HITACHI

INSTALLATION AND OPERATION MANUAL

UTOPIA
R32 SERIES

MODELS
RAS-(2-3)HVRC3

Cooling & Heating

air

PMEN0654 rev.0 - 12/2023

EN

The English version is the original one; other languages are translated from English. Should any discrepancy occur between the English and the translated versions, the English version shall prevail.

ES

La versión en inglés es la original, y las versiones en otros idiomas son traducciones de la inglesa. En caso de discrepancias entre la versión inglesa y las versiones traducidas, prevalecerá la versión inglesa.

DE

Die englische Fassung ist das Original, und die Fassungen in anderen Sprachen werden aus dem Englischenübersetzt. Sollten die englische und die übersetzten Fassungen voneinander abweichen, so hat die englische Fassung Vorrang.

FR

La version anglaise est la version originale; les autres langues sont traduites de l'anglais. En cas de divergence entre les versions anglaise et traduite, la version anglaise prévaudra.

IT

La versione inglese è l'originale e le versioni in altre lingue sono traduzioni dall'inglese. In caso di divergenze tra la versione inglese e quelle tradotte, fa fede la versione inglese.

PT

A versão inglesa é a original; as versões em outras línguas são traduzidas do inglês. Em caso de divergência entre a versão em língua inglesa e as versões traduzidas, faz fé a versão em língua inglesa.

DA

Den engelske udgave er originalen, og udgaverne på andre sprog er oversat fra engelsk. Hvis der forekommer uoverensstemmelser mellem den engelske og den oversatte sprogudgave, vil den engelske udgave være gældende.

NL

De Engelse versie is de originele; andere talen zijn vertaald uit het Engels. In geval van verschillen tussen de Engelse versie en de vertaalde versies, heeft de Engelse versie voorrang.

SV

Den engelska versionen är originalet, och versionerna på andra språk är från engelska översättningar. I händelse av bristande överensstämmelse mellan den engelska och den översatta versionerna, skall den engelska versionen vara giltig.

EL

Η αγγλική έκδοση είναι το πρωτότυπο και οι εκδόσεις σε άλλες γλώσσες μεταφράζονται από τα αγγλικά. Σε περίπτωση που διαπιστωθούν διαφορές μεταξύ της αγγλικής και της μεταφρασμένης έκδοσης, η αγγλική έκδοση είναι επικρατέστερη.

BG

Версията на английски език е оригиналната; версиите на останалите езици са в превод от английски език. При различие между английската версия и преводна версия на друг език за меродавна се счита английската версия.

CS

Originální verze tohoto dokumentu je v angličtině; ostatní jazykové varianty jsou z angličtiny přeložené. Pokud mezi anglickou a jakoukoli jinou jazykovou verzí dojde k rozporu, bude převažovat anglická verze.

ET

Originaalversioon on ingliskeelne; teised keeled on tõlge inglise keelest. Vastuolude korral ingliskeelse ja tõlkeversioonide vahel kehtib eesõiguslikult ingliskeelne versioon.

HU

Az eredeti változat az angol; az egyéb nyelvű változatok angolról lettek fordítva. Amennyiben az angol és a fordított verziók között bármilyen eltérés mutatkozik, az angol nyelvű változat a mérvadó.

LV

Az eredeti változat az angol; az egyéb nyelvű változatok angolról lettek fordítva. Amennyiben az angol és a fordított verziók között bármilyen eltérés mutatkozik, az angol nyelvű változat a mérvadó.

LT

Versija anglų kalba yra originali; versijos kitomis kalbomis yra išverstos iš anglų kalbos. Jei yra neatitikimų tarp versijos anglų kalba ir verstinių versijų, pirmenybė teikiama versijai anglų kalba.

PL

Wersja angielska jest wersją oryginalną - wszystkie pozostałe stanowią jej tłumaczenie na odpowiednie języki. W przypadku stwierdzenia jakichkolwiek rozbieżności między oryginałem a jego tłumaczeniem, rozstrzygająca jest wersja w języku angielskim.

RO

Versiunea originală este cea în limba engleză; versiunile în alte limbi sunt traduse din limba engleză. Dacă există vreo discrepanță între versiunile în limba engleză și versiunea tradusă, prevalează versiunea în limba engleză.

RU

Английская версия является оригинальной; другие языки переведены с английского. В случае любого расхождения между английской и переведенной версиями, английская версия имеет преимущественную силу.

EN	English	Original version
ES	Español	Versión traducida
DE	Deutsch	Übersetzte Version
FR	Français	Version traduite
IT	Italiano	Versione tradotta
PT	Português	Versão traduzidal
DA	Dansk	Oversat version
NL	Nederlands	Vertaalde versie
SV	Svenska	Översatt version
EL	Ελληνικα	Μεταφρασμένη έκδοση
BG	Български	Преведена версия
CS	Čeština	Přeložená verze
ET	Eesti	Tõlgitud versioon
HU	Magyar	Lefordított változat
LV	Latviešu	Tulkotā versija
LT	Lietuvių	Versta versija
PL	Polski	Tłumaczenie wersji oryginalnej
RO	Română	Versiune tradusă
RU	Русский	Переведенная версия

Contents

General Index

General information

1.1 General information

Within the policy of continuous improvement of its products, Johnson Controls-Hitachi Air Conditioning Spain, S.A.U. reserves the right to make changes at any time without prior notification and without being compelled to introducing them into previously sold products. This document may therefore have been subject to amendments during the life of the product.

Hitachi makes every effort to offer correct, up-to-date documentation. Despite this, printing errors cannot be controlled by Hitachi and are not its responsibility.

As a result, some of the images or data used to illustrate this document may not refer to specific models. No claims will be accepted based on the data, illustrations and descriptions included in this manual.

No type of modification must be made to the equipment without prior, written authorization from the manufacturer.

1.2 Applied symbols

During normal air conditioning system design work or unit installation, greater attention must be paid in certain situations requiring particular care in order to avoid injuries and damage to the unit, the installation or the building or property.

Situations that jeopardise the safety of those in the surrounding area or that put the unit itself at risk will be clearly indicated in this manual.

To indicate these situations, a series of special symbols will be used to clearly identify these situations.

Pay close attention to these symbols and to the messages following them, as your safety and that of others depends on it.

⚠ DANGER

- ***The text following this symbol contains information and instructions relating directly to your safety in addition to hazards or unsafe practices which could result in severe personal injuries or death.***
- ***Not taking these instructions into account could lead to serious, very serious or even fatal injuries to you and others in the proximities of the unit.***

In the text following the danger symbol you can also find information on safe procedures during unit installation.

CAUTION

- *The text following this symbol contains information and instructions relating directly to your safety, in addition to hazards or unsafe practices which could result in minor personal injuries or product or property damage.*
- *Not taking these instructions into account could lead to minor injuries to you and others.*
- *Not taking these instructions into account could lead to unit damage.*

In the text following the caution symbol you can also find information on safe procedures during unit installation.

NOTE

- *The text following this symbol contains information or instructions that may be of use or that require a more thorough explanation.*
- *Instructions regarding inspections to be made on unit parts or systems may also be included.*

Symbols in the appliance	Explanation
	Before installation, read the installation and operation manual, and the wiring instruction sheet.
	Before performing maintenance and service tasks, read the service manual.
	For more information, see the installer and user reference guide.

1.3 Additional information about safety

DANGER

- ***DO NOT CONNECT THE POWER SUPPLY TO THE INDOOR UNIT PRIOR TO FILLING THE SPACE HEATING CIRCUIT (AND DHW CIRCUIT IF IT WAS THE CASE) WITH WATER AND CHECKING WATER PRESSURE AND THE TOTAL ABSENCE OF ANY WATER LEAKAGE.***
- ***Do not pour water into the indoor or outdoor unit. These products are equipped with electrical parts. If water contacts with electrical components then it will cause a serious electrical shock.***
- ***Do not touch or adjust safety devices inside the indoor or outdoor units. If these devices are touched or adjusted, it may cause a serious accident.***
- ***Do not open the service cover or access the indoor or outdoor units without disconnecting the main power supply.***
- ***In case of fire Turn OFF the main switch, put out the fire at once and contact your service contractor.***

CAUTION

- *Do not use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately 1 meter from the system.*
- *If circuit breaker or fuse is often activated, stop the system and contact your service contractor.*
- *Do not make service or inspections tasks by yourself. This works must be performed by qualified service person.*
- *Do not put any strange material (sticks, etc.) into the air inlet and outlet. These units have high speed rotating fans and it is dangerous that any object touches them.*
- *Refrigerant leakage can cause difficulty with breathing due to insufficient air.*
- *This appliance must be used only by adult and capable people, having received the technical information or instructions to handle properly and safely this appliance.*
- *Children should be supervised to ensure that they do not play with the appliance.*

NOTE

It is recommended to ventilate the room every 3 or 4 hours.

1.4 Important notice

- Verify, in accordance with the manuals which appear in the outdoor and indoor units, that all the information required for the correct installation of the system is included. If this is not the case, contact your distributor.
- Hitachi pursues a policy of continuing improvement in design and performance of products. The right is therefore reserved to vary specifications without notice.
- Hitachi cannot anticipate every possible circumstance that might involve a potential hazard.
- This air conditioner has been designed for standard air conditioning for human beings. For use in other applications, please contact your Hitachi dealer or service contractor.
- No part of this manual may be reproduced without written permission.
- If you have any questions, contact your service contractor of Hitachi.
- This manual should be considered as a permanent part of the air conditioner. This manual gives a common description and information for this air conditioner which you operate as well as for other models.
- Check and make sure that the explanations of each part of this manual correspond to your air conditioner model.
- Refer to the models codification to confirm the main characteristics of your system.
- Operations modes are controlled by the remote control switch.

CAUTION

This unit is designed for commercial and light industrial application. If installed in house hold appliance, it could cause electromagnetic interference.

1.5 Product guide

1.5.1 Classification of the outdoor unit

Unit type (Outdoor unit): RAS	Position-separating hyphen (fixed)	Capacity (HP): 2, 2.5, 3	H: Heat pump	V: Single phase unit (~ 230V 50Hz)	R: R32 refrigerant	C: Simultaneous operation or monosplit system	3: series
RAS	**–**	**X**	**H**	**V**	**R**	**C**	**3**

1.5.2 Outdoor units product line-up

~ 230V 50Hz

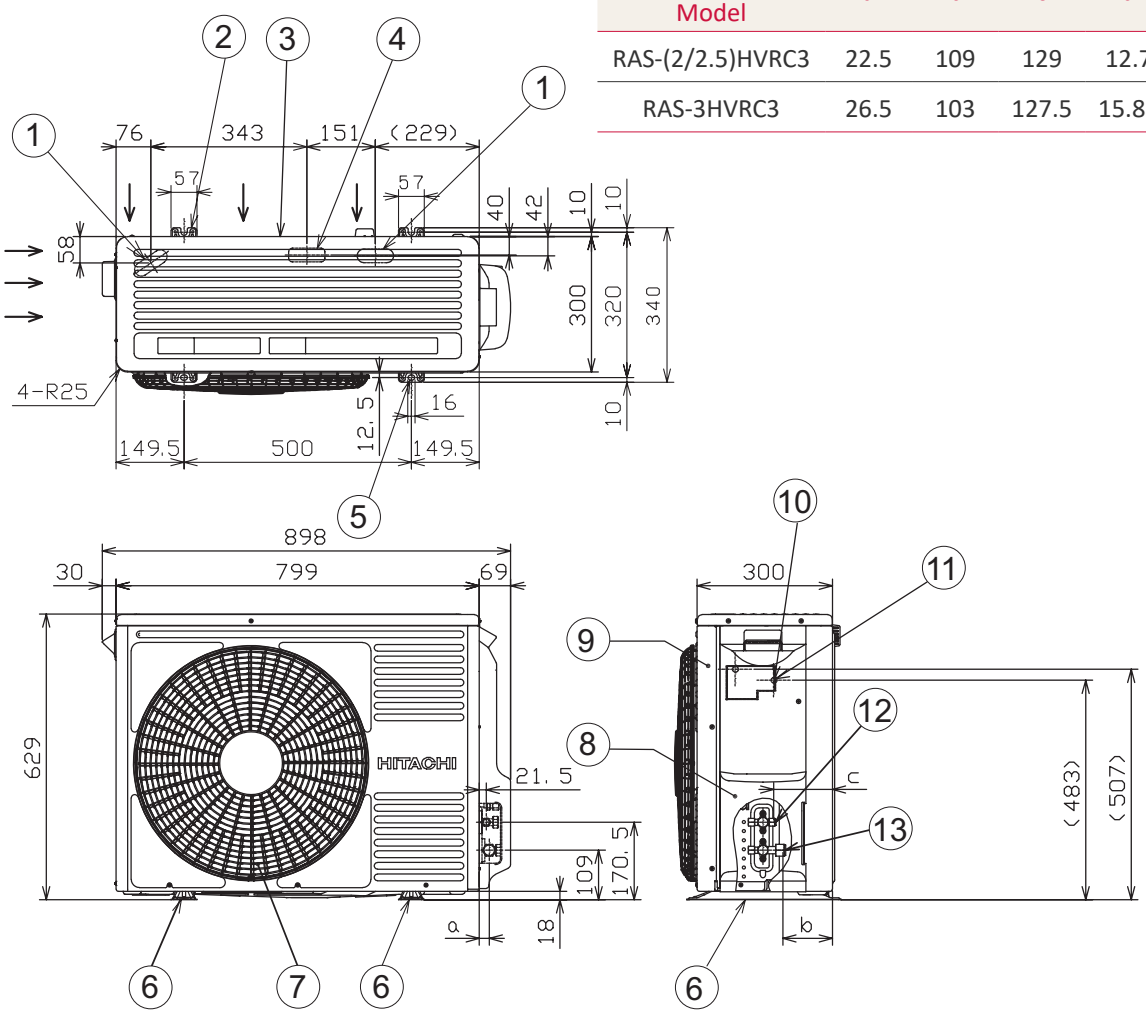
R32 Unit
RAS-2HVRC3
RAS-2.5HVRC3
RAS-3HVRC3

Name of parts and dimensional data

2.1 RAS-(2-3)HVRC3

For more information check the technical catalogue.

Dimension / Model	a	b	c	d	e
RAS-(2/2.5)HVRC3	22.5	109	129	12.7	6.35
RAS-3HVRC3	26.5	103	127.5	15.88	9.52



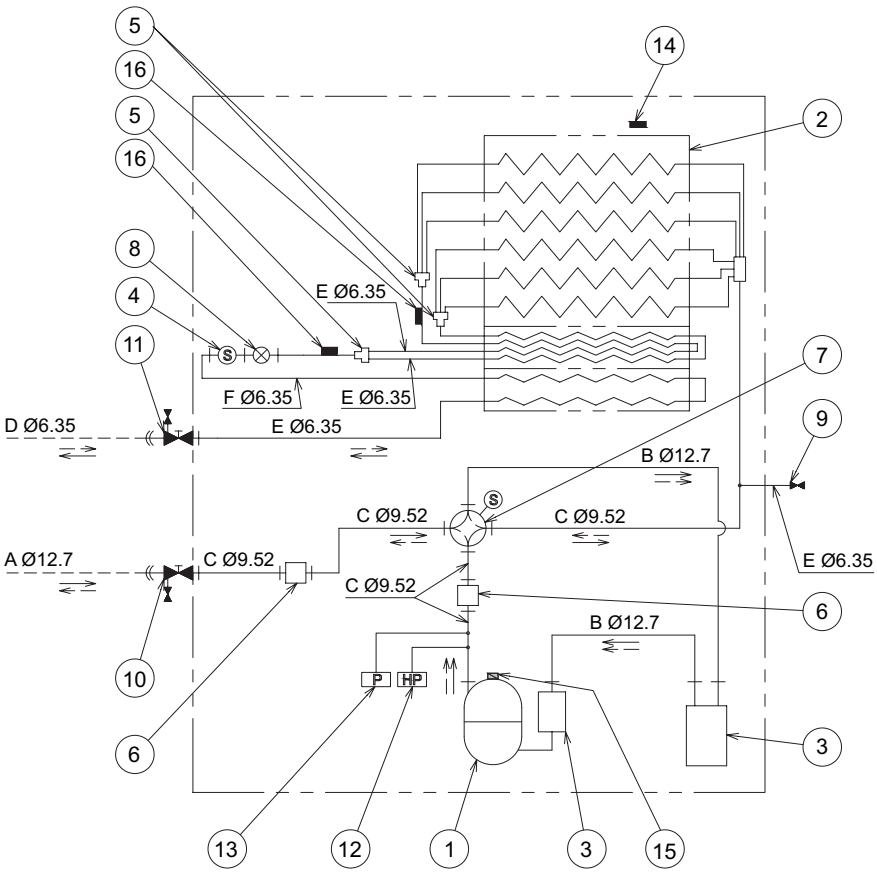
1. Punched drain hole: 30x80 long hole
2. Attachment hole for M10 anchor bolt: 2-U cut hole
3. Air suction inlet
4. Punched drain hole: For drain pipe
5. Attachment hole for M10 anchor bolt: 2-Long hole
6. Foot part
7. Air discharge outlet
8. Pipe cover
9. Service cover
10. Terminal board for power supply and transmission
    Terminal screw of power supply wire (M5)
    Terminal screw of transmission wire (M4)
11. Terminal screw of earth wire (M5)
12. Connection of refrigerant liquid pipe: with flare nut for Øe copper pipe
13. Connection of refrigerant gas pipe: With flare nut for Ød copper pipe

Refrigerant cycle

3.1 General notes

					Refrigerant
Heating refrigerant flow	Cooling refrigerant flow	Field supplied piping line	Flare nut connection	Brazed connection	R32

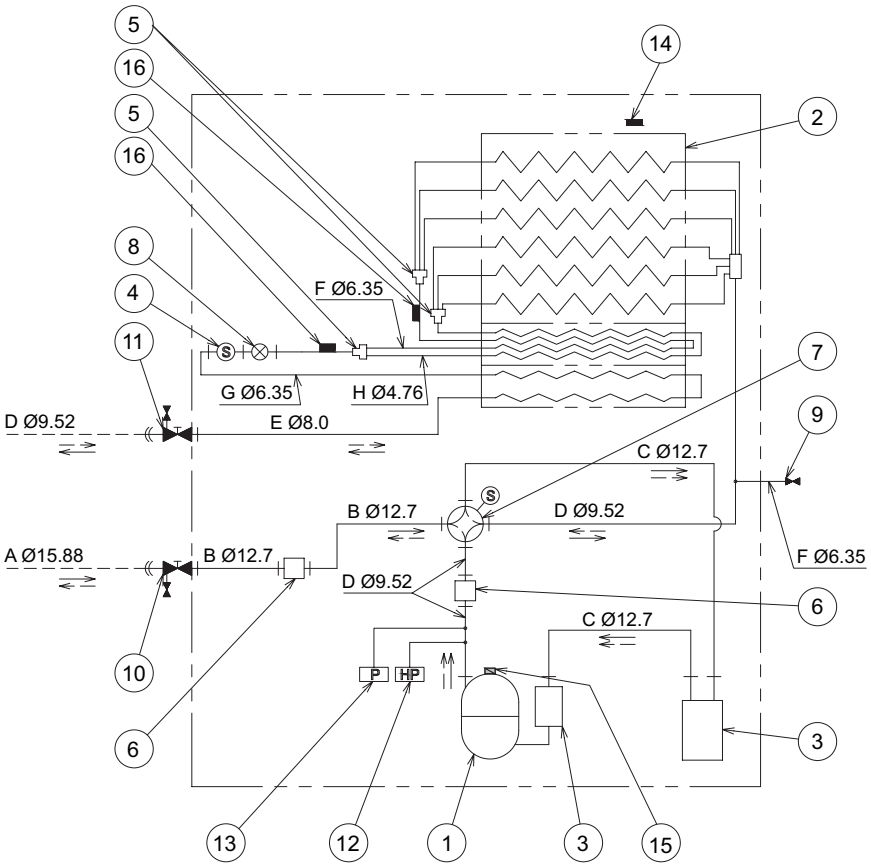
3.2 RAS-(2/2.5)HVRC3



N°	Part name
1	Compressor
2	Air side heat exchanger
3	Accumulator
4	Refrigerant strainer
5	Distributor
6	Silencer
7	4-way valve
8	Outdoor unit electronic expansion valve
9	Refrigerant check joint
10	Stop valve for gas line
11	Stop valve for liquid line
12	High pressure switch for protection
13	Pressure switch for control
14	Ambient thermistor
15	Discharge gas thermistor
16	Pipe thermistor

Mark	Outer diameter x wall thickness	Material
A	Ø 12.7 x 0.8 t	C1220T-0
B	Ø 12.7 x 0.7 t	
C	Ø 9.52 x 0.8 t	
D	Ø 6.35 x 0.8 t	
E	Ø 6.35 x 0.7 t	
F	Ø 6.35 x 0.6 t	

3.3 RAS-3HVRC3



N°	Part name
1	Compressor
2	Air side heat exchanger
3	Accumulator
4	Refrigerant strainer
5	Distributor
6	Silencer
7	4-way valve
8	Outdoor unit electronic expansion valve
9	Refrigerant check joint
10	Stop valve for gas line
11	Stop valve for liquid line
12	High pressure switch for protection
13	Pressure switch for control
14	Ambient thermistor
15	Discharge gas thermistor
16	Pipe thermistor

Mark	Outer diameter x wall thickness	Material
A	Ø 15.88 x 1.0 t	C1220T-0
B	Ø 12.7 x 0.8 t	
C	Ø 12.7 x 0.7 t	
D	Ø 9.52 x 0.8 t	
E	Ø 8.0 x 0.75 t	
F	Ø 6.35 x 0.7 t	
G	Ø 6.35 x 0.6 t	
H	Ø 4.76 x 0.7 t	

Additional considerations for the unit installation

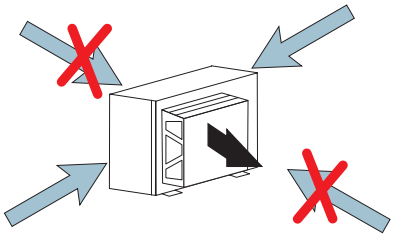
4.1 Installations with exposure to strong winds

Follow the instructions below to install on the rooftop or a location without surrounding buildings, where strong wind is expected against the product.

Choose a location where the outlet or inlet side of the product will not be exposed to strong wind.

When the outlet is exposed to strong wind:

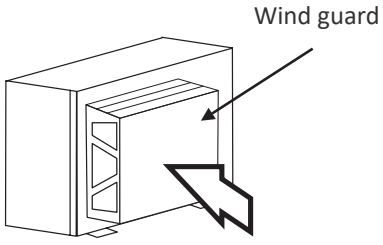
Direct strong wind may cause lack of air flow and adversely affect to the operation.



CAUTION

Excessive strong wind against the outdoor unit outlet may cause inverse rotation and damage the fan and motor.

In case of blowing strong wind to air outlet the wind guard (optional) is available to avoid strong wind.



Wind guard model	Number of set required
WSP-264	1

NOTE

- *The wind guard must be set at annual cooling operation (in DSW2 switch 3).*
- *For ambient temperature ≤ 10°C, it is recommended to set the wind guard at cooling operation.*

Refrigerant piping and refrigerant charge

5.1 Selection of the copper pipes

The copper pipe used for the installation must be specific for refrigeration systems.

⚠ CAUTION

- *The copper pipe used in the refrigeration installations is different to the copper pipe used in installations carrying domestic or heating water.*
- *The copper pipe for refrigeration installations is especially treated for outdoors and indoors. The interior surface finish makes it easier for the refrigerant to circulate and withstands the action of the lubricant oil used in outdoor units.*

Select the pipe with the appropriate diameter and thickness. Use the table below to select the most appropriate pipe:

Nominal diameter		Thickness (mm)	Supply
mm	Inches		
Ø6.35	1/4	0.80	Coil
Ø9.52	3/8	0.80	Coil
Ø12.7	1/2	0.80	Coil
Ø15.88	5/8	1.00	Coil
Ø19.05	3/4	1.00	Straight lengths
Ø22.2	7/8	1.00	Straight lengths
Ø25.4	1	1.00	Straight lengths
Ø28.58	1-1/8	1.00	Straight lengths
Ø31.75	1-1/4	1.10	Straight lengths
Ø38.1	1-1/2	1.35	Straight lengths
Ø41.3	1-5/8	1.45	Straight lengths
Ø44.45	1-3/4	1.55	Straight lengths
Ø50.8	2	1.78	Straight lengths

Always use clean copper pipes with no signs of knocks or cracks. Make sure there is no dust or dampness on the inside. A system with no moisture or oil contamination will give maximum performance and life cycle compared to that of a poorly prepared system.

5.2 Three principles on work with refrigerant pipes

The basic refrigerant pipe installation work must be carried out paying particular attention to avoid the infiltration of humidity or dust while working with the refrigerant piping. Otherwise, rust may appear inside the system or the units and cause serious faults.

Therefore, all work carried out on the copper pipes for refrigerant must follow the three principles described below:

Principle	Cause of the fault	Possible fault	Preventive measure
Absence of humidity	Water infiltration due to insufficient protection on the ends of the pipes. Condensation on the inside of the pipes. Insufficient vacuum.	Ice on the inside of the pipe, on the expansion valve (water obstruction) + Absorption of oil humidity and oxidation ↓ **Filter clogging, insulation and compressor fault**	Seal the ends of the pipes. Protect and insulate the ends of the pipes. ↓ Wash ↓ Vacuum dry (*)
Cleaning	Dust or other elements entering the ends of the pipes. Film of rust formed during brazing without nitrogen injection. Insufficient nitrogen wash after brazing.	Expansion valve, Capillary tube and filter clogging, Oil oxidation ↓ **Compressor fault, insufficient cooling or heating**	Fit caps to the ends of the pipes. Protect and insulate the ends of the pipes. ↓ Wash
Absence of leaks	Brazing fault. Flaring fault and insufficient torque. Insufficient torque on compressor connectors.	Lack of refrigerant, Drop in performance, Compressor fault, Oil oxidation ↓ **Compressor overheating**	Carry out basic brazing → Flaring → Connection work carefully ↓ Airtight test ↓ Preserving of vacuum

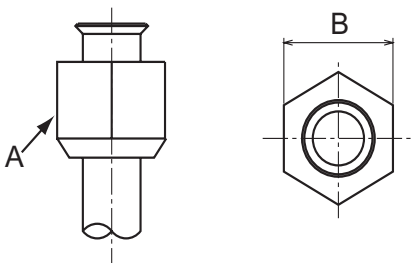
(*) One gram of water becomes approximately 1000 l of steam at 1 Torr. (1 Torr = 1 mmHg = 133.32 Pa). Therefore, a long time must be spent on vacuum work using a small pump.

5.3 Flared pipes

5.3.1 Selection of the connection with flare fitting

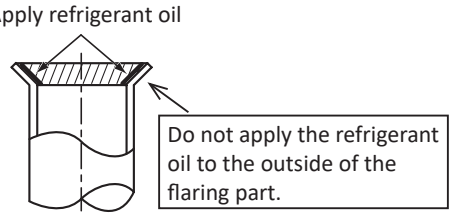
If it is not possible to perform the widening operation, use a connection with flare fitting.

Distance between sides -B- of the nut -A-	
Diameters (mm)	-B- (mm)
Ø6.35	17
Ø9.52	22
Ø12.7	26
Ø15.88	29
Ø19.05	36



Check that there are no scratches, adhered grinding swarf, deformation or surface unevenness at the flaring part.

Before tightening the flare nut, apply the refrigerant oil (field-supplied) of the same type and brand that the compressor installed in the outdoor unit is using in thin layer over the flaring part. Do not apply the oil on other portions. Tighten the flare nut for the liquid pipe to the specified torque with two spanners. Then, tighten the flare nut for the gas pipe in the same way. After tightening work, check that there is no refrigerant leakage.



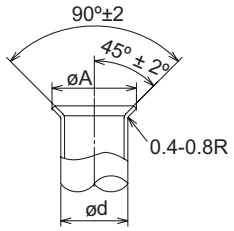
⚠ CAUTION

For units with air panel be careful that the refrigerant oil does not contact the air panel because it may cause a crack.

5.3.2 Dimensions of flared pipe

Perform the widening operations in accordance with the measurements shown below.

Diameters (mm)	$A^{+0}_{-0.4}$ (mm)
Ø6.35	9.1
Ø9.52	13.2
Ø12.7	16.6
Ø15.88	19.7
Ø19.05	– (1)



(1) *Not possible to perform the widening using pipe. In this case, use a connection with flare fitting.*

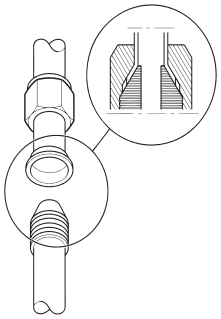
5.3.3 Flared connection mounting

Apply a thin layer of oil to the cone opening for refrigeration systems. Line up the end of the flared pipe to face the fitting to which it is to be threaded.

Gently rest the female cone on the male cone and check that the measurement is correct. Keep the connection lined up with one hand and gently thread on the flare nut with the other.

Tighten the connection to the corresponding tightening torque indicated in the table.

Nominal diameter		Tightening torque
mm	Inches	
Ø6.35	1/4	20 N·m
Ø9.52	3/8	40 N·m
Ø12.7	1/2	60 N·m
Ø15.88	5/8	80 N·m
Ø19.05	3/4	100 N·m
Ø22.2	7/8	–
Ø25.4	1	–
Ø28.6	1-1/8	–



⚠ CAUTION

- *Secure the fixed connection with a suitable wrench and use a torque wrench to tighten the flare nut on the threaded connections.*
- *Do not exceed the torque value indicated in the table. The fitting can become misshapen and the connection may leak.*

If temperature and humidity inside the ceiling exceed 27°C / RH 80%, dew condensation occurs on the surface of the accessory insulation. Wrap additional insulation (approx. 5 ~ 10mm thickness) around the accessory insulation of the refrigerant pipe as a preventive measure.

For buried pipe with joints such as an elbow or a socket, provide service access doors to facilitate the check for connection.

The pipes must be reinforced by an earthquake resistant support so that they will not be damaged by an external force.

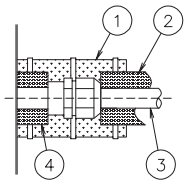
Do not clamp the refrigerant pipe tightly when supporting them for prevention of heat stress.

When connecting indoor/outdoor units with refrigerant pipes, fix the pipes as required so that the pipes may not to contact weak portions of the wall, ceiling, etc. Failure to take this measure may lead to an abnormal sound caused by the vibration of the pipe.

Perform the air tight test according to Installation and Operation Manual of the outdoor unit.

After connecting the refrigerant piping, seal the open space between knockout hole and refrigerant pipes by using insulation material.

Unit side



N°	Description
①	Insulation material
②	Insulation material
③	Field supplied
④	Insulation material

5.4 General instructions on the installation of refrigerant pipes

5.4.1 Preparing copper refrigeration pipes

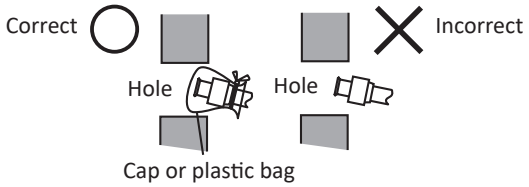
Clean the area where the copper refrigeration pipe preparation work is to be carried out. It must particularly be free of waste, soil, wood or metal shavings and, in general, any substance that could enter the ends of the pipe during handling. The copper pipe must be clean and have no remains of adhesive, cement, dust or other substances adhered to it.

⚠ CAUTION

- *Before you install the pipes, blow the inside with oxygen-free nitrogen gas to eliminate any remains of dust or other substances.*

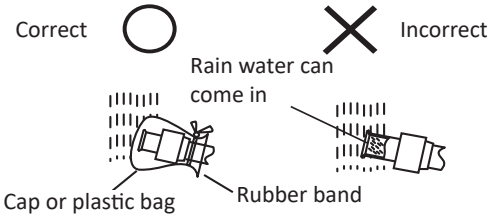
- *Use nitrogen gas for blowing during pipe brazing work. Otherwise a lot of oxidation film will occur inside of tubes. This film will be flecked off after operation and will circulate in the cycle, resulting in clogged expansion valves, bad influence to the compressor, etc.*
- *Cap the end of the pipe when pipe is to be inserted through a hole or while other installation work is being carried out, do not put pipes on the ground directly without a cap or vinyl tape at the end of the pipe.*
- *If piping installation is not completed until next day or over a longer period of time, braze off the ends of the piping and charge with oxygen free nitrogen through a Schrader valve type access fitting to prevent moisture and particle contamination.*

In case of getting the pipe through a hole in the wall:



Do not place the pipe directly on the ground:

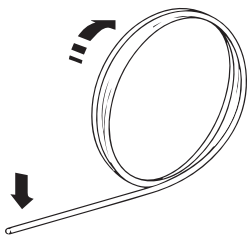
In case of rain:



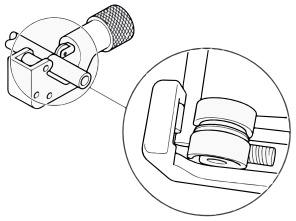
Where the copper pipe is supplied in rolls, fit a cap on the end and unwind it while it is resting on the ground so that the turning movement of the roll as it is unwound forms a straight pipe.

NOTE

- *The rolls of copper refrigeration pipe are normally supplied with caps on their ends.*
- *Where the roll of pipe does not come supplied with caps, check that the inside of the pipe is clean. If it is not, use a new roll of pipe.*
- *It is also possible to cover the end of the pipe temporarily using high quality adhesive tape.*
- *Do not wind and unwind the pipe continuously, as the properties of the copper for refrigeration pipes are altered, making it more rigid and brittle.*



5.4.2 Cutting copper refrigeration pipes

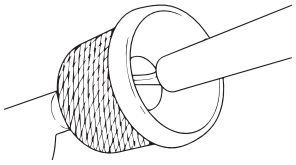


Use a pipe cutter and define the necessary length of pipe and add a few more centimetres to give yourself enough margin in case the cut has to be repeated.

Remove any internal burrs arising from the pipe cutter using a pipe reamer. While making the cut, slant the pipe downwards to prevent burrs or shavings from falling inside the pipe.

⚠ CAUTION

- *Ensure the pipe cutter rollers remain perfectly seated on the copper pipe.*
- *Do not use hand saws, circular saws, abrasive grinders or other tools that generate shavings.*
- *Wear appropriate means of protection during cutting or brazing operations and installation (gloves, eye protection, etc).*
- *Strictly follow national or local regulations regarding occupational health and safety.*



5.4.3 Bending copper pipes

Where the refrigerant pipes are to be bent, always use a bending tool or a spring, both of a diameter that is adapted to the pipe to be bent. The bending radii must be as wide as possible so that the gas or liquid refrigerant flow is not altered and no circulation noise is generated during operation.

⚠ CAUTION

Never bend pipes with radii of less than 90°.

NOTE

- *Bends in refrigerant pipes reduce system performance due to changes in the flow of gas and liquid refrigerant circulation.*
- *Do not use any other tool to bend pipes, as the pipe may be excessively bent or crushed and its inner diameter reduced.*

5.4.4 Brazing copper refrigerant pipes

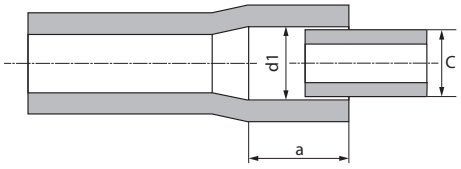
Brazing is the most important job in the installation of refrigeration pipes. In the event of an accidental leak due to negligence during the brazing process, the capillary tubes, expansion valves, etc., will be obstructed or the compressor seriously damaged.

To guarantee correct brazing between pipe surfaces, prepare them for widening according to the data in the following table.

⚠ CAUTION

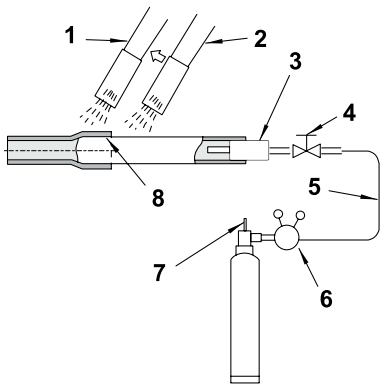
- *It is important to check the pipe fitting measurement as indicated in the following table.*
- *If a tool is used to widen the copper pipe, the dimensions indicated must be respected.*

Copper pipe size (C)	Ød1	Tolerance between d1 and C	a (Unit: mm)
Ø6.35 $^{+0.08}_{-0.08}$	Ø6.5 $^{+0.1}_{0}$	$^{+0.33}_{0.07}$	6
Ø9.52 $^{+0.08}_{-0.08}$	Ø9.7 $^{+0.1}_{0}$	$^{+0.36}_{0.10}$	8
Ø12.7 $^{+0.08}_{-0.08}$	Ø12.9 $^{+0.1}_{0}$	$^{+0.38}_{0.12}$	8
Ø15.88 $^{+0.09}_{-0.09}$	Ø16.1 $^{+0.1}_{0}$	$^{+0.41}_{0.13}$	8
Ø19.05 $^{+0.09}_{-0.09}$	Ø19.3 $^{+0.1}_{0}$	$^{+0.44}_{0.16}$	10
Ø22.22 $^{+0.09}_{-0.09}$	Ø22.42 $^{+0.1}_{0}$	$^{+0.39}_{0.11}$	10
Ø25.4 $^{+0.12}_{-0.12}$	Ø25.6 $^{+0.1}_{0}$	$^{+0.42}_{0.08}$	12
Ø28.58 $^{+0.12}_{-0.12}$	Ø28.78 $^{+0.1}_{0}$	$^{+0.42}_{0.08}$	12
Ø31.75 $^{+0.12}_{-0.12}$	Ø32.0 $^{+0.1}_{0}$	$^{+0.47}_{0.13}$	12
Ø38.1 $^{+0.12}_{-0.12}$	Ø38.3 $^{+0.1}_{0}$	$^{+0.42}_{0.08}$	14



The necessary brazing must be done by brazing, using a copper and silver alloy. Before you start brazing, install a dry nitrogen gas injection system inside the pipes to prevent the copper from being exposed to the air while it is subjected to high temperatures.

1 Heat the outer pipe previously to ensure the filler metal flows more easily.
2 Heat the inner pipe evenly.
3 Rubber cap.
4 Valve with no packing.
5 High pressure pipe.
6 0.03 to 0.05 MPa (0.3 to 0.5 kg/cm^2 G).
7 Reducer valve: only open the valve when gas is required.
8 Nitrogen gas flow, 0.05 m^3/h or less.



⚠ CAUTION

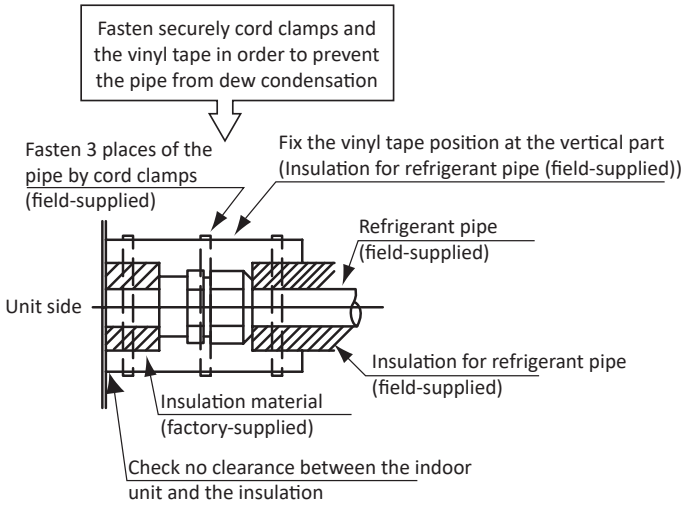
- *Do not braze on refrigerant pipes without a dry nitrogen gas injection system. Otherwise, a layer of rust will form that may become detached when the refrigeration system is started, causing filter or compressor blockages.*
- *NEVER USE oxygen, acetylene or fluorocarbonated gas to replace nitrogen gas: this will cause an explosion or will generate toxic gas.*
- *Keep the nitrogen gas pressure within the indicated values. A rise in the pipe could cause an explosion.*

5.5 Refrigerant pipe insulation

The refrigerant pipes must be fitted with a suitable insulation system that prevents the increase in temperature of the refrigerant and the subsequent loss of energy and the condensation of water along the entire pipe.

Refrigerant pipes must always be separately insulated, using closed cell insulation foam designed especially for refrigeration. This insulation foam, supplied by the installer, can be obtained in different formats. The most common is in the form of sheets and rolls of tubes of different diameters.

Furthermore, all connections between the different sections of insulation tubes must be reinforced with adhesive tape of the same characteristics.



⚠ CAUTION

- *On completing the installation of the refrigerant pipes, insulate the unions and flare-nuts at the piping connection part completely, insulate them appropriately using suitable insulating material and seal the open space between the holes made and the pipe.*
- *For units with air panel: If coating the optional air panel with a forming agent (recommended Gupoflex) after installation, make sure that the forming agent does not contact it. Otherwise, it could cause a breakage of the panel, resulting in the panel falling. If the forming agent contacts the air panel, completely wipe it off.*

NOTE

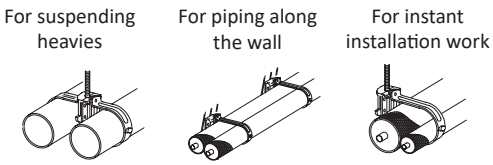
- *Do not use insulation material that contains NH_3 because it can damage cooper pipe material and can be a source of future leakage.*
- *Where polyethylene foam insulation is used, a 10 mm thick layer should be used for the liquid pipe and between 15 and 20 mm for the gas pipe.*
- *Insulate the liquid piping completely to avoid a decrease of performance; if not, it will cause sweating on the surface of the pipe.*
- *Install the insulation after the pipe surface temperature has dropped to the same temperature as that of the room, otherwise the insulation may melt.*
- *Where the fitter has supplied his own branches, these should be appropriately insulated to avoid decreases in capacity in line with to environmental conditions and dew on the surface of the piping due to low pressure.*

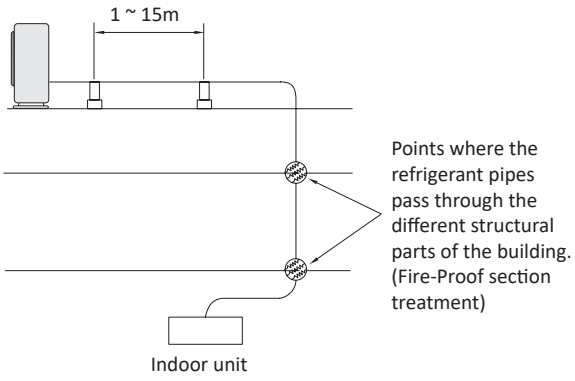
5.6 Suspension of Refrigerant Piping

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).

Do not fix the refrigerant piping directly with the metal fittings. (The refrigerant piping may expand and contract).

Some examples for suspension method are shown below.

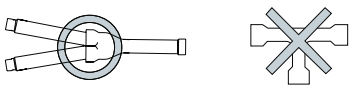




5.7 Line branch and header branch installation

Install the distributor supplied by Hitachi on request.

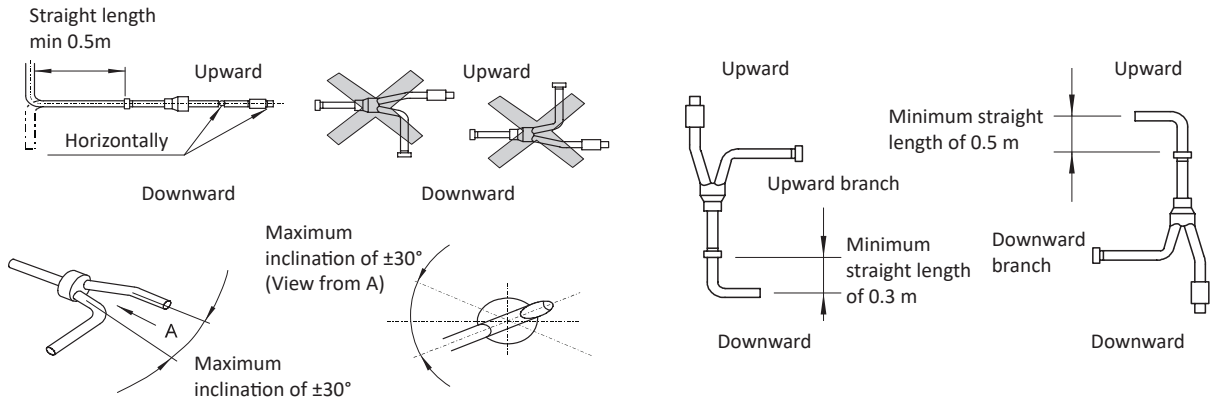
A tee can not be installed instead of a branch pipe.



Fix the branch pipe horizontally to the pillar, wall or ceiling. Piping must not be fixed rigidly to the wall as thermal expansion and contraction can cause pipe fracture.

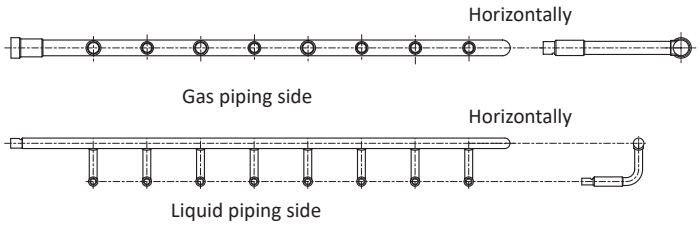
◆ Correct position of Line Branch E-SN/E-XN series

Horizontal	Vertical
Locate the branch pipes on the same horizontal plane. (Inclination within 30°) Make the straight length a minimum of 0.5m after the vertical bend.	Straight length of the pipe connection on the outdoor unit side is made as follows: - The collective pipe connection part is installed upward, the straight length must be minimum 0.5 m. - The collective pipe connection part is installed downward, the straight length must be minimum 0.3 m.



◆ Correct position of distributor MH series

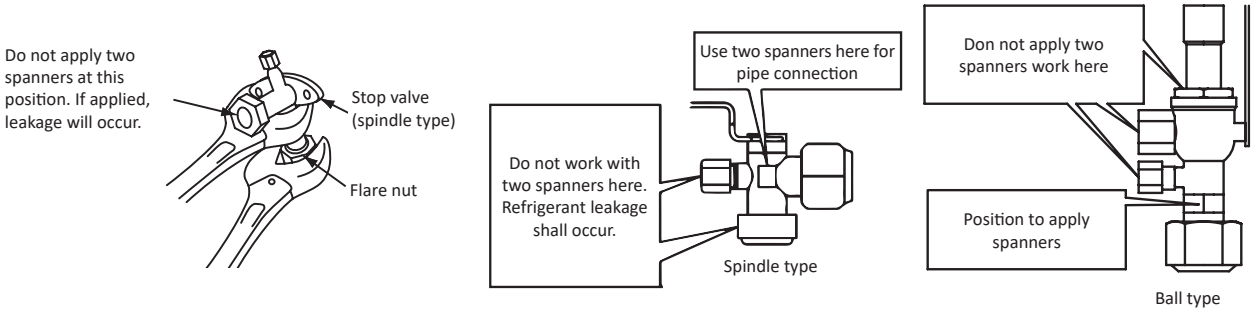
Perform to install horizontally always (Example: In case of model MH-108AN)



⚠ CAUTION

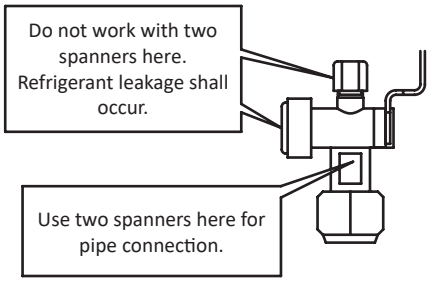
Seal the end of branch pipes which are not connected, by brazing factory supplied closing pipes.

5.8 Piping connection for outdoor unit

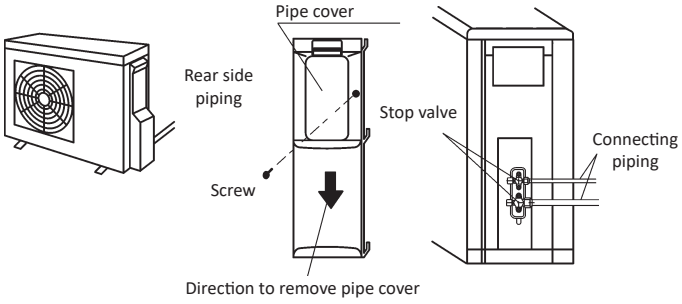


⚠ CAUTION

- *At the test run, fully open the spindle and ball stop valve.*
- *If not fully opened, the devices will be damaged.*
- *Do not attempt to turn service valve rod beyond its stop.*
- *Do not loosen the stop ring. If the stop ring is loosened, it is dangerous since the spindle will hop out.*
- *An excess or a shortage of refrigerant is the main cause of trouble to the units. Charge the correct refrigerant quantity according to the description of label at the inside of service cover.*
- *Check for refrigerant leakage in detail. If a large refrigerant leakage occurs, it will cause difficulty with breathing or harmful gases would occur if a fire was being used in the room.*
- *When the cap is removed, a hissing sound may be heard because the gas trapped at O-ring thread face is released. However, this is not gas leakage.*



1 Take the piping cover away from the unit. Then fetch the pipes through the rear side and route piping according to the installation place as shown in the figure. Make holes by cutting along the guideline at the rear of the cover or punching with a driver. Remove the burr with a cutter, and place a insulation (field supplied) to protect cables and pipes.



2 Attach the pipe cover in order to prevent rainwater from entering inside the cabinet.

3 Use a pipe bender for pipe bending work when connecting pipes.

4 Check to ensure that the stop valves are completely closed before connecting pipes.

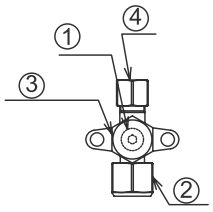
5 Connect the field supplied refrigerant pipes to the indoor unit and outdoor unit. Apply the oil thinly at the seat flare nut and pipe before tightening.

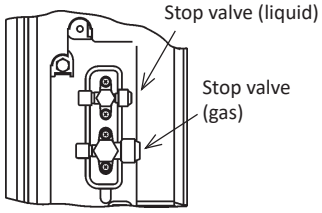
6 Operation of stop valve should be performed according to the figure below.

5.8.1 Outdoor unit stop valve

Operation of stop valve should be performed according to the figures and tables below:

Spindle Type

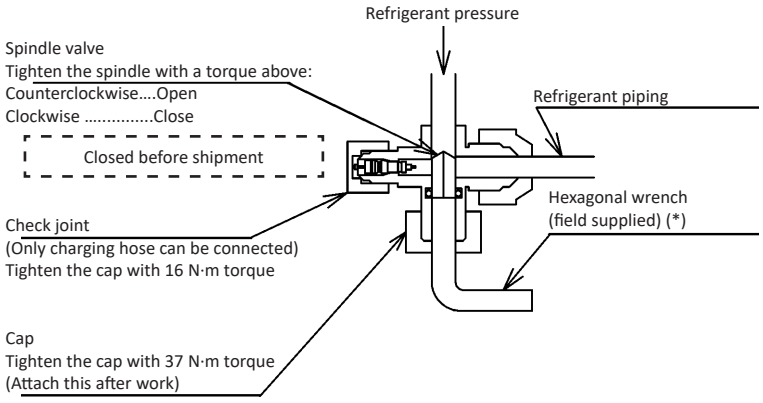




① Spindle valve
② Flare nut
③ Cap
④ Check joint for service port

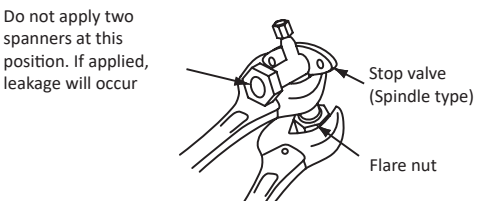
Closed upon factory shipping

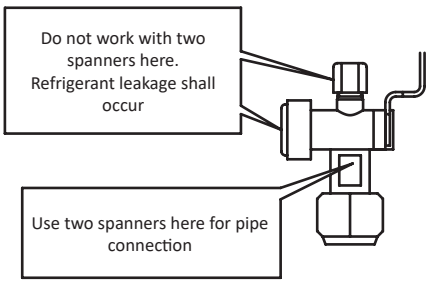
Outdoor unit	Tightening Torque (N·m)							
	①		②		③		④	
	Gas valve	Liquid valve	Gas valve	Liquid valve	Gas valve	Liquid valve	Gas valve	Liquid valve
RAS-(2/2.5)HVRC3	7-9	7-9	34-42	14-18	33-42	33-42	14-18	14-18
RAS-3HVRC3	9-11	7-9	68-82	34-42	33-42	33-42	14-18	14-18



(*) Size of hexagonal wrench size used for spindle valve:

	2HP / 2.5HP	3HP
Gas valve	4 mm	5 mm
Liquid valve	4 mm	4 mm

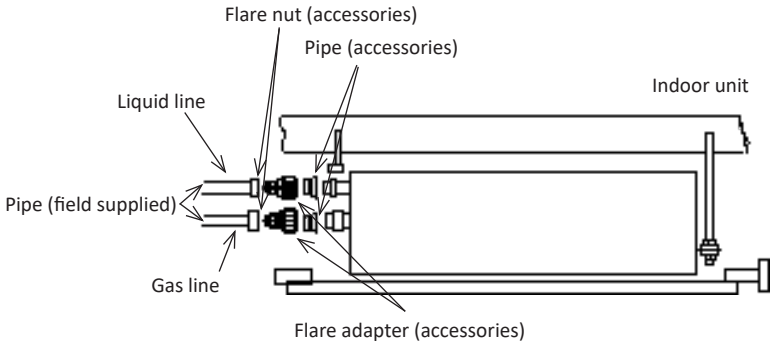




⚠ CAUTION

- *At the test run, fully open the spindle and ball stop valve.*
- *If not fully opened, the devices will be damaged.*
- *Do not attempt to turn service valve rod beyond its stop.*
- *Do not loosen the stop ring. If the stop ring is loosened, it is dangerous since the spindle will hop out.*
- *An excess or a shortage of refrigerant is the main cause of trouble to the units. Charge the correct refrigerant quantity according to the description of label at the inside of service cover.*
- *Check for refrigerant leakage in detail. If a large refrigerant leakage occurs, it will cause difficulty with breathing or harmful gases would occur if a fire was being used in the room.*

5.8.2 Connecting flare adapter



The piping sizes for indoor unit and outdoor unit are different. Attach the flare adapter (accessories) at the indoor piping union part.

Use the adequate flare adapter as follows:

Indoor unit	Flare adapter	
	Gas pipe	Liquid pipe
2.0 HP	Big size (∅15.88 → ∅12.70)	-
2.5 HP	Big size (∅15.88 → ∅12.70)	Small size (∅9.52 → ∅6.35)
3 HP	-	-

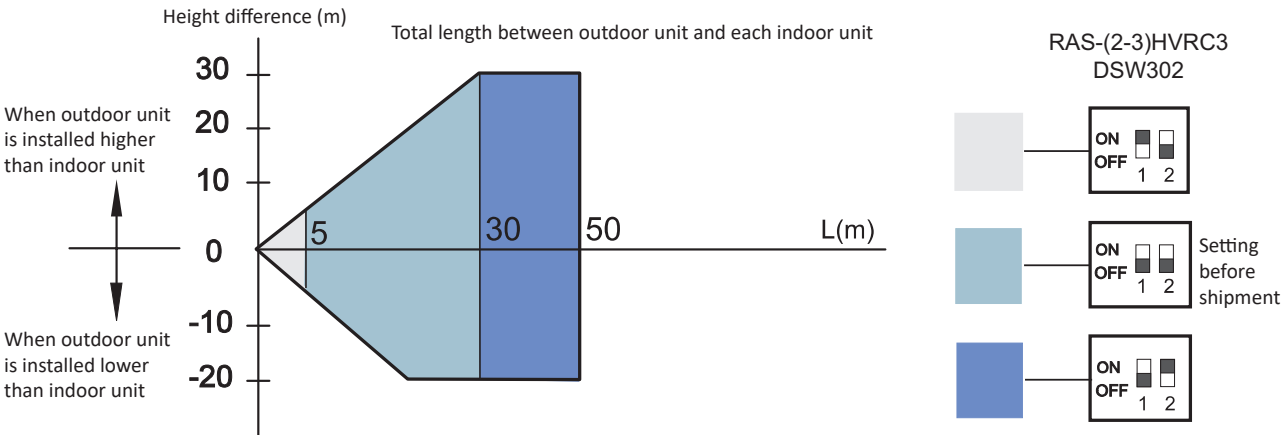
Refrigerant piping length

6.1 RAS-(2-3)HVRC3

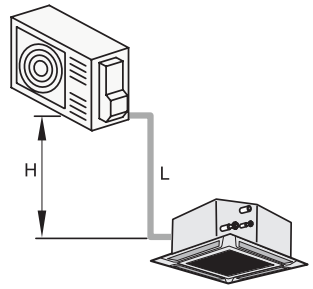
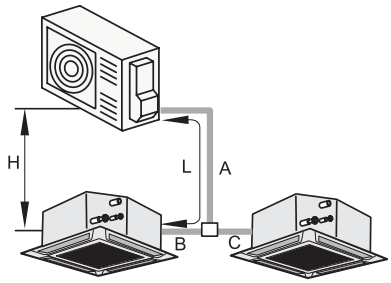
6.1.1 Refrigerant piping length

The refrigerant piping between the indoor unit and the outdoor unit should be designed using the following chart.

Keep the design point within the area of the chart, which is showing the applicable height difference according to piping length.



6.1.2 Piping system for header branch

1 indoor unit system (2, 2.5 or 3 HP outdoor unit)	2 indoor units system (3 HP outdoor unit)
	

(Pictures are as example)

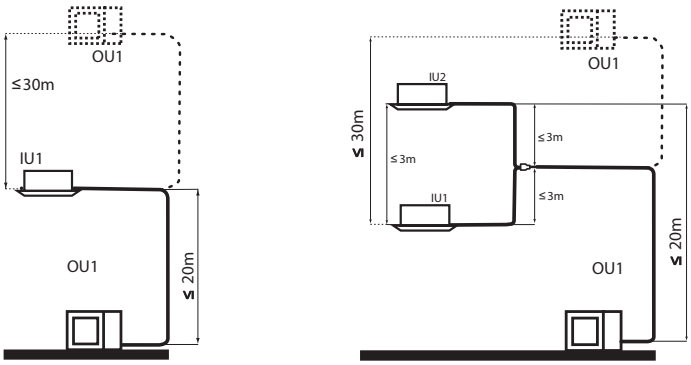
◆ Maximum refrigerant piping length

Outdoor Unit		2 HP	2.5 HP	3 HP
Maximum piping length between the outdoor unit and the farthest indoor unit	Actual length (L)	50	50	50
	Equivalent length (EL)	70	70	70
Total piping length	2 units (A+B+C)	--	--	50
Maximum piping line after first branch	2 units (B, C)	--	--	15
Main piping length A		--	--	A > B, C
Maximum height difference, Outdoor / Indoor (H) (Outdoor Unit is higher / lower)		30 / 20	30 / 20	30 / 20
Maximum height difference Indoor / Indoor		--	--	3
Maximum height difference: Branch pipe/indoor 2 indoor units system		--	--	3
Maximum length difference of the several branches: (B-C) (2 unit system)		--	--	< 8

NOTE

- *The liquid piping and the gas piping must be of the same piping length and run along the same route.*
- *Install the branch piping as much as possible near the indoor units.*
- *Install Multi-Kits at the same horizontal level.*

◆ Maximum height difference (clarification)



NOTE

All pictures are as example. Branch and headers are not showed as real sizes or real picture, for the installation of this components follow the technical documentation.

6.1.3 Combinations of piping size and piping length

Liquid	Ø6.35				Ø9.52	
Gas	Ø9.52	Ø12.70	Ø15.88	Ø19.05	Ø12.70	Ø15.88
Performance capacity	(m)					
2 HP	15 (1)	50	30	-	15 (3)	15 (3)
2.5 HP	-	50	30	-	20 (3)	20 (3)
3 HP	-	30 (1) (2)	30 (2)	-	30 (1)	50

	Standard

(1) Reducing gas pipe size will lower cooling capacity due to larger pressure loss in gas piping and narrow operation range.

(2) Reducing liquid pipe size will narrow operation range due to indoor unit relation with expansion valve capacity.

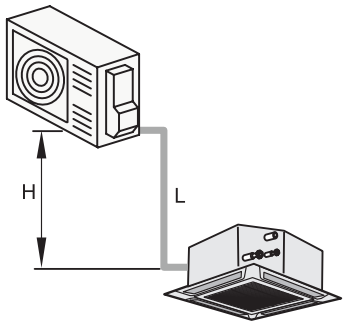
(3) Increasing liquid pipe size will require additional refrigerant charge.

6.1.4 Refrigerant piping size and Multi-Kit/distributor

Select the piping connection sizes according to the following procedures

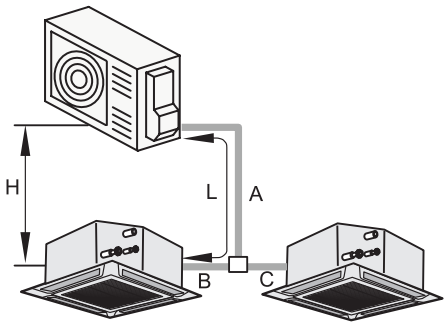
- Between outdoor unit and branch pipe: Select the same pipe connection size as the pipe size of the outdoor unit.
- Between branch pipe and indoor unit: Select the same pipe connection size as the pipe size of the indoor unit.

1 indoor unit system



Outdoor Unit HP	Pipe Size (L)	
	Gas	Liquid
2 / 2.5	Ø12.70	Ø6.35
3	Ø15.88	Ø9.52

2 indoor units system



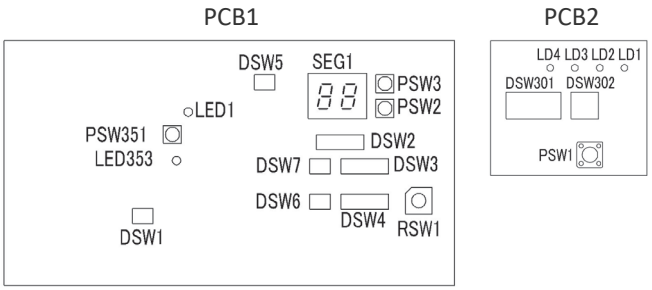
Outdoor Unit HP	Pipe Size (A)		Branch pipe
	Gas (mm)	Liquid (mm)	
3	Ø15.88	Ø9.52	E-102SN4

DIP switches

7.1 Setting of DIP switches for outdoor unit

◆ Quantity and position of DIP switches

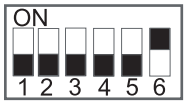
The PCB in the outdoor unit is operating with 9 types of DIP switches, and 4 push switches. The location is as follows:



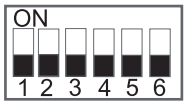
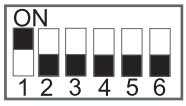
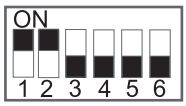
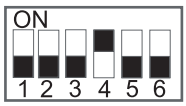
◆ DSW1: No setting is required

DSW1	
Factory setting When set pin number 1 to ON, the electric current detection is cancelled. Pin number 1 should be set back to OFF after electrical work.	

◆ DSW2: Optional function setting

DSW2	
Factory setting	
Annual cooling	
Optional function setting	
External input / output setting mode	

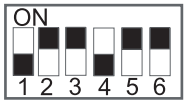
DSW301: Test run mode

DSW301	
Factory setting	
Cooling	
Heating	
Forced stop of compressor	

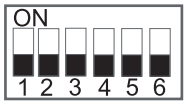
DSW302: Piping Length Setting (Setting is required)

DSW302	
Factory setting	
Pipe length (<5m)	
Pipe length (≥30m)	

◆ DSW3: Capacity Setting (No setting is required)

DSW3	
Model	RAS-2HVRC3
Factory setting	
Model	RAS-2.5HVRC3
Factory setting	
Model	RAS-3HVRC3
Factory setting	

◆ DSW4 / RSW1: Refrigerant cycle number setting (Setting is required)

DSW4	
Factory setting Setting for the tens digit	

RSW1	
Factory setting Set by inserting slotted screwdriver into the groove (setting for the last digit)	

◆ DSW5: End terminal resistance

DSW5	
Factory setting	

◆ DSW6: No setting is required (Do not change)

DSW6	
Factory setting	

◆ DSW7: No setting is required (Do not change)

DSW7	
Factory setting	

Commissioning

8.1 Main concerns for commissioning

When installation is completed, perform test run according to the following procedure, and hand over the system to the customer. Perform test run regarding indoor units one by one in order, and confirm that the electrical wiring and the refrigerant piping are correctly connected.

⚠ CAUTION

Do not operate the system until all the check points have been cleared:

- *Check to ensure that the electrical resistance is more than 1 MΩ, by measuring the resistance between ground and the terminal of the electrical parts. If not, do not operate the system until the electrical leakage is found and repaired. Do not impress the voltage on the terminals for transmission 1 and 2.*
- *Check to ensure that the stop valves of the outdoor unit are fully opened, and then start the system.*
- *Check to ensure that the switch on the main power source has been ON for more than 12 hours, to warm the compressor oil by the oil heater.*

Pay attention to the following items while the system is running:

- *Do not touch any of the parts by hand at the discharge gas side, since the compressor chamber and the pipes at the discharge side are heated higher than 90°C.*
- *DO NOT PUSH THE BUTTON OF THE MAGNETIC SWITCH(ES), it will cause a serious accident.*
- *Do not touch any electrical components for more than three minutes after turning OFF the main switch.*
- *Confirm that the gas line stop valve and the liquid line stop valve are fully open.*
- *Confirm that the leakage of the refrigerant does not exist. The flare nuts are sometimes loosened by vibration during transportation.*
- *Check that the refrigerant piping and the electrical wiring conform to the same system.*
- *Confirm that the DIP switch setting on the printed circuit board of the indoor units and the outdoor units are correct.*
- *Check whether or not the electrical wiring of the indoor units and the outdoor units are connected as shown in the chapter "DIP switches".*

⚠ CAUTION

Confirm that field-supplied electrical components (main switch fuse, fuse-free breaker, earth leakage breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data given in the Technical Catalog of the unit and ensure that the components comply with national and local codes.

ⓘ NOTE

- *For 2 indoor units system check the indoor unit outlet air temperature at test run. If the temperature difference is large, approximately: 10 deg. or more (in cooling mode); 20 deg. or more (in heating mode), recheck the refrigerant piping, installation may have some problem.*

Vacuum pumping

9.1 Basic Method

If the penetration of moisture is suspected, perform “Triple Evacuation Method” that is described in the next paragraph.

- 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 valve.
- Check for any gas leakage at the flare nut connection, by using nitrogen gas to increase the pressure at 4.15 MPa for outdoor units inside of the field-supplied piping.
- Connect a manifold gauge and vacuum pump to the check joints.

	RAS-(2-3)HVRC3
Heat pump system	Gas stop valve
	Liquid stop valve

- Continue vacuum pumping work until the pressure reaches 500 microns (0.5 mmHg) or lower for one to two hours.
- After vacuum pumping work, stop the vacuum pumping and leave the gauge for one hour. Check to ensure that the pressure in the manifold gauge does not increase.
- If the pressure inside the gauge does not maintain 500 microns (0.5 mmHg), it is considered that there is a gas leakage. Check for any gas leakage once again.
- If no leakage exists, operate the vacuum pumping for one to two hours. If moisture remains inside the pipes, the compressor may be damaged.
- Tighten the caps of check joint according to the specified torque after the vacuum pumping work.

NOTE

- *This system is only for the refrigerant R32. The manifold gauge and the charging hose should be exclusive use for the corresponding refrigerant.*
- *If tools or measuring instruments come into contact with the refrigerant, use the tools or the measuring instruments exclusively for the corresponding refrigerant.*
- *DO NOT perform vacuuming pumping work with valves of the outdoor units open. Otherwise, the refrigerant charged before shipment may leak and it may result in failure.*
- *When the spindle cap for stop valve is removed, the gas accumulated at O-ring or screws is released and may make sound. This phenomenon is NOT a gas leakage.*
- *If vacuum degree of 500 microns (0.5 mmHg) is not available, it is considered of gas leakage or entering moisture. Check for any gas leakage once again. If no leakage exists, operate the vacuum pump for more than one to two hours.*
- *Insulate the liquid pipe for prevention of the capacity decrease according to the ambient air conditions and the dewing on the pipe surface by the low pressure.*

9.2 Triple Evacuation Method

According to the following [Step 1] [Step 2] [Step 3] in order, conduct vacuum drying work.

Step 1

1 Vacuum until the pressure reaches 2000 microns (2.0 mmHg).
2 Pressurize with nitrogen up to 0.3 MPaG (50 PSIG) for 15 minutes.
3 Release pressure until reaching the atmosphere level, as low as 0.03 MPaG (5 PSIG).

Step 2

1 Vacuum until the pressure reaches 1000 microns (1.0 mmHg).
2 Pressurize with nitrogen up to 0.3 MPaG (50 PSIG) for 15 minutes.
3 Release pressure until reaching the atmosphere level, as low as 0.03 MPaG (5 PSIG).

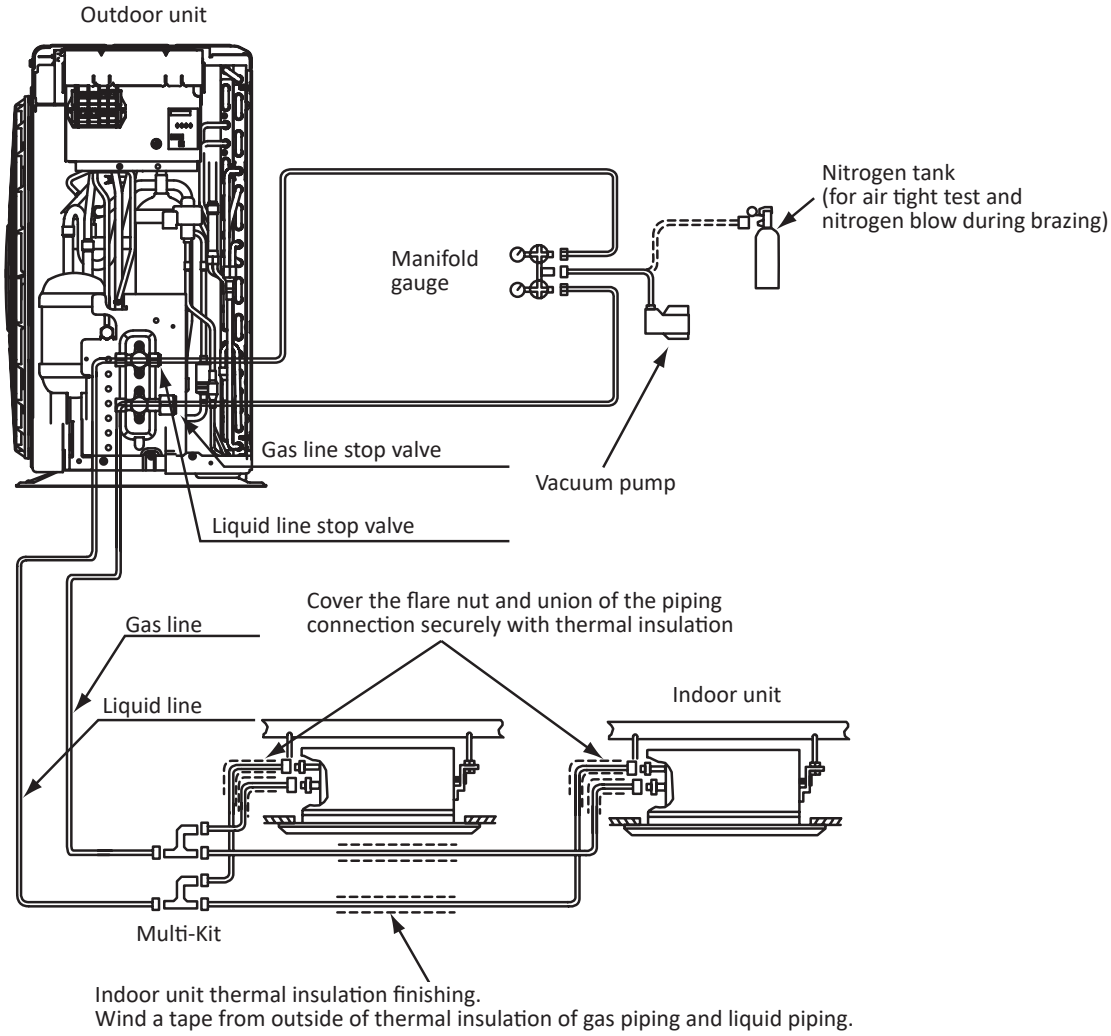
Step 3

1 Vacuum until the pressure reaches 500 microns (0.5 mmHg).
2 Stop vacuum pump.
3 Check that the vacuum 500 microns (0.5 mmHG) can maintain for one hour.

NOTE

- *If tool or measuring instruments come into contact with the refrigerant, use the tools or the measuring instruments exclusively designed for the task at hand.*
- *Do not perform vacuuming pumping work with valves of the outdoor units open. Otherwise, the refrigerant charged before shipment may leak and it may result in failure. If moisture remains inside the pipes, the compressor may be damaged.*

9.3 RAS-(2-3)HVRC3 vacuum pumping example



Charging work

10.1 Important considerations

Appropriate refrigerant

The refrigerant used in each unit is identified on the specification label and manuals of the unit. Hitachi shall not be held liable for any failure, trouble, malfunction or accident caused by units illegally charged with refrigerants other than the specified one.

Consequences of charging non-specified refrigerant

It may cause mechanical failure, malfunction and other accidents.

It may cause operational failure of protection and safety devices of air conditioners.

It may also cause lubrication failure of the sliding part of the compressor due to deterioration of refrigerant oil.

In particular, hydrocarbon refrigerants (such as propane, R441A, R443A, GF-08, etc.) are not allowed, since these are combustible and may cause major accidents such as fire and explosion in case of improper handling.

Once a non-specified refrigerant has been charged, no further servicing (including draining of refrigerant) shall be performed, even in case of malfunction. Improper handling of refrigerant may be a cause of fire and explosion, and servicing in such cases may be considered an illegal act.

End clients and costumers shall be informed that servicing is not approved, and the installer who charged the non-specified refrigerant shall be asked to fix the unit.

Hitachi will accept no responsibility for units that have been charged with non-specified refrigerant once.

⚠ DANGER

Use refrigerant R32 according to the outdoor units model in the refrigerant cycle. Do not charge oxygen, acetylene or other flammable and poisonous gases into the refrigerant cycle when performing a leakage test or an air-tight test. These types of gases are extremely dangerous and can cause an explosion. It is recommended that compressed air, nitrogen or refrigerant be used for these types of test.

- After vacuum pumping work, keep the gas valve and liquid valve fully closed.
- Check if the system needs an additional charge of refrigeration.
- If the total refrigerant amount of the system is insufficient, charge the additional refrigerant, which amount is calculated, from the check joint of the liquid valve. (Additional refrigerant tolerance shall be +0.5 kg.) according to follows:
  - ✓ Fully open the gas valve.
  - ✓ 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.

✓ Charge the proper quantity of refrigerant according to the piping length (Calculate the quantity of the refrigerant charge). Charged quantity needs to be controlled by a weighing equipment.

✓ Charge refrigerant by opening the gauge manifold valve. Charge the required refrigerant by operating the system in cooling.

✓ With the gas line stop valve fully open, slightly open the liquid line stop valve.

✓ Operate the compressor at the cooling mode. At this time, liquid valve is slightly opened. Continue cooling operation for more than 10 minutes to circulate the refrigerant.

✓ Fully open the gas valve and liquid valve.

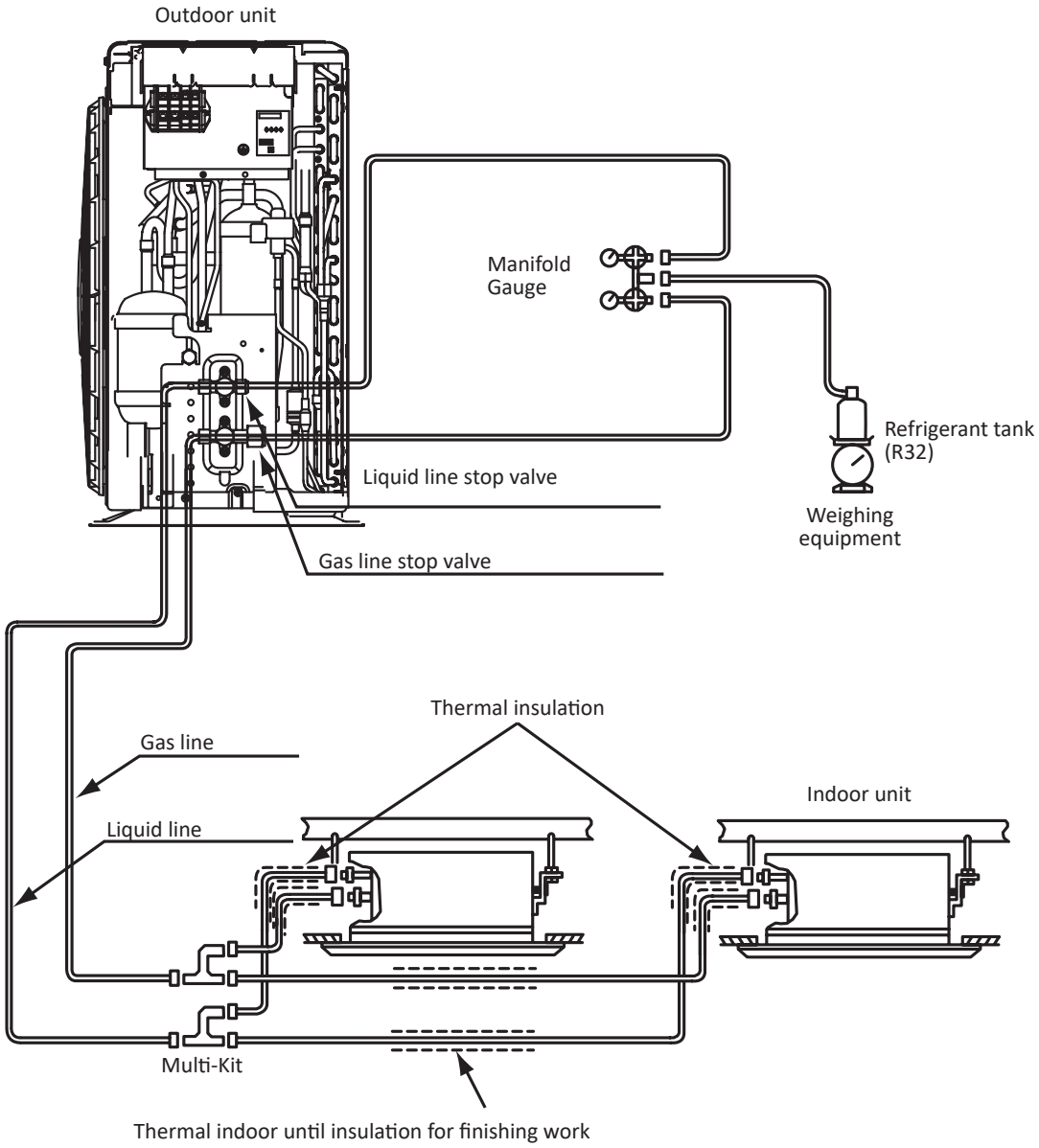
⚠ **CAUTION**

- *If the total refrigerant amount is excessive or insufficient, the compressor will be damaged.*
- *Be sure to charge the refrigerant in the liquid condition.*
- *The additional refrigerant charge must be performed from the check joint of the liquid valve. If the additional refrigerant is charged from the check joint of the gas valve, the compressor will be damaged.*
- *Insulate the liquid pipe for prevention of the capacity decrease according to the ambient air conditions and the dewing on the pipe surface by the low pressure. Insulate the flare nut and union of the piping connection.*
- *Check for refrigerant leakage in detail to ensure that there is no gas leakage. When large amount of the refrigerant leaks, the troubles as follows may occur.*

  ✓ Oxygen deficiency: it will cause difficulty with breathing or harmful gases would occur.

  ✓ Generation of harmful gas due to chemical reaction with fire.
- *An excess or a shortage of refrigerant is the main cause of trouble to the units. Charge the correct refrigerant quantity according to the description of label at the inside of service cover.*
- *Never use the refrigerant charged in the outdoor unit for air purging. If used, insufficient refrigerant will lead to failure.*

10.2 RAS-(2-3)HVRC3 charging work example



Refrigerant pump down

11.1 General considerations

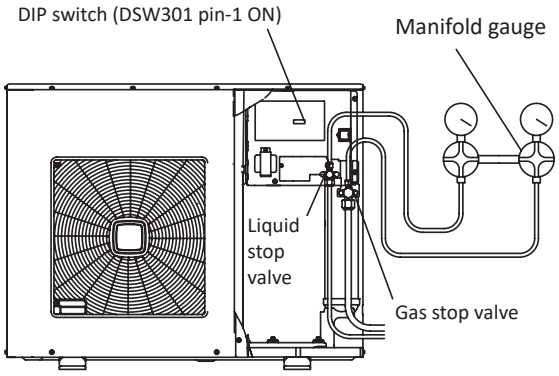
When the refrigerant should be collected into the outdoor unit due to indoor/outdoor unit relocation, collect the refrigerant as follows:

- Attach the manifold gauge to the gas stop valve and the liquid stop valve.
- Turn ON the power source.
- On outdoor unit PCB set the DSW301- pin1 ON for cooling operation.
- Close the Liquid stop valve on the unit and collect the refrigerant.
- When the pressure at lower pressure side (gas stop valve) indicates -0.01 MPa (-100 mmHg), perform the following procedures immediately.
  - ✓ Close the “gas stop valve” or the “High/ Low gas stop valve” depending on the unit series.
  - ✓ Set the DSW turned ON before at the OFF side (To stop the unit operation).
- Turn OFF the power source.

⚠ CAUTION

- *Measure the low pressure by the pressure gauge and keep it not to decrease than -0.01 MPa.*
- *If the pressure is lower than -0.01 MPa, the compressor may be faulty.*

11.2 RAS-(2-3)HVRC3 refrigerant pump down example



H-LINK II system

12.1 General considerations

The H-LINK II system can not be applied to the cycle with the old H-LINK model.

1 Application

The H-LINK II connecting each indoor unit and outdoor unit for up to 64 refrigerant cycles, and connecting wires for all indoor units and all outdoor units in series.

2 Specifications

- ✓ Transmission Wire: 2-Wire.
- ✓ Polarity of transmission wire: Non-Polar wire.
- ✓ Maximum number of outdoor units to be connected: 64 units per H-LINK II system.
- ✓ Recommended number of indoor units to be connected: 64 Units per H-LINK II system.
- ✓ Maximum wiring length: total 1000 m (including CS-NET). In case that the total wiring length is longer than 1000 m, contact the Hitachi dealer.
- ✓ Recommended cable: twist pair cable with shield, over 0.75 mm2 (Equivalent to KPEV-S).
- ✓ Voltage: 5 V.

Do not make a wiring in a loop.

3 DSW setting of indoor PCB and outdoor PCB.

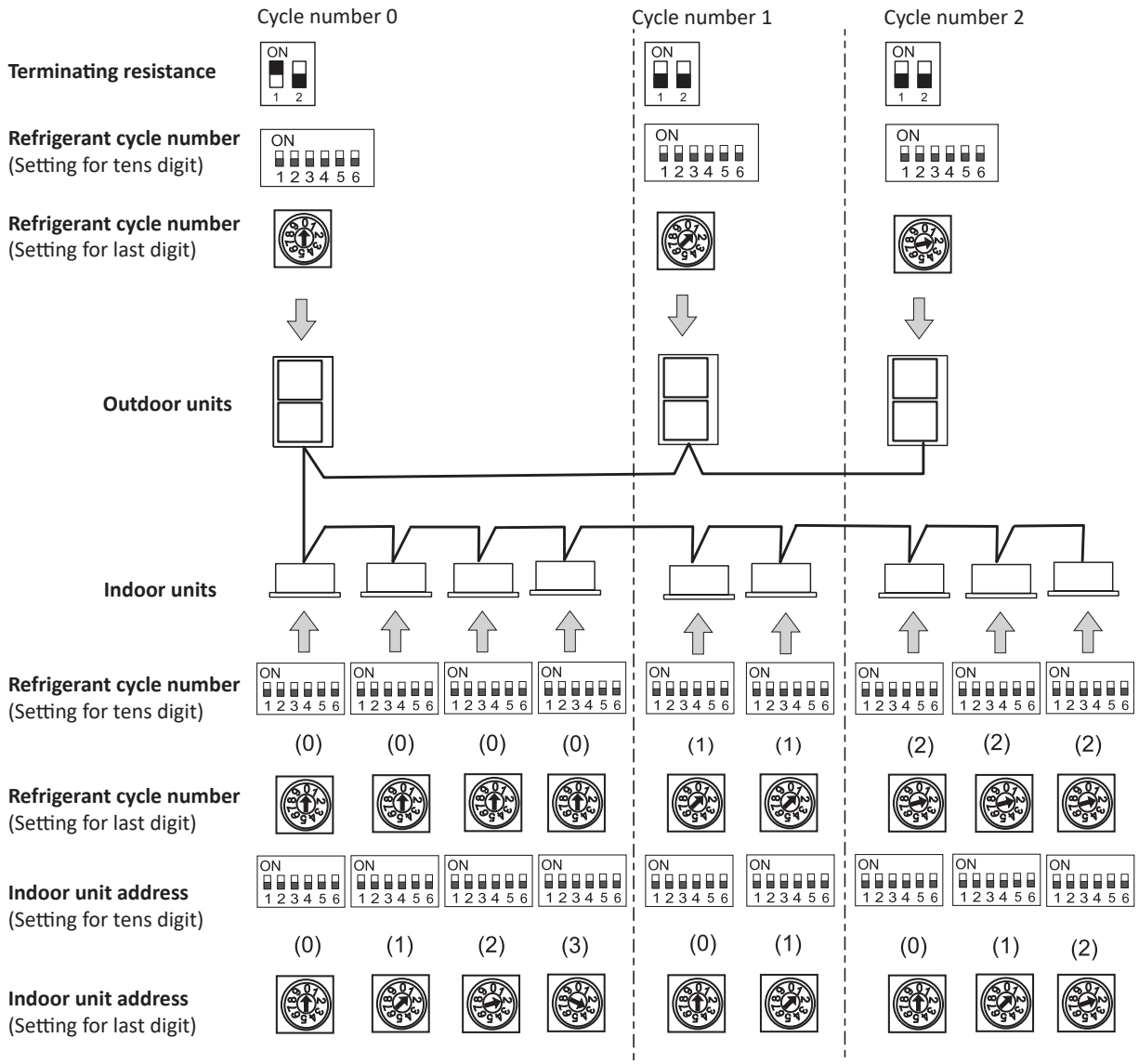
It is recommended to set dip switches of every indoor unit and outdoor unit.

12.2 System installation DSW Setting

DSW setting of indoor PCB and outdoor PCB for H-LINK II

It is required to set DSW of every indoor unit and outdoor unit and match of the transmission circuit impedance.

DSW Setting example:



Outdoor unit	RAS-(2-3)HVRC3	Function
Refrigerant cycle	DSW4 / RSW1	For setting refrigerant cycle address of outdoor unit. Set the DSW and RSW not to overlap the setting of other outdoor unit in the same H-LINK system.
Terminal resistance	DSW5	For matching impedance of transmission circuit, set the DSW5 according to the quantity of outdoor units in the H-LINK system.

Indoor unit		
Refrigerant cycle	DSW5 RSW (1/2) (*)	For setting refrigerant cycle address of indoor units. Set the DSW5 and RSW1/2 (*) corresponding to the address of outdoor unit in the same refrigerant cycle.
Indoor unit address	DSW6 RSW (1/2) (*)	For setting indoor unit address. Set the DSW6 and RSW1/2 (*) not to overlap the setting of other indoor units in the same refrigerant cycle. (If not set, the automatic address function is performed).

(*) See in the indoor unit technical documentation de corresponding RWS number.

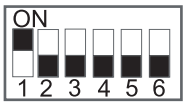
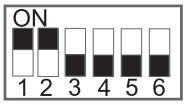
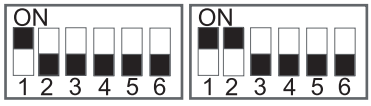
Test run from outdoor unit side

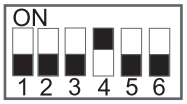
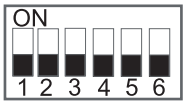
13.1 RAS-(2-3)HVRC3 test run procedure

The procedure of test run from outdoor unit side is indicated below. Setting of this DSW is available with the power source ON.

⚠ CAUTION

- *Do not touch any other electrical parts when operating switches on the PCB.*
- *Do not attach or detach service cover when the power source for the outdoor unit is ON and the outdoor unit is operated.*
- *Turn all pins of DSW1 OFF when the test run operation is completed.*

Operation	DSW Setting	Operation	Remarks
Test run	❶ Setting of operation mode: Cooling: Set DSW301-1 ON.  Heating: Set DSW301-2 ON.  ❷ Starting test run: Set DSW301-1 = ON and the operation is started after a few ~20 seconds. Cooling Heating  	❶ The indoor unit automatically start to operate when the test run of the outdoor unit is set. ❷ The ON/OFF operation can be performed from the remote control switch or DSW301-1 of the outdoor unit. ❸ Continuous operation during 2 hours is performed without Thermo-OFF. NOTE • *TEST RUN operation time can be increased depressing the time switch in the Remote Control.* • *If is setting DSW301-3 = ON, cooling/heating short test run procedure mode is activated.*	• Take care that the indoor units start operation in accord with the test run operation of the outdoor unit. • The test run is started from the outdoor unit and stopped from the remote control switch, the test run function of the remote control switch is cancelled. However, the test run function of the outdoor unit is not cancelled. • In case that the plural indoor units are connected with one remote control switch, all the units start test run operation at the same time, therefore, turn the power source OFF for the indoor units not to operate test run. In this case, the "TEST RUN" indication of the remote control switch may flicker, and this is not abnormal. • The setting of DSW1 is not required for the test run from the remote control switch.

Operation	DSW Setting	Operation	Remarks
Manual OFF of compressor	❶ Setting: Compressor Manual OFF: DSW301-4 ON.  Compressor ON: DSW301-4 OFF. 	❶ When DSW301-4 is ON during compressor operation, the compressor stops to operate immediately and the indoor unit is under the condition of Thermo-OFF. ❷ When DSW301-4 is OFF, the compressor starts to operate after the cancellation of 3-minutes guard.	• Do not repeat compressor ON/OFF frequently.
Manual defrost	❶ Manual defrost operation starts Press PSW1 for more than 3 seconds during heating operation, the defrost operation is started after 2 minutes. This function is not available within 5 minutes after starting heating operation. ❷ Manual defrost operation finishes Defrost operation is automatically ended and the heating operation is started.	❶ Defrost operation is available regardless of frosting condition and total time of heating operation. ❷ Defrost operation in not performed when the temperature of outdoor heat exchanger is higher than 10°C, high pressure is higher than 3.3 MPa (33 kgf/cm^{2}G) or Thermo-OFF.	• Do not repeat defrost operation frequently.

13.2 Test run check list

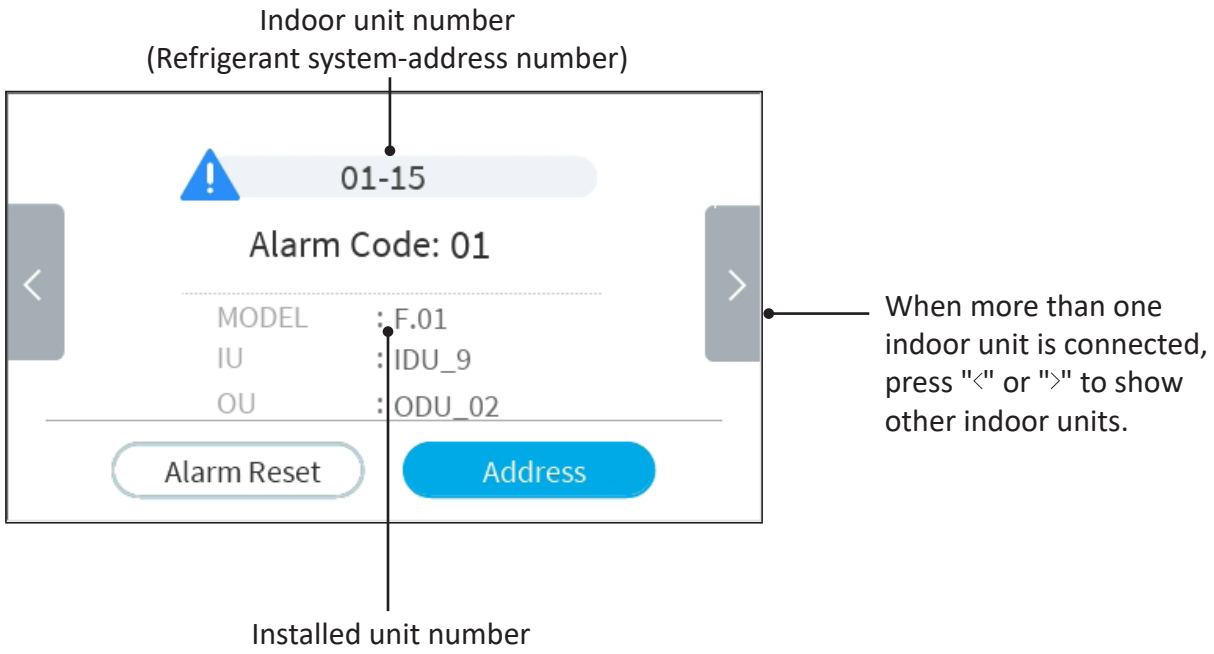
MODEL:		SERIAL NUMBER:		COMPRESSOR MANUFACTURER NUMBER:	
CUSTOMER'S NAME AND ADDRESS:				DATE:	

1	Is the rotation direction of the indoor fan correct?					☐
2	Is the rotation direction of the outdoor 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	N° 1 DB__/WB__°C	N° 2 DB__/WB__°C	N° 3 DB__/WB__°C	N° 4 DB__/WB__°C	
•	Outlet	DB__/WB__°C	DB__/WB__°C	DB__/WB__°C	DB__/WB__°C	
•	Inlet	N° 5 DB__/WB__°C	N° 6 DB__/WB__°C	N° 7 DB__/WB__°C	N° 8 DB__/WB__°C	
•	Outlet	DB__/WB__°C	DB__/WB__°C	DB__/WB__°C	DB__/WB__°C	
6	Check outdoor ambient temperature					
•	Inlet	DB _____°C	WB _____°C			
•	Outlet	DB _____°C	WB _____°C			
7	Check refrigerant temperature					
•	Liquid temperature:	_____°C				
•	Discharge gas temperature:	_____°C				
8	Check pressure					
•	Discharge pressure:	_____MPa				
•	Suction pressure:	_____MPa				
9	Check voltage					
•	Rated voltage:	_____V				
•	Operating voltage:	L1-L2 _____V	L1-L3 _____V	L2-L3 _____V		
•	Starting voltage:	_____V				
•	Phase imbalance:	$1-\frac{V}{Vm}$ =_____V				
10	Check compressor input running current					
•	Input:	_____kW				
•	Running current:	_____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 free from rattles?					☐
17	Is the filter clean?					☐
18	Is the heat exchanger clean?					☐
19	Are the stop valves open?					☐
20	Does the drain water flow smoothly from the drain pipe?					☐

Troubleshooting

14.1 On-screen display during abnormal operation

PC-ARFG-E example



Abnormal operation can be produced due to the following reasons:

◆ Malfunction

If the RUN LED flickers for 2 seconds, there is a failure in the transmission between the indoor unit and the remote control switch.

Possible causes are:

- Broken remote cable.
- Contact failure in the remote control cable.
- Defective IC or defective microcomputer.

In any case, ask your retailer for service.

If the RUN LED flickers 5 times (5 seconds) with the unit number and the alarm code displayed, make a note of the alarm code (refer to the table below) and ask your retailer for service.

The RUN (red) indicator flashes

The ALARM indicator appears on the liquid crystal display.

The screen also displays the following items:

✓ A: indoor unit address (Abnormal Indoor Unit Number).
✓ B: Refrigerant cycle number (Abnormal Refrigerant Cycle Number).
✓ C: Alarm code.

✓ D: Model code.

Model code	
Indication	Model
H	Heat pump
P	Inverter
F	Multi (SET FREE)
C	Cooling only
E	Other
b	IVX, individual operation
L	KPI

✓ E: If there are various indoor units connected, the above mentioned information is shown for each one of them.

◆ Power supply failure

All the indications are OFF.

Once the unit is stopped by the power failure, the unit will not be started again although the power recovers. Perform the starting procedures again. In case of instantaneous power failure within 2 seconds, the unit will be started again automatically.

◆ Electrical noise

There could be a case that all the indications are OFF and the unit is stopped. This is occurred by the activation of the micro computer for the unit protection from the electric noise. Perform the starting procedures again.

14.2 Main Alarm Codes

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section.
- The unit number and the alarm code are displayed on the 7 segments of the outdoor unit PCB and remote control screen (if installed).
- The list of the alarms which are actually shown in the remote control switch display may vary depending on the models and combinations of indoor and outdoor units. The causes leading to the activation of a specific alarm in certain models may not trigger the same alarm in other models, without this implying an abnormality.

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of protection device (float switch)	Activation of float switch (high water level in drain pan, abnormality of drain pipe, float switch, or drain pan)
02	Outdoor Unit	Activation of protection device (High pressure cut)	Activation of PSH (pipe clogging, excessive refrigerant, inert gas mixing)
03	Communication	Abnormal communication between indoor units and outdoor units	Incorrect wiring, loose terminals, disconnected communication cable, blowout of fuse, indoor unit Power OFF
04		Abnormal communication between inverter PCB and outdoor PCB	Inverter PCB - outdoor PCB communication failure (loose connector, wire breaking, blowout of fuse)
05	Supply Phase	Abnormality of power supply phases	Incorrect power supply, connection to reversed phase, Open-phase
06	Voltage	Abnormal inverter voltage	Outdoor voltage decrease, insufficient power capacity
07	Cycle	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)
0A	Communication	Abnormal communication between outdoor units	Incorrect wiring, breaking wire, loose terminals
0b	Outdoor Unit	Incorrect outdoor unit address setting	Duplication of address setting for outdoor units (sub units) in same refrigerant cycle number
0C		Incorrect outdoor unit main unit setting	Two (or more) outdoor units set as "main unit" exist in same refrigerant cycle number
11	Sensor on Indoor Unit	Abnormality of inlet air thermistor	Incorrect wiring, disconnecting wiring, breaking wire, short circuit DOAS: Dedicated outdoor air system, all fresh air indoor unit
12		Abnormality of outlet air thermistor	
13		Abnormality of freeze protection thermistor	
14		Abnormality of gas piping thermistor	
15		Abnormality of outdoor air thermistor (EconoFresh)	
16		Abnormality of remote sensor (DOAS), not for EU market	
17		Abnormality of thermistor built-in remote controller (DOAS), not for EU market	

Code	Category	Content of Abnormality	Leading Cause
18	Indoor Fan Motor	Abnormality of indoor fan system	Abnormality of indoor fan motor (step-out), indoor fan controller failure
19		Activation of protection device for indoor fan	Fan motor overheat, lockup
1A	Indoor Fan Controller	Abnormality of fan controller fin temperature	Abnormality of fin thermistor or fan controller, heat exchanger clogging, abnormality of fan motor
1b		Activation of overcurrent protection	Abnormality of fan motor
1C		Problem with current sensor	Abnormality of fan controller current sensor
1d		Activation fan controller protection	Driver IC error signal detection, instantaneous overcurrent
1E		Abnormality of indoor fan controller voltage	Indoor voltage decrease, insufficient capacity of power supply wiring
21	Sensor on Outdoor Unit	Abnormality of high pressure sensor	Incorrect wiring, disconnecting wiring, breaking wire, short circuit
22		Abnormality of outdoor air thermistor	
23		Abnormality of discharge gas thermistor on top of compressor	
24		Abnormality of heat exchanger liquid pipe thermistor	
25		Abnormality of heat exchanger gas pipe thermistor	
29		Abnormality of low pressure sensor	
30	System	Incorrect DSW settings of outdoor unit for CH-Box	Connection of CH-Box to heat pump system, disconnection of CH-Box to heat recover system
31		Incorrect capacity setting of outdoor unit and indoor unit	Incorrect capacity setting of outdoor unit and indoor unit, excessive or insufficient indoor unit total capacity code
35		Incorrect setting of indoor unit number	Duplication of indoor unit number in same refrigerant cycle number
36		Incorrect of indoor unit combination	Indoor unit is designed for R22
38		Abnormality of picking up circuit for protection in outdoor unit	Failure of protection detecting device (incorrect wiring of outdoor PCB)

Code	Category	Content of Abnormality	Leading Cause
3A	Outdoor Unit	Abnormality of outdoor unit capacity	Outdoor unit capacity > permitted maximum
3b		Incorrect setting of outdoor unit models combination or voltage	Incorrect setting of main and sub units(s) combination or voltage
3d		Abnormal communication between main unit and sub unit(s)	Incorrect wiring, disconnect wire, breaking wire, PCB failure
3E		Abnormal combination between inverter PCB and outdoor PCB	Incorrect combination between inverter PCB and outdoor PCB
43	Protection Device	Activation of pressure ratio decrease protection	Defective compression (failure of compressor or inverter, loose power supply Connection)
44		Activation of low pressure increase protection	Overload at cooling, high temperature at heating, expansion valve locking at open position (loose connector)
45		Activation of high pressure increase protection	Overload operation (heat exchanger clogging, short circuit of airflow), pipe clogging, excessive refrigerant, inert gas mixing
47		Activation of low pressure decrease protection	Insufficient refrigerant, piping clogging, expansion valve locking at close position (loosen connector)
48		Activation of inverter overcurrent protection	Overload operation, compressor failure
49	Outdoor Unit	Shortage of energy transfer at indoor unit and outdoor unit side	Shortage of refrigerant due to gas leakage
51	Sensor	Abnormal inverter current sensor	Current sensor failure
53	Inverter	Inverter error signal detection	Driver IC error signal detection (protection for overcurrent, voltage decrease, short circuit), instantaneous overcurrent
54		Abnormality of inverter fin temperature	Abnormal inverter fin thermistor, heat exchanger clogging, fan motor failure
55		Inverter failure	Inverter PCB Failure
57	Fan Controller	Activation of fan controller protection	Driver ic error signal detection (protection for overcurrent, voltage decrease, short circuit), instantaneous overcurrent
5A		Abnormality of fan controller fin temperature	Fin thermistor failure, heat exchanger clogging, fan motor failure
5b		Activation of overcurrent protection	Fan motor failure
5C		Abnormality of fan controller sensor	Failure of current sensor (instantaneous overcurrent, increase of fin temperature, voltage decrease, grand fault, step-out)
A1	External Input	Detection of external abnormality	Input signal by external abnormality detection setting

Code	Category	Content of Abnormality	Leading Cause
b0	Indoor Unit	Incorrect setting of unit model code	Incorrect setting of indoor unit model
b1		Incorrect setting of unit and refrigerant cycle number	64 or more number is set for address or refrigerant cycle
b2		Abnormality of EEPROM	EEPROM failure, incorrect data of EEPROM
b5		Incorrect indoor unit number setting	There are 17 or more non-corresponding to H-LINK II units are connected to one system.
b6		Abnormal communication between indoor PCB and indoor fan controller	Communication failure, disconnected communication cable, abnormal connection
C1	CH-Box (Change-Over Box)	Incorrect CH-Box connection	2 or more CH-Box are connected between outdoor unit and indoor unit
C2		Incorrect indoor unit connection number	9 or more indoor units connected to single branch type CH-Box 7 or more indoor units connected per a branch of multiple branch type CH-Box
C3		Incorrect indoor unit refrigerant number setting	Indoor units of different refrigerant cycle number are connected to CH-Box
C4		Incompatible outdoor unit connection (CH-Box)	This outdoor unit is not compatible with this CH-Box.
C5		Incorrect connection port setting	Indoor unit is connected to a port that is set to not used for multiple branch type CH-Box
EE	Compressor	Compressor protection alarm (It can not be reset from wired controller)	This alarm code appears when the following alarms* occurs three times within 6 hours *02, 07, 08, 39, 43 to 45, 47

Maintenance

15.1 General considerations

DANGER

- ***Turn OFF the power source before the maintenance work. If not, it may cause a fire or an electric shock.***
- ***Perform the maintenance work with stable footing. If not, it may cause falling or injury.***

NOTE

Do not operate the system without the air filter to protect the indoor unit heat exchanger against being clogged.

◆ Maintenance beginning and ending of use

Beginning of use

Remove obstacles for the air inlet grilles of indoor unit and outdoor unit and the air outlet.

Check that the air filter is not clogged.

Ending of use

Clean the air filter, the air inlet grille and the flat panel.

15.2 General maintenance work

For the indoor unit and the outdoor unit

1 Fan and fan motor

✓ Lubrication: All the fan motors are pre-lubricated and sealed at the factory. Therefore no lubrication maintenance is required.

✓ Sound and vibration: Check for abnormal sounds and vibrations.

✓ Insulation: Check the electrical insulation resistance.

2 Heat exchanger

✓ Clog: Inspect the heat exchanger at regular intervals and remove any accumulated dirt and any accumulated dust from the heat exchanger. You should also remove from the outdoor units other obstacles such as the growing grass and the pieces of paper which might restrict the airflow.

3 Piping connection

✓ Leakage: Check for the refrigerant leakage at the piping connection.

4 Cabinet

✓ Stain and lubrication: Check for any stain and any lubrication. Remove the stain and the lubrication.

✓ Fixing screw: Check for any loosened screw or any lost screw. Fix the loosened screws and the lost screws.

✓ Insulation material: Check for any peeled thermal insulator on the cabinet. Repair the thermal insulator.

5 Electrical equipment

✓ Activation: Check for an abnormal activation of the magnetic contactor the auxiliary relay the PCB and others.

✓ Line condition: Pay attention to the working voltage the working amperage and the working phase balance. Check for any faulty contact that is caused by the loosened terminal connections the oxidized contacts the foreign matter and other items. Check the electrical insulation resistance.

6 Control device and protection device

✓ Setting: Do not readjust the setting in the field unless the setting is maintained at a point that is different from the point listed in the service manual of the unit.

For the outdoor unit

1 Compressor

✓ Sound and vibration: Check for abnormal sounds and vibrations.

✓ Activation: Check that the voltage drop of the power supply line is within 15% at the start and within 2% during the operation.

2 Fan

✓ Rotation: Check the counter clockwise (or Clockwise according to de outdoor unit model) rotation and the rotating speed.

3 Reverse valve

✓ Activation: Check for any abnormal activation sound.

4 Strainer

✓ Clog: Check that there is no temperature difference between both ends.

5 Ground wire

✓ Ground line: Check for the continuity to earth.

6 Oil heater

✓ Activation: You should activate the oil heater at least twelve hours before the start-up by turning ON the main switch.

Optional parts for RAS-(2-3)HVRC3 series

16.1 Assigned models and quantity

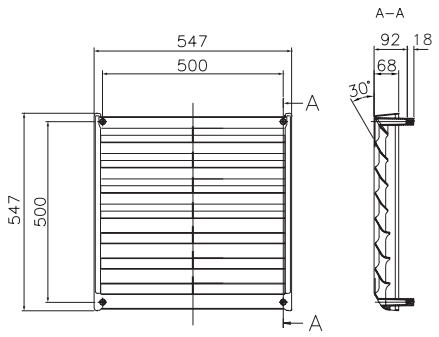
		RAS-(2-3)HVRC3
Air flow guide		
AG-264		1
Wind guard		
WSP-SP10A		1
Snow protection hood (Zinc plate)		
ASG-SP10FTB (Half)	Air outlet	1
ASG-SP11FTB (Full)		1
ASG-SP10BTB	Air inlet of rear side	1
ASG-SP10LTB	Air inlet of side face	1

16.2 Air flow guide

16.2.1 AG-264

◆ Specifications

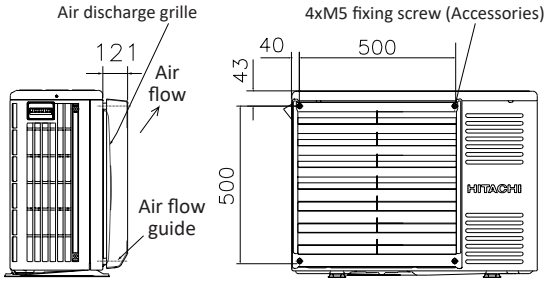
Air discharge direction		Upward (downward) left and right
Material		Weather proof polypropylene resin
Color		Gray (Munsell code: 1.0Y8.5/0.5)
Weight		1.7 kg
Accessories	Fixing screw	4 x [M5 (SUS) x 12] + 4 x [M5 (SUS) x 30]
	Self-screw	Self-screw 2x [M4 x 13]
		Installation manual
Installation restriction		"Wind Guard" or "Snow protection hood" is not available to install with air flow guide. ("Guard net" is available to be installed together.)



◆ Air flow guide installation

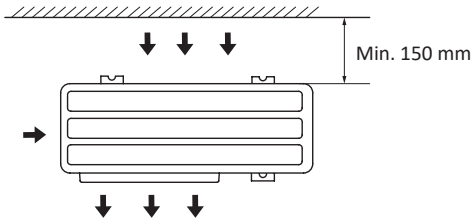
One air flow installation

The holes for the attachment of the airflow guide shall be first opened using a M4x13 self-tapping screw at the designated locations, then removing the self-tapping screw and using the supplied M5x12 SUS screws for fixing the airflow guide.



◆ Service space

- In case of right and left sides air discharge enough space for air discharge is required.
- The downward air discharge is also available. In such case install the base under the unit to secure enough space for air discharge.
- In case of serial units installation air discharge should be upward.

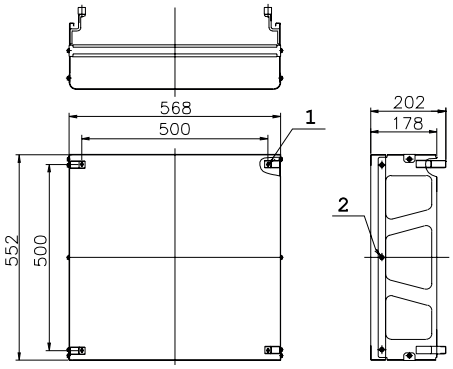


16.3 Wind guard

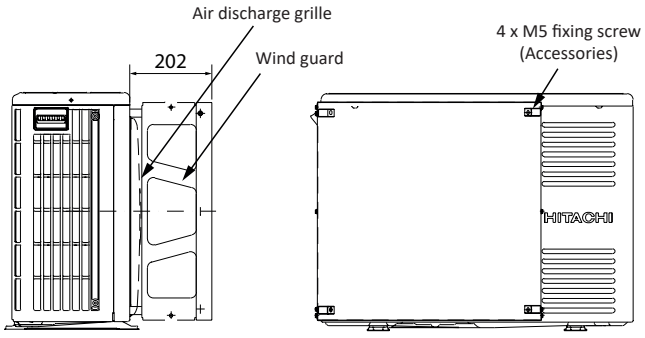
16.3.1 WSP-SP10A

◆ Specifications

Material		Galvanized sheet metal + baked painting
Color		UTOPIA Beige (Munsell code: 2.5Y8/2)
Weight		4.0 kg
Accessories	Unit fixing screw	4 x [M5 (SUS) x 30]
	Wind guard fixing screw	10 x [M5 (SUS) x 12]
		Installation manual
Installation restriction		"Guard net" "Air flow guide" or "Snow protection hood" is not available to install with Wind guard
		4-6x10 Long Hole 5 (Both Sides) - M5 Screw (attachment)

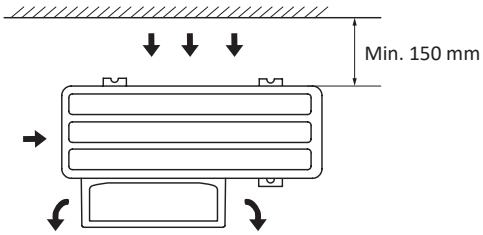


◆ One wind guard cover installation



◆ Service space (In case of upward air discharge)

- In case of right and left sides air discharge enough space for air discharge is required.
- The downward air discharge is also available. In such case install the base under the unit to secure enough space for air discharge.
- In case of serial units installation air discharge should be upward.

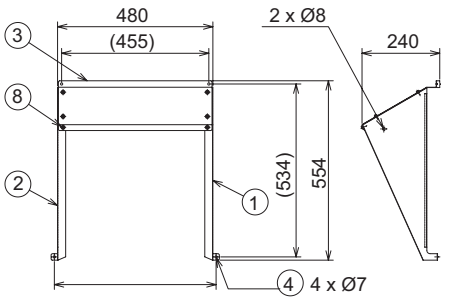


16.4 Snow protection hood

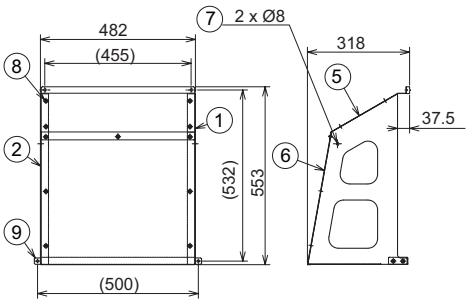
16.4.1 Air discharge hood

Product name	ASG-SP10FTB (Half) (1) ASG-SP11FTB (Full) (2)
Material	Bonderized steel sheet
Color	Gray (1.0Y8.5/0.5)
Weight	(1) 1.9 kg (2) 4.3 kg
Assembling	Assembly on site
Components	
Hood	For air discharge part x1
Fixing screw	(1) 7 x [M5x12] (2) 16 x [M5x12]
Hood fixing screw (SUS)	5 x [M5x16]
Self-screw	2 x [M4x13]
Installation restriction	Installation with “Air flow guide” or “Wind guard” is not available.
Safety wire rope	ASG-SW20A (for overturning prevention (optional parts))

(1) Half type



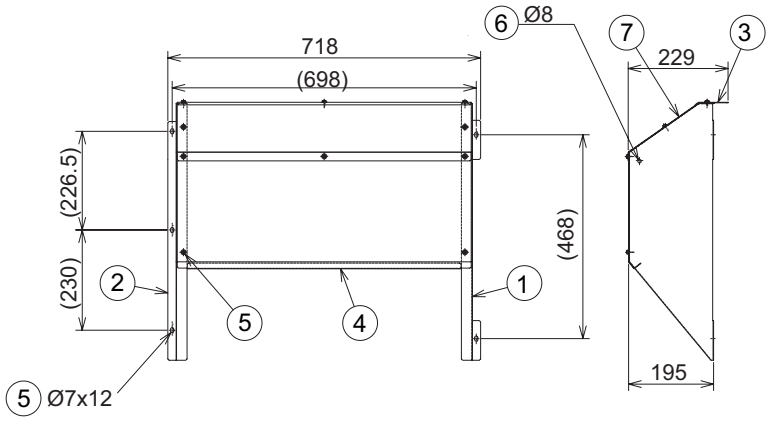
(2) Full type



N°	Name of parts	Quantity (Half type)
1	Right plate	1
2	Left plate	1
3	Front plate	1
4	Fixing support Hole	4
5	Front plate (Upside)	-
6	Front plate (Downside)	-
7	Hole (safety wire rope)	2
8	Assembling screw	6
9	Fixing plate	-

16.4.2 Rear suction hood

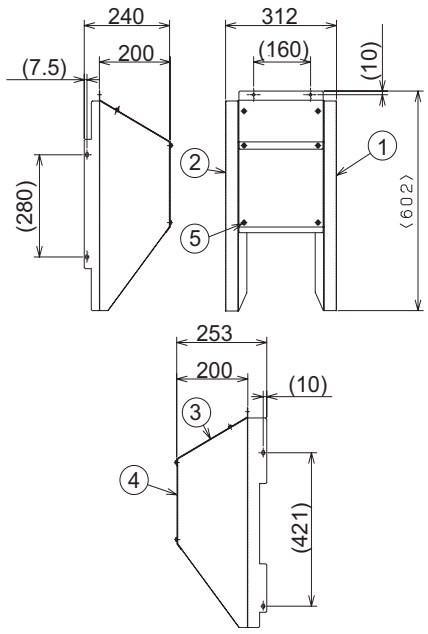
Product name		ASG-SP10BTB
Material		Bonderized steel sheet
Color		Gray (1.0Y8.5/0.5)
Weight		3.9 kg
Assembling		Assembly on site
Components		
	Hood	For rear side air intake x 1 (Upper side x 1 lower side x 1)
	Fixing screw	4 x [M5x12]
	Hood fixing screw (SUS)	10 x [M5x12]
	Self-screw	2 x (M4x13)
Installation restriction		Installation with “Guard net” is not available
Safety wire rope		ASG-SW20A (for overturning prevention (optional parts))



N°	Name of parts	Quantity
1	Right side plate	1
2	Left side plate	1
3	Upper front panel (Upside)	1
4	Upper front panel (Downside)	1
5	Fixing screw (Accessories)	1
6	Hole for safety wire rope to prevent overturning	10
7	Surface plate (Middle)	1

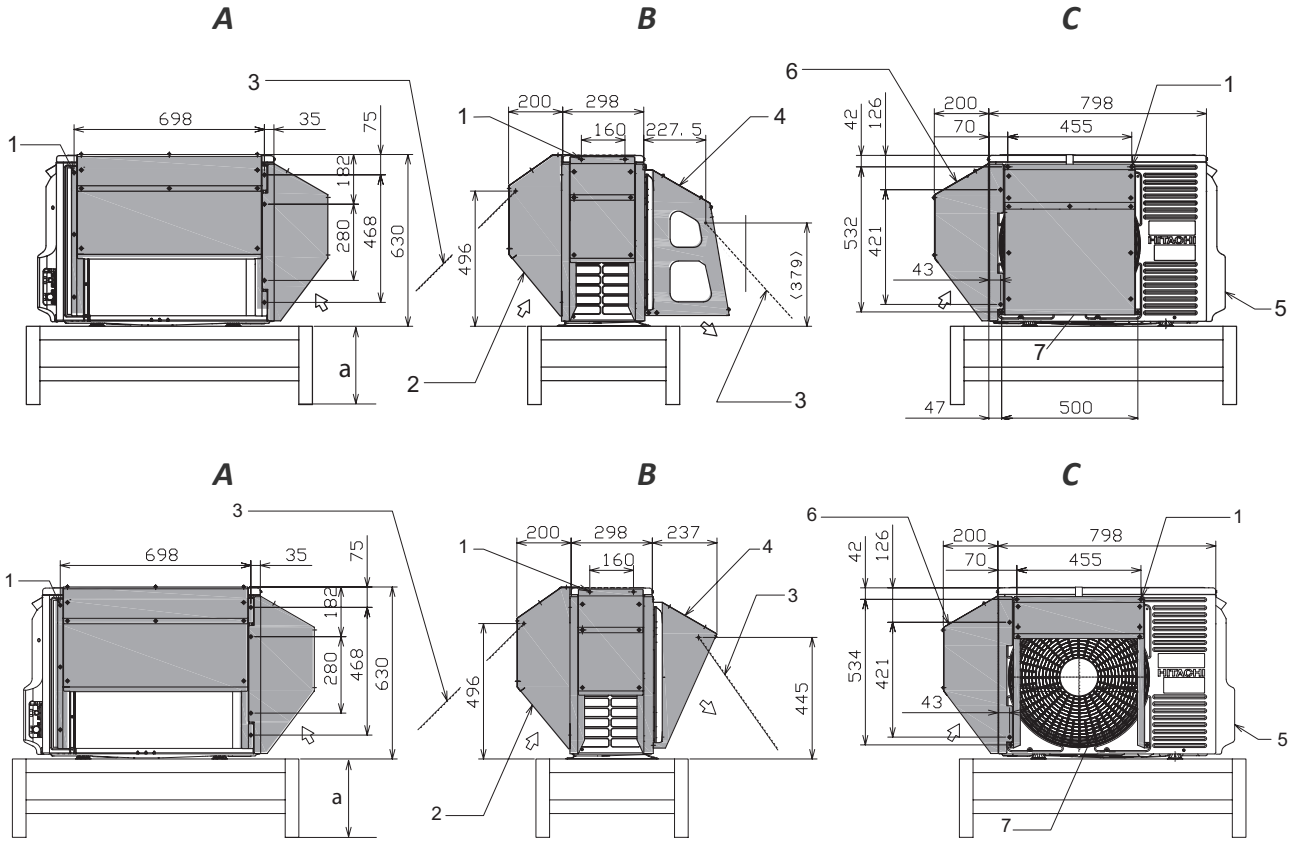
16.4.3 Left suction hood

Product name		ASG-SP10LTB
Material		Bonderized steel sheet
Color		Gray (1.0Y8.5/0.5)
Weight		2.5 kg
Assembling		Assembly on site
Components		
	Hood	For left side air intake x 1
	Fixing screw	6 [M5x12]
	Hood fixing screw (SUS)	6 x [M5x12]
	Self-screw	2 (M4x13)
Installation restriction		Installation with “Guard net” is not available
Safety wire rope		ASG-SW20A (for overturning prevention (optional parts))



N°	Name of parts	Quantity
1	Right plate	1
2	Left plate	1
3	Upper front panel (Upside)	1
4	Upper front panel (Downside)	1
5	Fixing screw (accessory)	1
6	-	1

16.4.4 Assembly of snow protection hood



A. Rear side
B. Left side
C. Front side

1. Fixing screw
2. Air inlet hood
3. Wire rope (optional for over turning protection)
4. Air discharge hood
5. Outdoor unit
6. Left suction hood
7. Air discharge grille

NOTE

- *a > Maximum snowfall height.*
- *Base structure supplied in the field.*

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