ULTRA HEAT GMV MULTI VRF UNIT

——Heat Pump Series

CAPACITY RANGE: 21.1~28.1KW(72~96kBtu/h)

OPERATING RANGE:

COOLING: -10~52 ℃(14~125.6℉)

HEATING: -30~24 ℃(-22~75.2℉)

R410A

GREE ELECTRIC APPLIANCES INC. OF ZHUHAI

CONTENTS

1 OUTLINE OF MULTI VFR

Ultra Heat GMV Multi VRF heat pump Units: The basic models of the whole series are 6ton, 8ton: GMV-V72W/A-F(U) and GMV-V96W/A-F(U)

6ton~8ton

1.1 Energy Efficient

The products benefit from the advanced DC inverter technology, optimized air conditioner system design, and accurate intelligent control technology.

- **Multi-cylinder jet type compression technology**

Ultra Heat GMV units adopt multi-cylinder enthalpy-adding compressor, which is first developed by GREE. With stronger driving force and variable discharge ratio, capacity is increased by 5%~10% under general working condition, and 100% under high/low temperature condition.EER is improved by 20%. It is more efficient, with less noise and longer service life.

- **Two-stage compression and high frequency weak magnetism**

Two-stage compression and HF weak magnetism technology is adopted. Compressor can work at higher frequency, with stronger output capacity and better heating performance. Extreme performance provides up to 100% heating output at -4℉ and stable operation under -22℉.

- **High efficiency enthalpy-adding technology**

Precisely adjust flow volume and intermediate air make-up volume of main circulation system to make sure compressor and evaporator running at the best efficiency and realize energy saving and stable operation.

- **Boost three phases PFC**

Traditional AC/DC exchange doesn't control current, so current input has much harmonic hurting electirc power network. Generally traditional electirc power network power factor is 0.7~0.8, while boost three phases PFC adopts active devices to rectifier and power factor can advance to 0.99. Also boost three phases PFC can export lower voltage more efficiently, which is better applied in big power network.

1.2 Comfortable Mute

Ultra Heat GMV air conditioning units fully consider the comfort requirement of people, and the humanized technology further perfects the degree of comfort. The wider operation range of the units ensures normal operation in sub-zero weather or hot weather. The better mute effect creates a quiet environment for work and

life.

- **ODU mute mode**

When the unit is installed at a place with the requirement for a lower noise level, it should operate in the mute mode in the daytime and at night. In this case, three forced mute setting modes can be selected to ensure that the unit operates at the low noise mode all the time.

- **IDU mute mode**

The indoor unit also adopts the DC inverter motor to implement stepless speed regulation and greatly reduce the noise level. Moreover, the wired controller can be used to set the automatic mute mode of indoor unit and enable the automatic mute function according to the indoor temperature and movements of persons.

1.3 Advanced Technology to Ensure Stability and Reliability

Ultra Heat GMV units have earned a reputation in the field due to the high technical content. Thanks to research and experiments for more than one decade, all the technologies of GMV have become more matured. Gree Ultra Heat GMV has been upgraded in an all-round way, including electric elements, machine elements, control technology and communication technology. Continuous revolution in technologies must bring more reliable and efficient service to users.

- **Oil return control of new generation**

Ultra Heat GMV units adopt intelligent oil return technology actively, which controls the compressor's oil-balance pipe to realize oil return of the system and oil discharge in case that system will store overfull oil for impairing heat exchange. All compressors oil level is around by oil-balance pipe, and system's overfull oil can be returned to the compressor by oil-balance pipe in case of reducing compressor life for lack of oil. Also compressor's overfull oil can be discharged by oil-balance pipe in case of oil strike fault for higher oil level, thus increasing the service life of the compressor substantially.

- **Unique comfortability control**

The outdoor unit is regulated using dual electronic expansion valves within the regulation range of 960 stages to accurately realize the flow control between the indoor unit module and outdoor unit module, so the system operates more stably.

- **Heating can start quickly.**

1.4 Humanized Engineering Operation

- **The unit is characterized by automatic address allocation and non-polarity communication.**
- **The unit can perform automatic debugging and fault detection. Ultra Heat GMV has five automatic debugging functions.**

1) Automatically allocating indoor and outdoor unit addresses; 2) Automatically checking the quantities of indoor and outdoor units; 3) Automatically detecting internal faults of units; 4) Automatically starting debugging;
5) Judging pipeline exceptions in real time.

1.5 Intelligent Management

- **The units are designed in the dual-energy saving operation modes.**

Along with penetration of energy conservation and emission reduction and increasingly strict requirements for

power utilization in cities raised by the state, a lot of cities will issue corresponding power rationing measures in the peak of power consumption, especially in summer. Ultra Heat GMV conditioning units unit provides two energy saving modes for users to select as needed and meets the requirements for off-peak power consumption and power brownout in cities.

Energy saving mode 1: When the unit is set to the automatic energy saving mode during operation, the system automatically adjusts and controls the target parameter according to the operating status, and greatly reduces power consumption of the whole system.

Energy saving mode 2: When the unit is set to the forced energy saving mode during operation, the system forcedly limits power output of the system.

- **The unit is provided with the energy consumption analysis function and corresponding solution.**
- **The unit supports the emergency shutdown function.**

With remote monitoring, the outdoor unit can directly intervene in the fire alarm linkage signal, and the whole system can stop immediately in case of an emergency to avoid more risk losses.

- **The unit has the management function by area.**

1.6 Wide Operation Range

Operating temperature range: -10°C to 52°C(14~125.6 ℉) for cooling; -30°C to 24°C (-22~75.2 ℉)for heating; Operating range of power supply: 3~, 208/230V, 60Hz.

1.7 High Static Pressure Design of ODU to Realize More Flexible Selection

The unit is provided with four levels of static pressures：0 Pa (0In.W.G), 30 Pa (0.12In.W.G), 50 Pa (0.20In.W.G), and 82 Pa (0.328In.W.G). The corresponding static pressure can be selected for the outdoor unit according to the building form, and the maximum static pressure is 82 Pa (0.328In.W.G). The unit especially applies to the scenario where the outdoor unit needs to be placed indoors.

2 SUMMARY OF SYSTEM EQUIPMENTS

2.1 Outdoor Unit

Outdoor Units_Heat Recovery		Ton	6	8
Model		-	GMV-V72W/A-F(U)	GMV-V96W/A-F(U)
Performance	Nominal Cooling Capacity	Btu/h	72000	96000
		kW	21.1	28.1
	Nominal Heating Capacity	Btu/h	81000	108000
		kW	23.7	31.6
	Cooling Power Input	kW	5.54	7.87
	Heating Power Input	kW	6.09	8.33
	Sound Pressure Level	dB(A)	60	60
	Power Supply	-	208/230V 3~ 60HZ	
Compressor	Type	-	Inverter Rotary	Inverter Rotary
	Number	N	2	2
	Motor Output	kW	5.83	5.83
	Starting Method	-	Inverter	Inverter
	Operating Range	-	10%~100%	10%~100%
	Refrigeration Oil Brand	-	FV50S	FV50S
	Oil Charge	L	1.35	1.35
Fan	Type×Quantity	-	Propeller×2	Propeller×2
	Motor Output	W	750+750	750+750
	Starting Method	-	Inverter	Inverter
	Air Flow Rate	m3/h	14000	14000
		cfm	8240	8240
	Max. External Static Pressure	Pa	82	82
		in.W.G	0.328	0.328
Ambient Temperature Range	Cooling	℃	-10~52	-10~52
		℉	14~125.6	14~125.6
	Heating	℃	-30~24	-30~24
		℉	-22~75.2	-22~75.2
Refrigerant	Type	-	R410A	R410A
	Charge Volume	kg	11	11
		lbs.	24.3	24.3

	Control	-	EEV	EEV
Pipe Connection	Gas Pipe Size	mm	28.6	28.6
		in.	1-1/8	1-1/8
	Liquid Pipe Size	mm	9.52	9.52
		in.	3/8	3/8
Dimensions (width×depth×height)	External Dimension	mm	1340×765×1605	1340×765×1605
		in.	52-3/4×30-1/8×63-1/5	52-3/4×30-1/8×63-1/5
	Packaging Dimension	mm	1420×840×1775	1420×840×1775
		in.	56×33×69-7/8	56×33×69-7/8
Weight	Net Weight	kg	375	375
		lbs.	827	827
	Gross Weight	kg	391	391
		lbs.	862	862
Maximum Quantity of Connected Indoor Unit		unit	12	17
Protection Devices	High Pressure Protection	-	High pressure sensor, high pressure switch	
	Compressor/Fan	-	Over-current protection, over-heat protection	
	Inverter	-	Over-current protection	
Remark	1. Rating conditions: Cooling: Indoor 26.7℃(80.1℉)DB/19.4℃(66.9℉)WB, Outdoor 35℃(95℉)DB/23.9℃(75℉)WB Heating: Indoor 21.1℃(70℉)DB/15℃(59℉)WB, Outdoor 8.3℃(46.9℉)DB/6.1℃(43℉)WB 2. It refers to the operation power of compressor under ARI test conditions (condensing temp.130℉, evaporating temp.45℉, return gas temp.65℉, liquid temp.115℉) at 60HZ. 3. Oil charge includes the total oil amount of outdoor units, residual oil amount of compressor and oil separate tank. When replacing the compressor or oil separate tank, only the corresponding required oil amount shall be charged.			

2.2 Indoor Unit

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Floor Ceiling		GMV-ND09ZD/A-T(U)	2.8	9.5	3.1	10.5
		GMV-ND12ZD/A-T(U)	3.5	12	4.0	13.5
		GMV-ND18ZD/A-T(U)	5.3	18	5.9	20
		GMV-ND24ZD/A-T(U)	7.0	24	7.9	27
		GMV-ND30ZD/A-T(U)	8.8	30	9.7	33
		GMV-ND36ZD/A-T(U)	10.6	36	11.7	40
		GMV-ND42ZD/A-T(U)	12.3	42	13.8	47
		GMV-ND48ZD/A-T(U)	14.1	48	15.8	54

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Slim Duct Type with Low ESP		GMV-ND07PLS/A-T(U)	2.2	7.5	2.5	8.5
		GMV-ND09PLS/A-T(U)	2.8	9.5	3.1	10.5
		GMV-ND12PLS/A-T(U)	3.5	12	4.0	13.5
		GMV-ND14PLS/A-T(U)	4.0	14	4.5	15
		GMV-ND18PLS/A-T(U)	5.3	18	5.9	20
		GMV-ND22PLS/A-T(U)	6.3	22	7.1	24

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Duct Type with High ESP		GMV-ND18PHS/A-T(U)	5.3	18	5.9	20
		GMV-ND24PHS/A-T(U)	7.0	24	7.9	27
		GMV-ND30PHS/A-T(U)	8.8	30	10	34
		GMV-ND36PHS/A-T(U)	10.6	36	11.7	40
		GMV-ND42PHS/A-T(U)	12.3	42	13.8	47
		GMV-ND48PHS/A-T(U)	14.1	48	15.8	54

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Wall Mounted Type		GMV-N07G/A3A-D(U)	2.2	7.5	2.5	8.5
		GMV-N09G/A3A-D(U)	2.8	9.5	3.2	11
		GMV-N12G/A3A-D(U)	3.5	12	4.0	13.5
		GMV-N18G/A3A-D(U)	5.3	18	5.9	20
		GMV-N24G/A3A-D(U)	7.0	24	7.5	25.5

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Console		GMV-ND07C/A-T(U)	2.2	7.5	2.5	8.5
		GMV-ND09C/A-T(U)	2.8	9.5	3.2	11
		GMV-ND12C/A-T(U)	3.5	12	4.0	13.5
		GMV-ND18C/A-T(U)	5.3	18	5.9	20

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
4 Way Cassette		GMV-ND07T/A-T(U)	2.2	7.5	2.5	8.5
		GMV-ND09T/A-T(U)	2.8	9.5	3.1	10.5
		GMV-ND12T/A-T(U)	3.5	12	4.0	13.5
		GMV-ND15T/A-T(U)	4.4	15	5.0	17
		GMV-ND18T/A-T(U)	5.3	18	5.9	20
		GMV-ND24T/A-T(U)	7.0	24	7.9	27
		GMV-ND30T/A-T(U)	8.8	30	10	34
		GMV-ND36T/A-T(U)	10.6	36	11.7	40
		GMV-ND42T/A-T(U)	12.3	42	13.8	47
		GMV-ND48T/A-T(U)	14.1	48	15.8	54

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
2 Way Cassette		GMV-ND09TS/A-T(U)	2.8	9.5	3.1	10.5
		GMV-ND12TS/A-T(U)	3.5	12	4.0	13.5
		GMV-ND15TS/A-T(U)	4.4	15	5.0	17
		GMV-ND18TS/A-T(U)	5.3	18	5.9	20
		GMV-ND24TS/A-T(U)	7.0	24	7.9	27

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Compact 4-way Cassette		GMV-ND07T/B-T(U)	2.2	7.5	2.5	8.5
		GMV-ND09T/B-T(U)	2.8	9.5	3.1	10.5
		GMV-ND12T/B-T(U)	3.5	12	4.0	13.5
		GMV-ND15T/B-T(U)	4.4	15	5.0	17
		GMV-ND18T/B-T(U)	5.3	18	5.9	20

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Large Duct Type		GMV-ND72PH/A-T(U)	20.2	69	22.6	77
		GMV-ND96PH/A-T(U)	27	92	30.2	103

Rated Conditions

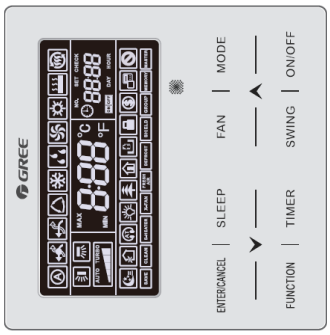
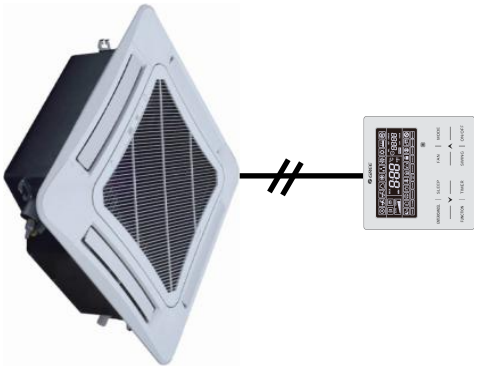
Cooling: Indoor 26.7℃(80.1℉)DB/19.4℃(66.9℉)WB, Outdoor 35℃(95℉)DB/23.9℃(75℉)WB

Heating: Indoor 21.1℃(70℉)DB/15℃(59℉)WB, Outdoor 8.3℃(46.9℉)DB/6.1℃(43℉)WB

Caution:

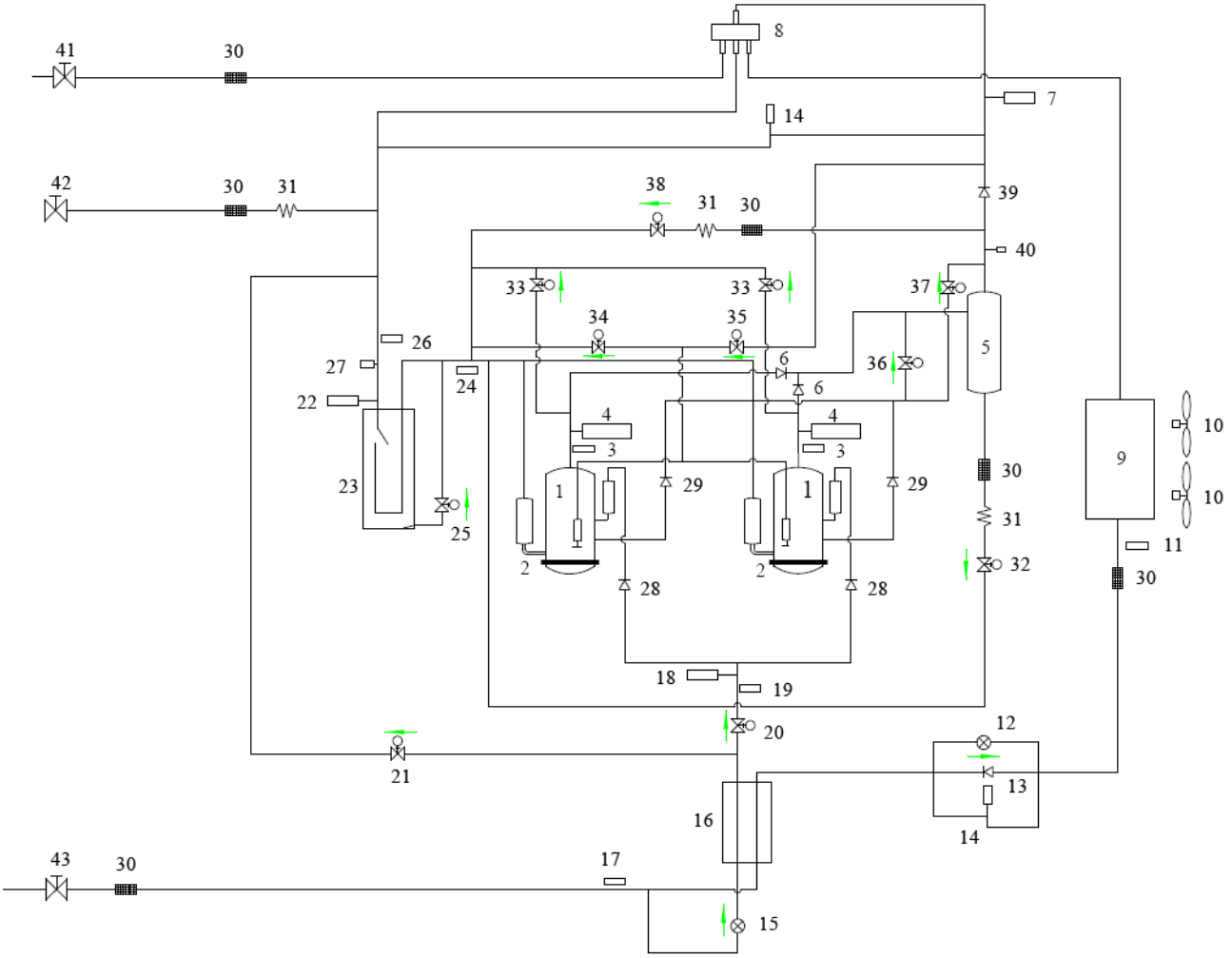
Ultra Heat GMV multi VRF unit selection must abide by technical sales manual. It is not recommended to adopt the combination mode not specified by this manual.

2.3 Controller

Name	Model Name	Appearance	Application	Function
Wired Controller	XK46 XK79			✧ Start/Stop ✧ Mode changing ✧ Temperature setting ✧ Air flow changing ✧ Time setting ✧ Self-diagnosing function ✧ Display codes of trouble ✧ Control by 2 controller separately ✧ One indoor unit can be separately operated by wired controller and remote controller.
Remote Controller	YV1L1 YAP1F			✧ Start/Stop ✧ Mode changing ✧ Temperature setting ✧ Air flow changing ✧ Time setting

3 INTERNAL PIPING DESIGN OF THE UNITS

3.1 Piping Diagram of GMV-V72W/A-F(U) and GMV-V96W/A-F(U)



3.2 Names and main functions of components

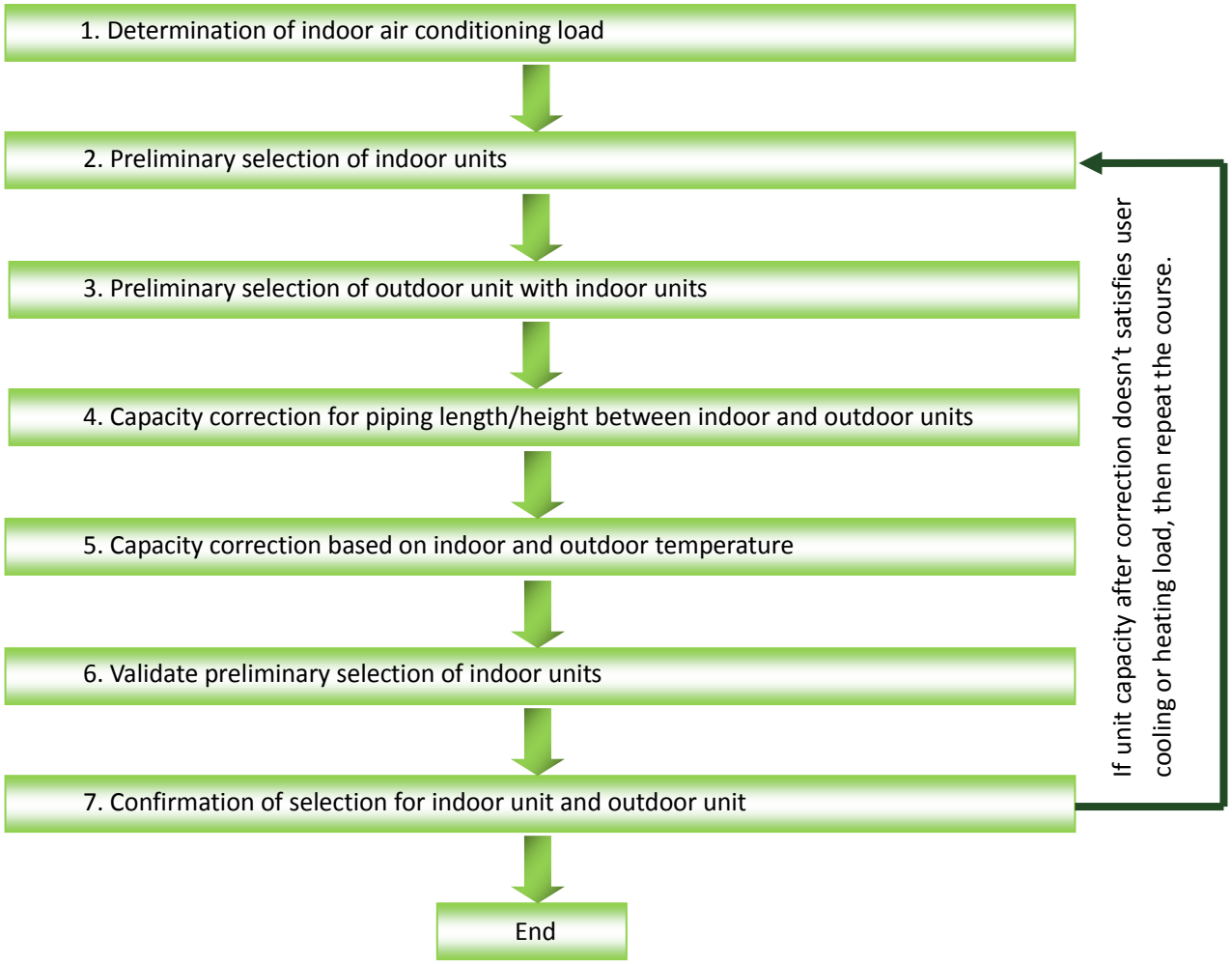
No.	Name	Main Function
1	Compressor	Adjusts its own rotational speed based on the actual requirement of the system to implement capacity control.
2	Compressor heat tape	Maintains a proper oil temperature in the compressor when the compressor is in standby status, ensuring the reliability during compressor startup.
3	Exhaust pipe temperature sensor of compressor	Detects a compressor's exhaust gas temperature for compressor control and protection.
4	High-pressure circuit breaker	Protects a compressor by sending feedback signal to stop the system when the compressor's discharge pressure exceeds the operating value of high-pressure circuit breaker.

5	Oil extractor	Separates the gas and oil in the system to ensure compressor reliability.
6	One-way valve	Prevents high-pressure gas from entering the compressor and fast balances the suction pressure and discharge pressure in a compressor.
7	High-pressure sensor	Detects the high pressure value in the system in real time mode for compressor protection and other control functions.
8	Four-way valve 1	Used for the switching between the cooling and heating functions of system IDU.
9	Heat exchanger	Used for outdoor heat exchange.
10	Fan	Strengthens heat exchanging.
11	Defrosting temperature sensor	Used for defrosting detection.
12	Electronic expansion valve for heating	Controls refrigerant adjustment in heating mode.
13	One-way valve	Controls refrigerant flow direction.
14	Unloading valve	Opening if the pressure inside the liquid pipe /gas pipe is too high.
15	Sub cooler electronic expansion valve	Reduces the pressure and temperature of ramous refrigerant to cool the main branch refrigerant.
16	Sub cooler	Controls the degree of sub cooling of tube.
17	Liquid outlet temperature sensor of sub cooler	Detects tube temperature.
18	Middle-pressure sensor	Detects system middle pressure.
19	Gas outlet temperature sensor of sub cooler	Detects gas temperature of sub cooler.
20	Compensate vapor valve	Used for compensating vapor for second compression.
21	Sub-cooling valve	Used for providing with sub-cooling liquid.
22	Low-pressure sensor	Detects system low pressure to avoid extra-low operating pressure.
23	Gas-liquid separator	Separate gas and liquid to prevent the system from running when the refrigerant flows back to the compressor.
24	Outlet temperature sensor of gas-liquid separator	Detects internal status of gas-liquid separator to further control the compressor suction performance.
25	Oil return valve 1	Oil return control for the compressor.
26	Inlet temperature sensor of gas-liquid separator	Detects inlet temperature of gas-liquid separator.
27	Fusible plug	Opening if the pressure or the temperature inside the accumulator or liquid-gas separator is too high
28	One-way valve	Controls refrigerant flow direction.
29	One-way valve	Controls refrigerant flow direction.
30	Filter	Prevents impurities from entering components and parts.
31	Capillary tube	Supports flow regulating and pressure reduction.
32	Oil return valve	Oil return control for the compressor.
33	Pressure-balanced valve	Ensures success startup of compressor.
34	Varying capacity valve 1	To make the compressor turn with double cylinders.
35	Varying capacity valve 2	To make the compressor turn with triple cylinders.
36	Oil-balanced valve 1	Make sure oil of the system is balanced.
37	Oil-balanced valve 2	Make sure oil of the modules is balanced.

38	Gas-bypass valve	Make sure pressure of the system is balanced.
39	One-way valve	Prevents high-pressure gas from entering the compressor and fast balances the suction pressure and discharge pressure in a compressor.
40	Oil orifice	To charge compressor oil.
41	Gas pipe valve	Stop valve, closed when the unit is delivered from the factory and will be opened after installation.
42	Low-pressure measurement valve	Detects the low pressure value or charges refrigerant during system running.
43	Liquid pipe valve	Stop valve, closed when the unit is delivered from the factory and will be opened after installation.

4 EQUIPMENT SELECTION PROCEDURE

4.1 Selection Flow Chart



4.2 Combination Conditions for Indoor Unit and Outdoor Unit

1) The capacity code = the nominal cooling capacity (Btu/h)×0.001.

2) For outdoor unit, MAX. Number of connectable indoor units and total capacity code of indoor units are decided.

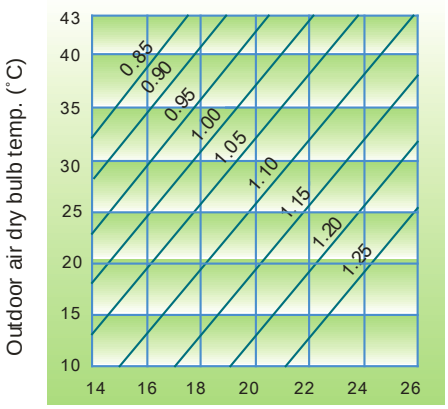
Model Name of Outdoor Unit	Capacity Code of Outdoor Unit	MAX. Number of Indoor Units	Total Capacity Code of Indoor Units	MIN. Number of Indoor Units
GMV-V72W/A-F(U)	72	12	36 to 97	2
GMV-V96W/A-F(U)	96	17	48 to 129	2

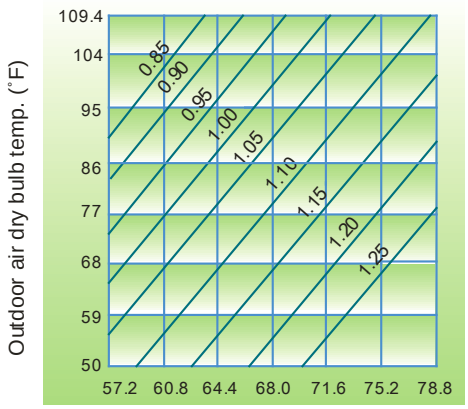
4.3 Cooling/Heating Capacity Characteristics

4.3.1 Cooling capacity calculation method

Required cooling capacity = Cooling capacity×Factor①×Factor②kBtu/h

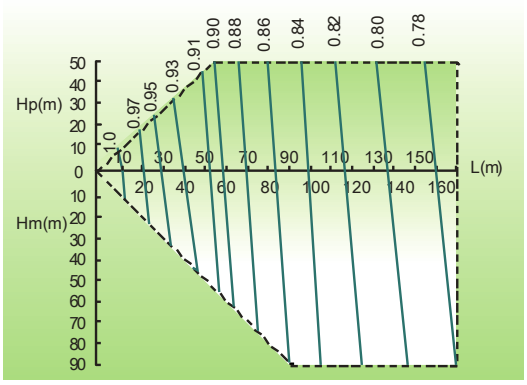
① **Ambient Temperature VS. Capacity**

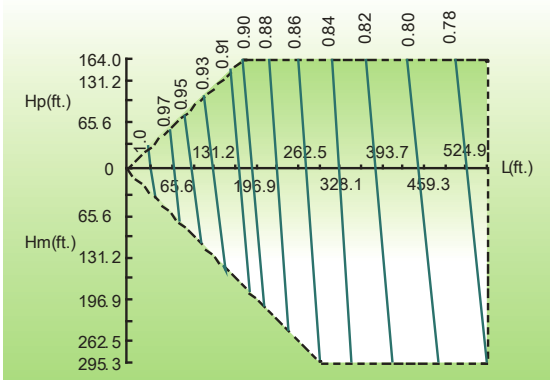




② **Connecting Pipe Length and Height Difference Between Indoor and Outdoor Units VS. Capacity Correction Value**

- ✧ Hp: Height Difference Between Indoor and Outdoor Units (Outdoor unit higher)
- ✧ Hm: Height Difference Between Indoor and Outdoor Units (Outdoor unit lower)
- ✧ L: Equivalent Pipe Length

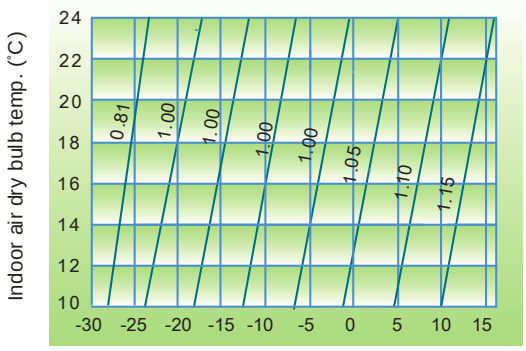


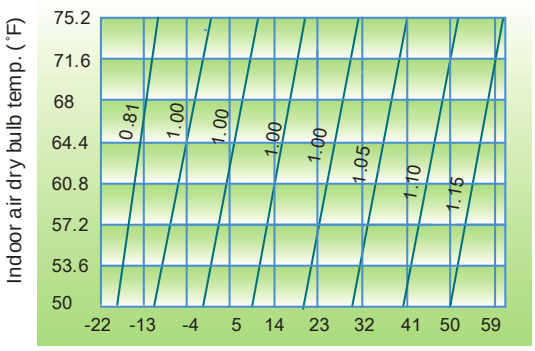


4.3.2 Heating capacity calculation method

Required heating capacity = Heating capacity×Factor①×Factor②kW

① **Ambient Temperature VS. Capacity**

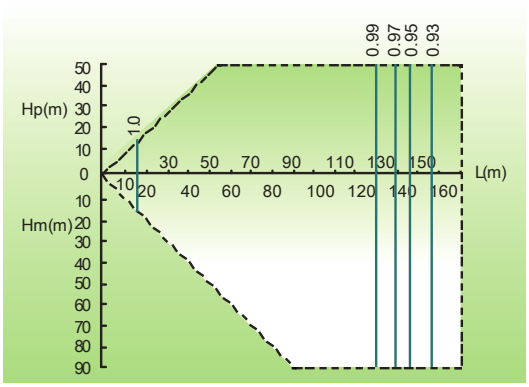


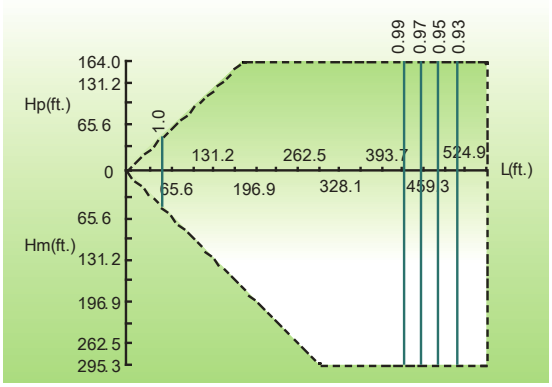


② **Connecting Pipe Length and Height Difference Between Indoor and Outdoor Units VS. Capacity Correction**

Value

- ✧ Hp: Height Difference Between Indoor and Outdoor Units (Outdoor unit higher)
- ✧ Hm: Height Difference Between Indoor and Outdoor Units (Outdoor unit lower)
- ✧ L: Equivalent Pipe Length





4.3.3 Capacity calculation for each indoor unit

Capacity for each indoor unit

$$= \text{Capacity after correction of outdoor unit} \times \frac{\text{Required standard capacity of indoor unit}}{\text{Total value of standard indoor unit capacity}}$$

4.3.4 Operating temperature range

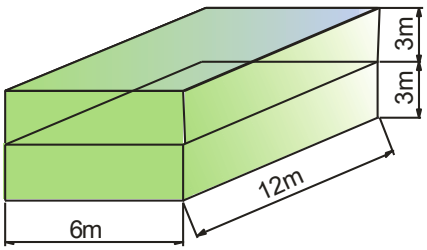
Range / Mode	Outdoor Temperature Range℃(℉)
Cooling	-10~52 (14~125.6)
Heating	-30 ~24 (-22~75.2)

If the temperature is beyond the range, the safety protection measure of the unit may take effect, and the air conditioning unit will stop.

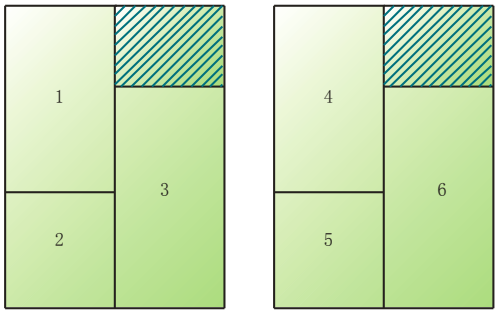
4.4 Example of Equipment Selection

4.4.1 Overview of building model

<Outside view>



<Stories configuration>



Steel frame, reinforced concrete building, two stories above ground.

An apartment area: 144m^2, each story area: 72 m^2.

Outdoor unit is installed on the balcony.

Cooling:

Design indoor conditions: 26.7℃(80.1℉)DB/19.4℃(66.9℉)WB

Design outdoor conditions: 35℃(95℉)DB/23.9℃(75℉)WB

4.4.2 Selection criteria for each apartment

Outdoor capacity exactly matches the total indoor capacity. Total indoor HP = Outdoor unit HP.

For example:

Indoor: 1.5HP+1HP+2HP=4.5HP

Outdoor: 5HP

4.4.3 Procedure and result of equipment selection

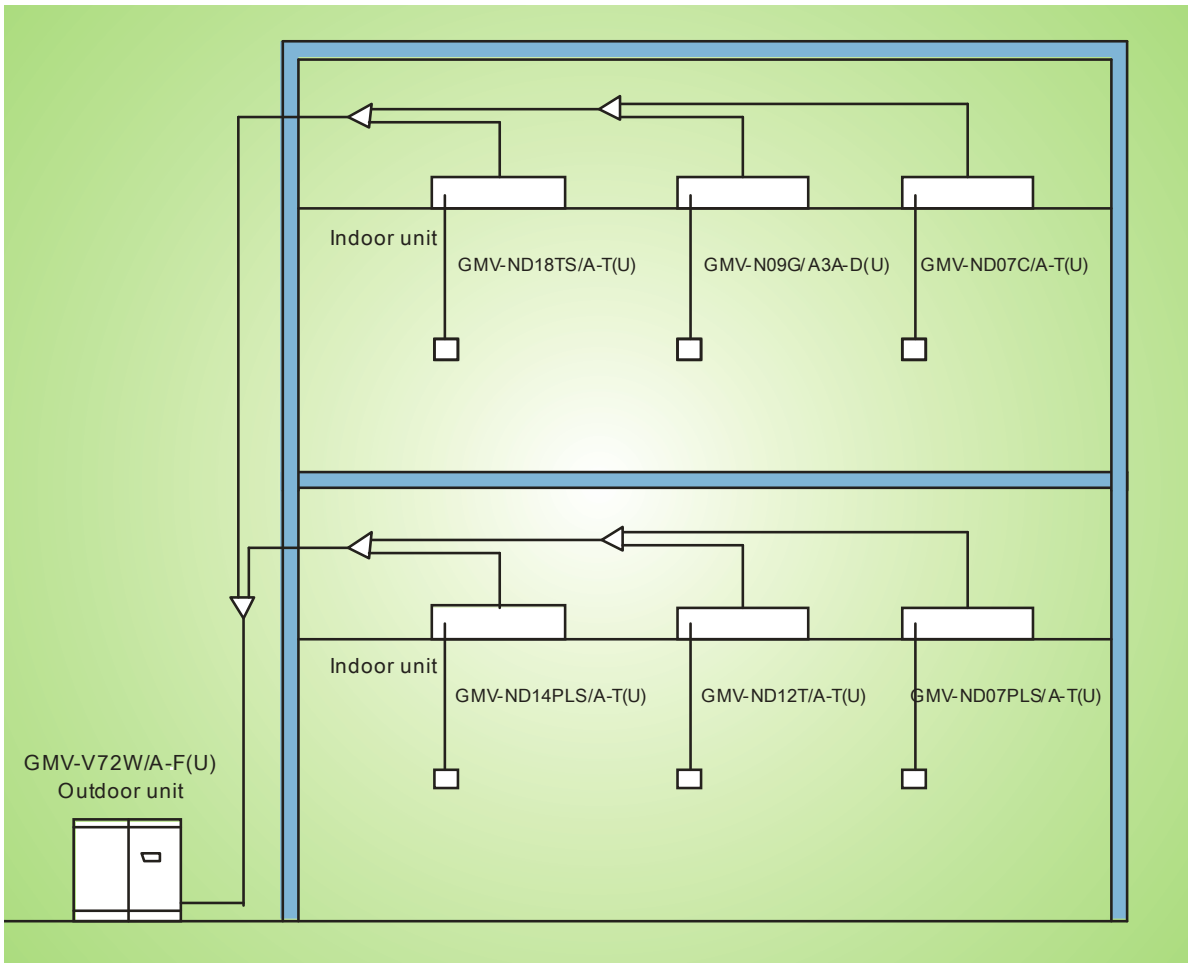
① **Procedure of Equipment Selection**

- ✧ Calculate cooling for every room.
- ✧ Select an indoor unit to match the cooling load for every room.
- ✧ Choose a tentative outdoor that will match with indoor units, perform capacity correction based on the pipe length, system lift, indoor set temperature, outdoor temperature, then make sure the corrected system cooling capacity satisfies the cooling load.

② **Equipment Selection and Capacity Check**

Air Conditioning Load			Equipment Selection					
Floor	Room No.	Indoor Cooling Load (kBtu/h)	Indoor Unit			Outdoor Unit		
			Model	Capacity (kBtu/h)		Model	Capacity (kBtu/h)	
				Cooling	Heating		Cooling	Heating
1F	1	6	GMV-ND07PLS/A-T(U)	7.5	8.5	GMV-V72W/A-F(U)	72	81
	2	11	GMV-ND12T/A-T(U)	12	13.5			
	3	14	GMV-ND14PLS/A-T(U)	14	15			
2F	4	7	GMV-ND07C/A-T(U)	7.5	8.5			
	5	8.5	GMV-N09G/A3A-D(U)	9.5	11			
	6	16.7	GMV-ND18TS/A-T(U)	18	20			

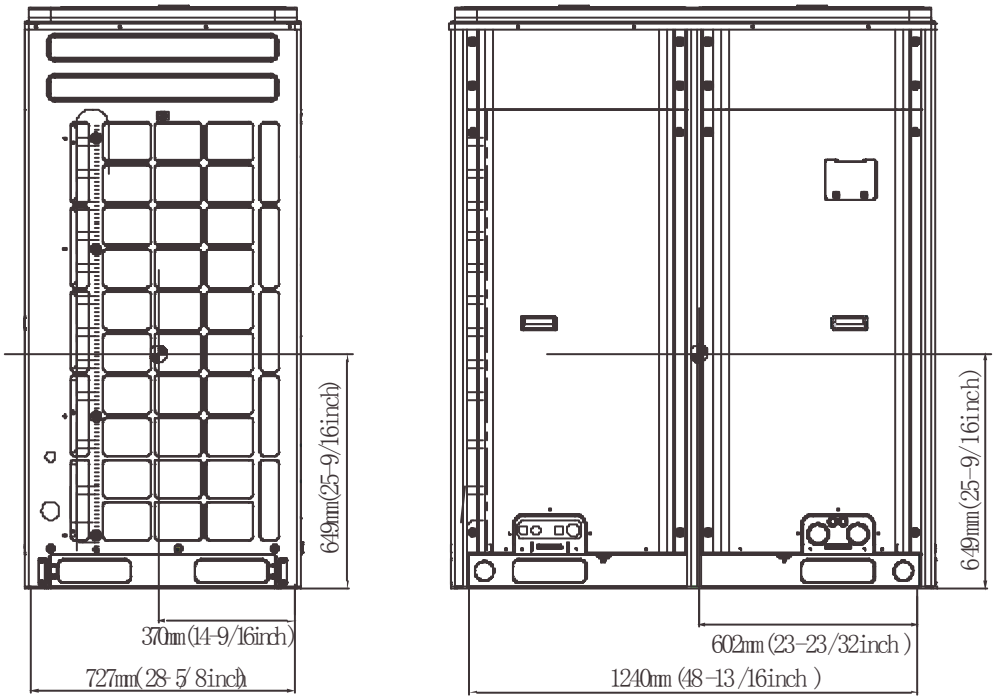
③ **Schematic Diagram**


Indoor unit
GMV-ND18TS/A-T(U)
GMV-N09G/A3A-D(U)
GMV-ND07C/A-T(U)
Indoor unit
GMV-ND14PLS/A-T(U)
GMV-ND12T/A-T(U)
GMV-ND07PLS/A-T(U)
GMV-V72W/A-F(U)
Outdoor unit

5 UNIT GRAVITY CENTER DIAGRAMS

Unit: mm

GMV-V72W/A-F(U), GMV-V96W/A-F(U):



6 UNIT INSTALLATION SPACE REQUIREMENTS

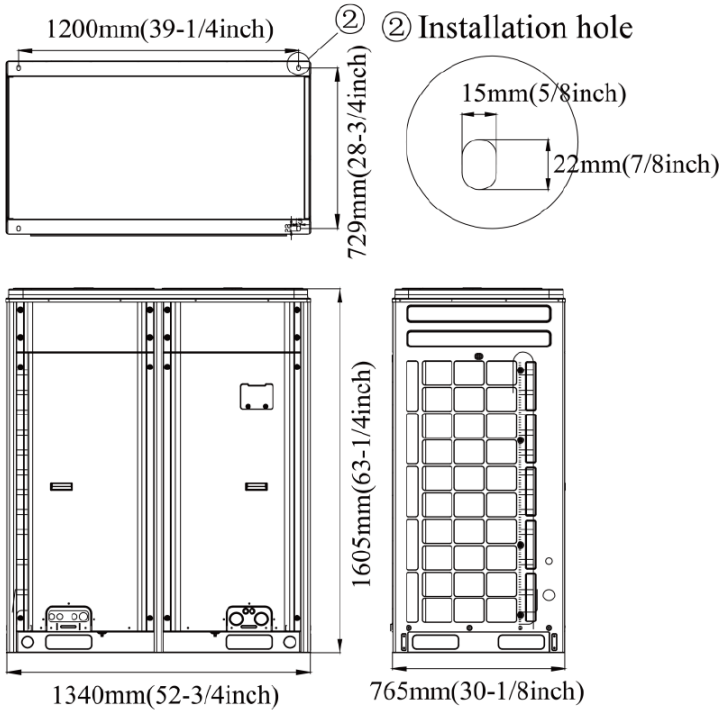
6.1 Selection of Outdoor Unit Installation Site

VRF units are used in a lot of situations and serve wider users. If the unit is installed in a living environment, the cooling, heating and noise requirements will be higher, especially for the aged and infants. Therefore, the indoor/outdoor unit model with sufficient capacity and low noise should be preferred during model selection. It is not advisable to install the outdoor unit outside the bedroom, study room, or meeting room. For the commercial site, it is improper to install the outdoor unit near the office.

6.2 External Dimensions and Mounting Hole Dimensions of the Outdoor Unit

Unit: mm

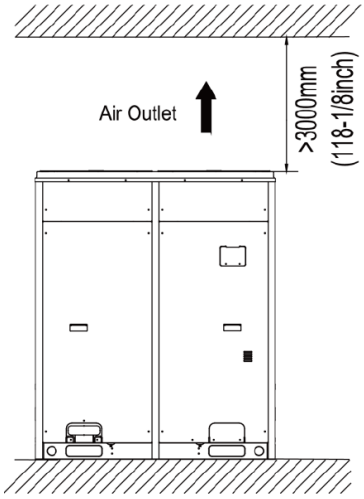
External and installation dimensions of GMV-V72W/A-F(U), GMV-V96W/A-F(U):

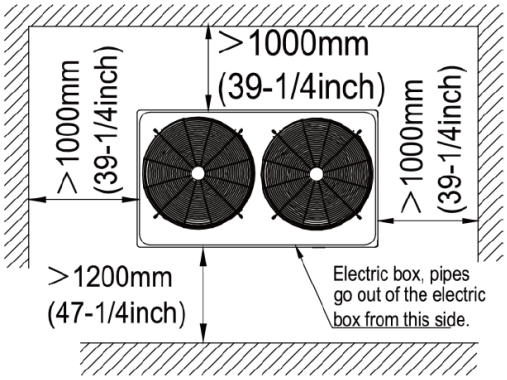


6.3 External Unit Installation Space Requirements

Unit: mm

1) If all sides of the outdoor unit (including the top) are surrounded by walls, process according to the following requirements for installation space: Installation space requirements for the single-module unit





2) If there is a crown wall (such a barrier against wind) above the machine top, the machine top should be more than 3000 mm away from the crown wall in principle. If the spaces around the front, rear, left side, and right side of the machine are all open spaces, the machine top should be more than 1500 mm away from the crown wall, as shown in Figure (a). If the dimension is less than 1500 mm or the spaces around the machine are not open spaces, it is required to use a return duct to keep smooth ventilation, as shown in Figure (b).

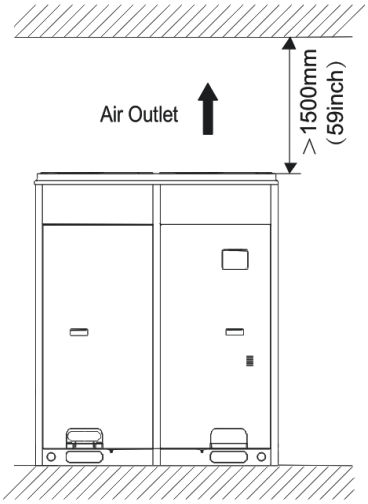


Figure (a)

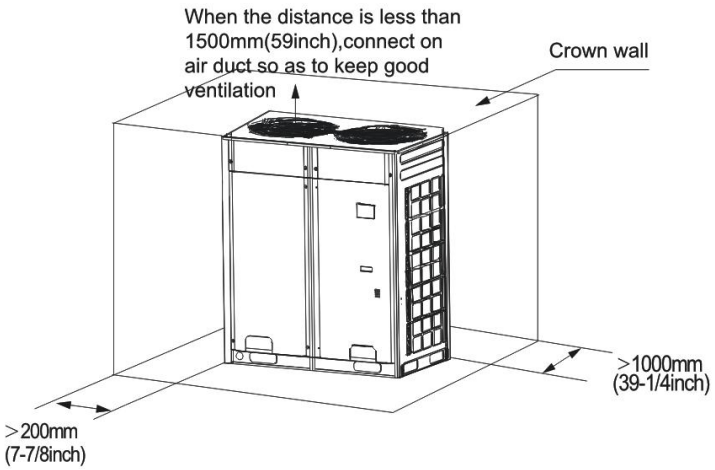
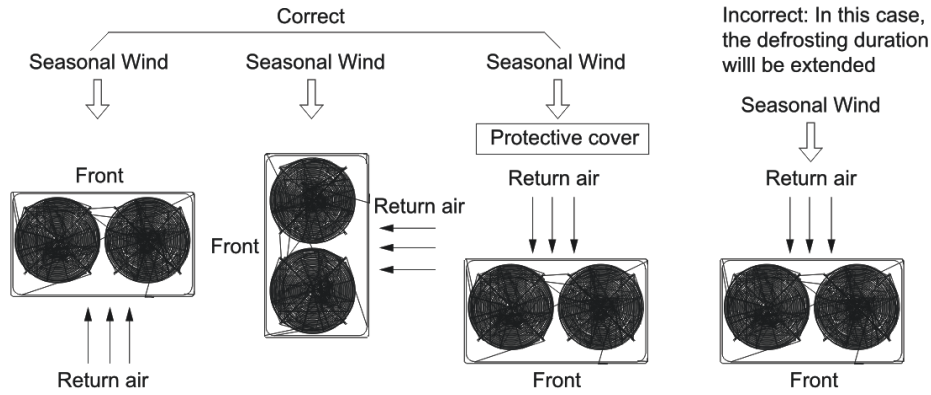
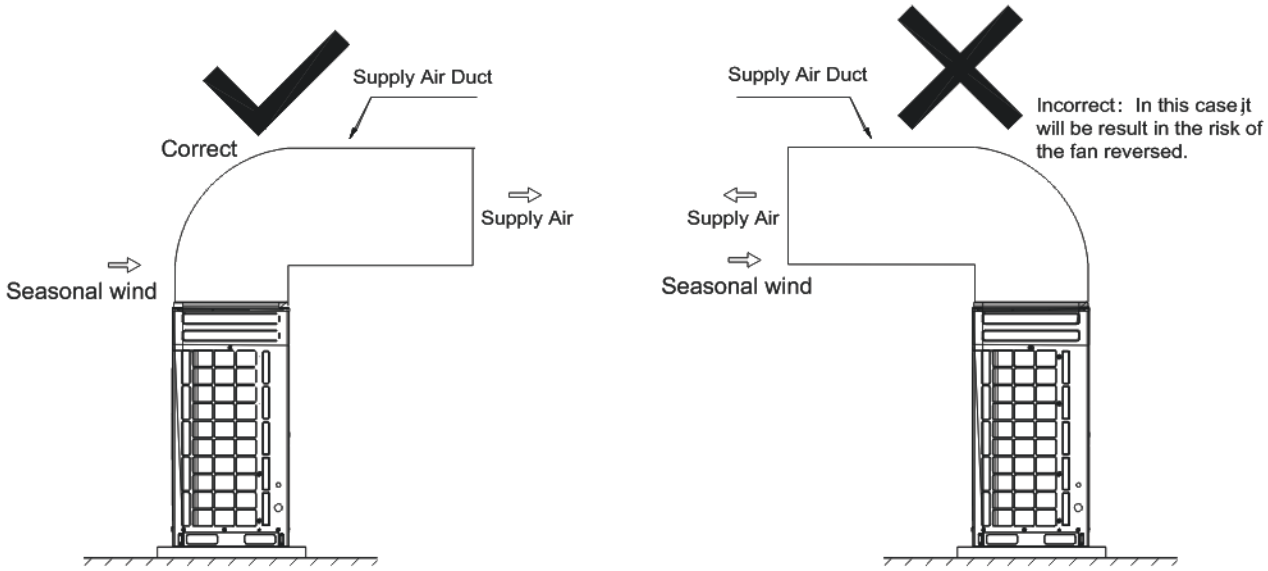


Figure (b)

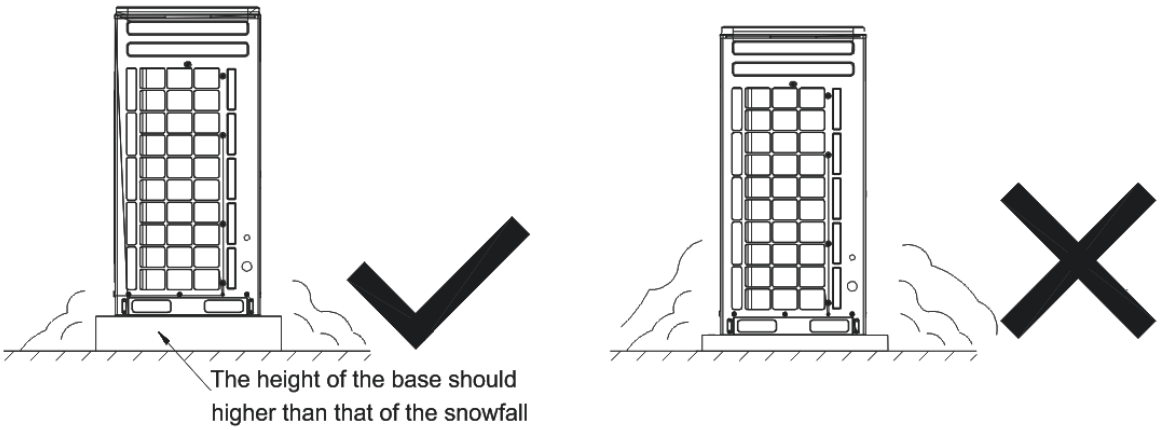
3) Considering the seasonal wind in outdoor unit installation



4) Anti-monsoon installation requirements for unit connecting exhaust duct:



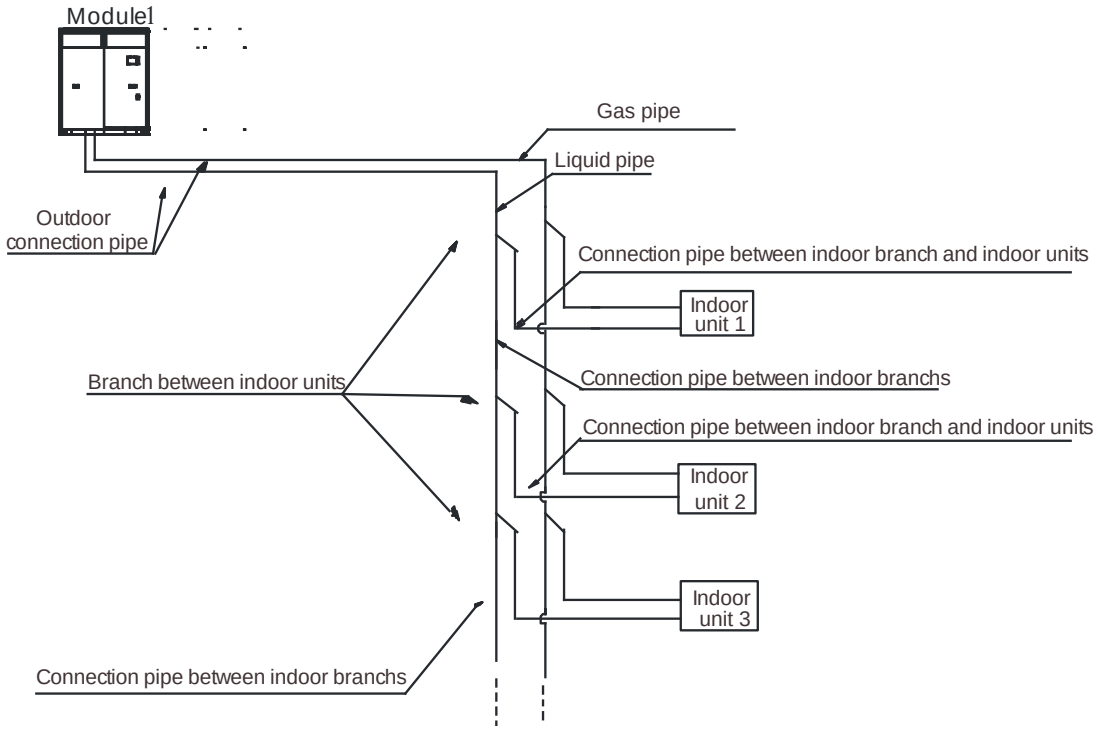
5) Considering snow in outdoor unit installation



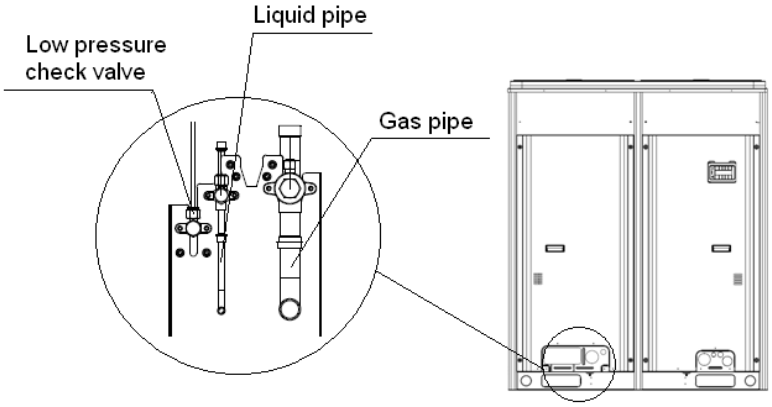
6) When the outdoor unit is installed on equipment, an air exhaust pipe should be connected, the aperture opening ratio of the louver cannot be smaller than 80%, and the included angle between the louver and the horizontal plane should be smaller than 20°.

7 MODEL SELECTION FOR UNIT PIPING

7.1 Schematic Diagram of Piping Connection

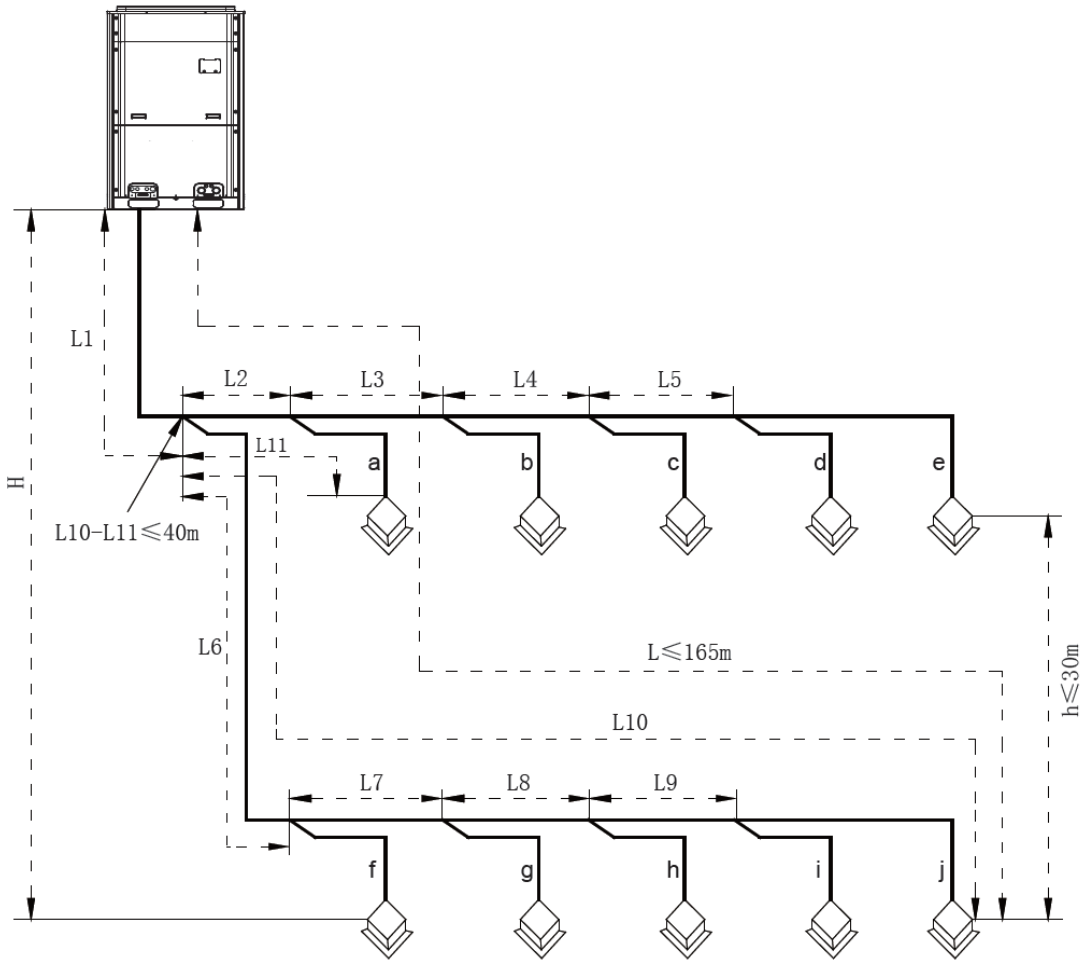


Schematic diagram of piping sequence of GMV-V72W/A-F(U) and GMV-V96W/A-F(U):



7.2 Allowable Pipe Length and Drop Height Among Indoor and Outdoor Units

Y type branch joint is adopted to connected indoor and outdoor units. Connecting method is shown in the figure below. Remark: equivalent length of one Y-type manifold is about 0.5m (1-3⁄4feet).



L10: 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 (1-3/4feet).

R410A Refrigerant System		Allowable Value m(feet)	Fitting Pipe
Total length (actual length) of fitting pipe		≤1000(3280-3/4)	L1+L2+L3+L4+…+L9+a+b+…+i+j
Length of farthest fitting pipe m(feet)	Actual length	≤165(541-1/4)	L1+L6+L7+L8+L9+j
	Equivalent length	≤190(623-1/4)	
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)	L10-L11
Equivalent length from the first branch to the furthest piping (1)		≤40(131-1/4)	L6+L7+L8+L9+j
Height difference between outdoor unit and indoor unit	Outdoor unit at upper(2)	≤50(164)	——
	Outdoor unit at lower(2)	≤40(131-1/4)	——
Height difference between indoor units		≤15(49)	——
Maximum length of Main pipe(3)		≤90(295-1/4)	L1
From IDU to its nearest branch (4)		≤10(32-3/4)	a, b, c, d, e, f, g, h, i, j

Notices:

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

1) Actual length of pipe in total: L1+L2×2+L3×2+L4×2+…+L9×2+a+b+…+i+j≤1000m (3280- 3/4feet).

2) Length between each IDU and its nearest branch a, b, c, d, e, f, g, h, i, j≤40m (131- 1/4feet).

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: L10-L11≤40m (131-1/4feet).

(2) When the outdoor unit is at upper side and height difference is more than 50m, please consult company for the related technical requirement.

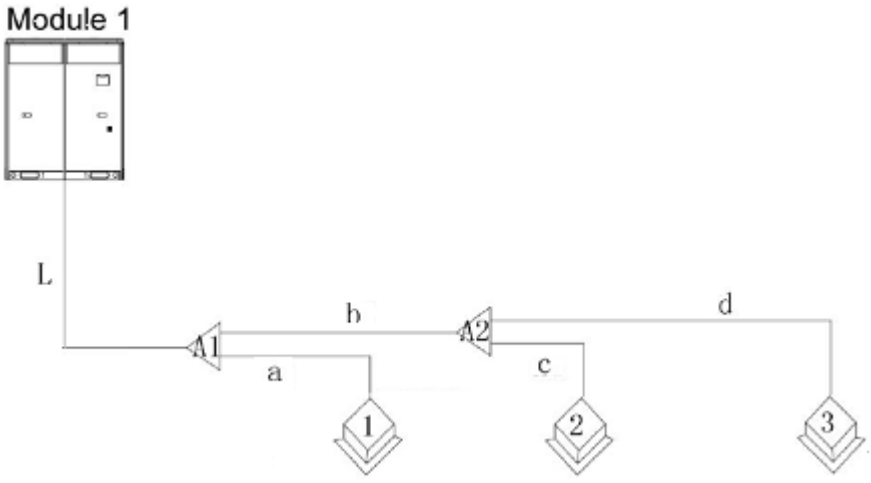
(3) When the maximum length of the main pipe from ODU to the first branch of IDU is ≥90m (295-1/4ft), then adjust the pipe size.

Total rated capacity of ODU: C (Btu/h)	Pipe between outdoor unit and the first indoor branch	
	Gas pipe mm(inch)	Liquid pipe mm(inch)
C≤72000	No need to enlarge pipe size	No need to enlarge pipe size
72000＜X≤96000	No need to enlarge pipe size	Φ12.7(1/2)
96000＜X≤120000	No need to enlarge pipe size	Φ15.9(5/8)

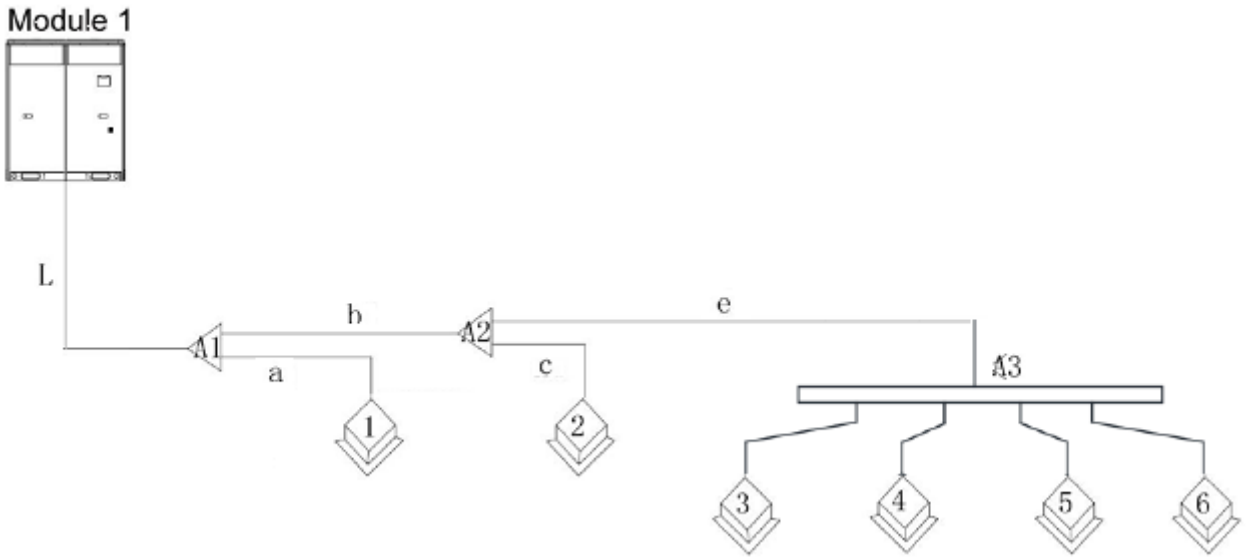
(4) If the length between an IDU and its nearest branch is above 10m(32-4/5feet), then double the size of the liquid pipe of IDU (only for the pipe size that is≤6.35mm(1/4inch).

7.3 Size Requirement for Branch Pipe and Piping (Main Pipe)

7.3.1 Connection sketch map of single-module system



(a)



(b)

7.3.2 Select appropriate pipe between outdoor unit and the first indoor branch ("L") as per the pipe size of outdoor unit.

Pipe between outdoor unit and the first indoor branch:

Basic module	Pipe between outdoor unit and the first indoor branch	
	Gas pipe mm(inch)	Liquid pipe mm(inch)
GMV-V72W/A-F(U)	Φ28.6(1-1/8)	Φ9.52(3/8)
GMV-V96W/A-F(U)	Φ28.6(1-1/8)	Φ9.52(3/8)

7.3.3 Branch selection of mode exchanger ("A1, A2, A3")

Select branch of mode exchanger as per total capacity of downstream indoor unit(s). Please refer to the following table.

R410A refrigerant system	Total Capacity of the Downstream Indoor Unit X(Btu/h)	Model
Y-type Branch Pipe	C≤68000	FQ01A/A
	68000＜C≤102000	FQ01B/A
	102000＜C≤239000	FQ02/A
	239000＜C	FQ03/A
T-type Branch Pipe	C≤136000	FQ014/H1
	136000＜C≤232000	FQ018/H1
	232000＜C	FQ018/H2

7.3.4 Piping size among upstream branches ("b, e")

Total rated capacity of downstream indoor units: X(Btu/h)	Size of connection pipe between branches	
	Gas pipe mm(inch)	Liquid pipe mm(inch)

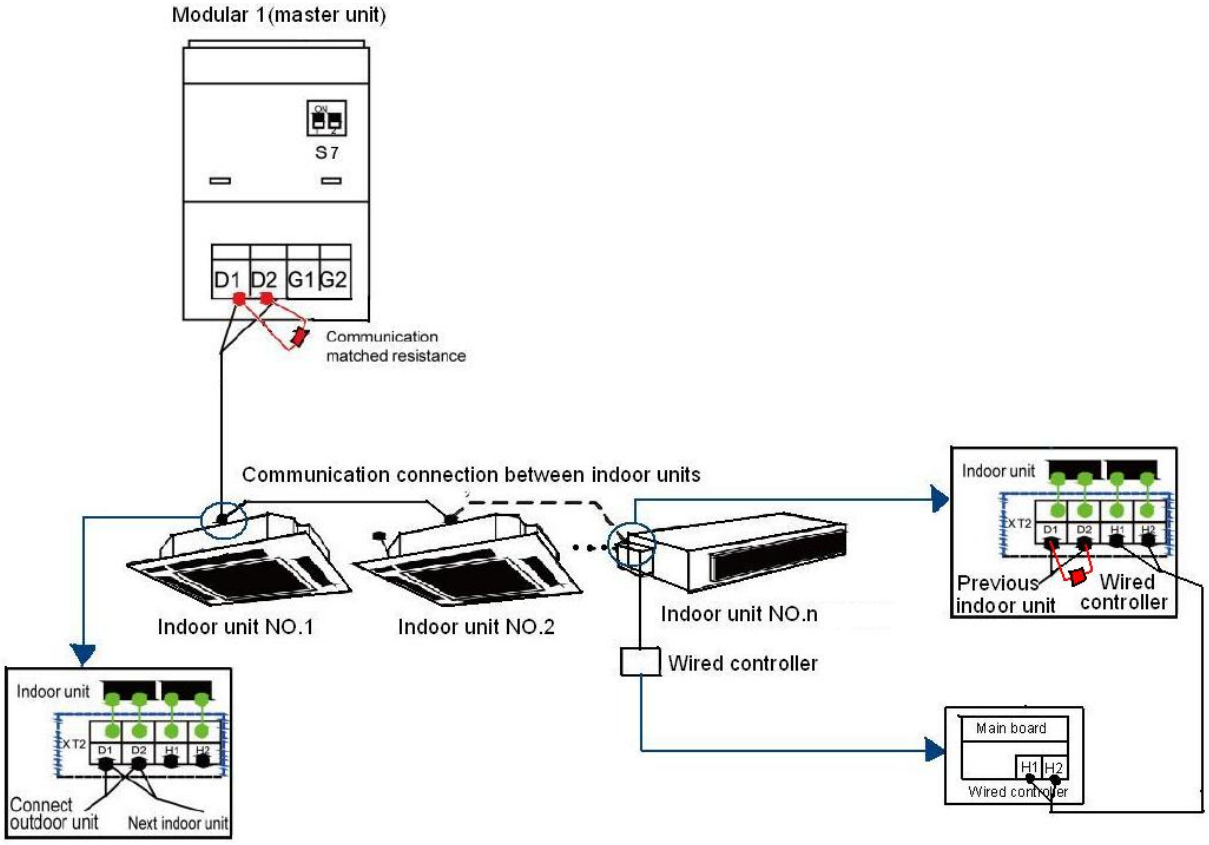
X≤17100	Φ12.7(1/2)	Φ6.35(1/4)
17100＜X≤48500	Φ15.9(5/8)	Φ9.52(3/8)
48500＜X≤72000	Φ19.05(3/4)	Φ9.52(3/8)
72000＜X≤96000	Φ22.2(7/8)	Φ9.52(3/8)
96000＜X≤144000	Φ28.6(1-1/8)	Φ12.7(1/2)
144000＜X≤216000	Φ28.6(1-1/8)	Φ15.9(5/8)
216000＜X≤240000	Φ34.9(1-3/8)	Φ15.9(5/8)
240000＜X≤336000	Φ34.9(1-3/8)	Φ19.05(3/4)
336000＜X	Φ41.3(1-5/8)	Φ19.05(3/4)

7.3.5 Piping between branch and indoor unit (“a, c, d”)

Rated capacity of indoor units: X ((Btu/h)	Size of connection pipe between indoor branch and indoor unit	
	Gas pipe mm(inch)	Liquid pipe mm(inch)
X≤9500	Φ9.52(3/8)	Φ6.35(1/4)
9500＜X≤17100	Φ12.7(1/2)	Φ6.35(1/4)
17100＜X≤48500	Φ15.9(5/8)	Φ9.52(3/8)
48500＜X≤72000	Φ19.05(3/4)	Φ9.52(3/8)
72000＜X	Φ22.2(7/8)	Φ9.52(3/8)

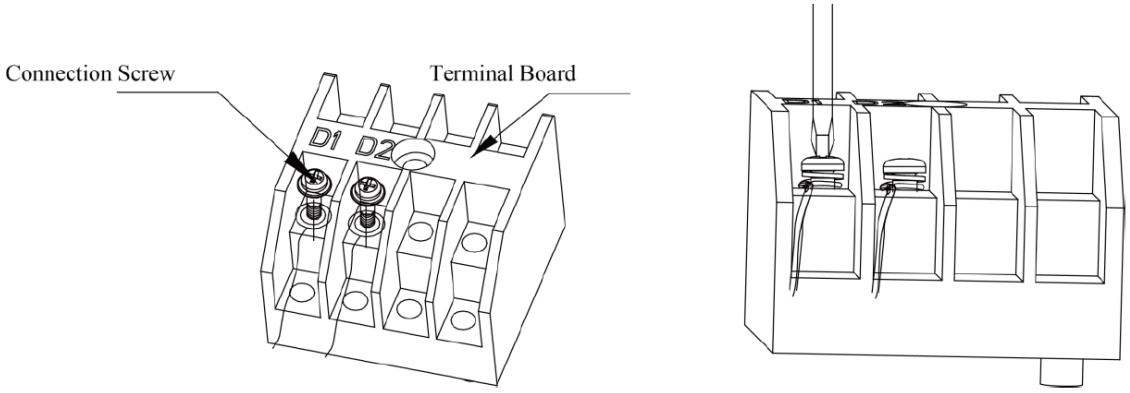
8 REQUIREMENTS FOR COMMUNICATION MODE

Ultra Heat GMV unit air conditioning system adopts the CAN communication network. Manual dialing and differentiation of the communication cable polarity are not required for the indoor unit, and only functional dialing should be set for the indoor unit.



8.1 Connection Mode of Connection Line Terminals

All communication wires of Ultra Heat GMV units are connected by screws.

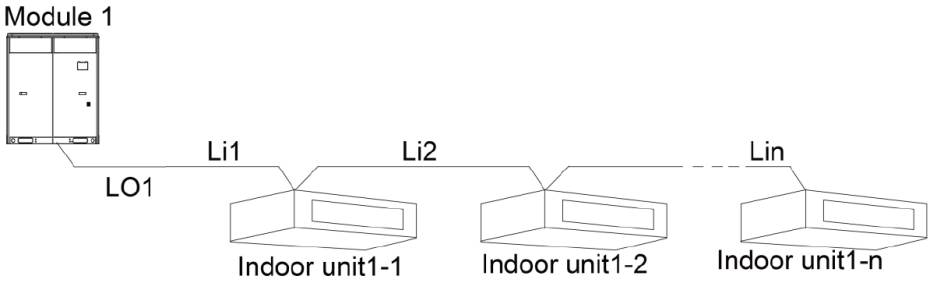


8.2 Communication Cable Material and Wring Mode

8.2.1 Communication material

➢ Select communication wire between ODU and IDU.

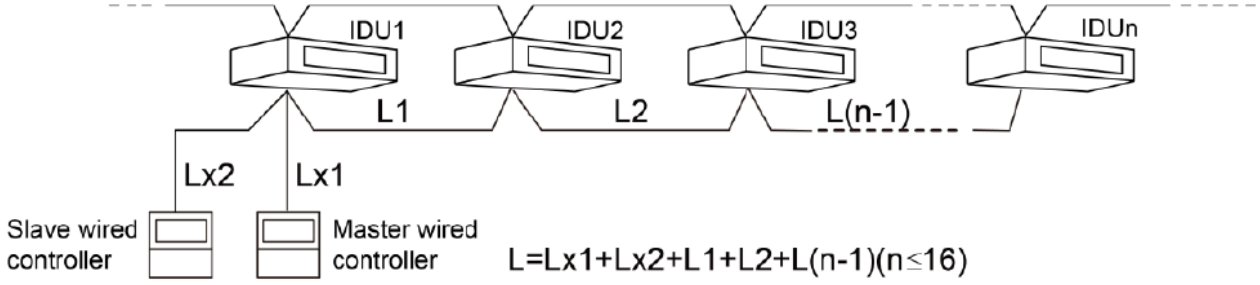
Material Type	Total Length L(m) of Communication Cable between IDU Unit and IDU (ODU) Unit m(feet)	Wire size	Remarks
Light/Ordinary polyvinyl chloride sheathed cord.	L≤1000(3280-5/6)	≥2×AWG18	1. If the wire diameter is enlarged to 2 ×AWG16, the total communication length can reach 1500m (4921-1/4feet). 2. The cord shall be Circular cord (the cores shall be twisted together). 3. If unit is installed in places with intense magnetic field or strong interference, it is necessary to use shielded wire.



➢ Select communication wire between IDU and wired controller.

Material type	Total length of communication line between IDU unit and wired controller L m(feet)	Wire size	Remarks
Light/Ordinary polyvinyl chloride sheathed cord.	L≤250(820-1/5)	2×AWG18~ 2×AWG16	1. Total length of communication line can't exceed 250m (820-1/5feet). 2. The cord shall be Circular cord (the cores shall be twisted together). 3. If unit is installed in places with intense magnetic field or strong interference, it is necessary to use shielded wire.

For example, two wired controllers control multiple IDUs and the graphic of connection between IDU and wired controller is:



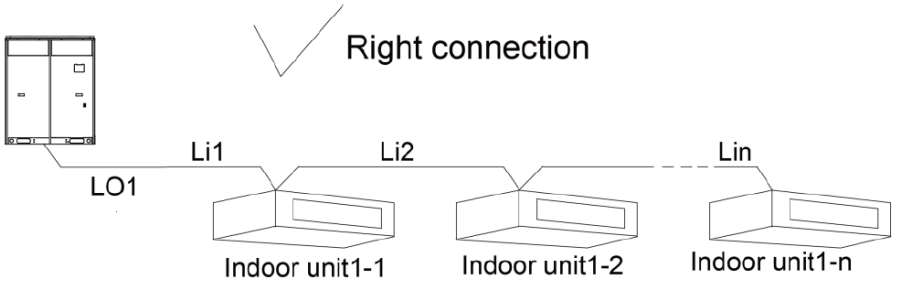
Notes: If the air conditioning units are installed at a place with strong electromagnetic interference, a shielded cable must be used as the communication cable between the indoor unit and wired controller, and a shielded twisted pair must be used as the communication cable between the indoor unit and indoor (outdoor) unit.

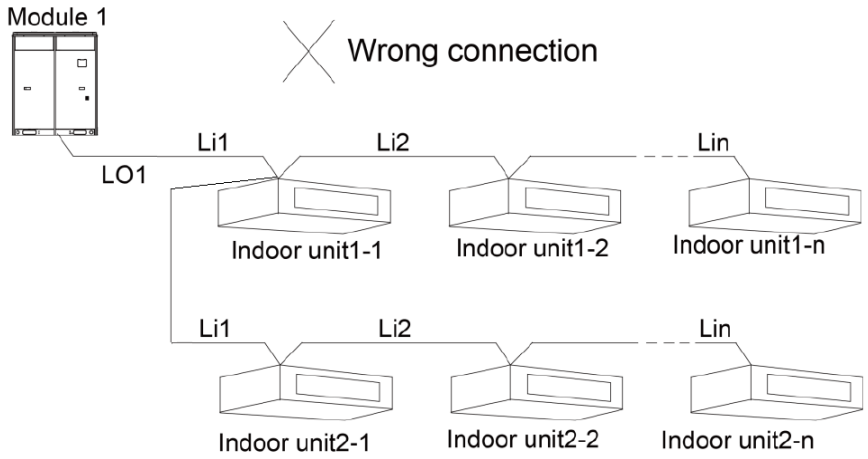
8.2.2 Communication access mode

The communication bus of Ultra Heat GMV indoor and outdoor units must be connected in series, and star connection is forbidden. The indoor unit at the end of the communication bus for the indoor units and outdoor units must be connected to a communication matching resistor (which is contained in the packing bag of the

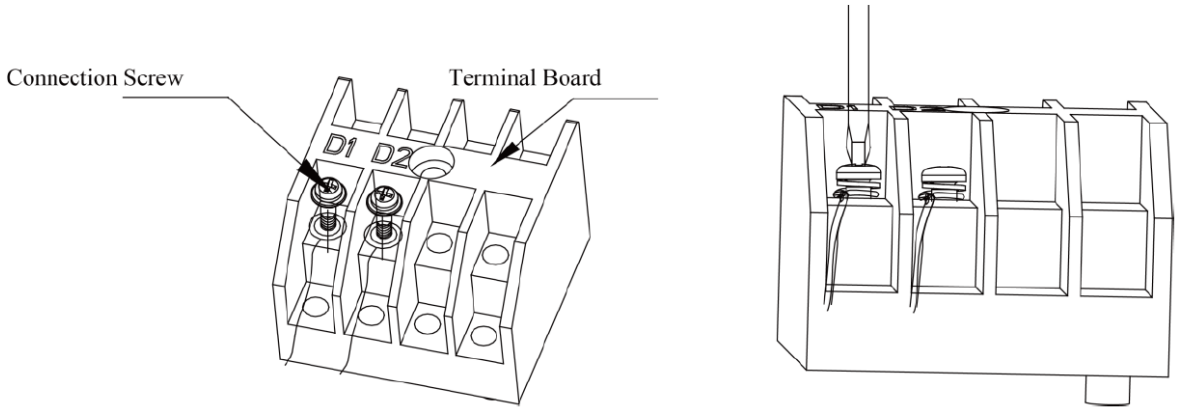
outdoor unit).

(1) All communication wires of Ultra Heat GMV must be connected in series rather than in star.





(2) All communication wires of Ultra Heat GMV units are connected by screws.



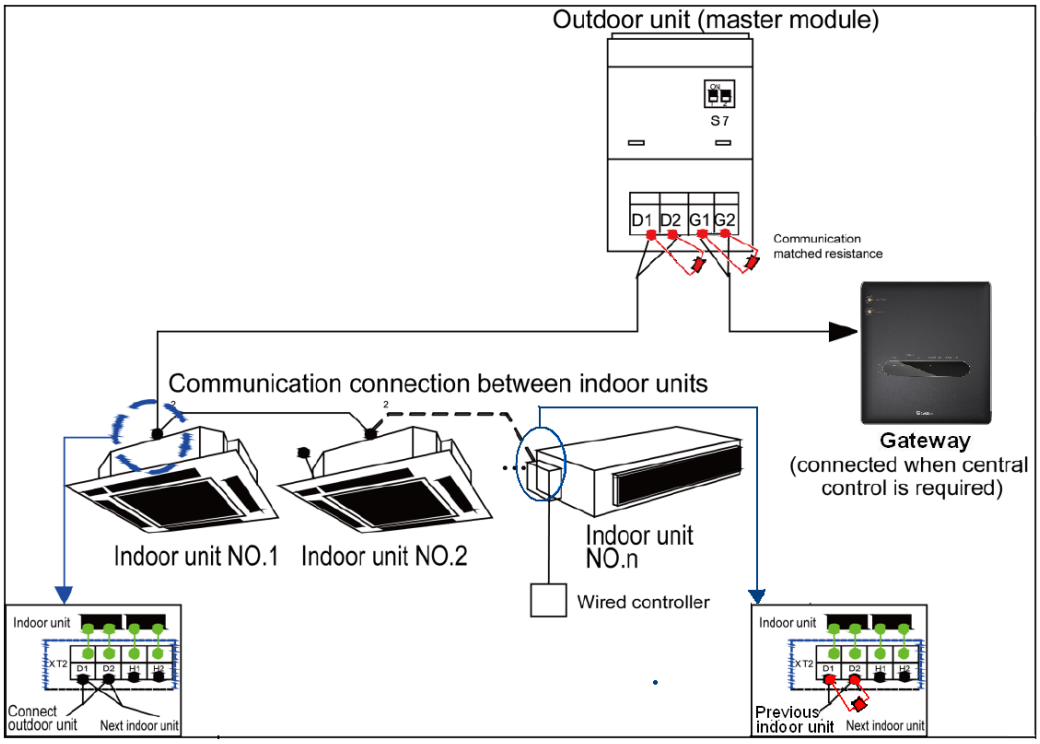
(3) If a single communication wire is not long enough and needs to be connected, the connected joint must be welded or pressure-welded. Do not simply twist the wires together.

8.3 Connection Method and Procedure of Communication Cable

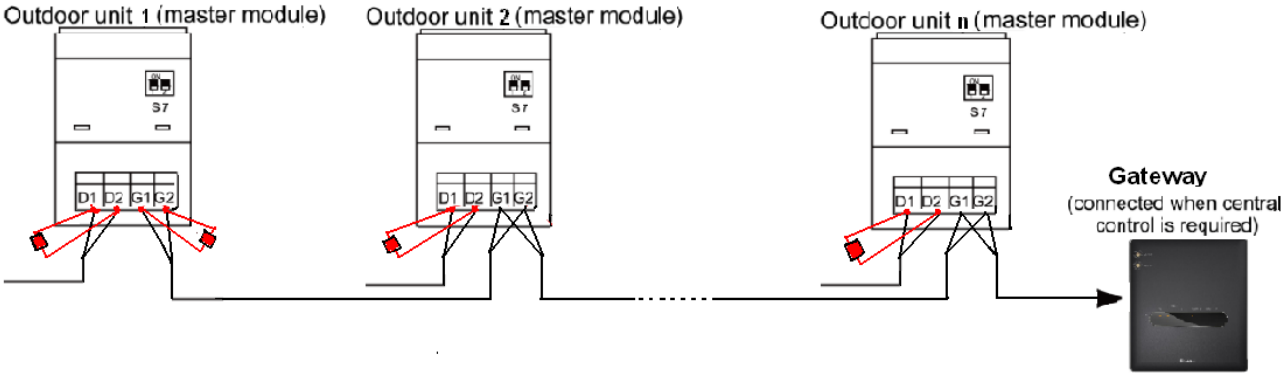
8.3.1 Communication connection between the indoor unit and outdoor unit

The indoor unit is connected to the outdoor unit through the D1/D2 port of the terminal plate XT2. The figures below show the connection method of the single outdoor unit and connection method of the modular outdoor unit.

Communication connection mode of the single module system

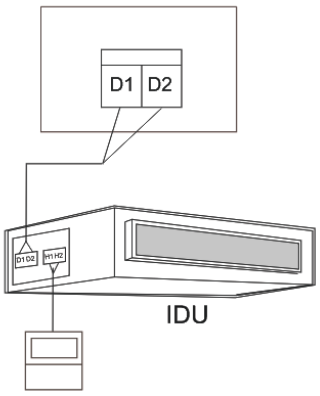


Connection of communication for multi refrigeration systems:

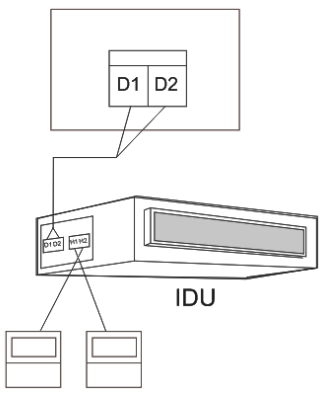


8.3.2 Communication connection mode between the indoor unit and wired controller

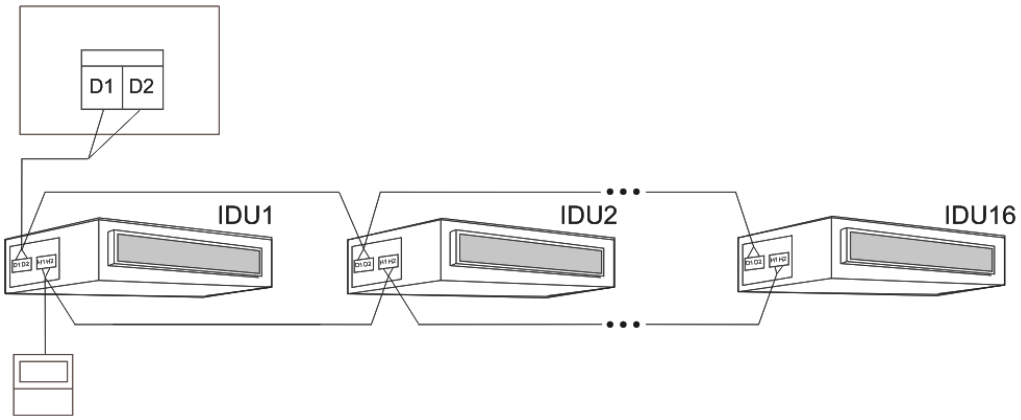
The indoor unit and the wired controller are connected in one of the following four modes, which are respectively shown in Figure below:



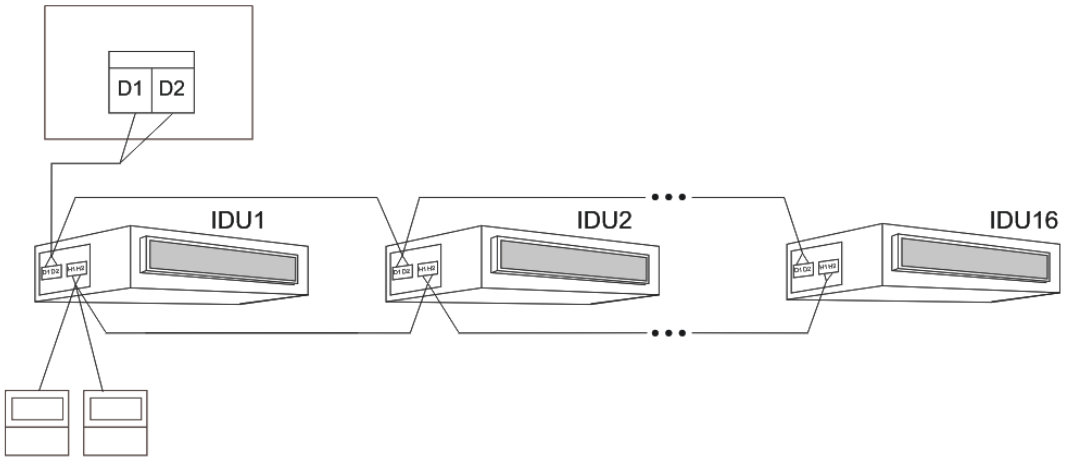
One wired controller controls one IDU



Two wired controller controls one



One wired controller controls multiple IDUs



Two wired controllers control multiple IDUs

When two wired controllers control multiple indoor units at the same time, the wired controllers can be connected to any indoor unit, the connected indoor units must belong to the same series, and only one wired controller must be set to a slave wired controller. The number of indoor units controlled by the two wired controllers is not more than 16, and the connected indoor units must be on the same indoor unit network.

(1) The slave wired controller can be set in the power-on or power-off status:

(2) Press and hold the “FUNCTION” button on the wired controller to be set to a slave wired controller for five seconds. The temperature area displays “C00”. Continue holding the “FUNCTION” button for five seconds to enter the wired controller parameter setting interface. The temperature area displays “P00” by default.

(3) Select a P13 parameter code by pressing “ ∧ ” or “ ∨ ”. Press the “MODE” button to switch to parameter value settings. The parameter value blinks. Press “ ∧ ” or “ ∨ ” to select “02”, and then press the “ENTER/CANCEL” button to complete settings.

(4) Press the “ENTER/CANCEL” button to return to the upper-level menu till quitting parameter settings. The user parameter setting list is as follows:

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, they shall have different addresses. Slave wired controller (02) can't set up units' parameters except its own address.

Note:

a. The default factory setting of all the wired controllers is the master wired controller status.

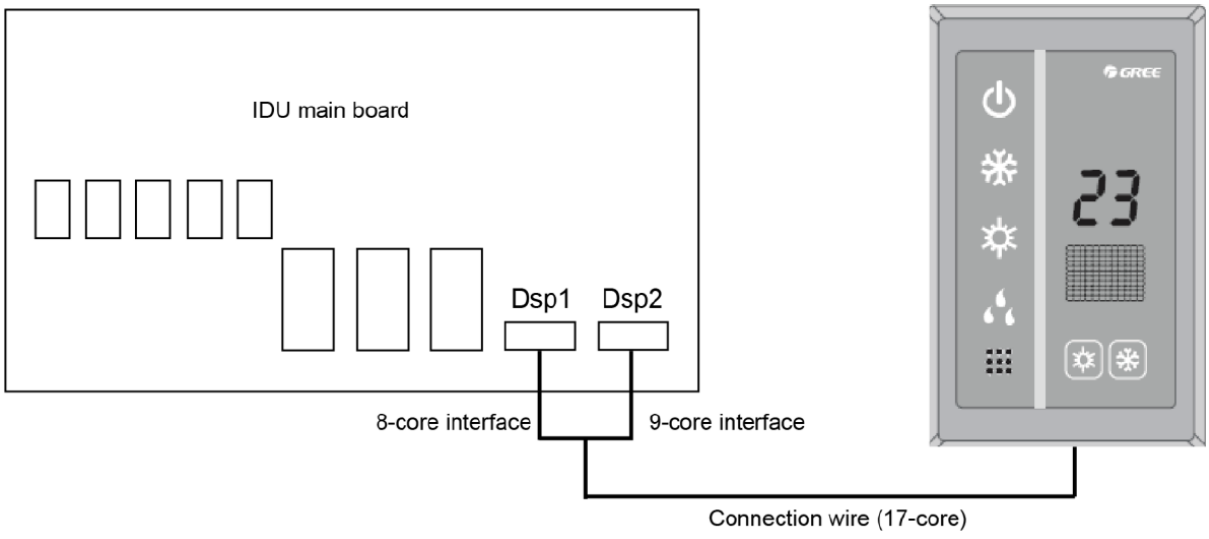
b. In the parameter setting status, the "FAN", "Timer", "SLEEP", and "SWING" buttons are invalid. By pressing "ON/OFF", you can return to the main interface but will not power on/off the unit.

c. In the parameter setting status, signals of the remote controller are invalid.

8.3.3 Connection mode between the air duct-type indoor unit and receiving LED panel

When the air duct-type indoor unit needs to be connected to a remote receiving LED panel, they are connected through Dsp1 and Dsp2 of the main board for indoor unit:

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)



NOTES:

a. The wired controller and remote receiving LED panel can be used at the same time.

b. Note to select a remote controller when a remote receiving LED panel is used.

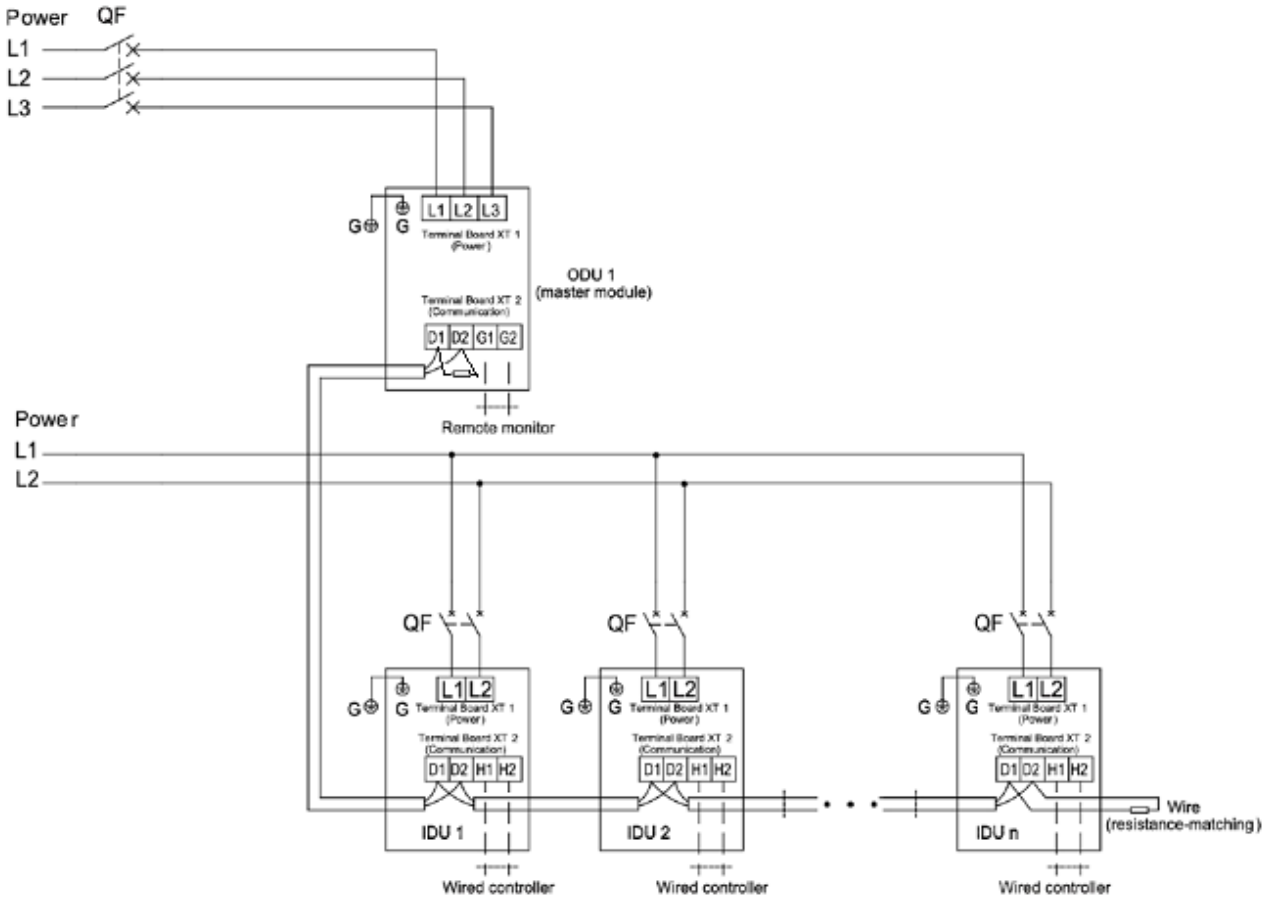
9 ELECTRICAL CONNECTION

9.1 External Connection Interfaces

External connection interfaces	Power supply	Quantity	5
		Label	L1 L2 L3 N PE
	Indoor/outdoor unit communication	Quantity	2
		Label	D1 D2
	Centralized control	Quantity	2
		Label	G1 G2

9.2 External Connection

Every unit must be configured with a circuit breaker to implement short circuit and abnormal overload protection. Besides, the indoor unit and outdoor unit should be respectively configured with a general circuit breaker, which is used to uniformly connect to or cut off the general power supply for the indoor unit or outdoor unit.



NOTES:

The maximum number n of connected indoor units depends on the outdoor unit capacity. For details, see the content of the introduction to unit combination.

10 CALCULATION METHOD OF REFRIGERANT ADDED FOR ENGINEERING PIPING

Added refrigerant quantity R = Added refrigerant quantity A for liquid piping + ∑Added refrigerant quantity B for each module

(1) Pipeline charging amount

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

	Diameter of liquid pipe mm(inch)							
	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/inch	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(lb)		Rated Capacity(1000Btu/h)	
IDU/ODU rated capacity collocation ratio C	Quantity of included IDUs(N)	72	96
50%≤C≤90%	N＜4	0	0
	N≥4	0.5(1.1)	1(2.2)
90%＜C≤105%	N＜4	0	0.5(1.1)
	8＞N≥4	0.5(1.1)	1.5(3.3)
	N≥8	2(4.4)	3(6.6)
105%＜C≤135%	N＜4	0.5(1.1)	1(2.2)
	8＞N≥4	2.5(5.5)	3.5(7.7)
	N≥8	4(8.8)	5(11.0)

For example:

The OUD is GMV-V96W/A-F(U). The IDUs are made up of 7sets of GMV-ND18PHS/A-T(U).

IDU/ODU rated capacity collocation ratio C=18×7/96=131%.The quantity of included IDUs is more than 4 sets. Please refer to the above table.

Refrigerant charging amount B for GMV-V96W/A-F(U) module is3.5kg(7.7pounds).

Suppose the Pipeline charging amount A= 25kg (55.1 pounds)

Total refrigerant charging amount R=25+3.5=28.5kg (55.1+7.7=62.8pounds).

After confirming that there is no leakage from the system, charge additional R410A with specified amount to the unit through the filling opening of the liquid pipe valve of the outdoor unit when the compressor is not in operation. If required additional refrigerant cannot be quickly filled for increase of pressure in the pipe, set the unit at cooling startup and then fill the refrigerant from gas valve of outdoor unit. If ambient temperature is low, the unit can’t be set to cooling mode but heating mode.

11 OPTIONAL COMPONENTS

The Ultra Heat GMV series VRF units provide the following options:

		Model	Remarks
Manifold	Outdoor unit	ML01R	For the model selection method, see the part of pipeline selection
	Indoor unit	FQ01A/A, FQ01B/A, FQ02/A, FQ03/A, FQ04/A	
Remote receiving LED panel		JS05	Applicable to the duct-type indoor unit
Remote controller for debugging		YV1L1	With the debugging function, used to set functions of the indoor unit
Classic wired controller		Wired controller XK46	Applicable to the air Cassette, Floor Ceiling, Wall-Mounted indoor unit (duct-type indoor unit standard)
Wired controller for hotel		Wired controller XK79	With the access control function
Color screen wired controller		Wired controller XK55	
Debugging Software		VRF Debugging Software.exe	Applicable to Ultra Heat GMV unit
Remote monitoring system	Software	VRF Monitoring System.exe	Applicable to Ultra Heat GMV unit
	Gateway	FE22-41/BEF(MCB)	
	Optoelectronic isolated repeater	RS485-W	

Note: if you need the above optional components, please consult your local sales company.

Gree Electric Appliances, Inc. of Zhuhai, founded in 1991, is the world's largest air conditioner enterprise integrating R&D, manufacturing, marketing and services. Technology Innovation and quality are always our priority. With efforts of thousands of Gree's engineers, we own more than 3500 patents for our products. Nowadays, we have 7 production bases in Zhuhai, Chongqing, Hefei and Zhengzhou (China), as well as Brazil, Pakistan and Vietnam, with annual production capacity of 30 million sets of residential air conditioners and 4 million sets of commercial air conditioners.

With the installation of Gree commercial air conditioners in important projects at home and abroad like Media Village for 2008 Beijing Olympic Games, Stadiums for 2010 World Cup in South Africa, as well as India Telecom base station, Gree commercial air conditioner are ready to develop steadily to every corner in the world, to present a more comfortable and harmonious working environment and family atmosphere.

EE MAKING BETTER CONDITIONERS GREE MAKING BETTER CONDITIONERS GREE MAKING BETTER CONDITIONERS GREE MAKIN BETTER CONDITIONERS GREE M

GREE

Add: West Jinji Rd, Qianshan Zhuhai,Guangdong, China519070
Tel: (+86-756)8614883 Fax: (+86-756)8614998
Http://www.gree.com Email: gree@gree.com.cn

Sj00480905