unit.

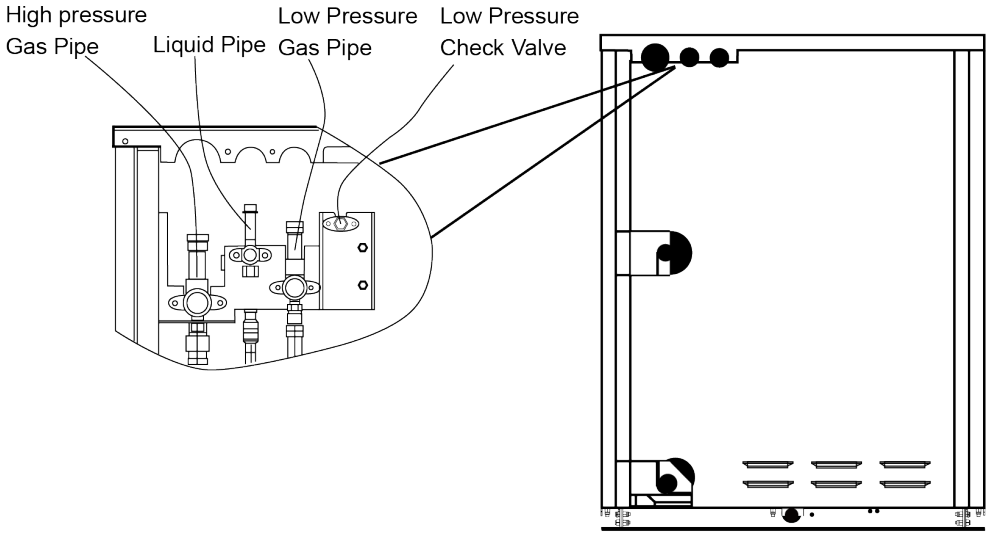


Fig.4.2.2

4.2.3 Allowable pipe length and dropping height among indoor and outdoor units

Y type branch joint is adopted to connect indoor and outdoor units. Connecting method is shown as the figure below.

Remark: Equivalent length of one Y-type manifold is about 0.5m (1-3/4ft.).

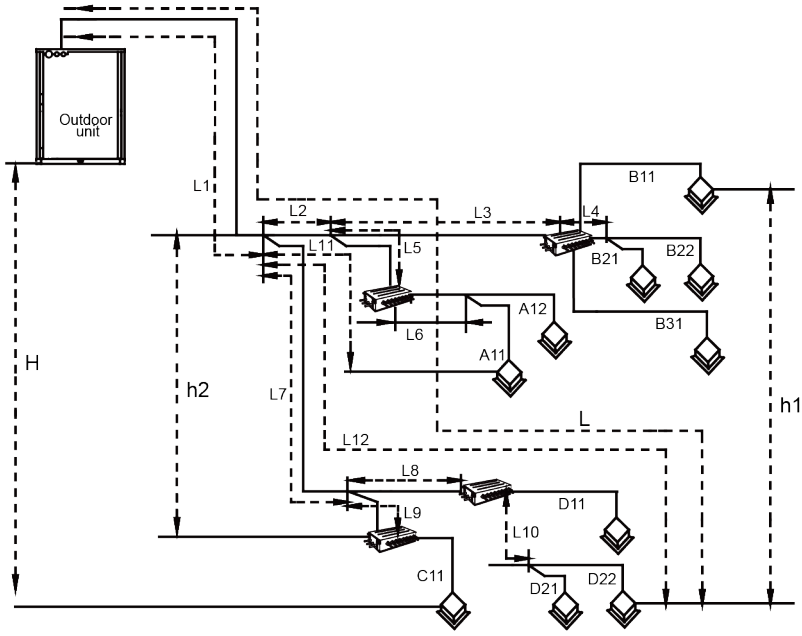


Fig.4.2.3

H：Height difference between indoor unit and outdoor unit.

L12: Length from the first branch to the farthest IDU.

L11: Length from the first branch to the nearest IDU.

Equivalent length of branch of IDU is 0.5m (1-3/4ft.).

Equivalent length of mode exchanger depends on the using situation, for example, when using one branch, the length is 1m(39-3/8in.), when using N branches, the length is N meters.

R410A Refrigerant System		Allowable Value m(ft.)	Fitting Pipe
Total length (actual length) of fitting pipe		≤300(984-1/4)	L1+L2+L3+L4+…+L10+A11+A12+…+D21+D22
Length of farthest fitting pipe m(ft.)	Actual length	≤165(541-5/16)	L
	Equivalent length	≤190(623-3/8)	—
Difference between the pipe length from the first branch of IDU to the farthest IDU and the pipe length from the first branch of IDU to the nearest IDU		≤40(131-1/4)	L12-L11
Equivalent length from the first branch to the furthest piping (1)		≤40(131-1/4)	L7+L8+L10+D22
Height difference between outdoor unit and indoor unit	Outdoor unit at upper(2)	≤50(164-1/16)	—
	Outdoor unit at lower(2)	≤50(164-1/16)	—
Height difference between indoor units		≤30(98-7/16)	h1
Maximum length of Main pipe(3)		< 90(295-1/4)	L1
From IDU to its nearest branch (4)		≤40(131-1/4)	A11,A12,B21,B22,D21,D22

NOTICE

① Generally, the pipe length from the first branch of IDU to the farthest IDU is 40m(131-1/4ft.). Under the following conditions, the length can reach 90m (295-1/4ft.).

Actual length of pipe in total:

1) L1+L2 ×2+L3 ×2+L4 ×2+…+L10 ×2+A11+A12+…+D21+D22≤300m (984-1/4ft.).
2) Length between each IDU and its nearest branch A11, A12, B21, B22, D21, D22≤40m(131-1/4ft.).
3) Difference between the pipe length from the first branch of IDU to the farthest IDU and the pipe length from the first branch of IDU to the nearest IDU: L12-L11≤40m(131-1/4ft.).

② When the maximum length of the main pipe from ODU to the first branch of IDU is≥80m(262-7/16ft.), then adjust the pipe size of the gas pipe and liquid pipe of main pipe according to the following table.

Outdoor Model	Size of connection between outdoor unit and the first indoor branch		
	Low pressure gas pipe mm(in.)	Liquid pipe mm(in.)	High pressure gas pipe mm(in.)
GMV-WQ72WM/A-F(U)	No change	No change	No change
GMV-WQ96WM/A-F(U)	No change	Φ12.7(1/2)	Φ22.2(7/8)
GMV-WQ120WM/A-F(U)	No change	Φ15.9(5/8)	Φ28.6(1-1/8)

③ If the length between an IDU and its nearest branch is above 10m (32-8/10ft.), then increase the size of the liquid pipe of IDU (only for the pipe size which is≤6.35mm (1/4in.).

4.2.5 Size of piping (main pipe) from ODU to the first indoor branch

4.2.5.1 Connection sketch map of single-module system

If the system is a single module system, the size of piping from ODU to the first indoor branch should be selected according to the connecting pipe outer diameter of ODU.

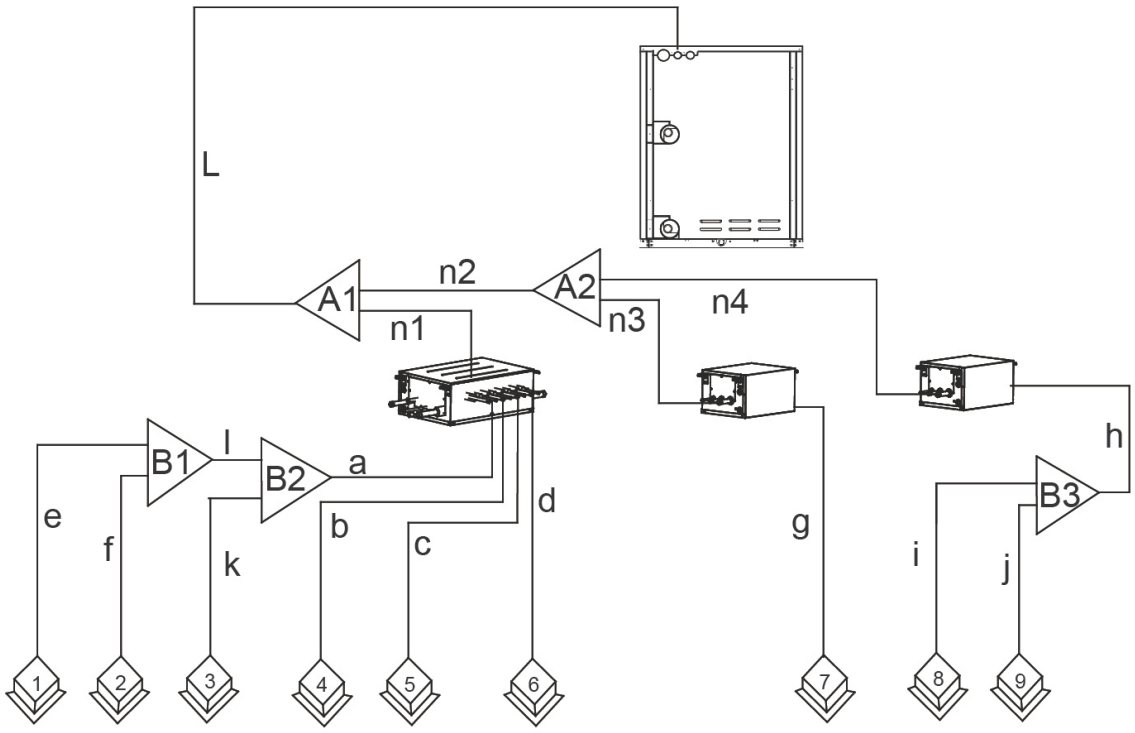


Fig.4.2.4

4.2.5.2 For single ODU system, select appropriate pipe between ODU and the first indoor branch (“L”) according to the pipe size specification of ODU. Pipe size of basic outdoor module is shown as below:

Between ODU and the first indoor branch.

Basic module	Pipe between ODU and the first indoor branch		
	Low pressure gas pipe mm(in.)	Liquid pipe mm(in.)	High pressure gas pipe mm(in.)
GMV-WQ72WM/A-F(U)	Φ19.05(3/4)	Φ9.52(3/8)	Φ15.9(5/8)
GMV-WQ96WM/A-F(U)	Φ22.2(7/8)	Φ9.52(3/8)	Φ19.05(3/4)
GMV-WQ120WM/A-F(U)	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ22.2(7/8)

4.2.5.3 Size of connection pipe “M4” between branches of basic module

Size of connection pipe between branches of basic module is determined by the total rated capacity of upstream modules.

Connection pipe “M4” between branches of outdoor module.

Total rated capacity of upstream modules: C (Btu/h)	Size of connection pipe between branches of outdoor module		
	Low pressure gas pipe mm(in.)	Liquid pipe mm(in.)	High pressure gas pipe mm(in.)
C≤72000	Φ19.05(3/4)	Φ9.52(3/8)	Φ15.9(5/8)
72000 < C≤96000	Φ22.2(7/8)	Φ9.52(3/8)	Φ19.05(3/4)
96000 < C≤120000	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ22.2(7/8)

4.2.5.4 Size of connection pipe “L” between the terminal outdoor branch and the first indoor branch

Connection pipe “L” between outdoor unit and the first indoor branch.

Module	Size of connection between outdoor unit and the first indoor branch		
	Low pressure gas pipe mm(in.)	Liquid pipe mm(in.)	High pressure gas pipe mm(in.)
GMV-WQ72WM/A-F(U)	Φ19.05(3/4)	Φ9.52(3/8)	Φ15.9(5/8)
GMV-WQ96WM/A-F(U)	Φ22.2(7/8)	Φ9.52(3/8)	Φ19.05(3/4)
GMV-WQ120WM/A-F(U)	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ22.2(7/8)

4.2.5.5 Branch selection of mode exchanger (“A1, A2”)

Select branch of mode exchanger according to each total capacity of downstream indoor unit. Please refer to the following table.

Model selection for branch “A1 / A2” of mode exchanger.

R410A refrigerant system	Total Capacity of the Downstream Indoor Unit X(Btu/h)	Model
Y-Type Branch Pipe	X≤17100	FQ01Na/A
	17100 < X≤72000	FQ02Na/A
	72000 < X≤96000	FQ03Na/A
	96000 < X≤232000	FQ04Na/A

4.2.5.6 Piping size among upstream branches of mode exchanger (“n1/n2/n3/n4”)

Total rated capacity of downstream indoor units: C(Btu/h)	Size of connection pipe between branches of mode exchanger		
	Low pressure gas pipe mm(in.)	Liquid pipe mm(in.)	High pressure gas pipe mm(in.)
C≤17100	Φ12.7(1/2)	Φ6.35(1/4)	Φ12.7(1/2)
17100 < C≤48500	Φ15.9(5/8)	Φ9.52(3/8)	Φ12.7(1/2)
48500 < C≤72000	Φ19.05(3/4)	Φ9.52(3/8)	Φ15.9(5/8)
72000 < C≤96000	Φ22.2(7/8)	Φ9.52(3/8)	Φ19.05(3/4)
96000 < C≤120000	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ22.2(7/8)
120000 < C≤144000	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ22.2(7/8)
144000 < C≤168000	Φ28.6(1-1/8)	Φ15.9(5/8)	Φ22.2(7/8)

4.2.5.7 Piping size among downstream branches of mode exchanger “a / h”

Rated capacity of indoor unit C(Btu/h)	Size of piping among downstream branches of mode exchanger	
	Gas Pipe mm(in.)	Liquid Pipe mm(in.)
C≤9500	Φ9.52(3/8)	Φ6.35(1/4)
9500 < C≤17100	Φ12.7(1/2)	Φ6.35(1/4)
17100 < C≤48500	Φ15.9(5/8)	Φ9.52(3/8)

4.2.5.8 Branch selection of downstream indoor unit of mode exchanger (“B1/B2/B3”)

R410A refrigerant system	Total rated capacity of downstream indoor units: X(Btu/h)	Model
Y-type branch	X≤48500	FQ01A/A

4.2.5.9 Piping size between mode exchanger and downstream indoor unit (“b / c / d / g”)

Rated capacity of indoor unit C(Btu/h)	Pipe between mode exchanger and IDU	
	Gas Pipe mm(in.)	Liquid Pipe mm(in.)
C≤9500	Φ9.52(3/8)	Φ6.35(1/4)
9500 < C≤17100	Φ12.7(1/2)	Φ6.35(1/4)
17100 < C≤48500	Φ15.9(5/8)	Φ9.52(3/8)

4.2.5.10 Piping between indoor branch and indoor unit (“e / f / i / j / k”)

Size of connection pipe between indoor branch and indoor unit should be consistent with the connection pipe of indoor unit.

Piping between indoor branch and indoor unit “e / f / i / j / k”.

Rated capacity of indoor units: C ((Btu/h)	Size of connection pipe between indoor branch and indoor unit	
	Gas pipe mm(in.)	Liquid pipe mm(in.)
C≤9500	Φ9.52(3/8)	Φ6.35(1/4)
9500 < C≤17100	Φ12.7(1/2)	Φ6.35(1/4)
17100 < C≤48500	Φ15.9(5/8)	Φ9.52(3/8)

4.2.5.11 Piping between indoor branches (“I”)

Rated capacity of the downstream indoor units C(kW)	Size of connection pipe between indoor branch	
	Gas pipe mm(in.)	Liquid pipe mm(in.)
C≤9500	Φ9.52(3/8)	Φ6.35(1/4)
9500 < C≤17100	Φ12.7(1/2)	Φ6.35(1/4)
17100 < C≤48500	Φ15.9(5/8)	Φ9.52(3/8)

4.2.6 Connection method cooling capacity of IDU exceeds 48500Btu/h

When the cooling capacity of connected IDU exceeds 48500Btu/h, it is prohibit connecting with only one branch of mode exchanger; it should use two branches of the same mode exchanger controlled for parallel connection.

Parallel connection	Indoor unit Communication connection for mode exchanger	Remarks
Indoor unit No.1 and No.2	“1D1 1D2”	Parallel connection should be conducted only from the combination of this table. It is prohibit connecting in any other way. Attention that after connection, SA2 of mainboard should be set manually, and change the code at the first place as follow.
Indoor unit No.3 and No.4	“3D1 3D2”	—
Indoor unit No.5 and No.6	“5D1 5D2”	—
Indoor unit No.7 and No.8	“7D1 7D2”	—

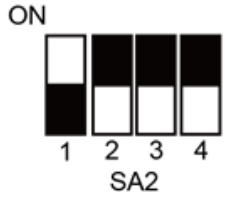


Fig.4.2.5

Connecting method is as shown as below

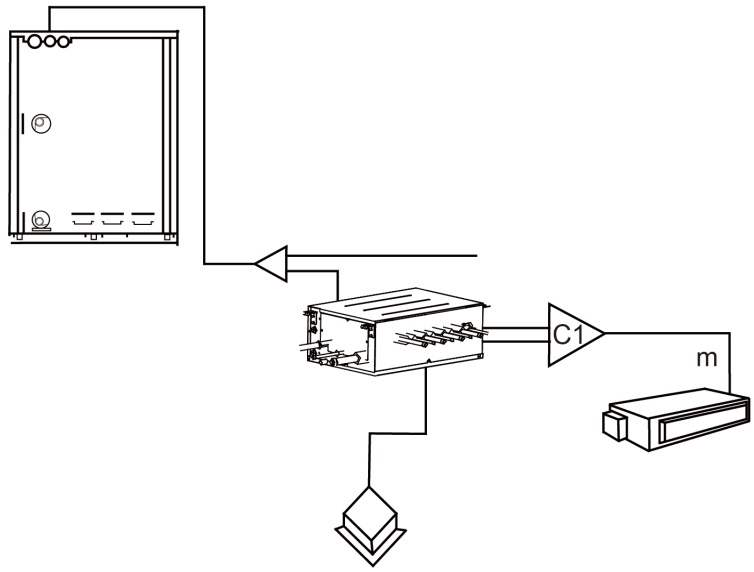


Fig.4.2.6

4.2.6.1 Branch selection of indoor unit of mode exchanger (“C1”)

R410A refrigerant system	Capacity of down steam indoor units: X (Btu/h)	Model
Y-type branch	48500 < X≤96000	FQ01B/A

4.2.6.2 Piping size between mode exchanger and downstream indoor unit (“m”)

Size of connection pipe between indoor branch and indoor unit should be consistent with the connection pipe of indoor unit.

Piping between indoor branch and IDU “m”.

Rated capacity of indoor units (Btu/h)	Size of connection pipe between indoor branch and IDU	
	Gas pipe mm(in.)	Liquid pipe mm(in.)
48500 < C≤72000	Φ19.05 (3/4)	Φ9.52(3/8)
72000 < C≤96000	Φ22.2 (7/8)	Φ9.52(3/8)

4.3 Installation of the Connection Pipe

NOTICE

Before welding the pipeline sealing cap, please make sure there’s no refrigerant in pipeline. If welding it directly, it may cause unnecessary property damage or personal injury.

4.3.1 Precautions when installing the connection pipe

(1) Conform to the following principles during piping connection: Connection pipeline should be as short as possible. The height difference between indoor and outdoor units should be as short as possible. The quantity of bends should be as less as possible. The radius of bending should be as large as possible.

(2) Weld the connection pipes between indoor and outdoor units. Please strictly conform to the requirements for welding process. Rosin joints and pin holes are not allowable.

(3) When laying the pipes, be careful not to deform them. The radius of bending parts should be more than 200mm (7-7/8in.). The pipes should not be repeatedly bent or extended, otherwise the material will get harden. Do not bend or extend the pipe over three times at the same position.

(4) Please use a torque wrench to connect union nut on the indoor unit as below.

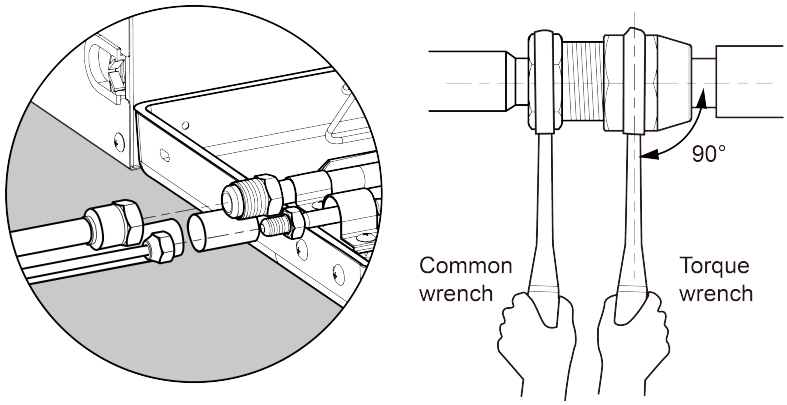


Fig.4.3.1

1) Align the expansion end of copper pipe with the center of threaded joint. Tighten the flare nuts with hands.
2) Tighten the flare nuts with torque wrench until hearing “click” sound.
3) Use sponge to wrap the connecting pipe and joints without thermal insulation and tie it up with plastic tape.
4) Mounting supporter for the connection pipe is required.
5) The bending degree of connection pipe should not be small too much, otherwise the pipe might crack. Installation personnel should use tube bender when bending the pipe.
6) Don't pull of draw the pipe joints, otherwise indoor capillary or other pipes might be damaged and even lead to refrigerant leakage.

4.3.2 Y-type manifold

(1) Y-type manifold

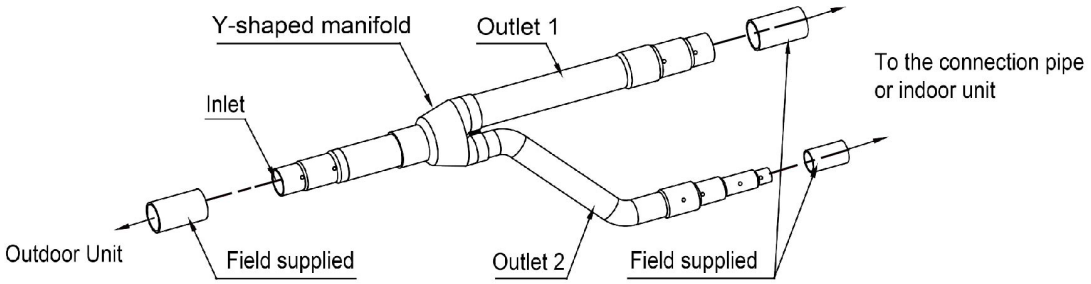


Fig.4.3.2

(2) Y-type manifold has several pipe sections with different pipe size, which is convenient to match with various copper pipes. Use pipe cutter to cut in the middle of the pipe section with different pipe size and eliminate the burr as well. Show as Fig.4.3.3.

(3) Y-type manifold should be installed vertically or horizontally.

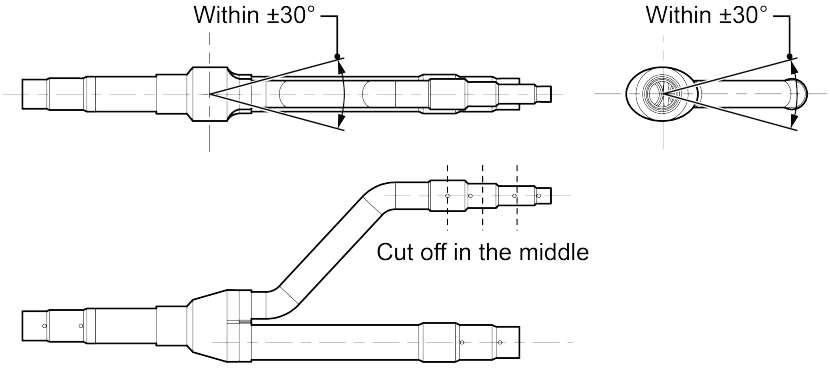
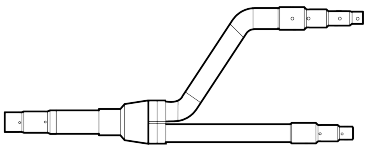


Fig.4.3.3

Y-type manifold	Total capacity of downstream indoor unit(s) C (Btu/h)	Model
	C < 68000	FQ01A/A
	68000≤C≤102000	FQ01B/A
	102000 < C≤239000	FQ02/A
	239000 < C	FQ03/A

(4) Manifold is thermal insulation by applying material which can sustain 120°C (248°F) or above. Manifold attached foam should not be applied as thermal insulator.

4.3.3 Thermal insulation for pipeline

(1) For multi VRF system, every copper pipe should be labeled to avoid misconnection.

(2) Requirement for manifolds is as follow:

The length of a straight pipe between two manifolds should not be less than 500 mm (19-11/16in.). The length of a straight pipe before the main pipe port of the manifold should not be less than 500mm (19-11/16in.). The length of a straight pipe between the branch of the manifold and the IDU should not be less than 500mm (19-11/16in.). Show as Fig.4.3.4.

Unit:mm (in.)

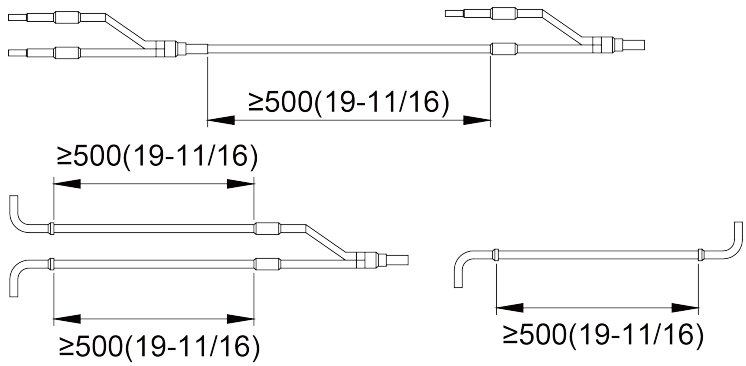


Fig.4.3.4

(3) Three fixing point for both horizontal and vertical installation of the Y-type manifold should be applied. Show as Fig.4.3.5.

Fixing point 1: 100 mm (3.94in.) on the main inlet manifold from the welding point.

Fixing point 2: 200 mm (7.88in.) on the main branched pipe from the welding point.

Fixing point 3: 250 mm (9.84 in.) on the branched pipe from the welding point.

Unit: mm (in.)

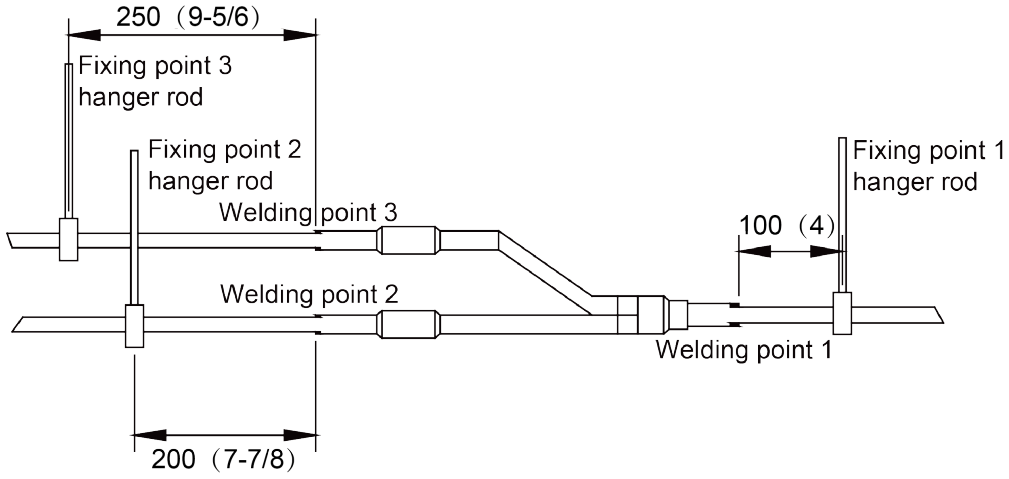


Fig.4.3.5

(4) Thermal insulation for pipeline.

1) To avoid condensate or water leakage from connecting pipe, gas pipe and liquid pipe should be wrapped with thermal insulator and adhesive pipe for insulation from the air.

2) For heat pump unit, thermal insulator for liquid pipe should sustain 70°C(158°F) or above, and for gas pipe should sustain 120°C(248°F) or above. For cooling only unit,

thermal insulator for both liquid pipe and gas pipe can sustain 70°C(158°F) or above. Example: Polyethylene foam can sustain 120°C(248°F) or above and foaming polyethylene can sustain 100°C(212°F) or above.

3) Joints at indoor and outdoor units should be wrapped with thermal insulator and no clearance between pipe and wall. Show as Fig.4.3.6.

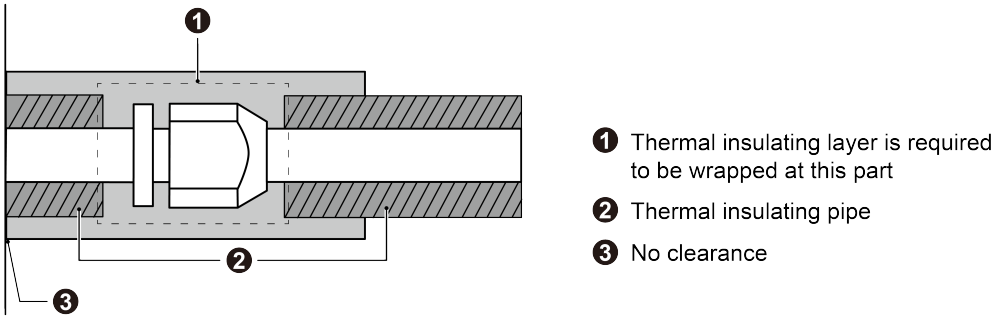


Fig.4.3.6

4) Manifold attached foam cannot be taken as insulating material.
5) When wrapping the tape, the later circle should cover half of the former one. Don't wrap the tape too tight, otherwise the insulation degrades.
6) After wrapping the pipe, adopt sealing material to completely fill the hole to prevent wind and rain entering the room.

4.3.4 Support and protection for pipeline

(1) Support should be made for hanging connection pipe. Distance between each support cannot be over 1m (39-3/8in.).
(2) Protection towards accidental damage should be made for outdoor pipeline. If the pipe exceeds 1m (39-3/8in.), a pin board should be adopted for protection.

4.4 Vacuum and Refrigerant Charge

4.4.1 Vacuum

(1) Before vacuum, make sure that outdoor liquid pipe/low pressure gas pipe/high pressure gas pipe valves are all closed. Apply vacuum pumps to pump out air from IDUs and connection pipe through the fluorine injection nozzles at the outdoor liquid pipe/low pressure gas pipe/high pressure gas pipe valves of ODU. Connection graph is shown as Fig.4.4.1 and Fig.4.4.2.
(2) Vacuum connection method for more than 2 ODUs is the same.

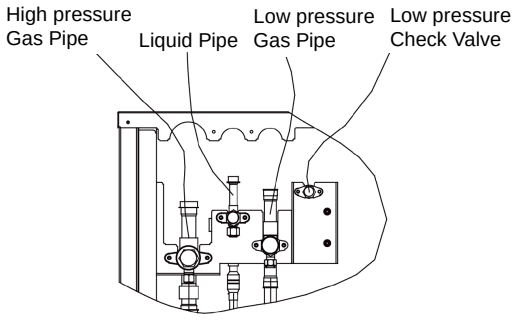


Fig.4.4.1

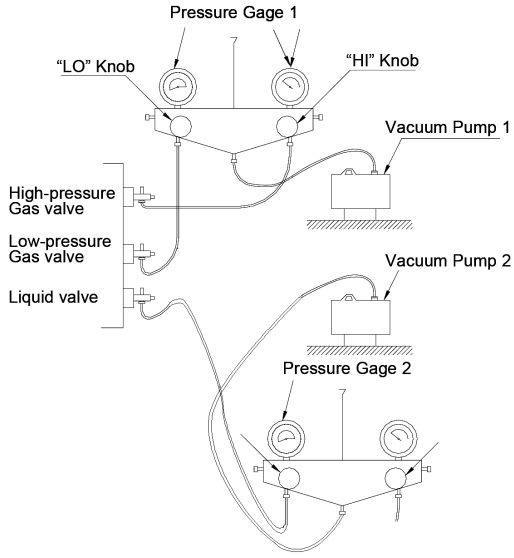


Fig.4.4.2

4.4.2 Additional refrigerant charging

Outdoor unit has been charged refrigerant before delivery.

Charge additional refrigerant for field-installed connecting pipe. Check the table below (only apply the liquid pipe as benchmark) for the refrigerant to be added when the pipeline length exceeds one meter each time.

How much additional refrigerant should be charged.

Total refrigerant charging amount R= Pipeline charging amount A + Refrigerant charging amount B of every module .

(1) Pipeline charging amount.

Added refrigerant quantity A for piping = ∑Liquid pipe length × Added refrigerant quantity for each meter (in.) of liquid pipe.

	Diameter of liquid pipe mm(in.)							
	28.6(1-1/8)	25.4(1)	22.2(7/8)	19.05(3/4)	15.9(5/8)	12.7(1/2)	9.52(3/8)	6.35(1/4)
kg/m	0.680	0.520	0.350	0.250	0.170	0.110	0.054	0.022
OZ/in.	0.61	0.47	0.31	0.22	0.15	0.10	0.05	0.02

(2) Refrigerant charging amount B of every module.

Refrigerant charging amount B of every module kg(Pounds)		Rated Capacity(1000Btu/h)		
IDU/ODU rated capacity collocation ratio C	Quantity of included IDUs(N)	72	96	120
50%≤C≤90%	N < 4	0	0	0
	N≥4	0.5(1.1)	0.5(1.1)	0.5(1.1)
90% < C≤105%	N < 4	1(2.2)	1(2.2)	1.5(3.3)
	8 > N≥4	3.5(7.7)	2(4.4)	3(6.6)
	N≥8	4(8.8)	3.5(7.7)	5.5(12.1)
105% < C≤135%	N < 4	2(4.4)	2(4.4)	2.5(5.5)
	8 > N≥4	4(8.8)	3.5(7.7)	4(8.8)
	N≥8	4.5(9.9)	4.5(9.9)	5(11.0)

NOTICE	
(1)	IDU/ODU rated capacity collocation ratio C = Sum of rated cooling capacity of indoor unit / Sum of rated cooling capacity of outdoor unit.
(2)	If all of the indoor units are fresh air indoor units, the quantity of refrigerant added to each module is 0kg.
(3)	If outdoor air processor is connected with normal VRF indoor unit, adopt the perfusion method for normal indoor unit for perfusion.

Example1:

The OUD is composed of the module: 120 kBtu/h.

The IDUs are made up of 4 sets of 30 kBtu/h.

IDU/ODU rated capacity collocation ratio C= 30×4/(120)=100%.The quantity of included IDUs is more than 4 sets. Please refer to the above table.

Refrigerant charging amount B for 120 kBtu/h module is 3.0kg (6.6pounds).

So, Refrigerant charging amount B =3kg (6.6pounds).

Suppose the Pipeline charging amount A=Σ Liquid pipe length × refrigerant charging amount of every 1m (39.37in.) liquid pipe=2kg (4.4 pounds).

Total refrigerant charging amount R=2+3=5kg (4.4+6.6=11pounds).

Example 2:

Outdoor unit is a 72kBtu/h module and the indoor unit is a 72kBtu/h fresh air unit. The quantity (B) of refrigerant added to this module is 0kg (0pounds).

As a result, Refrigerant charging amount B = 0kg (0pounds).

Suppose the Pipeline charging amount A = Σ Length of liquid pipe x Quantity of refrigerant added to liquid pipe per meter) = 5kg (11pounds).

Total refrigerant charging amount R = 5+0=5kg (11+0=11pounds).

After confirmed there is no leakage from system, when the compressor does not operates, charge additional R410A with specified amount to the unit through the fluorine injection nozzles at the outdoor liquid pipe valve of the outdoor unit. If required additional refrigerant cannot be quickly charged due to pressure increase inside the pipes, turn on the unit at cooling mode and then charge the refrigerant from low pressure gas valve of outdoor unit. If water inlet temperature is low, the unit can’t be set to cooling mode, but heating mode, which is also accepted.

4.5.3 Precautions on Refrigerant Leakage

(1) Personnel related to air conditioning engineering design and installation should abide by the safety requirement for preventing refrigerant leakage specified in local laws and regulations.

(2) The units apply R410A refrigerant, which is nonflammable and nontoxic. However, the space for refrigerant leakage should be large enough to ensure the refrigerant concentration does not exceed the specified value in safety requirement; otherwise, people inside the space will be dangerous of stifled by refrigerant. For example, according to the appropriate European Standard, the maximum allowable concentration level of R410A to human space is limited at 0.44 kg/m^3.

The maximum amount of refrigerant (kg) in the system = The volume of room (m^3) ×The maximum allowed concentration level of refrigerant (kg/m^3).

Total amount of refrigerant (kg) in the system = Total additional charging amount (kg) + Amount

of refrigerant (kg) which is charged ex-factory (for the system consisting of multiple modules in parallel, the accumulative charge quantity of modules ex-factory should be used).

Total amount of refrigerant (kg) in the system≤The maximum amount of refrigerant (kg) in the system.

(3) When the total amount of refrigerant in the system is more than the maximum amount of refrigerant, the system should be designed again. In this case, the system can also be separated into several systems with less capacity, or adding corresponding ventilation measures or alarming display.

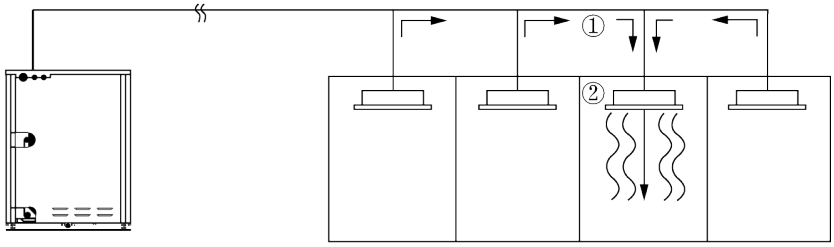


Fig.4.4.3

① Flow direction of refrigerant leakage.

② Room for refrigerant leakage. Because the density of refrigerant is greater than air, pay attention to the spaces where the refrigerant may remain, for example, the basement.

4.5 Electric Wiring

4.5.1 Wiring precautions

⚠WARNING	
(1)	Wiring should conform to national rules. All the parts, materials, electric work should be in accordance with local codes.
(2)	Rated voltage and exclusive power supply should be used.
(3)	Power cord should be fixed reliably. Prohibit to pull the power cord by force.
(4)	Wire size of power cord should be large enough. The damaged power cord and connecting wire should be replaced by exclusive cable.
(5)	All the electrical work should be performed by professional personnel according to local laws, regulation and manuals.
(6)	Connect the unit to the special earth device and make sure the unit is earthed reliably.
(7)	Air switch and circuit breaker is required to be set. Air switch should have both magnetic trip and thermal trip functions to protect the unit when short-circuit and overload happens. D-type breaker is recommended to be used.
(8)	Wiring diagram attached on the unit is prevailed.

4.5.2 Wiring of power cord

Every unit should have corresponding short-circuit and overload protector. And also a general switch is required to control power supply or off. Show as Fig.4.5.1.

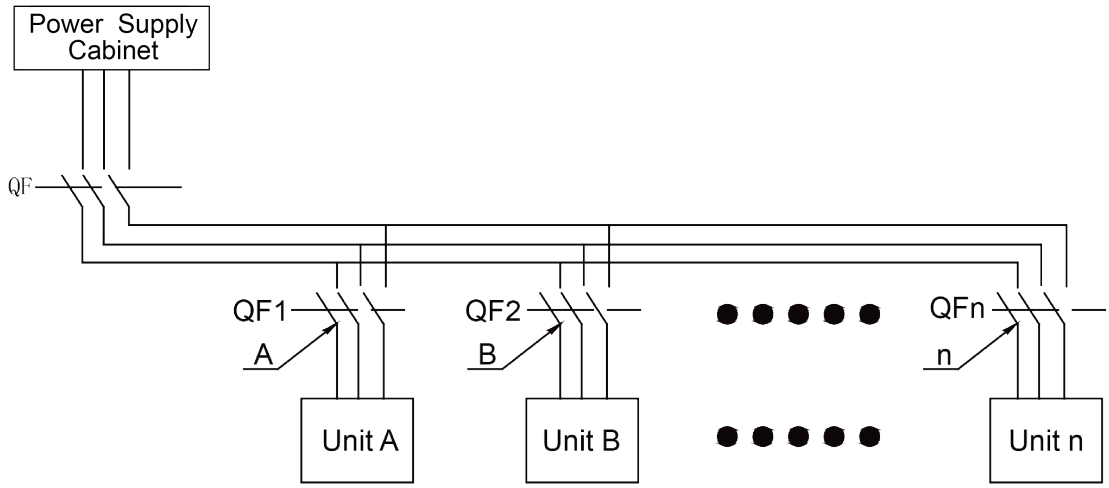


Fig.4.5.1

No.	Outdoor units	Power Supply	Fuse Capacity	Minimum Circuit Ampere	Maximum Overcurrent Protector Ampere
		V/Ph/Hz	A	A	A
1	GMV-WQ72WM/A-F(U)	208/230V 3~ 60Hz	25	23	25
2	GMV-WQ96WM/A-F(U)	208/230V 3~ 60Hz	35	28	35
3	GMV-WQ120WM/A-F(U)	208/230V 3~ 60Hz	45	38	45

⚠ WARNING	
(1)	Specification of circuit breaker and power cord base on unit's maximum power (max. current).
(2)	Specification of power cord base on the working condition where ambient temperature is 40°C (104°F) and multi-core cable with copper conductor(working temperature is 90°C (194°F), e.g. power cable with YJV cross-linked copper, insulated PE and PVC sheath) is lying on the surface of slot. If working condition is different, please adjust the specification according to national standard.
(3)	Copper-core cable should be used.
(4)	The above sectional area is suitable only for maximum 15m(49-1/5ft.). If exceeds 15m(49-1/5ft.), sectional area should be scale up to prevent overload current from burning or causing fire hazard.
(5)	Specification of circuit breaker base on the working condition where the ambient temperature of circuit breaker is 40°C (104°F). If working condition is different, please adjust the specification according to national standard.
(6)	The air switch should include magnetic trip function and thermal trip function so that system can be protected from short circuit and overload.
(7)	An all-pole disconnection switch having a contact separation of at least 3mm(1/8in.) in all poles should be connected in fixed wiring.

4.5.3 Connection of power cord

⚠ WARNING	
(1)	Before connecting terminals, all supply circuits should be power off.
(2)	Making reliably earth for type I electrical appliances.
(3)	Earth resistance should follow requirements of local standards.
(4)	The green-yellow wire within units is earth wire. Do not use it for other purposes. Do not cut it off or secured by tapping screws neither. Otherwise, it may cause electric shock.
(5)	Power supply on user side should be reliable earth terminal. Do not connect earth wire to the following places: 1) Water pipe. 2) Gas pipe. 3) Drainage pipe. 4) Other places which are considered by professionals as unreliable.
(6)	Power cord and communication wire should be separated, with a distance of more than 20cm (7-7/8in.). Otherwise, system's communication will be abnormal.

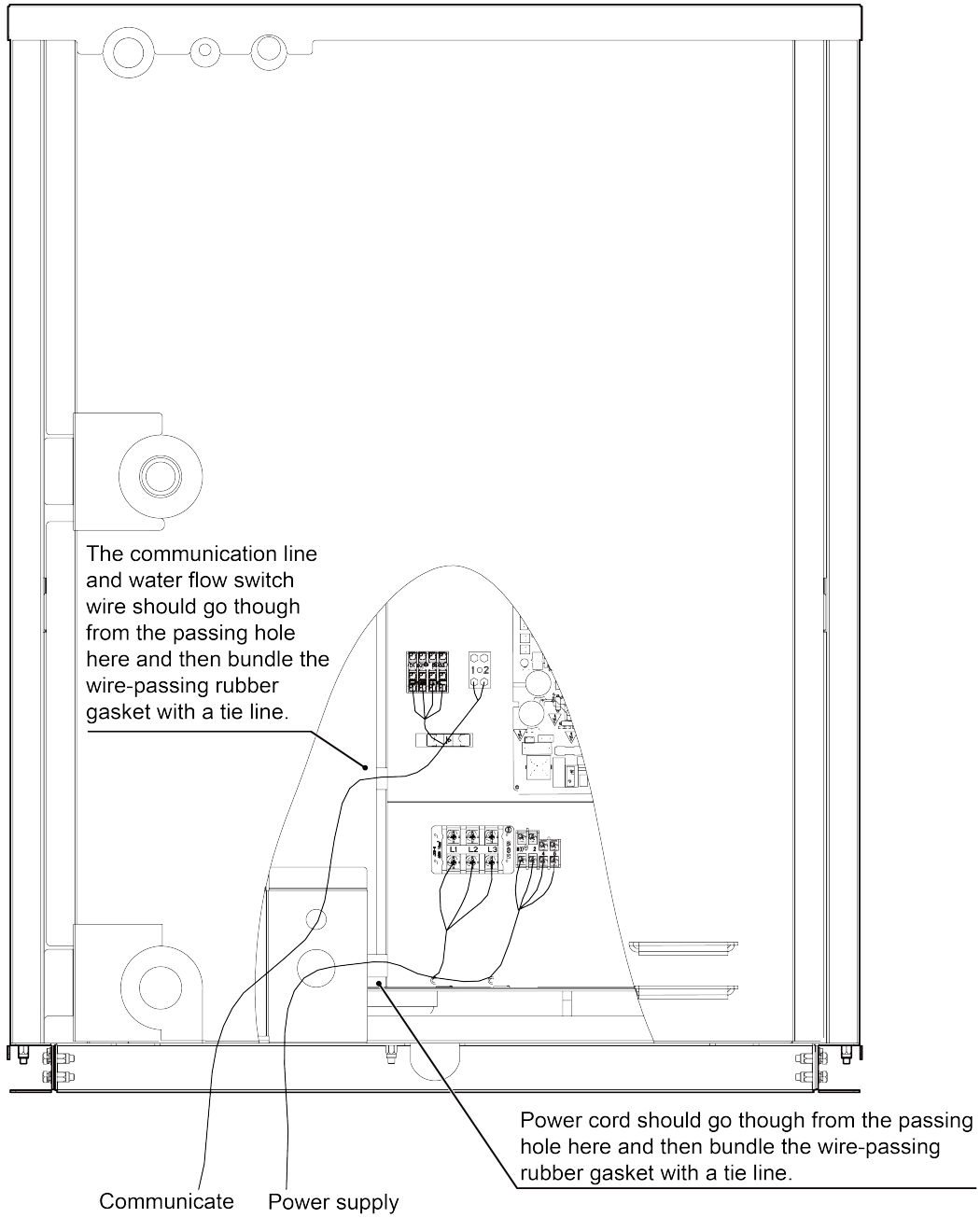


Fig.4.5.2

Steps for power cord connection:

(1) Knock off the cross-through hole which is for passing through the power cord, with the cross-through rubber ring on the hole. Then pass the cable through the hole. Connect L1, L2, L3 of power cord and earth wire separately to the positions on wiring board (for power supply) which are marked with L1, L2, L3 and the earth screw nearby.

(2) Fasten the power cord with cable tie.

(3) Wiring of power cable and communication wire for the ODU should refer to the marker of circuit diagram on front cover of electrical box of ODU.

4.6 System Communication

4.6.1 Communication system includes:

(1) Communication among outdoor basic modules.

(2) Communication between ODU and IDU.

(3) Communication among IDUs.

(4) Communication between IDU and wired controller.

(5) Connection between IDU and light board receiver.

(6) Communication between different refrigeration systems.

(7) Graph of general communication connection.

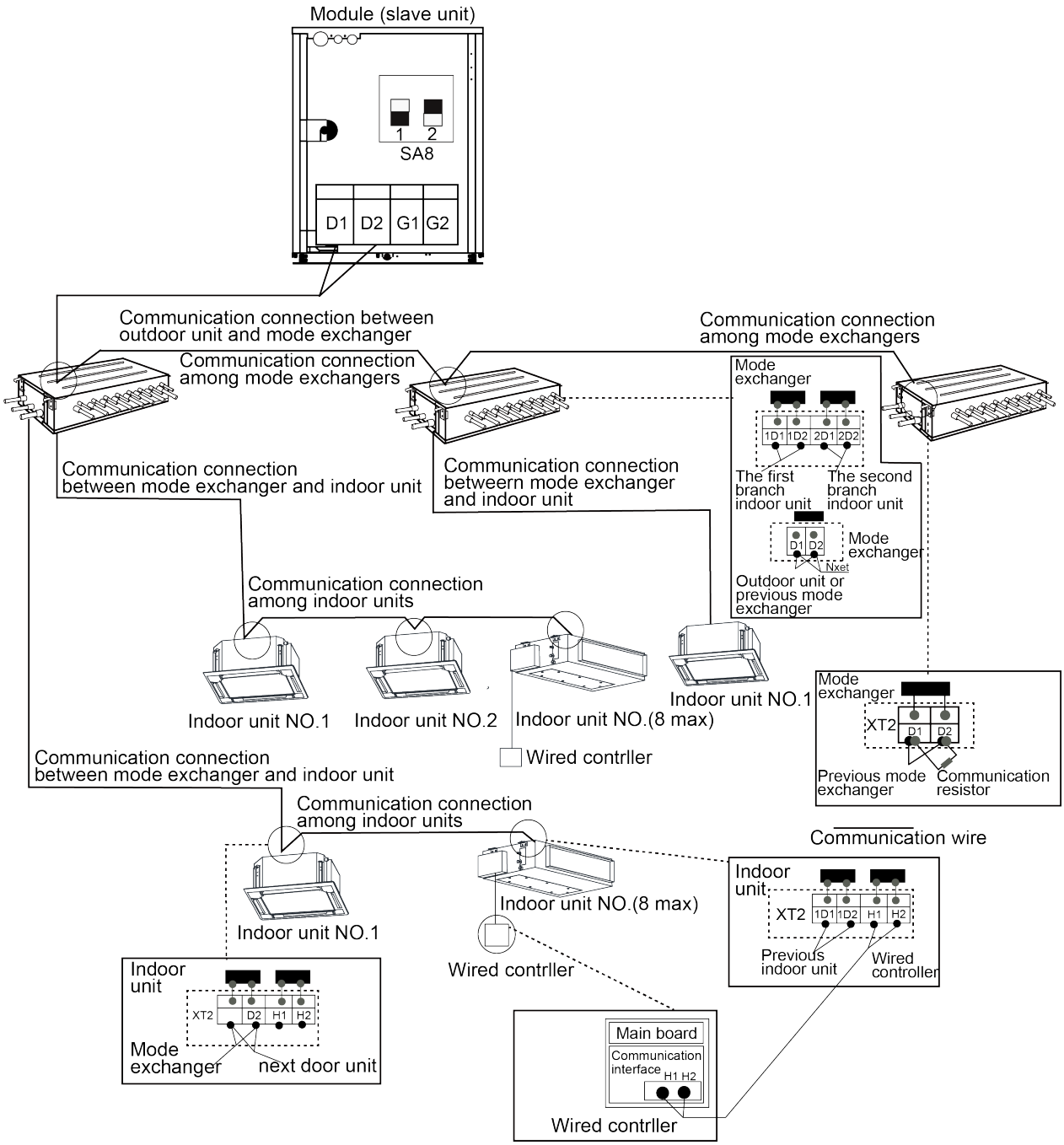


Fig.4.6.1

4.6.2 Communication mode of Heat Recovery DC Inverter Units

CAN bus mode is applied for communication between IDU and ODU and communication among IDUs.

4.6.3 Selection and connection mode of GMV WATER communication material

4.6.3.1 Select communication wiring material

NOTICE If air conditioners are installed at the place with strong electro-magnetic interference existing, the communication wire of IDU and wired controller should use shielded wire and the communication wire between IDU and IDU/ODU should use shielded twisted pair.

Select communication wire between IDU and wired controller

Material type	Total length of communication line between IDU unit and wired controller L m(ft.)	Wire size	Remarks
Light/Ordinary polyvinyl chloride sheathed cord.	L≤250(820-1/5)	2×AWG18~ 2×AWG16	1. Total length of communication line should be shorter than 250m (820-1/5ft.). 2. The cord shall be circular cord (the cores should be twisted together). 3. If unit is installed in places with strong electromagnetic interference existing, shielded wire should be used.

Connection between IDU and wired controller figure

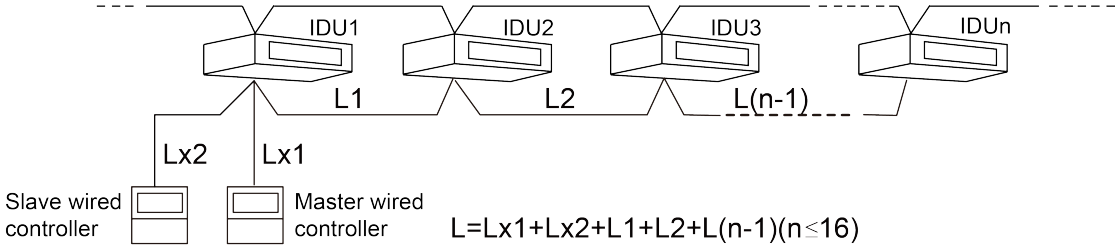


Fig.4.6.2

Select communication wire between ODU and IDU

Material Type	Total Length L(m) of Communication Cable between IDU Unit and IDU (ODU) Unit m(ft.)	Wire size	Remarks
Light/Ordinary polyvinyl chloride sheathed cord.	L≤1000(3280-5/6)	≥2×AWG18	1. If the wire diameter is scale up to 2 ×AWG16, the total communication length can reach 1500m (4921-1/4ft.). 2. The cord should be circular cord (the cores shall be twisted together). 3. If unit is installed in places with strong electromagnetic interference existing, shielded wire should be used.

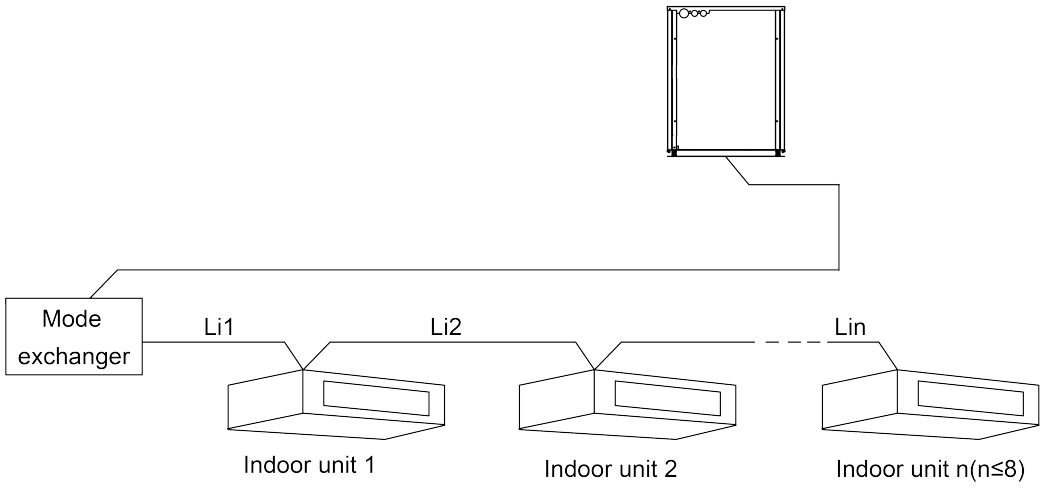


Fig.4.6.3

NOTICE

All of the selected communication wire should be consistent with local laws and regulations.

4.6.3.2 Connection mode of communication

(1) All communication wires of GMV WATER should be connected in series rather than in star.

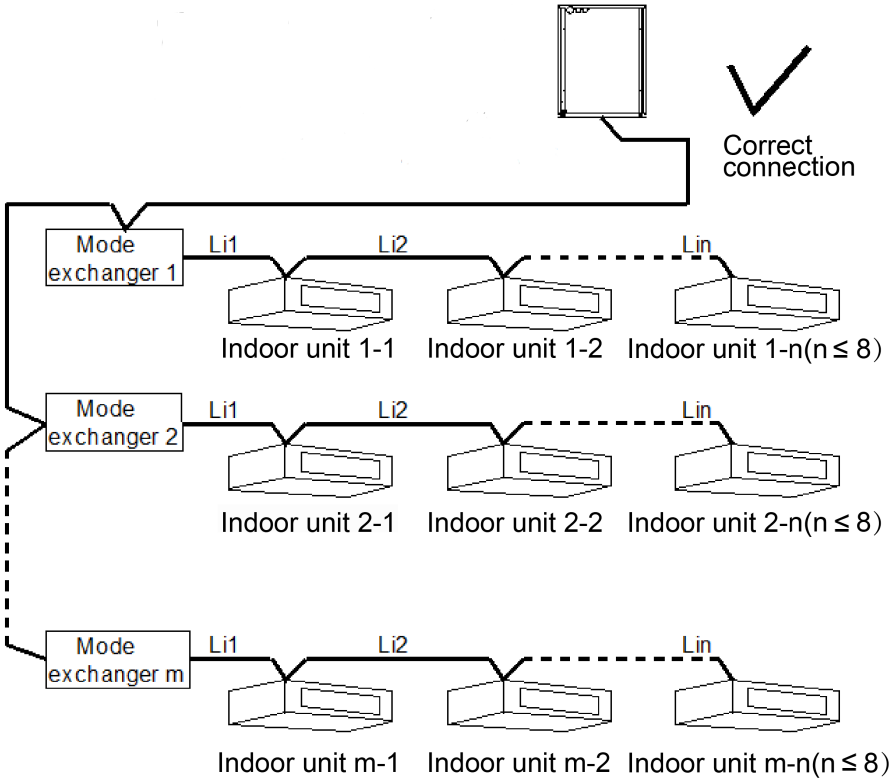


Fig.4.6.4

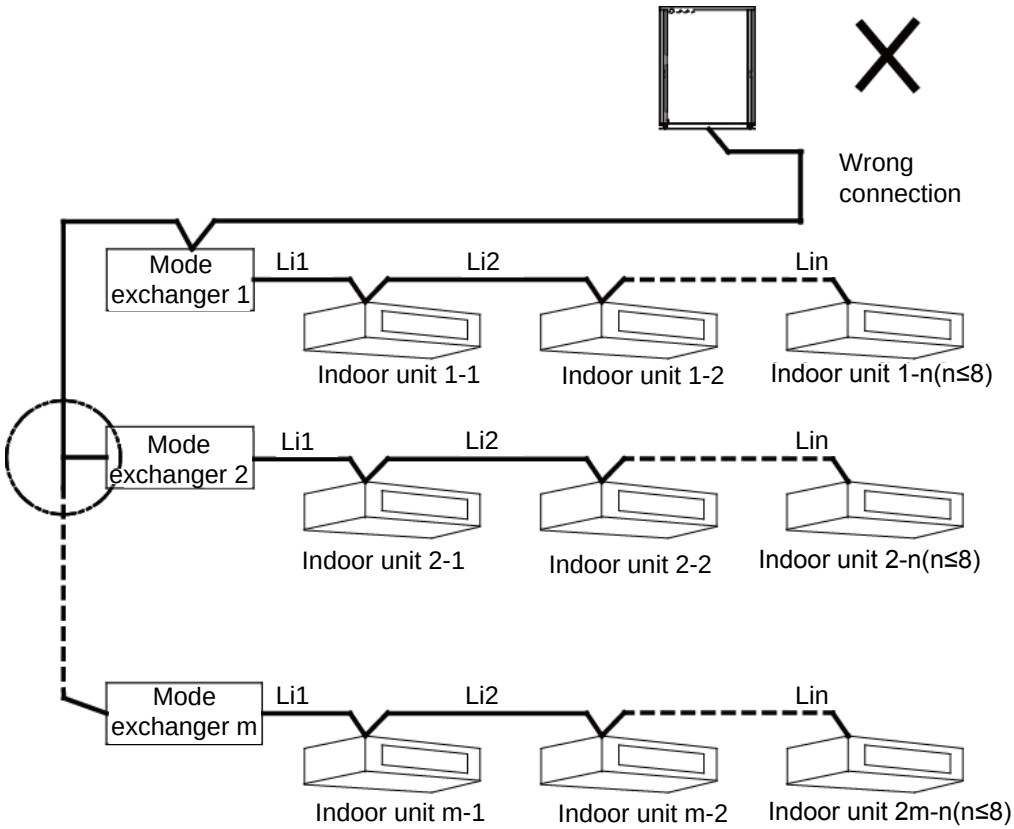


Fig.4.6.5

(2) All communication wires should be fastened by screws.

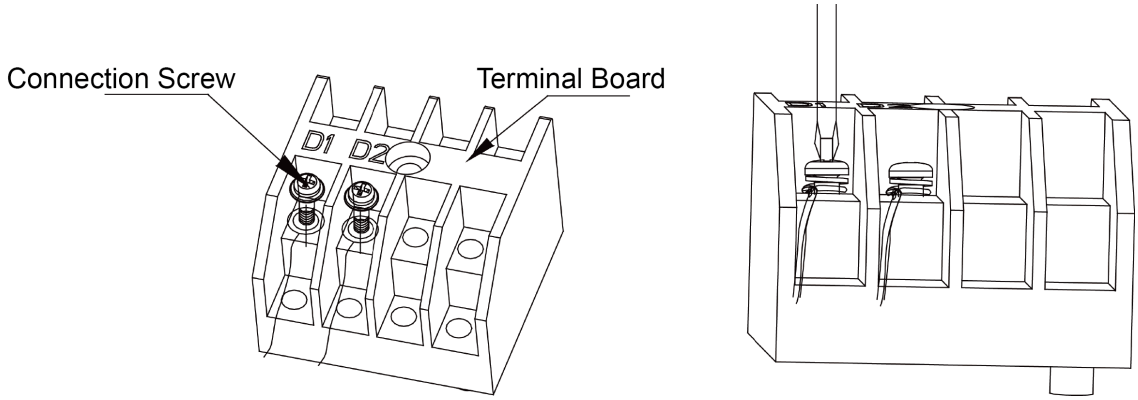


Fig.4.6.6

(3) If a single connected communication wire is not long enough, the connected joint should be welded or press-welded. Do not simply twist the wires together.

4.6.4 Communication address

Auto addressing technology is adopted for GMV WATER IDU and ODU. No need to set address codes manually. Only the addresses of master unit and central control are necessary to be set (address of central control is only necessary when there are multiple refrigeration systems).

NOTICE

When installing remote monitor or central controller, displacement on indoor units' project codes should be made. Otherwise, there will be collision malfunction of the project codes. For detail operation methods, please refer to Installation and Maintenance Manual.

4.7 Connection Method and Steps for System Communication

4.7.1 Communication connection between IDU and ODU

NOTICE

Install the centralized controller only when it is necessary.

Connect IDU and ODU by terminal D1/D2 of wiring board XT2. Connection graphs of single unit are shown as follow:

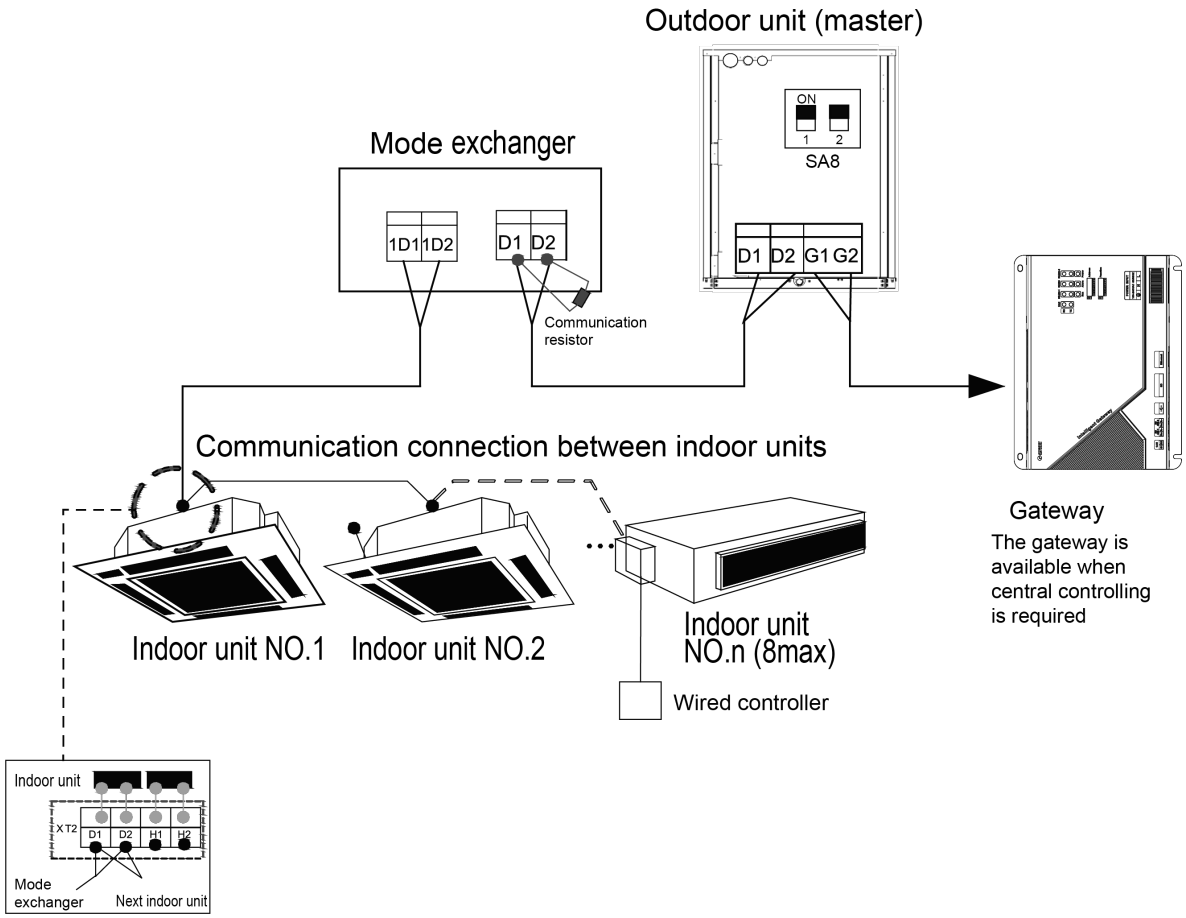


Fig.4.7.1 Connection of communication for single-module system and single-module mode exchanger system.

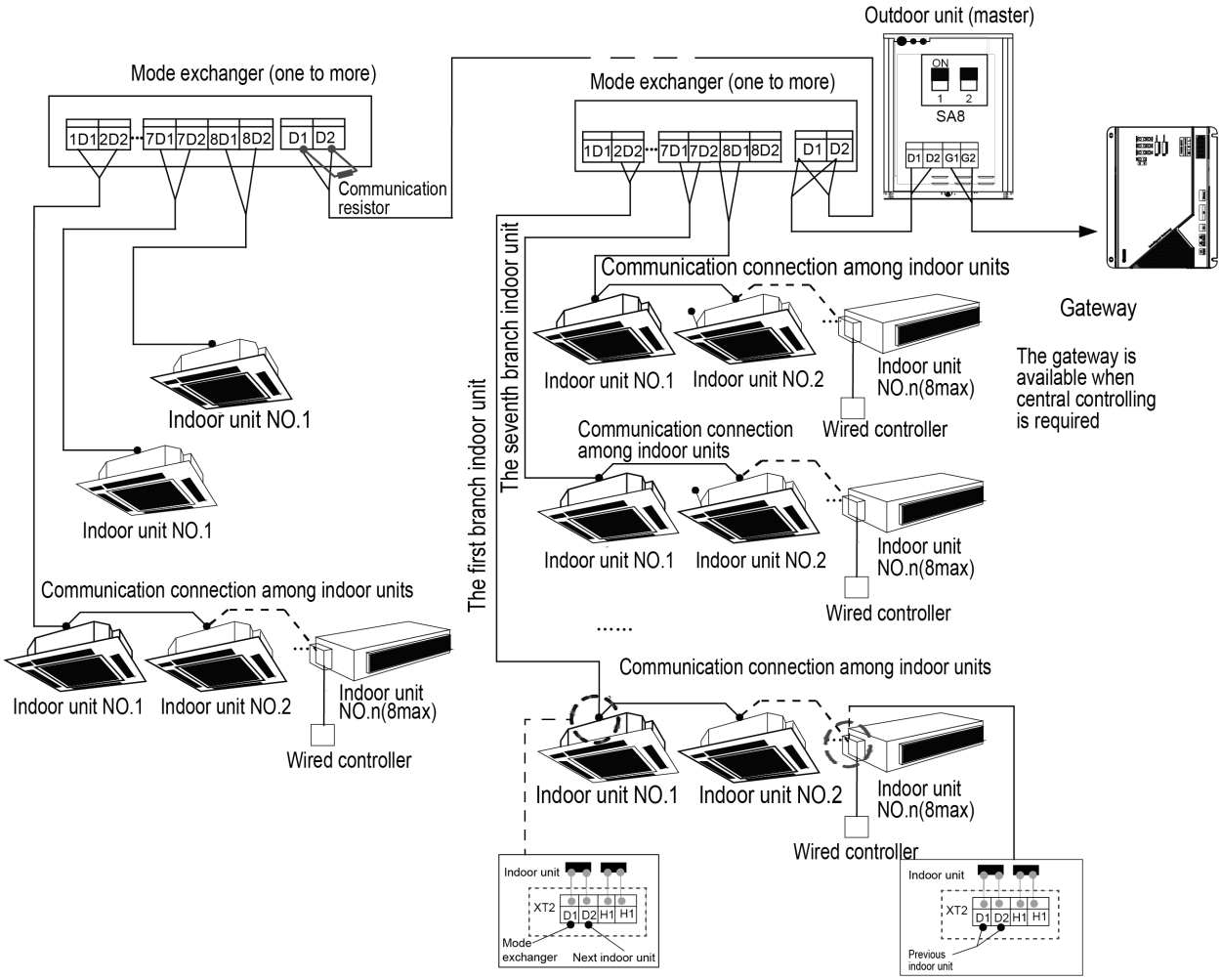


Fig.4.7.2 Connection of communication for single-module system and multi-module mode exchanger system.

NOTICE	
(1)	Communication wire and power cord should be separated.
(2)	Communication wire should be long enough for connection. Joint connection is not allowed.
(3)	IDUs should be connected in series. The last IDU should be connected with the communication matched resistor (supplied on the list of ODU spare parts).

4.7.2 Communication connection between IDU and wired controller

There are 4 kinds of connection methods between IDU(s) and wired controller(s), shown as below:

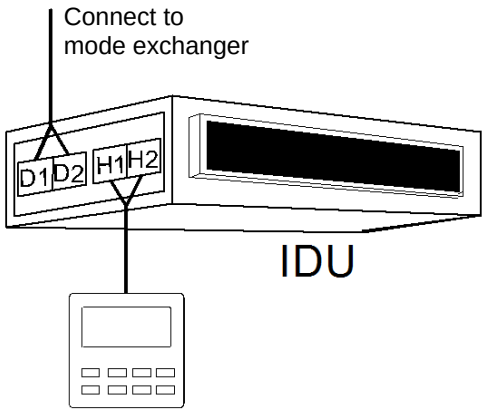


Fig.4.7.3 One wired controller controls one IDU

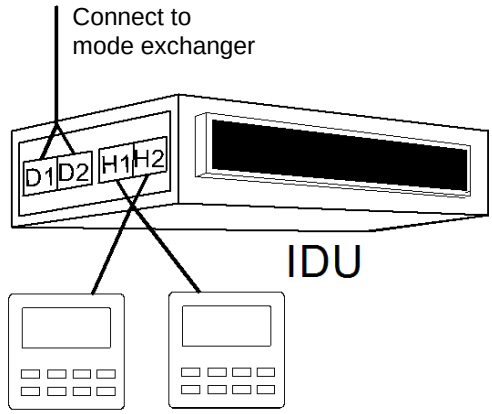


Fig.4.7.4Two wired controllers control one IDU

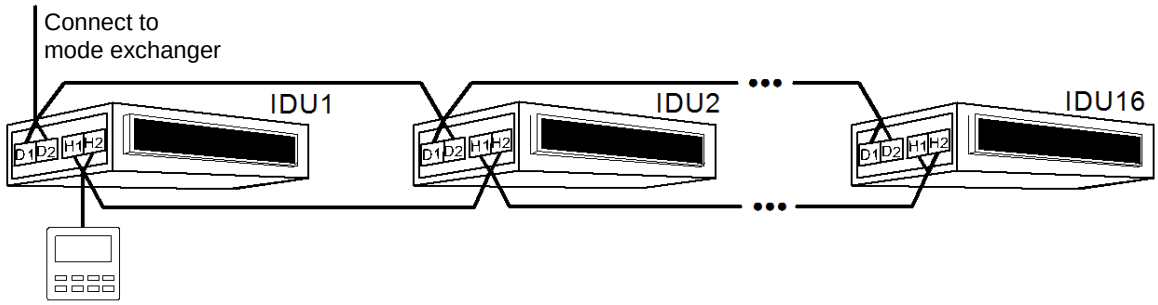


Fig.4.7.5 One wired controller controls multiple IDUs

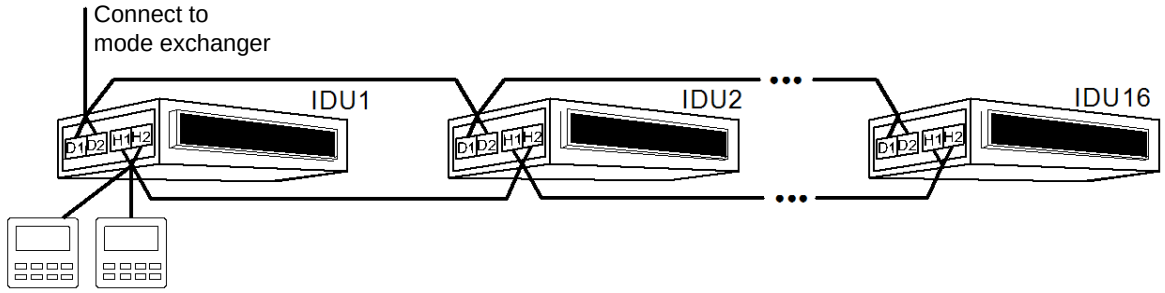


Fig.4.7.6 Two wired controllers control multiple IDUs

When two wired controllers control multiple IDUs, the wired controller can be connected to any one IDU which should be the same series. Meanwhile, only one of the wired controllers should be set as slave controller. At most 16 IDUs can be controlled by wired controllers and the connected IDUs shall be within a same IDU network.

No matter unit is turned on or off, slave controller can be set.

How to set a slave controller: hold “function” button on the designated controller for 5s, and temperature zone displays C00. Continue holding “function” button for 5s and setting screen of controller parameter will come out. Default temperature zone displays P00.

Press ∧ button or ∨ button to select parameter code to be P13. Press “mode” button to switch to parameter setting. Then the parameter blinks. Press ∧ button or ∨ button to select code to be 02. And then press “confirm/cancel” to finish setting.

Press “confirm/cancel” to return to the previous display, press again to quit from the parameter setting and go back to default display.

User’s parameter settings is shown as below:

Parameter code	Parameter name	Parameter scope	Default value	Remark
P13	Set up address for wired controller	01: master wired controller 02: slave wired controller	01	When 2 wired controllers control one or more IDUs, different addresses should be set. Slave wired controller (02) can’t set units’ parameter but only its own address.

4.7.3 Communication connection between duct type IDU and light board receiver

When the duct type IDU needs to be connected to light board remote receiver, it can be connected by Dsp1 and Dsp2 on the IDU main board.

IDU type	Connection wire	Main board interface of corresponding IDU
Duct type IDU	Between boards (17-core)	Dsp1 (direct to 8-core interface) Dsp2 (direct to 9-core interface)

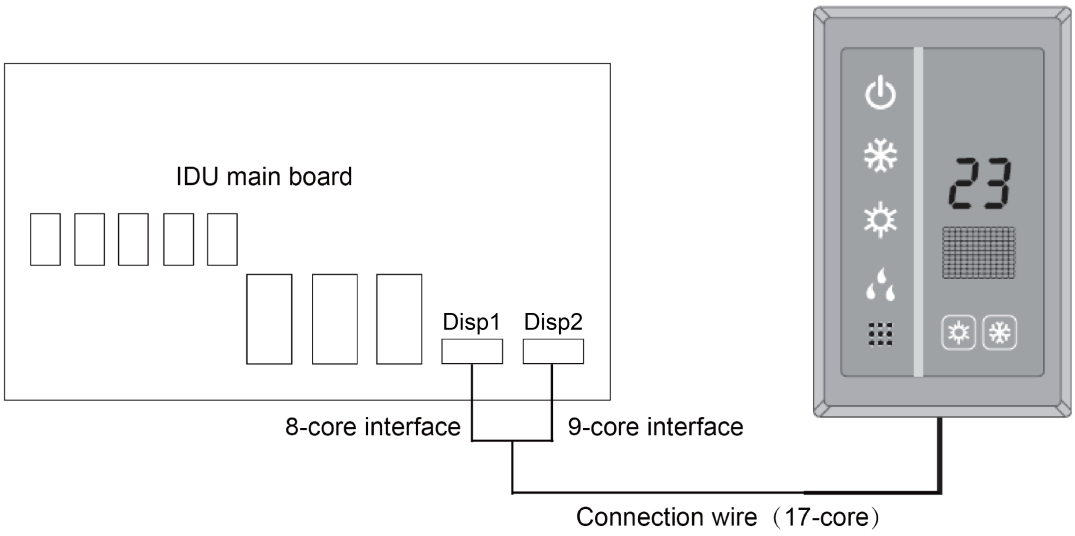


Fig.4.7.7

NOTICE	
(1)	Wired controller and light board remote receiver can be used at the same time.
(2)	When light board remote receiver is used, please use remote controller at the same time.

4.8 External Electrical Wiring Diagram

⚠ WARNING	
(1)	Each unit should be equipped with a circuit breaker for short-circuit and overload protection.
(2)	During operation, all indoor units and outdoor units in the same system should be power on. Otherwise, the unit can't operate normally.

4.8.1 External wiring diagram of a single unit

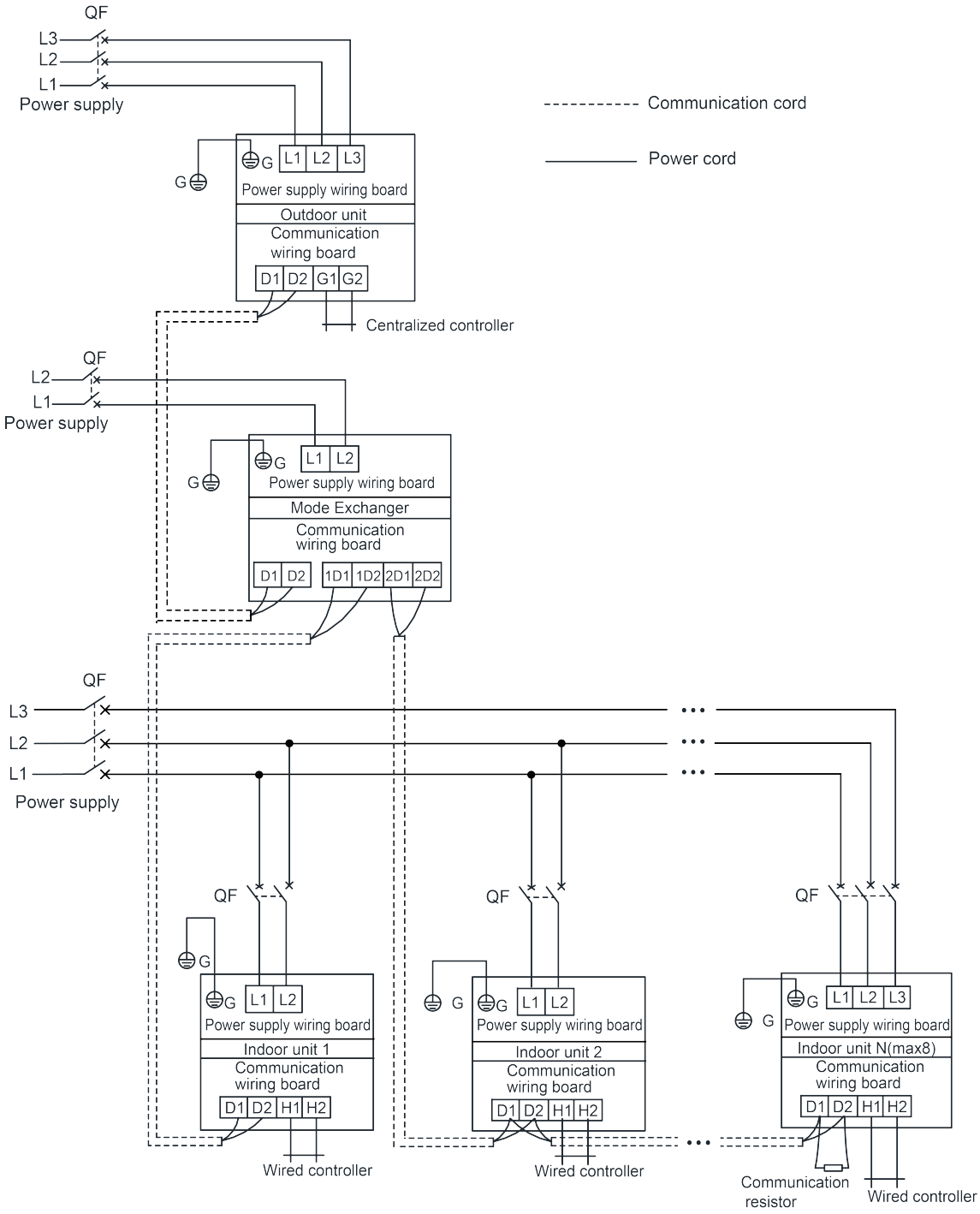


Fig.4.8.1

NOTICE

The maximum connect quantity of indoor units is dependent on the capacity of outdoor units. For details, please refer to sections of combination of indoor and outdoor units.

4.9 Water System Design

Gree Water-cooled Heat Recovery DC Inverter VRF system comprises two parts. The first part refers to the water system (which should be a closed type cycle) or thermal exchanger between the outdoor unit and water/ground source; the second part refers to the VRF system from ODU to mode exchanger then to IDU.

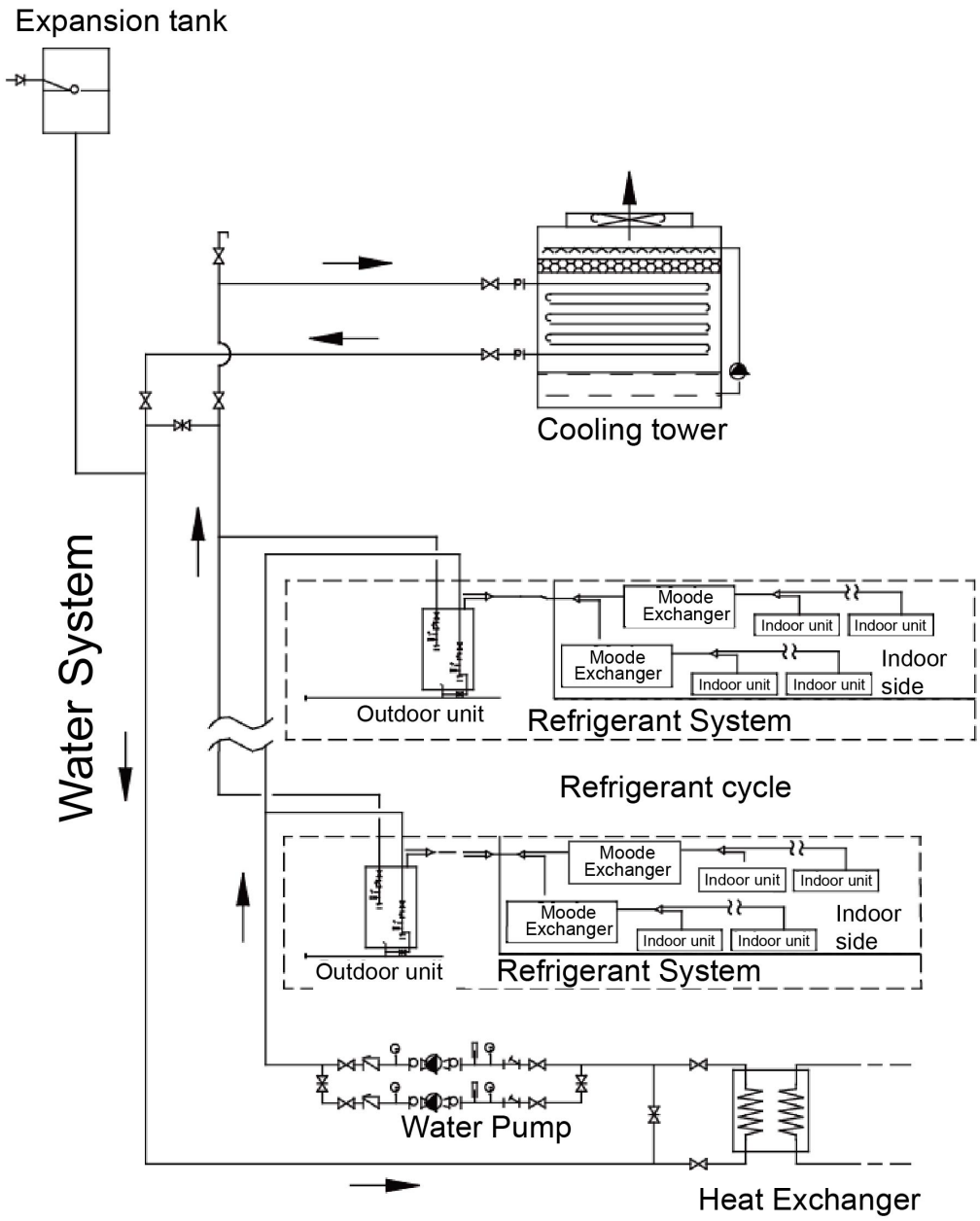


Fig.4.8.2

4.9.1 Basic composition of the water system of Gree Water-cooled Heat Recovery DC Inverter VRF system.

The water system of Gree Water-cooled Heat Recovery DC Inverter VRF system consists of the following parts:

- Cooling equipment – closed type cooling tower/water heat exchanger.
- Heating equipment – boiler/water heat exchanger.
- Expansion tank.

- Exhaust and water supply device.
- Circulating water pump.
- Water-cooled Heat Recovery DC Inverter VRF system.
- Water flow switch.
- Y-type filter.
- Water flow control valve.

4.9.2 External energy sources of Gree Water-cooled Heat Recovery DC Inverter VRF system.

External energy sources of Gree Water-cooled Heat Recovery DC Inverter VRF system includes cooling towers, boilers and buildings, or various renewable energy sources such as the water source heat of surface water (rivers, lakes and sea) and underground water, buried soil heat, solar energy, industrial waste warm water and the waste energy of domestic sewage water.

4.9.3 Water system control of Gree Water-cooled Heat Recovery DC Inverter VRF .

The water inlet temperature of Gree Water-cooled Heat Recovery DC Inverter VRF system is 10°C to 50°C, and the water flow should be sufficient and continuous. When the system detects lack of water, Gree Water-cooled Heat Recovery DC Inverter VRF system will stop, otherwise the plate heat exchanger will become freeze up. The temperature and pressure differences of plate heat exchanger inlet and outlet can be measured to check whether the water flow decreases due to blocking of the filter, containing air, or circulating pump failure. When the cooling tower is power failure or the boiler is malfunction (water temperature is too low) , the heat exchanger for ODU may be crack due to freeze up. Excessively large water flow will lead to high energy consumption and loud noise.

4.9.3.1 Two types of water system control for Gree water-cooled DC inverter GMV system:

Water pump control: If a water pump is selected, the unit only provides a control signal. The rated voltage of the control signal is subject to the rated voltage of the unit. It is strictly forbidden to directly connect the water pump to the unit for power supply; otherwise, the unit will be damaged.

Control by the water flow control valve and inverter water pump: The selected water flow control valve can be an adjustment cut-off valve (straight trip) or electric ball valve (angular stroke), and its driver voltage is AC 230V. The water flow control valve should be used together with the inverter water pump or pressure equalizing valve to ensure proper water flow.

Remarks: When the pressure difference at the water flow control valve inlet/outlet exceeds 3.5 MPa, noises generates and the valve cannot close up.

4.9.3.2 Control on other equipment.

Cooling tower: If the cooling tower is malfunction or the water temperature is abnormal, the system stops.

Boiler (or other heating equipment): Startup or shutdown of the boiler (or other heating equipment) should be controlled by water temperature setting.

Water pump of the system: The master water pump should be linked with the slave water pump to operate alternately and equalize the operation time. If the water flow switch of the system detects

any malfunction, master water pump will be switched to the salve water pump automatically. If the water flow cannot be restored yet, the system stops.

4.9.4 Water quality requirements.

The plate heat exchanger for ODU is designed in the brazed non-detachable structure. To prevent corrosion and scale deposit, water quality for plate heat exchanger should be specially controlled.

Recommend standards for cooling water, hot water and replenished water.

	Item	Unit	Cooling water system		Hot water system		Inclination	
			Circulating water	Replenished water	Circulating water	Replenished water	Corrosion	Scale deposit
Basic items	PH (25°C)	—	6.5-8.2	6.0-8.0	7.0-8.0	7.0-8.0	●	●
	Conductivity (25°C)	μS/cm	< 80	< 30	< 30	< 30	●	●
	Cl	mg(Cl-)/L	< 200	< 50	< 50	< 50	●	—
	SO	mg(SO_4^{2-})/L	< 200	< 50	< 50	< 50	●	—
	Acid consumption (PH4.8)	mg($CaCO_3$)/L	< 100	< 50	< 50	< 50	—	●
	Total hardness	mg($CaCO_3$)/L	< 200	< 70	< 70	< 70	—	●
	Calcium hardness	mg($CaCO_3$)/L	< 150	< 50	< 50	< 50	—	●
	Ionized silicon	mg(SiO_2)/L	< 50	< 30	< 30	< 30	—	●
Reference items	Fe	mg(Fe)/L	< 1.0	< 0.3	< 1.0	< 0.3	●	●
	Cu	(mg(Cu)/L	< 0.3	< 0.1	< 1.0	< 0.1	●	—
	Sulfate ion	mg(S^{2-})/L	Not detectable	Not detectable	Not detectable	Not detectable	●	—
	Ammonium ion	mg(NH_4^+)/L)	< 1.0	< 0.1	< 0.3	< 0.1	●	—
	Residual chlorine	mg(Cl^-)/L	< 0.3	< 0.1	< 1.0	< 0.1	●	—
	Free carbon dioxide	mg(CO_2)/L)	< 4.0	< 4.0	< 4.0	< 4.0	●	—
	Stability index	—	6.7-7.0	—	—	—	●	●

Remarks:

① In the “Corrosion” and “Scale deposit” columns, “●” means the factor related to corrosion or scale generation.

② The cooling water used for closed cooling tower, circulating water and replenished water of the closed loop should comply with water quality standards of hot water system; the dispersed water and its replenished water should comply with standards of the circulating chilled water system.

③ When the temperature is high (≥40°C), the corrosion is significant. Especially when the material is not provided with a protecting film or is in contact with water, it is preferred to adopt effective anticorrosive measures, e.g., add preservative and perform degasification.

④ User should not adopt open circulating water flow as which will result in corrosion.

4.9.5 System anti-freezing

The water temperature range for operation of the unit is 10°C to 50°C. When the water temperature is lower than 10°C, anti-freeze fluid (ethylene glycol) should be added; otherwise it will lead to poor heating effect or low pressure protection. More seriously, the plate heat exchanger may be crack due to the freeze up.

NOTE!

① If the application condition exceeds the operating range, please contact Gree.

② When the water temperature may be lower than or close to 0°C, ethylene glycol should be added to water for anti-freezing.

The table below provides the relations between the minimum ethylene glycol concentrations and the minimum ethylene glycol solution inlet temperatures:

Ethylene glycol solution inlet temperature °C	8	6	4	2	0	-2	-4	-6	-8
Minimum ethylene glycol concentration%	10	10	20	20	30	30	30	40	40

Due to product improvements, the unit performance parameters may change without prior notice. The specific parameters depend on the product nameplate.

The ethylene glycol concentration in the table is mass concentration.

After anti-freeze fluid is added, the low pressure protection value [Ts] for heating should be changed. Setting range is [-15°C ~5°C]. Setting method is as below:

After commissioning of the system, press the SW3 function key on the master unit so that the system enters the status for function selection. And press the SW1 upward selection key (▲) and SW2 downward selection key (▼) on master unit to select the corresponding function. [nC] indicates setting of the heating function at low water temperature, and the setting value is displayed on the digital tube LED2. Press the SW3 confirmation key to access setting of this function. The negative value display mode is switchover to display of “nE” and value in turn.

Note: The heating function (Ts=0°C) at low water temperature is unavailable at ex-factory state, and the system can implement the heating mode at the minimum water inlet temperature of 10°C. After anti-freeze fluid is added, [Ts] should be greater than the freezing point of the ethylene glycol solution concentration.

5 Check Items after Installation and Trial Run

5.1 Check Items after Installation

Check Item.	Possible Problems Caused by Improper Installation.	Check
Are the unit components installed securely?	The unit may fall, vibrate or generate noise.	
Is the leakage test performed?	The cooling capacity (or heating capacity) may be insufficient.	
Is thermal insulator getting prepared well for the unit?	Condensation and dripping may occur.	
Is the water drainage smooth?	Condensation and dripping may occur.	
Is the power voltage consistent with that indicated on the nameplate?	The unit may become malfunction or the parts may be burnt.	
Are the lines and pipes correctly installed?	The unit may become malfunction or the parts may be burnt.	
Is the unit safely earthed?	Electric leakage may occur.	
Is the power cord specified?	The unit may become malfunction or the parts may be burnt.	
Is there any obstacle blocking the water outlet or inlet of ODU?	The cooling capacity (or heating capacity) may be insufficient.	
Are the refrigerant pipe length and the refrigerant filling quantity recorded?	The filling quantity of refrigerant is not accurate.	
Are the address dialing and module number dialing of the outdoor module correct?	The unit cannot run and communication fault occurs.	
Is the address dialing and wired controller dialing of IDU correct?	The unit cannot run and communication fault occurs.	
Are the communication cables of the unit correctly connected?	The unit cannot run and communication fault occurs.	
Are the unit pipe connection and the on/off status of valves correct?	The unit cannot operate normally or the unit is damaged.	
Is the water flow direction of the unit heat exchanger correct?	The cooling performance becomes poor.	
Is the water flow switch correctly installed?	The unit cannot run and water flow switch exception protection occurs.	

5.2 Trial Run

NOTICE During debugging, only one IDU should be set as master IDU.

When no special requirement is necessary, setting functions is finish. Unit can operate according to ex-factory settings. When special requirement is needed, please refer to Service Manual or Debugging and Maintenance Manual for detail.

5.2.1 Preparation before trial run

(1) Do not power on the unit until all installation operations are completed.

(2) All control circuits and electric wires must be correctly and securely connected; valves of gas pipe and liquid pipe must be fully opened.

(3) All the objects like metal filing, thrum and clip should be cleared after installation.

(4) Check whether the unit appearance and pipeline system are damaged during transportation.

(5) Check whether the terminals of electrical appliances in the unit are securely connected and whether the phase sequence is correct.

(6) Check the on/off status of valves in the system to ensure that: in single modular mode, valves of gas pipe and liquid pipe are opened and oil balance valve is closed.

(7) Ensure that the adding of refrigerant through pipes is completed or at least 70% of the refrigerant filling quantity is added.

(8) Check whether the pipes for cooling water and chilled water are cleaned, whether impurities exist in places that connect the cooling tower and the water pool to the outside, and whether the water quality meets the requirements.

(9) Check whether the pressure gauge and thermometer on the water side are correctly connected: the pressure gauge should be installed perpendicularly to the water pipe, and the temperature sensor of the thermometer must be directly inserted into the water pipe.

(10) Inch the cooling water pump and chilled water pump to check the rotation direction of the water pumps. The water pump shall run clockwise; otherwise, check the water pump wiring again.

(11) Run the cooling water pump and chilled water pump. Check whether the water pressure is stable. Observe the inlet and outlet pressure of the water pump, the reading on the pressure gauge when the water pressure is stable, and the change in difference between inlet and outlet pressure.

(12) Check whether the auto water replenishment device of the cooling tower/expansion water tank can ensure smooth water replenishment, and check whether the automatic air discharge valve is functional. In case of manual air discharge valve, open the air discharge valves of the cooling water pipe and chilled water pipe to discharge all air in the pipe.

(13) Check and ensure that the cooling tower fan and other devices are functional without abnormal noises. Check and ensure proper tightness of the fan belt to make sure that the belt connecting the fan and the motor does not slip during operation and no abnormal noise is generated.

5.2.2 Trial run

(1) Before commissioning, ensure that the electric compressor of the unit has been preheated for at least 8 hours. Only after verifying that preheating is normal by touching the compressor with a hand to confirm, the operator can start the commissioning; otherwise, the compressor may be damaged. Commissioning must be performed by professional technicians or under the guidance of professional technicians.

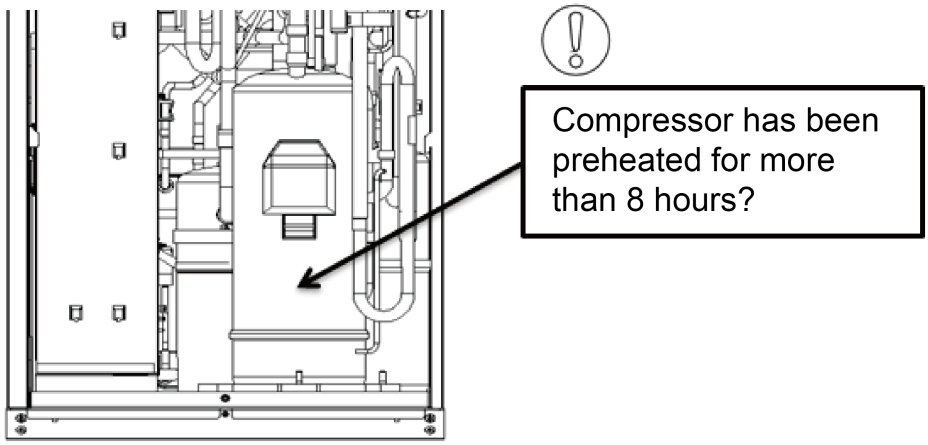


Fig.5.2.1

(2) When debugging starts, system will operate according to the ambient temperature.

1) When water inlet temperature of master ODU ≥20°C (68°F), debugging shall be in cooling mode.
2) When water inlet temperature of master ODU <20°C (68°F), debugging shall be in heating mode.

(3) Before debugging, confirm whether the cut-off valves of each basic module are fully open again.

(4) During debugging, water pipe should be installed and water flow should be within 2.0~9.5 m^3/h(8.8~41.8gpm).

(5) Before commissioning, check and ensure that the adding of refrigerant through pipes is completed or at least 70% of the refrigerant filling quantity is added. (For the refrigerant filling method, refer to the Installation Manual.).

(6) Descriptions about different messages displayed during commissioning processes are listed in the following table.

Description of each stage of debugging progress							
—	Debugging code		Progress code		Status code		Meaning
Progress	LED1		LED2		LED3		
	Code	Display status	Code	Display status	Code	Display status	
01_ Set master unit	db	On	01	On	A0	On	System is not debugged.
	db	On	01	On	CC	On	Master unit hasn't been set.
	db	On	01	On	CF	On	Master unit is two or more. Please make it correct.
	db	On	01	On	OC	On	Master unit has been set successfully. Go to next step automatically.
02_ Allocate addresses	db	On	02	On	Ad	Blink	System is allocating address.
	db	On	02	On	L7	Blink	No master indoor unit. Please the maser indoor unit. If master indoor unit is not set within 1min, system will set it randomly.
	db	On	02	On	OC	On	Address allocation is finished. Go to next step automatically.
03_Confirm the quantity of module	db	On	03	On	01~04	Blink	LED3 indicates the quantity of module. In this case, please confirm whether the quantity is correct manually by pressing SW3.
	db	On	03	On	OC	On	System has confirmed the quantity of module. Go to next step automatically.
04_Confirm the quantity of IDU	db	On	04	On	01~80	Blink	LED3 indicates the quantity of IDU. In this case, please confirm whether the quantity is correct manually by pressing SW3.
	db	On	04	On	OC	On	System has confirmed the quantity of IDU. Go to next step automatically.

Description of each stage of debugging progress							
—	Debugging code		Progress code		Status code		Meaning
Progress	LED1		LED2		LED3		
	Code	Display status	Code	Display status	Code	Display status	
05_Internal communication detection	db	On	05	On	C2	On	Communication error between master ODU and inverter compressor driver.
	db	On	05	On	CH	On	Rated capacity ratio between IDU and ODU is too high.
	db	On	05	On	CL	On	Rated capacity ratio between IDU and ODU is too low.
	db	On	05	On	OC	On	System detection is finish. Go to next step automatically.
06_Detect outdoor components	db	On	06	On	Related error code	On	System detects error on outdoor components.
	db	On	06	On	OC	On	System detects no error on outdoor components. Go to next step automatically.
07_Detect indoor components	db	On	07	On	XXXX/ Related error code	On	System detects error on indoor components. XXXX means the project code of error IDU. 3s later, related error code will be displayed. For example, if no.100 IDU has d5 error, then the LED3 will display alternately as below: 01(2s later), 00(2s later), d5.
	db	On	07	On	OC	On	System detects no error on indoor components. Go to next step automatically.
08_Confirm preheated compressor	db	On	08	On	U0	On	Preheat time for compressor is less than 8 hours.
	db	On	08	On	OC	On	Compressor has been preheated for 8 hours. Go to next step automatically.
09_Refrigerant amount judgments before startup	db	On	09	On	U4	On	System is lack of refrigerant. System stops with balance equalizing pressure lower than 0.3Mpa.
	db	On	09	On	OC	On	Refrigerant amount is normal. Go to next step automatically.
10_Status judgments of outdoor valves before startup	db	On	10	On	ON	On	Outdoor valves state is being inspected.
	db	On	10	On	U6	On	Outdoor valves are not fully opened.
	db	On	10	On	OC	On	Outdoor valves open normally.
11_Calculate refrigerant charging amount state manually	db	On	11	On	AE	On	The refrigerant charging amount state is manual calculation state (additional refrigerant charging amount should be calculated correctly).
12_Confirm debugging startup	db	On	12	On	AP	Blink	Ready for units to start debugging.
	db	On	12	On	AE	On	The unit has been set in debugging operation state of manual calculation of refrigerant charging amount.

Description of each stage of debugging progress							
—	Debugging code		Progress code		Status code		Meaning
Progress	LED1		LED2		LED3		
	Code	Display status	Code	Display status	Code	Display status	
13_	—	—	—	—	—	—	No meaning.
14_	—	—	—	—	—	—	No meaning.
15_Cooling debugging	db	On	15	On	AC	On	Debugging for cooling mode. (Debugging operation mode, the system will select automatically, no need manually setting).
	db	On	15	On	Related error code	On	Malfunction occurs at debugging for cooling mode.
	db	On	15	On	J0	On	Malfunction of other module occurs at debugging for cooling mode.
	db	On	15	On	U9	On	Pipeline or valve of outdoor unit is faulty.
	db	On	15	On	XXXX/ U8	On	System detects error on indoor pipeline. XXXX means the project code of IDU with error. 3s later, U8 will be displayed. For example, if no.100 IDU has U8 error, then the LED3 will display alternately as below: 01(2s later), 00(2s later), U8.
16_Heating debugging	db	On	16	On	AH	On	Debugging for heating mode. (Debugging operation mode, the system will select automatically with no need manually setting).
	db	On	16	On	Related error code	On	Malfunction occurs at debugging for heating mode.
	db	On	16	On	J0	On	Malfunction of other module occurs at debugging for heating mode.
	db	On	16	On	U9	On	Pipeline or valve of outdoor unit is faulty.
	db	On	16	On	XXXX/ U8	On	System detects error on indoor pipeline. XXXX means the project code of IDU with error. 3s later, U8 will be displayed. For instance, if no.100 IDU has U8 error, then the LED3 will display alternately as below: 01(2s later), 00(2s later), U8.
17_Debugging completion status	01~04	On	OF	On	OF	On	Debugging operation has been finish and the unit is in standby state. LED1 displays module address. LED2 and LED3 display “OF”.

5.2.2.2 Debugging operation mode

Gree Water-cooled Multi VRF System has two debugging modes: one is direct operation on main board of outdoor units, and second is PC operation via special software. In PC software debugging, indoor/outdoor parameters can be displayed and historical data can be recorded and inquired.

(Operation details can be found in relevant instruction manuals).

Debugging through operation on main board of outdoor units.

In this debugging mode, following debugging functions are included on the main board:

Step 1: Water pipe should be installed and water flow should be within 2.0~9.5m³/h (8.8~41.8gpm). Open the debugging window of each basic module;

Step 2: Power off all outdoor units and set one module as master. Setting methods is shown in Master Unit Setup SA8_MASTER_S.

Step 3: Power on all indoor units, then all outdoor modules will display “Debugging not enabled”.

Step 4: Find out the module with “01” module address, which means master module. Press SW3 button on the master module for at least 5s and release to enable debugging.

Step 5: System will start progress 01 and 02; in progress 01, if master unit is not set correctly, progress 01 shows the following errors.

—	Debugging Code		Progress Code		Status Code		Meaning
Progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
01_01 Set up master unit:	db	ON	01	ON	CC	ON	No master unit.
	db	ON	01	ON	CF	ON	More than 2 master units are set.
	db	ON	01	ON	OC	ON	Master unit setting success. Go to next progress.

According to the above errors, reset the master unit as instructed in Master Unit Setup SA8_MASTER_S. After reset is finished, start debugging again.

Step 6: in progress 03, the quantity of modules should be confirmed manually. Main board of each module displays.

—	Debugging code		Progress code		State code	
Progress	LED1		LED2		LED3	
	Code	Display state	Code	Display state	Code	Display state
03_Quantity of modules	db	ON	03	ON	Quantity of modules	blink

If the displayed quantity is the same as actual quantity, then press SW3 button on the master unit to confirm it. System will go to next progress.

—	Debugging code		Progress code		Status code	
Progress	LED1		LED2		LED3	
	Code	Display state	Code	Display state	Code	Display state
03_Confirm the quantity of modules	db	ON	03	ON	OC	ON

If the displayed quantity is different from actual quantity, power off the whole system and check whether connection of communication wire among each module is correct. After checking, start debugging again.

Step 7: in progress 04, the quantity of IDUs should be confirmed manually. Main board of each module displays.

—	Debugging code		Progress code		State code	
Progress	LED1		LED2		LED3	
	Code	Display state	Code	Display state	Code	Display state
04_Confirm the quantity of IDUs	db	ON	04	ON	Quantity of connected IDUs	blink

If the displayed quantity is the same as actual quantity, then press SW3 button on the master unit to confirm it. System will go to next progress.

—	Debugging code		Progress code		Status code	
Progress	LED1		LED2		LED3	
	Code	Display state	Code	Display state	Code	Display state
04_Confirm the quantity of IDUs	db	ON	04	ON	OC	ON

If the displayed quantity is different from actual quantity, power off the whole system and check whether connection of communication wire among each IDU is correct. After checking, start debugging again.

Step 8: progress 05 is “Detect internal communication”

If no error is detected, system displays as below and go to next progress.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
05_Detect internal communication	db	ON	05	ON	OC	ON	Detection is finished. Go to next progress.

If error is detected, system stays at current progress. Error has to be solved manually. Below are relevant errors:

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
05_Detect internal communication	db	ON	05	ON	C2	ON	System detects “driven communication error between PCB and inverter compressor driven board”.
	db	ON	05	ON	CH	ON	IDU/ODU “high proportion of rated capacity”.
	db	ON	05	ON	CL	ON	IDU/ODU “low proportion of rated capacity”.

Elimination methods of above errors can be found in Troubleshooting.

Step 9: progress 06 is “Detect outdoor components”

If no error is detected, system will display as below and then start next progress.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
06_Detect outdoor components	db	ON	06	ON	OC	ON	No error is detected in outdoor components. Start next progress.

If error is detected, system stays at current progress. Error has to be solved manually. Below is relevant error:

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
06_Detect outdoor components	db	ON	06	ON	Error code	ON	System detects error in outdoor components.

Elimination methods of above error can be found in Troubleshooting.

Step10: progress 07 is “Detect indoor components”

If no error is detected, system displays as below and go to next progress.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
07_Detect indoor components	db	ON	07	ON	OC	ON	No error is detected in indoor components. Go to next progress.

If error is detected, system stays at current progress. Error has to be solved manually. Below is relevant error:

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
07_Detect indoor components	db	ON	07	ON	XXXX or Error code	ON	System detects error in indoor components.

XXXX is the project no. of the faulted IDU. 3s later, relevant error code is displayed. For example, IDU no. 100 has d5 error, then LED3 displays: 01 (2s later) 00 (2s later) d5, and repeat again.

Elimination methods of above error can be found in Troubleshooting.

Step 11: progress 08 is “Confirm preheated compressor”

If more than 8h of preheat time is detected, system displays as below and go to next progress.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
08_Confirm preheated compressor	db	ON	08	ON	OC	ON	Preheat time for compressor is 8h or more. Go to next progress.

If less than 8h of preheat time is detected, system shows error alarm and display as below. Then press SW3 button to skip the waiting time and go to next progress. But this action will cause force start of the compressor, which may damage the compressor.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
08_Confirm preheated compressor	db	ON	08	ON	UO	ON	Preheat time for compressor is less than 8h.

Step 12: progress 09 is “Refrigerant judgments before startup”

If the refrigerant quantity inside the system meets the requirement of operation startup, system will display as below and go to next progress.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
09_Refrigerant judgments before startup	db	ON	09	ON	OC	ON	System refrigerant is normal. Go to next progress.

If there’s no or not enough refrigerant in the system to meet the requirement of operation startup, system displays U4 “refrigerant shortage protection” and fails to go to next progress. Then check leakage or charge refrigerant until error eliminated.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
09_Refrigerant judgments before startup	db	ON	09	ON	O4	ON	System refrigerant is not enough. System pressure is lower than 0.3MPa (4-2/5psig).

Step 13: progress 10 is “State judgments of outdoor valves before start up”

If master unit displays below, state judgments are enabled.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
10_State judgments of outdoor valves before startup	db	ON	10	ON	ON	ON	Outdoor valves are opened.

If unit detects that valve state is abnormal, display as below:

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
10_State judgments of outdoor valves before startup	db	ON	10	ON	U6	ON	Outdoor valves are not fully opened.

Check the gas and liquid valves whether they are fully opened. After checking, press SW4 return button to restart the judgments.

If detects the valve state is normal, display as below and go to next progress.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
10_State judgments of outdoor valves before startup	db	ON	10	ON	OC	ON	Outdoor valves are opened.

Step 14: progress 11 is “Calculate refrigerant amount manually”

No need to operate. System goes to next progress.

Step 15: progress 12 is “Confirm debugging startup”

In order to make sure all preparation work is finish before startup, this step is to confirm the startup again. Operation is as below.

If master unit displays as below, system is waiting for confirmation signal.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
12_State judgments of outdoor valves before startup	db	ON	12	ON	AP	Blink	Ready for units to start debugging.

If it’s confirmed, press SW3 button. Unit displays as below and go to next progress.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
12_State judgments of outdoor valves before startup	db	ON	12	ON	AE	ON	Manual calculation of refrigerant amount.

Step 16: After unit confirm to start debugging, system select cooling/heating mode according to water inlet temperature.

A If cooling mode is selected, relevant display is as below.

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
15_Cooling debugging	db	ON	15	ON	AC	ON	Debugging is enabled in cooling mode (debugging mode, auto-selected by system).
	db	ON	15	ON	Error code	ON	Error occurs during debugging in cooling mode.
	db	ON	15	ON	J0	ON	Error of other modules occurs during debugging in cooling mode.
	db	ON	15	ON	U9	ON	Outdoor pipeline and valves are abnormal.
	db	ON	15	ON	XXXX /U8	ON	System detects error in indoor pipeline. XXXX is the project no. of the faulted IDU. 3s later, error code U8 is displayed. For example, IDU no. 100 has U8 error, then LED3 displays like this: 01 (2s later) 00 (2s later) U8, and repeat again.

B If heating mode is selected, relevant display is as below:

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
16_Heating debugging	db	ON	16	ON	AE	ON	Debugging is enabled in heating mode (debugging mode, auto-selected by system).
	db	ON	16	ON	Error code	ON	Error occurs during debugging in heating mode.
	db	ON	16	ON	J0	ON	Error of other modules occurs during debugging in heating mode.
	db	ON	16	ON	U9	ON	Outdoor pipeline and valves are abnormal.
	db	ON	16	ON	XXXX /U8	ON	System detects error in indoor pipeline. XXXX is the project no. of the faulted IDU. 3s later, error code U8 is displayed. For example, IDU no. 100 has U8 error, then LED3 displays like this: 01 (2s later) 00 (2s later) U8, and repeat again.

Step 17: if there's no error during operation for about 40mins, system automatically confirms that debugging is finished and then stop. System resumes standby mode and displays as below:

—	Debugging code		Progress code		State code		Meaning
progress	LED1		LED2		LED3		
	Code	Display state	Code	Display state	Code	Display state	
17_Debugging finished	01-04	ON	OF	ON	OF	ON	Debugging is finished. System is on standby mode. LED1 displays module address. LED2 and LED3 display "OF".

Step 18: after debugging is finished, some functions can be set according to project's actual needs. For specific details, please refer to System Functions Setup. If no special requirement, skip this step.

Step 19: deliver the product to user and inform user about usage precautions.

5.2.3 Appendix: judgment reference of normal operational parameters

Reference of Debug Parameters of Water-cooled Multi VRF System					
No.	Debug item		Parameter name	Unit	Reference
1	System parameters	ODU	Discharge tube temp. of compressor 1	°C (°F)	■ When system compressor starts up, temp. of discharge tube or casing top in cooling mode is within 70~95°C (158~203°F), and at least 5°C(9°F) higher than system high pressure saturation temp.; Temp. in heating mode is within 65~80°C(149~176°F), and at least 5°C(9°F) higher than system high pressure saturation temp. ■ When inverter compressor starts but inverter compressor 2 stops, the discharge tube temperature of inverter compressor 2 is almost the same with ambient temp.
2			Casing top temp. of compressor 1	°C (°F)	
3			Discharge tube temp. of compressor 2	°C (°F)	
4			Casing top temp. of compressor 2	°C (°F)	
5			Condensing temp.	°C (°F)	■ System's normal condensing temp value is within 20~25°C(68~77°F) According to the change in water temp. and system operational capacity, condensing temp value is 5~20°C(9~36°F) higher than water temp. The higher water temp is, the smaller temp. difference is. ■ When water temp. is 25~35°C(77~95°F), condensing temp value in cooling mode is 30~45°C(86~113°F). ■ When water temp is 15~25°C(59~77°F), condensing temp value in heating mode is 40~52°C(104~125.6°F).
6			Evaporating temp.	°C(°F)	■ When water temp. is 25~35°C(77~95°F), evaporating temp value in cooling mode is 0~8°C(32~46.4°F). ■ When water temp is 15~25°C(59~77°F), evaporating temp value in heating mode is 5~10°C(41~50°F).
7			Opening angle of heating EXV	PLS	■ In cooling mode, heating electronic expansion valve remains 3000PLS. ■ In heating mode, the opening angle of adjustable electronic expansion valve varies within 200~2500PLS.
8			Operating freq. of compressor 1	Hz	Varies from 15Hz to 100Hz.
9			Current. of compressor 1	A	According to different operating freq. and different load, current will vary from 7A to 40A.
10			IPM temp of compressor 1	°C(°F)	When water temp is lower than 45°C(113°F), IPM temp is below 85°C(185°F). Highest temp won't be above 95°C(203°F).
11			Compressor 1 driven bus voltage	V	Normal bus voltage is 1.414 times of power voltage. For example, if 3-phase power voltage is 220V, then the bus voltage after rectification is: 220V×1.414=311V. It's normal if actual voltage varies 15v from the calculated voltage.
12			Operating freq. of compressor 2(if exist)	Hz	Varies from 15Hz to 100Hz.

Reference of Debug Parameters of Water-cooled Multi VRF System					
No.	Debug item		Parameter name	Unit	Reference
13	System parameters	ODU	Current of compressor 2(if exist)	A	According to different operating freq. and different load, current will vary from 7A to 25A.
14			IPM temp of compressor 2(if exist)	°C(°F)	When water temp is lower than 45°C(113°F), IPM temp is below 85°C(185°F). Highest temp won't be above 95°C(203°F).
15			Compressor 2 driven bus voltage(if exist)	V	Normal bus voltage is 1.414 times of power voltage. For example, if 3-phase power voltage is 220V, then the bus voltage after rectification is: 220V×1.414=311V. It's normal if actual voltage varies 15v from the calculated voltage.
16			Inlet tube temp of indoor heat exchanger	°C(°F)	■ According to different ambient temp, for a same IDU under cooling mode, inlet tube temp will be 1~7°C(33.8~44.6°F) lower than outlet tube temp. ■ For a same IDU under heating mode, inlet tube temp will be 10~20°C(50~68°F) lower than outlet tube temp.
17			Outlet tube temp of indoor heat exchanger	°C(°F)	
18			Opening angle of indoor EXV	PLS	Adjusts opening angle automatically in 200~2000PLS or 70~480PLS.
19	Communi-cation parameter	Communication data		—	Quantity of IDU and ODU detected by software is the same as actual quantity. No communication error.
20	Drainage system	—		—	IDU drains water out completely and smoothly. Condensate pipe has no backward slope of water. Water of ODU can be drained completely through drainage pipe. No water drop from unit base.
21	Others	—		—	Compressor and indoor fan motor has no strange noise. Unit operates normally.

6 Common Malfunction and Troubleshooting

Check the following items before contacting for repair.

Phenomenon	Reason	Measure
The unit doesn't run.	No power supply.	Connect to power supply.
	Voltage too low.	Check whether the voltage is within rating range.
	Broken fuse or breaker trips off.	Replace fuse or connect breaker.
	Insufficient energy of remote controller.	Replace new battery.
	Remote controller beyond control scope.	Control scope is within 8m.
Unit runs but stop immediately	Air intake or outlet of indoor unit is blocked.	Remove obstruction.
Abnormal cooling or heating	Air intake or outlet of indoor unit is blocked.	Remove obstruction.
	Improper temperature setting.	Adjust setting at wireless remote controller or wired controller.
	Fan speed is setting too low.	Adjust setting at wireless remote controller or wired controller.
	Wind direction is not correct.	Adjust setting at wireless remote controller or wired controller.
	Door or windows are opened.	Close the door or windows.
	Direct sunshine.	Draw curtain or shutter.
	Too many people in the room.	—
	Too many heat resources in the room.	Reduce heat resources.
	Filter is blocked for dirt.	Clean the filter.

⚠WARNING
(1) When installing remote monitor or central controller, displacement on indoor units' project codes should be set. Otherwise, collision malfunction of the project codes may happen. For detail operation methods, please refer to the Water-cooled Multi VRF System Installation and Maintenance Manual.
(2) If problem cannot be solved after checking above items, please contact Gree service center and show phenomena and models.

Following phenomena are not malfunction.

Malfunction		Reason
Unit doesn't operate	Unit doesn't starts up after it is just being turned off.	Overload protection switch makes it run after 3 minutes delay.
	When power is turned on.	Standby operating for about 1 minute.
Mist comes from the unit	Under cooling.	Indoor high humidity air is cooled rapidly.
Noise is emitted	Slight cracking sound is generated when just turned on.	Electronic expansion valve initialization.
	There is consecutive sound when cooling.	That's sound for gas refrigerant flowing in unit.
	There is sound when unit starts or stops.	That's sound for gas refrigerant stops to flow.
	There is slight and consecutive sound when unit is running or after running.	That's sound for operation of drainage system.
	Cracking sound is heard when unit is operating and after operating.	That's sound caused by expansion of panel and other parts due to temperature change.
The unit blows out dust	When unit runs after no operation for a long period.	Dust in indoor unit is blew out.
The unit emits odor	Operating.	The room odor absorbed by the unit is blew out again.
Indoor unit still runs after switch off	After every indoor unit receive "stop" signal, fan will keep running.	Indoor fan motor will keep running 20-70s so as to take good use of excess cooling and heating and prepare for next operation.

7 Error Indication

Inquiry method of error indication: combine division symbol and content symbol to check the corresponding error.

Indoor:

Error Code	Content	Error Code	Content
L0	Malfunction of IDU.	d2	Malfunction of lower water temperature sensor of water tank.
L1	Protection of indoor fan.	d3	Malfunction of indoor ambient temperature sensor.
L2	Auxiliary heating protection.	d4	Malfunction of refrigerant in-tube temperature sensor.
L3	Water-full protection	d6	Malfunction of refrigerant out-tube temperature sensor.
L4	Abnormal power supply for wired controller.	d7	Malfunction of humidity sensor.
L5	Freeze prevention protection.	d8	Malfunction of water temperature sensor.
L7	No master IDU.	d9	Malfunction of jumper cap.
L8	Insufficient of power supply.	dA	Web address of IDU abnormal.
L9	For single control over multiple units, number of IDU is inconsistent.	dH	PCB of wired controller abnormal.

Error Code	Content	Error Code	Content
LA	For single control over multiple units, IDU series is inconsistent.	dC	Setting capacity of DIP switch code is abnormal.
LH	Alarm due to bad air quality.	dL	Malfunction of air outlet temperature sensor.
LC	IDU is not matching with outdoor unit.	dE	Malfunction of indoor CO_2 sensor.
LL	Malfunction of water flow switch.	dF	Malfunction of upper water temperature sensor of water tank.
LE	Rotation speed of EC DC water pump is abnormal.	dJ	Malfunction of backing water temperature sensor.
LF	Malfunction of water shunt valve setting.	dP	Malfunction of inlet tube temperature sensor of generator.
LJ	Setting of functional DIP switch code is wrong.	dU	Malfunction of drainage pipe temperature sensor of generator.
LP	Zero-crossing malfunction of PG motor.	db	Debugging status.
LU	Indoor unit's branch is not inconsistent for one-to-more unit of heat recovery system.	dd	Malfunction of solar power temperature sensor.
d1	Indoor PCB is abnormal.	dn	Malfunction of swing parts.

Outdoor:

Error Code	Content	Error Code	Content
E0	Malfunction of ODU.	FH	Electric current sensor of compressor 1 is abnormal.
E1	High-pressure protection.	FC	Electric current sensor of compressor 2 is abnormal.
E2	Discharge low-temperature protection.	FL	Electric current sensor of compressor 3 is abnormal.
E3	Low-pressure protection.	FE	Electric current sensor of compressor 4 is abnormal.
E4	High discharge temperature protection of compressor.	FF	Electric current sensor of compressor 5 is abnormal.
J0	Protection for other modules.	FJ	Electric current sensor of compressor 6 is abnormal.
J1	Over-current protection of compressor 1.	FP	Malfunction of DC motor.
J2	Over-current protection of compressor 2.	FU	Malfunction of casing top temperature sensor of compressor 1.
J3	Over-current protection of compressor 3.	Fb	Malfunction of casing top temperature sensor of compressor 2.
J4	Over-current protection of compressor 4.	Fd	Malfunction of refrigerant out tube temperature sensor of mode exchanger.
J5	Over-current protection of compressor 5.	Fn	Malfunction of refrigerant in tube temperature sensor of mode exchanger.
J6	Over-current protection for compressor 6.	b1	Malfunction of outdoor ambient temperature sensor.
J7	Gas-mixing protection of 4-way valve.	b2	Malfunction of defrosting temperature sensor 1.
J8	High pressure ratio protection of system.	b3	Malfunction of defrosting temperature sensor 2.
J9	Low pressure ratio protection of system.	b4	Malfunction of liquid-out temperature sensor of sub-cooler.
JA	Protection because of abnormal pressure.	b5	Malfunction of gas-out temperature sensor of sub-cooler.
JC	Water flow switch protection.	b6	Malfunction of inlet tube temperature sensor of vapor liquid separator.
JL	Protection because high pressure is too low.	b7	Malfunction of outlet tube temperature sensor of vapor liquid separator.
JE	Oil-return pipe is blocked.	b8	Malfunction of outdoor humidity sensor.

Error Code	Content	Error Code	Content
JF	Oil-return pipe is leaking.	b9	Malfunction of gas temperature sensor of heat exchanger inlet.
bd	Malfunction of gas-in temperature sensor of sub-cooler.	by	Malfunction of water-out of heat exchanger.
P0	malfunction of driving board of compressor.	bA	Malfunction of oil-return temperature sensor 1.
P1	Driving board of compressor operates abnormally.	bH	Clock of system is abnormal.
P2	Voltage protection of driving board power of compressor.	bE	Malfunction of inlet tube temperature sensor of condenser.
P3	Reset protection of driving module of compressor.	bF	Malfunction of outlet tube temperature sensor of condenser.
P4	Drive PFC protection of compressor.	bJ	High-pressure sensor and low-pressure sensor are connected reversely.
P5	Over-current protection of inverter compressor.	bP	Malfunction of temperature sensor of oil-return 2.
P6	Drive IPM module protection of compressor.	bU	Malfunction of temperature sensor of oil return 3.
P7	Malfunction of drive temperature sensor of compressor.	bb	Malfunction of temperature sensor of oil return 4.
P8	Drive IPM high temperature protection of compressor.	H0	Malfunction of driving board of fan.
P9	Desynchronizing protection of inverter compressor.	H1	Driving board of fan operates abnormally.
PA	Malfunction of drive storage chip of compressor.	H2	Voltage protection of driving board power of fan.
PH	High-voltage protection of compressor's drive DC bus bar.	H3	Reset protection of driving module of fan.
PC	Malfunction of current detection circuit drive of compressor.	H4	Drive PFC protection of fan.
PL	Low voltage protection for DC bus bar of drive of compressor.	H5	Over-current protection of inverter fan.
PE	Phase-lacking of inverter compressor.	H6	Drive IPM module protection of fan.
PF	Malfunction of charging loop of driven of compressor.	H7	Malfunction of drive temperature sensor of fan.
PJ	Failure startup of inverter compressor.	H8	Drive IPM high temperature protection of fan.
PP	AC current protection of inverter compressor.	H9	Desynchronizing protection of inverter fan.
PU	AC input voltage of drive of inverter compressor.	HA	Malfunction of drive storage chip of inverter outdoor fan.
F0	Main board of ODU is poor.	HH	High-voltage protection of fan's drive DC bus bar.
F1	Malfunction of high-pressure sensor.	HC	Malfunction of current detection circuit of fan drive.
F3	Malfunction of low-pressure sensor.	HL	Low voltage protection of bus bar of fan drive.
F5	Malfunction of discharge temperature sensor of compressor 1.	HE	Phase-lacking of inverter fan.
F6	Malfunction of exit-tube temperature sensor.	HF	Malfunction of charging loop of fan drive.
F7	Malfunction of humidity sensor.	HJ	Failure startup of inverter fan.
F8	Malfunction of water temperature sensor.	HP	AC current protection of inverter fan.
F9	Malfunction of jumper cap.	HU	AC input voltage of drive of inverter fan.
FA	Web address of IDU is abnormal.	Fy	Malfunction of water-in of heat exchanger.

Debugging:

Error Code	Content	Error Code	Content
U0	Preheat time of compressor is insufficient.	C6	Alarm because ODU quantity is inconsistent.
U2	Wrong setting of ODU's capacity code/jumper cap.	C7	Abnormal communication of converter.
U3	Power supply phase sequence protection.	C8	Emergency status of compressor.
U4	Refrigerant-lacking protection.	C9	Emergency status of fan.
U5	Wrong address for driving board of compressor.	CA	Emergency status of module.
U6	Alarm because valve state is abnormal.	CH	Rated capacity is too high.
U8	Malfunction of pipeline for IDU.	CC	No main unit.
U9	Malfunction of pipeline for ODU.	CL	The matching ratio of rated capacity for IDU and ODU is too low.
UC	Setting of main IDU success.	CE	Communication malfunction between mode exchanger and IDU.
UL	Emergency operation DIP switch code of compressor is wrong.	CF	Malfunction of multiple main control units.
UE	Charging of refrigerant is invalid.	CJ	Address DIP switch code of system is shocking.
UF	Identification malfunction of IDU of mode exchanger.	CP	Malfunction of multiple wired controller.
C0	Communication malfunction between IDU, ODU and IDU's wired controller.	CU	Communication malfunction between IDU and the receiving lamp.
C1	Communication malfunction between main control and DC-DC controller.	Cb	Overflow distribution of IP address.
C2	Communication malfunction between main control and inverter compressor driver.	Cd	Communication malfunction between mode exchanger and ODU.
C3	Communication malfunction between main control and inverter fan driver.	Cn	Malfunction of network for IDU and ODU of mode exchanger.
C4	Malfunction of lack of IDU.	Cy	Communication malfunction of mode exchanger.
C5	Alarm because project code of IDU is inconsistent.	JJ	Low temperature protection of inlet tube.

Status:

Error Code	Content	Error Code	Content
A0	Unit waiting for debugging.	Ay	Shielding status.
A2	Refrigerant recovery operation of after-sales.	n0	SE operation setting of system.
A3	Defrosting.	n3	Compulsory defrosting.
A4	Oil-return.	n4	Limit setting for max. capacity/output capacity.
A6	Heat pump function setting.	n5	Compulsory excursion of engineering code of IDU.
A7	Quiet mode setting.	n6	Inquiry of malfunction.
A8	Vacuum pump mode.	n7	Inquiry of parameters.
AH	Heating.	n8	Inquiry of project code of IDU.
AC	Cooling.	n9	Check quantity of IDU on line.
AL	Charge refrigerant automatically.	nA	Heat pump unit.
AE	Charge refrigerant manually.	nH	Heating only unit.
AF	Fan.	nC	Cooling only unit.
AJ	Cleaning reminding of filter.	nE	Negative code.
AP	Debugging confirmation when starting up the unit.	nF	Fan model.

Error Code	Content	Error Code	Content
AU	Long-distance emergency stop.	nJ	High temperature prevention when heating.
Ab	Emergency stop of operation.	nU	Eliminate the long-distance shielding command of IDU.
Ad	Limit operation.	nb	Bar code inquiry.
An	Child lock status.	nn	Length modification of connection pipe of ODU.

NOTICE For detailed malfunction and maintenance, please refer to the engineering debugging and after-sales maintenance manual.

8 Maintenance and Care

Regular checking, Maintenance and care should be performed every six months by professional personnel, which will prolong the unit life span. Disconnect the power supply before cleaning and maintenance.

8.1 Outdoor Heat Exchanger

After long-term running, accumulation of calcium oxide or other mineral sediments can be found on the heat transfer surface on the water side of the outdoor unit's heat exchanger. The scale formation of these minerals may affect the heat transfer performance and lead to higher air discharge pressure and more electrical energy consumption, as well as chilled water freezing due to reduced flow. To maintain the outdoor heat exchanger, do as follows:

(1) Check the water system on a regular basis, including water quality inspection, filter cleaning, confirmation of inlet and outlet water temperature difference and the check of water pressure.

(2) To clean the outdoor heat exchanger, use 5% dilute phosphoric acid, citric acid or other weak acid as the detergent. Highly corrosive strong acid cannot be adopted.

(3) Inject the 50~60°C(122~140°F) detergent in the opposite direction of the normal flow. Set the flow rate 1.5 times of the normal one and keep the circulation for 2~5 hours.

(4) Discharge the detergent from the outdoor heat exchanger. Then, inject 1~2% sodium hydroxide or sodium bicarbonate water solution and circulate for 20~30 minutes to neutralize the acid of the detergent.

(5) After neutralization, use clean water to clean the outdoor heat exchanger.

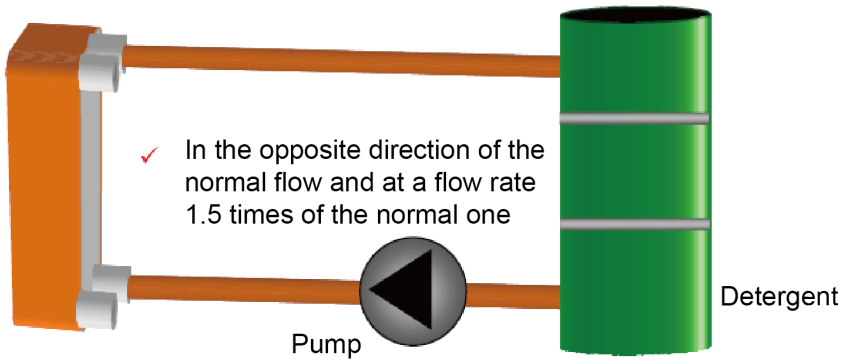


Fig.8.1.1

8.2 Drain Pipe

Regularly check if the drain pipe is clogged in order to drain condensate smoothly.

8.3 Notice before Seasonal Use

(1) Check whether the inlet/outlet of the indoor unit is clogged.
(2) Check whether the ground wire is earthed reliably.
(3) Check whether battery of remote wireless controller has been replaced.
(4) Check whether the water pipeline and water flow is abnormal.
(5) Check whether the filter screen has been set soundly.
(6) After long period of shutdown, power on for 8 hours and remain standby mode before start up the unit so as to preheat the compressor crankcase.
(7) Check whether the outdoor unit is installed firmly. If there is something abnormal, please contact the GREE appointed service center.

8.4 Maintenance after Seasonal Use

(1) Power off the unit.
(2) Clean filter screen and indoor units.
(3) Release all water inside the water pipeline and heat exchanger.
(4) Clean the dust and sundries on the indoor and outdoor units.
(5) In the event of rusting, use the anti-rust paint to stop spreading of rust.

8.5 Parts Replacement

Purchase parts from Gree appointed service center or dealer if necessary.

NOTE!

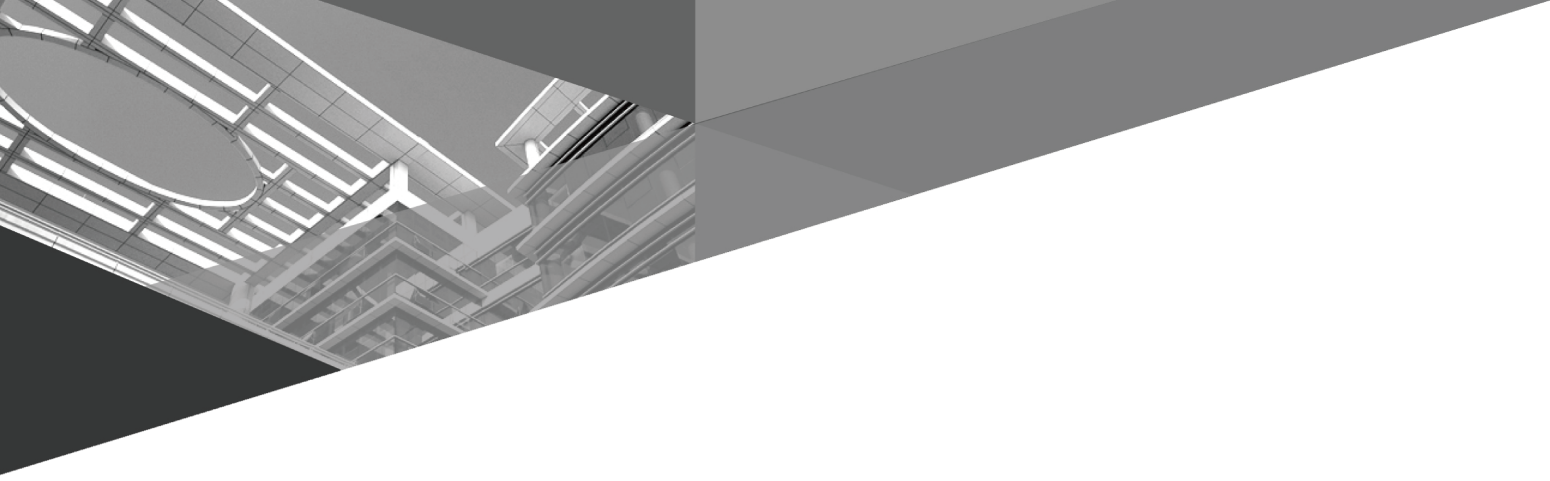
During airtight and leakage test, pay attention NO mix the oxygen, ethyne and other dangerous gas into refrigeration cycle. For safety, it is better to use nitrogen or refrigerant to accomplish such test.

9 After-sales Service

In case the air-conditioning unit you bought has any quality problem or you have any question, please contact local Gree after-sales service agency.

Warranty should meet the following requirements:

(1) The initial startup of the unit should be performed by the professional maintenance personnel from Gree maintenance service center or people from a company authorized by Gree.
(2) Only the spare parts provided by Gree can be used.
(3) All the instructions listed on this manual should be followed.
(4) Warranty is automatically invalid if not obey any item mentioned above.



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