ULTRA HEAT GMV MULTI VRF UNIT

——Heat Recovery Series

R410A

GREE ELECTRIC APPLIANCES INC. OF ZHUHAI

CONTENTS

1 OUTLINE OF MULTI VFR

Ultra Heat GMV Multi VRF Units: The basic models of the whole series are 6ton, 8ton: GMV-VQ72W/A-F(U) and GMV-VQ96W/A-F(U); and the combination model are 12ton, 14ton, 16 ton, GMV-VQ144WM/A-F(U), GMV-VQ168WM/A-F(U), GMV-VQ192WM/A-F(U).

6ton~8ton

12ton, 14ton, 16ton

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.

- **Refrigerant storage and distribution technology**

Ultra Heat GMV units adopt refrigerant adjustment tank control technology that can adjust the operating volume of refrigerant according to the operating situation of system. Under the high-temperature and low load condition, it requires low operating capacity and high pressure, then the refrigerant can be stored by refrigerant adjustment tank. When the operating load is great, the refrigerant can be discharged from the adjustment tank to increase operating volume of refrigerant in the system.

- **Unique comfortable 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	12	14	16
Model		-	GMV-VQ72W/A-F(U)	GMV-VQ96W/A-F(U)	GMV-VQ144WM/A-F(U)	GMV-VQ168WM/A-F(U)	GMV-VQ192WM/A-F(U)
Combination Model		-	/	/	GMV-VQ72W/A-F(U)+GMV-VQ72W/A-F(U)	GMV-VQ72W/A-F(U)+GMV-VQ96W/A-F(U)	GMV-VQ96W/A-F(U)+GMV-VQ96W/A-F(U)
Performance	Nominal Cooling Capacity	KBtu/h	72	96	144	168	192
		kW	21.1	28.1	42.2	49.2	56.3
	Rated Cooling Capacity①	KBtu/h	69	92	138	160	184
		kW	20.2	27.0	40.45	46.89	53.9
	Nominal Heating Capacity	KBtu/h	81	108	162	189	216
		kW	23.7	31.6	47.5	55.4	63.3
	Rated Heating Capacity	KBtu/h	77	103	154	180	200
		kW	22.6	30.2	45.13	52.76	58.6
	Cooling Power Input	kW	6.10	8.36	12.58	14.79	17.36
	Heating Power Input	kW	6.64	8.88	13.67	16.25	18.03
	Sound Pressure Level	dB(A)	60	60	/	/	/
	Power Supply	-	208/230V 3~ 60HZ				
Compressor	Type	-	Inverter Rotary	Inverter Rotary	Inverter Rotary	Inverter Rotary	Inverter Rotary
	Number	N	2	2	2+2	2+2	2+2
	Motor Output②	kW	5.83×2	5.83×2	5.83×2+5.83×2	5.83×2+5.83×2	5.83×2+5.83×2
	Starting Method	-	Inverter	Inverter	Inverter	Inverter	Inverter
	Operating Range	-	10%~100%	10%~100%	/	/	/
	Refrigeration Oil Brand	-	FV50S	FV50S	FV50S	FV50S	FV50S

	Oil Charge	Compressor	L	1.35×2	1.35×2	1.35×2+1.35×2	1.35×2+1.35×2	1.35×2+1.35×2
		Oil Separate Tank	L	6	6	6+6	6+6	6+6
		Total	L	8.7	8.7	8.7+8.7	8.7+8.7	8.7+8.7
Fan	Type×Quantity		-	Propeller×2	Propeller×2	Propeller×(2+2)	Propeller×(2+2)	Propeller×(2+2)
	Motor Output		W	750+750	750+750	750×2+750×2	750×2+750×2	750×2+750×2
	Starting Method		-	Inverter	Inverter	Inverter	Inverter	Inverter
	Air Flow Rate		m3/h	14000	14000	14000+14000	14000+14000	14000+14000
			cfm	8240	8240	8240+8240	8240+8240	8240+8240
	Max. External Static Pressure		Pa	82	82	82	82	82
			in. W. G	0.328	0.328	0.328	0.328	0.328
Ambient Temperature Range	Cooling		℃	-10~52	-10~52	-10~52	-10~52	-10~52
			℉	14~125.6	14~125.6	14~125.6	14~125.6	14~125.6
	Heating		℃	-30~24	-30~24	-30~24	-30~24	-30~24
			℉	-22~75.2	-22~75.2	-22~75.2	-22~75.2	-22~75.2
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A
	Charge Volume		kg	12.5	12.5	12.5+12.5	12.5+12.5	12.5+12.5
			lbs.	27.6	27.6	27.6+27.6	27.6+27.6	27.6+27.6
	Control		-	EEV	EEV	EEV	EEV	EEV
Pipe Connection	Low Pressure Gas Pipe		mm	28.6	28.6	34.9	34.9	34.9
			in.	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8
	High Pressure Gas Pipe		mm	19.05	19.05	28.6	28.6	28.6
			in.	3/4	3/4	1-1/8	1-1/8	1-1/8
	Liquid Pipe		mm	12.7	12.7	15.9	15.9	15.9
			in.	1/2	1/2	5/8	5/8	5/8
Dimensions (width×depth×height)	External Dimension		mm	1340×765×1605	1340×765×1605	1340×765×1605+1340×765×1605	1340×765×1605+1340×765×1605	1340×765×1605+1340×765×1605
			in.	52-3/4×	52-3/4×	52-3/4×30-1/8×63-1/5+	52-3/4×30-1/8×63-1/5+	52-3/4×30-1/8×63-1/5+

			30-1/8× 63-1/5	30-1/8× 63-1/5	52-3/4×30-1/8 ×63-1/5	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	1420×840× 1775+ 1420×840× 1775	1420×840× 1775+ 1420×840× 1775	1420×840× 1775+ 1420×840× 1775
		in.	56×33× 69-7/8	56×33× 69-7/8	56×33× 69-7/8+ 56×33× 69-7/8	56×33× 69-7/8+ 56×33× 69-7/8	56×33× 69-7/8+ 56×33× 69-7/8
Weight	Net Weight	kg	408	408	408+408	408+408	408+408
		lbs.	899	899	899+899	899+899	899+899
	Gross Weight	kg	423	423	423+423	423+423	423+423
		lbs.	933	933	933+933	933+933	933+933
Maximum Quantity of Connected Indoor Unit		unit	12	17	24	29	34
Protecti on 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 C&H Mode Exchanger

The C&H mode exchanger is used for connecting outdoor unit and indoor unit, and providing high pressure, low pressure and medium pressure refrigerant provided by outdoor unit for cooling or heating mode and complete the refrigerant system circulation for the purpose of adjusting indoor temperature.

1) The C&H mode exchanger provides multiple branch combination forms, which can connect different kinds of lower branches. Each branch of the convertor of the C&H mode exchanger can connect 8 indoor units at the most and the total capacity should be no more than 14kw.
2) The C&H mode exchanger provides multiple branches used for connection lower indoor units. It's convenient for installation, leakage detection and maintenance.
3) The C&H mode exchanger is supplied power independently, which connects indoor unit and outdoor unit with communication wire. It's convenient and flexible for installation and construction.

One-to-one mode exchanger NCHS1B(U):

One-to-two mode exchanger NCHS2B(U):

One-to-four mode exchanger NCHS4B(U):

One-to-eight mode exchanger NCHS8B(U):

Model	NCHS1B(U)	NCHS2B(U)	NCHS4B(U)	NCHS8B(U)
Max. IDU Branches	1	2	4	8
No. of Connectable IDU of Each Branch	8	8	8	8

Total Connectable IDU			8	16	32	64
Max. Capacity of Each Branch		kW	14	14	14	14
		kBtu/h	47.7	47.7	47.7	47.7
Max. Capacity of Connectable IDU		kW	14	28	45	68
		kBtu/h	47.7	95.5	153	232
Power Supply		V/Ph/Hz	208/230V 1Ph 60Hz			
Power Consumption		W	8	20	32	80
ODU Piping Connection	Liquid Pipe	mm	9.52	9.52	12.7	15.9
		In.	3/8	3/8	1/2	5/8
	Gas Pipe (Low Pressure)	mm	22.2	22.2	28.6	28.6
		In.	7/8	7/8	11/8	11/8
	Gas Pipe (High Pressure)	mm	15.9	19.05	19.05	22.2
		In.	5/8	3/4	3/4	7/8
IDU Piping Connection	Liquid Pipe	mm	9.52	9.52	9.52	9.52
		In.	3/8	3/8	3/8	3/8
	Gas Pipe	mm	15.9	15.9	15.9	15.9
		In.	5/8	5/8	5/8	5/8

2.3 Combination Mode

Single Model	GMV-VQ72W/A-F(U)	GMV-VQ96W/A-F(U)
GMV-VQ72W/A-F(U)	⬟	
GMV-VQ96W/A-F(U)		⬟
GMV-VQ144WM/A-F(U)	⬟ ⬟	
GMV-VQ168WM/A-F(U)	⬟	⬟
GMV-VQ192WM/A-F(U)		⬟ ⬟

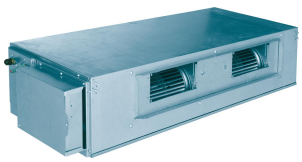
2.4 Electrical Specifications

ODU Model	Power Supply	Fuse Capacity	Minimum Circuit Ampacity	Maximum Overcurrent Protection
	V/Ph/Hz	A	A	A
GMV-VQ72W/A-F(U)	208/230V 3Ph 60Hz	50	40	50
GMV-VQ96W/A-F(U)	208/230V 3Ph 60Hz	60	45	60
GMV-VQ144WM/A-F(U)	208/230V 3Ph 60Hz	50+50	40+40	50+50
GMV-VQ168WM/A-F(U)	208/230V 3Ph 60Hz	50+60	40+50	50+60
GMV-VQ192WM/A-F(U)	208/230V 3Ph 60Hz	60+60	45+45	60+60

2.5 Indoor Unit

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Super High Duct Type		GMV-ND07PHS/B-T(U)	2.2	7.5	2.5	8.5
		GMV-ND09PHS/B-T(U)	2.8	9.5	3.1	10.5
		GMV-ND12PHS/B-T(U)	3.5	12	4.0	13.5
		GMV-ND15PHS/B-T(U)	4.4	15	5	17
		GMV-ND18PHS/B-T(U)	5.3	18	5.9	20
		GMV-ND22PHS/B-T(U)	6.4	22	7.0	24
		GMV-ND24PHS/B-T(U)	7.0	24	7.9	27
		GMV-ND30PHS/B-T(U)	8.8	30	10.0	34
		GMV-ND36PHS/B-T(U)	10.6	36	11.7	40
		GMV-ND42PHS/B-T(U)	12.3	42	13.8	47
		GMV-ND48PHS/B-T(U)	14.1	48	15.8	54
		GMV-ND54PHS/B-T(U)	15.8	54	17.6	60

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
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
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
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
Slim Duct Type with Low ESP (Left type)		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)	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
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
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
1 Way Cassette		GMV-ND07TD/A-T(U)	2.2	7.5	2.5	8.5
		GMV-ND09TD/A-T(U)	2.8	9.5	3.1	10.5
		GMV-ND12TD/A-T(U)	3.5	12	4.0	13.5
Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Slim Duct Type with Low ESP (Right type)		GMV-ND07PLS/B-T(U)	2.2	7.5	2.5	8.5
		GMV-ND09PLS/B-T(U)	2.8	9.5	3.2	11
		GMV-ND12PLS/B-T(U)	3.5	12	4.0	13.5
		GMV-ND14PLS/B-T(U)	4.0	15	4.5	17
		GMV-ND18PLS/B-T(U)	5.3	18	5.9	20
		GMV-ND24PLS/B-T(U)	7.0	24	7.9	27

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Air Handler		GMV-ND09A/A-T(U)	2.8	9.5	3.1	10.5
		GMV-ND12A/A-T(U)	3.5	12	4.0	13.5
		GMV-ND18A/A-T(U)	5.3	18	5.9	20
		GMV-ND24A/A-T(U)	7.0	24	7.9	27
		GMV-ND30A/A-T(U)	8.8	30	10	34
		GMV-ND36A/A-T(U)	10.6	36	11.7	40
		GMV-ND42A/A-T(U)	12.3	42	13.8	47
		GMV-ND48A/A-T(U)	14.1	48	15.8	54
		GMV-ND54A/A-T(U)	15.8	54	17.6	60

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
100% Fresh Air Handler Unit		GMV-NDX42P/A-T(U)	12.3	42	8.5	29
		GMV-NDX48P/A-T(U)	14.1	48	10	34
		GMV-NDX54P/A-T(U)	15.8	54	13.2	45
		GMV-NDX72P/A-T(U)	21.1	72	16.1	55
		GMV-NDX96P/A-T(U)	28.1	96	19.9	68

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Large Duct		GMV-ND72PH/A-T(U)	20.2	69	22.6	77
		GMV-ND96PH/A-T(U)	27	92	30.2	103
		GMV-ND72PH/B-T(U)	21.1	72	23.7	81
		GMV-ND96PH/B-T(U)	28.1	96	31.7	108

Type	Appearance	Model	Cooling Capacity		Heating Capacity	
			kW	kBtu/h	kW	kBtu/h
Wall Mounted Type Indoor Unit (Lomo)		GMV-ND06G/B4B-T(U)	1.8	6	1.8	6
		GMV-ND07G/B4B-T(U)	2.2	7.5	2.5	8.5
		GMV-ND09G/B4B-T(U)	2.8	9.5	3.2	11
		GMV-ND12G/B4B-T(U)	3.5	12	4	13.5
		GMV-ND14G/B4B-T(U)	4.4	15	5	17
		GMV-ND18G/B4B-T(U)	5.3	18	5.9	20

		GMV-ND24G/B4B-T(U)	7	24	7.5	25.5
		GMV-ND30G/B4B-T(U)	8.8	30	10	34
		GMV-ND36G/B4B-T(U)	9.5	32.5	10.5	36

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.

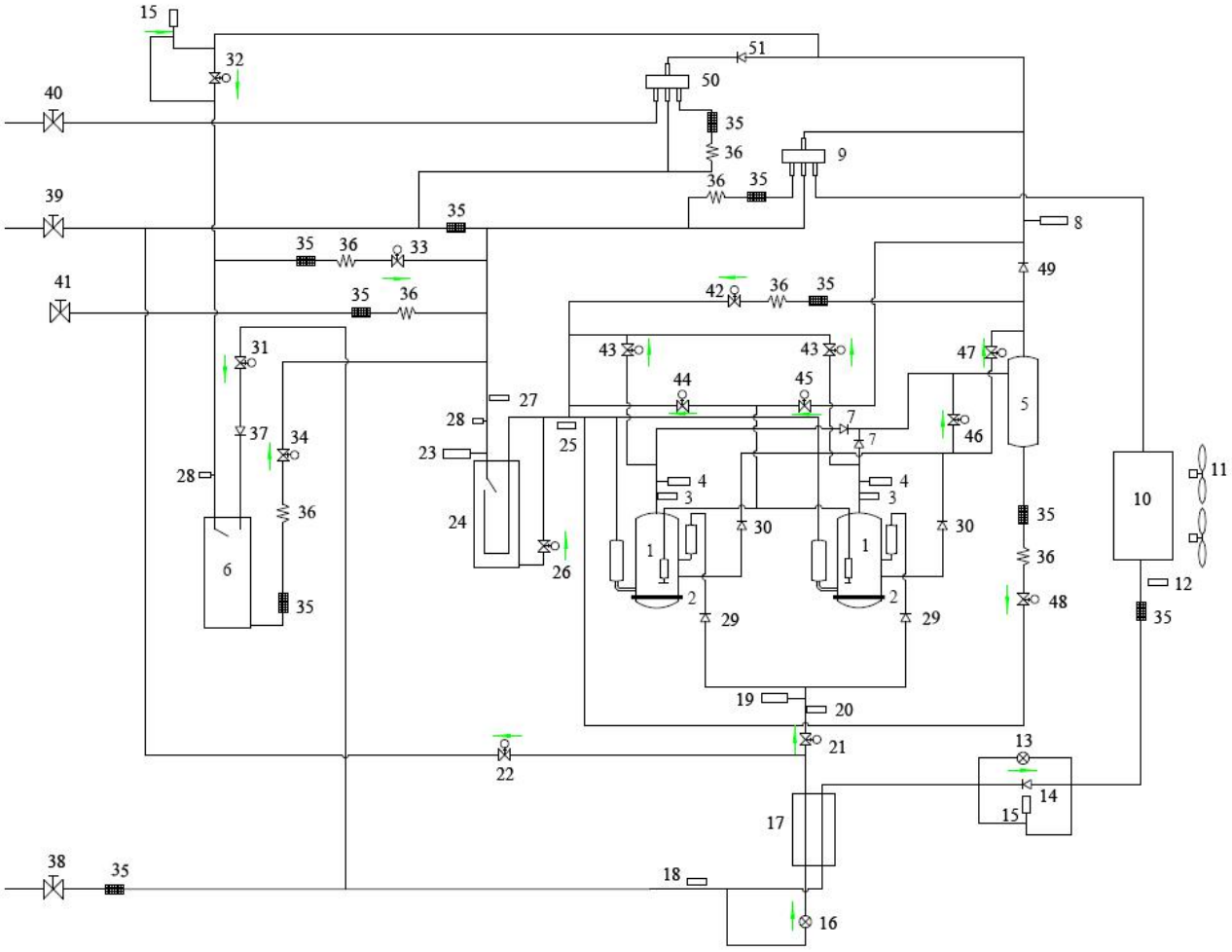
2.6 Controller

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 Design of GMV-VQ72W/A-F(U) and GMV-VQ96W/A-F(U)

3.1.1 Piping diagram



3.1.2 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.

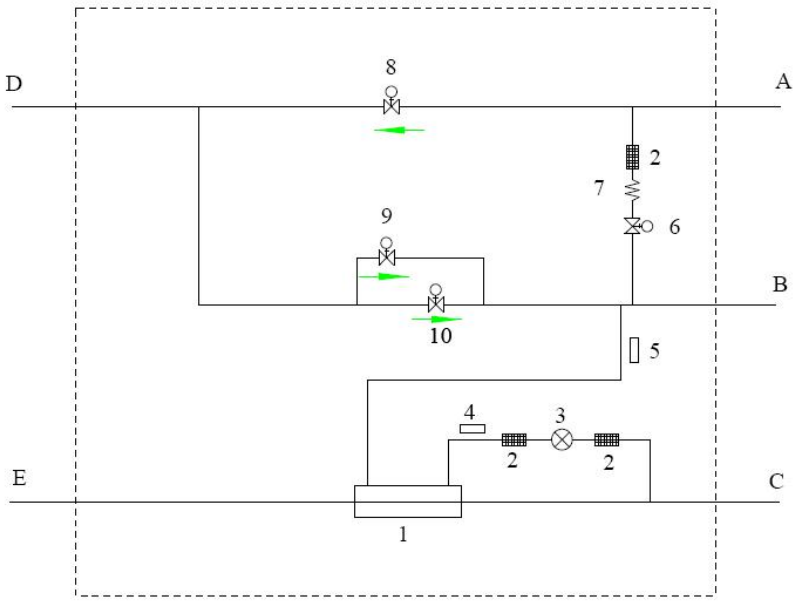
5	Oil extractor	Separates the gas and oil in the system to ensure compressor reliability.
6	Accumulator	Refrigerant adjustment.
7	One-way valve	Prevents high-pressure gas from entering the compressor and fast balances the suction pressure and discharge pressure in a compressor.
8	High-pressure sensor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

35	Filter	Prevents impurities from entering components and parts.
36	Capillary tube	Supports flow regulating and pressure reduction.
37	One-way valve	Avoid impurities getting into the electric parts. Meanwhile, absorb the water inside the liquid status to prevent ice blockage.
38	Liquid valve	Stop valve, closed when the unit is delivered from the factory and will be opened after installation.
39	Low pressure gas pipe valve	Stop valve, closed when the unit is delivered from the factory and will be opened after installation.
40	High pressure gas pipe valve	Stop valve, closed when the unit is delivered from the factory and will be opened after installation.
41	Low-pressure measurement valve	Detects the low pressure value or charges refrigerant during system running.
42	Gas-bypass valve	Make sure pressure of the system is balanced.
43	Pressure-balanced valve	Ensures success startup of compressor.
44	Varying capacity valve 1	To make the compressor turn with double cylinders.
45	Varying capacity valve 2	To make the compressor turn with triple cylinders.
46	Oil-balanced valve 1	Make sure oil of the system is balanced.
47	Oil-balanced valve 2	Make sure oil of the modules is balanced.
48	Oil return valve	Oil return control for the compressor.
49	One-way valve	Prevents high-pressure gas from entering the compressor and fast balances the suction pressure and discharge pressure in a compressor.
50	Four-way valve 2	Used for the switching between the cooling and heating functions of system IDU.
51	One-way valve	Controls refrigerant flow direction.

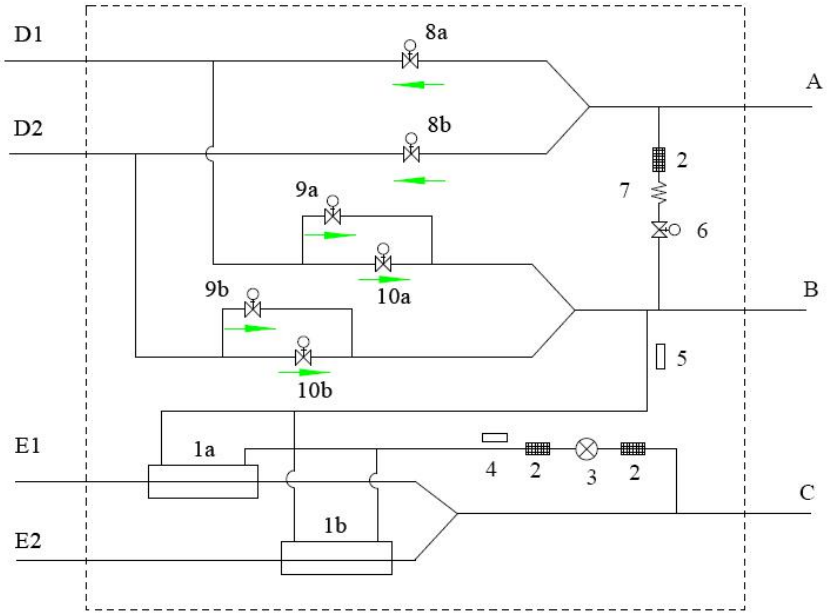
3.2 Piping Design of C&H Mode Exchanger

3.2.1 Piping diagram

NCHS1B(U):



NCHS2B(U):



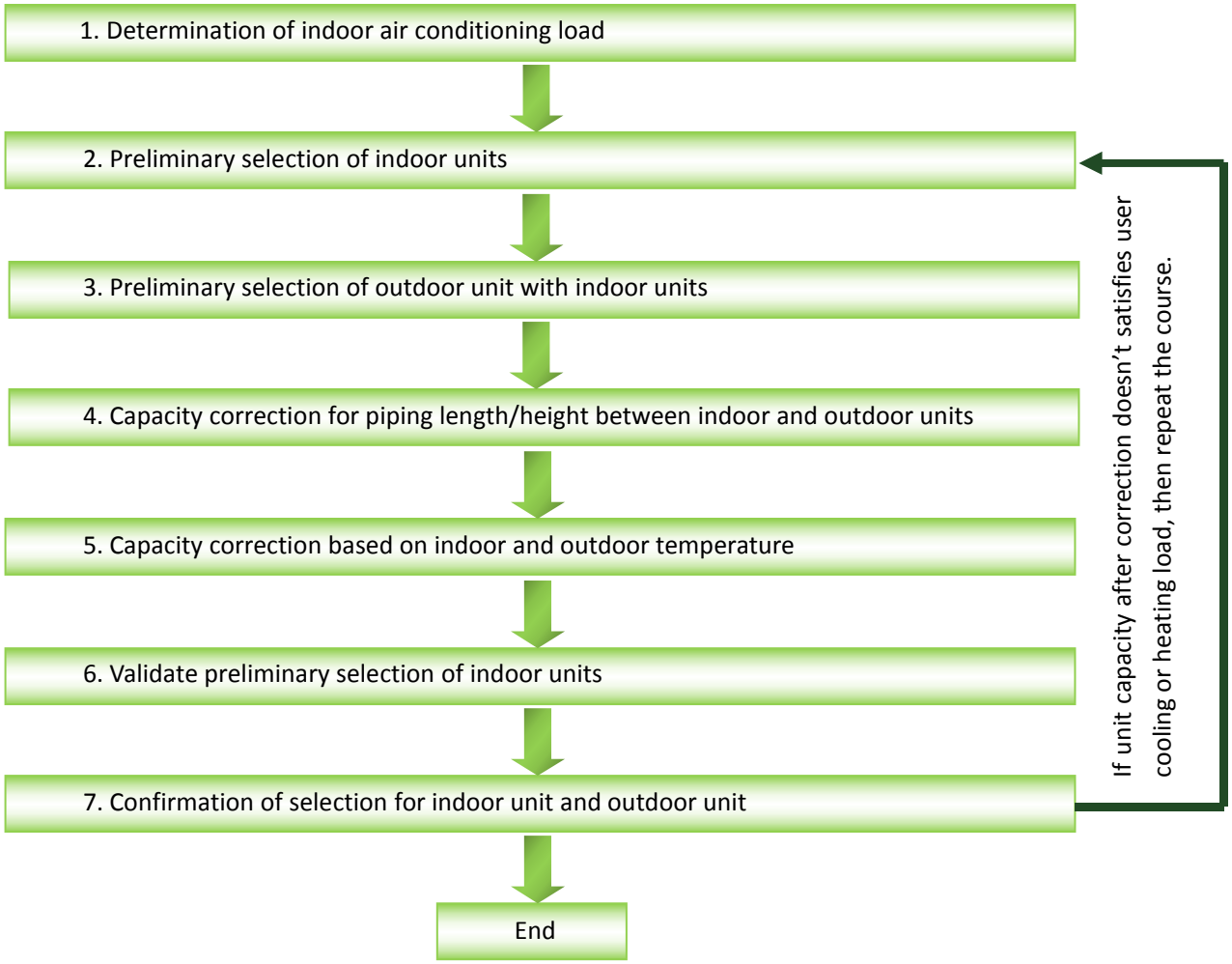
The piping diagram of NCHS4B(U) and NCHS8B(U) is similar to the piping diagram of NCHS2B(U), which have 4 or 8 branches of liquid pipes and gas pipes connecting with IDU.

3.2.2 Names and main functions of components

No.	Name	Main Function
1	Sub cooler	Controls the degree of sub cooling of tube. (For example, 1a is the sub cooler of IDU1)
2	Filter	Prevents impurities from entering components and parts.
3	Sub cooler electronic expansion valve	Controls the degree of sub cooling of tube refrigerant.
4	Gas inlet temperature sensor of sub cooler	Detects gas tube temperature before inflowing to sub cooler.
5	Gas outlet temperature sensor of sub cooler	Detects outflow gas temperature of sub cooler.
6	Gas-bypass valve	Make sure pressure of the system is balanced.
7	Capillary tube	Supports flow regulating and pressure reduction.
8	High pressure gas valve	Controls the refrigerant flow when IDU is heating. (For example, 8a is the high pressure gas valve of IDU1)
9	Gas-bypass valve	Make sure pressure of the system is balanced. (For example, 9a is the gas-bypass valve of IDU1)
10	Low pressure gas valve	Controls the refrigerant flow when IDU is cooling.
A	High pressure gas pipe	Connects with ODU high pressure gas pipe.
B	Low pressure gas pipe	Connects with ODU low pressure gas pipe.
C	Liquid pipe	Connects with ODU liquid pipe.
D	Gas pipe(with IDU)	Connects with IDU gas pipe. (For example, D1 means connecting with gas pipe of IDU1)
E	Liquid pipe(with IDU)	Connects with IDU liquid pipe. (For example, E1 means connecting with liquid pipe of IDU1)

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.

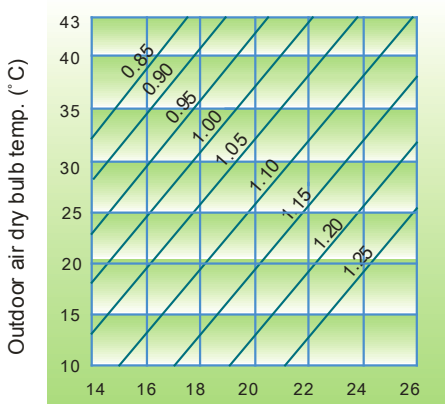
Model Name of Outdoor Unit	Capacity Code of Outdoor Unit	MAX. Number of Indoor Units	Total Capacity Code of Indoor Units	MIN. Number of Indoor Units
GMV-VQ72W/A-F(U)	72	12	36 to 97	2
GMV-VQ96W/A-F(U)	96	17	48 to 129	2
GMV-VQ144WM/A-F(U)	144	24	72~194	2
GMV-VQ168WM/A-F(U)	168	29	84~226	2
GMV-VQ192WM/A-F(U)	192	34	96~259	2

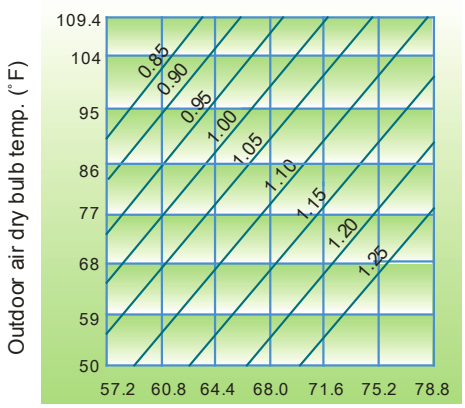
4.3 Cooling/Heating Capacity Characteristics

4.3.1 Cooling capacity calculation method

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

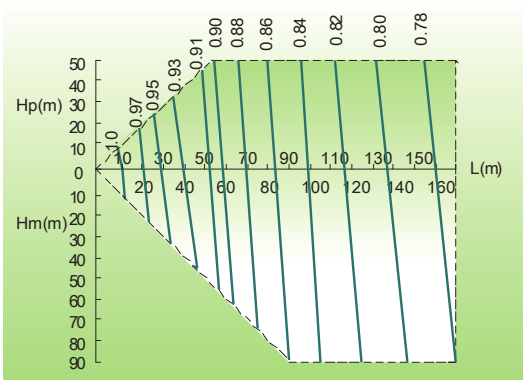
① Ambient Temperature VS. Capacity

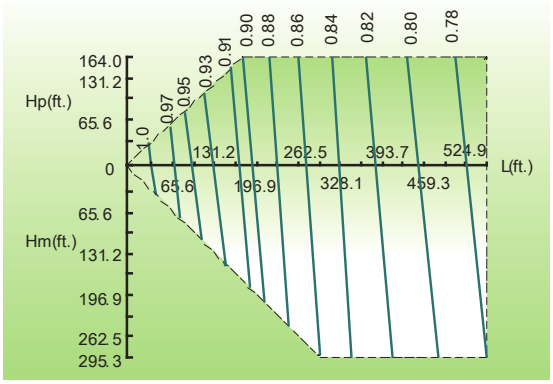




② Connecting Pipe Length and Height Difference Between Indoor and Outdoor Units VS. Capacity Correction Value

- ✧ 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

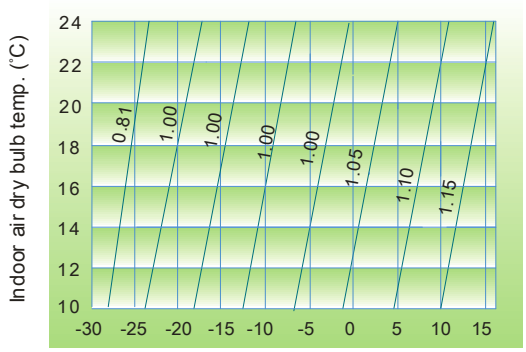




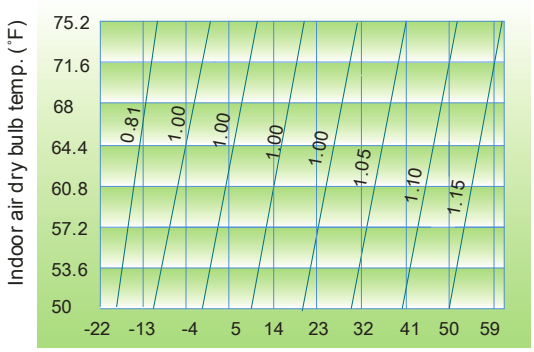
4.3.2 Heating capacity calculation method

Required heating capacity = Heating capacity×Factor①×Factor②kW

① Ambient Temperature VS. Capacity



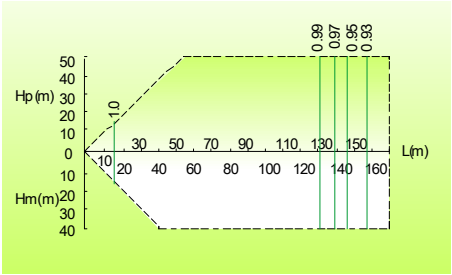
Outdoor air wet bulb temp. (℃)

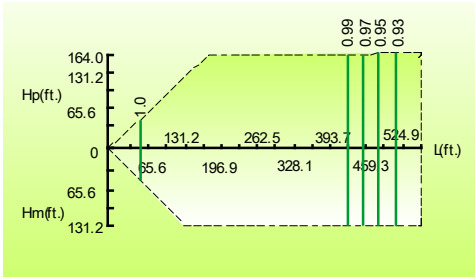


Outdoor air wet bulb temp. (℉)

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)
Heat recovery operation	-10~20 (14~68)

When the indoor units are all VRF air processor, the unit operating range is as follows:

Range / Mode	Outdoor Temperature Range℃(℉)
Cooling	16~45 (60.8~113)
Heating	-7~16 (19.4~60.8)

NOTICE! Out of the working Temperature Range may damage this products and will invalidate the warranty. If the temperature is beyond the range, the safety protection measure of the unit may take effect, and the air conditioning unit will stop.

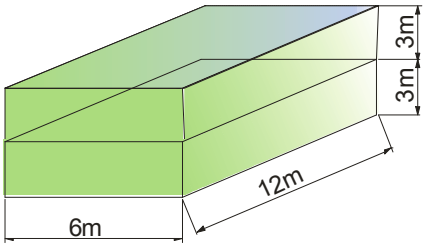
Electrify the unit 8 hours before operation. Please switch on for 8 hours before operation. Do not cut off the

power when 24 hours short-time halting (to protect the compressor).

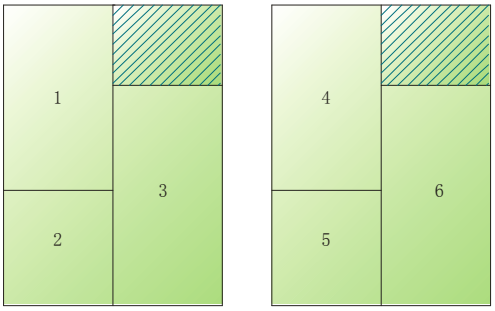
4.4 Example of Equipment Selection

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**

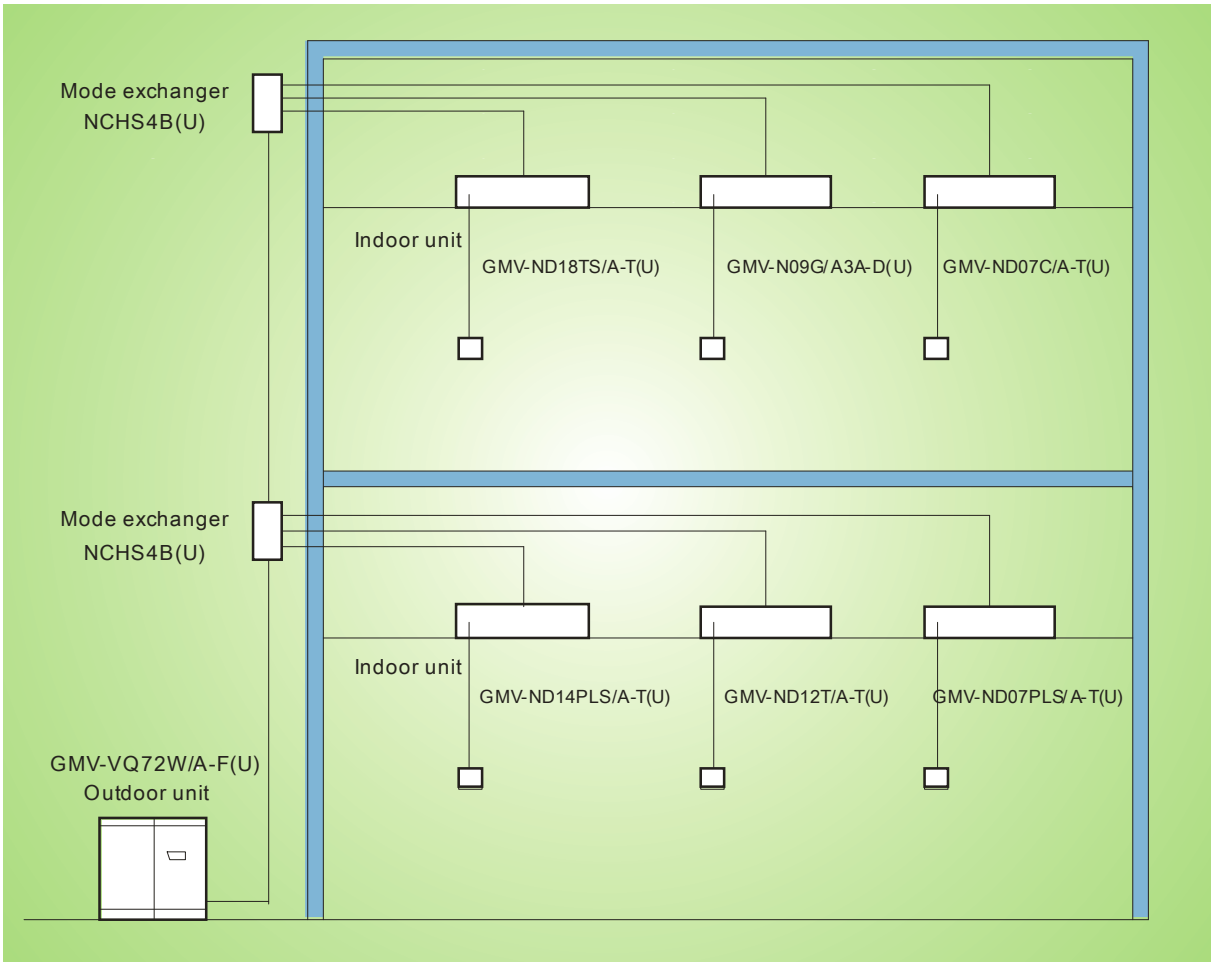
- ✧ Calculate cooling for every room.
- ✧ Select an indoor unit to match the cooling load for every room.
- ✧ Choose a tentative outdoor that will match with indoor units, perform capacity correction based on the pipe length, system lift, indoor set temperature, outdoor temperature, then make sure the 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			Mode Exchanger
			Model	Capacity (kBtu/h)		Model	Capacity (kBtu/h)		Model
				Cooling	Heating		Cooling	Heating	
1F	1	6	GMV-ND07PLS/A-T(U)	7.5	8.5	GMV-VQ72W/A-F(U)	72	81	2× NCHS4B(U)
	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				

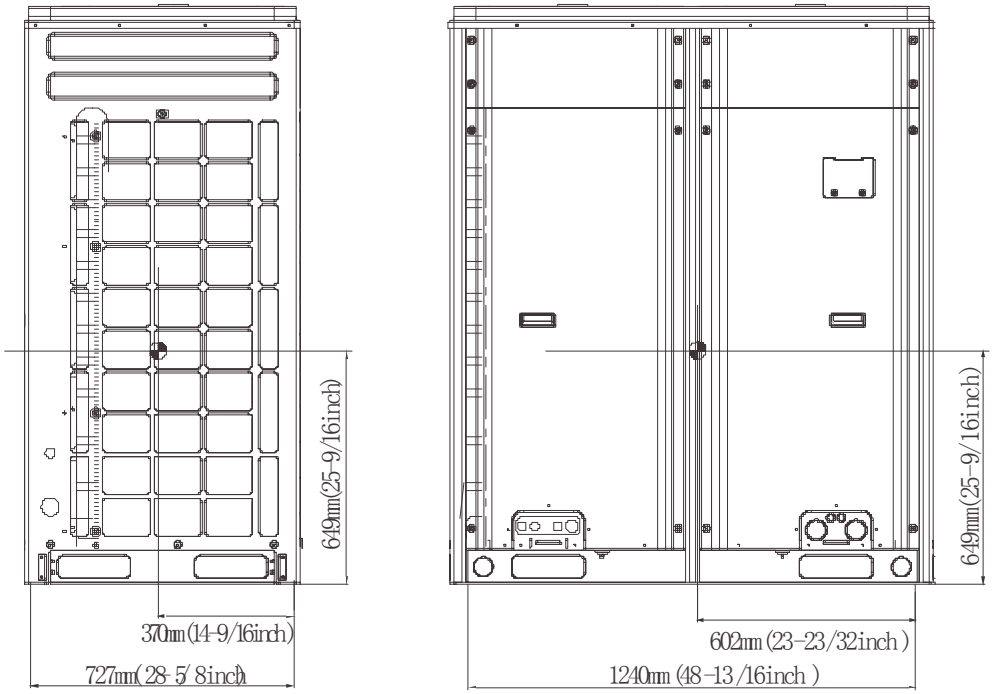
③ **Schematic Diagram**



5 UNIT GRAVITY CENTER DIAGRAMS

Unit: mm

GMV-VQ72W/A-F(U), GMV-VQ96W/A-F(U):



6 UNIT INSTALLATION SPACE REQUIREMENTS

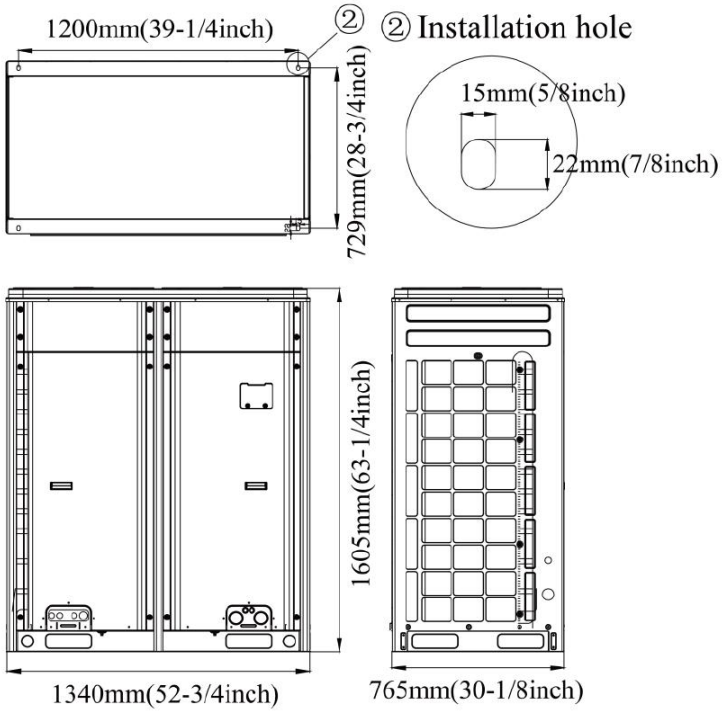
6.1 Selection of Outdoor Unit Installation Site

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-VQ72W/A-F(U), GMV-VQ96W/A-F(U):



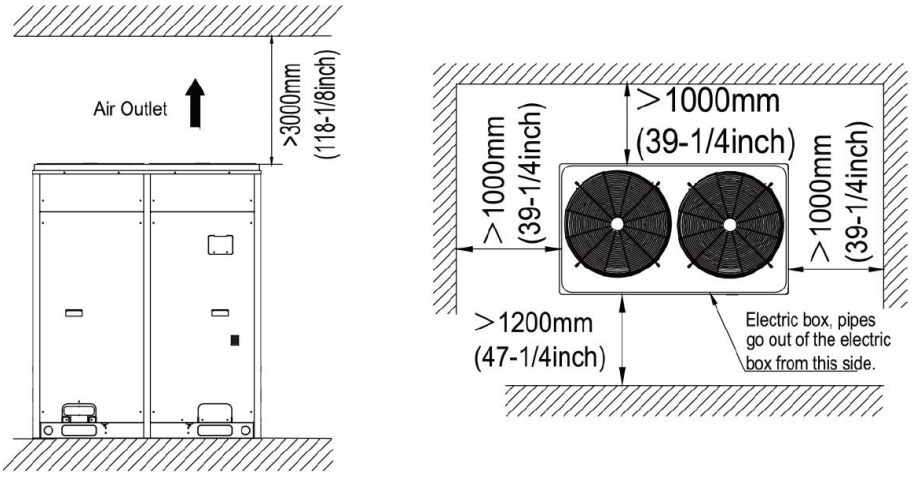
6.3 External Unit Installation Space Requirements

Unit: mm

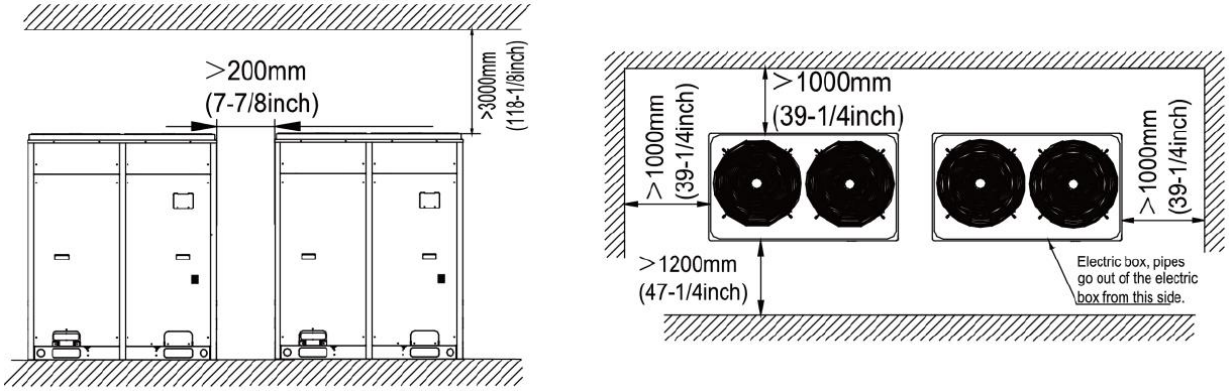
1) Space requirement for the surround of outdoor unit

When the unit is surrounded by obstructions in four directions, please keep the distance between the unit top and the top wall at least 3000mm (118-1/8inch) or above. And keep the distance between the unit and the surrounded wall at least 1000mm (39-1/4inch) or above.

a) Space dimension for single-module unit



b) Space dimension for dual-module unit



2) Space requirement for the top of outdoor unit

When the unit is located in a totally open space with no obstructions in four directions, keep the distance between the unit top and wall at least 1500mm (59inch) or above (See Fig.(a)). When space is limited within 1500mm (59inch) or the unit is not set in an open space, air return pipe is required to be installed in order to keep good ventilation (See Fig.(b)).

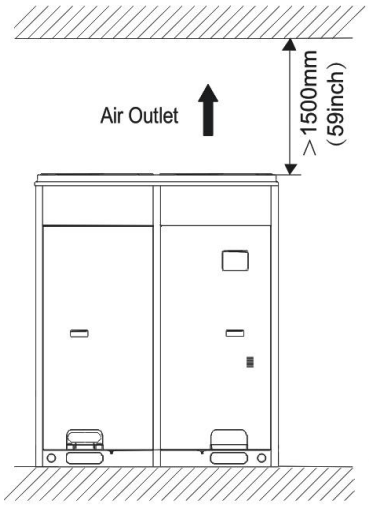


Figure (a)

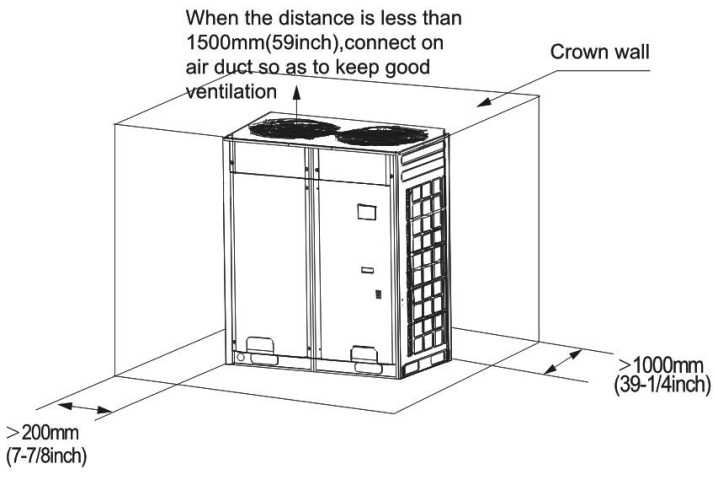
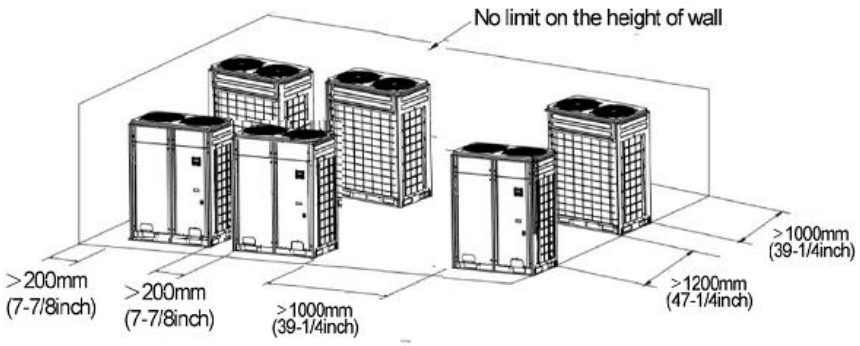


Figure (b)

3) Space dimension for multiple-module unit

For keeping good ventilation, make sure there are no obstructions above the unit.

When the unit is located at a half-open space (front and left/right side is open), install the unit as per the same or opposite direction.



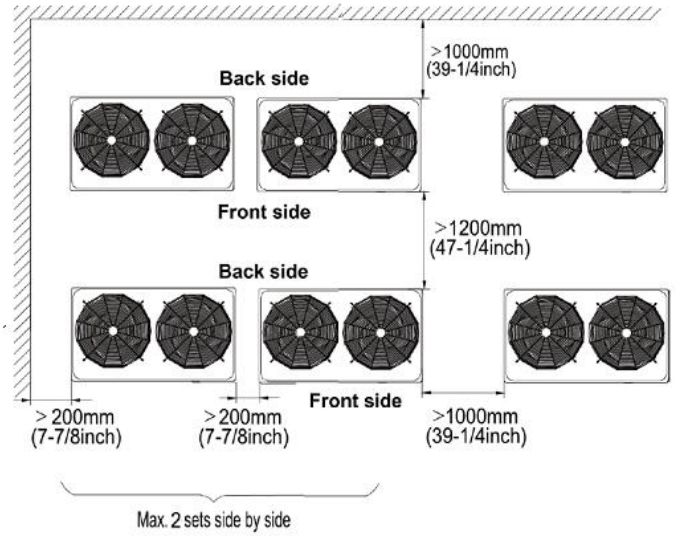
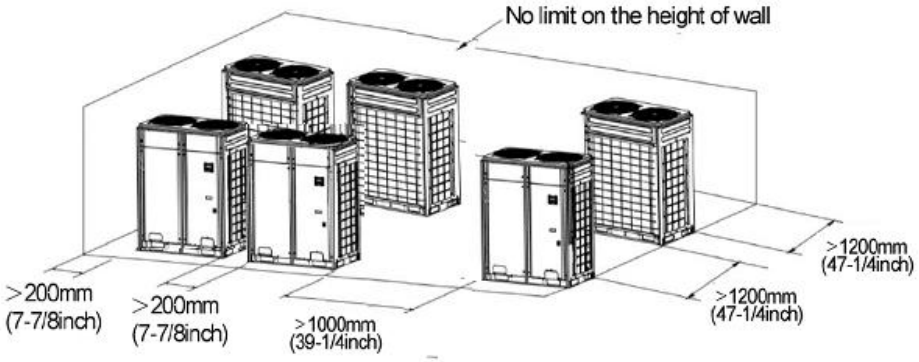


Fig.(a)



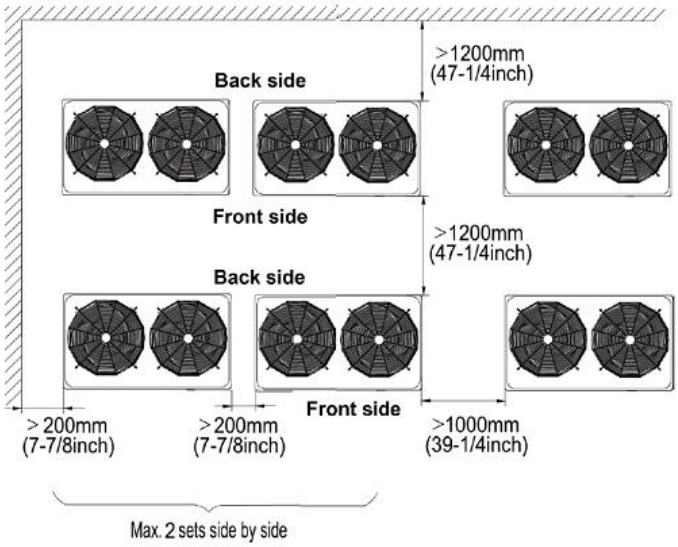
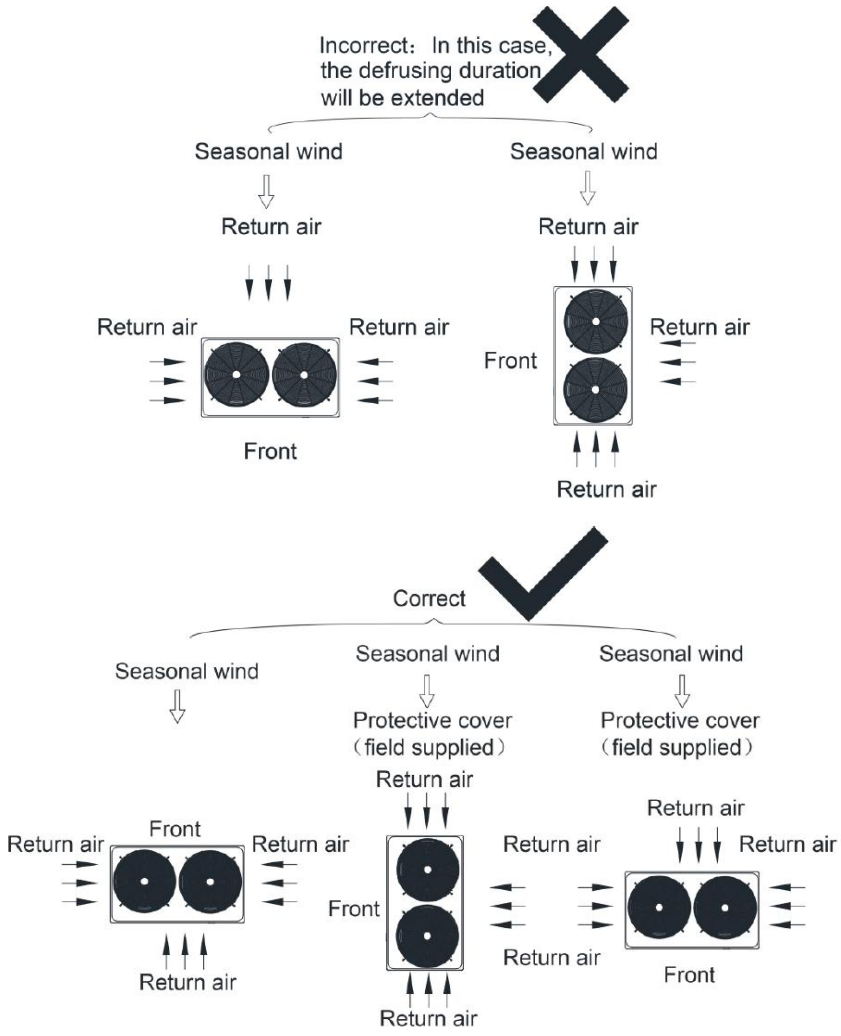


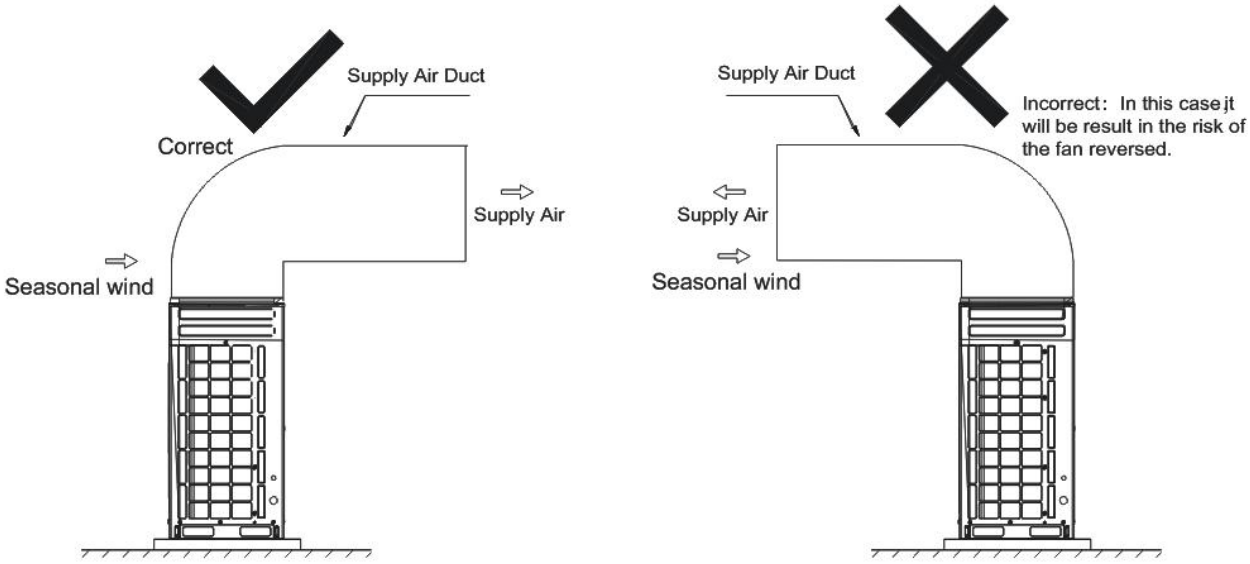
Fig.(b)

4) Take seasonal wind into consideration when installing the outdoor unit

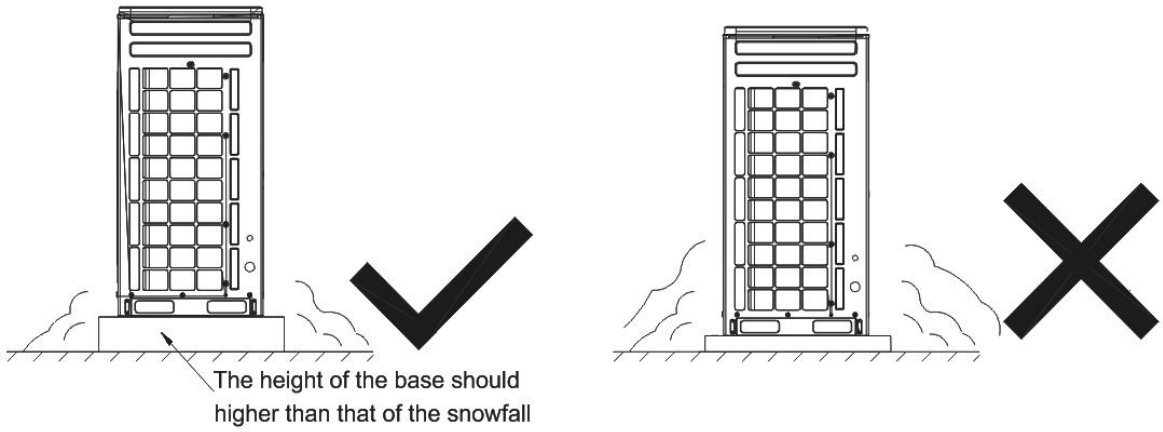
a) Anti-monsoon installation requirements for unit not connecting exhaust duct



b) Anti-monsoon installation requirements for unit connecting exhaust duct



5) Take snow into consideration when installing the outdoor unit

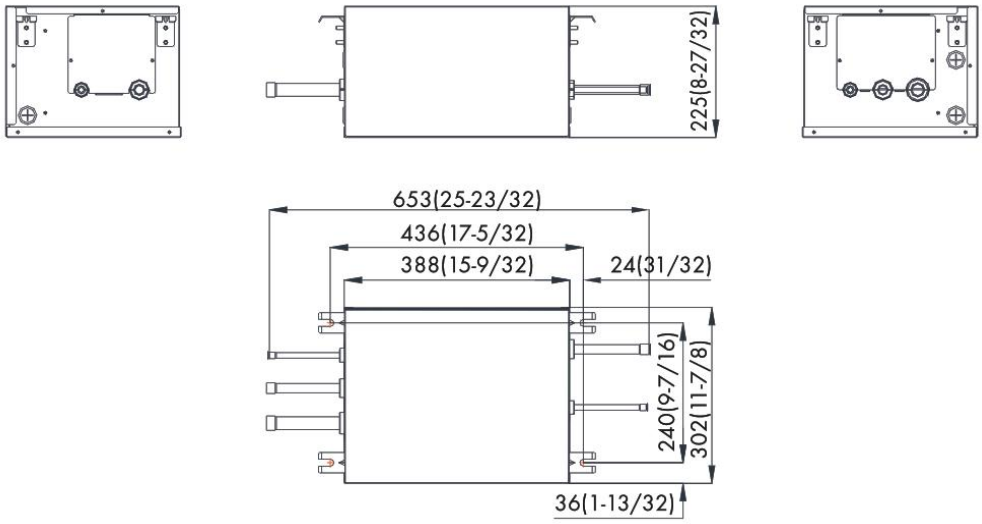


6) When the outdoor unit is installed on equipment, an air exhaust pipe should be connected, the aperture opening ratio of the louver cannot be smaller than 80%, and the included angle between the louver and the horizontal plane should be smaller than 20°.

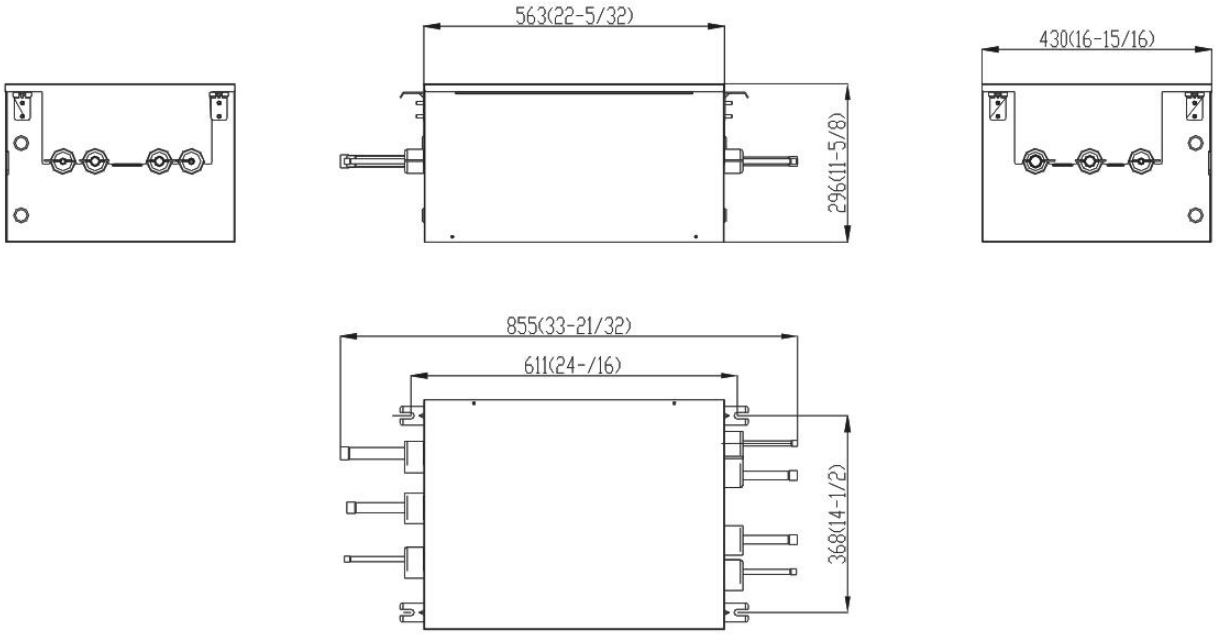
6.4 Installation Space Requirement for C&H Mode Exchanger

6.4.1 Dimension of C&H mode exchanger

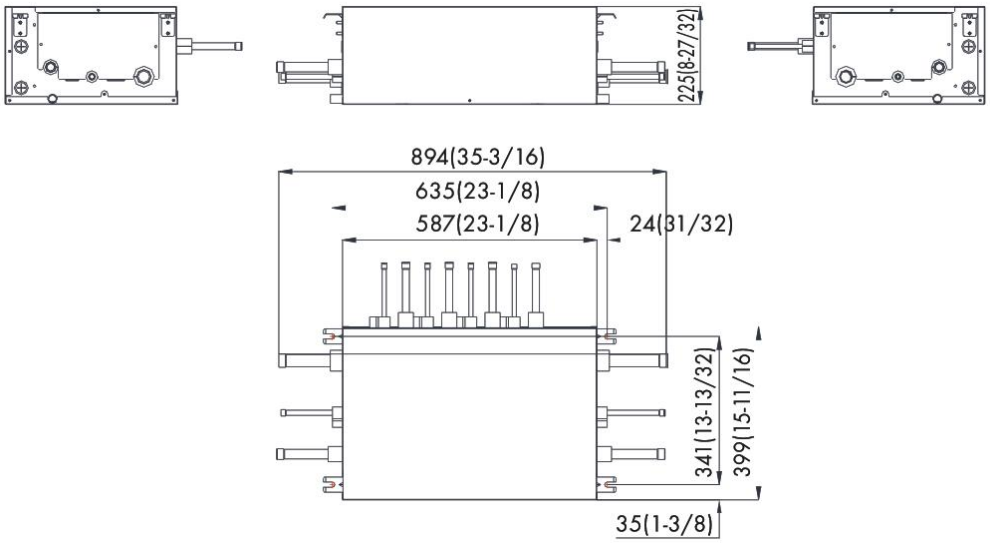
NCHS1B(U) outline and installation dimension:



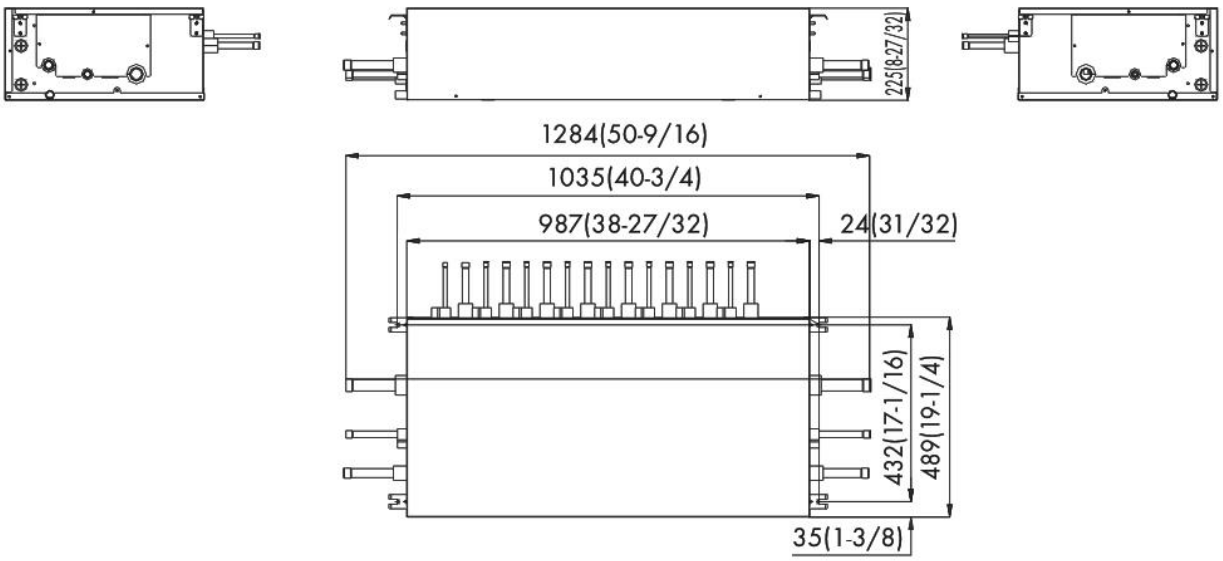
NCHS2B(U) outline and installation dimension:



NCHS4B(U) outline and installation dimension:



NCHS8B(U) outline and installation dimension:



6.4.2 Installation site

(1) Make sure the hanging parts can hold the weight of unit.

(2) Water can be drained out from the drainage hose conveniently.

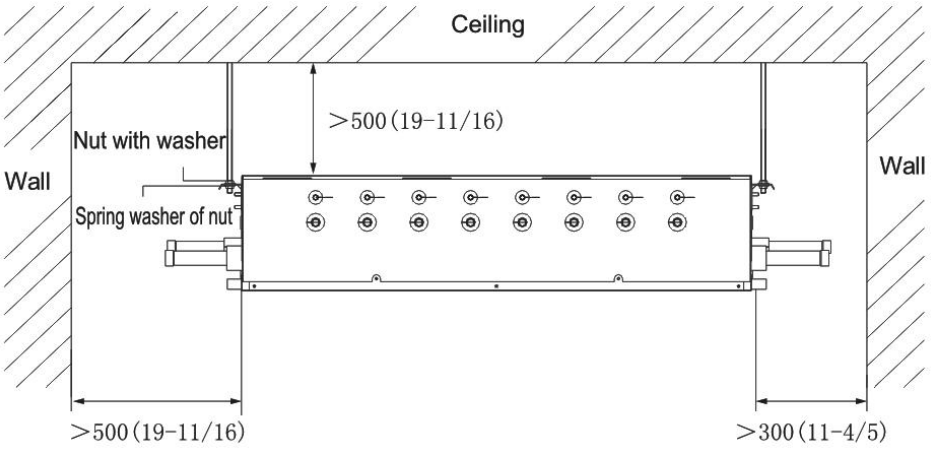
(3) No obstacles at outlet and inlets. Keep the air ventilation in good condition.

(4) The installation distance for indoor unit (as shown in below fig) and the space used for maintenance should be ensured.

(5) Please keep the unit away from those positions where there's thermal source, inflammable gas and smog.

(6) The unit is the cassette type (concealed type).

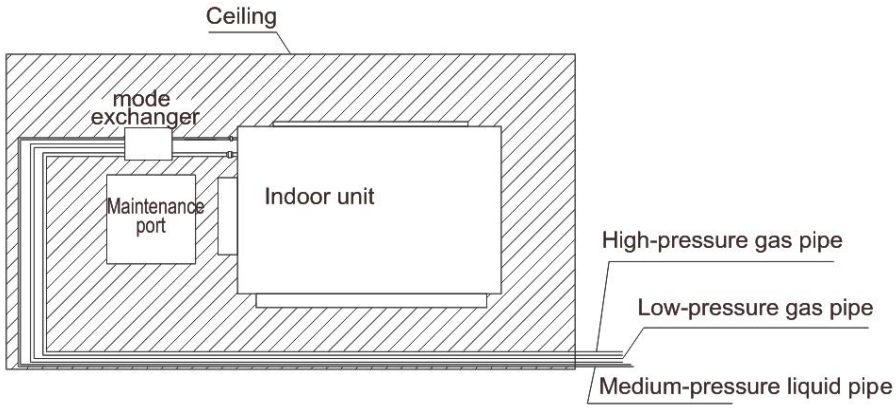
(7) Indoor unit, outdoor unit, power cord and connection cord should be kept 1m above away from TV and radio for preventing graphic interference and noise. （Even the distance is 1m, if there's strong electric wave, there's still noise）

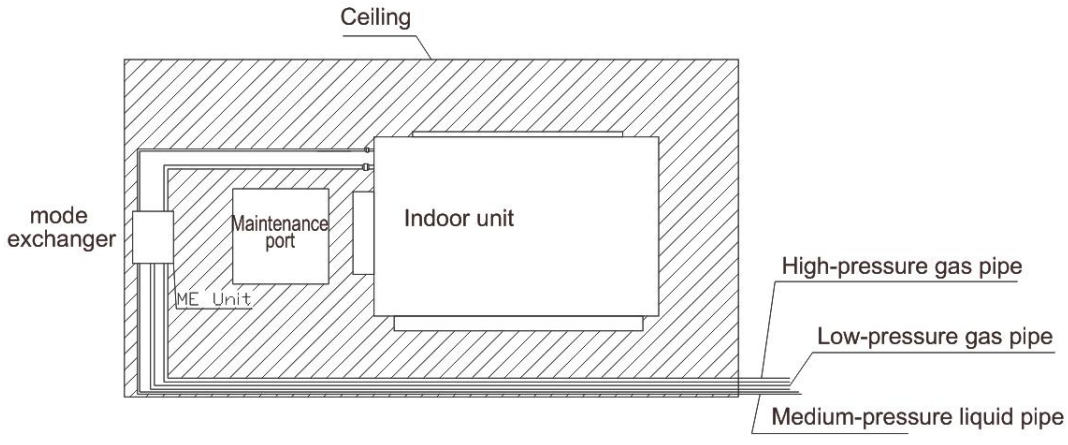


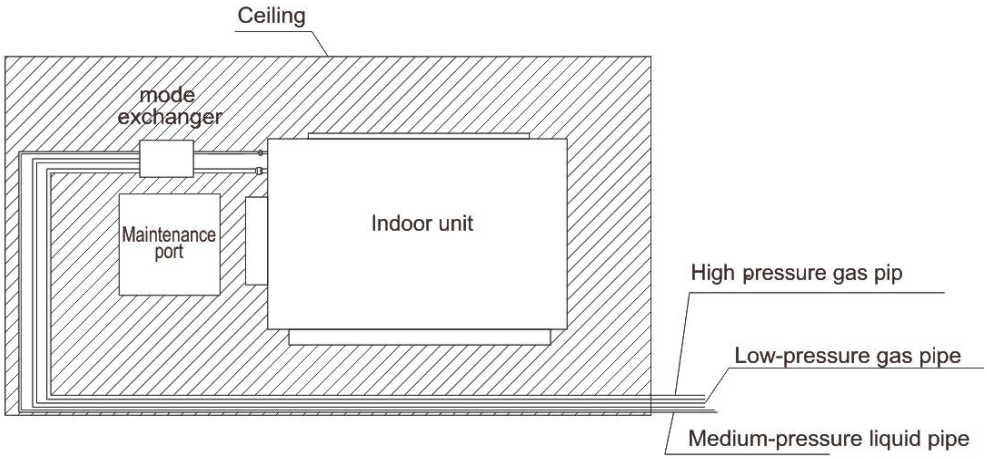
6.4.3 Installation instruction

After the unit is installed, a maintenance port should be reserved at the electric box side of unit for maintenance. The position of maintenance port should be lower than the lower size of unit. C&H Mode Exchanger should be installed at the position where is closing to the service port or the air return outlet of indoor unit. (Note: When installing it closing to the air return outlet, please make sure it won't affect the air return and it should be convenient for maintenance)

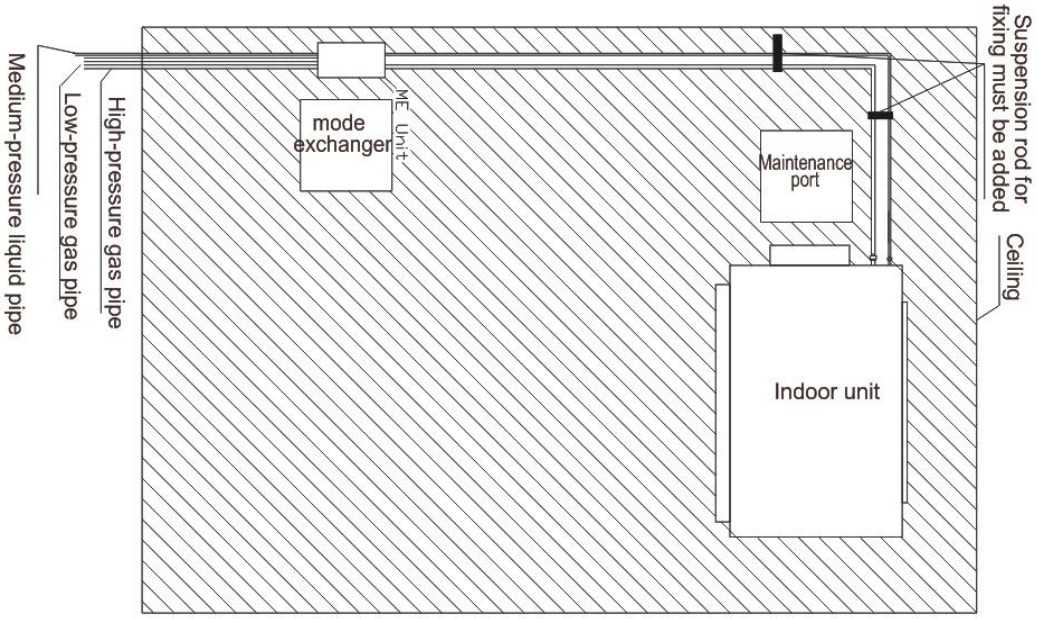
The service port and the installation of C&H Mode Exchanger is described in detailed in below fig:





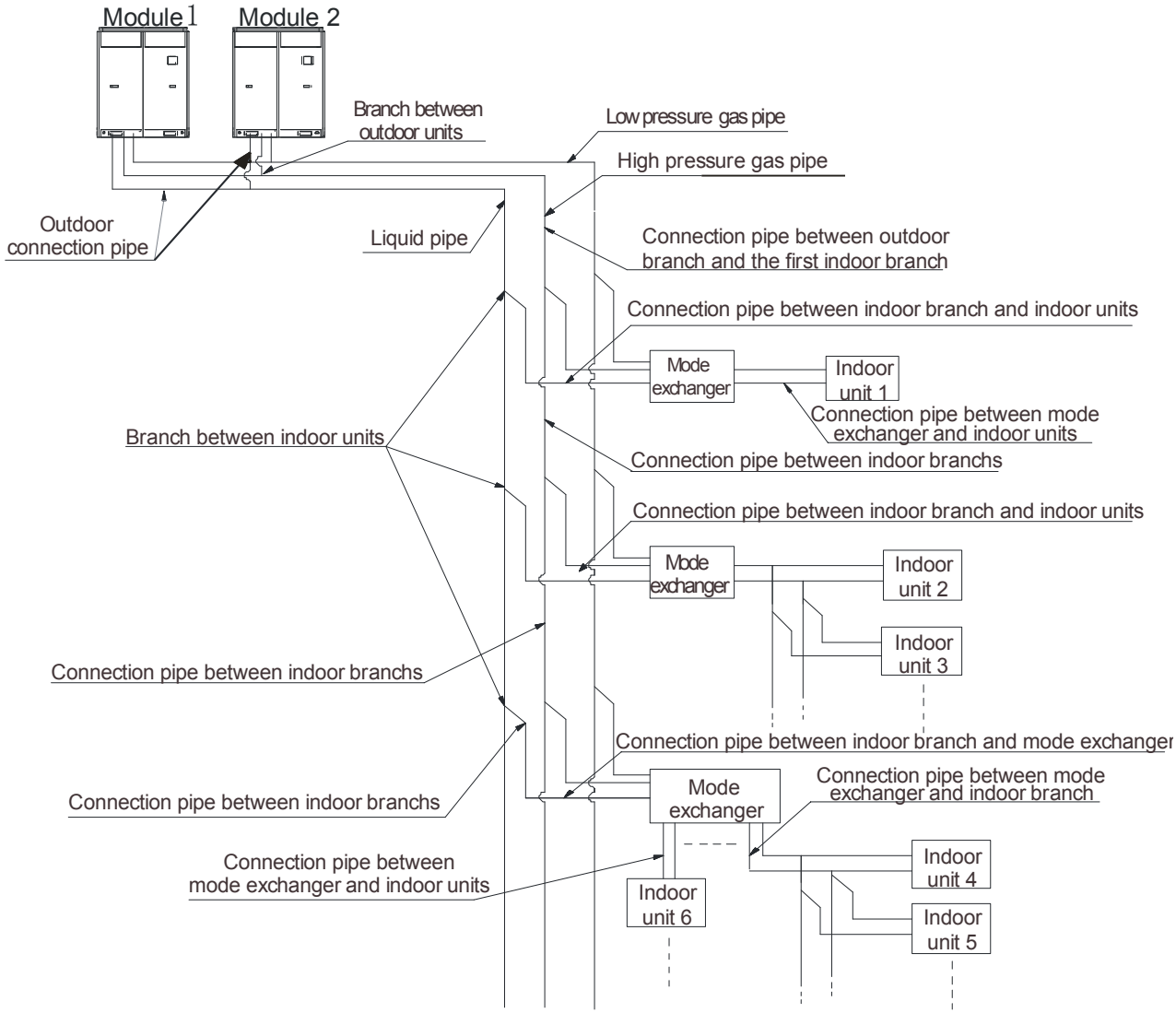


If the C&H Mode Exchanger is far away from the service port of indoor unit because of the installation space structure, it needs to add a service port for the C&H Mode Exchanger.

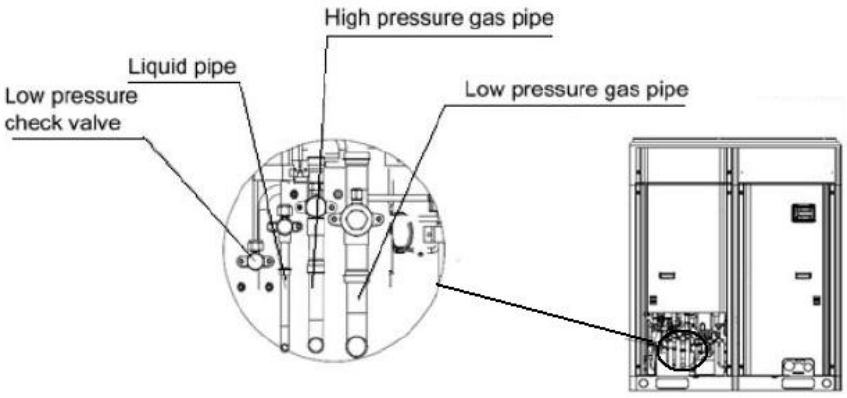


7 MODEL SELECTION FOR UNIT PIPING

7.1 Schematic Diagram of Piping Connection

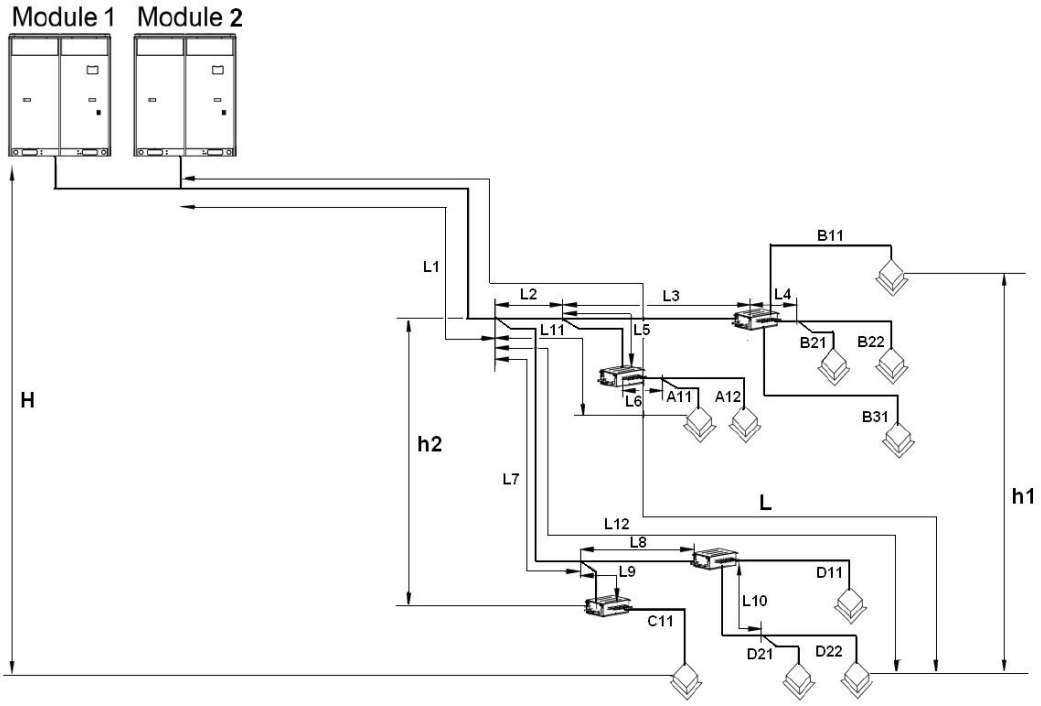


Schematic diagram of piping sequence of GMV-VQ72W/A-F(U) and GMV-VQ96W/A-F(U):



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).



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 (1-3/4feet).

R410A Refrigerant System		Allowable Value m(feet)	Fitting Pipe
Total length (actual length) of fitting pipe		≤1000(3280-3/4)	L1+L2+L3+L4+…+L10+A11+A12+…+D21+D22
Length of farthest fitting pipe m(feet)	Actual length	≤165(541-1/4)	L1+L7+L8+L10+d22
	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)	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)	——
	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)		≤40(32-3/4)	A11, A12, B21, B22, D21, D22

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+L2x2+L3x2+L4x2+…+L9x2+L10x2+A11+A12+…+D21+D22≤ 1000m (3280-3/4feet).

2) Length between each IDU and its nearest branch A11, A12, B11, B21, B22, B31, C11, D11, D21, D22≤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: L12-L11≤40m (131-1/4feet).

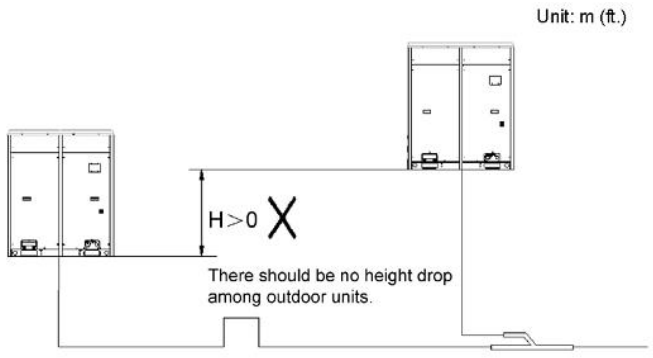
(2) When the outdoor unit is at upper side and height difference is more than 50m, please consult company for the related technical requirement.

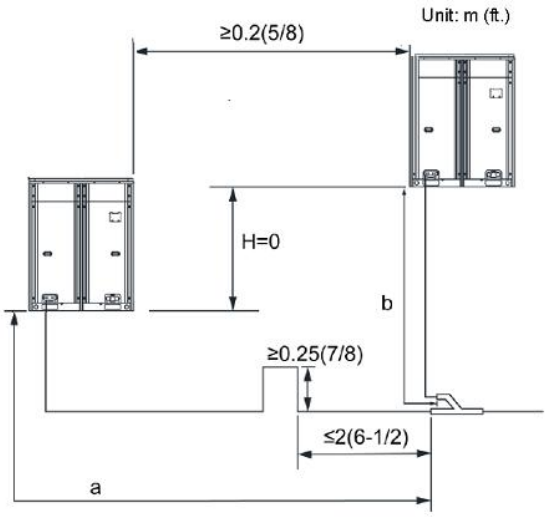
(3) When the maximum length of the main pipe from ODU to the first branch of IDU is ⩾50m (164 ft), then adjust the pipe size.

Total rated capacity of ODU: C (Btu/h)	Pipe between outdoor unit and the first indoor branch		
	Low pressure gas pipe mm(inch)	Liquid pipe mm(inch)	High pressure gas pipe mm(inch)
GMV-VQ72W/A-F(U)	No need to enlarge pipe size	No need to enlarge pipe size	Φ22.2(7/8)
GMV-VQ96W/A-F(U)	No need to enlarge pipe size	No need to enlarge pipe size	Φ22.2(7/8)
GMV-VQ144WM/A-F(U)	No need to enlarge pipe size	Φ19.05(3/4)	Φ31.8(1-1/4)
GMV-VQ168WM/A-F(U)	No need to enlarge pipe size	Φ19.05(3/4)	Φ31.8(1-1/4)
GMV-VQ192WM/A-F(U)	No need to enlarge pipe size	Φ19.05(3/4)	Φ31.8(1-1/4)

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

7.3 Connection pipe among outdoor modules

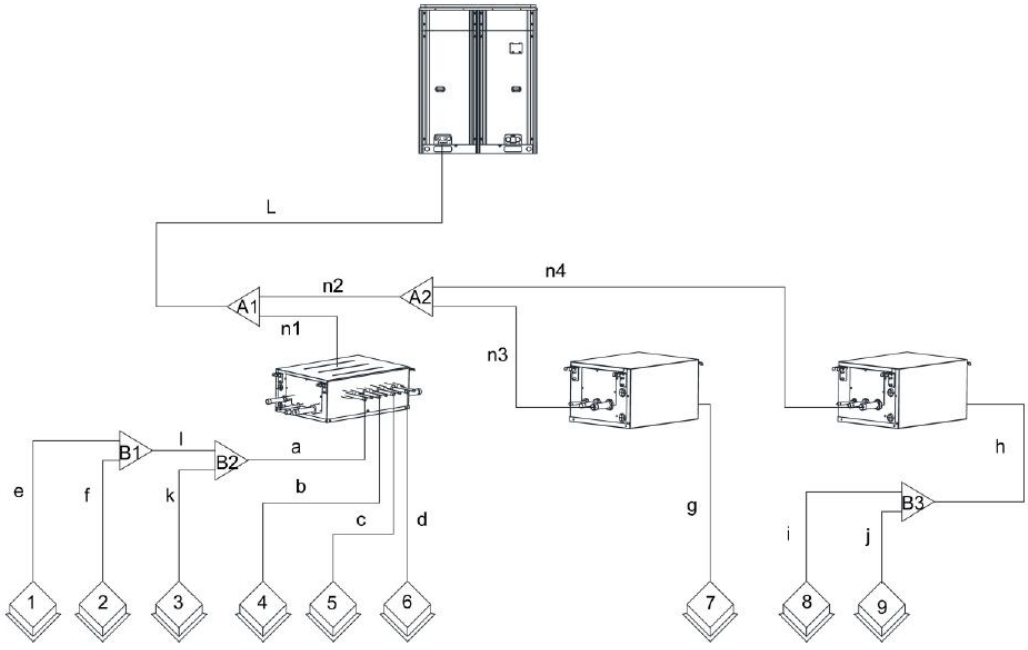




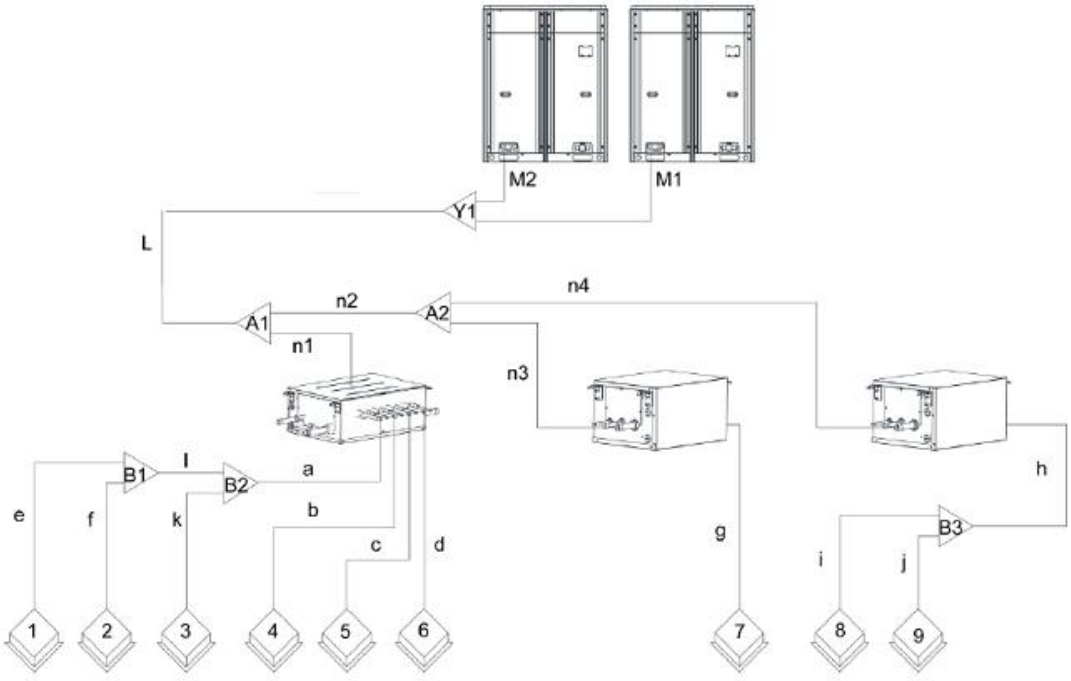
Note: when the distance between outdoor units exceeds 2m (6-1/2 feet), U-type oil trap should be added at low-pressure gas pipe. a≤10m (32-7/8 feet); b≤10m (32-7/8 feet).

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

7.4.1 Connection sketch map of single-module system



7.4.2 Connection sketch map of multi-module system



7.4.3 Pipe selection between outdoor unit and the first indoor branch ("L")

For single module, L pipe between the basic outdoor unit and the first indoor branch:

Basic module	Pipe between outdoor unit and the first indoor branch		
	Low pressure gas pipe mm(inch)	Liquid pipe mm(inch)	High pressure gas pipe mm(inch)
GMV-VQ72W/A-F(U)	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ19.05(3/4)
GMV-VQ96W/A-F(U)	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ19.05(3/4)

For multi-module, L pipe between the terminal outdoor branch and the first indoor branch:

Basic module	Pipe between outdoor unit and the first indoor branch		
	Low pressure gas pipe mm(inch)	Liquid pipe mm(inch)	High pressure gas pipe mm(inch)
GMV-VQ144WM/A-F(U)	Φ34.9(1-3/8)	Φ15.9(5/8)	Φ28.6(1-1/8)
GMV-VQ168WM/A-F(U)	Φ34.9(1-3/8)	Φ15.9(5/8)	Φ28.6(1-1/8)
GMV-VQ192WM/A-F(U)	Φ34.9(1-3/8)	Φ15.9(5/8)	Φ28.6(1-1/8)

7.4.4 ODU pipe size selection for multi-module system

Pipe size between module and outdoor branch "M1, M2":

Basic module	Pipe between outdoor unit and the first indoor branch		
	Low pressure gas pipe mm(inch)	Liquid pipe mm(inch)	High pressure gas pipe mm(inch)
GMV-VQ72W/A-F(U)	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ19.05(3/4)
GMV-VQ96W/A-F(U)	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ19.05(3/4)

Selection of branch "Y1" connecting to outdoor modules:

Module's capacity C (Btu/h)	Model

C≤327500	ML01R
327500 < C	ML02R

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

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	FQ05Na/A
	232000＜X≤327500	FQ05Na/A
	327500＜X	FQ06Na/A

7.4.6 Pipe size among upstream branches of heat pump mode exchanger (“n1, n2, n3, n4”)

Total rated capacity of downstream indoor units: X(Btu/h)	Size of connection pipe between branches of mode exchanger		
	Low pressure gas pipe mm(inch)	Liquid pipe mm(inch)	High pressure gas pipe mm(inch)
X≤17100	Φ12.7(1/2)	Φ6.35(1/4)	Φ12.7(1/2)
17100＜X≤48500	Φ15.9(5/8)	Φ9.52(3/8)	Φ12.7(1/2)
48500＜X≤72000	Φ19.05(3/4)	Φ9.52(3/8)	Φ15.9(5/8)
72000＜X≤96000	Φ22.2(7/8)	Φ9.52(3/8)	Φ19.05(3/4)
96000＜X≤120000	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ22.2(7/8)
120000＜X≤144000	Φ28.6(1-1/8)	Φ12.7(1/2)	Φ22.2(7/8)
144000＜X≤168000	Φ28.6(1-1/8)	Φ15.9(5/8)	Φ28.6(1-1/8)
168000＜X≤216000	Φ28.6(1-1/8)	Φ15.9(5/8)	Φ28.6(1-1/8)
216000＜X≤240000	Φ34.9(1-3/8)	Φ15.9(5/8)	Φ28.6(1-1/8)
240000＜X≤312000	Φ34.9(1-3/8)	Φ19.05(3/4)	Φ28.6(1-1/8)
312000＜X≤336000	Φ34.9(1-3/8)	Φ19.05(3/4)	Φ28.6(1-1/8)
336000＜X≤360000	Φ41.3(1-5/8)	Φ19.05(3/4)	Φ34.9(1-3/8)

7.4.7 Pipe size among downstream branches of mode exchanger (“a, h”)

Total rated capacity of downstream indoor units: X ((Btu/h)	Size of piping between indoor branches	
	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)

7.4.8 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

7.4.9 Pipe size between mode exchanger and downstream indoor unit (“b, c, d, g”)

Total rated capacity of downstream indoor units: X (Btu/h)	Piping size between indoor branches	
	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)

7.4.10 Pipe size between indoor branch and indoor unit (“e, f, i, j, k”)

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)

7.4.11 Pipe size between indoor branches (“I”)

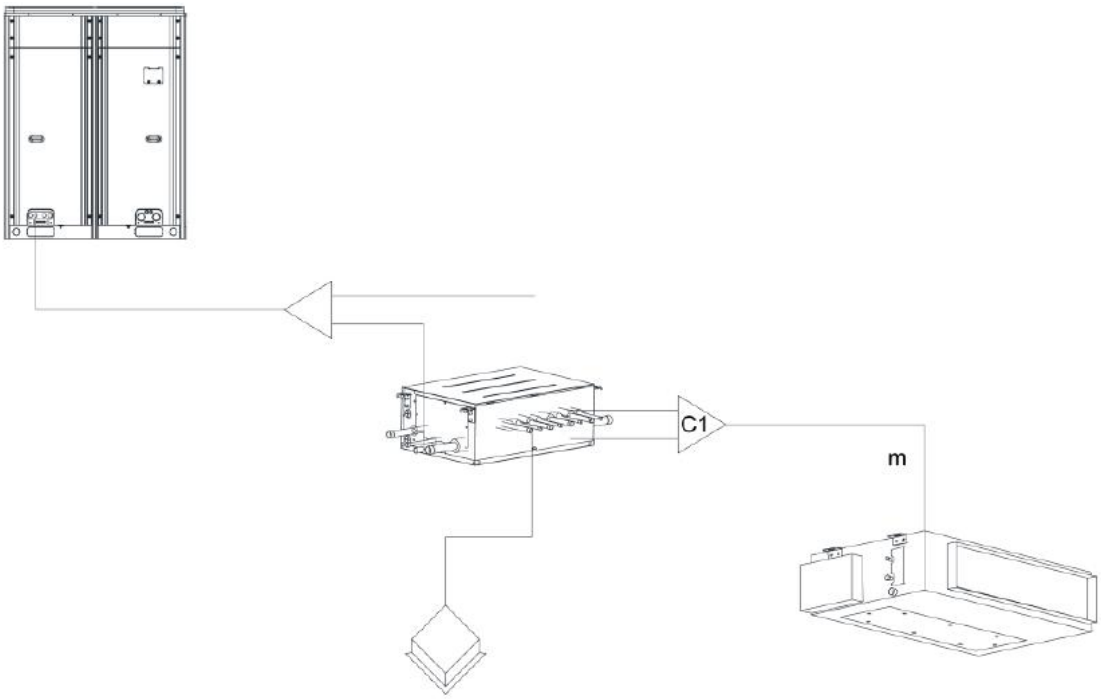
Rated capacity of indoor units: X ((Btu/h)	Size of connection pipe between indoor branch and indoor unit	
	Gas pipe mm(inch)	Liquid pipe mm(inch)
X≤9500	Φ9.52(3/8)	Φ6.35(1/4)
9500＜X≤17100	Φ12.7(1/2)	Φ6.35(1/4)
17100＜X≤48500	Φ15.9(5/8)	Φ9.52(3/8)

7.5 Connection method when capacity of indoor unit exceeds 48500 Btu/h

When connecting to the indoor unit with capacity of over 48500 Btu/h, it is not allowed to connect with only one branch; it must use two branches controlled by the same main board for parallel connection.

Parallel connection	Indoor unit communication connection for mode exchanger	Remarks
Indoor unit No.1 and No.2	“1D1 1D2”	Parallel connection can be conducted only as the combination of this table, it is not allowed to otherwise connect. Note that after the connection, manually set the SA2 dial code of corresponding mainboard, and dial the code in the first place to number end.
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”	

Connecting method is shown as in the below Fig.



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

R410A refrigerant system	Total rated capacity of downstream indoor units: X(Btu/h)	Model
Y-type branch	48500<X≤96000	FQ01B/A

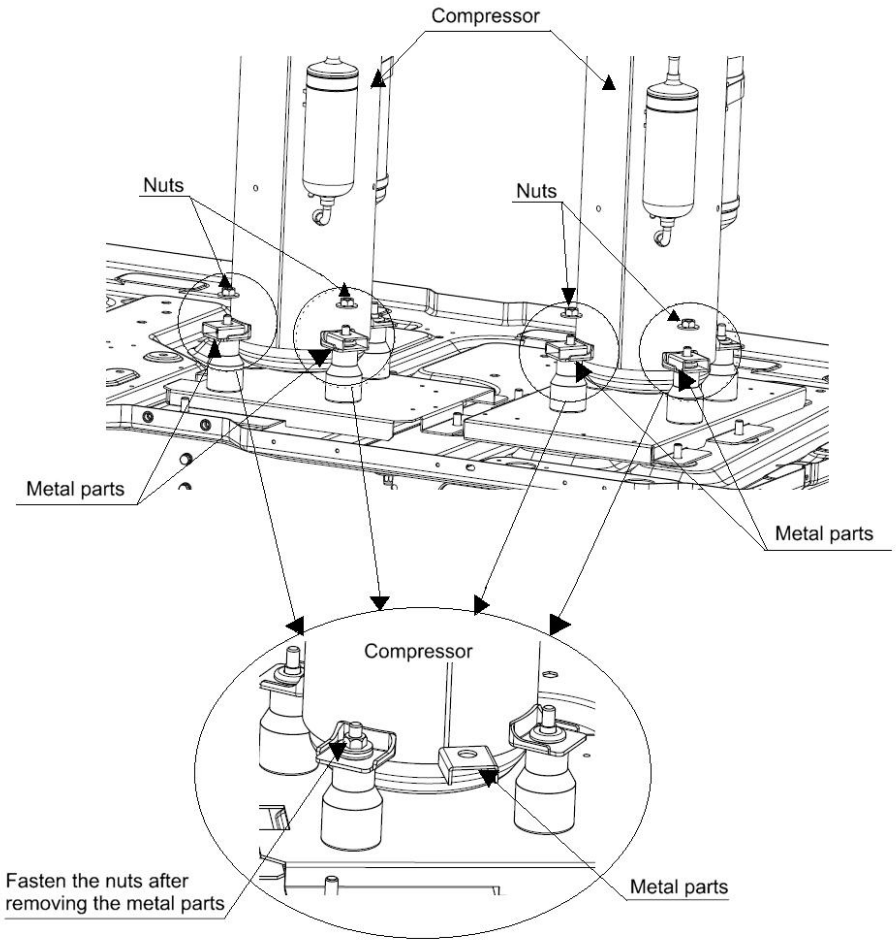
7.5.2 Pipe size between mode exchanger and downstream and indoor unit (“m”)

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)
48500＜X≤72000	Φ19.05(3/4)	Φ9.52(3/8)
72000＜X≤96000	Φ22.2(7/8)	Φ9.52(3/8)

7.6 Attention before operation

The installer should read the following items, and make sure that the metal parts supplied for transportation are taken down.

1) For safe handling, two metal parts are fixed at the feet of compressor before delivery (shown as follows):

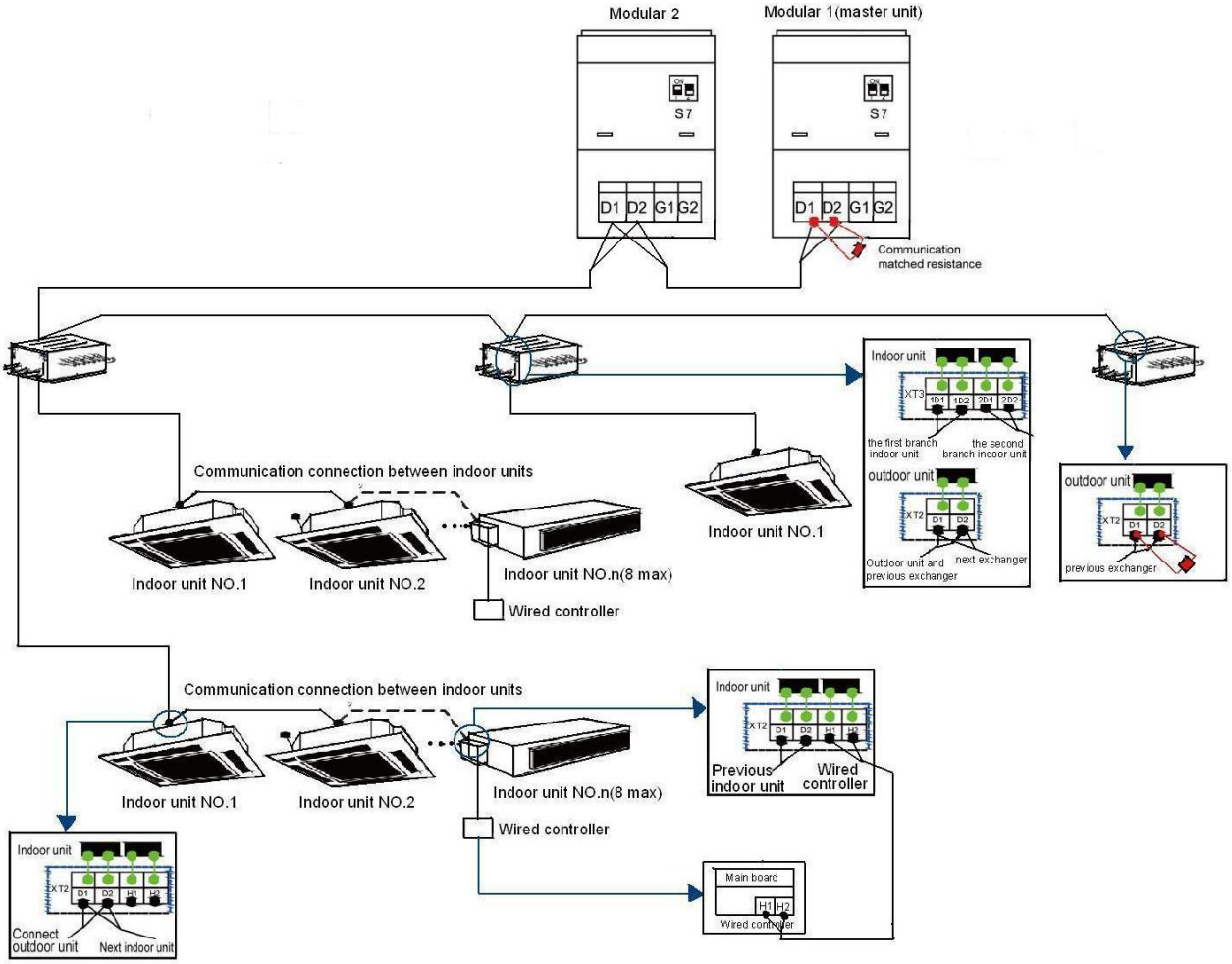


2) While installation, please make sure the metal parts are taken down. Then fasten the compressor fixed nuts again and re-wrap the soundproof material.

⚠ Note: if the unit is operating with the metal parts stay, it may lead to compressor abnormal vibration; even reduce the lifespan of the unit.

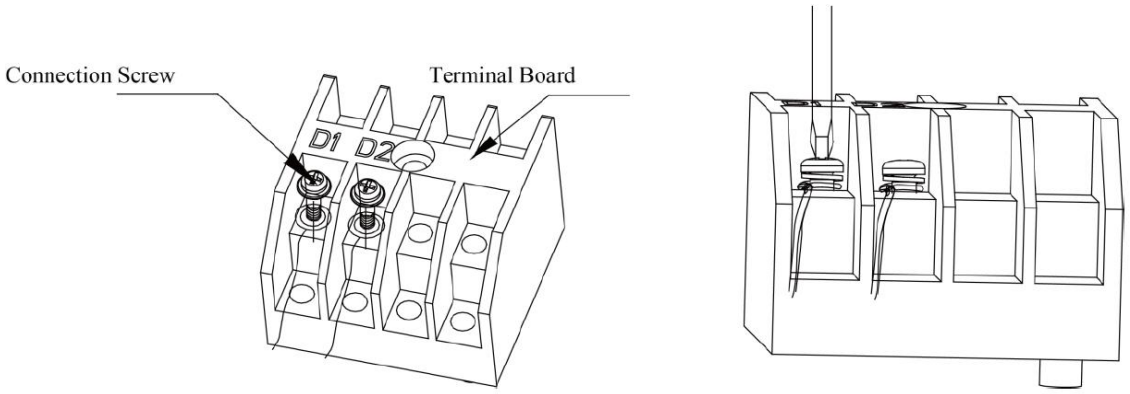
8 REQUIREMENTS FOR COMMUNICATION MODE

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.

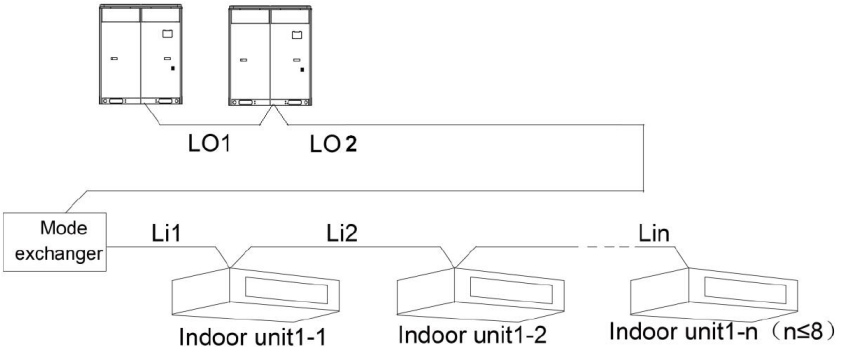


8.2 Communication Cable Material and Wring Mode

8.2.1 Communication material

➢ Select communication wire between ODU and IDU.

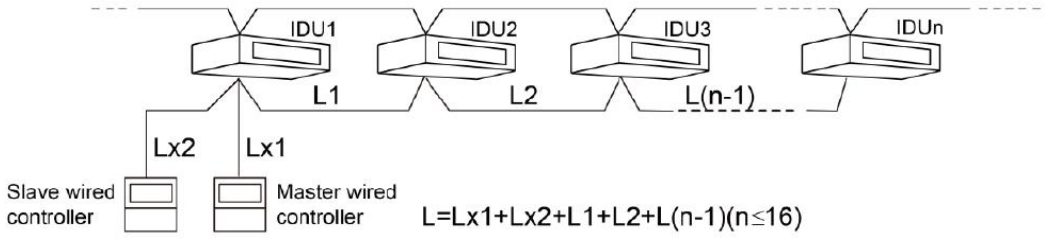
Material Type	Total Length L(m) of Communication Cable between IDU Unit and IDU (ODU) Unit m(feet)	Wire size	Remarks
Light/Ordinary polyvinyl chloride sheathed cord.	L≤1000(3280-5/6)	≥2×AWG18	1. If the wire diameter is enlarged to 2 ×AWG16, the total communication length can reach 1500m(4921-1/4feet). 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:

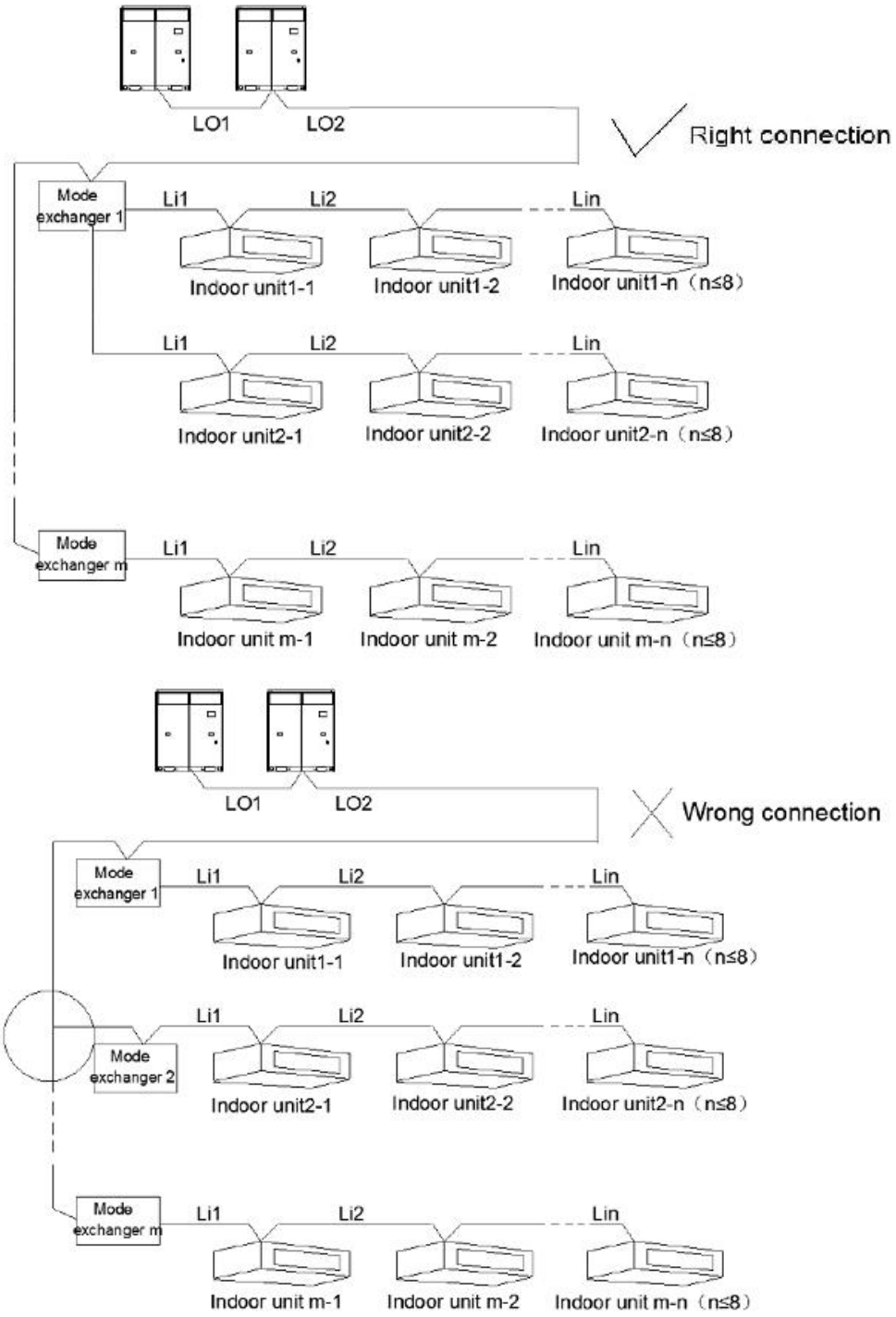


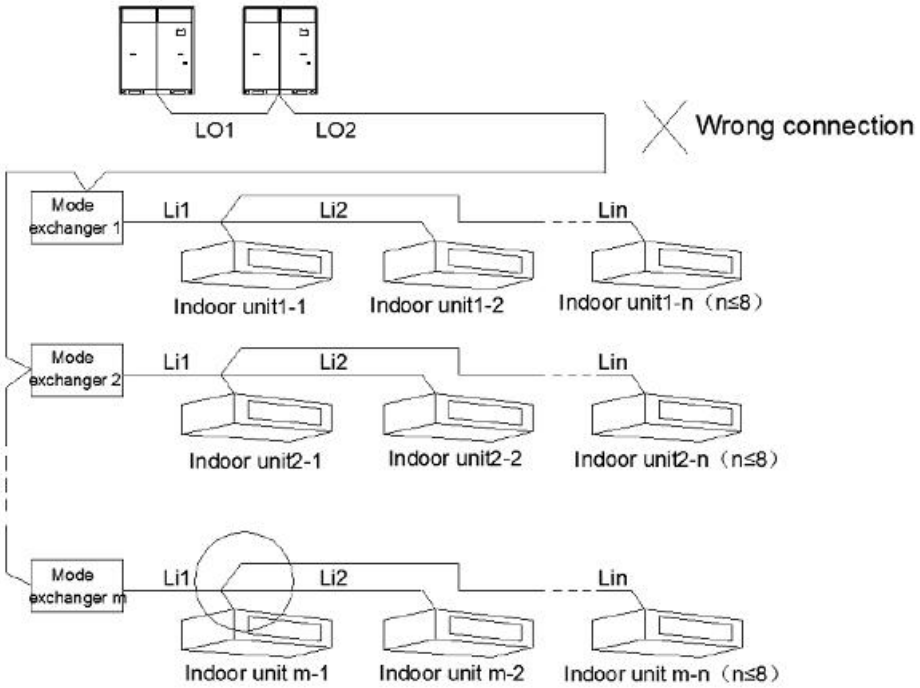
Notes: If the air conditioning units are installed at a place with strong electromagnetic interference, a shielded cable must be used as the communication cable between the indoor unit and wired controller, and a shielded twisted pair must be used as the communication cable between the indoor unit and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

8.2.2 Communication access mode

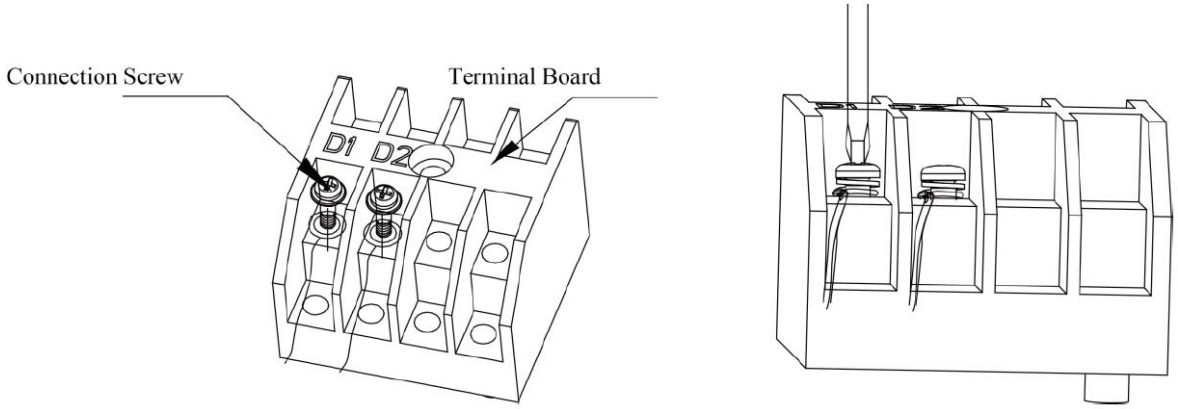
The communication bus of Ultra Heat GMV indoor and outdoor units must be connected in series, and star connection is forbidden. The mode exchanger at the end of the communication bus for the indoor units and outdoor units must be connected to a communication matching resistor (which is contained in the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



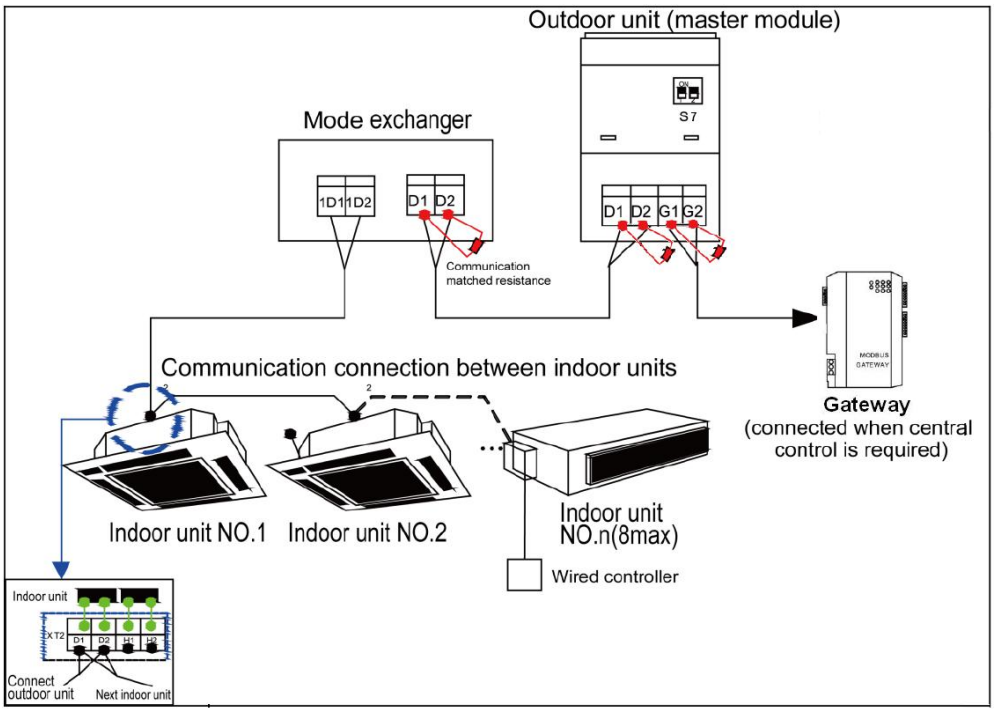
(3) If a single communication wire is not long enough and needs to be connected, the connected joint must be welded or pressure-welded. Do not simply twist the wires together.

8.3 Connection Method and Procedure of Communication Cable

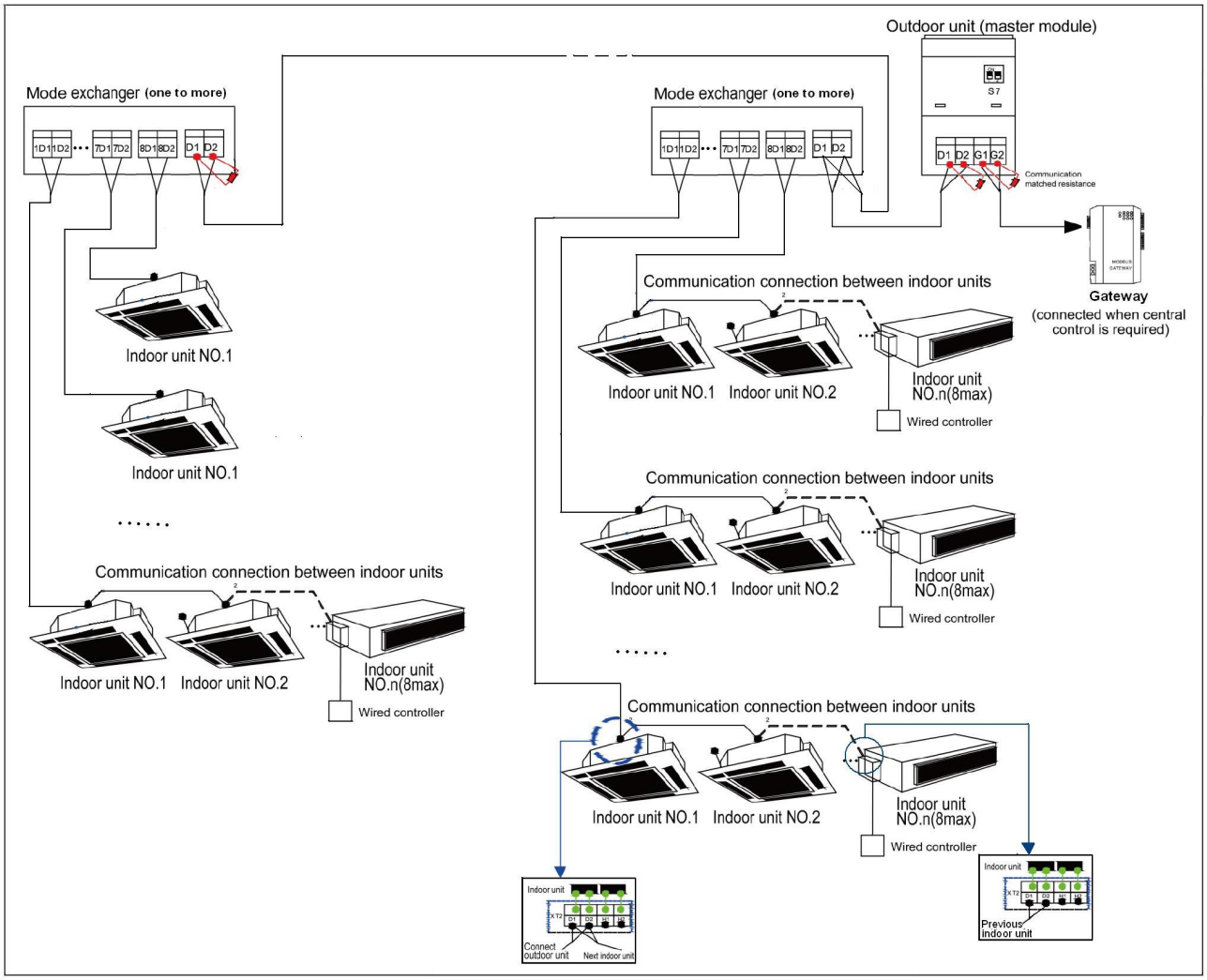
8.3.1 Communication connection between the indoor unit and outdoor unit

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.

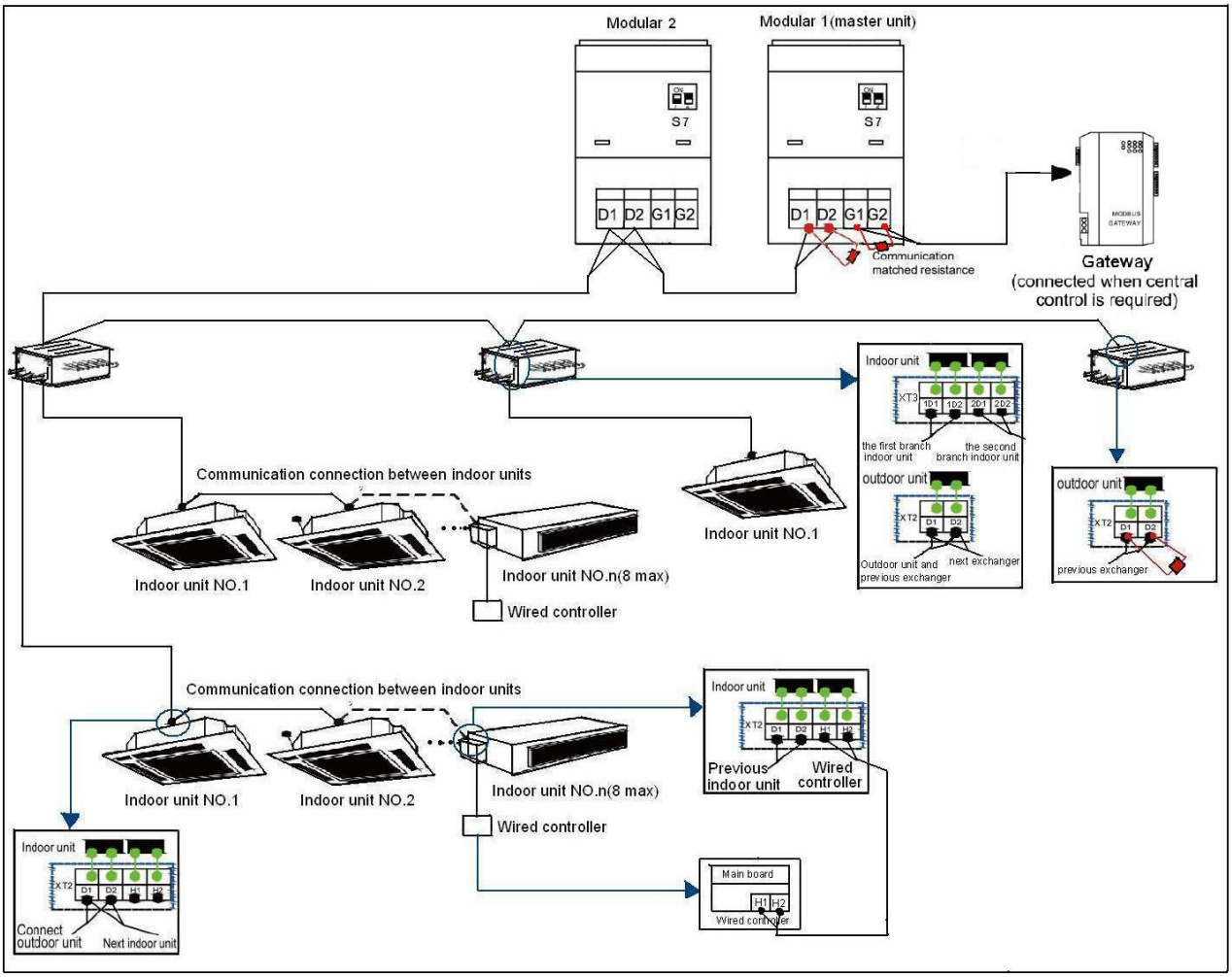
Communication connection mode of the single module system



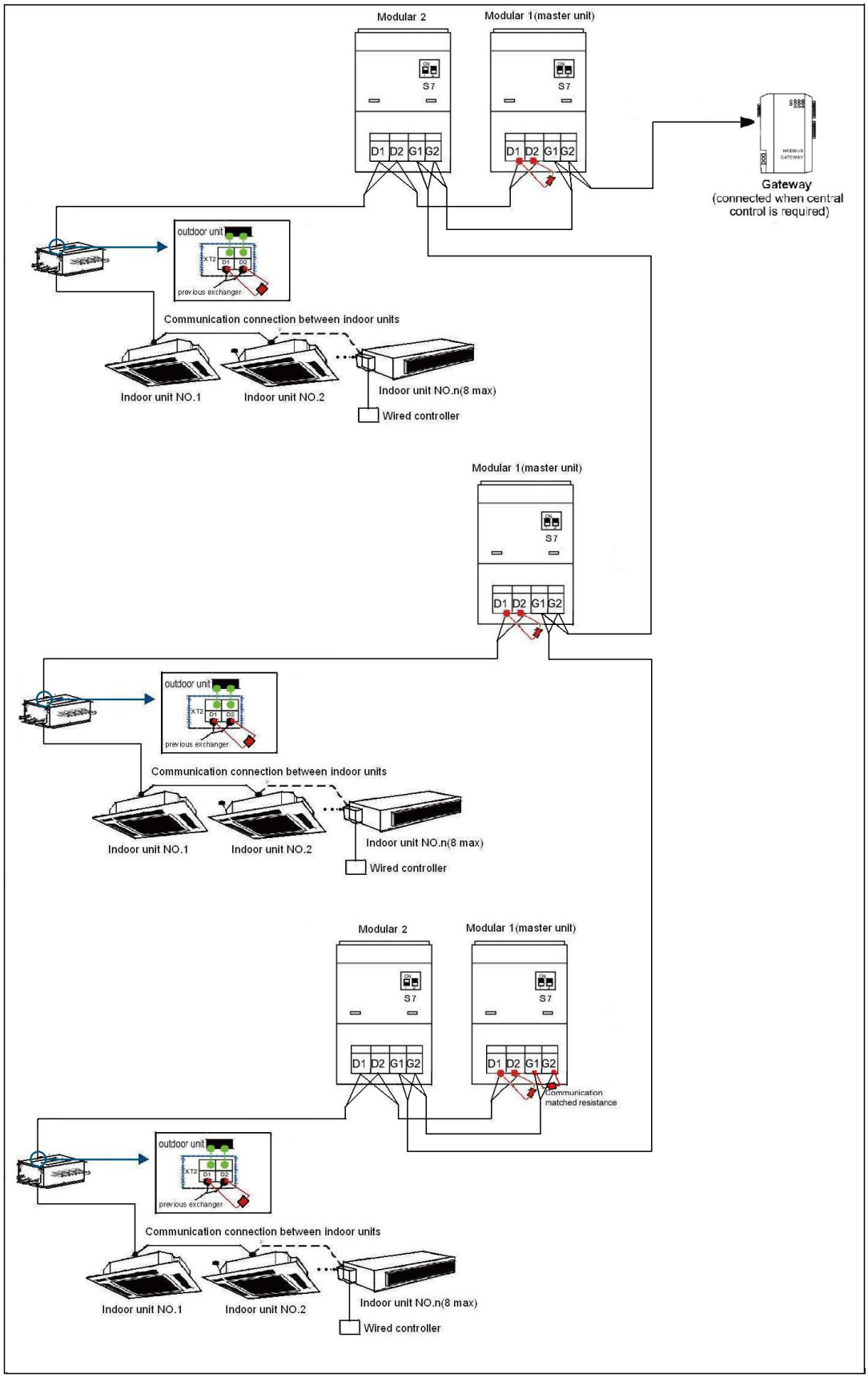
Connection of communication for single-module system and multi-module converter system:



Connection of communication for multi-module system and multi-module mode exchanger system:



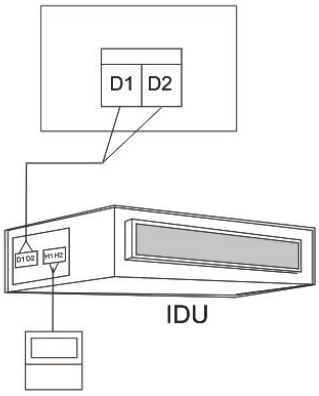
Connection of communication for multi refrigeration systems:


Modular 2
Modular 1(master unit)
S7
D1 D2 G1 G2
Gateway
(connected when central control is required)
outdoor unit
previous exchanger
Communication connection between indoor units
Indoor unit NO.1
Indoor unit NO.2
Indoor unit NO.n(8 max)
Wired controller
Communication matched resistance

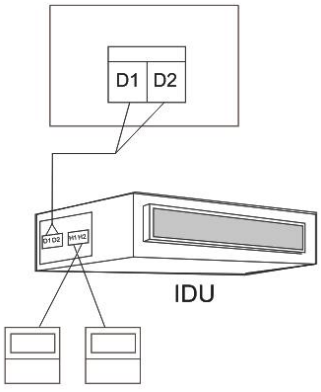
NOTICE
(1) For modular outdoor units, if there are multiple outdoor modules, then the master unit must be the first outdoor module on the communication wire and should not connect with IDU (master unit is set by S7 of the outdoor main board).
(2) For modular outdoor units, if there are multiple outdoor modules, then the indoor units must be connected with the last slave module of ODU (slave unit is set by S7 of the outdoor main board).
(3) Communication wire and power cord must be separated.
(4) Communication wire must be of proper length. Extension is not allowed.
(5) IDUs must be connected in series. The last mode exchanger D1/D2 connecting with ODU must be connected with the communication matched resistance (supplied in the list of ODU spare parts). The ODU D1/D2 must be connected with the communication matched resistance (installed before factory).
(6) For modular outdoor units, if there are multiple outdoor modules, the communication matched resistance (installed before factory) of slave modules connecting with D1/D2 must be removed.
(7) For modular outdoor units, if there are multiple outdoor modules, S7 dip switch of master unit is "00", and S7 dip switch of slave unit is "10", otherwise, the system main board will display CJ which means address DIP switch code of system is shocking.
(8) For multi-refrigeration systems, when it is necessary to connect with a centralized controller, the communication lines connecting with all the ODUs G1/G2 must be connected in series, and the last refrigeration system master unit G1/G2 must be connected with the communication matched resistance (supplied in the list of ODU spare parts).
(9) For multi-refrigeration systems, the address dip switch S3 of the master unit must be set by different numbers according to Ultra Heat technical service manual, and slave unit S3 can't be set.

8.3.2 Communication connection mode between the indoor unit and wired controller

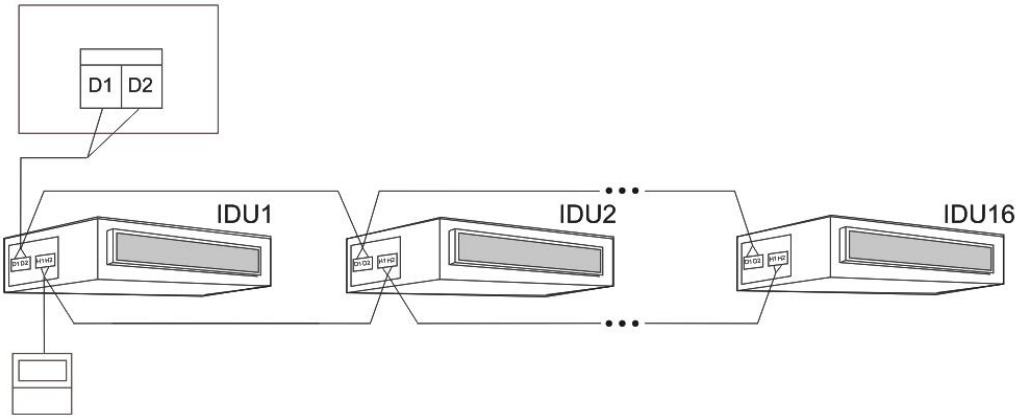
The indoor unit and the wired controller are connected in one of the following four modes, which are respectively shown in Figure below:



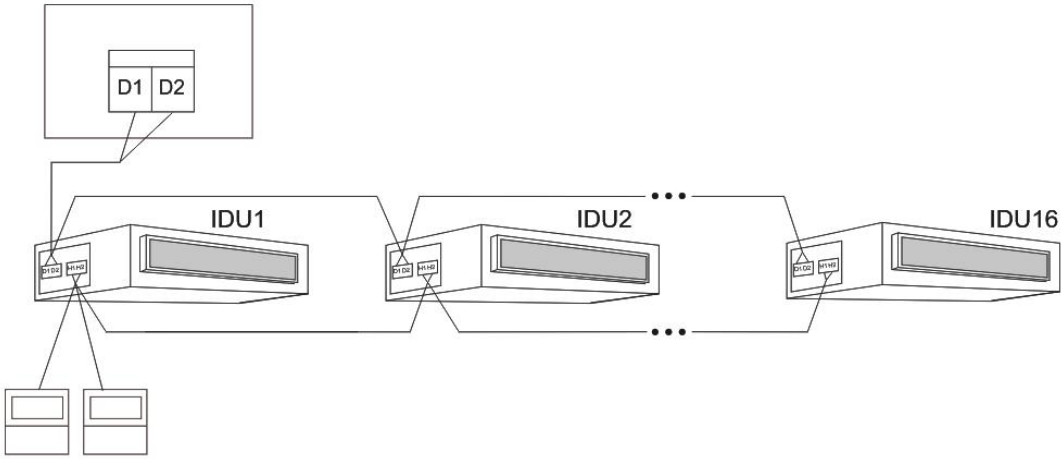
One wired controller controls one IDU



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.

9 ELECTRICAL CONNECTION

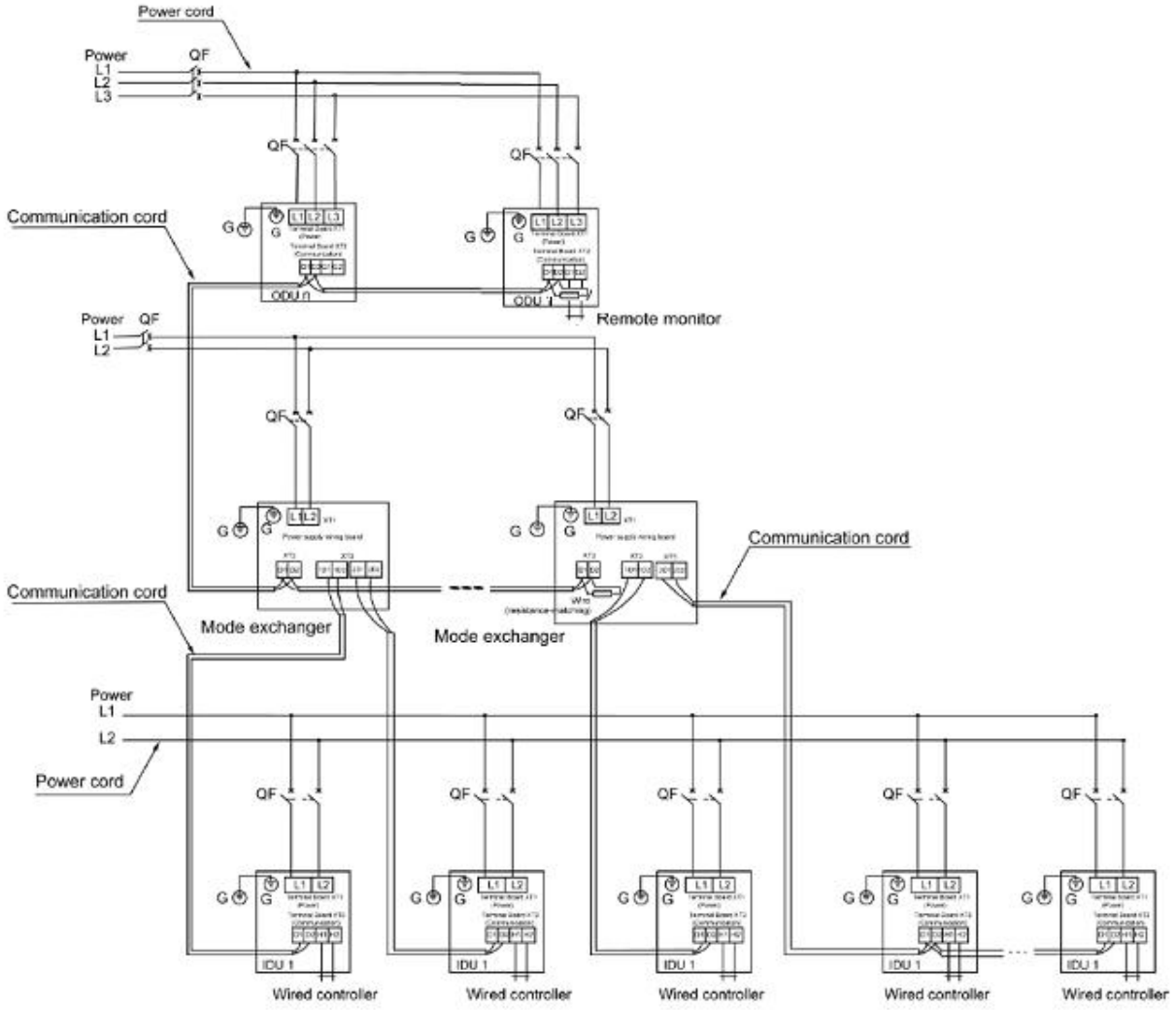
9.1 External Connection Interfaces

External connection interfaces	Power supply	Quantity	4
		Label	L1 L2 L3 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.

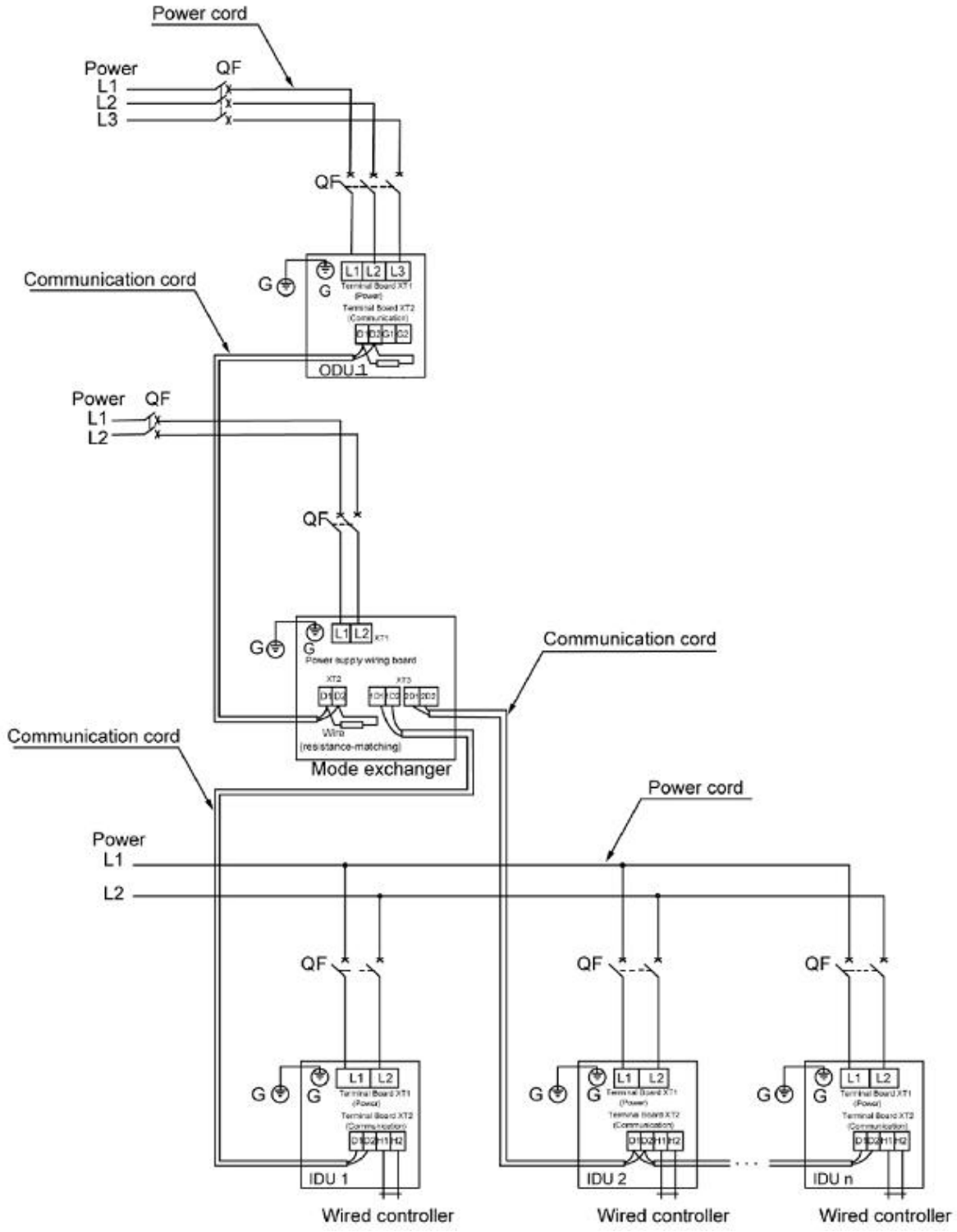
1) External connection diagram of modular connection



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.

2) External connection diagram of a single unit



NOTES:

a. The maximum number N of connected outdoor units and the maximum number n of connected indoor units depend on the outdoor unit combination form.

b. A copper conductor must be used as a power cable. It must comply with the relevant national lead standard and meet the current-carrying capacity requirement of the unit.

10 CALCULATION METHOD OF REFRIGERANT ADDED FOR ENGINEERING PIPING

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

(1) Pipeline charging amount

Added refrigerant quantity A for piping = Added refrigerant quantity A1 for liquid piping + Added refrigerant quantity A2 for high pressure gas piping

Added refrigerant quantity A1 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

Added refrigerant quantity A2 for high pressure gas piping = ∑high pressure gas pipe length × Added refrigerant quantity for each meter (inch) of high pressure gas pipe

	Diameter of high pressure gas 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)
kg/m	0.054	0.046	0.032	0.024	0.017	0.009
OZ/inch	0.048	0.041	0.029	0.022	0.015	0.008

Note: high pressure gas pipe lengths means all the lengths between ODU and mode exchangers.

(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 1:

The OUD is GMV-VQ192WM/A-F(U) including GMV-VQ96W/A-F(U) and GMV-VQ96W/A-F(U). The IDUs are made up of 10 sets of GMV-ND18PHS/A-T(U).

IDU/ODU rated capacity collocation ratio C=18×10/192=94%.The quantity of included IDUs is more than 8 sets. Please refer to the above table.

Refrigerant charging amount B for GMV-VQ96W/A-F(U) module is3kg(6.6 lbs).

Refrigerant charging amount B for GMV-VQ96W/A-F(U) module is3kg(6.6 lbs).

Suppose the Pipeline charging amount A=Added refrigerant quantity A1 for liquid piping + Added refrigerant quantity A2 for high pressure gas piping=25kg (55.1 lbs)

Total refrigerant charging amount R=25+3+3=31kg (55.1+6.6+6.6=68.3 lbs).

For example 2:

The OUD is GMV-VQ72W/A-F(U). The IDUs are made up of 1 set of GMV-NDX72P/A-T(U).

IDU/ODU rated capacity collocation ratio C=0/72=0%. Refrigerant charging amount B for GMV-VQ 72W/A-F(U) module is0kg(0 lbs).

Suppose the Pipeline charging amount A=Added refrigerant quantity A1 for liquid piping + Added refrigerant quantity A2 for high pressure gas piping=25kg (55.1 lbs)

Total refrigerant charging amount R=25+0=25kg (55.1+0=55.1 lbs).

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	
	Mode exchanger	FQ01Na/A, FQ02Na/A, FQ03Na/A, FQ04Na/A, FQ05Na/A, FQ06Na/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	
Smart zone controller		CE52-24/F(C)	Applicable to the unit of CAN bus communication technology
4G		IE60-33/CF2	
Debugging Software		DE40-33/A(C)	
Remote monitoring system	Software	FE30-24/DF(B)	Applicable to the unit of CAN bus communication technology
	Optoelectronic isolated converter	GD02	
	MODbus Gateway	ME30-24/DF(B)	

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

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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.

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