

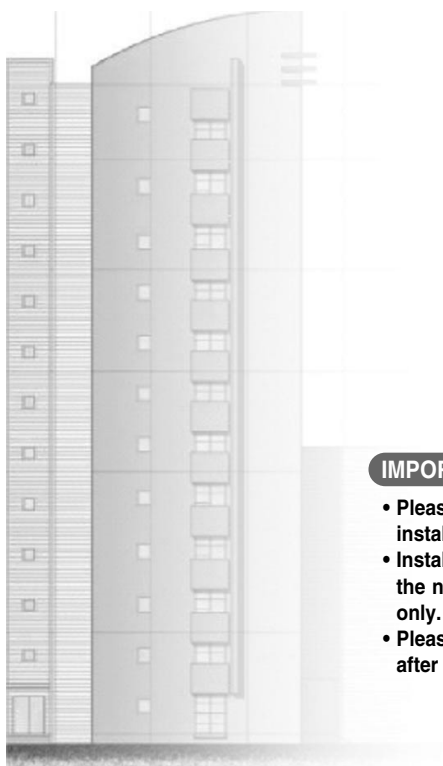


website <http://www.lgservice.com>

LG

MULTI VTM SYNC System Heat Recovery Outdoor Unit **R410A** **INSTALLATION MANUAL**

MODELS: ARUB Series



IMPORTANT

- Please read this installation manual completely before installing the product.
- Installation work must be performed in accordance with the national wiring standards by authorized personnel only.
- Please retain this installation manual for future reference after reading it thoroughly.

ENGLISH

ITALIANO

ESPAÑOL

FRANÇAIS

DEUTSCH

PORTUGUESE

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Safety Precautions



To prevent injury to the user or other people and property damage, the following instructions must be followed.

- Incorrect operation due to ignoring instruction will cause harm or damage. The seriousness is classified by the following indications.

⚠ WARNING This symbol indicates the possibility of death or serious injury.

⚠ CAUTION This symbol indicates the possibility of injury or damage to properties only.

- Meanings of symbols used in this manual are as shown below.

	Be sure not to do.
	Be sure to follow the instruction.

⚠ WARNING

■ Installation

Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard" and "Interior Wire Regulations" and the instructions given in this manual and always use a special circuit.

- If the power source capacity is inadequate or electric work is performed improperly, electric shock or fire may result.



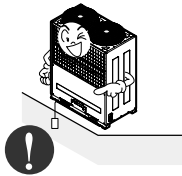
Ask the dealer or an authorized technician to install the air conditioner.

- Improper installation by the user may result in water leakage, electric shock, or fire.



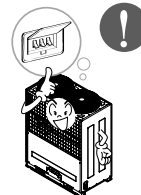
Always ground the product.

- There is risk of fire or electric shock.



Always install a dedicated circuit and breaker.

- Improper wiring or installation may cause fire or electric shock.



Safety Precautions

For re-installation of the installed product, always contact a dealer or an Authorized Service Center.

- There is risk of fire, electric shock, explosion, or injury.



Do not install, remove, or re-install the unit by yourself (customer).

- There is risk of fire, electric shock, explosion, or injury.



Do not store or use flammable gas or combustibles near the air conditioner.

- There is risk of fire or failure of product.



Use the correctly rated breaker or fuse.

- There is risk of fire or electric shock.



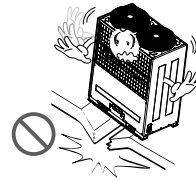
Prepare for strong wind or earthquake and install the unit at the specified place.

- Improper installation may cause the unit to topple and result in injury.



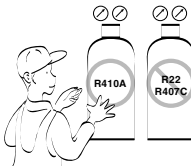
Do not install the product on a defective installation stand.

- It may cause injury, accident, or damage to the product.



When installing and moving the air conditioner to another site, do not charge it with a different refrigerant from the refrigerant specified on the unit.

- If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.



Do not reconstruct to change the settings of the protection devices.

- If the pressure switch, thermal switch, or other protection device is shorted and operated forcibly, or parts other than those specified by LGE are used, fire or explosion may result.



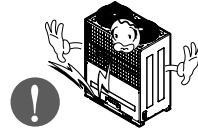
Ventilate before operating air conditioner when gas leaked out.

- It may cause explosion, fire, and burn.



Securely install the cover of control box and the panel.

- If the cover and panel are not installed securely, dust or water may enter the outdoor unit and fire or electric shock may result.



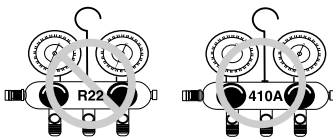
If the air conditioner is installed in a small room, measures must be taken to prevent the refrigerant concentration from exceeding the safety limit when the refrigerant leaks.

- Consult the dealer regarding the appropriate measures to prevent the safety limit from being exceeded. Should the refrigerant leak and cause the safety limit to be exceeded, hazards due to lack of oxygen in the room could result.



Don't use the existing manifold gage for R22 refrigerant.

- Use the manifold gage for high pressure (R410A) as possible as for stable refrigerant filling.



Don't mix and use the R22 pipe and the installation appliances that were used until now

- Mixing the oil of R22 and R410A may cause failure of the unit due to hydrolysis.



■ Operation

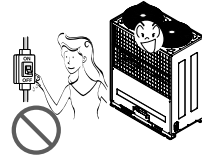
Do not damage or use an unspecified power cord.

- There is risk of fire, electric shock, explosion, or injury.



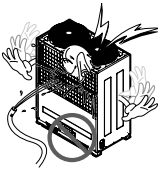
Use a dedicated outlet for this appliance.

- There is risk of fire or electrical shock.



Be cautious that water could not enter the product.

- There is risk of fire, electric shock, or product damage.



Do not touch the power switch with wet hands.

- There is risk of fire, electric shock, explosion, or injury.



Take care so that children should not randomly operate the wire remote control for play.

- Frequent conversion to cold or heat mode may cause failure of the unit.



When the product is soaked (flooded or submerged), contact an Authorized Service Center.

- There is risk of fire or electric shock.



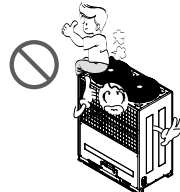
Be cautious not to touch the sharp edges when installing.

- It may cause injury.



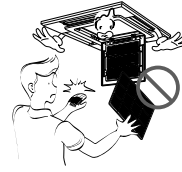
Take care to ensure that nobody could step on or fall onto the outdoor unit.

- This could result in personal injury and product damage.



Do not open the inlet grill of the product during operation. (Do not touch the electrostatic filter, if the unit is so equipped.)

- There is risk of physical injury, electric shock, or product failure.

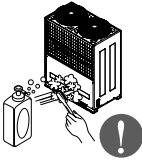


CAUTION

■ Installation

Always check for gas (refrigerant) leakage after installation or repair of product.

- Low refrigerant levels may cause failure of product.



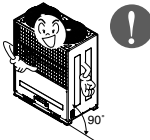
Do not install the product where the noise or hot air from the outdoor unit could damage the neighborhoods.

- It may cause a problem for your neighbors.



Keep level even when installing the product.

- To avoid vibration or water leakage.



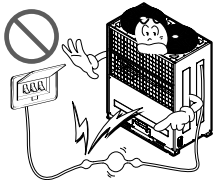
Do not install the unit where combustible gas may leak.

- If the gas leaks and accumulates around the unit, an explosion may result.



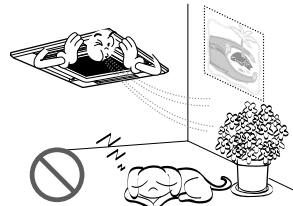
Use power cables of sufficient current carrying capacity and rating.

- Cables that are too small may leak, generate heat, and cause a fire.



Do not use the product for special purposes, such as preserving foods, works of art, etc. It is a consumer air conditioner, not a precision refrigeration system.

- There is risk of damage or loss of property.



Keep the unit away from children. The heat exchanger is very sharp.

- It can cause the injury, such as cutting the finger. Also the damaged fin may result in degradation of capacity.



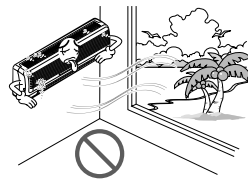
When installing the unit in a hospital, communication station, or similar place, provide sufficient protection against noise.

- The inverter equipment, private power generator, high-frequency medical equipment, or radio communication equipment may cause the air conditioner to operate erroneously, or fail to operate. On the other hand, the air conditioner may affect such equipment by creating noise that disturbs medical treatment or image broadcasting.



Do not install the product where it is exposed to sea wind (salt spray) directly.

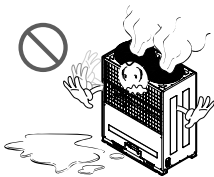
- It may cause corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient operation.



■ Operation

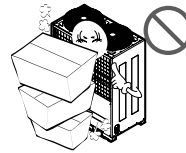
Do not use the air conditioner in special environments.

- Oil, steam, sulfuric smoke, etc. can significantly reduce the performance of the air conditioner or damage its parts.



Do not block the inlet or outlet.

- It may cause failure of appliance or accident.



Make the connections securely so that the outside force of the cable may not be applied to the terminals.

- Inadequate connection and fastening may generate heat and cause a fire.



Be sure the installation area does not deteriorate with age.

- If the base collapses, the air conditioner could fall with it, causing property damage, product failure, and personal injury.



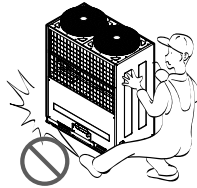
Install and insulate the drain hose to ensure that water is drained away properly based on the installation manual.

- A bad connection may cause water leakage.



Be very careful about product transportation.

- Only one person should not carry the product if it weighs more than 20 kg.
- Some products use PP bands for packaging. Do not use any PP bands for a means of transportation. It is dangerous.
- Do not touch the heat exchanger fins. Doing so may cut your fingers.
- When transporting the outdoor unit, suspending it at the specified positions on the unit base. Also support the outdoor unit at four points so that it cannot slip sideways.



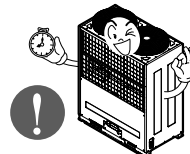
Safely dispose of the packing materials.

- Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries.
- Tear apart and throw away plastic packaging bags so that children may not play with them. If children play with a plastic bag which was not torn apart, they face the risk of suffocation.



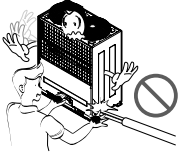
Turn on the power at least 6 hours before starting operation. (In case of outdoor temperature below 10°C)

- Starting operation immediately after turning on the main power switch can result in severe damage to internal parts. Keep the power switch turned on during the operational season.



Do not touch any of the refrigerant piping during and after operation.

- It can cause a burn or frostbite.



Do not operate the air conditioner with the panels or guards removed.

- Rotating, hot, or high-voltage parts can cause injuries.

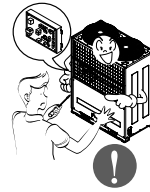


Do not directly turn off the main power switch after stopping operation.

- Wait at least 5 minutes before turning off the main power switch. Otherwise it may result in water leakage or other problems.

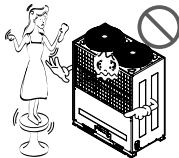


Auto-addressing should be done in condition of connecting the power of all indoor and outdoor units. Auto-addressing should also be done in case of changing the Indoor unit PCB.



Use a firm stool or ladder when cleaning or maintaining the air conditioner.

- Be careful and avoid personal injury.



Do not insert hands or other objects through the air inlet or outlet while the air conditioner is plugged in.

- There are sharp and moving parts that could cause personal injury.



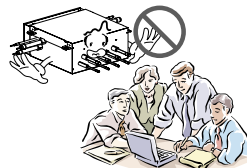
Avoid a place where rain may enter since the HR unit is for indoor

- There is risk of property damage, failure of product, or electric shock.

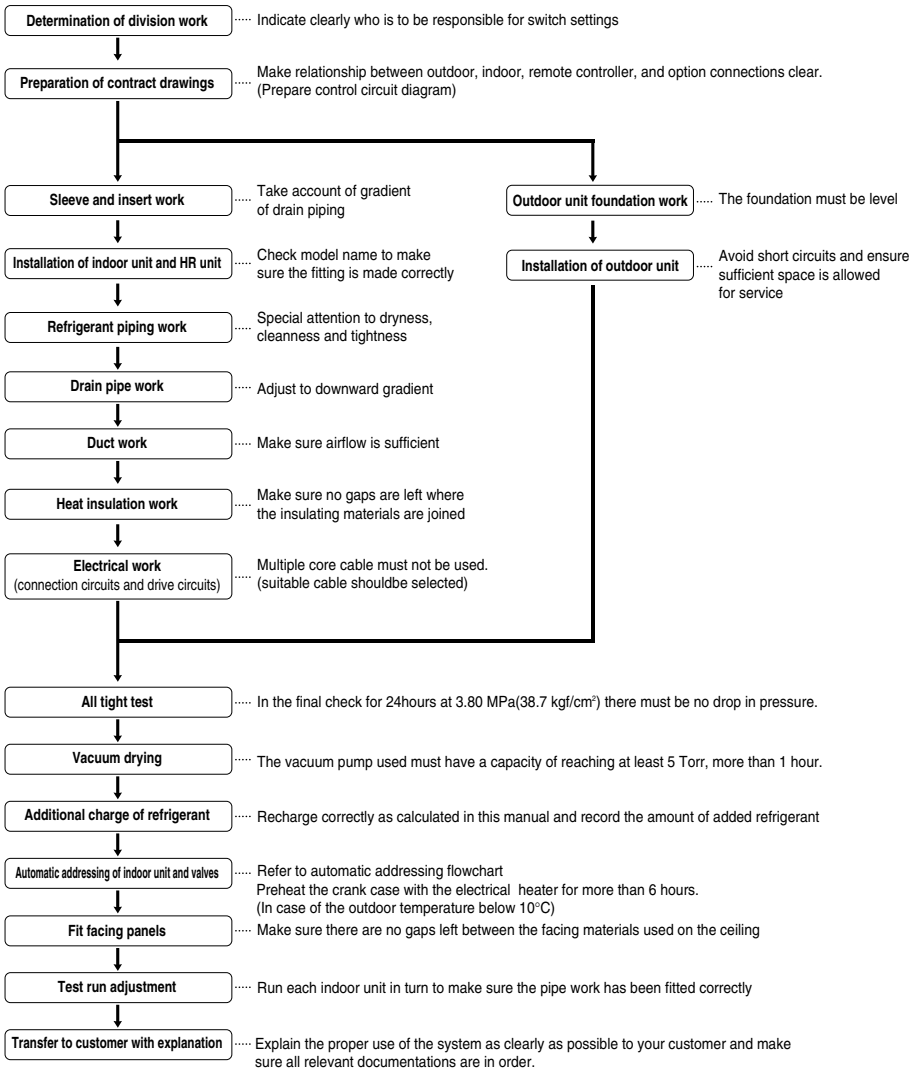


Install the HR unit at a place in which it is not affected by operation mode changing noise.

- Installation within cell such as meeting room etc, may disturb business due to noise.



Installation Process



⚠ CAUTION

- The above list indicates the order in which the individual work operations are normally carried out but this order may be varied where local conditions warrants such change.
- The wall thickness of the piping should comply with the relevant local and national regulations for the designed pressure 3.8MPa.
- Since R410A is a mixed refrigerant, the required additional refrigerant must be charged in its liquid state. (If the refrigerant is charged in its gaseous state, its composition changes and the system will not work properly.)

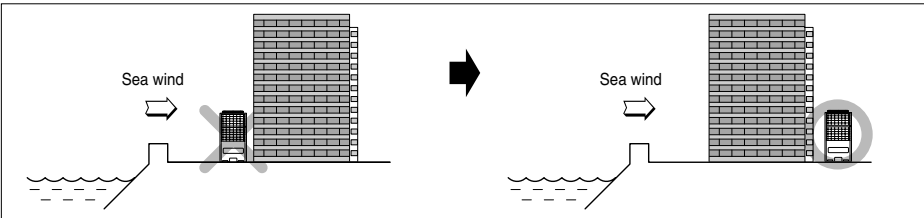
Installation guide at the seaside

⚠ CAUTION

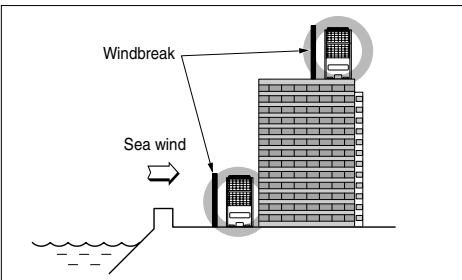
1. Air conditioners should not be installed in areas where corrosive gases, such as acid or alkaline gas, are produced.
2. Do not install the product where it could be exposed to sea wind (salty wind) directly. It can result corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient performance.
3. If outdoor unit is installed close to the seaside, it should avoid direct exposure to the sea wind. Otherwise it needs additional anticorrosion treatment on the heat exchanger.

Selecting the location(Outdoor Unit)

- 1) If the outdoor unit is to be installed close to the seaside, direct exposure to the sea wind should be avoided. Install the outdoor unit on the opposite side of the sea wind direction.



- 2) In case, to install the outdoor unit on the seaside, set up a windbreak not to be exposed to the sea wind.



- It should be strong enough like concrete to prevent the sea wind from the sea.
- The height and width should be more than 150% of the outdoor unit.
- It should be keep more than 70 cm of space between outdoor unit and the windbreak for easy air flow.

- 3) Select a well-drained place.

1. If you can't meet above guide line in the seaside installation, please contact LG Electronics for the additional anticorrosion treatment.
2. Periodic (more than once/year) cleaning of the dust or salt particles stuck on the heat exchanger by using water

Outdoor Units Information



CAUTION: A ratio of the connectable Indoor Units with the Outdoor: Within 50 ~ 130%
A ratio of the running Indoor Units with the Outdoor: Within 10 ~ 100%
(A combined operation over 100% causes to reduce the total capacity.)

Power Supply: Outdoor Unit (3Ø, 380 ~ 415V, 50Hz)

■ Heat Recovery System

Unit		1 outdoor unit			
System(HP)		8	10	12	14
Model		ARUB808T1	ARUB1008T1	ARUB1208T1	ARUB1408T1
Refrigerant	Charge(kg/Oz)	8/282.2	8/282.2	8/282.2	8/282.2
	Type	R410a	R410a	R410a	R410a
	CF(Correction Factor)	-1	0	1	2
Max. Connectable No. of Indoor Units		13	16	20	20
Net Weight	kg	300	300	300	300
	lbs	661.4	661.4	661.4	661.4
Dimensions (W*H*D)	mm	1280 * 1607 * 730	1280 * 1607 * 730	1280 * 1607 * 730	1280 * 1607 * 730
	inch	50.4 * 63.3 * 28.7	50.4 * 63.3 * 28.7	50.4 * 63.3 * 28.7	50.4 * 63.3 * 28.7
Connecting Pipes	Liquid Pipes(mm(inch))	Ø9.52(3/8)	Ø9.52(3/8)	Ø12.7(1/2)	Ø12.7(1/2)
	Low Pressure Pipes(mm(inch))	Ø19.05(3/4)	Ø22.2(7/8)	Ø28.58(1 1/8)	Ø28.58(1 1/8)
	High Pressure Gas Pipes(mm(inch))	Ø15.88(5/8)	Ø19.05(3/4)	Ø19.05(3/4)	Ø22.2(7/8)

Unit		2 outdoor units					3 outdoor units
System(HP)		16	18	20	22	24	26
Model		ARUB1608T1	ARUB1808T1	ARUB2008T1	ARUB2208T1	ARUB2408T1	ARUB2608T1
Refrigerant	Charge(kg/Oz)	16/564.4	16/564.4	16/564.4	16/564.4	16/564.4	24/846.6
	Type	R410a	R410a	R410a	R410a	R410a	R410a
	CF(Correction Factor)	-2	-1	0	1	2	3
Max. Connectable No. of Indoor Units		20	20	20	22	24	32
Net Weight	kg	300x2	300x2	300x2	300x2	300x2	300x3
	lbs	661.4x2	661.4x2	661.4x2	661.4x2	661.4x2	661.4x3
Dimensions (W*H*D)	mm	1280 * 1607 * 730)x2	1280 * 1607 * 730)x2	1280 * 1607 * 730)x2	1280 * 1607 * 730)x2	1280 * 1607 * 730)x2	1280 * 1607 * 730)x3
	inch	(50.4 * 63.3 * 28.7)x2	(50.4 * 63.3 * 28.7)x2	(50.4 * 63.3 * 28.7)x2	(50.4 * 63.3 * 28.7)x2	(50.4 * 63.3 * 28.7)x2	(50.4 * 63.3 * 28.7)x3
Connecting Pipes	Liquid Pipes(mm(inch))	Ø12.7(1/2)	Ø15.88(5/8)	Ø15.88(5/8)	Ø15.88(5/8)	Ø15.88(5/8)	Ø19.05(3/4)
	Low Pressure Pipes(mm(inch))	Ø28.58(1 1/8)	Ø28.58(1 1/8)	Ø28.58(1 1/8)	Ø34.9(1 3/8)	Ø34.9(1 3/8)	Ø34.9(1 3/8)
	High Pressure Gas Pipes(mm(inch))	Ø22.2(7/8)	Ø22.2(7/8)	Ø22.2(7/8)	Ø28.58(1 1/8)	Ø28.58(1 1/8)	Ø28.58(1 1/8)

Unit		3 outdoor units						
System(HP)		28	30	32	34	36	38	40
Model		ARUB2808T1	ARUB3008T1	ARUB3208T1	ARUB3408T1	ARUB3608T1	ARUB3808T1	ARUB4008T1
Refrigerant	Charge(kg/Oz)	24/846.6	24/846.6	24/846.6	24/846.6	24/846.6	24/846.6	24/846.6
	Type	R410a	R410a	R410a	R410a	R410a	R410a	R410a
	CF(Correction Factor)	-1	0	1	2	3	4	5
Max. Connectable No. of Indoor Units		32	32	32	34	36	38	40
Net Weight	kg	300x3	300x3	300x3	300x3	300x3	300x3	300x3
	lbs	661.4x3	661.4x3	661.4x3	661.4x3	661.4x3	661.4x3	661.4x3
Dimensions (W*H*D)	mm	(1280 * 1607 * 730)x3	(1280 * 1607 * 730)x3	(1280 * 1607 * 730)x3	(1280 * 1607 * 730)x3	(1280 * 1607 * 730)x3	(1280 * 1607 * 730)x3	(1280 * 1607 * 730)x3
	inch	(50.4 * 63.3 * 28.7)x3	(50.4 * 63.3 * 28.7)x3	(50.4 * 63.3 * 28.7)x3	(50.4 * 63.3 * 28.7)x3	(50.4 * 63.3 * 28.7)x3	(50.4 * 63.3 * 28.7)x3	(50.4 * 63.3 * 28.7)x3
Connecting Pipes	Liquid Pipes(mm(inch))	Ø19.05(3/4)	Ø19.05(3/4)	Ø19.05(3/4)	Ø19.05(3/4)	Ø19.05(3/4)	Ø19.05(3/4)	Ø19.05(3/4)
	Low Pressure Pipes(mm(inch))	Ø34.9(1 3/8)	Ø34.9(1 3/8)	Ø34.9(1 3/8)	Ø34.9(1 3/8)	Ø41.3(1 5/8)	Ø41.3(1 5/8)	Ø41.3(1 5/8)
	High Pressure Gas Pipes(mm(inch))	Ø28.58(1 1/8)	Ø28.58(1 1/8)	Ø28.58(1 1/8)	Ø28.58(1 1/8)	Ø28.58(1 1/8)	Ø34.9(1 3/8)	Ø34.9(1 3/8)

Select the Best Location

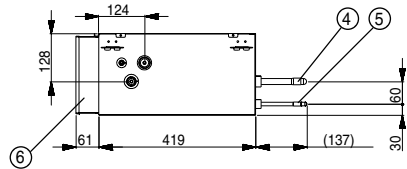
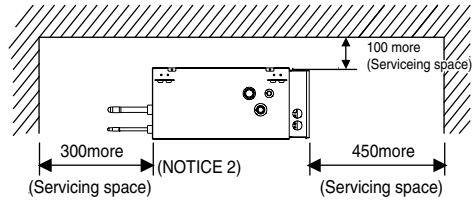
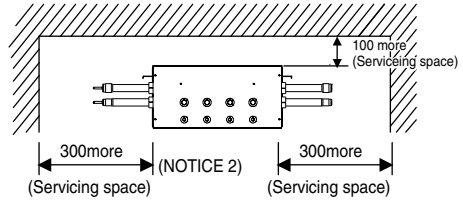
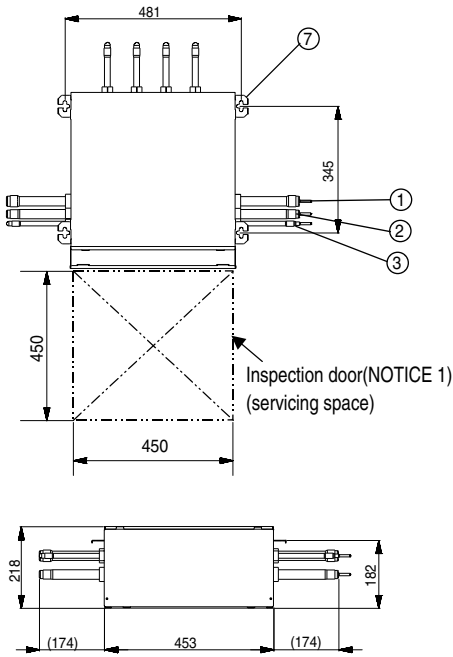
■ Select installation location of the outdoor unit suitable for following conditions

Select space for installing outdoor unit, which will meet the following conditions:

- No direct thermal radiation from other heat sources
- No possibility of annoying the neighbors by noise from unit
- No exposition to strong wind
- With strength which bears weight of unit
- Note that drain flows out of unit when heating
- With space for air passage and service work shown next.
- Because of the possibility of fire, do not install the system to the space where generation, inflow, stagnation, and leakage of combustible gas is expected.
- Avoid unit installation in a place where acidic solution and spray (sulfur) are often used.
- Do not use unit under any special environment where oil, steam and sulfuric gas exist.
- Don't operate heating mode when the outdoor air temperature is -20°C or lower.
- It is recommended to fence round the outdoor unit in order to prevent any person or animal from accessing the outdoor unit.
- If installation site is area of heavy snowfall, then the following directions should be observed.
 - Make the foundation as high as possible.
 - Fit a snow protection hood.
- Select installation location considering following conditions to avoid bad condition when additionally performing defrost operation.
 1. Install the outdoor unit at a place well ventilated and having a lot of sunshine in case of installing the product at a place with a high humidity in winter (near beach, coast, lake, etc).
(Ex) Rooftop where sunshine always shines.
 2. Performance of heating will be reduced and preheat time of the indoor unit may be lengthened in case of installing the outdoor unit in winter at following location:
 - (1) Shade position with a narrow space
 - (2) Location with much moisture in neighboring floor.
 - (3) Location with much humidity around.
 - (4) Location where ventilation is good.It is recommended to install the outdoor unit at a place with a lot of sunshine as possible as.
 - (5) Location where water gathers since the floor is not even.

■ Select installation location of the HR unit suitable for following conditions

- Avoid a place where rain may enter since the HR unit is for indoor.
- Sufficient service space must be obtained.
- Refrigerant pipe must not exceed limited length.
- Avoid a place subject to a strong radiation heat from other heat source.
- Avoid a place where oil spattering, vapor spray or high frequency electric noise is expected.
- Install the unit at a place in which it is not affected by mode change noise. (Installation within cell such as meeting room etc. may disturb business due to noise.)
- Place where refrigerant piping, drain piping and electrical wiring works are easy.
- The place shall be able to inspect the unit as the figure.



No.	Part Name	Description	
		PRHR040/030	PRHR020
1	Low pressure Gas pipe connection port	Ø28.58 Brazing connection	Ø22.2 Brazing connection
2	High pressure Gas pipe connection port	Ø22.2 Brazing connection	Ø19.05 Brazing connection
3	Liquid pipe connection port	Ø12.7 Brazing connection	Ø9.52 Brazing connection
4	Indoor unit Gas pipe connection port	Ø15.88 Brazing connection	Ø15.88 Brazing connection
5	Indoor unit Liquid pipe connection port	Ø9.52 Brazing connection	Ø9.52 Brazing connection
6	Control box		
7	Hanger metal	M10 of M8	M10 of M8

NOTICE :

1. Be sure to install the inspection door at the control box side.
2. If reducers are used, servicing space must be increased equal to reducer's dimension.

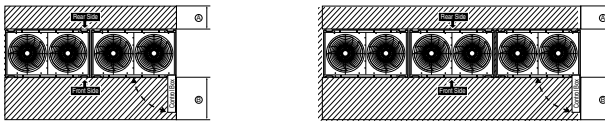
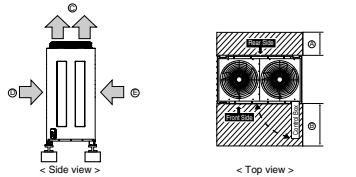
Installation Space

Individual Installation

Basic space required

A space of at least 250 mm is necessary at the back for inlet air. Taking servicing, etc. from the rear into account, a space of about 900 mm should be provided, the same as at the front.

- Ⓐ 250 mm or more
- Ⓑ 900 mm or more (Control box is of a open/close type)
- Ⓒ Top discharge (open in principle)
- Ⓓ Front inlet (open in principle)
- Ⓔ Rear inlet (open in principle)

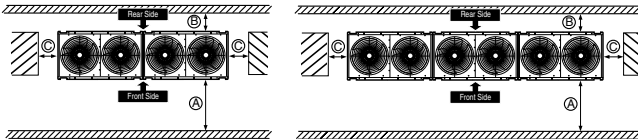
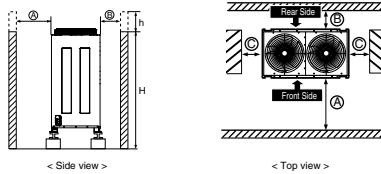


When inlet air enters from right and left sides of unit

- Ⓐ 900 mm or more (Control box is of a open/close type)
- Ⓑ 250 mm or more
- Ⓒ 150 mm from the wall

CAUTION

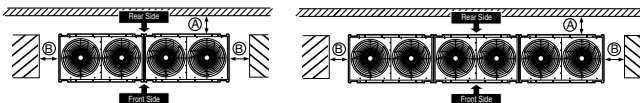
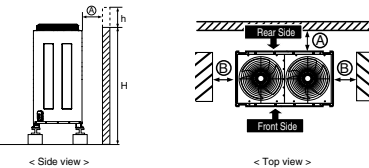
Wall height(H) must not exceed height of the product. If the wall height is higher than the whole height of product by (h), Add (h) to Ⓐ, Ⓑ.



- Ⓐ 250 mm or more (350mm or more at the coastal area)
- Ⓑ 150 mm from the wall

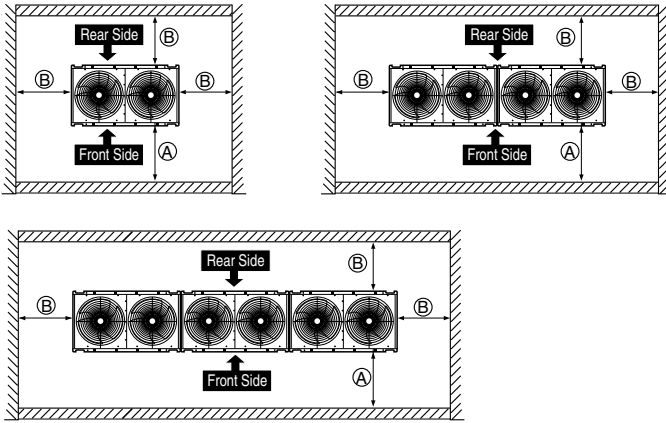
CAUTION

Wall height(H) must not exceed height of the product. If the wall height is higher than the whole height of product by (h), Add (h) to Ⓐ, Ⓑ.



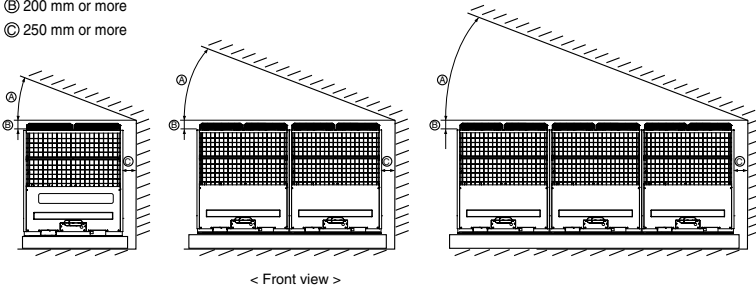
■ When unit is surrounded by walls

- Ⓐ 900 mm or more (Control box is of a open/close type)
- Ⓑ 250 mm or more

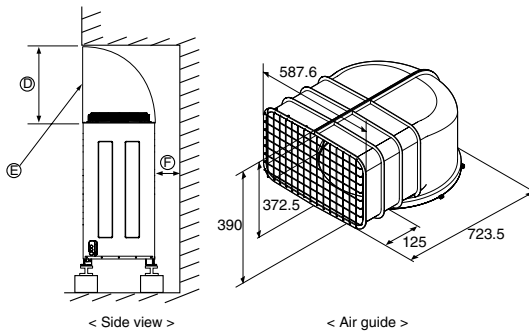


■ When there is an obstruction above the unit

- Ⓐ 45° or more
- Ⓑ 200 mm or more
- Ⓒ 250 mm or more



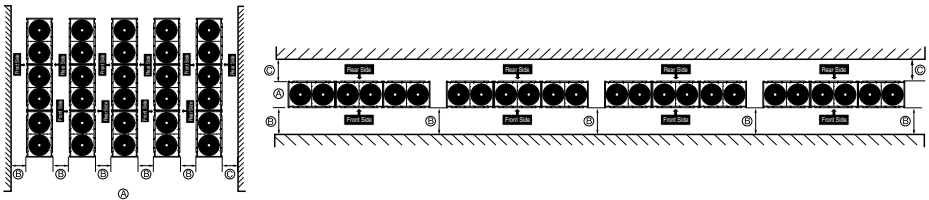
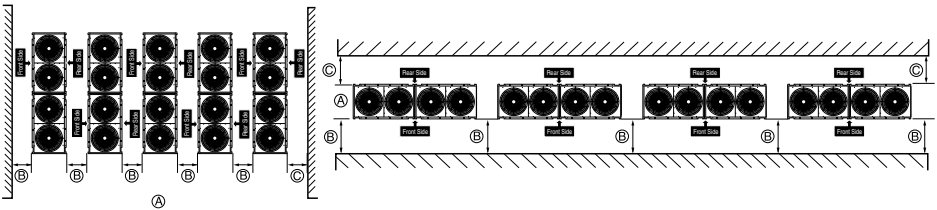
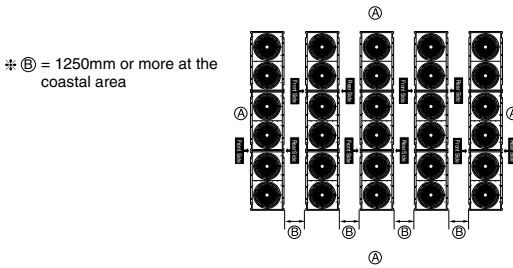
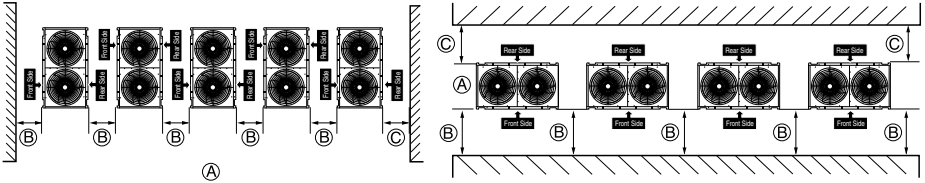
- Ⓓ 1000 mm or more
- Ⓔ Air outlet guide (Procured at the site)
- Ⓕ 250 mm or more



Collective / Continuous installation

Space required for collective installation and continuous installation: When installing several units, leave the space between each block as shown below considering passage for air and people.

- (A) (Be opened)
- (B) 900mm or more (control box is of a open/close type)
- (C) 250 mm or more



Cautions in winter especially for seasonal wind

- Sufficient measures are required at a snow area or severe cold area in winter so that product can be operated well.
- Get ready for seasonal wind or snow in winter even in other area.
- Install a suction and discharge duct not to let in snow or rain.
- Install the outdoor unit not to come in contact with snow directly. If snow piles up and freezes on the air suction hole, the system may malfunction. If it is installed at snowy area, attach the hood to the system.
- Install the outdoor unit at the higher installation console by 50cm than the average snowfall (annual average snowfall) if it is installed at the area with much snowfall.
- Where snow accumulated on the upper part of the outdoor unit by more than 10cm, always remove snow for operation.

1. The height of H frame must be more than 2 times the snowfall and its width shall not exceed the width of the product. (If width of the frame is wider than that of the product, snow may accumulate)
2. Don't install the suction hole and discharge hole of the outdoor unit facing to the seasonal wind.

 **CAUTION**

- Always apply main power of the outdoor unit during use of product (cooling season/heating season).
- Always apply power before 6 hours to heat the crank case heater where performing test run after installation of product or where operating the product after cutting the main power of the outdoor unit (for example, power failure). It may result in burning out of the compressor if not preheating the crank case with the electrical heater for more than 6 hours.(In case of the outdoor temperature below 10°C)

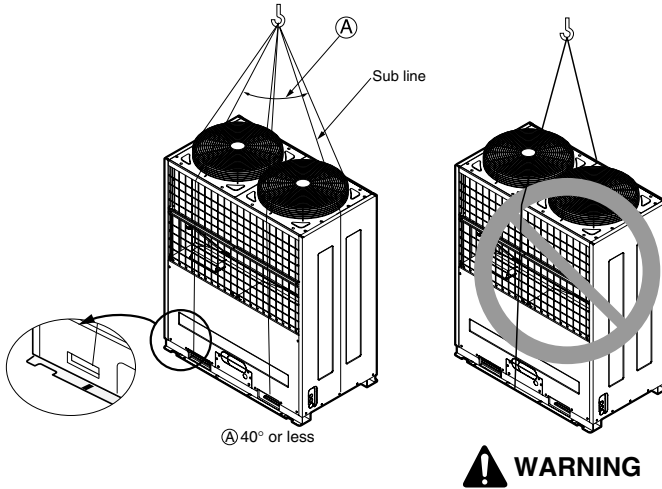
 **CAUTION**

Do not install the product where it is exposed to sea wind (salt spray) directly.

- It may cause corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient operation.

Lifting method

- When carrying the unit suspended, pass the ropes under the unit and use the two suspension points each at the front and rear.
- Always lift the unit with ropes attached at four points so that impact is not applied to the unit.
- Attach the ropes to the unit at an angle of 40° or less.



CAUTION

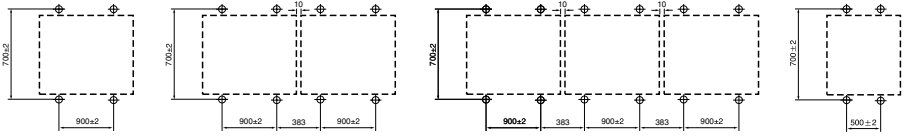
Be very careful while carrying the product.

- Do not have only one person carry product if it is more than 20 kg.
- PP bands are used to pack some products. Do not use them as a mean for transportation because they are dangerous.
- Do not touch heat exchanger fins with your bare hands. Otherwise you may get a cut in your hands.
- Tear plastic packaging bag and scrap it so that children cannot play with it. Otherwise plastic packaging bag may suffocate children to death.
- When carrying in outdoor unit, be sure to support it at four points. Carrying in and lifting with 3-point support may make outdoor unit unstable, resulting in a fall of it.

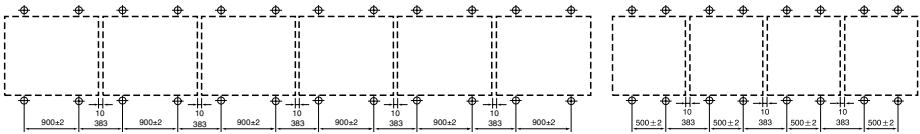
Installation

Location of anchor bolt

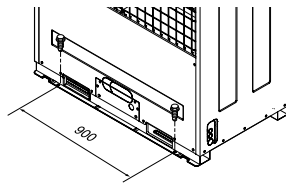
■ Individual installation



■ Example of collective installation

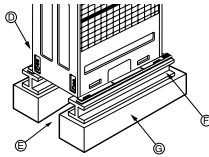
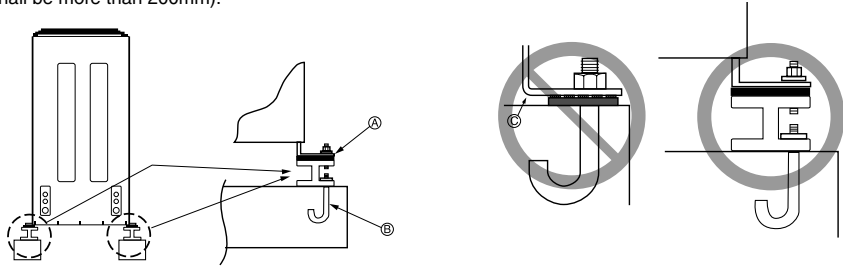


■ Installation foot (Location of anchor bolt)



Foundation for Installation

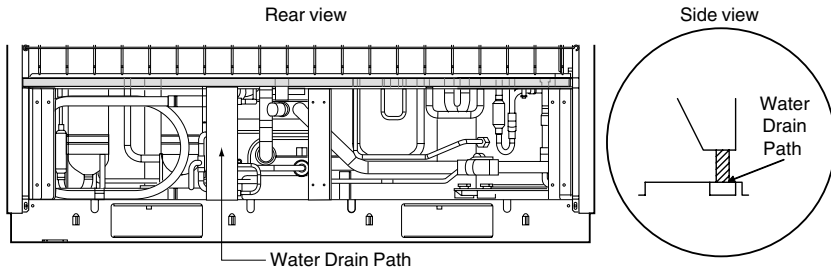
- Fix the unit tightly with bolts as shown below so that unit will not fall down due to earthquake or gust.
- Use the H-beam support as a base support
- Noise and vibration may occur from the floor or wall since vibration is transferred through the installation part depending on installation status. Thus, use anti-vibration materials (cushion pad) fully (The base pad shall be more than 200mm).



- Ⓐ Ensure that the corner part can be securely mounted. Otherwise, the support for installation may be bent.
- Ⓑ Obtain and use the M10 anchor bolt.
- Ⓒ The corner was not properly mounted.
- Ⓓ Outdoor unit (Insert the cushion pad between outdoor unit and base support to ensure that anti-vibration may be done in a wide area)
- Ⓔ Pipe and wiring space (in case of piping and wiring on the floor surface)
- Ⓕ H-Beam support
- Ⓖ Concrete base support

WARNING

- Be sure to install unit in a place strong enough to withstand its weight. Any lack of strength may cause unit to fall down, resulting in a personal injury.
- Have installation work in order to protect against a strong wind and earthquake. Any installation deficiency may cause unit to fall down, resulting in a personal injury.
- Especially take care for support strength of the floor surface, water drain processing (processing of water flown out from the outdoor unit during operation) and paths of the pipe and wiring when making a base support.
- Don't use a tube or pipe for water drain in the base pan and perform water drain processing by using the drain path. Water drain may be done due to freezing of a tube or pipe.

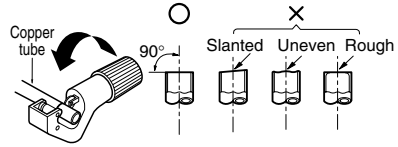


Preparation of Piping

Main cause of gas leakage is defect in flaring work. Carry out correct flaring work in the following procedure.

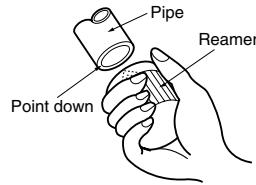
1) Cut the pipes and the cable.

- Use the accessory piping kit or the pipes purchased locally.
- Measure the distance between the indoor and the outdoor unit.
- Cut the pipes a little longer than measured distance.
- Cut the cable 1.5m longer than the pipe length.



2) Burrs removal

- Completely remove all burrs from the cut cross section of pipe/tube.
- Put the end of the copper tube/pipe to downward direction as you remove burrs in order to avoid to let burrs drop in the tubing.

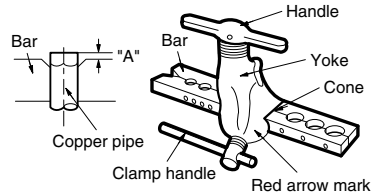


3) Flaring work

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

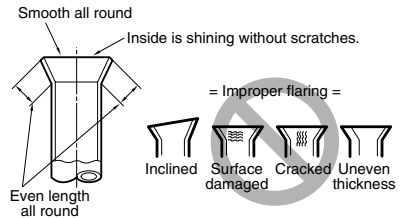
Indoor unit [kW(Btu/h)]	Pipe		" A "	
	Gas	Liquid	Gas	Liquid
<5.6(19,100)	1/2"	1/4"	1.6~1.8	1.1~1.3
<16.0(54,600)	5/8"	3/8"	1.6~1.8	1.5~1.7
<22.4(76,400)	3/4"	3/8"	1.9~2.1	1.5~1.7

Firmly hold copper tube in a bar(or die) as indicated dimension in the table above.



4) Check

- Compare the flared work with figure below.
- If flare is noted to be defective, cut off the flared section and do flaring work again.



FLARE SHAPE and FLARE NUT TIGHTENING TORQUE

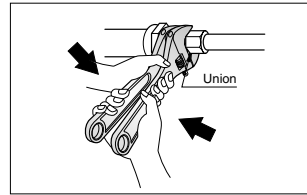
Precautions when connecting pipes

- See the following table for flare part machining dimensions.
- When connecting the flare nuts, apply refrigerant oil to the inside and outside of the flares and turn them three or four times at first. (Use ester oil or ether oil.)
- See the following table for tightening torque.(Applying too much torque may cause the flares to crack.)
- After all the piping has been connected, use nitrogen to perform a gas leak check.

pipe size	Flare nut fastening torque(N.m)	flare shape
Ø6.35mm	18~25	
Ø9.52mm	34~42	
Ø12.7mm	55~66	
Ø15.88mm	63~82	
Ø19.05mm	99~121	

CAUTION

- Always use a charge hose for service port connection.
- After tightening the cap, check that no refrigerant leaks are present.
- When loosening a flare nut, always use two wrenches in combination, When connecting the piping, always use a spanner and torque wrench in combination to tighten the flare nut.
- When connecting a flare nut, coat the flare(inner and outer faces) with oil for R410A(PVE) and hand tighten the nut 3 to 4 turns as the initial tightening.



Opening shutoff valve

1. Remove the cap and turn the valve counter clockwise with the hexagon wrench.
2. Turn it until the shaft stops.
Do not apply excessive force to the shutoff valve. Doing so may break the valve body, as the valve is not a backseat type. Always use the special tool.
3. Make sure to tighten the cap securely.

Closing shutoff valve

1. Remove the cap and turn the valve clockwise with the hexagon wrench.
2. Securely tighten the valve until the shaft contacts the main body seal.
3. Make sure to tighten the cap securely.
* For the tightening torque, refer to the table on the below.

Tightening torque

Shutoff valve size	Tightening torque N-m(Turn clockwise to close)					
	Shaft(valve body)		Cap(Valve lid)	Service port	Flare nut	Gas line piping attached to unit
Ø6.4	5.4-6.6	Hexagonal wrench 4mm	13.5-16.5	11.5-13.9	14-17	-
Ø9.5					33-39	
Ø12.7	8.1-9.9				18-22	
Ø15.9	13.5-16.5	Hexagonal wrench 6mm	23-27		62-75	
Ø22.2	27-33	Hexagonal wrench 10mm	36-44	-	22-28	
Ø25.4				-		

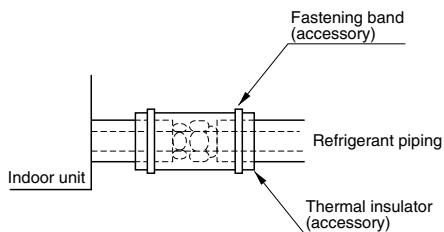
HEAT INSULATION

1. Use the heat insulation material for the refrigerant piping which has an excellent heat-resistance (over 120°C).

2. Precautions in high humidity circumstance:

This air conditioner has been tested according to the "ISO Conditions with Mist" and confirmed that there is not any default. However, if it is operated for a long time in high humid atmosphere (dew point temperature: more than 23°C), water drops are liable to fall. In this case, add heat insulation material according to the following procedure:

- Heat insulation material to be prepared... EPDM (Ethylene Propylene Diene Methylene)-over 120°C the heat-resistance temperature.
- Add the insulation over 10mm thickness at high humidity environment.

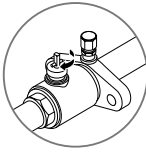


Refrigerant piping installation

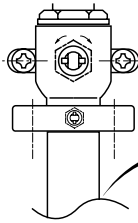
⚠ WARNING

Always use extreme care to prevent the refrigerant gas (R-410A) from the leakage while using fire or flame. If the refrigerant gas comes in contact with the flame from any source, such as a gas stove, it breaks down and generates a poisonous gas which can cause gas poisoning. Never perform brazing in an unventilated room. Always conduct an inspection for gas leakage after installation of the refrigerant piping has been completed.

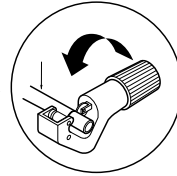
Cautions in pipe connection/valve operation



Open status when both the pipe and the valve are in a straight line.



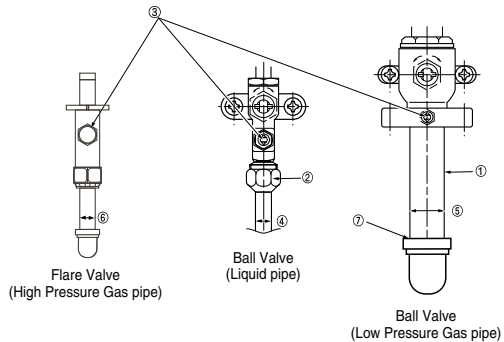
Cut both the pipe and the valve with a cutter to suit the length
(Don't cut the length of less than 70mm)



⚠ WARNING

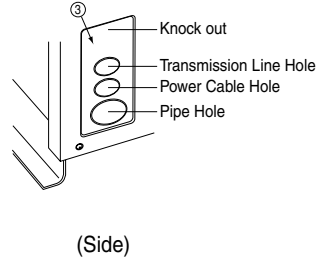
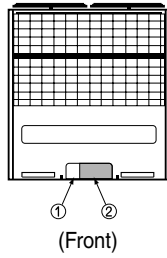
After completing work, securely tighten both service ports and caps so that gas does not leak.

- ① Pipe joint (auxiliary parts): Securely perform brazing with a nitrogen blow into the service valve port. (Releasing pressure : 0.02 MPa or less)
- ② Flare nut: Loose or tighten flare nut by using the wrench with both ends. Coat the flare connection part with oil for the compressor.
- ③ Service port: Make the refrigerant pipe vacuum and charge it using the service port. Always reattach caps after completing work (tightening torque of service cap: 14Nm (140kg-cm) or more).
- ④ Liquid pipe
- ⑤ Low Pressure Gas pipe
- ⑥ High Pressure Gas pipe
- ⑦ Elbow joint



When connecting the pipes from the front of the outdoor unit, Remove part ② (or part ② and part ①).

When connecting the pipes from the side of the outdoor unit, remove part ③ (the whole "Knock out" part).

**WARNING**

After installing the pipe, clog the pipe excavation inlet of the front panel and the side panel (Wire may be damaged due to entering of rats, animals, etc).

Connection of Outdoor Units

2 outdoor units

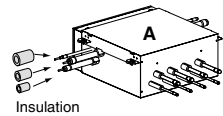
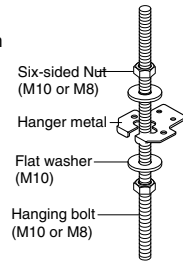
Model	Low Pressure Gas Pipe	Liquid Pipe	High Pressure Gas Pipe
ARCNB20			

3 outdoor units

Model	Low Pressure Gas Pipe	Liquid Pipe	High Pressure Gas Pipe
ARCNB20			
ARCNB30			

Installation Procedure

- Using an insert-hole-in- anchor, hang the hanging bolt.
- Install a hexagon nut and a flat washer (locally-procured) to the hanging bolt as shown in the figure in the bottom, and fit the main unit to hang on the hanger metal.
- After checking with a level that the unit is level, tighten the hexagon nut.
* The tilt of the unit should be within $\pm 5^\circ$ in front/back and left/right.
- This unit should be installed suspended from ceiling and side A should always be facing up.
- Insulate not used pipes completely as shown in the figure.

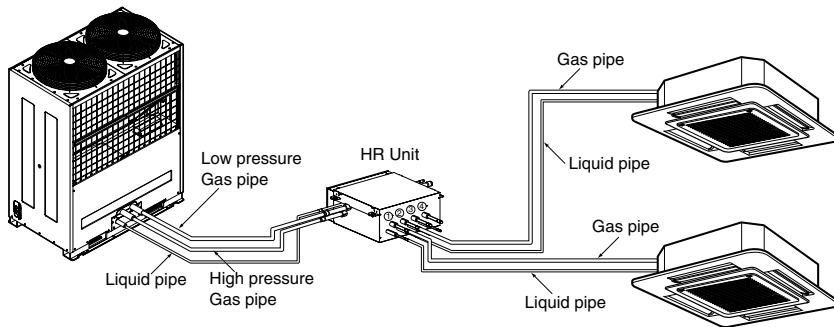


Installation of Outdoor Unit, HR Unit, Indoor Unit Refrigerant Pipe

3 pipes are connected to the HR unit from the outdoor unit, classified into liquid pipe, low pressure gas pipe and high pressure gas pipe depending on status of refrigerant passing through the pipe.

You must connect 3 pipes from outdoor unit to HR unit.

For connection between indoor unit and HR unit, you must connect both liquid pipe and gas pipe from the HR unit to the indoor unit. In this case, connect them to the indoor unit starting from No.1 connection port of the HR unit (the port number is displayed on ports of the HR unit). Use auxiliary flare as annexed parts in connection to the indoor unit.



! CAUTION:

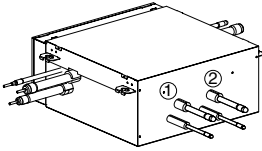
Whenever connecting the indoor units with the HR unit, install the indoor units in numerical order from No.1.
Ex) In case of installing 3 indoor units : No. 1, 2, 3 (O), No. 1, 2, 4 (X), No.1, 3, 4 (X), No.2, 3, 4 (X).

Type of HR Unit

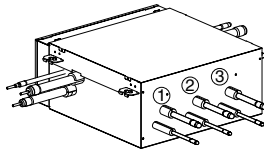
Select an HR unit according to the number of the indoor units to be installed. HR units are classified into 3 types by the number of connectable indoor units.

Ex) Installation of 6 indoor units

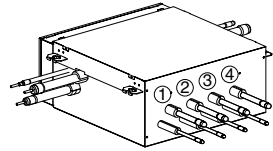
Consists of HR unit for 4 rooms and HR unit for 2 rooms.



PRHR020(2 rooms)



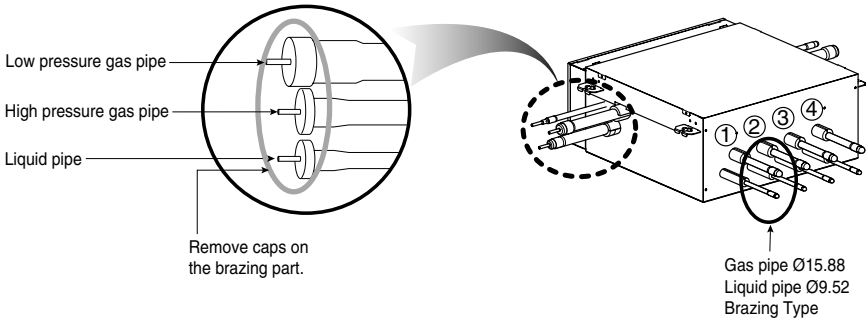
PRHR030(3 rooms)



PRHR040(4 rooms)


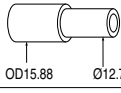

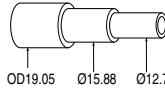
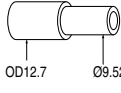
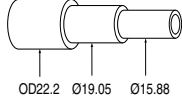

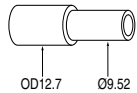
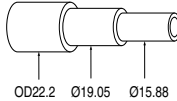
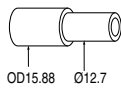
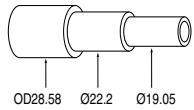
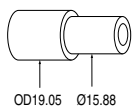
! WARNING

- 1 port of HR unit allows up to 14.1kW based on cooling capacity of the indoor unit (up to 14.1kW (48kBtu/hr) for max installation).
- The maximum total capacity of the indoor units connected to one PRHR040 HR unit is 47kW (160kBtu/hr). In case of installation of four indoor units of 14.1kW (48kBtu/hr), use two PRHR020's rather than one PRHR040.



HR unit	PRHR020	PRHR030	PRHR040
Low pressure gas pipe	Ø22.2	Ø28.58	Ø28.58
High pressure gas pipe	Ø19.05	Ø22.2	Ø22.2
Liquid pipe	Ø9.52	Ø12.7	Ø12.7

[Reducers for indoor unit and HR unit]

Models		Liquid pipe	Gas pipe	
			High pressure	Low pressure
Indoor unit reducer				
HR unit reducer	PRHR020		 	 
	PRHR030/ PRHR040		 	 

Caution

1. Use the following materials for refrigerant piping.
 - Material: Seamless phosphorous deoxidized copper pipe
 - Wall thickness : Comply with the relevant local and national regulations for the designed pressure 3.8MPa. We recommend the following table as the minimum wall thickness.

Outer diameter [mm]	6.35	9.52	12.7	15.88	19.05	22.2	25.4	28.58	31.8	34.9	38.1	41.3
Minimum thickness [mm]	0.8	0.8	0.8	0.99	0.99	0.99	0.99	0.99	1.1	1.21	1.35	1.43

2. Commercially available piping often contains dust and other materials. Always blow it clean with a dry inert gas.
3. Use care to prevent dust, water or other contaminants from entering the piping during installation.
4. Reduce the number of bending portions as much as possible, and make bending radius as big as possible.
5. Always use the branch piping set shown below, which are sold separately.

Y branch	
ARBLB01620	ARBLB03320
ARBLB07120	ARBLB14520

6. If the diameters of the branch piping of the designated refrigerant piping differs, use a pipe cutter to cut the connecting section and then use an adapter for connecting different diameters to connect the piping.
7. Always observe the restrictions on the refrigerant piping (such as rated length, difference in height, and piping diameter).
Failure to do so can result in equipment failure or a decline in heating/cooling performance.
8. The system will stop due to an abnormality like excessive or insufficient refrigerant. At such a time, always properly charge the unit. When servicing, always check the notes concerning both the pipe length and the amount of additional refrigerant.
9. **Never perform a pump down. This will not only damage the compressor but also deteriorate the performance.**
10. **Never use refrigerant to perform an air purge. Always evacuate using a vacuum pump.**
11. Always insulate the piping properly. Insufficient insulation will result in a decline in heating/cooling performance, drip of condensate and other such problems.
12. When connecting the refrigerant piping, make sure the service valves of the outdoor unit is completely closed (the factory setting) and do not operate it until the refrigerant piping for the outdoor and indoor units has been connected, a refrigerant leakage test has been performed and the evacuation process has been completed.
13. Always use a non-oxidizing brazing material for brazing the parts and do not use flux. If not, oxidized film can cause clogging or damage to the compressors and flux can harm the copper piping or refrigerant oil.
14. Diameter of the refrigerant pipe from the HR unit to the indoor unit is determined by capacity of the indoor unit. The pipe port is installed to suit a large capacity of the indoor unit for the connection flare of the HR unit. It is sufficient to cut, connect and install the subsidiary flare to suit the pipe of the indoor unit connected.
15. Take care so that there is no thermal damage on the service valves of the outdoor unit.
(Especially packing part of service port.) Wrap the service valve with a wet towel when brazing it.

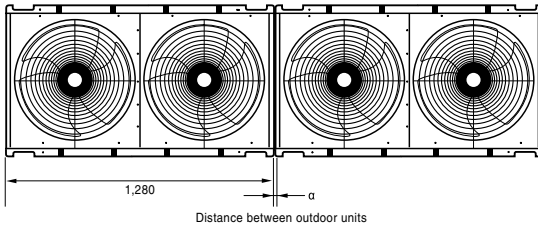
! WARNING

When installing and moving the air conditioner to another site, be sure to make recharge refrigerant after perfect evacuation.

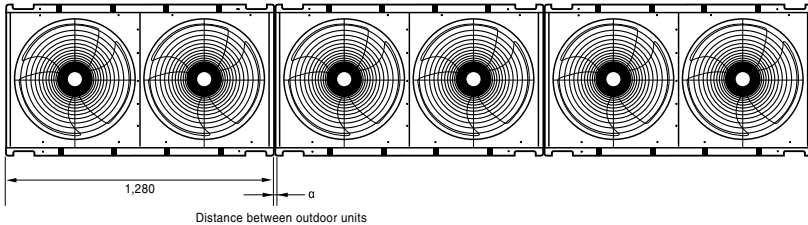
- If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.
- After selecting diameter of the refrigerant pipe to suit total capacity of the indoor unit connected after branching, use an appropriate branch pipe set according to the pipe diameter of the indoor unit and the installation pipe drawing.

Pipe Length between Outdoor Units (Low pressure gas pipe, High pressure gas pipe, Liquid pipe)

= Product length (1,280) + α (distance between outdoor units)



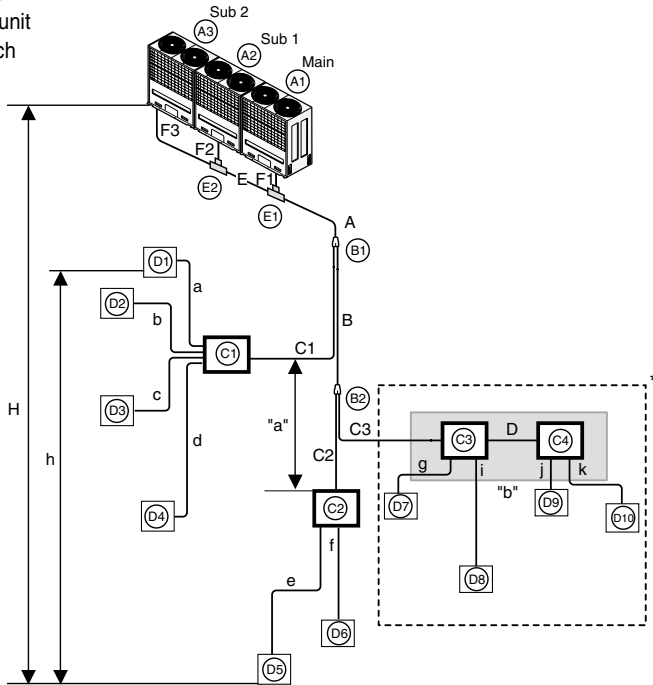
Unit: mm



Refrigerant piping system

Example : 3 outdoor units, 4 HR units and 11 indoor units

- (A) Outdoor unit
- (B) Y branch
- (C) HR unit
- (D) Indoor unit
- (E) Y branch



- **Case1 ("a")**
: Maximum height is 15 m if you install with Y branch.
- **Case2 ("b")**
: Height is zero(0) m in HR unit serial connector.

WARNING

* : Serial connection of HR units : Capacity sum of indoor units ≤ 160kBtu/hr

- Refer to the HR unit PCB part for the valve group control setting.
- It is recommended that difference in pipe lengths between an HR unit and indoor units, for example difference in length of a, b, c, and d, be minimized. The larger difference in pipe lengths, the more different performance between indoor units.
- Piping length from outdoor branch to outdoor unit ≤ 10m, equivalent length : max 13m (for 16HP or more)

▷ Refrigerant pipe diameter between branches and HR units (B,C,D)

Downward indoor unit total capacity [kW(Btu/h)]	Liquid pipe [mm(inch)]	Gas pipe [mm(inch)]	
		Low pressure	High pressure
< 5.6 (19,100)	Ø6.35(1/4)	Ø12.7(1/2)	Ø9.52(3/8)
< 16.0 (54,600)	Ø9.52(3/8)	Ø15.88(5/8)	Ø12.7(1/2)
< 22.4 (76,400)	Ø9.52(3/8)	Ø19.05(3/4)	Ø15.88(5/8)
< 33 (112,600)	Ø9.52(3/8)	Ø22.2(7/8)	Ø19.05(3/4)
< 47 (160,400)	Ø12.7(1/2)	Ø28.58(1 1/8)	Ø22.2(7/8)
< 71 (242,300)	Ø15.88(5/8)	Ø28.58(1 1/8)	Ø28.58(1 1/8)
< 104 (354,900)	Ø19.05(3/4)	Ø34.9(1 3/8)	Ø28.58(1 1/8)
104 (354,900) ≤	Ø19.05(3/4)	Ø41.3(1 5/8)	Ø28.58(1 1/8)

▷ Total pipe length ≤ 300m

E1 ~ O10	Outdoor unit ~ the farthest indoor unit
	A+B+C3+D+k ≤ 150m (equivalent pipe length ≤ 175m)
C3 ~ C4	HR unit ~ neighboring HR unit
	D ≤ 10 m
E1 ~ O10	The 1st indoor branch ~ the farthest indoor unit
	B+C3+D+k ≤ 40m
E1 ~ A3	The 1st outdoor branch ~ the farthest outdoor unit
	E+F3 ≤ 10m
H	Difference in height (outdoor unit ↔ indoor unit)
	H ≤ 50m (40m:if outdoor unit is lower than indoor units)
h	Difference in height (indoor unit ↔ indoor unit)
	h ≤ 15m

CAUTION

- * : Assume equivalent pipe length of Y branch to be 0.5m, calculation purpose.

CAUTION:

- Should not be exceed 10m between neighboring HR unit.
- Serial connection of HR units : Capacity sum of indoor units ≤ 160kBtu/hr.

Prohibited pattern

• Capacity sum of indoor units is over 160k Btu/hr.

Prohibited pattern

• Distance between neighboring HR unit is over 10m, and Capacity sum of indoor units is over 160k Btu/hr.

Pattern

Pattern

1 Indoor unit A Y Branch pipe

Outdoor Unit Low pressure Gas pipe High pressure Gas pipe HR Unit Gas pipe Indoor Unit Liquid pipe

◆ Outdoor Unit Connection

▷ Refrigerant pipe diameter before 1st branch (A,E,F)

Upward outdoor unit total capacity [HP]	Liquid pipe [mm(inch)]	Gas pipe [mm(inch)]	
		Low pressure	High pressure
8	Ø9.52(3/8)	Ø19.05(3/4)	Ø15.88(5/8)
10	Ø9.52(3/8)	Ø22.2(7/8)	Ø19.05(3/4)
12	Ø12.7(1/2)	Ø28.58(1 1/8)	Ø19.05(3/4)
14, 16	Ø12.7(1/2)	Ø28.58(1 1/8)	Ø22.2(7/8)
18, 20	Ø15.88(5/8)	Ø28.58(1 1/8)	Ø22.2(7/8)
22, 24	Ø15.88(5/8)	Ø34.9(1 3/8)	Ø28.58(1 1/8)
26~34	Ø19.05(3/4)	Ø34.9(1 3/8)	Ø28.58(1 1/8)
36	Ø19.05(3/4)	Ø41.3(1 5/8)	Ø28.58(1 1/8)
38, 40	Ø19.05(3/4)	Ø41.3(1 5/8)	Ø34.9(1 3/8)

WARNING

Do not choose the main pipe diameter, namely A, by downward indoor unit total capacity but its outdoor unit model name. Do not let the connection pipe from branch to branch exceed the main pipe diameter chosen by outdoor unit model name. EX) Where connecting the indoor units to the 22 HP (61.5 kW) outdoor unit to 130% of its system capacity (79.9 kW) and branching one HR unit of four 7k indoor units (8.4kW) at the 1st branch.

Main pipe diameter(22 HP outdoor unit): Ø15.88(Liquid pipe), Ø34.9(Low pressure gas pipe), Ø28.58(High pressure gas pipe)

Pipe diameter between 1st and 2nd branch (71.5kW indoor units): Ø19.05(Liquid pipe), Ø34.9(Low pressure gas pipe) and Ø28.58(High pressure gas pipe) in conformity with downward indoor units.

Since the main pipe diameter of 22HP outdoor unit is Ø15.88(Liquid pipe), Ø34.9(Low pressure gas pipe), Ø28.58(High pressure gas pipe), it should be used as the diameter of the main pipe and the connection pipe between 1st and 2nd indoor branches.

WARNING

When the equivalent length between the outdoor unit and a indoor unit is 90 m or more, the size of main pipes (only liquid pipe) must be increased one grade.

Liquid pipe

8, 10HP.....Ø9.52 → Ø12.7
12, 14, 16HP.....Ø12.7 → Ø15.88

18, 20, 22, 24HP.....Ø15.88 → Ø19.05
26, 28, 30, 32, 34, 36, 38, 40HP....Ø19.05 → Ø22.2

◆ Indoor Unit Connection

▷ Indoor unit connecting pipe from branch (a~k)

Indoor unit capacity [kW(Btu/h)]	Liquid pipe [mm(inch)]	Gas pipe [mm(inch)]
< 5.6(19,100)	Ø6.35(1/4 inch)	Ø12.7(1/2 inch)
< 16.0(54,600)	Ø9.52(3/8 inch)	Ø15.88(5/8 inch)
< 22.4(76,400)	Ø9.52(3/8 inch)	Ø19.05(3/4 inch)

◆ The Amount of Refrigerant

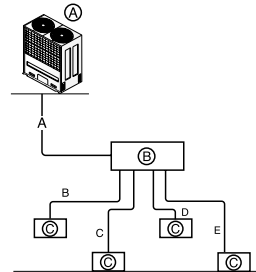
The calculation of the additional charge should take account of the length of pipe.

(A)	Product charge(1unit)=8kg	
(B)	Additional charge (kg)	
=	Total liquid pipe (m): Ø22.2mm	x 0.354(kg/m)
+	Total liquid pipe (m): Ø19.05mm	x 0.266(kg/m)
+	Total liquid pipe (m): Ø15.88mm	x 0.173(kg/m)
+	Total liquid pipe (m): Ø12.7mm	x 0.118(kg/m)
+	Total liquid pipe (m): Ø9.52mm	x 0.061(kg/m)
+	Total liquid pipe (m): Ø6.35mm	x 0.022(kg/m)
+	Number of installed HR units	x 0.5 kg(4 Rooms)
+	CF(kg) (Correction factor)	
	Total amount(kg)	= (A) + (B)

⚠ CAUTION If a negative result is obtained from the calculation, no refrigerant needs to be added.

Ex) ARUB1208T1

- Ⓐ Outdoor unit
- Ⓑ HR unit (1EA)
- Ⓒ Indoor unit



- A: Ø12.7, 50m
- B: Ø9.52, 10m
- C: Ø9.52, 10m
- D: Ø9.52, 10m
- E: Ø6.35, 10m

$$\begin{aligned}
 \text{Additional Charge} &= A \times 0.118 + B \times 0.061 + C \times 0.061 \\
 &\quad + D \times 0.061 + E \times 0.022 + \text{HR} + \text{CF} \\
 &= 50 \times 0.118 + 10 \times 0.061 + 10 \times 0.061 \\
 &\quad + 10 \times 0.061 + 10 \times 0.022 + 0.5(\text{HR}) + 1(\text{CF}) \\
 &= 7.45(\text{kg})
 \end{aligned}$$

⚠ WARNING

- ▶ Regulation for refrigerant leakage
: the amount of refrigerant leakage should satisfy the following equation for human safety.

$$\frac{\text{Total amount of refrigerant in the system}}{\text{Volume of the room at which indoor unit of the least capacity is installed}} \leq 0.3 \text{ (kg / m}^3 \text{)}$$

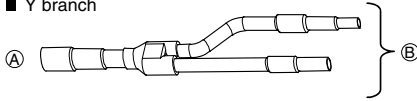
□ If the above equation can not be satisfied, then follow the following steps.

- Selection of air conditioning system: select one of the next
 1. Installation of effective opening part
 2. Reconfirmation of outdoor unit capacity and piping length
 3. Reduction of the amount of refrigerant
 4. Installation of 2 or more security device (alarm for gas leakage)
- Change indoor unit type
: installation position should be over 2m from the floor (wall mounted type → cassette type)
- Adoption of ventilation system
: choose ordinary ventilation system or building ventilation system
- Limitation in piping work
: Prepare for earthquake and thermal stress

⚠ WARNING ▶ Refer to model information since the CF value of correction factor differs depending on model.

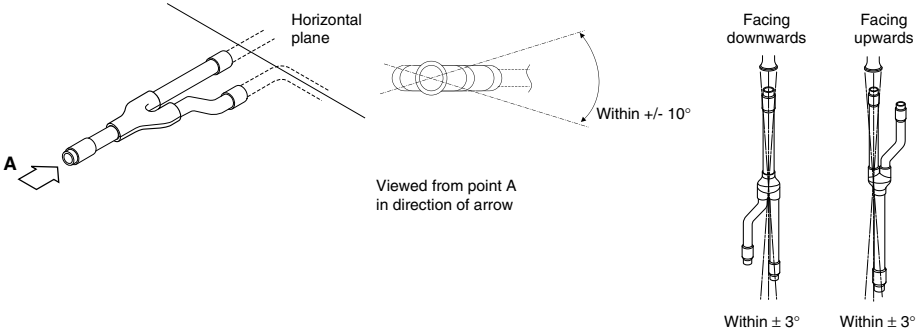
Branch pipe Fitting

■ Y branch

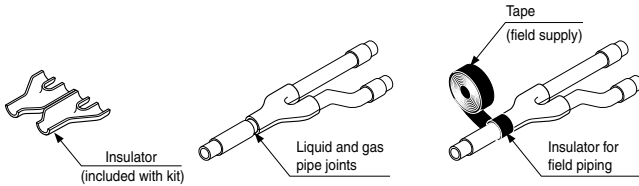


- Ⓐ To outdoor unit
- Ⓑ To branch piping or indoor unit

- Ensure that the branch pipes are attached horizontally or vertically (see the diagram below.)



- There is no limitation on the joint mounting configuration.
- If the diameter of the refrigerant piping selected by the procedures described is different from the size of the joint, the connecting section should be cut with a pipe cutter.
- Branch pipe should be insulated with the insulator in each kit.



◆ Y branch pipe

[unit:mm]

ENGLISH

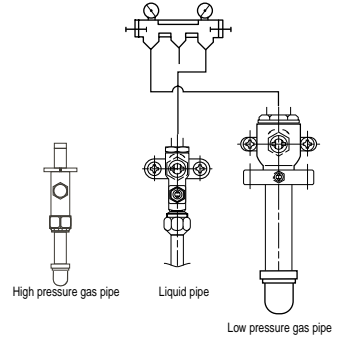
Models	Low Pressure Gas Pipe	Liquid pipe	High Pressure Gas Pipe
<p>ARBLB01620 ~ under 22.4kW (76kBtu/h)</p>			
<p>ARBLB03320 ~ under 33.0kW (112kBtu/h)</p>			
<p>ARBLB07120 ~ under 71.0kW (242kBtu/h)</p>			
<p>ARBLB14520 71.0kW or more ~ (242kBtu/h)</p>			

Leak Test and Vacuum

(1) Leak test

Leak test should be made by pressurizing nitrogen gas to 3.80MPa(38.7 kgf/cm²). For the test method, refer to the following figure. (Make a test with the service valves closed. Be also sure to pressurize low pressure gas pipe and liquid pipe simultaneously)
The test result can be judged good if the pressure has not be reduced after leaving for about one day after completion of nitrogen gas pressurization.

* When charging of refrigerant is needed due to a defect of outdoor unit, pressurize after opening the service valves.



Note:

If the ambient temperature differs between the time when pressure is applied and when the pressure drop is checked, apply the following correction factor

There is a pressure change of approximately 0.1 kg/cm² (0.01 MPa) for each 1°C of temperature difference.

Correction= (Temp. at the time of pressurization – Temp. at the time of check) X 0.1

For example: Temperature at the time of pressurization (3.8 MPa) is 27 °C
24 hour later: 3.73 MPa, 20°C

In this case the pressure drop of 0.07 is because of temperature drop
And hence there is no leakage in pipe occurred.

CAUTION

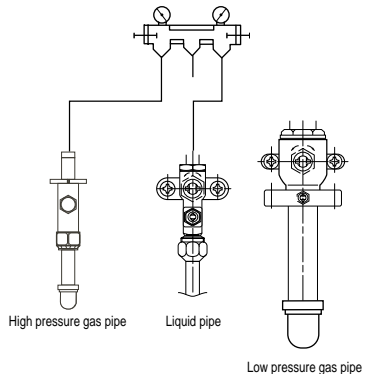
To prevent the nitrogen from entering the refrigeration system in the liquid state, the top of the cylinder must be at higher position than the bottom when you pressurize the system.
Usually the cylinder is used in a vertical standing position.

(2) Vacuum

Vacuum of the pipe and the indoor units should be made from the port of the outdoor unit's service valve with the service valve closed. Vacuum should be made from the high pressure gas pipe and the liquid pipe simultaneously with a vacuum pump including a vacuum gage. (The low pressure gas pipe becomes vacuum via the HR unit.) After the degree of vacuum gets to 5 Torr, keep vacuum for more than an hour.

* Never perform air purging by using refrigerant.

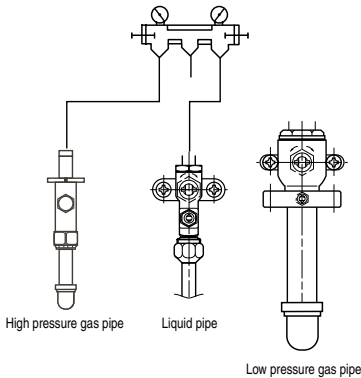
- Vacuum drying : Use a vacuum pump that can evacuate to -100.7kPa (5 Torr, -755mmHg).
1. Evacuate the system from the liquid pipes and the high pressure gas pipes with a vacuum pump for over 2 hours and bring the system to -100.7kPa. After maintaining system under that condition for over 1 hour, confirm the vacuum gauge rises. If it rises, the system may contain moisture or leak.
 2. Following should be executed if there is a possibility of moisture remaining inside the pipe.
(Rainwater may enter the pipe during work in the rainy season or over a long period of time)
After evacuating the system for 2 hours, give pressure to the system to 0.05MPa(vacuum break) with nitrogen gas and then evacuate it again with the vacuum pump for 1 hour to -100.7kPa(vacuum drying). If the system cannot be evacuated to -100.7kPa within 2 hours, repeat the steps of vacuum break and its drying. Finally, check if the vacuum gauge rise or not, after maintaining the system in vacuum for 1 hour.



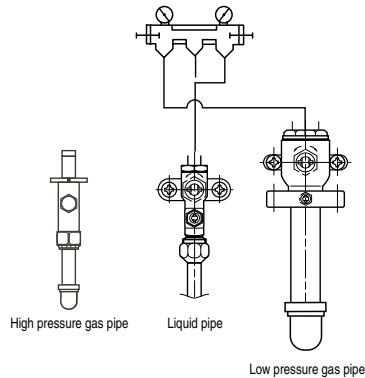
(3) Refrigerant Charged Method

After vacuum completion, primarily charge the calculated amount of additional refrigerant through the high pressure gas pipe and the liquid pipe. If the refrigerant is not charged any more, secondarily charge the remaining refrigerant through the low pressure gas pipe and the liquid pipe.

Vacuum and Primary charging



Secondary charging



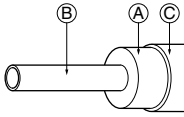
Note : Always add an appropriate amount of refrigerant. (For the refrigerant additional charge)
Too much or too little refrigerant will cause trouble.

! WARNING

- If the primary charging through the high pressure gas pipe and the liquid pipe is not performed after vacuum, wet air may go into the outdoor unit. If air is mixed with the refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.
- Charging of refrigerant while the compressor is working is prohibited. Otherwise, liquid may go into the compressor. It may cause faults of the compressor.
- Use a gravimeter accurate to 0.1kg.
- Pipe to be vacuum: liquid pipe, high pressure gas pipe (low pressure gas pipe is vacuumed via the HR unit).
- If other refrigerants are mixed in the original refrigerant, a refrigerant cycle may cause malfunction or damage.
- Add accurate refrigerant quantity via calculation.
 Too much or too little refrigerant may cause problems
- Repeated on and off of the indoor units without charging refrigerant may cause faults of LEV.
- Since R410A is a mixed refrigerant, the required additional refrigerant must be charged in its liquid state. If the refrigerant is charged in its gaseous state, its composition changes and the system will not work properly.
- When installing and moving the air conditioner to another site, recharge after perfect evacuation.
 - If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.

Thermal insulation of refrigerant piping

Be sure to give insulation work to refrigerant piping by covering liquid pipe and gas pipe separately with enough thickness heat-resistant polyethylene, so that no gap is observed in the joint between indoor unit and insulating material, and insulating materials themselves. When insulation work is insufficient, there is a possibility of condensation drip, etc. Pay special attention to insulation work to ceiling plenum.



- (A) Heat insulation material
- (B) Pipe
- (C) Outer covering
(Wind the connection part and cutting part of heat insulation material with a finishing tape.)

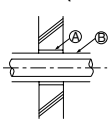
Heat insulation material	Adhesive + Heat - resistant polyethylene foam + Adhesive tape	
Outer covering	Indoor	Vinyl tape
	Floor exposed	Water-proof hemp cloth + Bronze asphalt
	Outdoor	Water-proof hemp cloth + Zinc plate + Oily paint

Note:
When using polyethylene cover as covering material, asphalt roofing shall not be required.

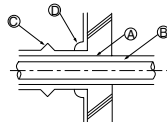
Bad example	<ul style="list-style-type: none"> Do not insulate gas or low pressure pipe and liquid or high pressure pipe together. <ul style="list-style-type: none"> (A) Liquid pipe (B) Gas pipe (C) Power lines (D) Finishing tape (E) Insulating material (F) Transmission lines 	<ul style="list-style-type: none"> Be sure to fully insulate connecting portion. <p>(A) These parts are not insulated.</p>
Good example	<ul style="list-style-type: none"> (A) Liquid pipe (B) Low pressure gas pipe (C) Power lines (D) Finishing tape (E) Insulating material (F) High pressure gas pipe (G) Transmission lines <p>Power lines Transmission lines</p> <p>Separation</p>	

Penetrations

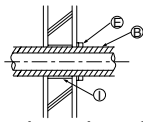
Inner wall (concealed)



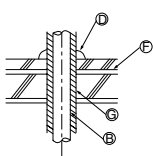
Outer wall



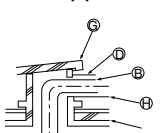
Outer wall (exposed)



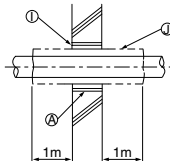
Floor (fireproofing)



Roof pipe shaft



Penetrating portion on fire limit and boundary wall



- (A) Sleeve
- (B) Heat insulating material
- (C) Lagging
- (D) Caulking material
- (E) Band
- (F) Waterproofing layer
- (G) Sleeve with edge
- (H) Lagging material
- (I) Mortar or other incombustible caulking
- (J) Incombustible heat insulation material

When filling a gap with mortar, cover the penetration part with steel plate so that the insulation material will not be caved in. For this part, use incombustible materials for both insulation and covering. (Vinyl covering should not be used.)

Electrical Wiring

Areas of Caution

1. Follow ordinance of your governmental organization for technical standard related to electrical equipment, wiring regulations and guidance of each electric power company.

WARNING

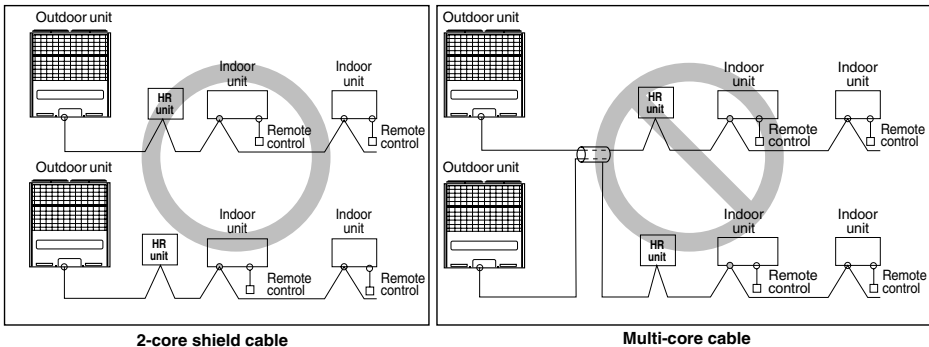
Be sure to have authorized electric engineers do electric work using special circuits in accordance with regulations and this installation manual. If power supply circuit has a lack of capacity or electric work deficiency, it may cause an electric shock or fire.

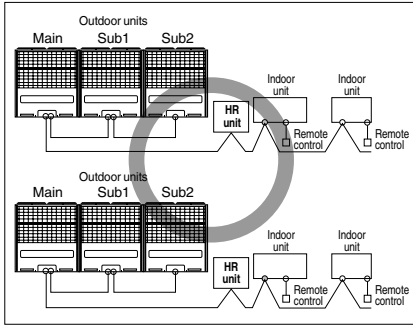
2. Install the outdoor unit transmission line away from the power source wiring so that it may not be affected by electric noise from the power source. (Do not run it through the same conduit.)
3. Be sure to provide designated grounding work to outdoor unit.

CAUTION

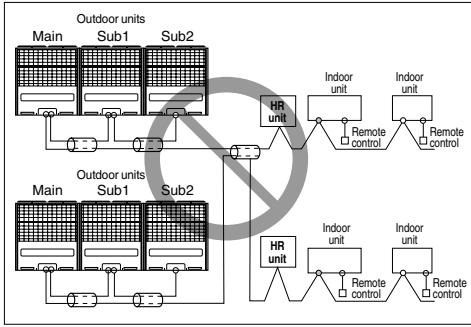
Be sure to put outdoor unit to earth. Do not connect earth line to any gas pipe, water pipe, lightning rod or telephone earth line. If earth is incomplete, it may cause an electric shock.

4. Give some allowance to wiring for electrical part box of Indoor, HR unit and outdoor units, because the box is sometimes removed at the time of service work.
5. Never connect the main power source to terminal block of transmission line. If connected, electrical parts will be burnt out.
6. Use 2-core shield cable for transmission line. (O mark in the figure below) If transmission lines of different systems are wired with the same multicore cable, the resultant poor transmitting and receiving will cause erroneous operations. (⊗ mark in the figure below)
7. Only the transmission line specified should be connected to the terminal block for outdoor unit transmission.





2-core shield cable



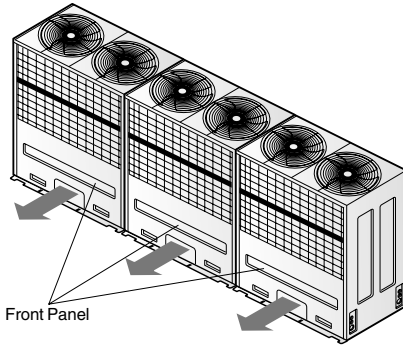
Multi-core cable

CAUTION

- Use the 2-core shield cables for transmission lines. Never use them together with power cables.
- Never use multi-core cable
- As this unit is equipped with an inverter, to install a phase leading capacitor not only will deteriorate power factor improvement effect, but also may cause capacitor abnormal heating. Therefore, never install a phase leading capacitor.
- Keep power imbalance within 2% of the supply rating. Large imbalance will shorten the life of the smoothing capacitor.

Control box and connecting position of wiring

- Remove all of the screws on front panel, and remove the front panel by pulling it forward.

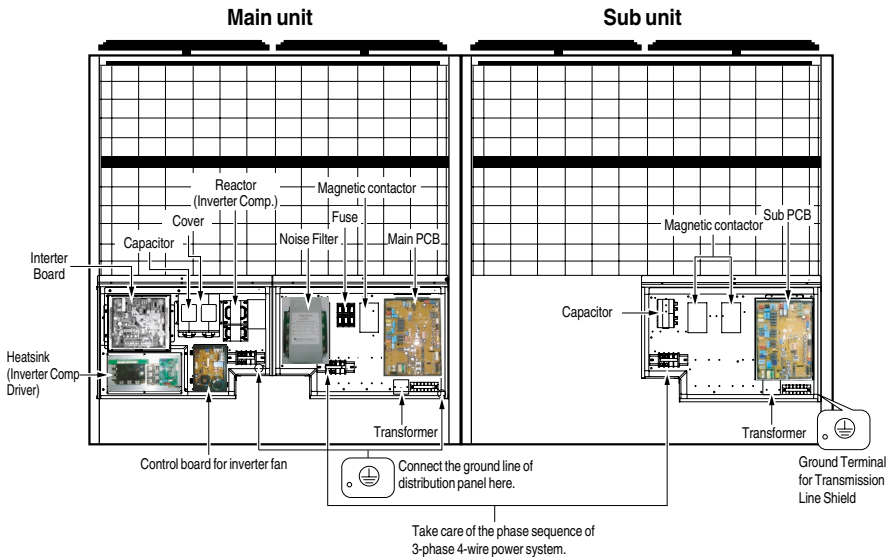


- Connect transmission line between main and sub outdoor unit through the terminal block.
- Connect transmission lines between outdoor unit and indoor/HR units through the terminal block.
- When the central control system is connected to the outdoor unit, a dedicated PCB must be connected between them.
- When connecting transmission line between outdoor unit and indoor/HR units with shielded wire, connect the shield ground to the earth screw.

WARNING

The temperature sensor for outdoor air should not be exposed to direct sunlight.

- Provide an appropriate cover to intercept direct sunlight.



Transmission and Power Lines

1) Transmission cable

- Types : shielding wire CVVS or CPEVS
- Diameter : over 1.25mm²
- Insulation material : PVC
- Maximum allowable temperature: 60°C
- Maximum allowable line length: under 220m

2) Remote control cable

- Types : 3-core cable

3) Simple central control cable

- Types : 4-core cable (Shielding wire)
- Diameter : over 0.75mm²
- Insulation material : PVC

4) Separation of transmission and power lines

- If transmission and power lines are run alongside each other then here is a strong likelihood of operational faults developing due to interference in the signal wiring caused by electrostatic and electromagnetic coupling.

The tables below indicates our recommendation as to appropriate spacing of transmission and power lines where these are to be run side by side

Current capacity of power line		Spacing
100V or more	10A	300mm
	50A	500mm
	100A	1000mm
	100A or more	1500mm

Note:

1. The figures are based on assumed length of parallel cabling up to 100m. For length in excess of 100m the figures will have to be recalculated in direct proportion to the additional length of line involved.
 2. If the power supply waveform continues to exhibit some distortion the recommended spacing in the table should be increased.
- If the lines are laid inside conduits then the following point must also be taken into account when grouping various lines together for introduction into the conduits
 - Power lines(including power supply to air conditioner) and signal lines must not be laid inside the same conduit
 - In the same way, when grouping the power lines and signal lines should not be bunched together.



CAUTION

- If apparatus is not properly earthed then there is always a risk of electric shocks, the earthing of the apparatus must be carried out by a qualified person.
- Use a power wire pipe for the power wiring.

◆ Wiring of Main Power Supply and Equipment Capacity

Outdoor unit (3Ø, 380 ~415V, 50Hz) Indoor unit (1Ø, 220V, 50Hz)

1. Use a separate power supply for the outdoor unit and indoor unit.
2. Bear in mind ambient conditions (ambient temperature, direct sunlight, rain water, etc.) when proceeding with the wiring and connections.
3. The wire size is the minimum value for metal conduit wiring. The power cord size should be 1 rank thicker taking into account the line voltage drops. Make sure the power-supply voltage does not drop more than 10%.
4. Specific wiring requirements should adhere to the wiring regulations of the region.
5. Power supply cords of parts of appliances for outdoor use should not be lighter than polychloroprene sheathed flexible cord.
6. Don't install an individual switch or electrical outlet to disconnect each of indoor unit separately from the power supply.

WARNING

- Follow ordinance of your governmental organization for technical standard related to electrical equipment, wiring regulations and guidance of each electric power company.
- Be sure to use specified wires for connections so that no external force is imparted to terminal connections. If connections are not fixed firmly, it may cause heating or fire.
- Be sure to use the appropriate type of overcurrent protection switch. Note that generated overcurrent may include some amount of direct current.

CAUTION

- Some installation site may require attachment of an earth leakage breaker. If no earth leakage breaker is installed, it may cause an electric shock.
- Do not use anything other than breaker and fuse with correct capacity. Using fuse and wire or copper wire with too large capacity may cause a malfunction of unit or fire.

Model	Unit			Power Supply		COMP		OFM	
	Hz	Volts	Voltage-range	MCA	MOP	MSC	RLA	kW	FLA
8HP	50	380-415	Min.:342 Max.:456	20.7	34.1	16.5/75	14.5/12	0.56	3.97
10HP	50	380-415	Min.:342 Max.:456	26.5	44.5	16.5/75	14.5/12	0.56	3.97
12HP	50	380-415	Min.:342 Max.:456	27.2	45.8	16.5/75	14.5/12	0.56	3.97
14HP	50	380-415	Min.:342 Max.:456	30.5	51.7	16.5/75	14.5/12	0.56	3.97
16HP	50	380-415	Min.:342 Max.:456	41.2	68.0	16.5/75/75/75	14.5/12/12/12	1.1	7.71
18HP	50	380-415	Min.:342 Max.:456	47.0	78.4	16.5/75/75/75	14.5/12/12/12	1.1	7.71
20HP	50	380-415	Min.:342 Max.:456	52.7	88.7	16.5/75/75/75	14.5/12/12/12	1.1	7.71
22HP	50	380-415	Min.:342 Max.:456	53.5	90.1	16.5/75/75/75	14.5/12/12/12	1.1	7.71
24HP	50	380-415	Min.:342 Max.:456	54.2	91.4	16.5/75/75/75	14.5/12/12/12	1.1	7.71
26HP	50	380-415	Min.:342 Max.:456	67.5	112.3	16.5/75/75/75/75	14.5/12/12/12/12/12	1.64	11.45
28HP	50	380-415	Min.:342 Max.:456	73.2	122.6	16.5/75/75/75/75	14.5/12/12/12/12/12	1.64	11.45
30HP	50	380-415	Min.:342 Max.:456	79.0	133.0	16.5/75/75/75/75	14.5/12/12/12/12/12	1.64	11.45
32HP	50	380-415	Min.:342 Max.:456	79.7	134.3	16.5/75/75/75/75	14.5/12/12/12/12/12	1.64	11.45
34HP	50	380-415	Min.:342 Max.:456	80.5	135.7	16.5/75/75/75/75	14.5/12/12/12/12/12	1.64	11.45
36HP	50	380-415	Min.:342 Max.:456	81.2	137.0	16.5/75/75/75/75	14.5/12/12/12/12/12	1.64	11.45
38HP	50	380-415	Min.:342 Max.:456	84.5	142.9	16.5/75/75/75/75	14.5/12/12/12/12/12	1.64	11.45
40HP	50	380-415	Min.:342 Max.:456	87.7	148.7	16.5/75/75/75/75	14.5/12/12/12/12/12	1.64	11.45

Notes:

1. Voltage range
Voltage supplied to the unit terminals should be within the minimum and maximum range
2. Maximum allowable voltage unbalance between phase is 2 %
3. MCA / MOP
MCA = (1.25 x Load1) + Load2
MOP = (2.25 x Load1) + Load2
- Load1 : Rated running current of largest motor (Compressor or other motor)
- Load2 : any other load rated 1.0A or more
4. Select wire spec. based on the MCA
5. Select proper circuit breaker as given below
MCA < Selected circuit breaker ≤ MOP
6. Recommended circuit breaker is ELCB (Earth Leakage Circuit Breaker)
7. MSC & RLA are measured as the compressor only test condition.
8. MSC values
16.5/75 : MSC of (INV. Comp) / (Const. Comp.1)

9. RLA is measured during each individual compressor test condition.
14.5/12.0 : RLA of (INV. Comp) / (Const. Comp.1)
10. OFM is measured as the outdoor unit test condition

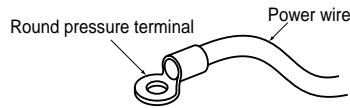
(Example)

- Selection of proper circuit breaker
- ① 10HP- Rated running current : 18.0 A
 - ② MCA = (1.25 x Load1) + Load2
= (1.25 x 18.0) + 3.97 = 26.5 A
 - ③ MOP = (2.25 x Load1) + Load2
= (2.25 x 18.0) + 3.97 = 44.5 A
- Finally select circuit breaker 40A

MCA : Minimum Circuit Amperes (A)
MOP : Maximum rating Over current Protective device
MSC : Maximum Starting Current
RLA : Rated Load Amperes (A)
OFM : Outdoor Fan Motor
kW : Fan Motor rated output (kW)
FLA : Full Load Amperes (A)

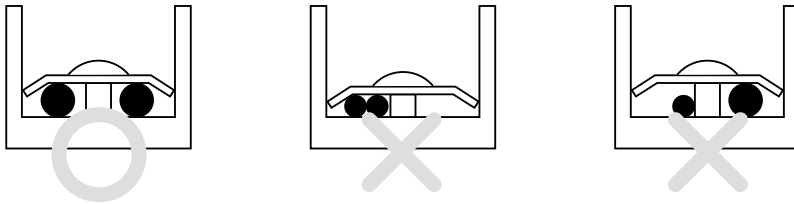
◆ Precautions when laying power wiring

Use round pressure terminals for connections to the power terminal block.



When none are available, follow the instructions below.

- Do not connect wiring of different thicknesses to the power terminal block. (Slack in the power wiring may cause abnormal heat.)
- When connecting wiring which is the same thickness, do as shown in the figure below.



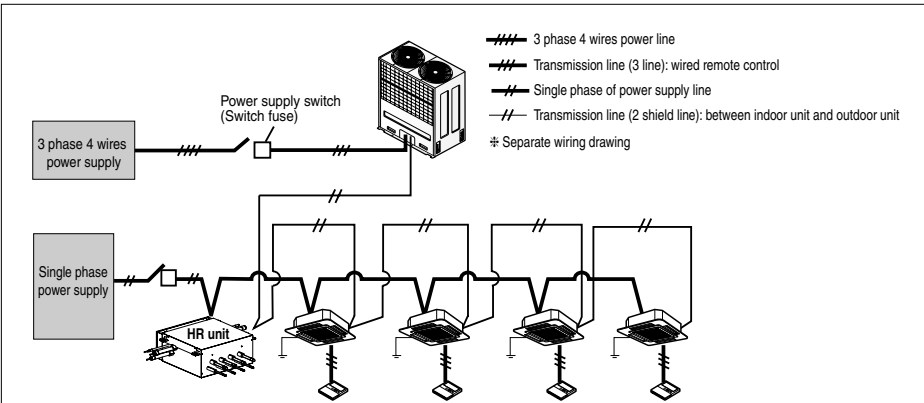
- For wiring, use the designated power wire and connect firmly, then secure to prevent outside pressure being exerted on the terminal block.
- Use an appropriate screwdriver for tightening the terminal screws. A screwdriver with a small head will strip the head and make proper tightening impossible.
- Over-tightening the terminal screws may break them.

CAUTION

When the 400 volt power supply is applied to "N" phase by mistake, replace inverter PCB and transformer in control box.

◆ Example Connection of Transmission Cable

1 Outdoor Unit

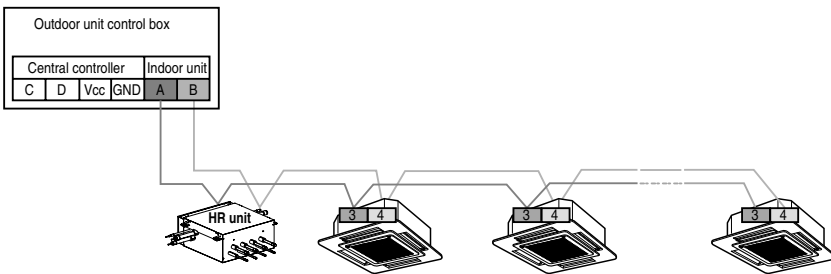


⚠ WARNING

- Indoor unit ground lines are required for preventing electrical shock accident in current leakage, transmission disorder by noise effect and motor current leakage (without connection to pipe).
- Don't install an individual switch or electrical outlet to disconnect each of indoor unit separately from the power supply.

⚠ CAUTION

- You can install as below figure.
- The transmission cable of HR unit can be installed between indoor unit and indoor unit.

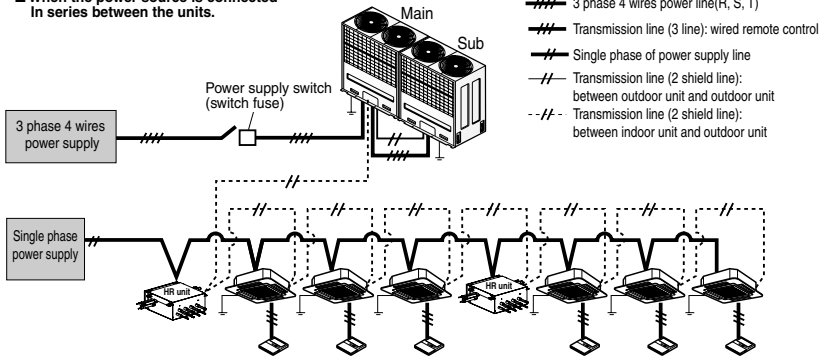


The GND terminal is a 'L' terminal for the central controller, not ground line

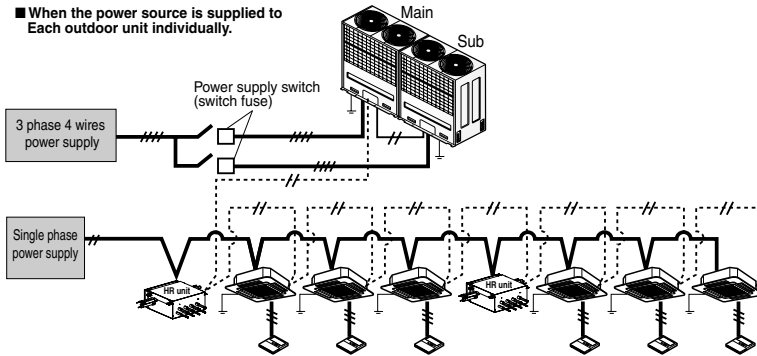
◆ Example Connection of Transmission Cable

2 Outdoor Units

■ When the power source is connected In series between the units.



■ When the power source is supplied to Each outdoor unit individually.



⚠ WARNING

- Indoor unit ground lines are required for preventing electrical shock accident in current leakage, transmission disorder by noise effect and motor current leakage (without connection to pipe).
- Don't install an individual switch or electrical outlet to disconnect each of indoor unit separately from the power supply.
- All wiring, components and materials to be procured on the site must comply with the applicable local and national codes.

Between indoor and main outdoor unit

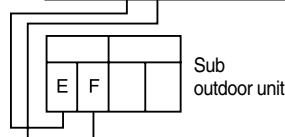
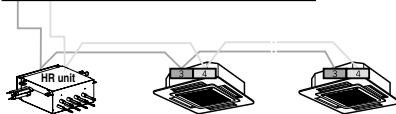
Indoor unit	Outdoor unit	Central controller				
A	B	E	F	C	D	Vcc/GND

Main outdoor unit

Between main outdoor and sub outdoor unit

Indoor unit	Outdoor unit	Central controller				
A	B	E	F	C	D	Vcc/GND

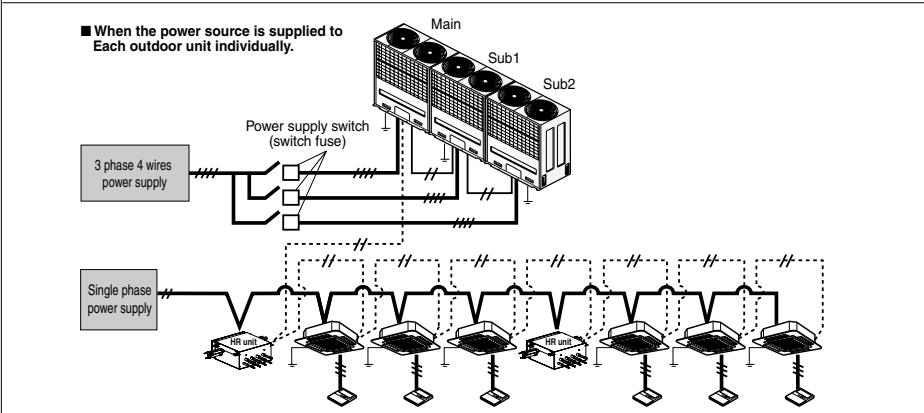
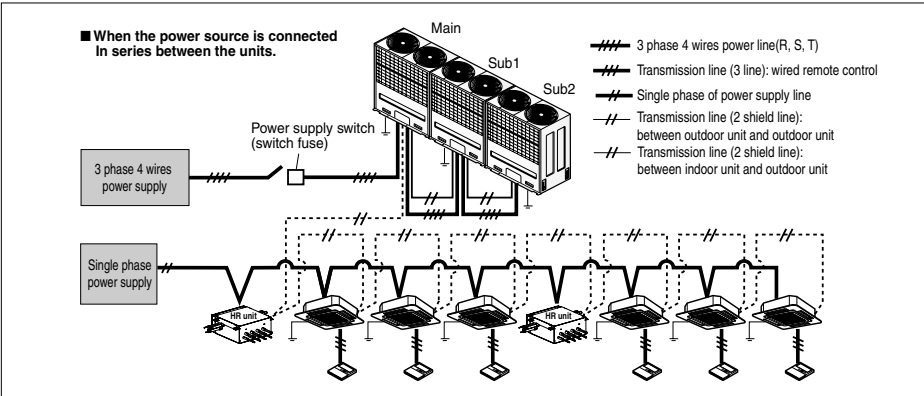
Main outdoor unit



The GND terminal is a 'L' terminal for the central controller, not ground line

◆ Example Connection of Transmission Cable

3 Outdoor Units



⚠ WARNING

- Indoor unit ground lines are required for preventing electrical shock accident in current leakage, transmission disorder by noise effect and motor current leakage (without connection to pipe).
- Don't install an individual switch or electrical outlet to disconnect each of indoor unit separately from the power supply.
- All wiring, components and materials to be procured on the site must comply with the applicable local and national codes.

Between indoor and main outdoor unit

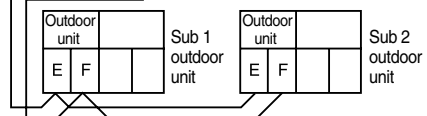
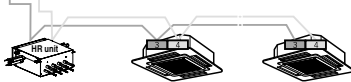
Indoor unit	Outdoor unit	Central controller		
A	B	E	F	
		C	D	Vcc GND

Main outdoor unit

Between main outdoor and sub outdoor unit

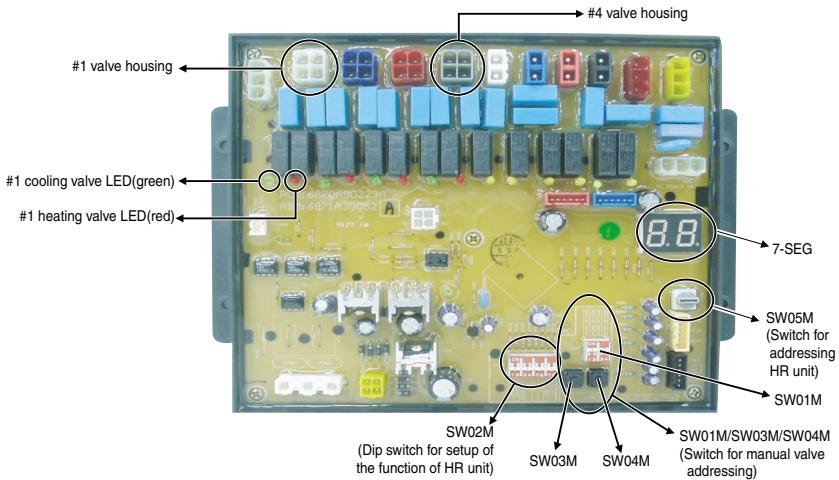
Indoor unit	Outdoor unit	Central controller		
A	B	E	F	
		C	D	Vcc GND

Main outdoor unit



The GND terminal is a "L" terminal for the central controller, not ground line

HR Unit PCB



Switch for setup of HR Unit

1. Main function of SW02M

ON S/W	Selection
No.1	Method for addressing valves of an HR unit (Auto/Manual)
No.2	Model of HR unit
No.3	Model of HR unit
No.4	Not used
No.5	Not used
No.6	Not used
No.7	Use only in factory production (preset to "OFF")
No.8	Use only in factory production (preset to "OFF")

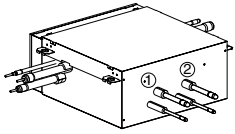
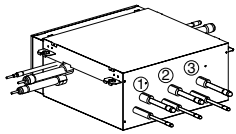
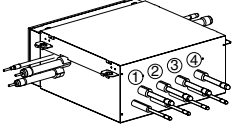


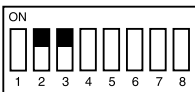





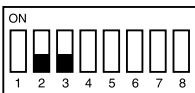
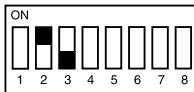




SW02M

1) Selection of the method for addressing valves of an HR unit (Auto/Manual)

<p>Switch No.1 Off</p> <p style="text-align: center;">Auto</p>	<p>Switch No.1 On</p> <p style="text-align: center;">Manual</p>
---	--

2) Selection of the model of the HR unit

	 <p>(For 2 rooms) PRHR020</p>	 <p>(For 3 rooms) PRHR040</p>	 <p>(For 4 rooms) PRHR040</p>
Initial Setting			
1 room Connected			
2 rooms Connected			
3 rooms Connected			
4 rooms Connected			

* Each model is shipped with the switches No.2 and No.3 pre-adjusted as above in the factory.

WARNING

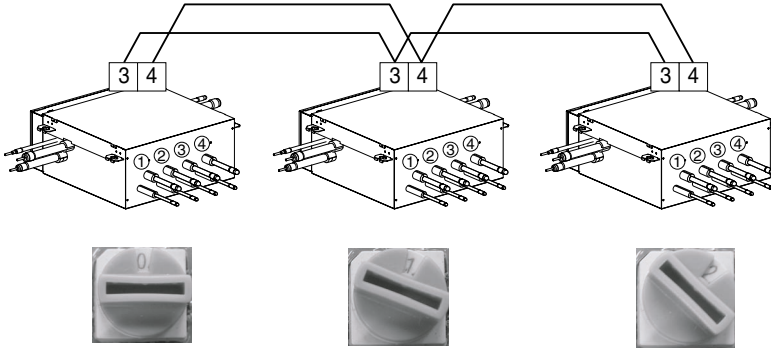
- If you want to use a PRHR030 for 2 rooms HR unit after closing the 3rd pipes, set the dip switch for 2 rooms HR unit.
- If you want to use a PRHR040 for 3 rooms HR unit after closing the 4th pipes, set the dip switch for 3 rooms HR unit.
- If you want to use a PRHR040 for 2 rooms HR unit after closing the 3rd and 4th pipes, set the dip switch for 2 rooms HR unit.
- The unused port must be closed with a copper cap, not with a plastic cap.

2. SW05M (Rotary S/W for addressing HR unit)

Must be set to '0' when installing only one HR unit.

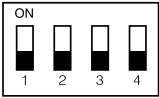


When installing multiple HR units, address the HR units with sequentially increasing numbers starting from '0'.

Ex) Installation of 3 HR units



3. SW01M/SW03M/SW04M (Dip S/W and tact S/W for manual valve addressing)

- Used in manual addressing of the valve in the HR unit
- Set the address of the valve of the HR unit to the central control address of the connected indoor unit.
- SW01M: selection of the valve to address
SW03M: increase in the digit of 10 of valve address
SW04M: increase in the last digit of valve address
- Prerequisite for manual valve addressing : central control address of each indoor unit must be preset differently at its wired remote control.

	S/W No.	Setup
 SW01M	No.1	Manual addressing of valve #1
	No.2	Manual addressing of valve #2
	No.3	Manual addressing of valve #3
	No.4	Manual addressing of valve #4
 SW03M	SW03M	Increase in the digit of 10 of valve address
 SW04M	SW04M	Increase in the last digit of valve address

Method for auto-addressing of valves.

1) Auto addressing for indoor unit

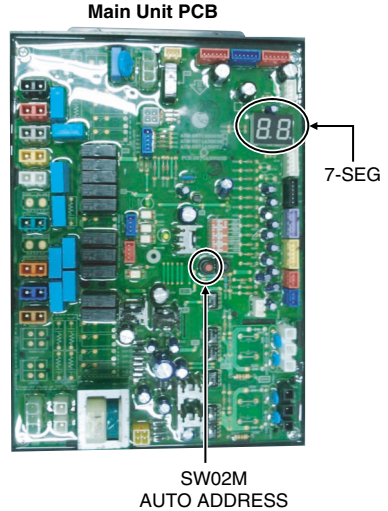
2) Auto pipe detection

3) Manual pipe detection(Execute in case of Auto pipe detection failure)

- Turn off all the indoor units before auto addressing.
If indoor unit is operated, auto addressing would not be completed.

1) Auto addressing for indoor unit

- Wait 3 minutes after turning on the outdoor unit, HR unit, indoor unit.
- Press SW02M of the outdoor unit main PCB for 5 seconds
- 2~7 minutes are required depending on the number of indoor units connected.
- The number of the indoor units and HR units connected is displayed at 7-SEG of the outdoor unit main PCB after completion of indoor unit addressing and the address of each indoor unit appears in the window of its own wired remote control. (Example: CH01, CH02, CH03....CH06)
- Indoor Unit auto addressing is completed



2) Auto pipe detection

- Turn No.1 of SW02M of HR unit PCB off.
- Confirm that the setting of No.2, 3 of SW02M corresponds with the number of indoor units.
- Reset the power of HR unit PCB
- Turn off the No.5 DIP S/W of main unit PCB when outdoor temperature is below 15°C
- Turn on the No.5 DIP S/W of main unit PCB when outdoor temperature is over 15°C
- Reset the power of outdoor unit.
- Wait 3 minutes.
- Press SW01M of the outdoor unit main PCB for 5 Seconds.
- The number of connected HR unit is displayed.
Ex) In case of installing four HR units : 04
- Operated after 88 is displayed on 7-SEG of the outdoor unit main PCB.
- Pipe detection proceed.
- 5~30 minutes are required depending on the number of the indoor units and outdoor temperature.
- The number of the indoor units installed is displayed on 7-SEG of the outdoor unit main PCB for about 1 minute
(For a HR unit, the number of the indoor units connected to each HR unit is displayed.
- '200' is displayed in case of auto pipe detection error, and auto detection is completed after '88' is disappeared.
- ※ Auto pipe detection function : the function that sets connection relationship automatically between the indoor unit and HR unit.

**WARNING**

1. Execute auto addressing and auto pipe detection again whenever the indoor PCB and HR unit PCB is replaced.
 - Operation error occurs unless power is applied to the indoor and HR units.
2. Error No.200 occurs if the number of connected indoor units and that of scanned indoor units are different.
3. When auto pipe detection fails, complete it with manual pipe detection (see Manual pipe detection).
4. When auto pipe detection addressing is completed normally, manual pipe detection is not required.
5. If you want to do auto pipe detection again after auto pipe detection fails, do after reset of outdoor unit by all means.

3) Manual pipe detection

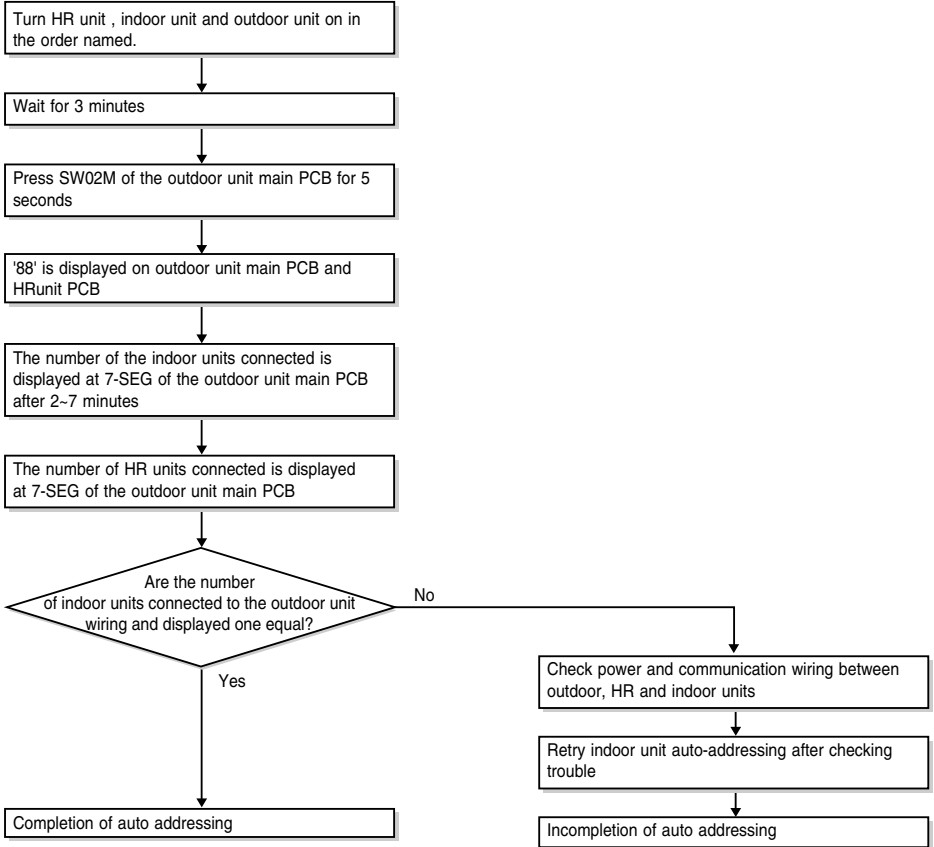
- Enter the central control address into each indoor unit using its wired remote control.
- Turn No.1 of SW02M of HR unit PCB on.
- Reset the power of HR unit PCB.
- On the HR unit PCB, manually set address of each valve of the HR unit to the central control address of the indoor unit connected to the valve.
- Turn No.6 of SW03M of outdoor unit PCB on.
- Reset the power of outdoor unit PCB.
- The number of the indoor unit installed is displayed after about 5 minutes.
ex) Ex) HR ⇒ The number of the indoor
- Turn No.6 of SW03M of outdoor unit PCB off.
- Reset the power of outdoor unit PCB, HR unit.
- Manual pipe detection is completed

**WARNING**

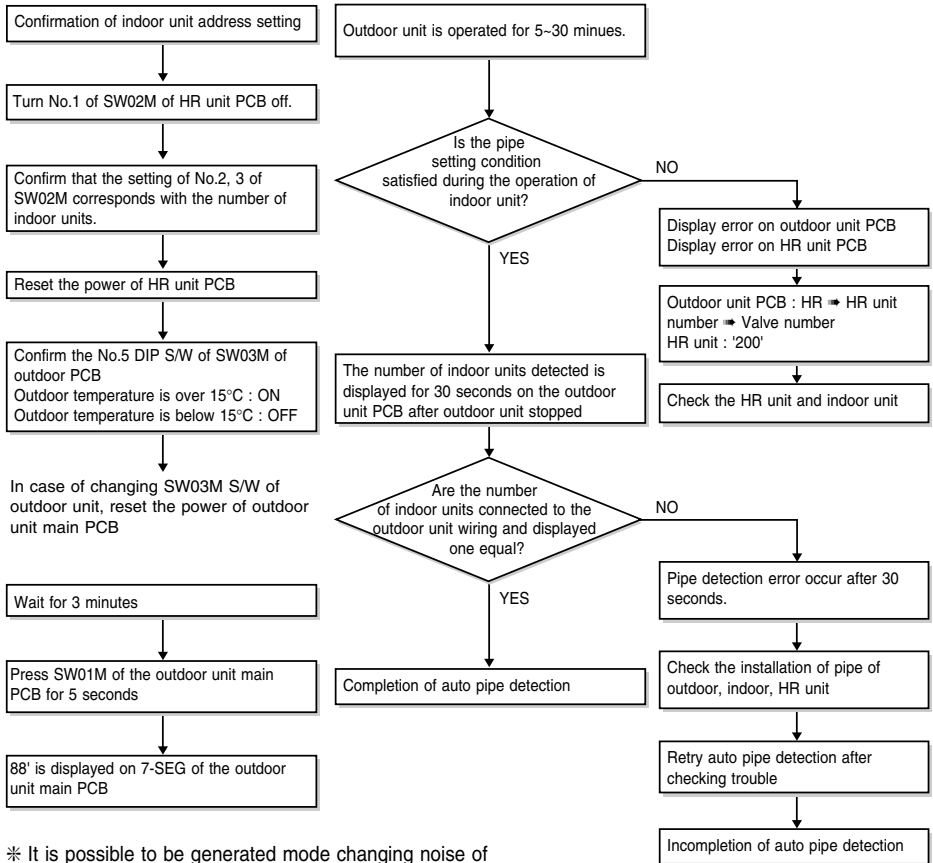
- In case that central controller is not installed, remain the address data after installer sets central control address as he wants
- In case that central controller is installed, there would be central control address in wired remote control of indoor unit.
- In this case, set the HR unit manual pipe address according to central control address of indoor unit.
- Pipe which is not connected with indoor unit should be set different address with pipe Connected with indoor unit.
(If addresses are piled up, corresponding valve is not working.
- If you want to change the setting of manual pipe, you should do it on HR unit PCB.
- If an error occurred, it means that manual pipe setting is not completed.

Flow chart for addressing of indoor and HR Unit

1) Flow chart for Auto addressing

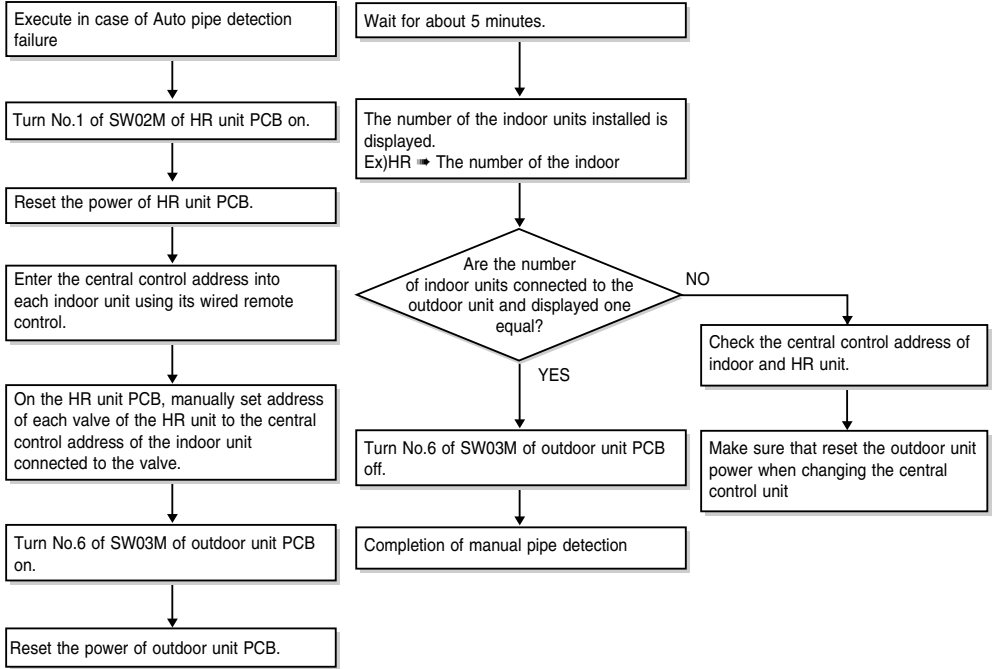


2) Flow chart for Auto pipe detection



* It is possible to be generated mode changing noise of heating and cooling which is normal.
There is no mode changing noise at normal operation.



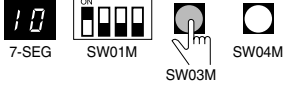
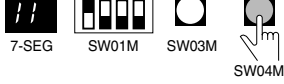

3) Flow chart for Manual pipe detection



Example of manual valve addressing

(In case that an indoor unit of central control address "11" is connected to a valve #1 of an HR unit)

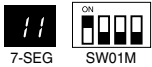

- Prerequisite for manual valve addressing: central control address of each indoor unit must be preset differently at its wired remote control

No.	Display and setup	Setup and Contents
1		<ul style="list-style-type: none"> • Operation: None • Display: None
2		<ul style="list-style-type: none"> • Operation: Turn dip S/W01M No.1 on to address valve #1 • Display: Existing value saved in EEPROM is displayed in 7-SEG.
3		<ul style="list-style-type: none"> • Operation: Set the digit of 10 to the number in Group High data of the wired remote control connected to the corresponding indoor unit to the valve #1 by pressing left tack S/W03M. • Display: Digit increasing with the times of pressing tack S/W03M is displayed in left 7-SEG
4		<ul style="list-style-type: none"> • Operation: Set the digit of 1 to the number in Group Low data of the wired remote control connected to the corresponding indoor unit to the valve #1 by pressing right tack S/W04M. • Display: Digit increasing with the times of pressing tack S/W04M is displayed in right 7-SEG
5		<ul style="list-style-type: none"> • Operation: Turn dip S/W No.1 off to save the address of valve #1 • Display: "11" displayed in 7-SEG disappears


- Above setup must be done for all HR unit valves.
- The valve that is not connected with any indoor unit should be addressed with any other number than used address numbers of the valves connected with indoor units.
(The valves does not work if the address numbers are same.)

Example of checking valve address

(In case that an indoor unit of central control address '11' is connected to a valve #1 of an HR unit)

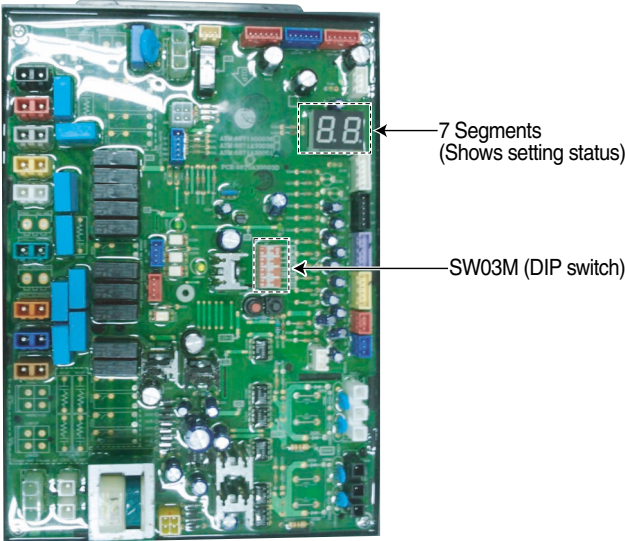
No.	Display and Setup	Setup and Contents
1	 <p>7-SEG SW01M</p>	<ul style="list-style-type: none"> • Operation: Turn dip S/W01M No.1 on. • Display: "11" is displayed in 7-SEG
2	 <p>7-SEG SW01M</p>	<ul style="list-style-type: none"> • Operation: Turn dip S/W01M No.1 off. • 7-SEG disappeared

Identification of Manual Valve ID (Address)

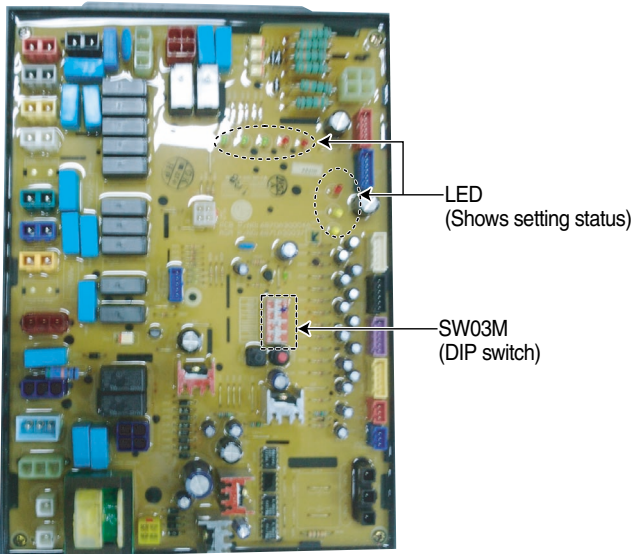
No.	Display and Setup	Setup and Contents
1	 <p>7-SEG SW01M</p>	<ul style="list-style-type: none"> • Operation: more than 2 dip switches turned on. • Display: "Er" is displayed in 7-SEG

Main unit and Sub unit PCB

Main Unit PCB



Sub Unit PCB



DIP switch setting

■ Checking according to dip switch setting

1. You can check the setting values of the main outdoor unit from the 7 segment LED and those of the sub outdoor unit from the LED. The dip switch setting should be changed when the power is OFF.
2. It checks whether the input is properly performed without the bad contact of the dip switch or not

■ Checking the setting of the main unit

The number is sequentially appeared at the 7 segment in 10 seconds after applying the power. This number represents the setting condition.

For example, R410a 30HP(Combined 10+10+10HP), Normal mode ;

Main model code ➡ Sub1 model code ➡ Sub2 model code ➡ total capacity ➡ 3 ➡ 25 ➡ 41
 (93) (97) (97) (30)

1~255: Main model code

1~255: Sub1 model code

1~255: Sub2 model code

5~40: HP number(sum of main capacity and sub capacity)

1: Save mode 3: Normal mode 4: Capacity up mode

25: Normal

22: R22 model 41: R410a model

Code Table

Main Unit		Sub Unit	
HP	Code	HP	Code
8	92	10	97
10	93	12	98
12	94		
14	95		

■ Checking the setting of the sub unit

It is displayed by 8 LED of the sub unit. A set of two LED's represents 0, 1, 2 and 3 in binary.

LED1, LED3, LED5, and LED7 are least significant bit of each digit.

LED2, LED4, LED6, and LED8 are most significant bit of each digit.

1) LED2, LED1

00 : 8HP unit 01 : 10HP unit 10 : 12HP unit 11 : 14HP unit

2) LED6, LED5

00 : - 01 : sub1 10 : sub2 11 : sub3

3) LED8, LED7

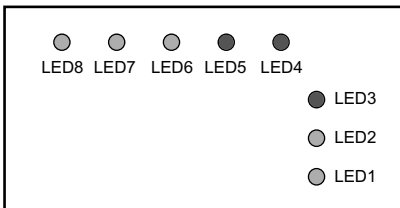
00 : normal 11 : data display



CAUTION

Product may not properly operate if the relevant DIP switch is not properly setup.

LED location of the sub part

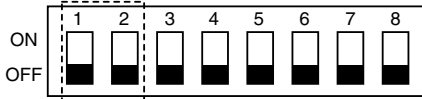


■ Setting the DIP switch (SW03M)

- Set the dip switch with the power turned off. If you change the setting when the power is on, the changed setting is not applied immediately. The changed setting is applied at the moment that the power is on.
- Instant indoor unit checking, data display mode, and forced oil collecting operation are used when the units are running. If you don't have to use those functions after using them, restore the dip switch setting.

1. Settings of main outdoor unit

1) Loss compensation: Standard mode(default)

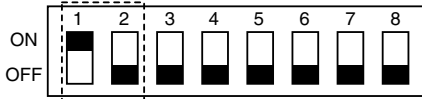


Setting before applying the power



When the installation condition is normal (almost all cases), use standard mode.

2) Loss compensation: Save mode

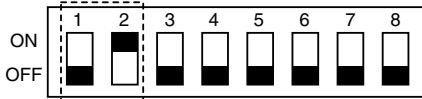


Setting before applying the power



When the total pipe length is extremely short, use save mode.

3) Loss compensation: Capacity up

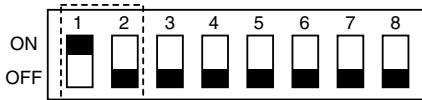


Setting before applying the power



When the total pipe length is extremely long, use capacity up mode.

4) Instant indoor unit checking: Cooling mode



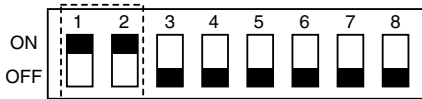
data



address

With dip switch setting as left side, push address(red) button 3 times in 3 sec.
With data button, select the indoor unit that you want to turn on/off. Push address button for 3 sec, and the indoor unit will be turned on/off.

5) Instant indoor unit checking: Heating mode



data



address

After using, restore the dip switch setting.

6) Instant indoor unit checking: Restoring



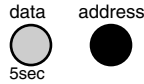
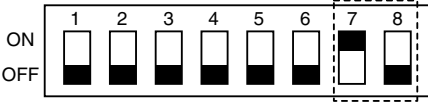
data



address

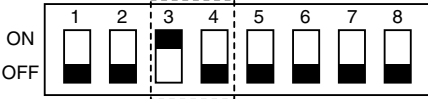
If you set the dip switch #1 and #2 off during the instant indoor checking mode, the mode is ended. After that, restore the dip switch setting.

7) Forced oil collecting operation



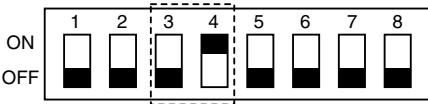
With dip switch setting as left side, push data button for 5 sec.
Oil collecting operation is enabled after 10 minutes running of comp.

8) Backup operation 1 : In case of Inverter compressor damaged.



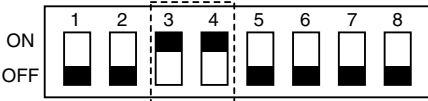
Setting before applying the power
Set at the unit of the inverter(constant speed comp.1) failure
In case of inverter failure, backup operation is possible when 110k or more indoor units are ON.

9) Backup operation 2 : In case of constant speed compressor damaged.



Set at the unit of the constant speed comp. failure.

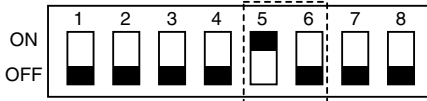
10) Backup operation 3 : In case of both compressors damaged.



Setting before applying the power
Set at the disabled unit.

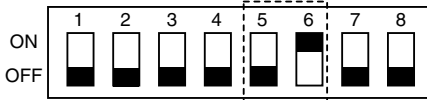
2. Settings of sub outdoor unit

1) The sequence of sub unit : 1st sub unit



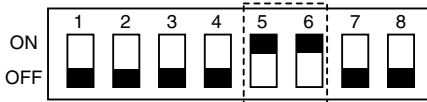
- At the 1st sub unit, set dip switch as the left side.
- Setting before applying the power.

2) The sequence of sub unit : 2nd sub unit



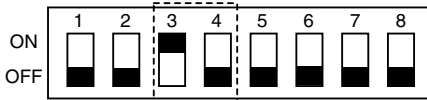
- At the 2nd sub unit, set dip switch as the left side.
- Setting before applying the power.

3) The sequence of sub unit : 3rd sub unit



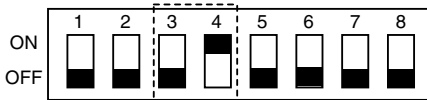
- At the 3rd sub unit, set dip switch as the left side.
- Setting before applying the power.

4) Backup operation 1 : In case of constant speed compressor 1 damaged.



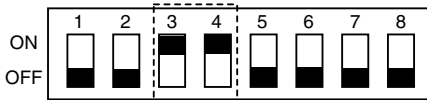
- Setting before applying the power
Set at the unit of the inverter(constant speed comp.1) failure
- In case of inverter failure, backup operation is possible when 110k or more indoor units are ON.

5) Backup operation 2 : In case of constant speed compressor 2 damaged.



- Setting before applying the power
Set at the unit of the constant speed comp.2 failure.
-

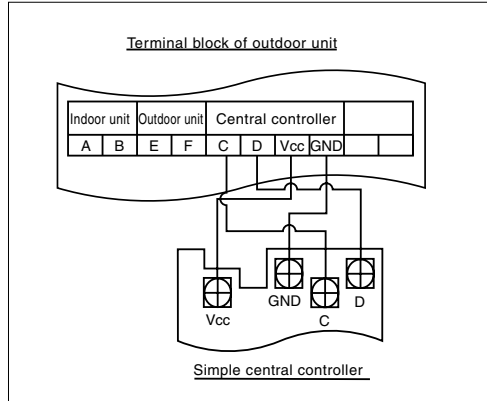
6) Backup operation 3 : In case of both compressors damaged.



- Setting before applying the power
Set at the disabled unit.
-

Installation of Simple Central Controller

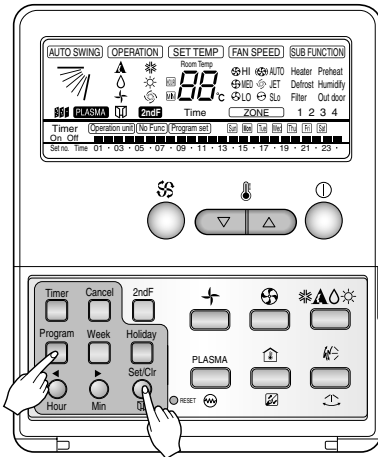
- ① Confirm the power of whole system(outdoor unit and indoor/HR units) is OFF, otherwise turn off.
- ② The transmission lines connected to C, D of simple central controller should be connected to C,D terminal port for central control of outdoor unit with care for their polarity (C → C, D → D)
- ③ Both the DC power (Vcc) and the GND connect the simple central controller according to the polarity of Vcc terminal and GND.
- ④ Turn the whole system on.
- ⑤ Set the group and indoor unit number with a wired remote control.
- ⑥ To control several sets of indoor units into a group, set the group ID from 0 to F for this purpose.



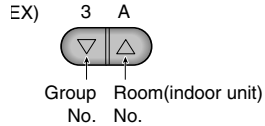
Group recognition of the simple central controller	
No. 0 group	(00~0F)
No. 1 group	(10~1F)
No. 2 group	(20~2F)
No. 3 group	(30~3F)
No. 4 group	(40~4F)
No. 5 group	(50~5F)
No. 6 group	(60~6F)
No. 7 group	(70~7F)
No. 8 group	(80~8F)
No. 9 group	(90~9F)
No. A group	(A0~AF)
No. B group	(B0~BF)
No. C group	(C0~CF)
No. D group	(D0~DF)
No. E group	(E0~EF)
No. F group	(F0~FF)

Group Number Setting of Indoor Units

1. Press Program button and Set/Clr button at the same time for 3 seconds.
2. The current group and the indoor unit numbers are indicated on the "88" of the wired remote control.



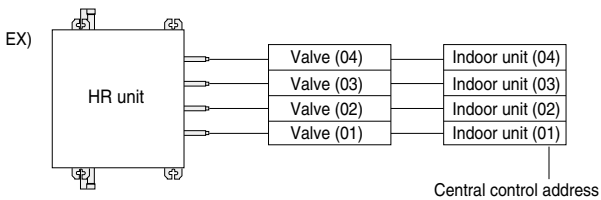
3. Set numbers by using the temperature adjust key.



4. Press Program button and Set/Clr button at the same time for 3 seconds.
5. If transmit recognition data are received from the indoor unit, it returns to the general operation mode.

WARNING

- Valve address and central control address of its corresponding indoor unit should be set identical in manual addressing.



Test Run

Checks Before Test Run

1	Check to see whether there is any refrigerant leakage, and slack of power or transmission cable.
2	<p>Confirm that 500 V megger shows 2.0 MΩ or more between power supply terminal block and ground. Do not operate in the case of 2.0 MΩ or less.</p> <p>NOTE: Never carry out megaohm check over terminal control board. Otherwise the control board would be broken.</p> <p>Immediately after mounting the unit or after leaving it turned off for an extended length of time, the resistance of the insulation between the power supply terminal board and the ground may decrease to approx. 2 MΩ as a result of refrigerant accumulating in the internal compressor. If the insulation resistance is less than 2 MΩ, turning on the main power supply and energizing the crankcase heater for more than 6 hours will cause the refrigerant to evaporate, increasing the insulation resistance.</p>
3	<p>Check if Liquid pipe, High Pressure Gas, Low Pressure Gas are fully opened</p> <p>NOTE: Be sure to tighten caps.</p>
4	<p>Check if there are any problems in automatic addressing or not:</p> <p>Check and confirm that there are no error messages in the display of indoor units or remote controls and LED in outdoor units.</p>



CAUTION

when cutting main power of the Multi V

- Always apply main power of the outdoor unit during use of product
- Always apply power before 6 hours to heat the crank case heater where performing test run after installation of product. It may result in burning out of the compressor if not preheating the crank case with the electrical heater for more than 6 hours.(In case of the outdoor temperature below 10°C)

How to Cope with Test Run Abnormality

The phenomena from main component failure

Component	Phenomenon	Cause	Check method and Trouble shooting
Compressor	Not operating	Motor insulation broken	Check resistance between terminals and chassis
	Stop during running	Motor insulation failure	Check resistance between terminals and chassis
Outdoor fan	High pressure error at cooling	Motor failure, Bad ventilation around outdoor heat exchanger	Check the outdoor fan operation after being turned the outdoor units off for some time. Remove obstacles around the outdoor units
Outdoor EEV	Heating failure, frequent defrosting	Bad connector contact	Check connector
	No operating sound at applying power	Coil failure	Check resistance between terminals
	Heating failure, Frozen outdoor heat exchanger part	EEV clogged	Service necessary
	Low pressure error or discharge temperature error	EEV clogged	Service necessary

When system fault occurs, the error code is displayed at indoor unit display or remote control display, the trouble shooting guide is in the service manual

Test Run

The test operation starts automatically by operating the DIP switch and buttons in the main unit as follows.

- (1) Before turning on the system, turn on the Dip switch No.7,8, turn on the No.1 Dip switch for cooling test and No.1,2 on for the heating test operation. After that, turn on the system. And you must wait for 1 minute.
- (2) If you turn on the No.7 and 8 DIP switch and press the black button for 2.5 seconds, you will see a character that looks like 'St' in the 7segment. When you turn both No. 7 and 8 off at this time, the test operation will start.
- (3) Indoor units are automatically setting as strong wind mode, set temperature to 30°C for heating and 18°C for air conditioning
- (4) When the compressor is normally operated with the operating logic, the target frequency will be 30Hz and when operated for more than 7 minutes after step (3), the unit will proceed to the next step.
- (5) Turn on one constant speed compressor, maintain the target frequency of the compressor to 40Hz and maintain this condition for 10.
- (6) Turn off the constant speed compressor that is on and at the same time turn on the other compressor.
- (7) Maintain the compressor that has been turned on newly in step (6) minutes (for series).
- (8) Maintain all compressors on for 10 minutes until the rotational switching operation of turning on each compressor at a time is completed.
- (9) Proceed to the next stage when step (8) is completed.
- (10) Turn off the constant speed compressor, wait 3 minutes and raise the target frequency of the compressor to 95Hz. This operation keeps about 7min.
- (11) Start the oil return operations.
- (12) When the oil return operation is completed, set the compressor frequency to 0 and maintain all indoor devices off.
- (13) When step (12) is completed, it means that the test operation is completed. Turn off the No. 1, 2 of DIP switch in the main unit and must reset the system.
- (14) If there is any error during the operation, the error code will be shown in 7segment and the test operation will automatically end. (The error does not include poor operation of the constant speed compressor and communication error from the indoor device.)

Self-Diagnosis Function

Error Indicator

- This function indicates types of failure in self-diagnosis and occurrence of failure for air condition.
- Error mark is displayed on display window of indoor units and wired remote controller, and 7-segment LED of outdoor unit control board as shown in the table.
- If more than two troubles occur simultaneously, lower number of error code is first displayed.
- After error occurrence, if error is released, error LED is also released simultaneously.

	Display		Title	Cause of Error
Indoor unit related error	0	1	Air temperature sensor of indoor unit	Air temperature sensor of indoor unit is open or short
	0	2	Inlet pipe temperature sensor of indoor unit	Inlet pipe temperature sensor of indoor unit is open or short
	0	3	Transmission error : wired remote controller ↔ indoor unit	Failing to receive wired remote controller signal at indoor unit PCB
	0	4	Drain pump	Malfunction of drain pump
	0	5	Transmission error : outdoor unit ↔ indoor unit	Failing to receive outdoor unit signal at indoor unit PCB
	0	6	Outlet pipe temperature sensor of indoor unit	Outlet pipe temperature sensor of indoor unit is open or short
	0	9	Serial No.	In the case that the serial number marked on EEPROM of Indoor unit is 0 or FFFFFF
	1	0	Poor fan motor operation	Disconnecting the fan motor connector/Failure or indoor fan motor lock.
	1	1	Transmission error: indoor unit ' main PCB of outdoor.	When the signal doesn't come out for 3mins. suddenly, while the indoor unit gets the calling signal coming from the outdoor unit
Power related error	2	1	DC peak	IPM fault or overcurrent to compressor
	2	2	Overcurrent of inverter comp.	Overcurrent flows to inverter compressor
	2	3	Poor voltage charge for driving INV compressor	DC charging is not performed after starting relay turn on
	2	4	High pressure switch of main outdoor unit	System is off by high pressure switch
	2	5	Low/Over voltage	Input voltage is out of tolerable range.
Compressor related error	3	2	Discharge temperature of main outdoor unit (INV compressor)	System is off due to rising of INV compressor discharge temperature
	3	3	Discharge temperature of main outdoor unit (constant speed compressor)	System is off due to rising of constant speed compressor discharge temperature
	3	4	High pressure of main outdoor unit	System is off by excessive increase of high pressure of main outdoor unit
	3	5	Low pressure of main outdoor unit	System is off by excessive decrease of low pressure of main outdoor unit

	Display	Title	Cause of Error	
Outdoor unit related error	4	0	Current sensor of inverter compressor	Current sensor of inverter compressor is open or short
	4	1	Discharge temperature sensor of inverter compressor	Discharge temperature sensor of inverter compressor is open or short
	4	2	Low pressure sensor of main outdoor unit	Low pressure sensor of main outdoor unit is open or short
	4	3	High pressure sensor of main outdoor unit	High pressure sensor of main outdoor unit is open or short
	4	4	Air temperature sensor of main outdoor unit	Air temperature sensor of main outdoor unit is open or short
	4	5	Temperature sensor of front-side heat exchanger	Temperature sensor of front-side heat exchanger is open or short
	4	6	Suction temperature sensor of main outdoor unit	Suction temperature sensor of main outdoor unit is open or short
	4	7	Discharge temperature sensor of the constant speed compressor of main outdoor unit	Discharge temperature sensor of the constant speed compressor of main outdoor unit is open or short
	4	8	Temperature sensor of rear-side heat exchanger	Temperature sensor of rear-side heat exchanger is open or short
Transmission related error	5	1	Excessive capacity of indoor units	Excessive connection of indoor units compared to capacity of outdoor unit
	5	2	Transmission error : inverter PCB → main PCB	Failing to receive inverter signal at main PCB
	5	3	Transmission error : indoor unit → main PCB of outdoor unit	Failing to receive indoor unit signal at main PCB of outdoor unit
	5	4	Reverse connection of R, S, T power of main outdoor unit	Reverse connection or omitting connection of R, S, T power of main outdoor unit
	5	7	Transmission error : main PCB → inverter PCB	Failing to receive main PCB signal at inverter PCB
Outdoor unit related error	6	2	Overheat of inverter heatsink	Overheat of inverter heatsink
	6	5	Temperature sensor of fan	Temperature sensor of fan is open or short

Test Run

	Display		Title	Cause of Error
Compressor related error	1	0 0	Discharge temperature of constant speed compressor 1 of sub1 outdoor unit	System is off by excessive increase of discharge temperature of constant speed compressor 1 of sub1 outdoor unit
	1	0 1	Discharge temperature of constant speed compressor 2 of sub1 outdoor unit	System is off by excessive increase of discharge temperature of constant speed compressor 2 of sub1 outdoor unit
	1	0 2	Discharge temperature of constant speed compressor 1 of sub2 outdoor unit	System is off by excessive increase of discharge temperature of constant speed compressor 1 of sub2 outdoor unit
	1	0 3	Discharge temperature of constant speed compressor 2 of sub2 outdoor unit	System is off by excessive increase of discharge temperature of constant speed compressor 2 of sub2 outdoor unit
Transmission related error	1	0 4	Transmission error : sub1 outdoor unit → main outdoor unit	Failing to receive sub1 signal at main PCB of main outdoor unit
	1	0 5	Transmission error : fan PCB → main PCB	Failing to receive fan signal at main PCB
	1	0 6	Over-current of fan motor (IPM fault)	Over-current of fan motor (IPM fault)
	1	0 7	Low voltage of fan motor driver	Low voltage of fan motor driver
	1	0 8	Transmission error : main PCB → fan PCB	Failing to receive main signal at fan PCB
	1	0 9	High pressure switch of sub1 outdoor unit	High pressure switch of sub1 outdoor unit is operated by high pressure rising
	1	1 0	Reverse connection of R, S, T power of sub1 outdoor unit	Reverse connection or omitting connection of R, S, T power of sub1 outdoor unit
Outdoor unit related error	1	1 3	Liquid pipe temperature sensor of main outdoor unit	Liquid pipe temperature sensor of main outdoor unit is open or short
	1	1 4	Subcooling inlet temperature sensor of main outdoor unit	Subcooling inlet temperature sensor of main outdoor unit is open or short
	1	1 5	Subcooling outlet temperature sensor of main outdoor unit	Subcooling outlet temperature sensor of main outdoor unit is open or short
	1	1 6	High pressure sensor of sub1 outdoor unit	High pressure sensor of sub1 outdoor unit is open or short
	1	1 7	Low pressure sensor of sub1 outdoor unit	Low pressure sensor of sub1 outdoor unit is open or short
	1	1 8	Air temperature sensor of sub1 outdoor unit	Air temperature sensor of sub1 outdoor unit is open or short
	1	2 0	Suction temperature sensor of sub1 outdoor unit	Suction temperature sensor of sub1 outdoor unit is open or short
	1	2 1	Discharge temperature sensor of the constant speed compressor 1 of sub1 outdoor unit	Discharge temperature sensor of the constant speed compressor 1 of sub1 outdoor unit is open or short
	1	2 2	Discharge temperature sensor of the constant speed compressor 2 of sub1 outdoor unit	Discharge temperature sensor of the constant speed compressor 2 of sub1 outdoor unit is open or short
	1	2 3	Temperature sensor of front-side heat exchanger of sub1 outdoor unit	Temperature sensor of front-side heat exchanger of sub1 unit is open or short

Display			Title	Cause of Error	
Outdoor unit related error	1	2	4	Temperature sensor of rear-side heat exchanger of sub1 outdoor unit	Temperature sensor of rear-side heat exchanger of sub1 outdoor unit is open or short
	1	2	5	Liquid pipe temperature sensor of sub1 outdoor unit	Liquid pipe temperature sensor of sub1 outdoor unit is open or short
	1	2	6	Subcooling inlet temperature sensor of sub1 outdoor unit	Subcooling inlet temperature sensor of sub1 outdoor unit is open or short
	1	2	7	Subcooling outlet temperature sensor of sub1 outdoor unit	Subcooling outlet temperature sensor of sub1 outdoor unit is open or short
	1	2	8	High pressure sensor of sub2 outdoor unit	High pressure sensor of sub2 outdoor unit is open or short
	1	2	9	Low pressure sensor of sub2 outdoor unit	Low pressure sensor of sub2 outdoor unit is open or short
	1	3	0	Air temperature sensor of sub2 outdoor unit	Air temperature sensor of sub2 outdoor unit is open or short
	1	3	2	Suction temperature sensor of sub2 outdoor unit	Suction temperature sensor of sub2 outdoor unit is open or short
	1	3	3	Discharge temperature sensor of the constant speed compressor 1 of sub2 outdoor unit	Discharge temperature sensor of the constant speed compressor 1 of sub2 outdoor unit is open or short
	1	3	4	Discharge temperature sensor of the constant speed compressor 2 of sub2 outdoor unit	Discharge temperature sensor of the constant speed compressor 2 of sub2 outdoor unit is open or short
	1	3	5	Temperature sensor of front-side heat exchanger of sub2 outdoor unit	Temperature sensor of front-side heat exchanger of sub2 outdoor unit is open or short
	1	3	6	Temperature sensor of rear-side heat exchanger of sub2 outdoor unit	Temperature sensor of rear-side heat exchanger of sub2 outdoor unit is open or short
	1	3	7	Liquid pipe temperature sensor of sub2 outdoor unit	Liquid pipe temperature sensor of sub2 outdoor unit is open or short
	1	3	8	Subcooling inlet temperature sensor of sub2 outdoor unit	Subcooling inlet temperature sensor of sub2 outdoor unit is open or short
	1	3	9	Subcooling outlet temperature sensor of sub2 outdoor unit	Subcooling outlet temperature sensor of sub2 outdoor unit is open or short
	1	4	0	High pressure sensor of sub2 outdoor unit	High pressure sensor of sub2 outdoor unit is open or short
	1	4	1	Reverse connection of R, S, T power of sub2 outdoor unit	Reverse connection or omitting connection of R, S, T power of sub2 outdoor unit
	1	4	2	Transmission error : main outdoor unit → sub1 outdoor unit	Failing to receive main signal at main PCB of sub2 outdoor unit
	1	4	3	High pressure of sub1 outdoor unit	System is off by excessive increase of high pressure of sub1 outdoor unit
	1	4	4	Low pressure of sub1 outdoor unit	System is off by excessive decrease of low pressure of sub1 outdoor unit
1	4	5	High pressure of sub2 outdoor unit	System is off by excessive increase of high pressure of sub2 outdoor unit	
1	4	6	Low pressure of sub2 outdoor unit	System is off by excessive decrease of low pressure of sub2 outdoor unit	
1	4	7	Low/high voltage of sub1 outdoor unit	Input voltage of sub1 outdoor unit is more than 487V or less than 270V	

Test Run

	Display		Title	Cause of Error
Outdoor unit related error	1	4 8	Voltage detection circuit of sub1 outdoor unit	Voltage detection circuit of sub1 outdoor unit is out of order
	1	4 9	Low/high voltage of sub2 outdoor unit	Input voltage of sub2 outdoor unit is more than 487V or less than 270V
	1	5 0	Voltage detection circuit of sub2 outdoor unit	Voltage detection circuit of sub2 outdoor unit is out of order
	1	5 1	Failure of operation mode conversion	Pressure unbalance between outdoor units
	1	7 3	Failure of Main constant speed compressor operation	Comp locking, Check Valve leakage, comp dielectric breakdown
	1	7 4	Failure of Sub1 constant speed compressor1 operation	Comp locking, Check Valve leakage, comp dielectric breakdown
	1	7 5	Failure of Sub1 constant speed compressor2 operation	Comp locking, Check Valve leakage, comp dielectric breakdown
	1	7 6	Failure of Sub2 constant speed compressor1 operation	Comp locking, Check Valve leakage, comp dielectric breakdown
	1	7 7	Failure of Sub2 constant speed compressor2 operation	Comp locking, Check Valve leakage, comp dielectric breakdown
	1	7 8	Failure of Sub3 constant speed compressor1 operation	Comp locking, Check Valve leakage, comp dielectric breakdown
1	7 9	Failure of Sub3 constant speed compressor2 operation	Comp locking, Check Valve leakage, comp dielectric breakdown	
HR unit related error	2	0 0	Automatic addressing of valves	Failure of automatic addressing of valves
	2	0 1	Liquid pipe sensor of HR unit 1	Liquid pipe sensor of HR unit 1 is open or short
	2	0 2	Inlet sensor of subcooler of HR unit 1	Inlet sensor of subcooler of HR unit 1 is open or short
	2	0 3	Outlet sensor of subcooler of HR unit 1	Outlet sensor of subcooler of HR unit 1 is open or short
	2	0 4	Transmission error : HR unit 1 → outdoor unit	Failing to receive HR unit 1 signal at outdoor unit
	2	0 5	Liquid pipe sensor of HR unit 2	Liquid pipe sensor of HR unit 2 is open or short
	2	0 6	Inlet sensor of subcooler of HR unit 2	Inlet sensor of subcooler of HR unit 2 is open or short
	2	0 7	Outlet sensor of subcooler of HR unit 2	Outlet sensor of subcooler of HR unit 2 is open or short
	2	0 8	Transmission error : HR unit 2 → outdoor unit	Failing to receive HR unit 2 signal at outdoor unit
	2	0 9	Liquid pipe sensor of HR unit 3	Liquid pipe sensor of HR unit 3 is open or short
	2	1 0	Inlet sensor of subcooler of HR unit 3	Inlet sensor of subcooler of HR unit 3 is open or short
	2	1 1	Outlet sensor of subcooler of HR unit 3	Outlet sensor of subcooler of HR unit 3 is open or short
	2	1 2	Transmission error : HR unit 3 → outdoor unit	Failing to receive HR unit 3 signal at outdoor unit
	2	1 3	Liquid pipe sensor of HR unit 4	Liquid pipe sensor of HR unit 4 is open or short
	2	1 4	Inlet sensor of subcooler of HR unit 4	Inlet sensor of subcooler of HR unit 4 is open or short
	2	1 5	Outlet sensor of subcooler of HR unit 4	Outlet sensor of subcooler of HR unit 4 is open or short
	2	1 6	Transmission error : HR unit 4 → outdoor unit	Failing to receive HR unit 4 signal at outdoor unit
	2	1 7	Liquid pipe sensor of HR unit 5	Liquid pipe sensor of HR unit 5 is open or short
	2	1 8	Inlet sensor of subcooler of HR unit 5	Inlet sensor of subcooler of HR unit 5 is open or short
	2	1 9	Outlet sensor of subcooler of HR unit 5	Outlet sensor of subcooler of HR unit 5 is open or short
2	2 0	Transmission error: HR unit 5 → outdoor unit	Failing to receive HR unit 5 signal at outdoor unit	
2	2 1	Liquid pipe sensor of HR unit 6	Liquid pipe sensor of HR unit 6 is open or short	
2	2 2	Inlet sensor of subcooler of HR unit 6	Inlet sensor of subcooler of HR unit 6 is open or short	
2	2 3	Outlet sensor of subcooler of HR unit 6	Outlet sensor of subcooler of HR unit 6 is open or short	
2	2 4	Transmission error: HR unit 6 → outdoor unit	Failing to receive HR unit 6 signal at outdoor unit	
2	2 5	Liquid pipe sensor of HR unit 7	Liquid pipe sensor of HR unit 7 is open or short	

	Display			Title	Cause of Error
HR unit related error	2	2	6	Inlet sensor of subcooler of HR unit 7	Inlet sensor of subcooler of HR unit 7 is open or short
	2	2	7	Outlet sensor of subcooler of HR unit 7	Outlet sensor of subcooler of HR unit 7 is open or short
	2	2	8	Transmission error: HR unit 7 → outdoor unit	Failling to receive HR unit 7 signal at outdoor unit
	2	2	9	Liquid pipe sensor of HR unit 8	Liquid pipe sensor of HR unit 8 is open or short
	2	3	0	Inlet sensor of subcooler of HR unit 8	Inlet sensor of subcooler of HR unit 8 is open or short
	2	3	1	Outlet sensor of subcooler of HR unit 8	Outlet sensor of subcooler of HR unit 8 is open or short

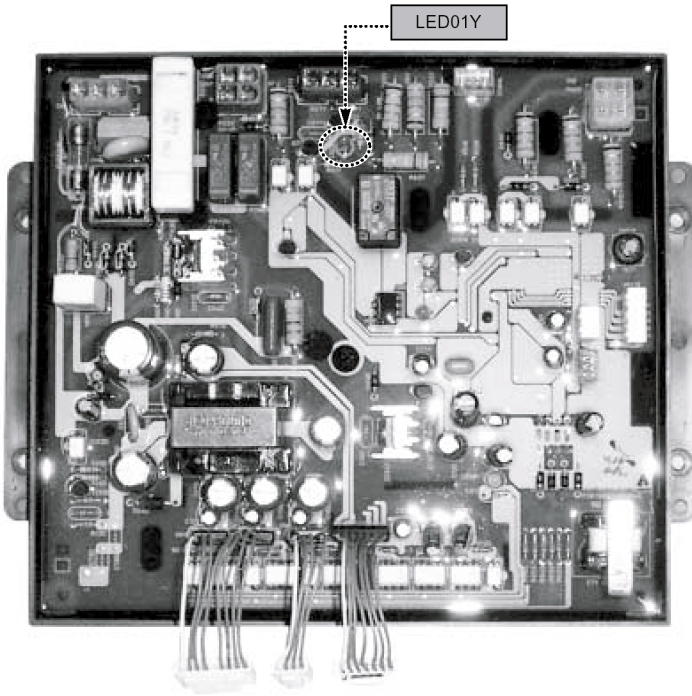
■ Please refer to trouble shooting guide in service manual for each error title



CAUTION

In case that the control box is opened and before checking electrical parts, it should be checked that the LED 01Y turned off (wait 3 minutes after main power OFF), otherwise, it may cause electrical shock.

Position of the LED01Y in inverter board



Caution For Refrigerant Leak

The installer and system specialist shall secure safety against leakage according to local regulations or standards. The following standards may be applicable if local regulations are not available.

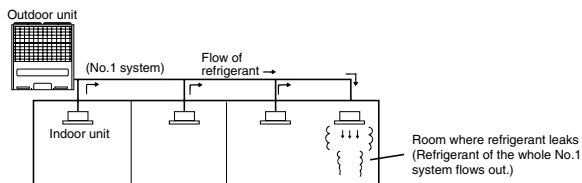
Introduction

Though the R410A refrigerant is harmless and incombustible itself, the room to equip the air conditioner should be large to such an extent that the refrigerant gas will not exceed the limiting concentration even if the refrigerant gas leaks in the room.

Limiting concentration

Limiting concentration is the limit of Freon gas concentration where immediate measures can be taken without hurting human body when refrigerant leaks in the air. The limiting concentration shall be described in the unit of kg/m^3 (Freon gas weight per unit air volume) for facilitating calculation.

Limiting concentration: 0.30kg/m^3 (R410A) (ISO5149, EN378-1)



Checking procedure of limiting concentration

Check limiting concentration along following steps and take appropriate measure depending on the situation.

Calculate amount of all the replenished refrigerant (kg) per each refrigerant system.

Amount of replenished refrigerant per one outdoor unit system + Amount of additional replenished refrigerant = Total amount of replenished refrigerant in refrigerant facility (kg)

Amount of replenished refrigerant at factory shipment

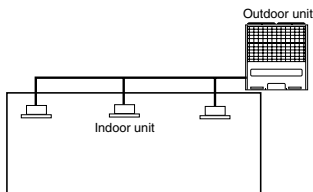
Amount of additionally replenished refrigerant depending on piping length or piping diameter at customer

Note : In case one refrigerant facility is divided into 2 or more refrigerant systems and each system is independent, amount of replenished refrigerant of each system shall be adopted.

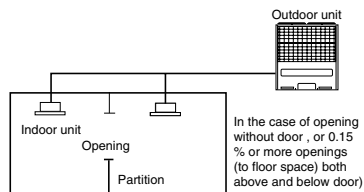
Calculate minimum room capacity

Calculate room capacity by regarding a portion as one room or the smaller room.

(1) Without partition

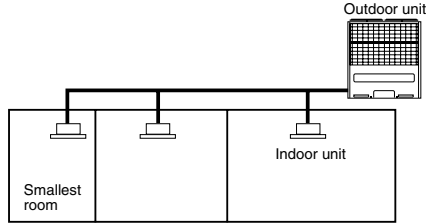


(2) With partition and with opening which serve as passage of air to adjoining room



Caution For Refrigerant Leak

(3) With partition and without opening which serve as passage of air to adjoining room



■ Calculate refrigerant concentration

$$\frac{\text{Total amount of replenished refrigerant in refrigerant facility (kg)}}{\text{Capacity of smallest room where indoor unit is installed (m}^3\text{)}} = \text{Refrigerant concentration (kg/m}^3\text{)} \quad \text{(R410A)}$$

In case the result of calculation exceeds the limiting concentration, perform the same calculations by shifting to the second smallest, and the third smallest rooms until at last the result is below the limiting concentration.

■ In case the concentration exceeds the limit

When the concentration exceeds the limit, change original plan or take one of the countermeasures shown below:

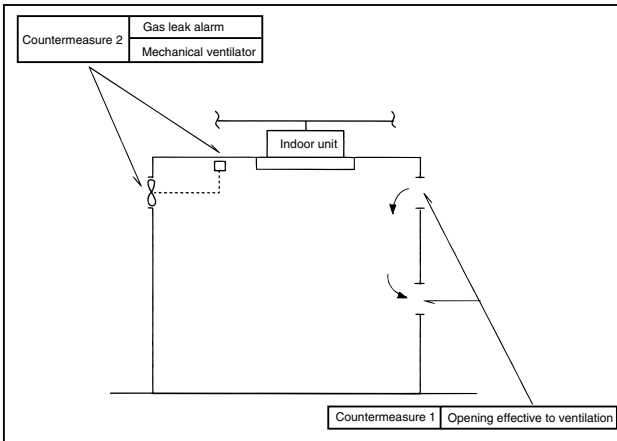
• Countermeasure 1

Provide opening for ventilation.

Provide 0.15% or more opening to floor space both above and below door, or provide opening without door.

• Countermeasure 2

Provide gas leak alarm linked with mechanical ventilator.



Pay a special attention to the place, such as a basement, etc. where refrigerant can stay, since refrigerant is heavier than air.

