HITACHI

Before installation, please read this manual carefully and keep it properly.

INVERTER-DRIVEN MULTI-SPLIT SYSTEM AIR CONDITIONERS

Outdoor Units

Scan this to get a digital copy of the manual

Installation & Maintenance Manual

RAM-280FSPH(D)	RAM-335FSPH(D)

■ This manual makes sure to transfer to the next step of construction, and finally the customer keeps it.
(Transportation and Handling) → (Refrigerant Piping Work) → (Electrical Wiring) → (Test Run) → (Customer)

Important Notice

●The air conditioner for general use. Food, animals and plants, precision machinery and preservation of works of art and other special purpose, please do not use.
●Do not install in the following places. If you have gas and oil droplets exist around, it will cause fires and machine deformation, corrosion, damage.
○Oil (including machine oil) of the droplets, oil gas and more places. ○The sulfur gas and hot springs more places.
●Do not install in the following places, it will cause corrosion.
○Near the sea (in the salty environment). ○An acid or alkaline environment.
●When produce electromagnetic waves used in medical equipment places, please note that the air conditioner to prevent malfunction.
○Do not install the outdoor unit where the electromagnetic wave is directly radiated to the electrical box.
○Do not install the indoor unit, outdoor unit, controller and cable within approximately 3 meters from strong electromagnetic waves such as medical equipment.
●Do not install in the animals or plants will be directly affected by the wind to the place, otherwise have adverse effects on plants and animals.
●Use the wireless remote controller, since they will be affected by the lighting equipment, etc., resulting in the receiver to receive signals failed, therefore as far as possible away from the receiver and the lighting of more than 1m.

Safety Summary

●Before installation, This is a " **Safety Summary** " in the content, be sure to read, for the correct installation.
●In this manual to note that the "⚠Danger" "⚠Caution", when the installation error, it may lead to significant harm, particularly marked. Therefore, an important part of safety, please be sure to actually follow.
●When the installation is complete, and then test run, to confirm whether there is abnormal. Please follow the manual's instructions, using the method, maintenance method for illustration to customers, and the installation manual and operation manual by the customers really to keep.

【Definition for signal words】

⚠ **DANGER**：Immediate hazards which **will** result in severe personal injury or death.

: Enforcement matters；Machine with a ground terminal, the user must follow the instructions for ground work.

: Prohibitions.

: Enforcement matters；Indicating the general behavior (Non-specific object).

About electrical works

⚠ DANGER	●When perform electrical work , please have a qualified personnel. Please note that the construction is not completely by yourself, there will be occurred an electric shock.	❗
	●Perform electrical work according to Installation Manual and all the relevant regulation and standard. If the instructions are not followed, an electrical shock and fire may occur due to insufficient capacity and inadequate performance.	❗
	●The wiring between products, please use the specification wire. Select the wrong wire, it will cause fire or electric shock.	❗
	●Ensure that the wiring terminals are tightened securely with the specified torques. If not, generating fire or electrical shock at the terminal's connection part may occur.	❗
	●Fix the cables securely. External forces on the terminals could lead to a fire.	❗
	●Use an ELB(Earth Leakage Breaker)；In the event of fault, there is danger of an electric shock or a fire if it not used.	❗
	●Due to electrical wiring, inspection work and open the service cover, completely turn off the power to implement in order to avoid electric shock.	❗
	●Check that the ground wire is securely connected. If the unit is not correctly grounded, it leads electrical shock. Do not connect the ground wiring to gas piping, water piping, lighting conductor or ground wiring for telephone.	❗

About installation

⚠ DANGER	●When installation, make sure you follow the installation manual. If the instructions are not followed, it may result in a water leakage, electric shock or a fire.	❗
	●Please install the unit where is able to withstand the weight. Strength, and installation is not complete, the body may fall and cause injury.	❗
	●Please do not place flammable gas and have doubts about the place to the installation, it may cause fires and other accidents.	⃠
	●Do not climb air conditioner, or place objects on top, so as to avoid falling damage.	❗
	●In case of refrigerant leakage occurs, please immediately turn off the fire source (such as: stoves and other appliances), remove the refrigerant on the ground, open the doors and windows to ventilation , and contact your service contractor.	❗
	●The indoor unit drain pipe do not directly into the drainage ditches. The biogas will be produced through the drainpipe into the indoor, resulting in poisoned phenomenon.	❗

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	●Use the adequate non-flammable refrigerant(R410A) to the outdoor unit in refrigerant cycle. Do not charge Oxygen, acetylene or other flammable and poisonous gases. These types of gases are extremely dangerous can cause an explosion and fire.

⚠ Caution	●Condensation water drain pipe, please make sure that it can be drained. Incorrect piping may cause water to enter the house or wet furniture.
	●Please tighten the flare nut with specification torque. If the torque too much, it will result in flare nut cracking, and make the refrigerant leakage phenomenon.
	●During the field decoration construction, prohibition of the unit operation, and prepare the unit to prevent dust and defacement.
	●Before the unit operation, please make sure is the field cleaned finish? Objects floating in the air, has the smell cleared? Has the unit been cleaned? To prevent future the unit is not cold or water leakage.

1. Common Items

1.1 Combination of Indoor Unit and Outdoor Unit

Please refer to the table, the selection of outdoor unit and indoor unit number and capacity.

Outdoor Unit Model	Indoor Unit	
	Combination Capacity of Ratio (For Outdoor Unit)	Combination Quantity
RAM-280FSPH(D)	50~130%	14
RAM-335FPSH(D)		

●For the system which all indoor units are operated simultaneously, the total indoor unit capacity should be less or equal to the outdoor unit capacity.

●For the system which all indoor units are not operated simultaneously, the total indoor unit capacity is available up to maximum against the outdoor unit capacity.

1.2 Operation temperature range

Condition / Item	Air inlet temperature of outdoor unit	Air inlet temperature of indoor unit (non-room temperature)
Cooling	-5℃ DB ~ 43℃ DB	21℃ DB/15℃ WB ~ 32℃ DB/23℃ WB

DB: Dry Bulb WB: Wet Bulb

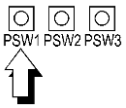
1.3 Cooling operating instructions

The same refrigerant system of indoor unit, the cooling shall be operated.

1.4 Note

This system can not operate within 4 hours of powered, stop reason code will be displayed "d1-22",
If you want to operate in 4 hours, please follow the steps to release the protection settings:

1) Please power ON indoor and outdoor unit.
2) Wait 30 seconds.
3) Press the outdoor unit's arrangement of PSW1 above 3 seconds.

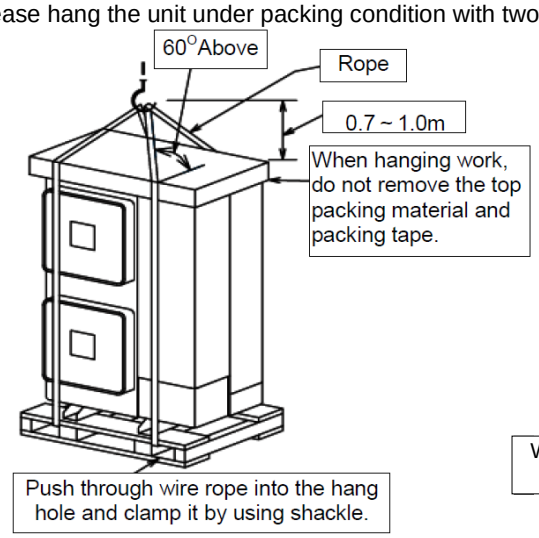


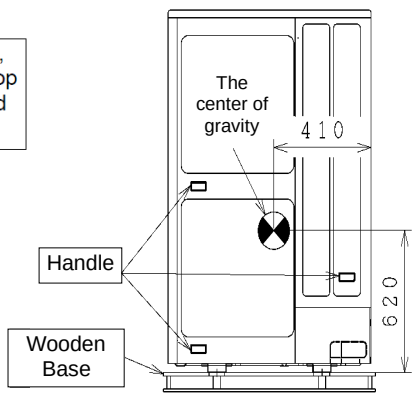
2. Transportation and Handling

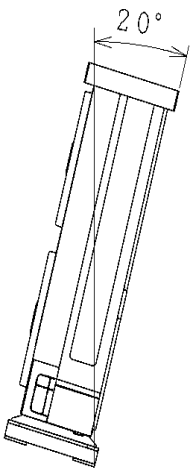
2.1 When transporting the outdoor unit, please observe the following items, please state as much as possible to keep the packaging moved to the location of installation.

●The hanging method under packing situation:

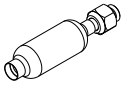
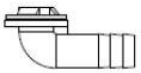
Please hang the unit under packing condition with two ropes.







2.2 The following is accessory parts of the outdoor unit. Please confirm it before installation.

Accessory	Q'ty	Use Place	Use Method
Pipe Combination 	1	Use to connect gas piping.	Please refer the piping work on page 9.
突起 Drain Connector 	1	Base condensation water exhaust.	Please refer the foundation work on page 9.
Washer 	1		

3. Before Installation

3.1 The R410A refrigerant pressure higher than R22 about 1.4 times, it is more susceptible to moisture, acid materials, oil and other impurities influence. Because of the new refrigerant, refrigerant oil also will be changed. Therefore, when installation, be careful not to water, impurities, the existing use of the refrigerant and refrigeration oil mixed in the cycle system.

The product of the design pressure is 4.15MpaG.

3.2 To avoid accidental mixing of different refrigerant or different refrigerant oil, the sizes of the charging connections have to be changed. It necessary to prepare the following special R410A tools before performing the installation work.

The measuring machine or tool which will contact the refrigerant, please use specially for the new refrigerant.

Symbol Description：○：for new and old type refrigerant ■：only for R410A (not for R22)

●：only for R407C (not for R22) ※：for two type R410A and R407C.

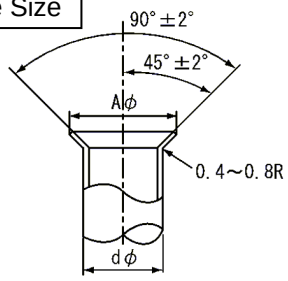
Measuring Instrument and Tool		Interchangeability with R22		Reason of Non-Interchangeability and Attention (Only for new refrigerant) (◎Strictly Required)	Use
		R407C	R410A		
Refrigerant Pipe	Pipe Cutter	○	○		Cutting Pipe；Removing Burrs
	Flaring Tool	○	○■	·To ensure the high pressure of R410A, if using flaring tube, make the dimension of tube larger for R410A. If you continue to use existent products, shall be used with the flaring tube adjustment gasket (1mm). Using the 1/2H pipe situation, can not be processed. (R410A special flaring tool can be used directly in the R407C)	Flaring for Tubes
	Extrusion Adjustment Gauge	—(Not use)	■		Dimensional Control for Extrusion Portion of Tube after Flaring
	Pipe Bender	○	○	·Using the 1/2H pipe situation, can not be processed. Please use the elbow welding connection.	Bending
	Expanding Tool	○	○	·Using the 1/2H pipe situation, can not be processed. Please use the elbow welding connection.	Expanding Tubes
	Torque Wrench	○	■	·R410A forΦ12.7、Φ15.88;spanner size is up 2mm; existent products can not be used.	Connection of Flare Nut
			○	·For Φ6.35、Φ9.53、Φ19.05; spanner size is the same.	
	Brazing Tool	○	○	·Perform correct brazing work.	Brazing for Tubes
	Nitrogen Gas	○	○	·Strict control against contamination. (Blow nitrogen during brazing)	Prevention from Oxidation during Brazing
	Lubrication Oil (for Flare Surface)	●	■	·Do not use R22 with mineral oil, and products must be used the same synthetic oil. ·Synthetic oil absorbs moisture quickly, Therefore, to avoid damp places.	Applying Oil to the Flared Surface

Measuring Instrument and Tool		Interchangeability with R22		Reason of Non-Interchangeability and Attention (Only for new refrigerant) (◎Strictly Required)	Use
		R407C	R410A		
Vacuum Drying Refrigerant Change	Refrigerant Cylinder	●(Brown)	■(Pink)	·Check refrigerant cylinder color. ◎〈 Filled with the gas refrigerant is strictly prohibited 〉 Liquid refrigerant charging is required regarding Non-azeotropic refrigerant.	Refrigerant Charging
	Vacuum Pump	○	○	◎The current ones are applicable. However, it is required to mount a vacuum pump adapter which can **prevent from reverse flow** when a vacuum pump stops, resulting in no reverse oil flow.	Vacuum Pumping
	Adapter for Vacuum Pump (Prevent from reverse)	※●	■		

Vacuum Drying Refrigerant Change	Manifold Valve	●	■	·No interchangeability is available due to higher pressure when compared with R22. (R410A connection diameter：1/2 UNF R407C connection diameter：7/16 UNF) ◎< **Do not use current ones (R22) to the different refrigerant** >; If used, mineral oil will flow into the cycle and cause sludge, resulting in clogging or compressor failure.	Vacuum Pumping; Vacuum Holding. Refrigerant Charging and Check of Pressures
	Charging Hose	●	■		
	Charging Cylinder	Prohibited		·Please use the weight scale.	Refrigerant Charging
	Weight Scale	○	○		Measuring Instrument for Refrigerant Charging
	Refrigerant Gas Leakage Detector	※●	■	·The current gas leakage detector(R22) is not applicable due to different detecting method.	Gas Leakage Check

3.3 The piping and connection parts, use the following R410A. Flare nut and the front part of pipe flare size also changes, according to the following specifications used.

Pipe Flare Size



Unit：mm

Piping Diameter dØ	Dimension A $^{+0}_{-0.4}$	
	R407C、R22	R410A
6.35	9.0	9.1
9.53	13.0	13.2
12.7	16.2	16.6
15.88	19.4	19.7
19.05	23.3	**※Can not be processed** (1/2H material)

※Please use the attached flare connecting pipe.

●Pipe thickness selected

With the design pressure changes, the pipe thickness and material should also be changed.

New Refrigerant Piping Thickness (mm)

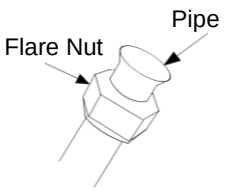
Pipe Size	Existent Type		New Refrigerant			
	R22		R407C		R410A	
	Thickness	Material	Thickness	Material	Thickness	Material
Φ6.35	0.6	O	0.8	O	0.8	O
Φ9.53	0.8	O	0.8	O	0.8	O
Φ12.7	0.8	O	0.8	O	0.8	O
Φ15.88	1.0	O	1.0	O	1.0	O
Φ19.05	1.0	O	1.0	O	1.0	1/2H
Φ22.2	1.2	O	1.15	O	1.0	1/2H
Φ25.4	1.2	O	1.0	1/2H	1.0	1/2H
Φ28.6	1.4	O	1.0	1/2H	1.0	1/2H

●Department of the connection selected

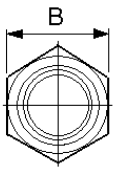
With the design pressure changes, the connection pipe (elbow etc.) thickness are also part the changes. When use 1/2H material, the bending and flaring can not be processed, so please follow the rules below the minimum thickness choose the appropriate connecting pipe. Please note that the size of flare nut is also part change.

Connection minimum thickness (mm)

Pipe Size	R407C、R22	R410A	Pipe Size	R407C、R22	R410A
Φ6.35	0.5	0.5	Φ22.2	0.9	0.9
Φ9.53	0.6	0.6	Φ25.4	0.95	0.95
Φ12.7	0.7	0.7	Φ28.6	1.0	1.0
Φ15.88	0.8	0.8	Φ31.75	1.05	1.1
Φ19.05	0.8	0.8	Φ38.1	1.25	1.35



Pipe Size	Flare Nut Size B(mm)		Pipe Size	Flare Nut Size B(mm)	
	R407C、R22	R410A		R407C、R22	R410A
Φ6.35	17	17	Φ15.88	27	29
Φ9.53	22	22	Φ19.05	36	36
Φ12.7	24	26			



4. Installation Work

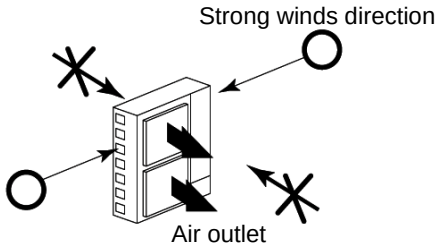
4.1 Outdoor unit installation place selected (common items)

1) Make sure the outdoor unit installation space, convenient to the normal operation and maintenance services.
2) Install the outdoor unit where good ventilation is available, and where it is dry.
3) Install the outdoor unit where it is in the shade, or it will not be exposed to direct sunshine or direct radiation from high temperature heat.
4) Install the outdoor unit where the sound from the outdoor unit does not affect neighbors.
5) Unit air outlet does not directly flow to the plant or neighbor's windows.
6) Provide a foundation so that the entire feet of the outdoor unit can be mounted on the foundation.
7) The place where the heat exchanger will not inhale the dust and paper scraps.
8) Installed as far as possible where is without reverse wind (the wind blowing directly against the fan).
   Installed on the roof and no buildings surrounding, and there may be strong winds blowing directly against the unit.
   Please note that strong winds do not blowing directly against the air outlet grille of the unit.
9) Can not be setting inside the house.
10) Do not place flammable objects near the unit, it may cause fires.
11) Do not install the outdoor unit where there is a high level of oil mist, salty air or harmful gases such as sulphur.
12) Do not install the outdoor unit where the electromagnetic wave is directly radiated to the electrical box.
13) Install the outdoor unit as far as at least 3 meters from the electromagnetic wave radiator.

Strong wind blowing directly against the product installation method

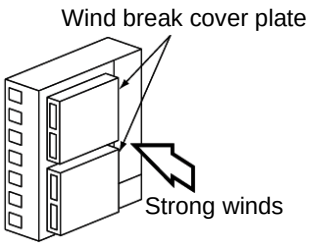
Installed on the roof and no buildings surrounding, and there may be strong winds blowing directly against the unit. Please follow the instructions below:

● Please note that strong winds do not blowing directly against the air outlet grille of the unit.
When strong winds blowing directly against the air outlet grille of the unit, making the necessary air flow can not ensure that the body will result in failure.

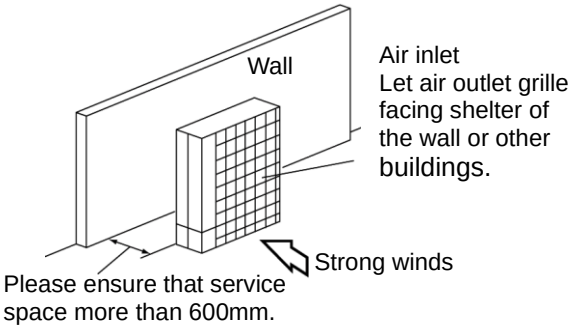


● When strong winds blowing directly against the air outlet grille.

(1) Option the wind break cover plate.



(2) When have a shelter of the wall

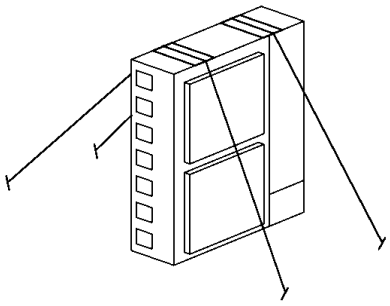


Note：The air outlet of outdoor unit suffered strong winds bluster continually, the fan speed may be due to high speed reversed and damage.

Option The Wind Break Cover Plate Type：

Type	Q'ty
WSP-335A	2

● When on the roof or open space, the strong winds will bluster the unit. Please make steel wire cable and others fixed the unit.

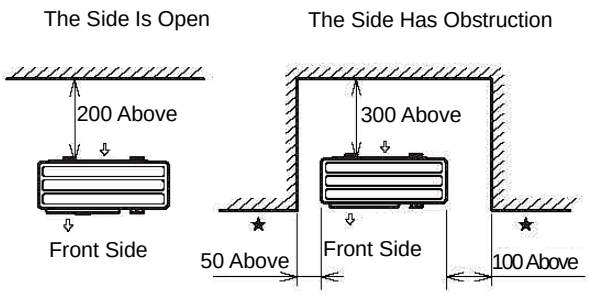


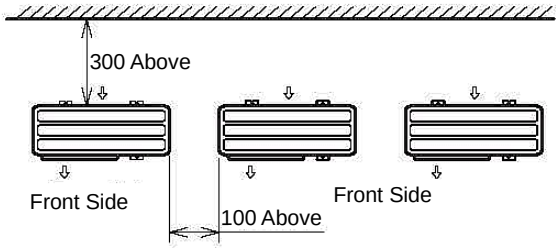
4.2 Installation Space

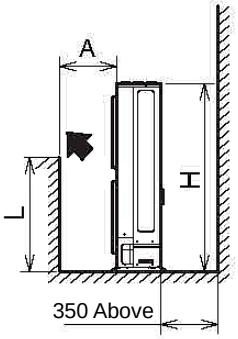
Around the outdoor unit must ensure the maintenance of space as shown below.

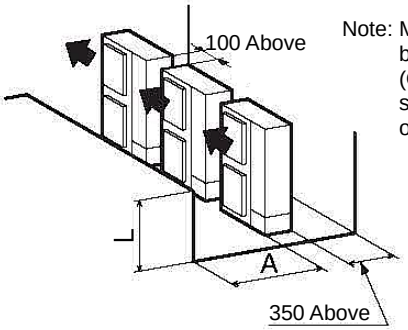
1) Obstruction in the air inlet side

(a) When the above open (Unit: mm)

<table>
<tr><th>A separate installation</th><th>A row installation (two more)</th></tr>
<tr><td>


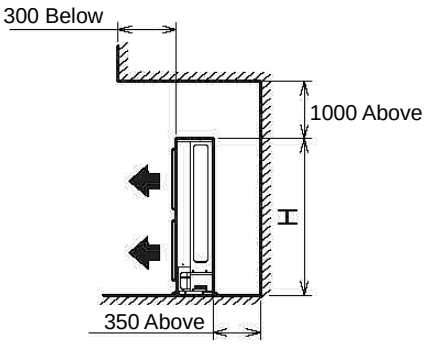
★With the unit front side same direction.
</td><td>


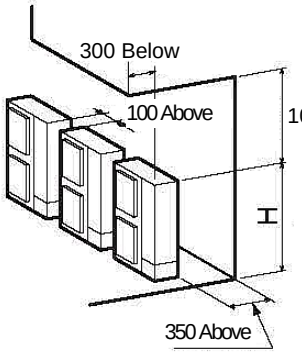
Note: Must be opened on both sides.
</td></tr>
<tr><td>


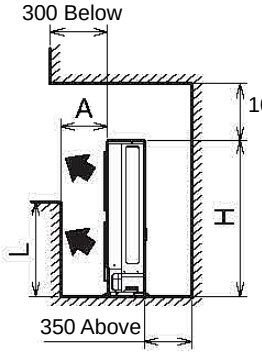
Note: Must install the wind break cover plate (Option), and both sides must be opened.
</td><td>


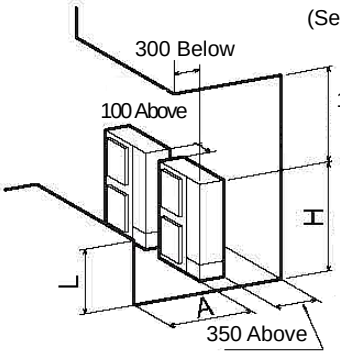
Note: Must install the wind break cover plate (Option), and both sides must be opened.
</td></tr>
</table>

(b) When obstruction at the top. (Unit: mm)

<table>
<tr><th>A separate installation</th><th>A row installation (two more)</th></tr>
<tr><td>


</td><td>


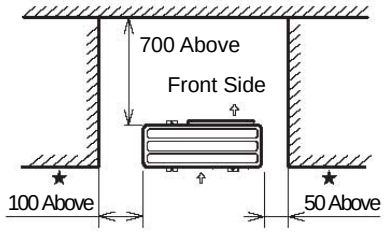
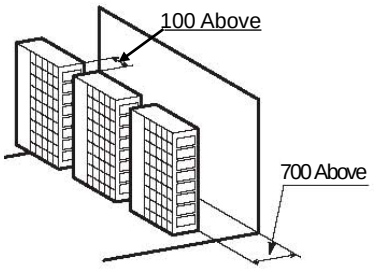
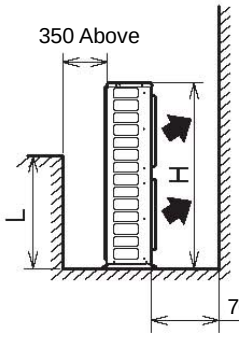
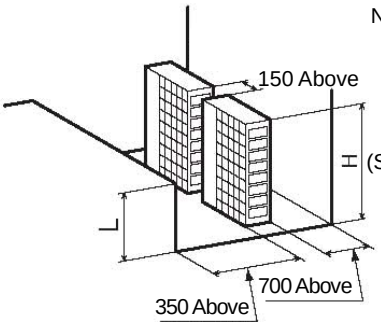
Note: both sides must be opened.
</td></tr>
<tr><td>


Note: Must install the wind break cover plate (Option), and both sides must be opened.
</td><td>
(Setting two sets situation)


Note: Must install the wind break cover plate (Option), and both sides must be opened.
</td></tr>
</table>

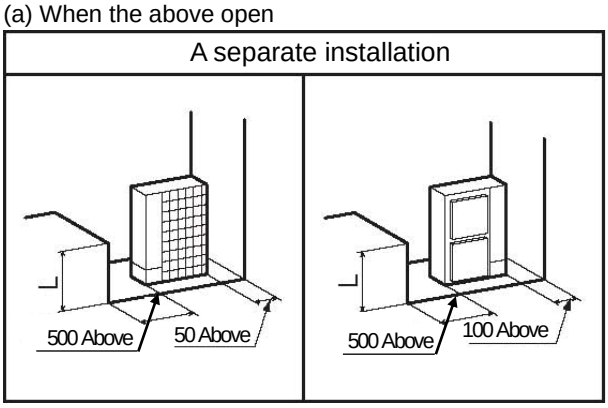
2) Obstruction in the air outlet side

(a) When the above open (Unit: mm)

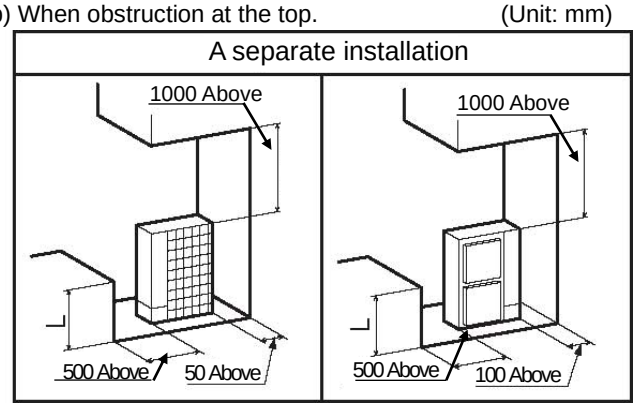
A separate installation	A row installation (two more)
 ★With the unit rear side same direction. Note: Must install the wind break cover plate (Option), and both sides must one side be opened at least.	
 Note: Must install the wind break cover plate (Option), and both sides must be opened.	 Note: Must install the wind break cover plate (Option), and both sides must be opened. (Setting two sets situation)

3) Obstruction at both sides

(a) When the above open



(b) When obstruction at the top. (Unit: mm)

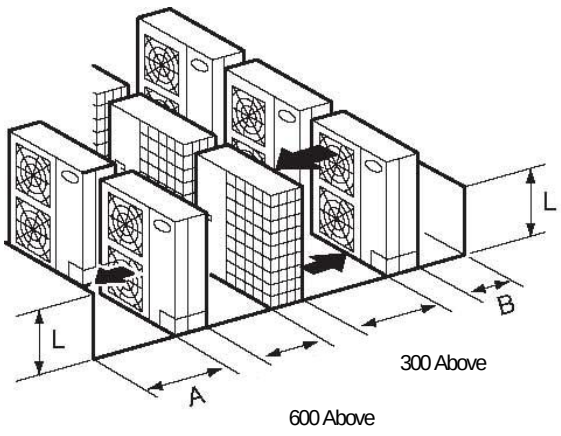


Note: (Unit: mm)

L	A
0 < L ≦ 1/2H	600 Above
1/2H < L ≦ H	1400 Above

When L > H, please set the metal framework under the outdoor unit which will make H≧L, in order to prevent the unit blowing air bypass, and set the metal framework sealed.

4) Multiple rows side by side installation (roof, etc.)



Even if the right and left sides open, the outdoor unit must be spaced more than 100mm.

A、B size please refer to the table：

(Unit: mm)

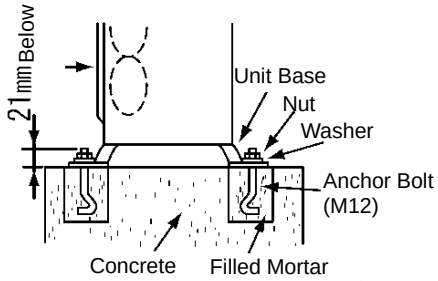
L	A	B
0 < L ≦ 1/2H	600 Above	300 Above
1/2H < L ≦ H	1400 Above	350 Above

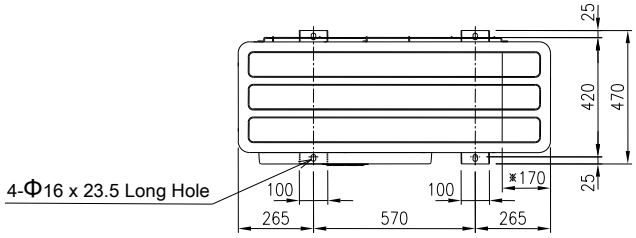
(Note)

When L > H, please set the metal framework under the outdoor unit which will make H > L, in order to prevent the unit blowing air bypass, and set the metal framework sealed.

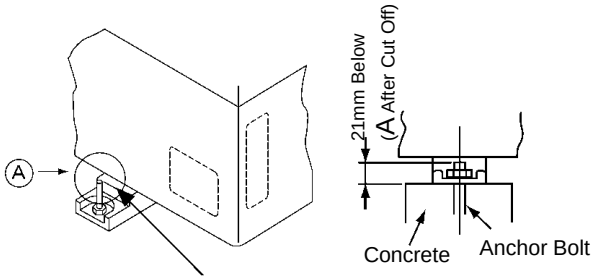
4.3 Foundation Work

1) Anchor bolts installation, lock method and fixed examples.



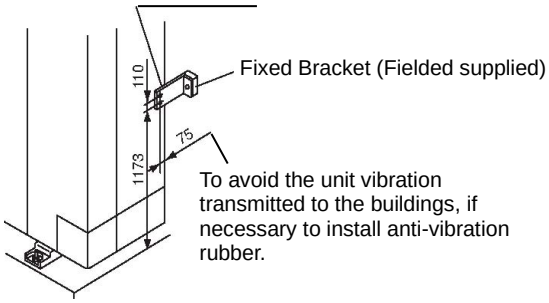


If ensure ※ 170 dimension, and without interference with foundation base, it can be downward the piping work.



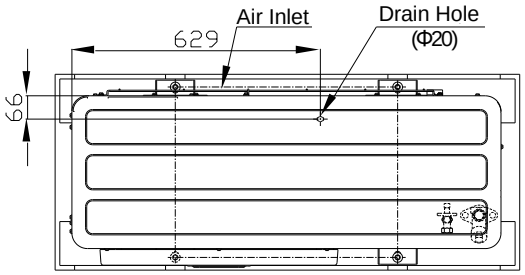
Using this type of Anchor Bolts, be sure to cut off the Ⓐ .
(Due to remove the pipe cover difficulty)

2) To avoid dumping the body resulting noise, or due to gusts and earthquakes caused by inclination. So be sure to make the outdoor units foundation work is really.



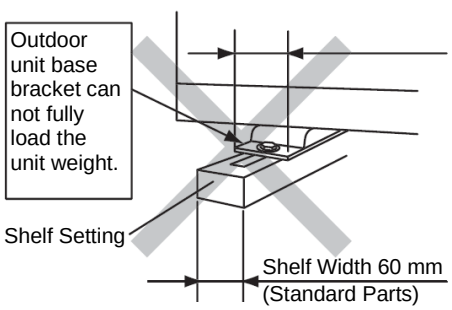
3) Confirm the drainage smooth flow

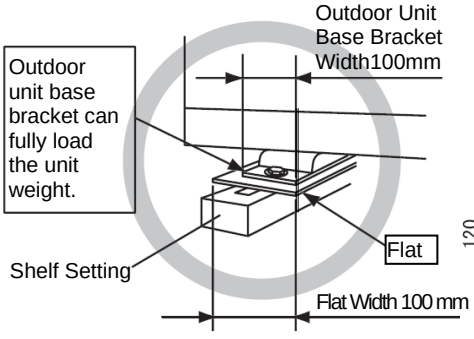
When Defrost operation, the condensation water will be discharged, select the best drainage of areas, the water discharge to drainage ditch. The drain hole position shown at right:



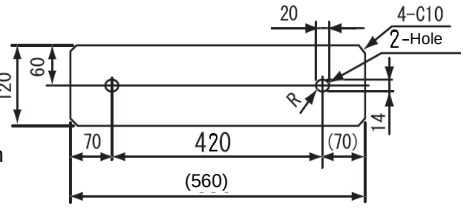
(Unit: mm)

4) Setting shelf use standard parts, when the standard parts width narrower than outdoor unit base bracket, please follow the figure below：between the standard parts shelf and outdoor unit base bracket feet, into the wider flat to withstand full weight of the outdoor unit.





Flat recommended Size：SPHC
(Fielded supplied)
Unit：mm
Flat Thickness：4.5mm



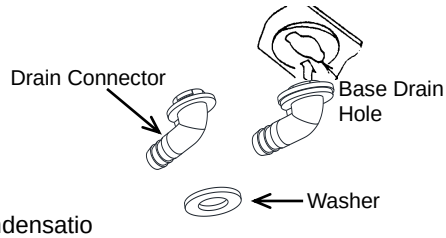
5) The drain connector installation methods:

1. Setting the washer on the drain connector convex (around) upper part.
2. Meet the base drain holes shape, the drain connector turns right about 40 ° and into the base.

3 The drain connector is equivalent to VP16.

4 The drainpipe is field supplied.

Note：The drain connector which is installed for defrosting or reservoir condensatio water to discharge.



5. Refrigerant Piping Work

5.1 Refrigerant Pipe

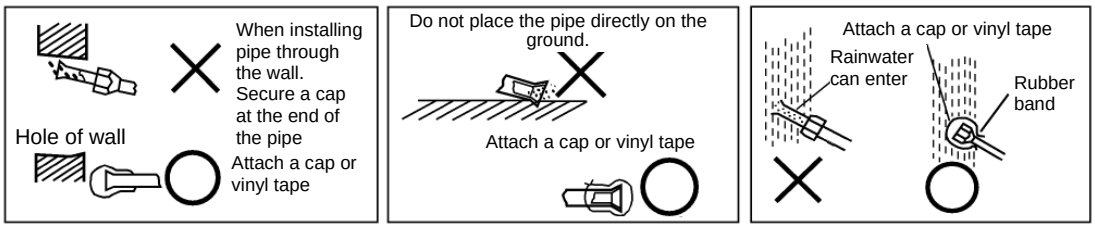
1) Refrigerant pipe selection

1.1 Please prepare the refrigerant pipe by field supplied.

1.2 Select clean copper pipes. Make sure there is no dust and moisture inside of the pipes.

● Cut off the refrigerant piping, use the pipe cutter. Blow the inside of the pipes with nitrogen or dry air, to remove any dust or foreign materials before connecting pipes. (Avoid using a saw or grinding stone tools so easy to produce powder.)

● Cautions for refrigerant piping work (for example)

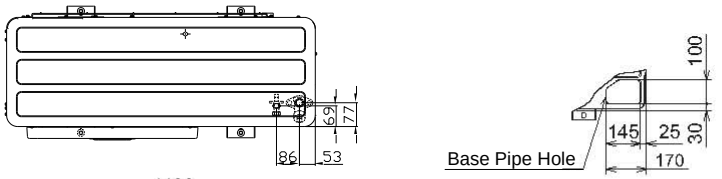


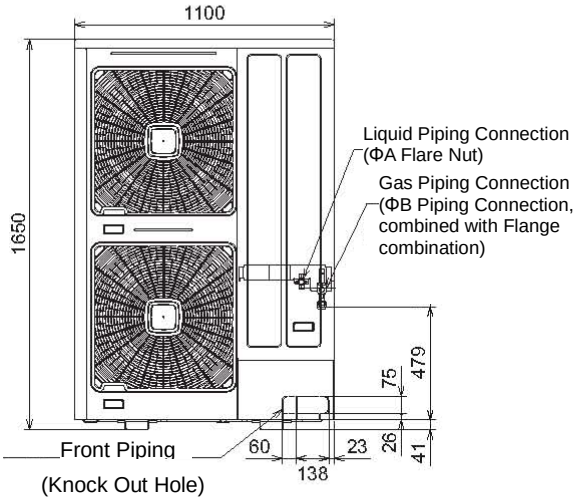
2) Piping Direction：

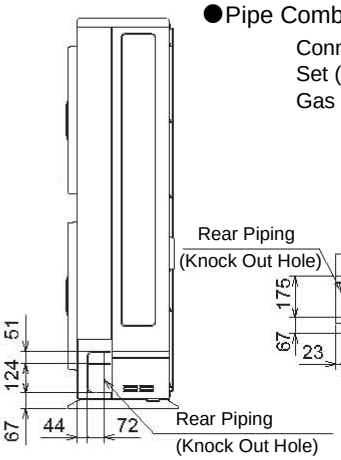
The pipe can be connected in four directions.

Size	ΦA	ΦB
RAM-280FSPH(D)	12.7	28.6
RAM-335FSPH(D)	12.7	28.6

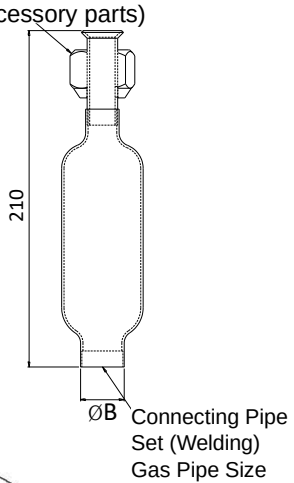
(Unit: mm)

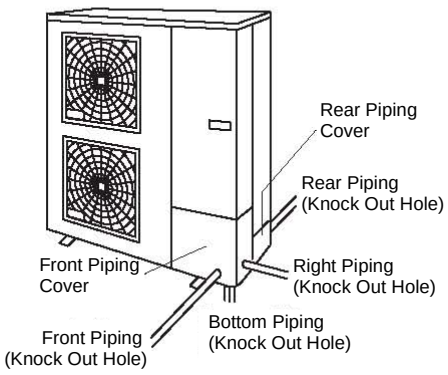


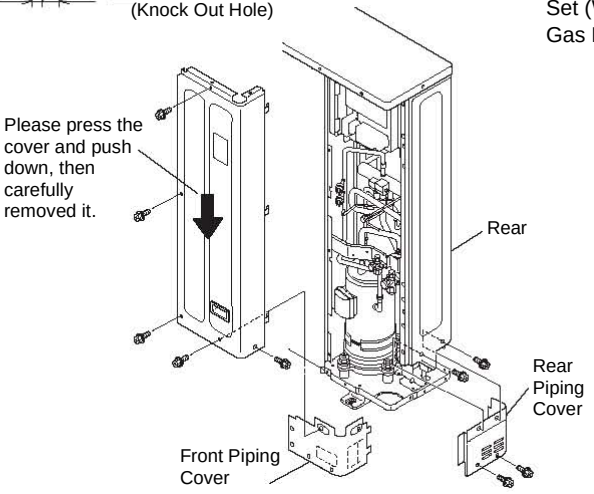




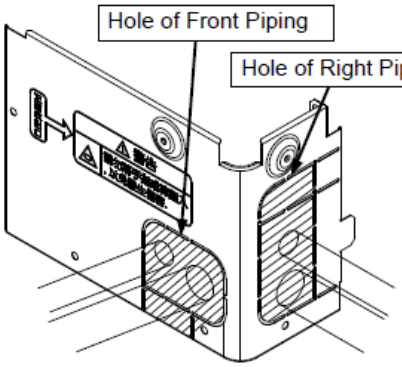
●Pipe Combination (accessory parts)



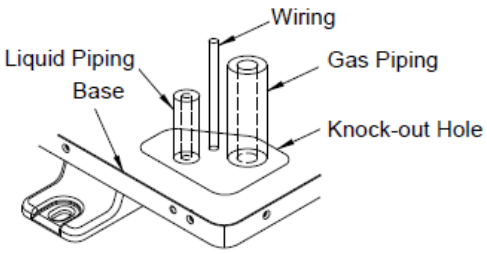




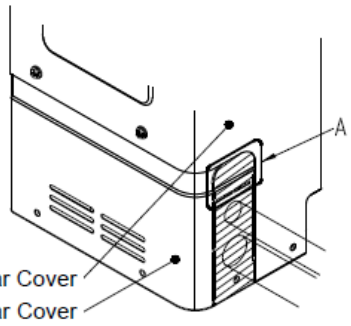
● Front and right piping removing ways.



● Under piping removing ways.
Do not touch the wiring during the construction of piping.



● Rear piping removing ways.
Please remove the rear piping cover under the back cover of the unit, then remove the following figure ▨ of knock-out hole.



2.1 If using rubber plugs and wires tubes, make sure the size of the gap refer to earlier, and then remove the ▨ of knock-out hole.

2.2 When removing the front piping and right piping, in order to ensure the wiring removing space. Please pay more attention when installation.

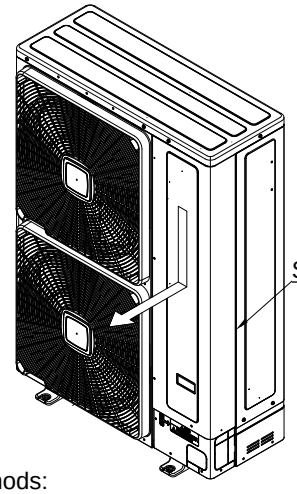
Example：When removing the rear piping and the right wiring, please make the gap of the upper (A division) remove part of piping. In the unit's internal piping and wiring, do not interfere with each other.

2.3 Connection piping bending, use the pipe bender.

2.4 In order to metal plate's burrs, does not hurt to wiring and piping. Please use the insulation material (Field-supplied materials) to protect them.

Open the service cover essentials：

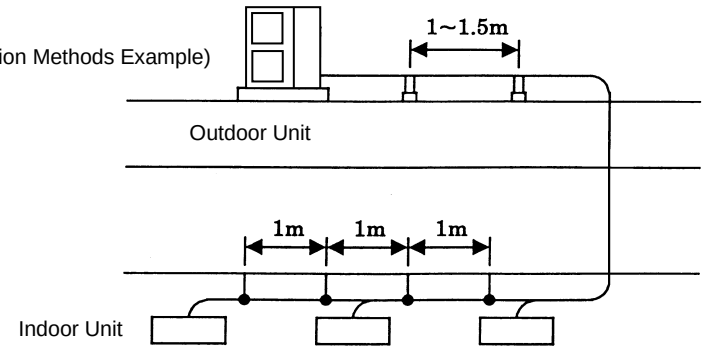
1 Please remove the left screw, and press cover by your hand, then remove the screw.
2 Please press the cover and push down, then carefully removed it.



3) Refrigerant piping fixation methods:

Connect the indoor unit and the outdoor unit with field-supplied refrigerant piping. Suspend the refrigerant piping at certain points and prevent the refrigerant piping from touching the weak part of the building such as wall, ceiling, etc. (If touched, abnormal sound may occur due to the vibration of the piping. Pay special attention in case of short piping length.)

(Fixation Methods Example)



Piping fixation Interval

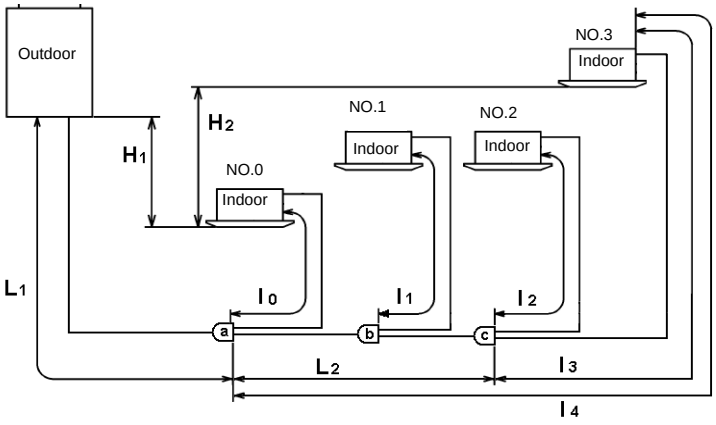
Pipe Size	20Less	25~40
Maximum Interval	1.0m	1.5m

4) Refrigerant piping limitation and multi-kit pipe:

Because the longer pipe, can cause air conditioner cooling and heating reduced capacity, so this factor to be considered for selected piping specifications.

Piping Connection Example：

These figures show examples of 4 indoor units combined with one outdoor unit.
The refrigerant pipes are shown as single line in the diagrams.
However, liquid line piping and gas line piping are required in the field piping work.

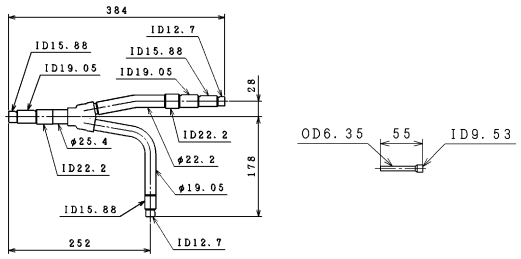
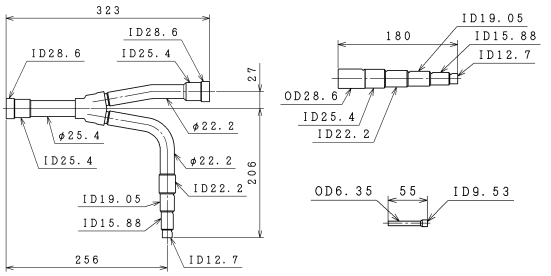
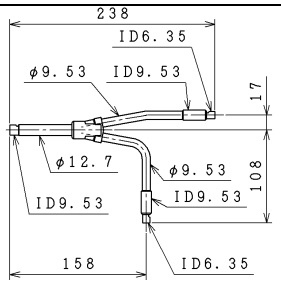
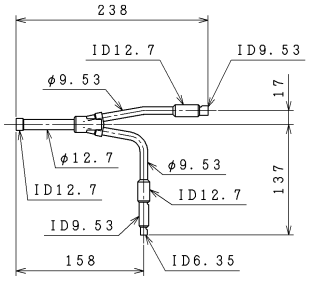


Maximum Piping Length	Actual Length	$L_1 + L_2 + l_3$：150m Below		
	Equivalent Length	L1 + L2 + l 3：190m Below		
	The Total Length	L1 + L2 + l0 + l1 + l2 + l 3：300m Below		
Maximum Lift between Outdoor Unit and Indoor Unit	The outdoor unit is higher than that of indoor unit.	H 1：50m Below		
	The outdoor unit is lower than that of indoor unit.	H 1：40m Below		
	Between each indoor unit	H 2：15m Below		
Maximum Piping Length	Between Each Multi-Kit and Each Indoor Unit	l 0、l 1、l 2、l 3：15m Below		
	Between Multi-kit "a" And the Farthest Indoor Unit	l 4：40m Below		
Multi-kit And Connection Pipe	The First Multi-Kit Pipe (a) And L1 Connection Pipe	Outdoor Unit Model	Gas/Liquid Pipe Size (Φ mm)	Multi-Kit Pipe Type
		RAM-280FSPH(D)	28.6 / 12.7	E-NP452S
		RAM-335FPS(D)	28.6/12.7	
	Others Multi-kit Pipe And Connection Pipe	Indoor Unit Total Capacity (kW)	Gas/Liquid Pipe Size (Φ mm)	Multi-Kit Pipe Type
		27≤	28.6/12.7	E-NP452S
		23~26.99	25.4/9.53	
		15~22.99	22.2/9.53	E-NP282S E-N55HT ※1
		′15	19.05/9.53	

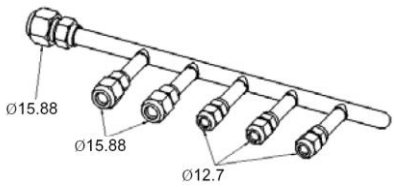
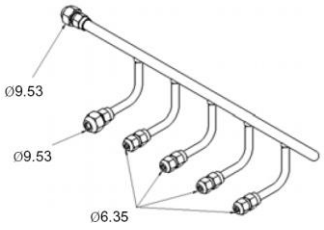
※1: E-N55HT (Header Branch), It can be used that each indoor unit distribution and connection.

●Multi-kit pipe please follow the requirement, remove the no used pipe, other pipes will be welded into the multi-kit pipe, otherwise it will result in reducing cooling capacity.

Line Branch Pipe

Type	E-NP282S	E-NP452S
Gas Piping		
Liquid Piping		

Header Branch Pipe

Type	E-N55HT
Gas Piping	
Liquid Piping	

5)Setting of the multi-kit pipe：

The multi-kit pipe which is connected to the indoor unit, **be sure to use an optional part of the multi-kit pipe set**, in order to prevent the uneven distribution of the refrigerant and causing the unit's capacity reduction. Do not connect using the connector.

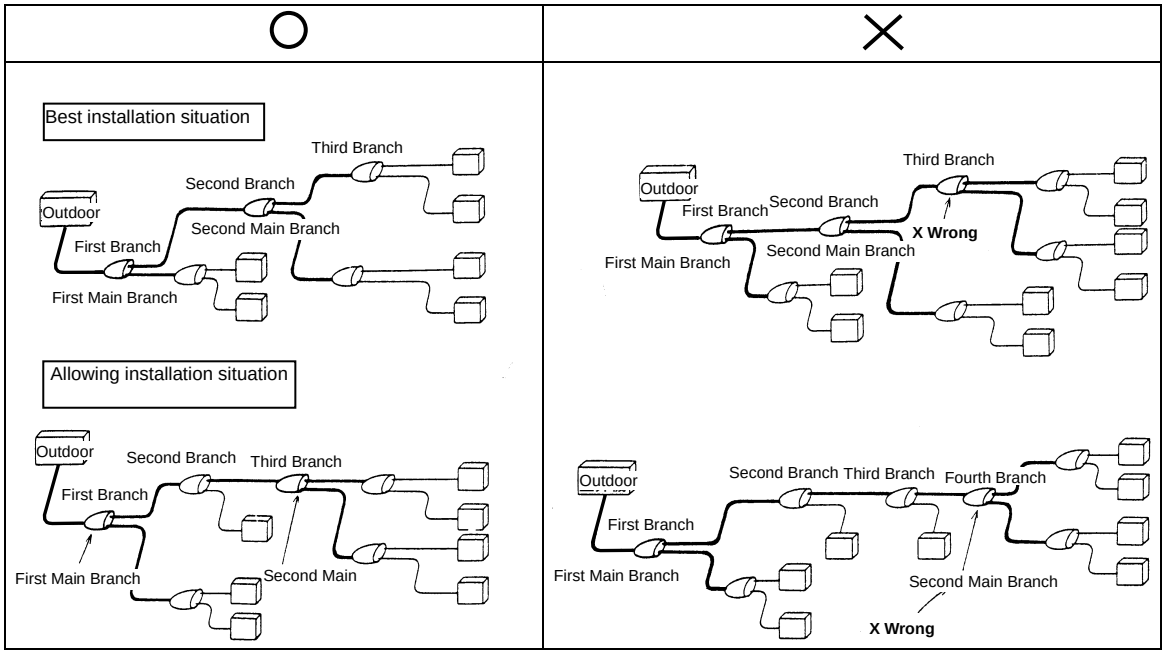
1) Line branch (use the line branch pipe), As shown below：

·〝——〞：Main pipe (The pipe between each multi-kit pipe or the pipe between outdoor units to first multi-kit pipe.)

·**Main Branch**：The multi-kit pipe has two multi-kit pipes which connect with more than one indoor unit.

·**Setting Condition**：Limited to third branch pipe, but only two main branches.

● Setting ways of branch pipe:

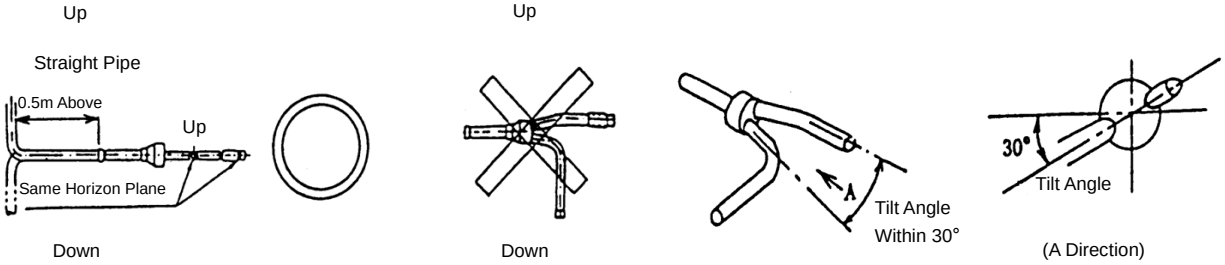


● The line branch pipe fixed limits：

Horizontal

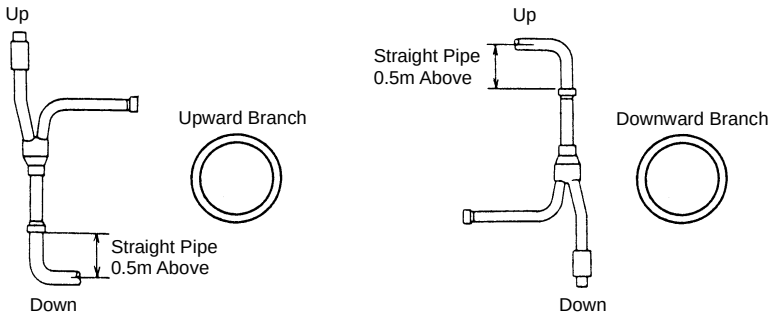
·The branch pipe must be set in the same plane.

·Outdoor unit connection pipe shall ensure that the straight pipe above 0.5m.

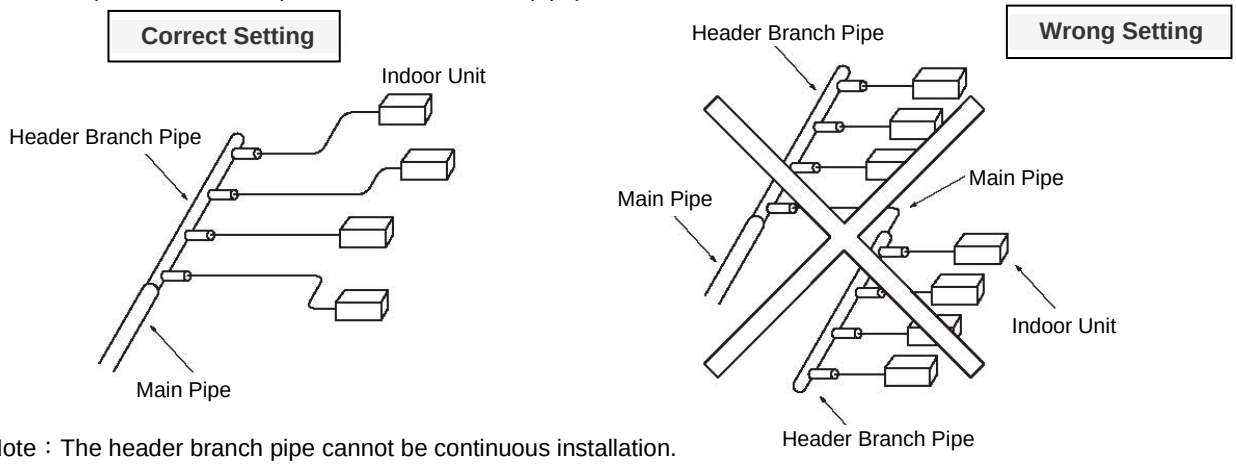


Vertical

·It is divided into two kinds which is up and down.



2) Header branch (use the header branch pipe), As shown below：

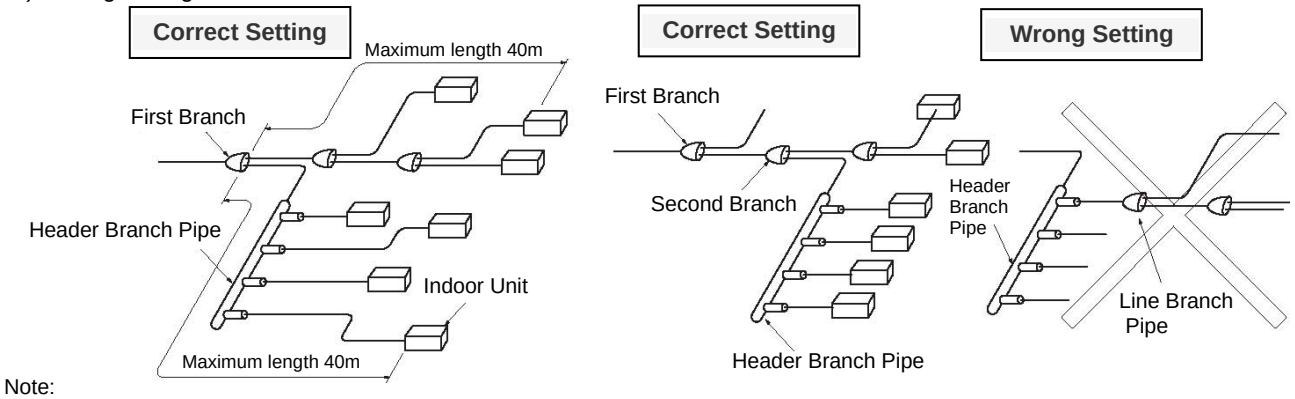


Note：The header branch pipe cannot be continuous installation.

●The header branch pipe fixed limits：

The header branch pipe must be installed horizontally.

3) Mixing setting of line branch and header branch, as shown below：



Note:

1.The line branch pipe can not be connected after the header branch pipe.

2.The first branch pipe can not use the header branch pipe.

5.2 Refrigerant Piping Work

1) Confirm that the stop valves of outdoor unit are closed.

2) Please connect the piping between indoor and outdoor unit. When tightening the joints of piping, in the inside and outside of flare piping, please coated with a layer of refrigerant oil [Field-supplied (Idemitsu Kosan Co., Ltd. Synthetic oil" FVC68D")], and in accordance with the provisions of tightening torque with double spanner to tighten. After tightening, please confirm the gas leakage once more. During brazing, please blowing nitrogen into the piping. Please connect the pipe which use the attached flange combination, while use the attached washer to replace the original washer.

3) Connect the indoor unit and the outdoor unit with field-supplied refrigerant piping. Suspend the refrigerant piping at certain points and prevent the refrigerant piping from touching the weak part of the building such as wall, ceiling, etc. (If touched, abnormal sound may occur due to the vibration of the piping. Pay special attention in case of short piping length.)

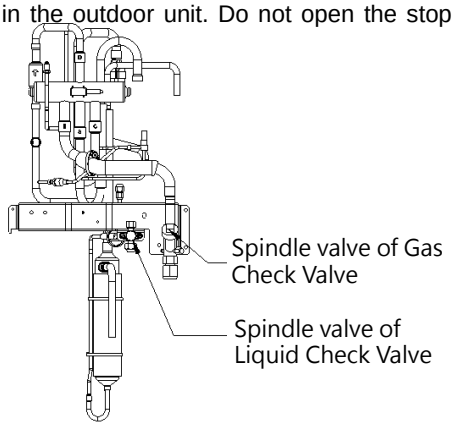
4) Please perform the air-tight test. Connect the gauge manifold using charging hoses with a vacuum pump or a nitrogen cylinder to the check joints of the liquid line and the gas line stop valves. Perform the air-tight test. Connect a manifold gauge to the check joints of the liquid and gas stop valves in the outdoor unit. Do not open the stop valves. Apply nitrogen gas pressure of 4.15MPaG.

Required Torque：

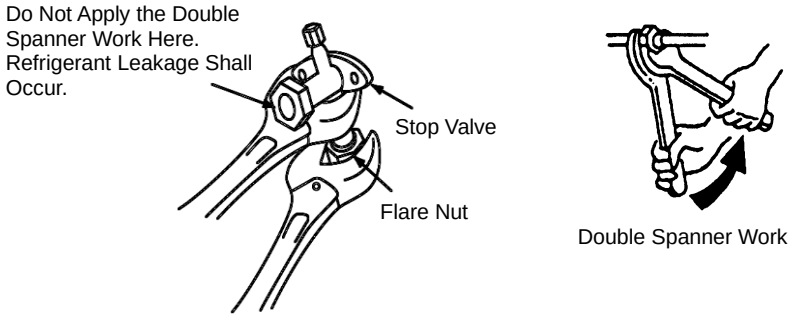
Piping Size (mm) and Flare Nut	Tightening Torque N · m
Φ6.35(1/4")	20
Φ9.53(3/8")	40
Φ12.7(1/2")	60
Φ15.88(5/8")	80
Φ19.05(3/4")	100

Spindle Valve Torque N · m	
Gas	Liquid
20~25	7~9

Hexagonal Wrench	
Gas	Liquid
10mm	5mm



(1) After connection piping and before implementation the airtight test, please remove the liquid and gas stop valve caps, the spindle valve ensures that be closed with tightening torque N · m. Tightening the flare nut do not use more than the torque marking on the table, too large torque will result in the spindle valve leakage.



(2) After locking work is completed, please implement air leakage test.

※Note：1. The work that after use the flare nut to connect pipe and stop valve, will be effective.

2. Because check joints and flare nut can not connect, so please use the charging hoses. The spindle valve cap of stop valve is removed, due to internal O-ring and thread will be opened, the voices caused by gas emitting, which has nothing to do with the leakage.

3. Do not apply an abnormal big force to the spindle valve at the complete opening (5.0 N-m or smaller).

5) Insulate the unions and flare-nuts at the piping connections completely. Insulate the liquid piping and gas piping completely to avoid decreasing of performance and dewing on the surface of the pipe.

6) In order to prevent rainwater invasion, the unit, make sure to install the pipe cover, and installation thermal insulation material where the pipe is through the unit, so that it can not have gaps happening.

5.3 Vacuum

1) Details stop valve operation, please refer to the attention of nameplate inside service cover description.

2) Connect a manifold gauge to the check joints at both sides. Continue vacuum pumping work until the pressure reaches-0.1MPa (-750mmHg) or lower for one to two hours.

3) After vacuum pumping work, stop the manifold valve's valve, stop the vacuum pump and leave it for one hour. **Check to ensure that the pressure in the mani-fold gauge does not increase**.

4) Because check joints and flare nut can not connect, so please use the charging hoses. After the work, please tighten the flare nut with 16N • m of torque.

5) Check for any gas leakage at the flare nut connections, or brazed parts by gas leakage tester or foaming agent. The following is recommended for foam testing fluid [Field-supplied (NUPRO "SNOPP" or Yokogawa & Co., Ltd."ｷｭﾎﾟﾌﾚｯｸｽ")], component is not clear which is general household cleaners do not use the liquid as a foam testing.

6) Vacuum drying determination example：

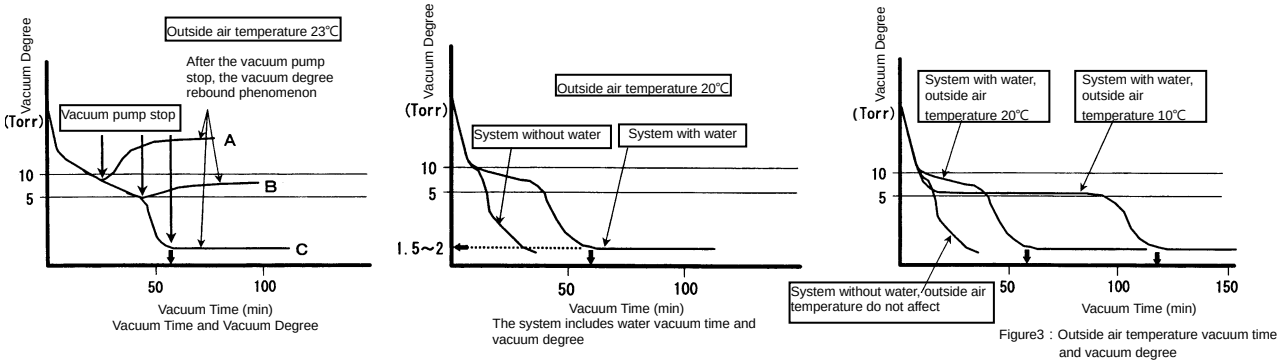


Figure3：Outside air temperature vacuum time and vacuum degree

※Note：1. When remove the spindle valve cap of stop valve, there may be slight refrigerant leakage sound is normal.

2. Use tools and measuring instruments only for the new refrigerant (R410A) which directly touch refrigerant.

3. If vacuum degree of -0.1MPa (-750mmHg) is not available, it is considered that leakage exists. Check for any gas leakage once again. If no leakage exists, operate the vacuum pump for one to two hours.

Please implement vacuum drying determination, to confirm whether water exists within the system. If moisture is present, please extend the vacuum time or installation the drying filter until no moisture is present within the system. **Be sure to do this work, otherwise in the future the unit could easily lead to failure, and difficult to handle.**

5.4 The Additional Refrigerant

1) Outdoor unit has been filled with refrigerant, but still based on the length of pipe filled with an appropriate amount of refrigerant. The filling amount of refrigerant, please following the liquid piping length and the capacity of the indoor unit calculation, the results please fill in "[ ]".

Calculation formula ：

W：Additional refrigerant of liquid pipe (kg) = W11+W12+W13 — additional refrigerant (kg) [ ]

W11：Φ12.7 liquid pipe length (m) [ ] ×0.12 (kg)= [ ]

W12：Φ9.53 liquid pipe length (m) [ ] ×0.07 (kg)= [ ]

W13：Φ6.35 liquid pipe length (m) [ ] ×0.03 (kg)= [ ]

W Total= [ ] (kg)

Model	The factory refrigerant charging weight (kg)	Additional refrigerant upper limit (kg)
RAM-280FSPH(D)	6.5	13.5
RAM-335FSPH(D)	7.8	

2) Fully open the gas line stop valve and slightly open the liquid line stop valve.

3) Cooling operation, then for charging refrigerant, connect the gauge manifold using charging hoses with a refrigerant charging cylinder to the check joint of the liquid line stop valve. (Refrigerant charging quantity of tolerance in the ± 0.1kg around.)

4) Fully open the liquid line stop valve after completing refrigerant charge.

5) Finally, please lock the spindle valve cap of liquid stop valve in according with the following tightening torque.

•Additional refrigerant W exceeds the amount of additional refrigerant filling upper limit, adjust the length of piping, such that W does not exceed the value of upper limit.

The cap tightening torque：

Liquid	20 N · m
Gas	49 N · m

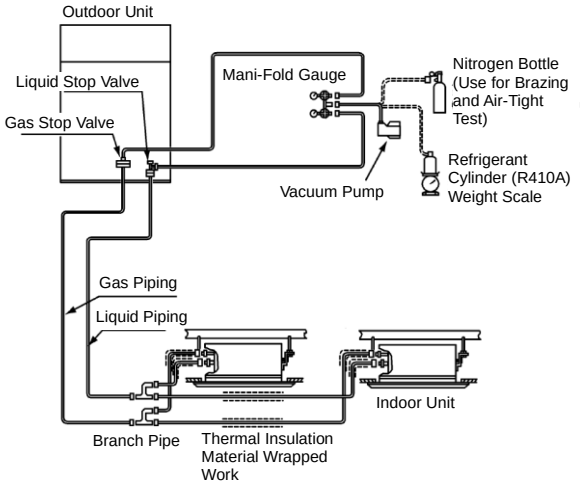
6) Please be sure to perform the air-tight test.

Additional refrigerant too more or too less, will result in compressor failure or others abnormal condition, be sure to charge refrigerant according to calculate values.

Liquid piping must be implemented thermal insulation. (To prevent poor performance, and low pressure pipe surfaces to prevent condensation.)

Be sure to check the refrigerant leakage. If a large refrigerant leakage, it will happen the following phenomena：

1. Lack of oxygen.



5.5 Caution of The Refrigerant Leakage

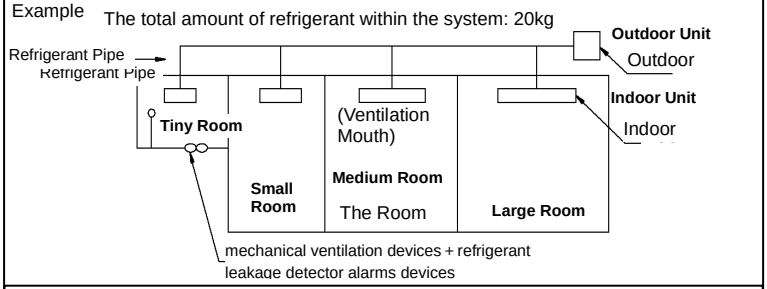
Air conditioner installation in room, in case of refrigerant leakage, refrigerant concentration must not exceed the limits of concentration.

- ●The products use non-flammable, non-toxic safety refrigerant R410A, if the indoor unit refrigerant leakage filled entire the room, there will be a choking hazard to happen. Especially multiple indoor unit and outdoor unit of the long-distance piping connection, the amount of refrigerant more than individual air-conditioner. So, make sure the indoor unit installation in the room, even in case of refrigerant leakage, immediate disposal of the refrigerant concentration should also lower than the limits concentration.
- ●Please calculate limits refrigerant concentration by the following formula：

$$\frac{\text{The total amount of refrigerant within the system (kg)}}{\text{Installation the product of the room indoor volume } (m^3)} \leqq \text{limits refrigerant concentration}$$

R410A (0.3kg / m^3)

- ●The calculation result, if installation products of the room more than the limits concentration, but when the air conditioner must be installed, please choose a treatment method according to the following：
  1) Setting refrigerant leakage detector alarms linked mechanical ventilation devices. (See below)
     (Per 1 ton cooling capacity should be more than 0.4 m^3/min ventilation capacity. Cooling capacity in the following table, according to the outdoor unit capacity.)
  2) Between adjacent room to set the effective ventilation mouth (such as opening mouth of no door or opening mouth which need to set more than 0.15% floor area on the upper and lower of the door), so that the leakage refrigerant concentration below the limit's concentration.



(Note：1) Whether it is a large room, medium room, small room, tiny room the amount of leakage refrigerant are all 20kgs.

(Note：2) The room must not exceed the limits refrigerant concentration of 0.42kg / m3.

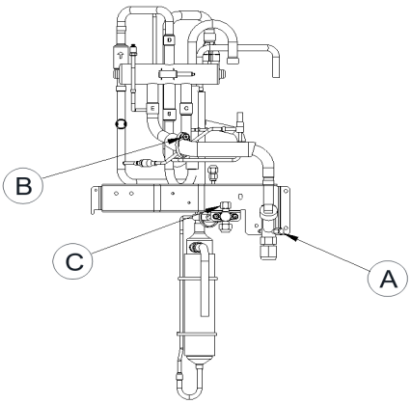
Outdoor Unit Model	Cooling Capacity
	R410A
RAM-280FSPH(D)	4.11Ton
RAM-335FSPH(D)	4.11 Ton

- ●New refrigerant R410A product notes:
  Since R410A is a non-azeotropic refrigerant, when refrigerant leakage, the refrigerant will result in weight percent composition changes, so can not directly add refrigerant treatment, must be re-processing system.

5.6 Caution of Measure Pressure Data from The Check Joints

Measure pressure data of work, please from the check joints of gas line stop valve (right figure Ⓐ) and the check joints of piping line (right figure Ⓑ) to connect. And then, please according to the different operation state, to change high and low pressure position of the connection. The details, please refer to the following description of the table.

	Cooling
The check joints of gas line stop valve Ⓐ	Low pressure
The check joints of piping line Ⓑ	High pressure
The check joints of liquid line stop valve Ⓒ	When vacuum, maintenance services use to charge the refrigerant specially.

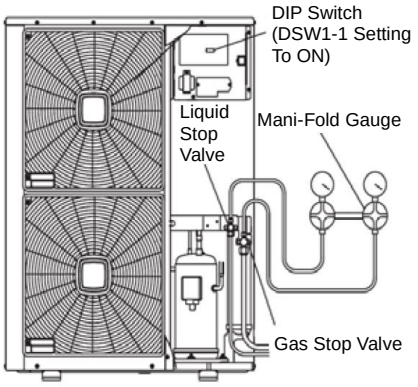


5.7 Refrigerant Recovery Methods

When the unit must be moved and outdoors refrigerant must be recovered, please follow these steps to implement the operation.

1) Please close the gas line stop valve, liquid line stop valve and the mani-fold gauge.
2) Please turn on the power source.
3) Setting to ON of outdoor unit electrical board DSW1-1, please implement cooling operation, then closed the liquid line stop valve, and refrigerant recovered operation will be started.
4) When the low-pressure (gas line stop valve) side of the pressure display -0.01MPa (-100mmHg), please action rapidly according the following instructions：

1.Please close the gas line stop valve.
2. Setting to OFF of outdoor unit electrical board DSW1-1. (Unit stop).
5) Please turn off the power source.



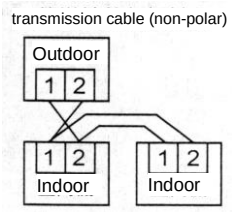
⚠ **Caution**	●Please do not let low-pressure gauge to measure the pressure is lower than-0.01MPa. ●When the refrigerant recovered operation, the low pressure is less than-0.01MPa, will result in compressor failure.

6. Electrical Wiring

CAUTION：All the field wiring and electrical components must comply with local codes.

6.1 Wiring Capacity

1) The indoor and outdoor unit transmission cable of the connection is a non-polar.

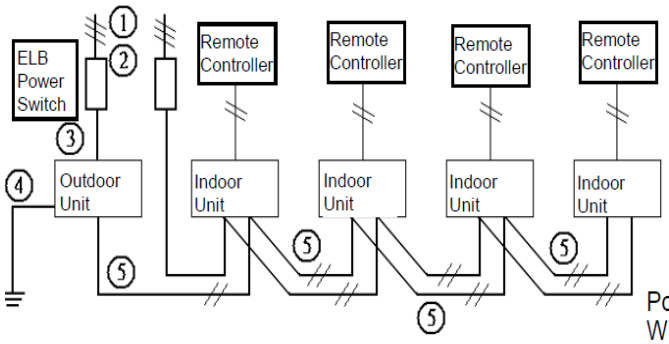


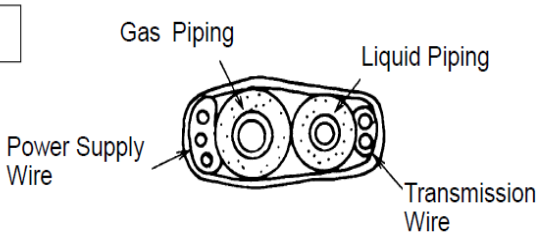
2) The type of earth leakage breaker required for the " high-speed type " (active time less than 0.1 sec.), when to buy, please pay special attention.
3) Around the unit installed over current breaker, the manual switch and earth leakage breaker (ELB) should be separated, but need set up it together.
4) Outdoor unit power supply specification for the 3Φ230V / 380V 60Hz。
5) Wiring capacity, please according to the following table.

Item / Model	Power Supply (3Φ 60Hz)	Maximum Current (A)	ELB (Earth Leakage Breaker)			Power Switch		Power Supply Size (mm^2)	Earth Wire Size (mm^2)	Transmission Cable Size
			Number of Poles	Rating Sensitivity Current (mA)	Rating Current (A)	Switch Capacity (A)	Fuse Capacity (A)			
					1	2	2	3	4	5
RAM-280FSPH	230V	37	3	100	60	60	50	14	5.5	2-Core Shielded Twist Pair Cable 0.75mm^2
RAM-335FSPH										
RAM-280FSPHD	380V	23	4	30	40	40	25	8	3.5	Total Length 1000m Below
RAM-335FSPHD										

Note: When earth leakage breaker specification selection, please according to above table (Note: The earth leakage breaker of power supply 380V must use 3Φ4 wire)

·Wiring Example：





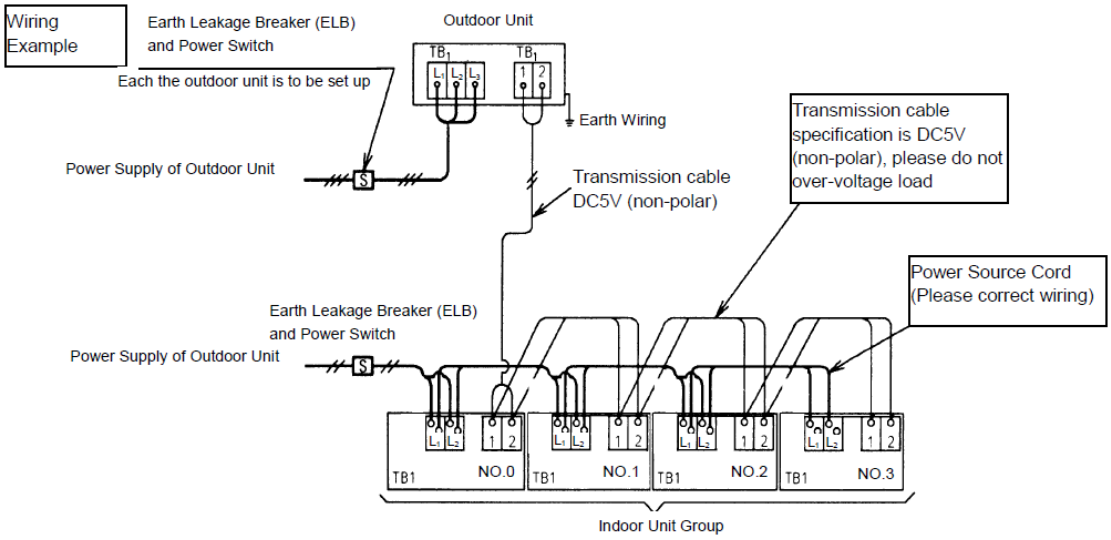
※ Piping thermal insulation material, Please use can withstand high temperature gas piping of the heat resistant specification products.

6.2 Wiring Essential

●The power source cord and transmission cable ,please according to the following essentials to implement.

1) To prevent electric shock accidents, in the electrical wiring, maintenance and other operations before to open the services cover, please turn off power supply completely before implementation.
2) Be sure the indoor unit power supply connects with each indoor unit which are all same outdoor unit. And all indoor unit, please install the inverter corresponding type earth leakage breaker (ELB) and the manual switch.
3) The transmission cable of the connection must be sure to connect the wiring with the same refrigerant cycle system of the unit. (On the outdoor unit, the refrigerant piping is connected to the indoor unit, its transmission cable is also sure to connect the same indoor unit.) Refrigerant piping and the transmission cable if connected with a different refrigeration cycle, there will be abnormal operation occurred.

4) The transmission cable of indoor and outdoor unit and the transmission cable of the connection between indoor units (DC5V), use 2-core shielded twist pair cable (0.75mm2 above). At the same time, the total length must be at 1000m below.
5) The transmission cable of the connection, use 2 core wire. (Do not use more than the 3-core wire.)



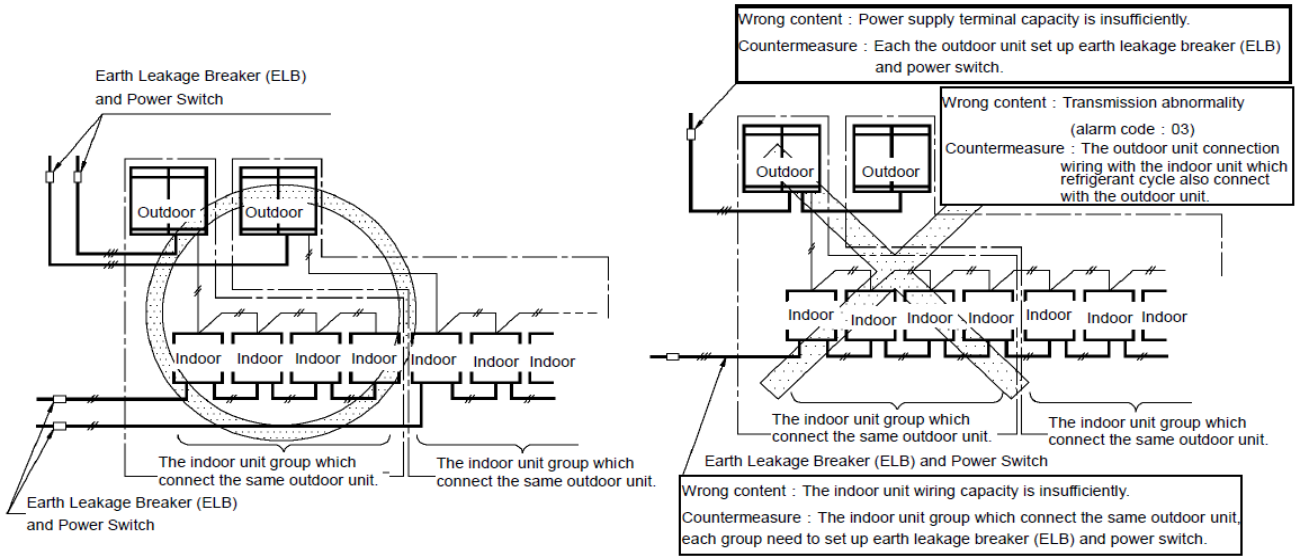
6) Does Power supply voltage match the rating voltage within±10% Due to higher or lower voltage, the unit will be damaged.
7) Check the capacity of the electrical wires. If the power source capacity is too low, the system cannot be started due to the voltage drop.
8) Indoor and outdoor unit is not grounded, electric shock and other accidents may be occurred, be sure to implement grounding fortifications. The grounding must use the grounding resistance 100Ω or less of three kinds of grounding fortification, make construction by qualified electrical personnel.
9) To prevent electric shock accidents, in the electrical wiring, maintenance and other operations before to open the services cover, please turn off power supply completely before implementation.

●Caution of indoor and outdoor unit connection wiring construction：

The transmission cable of indoor and outdoor unit and the 220V power source cord, be sure to keep the distance of more than 5 ~ 6cm. Therefore, do not use the coaxial cable.

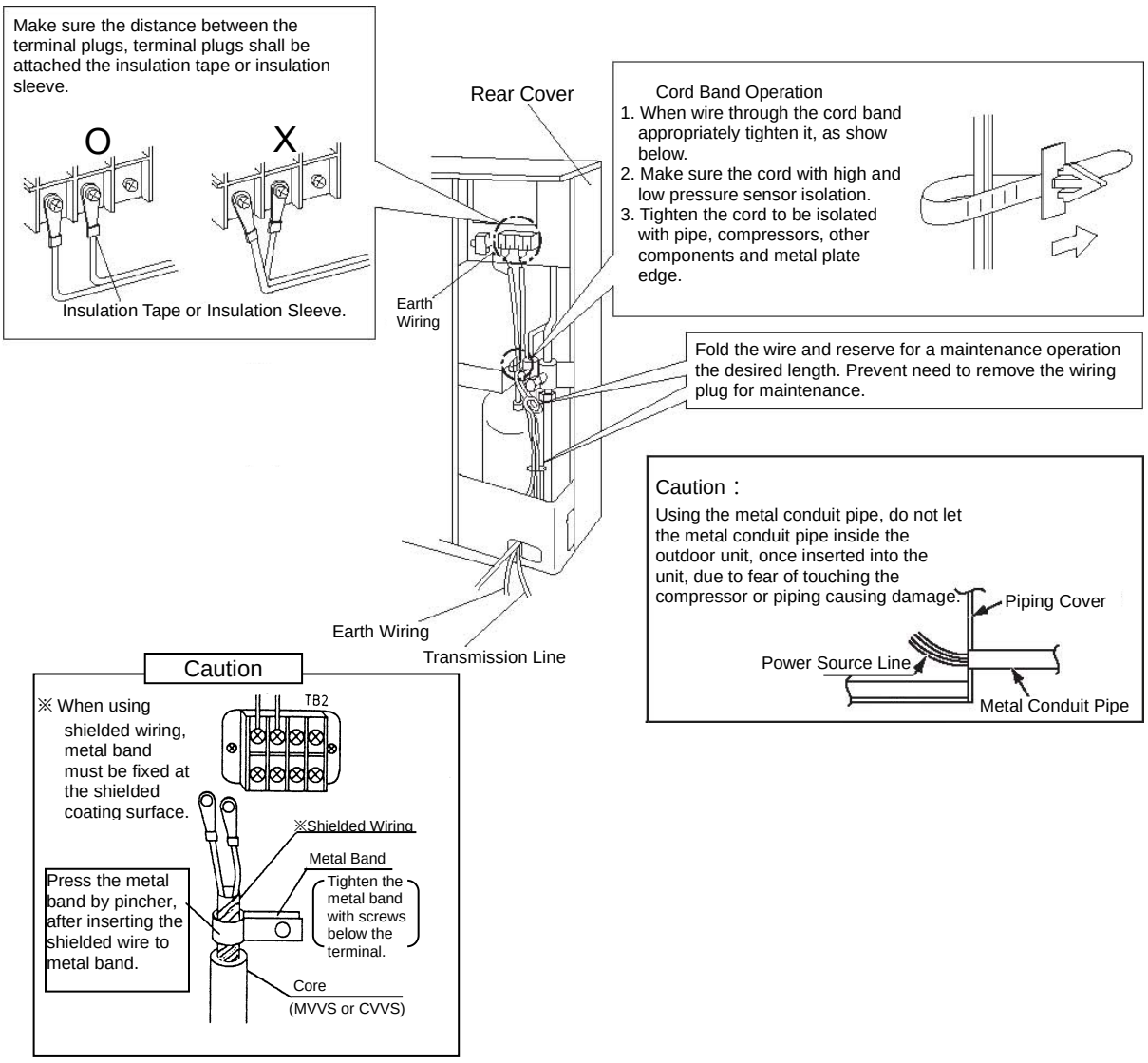
<u>If the transmission cable and power source cord connecting wrong, will cause the PCB of the outdoor unit burning, please pay special attention.</u>

10) Indoor and outdoor unit's power source cord and connection wiring methods:



11) Wiring connection port：

After wiring, must be implemented sealing to prevent water invasion inside the metal conduit pipe.



7. Dip Switch (DSW) Setting of Outdoor Unit

TURN OFF all power sources before setting. Without turning OFF, the switches do not work, and the contents of the setting are invalid.

(■ indicates the position of dip switches.)

1) Transmission method setting

More than one outdoor unit share the same transmission line, need to set refrigerant cycle number and end terminal resistance.

●Setting of refrigerant cycle number：

	Ref. Cycle NO. Setting		Example：Ref. Cycle NO.25
	(Tens Digit) ON OFF 1 2 3 4 5 6	(Last Digit) Alignment position, Flat blade screwdriver	ON OFF 1 2 3 4 5 6 Pin.2 Setting at the 'ON' ; Rotation to '5'
Outdoor Unit	DSW4	RSW1	
Indoor Unit	DSW5	RSW2	

Setting of end terminal resistance DSW5

Before leaving the factory: ON 1 2

Cancellation of end resistance: ON 1 2

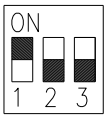
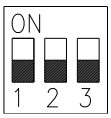
●Setting of end terminal resistance (PCB of outdoor unit) ：

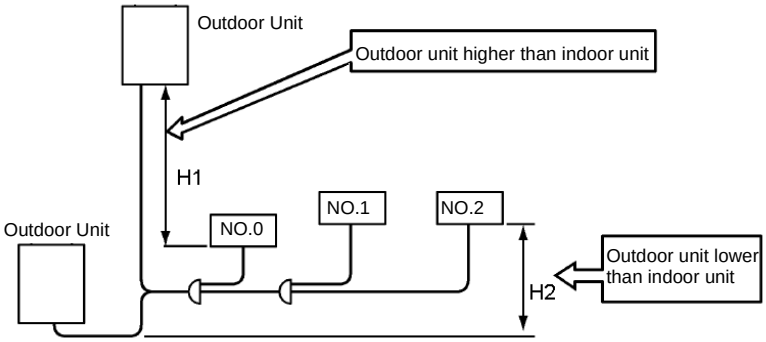
The unit before leaving the factory, No. 1 pin of DSW 5 is set at the “ON” side. In the case that the outdoor unit’s quantity in the same H-link is 2 or more, set No. 1 pin of DSW 5 at the “OFF” side from the 2nd unit. If only one outdoor unit is used, no setting is required.

2)Lift difference setting

●Setting the lift difference between the outdoor unit and indoor unit.

●Please use the DIP switch (DSW6) of the outdoor unit PCB (PCB1), setting each function according to the following table.

Function / Dip Switch	Outdoor unit lower than indoor unit 20~30m	Outside of the left item
DSW6		 Before leaving the factory



3) Others setting switch

(■ indicates the position of dip switches.)

DSW1 Test Operation

Setting Setting for Outdoor Unit Test Operation

Factory Setting	Cooling Operation	Compressor Forced Stop
		

DSW2 Auxiliary Function Setting

Setting Use Auxiliary function settings

Factory Setting

When setting the items in the table on the right, please set this switch to ON side.

Setting Items	Switch No.
High Efficiency Fan Motor	1
—	2
—	3
—	4
Function Setting	5
External I/O Setting	6

DSW3 Capacity Setting Each model is set based on the table

No setting is required

RAM-280FSPH(D)	RAM-335FSPH(D)
	

8. Test Run

【Before Test Run】

●Before test run, please re-confirm the installation whether there are problems, also confirm the following points.

●In addition, please confirm it with the outdoor unit attached the installation manual.

1) Refrigerant piping and the transmission cable if connected with a different refrigeration cycle, there will be abnormal operation occurred.

2) Please use the 500V electrical resistance tester to confirm the electrical parts between terminals and earth electrical resistance must be 1MΩ more than. If 1MΩ or less, that poor the electrical insulation, please do not operation the unit. (Do not input the power source to the terminal No.1,2 of transmission wiring.)

3) When power source wiring phase error, the unit can not be operated, and the remote controller display alarm code 〔 05 〕. Currently, please refer to the electrical box caution nameplate, check the phase of the first side and replace it. The phase of the replacement work, please process under the power source turn off.

4) Does the oil heater of the outdoor unit have been powered? (Before using, please input power source more than 12 hours.)

【Test Run】

●When installation is completed, perform test run according to the following procedure, and make sure that whether the abnormal operation, then hand over the system to the customer.

1) Outdoor unit the gas stop valve and the liquid stop valve, make sure full open state.

2) Please implement the test run of the indoor unit in turn, confirm the refrigerant cycle system and the electrical wiring system is the same. (While more than one indoor unit operation, the system is unable to confirm the consistency.)

3) Please according to the following procedure to test run, and make sure that whether the abnormal operation.

3.1 Depress the "MODE" and the "CHECK" switches together for more than 3 seconds. The "TEST RUN" and the counting number of the connected units are indicated on the remote control switch.

●When cooling operation test run, it should be at room temperature DB 21 ℃, WB 15 ℃, outside air temperature DB -5 ℃ or more.(Outside air temperature DB -5 ℃ below, air conditioner can not be operated.)

●Using a remote controller to operation more than one indoor unit, please confirm whether the number of the units display. If no indication appears or the number of the units indicated is smaller than the actual number of the units, some abnormalities exist, please confirm it again. Depress the "MODE" switch again to set the desired mode of operation.

3.2 Depress "RUN/STOP" switch.

●The "TEST RUN" operation will be started. (The 2 hours OFF-TIMER will be set, and the "TEST RUN" operation will be finished after 2 hours unit operation or by depressing the "RUN/STOP" switch again.)

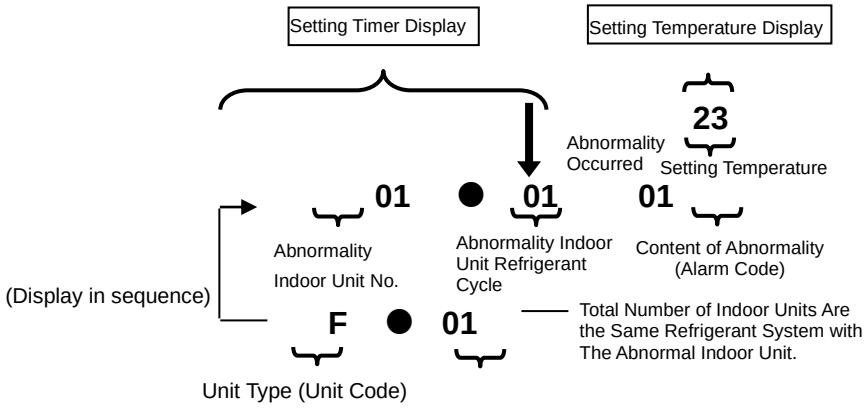
3.3 To end the test run, wait for 2 hours or push "RUN/STOP" switch again.

Number of The Unit	0	1	2	3	4	...	10	11	...	63
Timer Setting Display Left Two Digit	**01**	**02**	**03**	**04**	**05**	**…**	**11**	**12**	**…**	**64**
Ref. Cycle NO.	0	1	2	3	4	...	10	11	...	63
Timer Setting Display Right Two Digit	**01**	**02**	**03**	**04**	**05**	**…**	**11**	**12**	**…**	**64**

●Note：After the product stops operation, in order to recover the piping refrigerant to the outdoor unit, the compressor continues to operate a period of time (most about 10 minutes). Also, when the test run, it is not the product failure or abnormal.

●When test running, the protection device will be activated for some abnormality, the controller's operation indicator is still blinking, display "Alarm" (abnormality), while the setting temperature display will show alarm code.

●Setting temperature and setting timer display changes:



●At this time, please refer to page 22 of the alarm code to confirm the leading cause and treatment. If you can not handle, please contact your contractor for assistance.

Alarm Code

Code	Distinction	Content of Abnormality	Leading Cause
01	Indoor Unit	Indoor Unit Activation of Protection Device (Float Switch)	Activation of Float Switch (High water Level Drain Pan, Abnormality of Drainpipe, Float Switch or Drain Pan)
02	Outdoor Unit	Outdoor Unit Activation of Protection Device	Activation of High Pressure Switch (4.15MPa); Air Conditioner Outdoor Unit Fan Motor Lock.
03	Wiring	Transmission Abnormality between Indoor and Outdoor	Incorrect Wiring, Loose Terminals, Disconnect Wire, Blowout of Fuse, Outdoor Unit Power OFF.
04	Inverter	Transmission Abnormality between Inverter PCB and Outdoor PCB	Inverter PCB - Outdoor PCB Transmission Failure (Loose Connector, Wire Breaking, Blowout of Fuse), Abnormal fan motor controller transmitted, "04" the lower right will be "Signal flashing".
05	Wiring	Abnormality Power Source Phases	Incorrect Power Source Phases, Connection to Reversed Phases, Open-Phases.
06	Voltage	Abnormality Inverter Voltage	Outdoor Voltage Drop, Insufficient Power Capacity.
07	Refrigerant Cycle System	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector).
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Closed Position (Disconnect Connector).
11	Indoor Unit Thermistor	Abnormality Inlet Air Thermistor (Indoor)	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit.
12		Abnormality Outlet Air Thermistor (Indoor)	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit.
13		Abnormality Freeze Protection Thermistor (Indoor)	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit.
14		Abnormality Gas Piping Thermistor (Indoor)	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit.
19		Activation of Protection for Indoor Fan Motor	Fan Motor Overheat, Locking.
21	Outdoor Unit Thermistor	Abnormality High Pressure Thermistor (Outdoor)	Thermistor Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit.
22		Abnormality Outdoor Air Thermistor	
23		Abnormality Discharge Pipe Thermistor (Outdoor)	
24		Abnormality Heat Exchanger Liquid Pipe Thermistor (Outdoor)	
29		Abnormality Low Pressure Thermistor (Outdoor)	
31	System	Incorrect Capacity Setting of Outdoor and Indoor Unit	Incorrect Capacity Code Setting of Combination; Excessive or Insufficient Indoor Unit Total Capacity Code (outside of 80~120%)
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. In Same Ref. Gr., or The Connection Unit Number Exceeds the Maximum Number of Combination.
38	Outdoor Unit	Abnormality of Picking Up Circuit for Protection (Outdoor)	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
43	Pressure	Activation of Low Pressure Decrease Protection Device	Defective Compressor (Failure of Compressor of Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection Device	Overload at Cooling, High Temperature at Expansion Valve Locking (Loose Connector)
45		Activation of High Pressure Increase Protection Device	Overload Operation (Clogging, Short-Pass), Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing.
47		Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)	Insufficient Refrigerant, Pipe Clogging, Expansion Valve Locking at Open Position (Loose Connector).
48	Outdoor Unit	Activation of Inverter Overcurrent Protection Device	Overload Operation, Compressor Failure.
51	Inverter	Abnormality Inverter Current Sensor	Current Sensor Failure.
53		IPM Protection Activation	Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage)
54		Activation of Inverter Fin Thermistor Protection	Abnormality Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure.
55		Inverter Failure	Inverter PCB Failure
57	Outdoor Unit	Activation of Outdoor Fan Controller Protection	Abnormality Fan Controller Protection (Overcurrent), Fin Overheat
EE	Compressor	Compressor Protection Alarm	Compressor Occurred Three Times of Abnormality within 6 Hour.
b1	Wiring	Incorrect Outdoor Unit Address Number or Unit Number Setting	Over 64 Number Is Set for Address or Refrigerant Cycle.
b5		Number of Indoor Units Connected Error.	Connection of Non-H-LINK-Ⅱ Indoor Unit More Than 17 Units.

PS：Remote control operation indicator flashes once every 2 seconds, the symbol of between the indoor unit and remote control for the transmission abnormally (connector loss, loose, incorrect wiring, and disconnection).

4) Finally, please deliver the guarantee, operation manual, and installation manual, etc. to the customer to keep it.

⚠**Danger**：Before the preparation of test running, please do not start running, be sure implementation to confirm the electrical wiring, etc.

Test Run and Maintenance Record

MODEL: SERIAL. No. COMPRESSOR MFG. No.

DATE:

CUSTOMER'S NAME AND ADDRESS:

1. Is the rotation direction of the indoor coil fan correct? ☐
2. Is the rotation direction of the outdoor coil fan correct? ☐
3. Are there any abnormal compressor sounds? ☐
4. Has the unit been operated at least twenty (20) minutes? ☐
5. Check Room Temperature

Inlet: No. 1 DB /WB ℃, No. 2 DB /WB ℃, No. 3 DB /WB ℃, No. 4 DB /WB ℃,

Outlet: DB /WB ℃, DB /WB ℃, DB /WB ℃, DB /WB ℃,

Inlet: No. 5 DB /WB ℃, No. 6 DB /WB ℃, No. 7 DB /WB ℃, No. 8 DB /WB ℃,

Outlet: DB /WB ℃, DB /WB ℃, DB /WB ℃, DB /WB ℃,

6. Check Outdoor Ambient Temperature

Inlet: DB ℃, WB ℃

Outlet: DB ℃, WB ℃

7. Check Refrigerant Temperature: Operating Mode (Cool)

Discharge Gas Temperature: Td= ℃

Liquid Pipe Temperature: Te= ℃

8. Check Pressure

Discharge Pressure: Pd= MPa

Suction Pressure: Ps= MPa

9. Check Voltage

Rated Voltage: V

Operating Voltage: L_1-L_2 V L_1-L_3 V L_2-L_3 V

Starting Voltage: V

10. Check Compressor Input Running Current

Input: kW

Running Current: A A

11. Is the refrigerant charge adequate? ☐
12. Do the operation control devices operate correctly? ☐
13. Do the safety devices operate correctly? ☐
14. Has the unit been checked for refrigerant leakage? ☐
15. Is the unit clean inside and outside? ☐
16. Are all cabinet panels fixed? ☐
17. Are all cabinet panels free from rattles? ☐
18. Is the filter clean? ☐
19. Is the heat exchanger clean? ☐
20. Are the stop valves open? ☐
21. Does the drain water flow smoothly from the drain pipe? ☐

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