Water-Cooled VRF
Installation manual

VPC***W4M-4P / VRC***W4M-4G / VRC***W4M-4Y

- Thank you for purchasing this Lennox Product.
- Before operating this unit, please read this manual carefully and retain it for future reference.

LENNOX Powered by SAMSUNG

Contents

Safety precautions

California Proposition 65 Warning (US)

⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

Before installing an Water-Cooled VRF, please read this manual thoroughly to ensure that you know how to safely and efficiently install a new appliance.

- ❋ Water-Cooled VRF uses R-410A refrigerant.
  - When using R-410A, moisture or foreign substances may affect the capacity and reliability of the product. Safety precautions must be taken when installing the refrigerant pipe.
  - The designed maximum pressure of the system is 4.1 MPa (594.6 psi). Select appropriate material and thickness according to the regulations.
  - R-410A is a quasi-azeotrope of two refrigerants. Make sure to charge with liquid phase when filling refrigerant. (If you charge vapor refrigerant, it may affect the capacity and reliability of the product as a result of a change in the blend of the refrigerant.)
- ❋ You must connect the indoor units for R-410A refrigerant. Refer to product catalog to find out the models names for connectable indoor units.(If you connect the indoor units that are not designed for R-410A, it cannot operated normally.)
- ❋ Water-Cooled VRF uses plate type heat exchanger, and extra concern must be taken regarding on selecting the installation location since it requires water pipe installation.
- ❋ For product protection, it is recommended to adopt closed circuit cooling tower or indirect water pipe circuit structure for Water-Cooled VRF.

Before the installation, read the 'Severe warning signs' and the 'Caution signs' thoroughly.

- ❋ After completing the installation and trial operation, explain to the user how to use and maintain the product. Also, hand over this installation manual so that it can be stored by the user.
- ❋ Manufacturer is not responsible for the incidents occurred by improper installation. Installer is responsible for any installation related claims from the user occurred by neglecting warnings and cautions stated in this manual. (Installer will be responsible for any service charges that may occur)
- ❋ Generally, Water-Cooled VRFs should not be relocated after installation. But when it has to be relocated for inevitable reasons, please contact Lennox qualified dealers for Water-Cooled VRFs.

Product is irrelevant to any installation or performance problem of the cooling tower and water pipes.

Anti-freeze must be used when temperature of water inlet for heating is below 50 °F (10 °C) or ground heat source is used.

⚠ WARNING	Hazards or unsafe practices that may result in **severe personal injury or death.**
⚠ CAUTION	Hazards or unsafe practices that may result in **minor personal injury (to installer/user) or property damage.**

SEVERE WARNING SIGNS

Installation must be requested to a qualified installer.

► If the user installs a product improperly on their own, it may cause water leakage, electric shock or fire.

Install the unit in a place where it is strong enough to hold the product weight.

► When installed in place where it is not strong enough to withhold the product weight, the unit could fall and cause injury.

Electric work must be done by qualified persons, complying the national wiring regulations and installed according to the instruction stated in the installation manual with leased circuit.

► Capacity shortage on the leased circuit and improper installation may cause electric shock or fire.

Use specified wires to connect indoor and outdoor units, and make sure the wire is firmly fixed.

► Improper connection may cause fire.

Safety precautions

Neatly arrange the wires in the electrical parts to make sure that electrical cover is closed securely without any gaps.

- ▶ If the cover is not properly closed, heat may be generate on the electrical terminal and cause electric shock or fire.

Make sure to use the provided or specified parts with the specified tools for installation.

- ▶ Failing to do so may cause product falling, water leakage, fire or electric shock.

In any case of refrigerant leakage, make sure to ventilate.

- ▶ If the refrigerant gas comes in contact with fire, harmful gas will be generated.
- ▶ Make sure that the refrigerant gas does not leak after completing the installation. If the refrigerant gas of the indoor unit leaks and comes into contact with the fan heater, space heater or stove, harmful gas will be generated.

Make sure to perform grounding work.

- ▶ Do not connect the ground wire to a gas pipe, water pipe, lightning rod or telephone grounding. Improper grounding could cause electric shock.

Do not install the product in a place where it is or might be exposed to inflammable gas leakage.

- ▶ When the gas leaks and gets accumulated around the product, it may cause fire.

Installation work must be done according to the instruction in this installation manual.

- ▶ Improper installation may cause water leakage, electric shock or fire.

When inserting the power plug, make sure to insert it fully and check that power plug and a consent does not have any dust, blockage or loosened part.

- ▶ If there is dust, blockage or loosened part on a power plug or consent, it can cause electric shock or fire. Also, replace the consent if it is loosened.

When installation is in progress, check the following before operating the product.

- ▶ Make sure pipes are properly connected without any leakage.
- ▶ Service valve should remain open. If the compressor operates with service valve closed, compressor or other parts may get damaged due to overpressure. Also, if there is leakage on the connection part, air inflow and other matter may make the status even more overpressured, which can cause personal injury due to explosion.

Stop the compressor before disconnecting the refrigerant pipe for pump-down operation.

- ▶ If you disconnect the refrigerant pipe while compressor is operating with service valve open, air inflow will cause excessive pressure in the refrigerant cycle that could lead to explosion and personal injury.

Do not assemble the power cord on your own, use two cables together to extend the cable length or connect the power to a multi consent connected with other products.

- ▶ Bad connection, isolation and over voltage may cause fire or electric shock.

Cut-off the main power supply before indoor unit electrical installation.

- ▶ Potential risk or electric shock.

You may need to install an ELB (earth leakage breaker) depending on the installation location.

- ▶ Not installing an ELB (earth leakage breaker) may cause electric shock.
- ▶ Wear protective equipment (such as safety gloves, goggles, and headgear) during installation and maintenance works. Installation/repair technicians may be injured if protective equipment is not properly equipped.

CAUTION SIGNS

Perform the drainage/piping work securely according to the installation manual.

- ▶ If not, water could drop from the unit and household goods could get wet and damaged.

Fasten a flare nut with a torque wrench as specified in this installation manual.

- ▶ When fastened too tight, a flare nut may break after a long period of time and cause refrigerant leakage.

Wear thick gloves during the installation process.

- ▶ If not, personal injury may occur due to the Water-Cooled VRF parts.

Do not install the outdoor unit in a place where animals could live.

- ▶ If an animal get contact with the electric parts, damage or fire may occur. In addition ask the customer to maintain a clean installation place around it.

After completing the installation run the trial operation. If no error occurs, explain to the customer how to use and clean the Water-Cooled VRF according to the user's manual. In addition give the installation manual and the user's manual to the customer.

Before the installation, check if the product is in good shape.

- ▶ Do not install the product if there is any damage which occurred during shipment.

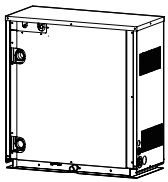
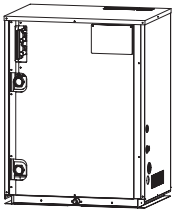
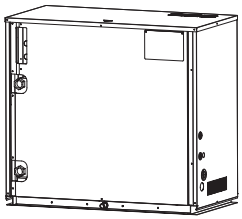
All the materials used to manufacture the product and packages are eco-friendly and they are recyclable.

Refrigerant used in this product must be added or disposed in an appropriate way by qualified personnel.

- ▶ At the end of the life cycle, take it to a proper recycling or disposal center or return it to the dealer so that it can be disposed correctly.

Preparing for installation

Outdoor unit classification

Classification	Small chassis	Medium chassis	Large chassis
Appearance			
Models	VPC038/048/055W4M-4P	VRC072/096/120W4M-4*	VRC192/240W4M-4*

CAUTION

Packaging material disposition

- Safely store or dispose the packaging materials.
  - Sharp metals such as nails or wooden material packaging that may break into pieces become a cause for personal injury.
  - Make sure to store or dispose the vinyl type packaging material to keep it out of reach of children. Children may put them over their face, which is very dangerous since it may lead to suffocation.

Outdoor unit combination

- ▶ Make sure to use an indoor unit that is compatible with Water-Cooled VRF.
- ▶ Indoor units can be connected within the range indicated in following table.
- ▶ If the total capacity of the connected indoor units exceeds the indicated maximum capacity, cooling and heating capacity of the indoor unit may decrease.
- ▶ Total capacity of the connected indoor units can be allowed from 50% to 130% of the total outdoor unit capacity. $0.5 \times \Sigma$(Outdoor unit capacity) ≤ Total capacity of the connected indoor units ≤ $1.3 \times \Sigma$(Outdoor unit capacity)

❋ You can connect maximum 64 indoor units to the outdoor unit. Maximum quantity of connectable indoor unit is set to 64 since outdoor unit only support up to 64 communication address. Indoor unit address can be assigned from 0~63. If the indoor unit address was assigned from 64~79, E201 error will occur.

❋ Maximum 32 Wall-mount type indoor units with EEV can be connected.

CAUTION

- Use the following table to determine the size and number of outdoor units needed to achieve the capacity requirements.

Outdoor unit combination

Model name for combination		Used only for heat pump system (1 phase)		
		3 ton	4 ton	5 ton
		VPC038W4M-4P	VPC048W4M-4P	VPC055W4M-4P
Number of individual outdoor units		1	1	1
Combined outdoor unit	VPC038W4M-4P	1		
	VPC048W4M-4P		1	
	VPC055W4M-4P			1
Nominal Capacity	Cooling (Btu/h)	38,200	47,800	54,600
	Heating (Btu/h)	42,600	54,600	61,400
Rated Capacity	Cooling (Btu/h)	38,000	48,000	54,500
	Heating (Btu/h)	42,000	54,000	61,000
Total capacity of the connected indoor units (cooling)	Minimum (Btu/h)	19,100	23,900	27,300
	Maximum (Btu/h)	49,700	62,100	71,000
Maximum number of connectable indoor units		6	8	9

Premium energy efficiency type

Model name for combination		Used for both heat pump and heat recovery systems (3 phase)			
		6 ton	8 ton	10 ton	12 ton
		VRC072W4M-4*	VRC096W4M-4*	VRC120W4M-4*	VRC144W4M-4*2
Number of individual outdoor units		1	1	1	2
Combined outdoor unit	VRC072W4M-4*	1			2
	VRC096W4M-4*		1		
	VRC120W4M-4*			1	
	VRC192W4M-4*				
Nominal Capacity	Cooling (Btu/h)	72,000	96,000	120,000	144,000
	Heating (Btu/h)	81,000	108,000	135,000	162,000
Rated Capacity	Cooling (Btu/h)	69,000	92,000	114,000	138,000
	Heating (Btu/h)	77,000	103,000	129,000	154,000
Total capacity of the connected indoor units (cooling)	Minimum (Btu/h)	36,000	48,000	60,000	72,000
	Maximum (Btu/h)	93,600	124,800	156,000	187,200
Maximum number of connectable indoor units		12	16	20	25

Preparing for installation

Model name for combination		Used for both heat pump and heat recovery systems (3 phase)			
		14 ton	16 ton	18 ton	22 ton
		VRC168W4M-4*2	VRC192W4M-4*	VRC216W4M-4*2	VRC264W4M-4*2
Number of individual outdoor units		2	1	2	2
Combined outdoor unit	VRC072W4M-4*	1			1
	VRC096W4M-4*	1		1	
	VRC120W4M-4*			1	
	VRC192W4M-4*		1		1
Nominal Capacity	Cooling (Btu/h)	168,000	192,000	216,000	264,000
	Heating (Btu/h)	189,000	216,000	243,000	297,000
Rated Capacity	Cooling (Btu/h)	160,000	184,000	206,000	252,000
	Heating (Btu/h)	180,000	206,000	232,000	282,000
Total capacity of the connected indoor units (cooling)	Minimum (Btu/h)	84,000	96,000	108,000	132,000
	Maximum (Btu/h)	218,400	249,600	280,800	343,200
Maximum number of connectable indoor units		29	33	37	45

Model name for combination		Used for both heat pump and heat recovery systems (3 phase)			
		24 ton	28 ton	30 ton	32 ton
		VRC288W4M-4*2	VRC336W4M-4*2	VRC360W4M-4*2	VRC384W4M-4*3
Number of individual outdoor units		2	3	3	3
Combined outdoor unit	VRC072W4M-4*		2	1	
	VRC096W4M-4*	1		1	2
	VRC120W4M-4*				
	VRC192W4M-4*	1	1	1	1
Nominal Capacity	Cooling (Btu/h)	288,000	336,000	360,000	384,000
	Heating (Btu/h)	324,000	378,000	405,000	432,000
Rated Capacity	Cooling (Btu/h)	276,000	322,000	344,000	368,000
	Heating (Btu/h)	308,000	360,000	386,000	412,000
Total capacity of the connected indoor units (cooling)	Minimum (Btu/h)	144,000	168,000	180,000	192,000
	Maximum (Btu/h)	374,400	436,800	468,000	499,200
Maximum number of connectable indoor units		49	58	62	64

Premium compact type

Module name of combination		Used for both heat pump and heat recovery systems (3phase)		
		20Ton	26Ton	28Ton
		VRC240W4M-4*	VRC312W4M-4*1	VRC336W4M-4*1
Number of individual outdoor units		1	2	2
Combined outdoor unit	VRC072W4M-4*		1	
	VRC096W4M-4*			1
	VRC120W4M-4*			
	VRC192W4M-4*			
	VRC240W4M-4*	1	1	1
Nominal capacity	Cooling (Btu/h)	240,000	312,000	336,000
	Heating (Btu/h)	270,000	351,000	378,000
Rated capacity	Cooling (Btu/h)	228,000	298,000	320,000
	Heating (Btu/h)	256,000	334,000	360,000
Total capacity of the connected indoor units (Cooling)	Minimum (Btu/h)	120,000	156,000	168,000
	Maximum (Btu/h)	312,000	405,600	436,800
Maximum number of connectable indoor units		51	54	58

Module name of combination		Used for both heat pump and heat recovery systems (3phase)	
		30Ton	34Ton
		VRC360W4M-4*1	VRC408W4M-4*1
Number of individual outdoor units		2	3
Combined outdoor unit	VRC072W4M-4*		1
	VRC096W4M-4*		1
	VRC120W4M-4*	1	
	VRC192W4M-4*		
	VRC240W4M-4*	1	1
Nominal capacity	Cooling (Btu/h)	360,000	408,000
	Heating (Btu/h)	405,000	459,000
Rated capacity	Cooling (Btu/h)	342,000	390,000
	Heating (Btu/h)	386,000	436,000
Total capacity of the connected indoor units (Cooling)	Minimum (Btu/h)	180,000	204,000
	Maximum (Btu/h)	468,000	530,400
Maximum number of connectable indoor units		62	64

❋ Minimum capacity of the indoor unit is 7.5 MBH.

CAUTION

- Installation combination must be complied when composing outdoor unit combination.

Preparing for installation

Moving the outdoor unit

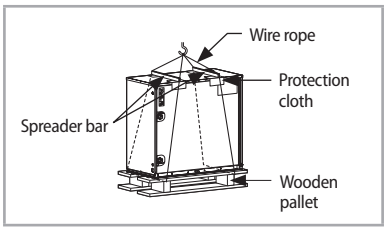
- Select the moving path in advance.
- Be sure that moving path can support weight of the outdoor unit.
- Do not slant the product more than 30˚ when carrying it. (Do not lay the product down in sideways.)
- Surface of the heat exchanger is sharp. Be careful not to get injured while moving the product.

CAUTION

- You must use certain part of the product when moving the product.

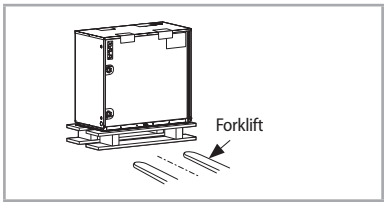
When moving with a crane

- Fasten the wire rope as shown in the figure.
- To protect damage or scratches, insert a piece of cloth between the outdoor unit and the wire rope.



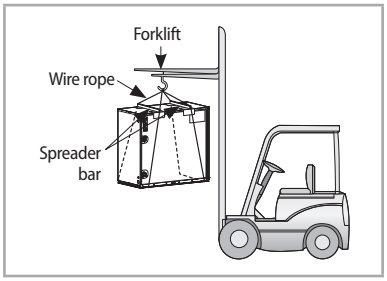
When moving with a forklift

- Carefully insert the forklift forks into the forklift holes at the bottom of the outdoor unit.
- Be careful with the forklift from damaging the product.



When moving the product without wooden pallet and the crane is not available for use

- Connect a wire rope to the outdoor unit as you would move it with a crane.
- Hang the wire rope to the forklift fork to move the outdoor unit.



Selecting installation location

Decide the installation location regarding the following condition and obtain user's approval.

Standard installation condition

- Heat source water containing foreign substances can cause condenser and pipe corrosion as well as water scale. Therefore, make sure that water source meets the standard of cooling water quality for refrigerating and air conditioning equipment. (Refer to 'Cooling water management 'on page 121.)
- Closed circuit cooling tower must be used, but when open cooling tower is in use, select indirect water pipe installation method which water pipe of the building is not directly connected to the water pipe of the product.
- Strainer (which needs to be purchased separately) must be installed to the 'Water IN' pipes of the heat source water. If sand, dust or rust debris enter to water system, it may cause corrosion on metallic materials or blockage of the water heat exchanger and damage the heat exchanger.
- Water-Cooled VRF Water-Cooled VRF is not designed to be installed outdoor. There are risk of burst and frozen water pipes when the outdoor unit is installed outdoor, therefore it must be installed indoor (machine room etc.)

Installation location condition

- Choose a place with ventilation duct or opening to cool down the heat generated from the product and maintain the surrounding temperature within 32~104 °F (0~40 °C) and the humidity below 80 %.
- Choose a place where structure can bear the weight and vibration of the outdoor unit.
- Choose a flat place that rainwater does not settle or leak.
- Choose a well ventilated place with sufficient space for repair and other services.
- Choose a place where you can easily connect the refrigerant pipes between indoor and outdoor units within allowable distance.
- This product is not salt tolerant, therefore do not install it near the sea or hot springs where outdoor unit may corrode.

CAUTION

- R-410A refrigerant is a safe, nontoxic and nonflammable refrigerant. However, if the place holds any concerns for exceeding dangerous level of refrigerant concentration in case of refrigerant leakage, extra ventilation system is required.
- Do not install the product in a place with corrosive gas such as sulfur oxides, ammonia gas, sulfurous gases. Example: near washroom exhaust pipe, ventilation duct outlet, or surface near hot spring etc. (Copper pipes and soldered parts may corrode and cause refrigerant leakage.)
- Install the product in a place without any risk of inflammable gas leakage.
- Water-Cooled VRF can be interfered with static noise when listening to AM radio. Therefore, select a location where indoor unit can be installed while keeping optimal distance from the radio, computer, stereo equipment. Furthermore, select a location where electrical wiring work is possible and put those wires in a individual protection tubes and ground those protection tube.
  - Especially, keep the unit at least 3 m (9.84 ft) away from the electrical equipment in an area with weak electromagnetic waves and put the main power cable and communication cables in separately installed protection tubes, and ground each protection tubes.
  - Make sure that there is no equipment that generates electromagnetic waves. If not electromagnetic waves may cause problem to the control systems which may lead to Water-Cooled VRF malfunction. (Example: Remote control sensor of the indoor unit may not be received well, due to ballast stabilizer of the lighting equipment.)

Space requirement for installation

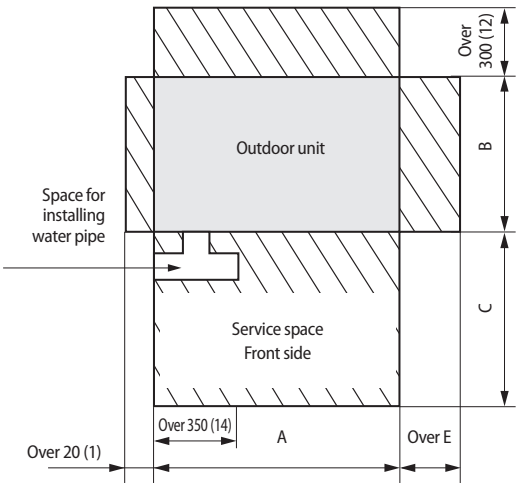
Minimum space requirement for installation

- ▶ Secure minimum installation space as shown in the following figures, considering service area and path for people etc.
  - If the installation space is narrow, installer or other worker may get injured during work and may also cause problem to the product.
- ▶ If the conditions does not meet the space requirement in this manual, please contact qualified installation agent.
- ▶ You must check the required service clearance since it is different for each model.

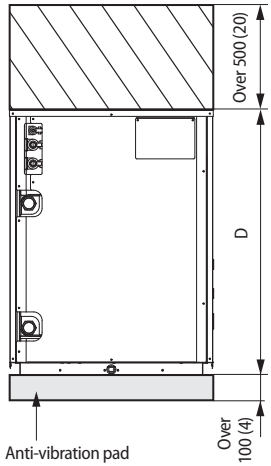
Single installation

When the water pipe passes through top of the product

Unit: mm (inch)



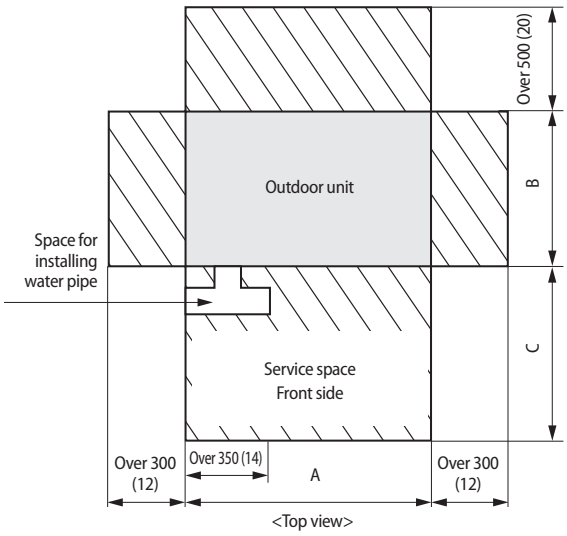
<Top view>



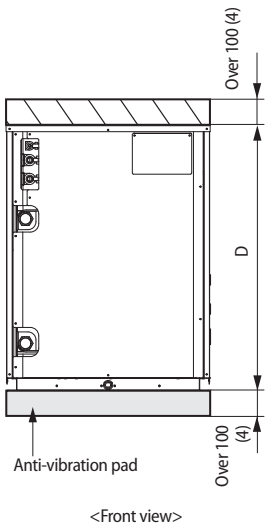
<Front view>

When the water pipe passes through back of the product

Unit: mm (inch)



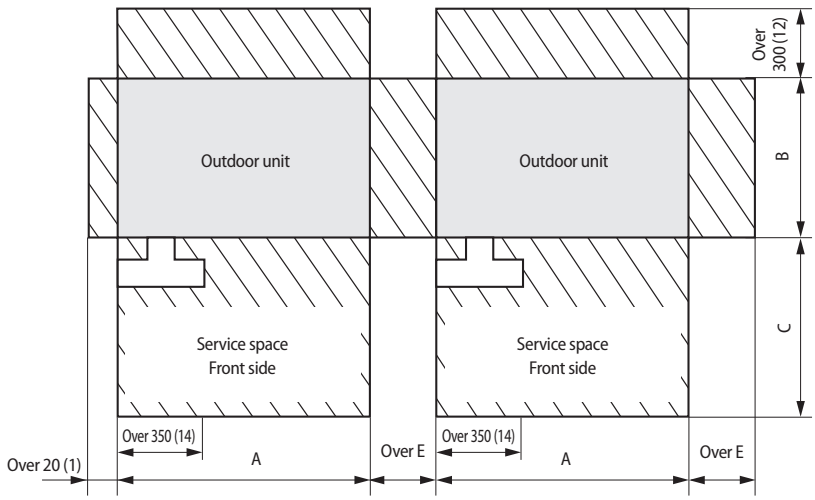
<Top view>



<Front view>

Module or continuous installation

Unit: mm (inch)

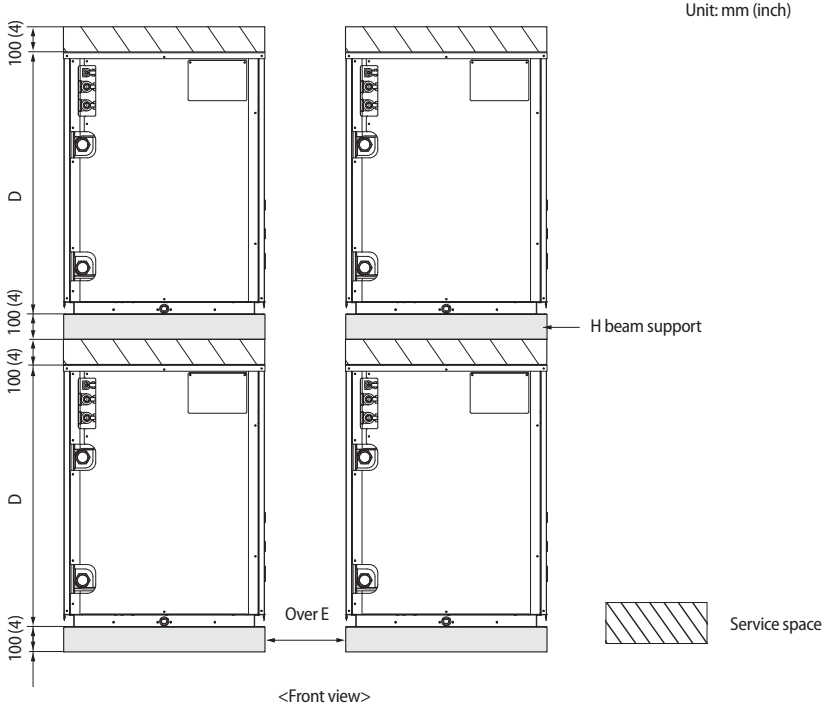


<Top view>

Space requirement for installation

Double installation

Unit: mm (inch)



<Front view>

- For the double installation, service space is required for the front, rear, and sides of the product. For the size of the service space, refer to the service space size of single, module or continuous installation.
- Clear enough space for E (space between outdoor units), so that water pipes connected to outdoor units does not block the front side of the outdoor units next to it.

Unit: mm (inch)

Model name of outdoor unit	A	B	C	D	E
VPC038/048/055W4M-4P	750 (29.5)	330 (13)	500 (19.7)	800 (31.5)	100 (4)
VRC072/096/120W4M-4Y	770 (30.3)	545 (21.5)	600 (23.6)	1000 (39.4)	100 (4)
VRC192/240W4M-4Y	1100 (43.3)	545 (21.5)	600 (23.6)	1000 (39.4)	100 (4)
VRC072/096/120W4M-4G	790 (31.1)	545 (21.5)	600 (23.6)	1000 (39.4)	300 (12)
VRC192/240W4M-4G	1120 (44.1)	545 (21.5)	600 (23.6)	1000 (39.4)	300 (12)

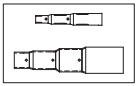
CAUTION

- If the outdoor unit is needed to be installed close to the walls unavoidably, prevent the vibration from being transferred to the walls with cushioning materials etc.

Accessories

Accessories

- ▶ You must keep following accessories until the installation is finished.
- ▶ Hand over the installation manual to the customer after finishing the installation.

Installation manual	*Installation socket
	

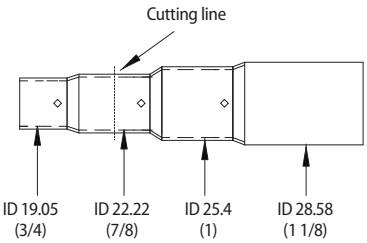
✻ Models with packing socket: VRC072/096/120W4M-4*.

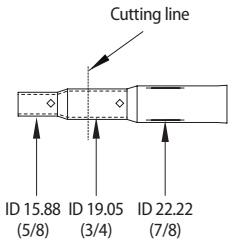
✻ Socket can be different depending on the models.

Model number	Connection type	Heat recovery [mm (inch)]				Heat pump [mm (inch)]		
		Gas	Liquid	High-pressure gas	Socket needed	Gas	Liquid	Socket needed
VRC072W4M-4* (6 ton) (a)	Unit connection	22.22 (7/8)	9.52 (3/8)	19.05 (3/4)	Yes	19.05 (3/4)	9.52 (3/8)	No
	Field connection	19.05 (3/4)	9.52 (3/8)	15.88 (5/8)		19.05 (3/4)	9.52 (3/8)	
VRC096W4M-4* (8 ton) (a)	Unit connection	22.22 (7/8)	9.52 (3/8)	19.05 (3/4)	No	19.05 (3/4)	9.52 (3/8)	Yes
	Field connection	22.22 (7/8)	9.52 (3/8)	19.05 (3/4)		22.22 (7/8)	9.52 (3/8)	
VRC120W4M-4* (10 ton) (a)	Unit connection	28.58 (1-1/8)	9.52 (3/8)	22.22 (7/8)	No	22.22 (7/8)	9.52 (3/8)	Yes
	Field connection	28.58 (1-1/8)	12.7 (1/2)	22.22 (7/8)		28.58 (1-1/8)	12.7 (1/2)	
VRC192W4M-4* (16 ton) (a)	Unit connection	28.58 (1-1/8)	15.88 (5/8)	28.58 (1-1/8)	No	28.58 (1-1/8)	15.88 (5/8)	No
	Field connection	28.58 (1-1/8)	15.88 (5/8)	28.58 (1-1/8)		28.58 (1-1/8)	15.88 (5/8)	
VRC240W4M-4* (20 ton) (a)	Unit connection	28.58 (1-1/8)	15.88 (5/8)	28.58 (1-1/8)	No	28.58 (1-1/8)	15.88 (5/8)	No
	Field connection	28.58 (1-1/8)	15.88 (5/8)	28.58 (1-1/8)		28.58 (1-1/8)	15.88 (5/8)	

(a) Cut socket as needed for 6, 8, and 10 ton units.

unit: mm (inch)





Accessories

Optional accessories

▶ Following optional accessories are needed for connecting pipes between the indoor and outdoor units.

Classification	Model Name	Specification	
		MBH	KW
Y-Joint	V1IDBP01PR	51 and below	15.0 and below
	V1IDBP02PR	Over 51~136 and below	Over 15.0 ~40.0 and below
	V1IDBP03PR	Over 136~154 and below	Over 40.0 ~45.0 and below
	V1IDBP04PR	Over 154~240 and below	Over 45.0 ~70.3 and below
	V1IDBP05PR	Over 240~336 and below	Over 70.3 ~98.4 and below
	V1IDBP06PR	Over 336~461 and below	Over 98.4 ~135.2 and below
	V1IDBP07PR	Over 461	Over 135.2
Y-Joint (Only H/R)	V1IDBP08HR	76 and below	22.4 and below
	V1IDBP09HR	Over 76~240 and below	Over 22.4 ~70.3 and below
	V1IDBP10HR	Over 240~461 and below	Over 70.3 ~135.2 and below
	V1IDBP07HR	Over 461	Over 135.2
Distribution header	V1HDRK11PR	154 and below (for 4 rooms)	45.0 and below (for 4 rooms)
	V1HDRK12PR	240 and below (for 8 rooms)	70.3 and below (for 8 rooms)
	V1HDRK13PR	Over 240 (for 8 rooms)	Over 70.3 (for 8 rooms)
Y-Joint - Outdoor unit	V1ODBP14HP	461 and below	135.2 and below
	V1ODBP15HP	478 and over	140.2 and over
Y-Joint (Only H/R) - Outdoor unit	V1ODBP14HR	461 and below	135.2 and below
	V1ODBP15HR	478 and over	140.2 and over

❋ If you use an indoor unit with no internal EEV (electronic expansion valve), you will need an EEV kit.

❋ Only use the genuine accessories listed in above table and do not use imitated accessories.

❋ Recommended specification of the strainer

Max. working pressure	Water pipe connection		Mesh size	Material(strainer/Mesh)
	VPC038/048/055* VRC072/096/120/192*	VRC240*		
1.96 MPa (284 psi)	NPT 1 1/4 (NPT internal thread)	NPT 2 (NPT internal thread)	50 Mesh	AISI316/SUS304

Base construction and installation of the outdoor unit

WARNING

- Make sure to remove the wooden pallet before installing the outdoor unit. If you do not remove the wooden pallet, there is risk of fire during welding the pipes. If the outdoor unit is installed with wooden pallet on, and it was used for long period time, wooden palette may break and cause electrical hazard or high pressure may damage the pipes.

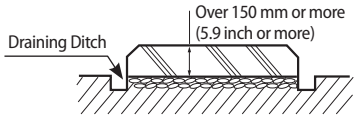
❋ Fix an outdoor unit firmly on the base ground with anchor bolts.

❋ Manufacturer is not responsible for the damage occurred by not following the installation standards.

1. Make sure that the height of the base ground is 150 mm (5.9 inch) or higher to protect the outdoor unit from rain water or other external conditions. Also, install a draining pit around the base ground and connect the drain pipe to the drainage.
2. Considering the vibration and weight of the outdoor unit, strength of the base ground must be strong to prevent noise and the top surface of it should be flat.
3. Base ground should be 1.5 times larger than the bottom of the outdoor unit.
4. Outdoor unit must be fixed firmly so that it can withstand the wind speed of 30 m/s (98.4 ft/s). If you cannot fix the outdoor unit on the base ground, fix it by side or use extra structure.
5. In heating operation, defrost water may form so you must really care about the drainage and waterproofing the floor. To prevent defrost water from stagnating or freezing, construct a drainage with over 1/50 slope. (Ice may form on the floor in winter time.)
6. It is necessary to add wire mesh or steel bar during concrete construction for the base ground to prevent damages or cracks.
7. When installing multiple outdoor units at the same place, construct a H beam or an anti-vibration frame on the base ground to install the outdoor unit.
8. After installing a H beam or an anti-vibration frame, apply corrosion protection and other necessary coating.
9. When concrete construction for outdoor unit installation is completed, install an anti-vibration pad (t=20 mm / 0.78 inch or more) or an anti-vibration frame to prevent vibration of the outdoor unit from transferring to the base ground.
10. Place the outdoor unit on a H beam or an anti-vibration frame and fix it with the bolt, nut and washer. (The bearing force has to be over 3.5 kN)

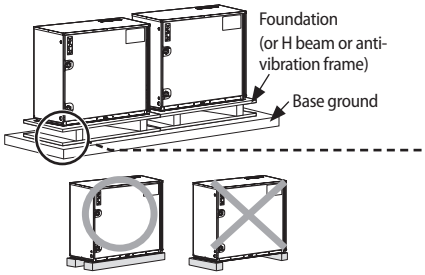
Base construction and installation of the outdoor unit

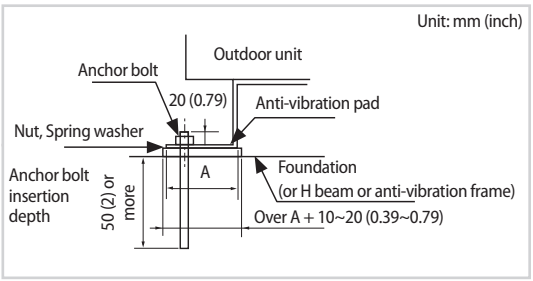
Foundation



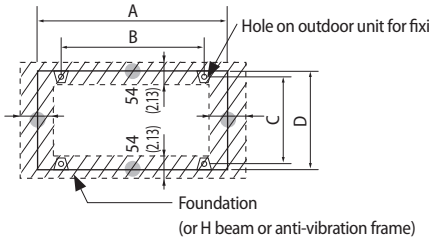
<When installing on the ground>

Outdoor unit installation





Fixing the outdoor unit



Unit: mm (inch)

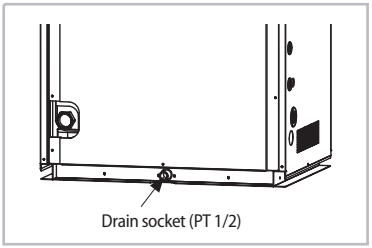
Classification	Small chassis	Medium chassis		Large chassis	
Models	VPC038/048/055W4M-4P	VRC072/096/120W4M-4Y	VRC072/096/120W4M-4G	VRC192/240W4M-4Y	VRC192/240W4M-4G
A	750 (29.5)	770 (30.3)	790 (31.3)	1100 (43.3)	1120 (44.1)
B	636 (25.0)	648 (25.5)		976 (38.4)	
C	313 (12.3)	527 (20.8)		528 (20.8)	
D	330 (13.0)	545 (21.5)		545 (21.5)	

※ For adding the anti-vibration frame on the base ground, the specification for the fixing hole depends on the specification of the anti-vibration frame.

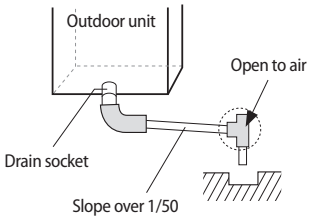
Drain pipe installation

Installing the drain pipe

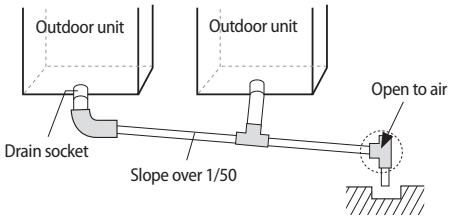
▶ Attach the drain pipe to the drain socket (PT1/2) located on the bottom of the product.



Single installation



Module installation



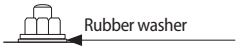
▶ Do not install trap and ensure the slope of the drain pipe is more than 1/50.
▶ Insulate the drain pipe and drain plug with insulation over 10 mm (0.4 inch) thick.
▶ Install self-regulating heating cable on the drain pipe to prevent it from freezing.
▶ If you have installed a heater to prevent drain pipe from freezing, install a safety equipment for a heating appliance.

Drain pipe installation

CAUTION

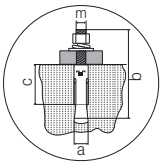
Cautions regarding connecting the anchor bolt

- Use the rubber washer to prevent the anchor bolt from corroding.



- Anchor bolt specifications

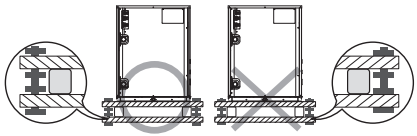
Size (m)	Drill bit diameter (a)	Anchor length (b)	Sleeve length (c)	Insertion depth	Fastening torque
Ø 10	14 mm (1/2″)	75 mm (3″)	40 mm (1 1/2″)	50 mm (2″)	30 N·m



✻ Use anchor bolts and nuts made of plated zinc or STS material. Regular anchor bolts or nuts may get damaged by corrosion.

Cautions regarding anti-vibration frame installation

- During installation, make sure there is no gap between the base ground and the supporting structures such as anti-vibration frame or H beam.
- Base ground must be constructed firmly to support the bottom part of the anti-vibration mount.
- After installing the anti-vibration frame, unscrew the fixing part on the top and bottom part of the frame.



- If the anti-vibration frame or H beam is fixed to the base ground with anchor bolts, make sure that waterproofed surface is not damaged by anchor bolts and apply additional waterproof solution if necessary.

Refrigerant pipe installation

WARNING

- When installing, make sure there is no leakage. When collecting the refrigerant, stop the compressor first before removing the connection pipe. If the refrigerant pipe is not properly connected and the compressor is working with the service valve open, the pipe sucks the air in which makes the pressure inside of the refrigerant cycle abnormally high which may lead to explosion and injury.

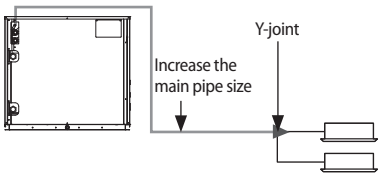
Refrigerant pipe work

- The length of refrigerant pipe should be as short as possible and the height difference between an indoor and outdoor unit should be minimized.
- Piping work must be done within allowable piping length, height difference, and the allowable length after branching.
- The pressure of the R-410A is high. Use only certified refrigerant pipe and follow the installation method.
- After installing the pipes, calculate the total length of the pipe to check if additional refrigerant is needed. When you need to charge the additional refrigerant, make sure to use R-410A refrigerant.
- The inside of the refrigerant pipe must be clean and contain no harmful ions, oxides, dust, iron particles or moisture.
- Use tools and accessories compatible with R-410A refrigerant gas.

<table>
<tr><th>Tool</th><th>Installation process/purpose</th><th colspan="2">Compatibility with conventional tool</th></tr>
<tr><td>Pipe cutter</td><td rowspan="5">Refrigerant pipe installation</td><td>Pipe cutting</td><td rowspan="2">Compatible</td></tr>
<tr><td>Flaring tool</td><td>Pipe flaring</td></tr>
<tr><td>Refrigerant machine oil</td><td>Apply refrigerant oil on flared part</td><td>Exclusive ether oil, ester oil, alkali benzene oil or synthetic oil</td></tr>
<tr><td>Torque wrench</td><td>Connect flare nut with pipe</td><td rowspan="4">Compatible</td></tr>
<tr><td>Pipe bender</td><td>Pipe bending</td></tr>
<tr><td>Nitrogen gas</td><td rowspan="2">Air tightness test</td><td>Prevent oxidation within the pipe</td></tr>
<tr><td>Welder</td><td>Pipe welding</td></tr>
<tr><td>Manifold gage</td><td rowspan="2">Air tightness test ~ additional refrigerant charging</td><td rowspan="2">Vacuuming, charging refrigerant and checking operation</td><td>Need exclusive one to prevent mixture of R-22 refrigerant oil use and also the measurement is not available due to high pressure</td></tr>
<tr><td>Refrigerant charging hose</td><td>Need exclusive one since there is risk of refrigerant leakage or contamination</td></tr>
<tr><td>Vacuum pump</td><td colspan="2">Pipe drying</td><td>Compatible (Use products which contain the check valve to prevent the oil from flowing backward into the outdoor unit.) Use the one that can be vacuumed up to -100.7 kpa(5 Torr).</td></tr>
<tr><td>Scale for refrigerant charging</td><td colspan="2" rowspan="2"></td><td>Compatible</td></tr>
<tr><td>Gas leak detector</td><td>Gas leak test</td><td>Need exclusive one
(Ones used for R-134a is compatible)</td></tr>
<tr><td>Flare nut</td><td colspan="3">Must use the flare nut supplied with the product. Refrigerant leakage may occur when the conventional flare nut for R-22 is used.</td></tr>
</table>

Refrigerant pipe installation

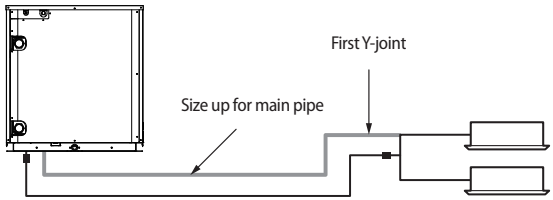
Selecting refrigerant pipe



- Install the refrigerant pipe according to main pipe size of each outdoor unit capacity.
- When the pipe length (including elbow) between the outdoor unit and the farthest indoor unit exceeds 90 m (295.28 ft), the size of the pipe (main pipe) connecting the outdoor unit to the first branch joint must be increased by 1 grade.
- For Heat recovery System, when the pipe length (including elbow) between an outdoor unit and the farthest indoor unit exceeds 90 m (295.28 ft), you must increase the size of the liquid pipe by 1 grade among the pipes(main pipe) which connects between the outdoor unit to the first branch joint

Choosing refrigerant pipe

Heat pump (VPC038/048/055W4M-4P)



Pipe installation between an outdoor unit and the first Y-joint

Outdoor unit capacity [HP(Ton)]	Liquid pipe [mm (inch)]	Gas pipe [mm (inch)]
4 (3)	Ø9.52 (3/8)	Ø15.88 (5/8)
5 (4)	Ø9.52 (3/8)	Ø19.05 (3/4)
6 (5)	Ø9.52 (3/8)	Ø19.05 (3/4)

- Install the refrigerant pipe according to main pipe size of each outdoor unit capacity.

Pipe installation between Y-joints

Indoor unit total capacity [kW (Btu/h)]	Pipe diameter (O•D•mm)	
	Liquid pipe [mm (inch)]	Gas pipe [mm (inch)]
X ≤ 15.0 (51000)	Ø9.52 (3/8)	Ø15.88 (5/8)
15.0 (51000) < X ≤ 23.2 (79000)		Ø19.05 (3/4)

Selecting Y-joint

- ▶ Select the first Y-joint according to main pipe size of each outdoor unit capacity.
- ▶ Select the other Y-joints according to the total indoor unit capacity under the selected Y-joint.

Selecting the first Y-joint	
Outdoor unit capacity [HP(Ton)]	**Y-joint model**
4 (3)	V1IDBP01PR
5(4)	V1IDBP02PR
6 (5)	V1IDBP02PR

Other Y-joints	
Total indoor unit capacity under the selected Y-joint [kW (Btu/h)]	**Y-joint model**
X ≤ 15.0 (51000)	V1IDBP01PR
15.0 (51000) < X ≤ 40.6 (138000)	V1IDBP02PR

Selecting additional refrigerant charging

- ▶ Basic refrigerant

  The basic amount of additional refrigerant charged at a factory

Model	Refrigerant	Factory charge	
		kg	lbs
VPC038W4M-4P	R-410A	1.1	2.425
VPC048W4M-4P		1.6	2.527
VPC055W4M-4P		1.6	2.527

- ▶ Charging additional refrigerant

The amount of additional refrigerant charging	=	The amount of refrigerant charging for pipe + the amount of refrigerant correction charging for an indoor unit.

1. The amount of additional refrigerant depending on the pipe size (ⓐ)
   - Amount of additional refrigerant has to be calculated based on the sum of all liquid pipe length.

Size of liquid pipe [mm(inch)]	6.35 (1/4)	9.52 (3/8)	12.7 (1/2)	15.88 (5/8)
Additional amount [kg/m (lb/ft)]	0.02 (0.013)	0.06 (0.040)	0.125 (0.084)	0.18 (0.121)

Additional refrigerant charging calculation = The sum of total length of Ø 9.52 liquid pipe(m) x 60g + the sum of total length of Ø 6.35 liquid pipe(m) x 20g

Ex) a(Ø 9.52)=40m(131.23'), b+c+d(Ø 9.52)=15m(49.21'), e+f+g(Ø 6.35)=15m(49.21') Refer to 'Connection by header joint' on page 45.

The amount of additional refrigerant = 55m(180.45') x 60g + 15m(49.21') x 20g = 3600g

Refrigerant pipe installation

2. Amount of additional refrigerant for each indoor unit (ⓑ)

Unit : lb (kg)

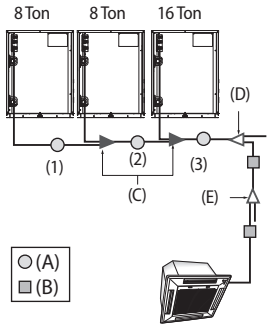
Capacity Index (MBH)	5	6	7	9	12	15	18	20	24	27	28	30	32	36	42	48	54	60	72	76	96
1way cassette (VOWC***S4-4P)	0.33 (0.15)		0.33 (0.15)	0.55 (0.25)	0.55 (0.25)	0.71 (0.32)	0.71 (0.32)		0.71 (0.32)												
4way cassette S (600x600) (V22C***S4-4P)	0.64 (0.29)		0.64 (0.29)	0.64 (0.29)	0.64 (0.29)		0.82 (0.37)	0.82 (0.37)													
4way cassette S (V33C***S4-4P)		1.61 (0.73)		1.61 (0.73)	1.61 (0.73)		1.61 (0.73)		1.61 (0.73)			1.94 (0.88)		1.94 (0.88)		1.94 (0.88)					
360 cassette (V36C***S4-4P)				0.99 (0.45)	0.99 (0.45)		0.99 (0.45)		0.99 (0.45)			1.52 (0.69)		1.52 (0.69)		1.52 (0.69)					
LSP duct (VLOC***S4-4P)			0.77 (0.35)	0.77 (0.35)	0.77 (0.35)		0.99 (0.45)		0.99 (0.45)												
MSP duct (VMDC***S4-4P)		0.99 (0.45)	0.99 (0.45)	0.99 (0.45)	0.99 (0.45)	0.99 (0.45)	1.50 (0.68)														
HSP duct (VHIC***S4-4P)									1.50 (0.68)	1.50 (0.68)		1.50 (0.68)		1.85 (0.84)		1.85 (0.84)	2.01 (0.91)				
Floor Standing (VSCC***S4-4P, VSEC***S4-4P)		0.26 (0.12)		0.49 (0.22)	0.49 (0.22)		0.71 (0.32)		0.71 (0.32)												
Ceiling (VUCC***S4-4P, VBCC***S4-4P)							0.86 (0.39)		0.86 (0.39)					1.23 (0.56)		2.09 (0.95)					
MPAHU(V-AHU) (VVCC***S4-4P)					0.73 (0.33)		1.10 (0.50)		1.10 (0.50)			1.83 (0.83)		1.94 (0.88)		2.60 (1.18)	2.80 (1.27)				
Wall mounted (with EEV) (VWMC***S4-4P)	0.51 (0.23)		0.51 (0.23)	0.71 (0.32)	0.71 (0.32)	1.06 (0.48)	1.06 (0.48)		1.06 (0.48)		1.41 (0.64)		1.50 (0.68)								
Hydro unit HE (VHEC***S4-4P)														1.32 (0.6)		1.32 (0.6)					
Hydro unit HT (VHTC***S4-4P)																1.32 (0.6)					

- ▶ If there is no additional refrigerant value for the indoor unit in the above table, refer to the indoor unit installation manual.
- ▶ Additional refrigerant charging of MSB is 0.5 kg (1.1 lb) for every MSB kit.

3. The total amount of additional refrigerant charging = the amount of refrigerant charging for pipe + the amount of refrigerant for each indoor unit.

   Ex) The amount of additional refrigerant charging = 3600g + 700g = 4300g

Heat pump (VRC072/096/120/192/240W4M-4*)



Ex.) 32 Ton

Outdoor unit capacity (Ton)	No.	Pipe size (O.D)			
		Liquid pipe		Gas pipe	
		mm	inch	mm	inch
8	(1)	9.52	3/8	22.22	7/8
16	(2)	15.88	5/8	28.58	1 1/8
32	(3)	19.05	3/4	41.28	1 5/8

The pipe that connects between outdoor unit (1)(2) and the main pipe (3)

Select the size of the pipe according to the below table.

Outdoor unit capacity (Cooling)			* Maximum pipe length within 90m (295.3ft)				* Maximum pipe length over 90m (295.3ft)			
Ton	MBH	kW	Liquid pipe		Gas pipe		Liquid pipe		Gas pipe	
			mm	inch	mm	inch	mm	inch	mm	inch
6	72	21.1	9.52	3/8	19.05	3/4	12.7	1/2	22.22	7/8
8	96	28.1	9.52	3/8	22.22	7/8	12.7	1/2	25.4 note1)	1 note1)
10	120	35.2	12.7	1/2	28.58	1 1/8	15.88	5/8	28.58	1 1/8
12	144	42.2	12.7	1/2	28.58	1 1/8	15.88	5/8	31.75 note2)	1 1/4 note2)
14	168	49.2	15.88	5/8	28.58	1 1/8	19.05	3/4	31.75 note2)	1 1/4 note2)
16	192	56.3	15.88	5/8	28.58	1 1/8	19.05	3/4	31.75 note2)	1 1/4 note2)
18	216	63.3	15.88	5/8	28.58	1 1/8	19.05	3/4	31.75 note2)	1 1/4 note2)
20	240	70.3	15.88	5/8	28.58	1 1/8	19.05	3/4	31.75 note2)	1 1/4 note2)
22	264	77.4	19.05	3/4	34.92	1 3/8	22.22	7/8	38.1 note3)	1 1/2 note3)
24	288	84.4	19.05	3/4	34.92	1 3/8	22.22	7/8	38.1 note3)	1 1/2 note3)
26	312	91.4	19.05	3/4	34.92	1 3/8	22.22	7/8	38.1 note3)	1 1/2 note3)
28	336	98.4	19.05	3/4	34.92	1 3/8	22.22	7/8	38.1 note3)	1 1/2 note3)
30	360	105.5	19.05	3/4	41.28	1 5/8	22.22	7/8	41.28	1 5/8
32	384	112.5	19.05	3/4	41.28	1 5/8	22.22	7/8	41.28	1 5/8
34	408	119.5	19.05	3/4	41.28	1 5/8	22.22	7/8	41.28	1 5/8

*Maximum pipe length : The pipe length between an outdoor unit and the farthest indoor unit.

Note1) If 1″ (25.40 mm) pipe is not available on site, use 1 1/8″ (28.58 mm) pipe.

Note2) If 1 1/4″ (31.75 mm) pipe is not available on site, use 1 3/8″ (34.92 mm) pipe.

Note3) If 1 1/2″ (38.10 mm) pipe is not available on site, use 1 5/8″ (41.28 mm) pipe.

✻ For the case that the diameter of the default pipe of an outdoor unit does not match that of the pipe installed on the site, a socket is provided by default together with the outdoor unit.

Refrigerant pipe installation

Size of the pipe between branch joints (B)

Select the pipe size according to the sum of indoor unit capacity which will be connected after the branch.

❋ However, if the size of the pipe between branch joints (B) is bigger than the size of the pipe connected to the outdoor unit (A), apply the pipe size (A).

Indoor unit capacity		Branch pipe length within 45 m (147.6 ft)				Branch pipe length between 45~90 m (147.6 ~ 295.3 ft)			
		Liquid pipe		Gas pipe		Liquid pipe		Gas pipe	
MBH	kW	mm	inch	mm	inch	mm	inch	mm	inch
~ 51	~ 15.0	9.52	3/8	15.88	5/8	12.70	1/2	19.05	3/4
51 ~ 76	15.0 ~ 22.4	9.52	3/8	19.05	3/4	12.70	1/2	22.22	7/8
76 ~ 96	22.4 ~ 28.1	9.52	3/8	22.22	7/8	12.70	1/2	25.40 note1)	1 note1)
96 ~ 136	28.1~ 40.0	12.70	1/2	28.58	1 1/8	15.88	5/8	28.58	1 1/8
136 ~ 154	40.0 ~ 45.0	12.70	1/2	28.58	1 1/8	15.88	5/8	31.75 note2)	1 1/4 note2)
154 ~ 240	45.0 ~ 70.3	15.88	5/8	28.58	1 1/8	19.05	3/4	31.75 note2)	1 1/4 note2)
240 ~ 336	70.3 ~ 98.4	19.05	3/4	34.92	1 3/8	22.22	7/8	38.10 note3)	1 1/2 note3)
336 ~ 461	98.4 ~ 135.2	19.05	3/4	41.28	1 5/8	22.22	7/8	41.28	1 5/8
461 ~ 577	135.2 ~ 169.0	19.05	3/4	41.28	1 5/8	22.22	7/8	53.98	2 1/8
577 ~	169.0 ~	22.22	7/8	53.98	2 1/8	25.40 note1)	1 note1)	53.98	2 1/8

Note1) If 1" (25.40) pipe is not available on site, use 1 1/8" (28.58) pipe.

Note2) If 1 1/4" (31.75) pipe is not available on site, use 1 3/8" (34.92) pipe.

Note3) If 1 1/2" (38.10) pipe is not available on site, use 1 5/8" (41.28) pipe

Size of the pipe between the branch joint and the indoor unit

Make a selection according to outdoor unit capacity.

Indoor unit capacity		Pipe size (Outer Diameter)			
		Liquid pipe		Gas pipe	
MBH	kW	mm	inch	mm	inch
~ 20	~ 6.0	6.35	1/4	12.70	1/2
24 ~ 52	7.1 ~ 16.0	9.52	3/8	15.88	5/8
68 ~ 78	20.0 ~ 23.0	9.52	3/8	19.05	3/4
78 ~	23.0 ~	9.52	3/8	22.22	7/8

Branch joint

▶ Branch joint between outdoor units (C)

Classification	Model name	Specification	
		MBH	kW
Y-joint for outdoor unit (C)	V1ODBP14HP	461 and below	135.2 and below
	V1ODBP15HP	478 and over	140.2 and over

▶ First branch joint (D)

Make a selection according to outdoor unit capacity.

Classification	Model name	Outdoor unit capacity	
		MBH	kW
Y-joint (D)	V1IDBP02PR	Over 51 ~ 136 and below	Over 15.0 ~ 40.0 and below
	V1IDBP03PR	Over 136 ~ 154 and below	Over 40.0 ~ 45.0 and below
	V1IDBP04PR	Over 154 ~ 240 and below	Over 45.0 ~ 70.3 and below
	V1IDBP05PR	Over 240 ~ 336 and below	Over 70.3 ~ 98.4 and below
	V1IDBP06PR	Over 336 ~ 461 and below	Over 98.4 ~ 135.2 and below
	V1IDBP07PR	Over 461	Over 135.2

▶ Branch joint (E)

Select a branch joint according to the sum of indoor unit capacity which will be connected after the branch.

❋ However, if the size of the pipe between branch joints (E) is bigger than the size of the pipe connected to the outdoor unit (D), apply the pipe size (D).

1) Y-joint

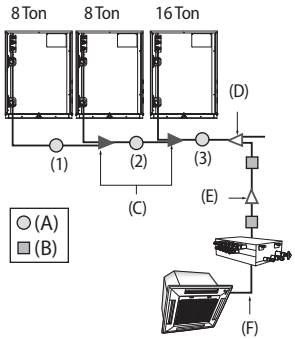
Classification	Model name	Specification	
		MBH	kW
Y-joint (E)	V1IDBP01PR	51 and below	15.0 and below
	V1IDBP02PR	Over 51 ~ 136 and below	Over 15.0 ~ 40.0 and below
	V1IDBP03PR	Over 136 ~ 154 and below	Over 40.0 ~ 45.0 and below
	V1IDBP04PR	Over 154 ~ 240 and below	Over 45.0 ~ 70.3 and below
	V1IDBP05PR	Over 240 ~ 336 and below	Over 70.3 ~ 98.4 and below
	V1IDBP06PR	Over 336 ~ 461 and below	Over 98.4 ~ 135.2 and below
	V1IDBP07PR	Over 461	Over 135.2

2) Distribution header

Classification	Model name	Specification	
		MBH	kW
Distribution header (E)	V1HDRK11PR	154 and below (for 4 rooms)	45.0 and below (for 4 rooms)
	V1HDRK12PR	240 and below (for 8 rooms)	70.3 and below (for 8 rooms)
	V1HDRK13PR	Over 240 (for 8 rooms)	Over 70.3 (for 8 rooms)

Refrigerant pipe installation

Heat recovery (VRC072/096/120/192/240W4M-4*)



Ex.) 32 Ton

Outdoor unit capacity (Ton)	No.	Pipe size (O.D)					
		Liquid pipe		Low pressure gas pipe		High pressure gas pipe	
		mm	inch	mm	inch	mm	inch
8	(1)	9.52	3/8	22.22	7/8	19.05	3/4
16	(2)	15.88	5/8	28.58	1 1/8	28.58	1 1/8
32	(3)	19.05	3/4	41.28	1 5/8	34.92	1 3/8

The pipe that connects between outdoor unit (1)(2) and the main pipe (3)

Select the size of the pipe according to the below table.

Outdoor unit capacity (Cooling)			* Maximum pipe length within 90m (295.3ft)						* Maximum pipe length over 90m (295.3ft)					
			Liquid pipe		Low pressure gas pipe		High pressure gas pipe		Liquid pipe		Low pressure gas pipe		High pressure gas pipe	
Ton	MBH	kW	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
6	72	22.1	9.52	3/8	19.05	3/4	15.88	5/8	12.7	1/2	19.05	3/4	15.88	5/8
8	96	28.1	9.52	3/8	22.22	7/8	19.05	3/4	12.7	1/2	22.22	7/8	19.05	3/4
10	120	35.2	12.7	1/2	28.58	1 1/8	22.22	7/8	15.88	5/8	28.58	1 1/8	22.22	7/8
12	144	42.2	12.7	1/2	28.58	1 1/8	22.22	7/8	15.88	5/8	28.58	1 1/8	22.22	7/8
14	168	49.2	15.88	5/8	28.58	1 1/8	22.22	7/8	19.05	3/4	28.58	1 1/8	22.22	7/8
16	192	56.3	15.88	5/8	28.58	1 1/8	28.58	1 1/8	19.05	3/4	28.58	1 1/8	28.58	1 1/8
18	216	63.3	15.88	5/8	28.58	1 1/8	28.58	1 1/8	19.05	3/4	28.58	1 1/8	28.58	1 1/8
20	240	70.3	15.88	5/8	28.58	1 1/8	28.58	1 1/8	19.05	3/4	28.58	1 1/8	28.58	1 1/8
22	264	77.4	19.05	3/4	34.92	1 3/8	28.58	1 1/8	22.22	7/8	34.92	1 3/8	28.58	1 1/8
24	288	84.4	19.05	3/4	34.92	1 3/8	28.58	1 1/8	22.22	7/8	34.92	1 3/8	28.58	1 1/8
26	312	91.4	19.05	3/4	34.92	1 3/8	28.58	1 1/8	22.22	7/8	34.92	1 3/8	28.58	1 1/8
28	336	98.4	19.05	3/4	34.92	1 3/8	28.58	1 1/8	22.22	7/8	34.92	1 3/8	28.58	1 1/8
30	360	105.5	19.05	3/4	41.28	1 5/8	34.92	1 3/8	22.22	7/8	41.28	1 5/8	34.92	1 3/8
32	384	112.5	19.05	3/4	41.28	1 5/8	34.92	1 3/8	22.22	7/8	41.28	1 5/8	34.92	1 3/8
34	408	119.5	19.05	3/4	41.28	1 5/8	34.92	1 3/8	22.22	7/8	41.28	1 5/8	34.92	1 3/8

*Maximum pipe length : The pipe length between an outdoor unit and the farthest indoor unit.

❋ For HR model, only increase the size of the liquid pipe If pipe length exceeds 90 m (295.3 ft)

❋ For the case that the diameter of the default pipe of an outdoor unit does not match that of the pipe installed on the site, a socket is provided by default together with the outdoor unit.

Size of the pipe between branch joints (B)

Select the pipe size according to the sum of indoor unit capacity which will be connected after the branch.

❋ However, if the size of the pipe between branch joints (B) is bigger than the size of the pipe connected to the outdoor unit (A), apply the pipe size (A).

Indoor unit capacity		Pipe size (O.D)					
		Liquid pipe		Low pressure gas pipe		High pressure gas pipe	
MBH	kW	mm	inch	mm	inch	mm	inch
~ 51	~ 15.0	9.52	3/8	15.88	5/8	15.88	5/8
51 ~ 76	15.0 ~ 22.4	9.52	3/8	19.05	3/4	15.88	5/8
76 ~ 96	22.4 ~ 28.1	9.52	3/8	22.22	7/8	19.05	3/4
96 ~ 115	28.1 ~ 33.6	12.70	1/2	28.58	1 1/8	19.05	3/4
115 ~ 154	33.6 ~ 45.0	12.70	1/2	28.58	1 1/8	22.22	7/8
154 ~ 172	45.0 ~ 50.4	15.88	5/8	28.58	1 1/8	22.22	7/8
172 ~ 240	50.4 ~ 70.3	15.88	5/8	28.58	1 1/8	28.58	1 1/8
240 ~ 336	70.3 ~ 98.4	19.05	3/4	34.92	1 3/8	28.58	1 1/8
336 ~ 360	98.4 ~ 105.5	19.05	3/4	41.28	1 5/8	28.58	1 1/8
360 ~ 461	105.5 ~ 135.2	19.05	3/4	41.28	1 5/8	34.92	1 3/8
461 ~ 577	135.2 ~ 169.0	19.05	3/4	41.28	1 5/8	34.92	1 3/8
577 ~	169.0 ~	22.22	7/8	53.98	2 1/8	41.28	1 5/8

Size of the pipe between the branch joint and indoor unit

Make a selection according to outdoor unit capacity.

Indoor unit capacity		Pipe size (O.D)			
		Liquid pipe		Gas pipe	
MBH	kW	mm	inch	mm	inch
~ 20	~6.0	6.35	1/4	12.70	1/2
24 ~ 52	7.1~16.0	9.52	3/8	15.88	5/8
68 ~ 78	20.0 ~ 23.0	9.52	3/8	19.05	3/4
78 ~ 96	23.0 ~ 29.0	9.52	3/8	22.22	7/8

Refrigerant pipe installation

Branch joint

▶ Branch joint between outdoor units (C)

Classification	Model name	Specification	
		MBH	kW
Liquid/Low pressure Y-joint (C)	V1ODBP14HP	461 and below	135.2 and below
	V1ODBP15HP	478 and over	140.2 and over
High pressure Y-joint (C)	V1ODBP14HR	461 and below	135.2 and below
	V1ODBP15HR	478 and over	140.2 and over

▶ First branch joint (D)

Make a selection according to outdoor unit capacity.

Classification	Model name	Outdoor unit capacity	
		MBH	kW
Liquid/Low pressure Y-joint (D)	V1IDBP02PR	Over 51 ~ 136 and below	Over 15.0 ~ 40.0 and below
	V1IDBP03PR	Over 136 ~ 154 and below	Over 40.0 ~ 45.0 and below
	V1IDBP04PR	Over 154 ~ 240 and below	Over 45.0 ~ 70.3 and below
	V1IDBP05PR	Over 240 ~ 336 and below	Over 70.3 ~ 98.4 and below
	V1IDBP06PR	Over 336 ~ 461 and below	Over 98.4 ~ 135.2 and below
	V1IDBP07PR	Over 461	Over 135.2
High pressure Y-joint (D)	V1IDBP08HR	76 and below	22.4 and below
	V1IDBP09HR	Over 76 ~ 240 and below	Over 22.4 ~ 70.3 and below
	V1IDBP10HR	Over 240 ~ 461 and below	Over 70.3 ~ 135.2 and below
	V1IDBP07HR	Over 461	Over 135.2

▶ Branch joint (E)

Select a branch joint according to the sum of indoor unit capacity which will be connected after the branch.

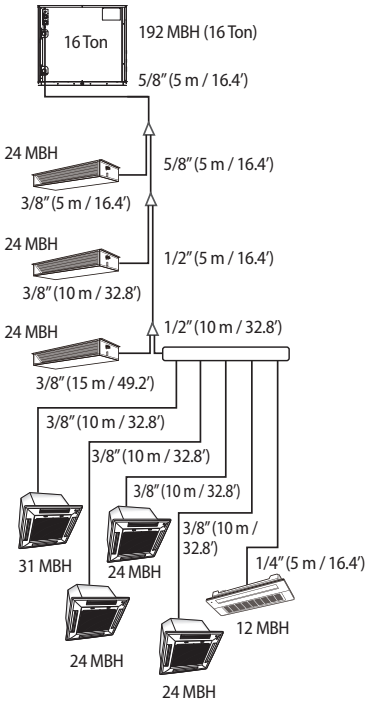
❋ However, if the size of the pipe between branch joints (E) is bigger than the size of the pipe connected to the outdoor unit (D), apply the pipe size (D).

• Y-joint

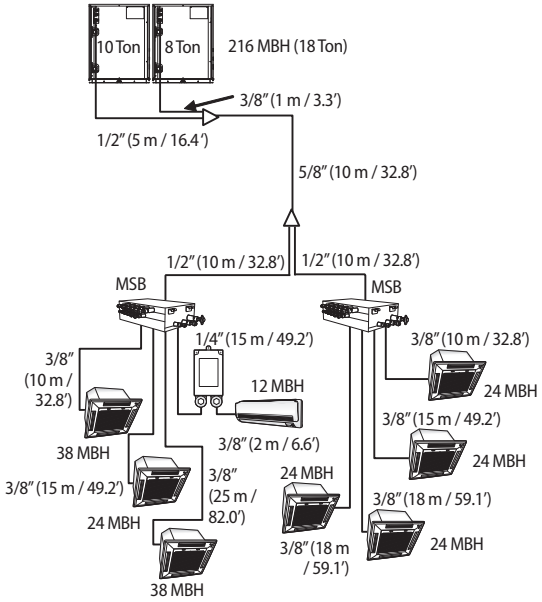
Classification	Model name	Specification	
		MBH	kW
Y-joint (E)	V1IDBP01PR	51 and below	15.0 and below
	V1IDBP02PR	Over 51 ~ 136 and below	Over 15.0 ~ 40.0 and below
	V1IDBP03PR	Over 136 ~ 154 and below	Over 40.0 ~ 45.0 and below
	V1IDBP04PR	Over 154 ~ 240 and below	Over 45.0 ~ 70.3 and below
	V1IDBP05PR	Over 240 ~ 336 and below	Over 70.3 ~ 98.4 and below
	V1IDBP06PR	Over 336 ~ 461 and below	Over 98.4 ~ 135.2 and below
	V1IDBP07PR	Over 461	Over 135.2
Y-joint (E) (Only H/R)	V1IDBP08HR	76 and below	22.4 and below
	V1IDBP09HR	Over 76 ~ 240 and below	Over 22.4 ~ 70.3 and below
	V1IDBP10HR	Over 240 ~ 461 and below	Over 70.3 ~ 135.2 and below
	V1IDBP07HR	Over 461	Over 135.2

Additional refrigerant

Heat pump (VRC072/096/120/192/240W4M-4*)



Heat recovery (VRC072/096/120/192/240W4M-4*)



Refrigerant pipe installation

▶ Basic amount of refrigerant inside the outdoor unit (kg)

- Amount of additional refrigerant has to be calculated based on the sum of all liquid pipe lengths.

Classification	VRC072W4M-4*	VRC096W4M-4*	VRC120W4M-4*	VRC192W4M-4*	VRC240W4M-4*
Basic amount [kg (lb)]	5.5 (12.1)	5.8 (12.8)	6.0 (13.2)	9.8 (21.6)	11 (24.3)

▶ Amount of additional refrigerant depends on the pipe size (ⓐ)

- Amount of additional refrigerant has to be calculated based on the sum of all liquid pipe length.

Size of liquid pipe [mm (inch)]	6.35 (1/4)	9.52 (3/8)	12.70 (1/2)	15.88 (5/8)	19.05 (3/4)	22.22 (7/8)	25.40 (1)
Additional amount [kg/m (lb/ft)]	0.02 (0.013)	0.06 (0.04)	0.125 (0.084)	0.18 (0.121)	0.27 (0.181)	0.35 (0.235)	0.53 (0.356)

- For the indoor unit already connected to EEV kit, the additional refrigerant charging is 0.01 kg (0.0067 lb) per meter regardless of the pipe size.

Refrigerant pipe installation

▶ Amount of additional refrigerant for each indoor unit (ⓑ)

Unit : lb (kg)

Capacity Index (MBH)	5	6	7	9	12	15	18	20	24	27	28	30	32	36	42	48	54	60	72	76	96	144
1way cassette (VOWC***S4-4P)	0.33 (0.15)		0.33 (0.15)	0.55 (0.25)	0.55 (0.25)	0.71 (0.32)	0.71 (0.32)		0.71 (0.32)													
4way cassette S (600x600) (V22C***S4-4P)	0.64 (0.29)		0.64 (0.29)	0.64 (0.29)	0.64 (0.29)		0.82 (0.37)	0.82 (0.37)														
4way cassette S (V33C***S4-4P)		1.61 (0.73)		1.61 (0.73)	1.61 (0.73)		1.61 (0.73)		1.61 (0.73)			1.94 (0.88)		1.94 (0.88)		1.94 (0.88)						
360 cassette (V36C***S4-4P)				0.99 (0.45)	0.99 (0.45)		0.99 (0.45)		0.99 (0.45)			1.52 (0.69)		1.52 (0.69)		1.52 (0.69)						
LSP duct (VLOC***S4-4P)			0.77 (0.35)	0.77 (0.35)	0.77 (0.35)		0.99 (0.45)		0.99 (0.45)													
MSP duct (VMDC***S4-4P)		0.99 (0.45)	0.99 (0.45)	0.99 (0.45)	0.99 (0.45)	0.99 (0.45)	1.50 (0.68)															
HSP duct (VHIC***S4-4P)									1.50 (0.68)	1.50 (0.68)		1.50 (0.68)		1.85 (0.84)		1.85 (0.84)	2.01 (0.91)			2.60 (1.18)	2.60 (1.18)	
OAP duct (VOSC***S4-4P)																			2.60 (1.18)		2.60 (1.18)	
Floor Standing (VSCC***S4-4P, VSEC***S4-4P)		0.26 (0.12)		0.49 (0.22)	0.49 (0.22)		0.71 (0.32)		0.71 (0.32)													
Ceiling (VUCC***S4-4P, VBCC***S4-4P)							0.86 (0.39)		0.86 (0.39)					1.23 (0.56)		2.09 (0.95)						
MPAHU(V-AHU) (VVCC***S4-4P)					0.73 (0.33)		1.10 (0.50)		1.10 (0.50)			1.83 (0.83)		1.94 (0.88)		2.60 (1.18)	2.80 (1.27)	3.73 (1.69)	3.73 (1.69)			
Wall mounted (with EEV) (VWMC***S4-4P)	0.51 (0.23)		0.51 (0.23)	0.71 (0.32)	0.71 (0.32)	1.06 (0.48)	1.06 (0.48)		1.06 (0.48)		1.41 (0.64)		1.50 (0.68)									
Hydro unit HE (VHEC***S4-4P)														1.32 (0.6)		1.32 (0.6)					1.54 (0.7)	2.65 (1.2)
Hydro unit HT (VHTC***S4-4P)																1.32 (0.6)			1.32 (0.6)			
MSB (V1MSBB**HR)	1.10 (0.50)																					

▶ If there is no additional refrigerant value for the indoor unit in the above table, refer to the indoor unit installation manual.

▶ Additional refrigerant charging of MSB is 0.5 kg (1.1 lb) for every MSB kit.

▶ If AHU kit is included among the indoor units, add 0.018 kg (0.04 lb) of refrigerant for every 1 MBH of AHU capacity.

▶ Method to calculate the total amount of additional refrigerant
- Amount of additional refrigerant depends on the pipe length (ⓐ)
- Amount of additional refrigerant for each indoor unit (ⓑ) = Σ(Amount of additional refrigerant for each connected indoor unit) ❊ Refer to the table
- Total amount of additional refrigerant = ⓐ+ⓑ

❊ Sum of total amount of additional refrigerant and the basic amount of refrigerant should not exceed 100 kg (220 lb). If the refrigerant exceeds 100 kg (220 lb), separate the module so that the weight of the refrigerant doesn't exceed 100 kg (220 lb).

Ex.) For VRC192W4M-4*, basic amount of refrigerant is 9.8 kg (21.6 lb), therefore total amount of additional refrigerant (ⓐ+ⓑ) should not exceed 90.2 kg (198.9 lb).

▶ Example of refrigerant calculation for Heat pump System

Classification	Size of liquid pipe [mm (inch)]	Length [m (ft)]	Unit amount of refrigerant [kg/m (lb/ft)]	Amount of additional refrigerant [kg (lb)]	Total amount of additional refrigerant [kg (lb)]
		①	②	①×②	Σ(①×②)
Liquid pipe (ⓐ)	6.35 (1/4")	5 (16.4)	0.02 (0.013)	0.1 (0.22)	ⓐ 7.975 (17.58)
	9.52 (3/8")	70 (229.7)	0.06 (0.040)	4.2 (9.26)	
	12.70 (1/2")	15 (49.2)	0.125 (0.084)	1.875 (4.13)	
	15.88 (5/8")	10 (32.8)	0.18 (0.121)	1.8 (3.97)	

Classification	Model name of indoor unit	Number of units	Unit amount of refrigerant [kg/EA (lb/EA)]	Amount of additional refrigerant [kg (lb)]	Total amount of additional refrigerant [kg (lb)]
		①	②	①×②	Σ(①×②)
Indoor unit (ⓑ)	4way cassette (V33C018S4-4P)	4	0.45 (0.99)	1.8 (3.96)	ⓑ 3.30 (7.26)
	LSP duct (VLOC024S4-4P)	2	0.45 (0.99)	0.90 (1.98)	
	LSP duct (VLOC012S4-4P)	1	0.35 (0.77)	0.35 (0.77)	
	1way cassette (VOWC012S4-4P)	1	0.25 (0.55)	0.25 (0.55)	

- Total amount of refrigerant (ⓐ+ⓑ) = 7.975 kg (17.58 lb) + 3.30 kg (7.26 lb)=11.275 kg (24.86 lb)

▶ Example of refrigerant calculation for Heat recovery System

Classification	Size of liquid pipe [mm (inch)]	Length [m (ft)]	Unit amount of refrigerant [kg/m (lb/ft)]	Amount of additional refrigerant [kg (lb)]	Total amount of additional refrigerant [kg (lb)]
		①	②	①×②	Σ(①×②)
Liquid pipe (ⓐ)	6.35 (1/4")	15 (49.2)	0.02 (0.013)	0.3 (0.64)	ⓐ 11.965 (26.24)
	9.52 (3/8")	112 (367.5)	0.06 (0.040)	6.72 (14.70)	
	12.70 (1/2")	25 (82.0)	0.125 (0.084)	3.125 (6.89)	
	15.88 (5/8")	10 (32.8)	0.18 (0.121)	1.8 (3.97)	
	6.35 (1/4") (EEV Kit ~ indoor unit)	2 (6.6)	0.01 (0.0067)	0.02 (0.04)	

Refrigerant pipe installation

Classification	Model name of indoor unit	Number of units	Unit amount of refrigerant [kg/EA (lb/EA)]	Amount of additional refrigerant [kg (lb)]	Total amount of additional refrigerant [kg (lb)]
		①	②	①×②	Σ(①×②)
Indoor unit (ⓑ)	4way cassette (V33C024S4-4P)	4	0.45 (0.99)	1.8 (3.96)	ⓑ 5.10 (11.23)
	360 cassette (V33C036S4-4P)	3	0.69 (1.52)	2.07 (4.56)	
	Wall mounted (with EEV) (VWMC005S4-4P)	1	0.23 (0.51)	0.23 (0.51)	
	MSB	2	0.5 (1.1)	1 (2.21)	

- Total amount of refrigerant (ⓐ+ⓑ) = 11.965 kg (26.24 lb) + 5.10 kg (11.23 lb) = 17.065 kg (37.47 lb)

Temper grade and minimum thickness of the refrigerant pipe

Outer diameter		Minimum thickness		Temper grade
mm	inch	mm	inch	
6.35	1/4	0.70	0.028	Annealed
9.52	3/8	0.70	0.028	
12.70	1/2	0.80	0.031	
15.88	5/8	1.00	0.039	
19.05	3/4	0.90	0.035	Drawn
22.22	7/8	0.90	0.035	
25.40	1	1.00	0.039	
28.58	1 1/8	1.10	0.043	
31.75	1 1/4	1.10	0.043	
34.92	1 3/8	1.20	0.048	
38.10	1 1/2	1.35	0.053	
41.28	1 5/8	1.43	0.056	
44.45	1 3/4	1.60	0.063	
50.80	2	2.00	0.079	
53.98	2 1/8	2.10	0.083	

CAUTION

- For pipes larger than 3/4" (19.05 mm), drawn type (C1220T-1/2H or C1220T-H) type copper pipe must be used. If a annealed type (C1220T-O) copper pipe is used, pipe may break due to its low pressure resistance and cause personal injury.

Keeping refrigerant pipe

To prevent foreign materials or water from entering the pipe, storing method and sealing method (especially during installation)is very important. Apply correct sealing method depending on the environment.

Exposure place	Exposure time	Sealing type
Outdoor	Longer than one month	Pipe pinch
	Shorter than one month	Taping
Indoor	-	Taping

Refrigerant pipe welding and safety information

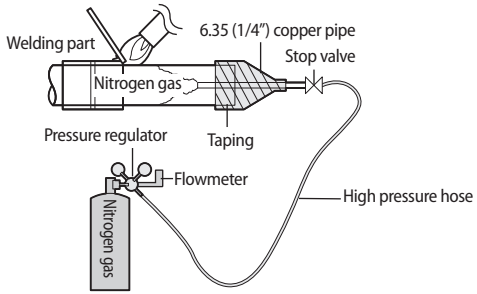
CAUTION

Important information for refrigerant pipe work

- Make sure there is no moisture inside the pipe.
- Make sure there are no foreign substances and impurities in the pipe.
- Make sure there is no leakage.
- Make sure to follow the instruction when welding or storing the pipe.

Nitrogen flushing welding

- ▶ When welding the refrigerant pipes, flush them with nitrogen gas as shown in the picture.
- ▶ If you do not perform nitrogen flushing when welding the pipes, oxide may form inside the pipe. It can cause the damage of the important parts such as compressor and valves etc.
- ▶ Adjust the flow rate of the nitrogen flushing with a pressure regulator to maintain 0.05 m^3/h (0.54 ft^2/h) or less.



Direction of the pipe when welding

- ▶ Direction of the pipe should be headed downward or in a sideways when welding.
- ▶ Avoid welding the pipe with pipe direction heading upward.

CAUTION

- When you test gas leakage after welding the pipes, use a designated solution for gas leakage detection. If you use the detection solution that includes sulfuric ingredient, it may cause corrosion to the pipes.

Refrigerant pipe installation

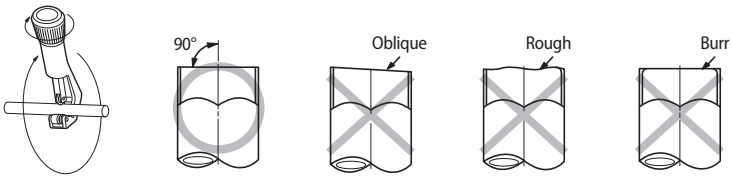
Cutting or flaring the pipes

1. Make sure that you prepared the required tools.

▶ Pipe cutter, Deburring tool, flaring tool and pipe holder, etc.

2. If you want to shorten the pipe, cut it with a pipe cutter ensuring that the cut edge remains at 90° with the side of the pipe.

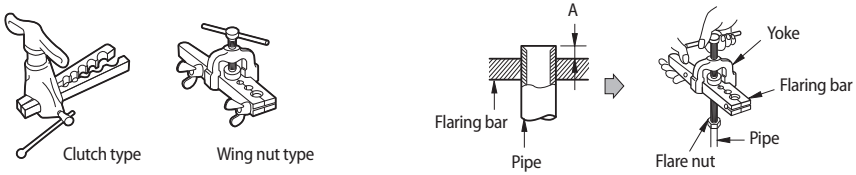
▶ Refer to below illustrations for correct and incorrect examples of cut edges.

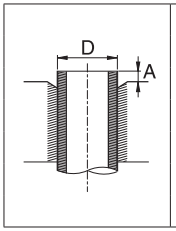


3. To prevent a gas leak, remove all burrs at the cut edge of the pipe using a Deburring tool.

4. Carry out flaring work using flaring tool as shown below.

[Flaring tools]





Pipe diameter [D, mm (inch)]	Depth of flaring part [A, mm (inch)]		
	Using flaring tool for R-410A	Using conventional flaring tool	
		Clutch type	Wing nut type
6.35 (1/4)	0 ~ 0.5 (0 ~ 0.02)	1.0 ~ 1.5 (0.04 ~ 0.06)	1.5 ~ 2.0 (0.06 ~ 0.08)
9.52 (3/8)	0 ~ 0.5 (0 ~ 0.02)	1.0 ~ 1.5 (0.04 ~ 0.06)	1.5 ~ 2.0 (0.06 ~ 0.08)
12.70 (1/2)	0 ~ 0.5 (0 ~ 0.02)	1.0 ~ 1.5 (0.04 ~ 0.06)	1.5 ~ 2.0 (0.06 ~ 0.08)
15.88 (5/8)	0 ~ 0.5 (0 ~ 0.02)	1.0 ~ 1.5 (0.04 ~ 0.06)	1.5 ~ 2.0 (0.06 ~ 0.08)

5. Check that you flared the pipe correctly.

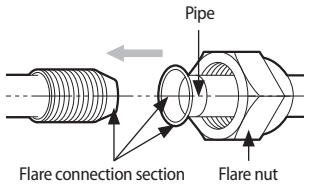
▶ Refer to below illustrations for correct and incorrect examples of flared pipe.

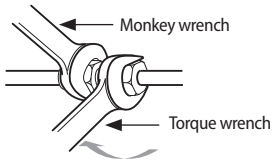
CAUTION

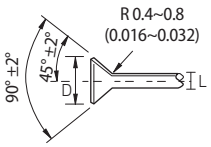
- If foreign matters or burrs are not removed after cutting pipe, refrigerant gas may leak.
- If foreign matters enter inside the pipe, important interior parts of the unit may get damaged or product efficiency will be reduced. So, the direction of pipe should be downward during pipe cutting or flaring.

Connecting the flared pipes

- ▶ Check if the flaring is properly done according to the standard size.
- ▶ Align the center of the piping and tighten the flare nut with your hands. Then, tighten the flare nut with torque wrench in a direction of the arrow indicated in below illustration.
- ▶ Make sure to use ester oil to coat the flare connection section.





Outer diameter (L)		Torque (D)		Flare dimension		Flare shape [mm(inch)]
mm	inch	N·m	lbf·ft	mm	inch	
6.35	1/4	14 ~ 18	10.3 ~ 13.3	8.7 ~ 9.1	0.34 ~ 0.36	
9.52	3/8	34 ~ 42	25.1 ~ 31.0	12.8 ~ 13.2	0.50 ~ 0.52	
12.7	1/2	49 ~ 61	36.1 ~ 45.0	16.2 ~ 16.6	0.64 ~ 0.65	
15.88	5/8	68 ~ 82	50.2 ~ 60.5	19.3 ~ 19.7	0.76 ~ 0.78	

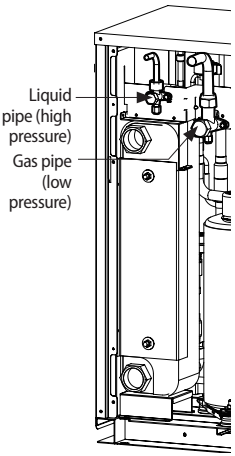
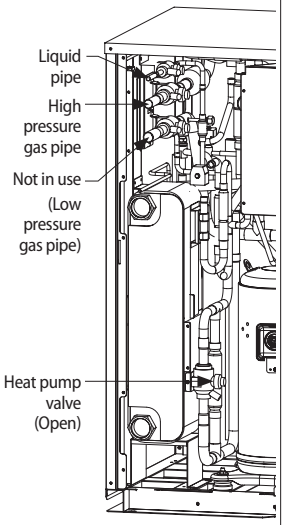
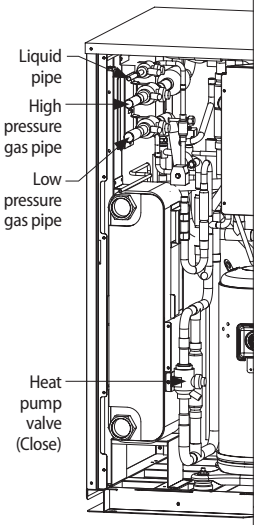
CAUTION

- Blowing Nitrogen gas should be done when welding the pipe.
- Make sure to use the provided flare nut.
- Make sure that there are no cracks or twisted part when you need to bend the pipe.
- Do not fasten the flare nut with excessive strength.
- R-410A is a high pressure refrigerant and there is a risk of refrigerant leakage if the flare connection is not coated with ester oil. Therefore, apply ester oil to coat the flare connection area.

Refrigerant pipe installation

Pipe installation for an outdoor unit

1. The outdoor unit of VPC***W4M-4P is the non-modular Heat pump exclusive system.
2. The outdoor unit of VRC***W4M-4* is used for both modular Heat pump and Heat recovery systems. Connect the liquid and gas pipes to the outdoor unit as shown in the figure.
   - For Heat pump System, connect liquid and gas pipes to an indoor unit.
   - For Heat recovery System, connect liquid and high/low pressure gas pipes to a MSB. Close the internal heat pump valve and set the following option switch.
   - For module installation, make sure that each heat pump valve and the following option switch setting is adjusted according to each purpose. (When installing outdoor units in module, E573 error may occur when settings are different between outdoor units.)

Classification		VPC038/048/055W4M-4P	VRC072/096/120/192/240W4M-4*	
		H/P system	H/P system	H/R system
Service valve				
Heat pump valve		-	Open (Factory default)	Close (Set during installation)
Option switch	PBA Key mode (K1+K2)	-	Set as "ht 00" (Factoty default)	Set as "ht 01" (Set during installation)

✻ Refer to "Setting outdoor unit option switches" on page 86~87 for setting option switches.

Caution for welding the pipe to an outdoor unit

CAUTION

- When welding the pipe, the unit may get damaged by the heat and flame from welding. Use a flame proofing cloth to protect the unit from a brazing fire or flame.
- The O-ring and Teflon packing inside service valve may get damaged by the heat from welding. Wrap the bottom side of the service valve with a wet cloth and weld it. Also, water dripping from the wet cloth may interrupt the welding. Make sure the water does not drip from the wet cloth.
- Make sure that connected pipes does not interrupt each other or make contact with the product. If they contact each other or contact with the outdoor unit, vibration will occur and it may cause damage to the pipes.
- When removing the sealed pipe on the bottom side of the service valve, cut it with a pipe cutter first and then start the welding. When the sealed pipe is welded without cutting, you may get injured by the refrigerant within the pipe.

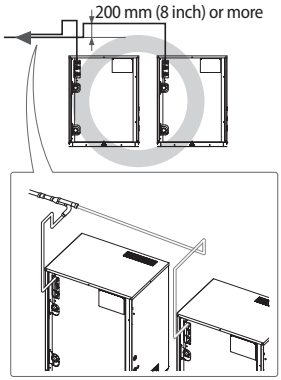
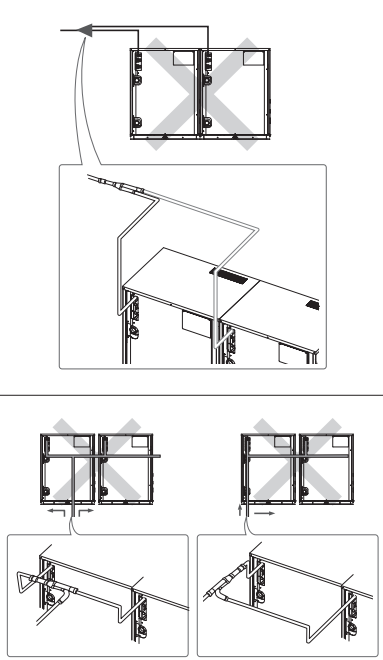
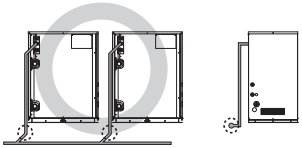
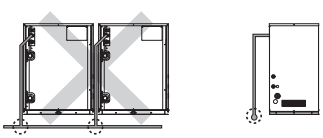
▶ The outdoor unit of VRC072/096/120/192/240W4M-4* is a modular product. Connect the refrigerant pipes between outdoor units as shown in the figure.

▶ Connect refrigerant pipes between outdoor units.

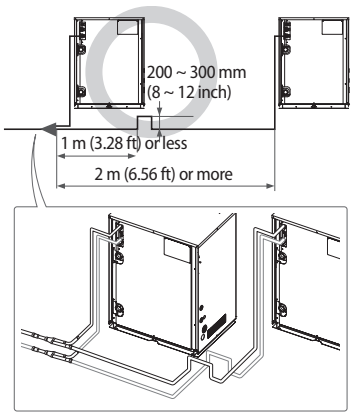
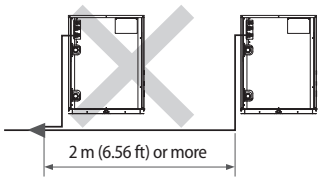
▶ To connect pipes between outdoor units, branch joints (that needs to be purchased separate) must be installed.

❋ **For optimal distribution of the refrigerant, you must use Y-joint for connecting outdoor units. (Do not use T-joint)**

▶ When outdoor units are installed in module, there are no restrictions on the order of installation.

Caution	Correct installation	Incorrect installation
When refrigerant pipe is installed at higher level than the pipe connection part of the outdoor unit, you must install a trap at the gas pipe.		
Branch joint between outdoor units must be installed horizontally.		

Refrigerant pipe installation

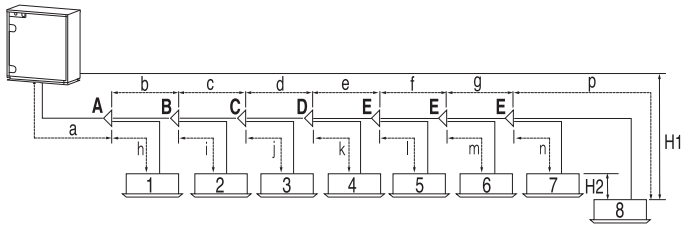
Caution	Correct installation	Incorrect installation
When the piping length between outdoor unit and the branch joint exceeds 2 m (6.56 ft), install a vertical trap as show in the figure.		

Allowable length of the refrigerant pipe and the installation examples

Heat pump (VPC038/048/055W4M-4P)

1. Connection by Y-joint

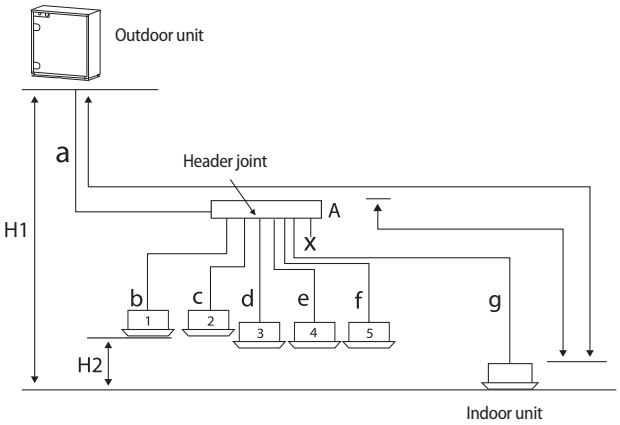
Outdoor unit



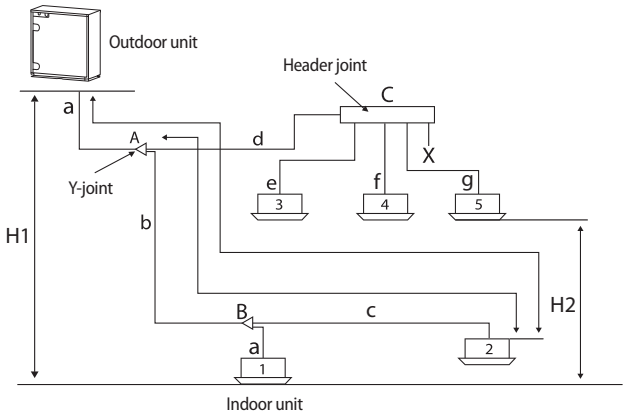
Classification			Y-joint connection
Maximum allowable length of pipe	Outdoor unit ~ Indoor units	Actual Length	The distance between the outdoor unit and the farthest indoor unit ≤ 75 m (246′) Ex) 8 indoor units a+b+c+d+e+f+g+p≤ 75 m (246′)
		Equivalent length	The distance between an outdoor unit and the farthest indoor unit ≤ 90 m (295′)
		Main pipe length	The main pipe(a) from the outdoor unit to the first Y-joint should be less than 50 m (164′)
		Total length	The sum of the total length of pipes should be less then 200 m (656′)
Maximum allowable height	Outdoor unit ~ Indoor units	Height	H1: The difference of height between an outdoor unit and indoor unit < 30 m (98′)
		Height	H2: The difference of height between indoor units ≤ 15 m (49′)
Maximum allowable length after Y-joint		Actual Length	The distance between the first Y-joint and the farthest indoor unit ≤ 40 m (131′) Ex) 8 indoor units b+c+d+e+f+g+p≤ 40 m (131′)

Refrigerant pipe installation

2. Connection by header joint



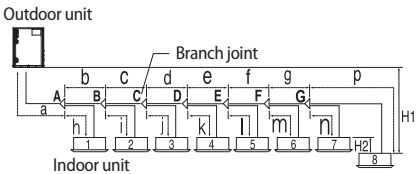
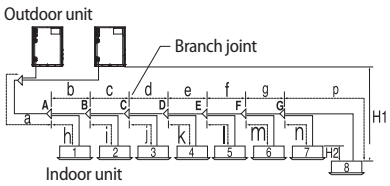
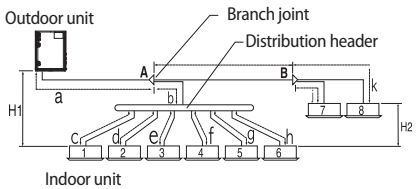
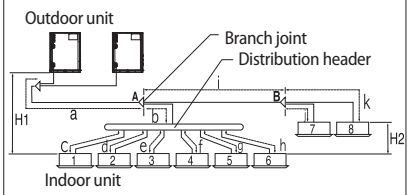
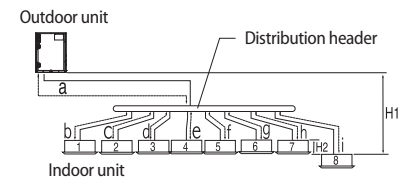
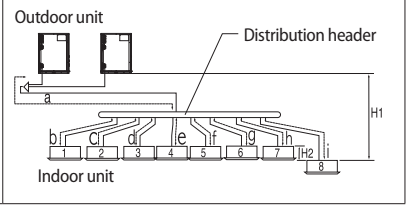
3. Connection by Y-joint/header joint



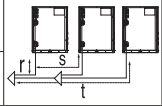
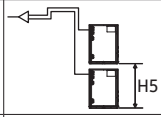
Classification			Header joint connection	Y-joint / header joint connection
Maximum allowable length of pipe	Outdoor unit ~ Indoor units	Actual Length	The distance between an outdoor unit and the farthest indoor unit ≤ 75 m (246')	
			Ex) 8 indoor units a+g≤ 75 m (246')	Ex) 8 indoor units a+b+c ≤ 75 m (246')
		Equivalent length	The distance between an outdoor unit and the farthest indoor unit ≤ 90 m (295')	
		Main pipe length	The main pipe(a) from the outdoor unit to the first Y-joint should be less than 50 m (164').	
		Total length	The sum of total length of pipes should be less then 200 m (656').	

Classification			Header joint connection	Y-joint / header joint connection
Maximum allowable height	Outdoor unit ~ Indoor units	Height	H1: The difference in height between an outdoor unit and indoor unit ≤ 30 m (98')	
		Height	H2: The difference in height between indoor units ≤ 15 m (49')	
Maximum allowable length after Y-joint		Actual Length	The distance between the header joint and the indoor unit ≤ 40 m (131') Ex) b, c ~ f, g ≤ 40 m (131')	The distance between the first Y-joint and the farthest indoor unit ≤ 40 m (131') Ex) 8 indoor units b+c, d+g ≤ 40 m (131')

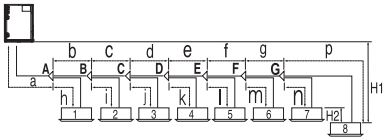
Heat pump (VRC072/096/120/192/240W4M-4*)

Classification	Single Installation	Module installation
Installing only with Y-joint		
Installing with Y-joint and distribution header		
Installing only with distribution header		

Refrigerant pipe installation

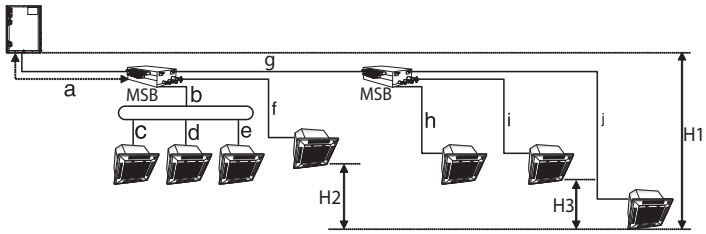
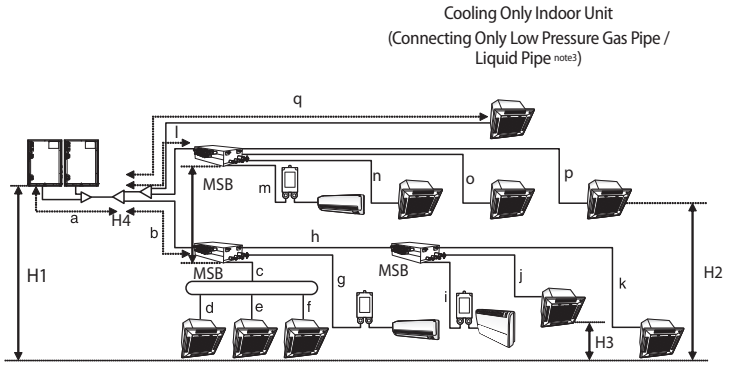
<table>
<tr><th colspan="5">Classification</th><th colspan="2">Example</th><th>Remarks</th></tr>
<tr><td rowspan="9">Maximum allowable pipe length</td><td rowspan="6">Outdoor unit ~ Indoor unit</td><td rowspan="3">Actual pipe length (Equivalent length)</td><td rowspan="3">170 m (558')or less [190 m (623') or less]</td><td>Installing only with Y-joint</td><td>a+b+c+d+e+f+g+p ≤ 170 m (190 m) / 558'(623')</td><td rowspan="3">Equivalent length
• Y-joint: 0.5 m (1.64')
• Distribution header: 1 m (3.28')</td></tr>
<tr><td>Installing with Y-joint and distribution header</td><td>a+b+h ≤ 170 (190) m / 558'(623'), a+i+k ≤ 170 (190) m / 558'(623')</td></tr>
<tr><td>Installing only with distribution header</td><td>a+i ≤ 170 (190) m / 558' (623')</td></tr>
<tr><td rowspan="3">Total length of pipe (m)</td><td rowspan="3">500 m (1640') or less</td><td>Installing only with Y-joint</td><td>a+b+c+d+e+f+g+p+h+i+j+k+l+m+n ≤ 500 m (1640')</td><td></td></tr>
<tr><td>Installing with Y-joint and distribution header</td><td>a+b+c+d+e+f+g+h+i+j+k ≤ 500 m (1640')</td><td></td></tr>
<tr><td>Installing only with distribution header</td><td>a+b+c+d+e+f+g+h+i ≤ 500 m (1640')</td><td></td></tr>
<tr><td rowspan="3">Outdoor unit ~ Outdoor unit (Module installation)</td><td>Pipe length</td><td>10 m (33') or less</td><td colspan="2">r ≤ 10 m (33'), s ≤ 10 m (33'), t ≤ 10 m (33')</td><td rowspan="2">  </td></tr>
<tr><td>Equivalent length</td><td>13 m (43') or less</td><td colspan="2">r ≤ 13 m (43'), s ≤ 13 m (43'), t ≤ 13 m (43')</td></tr>
<tr><td>Height difference</td><td>1.5 m (4.9') or less</td><td colspan="2">H5 ≤ 1.5 m (4.9')</td><td>  </td></tr>
<tr><td rowspan="2">Maximum allowable height difference</td><td>Outdoor unit ~ Indoor unit</td><td colspan="2">50/40 m (164'/131') Note 2)</td><td colspan="2">H1 ≤ 50/40 m (164'/131')</td><td></td></tr>
<tr><td>Indoor unit ~ Indoor unit</td><td colspan="2">50 m(164') or less</td><td colspan="2">H2 ≤ 50 m(164')</td><td></td></tr>
<tr><td rowspan="2">Maximum allowable length after branch joint</td><td rowspan="2">First branch joint ~ Farthest Indoor unit</td><td rowspan="2">Pipe length</td><td>45 m (148') or less</td><td colspan="2">b+c+d+e+f+g+p ≤ 45 m (148'), i ≤ 45 m (148')</td><td></td></tr>
<tr><td>45 m (148') ~ 90 m (295') note 1)</td><td colspan="2">Required conditions must be satisfied</td><td></td></tr>
</table>

Note 1) Required condition

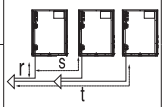
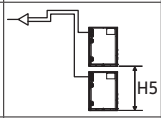
Classification	Condition	Example
First branch joint ~ Farthest Indoor unit	45 m (148') ≤ b+c+d+e+f+g+p ≤ 90 m (295'): Size of the branch pipe (b, c, d, e, f, g) must be increased by 1 grade	
Total length of extended pipe	If the size of the main pipe (pipe that connects between the outdoor unit ~ first branch joint) was not increased by 1 grade: a+(b+c+d+e+f+g)×2 +h+i+j+k+l+m+n+p ≤ 500 m (1640')	
	If the size of the main pipe (pipe that connects between the outdoor unit ~ first branch joint) was increased by 1 grade: (a+b+c+d+e+f+g)×2 +h+i+j+k+l+m+n+p ≤ 500 m (1640')	
Each Y-joint ~ Each indoor unit	h, i, j, … p ≤ 45 m (148')	
Difference between the distance of the outdoor unit to the farthest indoor unit and nearest indoor unit ≤ 45 m (148') (a+b+c+d+e+f+g+p)-(a+h) ≤ 45 m (148')		

Note 2) When indoor unit is located at higher level than outdoor unit, allowable height difference is 40 m (131'), but when the indoor unit is located at lower level than outdoor unit, allowable height difference is 50 m (164').

Heat recovery (VRC072/096/120/192/240W4M-4*)

Classification	Installation examples
Installing with MSB only	
Installing with MSB and Y-joint	

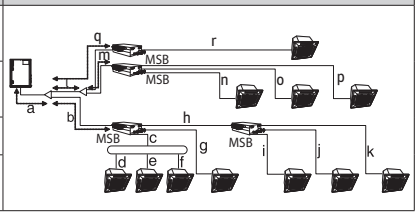
Refrigerant pipe installation

<table>
<tr><th colspan="4">Classification</th><th colspan="2">Example</th><th>Remarks</th></tr>
<tr><td rowspan="11">Maximum allowable pipe length</td><td rowspan="3">Outdoor unit ~ Indoor unit</td><td rowspan="2">Actual pipe length (Equivalent length)</td><td rowspan="2">170 m (558') or less [190 m (623') or less]</td><td>Installing only with MSB</td><td>a+g+j ≤ 170 m (190 m)/558'(623')</td><td rowspan="2">Equivalent length
• Y-joint: 0.5 m(1.64')
• Distribution header: 1 m(3.28')
• MSB: 1 m(3.28')</td></tr>
<tr><td>Installing with MSB and Y-joint</td><td>a+b+h+k ≤ 170 m (190 m)/558'(623')</td></tr>
<tr><td rowspan="2">Total length of pipe</td><td rowspan="2">500 m(1640') or less</td><td>Installing only with MSB</td><td>a+b+c+d+e+f+g+h+i+j ≤ 500 m(1640')</td><td></td></tr>
<tr><td>Installing with MSB and Y-joint</td><td>a+b+c+d+e+f+g+p+h+i+j+k+m+n+o+p+q ≤ 500 m(1640')</td><td></td></tr>
<tr><td rowspan="2">Outdoor unit ~ Outdoor unit (Module installation)</td><td>Pipe length</td><td>10 m (33') or less</td><td colspan="2">r ≤ 10 m (33'), s ≤ 10 m (33'), t ≤ 10 m (33')</td><td rowspan="2">  </td></tr>
<tr><td>Equivalent length</td><td>13 m (43') or less</td><td colspan="2">r ≤ 13 m (43'), s ≤ 13 m (43'), t ≤ 13 m (43')</td></tr>
<tr><td>Height difference</td><td>1.5 m (4.9') or less</td><td colspan="2">H5 ≤ 1.5 m (4.9')</td><td>  </td></tr>
<tr><td rowspan="2">MSB ~ Indoor unit</td><td rowspan="2">Pipe length</td><td rowspan="2">45 m(148') or less</td><td>Installing only with MSB</td><td>b+c ≤ 45 m(148'), b+d ≤ 45 m(148'), b+e ≤ 45 m(148'), f≤ 45 m(148'), g+h ≤ 45 m(148'), g+i ≤ 45 m(148'), g+j ≤ 45 m(148')</td><td></td></tr>
<tr><td>Installing with MSB and Y-joint</td><td>c+d ≤ 45 m(148'), c+e ≤ 45 m(148'), c+f ≤ 45 m(148'), g ≤ 45 m(148'), h+i ≤ 45 m(148'), h+j ≤ 45 m(148'), h+k ≤ 45 m,(148') m ≤ 45 m(148'), n ≤ 45 m(148'), o ≤ 45 m(148'), p ≤ 45 m(148')</td><td></td></tr>
<tr><td rowspan="5">Maximum allowable height difference</td><td>Outdoor unit ~ Indoor unit</td><td rowspan="4">Pipe length</td><td>50/40 (164'/131') Note 1)</td><td colspan="2">H1 ≤ 50m/40m(164'/131')</td><td></td></tr>
<tr><td>Indoor unit ~ Indoor unit</td><td>40 m(131') or less</td><td colspan="2">H2 ≤ 40 m(131')</td><td></td></tr>
<tr><td>Indoor unit ~ Indoor unit (in one MSB)</td><td>15 m(49') or less</td><td colspan="2">H3 ≤ 15 m(49')</td><td rowspan="2"></td></tr>
<tr><td colspan="3">But, when VWMC***S4-4P is installed, H2 is 15 m(49') or less.</td></tr>
<tr><td>MSB ~ MSB</td><td>30 m or less</td><td colspan="2">H4 ≤ 30 m</td><td></td></tr>
<tr><td rowspan="2">Maximum allowable length after branch joint</td><td rowspan="2">First branch joint ~ Farthest Indoor unit</td><td rowspan="2">Pipe length</td><td>45 m(148') or less</td><td>Installing only with MSB</td><td>g+j ≤ 45 m(148')</td><td></td></tr>
<tr><td>45 ~ 90 m (148'~295') Note 2)</td><td rowspan="2">Installing with MSB and Y-joint</td><td>b+h+k ≤ 45 m(148')
l+p ≤ 45 m(148')</td><td rowspan="2"></td></tr>
<tr><td colspan="2">Required conditions must be satisfied</td></tr>
</table>

Note 1) If an outdoor unit is located in a lower position than indoor unit, maximum level difference is 40 m. If outdoor unit is located in a higher position than indoor unit, level difference is 50 m or under.

❋ **Total refrigerant amount of the system must be less than 100 kg. If total refrigerant amount of system is over than 100 kg, the system has to be divided into smaller system, each less than 100 kg.**

Note 2) Required conditionw

Classification	Condition	Example
First branch joint ~ Farthest Indoor unit	45 m(148') ≤ b, l+m, q ≤ 90 m(295'): Size of the branch pipe (b, l, m, q) must be increased by 1 grade.	
Condition of total length of extended pipe	a+(bx2) + c + d + e + f + g + h + l + j + k + l + m + n + o + p + q + r ≤ 500 m (1640')	
MSB ~ Each indoor unit	c + d, c + e, c + f, g, h + l, h + j, h + k, n, o, p, r ≤ 45 m(148')	
Difference between the distance of the outdoor unit to the farthest indoor unit and nearest indoor unit ≤ 45 m(148') (a+b+h+k) - (a+b+c+d) ≤ 45 m(148')		

Note 3) For indoor units to which no MSB is connected, be sure to set their options to "Cooling only indoor unit," and then connect them to a low pressure gas pipe and a liquid pipe. Be sure to combine the cooling only indoor units so that their total capacity becomes 50% or less of the total capacity of all indoor units.

Note 4) In case of connecting more than one indoor unit in one MSB Port, the below indoor units can not be combined. OAP duct (VOSC***S4-4P), Hydro Unit HE (VHEC***S4-4P), Hydro Unit HT(VHTC***S4-4P)

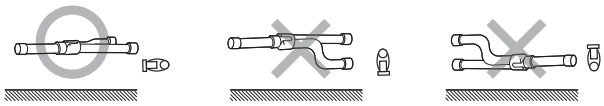
Note 5) In case of connecting two MSB ports with Y-joint, the indoor units can not be combined to more than one.

Refrigerant pipe installation

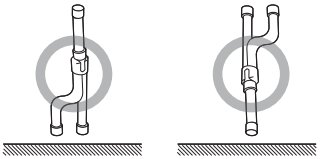
Installing the branch joints

Branch joints must be installed 'horizontally' or 'vertically'.

Horizontal installation

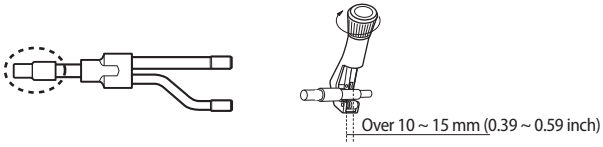


Vertical installation



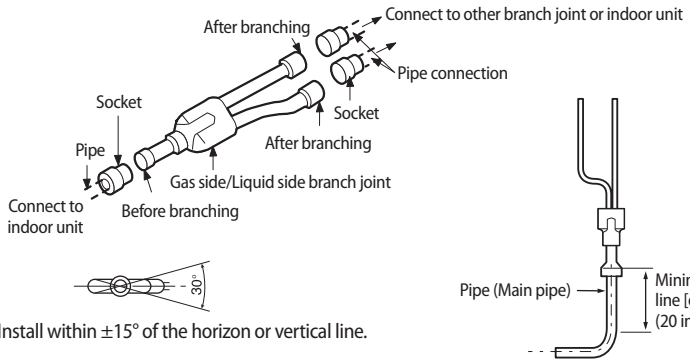
NOTE

- Cut the connection part of the branch joint or the provided socket, according to the diameter of the connection pipe, before connecting them.



CAUTION

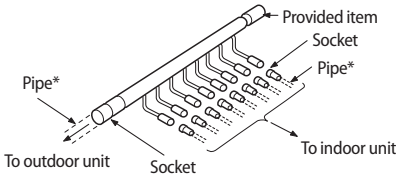
- Install the branch joint within ±15° of the horizon or vertical line.
- Make sure that the pipe is not bent at where it is connected to the branch joint.
- Keep a minimum straight line distance of 500 mm (20 inch) or more before connecting branch joint.



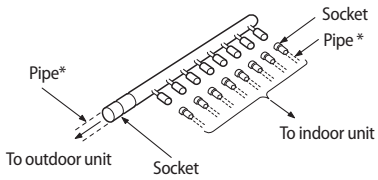
✻ Install within ±15° of the horizon or vertical line.

Installing the distribution header

1. Select the reducer that fits the diameter of the pipe.



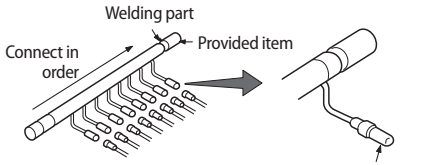
<Liquid side>



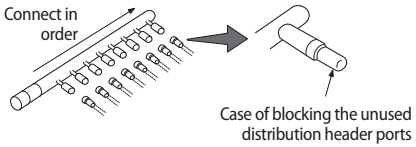
<Gas side>

✻ Pipe : Separately purchased item

2. If the number of connected indoor unit is fewer than ports on the distribution header, block the unused ports with caps.



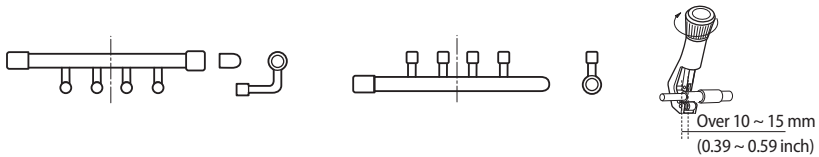
<Liquid side>



<Gas side>

NOTE

- Cut the provided socket, according to the diameter of the connection pipe, before connecting it.



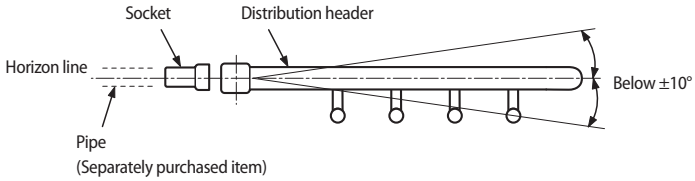
CAUTION

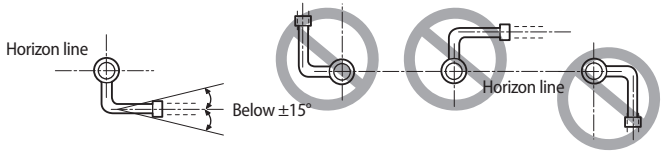
- Connect the indoor units in order, while following the direction of the arrow shown in the illustration.
- When indoor units are connected to same distribution head, indoor unit must be connected in order of their capacity, from largest to smallest.

Refrigerant pipe installation

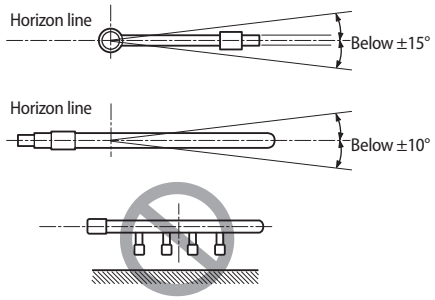
3. Install the distribution header horizontally.

► Install the distribution header horizontally so that its ports do not face down.





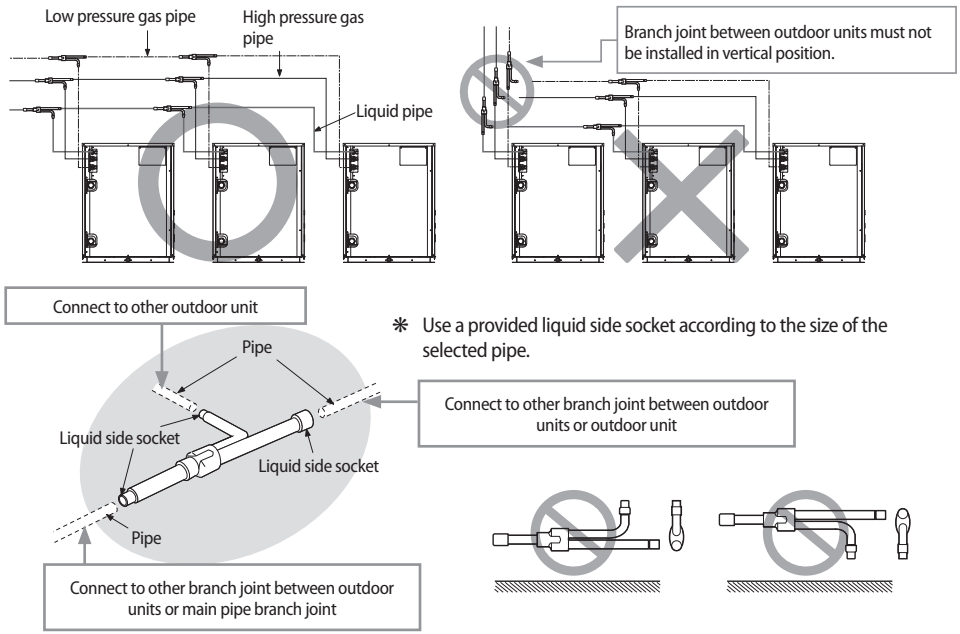
< Liquid side >



< Gas side >

Installing the branch joint between outdoor units

Installation of outdoor joints (VRC072/096/120/192/240W4M-4*)

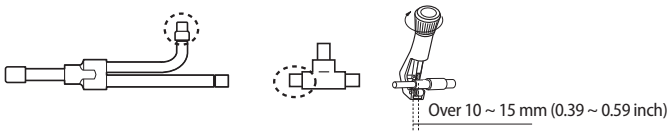


✻ Use a provided liquid side socket according to the size of the selected pipe.

<Liquid pipe, High pressure gas pipe, Low pressure gas pipe>

NOTE

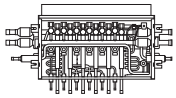
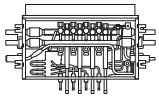
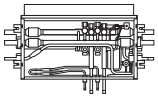
- Cut the connection part of the outdoor unit connection pipe or the provided socket, according to the diameter of the connection pipe, before connecting them.



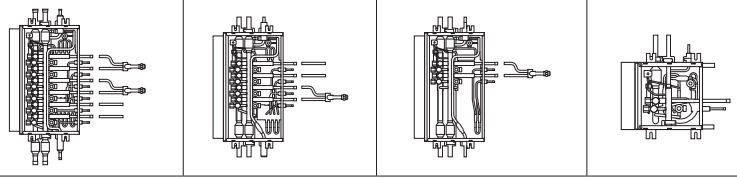
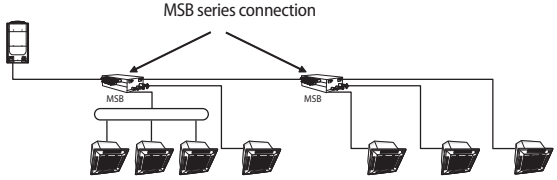
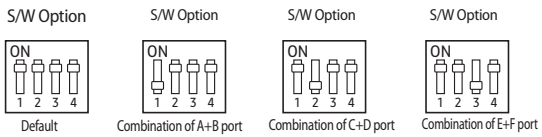
Refrigerant pipe installation

Installing the MSB

MSB specification

Model	V1MSBB06HR	V1MSBB04HR	V1MSBB02HR	V1MSBB01HR
Exterior of MSB				
Number of connectable indoor units at one port	Up to 8 units	Up to 8 units	Up to 8 units	Up to 8 units
The maximum capacity of the connectable indoor units at one port	16.0 kW (54.6 MBH)	16.0 kW (54.6 MBH)	16.0 kW (54.6 MBH)	16.0 kW (54.6 MBH)
The maximum capacity of the connectable indoor units	61.6 kW (210.2 MBH)	61.6 kW (210.2 MBH)	32.0 kW (109.2 MBH)	16.0 kW (54.6 MBH)
Internal EEV	Not included			

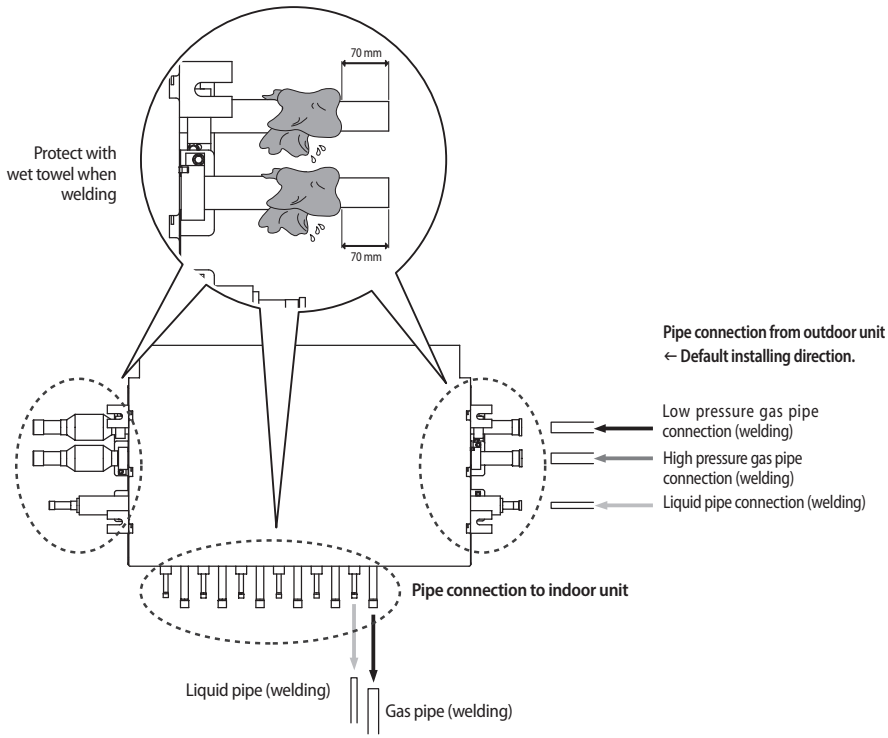
Installing the indoor units

<table>
<tr><th>Model</th><th>V1MSBB06HR</th><th>V1MSBB04HR</th><th>V1MSBB02HR</th><th>V1MSBB01HR</th></tr>
<tr><td>Example installing (Each port connection)</td><td colspan="3">  </td><td></td></tr>
<tr><td>Example installing (MSB series connection)</td><td colspan="4">MSB series connection
  </td></tr>
<tr><td>Installing indoor units</td><td colspan="3">Under 16.0 kW indoor unit : Don't use Y-connector
16.0 kW (54.6 MBH) ~ 28.0 kW (95.5 MBH) kW indoor unit : Use Y-connector at the Gas & Liquid line
In case of using Y-connector, it is only connectable for port combination at below
Connectable port combination for Y-connector : A + B port, C + D port, E + F port
Non-connectable port combination for Y-connector :
B + C port, D + E port, non-continuous port
Set Dip Switch option for using Y-connector
 
In case of MSB connection in series, the maximum capacity of indoor units in MSB series connection is 61.6 kW (210.2 MBH)</td><td>This unit is only connectable for one port under 16.0 kW (54.6 MBH)

This unit is impossible to connect MSB to MSB in series.</td></tr>
</table>

Refrigerant pipe installation

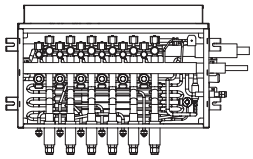
How to connect the pipes



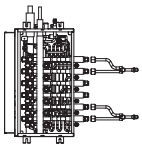
- ❋ When installing MSB, use the pattern sheet for installation that is provided with the product.
- ❋ When welding the gas pipes, protect the product with the flame-proof sheet.
- ❋ When connecting the MSB with outdoor units, default direction is set in the MSB.
  If installing opposite direction, weld the enclosed copper cap in each high pressure, low pressure and liquid pipes.

MSB specification

MSB specification

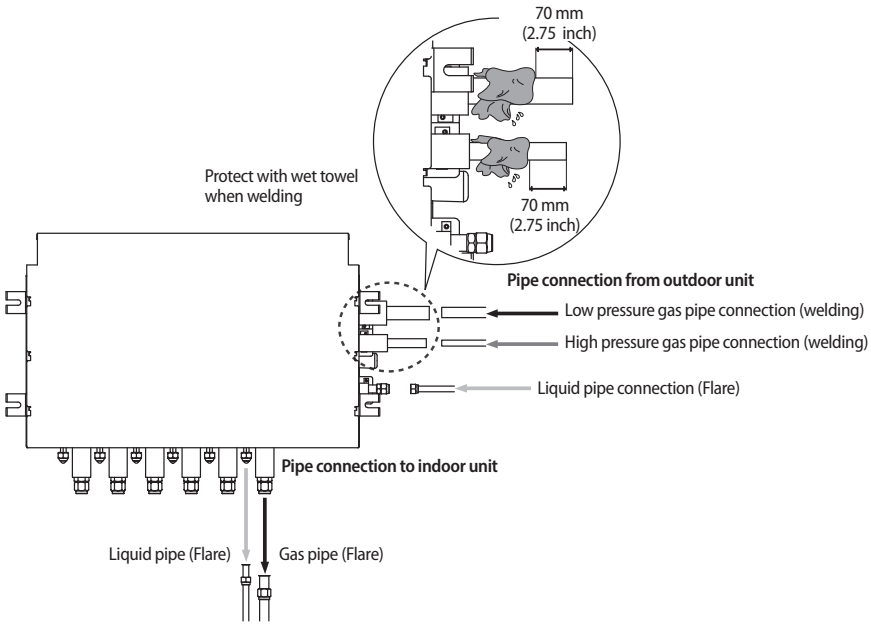
Model	V1MSBB06HR
Exterior of MSB	
Number of connectable indoor units	Up to 6 units
Maximum capacity of connectable indoor units	56 kW (192 MBH)

Installing the indoor units

Model	V1MSBB06HR
Example installing	
Installing indoor units	The indoor unit's capacity which is under 48 MBH, can be connected in the MSB. Do not connect the indoor unit's capacity exceeds 48 MBH. **Single capacity range under 36 MBH** - Connect the liquid, gas pipe of indoor unit to each single port in MSB. **Single capacity range between 36 MBH to 48 MBH** - Join two ports in the MSB with offered Y-connector(liquid, gas), then connect to indoor unit as above. ✻ Reference of continuous cooling. In case of continuous cooling at below 23 ˚F(-5 ˚C) ambient condition, join two ports in the MSB with offered Y-connector, then connect to indoor unit even though unit's capacity is between 18 MBH and 36 MBH. Option switch and key function needs to be set. Detail information refer the page 92 ~ 93.

Refrigerant pipe installation

How to connect the pipes



❋ When installing MSB, use the pattern sheet for installation that is provided with the product.

❋ When welding the high/low pressure gas pipe, protect the product with the flame-proof sheet.

Electrical wiring work

Specification of the circuit breaker and power cable

Electric Characteristics

1. Heat Pump (1 phase 208 ~ 230V)

Nominal Capacity (Ton)	Model name	Module 1		
		RLA	Power Supply	
		Comp 1	MCA	MOP
3 Ton	VPC038W4M-4P	16	20	35
4 Ton	VPC048W4M-4P	19.2	24	40
5 Ton	VPC055W4M-4P	20.8	26	45

2. Heat Pump (3 phase 208~230V) - Premium Energy Efficiency Type

Nominal Capacity (Ton)	Model name	Module 1				Module 2				Module 3			
		RLA		Power Supply		RLA		Power Supply		RLA		Power Supply	
		Comp 1	Comp 2	MCA	MOP	Comp 1	Comp 2	MCA	MOP	Comp 1	Comp 2	MCA	MOP
6 Ton	VRC072W4M-4Y	12.8		16	25								
8 Ton	VRC096W4M-4Y	18.4		23	40								
10 Ton	VRC120W4M-4Y	24		30	50								
12 Ton	VRC144W4M-4Y2	12.8		16	25	12.8		16	25				
14 Ton	VRC168W4M-4Y2	12.8		16	25	18.4		23	40				
16 Ton	VRC192W4M-4Y	17.6	17.6	39.6	50								
18 Ton	VRC216W4M-4Y2	18.4		23	40	24		30	50				
22 Ton	VRC264W4M-4Y2	12.8		16	25	17.6	17.6	39.6	50				
24 Ton	VRC288W4M-4Y2	18.4		23	40	17.6	17.6	39.6	50				
28 Ton	VRC336W4M-4Y2	12.8		16	25	12.8		16	25	17.6	17.6	39.6	50
30 Ton	VRC360W4M-4Y2	12.8		16	25	18.4		23	40	17.6	17.6	39.6	50
32 Ton	VRC384W4M-4Y3	18.4		23	40	18.4		23	40	17.6	17.6	39.6	50

3. Heat Pump (3 phase 208~230V) - Premium Compact Type

Nominal Capacity (Ton)	Model name	Module 1				Module 2				Module 3			
		RLA		Power Supply		RLA		Power Supply		RLA		Power Supply	
		Comp 1	Comp 2	MCA	MOP	Comp 1	Comp 2	MCA	MOP	Comp 1	Comp 2	MCA	MOP
20	VRC240W4M-4Y	29.3	29.3	66	90								
26	VRC312W4M-4Y1	12.8		16	25	29.3	29.3	66	90				
28	VRC336W4M-4Y1	18.4		23	40	29.3	29.3	66	90				
30	VRC360W4M-4Y1	24		30	50	29.3	29.3	66	90				
34	VRC408W4M-4Y1	12.8		16	25	18.4		23	40	29.3	29.3	66	90

Electrical wiring work

4. Heat Pump (3 phase 460V) - Premium Energy Efficiency Type

Nominal Capacity (Ton)	Model name	Module 1				Module 2				Module 3			
		RLA		Power Supply		RLA		Power Supply		RLA		Power Supply	
		Comp 1	Comp 2	MCA	MOP	Comp 1	Comp 2	MCA	MOP	Comp 1	Comp 2	MCA	MOP
6 Ton	VRC072W4M-4G	8		10	15								
8 Ton	VRC096W4M-4G	8.8		11	15								
10 Ton	VRC120W4M-4G	12.5		15.6	25								
12 Ton	VRC144W4M-4G2	8		10	15	8		10	15				
14 Ton	VRC168W4M-4G2	8		10	15	8.8		11	15				
16 Ton	VRC192W4M-4G	11.6	11.6	26.2	35								
18 Ton	VRC216W4M-4G2	8.8		11	15	12.5		15.6	25				
22 Ton	VRC264W4M-4G2	8		10	15	11.6	11.6	26.2	35				
24 Ton	VRC288W4M-4G2	8.8		11	15	11.6	11.6	26.2	35				
28 Ton	VRC336W4M-4G2	8		10	15	8		10	15	11.6	11.6	26.2	35
30 Ton	VRC360W4M-4G2	8		10	15	8.8		11	15	11.6	11.6	26.2	35
32 Ton	VRC384W4M-4G3	8.8		11	15	8.8		11	15	11.6	11.6	26.2	35

5. Heat Pump (3 phase 460V) - Premium Compact Type

Nominal Capacity (Ton)	Model name	Module 1				Module 2				Module 3			
		RLA		Power Supply		RLA		Power Supply		RLA		Power Supply	
		Comp 1	Comp 2	MCA	MOP	Comp 1	Comp 2	MCA	MOP	Comp 1	Comp 2	MCA	MOP
20	VRC240W4M-4Y	14.7	14.7	33	45								
26	VRC312W4M-4Y1	8		10	15	14.7	14.7	33	45				
28	VRC336W4M-4Y1	8.8		11	15	14.7	14.7	33	45				
30	VRC360W4M-4Y1	12.5		15.6	25	14.7	14.7	33	45				
34	VRC408W4M-4Y1	8		10	15	8.8		11	15	14.7	14.7	33	45

NOTE

(1) RLA is based on AHRI 1230 Cooling Standard Condition [Indoor Temp : 80 °F/ 26.7 °C(DB) / 67 °F /19.46 °C(WB), Inlet Water Temp : 86° F (30 °C)]
(2) Voltage Tolerance is ± 10 %
(3) Maxium allowable voltage between phases is 2 %
(4) Refer to module combination table for independent units information

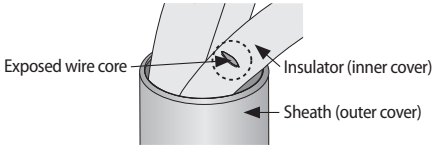
Symbols

(1) RLA : Rated Load Ampere
(2) MCA : Minimum Circuit Ampere (A)
(3) MOP : Maxium Overcurrent Protective Device (A)

CAUTION

Caution for electrical work

- You must install ELCB or MCCB + ELB
  - ELCB: Earth leakage breaker
  - MCCB: Molded case circuit breaker
  - ELB: Earth leakage breaker
- Do not operate the outdoor unit before completing the refrigerant pipe work.
- Do not disconnect or change the cable inside the product. It may cause damage to the product.
- Specification of the power cable is selected based on following installation condition; culvert installation/ ambient temperature 86 °F (30 °C)/ single multi conductor cables. If the condition is different from the ones stated, please consult an electrical installation expert and re-select the power cable.
  - If the length of power cable exceed 50 m (164.04 ft), re-select the power cable considering the voltage drop.
- Use a power cable made out of incombustible material for the insulator (inner cover) and the sheath (outer cover).
- Do not use the power cable with the core wire exposed due to insulator damage occurred during removal of the sheath. When the core wire is exposed, it may cause fire.

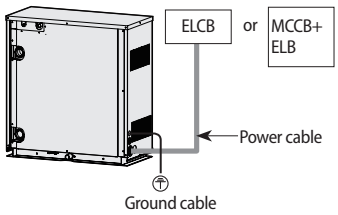
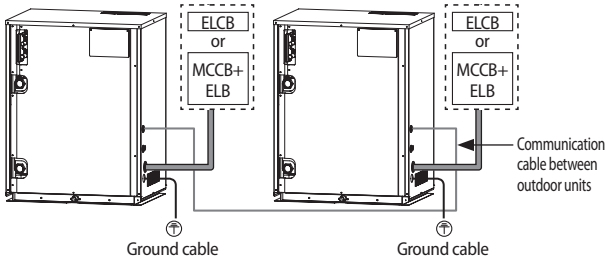


<The example of exposed core wire>

Electrical wiring work

Power and communication cable configuration

- Main power and the ground cable must be withdrawn through the knock-out hole on the bottom-right or right side of the cabinet.
- Withdraw the communication cable from the designated knock-out hole on the bottom-right side of the front part.
- Install the power and communication cable using separate cable protection tube.
- Fix a protection tube to the knock-out hole on the outdoor unit by using a CD connector or bushing. Make sure to use insulating bushing.
- Make sure that power and communication cables do not block the front panel.

VPC038/048/055W4M-4P	VRC072/096/120/192/240W4M-4*
	

Specification of the protection tube

Name	Temper grade	Applicable conditions
Flexible PVC conduit	PVC	When the protection tube is installed indoor and not exposed to outside, because it is embedded in concrete structure
Class 1 flexible conduit	Galvanized steel sheet	When the protection tube is installed indoor but exposed to outside so there are risk of damage to the protection tube
Class 2 flexible conduit	Galvanized steel sheet and Soft PVC compound	When the protection tube is installed outdoor and exposed to outside so there are risk of damage to the protection tube and extra waterproof is needed

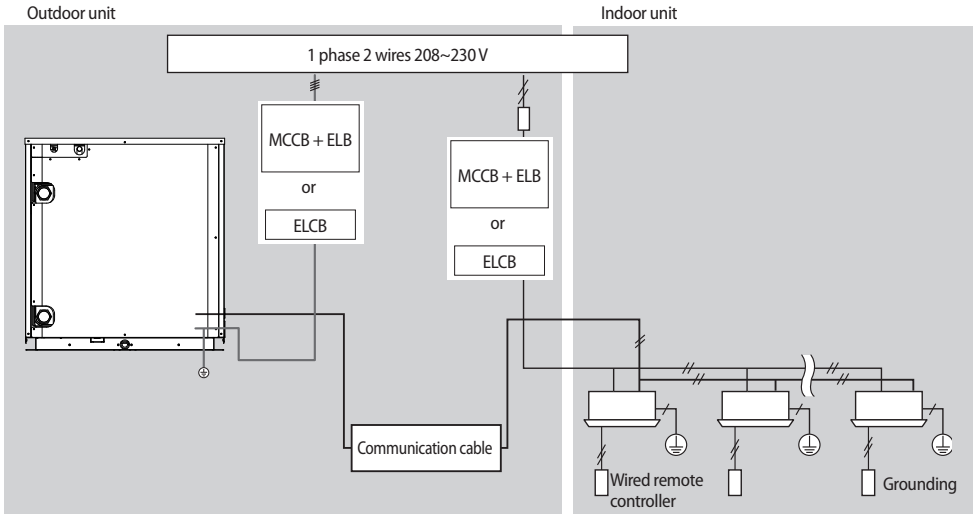
CAUTION

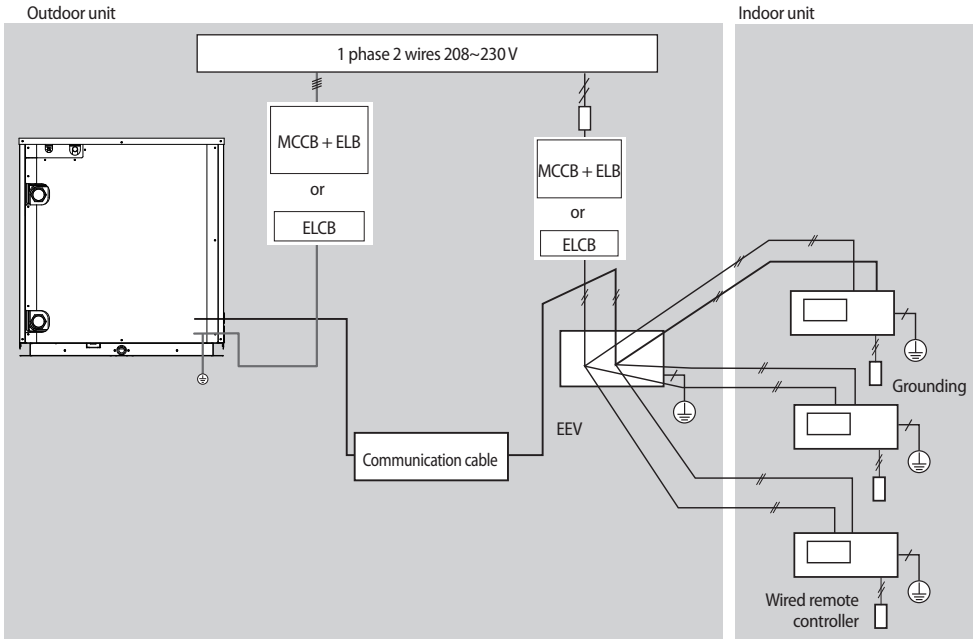
Caution for perforating the knock-out hole

- Perforate a knock-out hole by punching it with a hammer.
- After perforating the knock-out hole, apply rust resisting paint around the hole.
- When you need to pass the cables through the knock-out hole, remove burrs on the hole and protection the cable with a protection tape or bushing etc.

Power wiring diagram

1 phase 2 wires 208~230 V (VPC***W4M-4P)



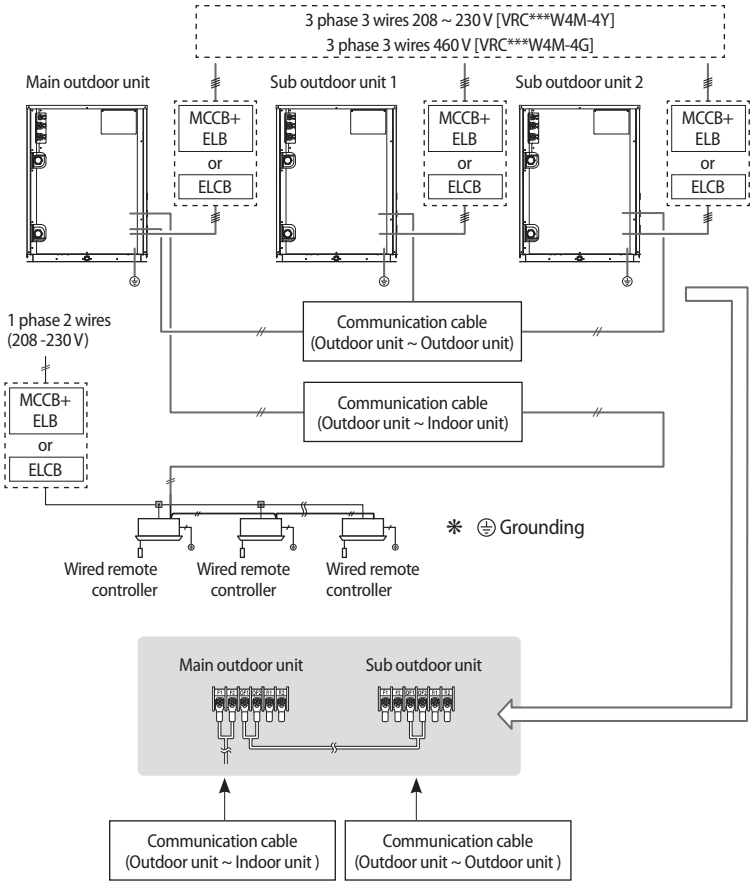


Electrical wiring work

- ▶ Connect a power cable of the outdoor unit after checking that L-N (1 phase 2 wires) is properly connected. (If the power of 208 ~ 230 V is supplied to the N phase, PCB and other electrical parts will be damaged.)
- ▶ Communication cable between indoor units has no polarity.
- ▶ Arrange the cables with a cable tie.

❋ ELCB and ELB must be installed since there is risk of electric shock or fire when they are not installed.

3 phase 3 wires 208~230 V [VRC***W4M-4Y] / 3 phase 3 wires 460 V [VRC***W4M-4G]

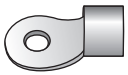


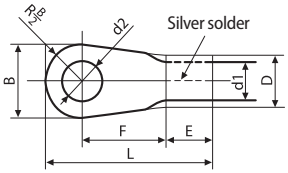
- ▶ Connect a power cable of the outdoor unit after checking that R-S-T (3 phase 3 wire) is properly connected.
- ▶ Communication cable between indoor and outdoor units and communication cable between outdoor units has no polarity.
- ▶ Arrange the cables with a cable tie.

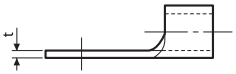
❋ ELCB and ELB must be installed since there is risk of electric shock or fire when they are not installed.

Selecting solderless ring terminal

- Select a solderless ring terminal for a power cable according to the nominal dimensions for cable.
- Apply insulation coating to the connection part of the solderless ring terminal and the power cable.







[Unit :kg(lb)]

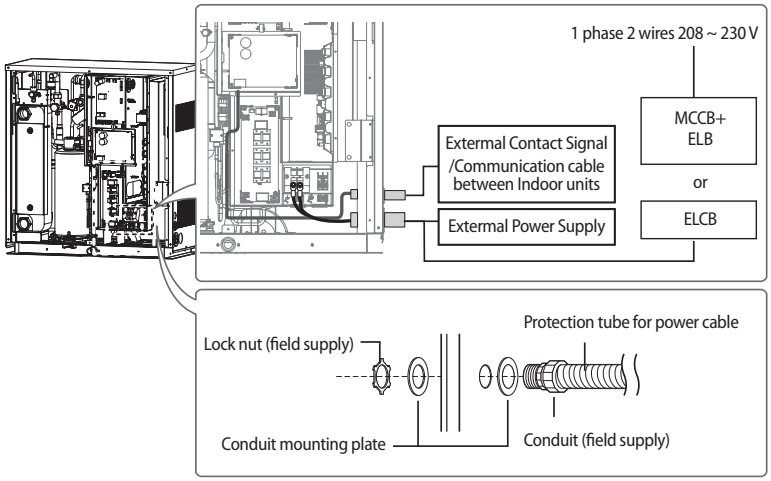
Nominal dimensions for cable [mm² (inch²)]		4/6 (0.006/0.009)		10 (0.01)	16 (0.02)	25 (0.03)		35 (0.05)		50 (0.07)	70 (0.10)
Nominal dimensions for screw [mm (inch)]		4 (3/8)	8 (3/16)	8 (3/16)	8 (3/16)	8 (3/16)	8 (3/16)	8 (3/16)	8 (3/16)	8 (3/16)	8 (3/16)
B	Standard dimension [mm (inch)]	9.5 (3/8)	15 (9/16)	15 (9/16)	16 (10/16)	12 (1/2)	16.5 (10/16)	16 (10/16)	22 (7/8)	22 (7/8)	24 (1)
	Allowance [mm (inch)]	±0.2 (±0.007)		±0.2 (±0.007)	±0.2 (±0.007)	±0.3 (±0.011)		±0.3 (±0.011)		±0.3 (±0.011)	±0.4 (±0.015)
D	Standard dimension [mm (inch)]	5.6 (1/4)		7.1 (1/4)	9 (3/8)	11.5 (7/16)		13.3 (1/2)		13.5 (1/2)	17.5 (1/2)
	Allowance [mm (inch)]	+0.3 (+0.011) -0.2 (-0.007)		+0.3 (+0.011) -0.2 (-0.007)	+0.3 (+0.011) -0.2 (-0.007)	+0.5 (+0.019) -0.2 (-0.007)		+0.5 (+0.019) -0.2 (-0.007)		+0.5 (+0.019) -0.2 (-0.007)	+0.5 (+0.019) -0.4 (-0.015)
d1	Standard dimension [mm (inch)]	3.4 (1/8)		4.5 (3/16)	5.8 (1/4)	7.7 (5/16)		9.4 (3/8)		11.4 (7/16)	13.3 (1/2)
	Allowance [mm (inch)]	±0.2 (±0.007)		±0.2 (±0.007)	±0.2 (±0.007)	±0.2 (±0.007)		±0.2 (±0.007)		±0.3 (±0.011)	±0.4 (±0.015)
E	Min. [mm (inch)]	6 (1/4)		7.9 (5/16)	9.5 (5/16)	11 (3/8)		12.5 (1/2)		17.5 (11/16)	18.5 (3/4)
F	Min. [mm (inch)]	5 (3/16)	9 (3/8)	9 (3/8)	13 (1/2)	15 (5/8)	13 (1/2)	13 (1/2)	13 (1/2)	14 (9/16)	20 (3/4)
L	Max. [mm (inch)]	20 (3/4)	28.5 (1-1/8)	30 (1-3/16)	33 (1-5/16)	34 (1-3/8)		38 (1-1/2)	43 (1-11/16)	50 (2)	51 (2)
d2	Standard dimension [mm (inch)]	4.3 (3/16)	8.4 (1-3/16)	8.4 (1-3/16)	8.4 (1-3/16)	8.4 (1-3/16)	8.4 (1-3/16)	8.4 (1-3/16)	8.4 (1-3/16)	8.4 (1-3/16)	8.4 (1-3/16)
	Allowance [mm (inch)]	+0.2 (+0.007) 0 (0)	+0.4 (+0.015) 0 (0)	+0.4 (+0.015) 0 (0)	+0.4 (+0.015) 0 (0)	+0.4 (+0.015) 0 (0)		+0.4 (+0.015) 0 (0)		+0.4 (+0.015) 0 (0)	+0.4 (+0.015) 0 (0)
t	Min. [mm (inch)]	0.9 (0.03)		1.15 (0.04)	1.45 (0.05)	1.7 (0.06)		1.8 (0.07)		1.8 (0.07)	2.0 (0.078)

Electrical wiring work

Connecting the power terminal

- Connect the cables to the terminal board with solderless ring terminals.
- Properly connect the cables by using certified and rated cables and make sure to fix them properly so that external force is not applied to the terminal.
- Use a driver and wrench that can apply the rated torque when tightening the screws on the terminal board.
- Tighten the terminal screws by complying rated torque value. If the terminal is loose, fire can occur due to arc heat generation and if the terminal is too tight, terminal board could get damaged.

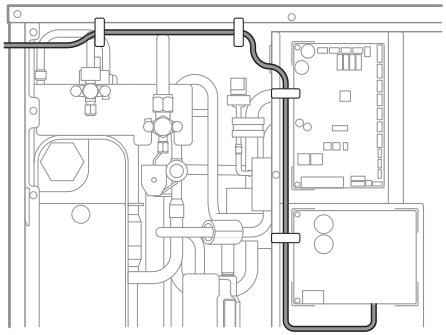
VPC038/048/055W4M-4P



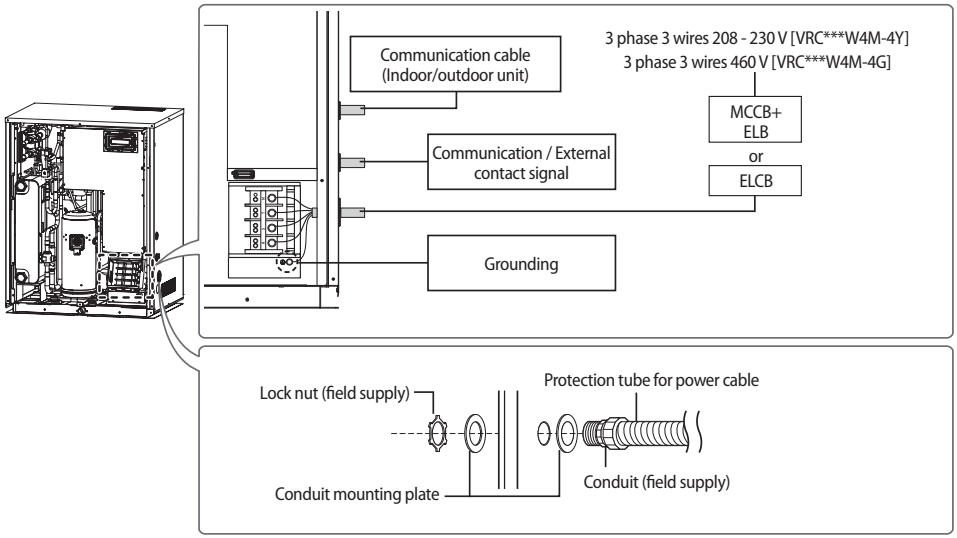
Screw	Tightening torque for terminal		Remarks
	N·m	lbf·ft	
M4	1.2~1.8	0.9~1.3	Communication : F1, F2
M5	2.0~3.0	1.5~2.2	1 phase AC power supply: : 1(L), 2(N), L, N

See the following figure when connecting the communication or external contact through the knock-out hole on the top left corner of the cabinet.

(Field installation range for the power cable protection tube)



VRC***W4M-4Y / VRC***W4M-4G



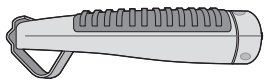
CAUTION

- When removing the outer sheath of the power supply cable, be careful not to scratch the inner sheath of the cable.
- Make sure that more than 20 mm (1 inch) of the outer sheath of the indoor unit power and communication cable are inside the electrical component box.
- Install the communication cable separately from power cable and other communication cables.

Screw	Tightening torque for terminal		Remarks
	N·m	lbf·ft	
M4	1.2~1.8	0.9~1.3	1 phase 208~230 V power cable
M8	5.5~7.3	4.1~5.4	3 phase 208~230 V / 460 V power cable

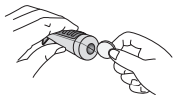
Electrical wiring work

Examples of how to use the cable striper



<Cable striper>

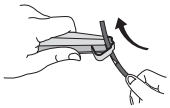
1. Adjust the blade position by coin. (Controller is at the bottom side of the tool.) Fix the blade position according to the outer sheath thickness of the power cable.



2. Fix the power cable and tool by using the hook at the top side of the tool.

3. Cut out the outer sheath of the power cable by revolving the tool in the direction of the arrow, two or three times.

4. At this situation, cut out the outer sheath of the power cable by moving the tool toward the direction of the arrow.



5. Slightly bend the wire and pull out the cut part of the outer sheath.

Fixing the power cable

CAUTION

- Do not let the power cable come into contact with the pipes inside the outdoor unit. If the power supply cable touches the pipes, the vibration of the compressor is transferred to the pipes and can damage the power supply cables or pipes, creating the danger of fire or explosion.
- Make sure that the place where the sheath of power supply cable is removed is inside the power supply box. If it is impossible, you should connect the protection tube for power cable to the power supply box.
- After arranging the power cable into the power supply box, tighten the cover.

Connect the ring terminal of 3 phase cable

1. Cut the power cable to an appropriate length and connect it with the solderless terminal.
2. After connecting the power cable to the terminal as seen in the illustration, fix it with cable tie.
3. Fix the housing, which has an insulator, to the terminal board.

Fixing the ground cable

▶ Connect the ground cable to the grounding hole inside the power supply box.

Withdrawing the power cable

▶ Through the cable withdrawing hole, penetrate the knock out hole on the side and connect the protection tube (for power cable) up to the power box.

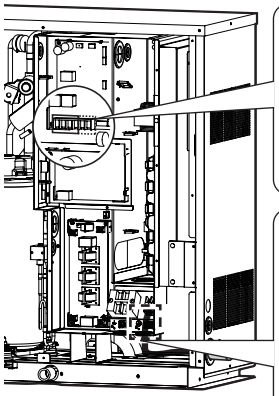
❋ When penetrating knock out hole, be careful not to damage the heat exchanger pipe or temperature sensor.

❋ Be sure that the power supply cable is not damaged by burr on the knock-out hole.

Electrical wiring work

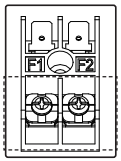
Installing the Solution device

VPC038/048/055W4M-4P



R1	Solution device terminal
R2	

Do not connect the power or communication cable here.

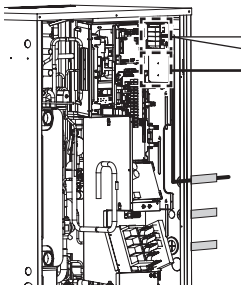


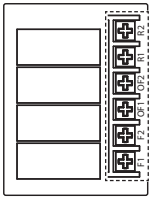
F1	Communication cable terminal (Outdoor unit ~ indoor unit)
F2	

✻ When connecting the communication cable, use a terminal block to fix it.

VRC***W4M-4Y / VRC***W4M-4G

▶ When the number of indoor units installed with the outdoor unit is 16 or less





R2	Solution device terminal
R1	
OF2	Communication cable terminal (Outdoor unit ~ Outdoor unit)
OF1	
F2	Communication cable terminal (Outdoor unit ~ Indoor unit)
F1	

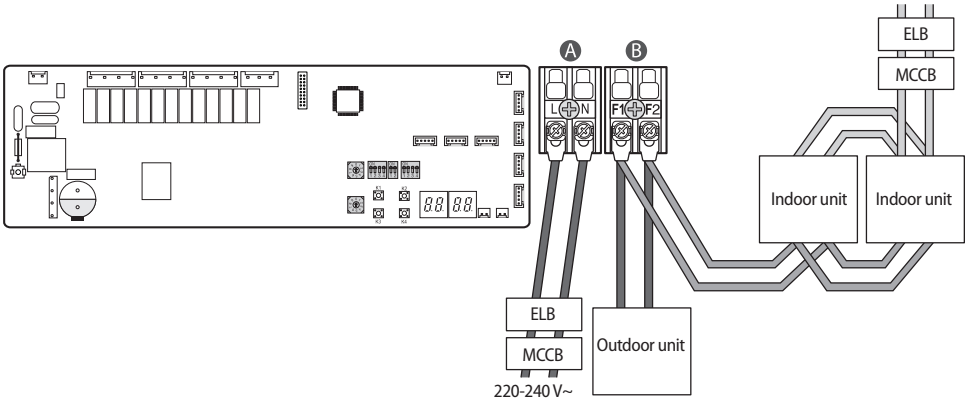
✻ When connecting the communication cable, use a wire holder to fix it.

Location of the interface module

✻ To connect old communication type upper level controller, interface module must be installed. For detail instruction of installation, refer to the installation manual of corresponding interface module.

Connecting the MSB (V1MSBB06HR, V1MSBB04HR, V1MSBB02HR, V1MSBB01HR)

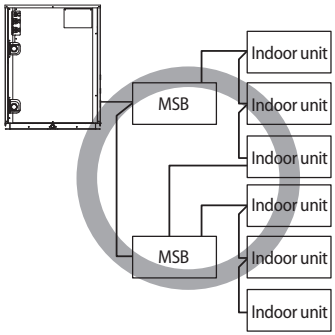
Example



- ▶ Ⓐ Power must be supplied to the MSB separately from the outdoor unit.
- ▶ Ⓑ Connect the communication cable of the outdoor unit (F1, F2) to the communication cable of the MSB (F1, F2)

CAUTION

- Power cable connection should be done with the solderless ring terminal.



- When installing the MSB, communication cable can be connected as shown above.

Electrical wiring work

Grounding work

Grounding must be done by a qualified installer for your safety.

Grounding the power cable

- ▶ The standard of grounding may vary according to the rated voltage and installation place of the Water-Cooled VRF.
- ▶ Ground the power cable according to the following table.

Power condition / Installation place	Voltage to ground is lower than 150 V	Voltage to ground is over 150 V
High humidity	Must perform the grounding work 3. [Note 1] (Including the case where earth leakage breaker is installed)	
Average humidity	Perform grounding work 3. [Note 1]	Must perform the grounding work 3. [Note 1] (Including the case where earth leakage breaker is installed)
Low humidity	Perform grounding work 3, if possible, for your safety. [Note 2]	

Note 1) About grounding work 3.

- Grounding work must be done by an expert (with qualification).
- Check if the grounding resistance is lower than 100 Ω. When installing a earth leakage breaker (that can cut the electric circuit within 0.5 second in case of a short circuit), allowable grounding resistance should be 30~500 Ω.

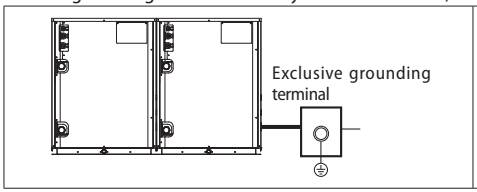
Note 2) Grounding at dry place

- The grounding resistance should be lower than 100 Ω. Even in worst case, grounding resistance should be lower than 250 Ω.

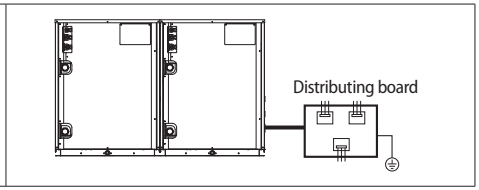
Performing the grounding work

- ▶ Use a rated grounding cable by referring to the specification of the electric cable for the outdoor unit.

✻ When using the exclusive grounding terminal (When the grounding terminal is already built on the house)



✻ When using grounding of the switch board

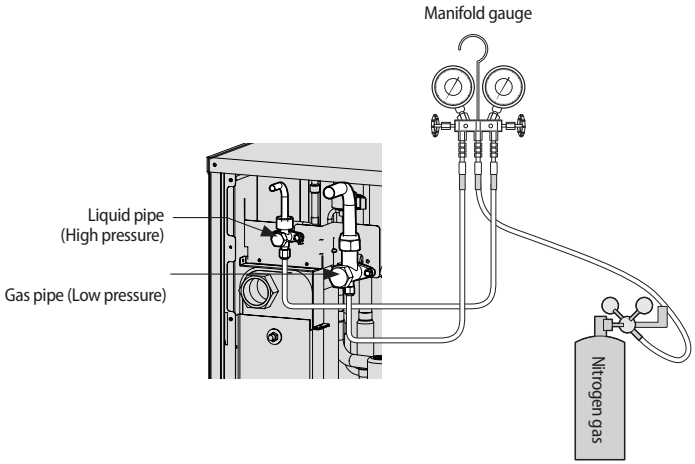


Air tightness test and vacuum drying

Air tightness test

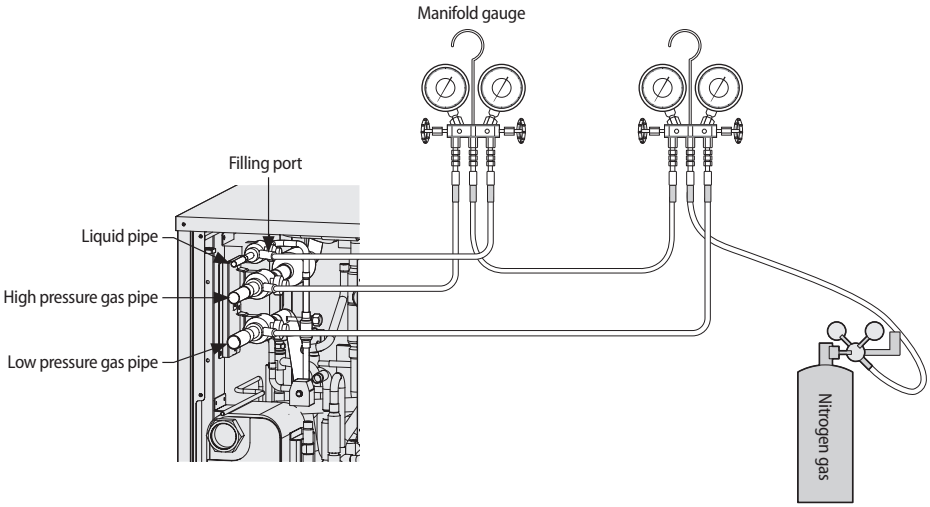
- Use tools for R-410A to prevent the inflow of foreign substances and resist against the internal pressure.
- Do not remove the core of filling port.
- Use Nitrogen gas for air tightness test as shown in the illustration.

VPC038/048/055W4M-4P



Air tightness test and vacuum drying

VRC***W4M-4Y / VRC***W4M-4G



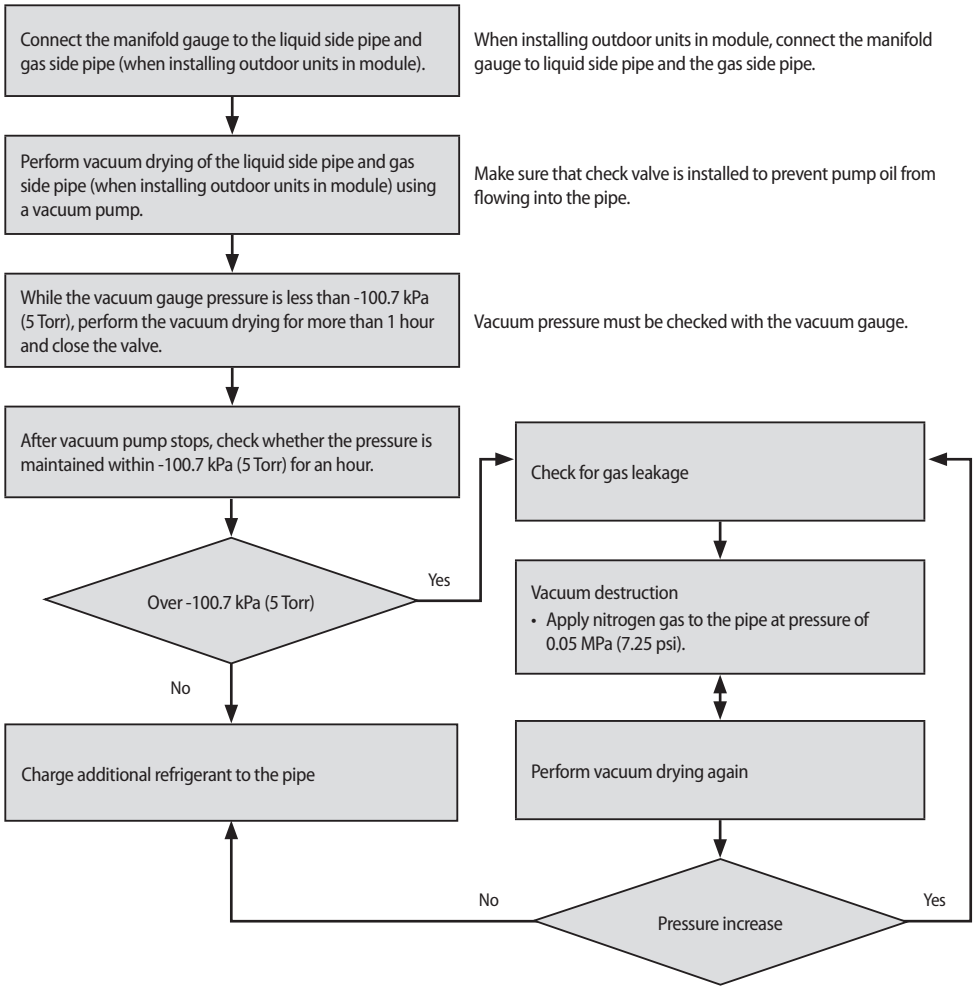
Apply pressure to the liquid side pipe and gas side pipe (when installing outdoor units in module) with Nitrogen gas at 4.1 MPa (594.6 psi).	If you apply pressure at more than 4.1 MPa (594.6 psi), pipes may get damaged. Apply pressure with pressure regulator and pay attention to the pressure of the nitrogen.
↓	
Keep it for minimum 24 hours to check if pressure drops.	After applying Nitrogen gas, check there's any change of pressure, using a pressure regulator.
↓	
If the pressure drops, check for gas leakage.	If the pressure is changed, apply soap water to check for leakage and check the pressure of the nitrogen gas again.
↓	
Maintain 1.0 MPa (145 psi) of the pressure before performing vacuum drying and check for further gas leakage.	After checking the first gas leakage, maintain 1.0 MPa (145 psi) to check for further gas leakage.

CAUTION

- Perform a Nitrogen gas leak test with the service valve of the outdoor unit closed.
- When charging the nitrogen gas, charge it from the both (high•low pressure) sides.
- If the pipe is filled in a short time with a highly excessive pressure of Nitrogen gas, the pipes may get damaged. Make sure to use a regulator to prevent the high pressure Nitrogen gas, over 4.1 MPa (594.6 psi), from entering into the pipe.

Vacuum drying pipes and indoor units

- Use tools for R-410A to prevent the inflow of foreign substances and resist against the internal pressure.
- Use vacuum pump that allows vacuuming under -100.7 kPa (5 Torr).
- Use the vacuum pump with the check valve to prevent pump oil from flowing backward while the vacuum pump is stopped.
- Completely close the liquid/gas side service valve of the outdoor unit.



✻ If the pressure rises in an hour, either water is remaining inside the pipe or there is a leakage.

✻ When the ambient temperature of vacuuming pipe is low (less than 32 °F/0 °C), moisture might remain within the pipe. Therefore, pay special attention to the pipe sealing in the winter.

Pipe insulation

Insulating the refrigerant pipes and branch joints

- Check for gas leakage before completing (the hose and pipe insulation) and if there is no sign of leakage, make sure to insulate the pipes and hoses.
- Use EPDM material insulator that meets the following conditions.

Test item	Unit	Standard
Density	g/cm³	0.048~0.096
Dimensional change rate by heat	%	Below -5
Absorption rate	g/cm³	Below 0.005
Thermal conduction rate	W/m·K	Below 0.037
Moisture transpiration factor	ng/(m²·s·Pa)	Below 15
Moisture transpiration grade	g/(m²·24h)	Below 15
Formaldehyde dispersion	mg/L	There should be none
Oxygen rate	%	Over 25

Selecting the refrigerant pipe insulator

- Insulate the gas pipe and liquid pipe by referring to the thickness of insulator for each pipe size.
- The standard condition is; temperature at 86 °F (30 °C), humidity less than 85%. If case if the humidity is higher, you must increase the size by 1 grade as stated in below table.

Pipe	Outer diameter		Insulator (Cooling, Heating)				Remarks
			General [86 °F (30 °C), 85%]		High humidity [86 °F (30 °C), over 85%]		
			EPDM, NBR				
	mm	inch	mm	inch	mm	inch	
Liquid pipe	6.35~9.52	1/4~3/8	9	3/8	9	3/8	Heating resisting temperature over 248 °F (120 °C)
	12.7~50.8	1/2~2	13	1/2	13	1/2	
Gas pipe	6.35	1/4	13	1/2	19	3/4	
	9.52~25.4	3/8~1	19	3/4	25	1	
	28.58~44.45	1 1/8~1 3/4	19	3/4	32	1 1/4	
	50.8	2	25	1	38	1 1/2	

❋ When installing insulation in places and conditions below, use the same insulation that is used for high humidity conditions.

<Geological condition>

- High humidity places such as shoreline, hot spring, near lake or river, and ridge (when the part of the building is covered by earth and sand.)

<Operation purpose condition>

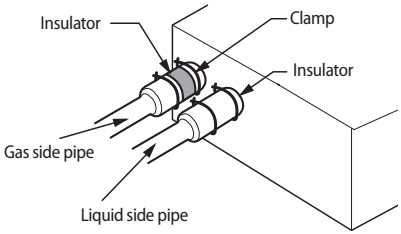
- Restaurant ceiling, sauna, swimming pool etc.

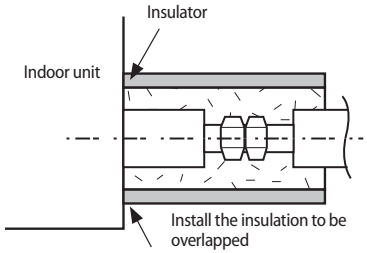
<Building construction condition>

- The ceiling frequently exposed to moisture and cooling is not covered. (e.g. The pipe installed at a corridor of a dormitory and studio or near an exit that opens and closes frequently.")
- The place where the pipe is installed is highly humid due to the lack of ventilation system.

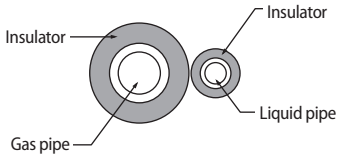
Insulate the refrigerant pipe

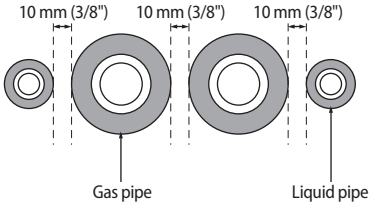
- ▶ Make sure to insulate the refrigerant pipe, branch joint, distribution header, and the connection part of the pipes.
- ▶ If you insulate the pipes, condensed water will not fall from the pipes.
- ▶ Check if there are any cracks on the insulation at the bent part of the pipe.





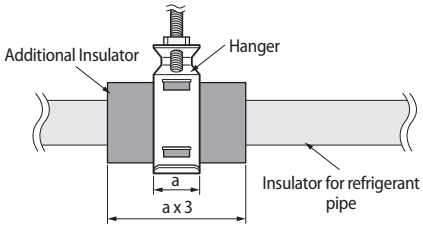
Insulating pipes	Insulating pipes connected behind the EEV kit
• The insulation of the gas and liquid pipes can be in contact with each other but they should not press excessively against each other. • When the gas side and liquid side pipes are contacting each other, increase the thickness of the insulation by 1 grade.	• When installing the gas side and liquid side pipes, leave at least 10 mm (3/8") of space. • When the gas side and liquid side pipes are contacting each other, increase the thickness of the insulation by 1 grade.





CAUTION

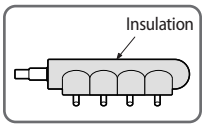
- Install the insulation without any gaps or cracks and use adhesive on the connection part of it to prevent moisture from entering.
- Bind the refrigerant pipe with insulation tape if it is exposed to outside sunlight. (When binding the pipe with finishing tape, be careful not to reduce the thickness of the insulation.)
- Install the refrigerant pipe respecting that the insulation does not get. thinner on the bent part or hanger of pipe.
- When the thickness of insulation is reduced, reinforce the reduced thickness with additional insulation.

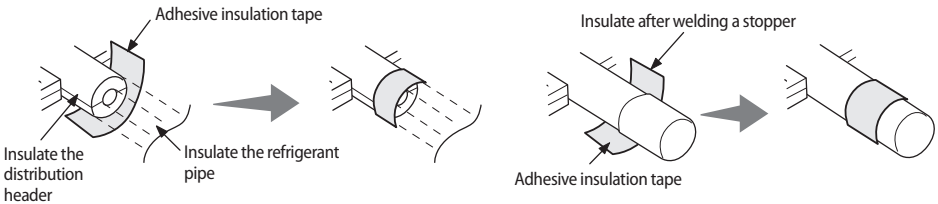


Pipe insulation

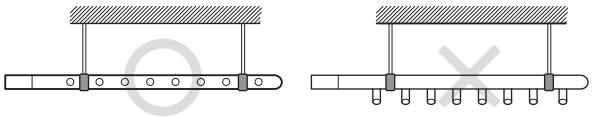
Insulate the distribution header

- Fix the distribution header with a cable tie and cover the connected part.
- Insulate the distribution header and the welded part and wrap the connected part with an adhesive insulation tape to prevent dew formation.



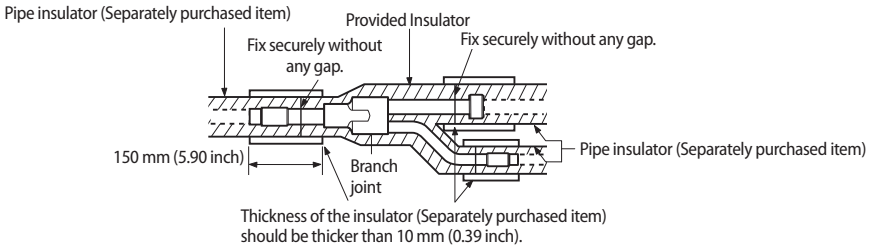


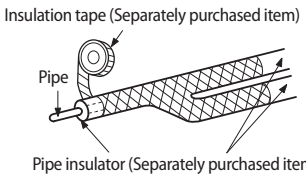
- Fix the distribution header with a hanger after insulating it.



Insulating the branch joint

- Tightly attach the insulator, provided with the branch joint, to the separately purchased insulator. Wrap the connected part with an insulator (separately purchased item) that has thickness of at least 10 mm (0.39 inch).
- Use an insulator that resist heat up to 248 °F (120 °C). Wrap the branch joint with an insulation that has thickness of at least 10 mm (0.39 inch).



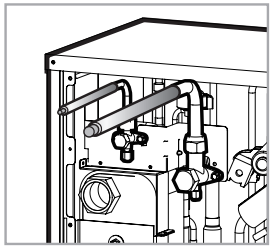
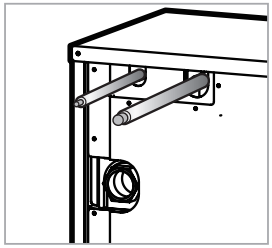


✻ Attach the adhesive insulation tape to the pipe, as shown in the picture, after insulating the pipe.

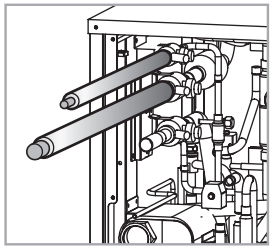
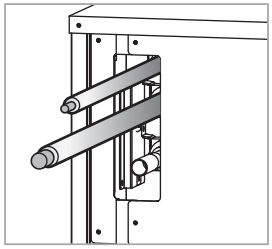
Insulating the pipe located inside of the outdoor unit

- With a pipe insulator, insulate the pipe up to whole service valve located inside of the outdoor unit.
- Seal the gap between the outdoor unit pipe and the insulator. Rainwater and dewdrops may soak through the gap between the pipe and the insulation of the outdoor unit installed on the outside.
- Separate the cover of the pipe and close it after insulation work. Only remove a knock-out hole cover where the pipe will be installed. If the knock-out hole is open unnecessarily, it must be closed. If not, small animals such as squirrels and rats may get into the unit through the hole and the unit may be damaged.

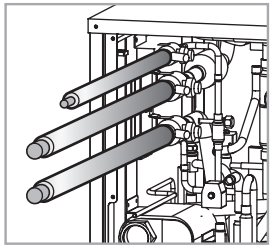
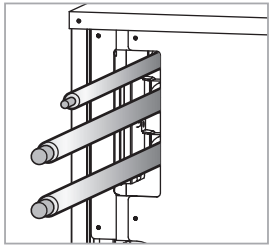
Heat pump (VPC038/048/055W4M-4P)

Heat pump (VRC***W4M-4Y / VRC***W4M-4G)

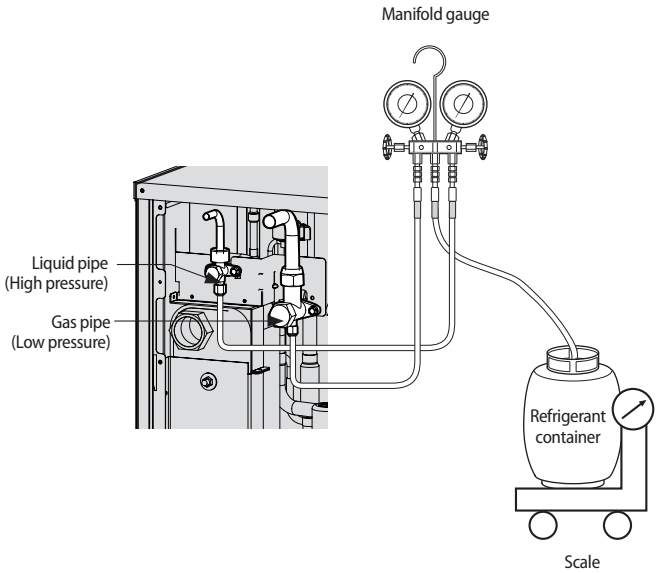
Heat recovery (VRC***W4M-4Y / VRC***W4M-4G)

Refrigerant collection

Collecting refrigerant (to a refrigerant container)

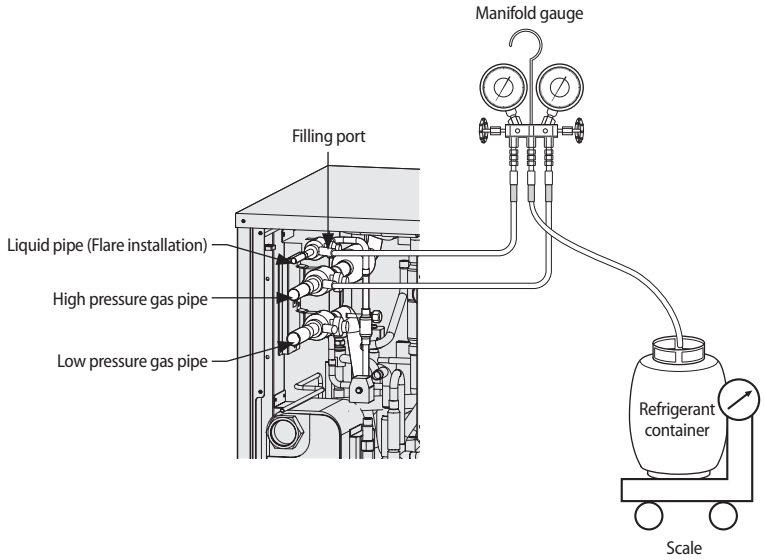
VPC038/048/055W4M-4P



VRC***W4M-4Y / VRC***W4M-4G

You cannot collect the entire refrigerant in the system at once during pump down operation. Therefore you must collect additional refrigerant into the empty refrigerant container prior to pump down operation.

1. Connect a refrigerant container to an outdoor unit as shown in the illustration and operate about 50 % of the indoor units in cooling mode.
2. When the pressure on the high pressure side is over 2.94 MPa (426 psi), decrease the number of operating indoor unit.
3. Open the manifold gauge (that is connected to the liquid side service valve) and the valve on the refrigerant container to collect refrigerant.

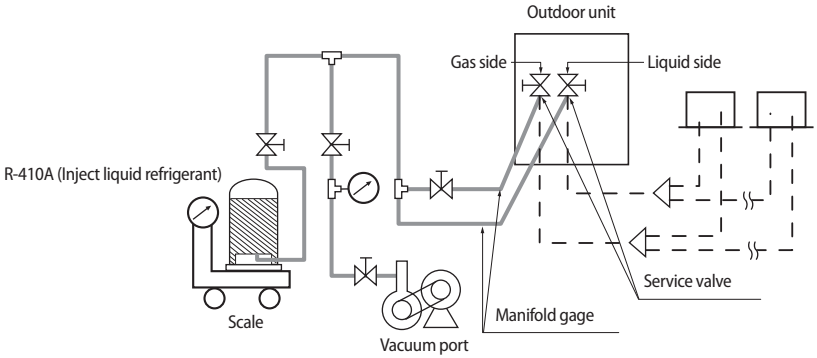


CAUTION
- Refrigerant must be collected prior to pump down operation.
- Make sure that amount of collecting refrigerant does not exceed capacity of the refrigerant container.
- Refer to service manual for detail instruction.

Charging refrigerant

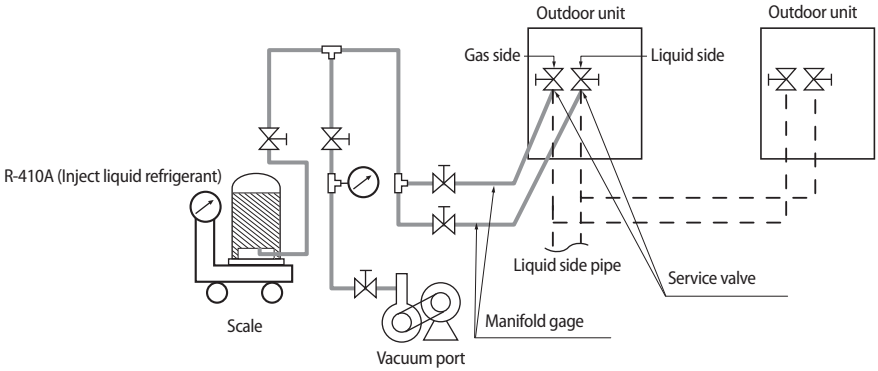
Single installation

- Open the manifold gauge valve connected to the liquid side service valve and add the liquid refrigerant.
- If you cannot add the whole quantity of the refrigerant while the outdoor unit is stopped, open the gas side and liquid side service valve. Then, add remaining refrigerant by pressing the refrigerant adding button of the outdoor PCB.



Module installation

- Open the manifold gauge valve connected to the liquid side service valve and add the liquid refrigerant.
- If you cannot add the whole quantity of the refrigerant while the outdoor unit is stopped, open the gas side and liquid side service valve. Then, add remaining refrigerant by pressing the refrigerant adding button of the outdoor PCB.
- If you use the refrigerant charging function from the PCB, outdoor unit will operate and charge the refrigerant. At this time, you must use gas side manifold gauge for cooling operation and use charging port for heating at the manifold gauge for heating operation.



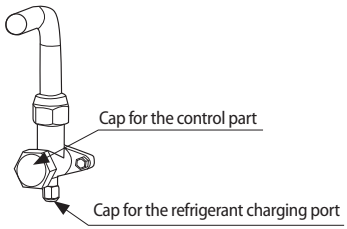
CAUTION

- Open the gas side and liquid side service valve completely after charging the refrigerant. (If you operate the Water-Cooled VRF with the service valve closed, the important parts may be damaged.)
- Put on safety equipment when charging refrigerant.
- Do not charge the refrigerant when you adjust or control other product such as indoor units or EEV kits.
- If you charge the refrigerant with the front cabinet open, be very careful with the fan on the top of the product to prevent personal injury.
- When the ambient temperature is low in winter time, do not heat the refrigerant container to speed up the charging process. There is risk of explosion.
- Beware for possibility of refrigerant leakage when you connect the manifold gauge to the charging port for heating.
- Close the valve of the refrigerant container immediately after charging the refrigerant. If not, there might be a change in entire amount of refrigerant.

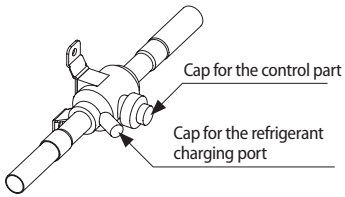
Using service valve for gas

- ▶ After charging the refrigerant, close all caps as shown in the illustration.
- ▶ Tightening torque for the cap of refrigerant charging port 10~12 N·m (7.4 ~ 8.9 lbf·ft)
- ▶ Tightening torque for the cap of control part 20~25 N·m (14.8 ~ 18.4 lbf·ft)
- ▶ Opening/closing torque for the valve
  - Over 19.05 mm (3/4 inch) : 10 N·m (7.4 lbf·ft)

VPC038/048/055W4M-4P



VRC*W4M-4Y / VRC***W4M-4G**



Basic segment display

Step	Display content	Display			
At initial power input	Checking segment display	SEG 1	SEG 2	SEG 3	SEG 4
		"8"	"8"	"8"	"8"
While setting communication between indoor and outdoor unit (Addressing)	Number of connected indoor units	SEG 1	SEG 2	SEG 3	SEG 4
		"A"	"d"	Number of communicated units ✻ Refer to "View Mode" for communication address	
After communication setting (usual occasion)	Transmit/Reception address	SEG 1	SEG 2	SEG 3	SEG 4
		I/U: "A" MSB: "C"	I/U: "0" MSB: "1"	Reception address (in decimal number)	

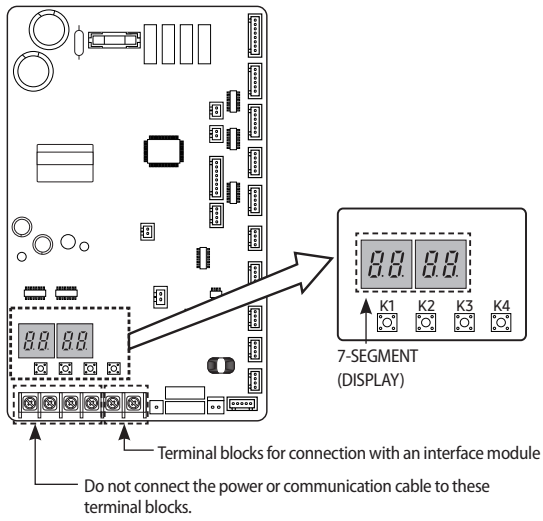
✻ I/U : Indoor unit

Setting outdoor unit option switch and key function

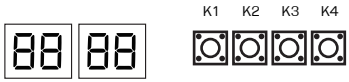
Setting outdoor unit option switches

Small chassis (VPC038/048/055W4M-4P)

1. PBA shape



2. Setting the number of connectiong indoor units



Step	Button	Display	Description	Remarks
The number of indoor units				
Step 1	Display of outdoor unit	7dnd	Required to set	-
Step 2	Press the K1 and K2 buttons for 2 seconds simultaneously.	7d00	Ready to set	Example) 03: 3 units 64: 64 units
	Press the K2 button n times.	7dX0	Tens digit (0 ~ 6)	
	Press the K4 button n times.	7d0X	Units digit (0 ~ 9)	
	Press the K4 button for 2 seconds - the number of connected indoor units is automatically detected.			
Step 3	Press the K2 button for 2 seconds to save the option and exit from menu. (System reset)			

3. Tact Switch Key Operation

KEY setting		
K1 (Number of press)	KEY operation	Display on 7-Segment
1 time	Refrigerant charging in Heating mode	H1
2 times	Trial operation in Heating mode	H2
3 times	Refrigerant discharging (Outdoor unit address 1)	H31
4 times	Vacuum (Outdoor unit address 1)	H41
5 times	End KEY operation	-
Press and hold	Auto inspection operation	HH

KEY setting		
K2 (Number of press)	KEY operation	Display on 7-Segment
1 time	Refrigerant charging in Cooling mode	H5
2 times	Trial operation in Cooling mode	H6
3 times	Pump down all units in Cooling mode	H7
4 times	Auto trial operation	H8
5 times	Checking the amount of refrigerant	H9 X X (Display of last two digits may differ depending on the progress)
6 times	Forced oil collection	HA
7 times	Inverter compressor 1 check	Hb
8 times	Water pipe connection inspection operation	Hc
9 times	Load inspection operation	Hd
10 times	End KEY operation	-

Setting outdoor unit option switch and key function

K3 (Number of press)	KEY operation	Display on 7-Segment
1 time	Initialize (Reset) operation	Same as initial state

View Mode			
Table. View mode 1			
K4 (Number of press)	Display content	Display	
		SEG 1	SEG 2,3,4
1 time	Outdoor Capacity	1	6 horsepower → 0,0,6
2 times	Target frequency (Compressor)	2	120Hz → 1,2,0
3 times	High pressure (kg/cm2)	3	15.2K → 1.5.2
4 times	Low pressure (kg/cm2) (Value of 1 second)	4	4.3K → 0.4.3
5 times	Discharge temperature (Compressor)	5	87 ℃ → 0.8.7
6 times	IPM temperature (Compressor)	6	87 ℃ → 0.8.7
7 times	CT sensor value (Compressor)	7	2 A → 0.2.0
8 times	Suction temperature	8	-42 ℃ → -.4.2
9 times	COND OUT temperature	9	-42 ℃ → -.4.2
10 times	Temperature of liquid pipe	A	87 ℃ → 0.8.7
11 times	TOP temperature (Compressor)	B	87 ℃ → 0.8.7
12 times	Water temperature	C	-42 ℃ → -.4.2
13 times	Main EEV step	D	2000 → 2.0.0
14 times	ESC EEV step	E	300 → 3.0.0
15 times	Current frequency of the compressor	F	120Hz → 1.2.0
16 times	Address of main indoor unit	G	When main indoor unit is not set → BLANK, N, D
			When indoor unit No.1 is set as main indoor unit → 0.0.1
17 times	Temperature of control box	H	-42 ℃ → -.4.2

Press K4 for 3 seconds to use View mode 2				
Table. View mode2				
K4 (Number of press)	Display content	Display		
		Page 1	Page 2	
1 time	Main version	MAIN	Version (Example: 1412)	
2 times	Water hub version	HUB2	Version (Example: 1412)	
3 times	Inverter 1 version	INV1	Version (Example: 1412)	
4 times	EEP version	EEP	Version (Example: 1412)	
5 times	Received units	AUTO	SEG1, 2	SEG3, 4
	Automatically assigned address		Indoor unit: "A", "0"	Address (Example: 07)
			MSB : "C","1"	
6 times	Received units	MANU	SEG1, 2	SEG3, 4
	Manually assigned address of the units		Indoor unit: "A", "0"	Address (Example: 15)

Installing and setting the option with tact switch

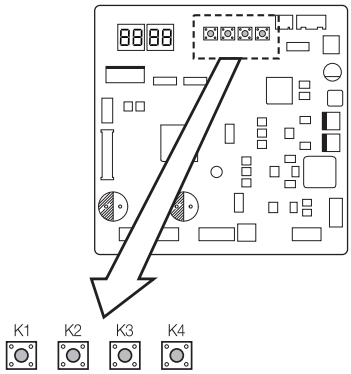
Refer to page 94 for the information about setting the option KEY.

Option item	Input unit	SEG1	SEG2	SEG3	SEG4	Funcion of the option	Remarks
Emergency operation for compressor malfunction	Individual	0	0	0	0	Disabled (Factory default)	E560 will occur when all the compressors are set as malfunction state.
				0	1	Set compressor 1 as malfunction state	
				0	2	Set compressor 2 as malfunction state (VRC***W4M-4* series)	
Cooling capacity correction	Main	0	1	0	0	7-9 (Factory default)	Targeted evaporation temperature [°C]. (When low temperature value is set, discharged air temperature of the indoor unit will decrease)
				0	1	5-7	
				0	2	9-11	
				0	3	10-12	
				0	4	11-13	
				0	5	12-14	
				0	6	13-15	
Heating capacity correction	Main	0	2	0	0	2.8 (Factory default)	Targeted high pressure [MPa]. (When low pressure value is set, discharged air temperature of the indoor unit will decrease)
				0	1	2.5	
				0	2	2.6	
				0	3	2.7	
				0	4	2.9	
				0	5	3.0	
				0	6	3.1	
				0	7	3.2	
				0	8	3.3	
Current restriction rate	Individual	0	3	0	0	100 % (Factory default)	When restriction option is set, cooling and heating performance may decrease.
				0	1	95 %	
				0	2	90 %	
				0	3	85 %	
				0	4	80 %	
				0	5	75 %	
				0	6	70 %	
				0	7	65 %	
				0	8	60 %	
				0	9	55 %	
				1	0	50%	
				1	1	Disable	
Oil collection interval	Main	0	4	0	0	Factory default	
				0	1	Shorten the interval by 1/2	
Disable	Main	0	5	0	0	Disable	
				0	1	Disable	
Disable	Individual	0	6	0	0	Disable	
				0	1	Disable	
Disable	Main	0	7	0	0	Disable	
				0	1	Disable	
				0	2	Disable	
				0	3	Disable	

Setting outdoor unit option switch and key function

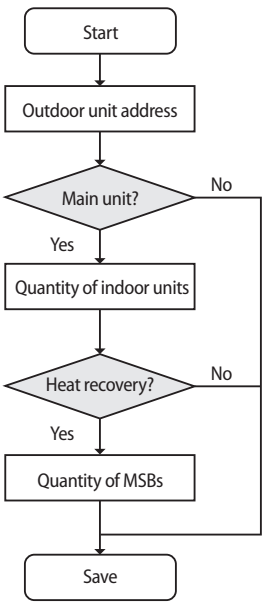
Option item	Input unit	SEG1	SEG2	SEG3	SEG4	Funcion of the option	Remarks
Setting high-head condition	Main	0	8	0	0	Disable (Factory default)	
				0	1	Level 1 of height difference type 1 (Indoor unit is lower than outdoor unit)	When outdoor unit is over 40 ~ 80 m (131'~ 263') above the indoor unit (VRC***W4M-4* series)
				0	2	Level 2 of height difference type 1 (Indoor unit is lower than outdoor unit)	When outdoor unit is over 80 m (263') above the indoor unit (VRC***W4M-4* series)
				0	3	Height difference type 2 (Outdoor unit is lower than indoor unit)	When indoor unit is over 30 m (98') above the outdoor unit
Setting long piping condition (Setting is unnecessary if high-head condition is set.)	Main	0	9	0	0	Disable (Factory default)	
				0	1	Long piping level 1	When equivalent length of farthest indoor unit from the outdoor unit is between 100~170 m (328'~558') (VRC***W4M-4* series)
				0	2	Long piping level 2	When equivalent length of farthest indoor unit from the outdoor unit is over 170 m (558') (VRC***W4M-4* series)
Energy saving setting	Main	1	0	0	0	Disable (Factory default)	
				0	1	Enable	The energy saving mode starts when the room temperature reaches desired temperature while operating in heating mode.
Disable	Main	1	1	0	0	Disable	This function is not applicable for this model.
				0	1	Enable	
Expand operational temperature range for cooling operation	Main	1	2	0	0	Disable	
				0	1	Enable	
Channel address	Main	1	3	A	U	Automatic setting (Factory default)	Address for classifying the product from upper level controller (Data Management Server)
				0 ~ 15		Manual setting for channel 0~15	
Disable	Main	1	4	0	0	Disable	This function is not applicable for this model.
				0	1	Disable	
Circulation water flow control	Main	1	5	0	0	Disable (Factory default)	When variable flow control valve is applied
				0	1	7-10 V	
				0	2	5-10 V	
				0	3	3-10 V	
Forced quiet mode (Disuse)	Main	1	6	0	0	Disable	
Disable	Main	1	7	0	0	Disable (Factory default)	Options for high-speed operation
				0	1	Enable	
Maximum cooling capacity restriction	Main	1	8	0	0	Enable	Maximum cooling capacity rescriction
				0	1	Disable	
Leaked refrigerant collection (Disuse)	Main	1	9	0	0	Disable	Leaked refrigerant collection
				0	1	Disable	
Circulation fluid flow setting	Individual	2	0	0	0	Water	Circulation fluid flow setting
				0	1	Antifreeze solution 1	
				0	2	Antifreeze solution 2	
				0	3	Water	

Setting outdoor unit option switches



▶ Setting outdoor install option

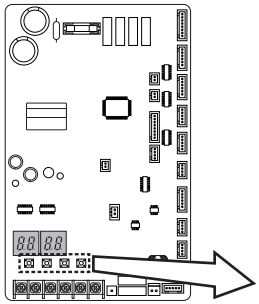
Step	Button	Display	Description	Note
Outdoor unit address				
Step1	Outdoor unit display	od nd	Setting required	-
Step2	Press (K1+K2) for 2 seconds	od 00	Unit address for module combination	00: Main unit
	K4 x 1 time	od 01		01: Sub1 unit
	K4 x 2 times	od 02		02: Sub2 unit
	K4 x 3 times	od 03		03: Sub3 unit
Step3	If it is main unit, go to step4. Otherwise, press K2 button for 2 seconds to save & exit (system will be reset)			
Quantity of indoor units				
Step4	Press K1	Id 00	Ready to set	-
Step5	K2 x n times	Id X0	Tens digit (0 ~ 6)	Ex) 03: 3 units 64: 64 units
	K4 x n times	Id 0X	Ones digit (0 ~ 9)	
	* K4: Press for 2 seconds - automatic detection of indoor units' quantity			
Step6	If it is heat recovery model, go to step 7. Otherwise, press K2 button for 2 seconds to save & exit (system will be reset)			
Quantity of MSBs * Heat recovery model only				
Step7	Press K1	nC 00	Ready to set	-
Step8	K2 x n times	nC X0	Tens digit (0 ~ 1)	Ex) 03: 3 units 16: 16 units
	K4 x n times	nC 0X	Ones digit (0 ~ 9)	
	* K4: Press for 2 seconds - automatic detection of MSBs' quantity			
Step9	Press K1	ht 00	Ready to set	00 : Heat pump system 01 : Heat recovery system
Step10	Press K4	ht 01	Ones digit(0~1)	
Step11	K2: long	Rd 00	Save	Restart
* Press K1 for 2 seconds to exit without save regardless of setting step.				



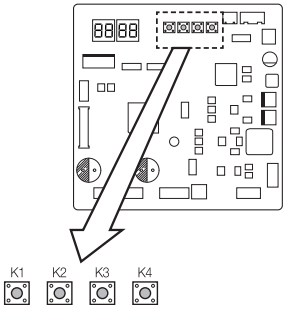
Setting outdoor unit option switch and key function

Setting outdoor unit key function

VPC038/048/055W4M-4P



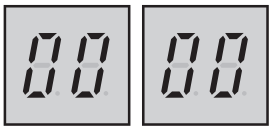
VRC***W4M-4Y / VRC***W4M-4G



Installing and setting the option with tact switch and explanation of the functions

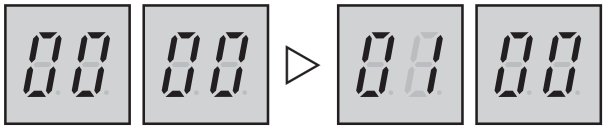
Setting the option

1. Press and hold K2 to enter the option setting. (Only available when the operation is stopped)
   - If you enter the option setting, display will show the following. (If you have set the 'Emergency operation for compressor malfunction', 1 or 2 will be displayed on Seg 4.)



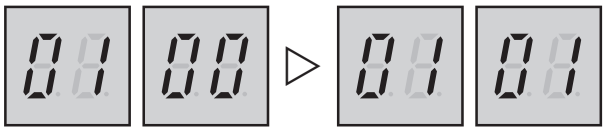
   - Seg 1 and Seg 2 will display the number for selected option.
   - Seg 3 and Seg 4 will display the number for set value of the selected option.
2. If you have entered option setting, you can shortly press the K1 switch to adjust the value of the Seg 1, Seg 2 and select the desired option. (Refer to pages 95 ~ 98 for the Seg number of the function for each option)

   Example)



3. If you have selected desired option, you can shortly press the K2 switch to adjust the value of the Seg 3, Seg 4 and change the function for the selected option. (Refer to pages 95 ~ 98 for the Seg number of the function for each option)

   Example)



4. After selecting the function for options, press and hold the K2 switch for 2 seconds. Edited value of the option will be saved when entire segments blinks and tracking mode begins.

CAUTION
- Edited option will not be saved if you do not end the option setting as explained in above instruction.

❋ While you are setting the option, you may press and hold the K1 button to reset the value to previous setting.

❋ If you want to restore the setting to factory default, press and hold the K4 button while you are in the option setting mode.
  - If you press and hold the K4 button, setting will be restored to factory default but it doesn't mean that restored setting is saved. Press and hold the K2 button. When the segments shows that tracking mode is in progress, setting will be saved.

Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Emergency operation for compressor malfunction	Individual	0	0	0	0	Disabled (Factory default)	E560 will occur when all the compressors are set as malfunction state.
				0	1	Set compressor 1 as malfunction state	
				0	2	Set compressor 2 as malfunction state	
Cooling capacity correction	Main	0	1	0	0	7-9 (Factory default)	Targeted evaporation temperature [℃]. (When low temperature value is set, discharged air temperature of the indoor unit will decrease)
				0	1	5-7	
				0	2	9-11	
				0	3	10-12	
				0	4	11-13	
				0	5	12-14	
				0	6	13-15	
Heating capacity correction	Main	0	2	0	0	2.8 (Factory default)	Targeted high pressure [MPa]. (When low pressure value is set, discharged air temperature of the indoor unit will decrease)
				0	1	2.5	
				0	2	2.6	
				0	3	2.7	
				0	4	2.9	
				0	5	3.0	
				0	6	3.1	
				0	7	3.2	
				0	8	3.3	

Setting outdoor unit option switch and key function

Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Current restriction rate	Individual	0	3	0	0	100% (Factory default)	When restriction option is set, cooling and heating performance may decrease.
				0	1	95 %	
				0	2	90 %	
				0	3	85 %	
				0	4	80 %	
				0	5	75 %	
				0	6	70 %	
				0	7	65 %	
				0	8	60 %	
				0	9	55 %	
				1	0	50 %	
				1	1	No restriction	
Oil collection interval	Main	0	4	0	0	Factory default	
				0	1	Shorten the interval by 1/2	
Disable	Main	0	5	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Disable	Individual	0	6	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Disable	Main	0	7	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
				0	2	Disable	
				0	3	Disable	
Setting high-head condition	Main	0	8	0	0	Disable (Factory default)	
				0	1	Level 1 of height difference type 1 (Indoor unit is lower than outdoor unit)	When outdoor unit is over 40 ~ 80 m (131'~263') above the indoor unit
				0	2	Level 2 of height difference type 1 (Indoor unit is lower than outdoor unit)	When outdoor unit is over 80 m (263') above the indoor unit
				0	3	Height difference type 2 (Outdoor unit is lower than indoor unit)	When indoor unit is over 30 m (98') above the outdoor unit

Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Setting long-piping condition (Setting is unnecessary if high-head condition is set.)	Main	0	9	0	0	Disable (Factory default)	
				0	1	Long piping level 1	When equivalent length of farthest indoor unit from the outdoor unit is between 100~170 m (328'~558')
				0	2	Long piping level 2	When equivalent length of farthest indoor unit from the outdoor unit is over 170 m (558')
Energy saving/ rapid cooling setting	Main	1	0	0	0	Disable (Factory default)	
				0	1	Energy saving mode	Energy saving mode triggers when the room temperature reaches desired temperature while operating in cooling or heating mode.
				0	2	Rapid cooling	This function increases cooling speed.
Disable	Main	1	1	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Expand operational temperature range for cooling operation	Main	1	2	0	0	Disable	
				0	1	Enable	
Channel address	Main	1	3	A	U	Automatic setting (Factory default)	Address for classifying the product from upper level controller (Data Management Server)
				0 ~ 15		Manual setting for channel 0~15	
Disable	Main	1	4	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Circulation water flow control	Individual	1	5	0	0	Disable (Factory default)	
				0	1	7-10 V	When variable flow control valve is applied
				0	2	5-10 V	
				0	3	3-10 V	
Forced quiet mode (Disuse)	Main	1	6	0	0	Disused option	
High-speed operation	Main	1	7	0	0	Disable (Factory default)	High-speed operation
				0	1	Enable	
Max. capacity restriction	Main	1	8	0	0	Enable	Maximum cooling capacity restriction
				0	1	Disable	
Gasleak Pumpdown	Main	1	9	0	0	Disable	Leaked refrigerant collection
				0	1	Enable	

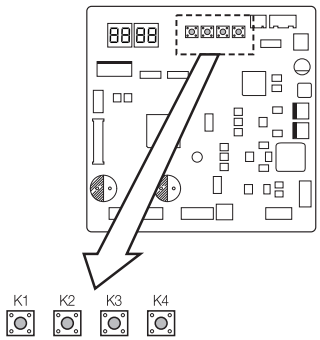
Setting outdoor unit option switch and key function

Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Note 1) Circulation fluid flow setting	Individual	2	0	0	0	Water	Circulation fluid flow setting
				0	1	Anti-freeze solution 1	
				0	2	Anti-freeze solution 2	
Disable	Main	2	1	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Emergency operation for indoor unit communication error	Main	2	2	0	0	Disabled (Factory default)	When set, emergency operation is possible even if an indoor communication error occurs.
				0	1	Indoor high humidity condition (operating for up to 12hours)	
				0	2	Indoor low humidity condition (operating for up to 24hours)	

Note 1) Anti-freeze solution 1: Freezing point of anti-freeze must be below‘17.6℉ (-8℃).
(Minimum temperature of entering water: 23℉ (-5℃))
Anti-freeze solution 2: Freezing point of anti-freeze must be below 5℉ (-15 ℃).
(Minimum temperature of entering water: 14℉ (-10℃))

❋ There is a risk of water leakage during emergency operation for indoor unit communication error. Please be careful when using it.

Setting outdoor unit key funtion



K1 (Number of press)	KEY operation	Display on segment
Press and hold 1 time	Auto trial operation	"K""K""BLANK""BLANK"
1 time	Refrigerant charging in Heating mode	"K""1""BLANK""BLANK"
2 times	Trial operation in Heating mode	"K""2""BLANK""BLANK"
3 times	Pump out in Heating mode (Outdoor unit address 1)	"K""3""BLANK""1"
4 times	Pump out in Heating mode (Outdoor unit address 2)	"K""3""BLANK""2"
5 times	Pump out in Heating mode (Outdoor unit address 3)	"K""3""BLANK""3"
6 times	Pump out in Heating mode (Outdoor unit address 4)	"K""3""BLANK""4"
7 times	Vacuumig (Outdoor unit address 1)	"K""4""BLANK""1"
8 times	Vacuumig (Outdoor unit address 2)	"K""4""BLANK""2"
9 times	Vacuumig (Outdoor unit address 3)	"K""4""BLANK""3"
10 times	Vacuumig (Outdoor unit address 4)	"K""4""BLANK""4"
11 times	Vacuuming (All outdoor units)	"K""4""BLANK""A"
12 times	End Key operation	-

Setting outdoor unit option switch and key function

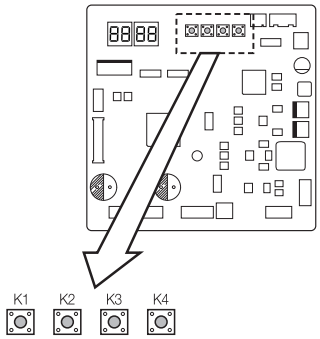
K2 (Number of press)	KEY operation	Display on segment
1	Refrigerant charging in Cooling mode	K - 5 - BLANK - BLANK
2	Trial operation in Cooling mode	K - 6 - BLANK - BLANK
3	Pump down all units in Cooling mode	K - 7 - BLANK - BLANK
4	HR: Pipe connection inspection H/P: Auto trial operation	K - 8 - BLANK - BLANK
5	Checking the amount of refrigerant	K - 9 - X - X (Display of last two digits may differ depending on the status)
6	Discharge mode of DC link voltage	K - A - BLANK - BLANK
7	Forced oil collection	K - C - BLANK - BLANK
8	Inspect inverter compressor 1	K - D - BLANK - BLANK
9	Inspect inverter compressor 2	K - E - BLANK - BLANK
10	Water pipe valve/Pump check	K - F - BLANK - BLANK
11	Cooling fan/Flow control valve check	K - G - BLANK - BLANK
12	End key operation	-

❋ During "Discharge mode of DC link voltage", voltage of INV1 and INV2 will be displayed alternately.

❋ Even when the outdoor unit power is off, it is dangerous when you come in contact with inverter PCB and fan PCB since they are charged with high DC voltage.

❋ When there were error, 'Discharge mode of DC link voltage' may not have been effective. Especially if error E464 and E364 have been occurred, power element might be damaged by fire and therefore, do not use the 'Discharge mode of DC link voltage'.

K3 (Number of press)	KEY operation	Display on segment
1 time	Initialize (Reset) setting	Same as initial state



K4 (Number of press)	KEY operation	Display on segment	
		SEG 1	SEG2, 3, 4
1 time	Outdoor unit model	1	(a) Capacity → Off, 1, 2
2 times	Target frequency (Compressor 1)	2	120 Hz → 1, 2, 0
3 times	Target frequency (Compressor 2)	3	120 Hz → 1, 2, 0
4 times	High pressure (MPa)	4	1.52 MPa → 1, 5, 2
5 times	Low pressure (MPa)	5	0.43 MPa → 0, 4, 3
6 times	Discharge temperature (Compressor 1)	6	87 ℃ → 0, 8, 7
7 times	Discharge temperature (Compressor 2)	7	87 ℃ → 0, 8, 7
8 times	IPM temperature (Compressor 1)	8	87 ℃ → 0, 8, 7
9 times	IPM temperature (Compressor 2)	9	87 ℃ → 0, 8, 7
10 times	CT sensor value (Compressor 1)	A	2 A → 0, 2, 0
11 times	CT sensor value (Compressor 2)	B	2 A → 0, 2, 0
12 times	Suction temperature	C	-42 ℃ → -, 4, 2
13 times	COND OUT temperautre	D	-42 ℃ → -, 4, 2
14 times	Temperature of liquid pipe	E	-42 ℃ → -, 4, 2
15 times	TOP temperature (Compressor 1)	F	-42 ℃ → -, 4, 2
16 times	TOP temperature (Compressor 2)	G	-42 ℃ → -, 4, 2
17 times	Water temperature	H	-42 ℃ → -, 4, 2
18 times	EVI inlet temperature	I	-42 ℃ → -, 4, 2
19 times	EVI outlet temperature	J	-42 ℃ → -, 4, 2
20 times	Main EEV 1 step	K	2000 steps → 2, 0, 0
21 times	Main EEV2 step	L	2000 steps → 2, 0, 0
22 times	EVI EEV step	M	300 steps → 3, 0, 0
23 times	HR EEV step	N	2000 steps → 2, 0, 0
24 times	-	O	-

Setting outdoor unit option switch and key function

K4 (Number of press)	KEY operation	Display on segment	
		SEG 1	SEG2, 3, 4
25 times	Current frequency of the compressor 1	P	120 Hz → 1, 2, 0
26 times	Current frequency of the compressor 2	Q	120 Hz → 1, 2, 0
27 times	Suction 2 temperature	R	-42 ℃ → -, 4, 2
28 times	Address of main indoor unit	S	When main indoor unit is not set → BLANK, N, D When indoor unit No.1 is set as main indoor unit →0, 0, 1
29 times	Temperature of control box	T	-42 ℃ → -, 4, 2

(a) When pressing K4 key 1 time, below number is displayed on segment depending on model.

Model	Display on segment
VRC072W4M-4*	Off, 0, 8
VRC096W4M-4*	Off, 1, 0
VRC120W4M-4*	Off, 1, 2
VRC192W4M-4*	Off, 2, 0
VRC240W4M-4*	Off, 2, 5

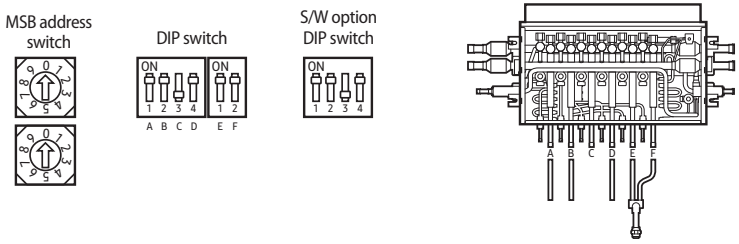
K4 (Number of press) Press and hold the K4 to enter the setting	Displayed content	Display on segment			
		page1	page2		
1 time	Main version	MAIN	Version (ex. 1412)		
2 times	Hub version	HUB	Version (ex. 1412)		
3 times	Water hub version	HUB2	Version (ex. 1412)		
4 times	Inverter 1 version	INV1	Version (ex. 1412)		
5 times	Inverter 2 version	INV2	Version (ex. 1412)		
6 times	EEP version	EEP	Version (ex. 1412)		
7 times	Automatically assigned address of the units	AUTO	SEG1	SEG2	SEG3, 4
			Indoor unit: "A" MSB: "C"	Indoor unit: "0" MSB: "1"	Address (ex: 07)
8 times	Manually assigned address of the units	MANU	SEG1	SEG2	SEG3, 4
			Indoor unit: "A"	Indoor unit: "0"	Address

Setting the MSB and Pipe Addresses (for Heat recovery Only)

You can set the MSB address, the MSB ports to use, and the address for each MSB port connected to each indoor unit.
It is for 2nd-generation MSB only. (V1MSBB06HR,V1MSBB04HR,V1MSBB02HR,V1MSBB01HR)

Setting the MSB address and the MSB ports to use

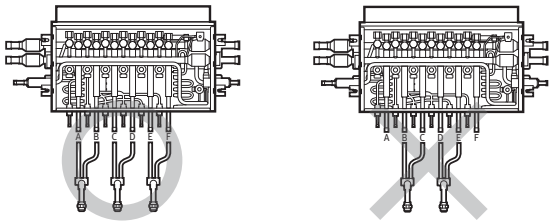
You can set the MSB address and the MSB ports on the MSB PBA.



1. Set the MSB address switch to a value. If two or more MSBs are installed, be sure to set a unique value for each MSB. For the MSB address, you can set a value from 0 to 15.
2. For each MSB ports that are connected to an indoor unit through piping, set their DIP switch to ON. For other MSB ports, set their DIP switches to OFF.
   You can find the address (A to F) of an MSB port on the indoor unit piping connection.
3. If two MSB ports are connected to an indoor unit through a Y-joint, set the relevant S/W option DIP switch to the settings given in the following table:

S/W option DIP switch No.	ON (Individual connection)	OFF (Shared connection)
1	Each of ports A and B	Both ports A and B
2	Each of ports C and D	Both ports C and D
3	Each of ports E and F	Both ports E and F

✻ You cannot make a shared connection for the two ports B and C, and D and E at the same time.



4. Set the address of each MSB port that is connected to an indoor unit by taking the procedures in Setting the Pipe Addresses Manually or Setting the Pipe Addresses Automatically. (Auto pipe pairing operation)

CAUTION

- If the following models are connected, set the pipe addresses manually by referring to Setting the Pipe Addresses Manually.
  - OAP duct (VOSC***S4-4P), Hydro Unit HE (VHEC***S4-4P), Hydro Unit HT(VHTC***S4-4P)

Setting the MSB and Pipe Addresses (for Heat recovery Only)

Setting the Pipe Addresses Manually

You can use the wired or wireless remote control or the Lennox Service Software to set the pipe addresses for each indoor unit.

Setting by using the wired or wireless remote control (For how to operate the remote control buttons, see the remote control user manual.)

1. Turn on both the indoor unit and the remote control.
2. Enter the "Option setting mode" on the remote control.
3. Set the address of each MSB port that is connected to an indoor unit by referring to the following table.
   (You can also set the address of each indoor unit.)

Option	SEG1	SEG2	SEG3	SEG4	SEG5	SEG6
Value	0	A: Address setting mode	0: The address of the indoor unit will not be set. 1: The address of the indoor unit will be set.	0 to 9: Hundreds digit of the indoor unit address	0 to 9: Tens digit of the indoor unit address	0 to 9: Units digit of the indoor unit address
Option	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
Value	1	0	0: The RMC address will not be set. 1: The RMC address will be set.	0	0 to F: RMC group channel	0 to F: RMC group address
Option	SEG13	SEG14	SEG15	SEG16	SEG17	SEG18
Value	2	0	0: The MSB address will not be set. 1: The MSB address will be set.	0 to 1: Tens digit of the MSB address	0 to 9: Units digit of the MSB address	A to F: MSB port address
Option	SEG19	SEG20	SEG21	SEG22	SEG23	SEG24
Value	3	0	0	0	0	0

Examples> If the indoor unit whose address is not yet set is connected to port A on the MSB 1, set 0A0000-100000-20101A-300000.

If the indoor unit whose address is set to 9 is connected to port B on the MSB 2, set 0A1009-100000-20102B-300000.

Setting by using Lennox Service Software

▶ Set the pipe addresses by using Add-on > Change address on Lennox Service Software. (For more information, see the Lennox Service Software Help.)

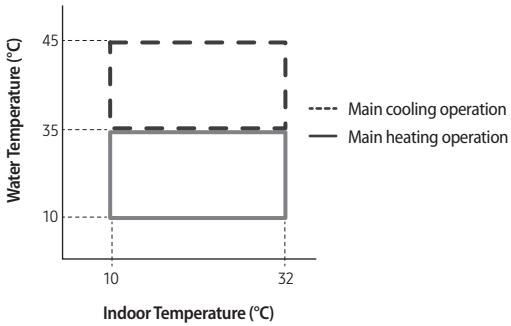
Setting the Pipe Addresses Automatically (Auto pipe pairing operation)

You can use the Automatic pipe-address setting operation to automatically set the address of each MSB port that is connected to an indoor unit.

If an MSB port is set incorrectly or a pipe between an MSB and an indoor unit is connected incorrectly, that indoor unit is indicated.

Check items before running the Auto pipe pairing operation

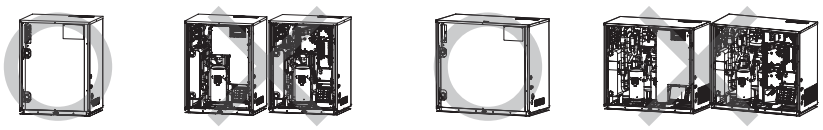
1. Ensure that the service valve of the outdoor unit is open.
2. Ensure that the power cables and communication cables of the indoor and outdoor units are correctly connected.
3. Turn on the indoor and outdoor units 6 hours before running the Automatic pipe-address setting operation to warm up both units sufficiently.
4. Before turning on the power, check whether the voltages and phases are correct by using a voltmeter and a phase tester.
   - Check for the R, S, T, and N terminals: ensure that 380-415V is read between lines (R-S, S-T, T-R) and 200-240V (R-N, S-N, T-N) between phases.
5. After the power is turn on, set the devices (indoor unit, MSB, and others) that are connected to the outdoor unit, and set the options.
   Note that, before the MSB port addresses are set, MSB port setting errors (E216, 217, 218) may occur. You can run the Automatic pipe-address setting operation regardless of MSB port setting errors.
6. If the OAP(Outdoor Air Precessing) Duct or Hydro unit is connected, set the pipe addresses manually referring to [Setting the Pipe Addresses Manually].
7. Check the operating temperature for the Automatic pipe-address setting operation:
   If this operation is run at a temperature out of the operating temperature range, the addresses set automatically may be incorrect. Set the pipe addresses manually by referring to Setting the Pipe Addresses Manually.
8. Auto pipe-pairing operation does not work within 3 minutes after power on and reset due to communication check.



[Operating temperature for the Auto pipe pairing operation]

Setting the MSB and Pipe Addresses (for Heat recovery Only)

❋ Before running the Auto pipe pairing operation, be sure to close the front cabinet. If this operation is run with the front cabinet open, the product may be damaged and the pipe addresses cannot be correctly recognized.



To run the Auto pipe pairing operation, take the following steps:

1. Press the K2 button 12 times on the B type main PBA of the outdoor unit to start the Auto pipe pairing operation. (Display : H88.)

Water temperature < 35 °C	30°C < Water temperature
Main heating operation	Main cooling operation

   Each step is indicated on the outdoor unit display. (The whole operation takes about 25 to 55minutes normally, depending on the number of indoor units connected. However, it can be operated for up to 2 hours to protect the compressor.)
   - Step 1 (Start H01) → Steps 2 to 8 (Setup H08) → Step 9 (Check H09) → Step 10 (Confirmation H10)
2. When the Auto pipe pairing operation finishes, the following data is shown on the outdoor unit display.

Result	Outdoor unit display	Description
Setting completed	End	
Setting error	E191 ⟷ Indoor unit data (displayed alternately)	Indoor unit data - SEG 1,2 = indoor unit address / SEG 3,4 = error status 00: An MSB port is not disabled, or a pipe is not connected. 01: Cooling only indoor unit is connected to MSB. 02: The shared setting for two ports is incorrect. Example) When the MSB port connected to the indoor unit 12 is disabled, E191 and 1200 are displayed alternately - If two or more indoor units have setting errors, the data about the next indoor unit is displayed each time you press the K2 switch.

CAUTION

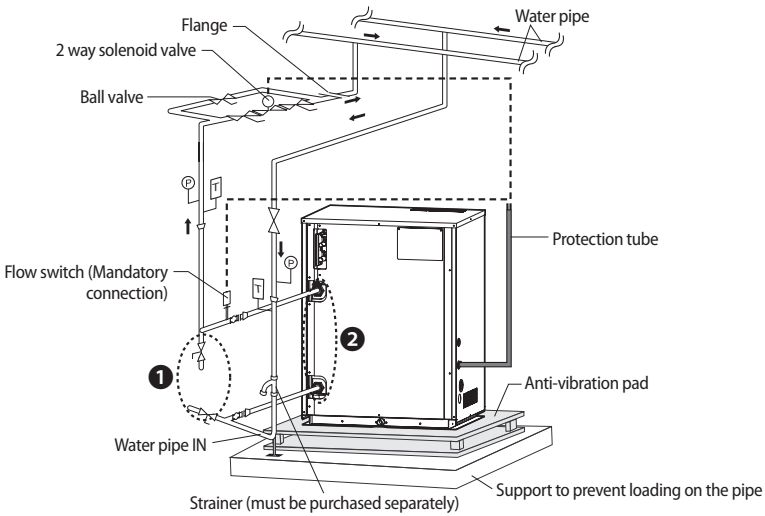
- If the MSB ports to use are set incorrectly, the Auto pipe pairing operation may stop due to high-pressure or low-pressure protection control or the data about the indoor unit that has a MSB port setting error may be incorrect. Ensure that the MSB ports to use are set correctly.
- Depending on the indoor and water temperature, the Auto pipe pairing operation may stop due to protection control.
- If an error occurs while the Auto pipe pairing operation is running, check the error code and take actions.
- If you cannot finish the Auto pipe pairing operation because of the previous reasons, set the pipe addresses manually by referring to Setting the Pipe Addresses Manually.

Water pipe installation

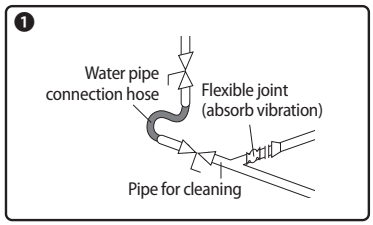
It is recommended to use closed circuit cooling tower. If open cooling tower is applied, use intermediate heat exchanger and make sure that supplied heat source water system is closed circuit.

Water pipe installation

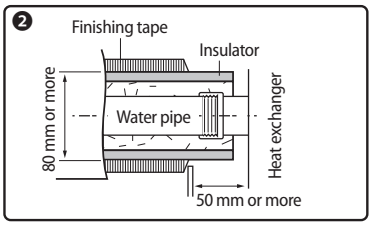
<Water pipe diagram>



[Connecting pipe before test operation]



[Pipe connection part]



❋ From above illustration, flow switch (mandatory) and 2 way solenoid valve (optional) must be at least equivalent to the specification recommended by our company and they should be installed horizontally.

❋ The FPT of the water pipe inlet and outlet is NPT internal thread.

CAUTION

When water pipe circuit freezes, it will cause damage to the plate type heat exchanger and therefore preventive measure must be taken according to the situation.

- Drain remaining water in the water pipe when it will not be used for long period of time
- Constantly operate the water pump to circulate the water within the water pipe
- Install self-regulating heat cable on the water pipes

Water pipe installation

❋ Design condition

Type	Circulating water	Operation	Inlet water temperature		Remarks
			Main usage range	Usage range limit Note 3)	
Heat source water	Water loop	Cooling	68 ~ 95 °F (20 ~ 35 °C)	50 ~ 113 °F (10 ~ 45 °C)	Refer to 'Cooling water management ' on page 121
		Heating			
Ground heat source Note1)	Ground loop	Cooling	59 ~ 95 °F (15 ~ 35 °C)	50 ~ 113 °F (10 ~ 45 °C)	
		Heating	41 ~ 77 °F (5 ~ 25 °C)	23 ~ 113 °F (-5 ~ 45 °C)	
				14 ~ 113 °F (-10 ~ 45 °C) Note 2)	

Note 1): Anti-freeze must be used when temperature of water inlet for heating is below 50 °F (10 °C) or ground heat source is used. Maintain appropriate concentration level of anti-freeze according to temperature of water inlet.

Note 2): Strict management of anti-freeze concentration level is required. Consult Lennox before application.

Note 3): When inlet water temperature is outside of limit, consult Lennox before application.

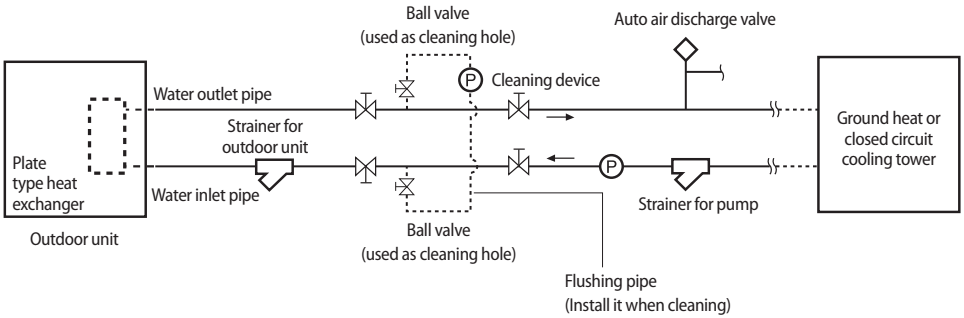
1. Refer to following table, for diameter of the outdoor unit connection part where water pipe will be connected. If you install outdoor units with different capacities, install a flow control valve to secure rated flow for each outdoor unit. Socket must be connected within below tightening torque. If the tightening torque exceeds below value, it may cause product breakage.

VPC038/048/055W4M-4P VRC072/096/120/192W4M-4*	VRC240W4M-4*
NPT 1-1/4 (NPT Internal thread)	NPT 2 (NPT Internal thread)

Outer diameter of water pipe		Tightening torque
mm	inch	N·m
10 ~ 20	0.39 ~ 0.79	25
21 ~ 30	0.83 ~ 1.18	50
31 ~ 50	1.22 ~ 1.97	100
51 ~ 80	2.0 ~ 3.15	220
81 ~ 115	3.19 ~ 4.53	600

2. Use certified parts for water pipe system and the water pressure of the water pipe system connected to outdoor unit must remain under 1.96 MPa (285 psi).
3. Outdoor unit water pipes must be equipped with valves and other instrumentations as shown in the figure on the previous page. Strainer and flow switch must be installed within 1 ~ 2 m (3.3 ~ 6.6 ft) from the entrance pipe of the outdoor unit. (Strainer must be installed on entrance side)
   - When strainer is not installed, sand, dust or rust debris may cause product breakage.
   - Make sure to install a flow switch that works at minimum discharge. When optimal discharge level is not reached, heat exchanger within the outdoor unit may break.
4. Water inlet pipe is located at the bottom part of the heat exchanger and the water outlet pipe is at the top part of the heat exchanger.
5. Outdoor unit must be installed indoor at room temperature and the water inlet and outlet of the outdoor unit must be insulated with the heat exchanger as shown in the illustration.
6. Damp-proof, cold reserving and insulation work must be done thoroughly to prevent condensation from forming on the surface of the product and drain pipes of indoor/outdoor units. When the necessary work is not done thoroughly, you will waste energy caused by thermal loss and may get property damage during cold seasons when water pipe freezes and bursts.

7. If you stop the product for long time or in night time, water pipe circuit may freeze naturally when the temperature around the outdoor unit is under 32 °F (0 °C). When water pipe circuit freezes, it will cause damage to the plate type heat exchanger and therefore preventive measure must be taken according to the situation.
   - Drain remaining water in the water pipe
   - Operate continuous water circulation pump during outdoor unit operation, 1~5 minutes before the operation and 1~5 minutes after operation stops
   - Install self-regulating heat cable on the water pipes
8. When inlet water temperature is lower than 50 °F (10 °C), appropriate anti-freeze must be used according to the temperature. (Set the outdoor unit option switch according to the usage temperature.)
   - When lowest inlet water temperature is 23 °F (-5 °C), freezing point of anti-freeze must be lower than 17.6 °F (-8 °C)
   - When lowest inlet water temperature is 14 °F (-10 °C), freezing point of anti-freeze must be lower than 5 °F (-15 °C)
9. Install number of auto air vent valve at a point where air may remain within the pipe (such as vertical water pipe). If the air within the pipe is not vented, it may cause performance decrease or corrosion on the product or pipes.
10. Keep the inlet water temperature within 'Main usage range'. If not, product may not work continuously.
11. Water scale may occur on the plate type heat exchanger depending on the water quality and the type of plate heat exchanger so regular chemical cleaning is necessary. When installing water pipes, install a heat source water shut-off valve and also install the flushing pipe with a ball valves (for chemical cleaning) on the pipe installed between the shut-off valve and the outdoor unit.



12. Before trial operation, connect the flushing pipes installed on inlet and outlet as shown in above illustration. Then, take appropriate measures (such as blind flange etc) to stop the circulation water from entering the outdoor unit plate type heat exchanger, and use circulating pump to remove foreign substance within the water pipes and clean the strainer. When foreign substances accumulates on outdoor unit plate type heat exchanger, it may break the heat exchanger or cause problem to it.
13. For legal facilities, install digital sensor and flow meter on the water pipe for monitoring.

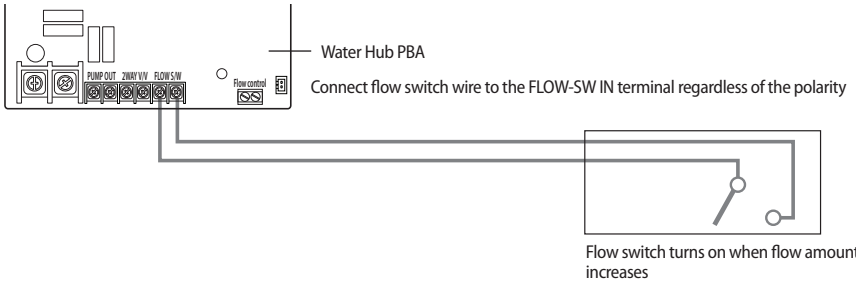
CAUTION

- Open the valve of the water pipe connected to the outdoor unit after flushing (cleaning foreign substances in water pipe) is completed.
- Check that air is vented from the water pipe and circulation amount is secured before opening the service valve on the refrigerant side of the outdoor unit.
- When circulating water stops during outdoor nit operation, it may cause breakage on plate type heat exchanger. Check the flow of circulation with flow switch or other devices.

External contact connection

Flow switch connection (Mandatory connection)

- When flow switch is used, it will receive signal of the heat source water circulation and detects if there is any problem on water circulation before operating the outdoor unit.
- When there is no contact signal input to the flow switch, it will be diagnosed as 'Problem with the heat source water circulation' and outdoor unit will stop operating to protect outdoor unit.

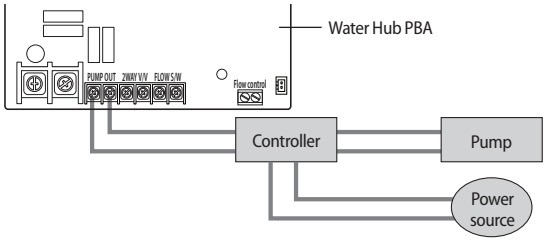


CAUTION

- Pump out, 2 way solenoid valve, flow switch can be used individually or together.
- For installation location of the 2 way solenoid valve and flow switch, Refer to 'Water pipe diagram' on page 103.

Pump out connection

- When the main pump is installed to common water pipe, powerless contact signal will be provided. (Refer to 'Installation example of extra controller such as 2 way solenoid valve and pump etc' in page 109 ~ 110.)

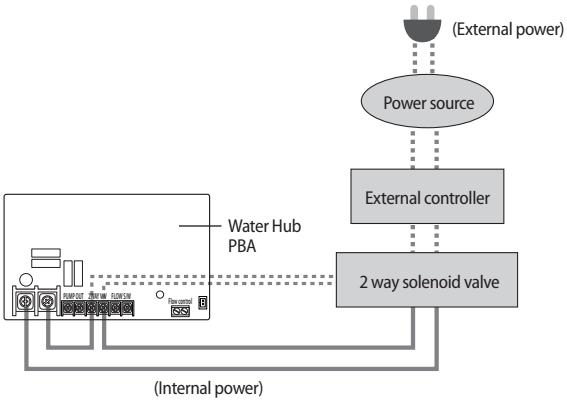


Explanation of optional functions

2 way solenoid valve

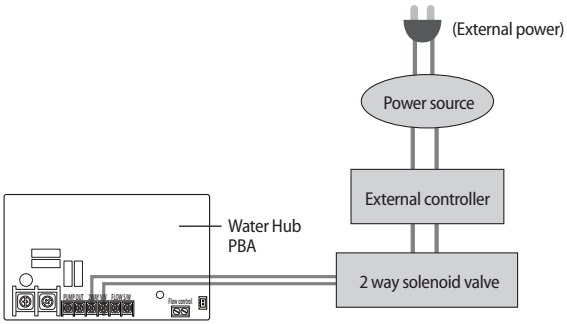
- When installing multiple number of outdoor units to a common water pipe, 2 way valve will cut the cooling water supply to an outdoor unit that is not operating, so it will increase the overall efficiency of the system. 2 way solenoid valve will operate automatically depending on the operation status of the indoor and outdoor units. (Outputs contact signal)
- You may select either internal or external power cable connection for the 2 way solenoid valve.

208~230 V [VRC***W4M-4Y, VPC***W4M-4P] models (Both internal/external power can be used)



✻ Connect the 2 way solenoid valve cable to the 2 way valve terminal regardless of the polarity.
(However, Use external power if the load of solenoid valve is maximum 250 V and current over 0.2 A.)

460 V [VRC***W4M-4G] models (Only external power can be used)



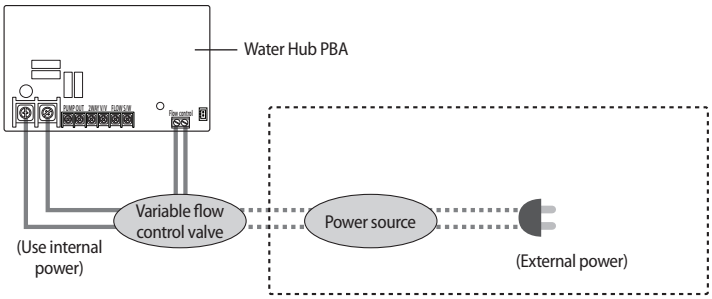
✻ Connect the 2 way solenoid valve cable to the 2 way valve terminal regardless of the polarity.

Explanation of optional functions

Flow control

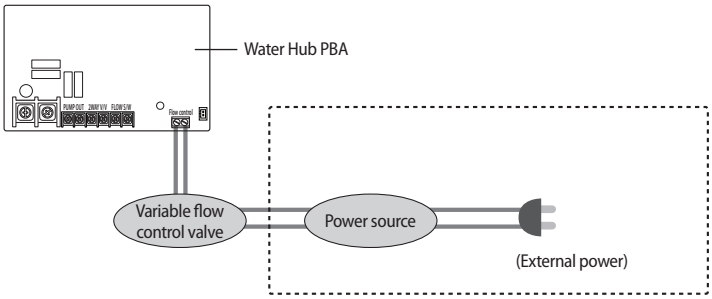
- After setting the outdoor unit option switch, you may connect variable flow control valve that is controlled at 0 ~ 10 V of input signal.
- If the power of variable flow control valve is 208 - 230 V, you may use the internal power of the outdoor unit.
- Use the external power if the load of variable solenoid valve is maximum 250 V and current over 0.2 A.)
- Output range of the variable flow control valve is different depending on the setting of the outdoor unit option switch (Refer to "Setting key operation and checking the view mode with tact switch" on page 91, page 97)

208~230 V [VRC***W4M-4Y, VPC***W4M-4P] models (Both internal/external power can be used)



✻ When valve load is over 0.2 A use external power.

460 V [VRC***W4M-4G] models (Only external power can be used)

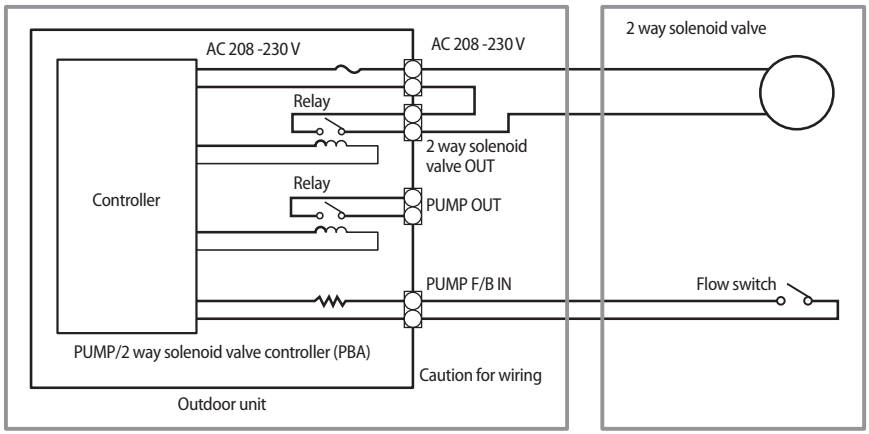


✻ When valve load is over 0.2 A use external power.

Wiring method for optional functions

Installation example of AC 208~230 V, direct operation type 2 way solenoid valve

208 ~ 230 V (VRC*W4M-4Y, VPC***W4M-4P) Models**

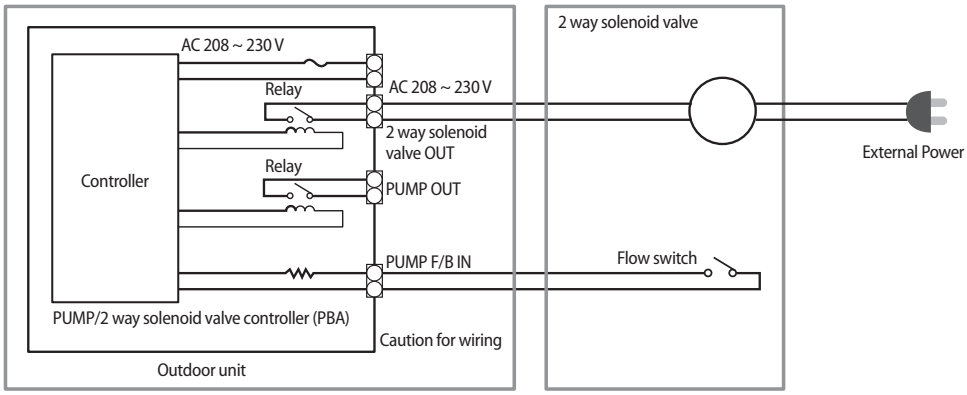


- ▶ 2 way solenoid valve is a type that works at AC 208 - 230 V 50/60 Hz and supports product with 0.2 A or low.
  - For 2 way solenoid valve with over 0.2 A, connect external power.
  - For external power cable for 2 way solenoid valve must use 600 V flame-resisting double layered cable.
- ▶ Product will not operate when flow switch is not installed.

Explanation of optional functions

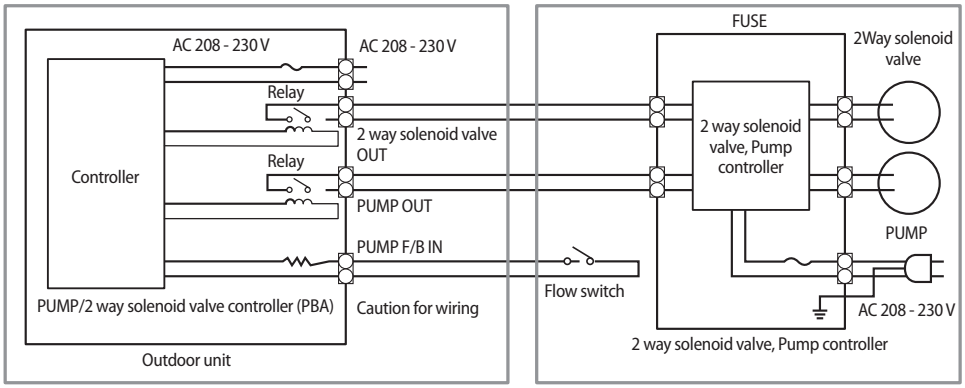
Installation example of AC 460 V, direct operation type 2 way solenoid valve

460 V (VRC***W4M-4G) Models



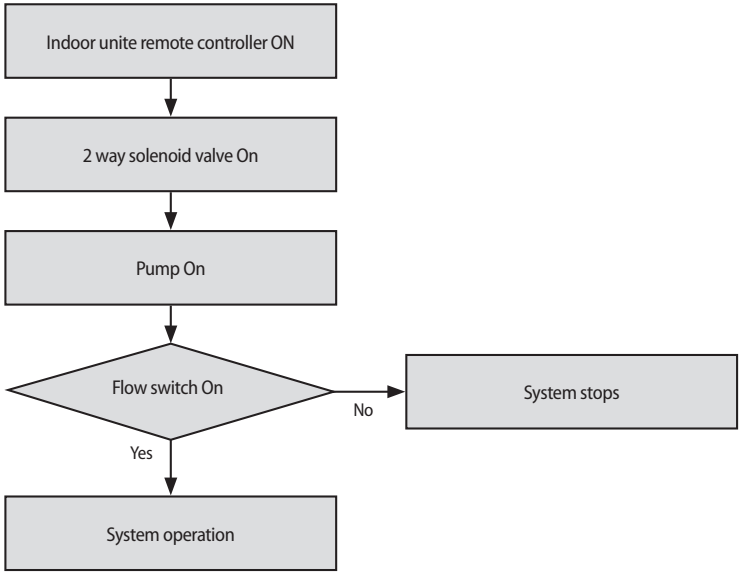
- ▶ 2 way solenoid valve is a type that works at AC 208 - 230 V 50/60 Hz and supports product with 0.2 A or low.
  - For external power cable for 2 way solenoid valve must use 600 V flame-resisting double layered cable.
- ▶ Product will not operate when flow switch is not installed.
- ▶ 460 V (VRC***W4M-4G) must use external power.

Installation example of extra controller such as 2 way solenoid valve and pump etc.



- ▶ If the operation type of 2 way solenoid valve is different, use extra controller.
  - Also use external controller for pump.
  - Outdoor unit only provides contact signal needed for 2 way solenoid valve and pump operation. Therefore, do not use the contact signal from the Water-Cooled VRF directly.
- ▶ Product will not operate when flow switch is not installed.

Flow chart of outdoor unit external contact controller

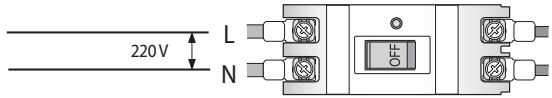


- Flow switch detector circuit must be detected for more than 30 seconds within 3 minutes after first operation signal output of the pump. (Outdoor unit will not operate when there is no detection.)
- Outdoor unit will stop if the contact of flow switch becomes 'Off' even during the operation.
- When outdoor unit stops, cooling water pump will also stop.
- Even when you are not using the external contact control from VRF outdoor unit, you may use other external control methods such as DDC, PLC or BMS and apply above flow chart. Also apply control for freezing prevention of the water circulation during winter season.
- If you control pump/2 way solenoid valve with extra controller, make sure to apply in control so that pump/2 way solenoid valve operates for 3 minutes after the outdoor unit stops operating.

Things to check after completing the installation

1. Before supplying the power, use DC 500 V (VRC***W4M-4Y) or DC 600 V (VRC***W4M-4G) insulation resistance tester to measure the power (3 phase: R, S, T) terminal and insulation resistance between the outdoor unit grounds.
   - Measurement should be over 30 MΩ.
2. Before supplying the power, use a voltmeter and phase tester to check the voltage and the phase.
   - Single phase 2 wired power supply
     L and N terminals: Check the 220 V (VPC***W4M-4P) between wires.

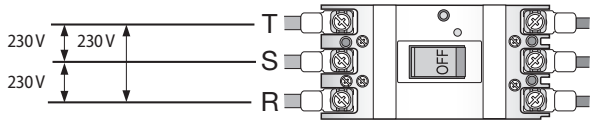
[VPC***W4M-4P]



<ELB>

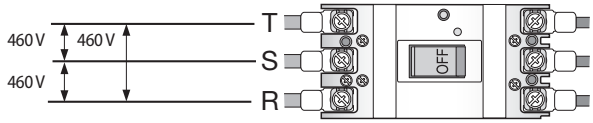
   - R, S, T terminal: Check the 230 V (VRC***W4M-4Y) or 460 V (VRC***W4M-4G) between wires (R-S, S-T, T-R)

[VRC***W4M-4Y]



<ELB>

[VRC***W4M-4G]



<ELB>

CAUTION
- Never measure the communication terminal since communication circuit may get damaged.
- Check for short-circuit of the communication terminal with a general circuit tester.

3. Check if the R-410A indoor units are connected.

4. Check the following after the installation is completed.

Installation work	**Outdoor unit**	• Have you checked the external surface and the inside of the outdoor unit? • Is there any possibility of short-circuit caused by the heat of an outdoor unit? • Is the place well-ventilated and ensures space for service? • Is the outdoor unit fixed securely to withstand any external force?
	Indoor unit	• Have you checked the external surface and the inside of the indoor unit? • Is there enough space for service? • Have you checked if the center of the indoor unit is ensured and it is installed horizontally?
Refrigerant pipe work		• Have you selected correct pipes? • Are the liquid and gas valve open? • Is the total number of connected indoor units within the allowable range? • Are the length and the height difference between the refrigerant pipes within the allowable range? • Are the branch joints properly installed? • Did you check the connection of liquid and gas pipes? • Have you selected correct insulator for pipes and insulated them correctly? • DId you insulate the pipes and connection part correctly? • Is the quantity of the additional refrigerant correctly weighed in? (You must record the amount of additional refrigerant on the service record paper placed inside of the outdoor unit.)
Drain pipe work		• Have you checked if the drain pipes of the indoor and outdoor unit are connected together? • Have you completed the drain test? • Is the drain pipe properly insulated?
Electrical wiring work		• Are the power cable and communication cable tightened firmly on the terminal board within the range of rated tightening torque? • Have you checked for cross-connection of the power and communication cables? • Have you performed the earthing work 3 to the outdoor unit? • Did you make sure to use 2-core cable (not multi-core cable) for the communication cable? • Is the length of the wire within allowed range? • Is the wiring route correct?
Setting address		• Did you set the address of the indoor and outdoor units properly? • Did you set the address of the indoor and outdoor units properly? (When using multiple remote controllers)
Option		• If there is a possibility of the outdoor unit from vibrating, check whether the anti-vibration frame is correctly installed.

Inspection and test operation

CAUTION

Precautions before trial operation

- When the outdoor temperature is low, turn on the main power 6 hours before beginning the operation.
  - If you start the operation immediately after turning on the main power, it may cause serious damage to the part within the product.
- Do not touch the refrigerant pipe during or right after the operation.
  - Refrigerant pipe may be hot or cold during or right after the operation depending on the status of the refrigerant which flows through the refrigerant pipe, compressor and other parts of the refrigerant cycle. If you touch the refrigerant during or right after the operation, you may get burns or frostbite.
- Do not operate the product with its panel or protection nets off.
  - There is risk of personal injury from the parts that rotates, heated or with the high voltage.
- Do not cut off the main power right after stopping the operation.
  - Wait for at least 5 minutes before turning off the main power. If not, water leakage or other problems may occur.
- Connect all the indoor units and the power supply for the outdoor unit and run auto address setting. Run auto address setting even after changing the indoor unit PCB.

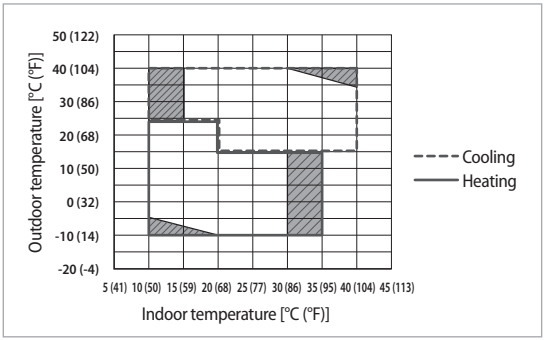
Checklist before auto trial operation

1. Check the power cable and communication cable of the indoor and outdoor unit.
2. Supply power to the outdoor unit 6 hours before trial operation to pre-heat the crank case heater.
3. Before supplying the power, use a voltmeter and phase tester to check the voltage and the phase.
   - Single phase 2 wires (VPC***W4M-4P)
     L and N terminals: Check the 220 V (VPC***W4M-4P) between wires.
   - R,S,T terminal: Check the 230 V between wires (R-S, S-T, T-R) (VRC***W4M-4Y Model only)./ 460 V between wires (R-S, S-T, T-R) (VRC***W4M-4G Model only)
4. When the power is supplied, outdoor unit will execute tracking to check the indoor unit connection and other optional functions.
5. Write down the installation report on the service history report paper attached on the front part of the control box.

CAUTION

- Supply power to the outdoor unit 6 hours before auto trial operation to pre-heat the crank case heater.

6. Guaranteed range of auto trial operation
   For precise judgment, you must perform auto trial operation in below indoor/outdoor temperature condition.



- In Auto trial operation, product will automatically select either cooling or heating mode and operate in selected mode.
- In the temperature range marked with slashed pattern, system protection control may trigger during operation.(If the system protection control is enabled, it can be hard to get the precise judgment after the auto trial operation.)
- When the temperature is outside of guaranteed range, accuracy of judgment on auto trial operation may decrease near boarder line area.

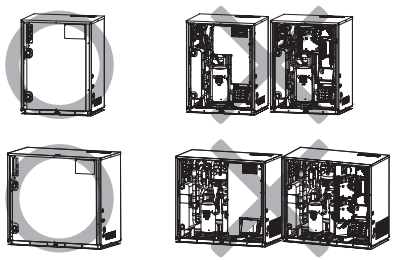
Inspection and test operation

Auto trial operation

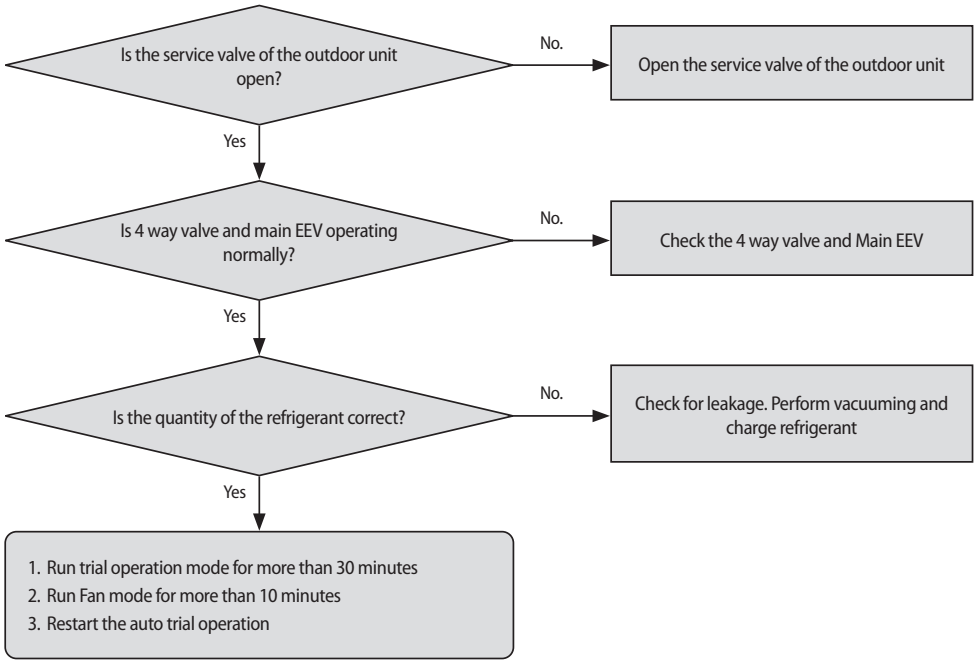
1. If the Auto Trial Operation is not completed, normal operation will be prohibited.
   - When the auto trial operation is not completed, UP (UnPrepared) will appear on the segment after the communication check and restrict compressor from operating. (UP Mode will be cleared automatically when auto trial mode is completed.)
   - Auto trial operation may take 20 minutes to maximum 2 hours depending on the operation status.
   - During auto trial operation, noise can be generated due to valve inspection. (Check the product if abnormal noise occurs continuously.)
2. When error occurs during auto trial operation, check the error code and take appropriate measures.
   - Refer to next couple of pages when E503, E505 or E506 error occurs.
   - Refer to service manual if you need inspection or when other errors occur.
3. When auto trial operation ends, use Lennox Service Software to issue a result report.
   - Refer to service manual for further actions if you have any items with "inspection required" sign on the result report.
   - After taking appropriate measure for the items with "inspection required" sign, run the auto trial operation again.
4. Check the following items by running trial operation (cooling/heating).
   - Check if cooling/heating operation performs normally.
   - Individual indoor unit control: Check for air flow direction and fan speed.
   - Check for abnormal operation noise from the indoor and outdoor unit.
   - Check for proper draining from the indoor unit during cooling operation.
   - Use Lennox Service Software to check the detail operation status.
5. Explain to the user how to use the Water-Cooled VRF according to the user's manual and provide this installation manual to the user.

CAUTION

- Make sure to close the front part of the outdoor unit cabinet during operation. If you operate the unit with the front cabinet open, it may cause damage to the product and you may not get the precise data from Lennox Service Software.



Measures to take when an E503 error occurs (When the "inspection required" message appears on the Lennox Service Software report)



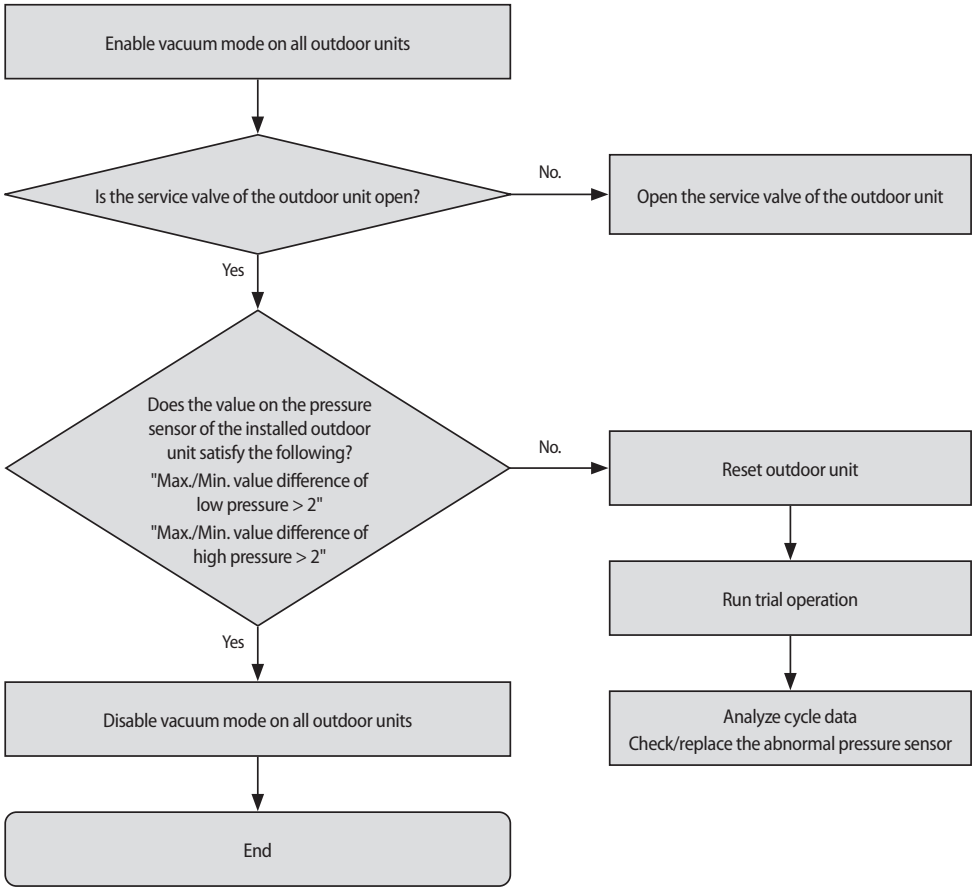
❋ 4 way valve abnormal operation symptoms:
- Refrigerant noise increases when the compressor is in operation and the inlet pipe temperature (Heat pump: Suction, Heat recovery: Suction 2) remains over 50 °F (10 °C) when compared to the low pressure saturation temperature.
- During heating operation, the temperature of the EVa. in/out maintains a value of less than 32 °F (0 °C).

❋ Main EEV abnormal operation symptoms:
- During heating operation, an error occurs when controlling the degree of the superheat on the compressor inlet.
  : If there is an operation error whilst the EEV is fully open, the target degree of superheat [33.8 °F (1 °C)] cannot be achieved [below 32 °F (0 °C) and the discharge temperature of the compressor is low.
  : If there is and operation error whilst the EEV is fully closed, the low pressure will decrease and the degree of superheat on the compressor inlet increases excessively.

CAUTION
- If the service valve needs to be detected, corresponding outdoor unit will display the error.
- If the service valve needs to be detected, auto detection mode will end. Check both gas pipe and liquid pipe service valves when detecting service valve.
- When 4 way valve, Main EEV detection is needed, run heating trial operation for more than 1 hour and analyze the data to check for a problem.
- If the operation range is not within guaranteed range, error may occur even though the product is normal.

Inspection and test operation

Measure to take when E505, E506 error occurs

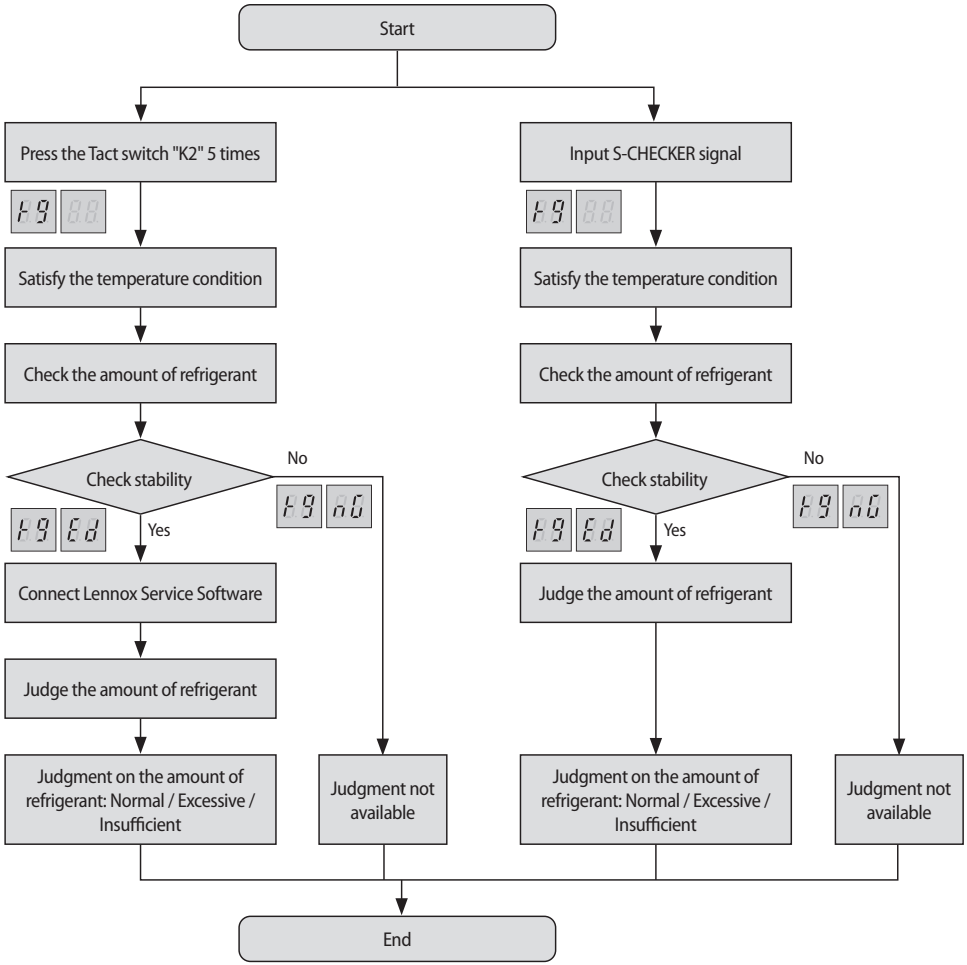


CAUTION

- When the auto trial operation for pressure sensor is executed before the pressure of the outdoor unit is equalized (when there is little difference between high and low pressure), error may occur even though the product is normal.
- If the pressure sensor needs to be detected, all outdoor units will display the error.
- If the pressure sensor needs to be detected, auto trial operation mode will end.
- To check for the pressure sensor with the problem, run trial operation for more than 1 hour and analyze the data to check for a problem.

Automatic refrigerant amount checking function

This function detects the amount of refrigerant in the system



Automatic refrigerant amount checking function

CAUTION

- When the temperature is outside of guaranteed range, you can not obtain an accurate result.
  - Indoor : 68 ~ 89.6 °F (20 ~ 32 °C)
  - Water temperature : 59 ~ 104 °F (15 ~ 40 °C)
- If the operation cycle is not stable, refrigerant amount detection operation may end.
- Accuracy of the results may decrease if the product is not operated for a long period time before the refrigerant amount detection function operation is activated. Use the refrigerant amount detection operation function after operating the product in cooling mode for at least 30 minutes.
- Depending upon the operational environment, a system protection operation may be triggered. As a result, the refrigerant amount detection result may be inaccurate.

Actions to take after the detection result

- Excessive amount of refrigerant : Discharge 5 % of the detected amount of refrigerant and restart the refrigerant amount detection operation.
- Insufficient amount of refrigerant : Charge 5 % of the detected amount of refrigerant and restart the refrigerant amount detection operation.
- Insufficient degree of supercooling : Charge 10 % of the detected amount of refrigerant and restart the refrigerant amount detection operation.
- Judgment not available : Check if the refrigerant amount detection operation was executed within guaranteed temperature range. Execute trial operation to check if there's any other problems on the system.

Precaution before trial operation

1. Water quality management
   - It is not possible to disassemble the plate heat exchanger for cleaning or part replacement. Therefore, to prevent corrosion or water scale on the plate type heat exchanger, you must manage the cooling water quality in compliance with standard of cooling water.(Refer to page 123.)
   - If the temperature of water is higher than room temperature, make sure to keep the concentration of chloride ion below 100 ppm to prevent corrosion and the water hardness should be below 150 mg CaCO3/L to prevent water scale. When a scale inhibitor is used, make sure to use the a type that is corrosion-free to the stainless steel and copper.
2. Water flow management
   - Insufficient water flow will lead to accidents related to frozen plate type heat exchanger. Check to make sure if there is any decrease in amount of water flow due to blocked strainer, problem on air ventilation or circulation pump after checking the temperature/pressure difference between the inlet and outlet of the plate type heat exchanger. If the temperature/pressure difference exceeds optimal range, stop the operation until remedial action is taken before the operation is restarted.
3. Counter-measures after E436 error (anti-freeze control) display
   - If E436 is displayed during operation, make sure to take care of the cause of problem before re-starting the operation. Water may freeze partially from the point when E436 is displayed. If you re-start the operation before the problem has been taken care of, plate type heat exchanger will shutdown and it will be impossible to melt the ice. If the water remains frozen, plate type heat exchanger will break and cause refrigerant leakage or water may enter into the refrigerant cycle.

Maintenance

Precautions on plate type heat exchanger maintenance

❋ Make sure to tell the user to keep this installation manual.

1. When the product was not operated for long period of time, check the followings:
   - Check the water to see if the water quality is meets the standard.
   - Clean the strainer.
   - Check to see if there is enough amount of water flow
   - Check to see if there is any problems on the water pressure, amount of water and the water temperature at inlet/outlet.
   - If you are using ground heat source, make sure to check the concentration level of the anti-freeze before the operation to maintain the freezing point at below 17.6 °F (-8 °C) (Refer to 'Ground heat exchanger circulation water (anti-freeze) usage standard (mandatory checklist)' on page 126 ~ 127)
2. It is not possible to disassemble the plate heat exchanger for cleaning or part replacement. Therefore it has to be cleaned by following methods.
   - Check if there is any cleaning hole for chemical cleaning at the inlet water pipe. For water scale cleaning use diluted (down to 5 %) citric acid, oxalic acid, acetic acid, phosphoric acid. However, do not use a cleaning solution containing hydrochloric acid, sulfuric acid or nitric acid since they are highly corrosive.
   - Check if there is valve on the inlet/outlet of the plate type heat exchanger.
   - Connect a exclusive pipe for cleaning to the inlet/outlet pipe of the plate type heat exchanger and fill the detergent at the temperature of 122 ~ 140 °F (50 ~ 60 ˚C) and circulate the detergent for about 2~5 hours. Cleaning time can be different depending on the temperature of detergent or degree of water scale. Judge the degree of water scale removal by the color of water detergent.
   - After cleaning, discharge the detergent within the plate type heat exchanger and fill the plate type heat exchanger with a water mixed with 1~2 % of sodium hydroxide or sodium bicarbonate. Circulate the water mixture for 15~20 minutes to neutralize.
   - After neutralizing the pipes, rinse the plate type heat exchanger with distilled water.
   - If you are using the detergent sold at local retail stores, make sure that it doesn't cause any corrosion to the stainless steel or copper.
   - For detail information on cleaning method (and proper use of detergent), contact the detergent manufacturer.
3. After cleaning, check to see if it is possible to operate normally.

Maintenance

Recommended number of inspection for normal operation

Inspection list	Inspection standard	Number of inspection	Side effects when inadequate
Forced drainage	Have you set the electric conductivity value properly?	Once a week	Corrosion, water scale or slime may occur
	Is electric conductivity sensor working properly?		
	Is auto valve working properly?		
Cooling water and water quality inspection	Is cooling water corrupted or have floating particles?	Once a month	Corrosion, water scale or slime may occur
	Is there rust water?		
	Is there any red tides?		
	Is the concentration of the antifreeze being maintained?	Once a year (before winter season)	-
Internal/external part of the cooling tower	Is there any water scale or slime?	Once a month	Corrosion, water scale or slime may occur
	Is there any signs of corrosion on the metal part?		
	Is there any water plant?		
Heat source water device	Have you set the make-up water supply value properly?	Daily	Operation problem at the cooling tower or intensified water concentration
	Is there any excess or deficiency of the make-up water?		
	Is the water level within the tank normal for operation?		

Cooling water management

1. Standard of cooling water quality for air conditioning and the number of water quality inspection

❋ Make sure to comply the standard for water quality management.

▶ Cooling water with high level of foreign substances can cause pipe corrosion or creation of water scale which effects the product's performance and lifespan. (Use the appropriate heat source water according to the below table) If the system water is sourced from anything other than the local water supply, make sure to check the quality of water.

❋ For water quality management on the heat source water of closed circuit water cooling must be done according to the below table. If the water quality is not managed according to the below table, it may decrease the performance of Water-Cooled VRF and cause serious problem on the product.

Classification	Item	Closed type system		Effects		Recommended number for water quality inspection
		Circulating water	Supplemented water	Corrosion	Scale	
Standard value	pH[77 °F (25 °C)]	7.0 ~ 8.0	7.0 ~ 8.0	❍	❍	Twice a month
	Electric conductivity [77 °F (25 °C)](mS/m)	30 or below	30 or below	❍	❍	
	Chloride ion (mg Cl^-/L)	50 or below	50 or below	❍		Once a month
	Sulfate ion (mg $S0_4^{2-}$/L)	50 or below	50 or below	❍	❍	
	M alkali level [pH 4.8] (mg $CaCo_3$/L)	50 or below	50 or below		❍	
	Total hardness (mg $CaCo_3$/L)	70 or below	70 or below		❍	
	Calcium hardness (mg $CaCo_3$/L)	50 or below	50 or below		❍	
	Ionized silica (mg SiO_2/L)	30 or below	30 or below		❍	
Reference	Iron (mg Fe/L)	1.0 or below	0.3 or below	❍	❍	Once a month
	Copper (mg Cu/L)	1.0 or below	1.0 or below	❍		
	Sulfate ion (mg S^{2-}/L)	Not to be detected	Not to be detected	❍		
	Ammonium ion (mg NH_4^+/L)	0.3 or below	0.1 or below	❍		
	Residual chlorine (mg Cl/L)	0.25 or below	0.3 or below	❍		
	Free carbon dioxide (mg CO_2/L)	0.4 or below	0.4 or below	❍		
	Stability index	-	-	❍	❍	

CAUTION

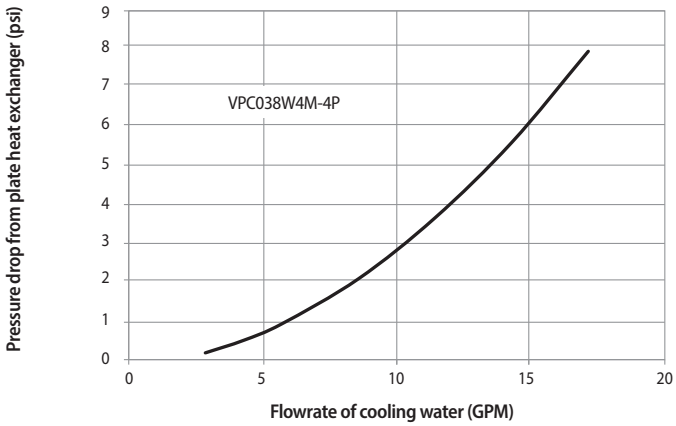
- Circle (O) denotes the factor relevant to corrosion or water scale.
- When the water temperature is over 104˚F (40˚C), steel without protective coating may corrode when exposed to water. Applying corrosion prevention material or degassing can be an effective measure to prevent corrosion.
- For the cooling water and the make-up water, used under closed circuit water system with closed circuit cooling tower, should satisfy the standard shown in above table.
- Supplied water or make-up water should be tap water, industrial water or groundwater. Purified water, neutralized water and softened water should not be supplied.
- 15 items in the above table is a typical factor for corrosion and/or water scale.

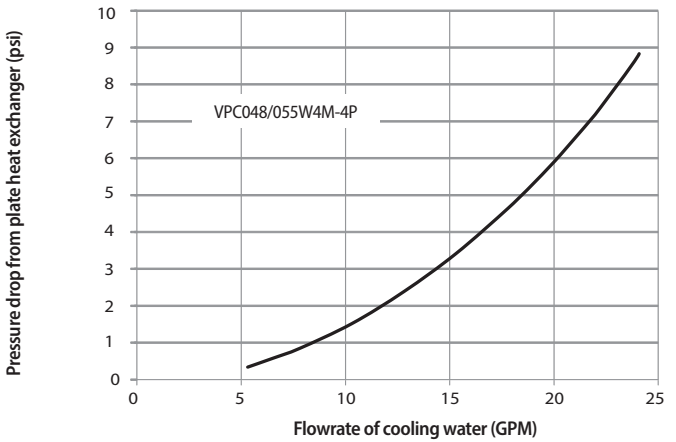
Cooling water management

2. Operation range of water

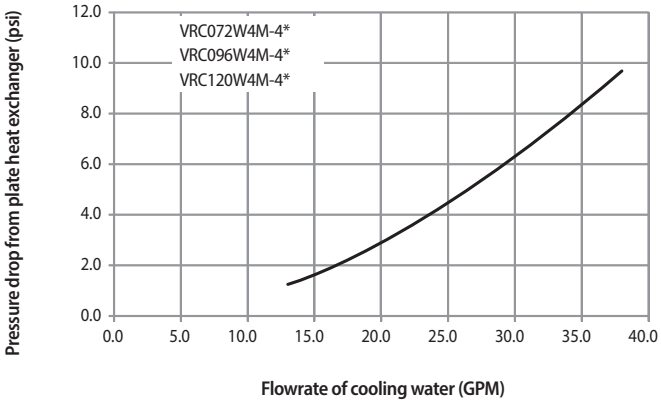
▶ When the amount of cooling water is out of the operation range, stop the outdoor unit and take care of the cause before re-start the operation (Operation range : 60~120 % of the standard amount of water flow)

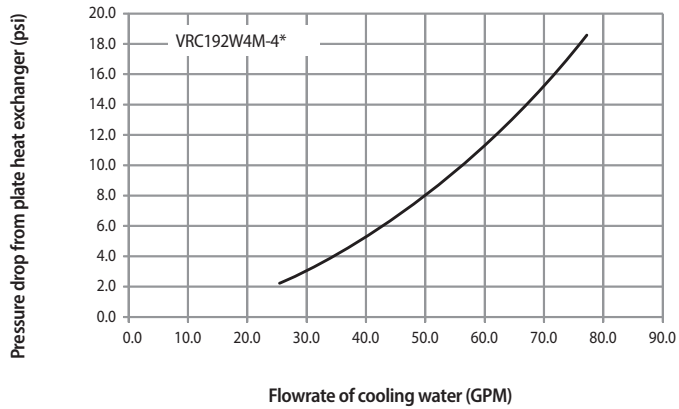
Flowrate of cooling water (GPM)				
Model name		VPC038W4M-4P	VPC048W4M-4P	VPC055W4M-4P
Standard condition	Cooling/Heating	10.5	13.2	15.9
Operation range	Cooling/Heating	6.3~12.7	7.9~15.9	9.5~19.0



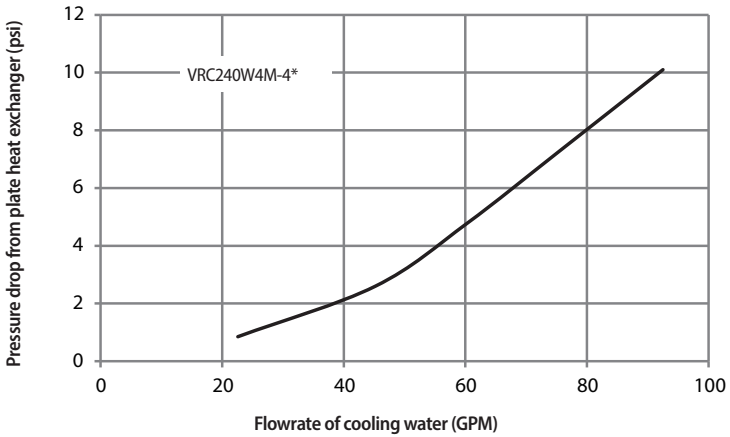


Flowrate of cooling water (GPM)						
Model name		VRC072W4M-4*	VRC096W4M-4*	VRC120W4M-4*	VRC192W4M-4*	VRC240W4M-4*
Standard condition	Cooling/ Heating	21.1	25.4	30.1	50.2	60.2
Operation range	Cooling/ Heating	12.7 ~ 25.4	15.3 ~ 30.4`	18 ~ 36.2	30.1 ~ 60.2	35.9 ~ 72.4





Cooling water management



3. Ground heat exchanger circulation water (anti-freeze) usage standard (mandatory checklist)

When using ground heat source, use anti-freeze to manage the freezing point. If you do not use anti-freeze, it will cause the pipes to freeze and burst. Note that the manufacturer does not take responsibility for any damage caused.

1) All the circulating water (anti-freeze) and additives (corrosion inhibitor, bacteria inhibitor, foam inhibitors) must be used after consulting with the business ordering party or supervisor for its impact on environment, toxicity, corrosiveness, harmfulness to human and management plan.
2) Contractor must take extra care regarding on handling, packaging and transporting regulations and procedure of the anti-freeze.
3) Do not use the anti-freeze that is harmful to humans or equipment. In addition, anti-freeze must be injected to the pipe according to specification and concentration level that is actually required by system. (Do not directly inject undiluted solution, consult business ordering party or supervisor when undiluted solution was brought to the site)
4) Before injecting the anti-freeze, evacuate any air that may remain in the system and apply pressure to check for leakage.
5) User must monitor and manage periodically to maintain initially designed concentration level of the anti-freeze. If the concentration level decrease due to leakage or over certain period of time, it may cause due to pipe to freeze and burst.
6) Usage condition of the anti-freeze when ground heat exchanger is installed (mandatory)
   - Flash point: Flash point of the anti-freeze must be over 194 °F (90 °C).
   - Biochemical oxygen demand: Amount of oxygen in 1 g of anti-freeze at 10 °C must be within 0.1 ~ 0.2 g and this value must be maintained for 5 days.
   - Freezing point: Concentration level of the anti-freeze must be maintained above freezing temperature.
   - Toxicity: LD50 per each 1 kg of anti-freeze must be less than 5 g.
   - Storage stability: It must not be separate when heated or cooled, and also turbidity should not be increased.
   - Corrosion resistance: It must be corrosion resistant to all the metallic material used for ground heat pumps and pipes.
   - Scale: Scale that has been accumulated on the plate type heat exchanger for one year of performance should not cause performance decrease over 15 %.

4. Standard data for status of Anti-freeze [Based on temperature of anti-freeze at 59 °F (15 °C)]

Type of anti-freeze [Based on 59 °F (15 °C)]	Concentration [% Wt.]	Freezing temperature		Density	
		°C	°F	kg/m³	lb/ft³
Ethylene glycol	10	-3.2	26.2	1014.87	63.4
	20	-7.8	18.0	1031.39	64.4
	30	-14.1	6.6	1047.07	65.4
	40	-22.3	-8.1	1061.65	66.3
Propylene glycol	10	-3.3	26.1	1009.75	63.0
	20	-7.1	19.2	1020.91	63.7
	30	-12.7	9.1	1030.51	64.3
	40	-21.1	-6.0	1038.65	64.8

Installation check card

When installing the refrigerant and water piping, installer must fill in the below installation check card.

Installation date	DD	MM	YY
Test Run Date	DD	MM	YY

Installer	Firm Name	
	Contact	
Install Technician	Name	
	Contact	
	Technician Code	
Inspect Association	Firm Name	
	Contact	
Inspect Supervisor	Firm Name	
	Contact	

Outdoor Unit Model	
Serial Number	
Note	

Installation Place of Indoor unit	Indoor Unit Model	Address	RMC

Calculation of Additional Charging Weight of the Refrigerant		
High Pressure Pipe	Total Pipe Length (m)	Additional Refrigerant (kg)
ø 6.35 (1/4")		
ø 9.52 (3/8")		
ø 12.70 (1/2")		
ø 15.88 (5/8")		
ø 19.05 (3/4")		
ø 22.23 (7/8")		
ø 25.40 (1")		

Installation condition for a water pipe			
Date of Installation	DD	MM	YY
Date of Test Run	DD	MM	YY

Water Pipe Installation Company	Company Name	
	Contact	
Cooling Water	Type and Capacity	
Boiler	Type and Capacity	
Anti-Freeze Specification	Type	
	Concentration	%
Flow switch (Compulsory)	Type	Manufacturer: Model Name:
	Installed Direction	Horizontal installation ( )
2Way Valve (Optional)	Type	Manufacturer: Model Name:
	Installed Direction	Horizontal installation ( )
Variable Flow Control Valve (Optional)	Type	Manufacturer: Model Name:
	Installed Direction	Horizontal installation ( )

- ✻ This product is irrelevant to any installation or performance problem of the cooling tower and boiler.
- ✻ This installation specification of the Lennox products will be managed as a reference for follow-up management.

- ✻ This product must be installed by the installation experts. Installing on your own or by unauthorized installer will be cause of product failure.
- ✻ Installer and inspector must fill in the installation check card after completing the product installation and test run.
- ✻ User must request the installer/inspector's to write down their real name since it will be convenient when receiving follow-up services or moving and re-installing the product.

Self-checklist for installer

	Item	Checklist		Check standard	Check result
Preparation	Distribution board	Did you install the separate circuit breakers to cut the power of each indoor unit?		Separate circuit breaker must be used to install indoor unit power	
	Outdoor unit power	Did you connect the outdoor unit power cable in correct order of RST power?		Visual check	
		Did you connect the outdoor unit power cable with solderless ring terminal by applying rated torque?		Use solderless ring terminal and follow rated torque for connection	
	Outdoor unit communication	Did you set the number of indoor units connected to the outdoor unit?		Check S/W combination of the outdoor unit PCB with the actual diagram	
		Did you connect the communication cable (F1, F2) between the indoor and outdoor units without dividing it multiple times from one indoor unit?		Check the connection status of communication cable	
	Outdoor unit	Is there enough space around the outdoor unit?		Check the standards in the installation manual	
		Did you select the appropriate location for installation?		Surrounding temperature within 0~40 °C, and humidity within 80 %	
		Did you apply anti-vibration frame or pad according to the standards stated in the installation manual?		Visual check	
		Did you install drain pipe for outdoor unit?		Visual check	
		Did you remove the stopper nut and washer used to fix the compressor?		Visually check that the compressor is fixed only with the nut washer	
	Water supply system	Is there any leakage on the pipe?		Visual check	
		Check if the temperature and pressure sensor is installed on the inlet/outlet of the outdoor unit.		Visual check. (4 in total) Notify the water pipe installer if they are not installed.	
		Check if the shut-off valve and flexible joint is installed on the inlet/outlet of the outdoor unit.		Visual check. (4 in total) Notify the water pipe installer if they are not installed.	
		Check if foreign substances and welding slugs in the pipe were cleaned.		Check whether or not flushing work has been performed and check the water quality. Notify the water pipe installer if flushing work has not been done.	
		Check if the strainer on the inlet water pipe were cleaned.		Clean the strainer. Notify the water pipe installer if the strainer was not cleaned.	
		Check if the flow switch is installed on the outlet water pipe and connected to the product. (Installed in a vertical position on horizontal water pipe.)		Visual check. Notify the water pipe installer if it is not installed.	
		Check if the drain valve (for discharging water)is installed.		Visual check. Notify the water pipe installer if it is not installed.	
		Is there countermeasure for maintaining the amount of water flow between the outdoor units?		Visual check. Notify the water pipe installer if they are not installed.	
Preparation	Water supply system	Ground heat	Is the internal pressure of the pipe at 1~4kg/cm2, when the ground water circulation pump is stopped?	Visually check the pressure gauge	
			What is the value of ground thermal conductivity?	Check the value of ground thermal conductivity on ground heat usage review	
			Did you check the concentration level of the anti-freeze among the circulation water?	Check the Brine concentration measurement (Based on the installation manual)	

	Item	Checklist	Check standard	Check result
Trial Operationg	Outdoor unit	Is the inlet water temperature appropriate?	Check the temperature gauge (Based on the installation manual)	( ) ℃
		Is the supplied amount of water flow within the maximum/minimum range?	Check the standards in the installation manual	( ) LPM
		Is the contact signal input for flow switch normal?	Check with clamp meter (Check for on/off contact when water pipe is on/off)	
		Is there error display on outdoor unit PCB?	Check error	
		Is there abnormal vibration or noise on outdoor unit cabinet?	Visual check	
	Indoor unit	Is there abnormal operation noise on indoor unit?	Check for abnormal noise	
		Is the cooling/heating discharge temperature of indoor unit appropriate?	Check for abnormal temperature	
		Is the blade movement of cassette type indoor unit appropriate?	Visual check	
		Is the discharged air volume for duct and indoor unit appropriate?	Check the temperature	
		Is there any water leakage on the drain pipe near the indoor unit?	Visual check	
		Is there any error display on indoor unit panel?	Check for error	
		Do you see any gaps or bent part on the panel of the cassette type indoor unit?	Visual check	
	Controller	Can you turn on/off the power with the controller?	Visual check	





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