Contents

Passer à la page 49 pour lire le manuel d’installation en français.
Die deutsche Installationsanleitung finden Sie auf Seite 95.
Por favor, vaya a la página 141 para seguir las instrucciones del manual de instalacíon en lengua española.
Il manuale d’installazione italiano è a pagina 187.
Zie bladzijde 233 voor de Nederlandse Installatievoorschriften.
See page 279 for the Portuguese Installation Instructions.
See page 325 for the Greek Installation Instructions.

Contents

Precautions

⚠ Please read these instructions carefully before starting the installation.

⚠ This equipment should only be installed by suitably trained operatives.

⚠ In all cases ensure safe working practice: Observe precautions for persons in the vicinity of the works.

⚠ Ensure that all local, national and international regulations are satisfied.

⚠ Check that the electrical specifications of the unit meet the requirements of the site.

⚠ Carefully unpack the equipment, check for damage or shortages. Please report any damage immediately.

These units comply with EU Directives:
73/23/EEC (Low Voltage Directive), 89/336/EEC (Electromagnetic Compatibility) and 97/23/EC (Pressure Equipment Directive). Accordingly, they are designated for use in commercial and industrial environments.

Avoid installation in the following locations:

⚠ Where there is danger of flammable gas leakages.

⚠ Where there are high concentrations of oil.

⚠ Where the atmosphere contains an excess of salt (as in coastal areas). The air conditioner is prone to failure when used under this condition unless special maintenance is provided.

⚠ Where the airflow from the outdoor unit may cause annoyance.

⚠ Where the operating noise of the outdoor unit may cause annoyance.

⚠ Where the foundation is not strong enough to fully withstand the weight of the outdoor unit.

⚠ Where the water drainage may cause a nuisance or a hazard when frozen.

⚠ Where strong winds may blow against the air outlet of the outdoor unit.

Precautions for R407C outdoor units

⚠ R407C outdoor units use synthetic oils which are extremely hygroscopic. Therefore ensure that the refrigerant system is NEVER exposed to air or any form of moisture.

⚠ Mineral oils are unsuitable for use in these units and may lead to premature system failure.

⚠ Use only equipment which is suitable for use with R407C. Never use equipment which has been used with R22.

⚠ R407C should only be charged from the service cylinder in the liquid phase. It is advisable to use a gauge manifold set equipped with a liquid sight glass fitted in the centre (entry) port.

Operating conditions

OUTDOOR TEMPERATURE	-5 ~ 43°C	COOLING
	-15 ~ 21°C	HEATING
ROOM TEMPERATURE	18 ~ 32°C	COOLING
	15 ~ 29°C	HEATING
ROOM HUMIDITY	<80%	COOLING

Metric/Imperial pipe conversion

Diameter (mm)	6.4	9.5	12.7	15.9	19.0	22.0	28.6	34.9	41.3	54.1
Nominal diameter (inch)	1/4	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8	1-5/8	2-1/8

Note: 1.0 MPa G = 10.2 kgf/cm^2 G

Components - 3 pipe system

1. Outdoor unit

Model name	Inverter unit
MAR-F105HTM8-PE	10 HP

2. Multi controllers

Model name	No. of indoor units connectable
RBM-Y1034F-PE	3
RBM-Y1044F-PE	4

3. Interface control kit

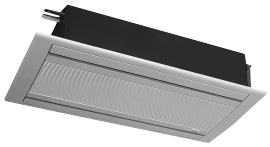
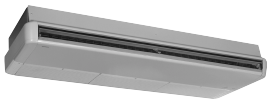
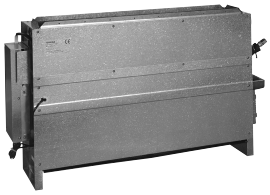
Model name	Requirement
RBC-16DIF1-PE	3 or 4 multi controllers used on a system

Combination of multi controllers, indoor units and interface kits

No. of indoor units	No. of 3-way multi controllers	No. of 4-way multi controllers	No. of interface kits
1-8	1-2 multi controllers		0
9	3	0	1
10	2	1	1
11	1	2	1
12	0	3	1
13	3	1	2
14	2	2	2
15	1	3	2
16	0	4	2

Components

4. Indoor units

Type	Appearance	Model name	Capacity code on multi controller
Cassette (4-way)		RAV-164UH-PE RAV-264UH-PE RAV-364UH-PE RAV-464UH-PE	4 6 8 10
Cassette (2-way)		RAV-104TUH-1-PE RAV-134TUH-1-PE RAV-164TUH-1-PE	2 3 4
Built-In Horizontal		RAV-104SBH-PE	2
		RAV-164BH-PE RAV-264BH-PE RAV-364BH-PE RAV-464BH-PE	4 6 8 10
Ceiling Suspended		RAV-134CH/CHR-PE RAV-164CH/CHR-PE RAV-264CH/CHR-PE RAV-364CH/CHR-PE RAV-464CH/CHR-PE	3 4 6 8 10
High Wall		RAV-105KH-E RAV-135KH-E RAV-165KH-E RAV-265KH-E	2 3 4 6
Built-In Vertical		RAV-104NH-PE RAV-134NH-PE RAV-164NH-PE RAV-264NH-PE	2 3 4 6
Floor Mounted		RAV-164SH/SHR-PE RAV-264SH/SHR-PE	4 6

Contents

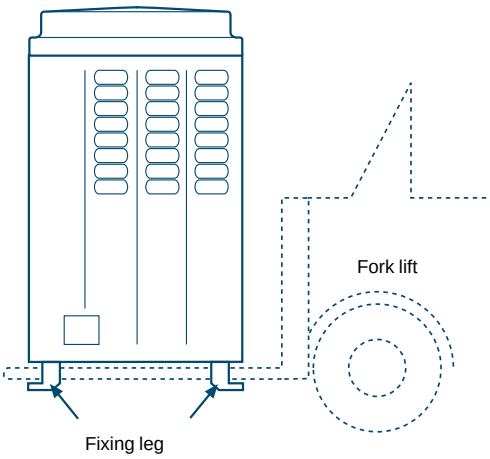
Outdoor unit

Transportation of the outdoor unit

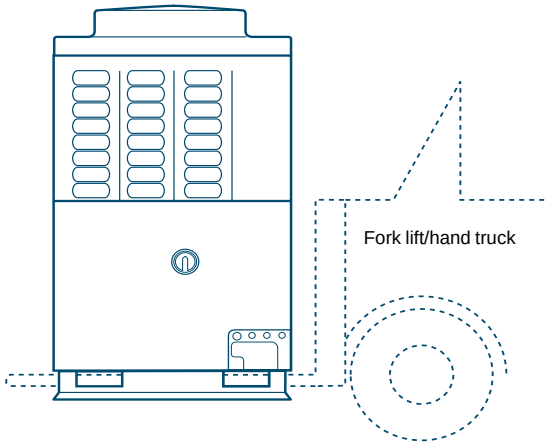
Fork Lift

- **Front Access** – insert the forks into the slots on the fixing legs.
- **Side Access** – see diagram.

Front Access



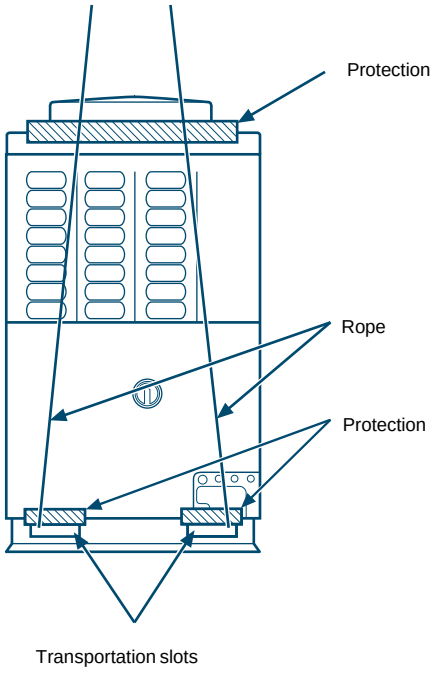
Side Access



Crane

- Check the suitability of the lifting rope (see table).
- Secure lifting rope through transportation slot.
- Protect the unit where rope contact could scratch or deform it.

Model Number	Weight
MAR-F105HTM8-PE	285 kg



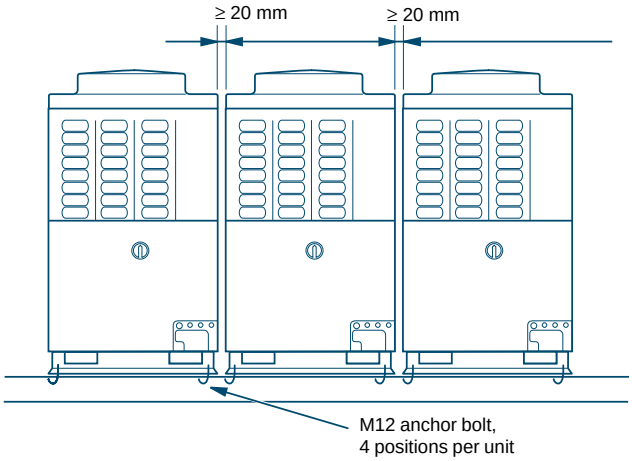
Outdoor unit

Installation of outdoor unit

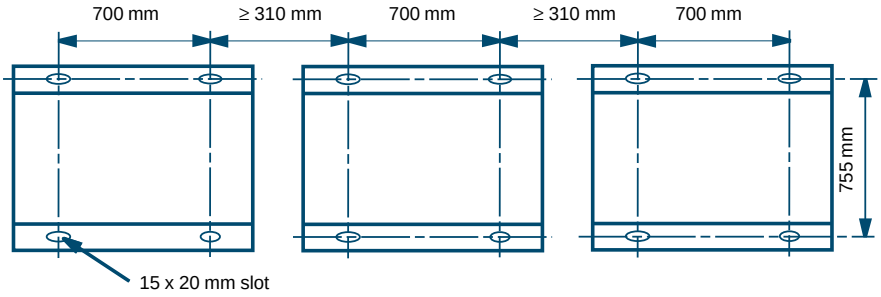
1. Align the outdoor units at intervals of 20 mm or more.

   Fix the outdoor units with M12 anchor bolts (4 positions per unit).

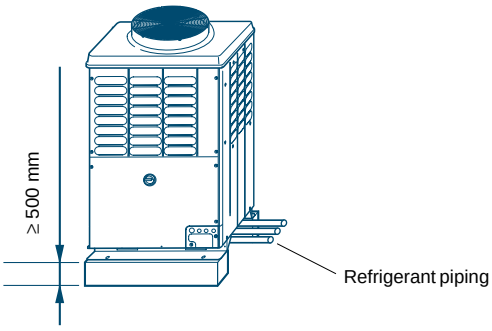
   Anchor bolt with 20 mm length is suitable.



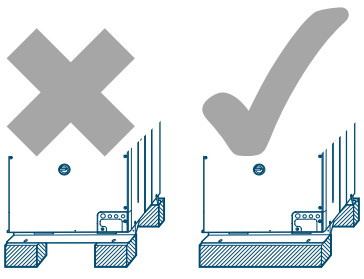
- Anchor bolt pitch is as shown in the following figure.



2. When routing the refrigerant piping through the base, the fixing height of the base (two-divided foundations) must be 500 mm or more.

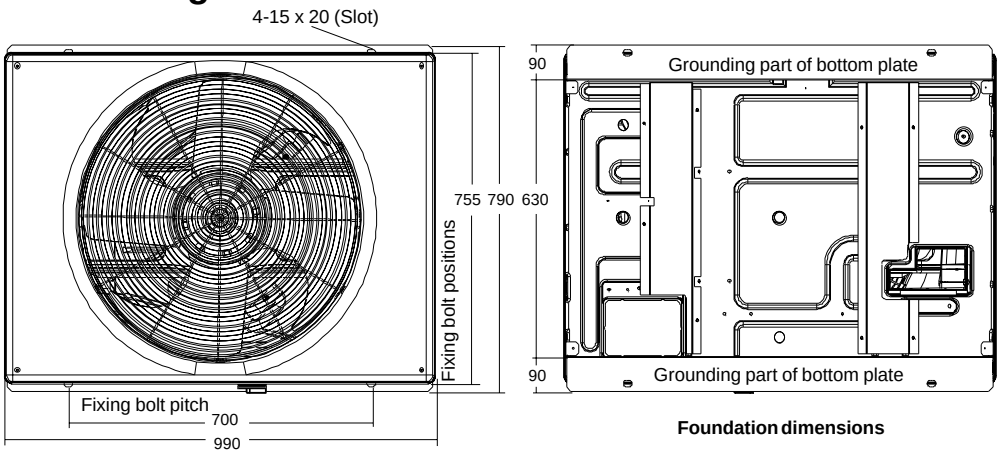


3. Correct foundation mounts for supporting the outdoor unit.

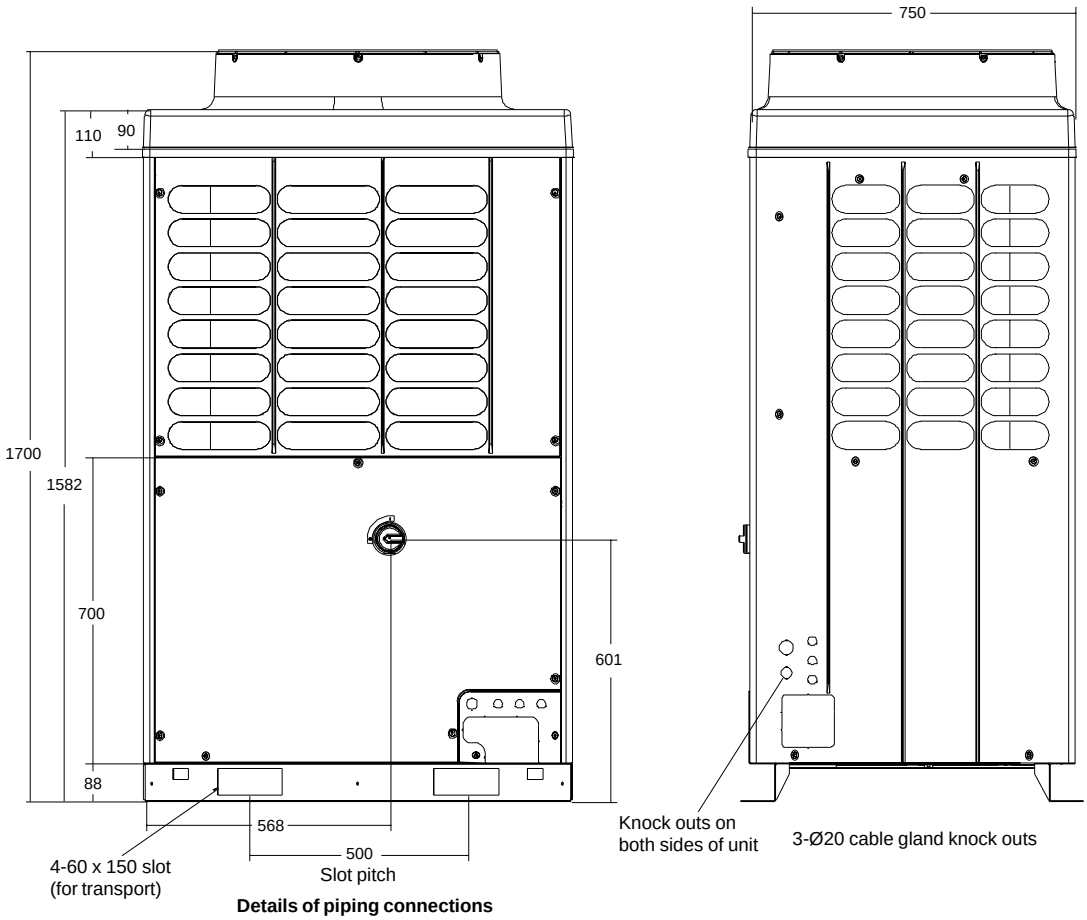


Outdoor unit

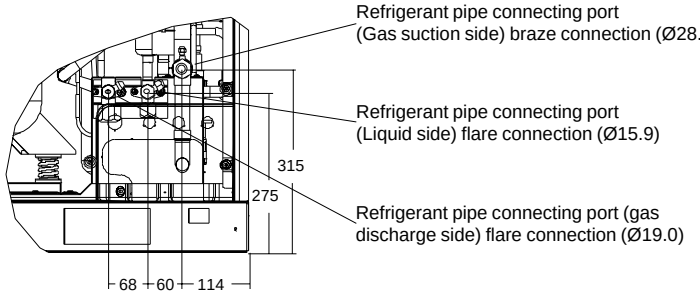
Dimensional drawings



Foundation dimensions



Details of piping connections



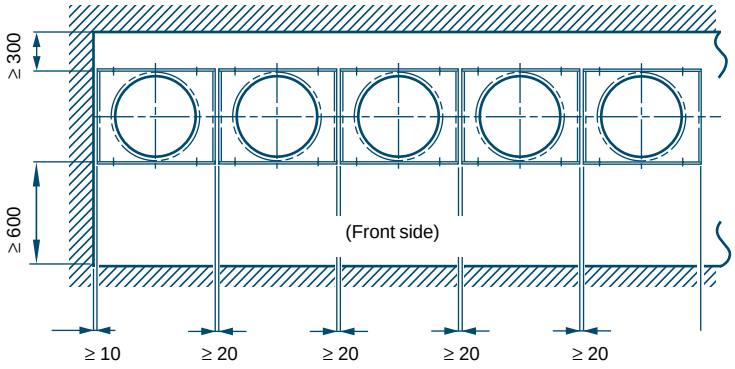
All dimensions in mm

Outdoor unit

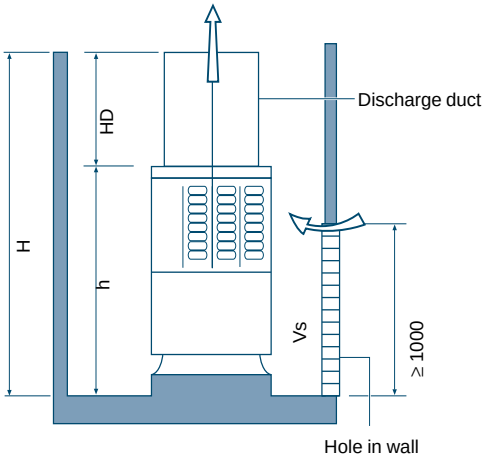
Multiple installation on the rooftop

If the outer wall is higher than the outdoor unit

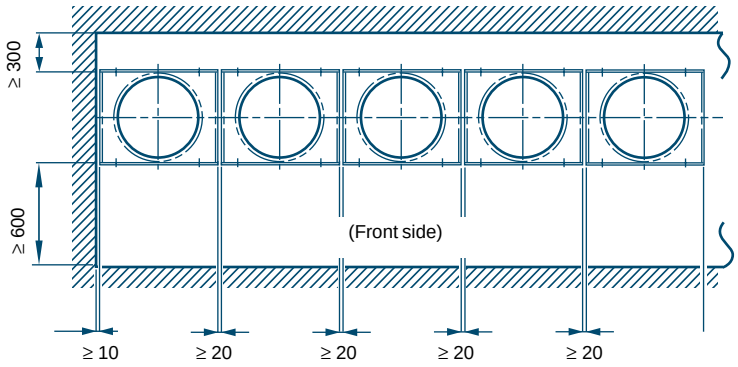
If a hole can be made in the wall:



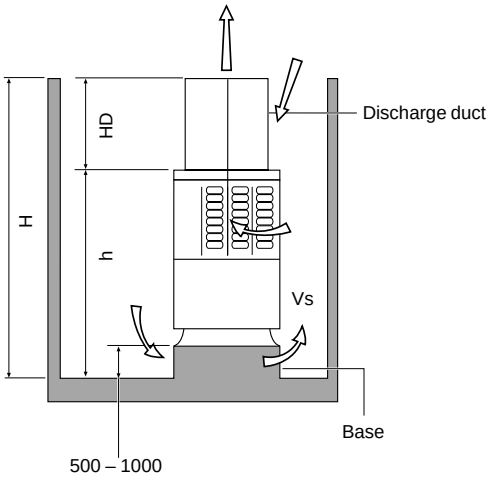
1. Set an aperture ratio so that suction air volume Vs from the hole becomes 1.5 m/s or less
2. Height of discharge duct: HD = H - h



If a hole cannot be made:



1. Set a base with 500 to 1000 mm height
2. Height of discharge duct: HD = H - h

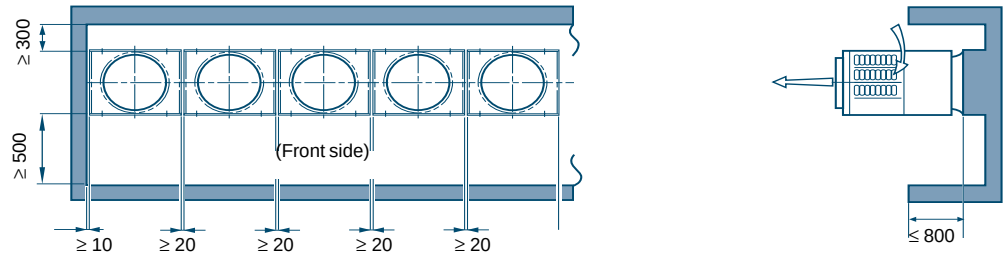


Note: All dimensions are in mm

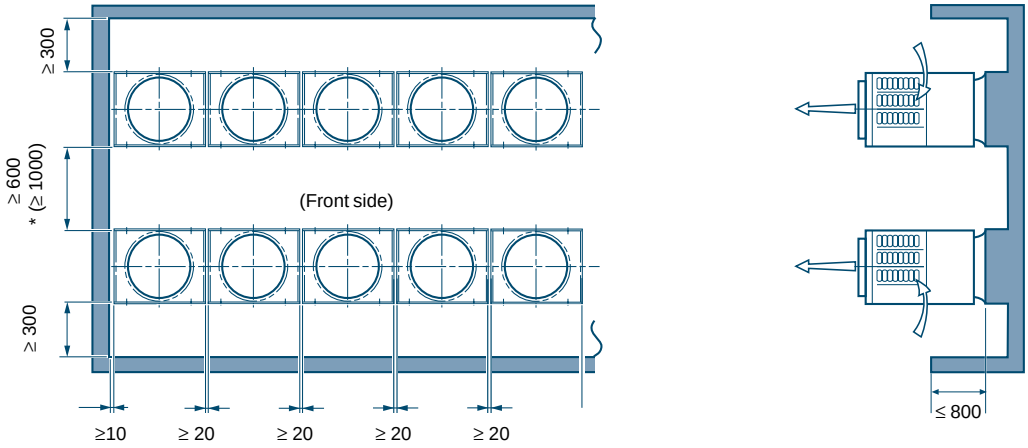
Outdoor unit

If the outer wall is lower than the outdoor unit

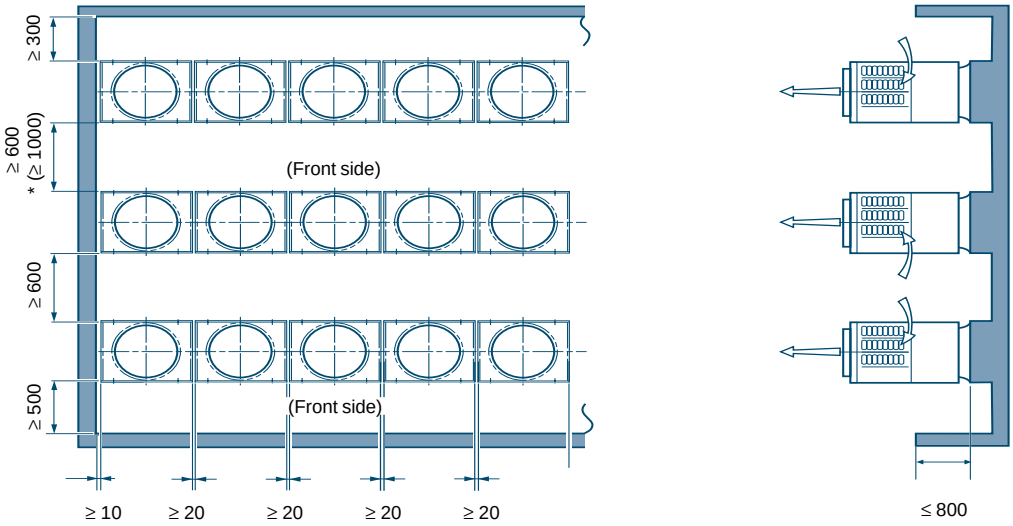
1-line installation



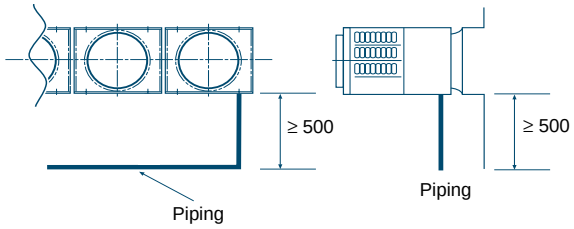
2-parallel lines installation



3-parallel lines installation



* When refrigerant piping is routed from the front of the unit, distance between outdoor unit and piping must be 500 mm or more (for service access).



Note: All dimensions are in mm

Multi Controller

Precautions

Avoid installing the multi controller in the following locations:

⚠ Where rain water may penetrate the unit.

⚠ Where the weight of the unit cannot be supported.

⚠ Where it is not level.

⚠ Where high temperature under the ceiling or high temperature atmosphere may be produced.

⚠ Where there is equipment that generates high frequencies.

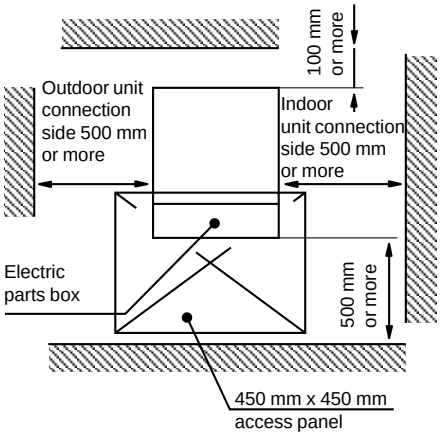
⚠ Where it is near devices or wiring which may give off electromagnetic interference.

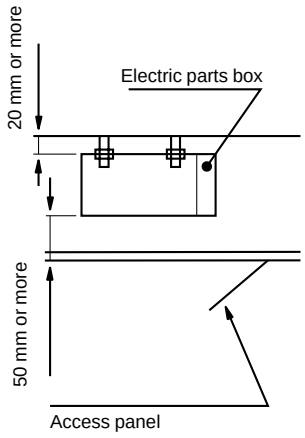
⚠ The base of the unit will reach temperatures of approximately 50°C. Do not place heat-sensitive objects close to the base of the unit.

Installation and service space

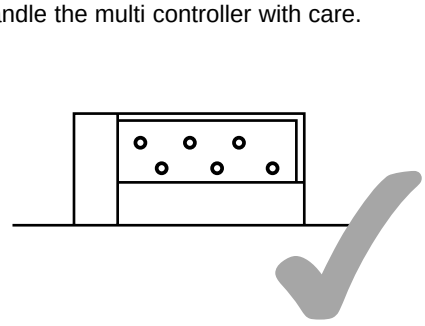
⚠ Always locate the unit in such a location that the electrical panel can be removed easily. This is very important for trial tests and service.

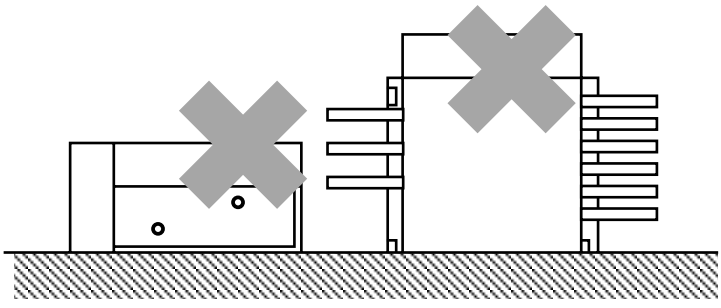
⚠ The amount of space that is required for the service area is 450 mm x 450 mm.





⚠ Handle the multi controller with care.





⚠ Do not drop the unit as this could damage components inside.

Installation

Installing ø 10 mm hanging bolts (4 pieces)

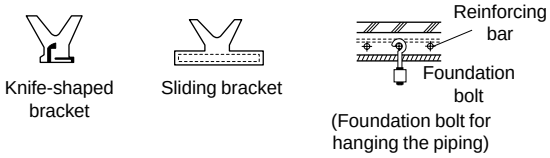
- Install the hanging bolts at intervals shown in the following figure.
- Use the ø 10 mm hanging bolts (to be locally procured).

Ceiling preparation: The actual procedure differs according to the structure. Consult your builder or whoever was responsible for the interior of the house/building.

1. **Remove part of the suspended ceiling:** In order to ensure that the ceiling is kept perfectly horizontal and to prevent the ceiling from vibrating, the ceiling framework must be reinforced.
2. Cut and remove part of the ceiling framework.
3. Reinforce the ends of the ceiling framework where sections have been removed.

- Some piping and wiring connections must be made in the ceiling after the unit has been suspended. After selecting where the unit will be installed decide on the direction of the piping and electrical connections.

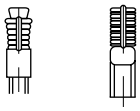
How to install the hanging bolts



Installation on a newly installed concrete slab:

Use insert brackets or foundation bolts for the installation.

Installation on an existing concrete slab:

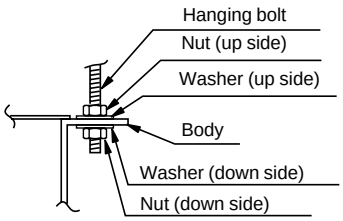


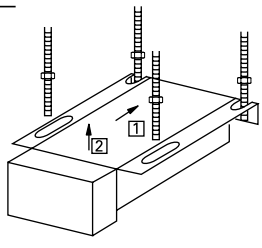
Use hole-in anchors, hole-in plugs or hole-in bolts for the installation.

Suspension

Refer to the external view for the position measurement of the hanging bolts and the external measurements.

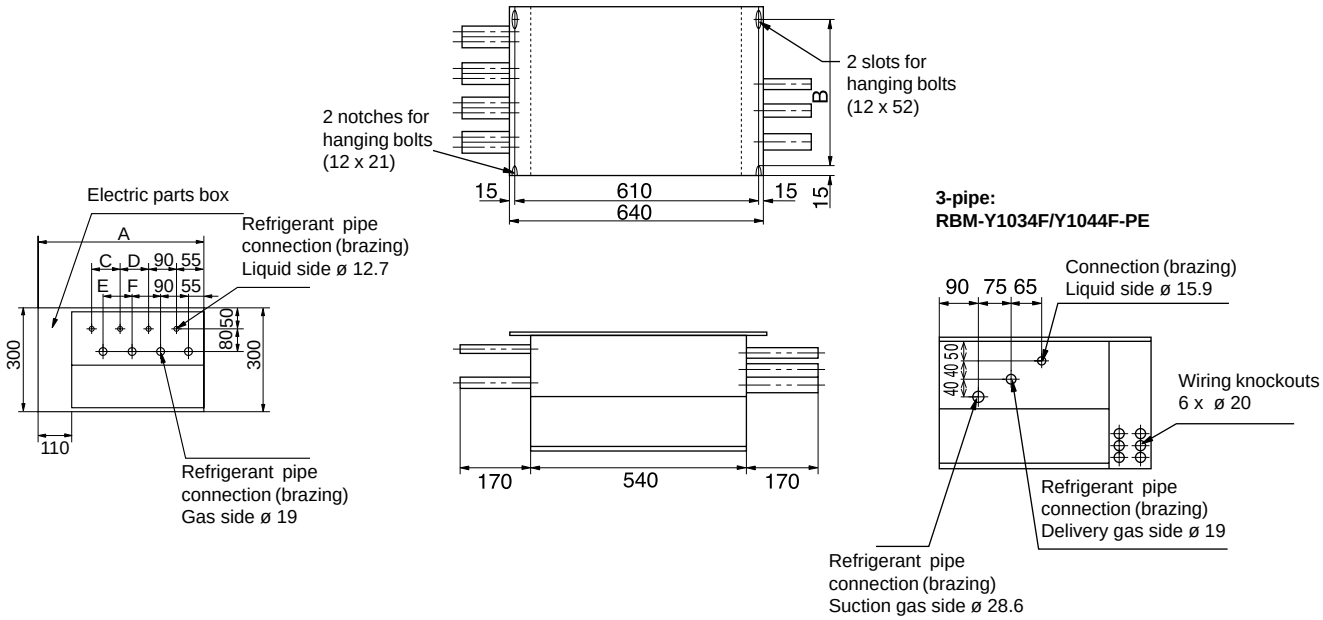
- Pick up the multi controller after matching with hanging bolts.
  1. Hang the notch hole of the back part into the hanging bolt.
  2. Fix the slot of the front part onto the hanging bolt.
- Tighten the nut firmly, and fix the unit in place.
- Use a hanging bolt with a diameter of 10 mm (local procurement).
- After hanging the main unit ensure that it is level then proceed to make the refrigerant and electrical connections.





Model	A	B	C	D	E	F
RBM-Y1034F-PE	460	300	-	90	-	90
RBM-Y1044F-PE	530	370	90	90	90	90

All dimensions are in mm



Interface kit

Precautions

Avoid installation in the following locations:

⚠ Where there is a danger of flammable gas leakage.

⚠ Where there is a danger of water coming in contact with the dual interface.

⚠ Where the mounting surface is flammable.

Installation and service space

- For internal use only.
- Ensure that there is sufficient space around the dual interface for installation and servicing.

Piping

WARNING!
During installation - if the refrigerant gas leaks, ventilate the room.
After installation - check for gas leakages.
If refrigerant gas comes into contact with fire - noxious gas may result!

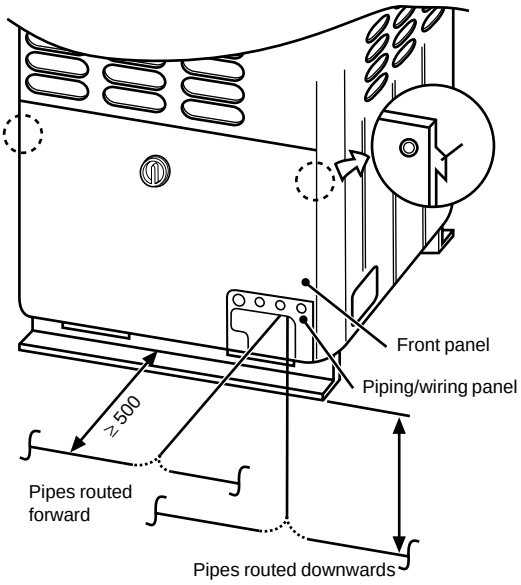
Connecting refrigerant pipes

1. To access the refrigerant piping connections and electrical wiring terminals, remove the 7 x M5 securing bolts in the front panel. To remove the panel, lift it up and away from its hanging tabs - see diagram.

2. The refrigerant pipes can be routed forwards, downwards or sideways.

3. If the pipes are routed forwards, make sure they exit through the piping/wiring panel - (remove knock out section) and allow at least 500 mm between the outdoor unit and the main pipe connecting it to the indoor unit. This is for servicing access. (Replacing the compressor, for example, requires a space of at least 500 mm.)

4. If the pipes are routed downwards, remove the knock out section in the baseplate of the outdoor unit. This will enable access. They can then be connected to the left or right, or the rear side.



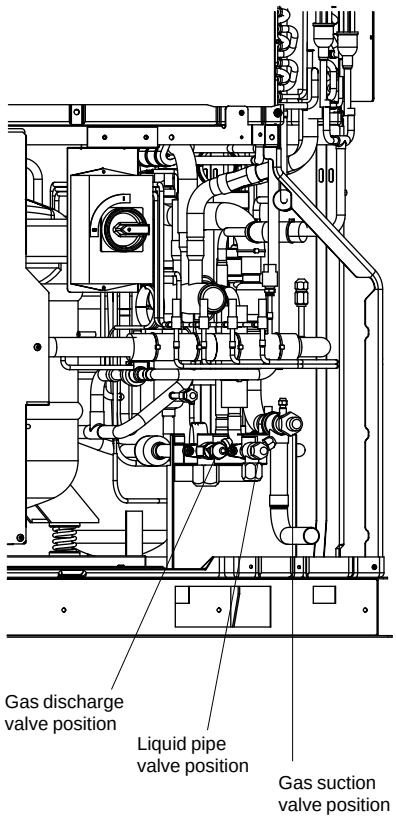
Notes:
1. When brazing, use nitrogen. This prevents internal oxidisation of the pipes.

2. Always use clean new pipe, and ensure it is not contaminated by water or dust. Piping material: seamless, deoxidised copper piping for air conditioning (refrigeration quality tube).

3. Always use a double spanner on the flare nut - and tighten to the specified torque (see table).

Note: All dimensions in mm

Connecting pipe outer dia. (mm)	Tightening torque (Nm)	Re-tightening torque (Nm)
Ø6.4	11.8 (1.2 kgf m)	13.7 (1.4 kgf m)
Ø9.5	24.5 (2.5 kgf m)	29.4 (3.0 kgf m)
Ø12.7	49.0 (5.0 kgf m)	53.9 (5.5 kgf m)
Ø15.9	78.4 (8.0 kgf m)	98.0 (10.0 kgf m)
Ø19.0	98.0 (10.0 kgf m)	117.7 (12.0 kgf m)



Piping

Materials and sizes

⚠ Materials and pipes required for connection between the indoor units, multi controllers and outdoor units are shown below:

Multi controller	Outdoor unit	Pipe	Main pipes outdoor unit to multi controller	Main pipes outdoor unit to header	Sub pipes header to multi controller	Multi controller connections
1 unit	MAR-F105HTM8-PE	Suction gas Discharge gas Liquid	Ø28.6 Ø19.1 Ø15.9	- - -	- - -	Ø28.6 Ø19.1 Ø15.9
2-4 units	MAR-F105HTM8-PE	Suction gas Discharge gas Liquid	- - -	Ø28.6 Ø19.1 Ø15.9	Ø19.1 Ø15.9 Ø12.7	Ø28.6 Ø19.1 Ø15.9

	Gas						Liquid					
Indoor unit*	10	13	16	26	36	46	10	13	16	26	36	46
Branch pipe sizes	Ø12.7			Ø15.9	Ø19.1		Ø6.4			Ø9.5		
Multi controller pipe sizes	Ø19.1						Ø12.7					

* Example: Indoor unit RAV-264CH-PE = 26

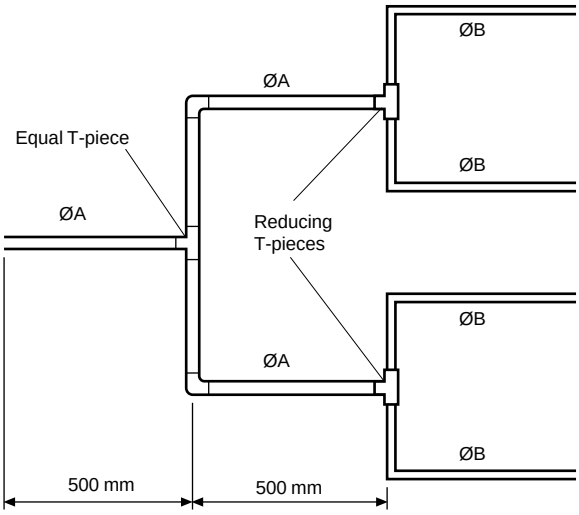
T-piece connections

- The main T-piece should be equal dimensions in all three positions, for example 12.7 x 12.7 x 12.7 mm.
- The sub T-pieces should be a reducing type, see diagram below.

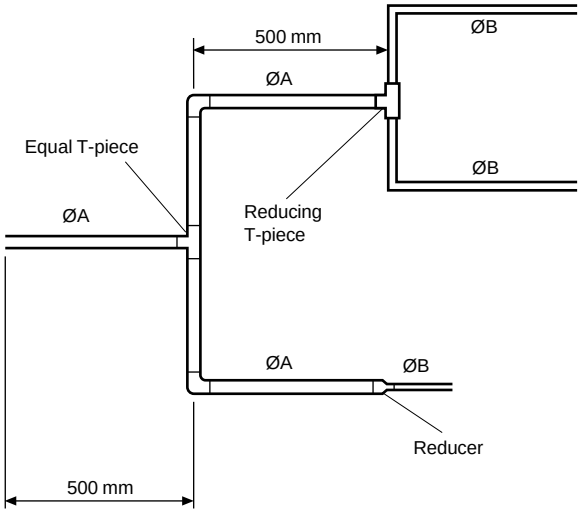
Outdoor unit	Suction gas		Discharge gas		Liquid	
	ØA	ØB	ØA	ØB	ØA	ØB
MAR-F105HTM8-PE	28.6	19.1	19.1	15.9	15.9	12.7

Note: There must be at least 500 mm of straight pipe before any T-piece, this is to ensure equal distribution.

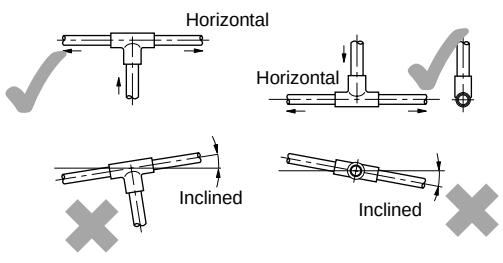
Header design - 4-way

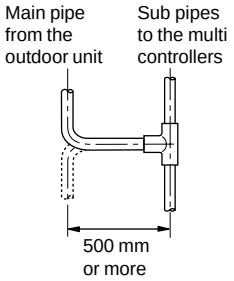


Header design - 3-way



- Keep the T-piece horizontal to the multi controller, if necessary bending the sub piping.
- Secure the T-piece to a wall or joist in the ceiling.
- Ensure a minimum of 500 mm of straight piping before any T-piece. This is to ensure equal distribution.
- Ensure correct pipe dimensions are used, between outdoor unit, T-pieces, multi controller and indoor units.
- As shown in the above tables, ensure the size of the main gas pipe between the T-piece and the outdoor unit must be the next size up compared with the pipe size between the T-piece and the multi controllers.
- Ensure any unused circuits on the multi controllers are sealed with brazed cap.



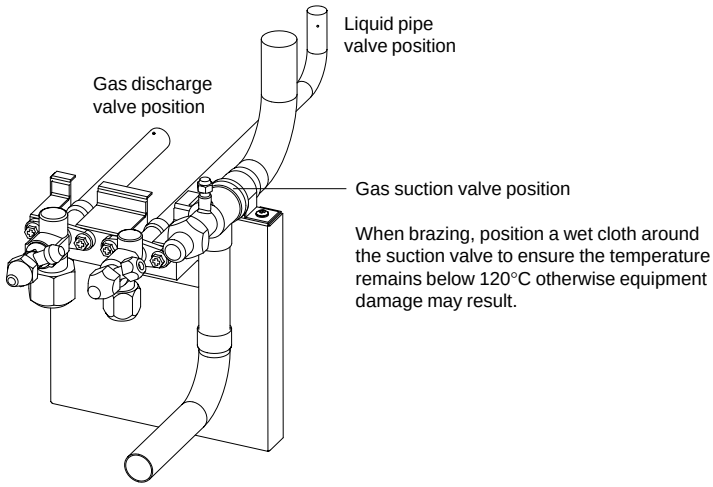


Piping

Connection to outdoor unit

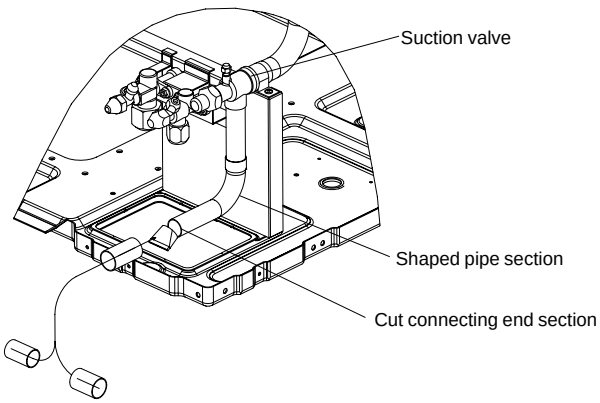
- The refrigerant pipes are connected inside the outdoor unit.
- The pipes can be routed forwards, downward or sideways.
- Do not use a liquid sight glass or incorporate an oil trap in vertical pipework.
- A dryer is incorporated into the piping of the outdoor unit.
- Cleanliness is essential - keep the piping securely sealed at all times throughout the installation.

Suction gas valve brazing



Pipework routed forwards

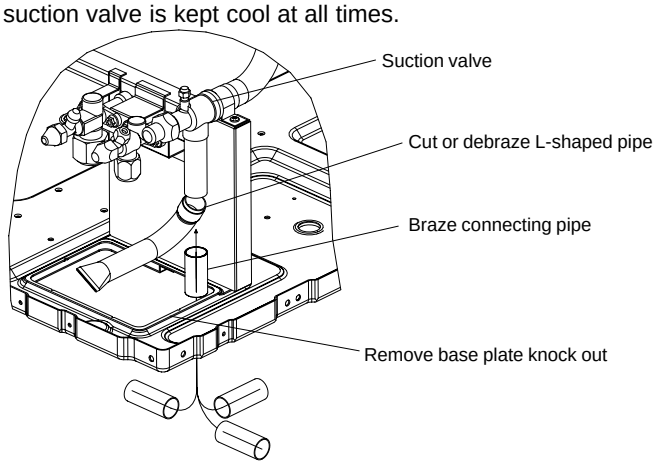
- If pipework is routed forwards ensure they exit through the piping and wiring panel (remove knock out section first)
- Cut the connecting section at the end of the pipe with a pipe cutter.
- Allow at least 500 mm between the outdoor unit and the main pipe connecting it to the indoor unit. This is for servicing access. (Replacing the compressor, for example, requires a space of at least 500 mm.)



Piping

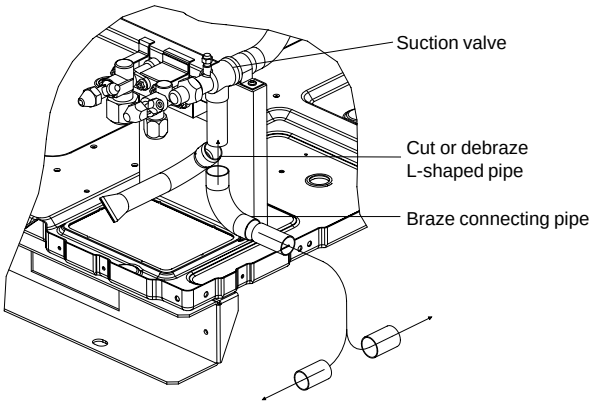
Pipework routed downwards

- If the pipes are routed downwards, remove the knock out section in the baseplate of the outdoor unit. This will enable access. They can then be connected to the left or right, or the rear side.
- De-braze or cut with a pipe cutter the connecting section above the flare.
- Braze connecting pipework to suction valve pipe.
- Ensure the suction valve is kept cool at all times.



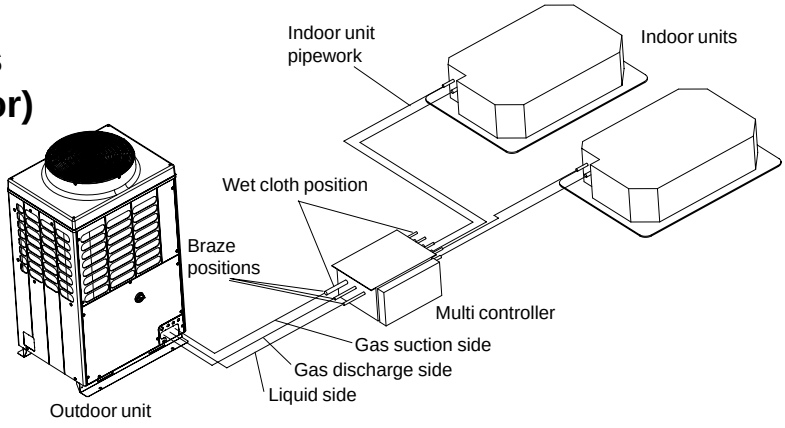
Pipework routed sideways

- If the pipes are routed sideways, remove the knock out section in the sideplate of the outdoor unit. This will enable access.
- De-braze or cut with a pipe cutter the connecting section above the flare.
- Braze connecting pipework to suction valve pipe.
- Ensure the suction valve is kept cool at all times.



Connecting refrigeration pipes (outdoor/multi controller/indoor)

- When brazing, position a wet cloth around the pipework between the brazed joint and multi controller to ensure the temperature remains below 120°C. Equipment damage to components within the multi controller may result if not protected.

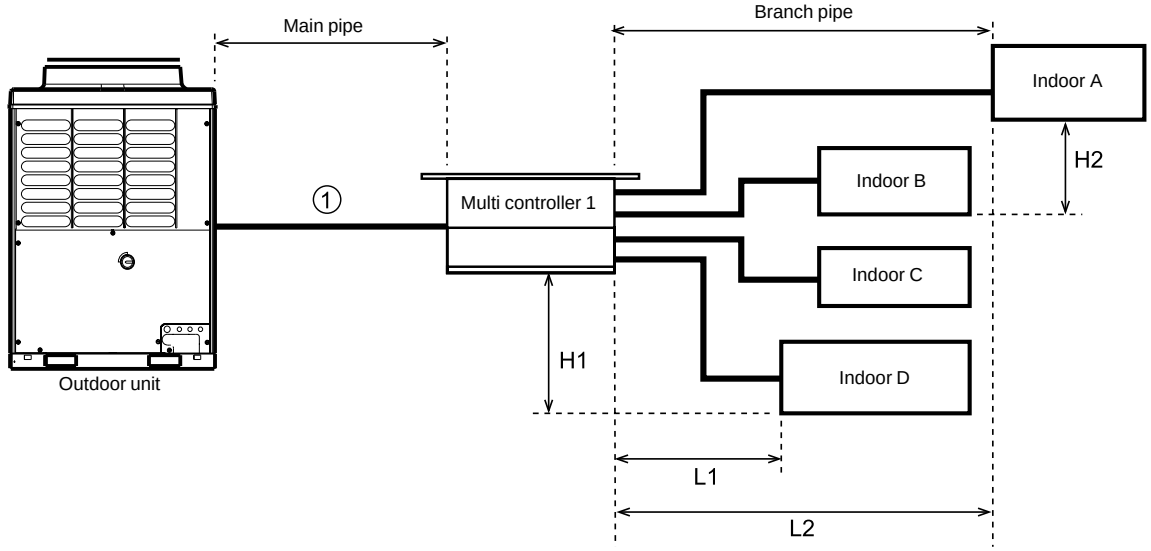


Piping

Permissible piping length and head

The maximum piping length from the outdoor unit to the indoor unit	Equivalent length	L ≤ 120 m
	Actual length	L ≤ 100 m
The maximum height difference from the outdoor unit to the multi controller or the indoor unit	When the outdoor unit is above	H ≤ 50 m
	When the outdoor unit is below	H ≤ 20 m

One-Multi-Controller system



Maximum piping lengths (actual)

No. of multi controllers	Main pipe	Branch pipe	Max. total pipe
1	3 m - 70 m	2 m - 30 m	100 m

Permissible piping length

H1	Maximum height difference between multi controller and indoor unit	≤ 15 m
H2	Maximum height difference between indoor units	≤ 15 m
ΔL	Maximum piping difference between multi controller and indoor unit	≤ 10 m

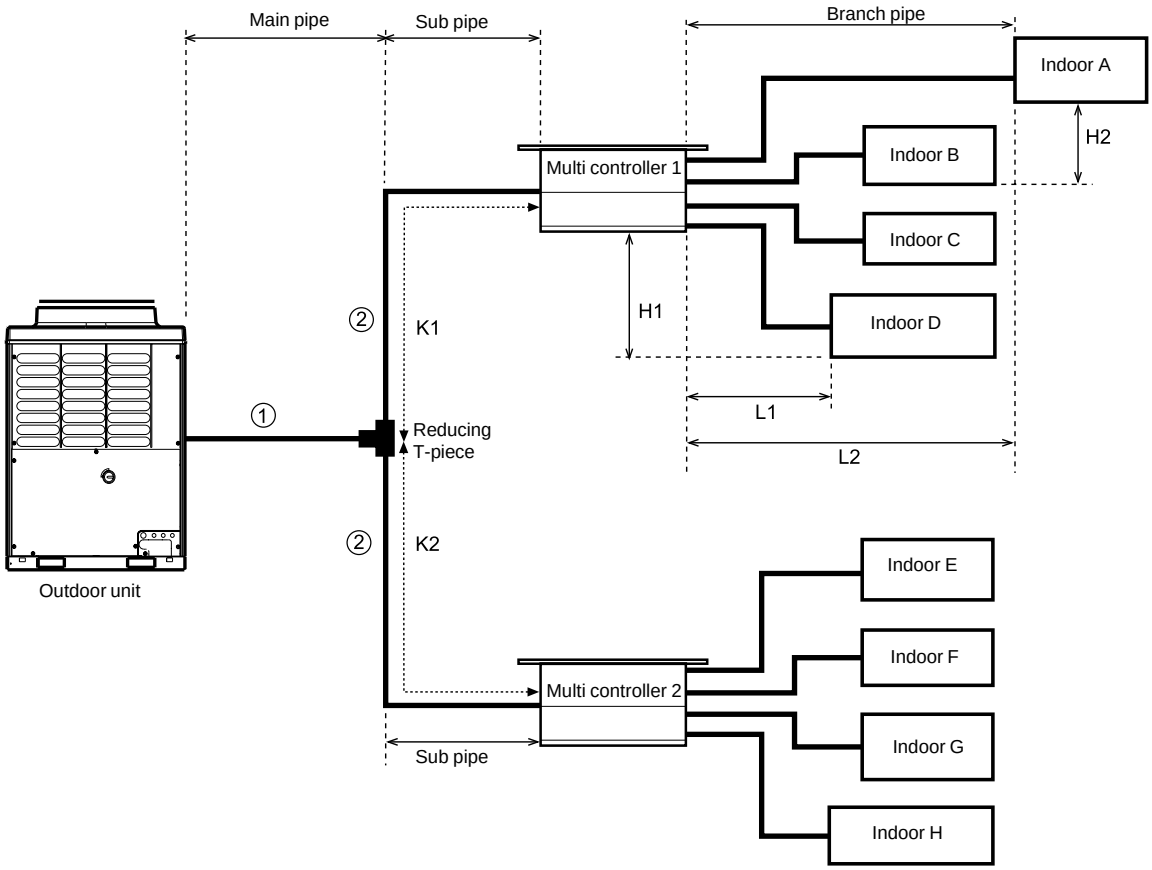
ΔL = longest pipe (L2) - shortest pipe (L1)

Pipe size

	Gas suction pipe ØA	Liquid pipe ØA	Gas discharge pipe ØA
①	28.6	15.9	19.1

Piping

Two-Multi-Controller system



Maximum piping lengths (actual)

No. of multi controllers	Main pipe	Sub pipe	Branch pipe	Max. total pipe
2	2 m - 70 m	1 m - 15 m	2 m - 30 m	100 m
	Main pipe + longest sub pipe ≤ 70 m			

Permissible piping length

H1	Maximum height difference between multi controller and indoor unit	≤ 15 m
H2	Maximum height difference between indoor units	≤ 15 m
ΔL	Maximum piping difference between multi controller and indoor unit	≤ 10 m
ΔK	Maximum piping difference between sub pipes (K2 - K1)	≤ 10 m

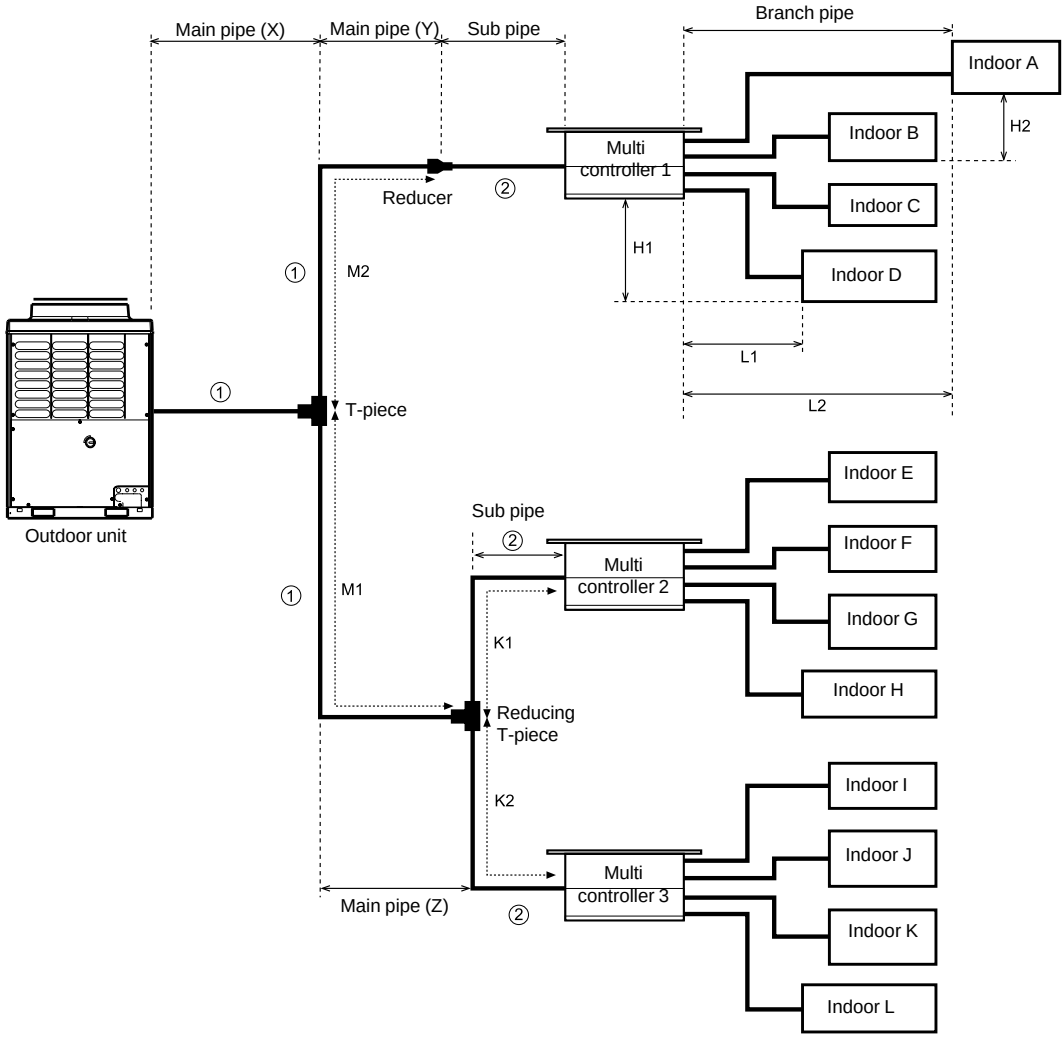
L = longest pipe - shortest pipe

Pipe size

	Gas suction pipe ØA	Liquid pipe ØA	Gas discharge pipe ØA
①	28.6	15.9	19.1
②	19.1	12.7	15.9

Piping

Three-Multi-Controller system



Maximum piping lengths (actual)

No. of multi controllers	Main pipe (X+Y+Z)	Sub pipe	Branch pipe	Max. total pipe
3	2 m - 70 m	1 m - 15 m	2 m - 30 m	100 m
	Main pipe + longest sub pipe ≤ 70 m			

Permissible piping length

H1	Maximum height difference between multi controller and indoor unit	≤ 15 m
H2	Maximum height difference between indoor units	≤ 15 m
ΔL	Maximum piping difference between multi controller and indoor unit (L2 - L1)	≤ 10 m
ΔK	Maximum piping difference between sub pipes (K2 - K1)	≤ 10 m
ΔM	Maximum piping difference between main pipes Y and Z (M2 - M1)	≤ 10 m

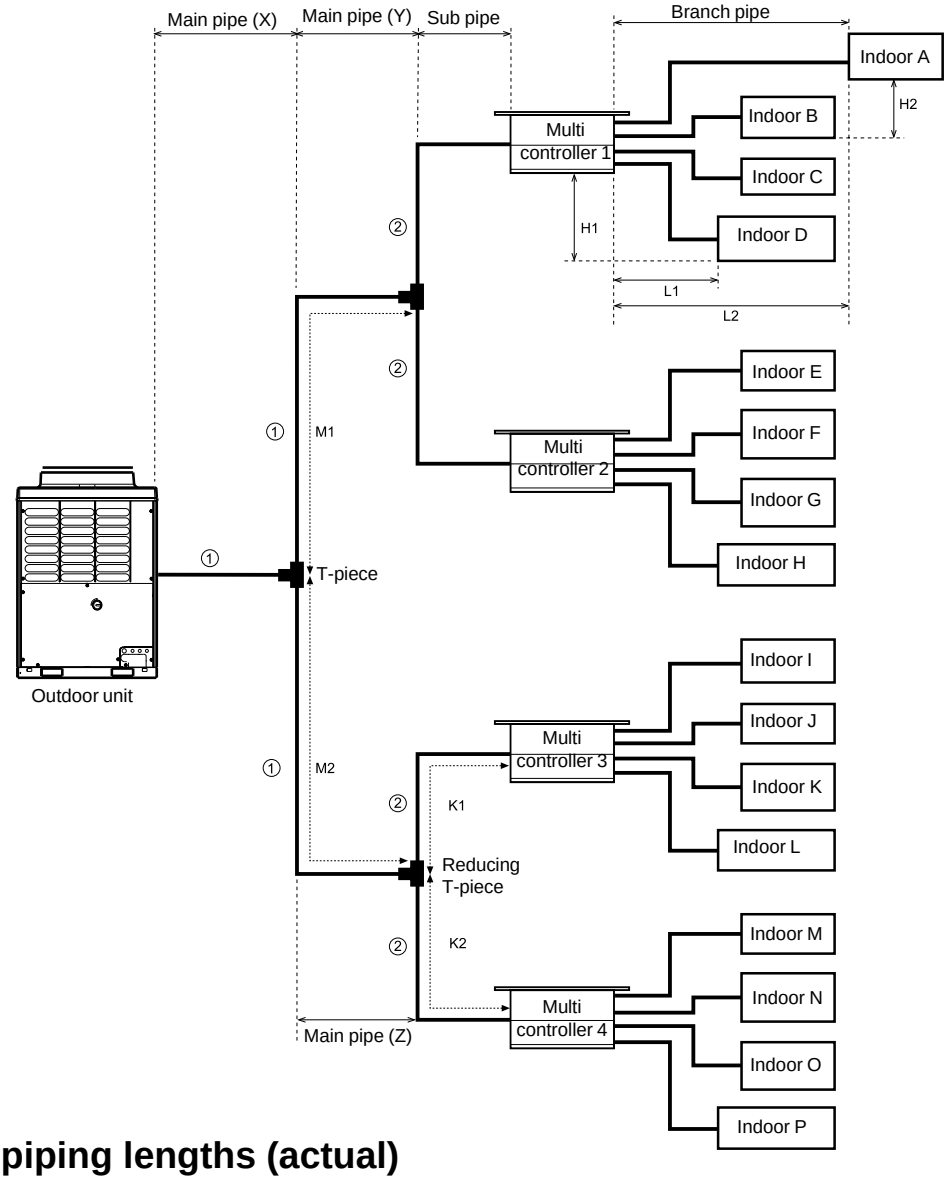
L = longest pipe - shortest pipe

Pipe size

	Gas suction pipe ØA	Liquid pipe ØA	Gas discharge pipe ØA
①	28.6	15.9	19.1
②	19.1	12.7	15.9

Piping

Four-Multi-Controller system



Maximum piping lengths (actual)

No. of multi controllers	Main pipe (X+Y+Z)	Sub pipe	Branch pipe	Max. total pipe
4	2 m - 70 m	1 m - 15 m	2 m - 30 m	100 m
	Main pipe + longest sub pipe ≤ 70 m			

Permissible piping length

H1	Maximum height difference between multi controller and indoor unit	≤ 15 m
H2	Maximum height difference between indoor units	≤ 15 m
ΔL	Maximum piping difference between multi controller and indoor unit (L2 - L1)	≤ 10 m
ΔK	Maximum piping difference between sub pipes (K2 - K1)	≤ 10 m
ΔM	Maximum piping difference between main pipes Y and Z (M2 - M1)	≤ 10 m

L = longest pipe - shortest pipe

Pipe size

	Gas suction pipe ØA	Liquid pipe ØA	Gas discharge pipe ØA
①	28.6	15.9	19.1
②	19.1	12.7	15.9

Piping

Airtight test

⚠ Carry out an airtight test after the refrigerant piping is complete. For an airtight test, connect a nitrogen gas bottle as shown, and apply pressure (use oxygen-free nitrogen, OFN).

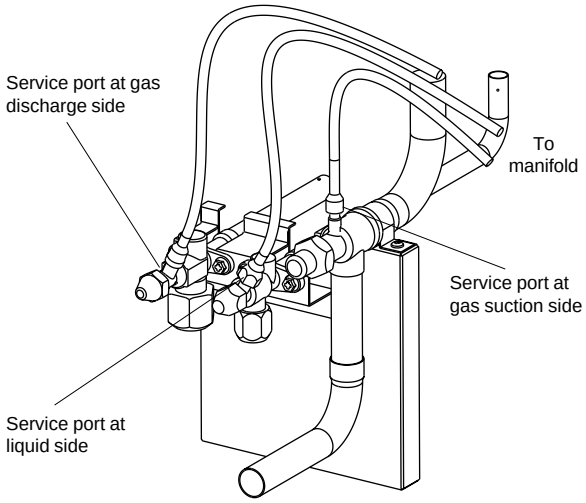
⚠ The pressure test must be completed before supplying power to ensure that the multi controller PMVs (pulse modulating valves) are open.

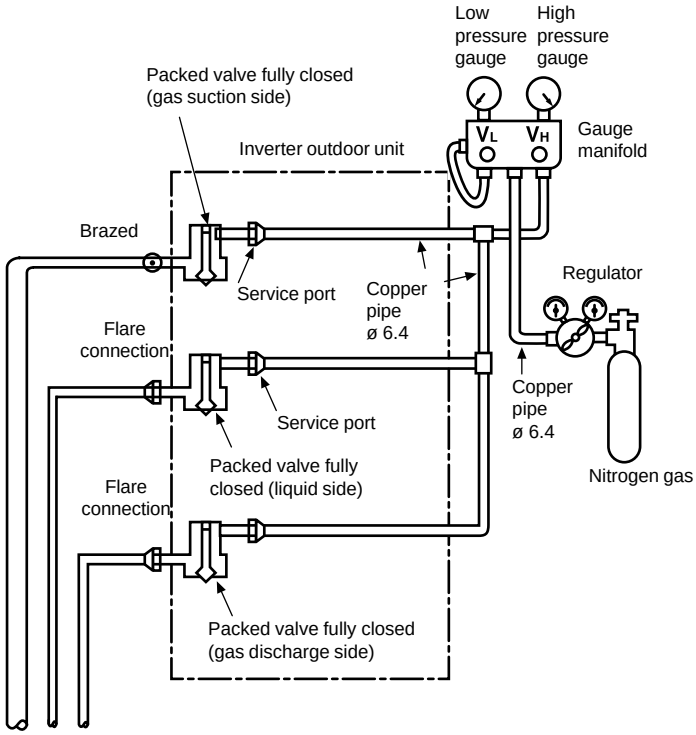
⚠ The test must be completed with the indoor units, multi controllers and outdoor unit connected.

- Be sure to carry out the test from the service ports of the packed valves at the discharge gas, liquid and suction gas side.
- Keep all of the valves at discharge gas, liquid and suction gas sides fully closed. Nitrogen may enter the cycle of the outdoor unit. Therefore, retighten the valve rod before applying pressure. (For all valves.)
- For each refrigerant line, apply pressure gradually at the discharge gas, liquid and suction gas sides.

Never use oxygen, or a flammable noxious gas.

Detailed drawing of packed valve





To detect a large leakage
Step 1: 0.3 MPa (3 kg/cm^2 G) Apply pressure for 3 minutes or more
Step 2: 1.5 MPa (15 kg/cm^2 G) Apply pressure for 3 minutes or more

To detect a fine leakage
Step 3: 3.0 MPa (30 kg/cm^2 G) Apply pressure for 24 hours

- Check for a reduction in pressure.

If there is no reduction in pressure this is acceptable.
If there is a reduction in pressure check for a leakage.
(**Note**: If there is a difference of ambient temp. between when the pressure was applied and 24 hours later, then pressure could change by approx. 0.01 MPa (0.1 kg/cm^2 G) - so correct the pressure change.

Piping

Leak position check

If a pressure drop is detected, check for leakage at connecting points. Locate the leakage by listening, feeling, using foaming agent, etc. - then rebraze or retighten.

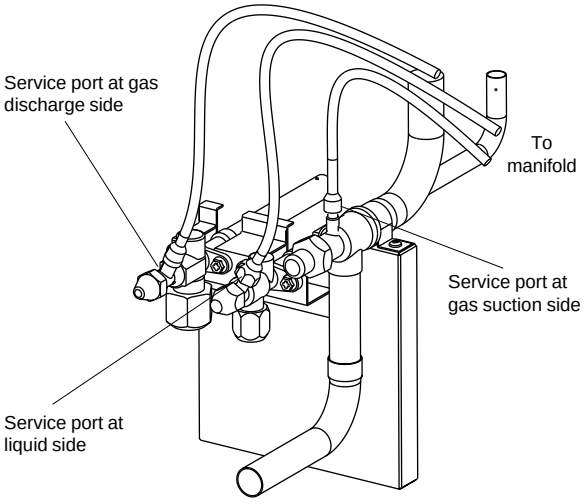
Air purge

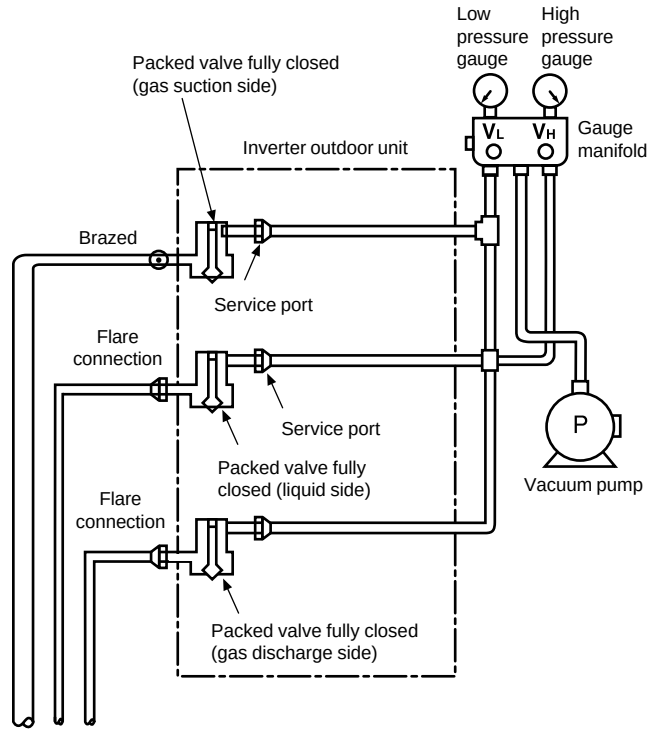
⚠ The air purge must be completed before supplying power to ensure the multi controller's PMVs are open.

Using a vacuum pump, complete an air purge. Never use refrigerant gas.

- After the airtight test, discharge the nitrogen gas.
- Connect a gauge manifold to the service port at discharge gas, liquid and suction gas sides, and connect a vacuum pump as shown.
- Be sure to vacuum at discharge gas, liquid and suction gas sides.

Detailed drawing of packed valve





- Use a vacuum pump with high vacuum carry-over degree (-0.013 x 10^5 Pa; 0.750 mm Hg or less) and large displacement (40 l/min. or more).
- Ensure to create a vacuum at -0.013 x 10^5 Pa (0.75 mm Hg) at the discharge gas, liquid and suction gas.
- After the procedure has been completed, replace the vacuum pump with a refrigerant bottle and add the refrigerant if required.

Adding the refrigerant

After the airtight test, replace the vacuum pump with a refrigerant bottle to charge the system.

Calculating the additional refrigerant required

The refrigerant amount at shipment does not include the refrigerant needed for the piping - so first calculate this amount, and then add it.

Refrigerant charge amount shipped from the factory

Outdoor unit model name	MAR-F105HTM8-PE
Charging amount (kg)	19.0
Maximum gas charge (kg)	36.3

The amount of additional refrigerant is calculated from the actual length of the liquid pipe.

To calculate the additional refrigerant volume, refer to the diagram and follow the steps below:

(i) The main pipe length is taken as the addition of pipes X, Y and Z.

(ii) The sub pipe length is taken as the addition of the two longest of the four (if 4 multi controllers).

(iii) The branch pipe lengths must be individually calculated using the 8 longest pipes.

(iv) Do not attempt to add gas above the maximum shown in the table above.

(v) For systems with one multi controller ignore the sub-pipe section within the additional gas charge calculation.

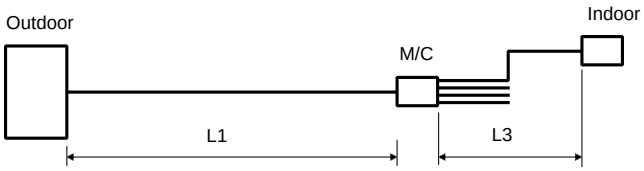
(vi) When using three multi controllers, it is important that a reducer is used on the pipework for the third multi controller. Pipework before the reducer is classed as main piping and after as sub piping.

Charging the system

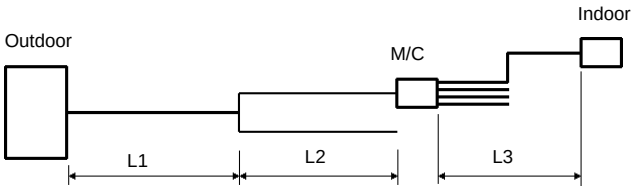
- Keeping the outdoor unit valve closed, charge the refrigerant from the service port on the liquid side.
- If the specified amount of refrigerant cannot be charged - fully open all the outdoor unit’s valves, then perform the cooling operation with the valve at the gas side slightly closed.
- If leaks cause a shortage of refrigerant - recover the refrigerant from the system, and recharge with new refrigerant to the total refrigerant charge.

Additional refrigerant

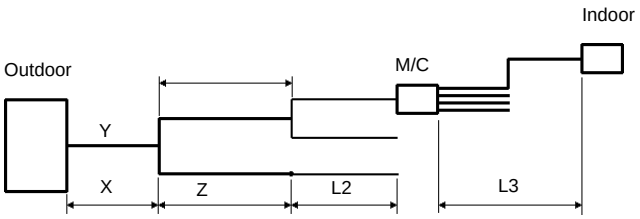
One Multi Controller



Two Multi Controllers



Three Multi Controllers



Four Multi Controllers

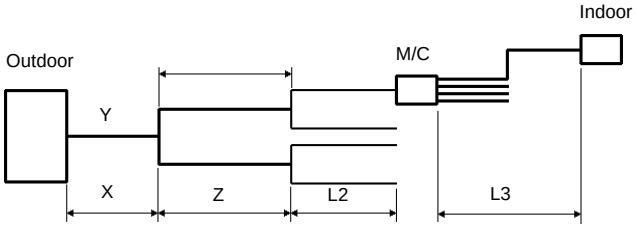


Table 1 - Branch pipes

RAV-10* : 0.030 kg/m
RAV-13* : 0.030 kg/m
RAV-16* : 0.030 kg/m
RAV-26* : 0.045 kg/m
RAV-36* : 0.045 kg/m
RAV-46* : 0.045 kg/m

Example:
RAV-464CH-PE → RAV-46*

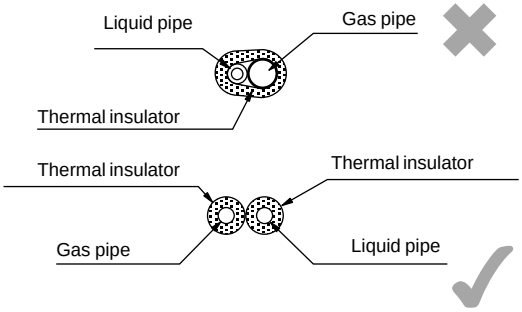
L1 = Main pipe (X + Y + Z)
L2 = Sub pipe
L3 = Branch pipe

Pipe		**Additional gas/metre**		**Additional gas**
MAR-F105 - main pipe L1 (X+Y+Z) (minus 2 m)	x	0.19 kg/m	=	
1st longest sub pipe L2 (minus 1 m)	x	0.125 kg/m	=	
2nd longest sub pipe L2 (minus 1 m)	x	0.125 kg/m	=	
1st longest branch pipe L3 (minus 2 m)	x	Refer to Table 1	=	
2nd longest branch pipe L3 (minus 2 m)	x	Refer to Table 1	=	
3rd longest branch pipe L3 (minus 2 m)	x	Refer to Table 1	=	
4th longest branch pipe L3 (minus 2 m)	x	Refer to Table 1	=	
5th longest branch pipe L3 (minus 2 m)	x	Refer to Table 1	=	
6th longest branch pipe L3 (minus 2 m)	x	Refer to Table 1	=	
7th longest branch pipe L3 (minus 2 m)	x	Refer to Table 1	=	
8th longest branch pipe L3 (minus 2 m)	x	Refer to Table 1	=	
		Total additional gas charge	**=**	**kg**

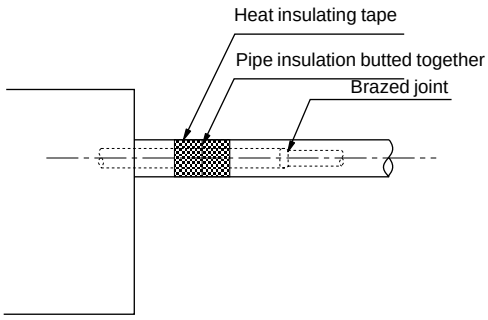
Piping

Heat insulation

- Provide heat insulation on the refrigerant piping on both the liquid side and the gas side separately, and ensure that joints in the insulation are vapour-sealed.
- Since the temperature of the piping on the gas side increases during heating operations, the heat insulating material used must be able to withstand temperatures of more than 120°C.



- Insulate the pipework as shown in the diagram below, slide insulation up to the insulation on the multi controller and seal joint with heat insulating tape.



- In the situation where high ceiling ambient temperatures are present thicker pipe insulation should be used.

Electrical wiring

Precautions

⚠ This guide should be read and utilised in conjunction with official published regulations and codes of practice, be they local, national or international.

⚠ Each air conditioning system will have its own discrete power supply, with overload current protection. The electrical power will be supplied to the outdoor unit via the built-in isolator.

⚠ The indoor units will derive their electrical power from the multi controller, and they in turn will derive their power from the outdoor unit.

⚠ The interface kit will derive its electrical power from the outdoor unit.

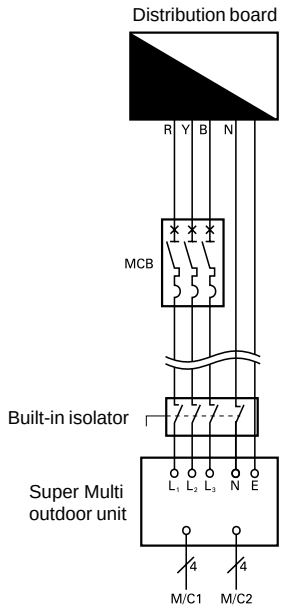
⚠ The circuit protection device will protect the supply cable against overcurrent. The circuit protection must be selected having due regard to the compressor starting current, such that the supply cables when sized correctly, are protected.

⚠ The cable should be selected to match the nominal load of the system, in addition to the losses associated with corrections for length, temperature, impedance, etc. In accordance with local codes of practice.

⚠ Please refer to the unit's nameplate and the relevant technical specifications to determine the correct power supply.

Power supply wiring

- Connect the power supply cables to the isolator on the outdoor unit.
- Secure the power cables on the terminal contact firmly.



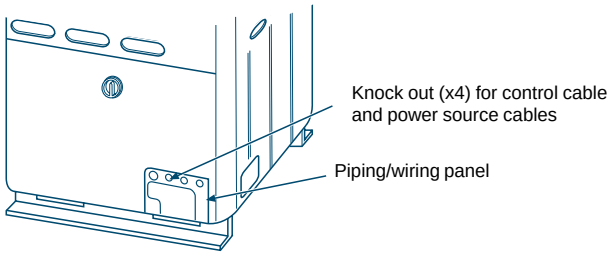
- Do not allow the cables to come into contact with any valves or pipes.
- Use the correct sized cable glands when connecting the power supply cables to the service panel.
- The table below shows the supply requirements.

Model	Running current (A)	Starting current (A)	Power supply
MAR-F105HTM8-PE	17.7	60	3 Ø 50 Hz 380/415 V

Electrical wiring

Connecting the power source cable and control cable

Insert the power source cable and control cable after removing the knockout in the piping / wiring panel on the front or side of the outdoor unit.



Power source cable

- Connect the electric cables and earth wire to the outdoor isolator terminal block through a notched section at side of the electric parts box, and fix with a clamp.
- Bundle the electric cables using the hole so that they are in the notched section of the electric parts box.

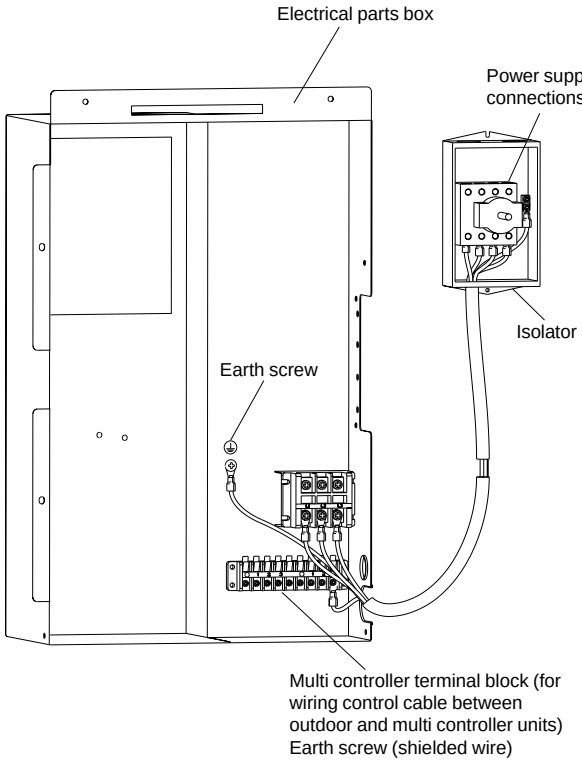
Control cable

- Connect the control cable between indoor and multi controller units through a hole at the side of the electric parts box, and fix with a clamp.

Notes:

1 Be sure to separate the power source cables and each control cable.

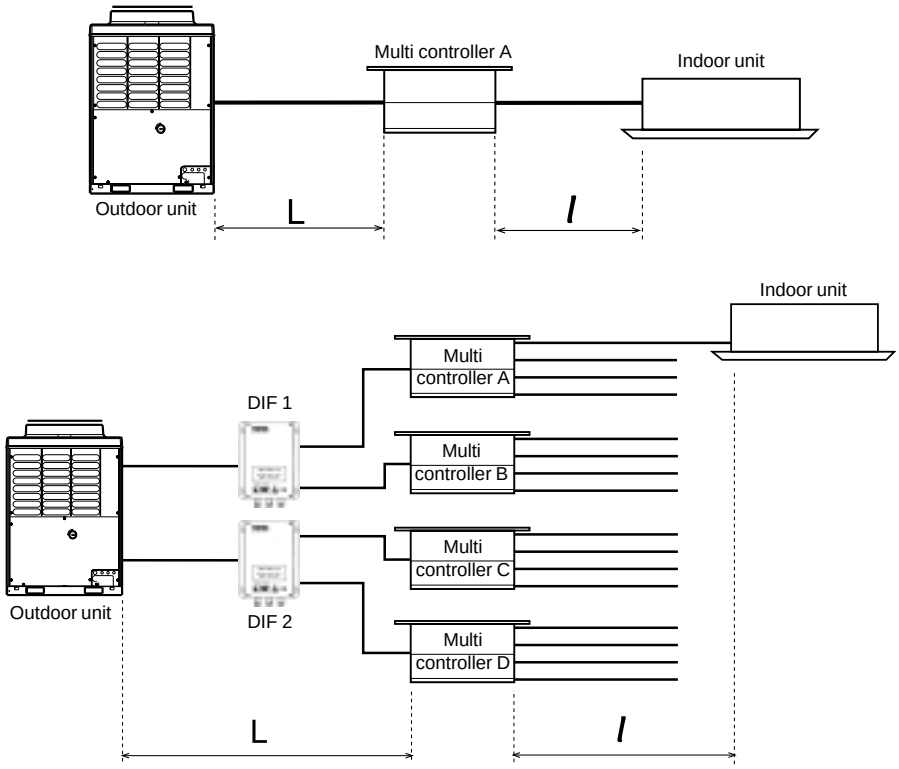
2 Arrange the power source cables and each control cable so they are not in contact with the bottom surface of the main unit.



Electrical wiring

Wiring between units

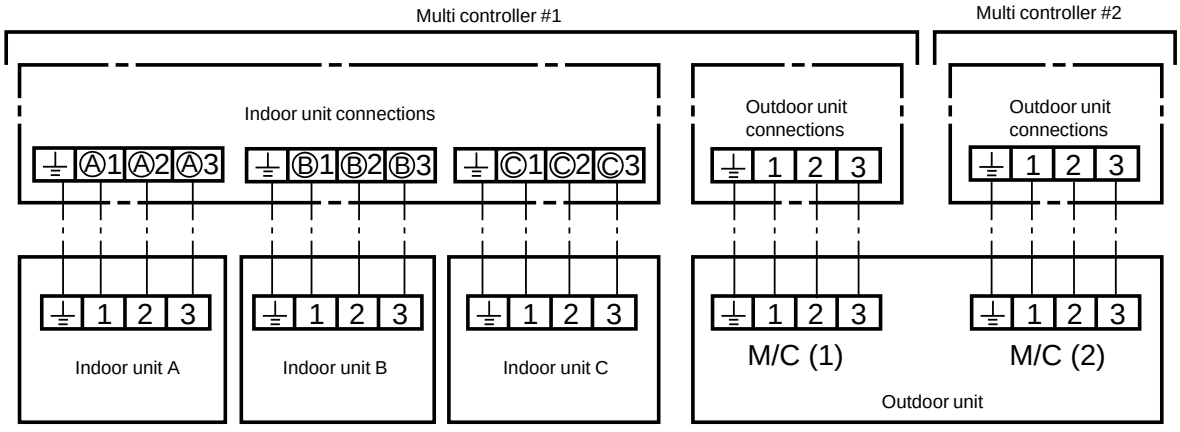
- Connect the wires between the units correctly. Errors made in the connections can result in the unit malfunctioning.



L	The length of the wires between the outdoor and multi controller units must be 80 metres or less.
l	The length of the wires between the indoor and multi controller units must be 80 metres or less.

For one and two multi controllers

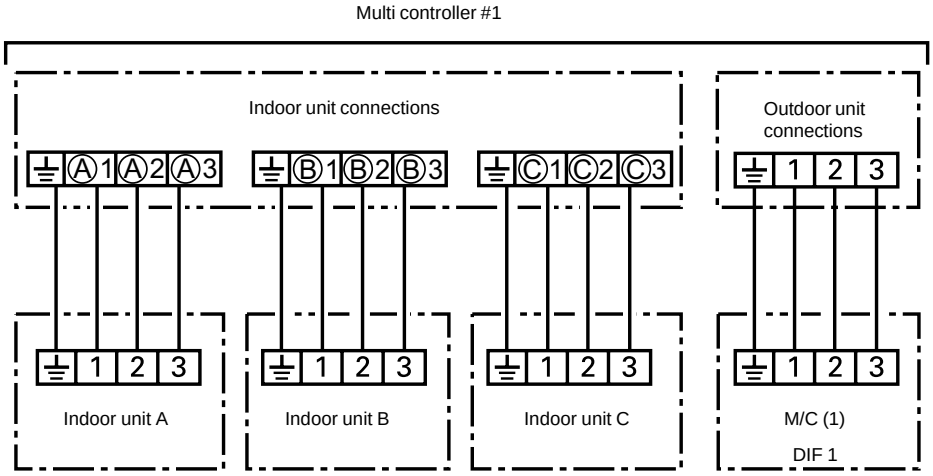
- Connect the control wires between the outdoor unit, indoor units and the multi controller as shown in the figure below:



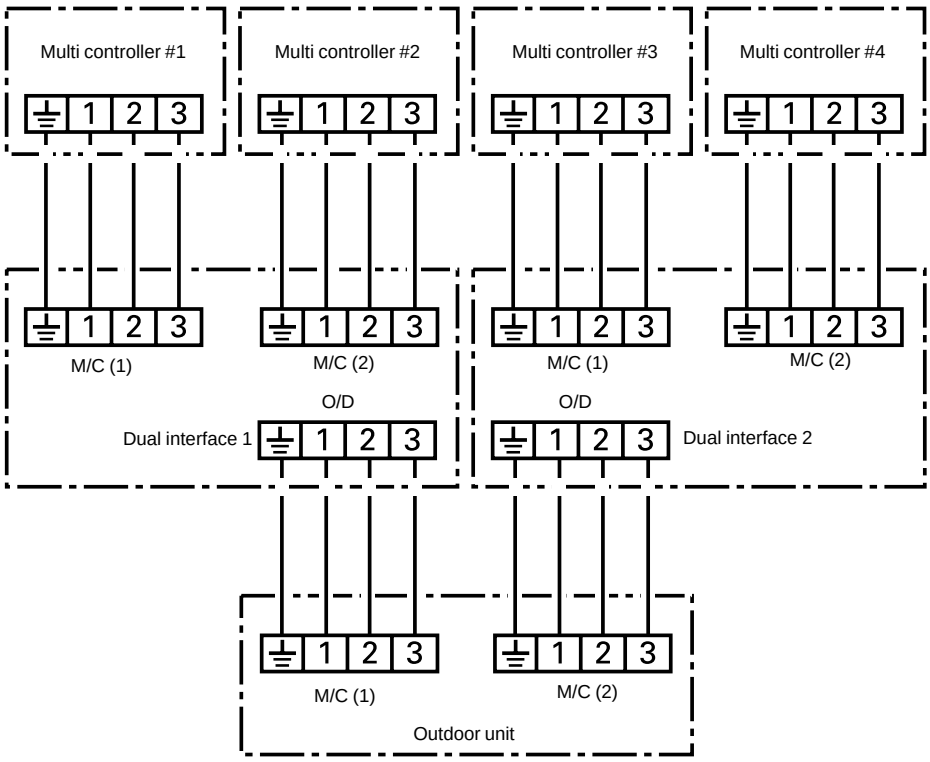
Electrical wiring

For three and four multi controllers

- Connect the control wires between the multi controllers and indoor units as shown in the figure below:



- Connect the control wires between the multi controllers and outdoor unit as shown in the figure below:

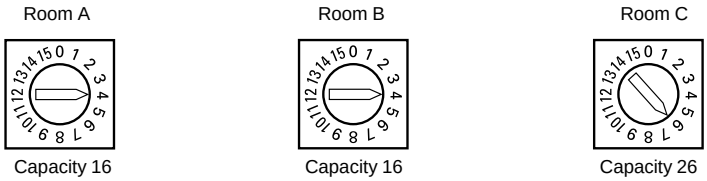


Electrical wiring

Setting of indoor unit capacity codes

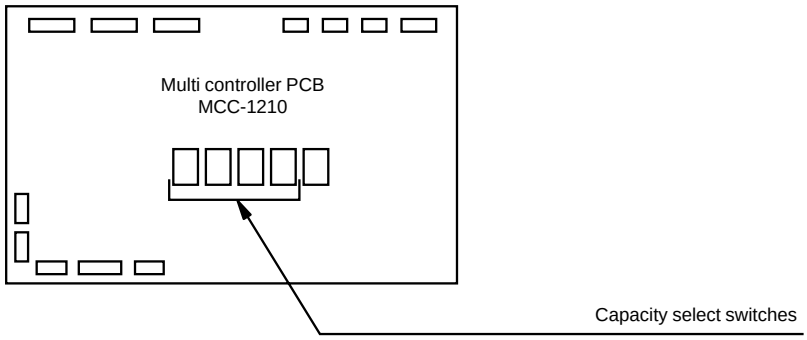
- The setting of the indoor unit capacities is important. Set the correct indoor unit code numbers according to the indoor unit capacity. The capacities are set by the rotary switches on the printed circuit board switch A (unit A), switch B (unit B), switch C (unit C) and switch D (unit D).
- During manufacture, the indoor capacity selection switches are set at '0'.
- Record the indoor capacity codes, indoor unit model names and locations in the table following, and on the wiring diagram on the electrical panel cover.

Example:



Indoor unit	Capacity	No connection	10	13	16	20	26	36	46
	Code number	0	2	3	4	5	6	8	10

(Example: Model RAV-364UH-PE, capacity = 36)

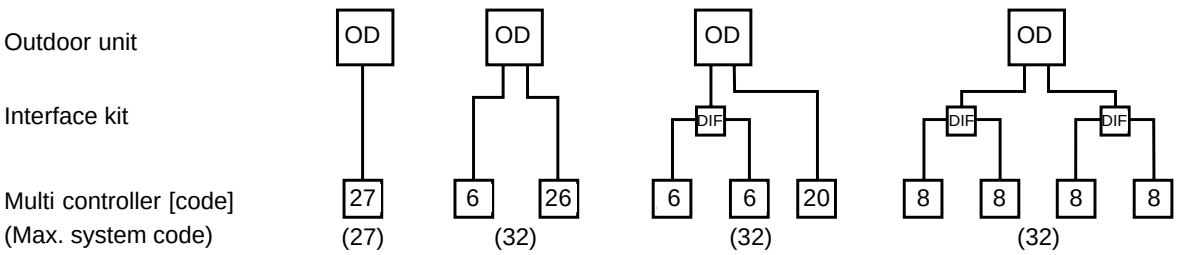


- Multiple indoor units may be connected to each outdoor unit, providing the total indoor code does not exceed the limits shown below.

Combination of multi controllers and indoor units

Number of multi controllers	Maximum No. of indoor units	Indoor unit diversity	Maximum system code	Maximum code per multi controller
1	4	135%	27	27
2	8	160%	32	27
3	12			27 (13*)
4	16			13

Example of systems with maximum possible code:



Electrical wiring

Precautions

⚠ At factory shipment the indoor capacity selection switch, on the multi controller, is set at ‘0’. If the switch remains at the ‘0’ setting, the relevant indoor unit will not operate.

⚠ When power is supplied indoor capacity code data cannot be rewritten, even if the code setting switch is changed. Set the capacity code before supplying power. To change the capacity codes once the power has been applied, set the desired codes using the appropriate switches and push the reset button on the multi controller for 2 or 3 seconds; this will reset the PCB.

⚠ RBM-Y1034F-PE switch D is to be set at ‘0’.

⚠ If the capacity code number is not set correctly, the desired cooling or heating capacity will not be obtained. This could cause the system to malfunction. If the total of the capacity codes exceeds 32 (10HP outdoor unit), the air conditioner will not function.

Trial run

Precautions

⚠ The power must be applied to the unit for at least 12 hours before operating the unit. This is to ensure the compressor is fully warmed by the heater otherwise the unit may malfunction.

⚠ Do not under any circumstances force the unit to operate by using the magnetic contactor override.

⚠ Before conducting the trial run, be sure to remove all packaging from the unit.

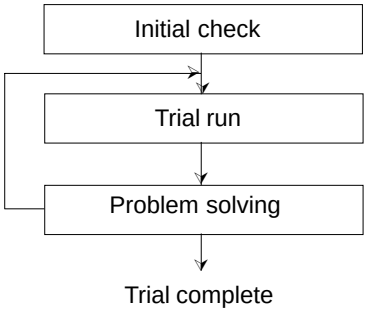
⚠ Ensure that the correct capacity code for each of the indoor units is set correctly on the multi controller’s PCB.

⚠ The total of the capacity codes must not exceed 27 (1 multi controller) or 32 (2-4 multi controller).

⚠ Check the refrigerant piping and control wires are connected correctly to the multi controller, i.e. the control wiring and refrigerant piping of unit A matches the unit A’s connections on the multi controller.

Procedure

- Conduct the trial run as follows, ensuring to act on the instructions of the following checklists.
- Write the results onto the checklists. These will be very helpful documents for service and maintenance in the future.



- Check the basic installation work by filling out checklist #1.
- Use checklist #2 to conduct the trial run test, record the results.
- If problems occur, correct them and rerun the test.
- If problems still persist, refer to the service manual for full details.

Trial run

Checklist # 1

Is the installation work finished correctly?

				Indoor unit model name	Registered code number	Check result
1)	Is the capacity number switched on the multi controller PCB registered correctly to each indoor unit?	M/C (1)	Unit A			
			Unit B			
			Unit C			
			Unit D			
		M/C (2)	Unit A			
			Unit B			
			Unit C			
			Unit D			
		M/C (3)	Unit A			
			Unit B			
			Unit C			
			Unit D			
		M/C (4)	Unit A			
			Unit B			
			Unit C			
			Unit D			

2)	Are there any wrong connections of the refrigerant piping control wiring between indoor units and multi controller?			
3)	Are there any wrong connections of both control wiring between indoor unit and multi controller, and multi controller and outdoor unit?			
4)	Is the circuit breaker installed?	Breaker capacity	A	
5)	Is the breaker capacity adequate?			
6)	Is there any wrong wiring of power cable?	Power cable	mm^2	
7)	Is the wire size correct?	Control wire	mm^2	
8)	Is the wiring correct between distribution board and outdoor unit?			
9)	Is the grounding attached?			
10)	Is there adequate resistance? (More than 10 MΩ)	Insulation resistance	MΩ	
11)	Is the voltage correct?	Voltage	V	
12)	Is the condensate draining adequate?			
13)	Is the heat insulation sufficient for all pipework?			
14)	Is there a short-circuit of air flow from the indoor unit?			
15)	Is there a short-circuit of air flow from the outdoor unit?			
16)	Is there sufficient refrigerant?			
17)	Are the valves fully opened?			
18)	Does the remote controller operate properly?			

Checklist # 2

Trial run

- After the initial check has been completed, the trial run may commence.
- The trial run should be completed individually for each and every indoor unit. If multiple units are operating simultaneously, you cannot carry out the check for cross connection between refrigerant piping and control wiring.
- For each indoor unit confirm both cooling and heating operations.
- Work through the checklist #2 below, filling in the relevant data, as the test proceeds.

Checklist #2

No.	Operation procedure	Check items	Confirmation															
			M/C (1)				M/C (2)				M/C (3)				M/C (4)			
			Unit A	Unit B	Unit C	Unit D	Unit A	Unit B	Unit C	Unit D	Unit A	Unit B	Unit C	Unit D	Unit A	Unit B	Unit C	Unit D
1	Turn on the power	Is the LED on the remote controller flashing?																
2	(Check the fan operation) Set the operation mode to 'Fan', and start operation.	Is the air flow blowing out from the air outlet?																
		Is there abnormal noise from the fan?																
3	(Check the cooling operation) Set the operation mode to 'Cooling' and start operation. (Once you have stopped operation, you have to wait for 3 minutes to restart due to the built-in restart delay circuit functioning)	Does the compressor start normally?																
		Is there abnormal sound? (compressor, piping)																
		Is the cool air flow coming out?																
		Is the air flow circulating adequately?																
		Does the thermostat work normally? (Confirm that compressor stops at high temperature setting, and restarts at low temperature setting)																
	In this case, check every indoor unit's operation simultaneously. Set the temperature to the lowest level	Is the temperature difference correct between return air and outlet air?																
		Is the power supply voltage correct? (220-240 V)																
		Is the operating current correct?																
		Is the operating pressure correct?																
4 (note)	(Check the heating operation) Set the operation mode to 'Heating' and start the operation (Once you have stopped operation, you have to wait for 3 minutes to restart due to the built-in restart delay circuit functioning)	Does the compressor start normally?																
		Is there abnormal sound? (compressor, piping)																
		Is the warm air flow coming out?																
		Is the air flow circulating adequately?																
		Does the thermostat work normally? (Confirm that compressor stops at low temperature setting, and restarts at high temperature setting)																
	In this case, check every indoor unit's operation simultaneously. Set the temperature to the highest level	Is the temperature difference correct between return air and outlet air?																
		Is the power supply voltage correct? (220-240 V)																
		Is the operating current correct?																
		Is the operating pressure correct?																

(Note) When the outdoor temperature rises above 25°C, heating operation will cease.

Circuit test procedure

- These systems have a feature which enables them to check that the wiring and piping connections are aligned with each other. This is carried out by allowing refrigerant to flow to one indoor unit at a time and monitoring that indoor unit's coil sensor for a corresponding drop in temperature. Each indoor unit is tested in turn and where two multi controllers are installed each multi controller is tested in turn.

- This test would normally be used at the commissioning stage.

- Procedure for initialising the circuit test.
  1. Turn the power off.
  2. Ensure the capacity codes are set correctly, capacity switches set to '0' are not tested.
  3. Put the outdoor display switches SW1 and SW2 to 9 and multi controller(s) display switch to 6.
  4. Turn the power back on.
  5. Set all the remote controllers to cool mode and 29°C.
  6. Press the on/off button to start all the indoor units (the outdoor LEDs show '1020').
  7. Press the outdoor unit switch SW3, and hold for 3 seconds.
  8. The system is now in self-testing (all 8 LEDs will be flashing rapidly).
  9. The system will stop at the end of the test.

- In the event of cross wiring/piping the system will indicate which units are faulty, see table below:

Outdoor display switch SW1 and SW2 set to position 9.

One and two Multi Controllers

Display	Multi controller	Fault	
1020	All	None	
1A20	1	Unit A	
1B20		Unit B	Units that are indicated
1C20		Unit C	failed the test
1D20		Unit D	
102A	2	Unit A	
102B		Unit B	
102C		Unit C	
102D		Unit D	

Three or more Multi Controllers

Display	Multi controller	Fault	
1020	All	None	
1A20	1	Unit A or B	
1B20		Unit C or D	Units that are indicated
1C20	2	Unit A or B	failed the test
1D20		Unit C or D	
102A	3	Unit A or B	
102B		Unit C or D	
102C	4	Unit A or B	
102D		Unit C or D	

Additional notes

⚠ Temperature difference between the indoor unit's air inlet and outlet.

(i) If the difference between the dry bulb temperatures at the indoor unit's air inlet and outlet is 10 K or more when the unit has been operating for at least 30 minutes in 'cooling' mode, the system is operating correctly (at maximum compressor frequency).
(ii) If the difference between the dry bulb temperatures at the indoor unit's air inlet and outlet is 18 K or more when the unit has been operating for at least 30 minutes in 'heating' mode, the system is operating correctly (at maximum compressor frequency).

⚠ Current measurement

(i) If the current is within ± 15% of the value given, in both heating and cooling modes, the system is operating correctly (at maximum compressor frequency).
(ii) The current varies as follows, depending on the operating conditions

When the current is higher than the standard current:

① High indoor/outdoor temperatures
② Poor heat dissipation of outdoor unit (during cooling)

When the current is lower than the standard current:

① Low indoor/outdoor temperatures
② Gas leak (insufficient refrigerant)

⚠ Pressure measurement

(i) The pressure levels established 15 minutes after start-up are shown below (dry bulb temperatures °C, with the unit operating at maximum compressor frequency)

Cooling	High pressure: 16 - 20 kg/cm^2 or 1.57 - 1.96 MPa Low pressure: 3.5 - 5.5 kg/cm^2 or 0.34 - 0.54 MPa	Indoor 18 to 32°C Outdoor 25 to 35°C
Heating	High pressure: 15 - 21 kg/cm^2 or 1.47 - 2.06 MPa Low pressure: 3.0 - 4.5 kg/cm^2 or 0.29 - 0.44 MPa	Indoor 15 to 25°C Outdoor 5 to 10°C

(ii) The operating conditions of the system will effect the pressures in the system.

⚠ The flashing of the remote controller's operation lamp does not indicate a failure.

⚠ If the total capacity code allowable is exceeded, the 'preheat/defrost' will flash, at 4 second intervals, on the LCD of the remote controller. This does not indicate a failure, however it should be corrected.

Fault codes

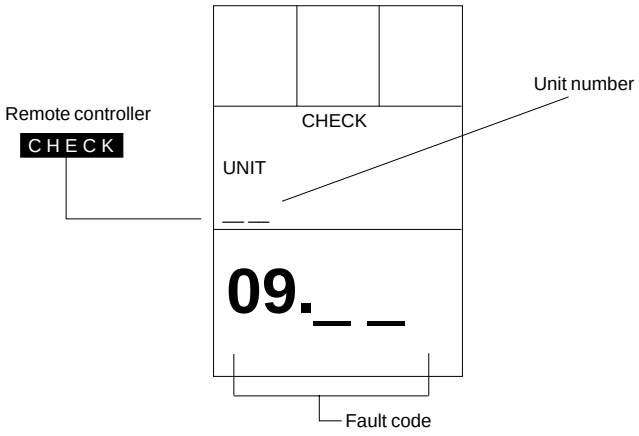
⚠ The remote controller, multi controller and outdoor units are provided with a means of checking the status of the system. This is achieved by the use of a 'check' display on the remote controller, and an LED display located on the microcomputer control PCB which itself is located in the outdoor unit's electrical box. The multi controller fault codes are repeated at the outdoor unit.

⚠ Any faults that occur can be identified by the use of these fault codes.

⚠ For full details please refer to the service manual

Phase rotation test procedure

- The dual-scroll compressor is unidirectional, whilst the variable speed inverter compressor's direction of rotation is determined internally, the fixed-speed is not, and is dependant upon the correct input electrical phase sequence.
- Start the system in either cool or heat mode, depending on the building requirements. Allow the machine to assume full-load. The inverter compressor will start and, at its maximum speed, will commence to slow its speed prior to the fixed-speed compressor being energised.
- If the phase rotation is correct, the main contactor will energise and allow the second fixed-speed compressor to run. If this is the case then proceed to the next test.
- If the phases are not correctly aligned, the second compressor will not start and the inverter will stop. Allow the inverter compressor to restart itself after the recycle period has elapsed; it will repeat the above sequence. At the end of this sequence, allow two minutes before interrogating the remote controller, multi controller or the outdoor interface PCB for a fault code.
- Display check for incorrect phase alignment.



- If the phase rotation is incorrect, interchange the incoming supply cables to L_2 and L_3 and reset the system.

Service support functions

Forcing the electromagnetic control valve (PMV 1 and 2) fully opened/fully closed - on the outdoor unit

1. Ensure that the system is OFF before the valves are manually operated.
2. Valves will reassume their required position unless electrically isolated.

Outdoor unit

SW1	SW2	Short point	Operation	Function
0	N/A	TP1	Valves will automatically assume their required position after 2 minutes	PMV 1 fully open for 2 minutes
1				PMV 2 fully open for 2 minutes
0		TP2		PMV 1 fully closed for 2 minutes
1				PMV 2 fully closed for 2 minutes
2	0	TP3	Press SW04	Solenoid valves manually energise in sequence when switch is pressed
			Press SW03	Solenoid valves automatically energised in sequence (1 second intervals)

Forcing the electromagnetic control valve (PMV A/B/C/D) fully opened/fully closed - on the multi controller

Multi controller

Display switch position	Valve	Short point	
0	PMV A	TP1	TP2
1	PMV B		
2	PMV C	Selected valve is fully open for 2 minutes	Selected valve is fully closed for 2 minutes
3	PMV D		

Self-diagnostic function

Remote controller fault code		Multi controller fault code		Outdoor fault code	
04	No communication signal between Interface PCB and IPDU No communication signal between M/C and O/D No communication signal between I/D and M/C	04	No communication signal between Interface PCB and IPDU No communication signal between M/C and O/D.	No communication signal between Interface PCB and IPDU	
0b	Drain pump fault - I/D unit				
0C	TA sensor fault				
0d	TC sensor fault				
08	Reverse TC temperature change				
09	No TC temperature change				
11	Motor short circuit				
12	Indoor PC board short circuit	8A	Multi Controller PCB error		
b5	External input display fault (Low level refrigerant leak if RBC-RD1-PE fitted)	88	Communication error between indoor unit and Multi Controller		
b6	External interlock display fault (High level refrigerant leak if RBC-RD1-PE fitted)	80	ThA sensor fault	80	ThA sensor fault
		81	ThB sensor fault	81	ThB sensor fault
97	Central management communication short circuit	82	ThC sensor fault	82	ThC sensor fault
98	Central management address set-up fault	83	ThD sensor fault	83	ThD sensor fault
99	No communication I/D to R/C	84	ThX sensor fault	84	ThX sensor fault
		0b	Drain pump fault - M/C unit	0b	Drain pump fault - M/C unit
15	Refer to M/C	89	Indoor units capacity codes too high or set to 0	89	Over capacity
				Er	**[E][r] fault code refers to Outdoor unit**
1C	Refer to O/D	1C	Refer to O/D	08	Four-way valve alarm.
				A0	Discharge temp. sensor (TD1) short circuit
				A1	Discharge temp. sensor (TD2) short circuit
				A2	Suction temp. sensor (TS) short circuit
				A4	External air sensor (THo) short circuit
				A5	Outdoor heat exchanger sensor (TE) short circuit
				A6	Discharge temp. (TD1) protective operation
				A7	Suction temp. (TS) protective operation
				AA	High pressure sensor (Pd) short circuit
				Ad	DOL compressor fault
				AE	Low pressure fault (Ps)
				AF	Outdoor Unit power source phase order miswiring
				1C	Extension IC, EEPROM short circuit
14	Refer to O/D	14	Refer to O/D	14	G-Tr short-circuit protective operation
17	Refer to O/D	17	Refer to O/D	17	Current detection circuit
21	Refer to O/D	21	Refer to O/D	21	High pressure SW circuit
1d	Refer to O/D	1d	Refer to O/D	1d	Compressor error
1F	Refer to O/D	1F	Refer to O/D	1F	Inverter malfunction
d3	Refer to O/D	d3	Refer to O/D	d3	TH sensor circuit - Inverter microprocessor (IPDU)
dA	Refer to O/D	dA	Refer to O/D	dA	Heat sink overheat protective operation (IPDU)

NOTE:

- To retrieve fault codes from the outdoor unit ensure rotary switch SW1 is set to position '2' and SW2 is set to position '0'.
- To retrieve fault codes from the multi controller ensure the display switch is set to position '1'.

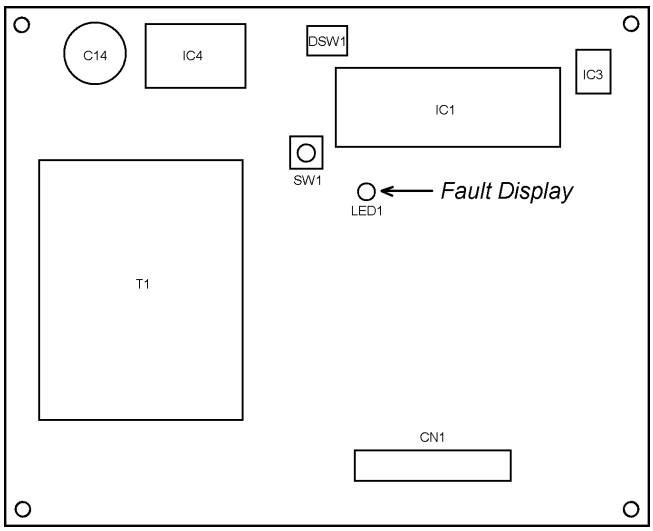
Fault codes

⚠ The dual interface has a LED which is used to display fault codes, see diagram below. This then can be used to trace the system error.

⚠ The table below shows the meaning of the faults which can be displayed. If two or more faults are detected, then only the fault with the highest priority will be displayed.

Fault description	Number of flashes	Priority
Power supply sag ~ temporary voltage drop	1	1
Communication type error ~ DSW1 setup incorrect	2	2
Received error from M/C 1	3	3
Received error from M/C 2	4	4
Received error from outdoor unit	5	5
(None)	6	6
(None)	7	7
Error receiving signal from outdoor unit	8	8

⚠ For full details please refer to the service manual.



Cautions on refrigerant leakage

Check of density limit

The room in which an air conditioning unit is to be installed requires a design such that, should there be a refrigerant leak, the density of the gas will not exceed a set limit.

The refrigerant R407C which is used in the system is safe, without the toxicity or combustibility of ammonia. However, since it is **an asphyxiant** it poses the risk of suffocation if its density should rise excessively.

Suffocation from leakage of R407C is almost non-existent. With the recent increase in the number of high density buildings, however, the installation of multi air conditioner systems is on the increase because of the need for effective use of floor space, individual control, energy conservation by curtailing heat and carrying power, etc. Most importantly, the multi air conditioner system is able to replenish a large amount of refrigerant compared with conventional individual air conditioners.

If a single unit of the multi air conditioner system is to be installed in a small room, select a suitable model and installation procedure so that if the refrigerant accidentally leaks out, its density does not reach the limit - and in the event of an emergency, measures can be taken before injury occurs.

In a room where the density may exceed the limit, create an opening with adjacent rooms, or install mechanical ventilation combined with a gas leak detection device.

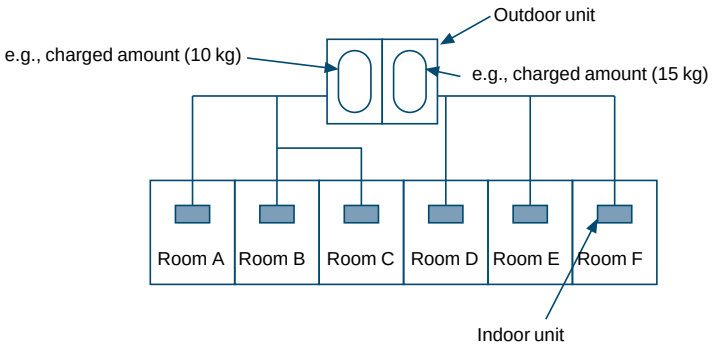
The density is;

$$\frac{\text{Total amount of refrigerant (kg)}}{\text{Min. volume of the indoor unit installed room (m}^3\text{)}}$$

$$\leq \text{density limit (kg/m}^3\text{)}$$

The density limit of R407C which is used in multi air conditioners is 0.15 kg/m^3.

Note 1:
If there are 2 or more refrigerating systems in a single refrigerating device, the amounts of refrigerant should be as charged in each independent device.

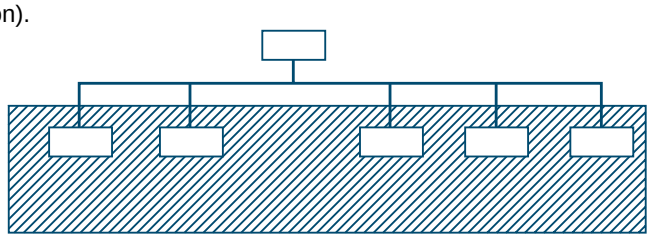


For the amount of charge in this example:
The possible amount of leaked refrigerant gas in rooms A, B and C is 10 kg.
The possible amount of leaked refrigerant gas in rooms D, E and F is 15 kg.

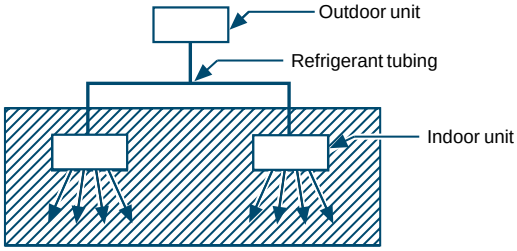
Cautions on refrigerant leakage

Note 2:
The standards for minimum room volume are as follows:

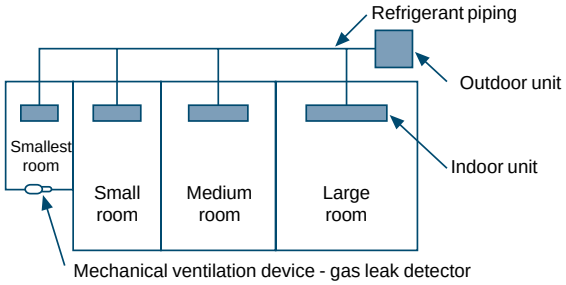
(1) No partition (shaded portion).



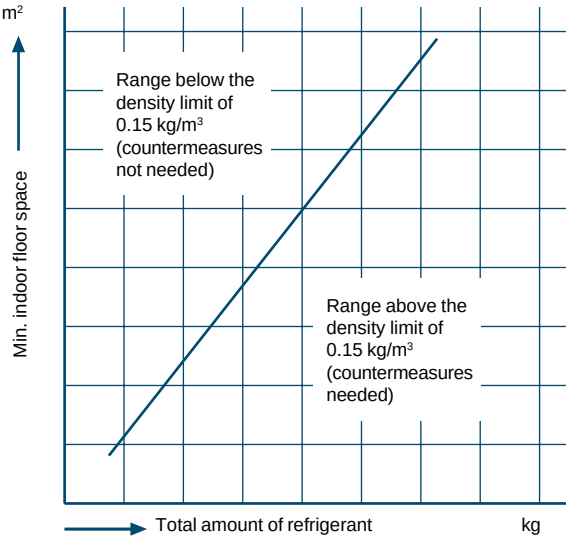
(2) When there is an effective opening with the adjacent room for ventilation of leaking refrigerant gas (i.e. an opening without a door, or an opening 0.15% or larger than the respective floor spaces at the top or bottom of the door).



(3) If an indoor unit is installed in each partitioned room and the refrigerant piping is interconnected, the smallest room becomes the object. But when a mechanical ventilation is installed interlocked with a gas leakage detector in the smallest room where the density limit is exceeded, the volume of the next smallest room becomes the object.



Note 3:
The minimum indoor floor space compared with the amount of refrigerant is roughly as shown (when the ceiling is 2.7 m high):



Environmental

Precaution for refrigerant leakage

⚠ This air conditioning system contains HFC-407C refrigerant gas. We recommend that the installer should compare the total amount of refrigerant contained in the system with the air volume of each of the rooms in which an indoor unit has been installed. This practice is of particular importance when installing a system with a large refrigerant volume. Using these figures, calculate the worst case refrigerant density (using the total refrigerant charge) in the unlikely event of a leak. If the resultant density level exceeds that of the standard, then either a ventilation system or alarm system, or both, must be installed. The above procedure must be completed in accordance with local, national an international standards, codes of practice and statutory requirements.

Product maintenance

⚠ To minimise the chances of environmental damage and to ensure the efficient operation of the unit, it is recommended to have the air conditioner periodically checked and serviced by a qualified engineer.

Product disposal

⚠ Please dispose of the air conditioner unit in an environmentally responsible manner.
Recycling is the preferred disposal method.

⚠ When disposing of an air conditioner system, contact either the manufacturer, your local environmental control authority or a local waste disposal company for advice.

⚠ Ensure all packaging material is either recycled or disposed of in accordance with local regulations.

⚠ The refrigerant gas within the unit should only be removed by an authorised company.

WARNING: Discharge of refrigerant to atmosphere is illegal and may lead to prosecution.

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