TECHNICAL CATALOGUE

HITACHI

HEAT PUMP AIR CONDITIONERS

- SET FREE Σ-HNCQ SERIES VRF AIR CONDITIONING SYSTEM-

Technical Catalogue for Outdoor Unit

Technical Catalogue

Models

< Outdoor Units >

RAS-8.0HNBCMQ	RAS-38HNBCMQ	RAS-68HNBCMQ
RAS-10HNBCMQ	RAS-40HNBCMQ	RAS-70HNBCMQ
RAS-12HNBCMQ	RAS-42HNBCMQ	RAS-72HNBCMQ
RAS-14HNBCMQ	RAS-44HNBCMQ	RAS-74HNBCMQ
RAS-16HNBCMQ	RAS-46HNBCMQ	RAS-76HNBCMQ
RAS-18HNBCMQ	RAS-48HNBCMQ	RAS-78HNBCMQ
RAS-20HNBCMQ	RAS-50HNBCMQ	RAS-80HNBCMQ
RAS-22HNBCMQ	RAS-52HNBCMQ	RAS-82HNBCMQ
RAS-24HNBCMQ	RAS-54HNBCMQ	RAS-84HNBCMQ
RAS-26HNBCMQ	RAS-56HNBCMQ	RAS-86HNBCMQ
RAS-28HNBCMQ	RAS-58HNBCMQ	RAS-88HNBCMQ
RAS-30HNBCMQ	RAS-60HNBCMQ	RAS-90HNBCMQ
RAS-32HNBCMQ	RAS-62HNBCMQ	RAS-92HNBCMQ
RAS-34HNBCMQ	RAS-64HNBCMQ	RAS-94HNBCMQ
RAS-36HNBCMQ	RAS-66HNBCMQ	RAS-96HNBCMQ

HC2017081A

IMPORTANT NOTICE

- 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 heat pump air conditioner is designed for standard air conditioning only. Do not use this heat pump air conditioner for other purpose such as drying clothes, refrigerating foods or for any other cooling or heating process.
- Do not install the unit in the following places. It may cause a fire, deformation, corrosion or failure.
  * Places where oil (including machinery oil).
  * Places where a lot of sulfide gas drifts such as in hot spring.
  * Places where inflammable gas may generate or flow.
  * Places where strong salty wind blows such as coast regions.
  * Places with an atmosphere of acidity or alkalinity.
- Do not install the unit in the place where silicon gas drifts. If the silicon gas attaches to the surface of heat exchanger, the fin surface repels water. As a result, drain water splashes outside of the drain pan and splashed water runs inside of electrical box. In the end, water leakage or electrical devices failure may occur.
- Pay attention to the following points when the unit is installed in a hospital or other facilities where electromagnetic wave generates from medical equipment.
  * Do not install the unit in the place where the electromagnetic wave is directly radiated to the electrical box, remote control cable or remote control switch.
  * Install the unit at least 3 meters away from electromagnetic wave such as a radio.
- Do not install the unit in the place where the breeze directly catches the animals and plants. It could adversely affect the animals and plants.
- The installer and system specialist shall secure against leakage according to local regulations or standards.
-
- It is assumed that this heat pump air conditioner will be operated and serviced by English speaking people. If this is not the case, the customer should be add safety, caution and operating signs in the native language.
- If you have any questions, contact your distributor or dealer of HITACHI.
- This manual gives a common description and information for this heat pump air conditioner which you operate as well for other models.

- This heat pump air conditioner has been designed for the following temperatures. Operate the heat pump air conditioner within this range.
- This system can provide Heat Pump System:

Temperature (°C)

		Maximum	Minimum
Cooling Operation	Indoor	23 WB	15 WB
	Outdoor	52 DB (*)	-5 DB
Heating Operation	Indoor	27 DB	15 DB
	Outdoor	15 WB	-20 WB

DB: Dry Bulb, WB: Wet Bulb

(*) NOTES:

1. Cooling operation at maximum 52°C DB (48°C~52°C interval operation) should be available, only if the outdoor air inlet temperature increase temporarily according to the installation condition.
2. If install the units to the place where exceed ambient temperature 48°C continuously, the combination ratio must be lower 100%, operation indoor units capacity must lower than outdoor unit capacity .
3. The cooling capacity is deteriorated at high ambient temperature. Select the larger capacity outdoor unit than compatible building heat load.
4. The appropriate amount (100%) of refrigerant must be charged. Excessive charging of refrigerant is forbidden and may cause alarm.
5. It must be avoided to install the units where affected by direct sunlight reflection and short circuit. There may be the possibility to activate protection control and alarm system if install the units to inappropriate place. Also the life time of the products and parts must be considerably shortened.
6. Periodic maintenance (1/certain month) must be applied to the heat exchanger fin to avoid adhesion of dirt and clogging of sand to the outdoor unit heat exchanger.
7. Refer to the technical catalogue for the detail.

SAFETY SUMMARY

< Signal Words >

- Signal words are used to identify levels of hazard seriousness.
  Definitions for identifying hazard levels are provided below with their respective signal words.

DANGER : DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING : WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION : CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE : NOTICE is used to address practices not related to personal injury.

NOTE : NOTE is useful information for operation and/or maintenance.

SAFETY SUMMARY

⚠ DANGER

- Do not perform installation work, refrigerant piping work, drain pump, drain piping and electrical wiring connection without referring to our installation manual. If the instructions are not followed, it may result in a water leakage, electric shock or a fire.
- Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. Do not charge material other than R410A into the unit such as hydrocarbon refrigerants (propane or etc.), oxygen, flammable gases (acetylene or etc.) or poisonous gases when installing, maintaining and moving. These flammables are extremely dangerous and may cause an explosion, a fire, and injury.
- Do not pour water into the indoor or outdoor unit. These products are equipped with electrical parts. If poured, it will cause a serious electrical shock.
- Do not open the service cover or access panel for the indoor or outdoor units without turning OFF the main power supply.
- Do not touch or adjust safety devices inside the indoor unit or outdoor units. If these devices are touched or readjusted, it may cause a serious accident.
- Refrigerant leakage can cause difficulty with breathing due to insufficient air. Turn OFF the main switch, extinguish any naked flames and contact your service contractor, if refrigerant leakage occurs.
- Make sure that the refrigerant leakage test should be performed. Refrigerant (Fluorocarbon) for this unit is incombustible, non-toxic and odorless. However if the refrigerant is leaked and is contacted with fire, toxic gas will generate. Also because the fluorocarbon is heavier than air, the floor surface will be filled with it, which could cause suffocation.
- The installer and system specialist shall secure safety against refrigerant leakage according to local regulations or standards.
- Use an ELB (Earth Leakage Breaker). In the event of fault, there is danger of an electric shock or a fire if it is not used.
- Do not install the outdoor unit where there is high level of oil mist, flammable gases, salty air or harmful gases such as sulfur.
- For installation, firmly connect the refrigerant pipe before the compressor starts operating. For maintenance, relocation and disposal, remove the refrigerant pipe after the compressor stops.
- Do not perform a short-circuit of the protection device such as a pressure switch when operating. It may cause a fire and explosion.

SAFETY SUMMARY

⚠ WARNING

- Do not use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately one (1) meter from the system.
- If circuit breaker or fuse is often activated, stop the system and contact your service contractor.
- Check that the ground wire is securely connected. If the unit is not correctly grounded, it lead electric shock. Do not connect the ground wiring to gas piping, water piping, lighting conductor or ground wiring for telephone.
- Connect a fuse of specified capacity.
- Before performing any brazing work, check to ensure that there is no flammable material around. When using refrigerant be sure to wear leather gloves to prevent cold injuries.
- Protect the wires, electrical parts, etc. from rats or other small animals.
  If not protected, rats may gnaw at unprotected parts and which may lead to a fire.
- Fix the cables securely. External forces on the terminals could lead to a fire.
- Provide a sufficiently strong foundation. If not, the unit may fall down and it may lead to injuries.
- Do not install the unit in a place where oil, vapor, organic solvent and corrosive gas (ammonia, sulfur compound and acid) may be present in quantities.
  It may cause refrigerant leakage due to corrosion, electrical shock, deteriorated performance and breakage.
- Perform electrical work according to Installation Manual and all the relevant regulation and standards.
  If the instructions are not followed, an electrical shock and fire may occur due to insufficient capacity and inadequate performance.
- Use specified cables between units and choose the cables correctly. If not, an electrical shock or fire may occur.
- Ensure that the wiring terminals are tightened securely with the specified torques. If not, generating fire or electrical shock at the terminal connection part may occur.

⚠ CAUTION

- Do not step or put any material on the product.
- Do not put any foreign material on the unit or inside the unit.
- Provide a strong and correct foundation so that:
  a. The outdoor unit is not on an incline.
  b. Abnormal sound does not occur.
  c. The outdoor unit will not fall down due to a strong wind or earthquake.

SAFETY SUMMARY

NOTICE

- Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.
- Supply electrical power to the system to energize the oil heater for 12 hours before startup after a long shutdown.
- Make sure that the outdoor unit is not covered with snow or ice, before operation.
- In some cases, the packaged air conditioner may not be operated normally under the following cases.
  * In case that electrical power for the packaged air conditioner is supplied from the same power transformer as the device*.
  * In case that the power source wires for the device* and the packaged air conditioner are located close to each other.

  (Device*: (Ex) Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch.
  It consumes a large quantity of electrical power.)

  Regarding the cases mentioned above, surge voltage may be inducted in the power supply wiring for the packaged air conditioner due to a rapid change in power consumption of the device and an activation of switch.
  Therefore, check the field regulations and standards before performing electrical work in order to protect the power supply for the packaged air conditioner.

NOTE

- It is recommended that the room will be ventilated every 3 to 4 hours.
- The heating capacity of the heat pump unit is decreased according to the outdoor air temperature. Therefore, it is recommended that auxiliary heating equipment be used in the field when the unit is installed in a low temperature region.

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Technical Data

1. Features

New HNCQ Series VRF Air Conditioning System

HITACHI proudly introduces the New HNCQ Series VRF Air Conditioning System, the highly-efficient and reliable air-conditioning system. Recently, increased numbers of buildings are requiring "Intelligent" facilities - communication networks, office automation, and a comfortable environment. Particularly, comfortable space is required all the day through out the year in office buildings.
This multi-split system air conditioner, HNCQ Series can meet these requirements. The proven combination of the scroll compressor and the inverter provides the best air conditioning for small/medium office buildings.

■ **HNCQ Series VRF Air Conditioning System**

HITACHI has developed the VRF Air Conditioning System with its customers always in mind.
This system, which is unique in the world, allows the interconnection of the same indoor units for all the HITACHI systems.

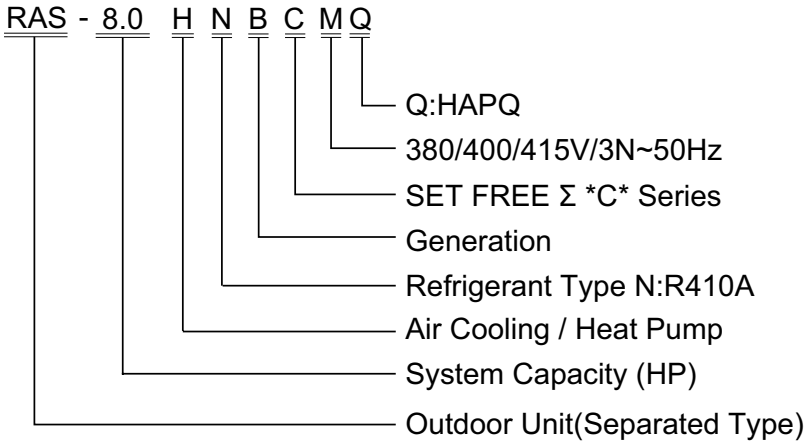
This system provides the end user with greater flexibility for installation, which means that the air-conditioning systems will integrate better with the whole of the installations that make up the building.

■ **Wide Product Range of Outdoor Units**

Space, structure and necessary functions, in line with evolution in building design, the requirements for air conditioning have also diversified.
New HNCQ series offers 9 module outdoor units.
Because the most suitable unit can be selected from a wide range of models for the type VRF, you can create a custom air conditioning environment to satisfy your specific building conditions.

■ **Line-Up**

This outdoor unit series “HNBCMQ” can build the capacity from 26 to 96HP by combining maximum 4 outdoor units from 8 to 24HP.



Note:

400/415V/3N~/50Hz must connect with 230/240V indoor unit.

<Base Module>

HP	8	10	12	14	16
Model	RAS-8.0HNBCMQ	RAS-10HNBCMQ	RAS-12HNBCMQ	RAS-14HNBCMQ	RAS-16HNBCMQ
HP	18	20	22	24	
Model	RAS-18HNBCMQ	RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-24HNBCMQ	

<Combination Module> ※

HP	26	28	30	32	34
Model	RAS-26HNBCMQ	RAS-28HNBCMQ	RAS-30HNBCMQ	RAS-32HNBCMQ	RAS-34HNBCMQ
Combination	RAS-10HNBCMQ	RAS-12HNBCMQ	RAS-14HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ
	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-18HNBCMQ
HP	36	38	40	42	44
Model	RAS-36HNBCMQ	RAS-38HNBCMQ	RAS-40HNBCMQ	RAS-42HNBCMQ	RAS-44HNBCMQ
Combination	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-18HNBCMQ	RAS-20HNBCMQ
	RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ
HP	46	48	50	52	54
Model	RAS-46HNBCMQ	RAS-48HNBCMQ	RAS-50HNBCMQ	RAS-52HNBCMQ	RAS-54HNBCMQ
Combination	RAS-22HNBCMQ	RAS-24HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ
	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ
	-	-	RAS-18HNBCMQ	RAS-20HNBCMQ	RAS-22HNBCMQ
HP	56	58	60	62	64
Model	RAS-56HNBCMQ	RAS-58HNBCMQ	RAS-60HNBCMQ	RAS-62HNBCMQ	RAS-64HNBCMQ
Combination	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-16HNBCMQ
	RAS-16HNBCMQ	RAS-18HNBCMQ	RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-24HNBCMQ
	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ
HP	66	68	70	72	74
Model	RAS-66HNBCMQ	RAS-68HNBCMQ	RAS-70HNBCMQ	RAS-72HNBCMQ	RAS-74HNBCMQ
Combination	RAS-18HNBCMQ	RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-24HNBCMQ	RAS-16HNBCMQ
	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-16HNBCMQ
	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-18HNBCMQ
	-	-	-	-	RAS-24HNBCMQ
HP	76	78	80	82	84
Model	RAS-76HNBCMQ	RAS-78HNBCMQ	RAS-80HNBCMQ	RAS-82HNBCMQ	RAS-84HNBCMQ
Combination	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-20HNBCMQ	RAS-20HNBCMQ	RAS-20HNBCMQ
	RAS-16HNBCMQ	RAS-16HNBCMQ	RAS-20HNBCMQ	RAS-20HNBCMQ	RAS-20HNBCMQ
	RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-20HNBCMQ	RAS-20HNBCMQ	RAS-20HNBCMQ
	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-24HNBCMQ
HP	86	88	90	92	94
Model	RAS-86HNBCMQ	RAS-88HNBCMQ	RAS-90HNBCMQ	RAS-92HNBCMQ	RAS-94HNBCMQ
Combination	RAS-20HNBCMQ	RAS-20HNBCMQ	RAS-20HNBCMQ	RAS-20HNBCMQ	RAS-22HNBCMQ
	RAS-20HNBCMQ	RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ
	RAS-22HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ
	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ	RAS-24HNBCMQ
HP	96				
Model	RAS-96HNBCMQ				
Combination	RAS-24HNBCMQ				
	RAS-24HNBCMQ				
	RAS-24HNBCMQ				
	RAS-24HNBCMQ				

※: The outdoor units from 26 to 96HP consists of the combination of 2 to 4 base units.
The combinations are not available except for the above table.

Base Unit Outer Dimension:

RAS-8.0 - 12HNBCMQ (8 - 12HP)	RAS-14 - 18HNBCMQ (14 - 18HP)	RAS-20 - 24HNBCMQ (20 - 24HP)
W958 x D782 x H1725 mm	W1218 x D782 x H1725 mm	W1608 x D782 x H1725 mm

Combination of Base Units

RAS-26 - 28HNBCMQ (26 - 28HP)	RAS-30 - 34HNBCMQ (30 - 34HP)	RAS-36 - 42HNBCMQ (36 - 42HP)

RAS-44- 48HNBCMQ (44 - 48HP)	RAS-50HNBCMQ (50HP)	RAS-52 - 58HNBCMQ (52 - 58HP)

FEATURES

RAS-60 - 66HNCMQ (60 - 66HP)

RAS-68 - 72HNCMQ (68 - 72HP)

RAS-74HNBCMQ (74HP)

RAS-76 - 78HNBCMQ (76 - 78HP)

RAS-80 - 96HNBCMQ (80 - 96HP)

Able to Connect a Set of Outdoor Unit with up to 64 Indoor Units

- The number of indoor units connectable to HNCQ series VRF Air Conditioning System series outdoor unit is as follows.
  Comply with the following conditions when installing the unit.
- A maximum total capacity of 130% for HNBCMQ and a minimum total capacity of 50% against the nominal outdoor unit capacity can be obtained by combination of the indoor units.

< HNBCMQ>

Outdoor Unit	Minimum Unit Operating Capacity (100W)	Maximum Quantity of Indoor Units That Can be Connected	Recommended Number of Indoor Units	Combined Capacity
RAS-8.0HNBCMQ		13	8	
RAS-10HNBCMQ		16	10	
RAS-12HNBCMQ		19	10	
RAS-14HNBCMQ		23	16	
RAS-16HNBCMQ		26	16	
RAS-18HNBCMQ		26	16	
RAS-20HNBCMQ		33	18	
RAS-22HNBCMQ		36	20	
RAS-24HNBCMQ		40	26	
RAS-26HNBCMQ		43	26	
RAS-28HNBCMQ		47	32	
RAS-30HNBCMQ		50	32	
RAS-32HNBCMQ		53	32	
RAS-34HNBCMQ		56	32	
RAS-36HNBCMQ		59	32	
RAS-38HNBCMQ		64	38	
RAS-40HNBCMQ		64	38	
RAS-42HNBCMQ		64	38	
RAS-44HNBCMQ		64	38	
RAS-46HNBCMQ		64	38	
RAS-48HNBCMQ		64	38	
RAS-50HNBCMQ		64	38	
RAS-52HNBCMQ		64	38	
RAS-54HNBCMQ		64	38	
RAS-56HNBCMQ	18	64	38	50%~130%
RAS-58HNBCMQ		64	38	
RAS-60HNBCMQ		64	38	
RAS-62HNBCMQ		64	38	
RAS-64HNBCMQ		64	38	
RAS-66HNBCMQ		64	38	
RAS-68HNBCMQ		64	38	
RAS-70HNBCMQ		64	38	
RAS-72HNBCMQ		64	38	
RAS-74HNBCMQ		64	38	
RAS-76HNBCMQ		64	38	
RAS-78HNBCMQ		64	38	
RAS-80HNBCMQ		64	38	
RAS-82HNBCMQ		64	38	
RAS-84HNBCMQ		64	38	
RAS-86HNBCMQ		64	38	
RAS-88HNBCMQ		64	38	
RAS-90HNBCMQ		64	38	
RAS-92HNBCMQ		64	38	
RAS-94HNBCMQ		64	38	
RAS-96HNBCMQ		64	38	

NOTES:

1. In a system, where all the indoor units are running, the capacity of the total indoor units should be less than or equal to the combined capacity of the outdoor unit. Otherwise, the overloading operation may occur in the case of harsh working conditions or in narrow operation range.
2. For systems where all the indoor units are not running at the same time, the total capacity of the indoor units can be allowed to up to 130% of the total capacity of the outdoor unit.
3. If the system is used in cold areas (where ambient temperature below -10°C) or high heat load environment, total capacity of the indoor units should be less than the total capacity of outdoor unit, and the total pipe length should be less than 300m.
4. Indoor unit of model with the type of capacity range of 18~36 have much more air flow per unit cooling capacity than 40 and above models of the unit. If the system uses more indoor units with model of 18~36, user can feel of cold wind blow. At this time, the recommended number of connectable indoor units is a benchmark.
5. For air conditioner with outdoor fresh air handling, the number of indoor units must be within the recommended number of connectible indoor units.
6. If the indoor unit capacity exceeds 100%, but less than 130%, please refer to the Technical Bulletin for details.
7. If the temperature in the installation place of the outdoor unit sustainably exceeds 48°C ,the total running capacity of the indoor units should be less than the total capacity of the outdoor units.

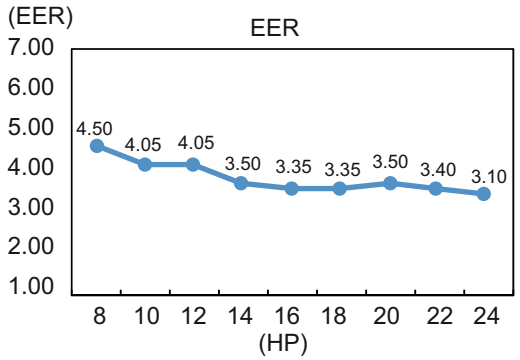
The load capacity per hour or the possibility of all indoor units simultaneous operation is unknown at the design stage, the total capacity of combined indoor units should be not over 100% against the outdoor unit capacity.

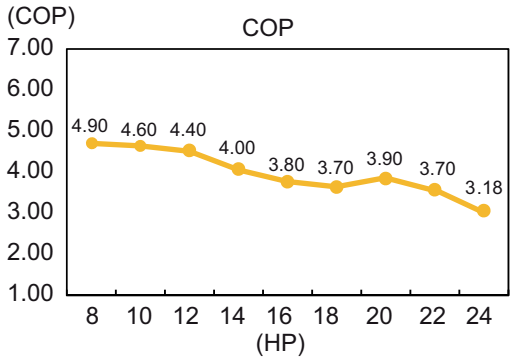
High Efficiency and Energy Saving

(1) High EER / COP Design

The new HNCQ series has achieved high EER/COP and considerable energy saving by improving the performance of compressor and optimizing refrigerant cycle system.

The graphs below show the EER/COP of single units:





Notes: The above values indicate the EER/COP per outdoor unit when it is combined with test indoor units.

< Performance Specifications >

	HP	8	10	12	14	16	18	20	22	24	26	28	30	32
Cooling	Capacity (KW)	22.4	28.0	33.5	40.0	45.0	50.0	56.0	61.5	68.0	73.0	78.5	85.0	90.0
	Power Input(KW))	4.98	6.91	8.27	11.43	13.43	14.93	16.00	18.09	21.94	20.34	21.70	24.86	26.86
	EER	4.50	4.05	4.05	3.50	3.35	3.35	3.50	3.40	3.10	3.59	3.62	3.42	3.35
Heating	Capacity (KW)	25.0	31.5	37.5	45.0	50.0	56.0	63.0	69.0	75.0	81.5	87.5	95.0	100.0
	Power Input(KW)	5.10	6.85	8.52	11.25	13.16	15.14	16.15	18.65	23.58	20.01	21.68	24.41	26.31
	COP	4.90	4.60	4.40	4.00	3.80	3.70	3.90	3.70	3.18	4.07	4.04	3.89	3.80

	HP	34	36	38	40	42	44	46	48	50	52	54	56	58
Cooling	Capacity (KW)	95.0	101.0	106.5	113.0	118.0	124.0	129.5	136.0	140.0	146.0	151.5	158.0	163.0
	Power Input(KW)	28.36	29.43	31.52	35.37	36.87	37.94	40.03	43.88	41.79	42.86	44.95	48.80	50.30
	EER	3.35	3.43	3.38	3.19	3.20	3.27	3.24	3.10	3.35	3.41	3.37	3.24	3.24
Heating	Capacity (KW)	106.0	113.0	119.0	125.0	131.0	138.0	144.0	150.0	156.0	163.0	169.0	175.0	181.0
	Power Input(KW)	28.30	29.31	31.81	36.74	38.72	39.73	42.23	47.16	41.46	42.47	44.97	49.90	51.88
	COP	3.75	3.86	3.74	3.40	3.38	3.47	3.41	3.18	3.76	3.84	3.76	3.51	3.49

	HP	60	62	64	66	68	70	72	74	76	78	80	82	84
Cooling	Capacity (KW)	169.0	174.5	181.0	186.0	192.0	197.5	204.0	208.0	214.0	219.5	224.0	229.5	236.0
	Power Input(KW)	51.37	53.46	57.31	58.81	59.88	61.97	65.82	63.73	64.80	66.89	64.00	66.09	69.94
	EER	3.29	3.26	3.16	3.16	3.21	3.19	3.10	3.26	3.30	3.28	3.50	3.47	3.37
Heating	Capacity (KW)	188.0	194.0	200.0	206.0	213.0	219.0	225.0	231.0	238.0	244.0	252.0	258.0	264.0
	Power Input(KW)	52.89	55.39	60.32	62.30	63.31	65.81	70.74	65.04	66.05	68.55	64.60	67.10	72.03
	COP	3.55	3.50	3.32	3.31	3.36	3.33	3.18	3.55	3.60	3.56	3.90	3.85	3.67

	HP	86	88	90	92	94	96
Cooling	Capacity (KW)	241.5	248.0	253.5	260.0	265.5	272.0
	Power Input(KW)	72.03	75.88	77.97	81.82	83.91	87.76
	EER	3.35	3.27	3.25	3.18	3.16	3.10
Heating	Capacity (KW)	270.0	276.0	282.0	288.0	294.0	300.0
	Power Input(KW)	74.53	79.46	81.96	86.89	89.39	94.32
	COP	3.62	3.47	3.44	3.31	3.29	3.18

Notes:

1. The cooling and heating performances are the values when combined with our specified indoor units.

Cooling Operation Conditions:
Indoor Air Inlet Temperature: 27°C DB 19°C WB
Outdoor Air Inlet Temperature: 35°C DB
Piping Length: 7.5 Meters

Heating Operation Conditions:
Indoor Air Inlet Temperature: 20°C DB
Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
Piping Lift: 0 Meter

2. The above values indicate the EER/COP per outdoor unit when it is combined with test indoor units.

(2) Energy Saving Technology

Bell-mouth

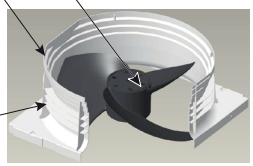
<Long Bell-mouth Structure>

Create smooth air flow and reduce fan input by adopting multi-stage enhanced structure.

Long Blade Propeller Fan

Multi-stage Enhanced Structure
Smooth air flow by distributing multipolar vortex.

Long Bell-mouth
Suppress leakage and effectively operate in wide range.

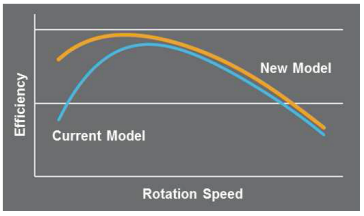


Compressor

<Improve Compressor Efficiency at Low Load Operation>

Optimize oil rate by improving oil distribution to the compressor and expand operation range at low load operation

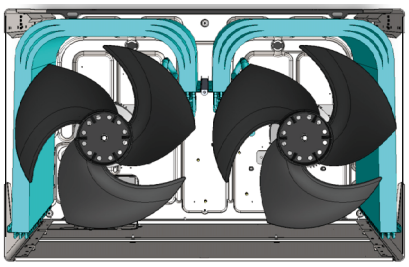
Efficiency of Compressor (image)



Heat Exchanger

<Σ Shape Heat Exchanger>

(≥14HP)
Adopt two fan structure for improve efficiency at low load operation. Adopt Σ shape heat exchanger to maximize the effect of the two fan structure for better energy saving.

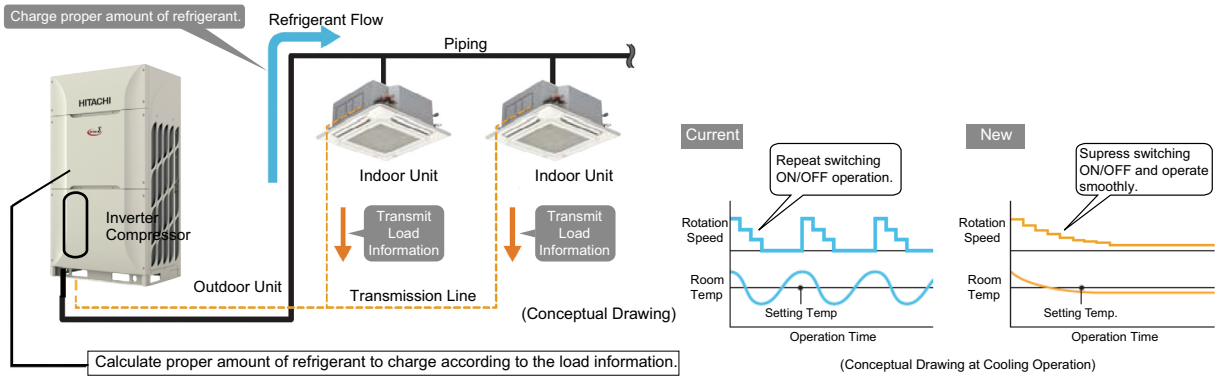


Operation Control

- Smooth Drive Control System:

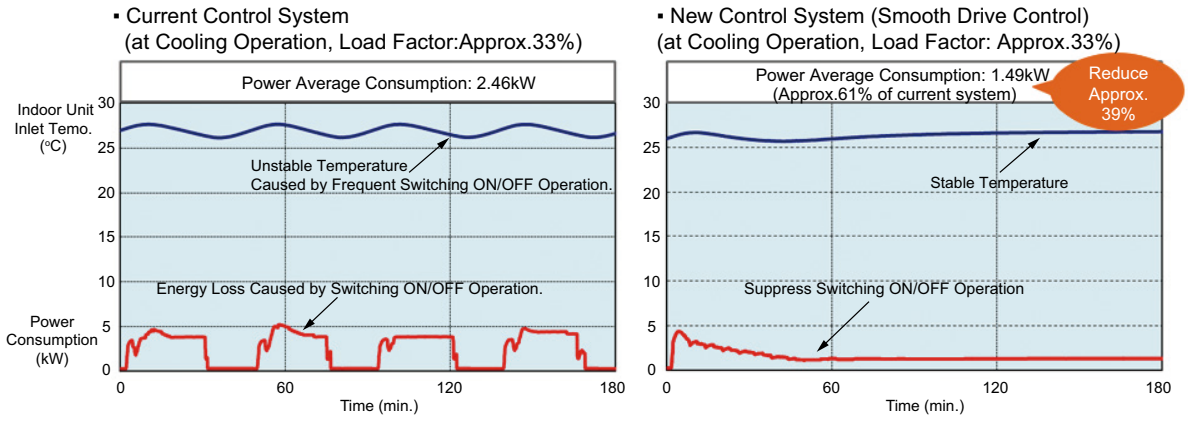
  Calculate the amount of refrigerant to charge based on the load information from the indoor units. Control inverter compressor rotation speed and charge proper amount of refrigerant to indoor unit at each loading condition. Suppress compressor switching ON/OFF at low load operation for better energy efficiency with smooth operation.

◆ Concept of Smooth Drive Control



- Verification Result of Energy Saving Effect from Smooth Drive Control

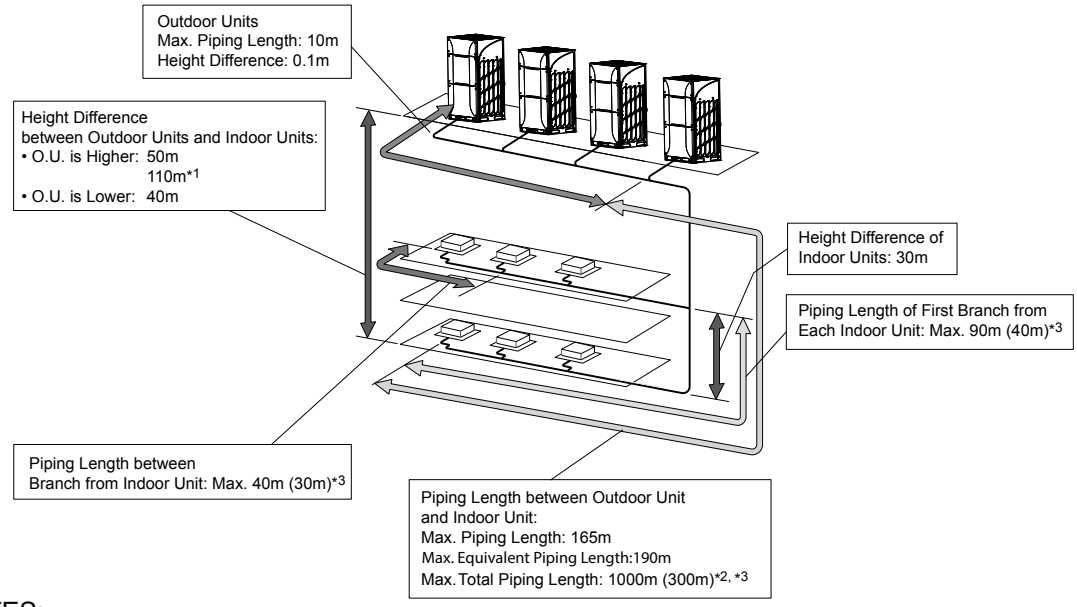
  The verification result of energy saving effect at part load testing chamber is shown below. The “Smooth Drive Control System” suppress the compressor switching ON/OFF operation and keep room temperature stable. The reduction of power consumption has been verified.



Flexibility of Facility Design

■ Improvement of Piping Installation
Height difference between the outdoor units and indoor units and height difference between the indoor units have been changed as shown below.

Item		Heat Pump System
		HNBCMQ
Height Difference between Outdoor Units and Indoor Units	Outdoor Unit is Higher	NEW ≤50m / ≤110m (*1)
	Outdoor Unit is Lower	≤ 40m
Height Difference between Indoor Units		≤ 30m



NOTES:

*1: When the height difference between indoor and outdoor units is greater than 50m (8-54HP: up to 110m, 56-96HP:up to 90m), contact your local dealer or distributor.

*2: Allowable total piping length may not exceed 1000m because of the limitation of maximum additional refrigerant amount as described in the following table. make sure that the additional refrigerant volume does not exceed the maximum additional amount as shown below.

HP	8 to 10	12	14 to 24	26 to 66	68 to 88	90 to 96
Max. Additional Refrigerant Charge (kg)	28	36	40	63	73	93

If the system is used in cold areas (where ambient temperature below -10°C) or high heat load environment, total capacity of the indoor units should be less than the total capacity of outdoor unit, and the total pipe length should be less than 300m.

3: If the piping length exceeds figure in ( ), the connectable indoor units number should be less than recommended number.

■ Limitation of piping branch

If the length of the pipe from the first branch pipe to the farthest indoor unit is more than 40m, follow the following conditions during installation:

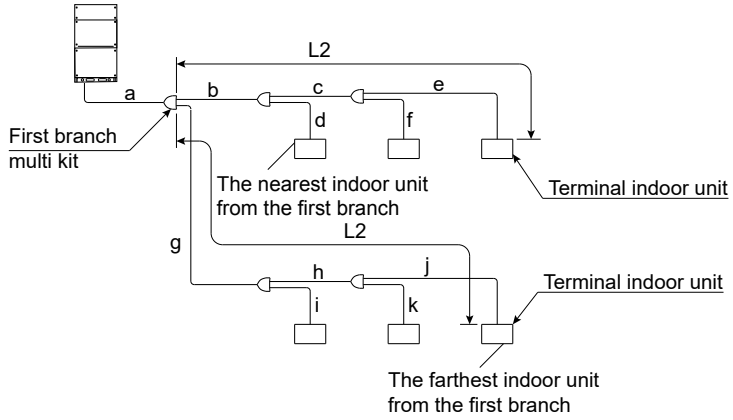
Example 1:

In case of that the piping length L2 from 1st branch pipe to the farthest indoor unit exceeds 40m, perform the construction following the conditions as below:

(1) When the piping distance L2 exceeds 40m, the b, c or g, h and the piping diameters of the gas and liquid side are all required to be enlarged by one gauge through the adapter. If you increase the diameter and a diameter is less than b and g, then increase a diameter to be as the same as b and g.

(2) Piping length difference between piping from farthest indoor unit to the first branch and piping from nearest indoor unit to the first branch pipe should not be less than 40m.
(g + h + j) - (b + d)≤ 40m.

The length of the piping from the end of first branch pipe to the end indoor unit is more than 40 meters and less than 90m

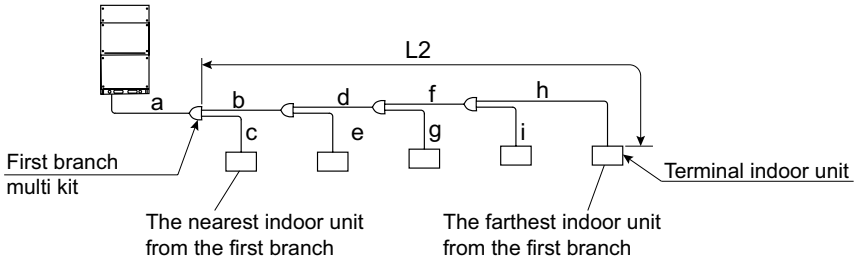


Example 2:

From the first branch of the main sub-manifold to the end indoor unit piping length of more than 40m and less than 90m:

(1) When the piping distance L2 exceeds 40m, the pipe diameter of the b, d, f gas and the liquid side is enlarged by one gauge through adaptor. By increasing the diameter, if a diameter is less than b, then increase a to match with b.

The piping length between the 1st level branch pipe to the end indoor unit exceed 40m and less than 90m



Wide Range of Indoor Unit Connection

The number of connectable indoor units with HNCQ series outdoor unit is as follows.
Comply with the condition as follows during installation.
Maximum Number of Connectable Indoor Units and Range of Combination Capacity

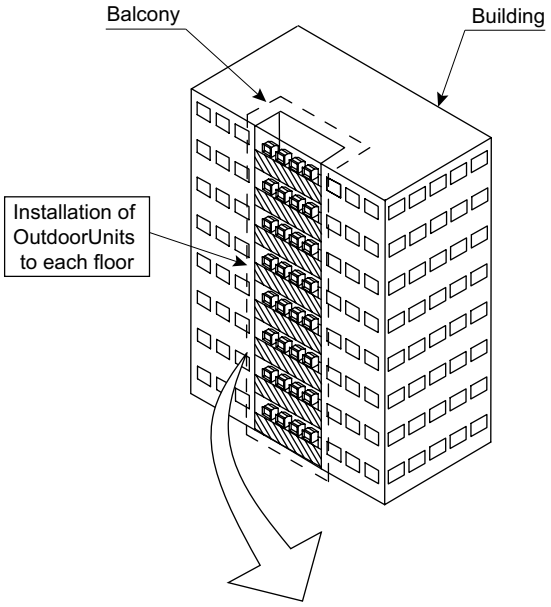
Outdoor Unit Capacity (HP)	8	10	12	14	16, 18	20	22	24	26	28	30	32	34	36	38 - 96
Range of Combination Capacity	50% to 130%														
Connectable Indoor Units Q'ty	13	16	19	23	26	33	36	40	43	47	50	53	56	59	64
Recommended Connectable Indoor Units Q'ty	8	10		16		18	20	26		32					38

Notes:

1. The connectable indoor unit capacity ratio can be calculated as follows:
   Connectable Indoor Unit Capacity Ratio = Total Indoor Unit Capacity / Total Outdoor Unit Capacity
2. For the system under which all the indoor units are supposed to operate simultaneously, the total indoor unit capacity should be less than outdoor unit capacity. Otherwise, it may cause a decrease of operating performance and operating limit in overload operation.
3. For the system under which all the indoor units are not supposed to operate simultaneously, the total indoor unit capacity is available up to 130% against the outdoor unit capacity.
4. When operating the outdoor unit in cold areas with temperatures of -10°C, or under the high heating load conditions, the total indoor unit capacity should be less than 100% against the outdoor unit capacity and the total piping length should be less than 300m.
5. Indoor unit of model with the type of capacity range of 18~36 have much more air flow per unit cooling capacity than 40 and above models of the unit. If the system uses more indoor units with model of 18~36, user can feel of cold wind blow. At this time, refer to the recommended number of connectable indoor units.
6. For air conditioner with outdoor fresh air handling, the number of indoor units must be within the recommended number of connectible indoor units.
7. If the indoor unit capacity exceeds 100%, but less than 130%, please refer to the Technical Bulletin for details.

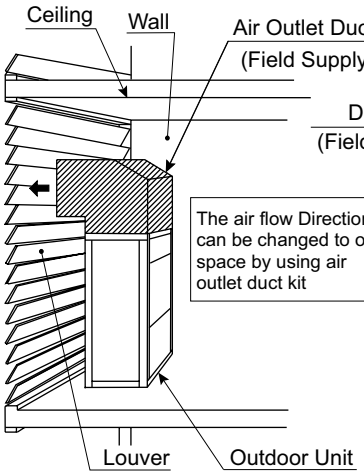
3. Installation Flexibility for Expand External Static Pressure

   For installation spaces such as a balcony or a floor where an external static pressure such as a louver or a duct is required to secure, the 3 steps external static pressure (80Pa, 60Pa and 30Pa) by the dip switch setting (DSW8) is adopted.

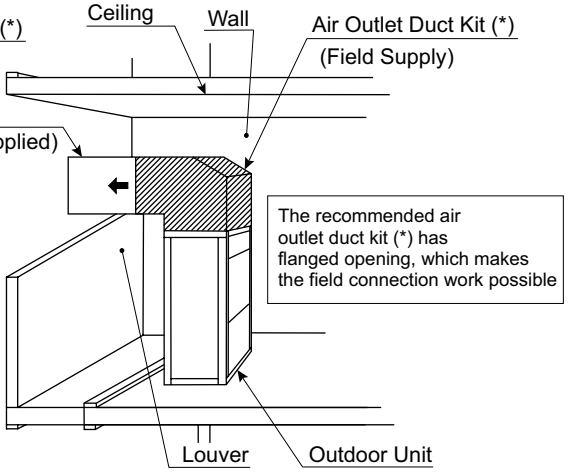


Setting for External Static Pressure	DSW8		
	#1	#2	#3
0Pa	OFF	OFF	OFF
Max.30Pa	ON	OFF	OFF
Max.60Pa	OFF	ON	OFF
Max.80Pa	ON	ON	OFF

Case that Open Space is Louver



Case that Open Space is Wall

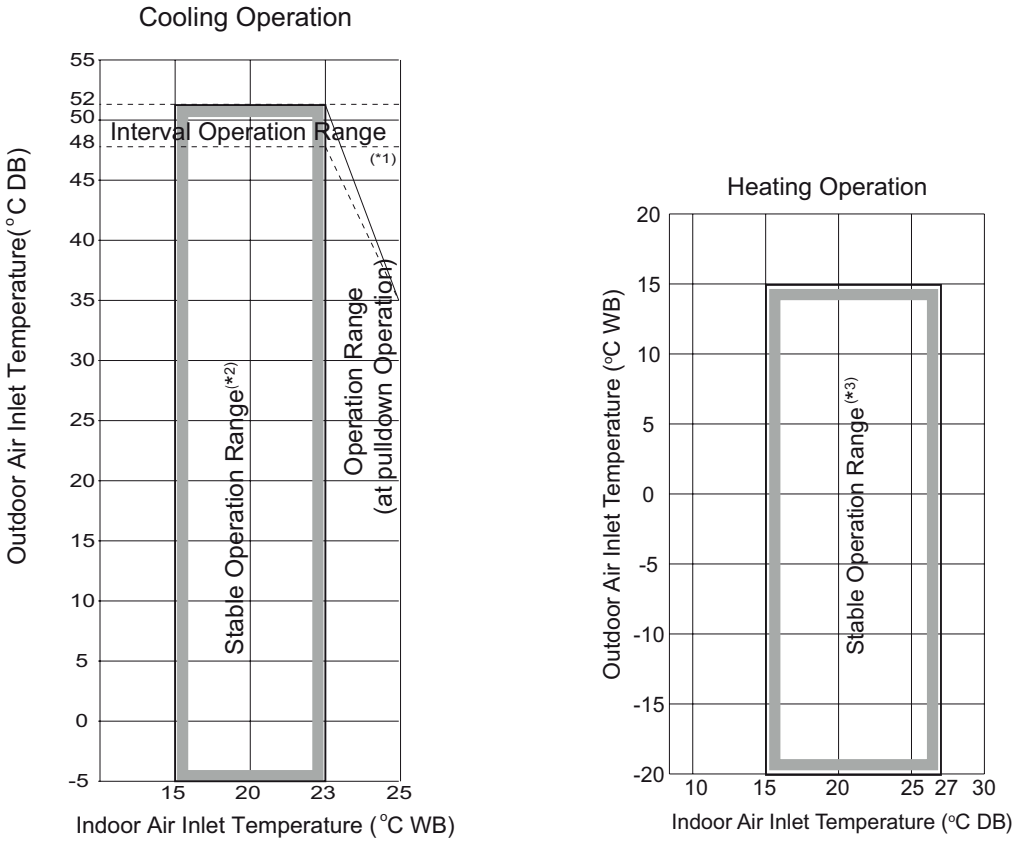


Notes:

1. Pay attention to the following case at the design and the installation. If the outlet air intakes by short-circuit, the operation range is limited due to increasing high pressure in the cooling operation or decreasing low pressure in the heating operation so that may cause failure of unit.
2. (*): Air outlet duct kit is field supply.
3. Refer to section "Wide Operation Range" on page 1-24 for details.

Wide Operation Range

This unit has been designed for cooling operation under low ambient temperatures down to -5°C. This feature enables cooling to be obtained even in winter in buildings with high internal heat gains due to lighting, people and machines, particularly in areas such as shops, lecture rooms, data processing areas etc. And the heating operation under low ambient temperature down to -20°C can also be performed.



	Cooling Operation	Heating Operation
Indoor Air Inlet Temperature	15 to 23 °C WB	15 to 27°C DB
Outdoor Air Inlet Temperature	-5 to 52°C DB (*1)	-20 to 15°C WB

Notes:

*1. (1) Cooling operation at maximum 52°C DB (48°C~52°C interval operation) should be available only if the outdoor air inlet temperature increase temporarily according to the installation condition.

(2) If install the units to the place where exceed ambient temperature 48°C continuously, the combination ratio must be lower 100%, operation indoor units capacity must lower than outdoor unit capacity .

(3) The cooling capacity is deteriorated at high ambient temperature. Select the larger capacity outdoor unit than compatible building heat load.

(4) The appropriate amount (100%) of refrigerant must be charged. Excessive charging of refrigerant is forbidden and may cause alarm.

(5) It must be avoided to install the units where affected by direct sunlight reflection and short circuit. There may be the possibility to activate protection control and alarm system if install the units to inappropriate place. Also the life time of the products and parts must be considerably shortened.

(6) Periodic maintenance (1/certain month) must be applied to the heat exchanger fin to avoid adhesion of dirt and clogging of sand to the outdoor unit heat exchanger.

*2. There might be the possibility of thermo-OFF when cooling load is low and outdoor air inlet temperature is 10°C DB or lower to prevent frost formation on indoor unit heat exchanger.

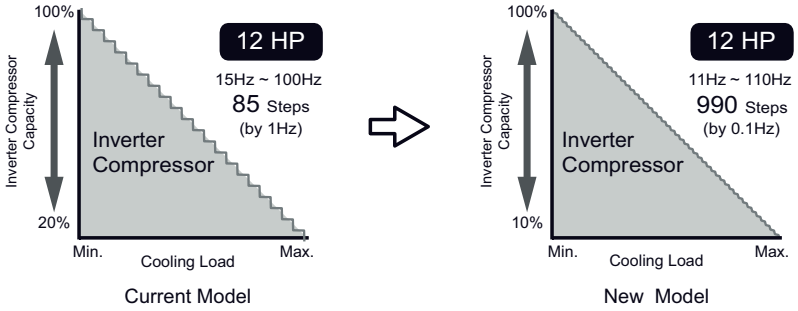
*3. There might be the possibility of thermo-OFF when heating load is low and outdoor air inlet temperature is high (higher than 15°C DB) to prevent the outdoor unit. The outdoor unit operation stops when outdoor air inlet temperature exceeds 26°C DB.

4. Operational range is different when connect to All Fresh Air Unit, Econofresh, and other special indoor units.Refer to the technical catalogue of indoor unit for the details.

Other Advance Technologies

- Capacity Control by 0.1Hz

  The highly improved performance as well as greater energy saving is achieved by adopting newly developed high efficiency DC inverter compressor, with outstandingly precise control technology of 0.1Hz increments inverter frequency. Another feature is the dramatically extended working range, enabled by expanding the compressor's operating frequency band, both upwards and downwards.



  - Wide Working Range for Cooling Operation

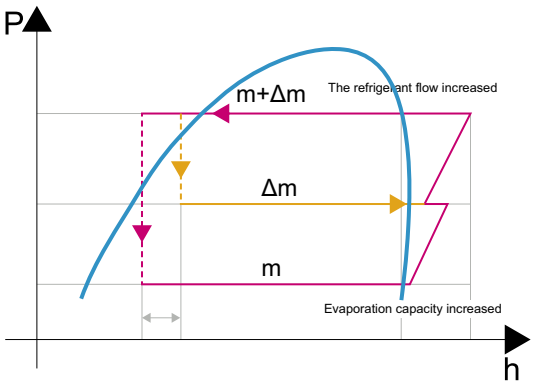
Type	Current Model	New Model
HNCQ series	43°C	52°C(*)

Notes:

(*)Refer to section "Wide Operation Range" on page 1-24 for the details.

- EVI (Enhanced Vapor Injection) Technology

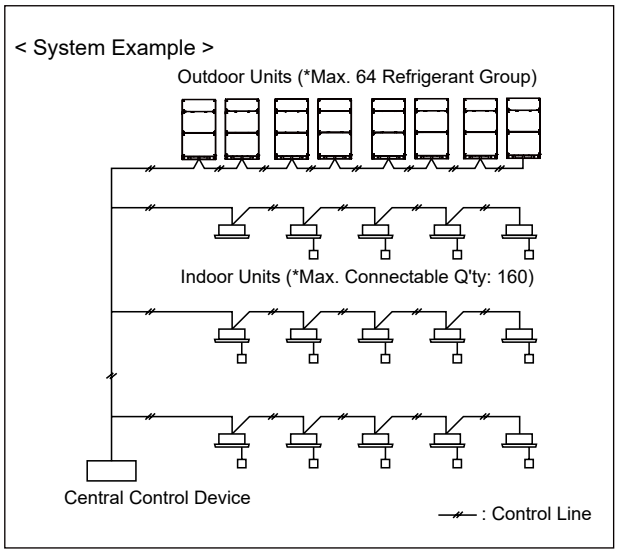
  - To increase about 20% capacity at low ambient heating compared to without EVI function;
  - To improve EER/COP at rated running conditions;



For example, in heating mode, when the OD ambient temperature is very low, the performance of OD unit decreases, and the refrigerant volume decreases in the compressor suction port. But with EVI technology, the intermediate pressure refrigerant would be injected to compressor, and will increase the discharge volume so the mass flow of the refrigerant cycle will also get increased, keeping sufficient heating capacity in low ambient condition.

Corresponding to H-LINK II System

This HNCQ Series VRF Air Conditioning System series outdoor units corresponds to the H-LINK II transmission system. Maximum 64 refrigerant systems and maximum 160 indoor units can be controlled by only one central control device when the equipments (central control device, indoor units, remote control switch) in the same transmission system all correspond to H-LINK II.



Item	H-LINK II
Number of Max. Ref. Group / System	64
Address Setting Range of Indoor Units / Ref. Group	0 to 63
Number of Max. Indoor Unit / System	160
Total Q'ty of Central Control Devices in the same H-LINK	200
Max. Wiring Length	Total 1,000m

■ H-LINK II System

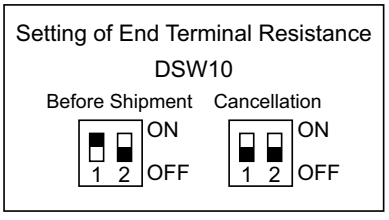
The H-LINK II wiring system requires only two transmission wires to connect each indoor unit and outdoor unit for up to 64 refrigerant cycles, and to connect wires for all indoor units and outdoor units.

<Specifications>
* Transmission Wire: 2-Wire
* Polarity of Transmission Wire: Non-Polar Wire
* Maximum Outdoor Units to be Connected: 64 Units per System
* Maximum Indoor Units to be Connected: 160 Units per H-LINK II System
* Maximum Wiring Length: Total 1,000m
* Recommended Cable: Twist-Pair Cable with Shield, over 0.75mm^2
* Voltage: DC5V

NOTE:
In case of applying H-LINK II system, the setting of dip switch for outdoor unit and indoor unit is required. If the dip switches are not set or set incorrectly, the alarm may occur due to a transmission failure.

■ Setting of End Terminal Resistance

Before shipment, No.1 pin of DSW10 is in the "ON" position.
In the case that the number of outdoor units in the same H-LINK is 2 or more, set No.1 pin of DSW10 at "OFF" from the 2nd unit.
If only one outdoor unit is used, no setting is required.



2. General Data

Model		RAS-8.0HNBCMQ	RAS-10HNBCMQ	RAS-12HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	22.4	28.0	33.5
Nominal Heating Capacity	kW	25.0	31.5	37.5
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	60	61	62
Outer Dimensions Height x Width x Depth	mm	1,725 x 958 x 782	1,725 x 958 x 782	1,725 x 958 x 782
Net Weight	kg	225	226	248
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		AA50PHDG	AA50PHDG	DC80PHDG
Compressor Quantity		1	1	1
Compressor Motor Output	kW	4.1	6.2	7.4
Refrigeration Oil Type		FV68H		
Charge	L/Unit	6.0	6.0	6.0
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		1	1	1
Air Flow Rate	m^3/min	165	170	190
Fan Motor Output	kW	0.26	0.28	0.42
Liquid Line	mm (in.)	Ø9.52 (3/8)	Ø9.52 (3/8)	Ø12.7 (1/2)
Gas Line	mm (in.)	Ø19.05 (3/4)	Ø22.2 (7/8)	Ø25.4 (1)
Refrigerant Charge (before Shipment)	kg	5.0	5.0	7.2

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6°C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.

   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.

Model		RAS-14HNBCMQ	RAS-16HNBCMQ	RAS-18HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	40.0	45.0	50.0
Nominal Heating Capacity	kW	45.0	50.0	56.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	63	64	64
Outer Dimensions Height x Width x Depth	mm	1,725 x 1,218 x 782	1,725 x 1,218 x 782	1,725 x 1,218 x 782
Net Weight	kg	308	310	356
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		DC80PHDG	DC80PHDG	AA50PHDG+AA50PHDG
Compressor Quantity		1	1	2
Compressor Motor Output	kW	9.3	10.8	6.4×2
Refrigeration Oil Type		FV68H		
Charge	L/Unit	6.9	6.9	7.9
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		2	2	2
Air Flow Rate	m^3/min	239	256	256
Fan Motor Output	kW	0.33 x 2	0.39 x 2	0.39 x 2
Liquid Line	mm (in.)	Ø12.7 (1/2)	Ø12.7 (1/2)	Ø15.88 (5/8)
Gas Line	mm (in.)	Ø25.4 (1)	Ø28.58 (1-1/8)	Ø28.58 (1-1/8)
Refrigerant Charge (before Shipment)	kg	8.9	9.9	10.7

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6°C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.

   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.

Model		RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	56.0	61.5	68.0
Nominal Heating Capacity	kW	63.0	69.0	75.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	65	66	66
Outer Dimensions Height x Width x Depth	mm	1,725 x 1,608 x 782	1,725 x 1,608 x 782	1,725 x 1,608 x 782
Net Weight	kg	390	415	416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		AA50PHDG+AA50PHDG	DC80PHDG+DC80PHDG	DC80PHDG+DC80PHDG
Compressor Quantity		2	2	2
Compressor Motor Output	kW	6.5 x 2	7.5 x 2	8.6 x 2
Refrigeration Oil Type		FV68H		
Charge	L/Unit	8.4	8.4	8.4
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		2	2	2
Air Flow Rate	m^3/min	329	329	348
Fan Motor Output	kW	0.48 x 2	0.48 x 2	0.56 x 2
Liquid Line	mm (in.)	Ø15.88 (5/8)	Ø15.88 (5/8)	Ø15.88 (5/8)
Gas Line	mm (in.)	Ø28.58 (1-1/8)	Ø28.58 (1-1/8)	Ø28.58 (1-1/8)
Refrigerant Charge (before Shipment)	kg	11.3	11.3	12.6

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6°C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.

   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.

Model		RAS-26HNBCMQ	RAS-28HNBCMQ	RAS-30HNBCMQ
Combination of Base Unit		RAS-10HNBCMQ RAS-16HNBCMQ	RAS-12HNBCMQ RAS-16HNBCMQ	RAS-14HNBCMQ RAS-16HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	73.0	78.5	85.0
Nominal Heating Capacity	kW	81.5	87.5	95.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	66	66	67
Outer Dimensions Height x Width x Depth	mm	1,725 x 2,196 x 782	1,725 x 2,196 x 782	1,725 x 2,456 x 782
Net Weight	kg	226 + 310	248 + 310	308 + 310
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		AA50PHDG + DC80PDG	DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG
Compressor Quantity		2	2	2
Compressor Motor Output	kW	6.2 x 1 + 10.8 x 1	7.4 x 1 + 10.8 x 1	9.3 x 1 + 10.8 x 1
Refrigeration Oil Type		FV68H		
Charge	L/Unit	12.9	12.9	13.8
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		3	3	4
Air Flow Rate	m³/min	170 + 256	190 + 256	239 + 256
Fan Motor Output	kW	0.28 + (0.39 x 2)	0.42 + (0.39 x 2)	(0.33 x 2)+ (0.39 x 2)
Liquid Line	mm (in.)	Ø19.05 (3/4)	Ø19.05 (3/4)	Ø19.05 (3/4)
Gas Line	mm (in.)	Ø31.75 (1-1/4)	Ø31.75 (1-1/4)	Ø31.75 (1-1/4)
Refrigerant Charge (before Shipment)	kg	14.9	17.1	18.8

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19.0°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6°C WB
   Piping Lift: 0 Meter
2. The sound pressure is based on the following conditions.

   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-32HNBCMQ	RAS-34HNBCMQ	RAS-36HNBCMQ
Combination of Base Unit		RAS-16HNBCMQ RAS-16HNBCMQ	RAS-16HNBCMQ RAS-18HNBCMQ	RAS-16HNBCMQ RAS-20HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	90.0	95.0	101.0
Nominal Heating Capacity	kW	100.0	106.0	113.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	67	67	68
Outer Dimensions Height x Width x Depth	mm	1,725 x 2,456 x 782	1,725 x 2,456 x 782	1,725 x 2,846 x 782
Net Weight	kg	310 + 310	310 + 356	310 + 390
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		DC80PHDG + DC80PHDG	DC80PHDG + AA50PHDG + AA50PHDG	DC80PHDG + AA50PHDG + AA50PHDG
Compressor Quantity		2	3	3
Compressor Motor Output	kW	10.8 x 1 + 10.8 x 1	10.8 x 1 + 6.4 x 2	10.8 x 1 + 6.5 x 2
Refrigeration Oil Type		FV68H		
Charge	L/Unit	13.8	14.8	15.3
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		4	4	4
Air Flow Rate	m^3/min	256 x 2	256 x 2	256 + 329
Fan Motor Output	kW	(0.39 x 2) x 2	(0.39 x 2) x 2	(0.39 x 2) + (0.48 x 2)
Liquid Line	mm (in.)	Ø19.05 (3/4)	Ø19.05 (3/4)	Ø19.05 (3/4)
Gas Line	mm (in.)	Ø31.75 (1-1/4)	Ø31.75 (1-1/4)	Ø38.1 (1-1/2)
Refrigerant Charge (before Shipment)	kg	19.8	20.6	21.2

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-38HNBCMQ	RAS-40HNBCMQ	RAS-42HNBCMQ
Combination of Base Unit		RAS-16HNBCMQ RAS-22HNBCMQ	RAS-16HNBCMQ RAS-24HNBCMQ	RAS-18HNBCMQ RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	106.5	113.0	118.0
Nominal Heating Capacity	kW	119.0	125.0	131.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	68	68	68
Outer Dimensions Height x Width x Depth	mm	1,725 x 2,846 x 782	1,725 x 2,846 x 782	1,725 x 2,846 x 782
Net Weight	kg	310 + 415	310 + 416	356 + 416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		DC80PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + DC80PHDG	AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		3	3	4
Compressor Motor Output	kW	10.8 x 1 + 7.5 x 2	10.8 x 1 + 8.6 x 2	6.4 x 2 + 8.6 x 2
Refrigeration Oil Type		FV68H		
Charge	L/Unit	15.3	15.3	16.3
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		4	4	4
Air Flow Rate	m^3/min	256 + 329	256 + 348	256 + 348
Fan Motor Output	kW	(0.39 x 2) + (0.48 x 2)	(0.39 x 2) + (0.56 x 2)	(0.39 x 2) + (0.56 x 2)
Liquid Line	mm (in.)	Ø19.05 (3/4)	Ø19.05 (3/4)	Ø19.05 (3/4)
Gas Line	mm (in.)	Ø38.1 (1-1/2)	Ø38.1 (1-1/2)	Ø38.1 (1-1/2)
Refrigerant Charge (before Shipment)	kg	21.2	22.5	23.3

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-44HNBCMQ	RAS-46HNBCMQ	RAS-48HNBCMQ
Combination of Base Unit		RAS-20HNBCMQ RAS-24HNBCMQ	RAS-22HNBCMQ RAS-24HNBCMQ	RAS-24HNBCMQ RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	124.0	129.5	136.0
Nominal Heating Capacity	kW	138.0	144.0	150.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	69	69	69
Outer Dimensions Height x Width x Depth	mm	1,725 x 3,236 x 782	1,725 x 3,236 x 782	1,725 x 3,236 x 782
Net Weight	kg	390 + 416	415 + 416	416 + 416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		4	4	4
Compressor Motor Output	kW	(6.5 x 2) + (8.6 x 2)	(7.5 x 2) + (8.6 x 2)	(8.6 x 2) x 2
Refrigeration Oil Type		FV68H		
Charge	L/Unit	16.8	16.8	16.8
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		4	4	4
Air Flow Rate	m³/min	329 + 348	329 + 348	348 x 2
Fan Motor Output	kW	(0.48 x 2) + (0.56 x 2)	(0.48 x 2) + (0.56 x 2)	(0.56 x 2) x 2
Liquid Line	mm (in.)	Ø19.05 (3/4)	Ø19.05 (3/4)	Ø19.05 (3/4)
Gas Line	mm (in.)	Ø38.1 (1-1/2)	Ø38.1 (1-1/2)	Ø38.1 (1-1/2)
Refrigerant Charge (before Shipment)	kg	23.9	23.9	25.2

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-50HNBCMQ	RAS-52HNBCMQ	RAS-54HNBCMQ
Combination of Base Unit		RAS-16HNBCMQ RAS-16HNBCMQ RAS-18HNBCMQ	RAS-16HNBCMQ RAS-16HNBCMQ RAS-20HNBCMQ	RAS-16HNBCMQ RAS-16HNBCMQ RAS-22HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	140.0	146.0	151.5
Nominal Heating Capacity	kW	156.0	163.0	169.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	69	69	70
Outer Dimensions Height x Width x Depth	mm	1,725 x 3,694 x 782	1,725 x 4,084 x 782	1,725 x 4,084 x 782
Net Weight	kg	310 + 310 + 356	310 + 310 + 390	310 + 310 + 415
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		DC80PHDG + DC80PHDG + AA50PHDG + AA50PHDG	DC80PHDG + DC80PHDG + AA50PHDG + AA50PHDG	DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		4	4	4
Compressor Motor Output	kW	10.8 x 1 + 10.8 x 1 + (6.4 x 2)	10.8 x 1 + 10.8 x 1 + (6.5 x 2)	10.8 x 1 + 10.8 x 1 + (7.5 x 2)
Refrigeration Oil Type		FV68H		
Charge	L/Unit	21.7	22.2	22.2
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		6	6	6
Air Flow Rate	m^3/min	256 x 3	256 x 2 + 329 x 1	256 x 2 + 329 x 1
Fan Motor Output	kW	(0.39 x 2) x 3	(0.39 x 2) x 2 + 0.48 x 2	(0.39 x 2) x 2 + 0.48 x 2
Liquid Line	mm (in.)	Ø19.05 (3/4)	Ø19.05 (3/4)	Ø19.05 (3/4)
Gas Line	mm (in.)	Ø38.1 (1-1/2)	Ø38.1 (1-1/2)	Ø38.1 (1-1/2)
Refrigerant Charge (before Shipment)	kg	30.5	31.1	31.1

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-56HNBCMQ	RAS-58HNBCMQ	RAS-60HNBCMQ
Combination of Base Unit		RAS-16HNBCMQ RAS-16HNBCMQ RAS-24HNBCMQ	RAS-16HNBCMQ RAS-18HNBCMQ RAS-24HNBCMQ	RAS-16HNBCMQ RAS-20HNBCMQ RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	158.0	163.0	169.0
Nominal Heating Capacity	kW	175.0	181.0	188.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	70	70	70
Outer Dimensions Height x Width x Depth	mm	1,725 x 4,084 x 782	1,725 x 4,084 x 782	1,725 x 4,474 x 782
Net Weight	kg	310 + 310 + 416	310 + 356 + 416	310 + 390 + 416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	DC80PHDG + AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG	DC80PHDG + AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		4	5	5
Compressor Motor Output	kW	10.8 x 1 + 10.8 x 1 + (8.6 x 2)	10.8 x 1 + (6.4 x 2) + (8.6 x 2)	10.8 x 1 + (6.5 x 2) + (8.6 x 2)
Refrigeration Oil Type		FV68H		
Charge	L/Unit	22.2	23.2	23.7
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		6	6	6
Air Flow Rate	m^3/min	256 x 2 + 348	256 x 2 + 348	256 + 329 + 348
Fan Motor Output	kW	(0.39 x 2) x 2 + (0.56 x 2)	(0.39 x 2) x 2 + (0.56 x 2)	(0.39 x 2) + (0.48 x 2) + (0.56 x 2)
Liquid Line	mm (in.)	Ø19.05 (3/4)	Ø19.05 (3/4)	Ø19.05 (3/4)
Gas Line	mm (in.)	Ø44.45 (1-3/4)	Ø44.45 (1-3/4)	Ø44.45 (1-3/4)
Refrigerant Charge (before Shipment)	kg	32.4	33.2	33.8

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-62HNBCMQ	RAS-64HNBCMQ	RAS-66HNBCMQ
Combination of Base Unit		RAS-16HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ	RAS-16HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ	RAS-18HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	174.5	181.0	186.0
Nominal Heating Capacity	kW	194.0	200.0	206.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	70	70	70
Outer Dimensions Height x Width x Depth	mm	1,725 x 4,474 x 782	1,725 x 4,474 x 782	1,725 x 4,474 x 782
Net Weight	kg	310 + 415 + 416	310 + 416 + 416	356 + 416 + 416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		5	5	6
Compressor Motor Output	kW	10.8 x 1 + (7.5 x 2) + (8.6 x 2)	10.8 x 1 + (8.6 x 2) x 2	6.4 x 2 + (8.6 x 2) x 2
Refrigeration Oil Type		FV68H		
Charge	L/Unit	23.7	23.7	24.7
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		6	6	6
Air Flow Rate	m^3/min	256 + 329 + 348	256 + 348 + 348	256 + 348 + 348
Fan Motor Output	kW	(0.39 x 2) + (0.48 x 2) + (0.56 x 2)	(0.39 x 2) + (0.56 x 2) x 2	(0.39 x 2) + (0.56 x 2) x 2
Liquid Line	mm (in.)	Ø19.05 (3/4)	Ø19.05 (3/4)	Ø19.05 (3/4)
Gas Line	mm (in.)	Ø44.45 (1-3/4)	Ø44.45 (1-3/4)	Ø44.45 (1-3/4)
Refrigerant Charge (before Shipment)	kg	33.8	35.1	35.9

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-68HNBCMQ	RAS-70HNBCMQ	RAS-72HNBCMQ
Combination of Base Unit		RAS-20HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ	RAS-22HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ	RAS-24HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	192.0	197.5	204.0
Nominal Heating Capacity	kW	213.0	219.0	225.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	70	71	71
Outer Dimensions Height x Width x Depth	mm	1,725 x 4,864 x 782	1,725 x 4,864 x 782	1,725 x 4,864 x 782
Net Weight	kg	390 + 416 + 416	415 + 416 + 416	416 + 416 + 416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		6	6	6
Compressor Motor Output	kW	(6.5 x 2)+ (8.6 x 2) x 2	(7.5 x 2)+ (8.6 x 2) x 2	(8.6 x 2) x 3
Refrigeration Oil Type		FV68H		
Charge	L/Unit	25.2	25.2	25.2
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		6	6	6
Air Flow Rate	m³/min	329 + 348 x 2	329 + 348 x 2	348 x 3
Fan Motor Output	kW	(0.48 x 2) + (0.56 x 2) x 2	(0.48 x 2) + (0.56 x 2) x 2	(0.56 x 2) x 3
Liquid Line	mm (in.)	Ø22.2 (7/8)	Ø22.2 (7/8)	Ø22.2 (7/8)
Gas Line	mm (in.)	Ø44.5 (1-3/4)	Ø44.5 (1-3/4)	Ø44.5 (1-3/4)
Refrigerant Charge (before Shipment)	kg	36.5	36.5	37.8

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-74HNBCMQ	RAS-76HNBCMQ	RAS-78HNBCMQ
Combination of Base Unit		RAS-16HNBCMQ RAS-16HNBCMQ RAS-18HNBCMQ RAS-24HNBCMQ	RAS-16HNBCMQ RAS-16HNBCMQ RAS-20HNBCMQ RAS-24HNBCMQ	RAS-16HNBCMQ RAS-16HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	208.0	214.0	219.5
Nominal Heating Capacity	kW	231.0	238.0	244.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	71	71	71
Outer Dimensions Height x Width x Depth	mm	1,725 x 5,322 x 782	1,725 x 5,712 x 782	1,725 x 5,712 x 782
Net Weight	kg	310 + 310 + 356 + 416	310 + 310 + 390 + 416	310 + 310 + 415 + 416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		DC80PHDG + DC80PHDG + AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		6	6	6
Compressor Motor Output	kW	10.8 x 1 + 10.8 x 1 + (6.4 x 2) + (8.6 x 2)	10.8 x 1 + 10.8 x 1 + (6.5 x 2) + (8.6 x 2)	10.8 x 1 + 10.8 x 1 + (7.5 x 2) + (8.6 x 2)
Refrigeration Oil Type		FV68H		
Charge	L/Unit	30.1	30.6	30.6
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		8	8	8
Air Flow Rate	m³/min	256 x 3 + 348	256 x 2 + 329 + 348	256 x 2 + 329 + 348
Fan Motor Output	kW	(0.39 x 2) x 3 + (0.56 x 2)	(0.39 x 2) x 2 + (0.48 x 2) + (0.56 x 2)	(0.39 x 2) x 2 + (0.48 x 2) + (0.56 x 2)
Liquid Line	mm (in.)	Ø22.2 (7/8)	Ø22.2 (7/8)	Ø22.2 (7/8)
Gas Line	mm (in.)	Ø50.8 (2)	Ø50.8 (2)	Ø50.8 (2)
Refrigerant Charge (before Shipment)	kg	43.1	43.7	43.7

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-80HNBCMQ	RAS-82HNBCMQ	RAS-84HNBCMQ
Combination of Base Unit		RAS-20HNBCMQ RAS-20HNBCMQ RAS-20HNBCMQ RAS-20HNBCMQ	RAS-20HNBCMQ RAS-20HNBCMQ RAS-20HNBCMQ RAS-22HNBCMQ	RAS-20HNBCMQ RAS-20HNBCMQ RAS-20HNBCMQ RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	224.0	229.5	236.0
Nominal Heating Capacity	kW	252.0	258.0	264.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	71	71	71
Outer Dimensions Height x Width x Depth	mm	1,725 x 6,492 x 782	1,725 x 6,492 x 782	1,725 x 6,492 x 782
Net Weight	kg	390 + 390 + 390 + 390	390 + 390 + 390 + 415	390 + 390 + 390 + 416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG	AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG	AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		8	8	8
Compressor Motor Output	kW	(6.5 x 2) x 4	(6.5 x 2) x 3 + 7.5 x 2	(6.5 x 2) x 3 + 8.6 x 2
Refrigeration Oil Type		FV68H		
Charge	L/Unit	33.6	33.6	33.6
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		8	8	8
Air Flow Rate	m³/min	329 x 4	329 x 4	329 x 3 + 348 x 1
Fan Motor Output	kW	(0.48 x 2) x 4	(0.48 x 2) x 4	(0.48 x 2) x 3 + (0.56 x 2)
Liquid Line	mm (in.)	Ø22.2 (7/8)	Ø22.2 (7/8)	Ø22.2 (7/8)
Gas Line	mm (in.)	Ø50.8 (2)	Ø50.8 (2)	Ø50.8 (2)
Refrigerant Charge (before Shipment)	kg	45.2	45.2	46.5

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-86HNBCMQ	RAS-88HNBCMQ	RAS-90HNBCMQ
Combination of Base Unit		RAS-20HNBCMQ RAS-20HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ	RAS-20HNBCMQ RAS-20HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ	RAS-20HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~50Hz		
Nominal Cooling Capacity	kW	241.5	248.0	253.5
Nominal Heating Capacity	kW	270.0	276.0	282.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	72	72	72
Outer Dimensions Height x Width x Depth	mm	1,725 x 6,492 x 782	1,725 x 6,492 x 782	1,725 x 6,492 x 782
Net Weight	kg	390 + 390 + 415 + 416	390 + 390 + 416 + 416	390 + 415 + 416 + 416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	AA50PHDG + AA50PHDG + AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		8	8	8
Compressor Motor Output	kW	(6.5 x 2) x 2 + 7.5 x 2 + 8.6 x 2	(6.5 x 2) x 2 + (8.6 x 2) x 2	6.5 x 2 + 7.5 x 2 + (8.6 x 2) x 2
Refrigeration Oil Type		FV68H		
Charge	L/Unit	33.6	33.6	33.6
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		8	8	8
Air Flow Rate	m³/min	329 x 3 + 348	329 x 2 + 348 x 2	329 x 2 + 348 x 2
Fan Motor Output	kW	(0.48 x 2) x 3 + 0.56 x 2	(0.48 x 2) x 2 + (0.56 x 2) x 2	(0.48 x 2) x 2 + (0.56 x 2) x 2
Liquid Line	mm (in.)	Ø22.2 (7/8)	Ø22.2 (7/8)	Ø25.4 (1)
Gas Line	mm (in.)	Ø50.8 (2)	Ø50.8 (2)	Ø50.8 (2)
Refrigerant Charge (before Shipment)	kg	46.5	47.8	47.8

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

Model		RAS-92HNBCMQ	RAS-94HNBCMQ	RAS-96HNBCMQ
Combination of Base Unit		RAS-20HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ	RAS-22HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ	RAS-24HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ RAS-24HNBCMQ
Power Supply		380/400/415V±10% 3N~ 50Hz		
Nominal Cooling Capacity	kW	260.0	265.5	272.0
Nominal Heating Capacity	kW	288.0	294.0	300.0
Cabinet Color (Munsell Code)		Natural White (ID8000-100036)		
Sound Pressure Level	dB(A)	72	72	72
Outer Dimensions Height x Width x Depth	mm	1,725 x 6,492 x 782	1,725 x 6,492 x 782	1,725 x 6,492 x 782
Net Weight	kg	390 + 416 + 416 + 416	415 + 416 + 416 + 416	416 + 416 + 416 + 416
Refrigerant		R410A		
Flow Control		Micro-Computer Control Expansion Valve		
Compressor		Hermetic (Scroll)		
Compressor Model		AA50PHDG + AA50PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG	DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG + DC80PHDG
Compressor Quantity		8	8	8
Compressor Motor Output	kW	6.5 x 2 + (8.6 x 2) x 3	7.5 x 2 + (8.6 x 2) x 3	(8.6 x 2) x 4
Refrigeration Oil Type		FV68H		
Charge	L/Unit	33.6	33.6	33.6
Heat Exchanger		Multi-Pass Cross-Finned Tube		
Condenser Fan		Propeller Fan		
Fan Quantity		8	8	8
Air Flow Rate	m³/min	329 + 348 x 3	329 + 348 x 3	348 x 4
Fan Motor Output	kW	(0.48 x 2) + (0.56 x 2) x 3	(0.48 x 2) + (0.56 x 2) x 3	(0.56 x 2) x 4
Liquid Line	mm (in.)	Ø25.4 (1)	Ø25.4 (1)	Ø25.4 (1)
Gas Line	mm (in.)	Ø50.8 (2)	Ø50.8 (2)	Ø50.8 (2)
Refrigerant Charge (before Shipment)	kg	49.1	49.1	50.4

Notes:

1. The cooling and heating performances are the values when combined with our test indoor units.

   Cooling Operation Conditions:
   Indoor Air Inlet Temperature: 27°C DB 19°C WB
   Outdoor Air Inlet Temperature: 35°C DB
   Piping Length: 7.5 Meters

   Heating Operation Conditions:
   Indoor Air Inlet Temperature: 20°C DB
   Outdoor Air Inlet Temperature: 7°C DB 6 °C WB
   Piping Lift: 0 Meter

2. The sound pressure is based on the following conditions.
   1 Meter from the unit service cover surface, and 1.36 Meters from floor level.
   The above data is based on the cooling mode. In case of heating mode, the sound pressure level increases by approximately 1~2 dB. The above data was measured in an semianechoic chamber so that reflected sound should be taken into consideration in the field.
3. Except for the test combination in the table (26~96HP), there is no other combination of the base unit.
4. The width of outer dimension, it is the value when each distance between the base outdoor units is test to 20mm.

3. Component Data

Model		RAS-8.0HNBCMQ	RAS-10HNBCMQ	RAS-12HNBCMQ	RAS-14HNBCMQ	RAS-16HNBCMQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		2	2	3	3	3
Number of Tube/ Coil		120	120	180	180	180
Maximum Operating Pressure	MPa	4.15	4.15	4.15	4.15	4.15
Fin Material		Aluminum				
Pitch	mm	1.7	1.7	1.7	1.7	1.7
Total Face Area	m²	2.36	2.36	2.36	3.12	3.12
Number of Coil/ Unit		1	1	1	2	2
Outdoor Fan		Large Diameter Fan (Propeller Fan)				
Number/Unit		1	1	1	2	2
Outer Diameter	mm	644	644	644	544 + 544	544 + 544
Revolution	rpm	780	804	924	1116 + 1116	1194 + 1194
Nominal Air Flow	m³/min	165	170	190	239	256
Outdoor Fan Motor		Drip-Proof Type Enclosure				
Starting Method		DC Motor				
Nominal Output	W	260	280	420	330 + 330	390 + 390
Quantity		1	1	1	2	2
Insulation Class		E	E	E	E	E

COMPONENT DATA

Model		RAS-18HNBCMQ	RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-24HNBCMQ	RAS-26HNBCMQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3	3	3	3	2+3
Number of Tube/ Coil		180	180	180	180	120 + 180
Maximum Operating Pressure	MPa	4.15	4.15	4.15	4.15	4.15
Fin Material		Aluminum				
Pitch	mm	1.7	1.7	1.7	1.7	1.7
Total Face Area	m²	3.12	3.58	3.58	3.58	2.36 + 3.12
Number of Coil/ Unit		2	2	2	2	3
Outdoor Fan		Large Diameter Fan (Propeller Fan)				
Number/Unit		2	2	2	2	3
Outer Diameter	mm	544 + 544	644 + 644	644 + 644	644 + 644	644 + 544 + 544
Revolution	rpm	1194 + 1194	888 + 888	888 + 888	936 + 936	804 + 1194 + 1194
Nominal Air Flow	m³/min	256	329	329	348	170 + 256
Outdoor Fan Motor		Drip-Proof Type Enclosure				
Starting Method		DC Motor				
Nominal Output	W	390 + 390	480 + 480	480 + 480	560 + 560	280+ 390 + 390
Quantity		2	2	2	2	3
Insulation Class		E	E	E	E	E + E

Model		RAS-28HNBCMQ	RAS-30HNBCMQ	RAS-32HNBCMQ	RAS-34HNBCMQ	RAS-36HNBCMQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3 + 3	3 + 3	3 + 3	3 + 3	3 + 3
Number of Tube/ Coil		180 + 180	180 + 180	180 + 180	180 + 180	180 + 180
Maximum Operating Pressure	MPa	4.15	4.15	4.15	4.15	4.15
Fin Material		Aluminium				
Pitch	mm	1.7	1.7	1.7	1.7	1.7
Total Face Area	m²	2.36 + 3.12	3.12 + 3.12	3.12 + 3.12	3.12 + 3.12	3.12 + 3.58
Number of Coil/ Unit		3	4	4	4	4
Outdoor Fan		Large Diameter Fan (Propeller Fan)				
Number/Unit		3	4	4	4	4
Outer Diameter	mm	644 + 544 + 544	544 + 544 + 544 + 544	544 + 544 + 544 + 544	544 + 544 + 544 + 544	544 + 544 + 644 + 644
Revolution	rpm	924 + 1194 + 1194	1116 + 1116 + 1194 + 1194	1194 + 1194 + 1194 + 1194	1194 + 1194 + 1194 + 1194	1194 + 1194 + 888 + 888
Nominal Air Flow	m³/min	190 + 256	239+ 256	256 + 256	256 + 256	256 + 329
Outdoor Fan Motor		Drip-Proof Type Enclosure				
Starting Method		DC Motor				
Nominal Output	W	420 + 390 + 390	330 + 330 + 390 + 390	390 + 390 + 390 + 390	390 + 390 + 390 + 390	390 + 390 + 480 + 480
Quantity		3	4	4	4	4
Insulation Class		E + E	E + E	E + E	E + E	E + E

Model		RAS-38HNBCMQ	RAS-40HNBCMQ	RAS-42HNBCMQ	RAS-44HNBCMQ	RAS-46HNBCMQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3 + 3	3 + 3	3 + 3	3 + 3	3 + 3
Number of Tube/ Coil		180 + 180	180 + 180	180 + 180	180 + 180	180 + 180
Maximum Operating Pressure	MPa	4.15	4.15	4.15	4.15	4.15
Fin Material		Aluminium				
Pitch	mm	1.7	1.7	1.7	1.7	1.7
Total Face Area	m²	3.12 + 3.58	3.12 + 3.58	3.12 + 3.58	3.58 + 3.58	3.58 + 3.58
Number of Coil/ Unit		4	4	4	4	4
Outdoor Fan		Large Diameter Fan (Propeller Fan)				
Number/Unit		4	4	4	4	4
Outer Diameter	mm	544 + 544 + 644 + 644	544 + 544 + 644 + 644	544 + 544 + 644 + 644	644 + 644 + 644 + 644	644 + 644 + 644 + 644
Revolution	rpm	1194 + 1194 + 888 + 888	1194 + 1194 + 936+ 936	1194 + 1194 + 936+ 936	888 + 888 + 936+ 936	888 + 888 + 936 + 936
Nominal Air Flow	m³/min	256 + 329	256 + 348	256 + 348	329 + 329	329 + 348
Outdoor Fan Motor		Drip-Proof Type Enclosure				
Starting Method		DC Motor				
Nominal Output	W	390 + 390 + 480 + 480	390 + 390 + 560 + 560	390 + 390 + 560 + 560	480 + 480 + 560 + 560	480 + 480 + 560 + 560
Quantity		4	4	4	4	4
Insulation Class		E + E	E + E	E + E	E + E	E + E

Model		RAS-48HNBCMQ	RAS-50HNBCMQ	RAS-52HNBCMQ	RAS-54HNBCMQ	RAS-56HNBCMQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3 + 3	3 + 3 + 3	3 + 3 + 3	3 + 3 + 3	3 + 3 + 3
Number of Tube/ Coil		180 + 180	180 + 180 + 180	180 + 180 + 180	180 + 180 + 180	180 + 180+ 180
Maximum Operating Pressure	MPa	4.15	4.15	4.15	4.15	4.15
Fin Material		Aluminum				
Pitch	mm	1.7	1.7	1.7	1.7	1.7
Total Face Area	m²	3.58 + 3.58	3.12 + 3.12 + 3.12	3.12 + 3.12 + 3.58	3.12 + 3.12 + 3.58	3.12 + 3.12 + 3.58
Number of Coil/ Unit		4	6	6	6	6
Outdoor Fan		Large Diameter Fan (Propeller Fan)				
Number/Unit		4	6	6	6	6
Outer Diameter	mm	644 + 644 + 644 + 644	544 + 544 + 544 + 544 + 544 + 544	544 + 544 + 544 + 544 + 644 + 644	544 + 544 + 544 + 544 + 644 + 644	544 + 544 + 544 + 544 + 644 + 644
Revolution	rpm	936 + 936 + 936 + 936	1194 + 1194 + 1194 + 1194 + 1194 + 1194	1194 + 1194 + 1194 + 1194 + 888 + 888	1194 + 1194 + 1194 + 1194 + 888 + 888	1194 + 1194 + 1194 + 1194 + 936 + 936
Nominal Air Flow	m³/min	348 + 348	256 + 256 + 256	256 + 256 + 329	256 + 256 + 329	256 + 256 + 348
Outdoor Fan Motor		Drip-Proof Type Enclosure				
Starting Method		DC Motor				
Nominal Output	W	560 + 560 + 560 + 560	390 + 390 + 390 + 390 + 390 + 390	390 + 390 + 390 + 390 + 480 + 480	390 + 390 + 390 + 390 + 480 + 480	390 + 390 + 390 + 390 + 560 + 560
Quantity		4	6	6	6	6
Insulation Class		E + E	E + E + E	E + E + E	E + E + E	E + E + E

Model		RAS-58HNBCMQ	RAS-60HNBCMQ	RAS-62HNBCMQ	RAS-64HNBCMQ	RAS-66HNBCMQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3 + 3 + 3	3 + 3 + 3	3 + 3 + 3	3 + 3 + 3	3 + 3 + 3
Number of Tube/ Coil		180 + 180 + 180	180 + 180 + 180	180 + 180 + 180	180 + 180 + 180	180 + 180 + 180
Maximum Operating Pressure	MPa	4.15	4.15	4.15	4.15	4.15
Fin Material		Aluminum				
Pitch	mm	1.7	1.7	1.7	1.7	1.7
Total Face Area	m²	3.12 + 3.12 + 3.58	3.12 + 3.58 + 3.58	3.12 + 3.58 + 3.58	3.12 + 3.58 + 3.58	3.12 + 3.58 + 3.58
Number of Coil/ Unit		6	6	6	6	6
Outdoor Fan		Large Diameter Fan (Propeller Fan)				
Number/Unit		6	6	6	6	6
Outer Diameter	mm	544 + 544 + 544 + 544 + 644 + 644	544 + 544 + 644 + 644 + 644 + 644	544 + 544 + 644 + 644 + 644 + 644	544 + 544 + 644 + 644 + 644 + 644	544 + 544 + 644 + 644 + 644 + 644
Revolution	rpm	1194 + 1194 + 1194 + 1194 + 936 + 936	1194 + 1194 + 888 + 888 + 936 + 936	1194 + 1194 + 888 + 888 + 936 + 936	1194 + 1194 + 936 + 936 + 936 + 936	1194 + 1194 + 936 + 936 + 936 + 936
Nominal Air Flow	m³/min	256 + 256 + 348	256 + 329 + 348	256 + 329 + 348	256 + 348 + 348	256 + 348 + 348
Outdoor Fan Motor		Drip-Proof Type Enclosure				
Starting Method		DC Motor				
Nominal Output	W	390 + 390 + 390 + 390 + 560 + 560	390 + 390 + 480 + 480 + 560 + 560	390 + 390 + 480 + 480 + 560 + 560	390 + 390 + 560 + 560 + 560 + 560	390 + 390 + 560 + 560 + 560 + 560
Quantity		6	6	6	6	6
Insulation Class		E + E + E	E + E + E	E + E + E	E + E + E	E + E + E

Model		RAS-68HNBCMQ	RAS-70HNBCMQ	RAS-72HNBCMQ	RAS-74HNBCMQ	RAS-76HNBCMQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3 + 3 + 3	3 + 3 + 3	3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3
Number of Tube/ Coil		180 + 180 + 180	180 + 180 + 180	180 + 180 + 180	180 + 180 + 180 + 180	180 + 180 + 180 + 180
Maximum Operating Pressure	MPa	4.15	4.15	4.15	4.15	4.15
Fin Material		Aluminum				
Pitch	mm	1.7	1.7	1.7	1.7	1.7
Total Face Area	m²	3.58 + 3.58 + 3.58	3.58 + 3.58 + 3.58	3.58 + 3.58 + 3.58	3.12 + 3.12 + 3.12 + 3.58	3.12 + 3.12 + 3.58 + 3.58
Number of Coil/ Unit		6	6	6	8	8
Outdoor Fan		Large Diameter Fan (Propeller Fan)				
Number/Unit		6	6	6	8	8
Outer Diameter	mm	644 + 644 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644	544 + 544 + 544 + 544 + 544 + 544 + 644 + 644	544 + 544 + 544 + 544 + 644 + 644 + 644 + 644
Revolution	rpm	888 + 888 + 936 + 936 + 936 + 936	888 + 888 + 936 + 936 + 936 + 936	936 + 936 + 936 + 936 + 936 + 936	1194 + 1194 + 1194 + 1194 + 1194 + 1194 + 936 + 936	1194 + 1194 + 1194 + 1194 + 888 + 888 + 936 + 936
Nominal Air Flow	m³/min	329 + 348 + 348	329 + 348 + 348	348 + 348 + 348	256 + 256 + 256 + 348	256 + 256 + 329 + 348
Outdoor Fan Motor		Drip-Proof Type Enclosure				
Starting Method		DC Motor				
Nominal Output	W	480 + 480 + 560 + 560 + 560 + 560	480 + 480 + 560 + 560 + 560 + 560	560 + 560 + 560 + 560 + 560 + 560	390 + 390 + 390 + 390 + 390 + 390 + 560 + 560	390 + 390 + 390 + 390 + 480 + 480 + 560 + 560
Quantity		6	6	6	8	8
Insulation Class		E + E + E	E + E + E	E + E + E	E + E + E + E	E + E + E + E

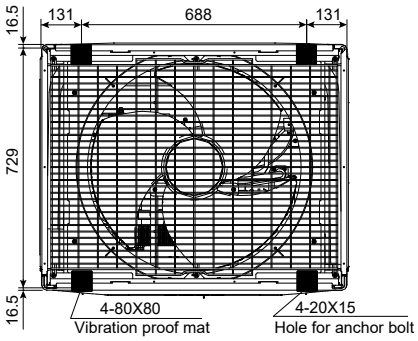
Model		RAS-78HNBCMQ	RAS-80HNBCMQ	RAS-82HNBCMQ	RAS-84HNBCMQ	RAS-86HNBCMQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3
Number of Tube/ Coil		180 + 180 + 180 + 180	180 + 180 + 180 + 180	180 + 180 + 180 + 180	180 + 180 + 180 + 180	180 + 180 + 180 + 180
Maximum Operating Pressure	MPa	4.15	4.15	4.15	4.15	4.15
Fin Material		Aluminum				
Pitch	mm	1.7	1.7	1.7	1.7	1.7
Total Face Area	m²	3.12 + 3.12 + 3.58 + 3.58	3.58 + 3.58 + 3.58 + 3.58	3.58 + 3.58 + 3.58 + 3.58	3.58 + 3.58 + 3.58 + 3.58	3.58 + 3.58 + 3.58 + 3.58
Number of Coil/ Unit		8	8	8	8	8
Outdoor Fan		Large Diameter Fan (Propeller Fan)				
Number/Unit		8	8	8	8	8
Outer Diameter	mm	544 + 544 + 544 + 544 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644 + 644 + 644
Revolution	rpm	1194 + 1194 + 1194 + 1194 + 888 + 888 + 936 + 936	888 + 888 + 888 + 888 + 888 + 888 + 888 + 888	888 + 888 + 888 + 888 + 888 + 888 + 888 + 888	888 + 888 + 888 + 888 + 888 + 888 + 936 + 936	888 + 888 + 888 + 888 + 888 + 888 + 936 + 936
Nominal Air Flow	m³/min	256 + 256 + 329 + 348	329 + 329 + 329 + 329	329 + 329 + 329 + 329	329 + 329 + 329 + 348	329 + 329 + 329 + 348
Outdoor Fan Motor		Drip-Proof Type Enclosure				
Starting Method		DC Motor				
Nominal Output	W	390 + 390 + 390 + 390 + 480 + 480 + 560 + 560	480 + 480 + 480 + 480 + 480 + 480 + 480 + 480	480 + 480 + 480 + 480 + 480 + 480 + 480 + 480	480 + 480 + 480 + 480 + 480 + 480 + 560 + 560	480 + 480 + 480 + 480 + 480 + 480 + 560 + 560
Quantity		8	8	8	8	8
Insulation Class		E + E + E + E	E + E + E + E	E + E + E + E	E + E + E + E	E + E + E + E

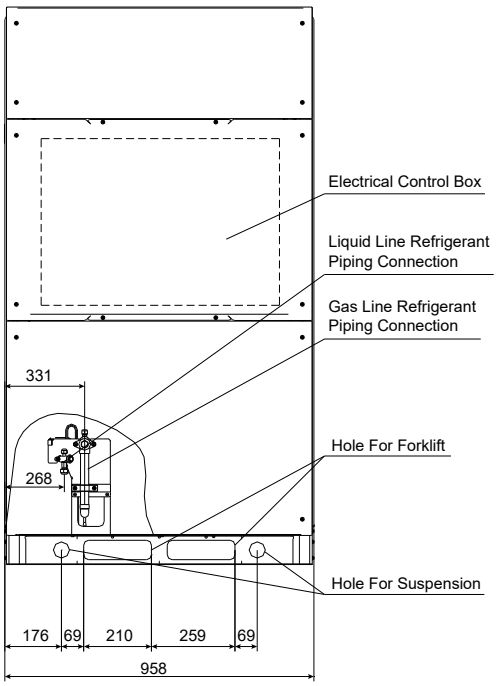
Model		RAS-88HNBCMQ	RAS-90HNBCMQ	RAS-92HNBCMQ	RAS-94HNBCMQ	RAS-96HNBCMQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3
Number of Tube/ Coil		180 + 180 + 180 + 180	180 + 180 + 180 + 180	180 + 180 + 180 + 180	180 + 180 + 180 + 180	180 + 180 + 180 + 180
Maximum Operating Pressure	MPa	4.15	4.15	4.15	4.15	4.15
Fin Material		Aluminum				
Pitch	mm	1.7	1.7	1.7	1.7	1.7
Total Face Area	m²	3.58 + 3.58 + 3.58 + 3.58	3.58 + 3.58 + 3.58 + 3.58	3.58 + 3.58 + 3.58 + 3.58	3.58 + 3.58 + 3.58 + 3.58	3.58 + 3.58 + 3.58 + 3.58
Number of Coil/ Unit		8	8	8	8	8
Outdoor Fan		Large Diameter Fan (Propeller Fan)				
Number/Unit		8	8	8	8	8
Outer Diameter	mm	644 + 644 + 644 + 644 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644 + 644 + 644	644 + 644 + 644 + 644 + 644 + 644 + 644 + 644
Revolution	rpm	888 + 888 + 888 + 888 + 936 + 936 + 936 + 936	888 + 888 + 888 + 888 + 936 + 936 + 936 + 936	888 + 888 + 936 + 936 + 936 + 936 + 936 + 936	888 + 888 + 936 + 936 + 936 + 936 + 936 + 936	936 + 936 + 936 + 936 + 936 + 936 + 936 + 936
Nominal Air Flow	m³/min	329 + 329 + 348 + 348	329 + 329 + 348 + 348	329 + 348 + 348 + 348	329 + 348 + 348 + 348	348 + 348 + 348 + 348
Outdoor Fan Motor		Drip-Proof Type Enclosure				
Starting Method		DC Motor				
Nominal Output	W	480 + 480 + 480 + 480 + 560 + 560 + 560 + 560	480 + 480 + 480 + 480 + 560 + 560 + 560 + 560	480 + 480 + 560 + 560 + 560 + 560 + 560 + 560	480 + 480 + 560 + 560 + 560 + 560 + 560 + 560	560 + 560 + 560 + 560 + 560 + 560 + 560 + 560
Quantity		8	8	8	8	8
Insulation Class		E + E + E + E	E + E + E + E	E + E + E + E	E + E + E + E	E + E + E + E

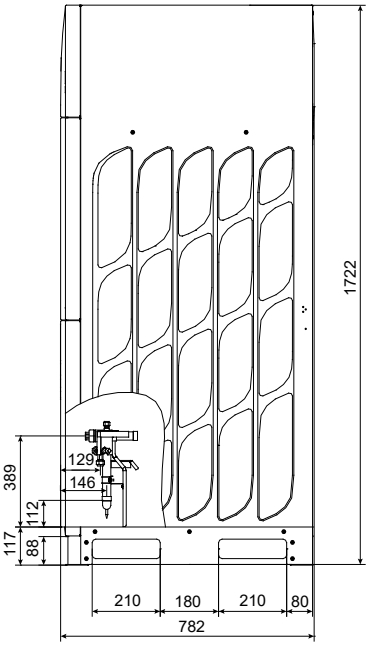
4. Dimensional Data

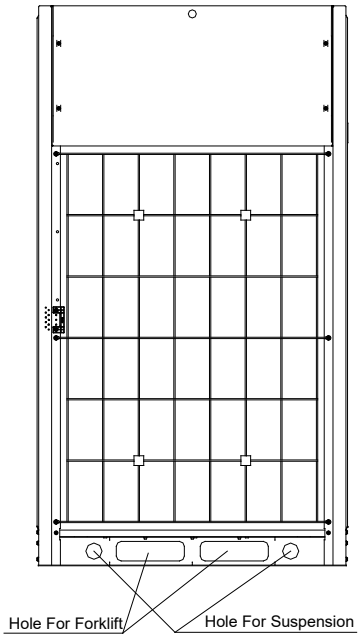
Model: RAS-8.0HNBCMQ, RAS-10HNBCMQ and RAS-12HNBCMQ

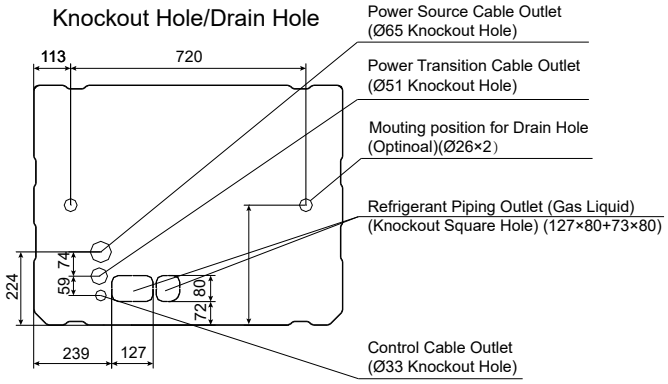
Unit: mm







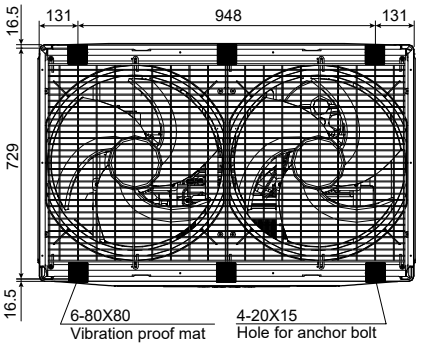


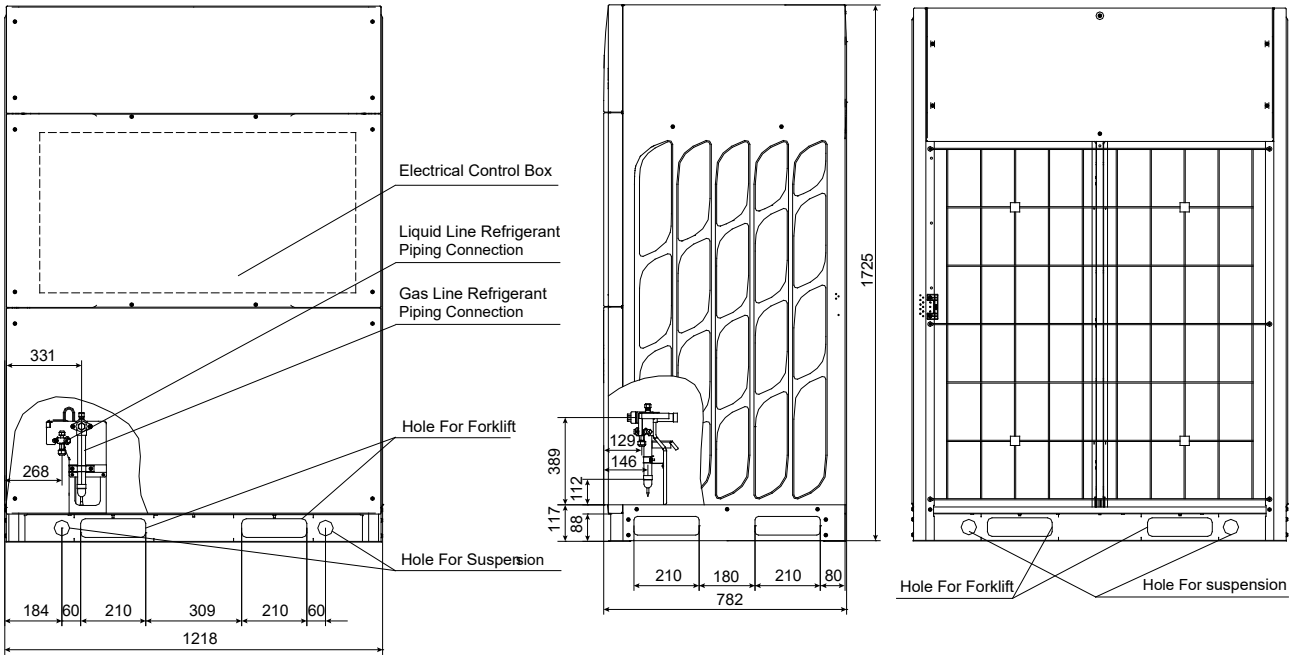


NOTES:
1. Refer to “System Pipe Drawing” for diameters.
2. Drainage to come out during heating or defrost operation and rain water too. Choose a well drained place to install units or provide a ditch to drain.

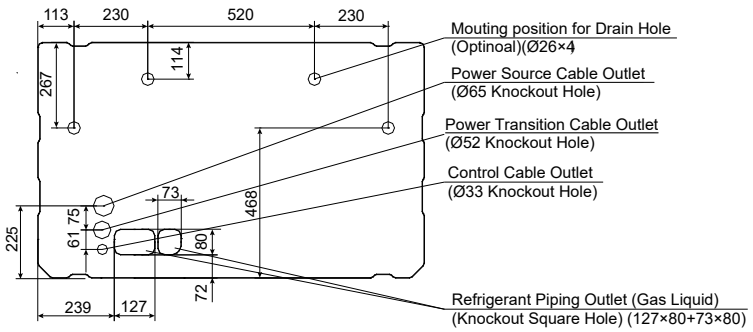
Model: RAS-14HNBCMQ, RAS-16HNBCMQ, and RAS-18HNBCMQ

Unit: mm





Knockout Hole/Drain Hole

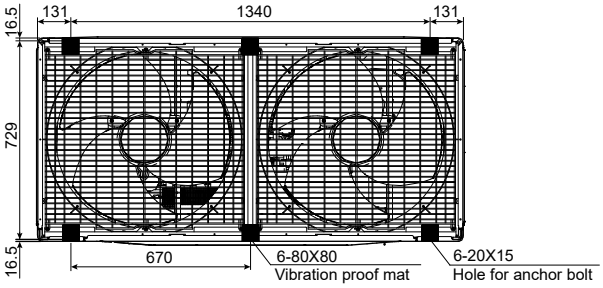


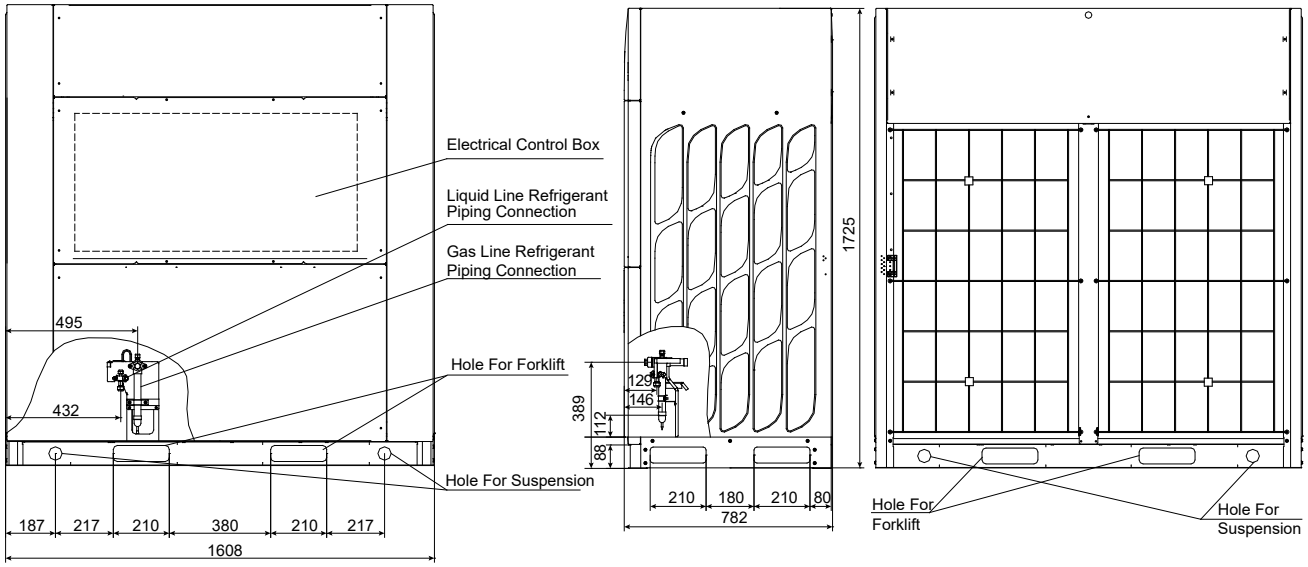
NOTES:
1. Refer to “System Pipe Drawing” for diameters.
2. Drainage to come out during heating or defrost operation and rain water too.
   Choose a well drained place to install units or provide a ditch to drain.

DIMENSIONAL DATA

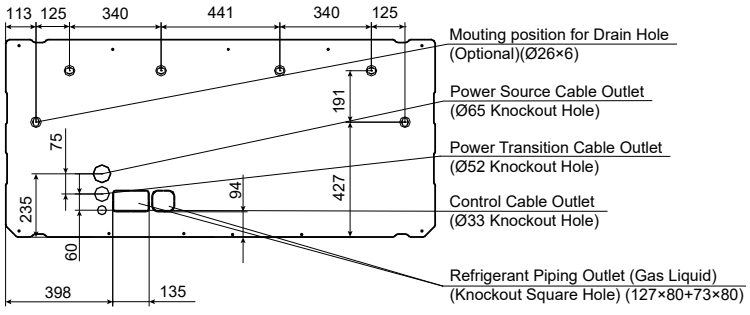
Model: RAS-20HNBCMQ, RAS-22HNBCMQ, and RAS-24HNBCMQ

Unit: mm



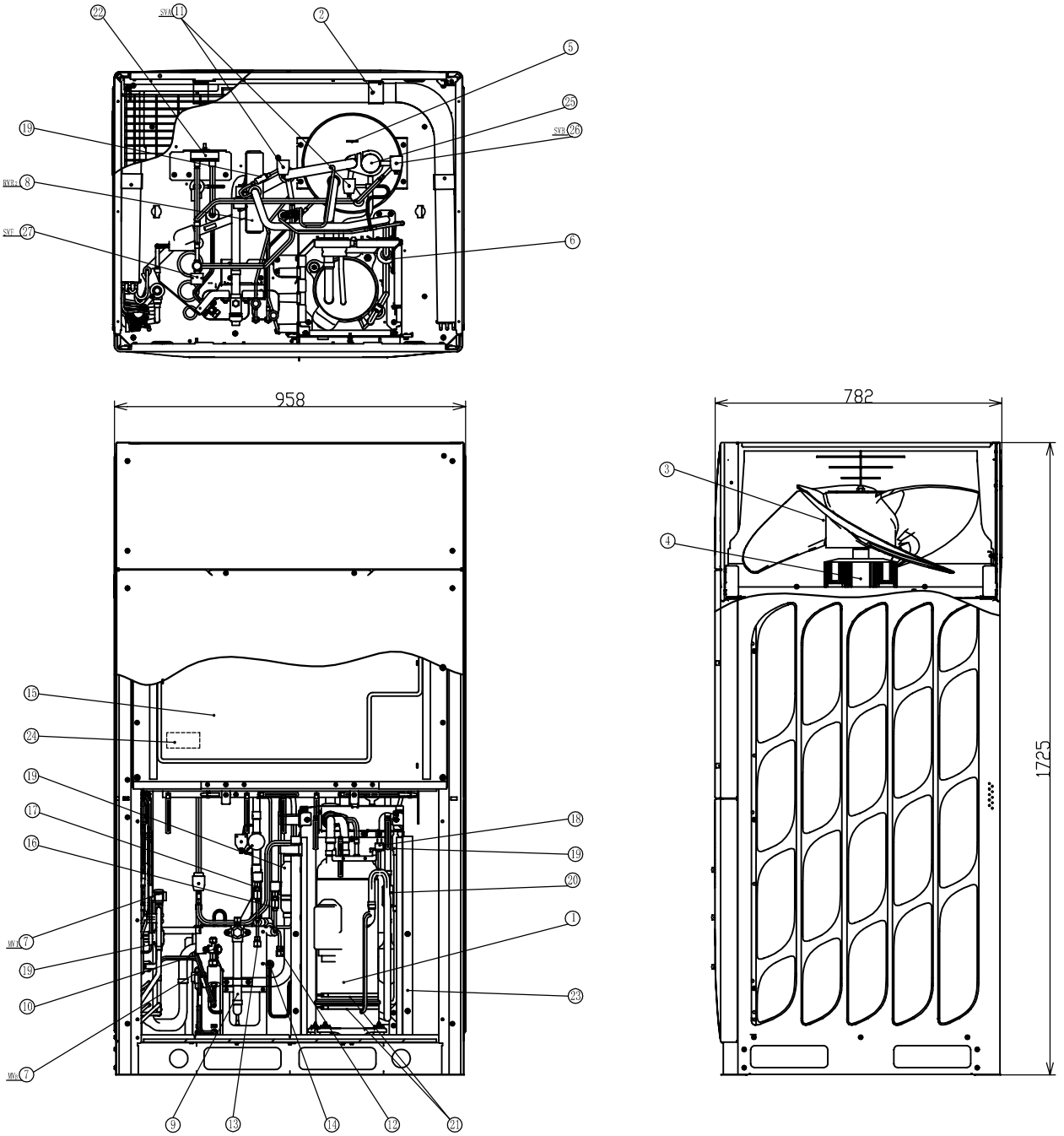


Knockout Hole/Drain Hole



NOTES:
1. Refer to “System Pipe Drawing” for diameters.
2. Drainage to come out during heating or defrost operation and rain water too.
   Choose a well drained place to install units or provide a ditch to drain.

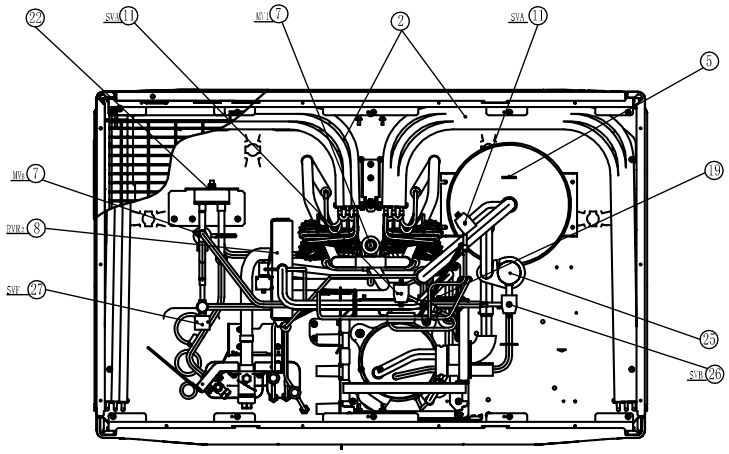
RAS-8.0-10-12HNBCMQ

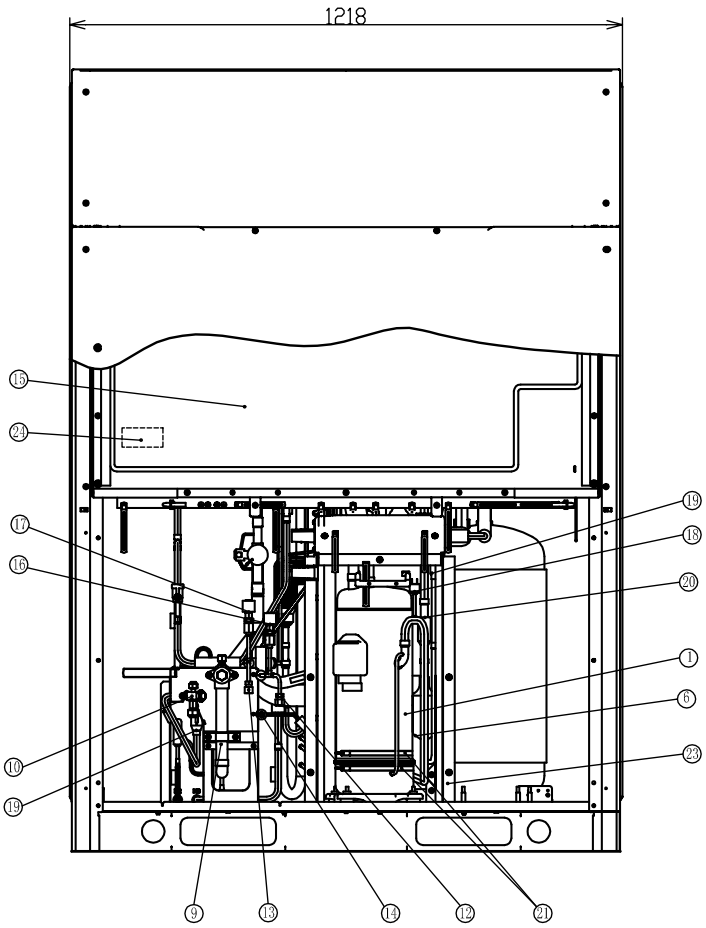


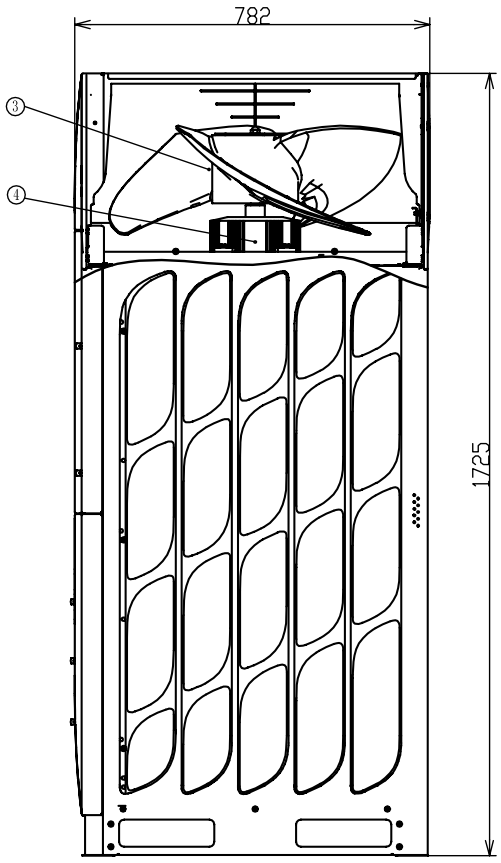
Item	Part Name	Item	Part Name
1	Compressor (Inverter)	15	Electrical Control Box
2	Heat Exchanger	16	Low Pressure Sensor
3	Propeller Fan	17	High Pressure Sensor
4	Fan Motor	18	High Pressure Switch for Protection
5	Accumulator (Pressure Vessel)	19	Strainer
6	Oil Separator (Not Pressure Vessel)	20	Check Valve
7	Micro-computer Control Expansion Valve (2 pcs)	21	Crankcase Heater (2pcs)
8	4-Way Valve	22	Plate Heat Exchanger
9	Stop Valve (Gas)	23	Compressor Cover
10	Stop Valve (Liquid)	24	Terminal Block Box
11	Hot Gas Bypass Solenoid Valve (SVA/2pcs)	25	Injection Muffler
12	Check Joint (Low)	26	Injection Solenoid Valve (SVB)
13	Check Joint (High)	27	Injection Solenoid Valve (SVF)
14	Check Joint (For Oil)		

DIMENSIONAL DATA

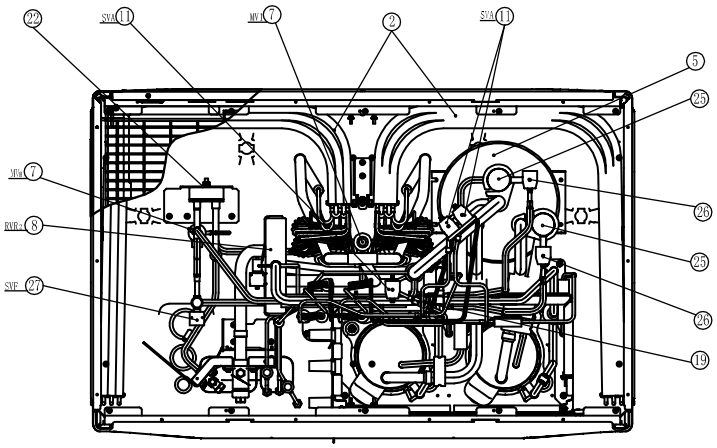
RAS-14-16HNBCMQ

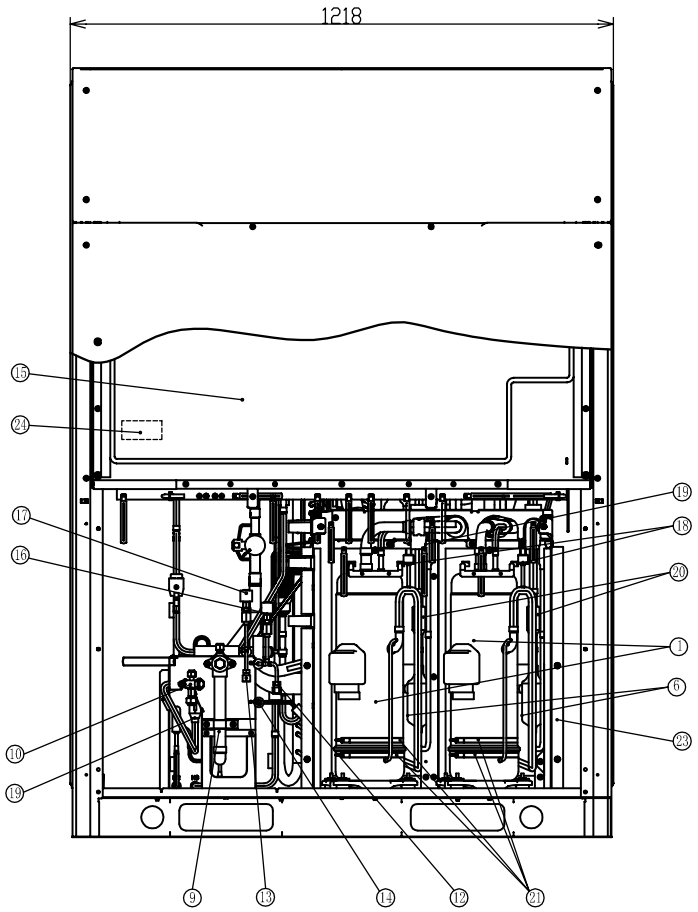


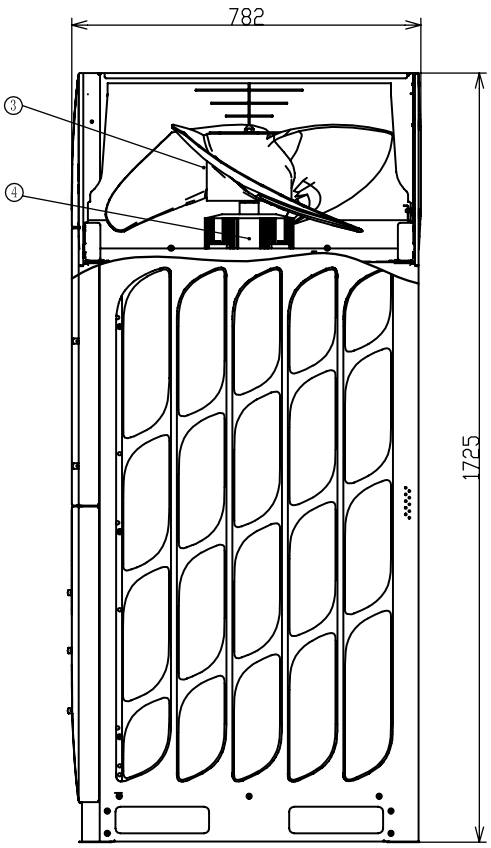




Item	Part Name	Item	Part Name
1	Compressor (Inverter)	15	Electrical Control Box
2	Heat Exchanger	16	Low Pressure Sensor
3	Propeller Fan	17	High Pressure Sensor
4	Fan Motor	18	High Pressure Switch for Protection
5	Accumulator (Pressure Vessel)	19	Strainer
6	Oil Separator (Not Pressure Vessel)	20	Check Valve
7	Micro-computer Control Expansion Valve (2 pcs)	21	Crankcase Heater (2 pcs)
8	4-Way Valve	22	Plate Heat Exchanger
9	Stop Valve (Gas)	23	Compressor Cover
10	Stop Valve (Liquid)	24	Terminal Block Box
11	Hot Gas Bypass Solenoid Valve (SVA/2 pcs)	25	Injection Muffler
12	Check Joint (Low)	26	Injection Solenoid Valve (SVB)
13	Check Joint (High)	27	Injection Solenoid Valve (SVF)
14	Check Joint (For Oil)		



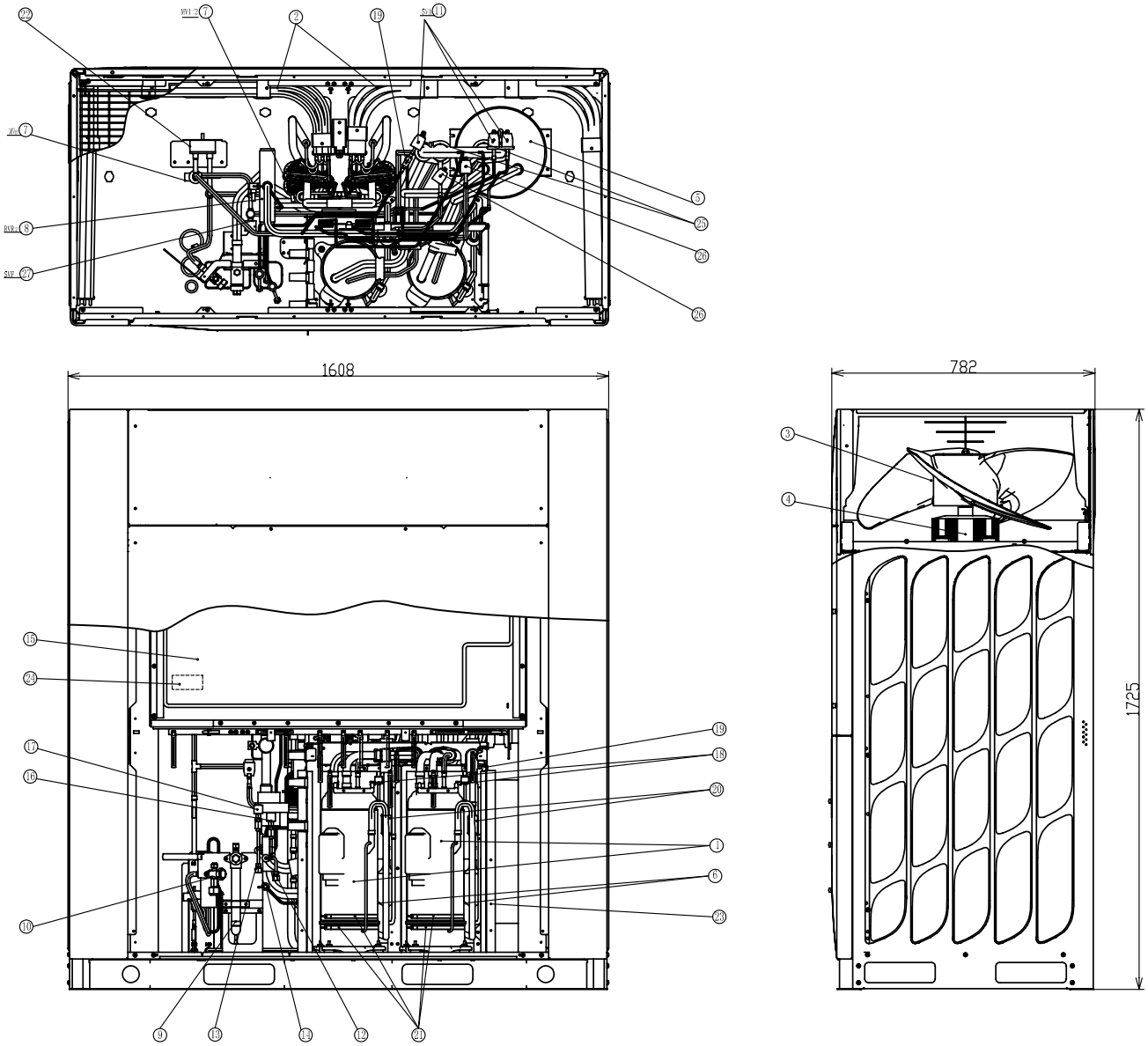




Item	Part Name	Item	Part Name
1	Compressor (Inverter) (2 pcs)	15	Electrical Control Box
2	Heat Exchanger	16	Low Pressure Sensor
3	Propeller Fan	17	High Pressure Sensor
4	Fan Motor	18	High Pressure Switch for Protection
5	Accumulator (Pressure Vessel)	19	Strainer
6	Oil Separator (Not Pressure Vessel) (2 pcs)	20	Check Valve
7	Micro-computer Control Expansion Valve (2 pcs)	21	Crankcase Heater (4 pcs)
8	4-Way Valve	22	Plate Heat Exchanger
9	Stop Valve (Gas)	23	Compressor Cover
10	Stop Valve (Liquid)	24	Terminal Block Box
11	Hot Gas Bypass Solenoid Valve (SVA/1 pcs)	25	Injection Muffler (2 pcs)
12	Check Joint (Low)	26	Injection Solenoid Valve (SVB)
13	Check Joint (High)	27	Injection Solenoid Valve (SVF)
14	Check Joint (For Oil)	28	Injection Solenoid Valve (SVC)

DIMENSIONAL DATA

RAS-20-24HNBCMQ



Item	Part Name	Item	Part Name
1	Compressor (Inverter) (2 pcs)	15	Electrical Control Box
2	Heat Exchanger	16	Low Pressure Sensor
3	Propeller Fan	17	High Pressure Sensor
4	Fan Motor	18	High Pressure Switch for Protection(2 pcs)
5	Accumulator (Pressure Vessel)	19	Strainer
6	Oil Separator (Not Pressure Vessel) (2 pcs)	20	Check Valve (2 pcs)
7	Micro-computer Control Expansion Valve (3 pcs)	21	Crankcase Heater (4 pcs)
8	4-Way Valve	22	Plate Heat Exchanger
9	Stop Valve (Gas)	23	Compressor Cover
10	Stop Valve (Liquid)	24	Terminal Block Box
11	Hot Gas Bypass Solenoid Valve (SVA/3 pcs)	25	Injection Muffler (2pcs)
12	Check Joint (Low)	26	Injection Solenoid Valve (SVB)
13	Check Joint (High)	27	Injection Solenoid Valve (SVF)
14	Check Joint (For Oil)	28	Injection Solenoid Valve (SVC)

5. Selection Data

5.1 Capacity Characteristic Curve

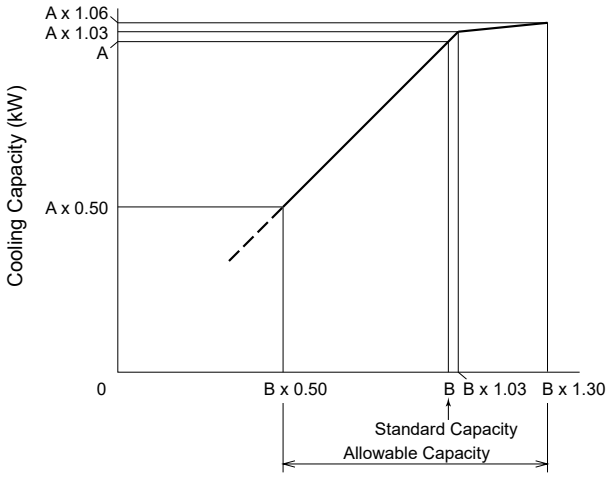
The following charts show the characteristics of outdoor unit capacity which corresponds with total horsepower of combined indoor unit, on standard condition with horizontal refrigerant piping of 7.5m in length.

< Cooling Capacity >

• Condition

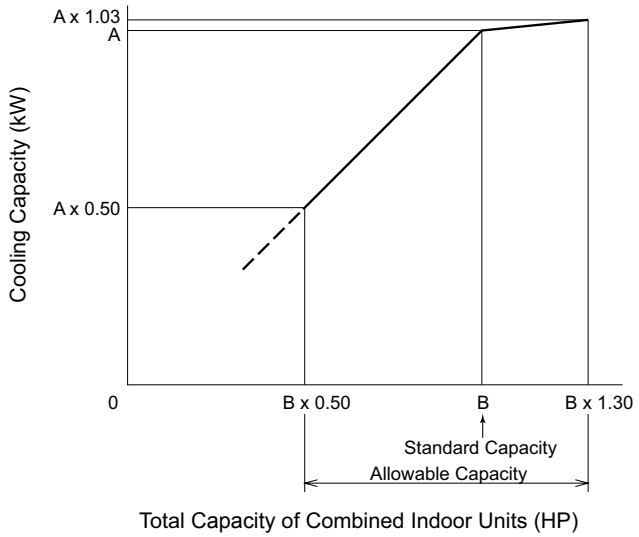
Indoor Air Inlet Temperature: 27.0°C DB (80.0°F DB), 19.0°C WB (66.2°F WB)

Outdoor Air Inlet Temperature: 35.0°C DB (95.0°F DB)



Model	A (kW)	B (HP)
RAS-8.0HNBCMQ	22.4	8
RAS-10HNBCMQ	28.0	10
RAS-12HNBCMQ	33.5	12
RAS-14HNBCMQ	40.0	14
RAS-16HNBCMQ	45.0	16
RAS-20HNBCMQ	56.0	20
RAS-26HNBCMQ	73.0	26

Model	A (kW)	B (HP)
RAS-28HNBCMQ	78.5	28
RAS-30HNBCMQ	85.0	30
RAS-32HNBCMQ	90.0	32
RAS-36HNBCMQ	101.0	36
RAS-52HNBCMQ	146.0	52
RAS-80HNBCMQ	224.0	80



Model	A (kW)	B (HP)
RAS-18HNBCMQ	50.0	18
RAS-22HNBCMQ	61.5	22
RAS-24HNBCMQ	68.0	24
RAS-34HNBCMQ	95.0	34
RAS-38HNBCMQ	106.5	38
RAS-40HNBCMQ	113.0	40
RAS-42HNBCMQ	118.0	42
RAS-44HNBCMQ	124.0	44
RAS-46HNBCMQ	129.5	46
RAS-48HNBCMQ	136.0	48
RAS-50HNBCMQ	140.0	50
RAS-54HNBCMQ	151.5	54
RAS-56HNBCMQ	158.0	56
RAS-58HNBCMQ	163.0	58
RAS-60HNBCMQ	169.0	60
RAS-62HNBCMQ	174.5	62

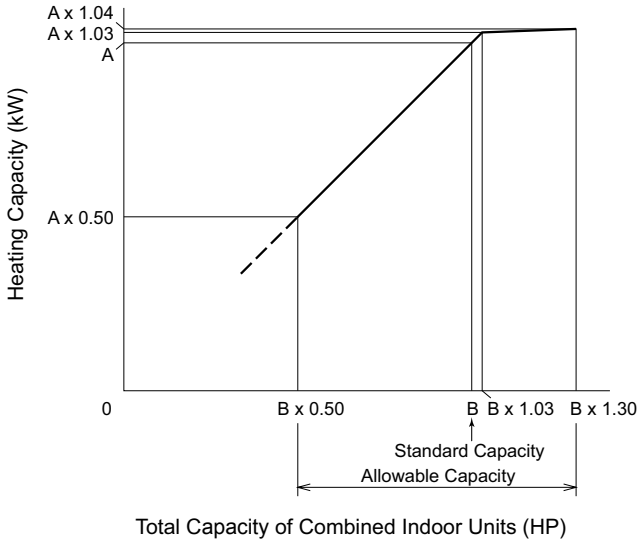
Model	A (kW)	B (HP)
RAS-64HNBCMQ	181.0	64
RAS-66HNBCMQ	186.0	66
RAS-68HNBCMQ	192.0	68
RAS-70HNBCMQ	197.5	70
RAS-72HNBCMQ	204.0	72
RAS-74HNBCMQ	208.0	74
RAS-76HNBCMQ	214.0	76
RAS-78HNBCMQ	219.5	78
RAS-82HNBCMQ	229.5	82
RAS-84HNBCMQ	236.0	84
RAS-86HNBCMQ	241.5	86
RAS-88HNBCMQ	248.0	88
RAS-90HNBCMQ	253.5	90
RAS-92HNBCMQ	260.0	92
RAS-94HNBCMQ	265.5	94
RAS-96HNBCMQ	272.0	96

< Heating Capacity >

• Condition

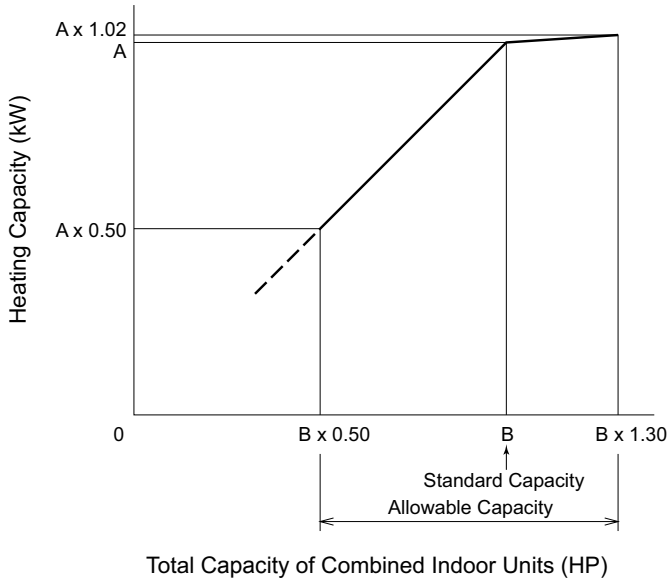
Indoor Air Inlet Temperature: 20.0°C DB (68.0°F DB)

Outdoor Air Inlet Temperature: 7.0°C DB (45.0°F DB), 6.0°C WB (43.0°F WB)



Model	A (kW)	B (HP)
RAS-8.0HNBCMQ	25.0	8
RAS-10HNBCMQ	31.5	10
RAS-12HNBCMQ	37.5	12
RAS-14HNBCMQ	45.0	14
RAS-16HNBCMQ	50.0	16
RAS-20HNBCMQ	63.0	20
RAS-26HNBCMQ	81.5	26

Model	A (kW)	B (HP)
RAS-28HNBCMQ	87.5	28
RAS-30HNBCMQ	95.0	30
RAS-32HNBCMQ	100.0	32
RAS-36HNBCMQ	113.0	36
RAS-52HNBCMQ	163.0	52
RAS-80HNBCMQ	252.0	80



Model	A (kW)	B (HP)
RAS-18HNBCMQ	56.0	18
RAS-22HNBCMQ	69.0	22
RAS-24HNBCMQ	75.0	24
RAS-34HNBCMQ	106.0	34
RAS-38HNBCMQ	119.0	38
RAS-40HNBCMQ	125.0	40
RAS-42HNBCMQ	131.0	42
RAS-44HNBCMQ	138.0	44
RAS-46HNBCMQ	144.0	46
RAS-48HNBCMQ	150.0	48
RAS-50HNBCMQ	156.0	50
RAS-54HNBCMQ	169.0	54
RAS-56HNBCMQ	175.0	56
RAS-58HNBCMQ	181.0	58
RAS-60HNBCMQ	188.0	60
RAS-62HNBCMQ	194.0	62

Model	A (kW)	B (HP)
RAS-64HNBCMQ	200.0	64
RAS-66HNBCMQ	206.0	66
RAS-68HNBCMQ	213.0	68
RAS-70HNBCMQ	219.0	70
RAS-72HNBCMQ	225.0	72
RAS-74HNBCMQ	231.0	74
RAS-76HNBCMQ	238.0	76
RAS-78HNBCMQ	244.0	78
RAS-82HNBCMQ	258.0	82
RAS-84HNBCMQ	264.0	84
RAS-86HNBCMQ	270.0	86
RAS-88HNBCMQ	276.0	88
RAS-90HNBCMQ	282.0	90
RAS-92HNBCMQ	288.0	92
RAS-94HNBCMQ	294.0	94
RAS-96HNBCMQ	300.0	96

5.2 Correction Factor According to Piping Length

< Cooling Capacity >

Correction Factor for Cooling Capacity According to Piping Length

The cooling capacity should be corrected according to the following formula:

CCA = CCxF

CCA: Actual Corrected Cooling Capacity

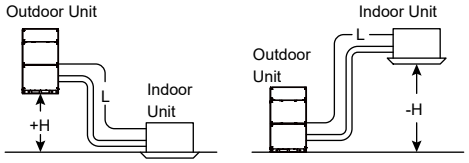
CC: Cooling Capacity in the Performance Table

F: Correction Factor Based on the Equivalent Piping Length

The correction factors are shown in the following figure.

Equivalent Piping Length for

- One 90° Elbow is 0.5m.
- One 180° Bend is 1.5m.
- One Multi-Kit is 0.5m.



H: Vertical Distance Between Indoor Unit and Outdoor Unit in Meters

EL: Equivalent Total Distance Between Indoor Unit and Outdoor Unit in Meters (Equivalent One-Way Piping Length)

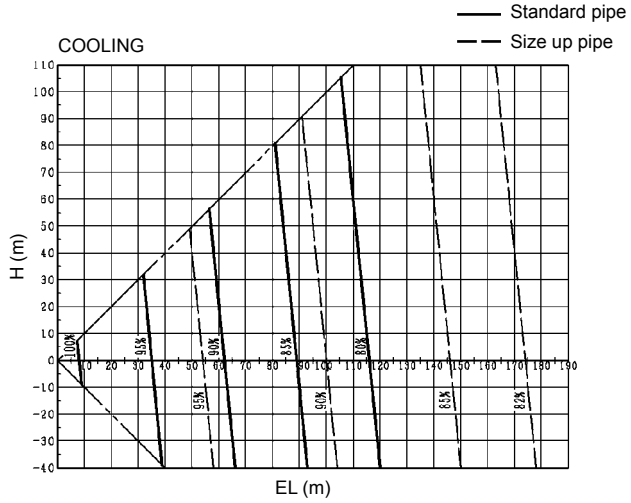
H>0: Position of Outdoor Unit Higher Than Position of Indoor Unit

L: Actual One-Way Piping Length Between Indoor Unit and Outdoor Unit in Meters

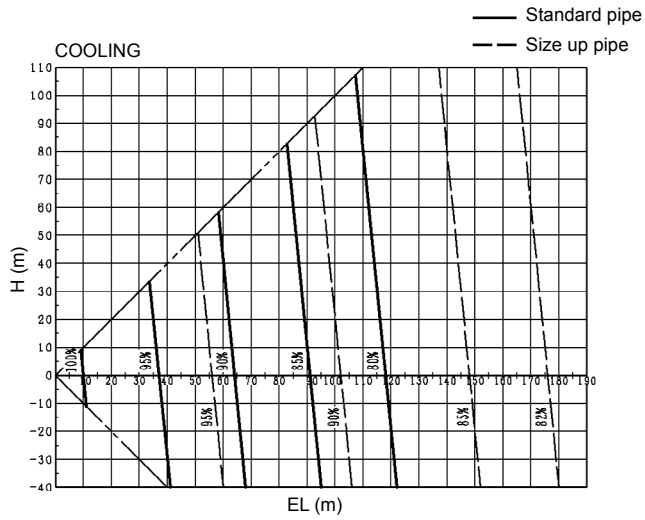
NOTE:

If EL is more than 100m, increase both Liquid Pipe and Gas Pipe .

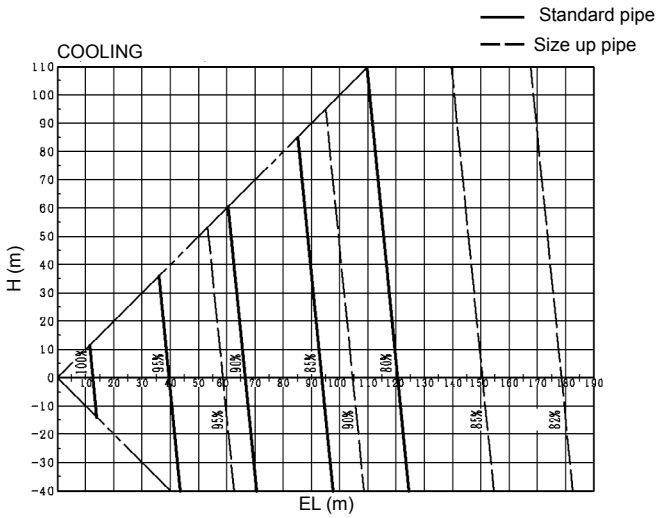
MODELS: RAS-8.0HNBCMQ, RAS-10HNBCMQ, RAS-12HNBCMQ, RAS-14HNBCMQ, RAS-16HNBCMQ, RAS-18HNBCMQ



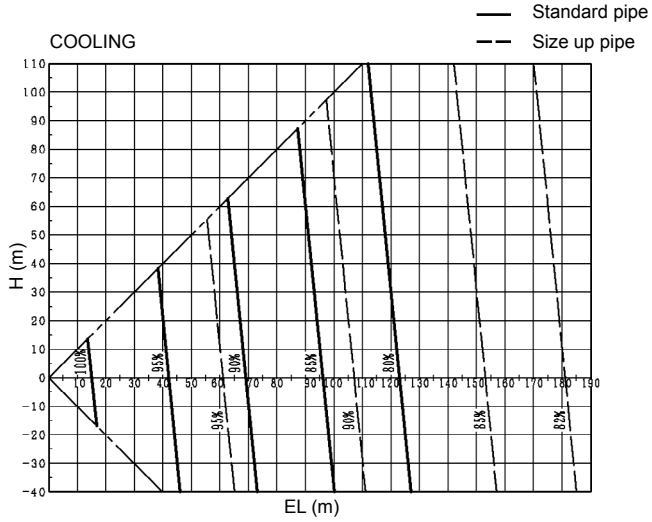
MODELS: RAS-20HNBCMQ, RAS-22HNBCMQ, RAS-24HNBCMQ, RAS-26HNBCMQ, RAS-28HNBCMQ, RAS-30HNBCMQ



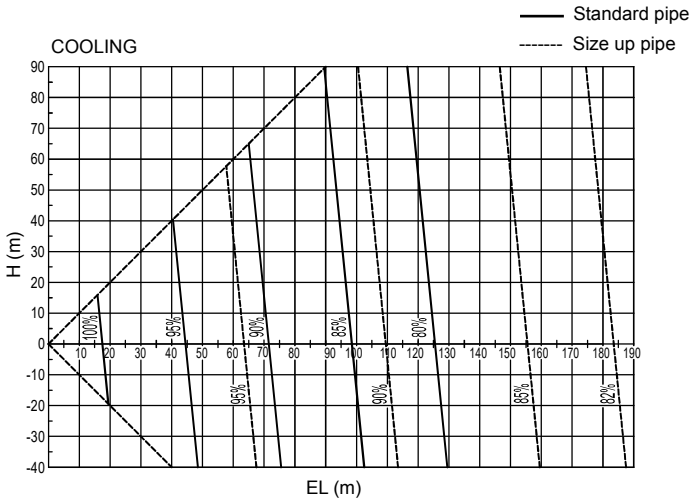
MODELS: RAS-32HNBCMQ, RAS-34HNBCMQ, RAS-36HNBCMQ, RAS-38HNBCMQ, RAS-40HNBCMQ, RAS-42HNBCMQ, RAS-44HNBCMQ



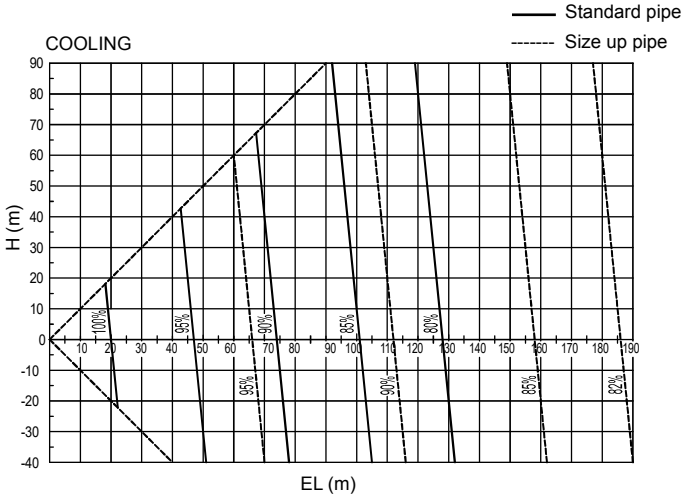
MODELS: RAS-46HNBCMQ, RAS-48HNBCMQ, RAS-50HNBCMQ, RAS-52HNBCMQ, RAS-54HNBCMQ



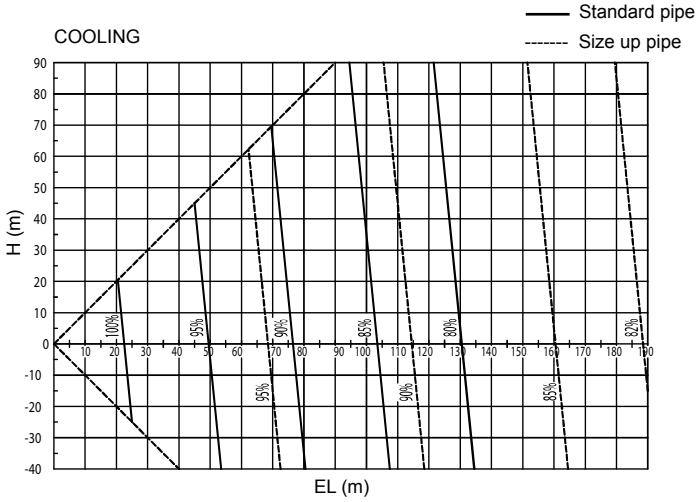
MODELS: RAS-56HNBCMQ RAS-58HNBCMQ, RAS-60HNBCMQ, RAS-62HNBCMQ, RAS-64HNBCMQ, RAS-66HNBCMQ, RAS-68HNBCMQ, RAS-70HNBCMQ, RAS-72HNBCMQ



MODELS: RAS-74HNBCMQ, RAS-76HNBCMQ, RAS-78HNBCMQ, RAS-80HNBCMQ, RAS-82HNBCMQ, RAS-84HNBCMQ



MODELS: RAS-86HNBCMQ, RAS-88HNBCMQ, RAS-90HNBCMQ, RAS-92HNBCMQ, RAS-94HNBCMQ, RAS-96HNBCMQ



< Heating Capacity >

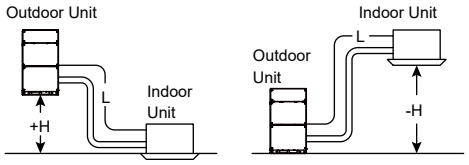
Correction Factor for Heating Capacity According to Piping Length
The heating capacity should be corrected according to the following formula:

HCA= HCxF

HCA: Actual Corrected Heating Capacity
HC: Heating Capacity in the Performance Table
F: Correction Factor Based on the Equivalent Piping Length

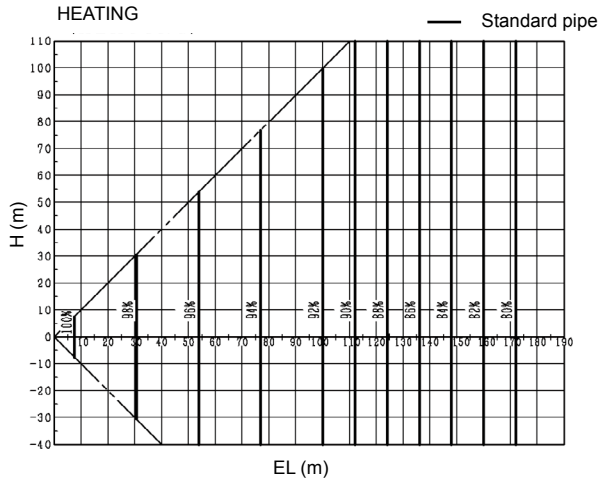
The correction factors are shown in the following figure.
Equivalent Piping Length for

- One 90° Elbow is 0.5m.
- One 180° Bend is 1.5m.
- One Multi-Kit is 0.5m.

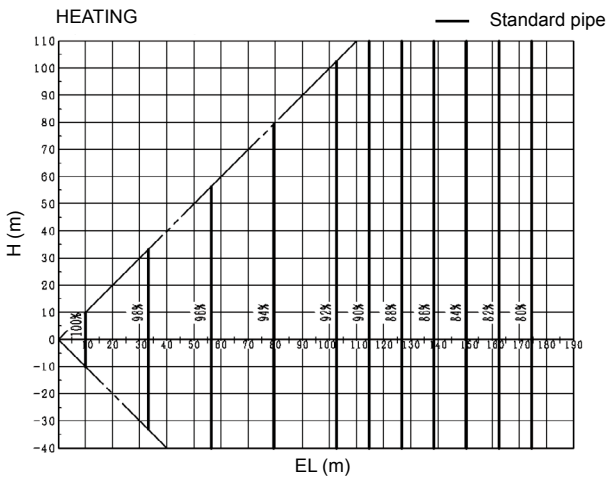


H: Vertical Distance Between Indoor Unit and Outdoor Unit in Meters
EL: Equivalent Total Distance Between Indoor Unit and Outdoor Unit in Meters (Equivalent One-Way Piping Length)
H>0: Position of Outdoor Unit Higher Than Position of Indoor Unit
L: Actual One-Way Piping Length Between Indoor Unit and Outdoor Unit in Meters

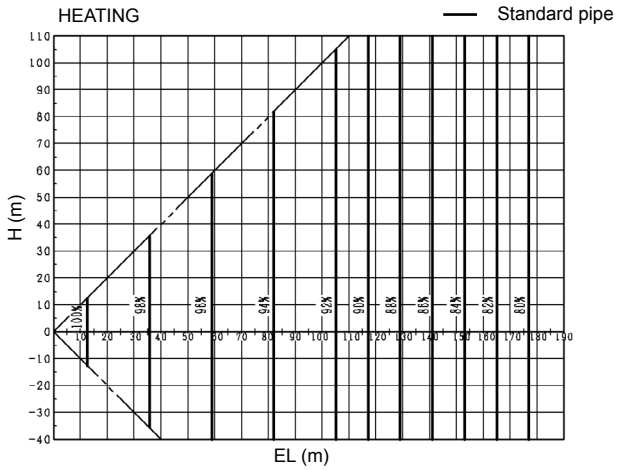
MODELS: RAS-8.0HNBCMQ, RAS-10HNBCMQ, RAS-12HNBCMQ, RAS-14HNBCMQ, RAS-16HNBCMQ, RAS-18HNBCMQ



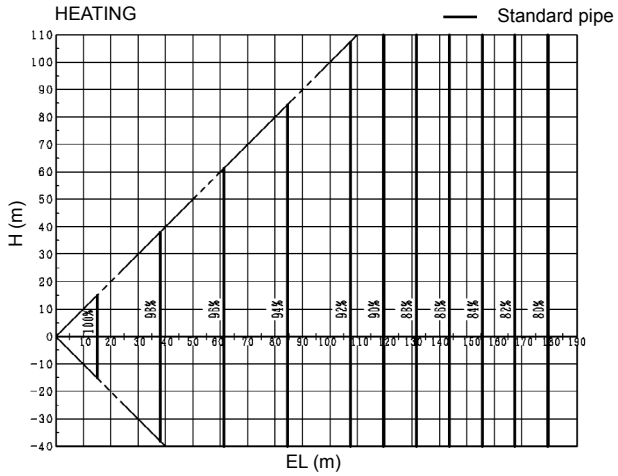
MODELS: RAS-20HNBCMQ, RAS-22HNBCMQ, RAS-24HNBCMQ, RAS-26HNBCMQ, RAS-28HNBCMQ, RAS-30HNBCMQ



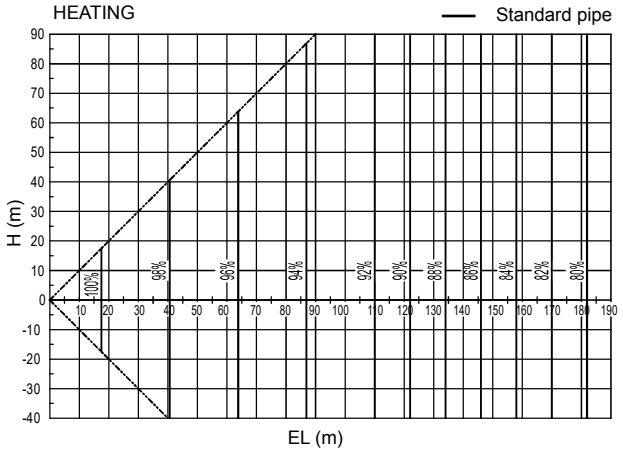
MODELS: RAS-32HNBCMQ, RAS-34HNBCMQ, RAS-36HNBCMQ, RAS-38HNBCMQ, RAS-40HNBCMQ
RAS-42HNBCMQ, RAS-44HNBCMQ



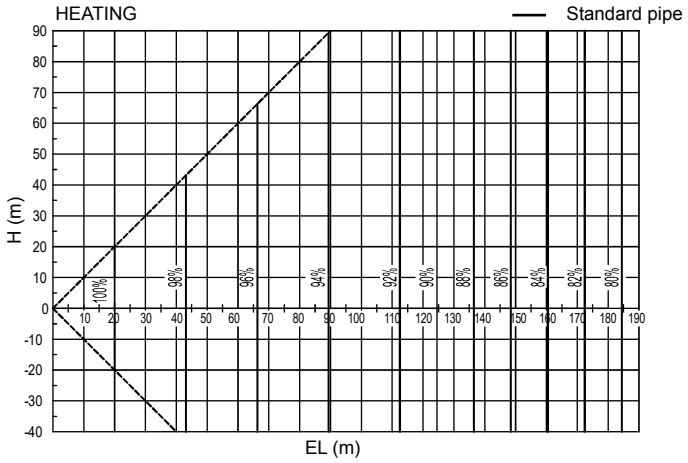
MODELS: RAS-46HNBCMQ, RAS-48HNBCMQ, RAS-50HNBCMQ, RAS-52HNBCMQ, RAS-54HNBCMQ



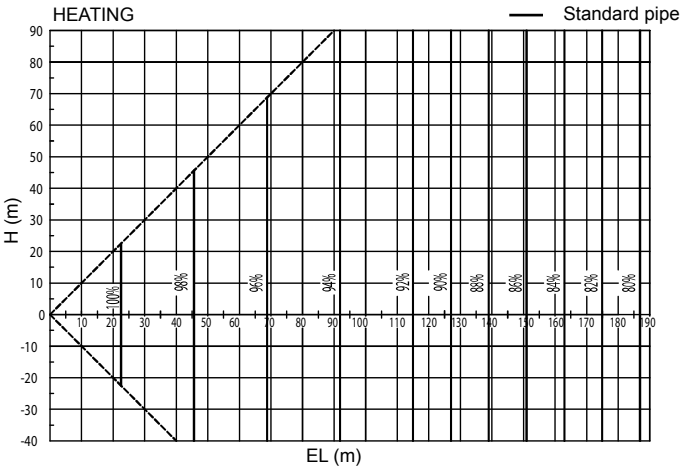
MODELS: RAS-56HNBCMQ, RAS-58HNBCMQ, RAS-60HNBCMQ, RAS-62HNBCMQ, RAS-64HNBCMQ,
RAS-66HNBCMQ, RAS-68HNBCMQ, RAS-70HNBCMQ, RAS-72HNBCMQ



MODELS: RAS-74HNBCMQ, RAS-76HNBCMQ, RAS-78HNBCMQ, RAS-80HNBCMQ, RAS-82HNBCMQ, RAS-84HNBCMQ



MODELS: RAS-86HNBCMQ, RAS-88HNBCMQ, RAS-90HNBCMQ, RAS-92HNBCMQ, RAS-94HNBCMQ, RAS-96HNBCMQ



5.3 Correction Factor According to Defrosting Operation

The heating capacity in the preceding paragraph, excludes the condition of the frost or the defrosting operation period.
In consideration of the frost or the defrosting operation, the heating capacity is corrected by the equation below.

Corrected Heating Capacity = Correction Factor x Heating Capacity

Outdoor Inlet Air Temp. (°C DB) (Humidity=85% RH)	-7	-5	-3	0	3	5	7
Correction Factor	0.95	0.93	0.88	0.85	0.87	0.90	1.0

NOTE:
The correction factor is not available for the special condition like a snowfall or a operation in a transitional period.

6. Electrical Data

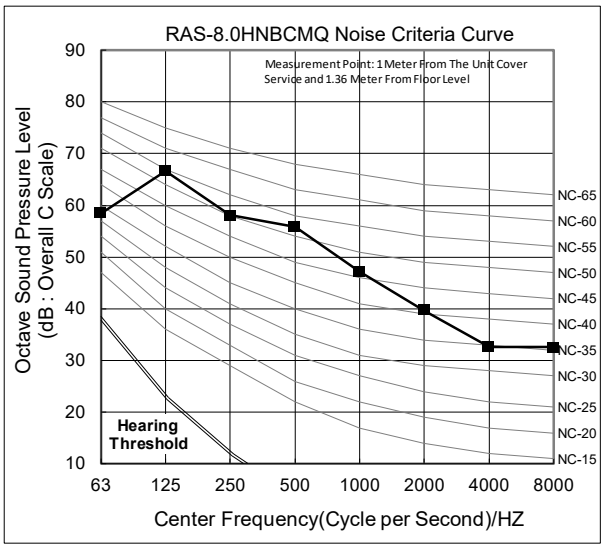
Model	Unit Main Power			Applicable Voltage		Cooling Operation		Heating Operation		Maximum Current(A)
	VOL	PH	HZ	Maxi-mum	Mini-mum	RNC	IPT	RNC	IPT	
RAS-8.0HNBCMQ	380/ 400/ 415V	3	50	456	342	8.5	4.98	8.7	5.10	17.0
RAS-10HNBCMQ						11.8	6.91	11.7	6.85	23.0
RAS-12HNBCMQ						14.0	8.27	14.5	8.52	27.0
RAS-14HNBCMQ						18.9	11.43	18.5	11.25	31.5
RAS-16HNBCMQ						22.1	13.43	21.6	13.16	35.5
RAS-18HNBCMQ						25.2	14.93	25.5	15.14	43.5
RAS-20HNBCMQ						26.9	16.00	27.4	16.15	45.0
RAS-22HNBCMQ						30.1	18.09	31.0	18.65	52.0
RAS-24HNBCMQ						36.5	21.94	39.3	23.58	61.5

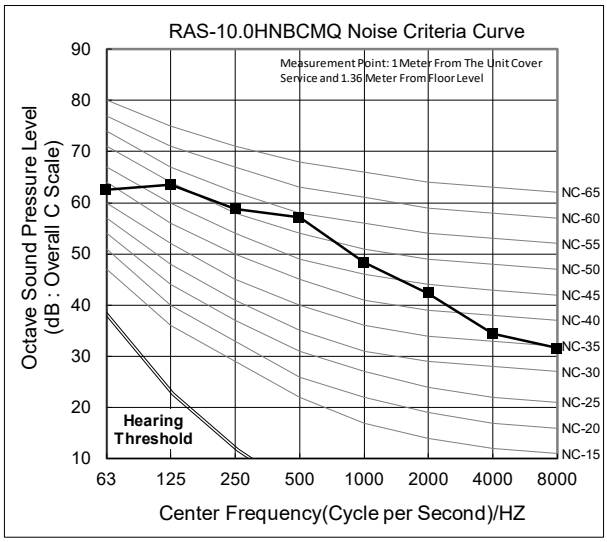
VOL: Rated Unit Power Supply Voltage (Plated)(V)	PH: Phase
HZ: Frequency (Hz)	IPT: Input (kW)
RNC: Running Current (A)	

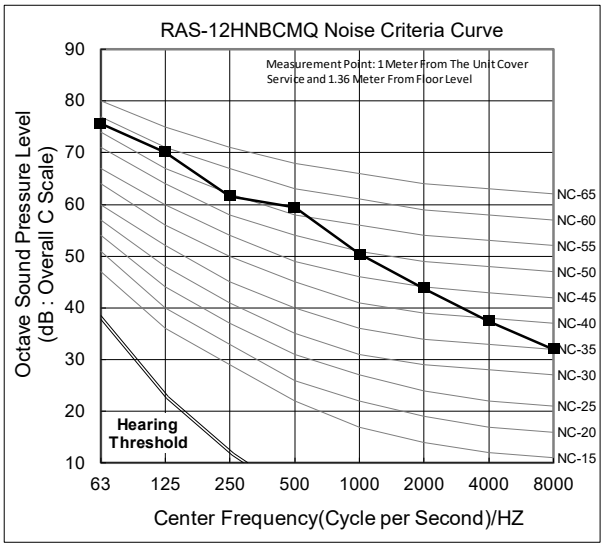
Notes:

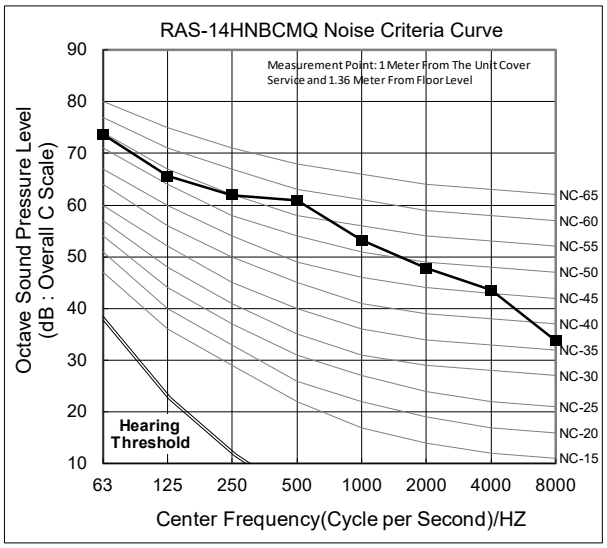
1. The above compressor data is based on 100% capacity combination of the indoor units at rated operating frequency.
2. The above performance data is based on 7.5m equivalent piping length and 0m piping lift.
3. These data are based on the same conditions as the nominal heating and cooling capacities.
4. The compressor is started by an inverter, resulting in extremely low starting current.

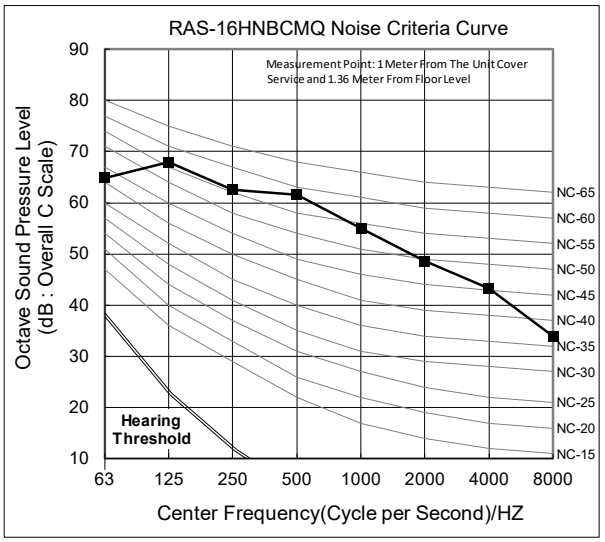
7. Sound Data

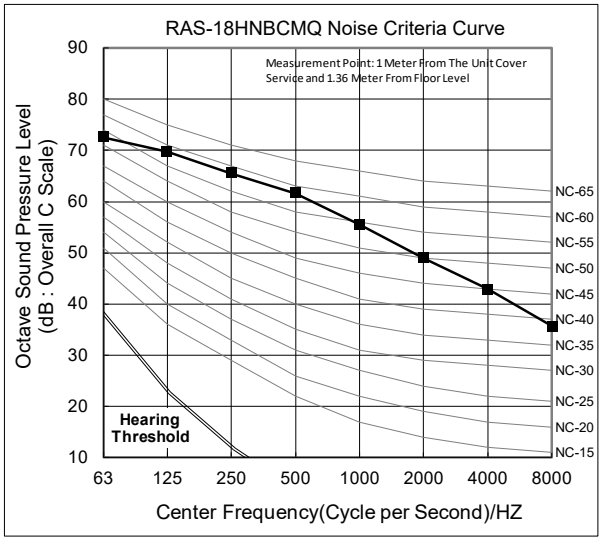




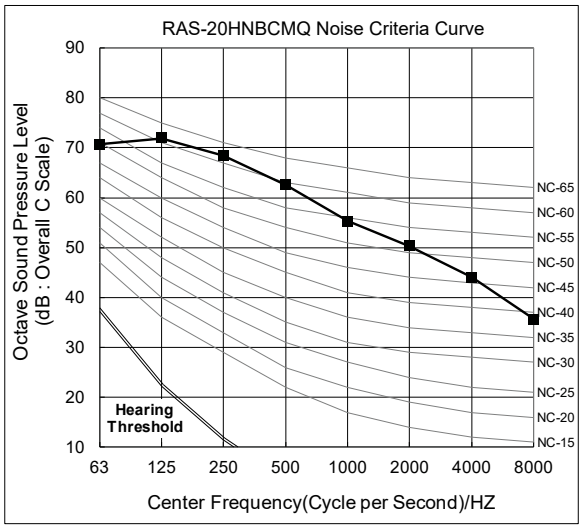


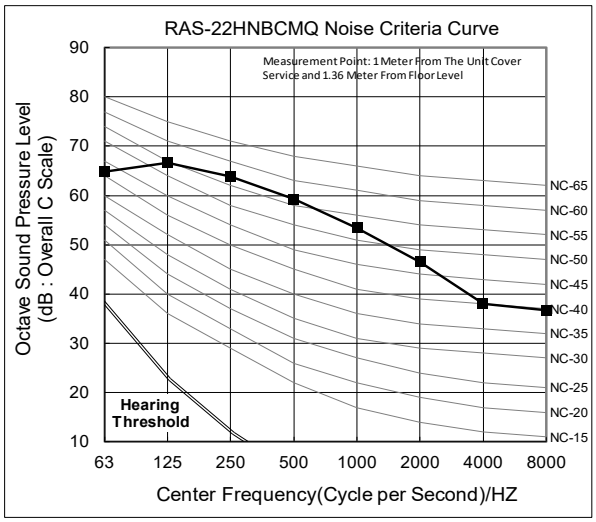


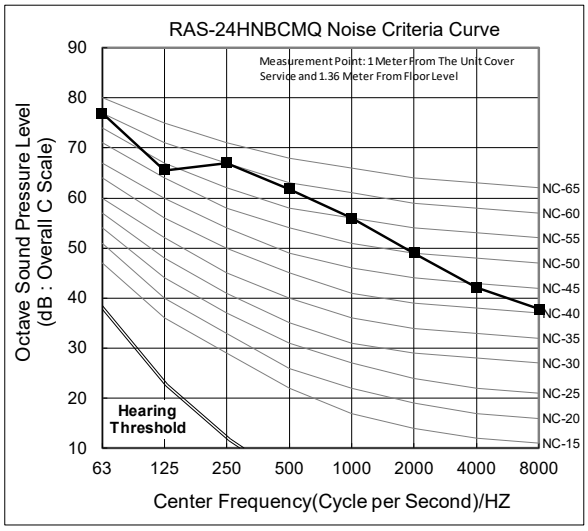


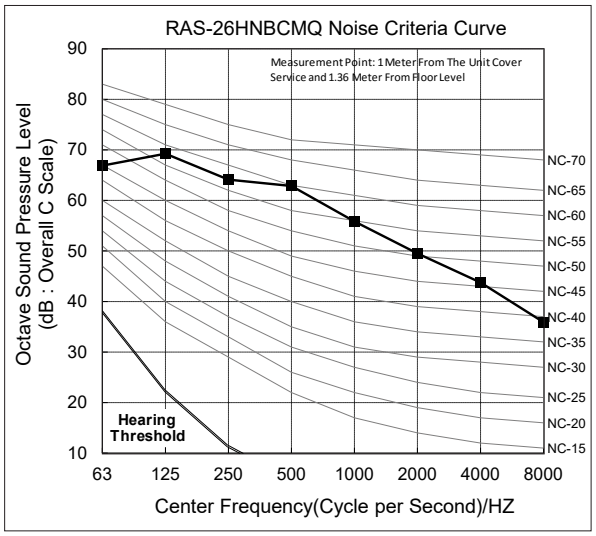


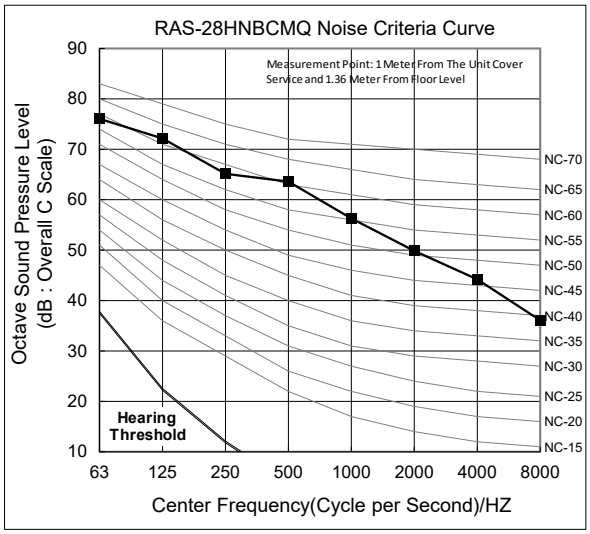
NOTE:
The readings were taken in an anechoic chamber. Sound in actural status may get bigger due to surrounding noise or echo.
Take noise source into consideration to look for proper installation location.
(Noise on the back surface will go up 6 to 7dB higher than the front surface.)

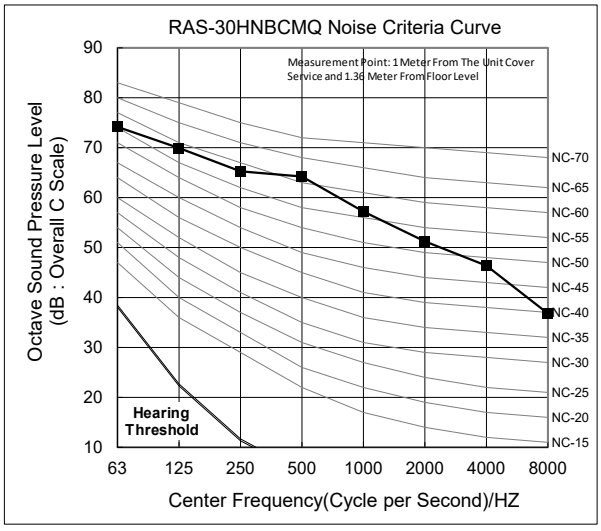












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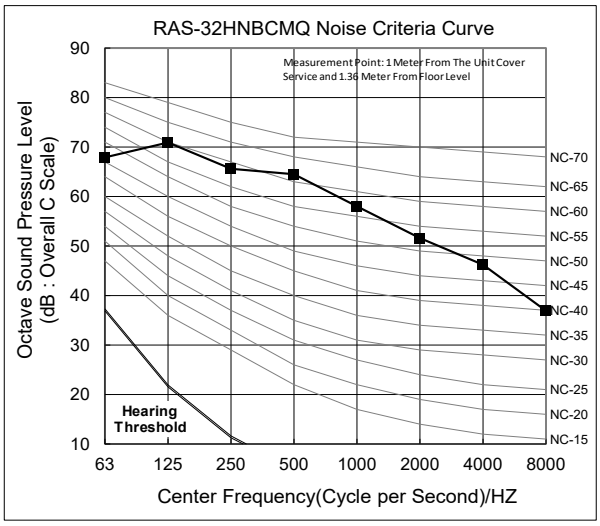

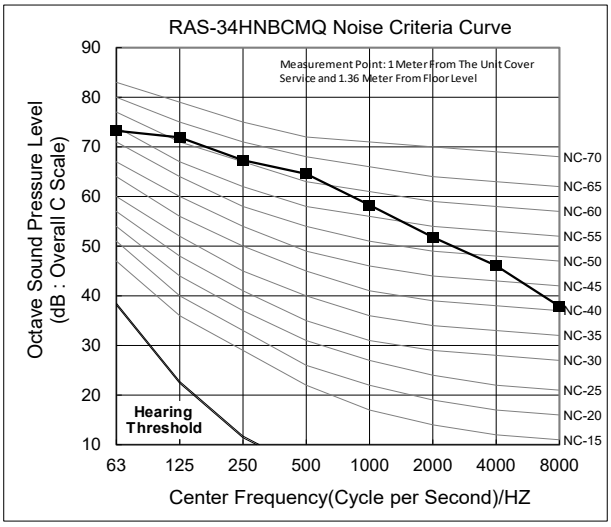

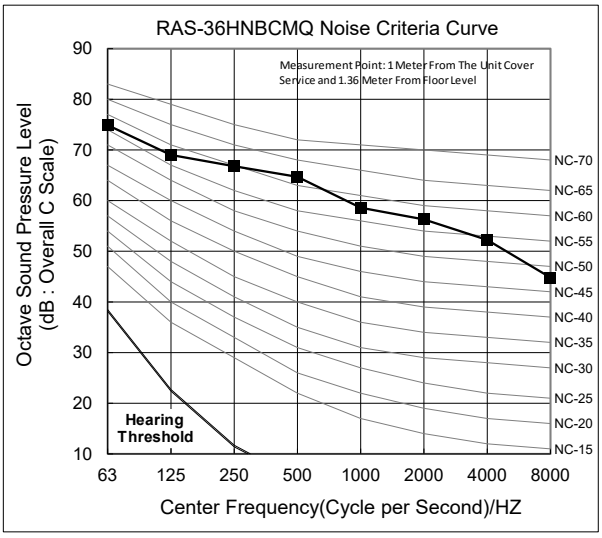

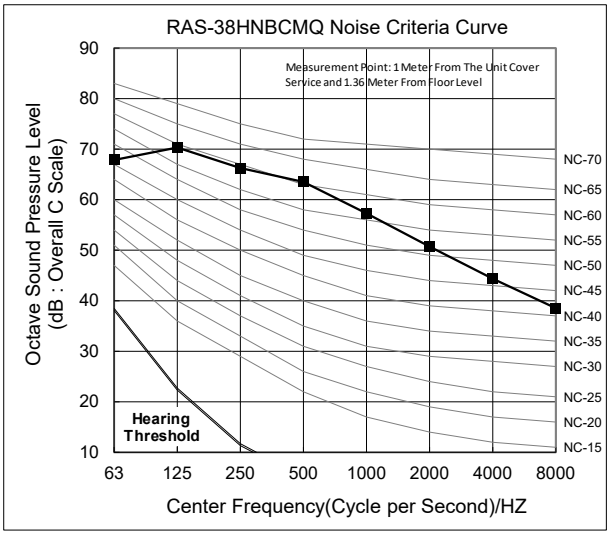

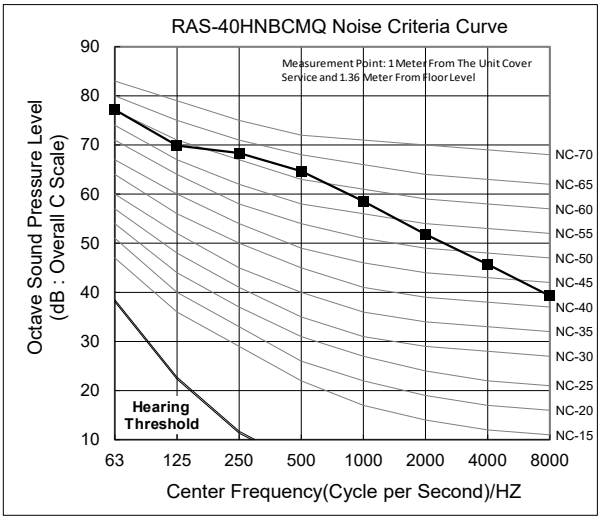

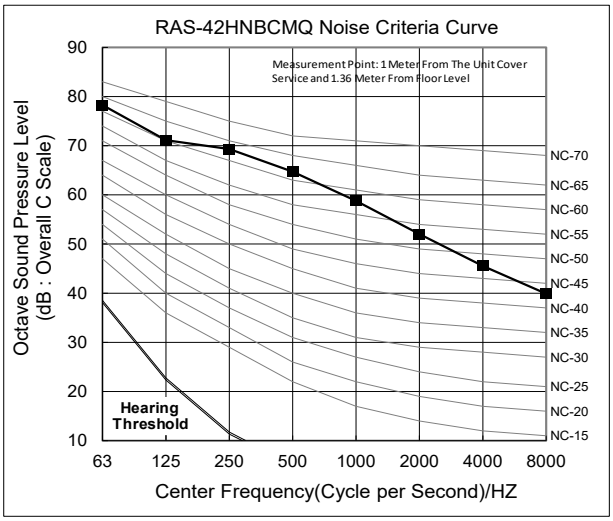

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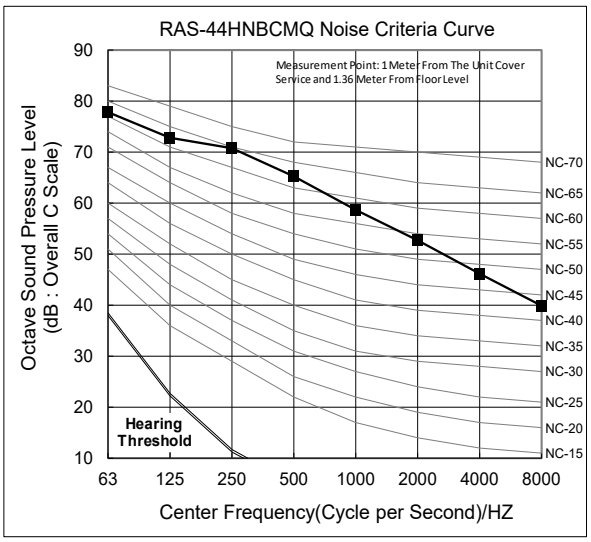
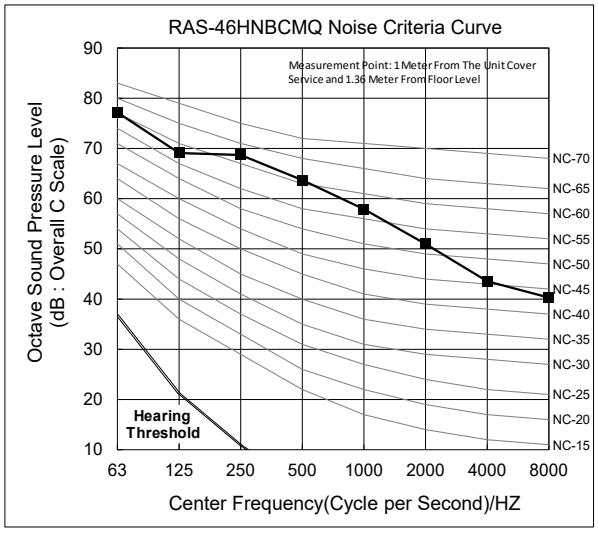
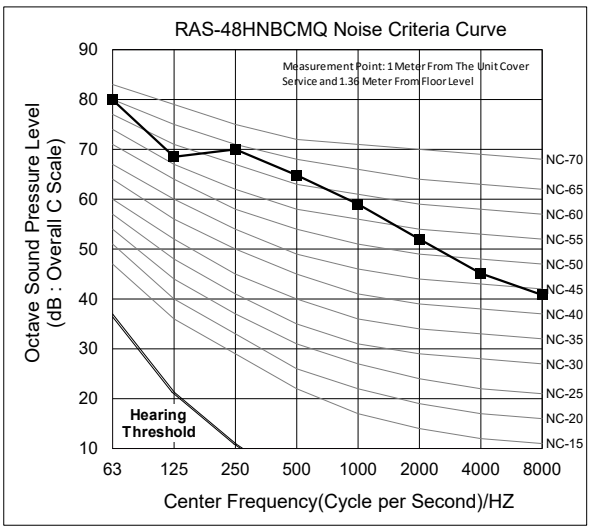
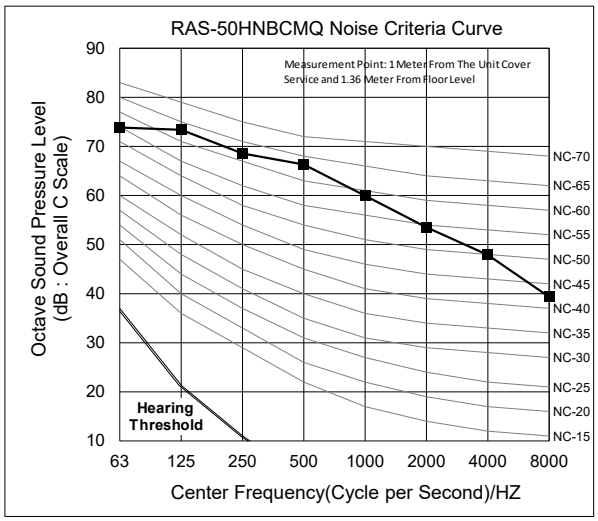
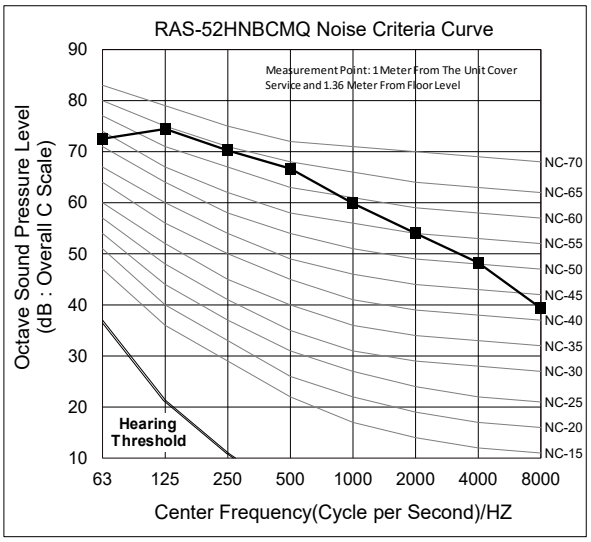
SOUND DATA

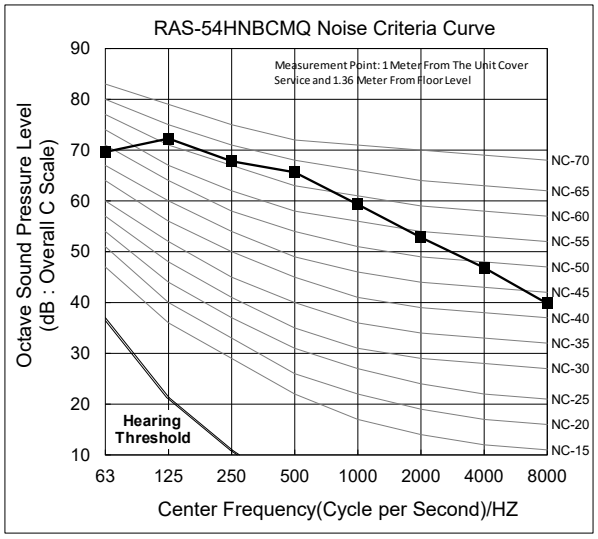












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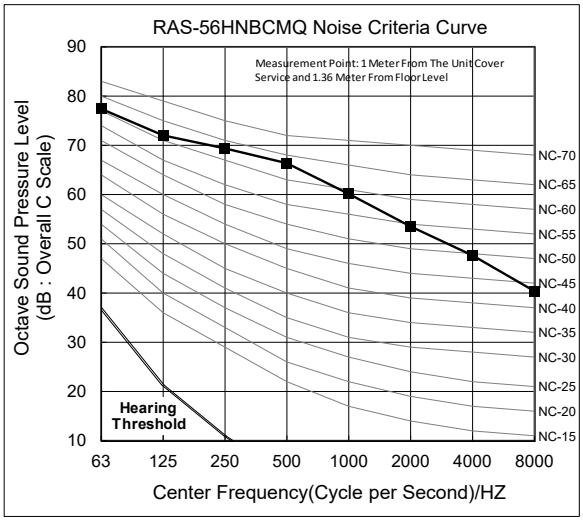

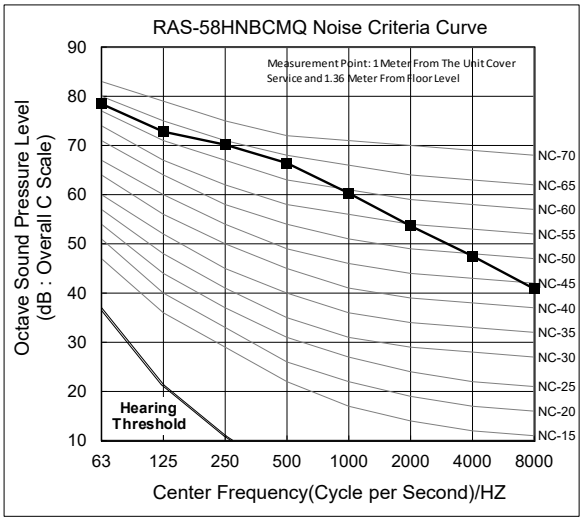

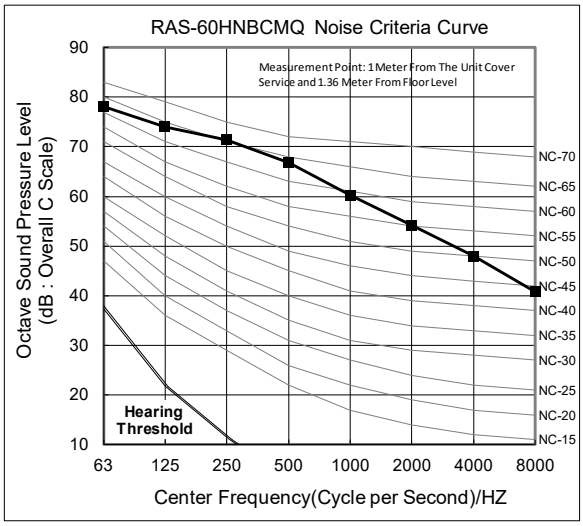

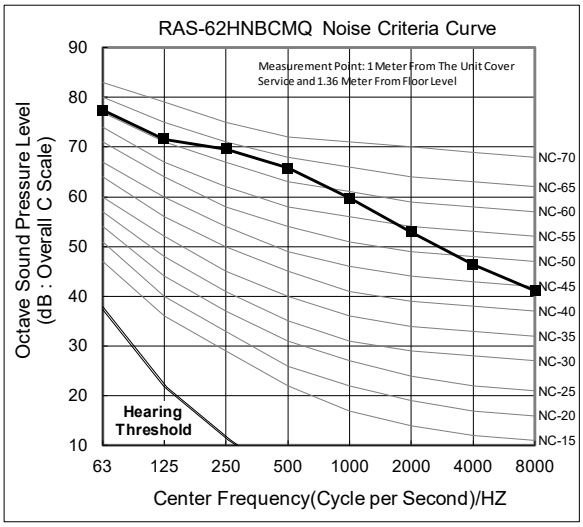

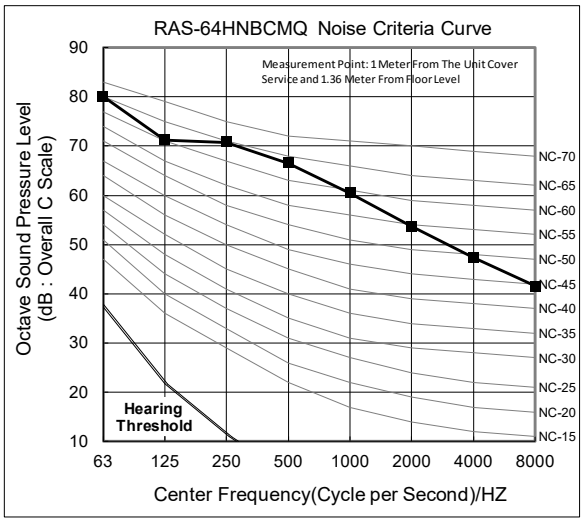

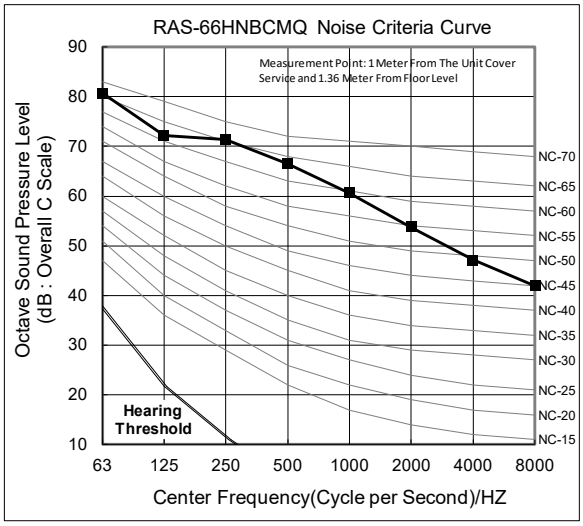

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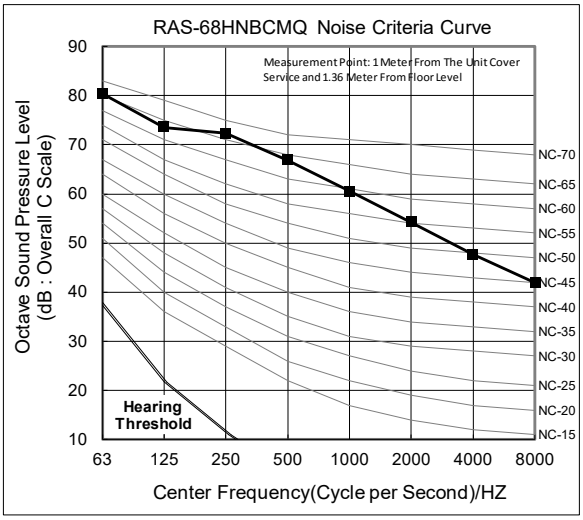
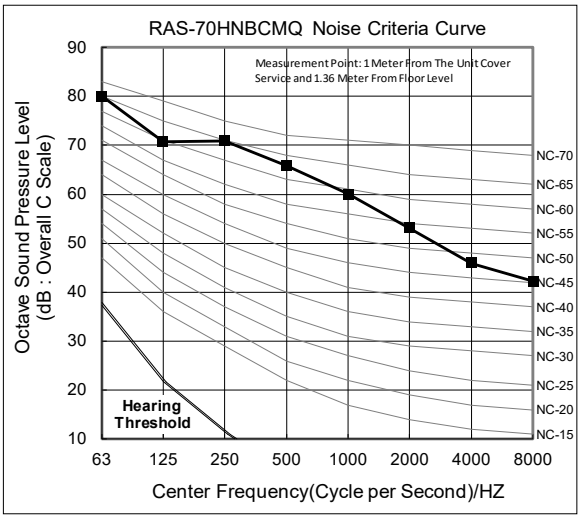
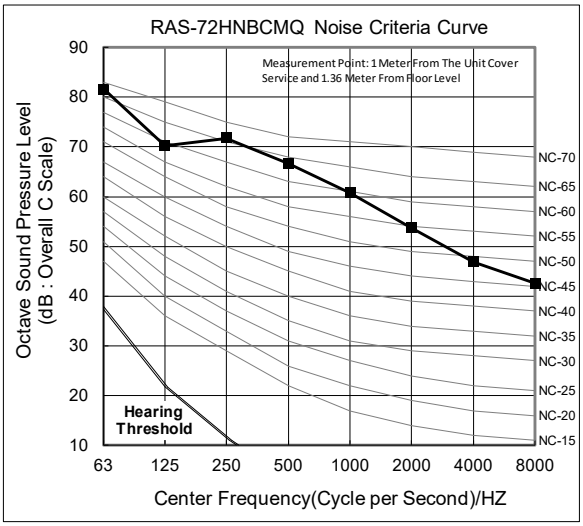
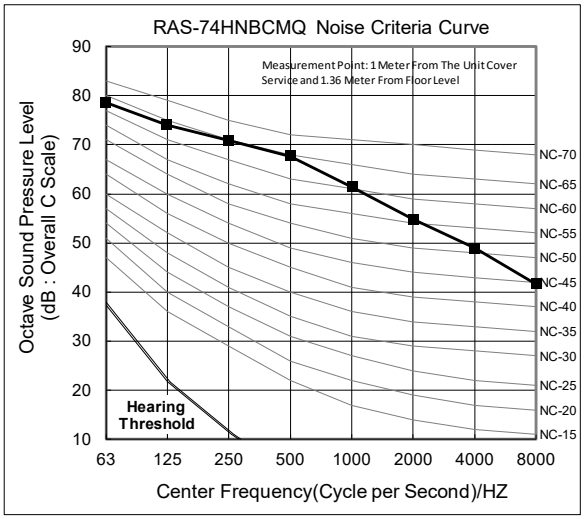
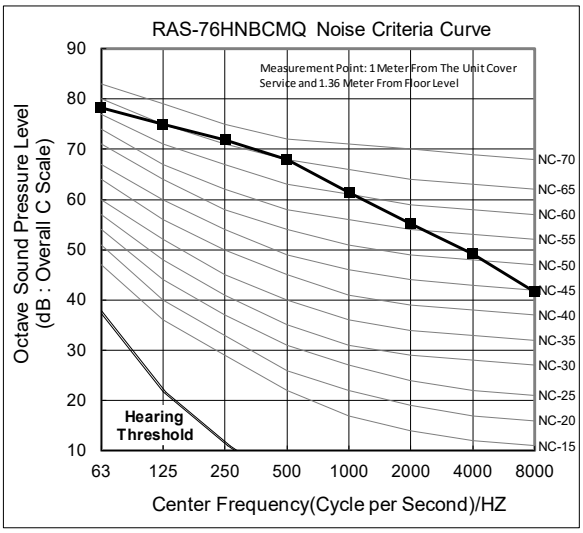
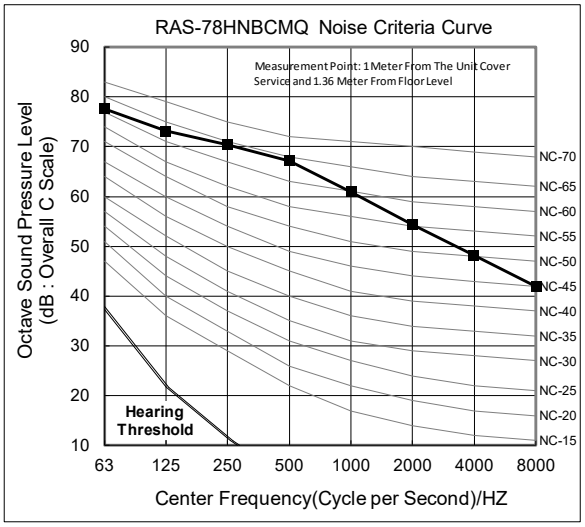






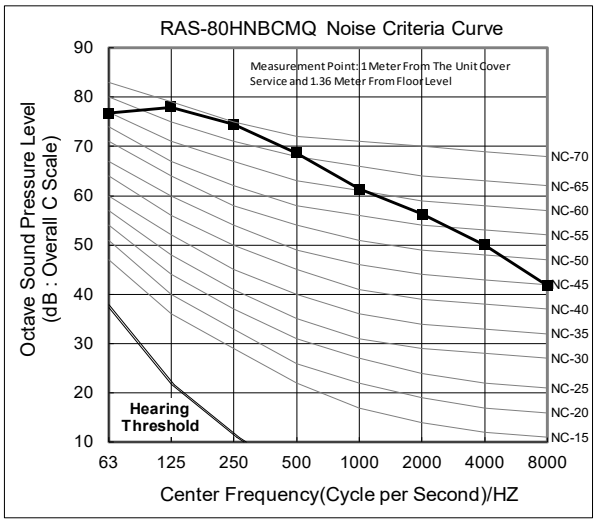


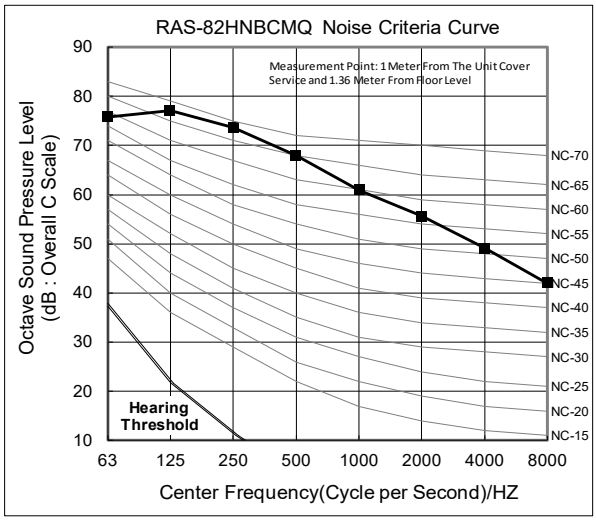


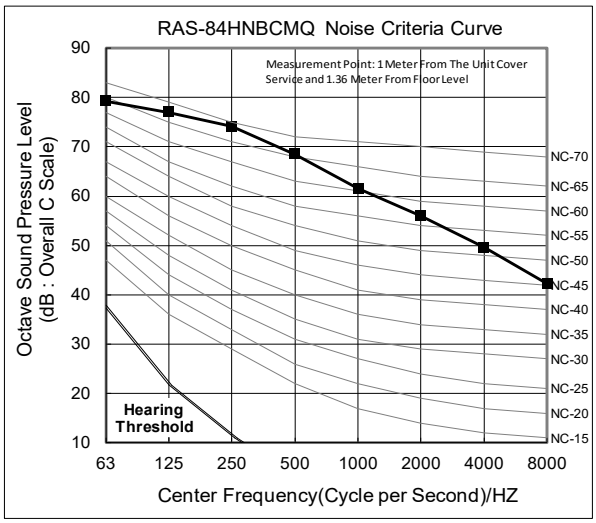


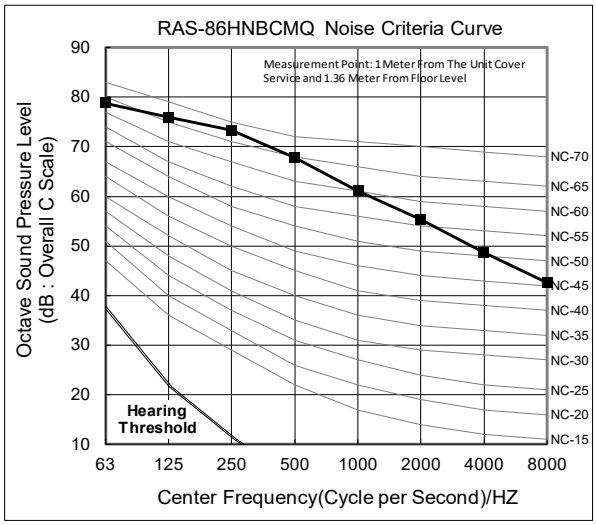
NOTE:

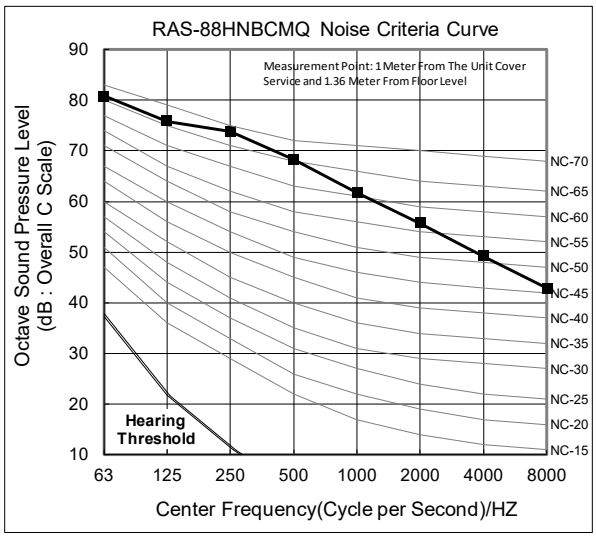
The readings were taken in an anechoic chamber. Sound in actual status may get bigger due to surrounding noise or echo. Take noise source into consideration to look for proper installation location.
(Noise on the back surface will go up 6 to 7dB higher than the front surface.)

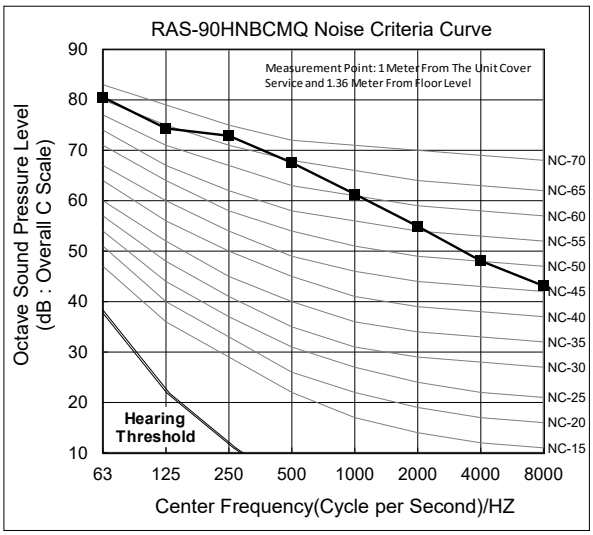






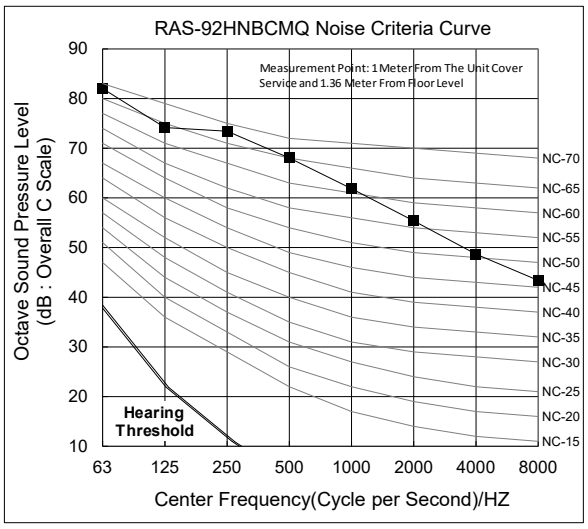


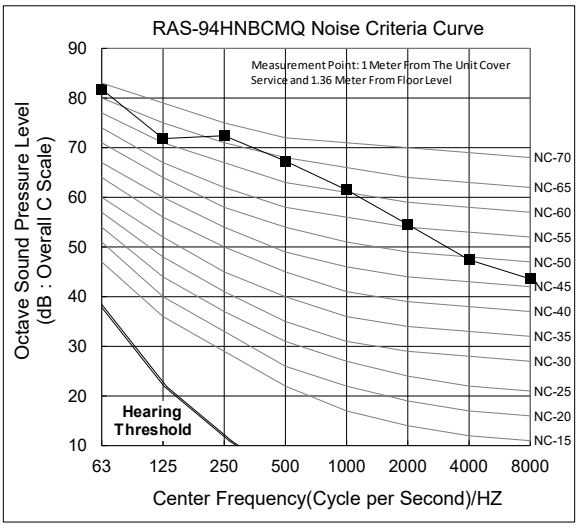


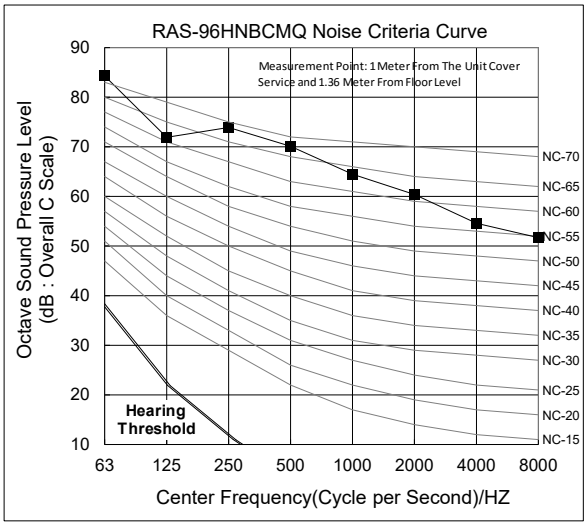


NOTE:

The readings were taken in an anechoic chamber. Sound in actual status may get bigger due to surrounding noise or echo. Take noise source into consideration to look for proper installation location.
(Noise on the back surface will go up 6 to 7dB higher than the front surface.)





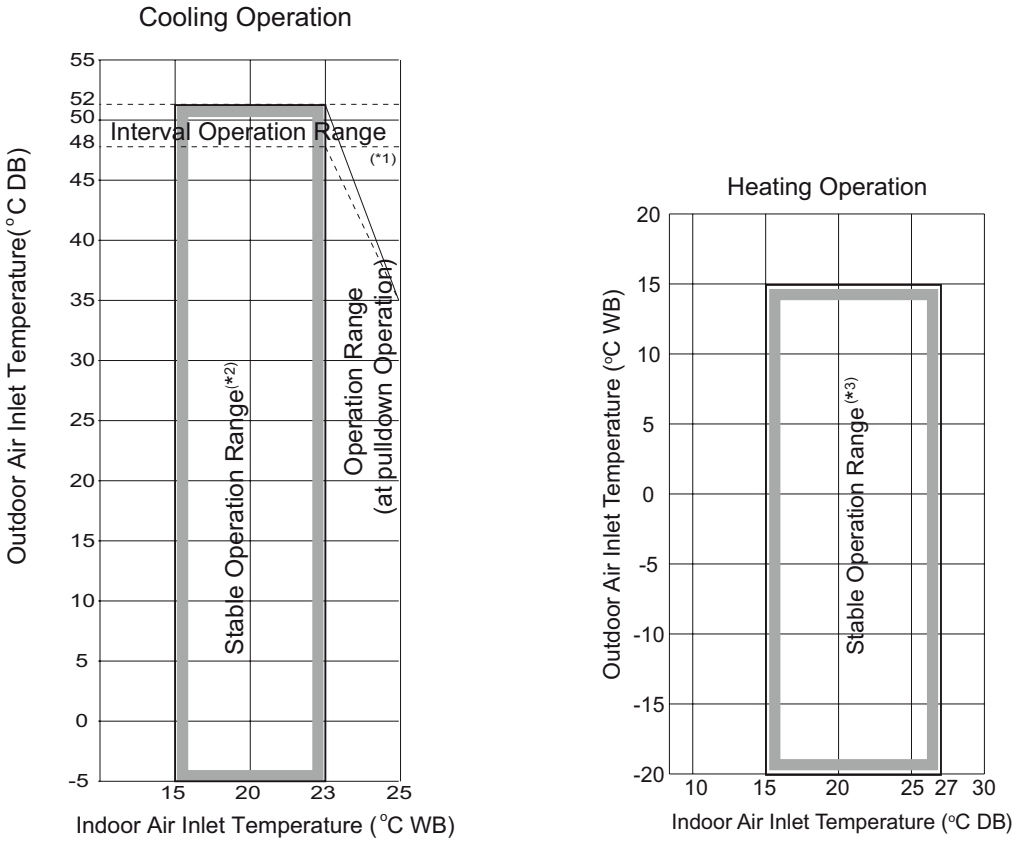


NOTE:

The readings were taken in an anechoic chamber. Sound in actual status may get bigger due to surrounding noise or echo. Take noise source into consideration to look for proper installation location.
(Noise on the back surface will go up 6 to 7dB higher than the front surface.)

8. Working Range

This unit has been designed for cooling operation under low ambient temperatures down to -5°C. This feature enables cooling to be obtained even in winter in buildings with high internal heat gains due to lighting, people and machines, particularly in areas such as shops, lecture rooms, data processing areas etc. And the heating operation under low ambient temperature down to -20°C can also be performed.



	Cooling Operation	Heating Operation
Indoor Air Inlet Temperature	15 to 23 °C WB	15 to 27°C DB
Outdoor Air Inlet Temperature	-5 to 52°C DB (*1)	-20 to 15°C WB

WORKING RANGE

Notes:

*1. (1) Cooling operation at maximum 52°C DB (48°C~52°C interval operation) should be available only if the outdoor air inlet temperature increase temporarily according to the installation condition.

(2) If install the units to the place where exceed ambient temperature 48°C continuously, the combination ratio must be lower 100%, operation indoor units capacity must lower than outdoor unit capacity .

(3) The cooling capacity is deteriorated at high ambient temperature. Select the larger capacity outdoor unit than compatible building heat load.

(4) The appropriate amount (100%) of refrigerant must be charged. Excessive charging of refrigerant is forbidden and may cause alarm.

(5) It must be avoided to install the units where affected by direct sunlight reflection and short circuit. There may be the possibility to activate protection control and alarm system if install the units to inappropriate place. Also the life time of the products and parts must be considerably shortened.

(6) Periodic maintenance (1/certain month) must be applied to the heat exchanger fin to avoid adhesion of dirt and clogging of sand to the outdoor unit heat exchanger.

*2. There might be the possibility of thermo-OFF when cooling load is low and outdoor air inlet temperature is 10°C DB or lower to prevent frost formation on indoor unit heat exchanger.

*3. There might be the possibility of thermo-OFF when heating load is low and outdoor air inlet temperature is high (higher than 15°C DB) to prevent the outdoor unit. The outdoor unit operation stops when outdoor air inlet temperature exceeds 26°C DB.

4. Operational range is different when connect to All Fresh Air Unit, Econofresh, and other special indoor units.

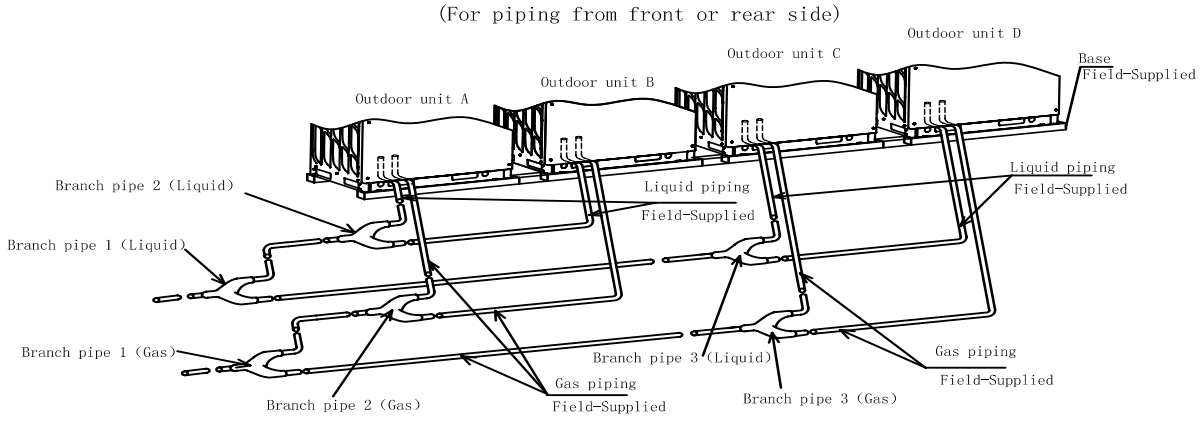
9. Optional Accessories

9.1. Piping Connection Kit

Item	Outdoor Combination		Branch Pipe Type	Remarks
	Outdoor Unit Capacity	Number of Outdoor Units		
Piping Connection Kit	26HP - 34HP	2	M-30SNQ#E	
	36HP - 48HP	2	M-46SNQ#E	
	50HP - 54HP	3	M-46SNQ#E + M-30SNQ#E	
	56HP - 72HP	3	M-68SNQ#E + M-30SNQ#E	
	74HP - 96HP	4	M-68SNQ#E+M-30SNQ#E+M-30SNQ#E	

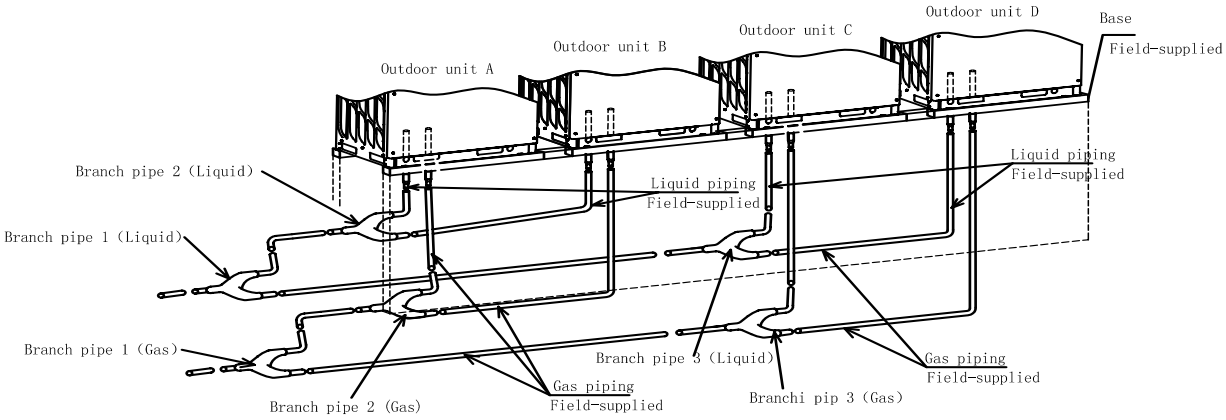
Construction Example : for 4 Units Combination

(For piping from front or rear side)



Note: Branch piping should be installed with the ground level (horizontal tilt angle≤15 degrees)

(For piping from lower side)



Note: Branch piping should be installed with the ground level (horizontal tilt angle≤15 degrees)

Notes:

1. Perform the piping connection between outdoor units according to this figure.
2. Refer to Installation and Maintenance Manual of the Outdoor unit for the dimension and distance between outdoor units and between connection kits.

9.2. Multi-Kit

Multi-Kit for Heat Pump System

1) The first branch pipe selection

Max Piping Lenth≥ 100m		Max Piping Lenth< 100m	
Outdoor Unit Capacity	Multi-kit Type	Outdoor Unit Capacity	Multi-kit Type
8HP	E-162SN#E	8-10HP	E-102SN#E
10HP	E-162SN#E	12-16HP	E-162SN#E
12-14HP	E-242SN#E	18-24HP	E-242SN#E
16-24HP	E-302SN#E	26-54HP	E-302SN#E
26-54HP	E-462SN#E	56-72HP	E-462SN#E
56-96HP	E-682SN#E	74-96HP	E-682SN#E

2) Piping connection from each first branch pipe to each indoor unit

Indoor Unit Machine capacity (kW)	Gas Pipe (mm)	Liquid Pipe (mm)	Multi-kit Type
Q ≤ 15.9	15.88	9.52	E-102SN#E
16 ≤ Q < 25	19.05	9.52	
25 ≤ Q < 33.5	22.2	9.52	
33.5 ≤ Q < 45	25.4	12.7	E-162SN#E
45 ≤ Q < 50	28.58	12.7	
50 ≤ Q < 72.9	28.58	15.88	E-242SN#E
72.9 ≤ Q < 100.8	31.75	19.05	E-302SN#E
100.8 ≤ Q < 156.8	38.1	19.05	
156.8 ≤ Q < 190.4	44.45	19.05	E-462SN#E
190.4 ≤ Q < 207.2	44.45	22.2	
207.2 ≤ Q < 252	50.8	22.2	E-682SN#E
252 ≤ Q < 274.4	50.8	25.4	
274.4 ≤ Q < 349.5	50.8	28.58	

9.3. Drain Pipe Joint

Drain pipe joint is a drain connection device when using outdoor unit chassis as a water tray.

Name	Model
Drain pipe joint	DC-01Q

Drain pipe connection components:

Model	Part Name	Quantity	Usage
DC-01Q	Drain pipe joint	1	Connect the drain connection
	Drain pipe cap	1	Blocking the water pipe mouth
	Rubber cap	4	Sealed drain connection and drain cap

Drain Water Treatment

Drain water is discharged during heating and defrosting operation. (Rain water is also discharged). Pay attention to the following:

(1) Choose a place where well drainage is available or provide a drain ditch.

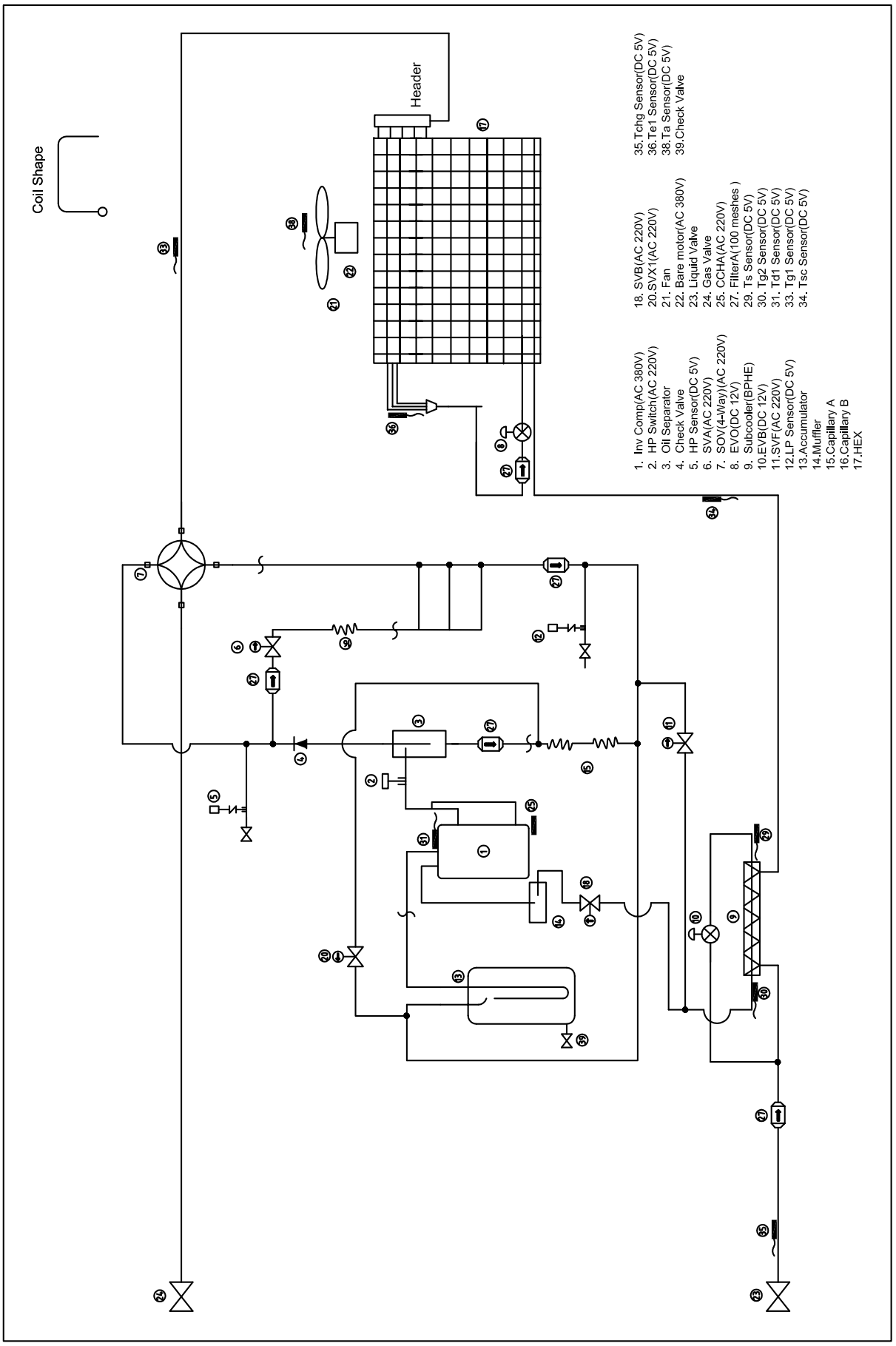
(2) Do not install the unit over the walkways. Condensation water may fall on people. In case of installing the unit in such a place, provide the additional drain pan.

(3) Do not use drain boss in the cold area. The drain water in the drain pipe may be frozen and then the drain pipe may crack.

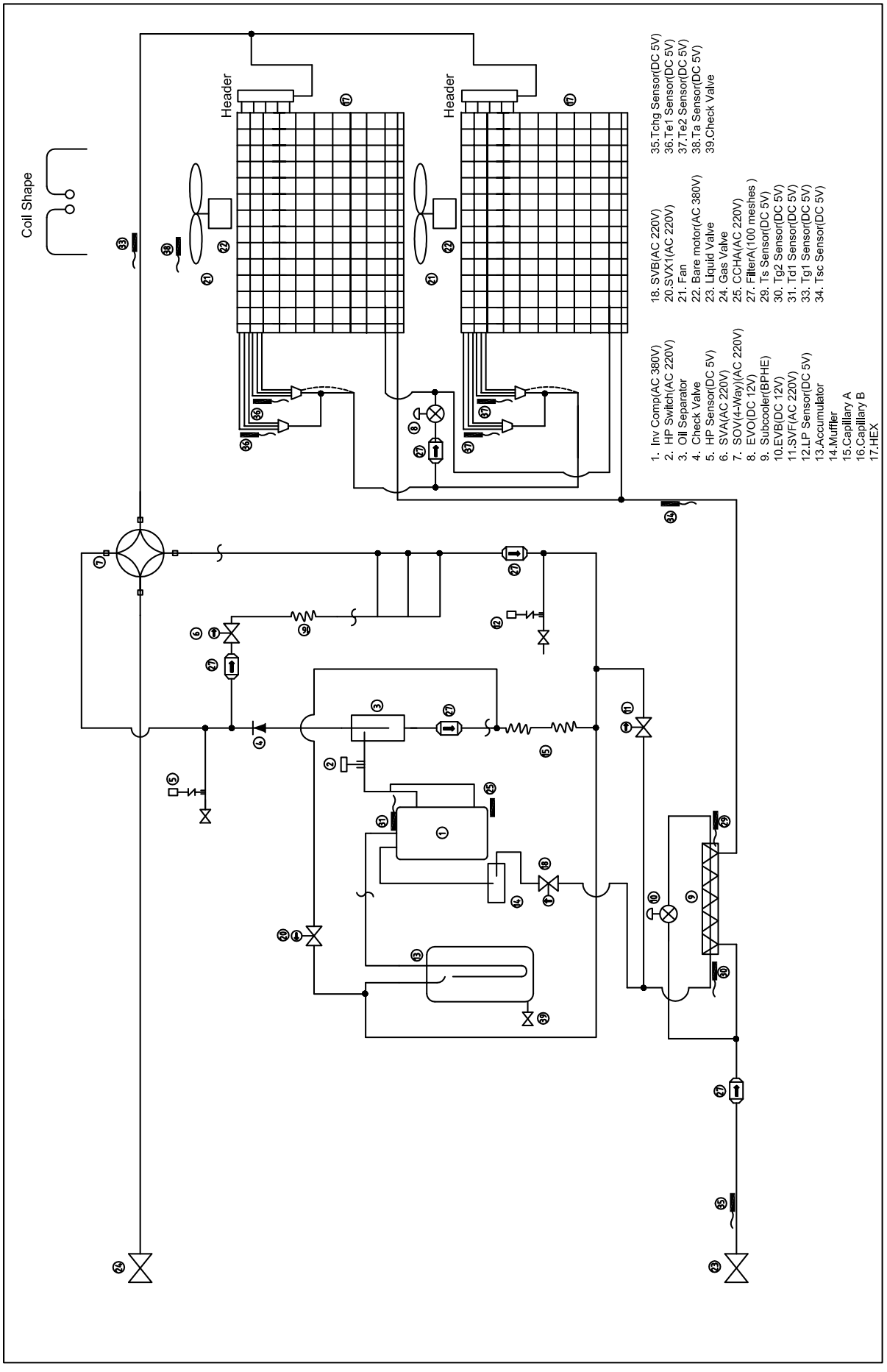
10. Control System

10.1 Refrigeration Cycle

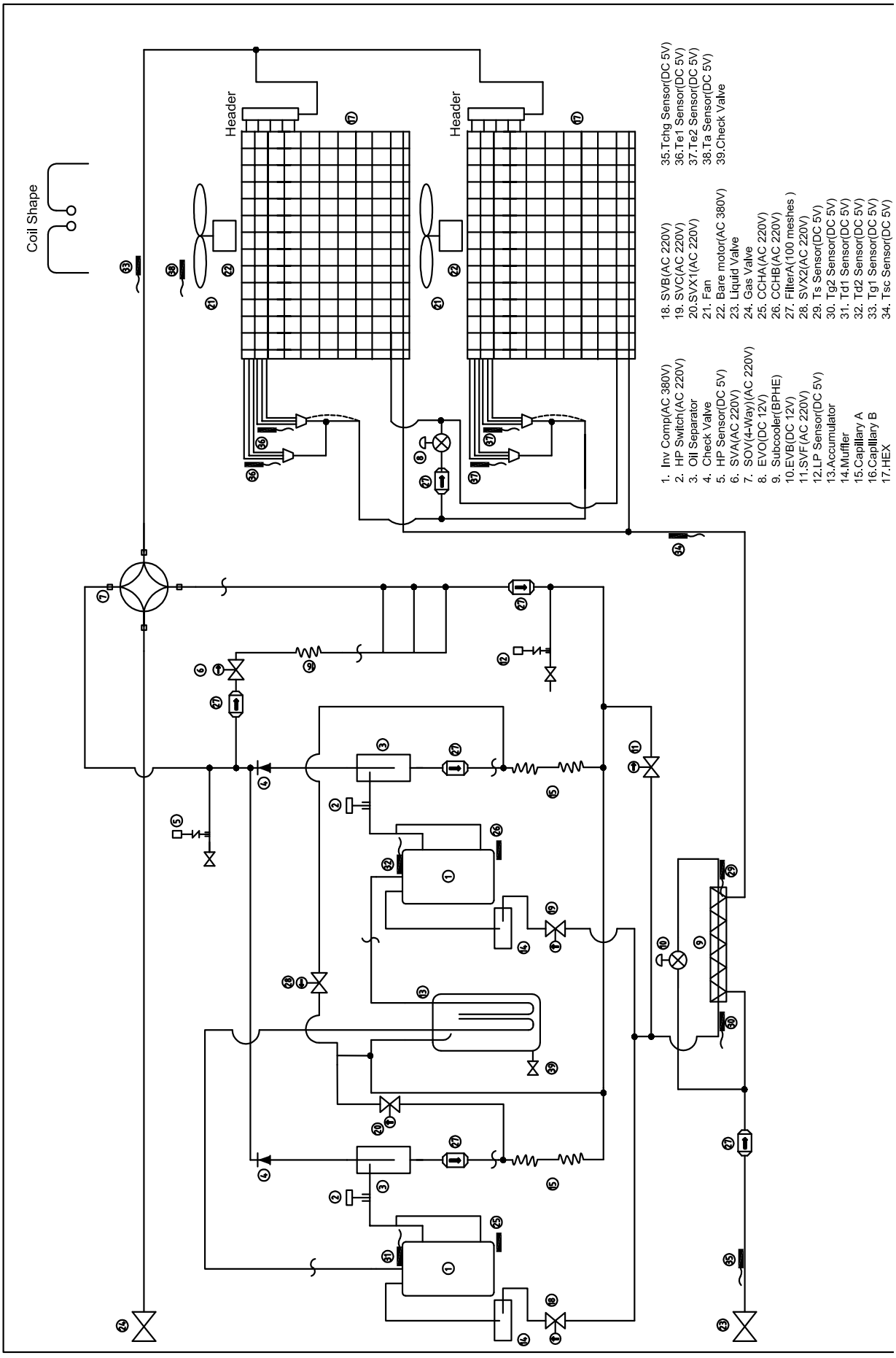
Model: RAS-8.0HNBCMQ, RAS-10HNBCMQ, RAS-12HNBCMQ



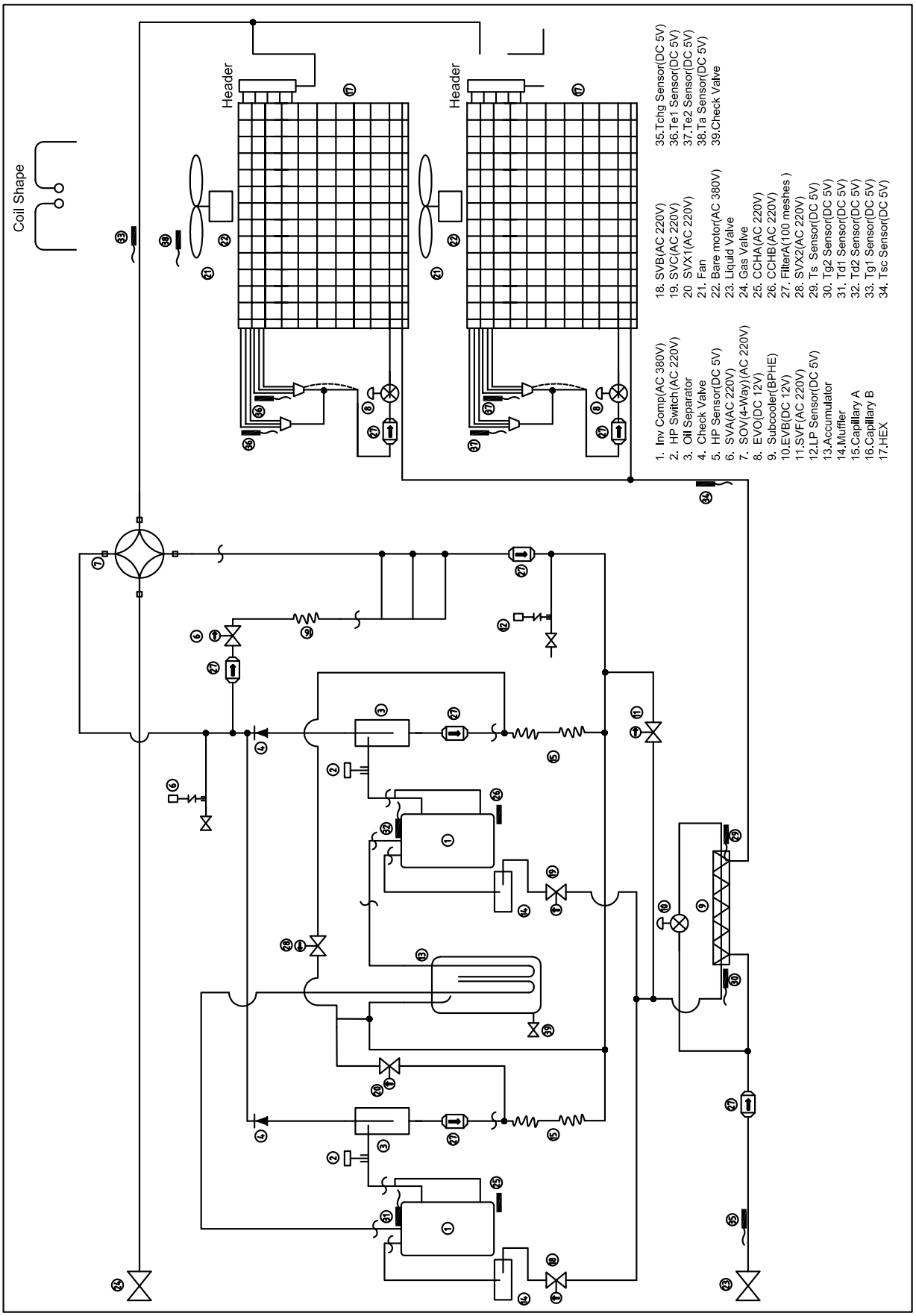
Model: RAS-14HNBCMQ, RAS-16HNBCMQ



Model: RAS-18HNBCMQ



Model: RAS-20HNBCMQ, RAS-22HNBCMQ, RAS-24HNBCMQ



10.2 Control System

■ Cycle Control

Control Device	Control				
	Cooling Operation *		Heating Operation		Defrosting
	Control Category	Purpose of Control	Control Category	Purpose of Control	Condition
Inverter Frequency of Compressor	Total I.U. Operating Capacity	Inverter Frequency Control is carried out to make I.U. air inlet temperature to temperature setpoint.	Total I.U. Operating Capacity	Inverter Frequency Control is carried out to make I.U. air inlet temperature to temperature setpoint.	All of the compressors: ON
Electronic Expansion Valve for O.U. Heat Exchanger	Capacity Control	Fully open	O.U. Heat Exchanger SH	PI control is carried out to achieve the targeted value of O.U. heat exchanger SH.	Fully open
Electronic Expansion Valve for Supercooling Heat Exchanger (Injection OFF)	Tsc - Tchg	PI Control is carried out to achieve the target value of Tsc - Tchg.	Tchg - Tsc	PI Control is carried out to achieve the target value of Tchg - Tsc.	Tsc - Tchg
Electronic Expansion Valve for Supercooling Heat Exchanger (Injection ON)	Tg_2 - Ts	PI Control is carried out to achieve the target value of Tg_2 - Ts.	Tg_2 - Ts	PI Control is carried out to achieve the target value of Tg_2 - Ts.	Tg_2 - Ts
Electronic Expansion Valve for I.U. Heat Exchanger	I.U. Heat Exchanger SH	PI control is carried out to achieve the targeted value of I.U. heat exchanger SH.	I.U. Heat Exchanger SC	Controls supercooling of I.U. liquid thermistor to achieve the targeted value.	I.U. Heat Exchanger SH Control
Outdoor Fan	Pd Control	PI control is carried out to achieve the targeted value of Pd.	Ps Control	PI control is carried out to achieve the targeted value of Ps.	Stop
Gas Bypass Valve (SVA)	1. Pd Increase Protection 2. Ps Decrease Protection	1. Pd>3.6MPA: Open 2. Ps<0.2MPA: Open	1. Pd Increase Protection 2. Ps Decrease Protection	1. Pd>3.5MPA: Open 2. Ps<0.1MPA: Open	Closed

(*): Dry operation is included in the cooling operation.

Pd: Discharge Pressure
Ps: Suction Pressure
SH: Superheat
Tsc: Subcooler Temperature
Tchg: Liquid Stop Valve Temperature
I.U.: Indoor Unit
O.U.: Outdoor Unit

■ Compressor Operation Control

(1) Compressor Rotation Control

This compressor rotation control is performed in order to make the compressor operating time equal for each outdoor unit.
This control is performed during the outdoor unit thermo-OFF or switch OFF.
When turning ON the outdoor unit, the inverter compressor with the shortest operating time (average operating time for the outdoor unit installed two inverter compressors) will operate preferentially.
At least 2 outdoor units are required for this function.

The operating sequence of compressor rotation control is as follows.

RAS-26, 28, 30, 32HNBCMQ

< Compressor Operating Sequence >

	Outdoor Unit A	Outdoor Unit B
	Inverter Compressor	
Last Time	1	2
This Time	2	1
Next Time	1	2

RAS-34, 36, 38, 40HNBCMQ

< Compressor Operating Sequence >

	Outdoor Unit A		Outdoor Unit B
	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor
Last Time	1	3	2
This Time	2	3	1
Next Time	1	3	2

NOTE:
When turning ON the outdoor unit A, the inverter compressor 1 or 2 with the shortest operating time will operate preferentially.

RAS-42, 44, 40, 48HNBCMQ

< Compressor Operating Sequence >

	Outdoor Unit A		Outdoor Unit B	
	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2
Last Time	1	3	2	3
This Time	2	3	1	3
Next Time	1	3	2	3

NOTE:
When turning ON the outdoor units, the inverter compressor of each outdoor unit with the shortest operating time will operate preferentially.

RAS-50, 52, 54, 56HNBCMQ

< Compressor Operating Sequence >

	Outdoor Unit A		Outdoor Unit B	Outdoor Unit C
	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor
Last Time	1	4	2	3
This Time	3	4	1	2
Next Time	2	4	3	1

RAS-58, 60, 62, 64HNBCMQ

< Compressor Operating Sequence >

	Outdoor Unit A		Outdoor Unit B		Outdoor Unit C
	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor
Last Time	1	4	2	4	3
This Time	3	4	1	4	2
Next Time	2	4	3	4	1

NOTE:
When turning ON the outdoor units, the inverter compressor of the outdoor unit A and B with the shortest operating time will operate preferentially.

RAS-66, 68, 70, 72HNBCMQ

< Compressor Operating Sequence >

	Outdoor Unit A		Outdoor Unit B		Outdoor Unit C	
	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2
Last Time	1	4	2	4	3	4
This Time	3	4	1	4	2	4
Next Time	2	4	3	4	1	4

NOTE:
When turning ON the outdoor units, the inverter compressor of each outdoor unit with the shortest operating time will operate preferentially.

RAS-74, 76, 78HNBCMQ

< Compressor Operating Sequence >

	Outdoor Unit A		Outdoor Unit B		Outdoor Unit C	Outdoor Unit D
	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor	Inverter Compressor
Last Time	1	5	2	5	3	4
This Time	4	5	1	5	2	3
Next Time	3	5	4	5	1	2
And Next Time	2	5	3	5	4	1

RAS-80, 82, 84, 86, 88, 90, 92, 94, 96HNBCMQ

< Compressor Operating Sequence >

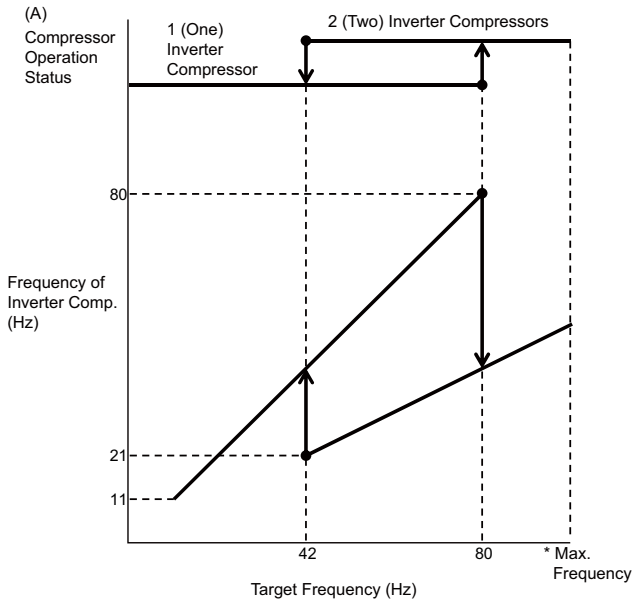
	Outdoor Unit A		Outdoor Unit B		Outdoor Unit C		Outdoor Unit D	
	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2
Last Time	1	5	2	5	3	5	4	5
This Time	4	5	1	5	2	5	3	5
Next Time	3	5	4	5	1	5	2	5
And Next Time	2	5	3	5	4	5	1	5

(2) Compressor Frequency Control

Compressor Operation Control is to adjust the output frequency of an Inverter Compressor according to Target Frequency.
(Target Frequency is determined by capacity control according to cooling and heating loads.)
Therefore, when the load is smaller, all compressors may not operate.

■ In case of single outdoor unit with two inverter compressors installed

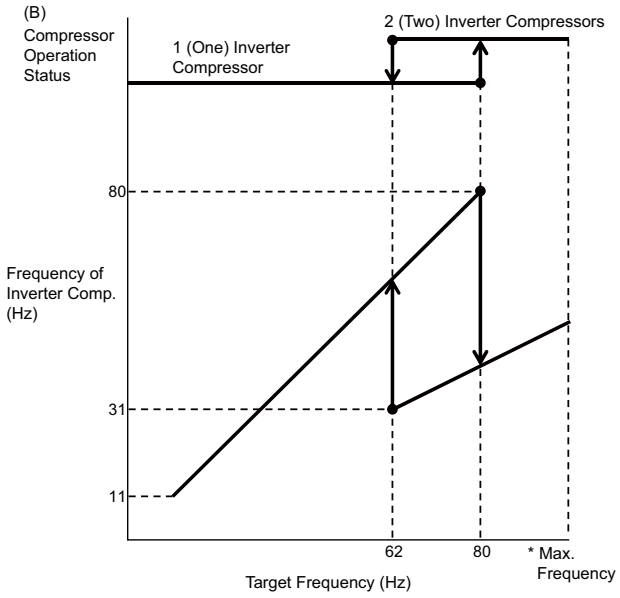
RAS-18HNBCMQ to 20HNBCMQ



Target Frequency [Hz]	Each Compressor Frequency [Hz]					
	Increase Direction			Decrease Direction		
	Comp. Operation Status	No.1 Comp.	No.2 Comp.	Comp. Operation Status	No.1 Comp.	No.2 Comp.
11.0	1	11.0	—	1	11.0	—
41.0	1	41.0	—	1	41.0	—
42.0	1	42.0	—	2	21.0	21.0
80.0	1	80.0	—	2	40.0	40.0
81.0	2	40.5	40.5	2	40.5	40.5
・ ・ ・	・ ・ ・	・ ・ ・	・ ・ ・	・ ・ ・	・ ・ ・	・ ・ ・

NOTE:
Refer to page 1-95 for the maximum frequency.

RAS-22HNBCMQ, 24HNBCMQ

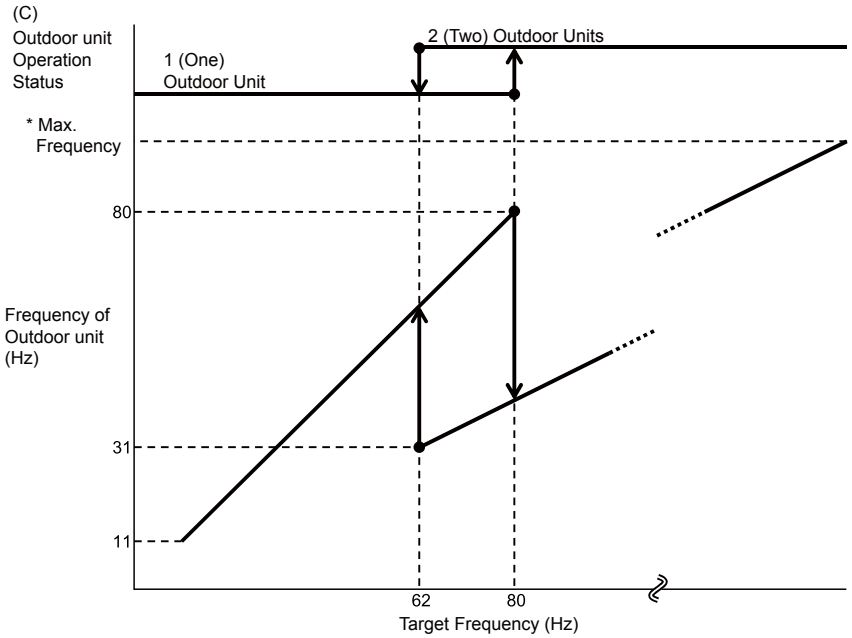


Target Frequency [Hz]	Each Compressor Frequency [Hz]					
	Increase Direction			Decrease Direction		
	Comp. Operation Status	No.1 Comp.	No.2 Comp.	Comp. Operation Status	No.1 Comp.	No.2 Comp.
11.0	1	11.0	—	1	11.0	—
61.0	1	61.0	—	1	61.0	—
62.0	1	62.0	—	2	31.0	31.0
80.0	1	80.0	—	2	40.0	40.0
81.0	2	40.5	40.5	2	40.5	40.5
・ ・ ・	・ ・ ・	・ ・ ・	・ ・ ・	・ ・ ・	・ ・ ・	・ ・ ・

NOTE:
Refer to page 1-95 for the maximum frequency.

■ In case of multiple outdoor units

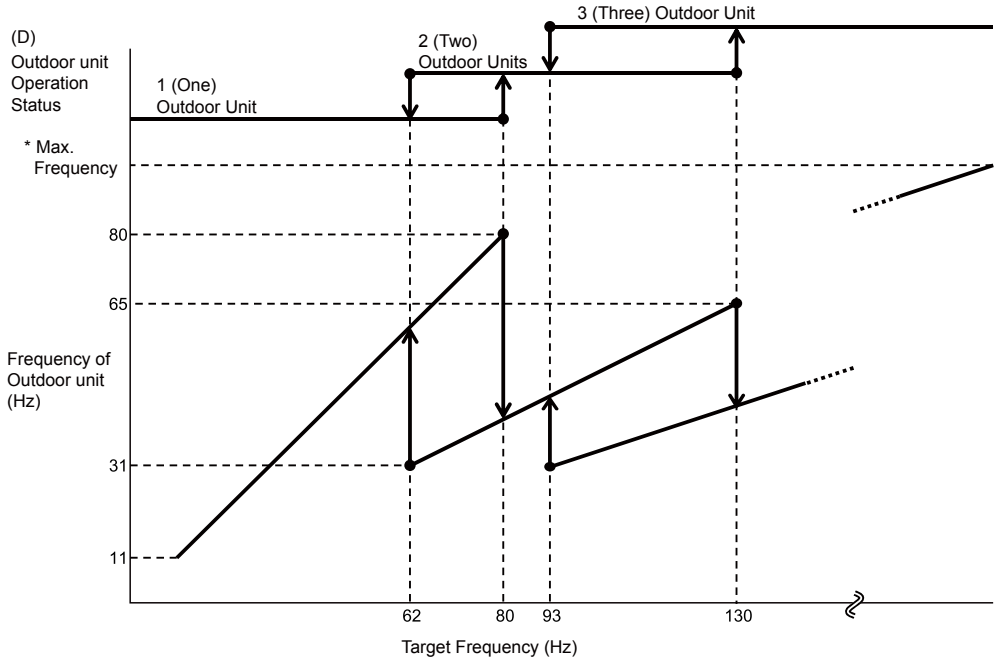
RAS-26HNBCMQ to 48HNBCMQ



Target Frequency [Hz]	Each Outdoor Unit Frequency [Hz]					
	Increase Direction			Decrease Direction		
	Outdoor unit Operation Status	Outdoor Unit (A)	Outdoor Unit (B)	Outdoor unit Operation Status	Outdoor Unit (A)	Outdoor Unit (B)
11.0	1	11.0	—	1	11.0	—
61.0	1	61.0	—	1	61.0	—
62.0	1	62.0	—	2	31.0	31.0
80.0	1	80.0	—	2	40.0	40.0
81.0	2	40.5	40.5	2	40.5	40.5
• • •	• • •	• • •	• • •	• • •	• • •	• • •

NOTE:
Refer to page 1-95 for the maximum frequency.

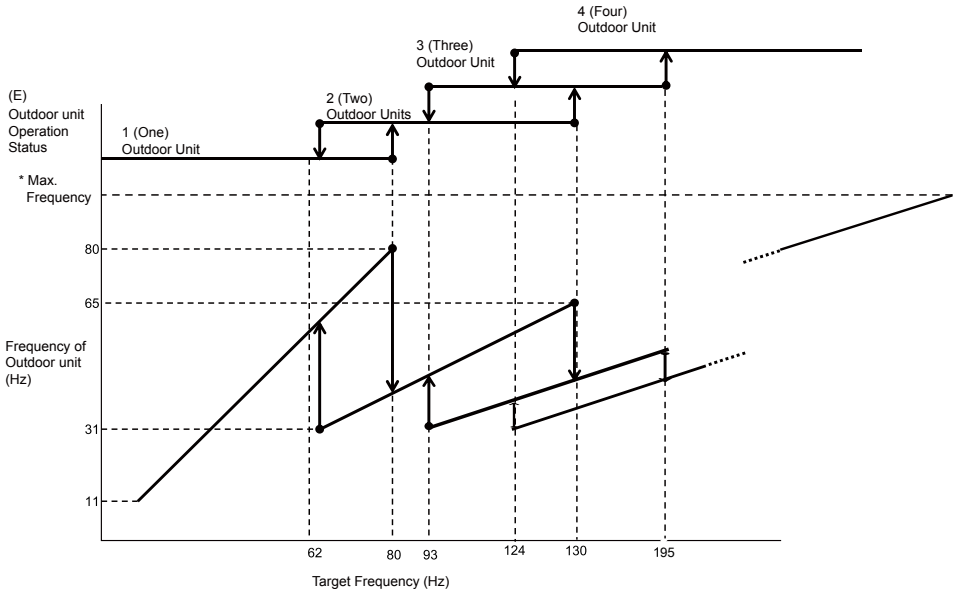
RAS-50HNBCMQ to 72HNBCMQ



Target Frequency [Hz]	Each Outdoor Unit Frequency [Hz]							
	Increase Direction				Decrease Direction			
	Outdoor unit Operation Status	Outdoor Unit (A)	Outdoor Unit (B)	Outdoor Unit (C)	Outdoor unit Operation Status	Outdoor Unit (A)	Outdoor Unit (B)	Outdoor Unit (C)
11.0	1	11.0	—	—	1	11.0	—	—
61.0	1	61.0	—	—	1	61.0	—	—
62.0	1	62.0	—	—	2	31.0	31.0	—
80.0	1	80.0	—	—	2	40.0	40.0	—
81.0	2	40.5	40.5	—	2	40.5	40.5	—
92.0	2	46.0	46.0	—	2	46.0	46.0	—
93.0	2	46.5	46.5	—	3	31.0	31.0	31.0
130.0	2	65.0	65.0	—	3	43.3	43.3	43.3
131.0	3	43.6	43.6	43.6	3	43.6	43.6	43.6
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮

NOTE:
Refer to page 1-95 for the maximum frequency.

RAS-74HNBCMQ to 96HNBCMQ



Target Frequency [Hz]	Each Outdoor Unit Frequency [Hz]									
	Increase Direction					Decrease Direction				
	Outdoor unit Operation Status	Outdoor Unit (A)	Outdoor Unit (B)	Outdoor Unit (C)	Outdoor Unit (D)	Outdoor unit Operation Status	Outdoor Unit (A)	Outdoor Unit (B)	Outdoor Unit (C)	Outdoor Unit (D)
11.0	1	11.0				1	11.0			
61.0	1	61.0				1	61.0			
62.0	1	62.0				2	31.0	31.0		
80.0	1	80.0				2	40.0	40.0		
81.0	2	40.5	40.5			2	40.5	40.5		
92.0	2	46.0	46.0			2	46.0	46.0		
93.0	2	46.5	46.5			3	31.0	31.0	31.0	
123.0	2	61.5	61.5			3	41.0	41.0	41.0	
124.0	2	62.0	62.0			4	31.0	31.0	31.0	31.0
130.0	2	65.0	65.0			4	32.5	32.5	32.5	32.5
131.0	3	43.6	43.6	43.6		4	32.8	32.8	32.8	32.8
195.0	3	65.0	65.0	65.0		4	48.8	48.8	48.8	48.8
196.0	4	49.0	49.0	49.0	49.0	4	49.0	49.0	49.0	49.0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮

NOTE:
Refer to page 1-95 for the maximum frequency.

Combination of Base Units and Maximum Frequency

Model	Combination of Base Units	Maximum Frequency [Hz]
RAS-26HNBCMQ	10	90
	16	148
RAS-28HNBCMQ	12	110
	16	148
RAS-30HNBCMQ	14	130
	16	148
RAS-32HNBCMQ	16	148
	16	148
RAS-34HNBCMQ	16	148
	18	200
RAS-36HNBCMQ	16	148
	20	200
RAS-38HNBCMQ	16	148
	22	250
RAS-40HNBCMQ	16	148
	24	260
RAS-42HNBCMQ	18	200
	24	260
RAS-44HNBCMQ	20	200
	24	260
RAS-46HNBCMQ	22	250
	24	260
RAS-48HNBCMQ	24	260
	24	260
RAS-50HNBCMQ	16	148
	16	148
	18	200
RAS-52HNBCMQ	16	148
	16	148
	20	200
RAS-54HNBCMQ	16	148
	16	148
	22	250
RAS-56HNBCMQ	16	148
	16	148
	24	260
RAS-58HNBCMQ	16	148
	18	200
	24	260
RAS-60HNBCMQ	16	148
	20	200
	24	260
RAS-62HNBCMQ	16	148
	22	250
	24	260
RAS-64HNBCMQ	16	148
	24	260
	24	260
RAS-66HNBCMQ	18	200
	24	260
	24	260
RAS-68HNBCMQ	20	200
	24	260
	24	260
RAS-70HNBCMQ	22	250
	24	260
	24	260

Model	Combination of Base Units	Maximum Frequency [Hz]
RAS-72HNBCMQ	24	260
	24	260
	24	260
RAS-74HNBCMQ	16	148
	16	148
	18	200
	24	260
RAS-76HNBCMQ	16	148
	16	148
	20	200
	24	260
RAS-78HNBCMQ	16	148
	16	148
	22	250
	24	260
RAS-80HNBCMQ	20	200
	20	200
	20	200
	20	200
RAS-82HNBCMQ	20	200
	20	200
	20	200
	22	250
RAS-84HNBCMQ	20	200
	20	200
	20	200
	24	260
RAS-86HNBCMQ	20	200
	20	200
	22	250
	24	260
RAS-88HNBCMQ	20	200
	20	200
	24	260
	24	260
RAS-90HNBCMQ	20	200
	22	250
	24	260
	24	260
RAS-92HNBCMQ	20	200
	24	260
	24	260
	24	260
RAS-94HNBCMQ	22	250
	24	260
	24	260
	24	260
RAS-96HNBCMQ	24	260
	24	260
	24	260
	24	260

NOTE:
The frequency in the table above indicates the total frequency of a outdoor unit if the unit is installed two compressors.

(3) Compressor Capacity Control

The operating speed of the compressor is determined according to the temperature difference (ΔT) between setting temperature and indoor unit air inlet temperature detected by each indoor unit under cooling/heating thermo-ON operation and the variation of ΔT to control compressor frequency.

The frequency is calculated as follows:
Current Frequency × Coefficient Based on the Temperature

(for Cooling Operation)
The coefficient becomes larger when the value of ΔT (the temperature difference between setting temperature and air inlet temperature is large) or variation of ΔT is larger.
The coefficient becomes smaller when the value of ΔT (the temperature difference between setting temperature and air inlet temperature is small) or variation of ΔT is smaller.

(for Heating Operation)
The coefficient becomes larger when the value of ΔT (the temperature difference between setting temperature and air inlet temperature is large) or variation of ΔT is larger.
The coefficient becomes smaller when the value of ΔT (the temperature difference between setting temperature and air inlet temperature is small) or variation of ΔT is smaller.

NOTE:
The temperature of the thermistor in the wired controller is utilized instead of indoor unit air inlet temperature when the thermistor in the wired controller is set by functional setting mode.

■ Heat Exchanger Mode Control

In accordance with the connectable indoor unit operation mode, the outdoor unit heat exchanger will be switched as shown in the table below.

O.U. Heat Exchanger Mode at Cooling: Condenser COND

O.U. Heat Exchanger Mode at Heating: Evaporator EVAP

(1) The Number of Outdoor Unit: 1 (one)

Heat Exchanger Mode		Cooling Mode	Heating Mode	Defrosting Mode
		COND	EVAP	DEF1
Heat Exchanger Condition		COND	EVAP	COND
Reversing Valve	RVR2	OFF	ON	OFF
Expansion Valve	MV1	Fully Open	Heat Exchanger SH	Fully Open
	MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)

(2) The Number of Outdoor Unit: 2 (two)

Heat Exchanger Mode			Cooling Mode	Heating Mode	Defrosting Mode
			COND	EVAP	DEF1
Main Outdoor Unit	Heat Exchanger Condition		COND	EVAP	COND
	Reversing Valve	RVR2	OFF	ON	OFF
	Expansion Valve	MV1	Fully Open	Heat Exchanger SH	Fully Open
		MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)
Sub Outdoor Unit	Heat Exchanger Condition		COND	EVAP	COND
	Reversing Valve	RVR2	OFF	ON	OFF
	Expansion Valve	MV1	Fully Open	Heat Exchanger SHf	Fully Open
		MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)

(3) The Number of Outdoor Unit: 3 (three)

Heat Exchanger Mode			Cooling Mode	Heating Mode	Defrosting Mode
			COND	EVAP	DEF1
Main Outdoor Unit	Heat Exchanger Condition		COND	EVAP	COND
	Reversing Valve	RVR2	OFF	ON	OFF
	Expansion Valve	MV1	Fully Open	Heat Exchanger SH	Fully Open
		MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)
Sub Outdoor Unit 1	Heat Exchanger Condition		COND	EVAP	COND
	Reversing Valve	RVR2	OFF	ON	OFF
	Expansion Valve	MV1	Fully Open	Heat Exchanger SH	Fully Open
		MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)
Sub Outdoor Unit 2	Heat Exchanger Condition		COND	EVAP	COND
	Reversing Valve	RVR2	OFF	ON	OFF
	Expansion Valve	MV1	Fully Open	Heat Exchanger SH	Fully Open
		MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)

(4) The Number of Outdoor Unit: 4 (four)

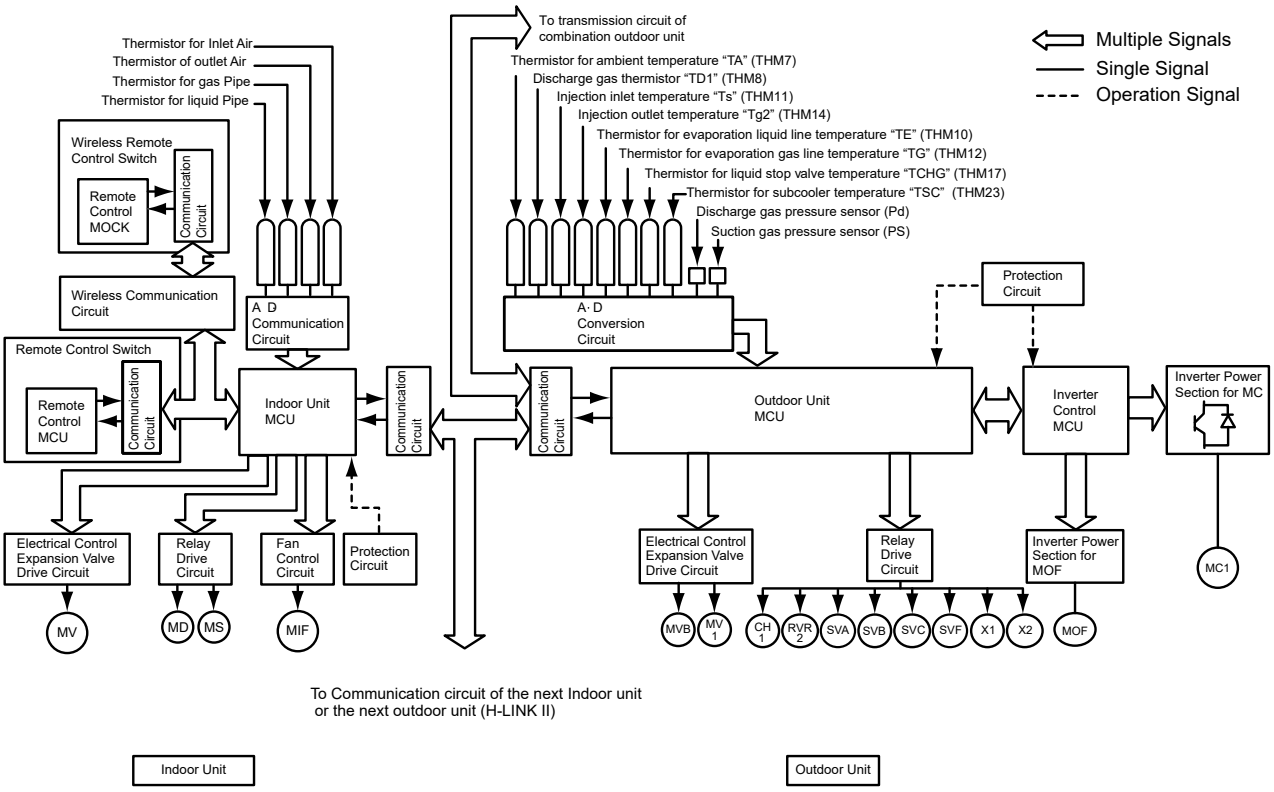
Heat Exchanger Mode			Cooling Mode	Heating Mode	Defrosting Mode
			COND	EVAP	DEF1
Main Outdoor Unit	Heat Exchanger Condition		COND	EVAP	COND
	Reversing Valve	RVR2	OFF	ON	OFF
	Expansion Valve	MV1	Fully Open	Heat Exchanger SH	Fully Open
		MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)
Sub Outdoor Unit 1	Heat Exchanger Condition		COND	EVAP	COND
	Reversing Valve	RVR2	OFF	ON	OFF
	Expansion Valve	MV1	Fully Open	Heat Exchanger SH	Fully Open
		MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)
Sub Outdoor Unit 2	Heat Exchanger Condition		COND	EVAP	COND
	Reversing Valve	RVR2	OFF	ON	OFF
	Expansion Valve	MV1	Fully Open	Heat Exchanger SH	Fully Open
		MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)
Sub Outdoor Unit 3	Heat Exchanger Condition		COND	EVAP	COND
	Reversing Valve	RVR2	OFF	ON	OFF
	Expansion Valve	MV1	Fully Open	Heat Exchanger SH	Fully Open
		MVB	(Tsc - Tchg) Or (Tg_2 - Ts)	(Tchg - Tsc) Or (Tg_2 - Ts)	(Tsc - Tchg) Or (Tg_2 - Ts)

NOTES:

1. Condition of Heat Exchanger
   COND : Use as Condenser
   EVAP : Use as Evaporator
2. Control Method of Expansion Valve
   Tsc - Tchg and Tchg - Tsc: PI control is carried out to achieve the target value of temperature difference between Tsc and Tchg when injection is OFF.
   Tg_2 - Ts: PI control is carried out to achieve the target value of temperature difference between Tg_2 and Ts when injection is ON.
   Heat Exchanger SH: PI control is carried out to achieve the targeted value of outdoor heat exchanger SH.

The figure below is a representation of the control system.

Example: Combination of Base Units, RAS-8.0HNBCMQ to RAS-12HNBCMQ / Indoor Unit



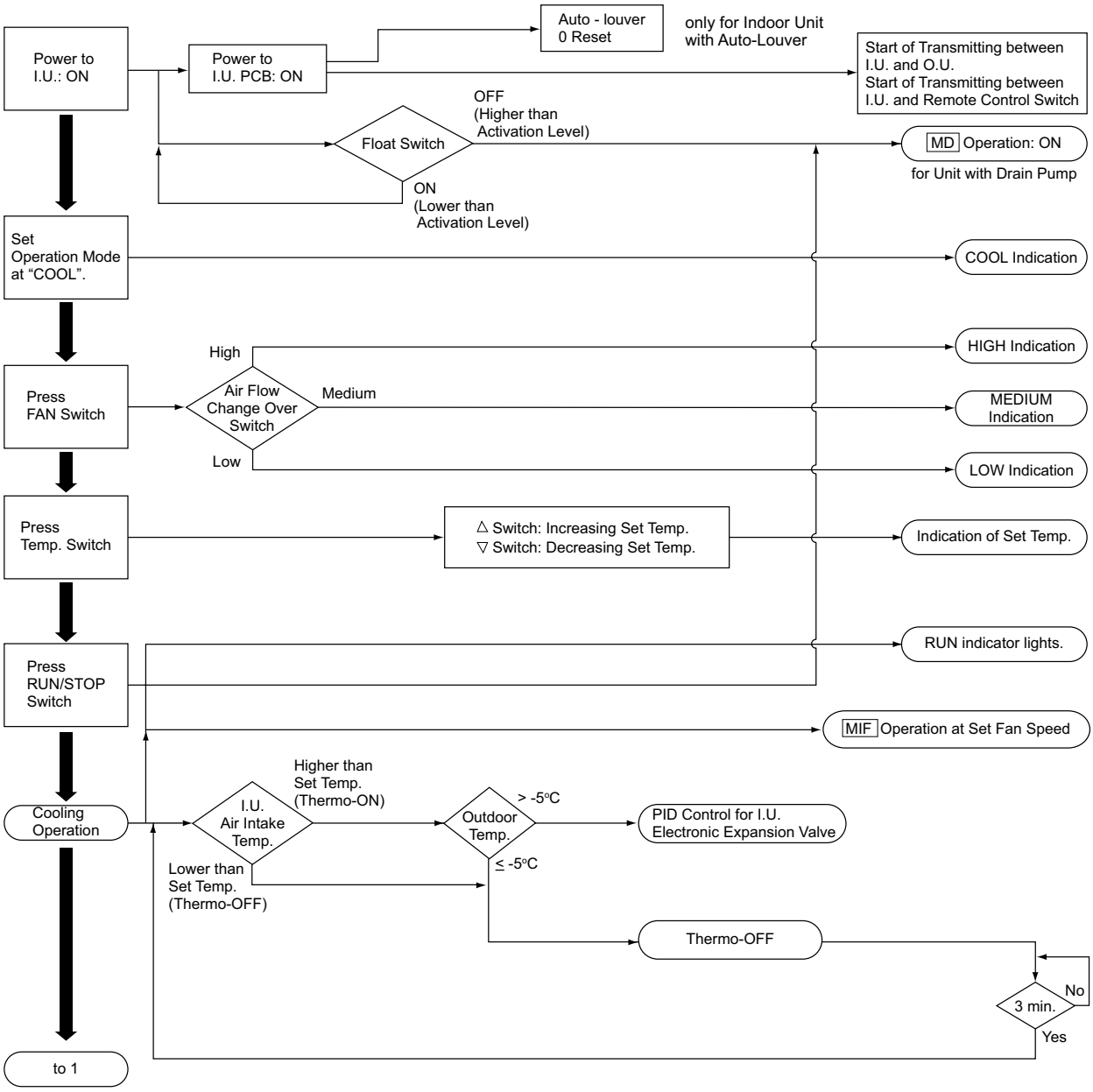
Symbol	Name
THM	Thermistor
MCU	Microcontroller
MC_1	DC Motor (for Inverter Compressor)
MOF	DC Motor (for Outdoor Fan)
MIF	Motor (for Indoor Fan)
MS	Motor (for Auto-Louver)
MD	Motor (for Drain Pump)
MV	Electronic Expansion Valve (for Indoor Unit)
MV_1	Electronic Expansion Valve (for Outdoor Unit)
MVB	Electronic Expansion Valve for Supercooling Heat Exchanger
SVA	Solenoid Valve
RVR_2	Reversing Valve
CH_1	Crankcase Heater
SVB	Solenoid Valve
SVC	Solenoid Valve (*)
SVF	Solenoid Valve
X1	Solenoid Valve
X2	Solenoid Valve (*)

(*) 18 to 24 HP only

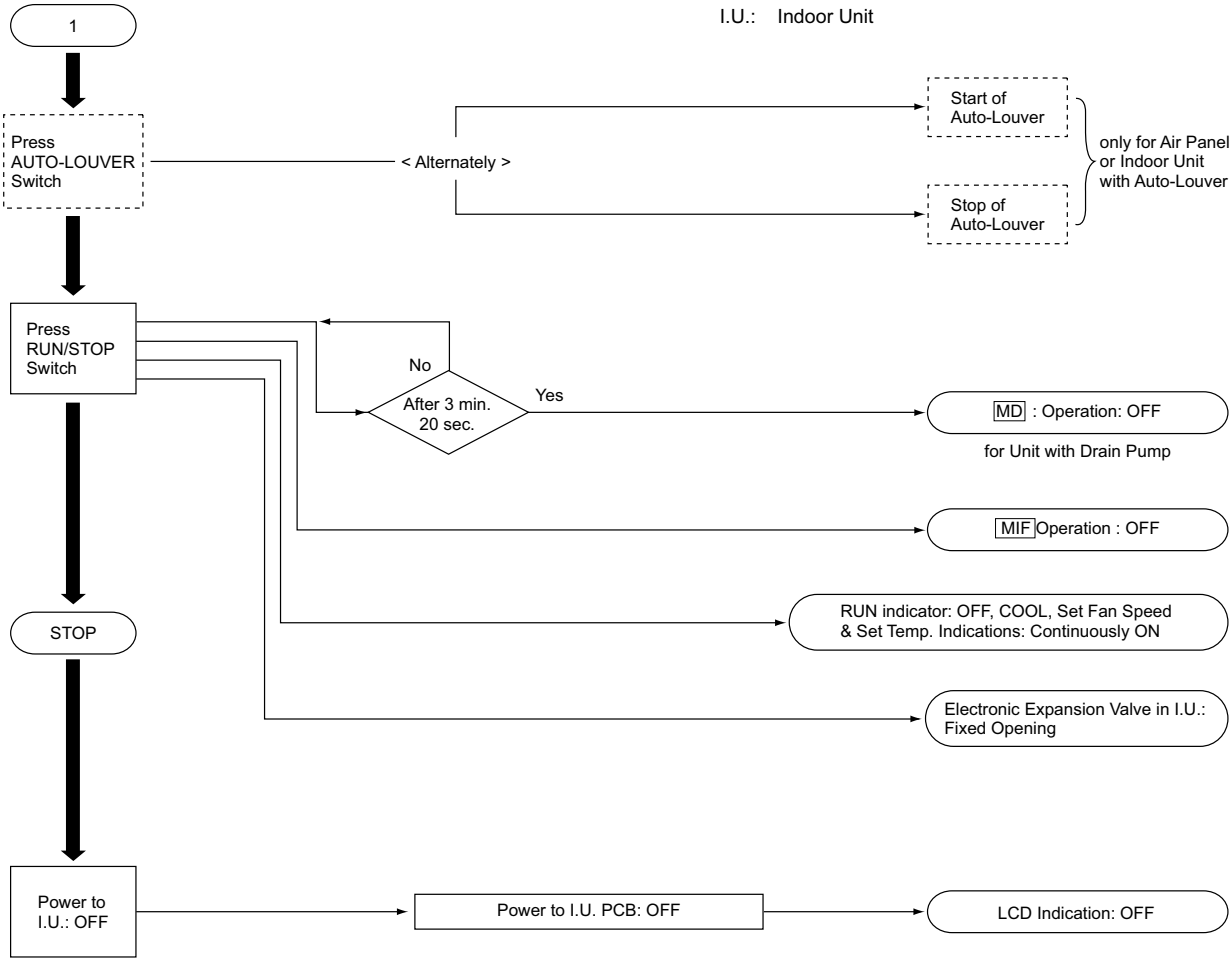
10.3 Standard Operation Sequence

■ Cooling Operation

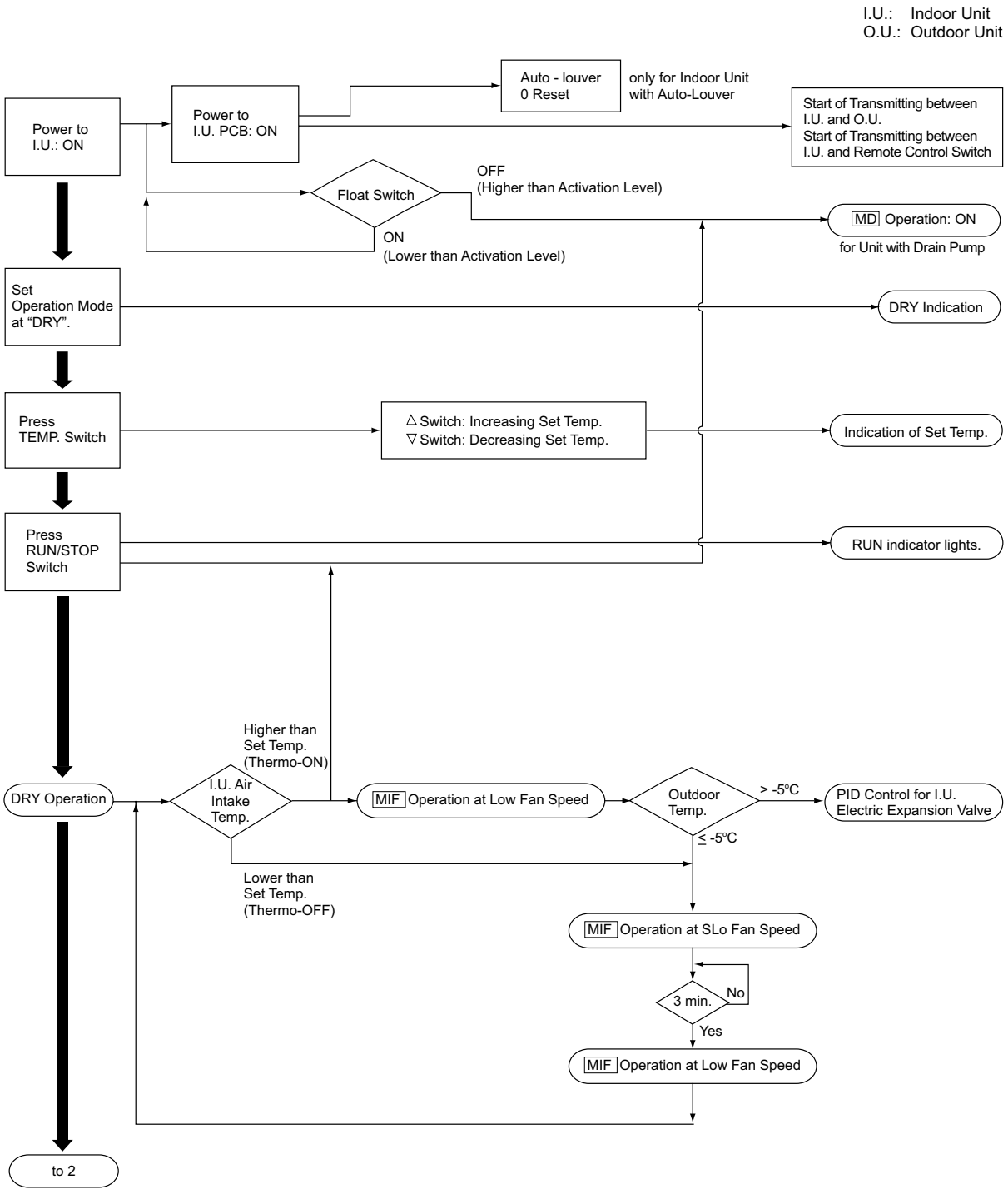
I.U.: Indoor Unit
O.U.: Outdoor Unit



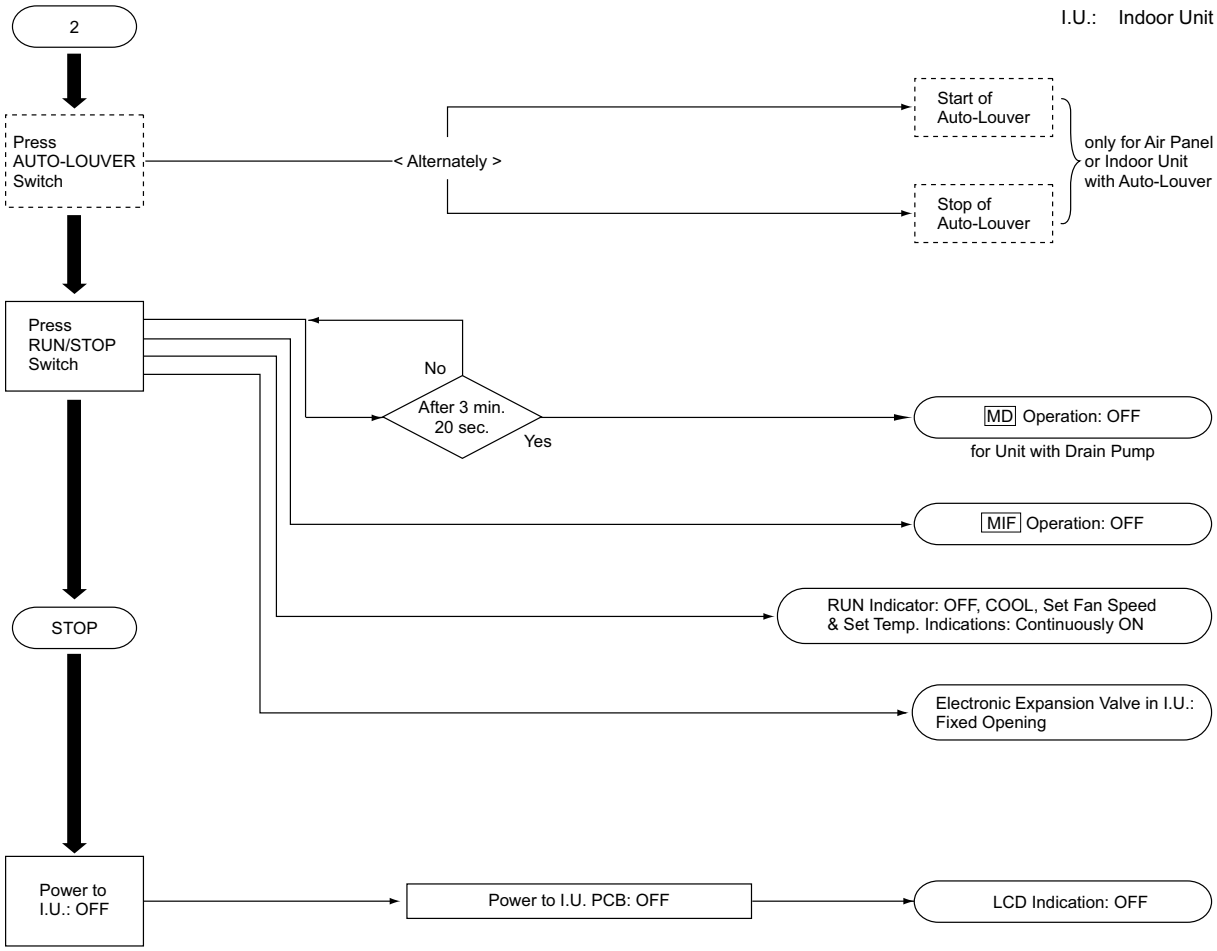
■ Cooling Operation



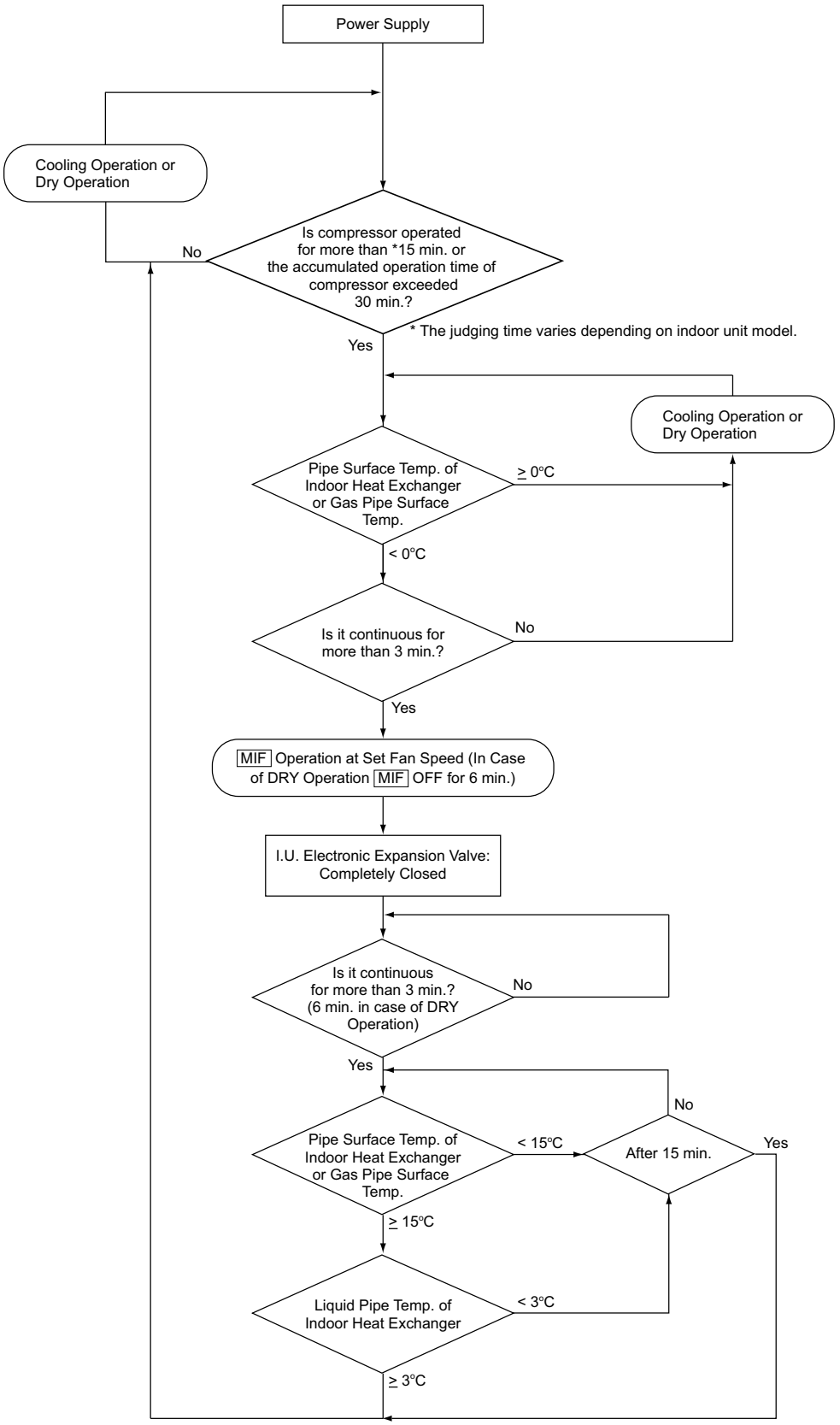
■ Dry Operation



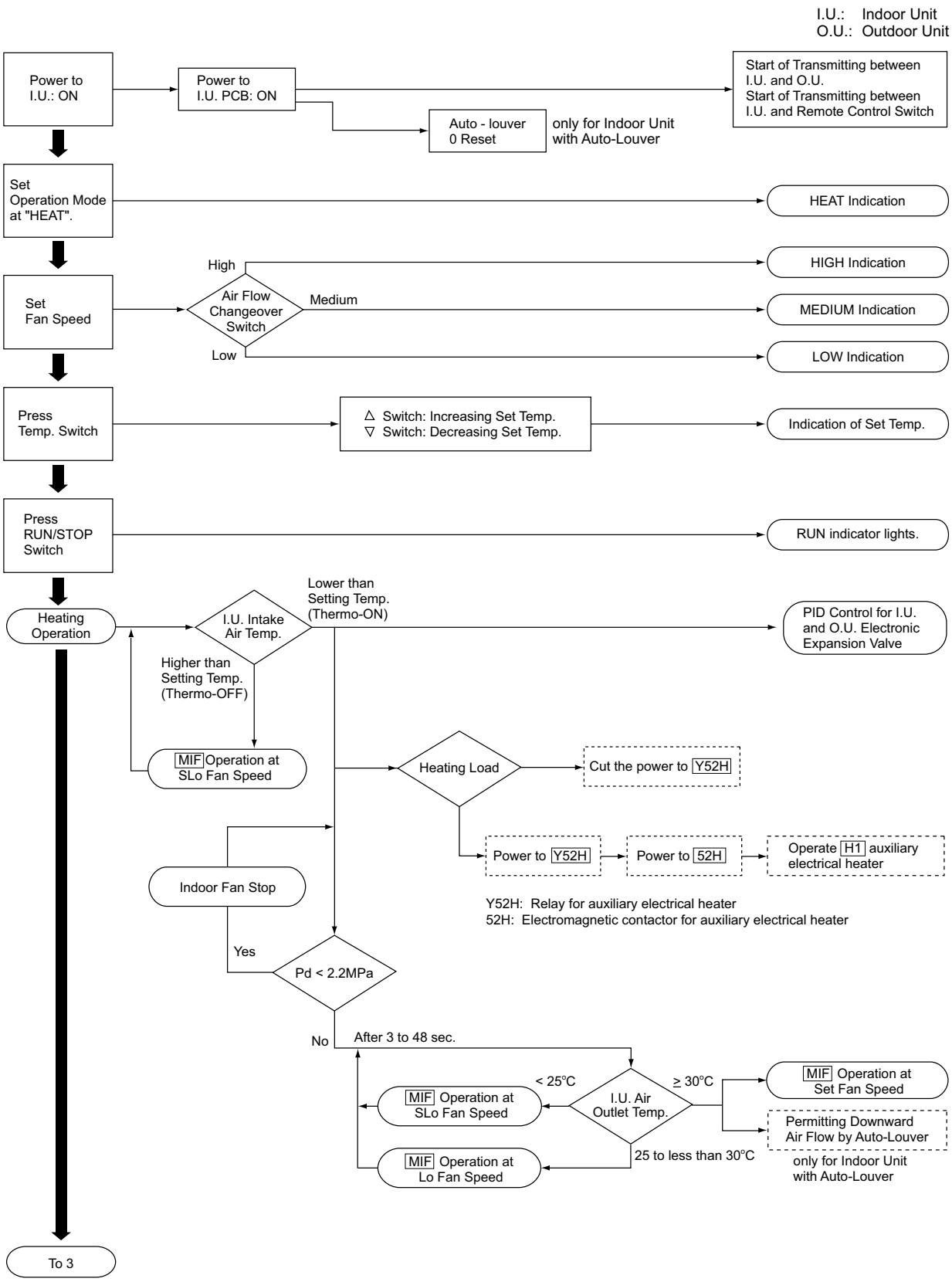
■ Dry Operation



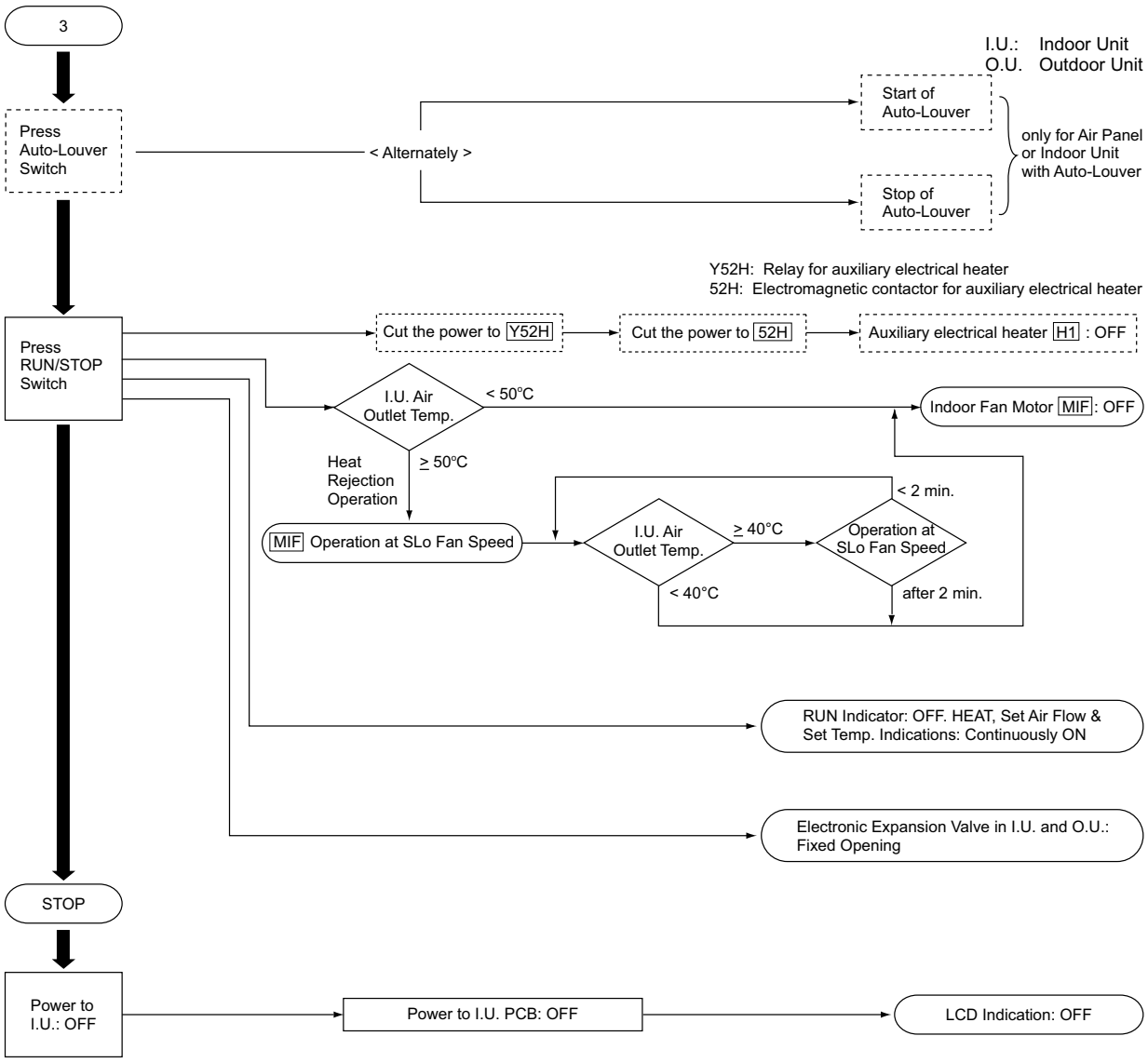
■ Freezing Protection Control during Cooling or Dry Operation



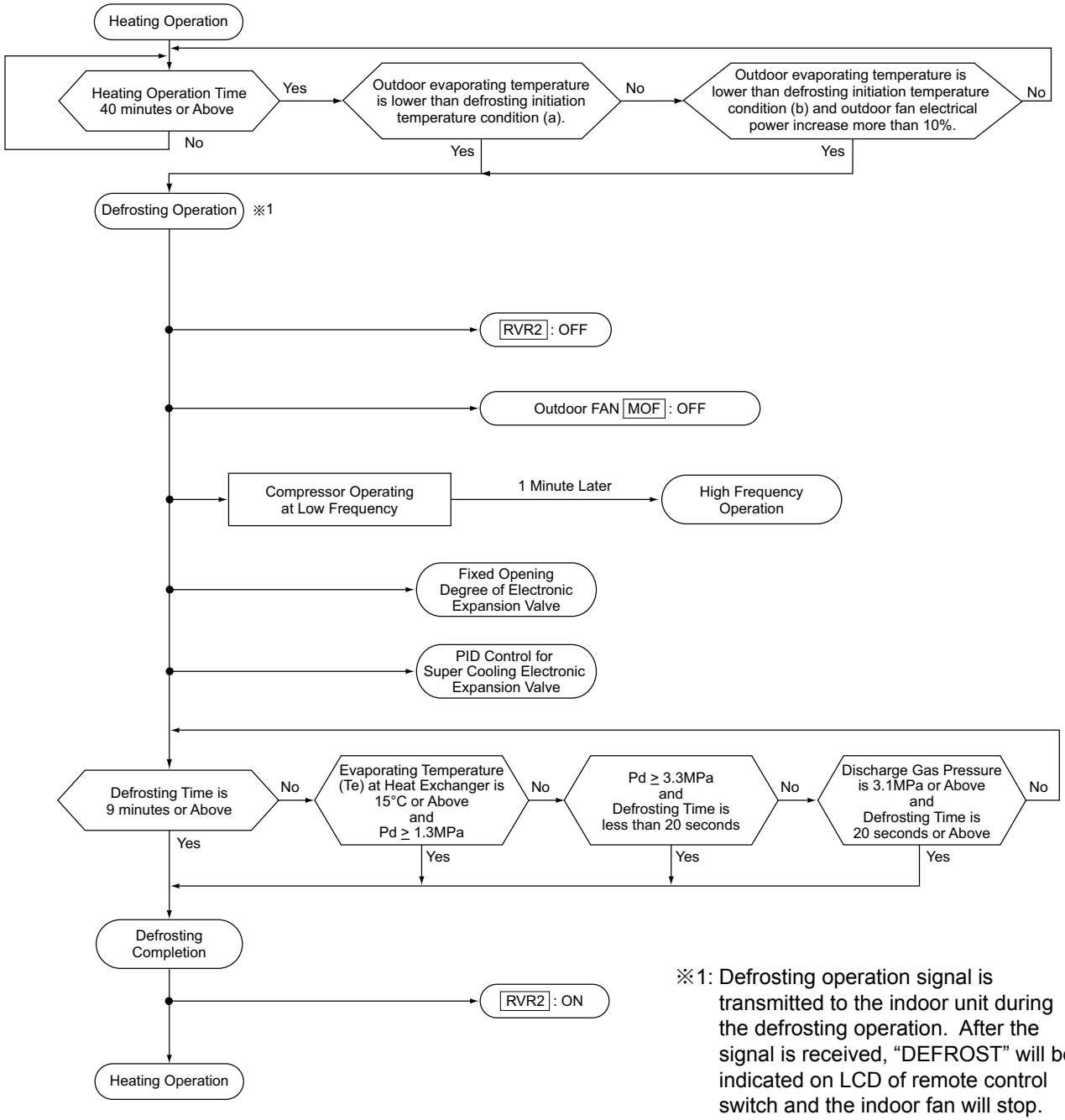
■ Heating Operation



■ Heating Operation

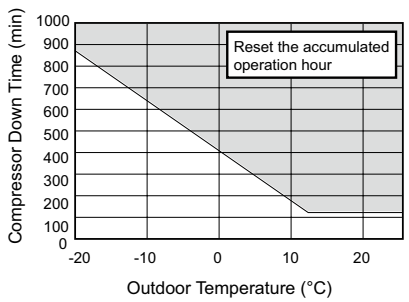


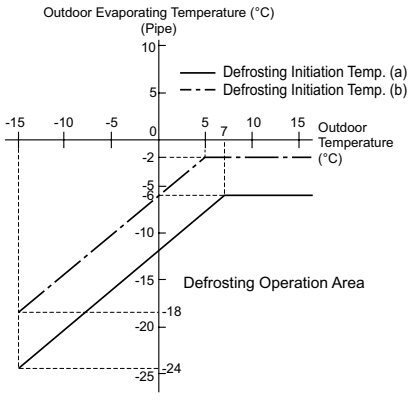
■ Defrosting Operation



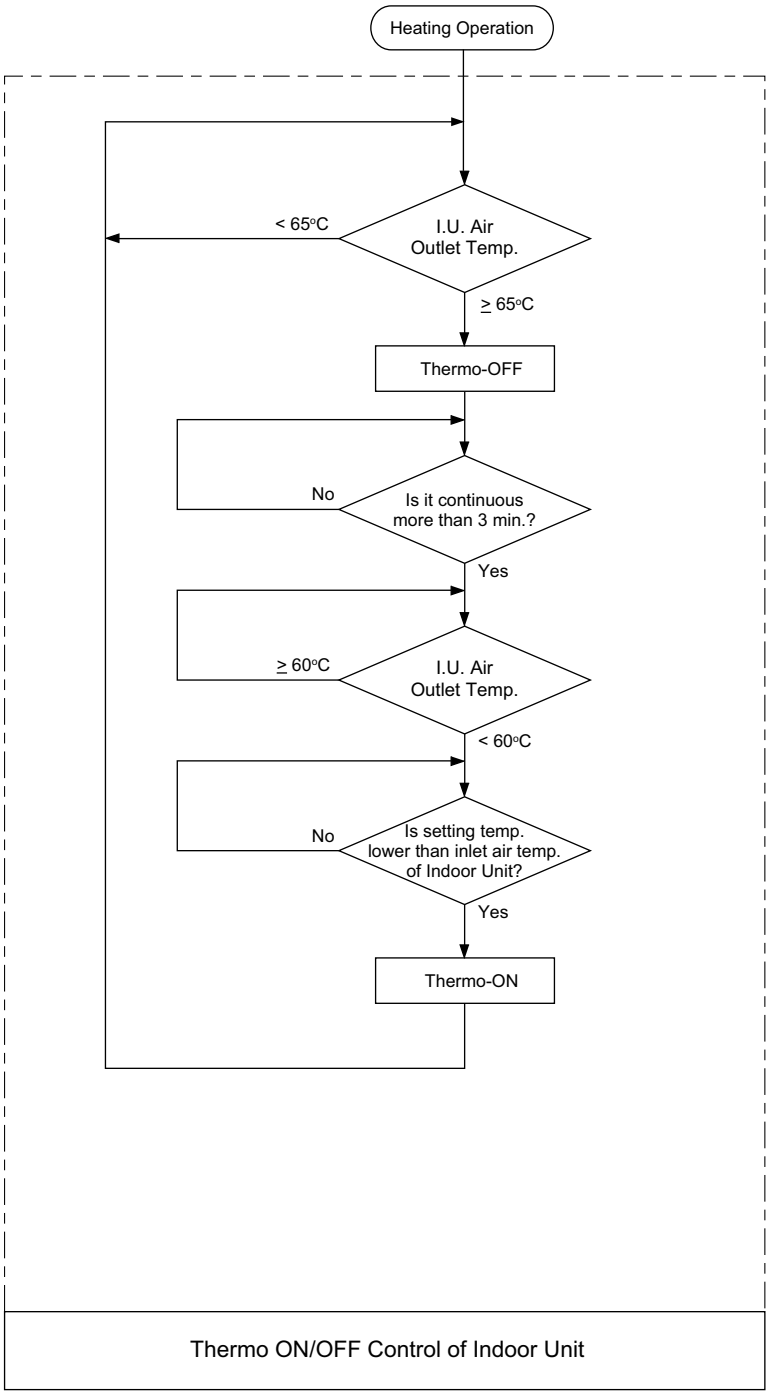
※1: Defrosting operation signal is transmitted to the indoor unit during the defrosting operation. After the signal is received, “DEFROST” will be indicated on LCD of remote control switch and the indoor fan will stop.

Accumulated Heating Operation Hour Resetting Condition	Temperature Condition under Defrosting Operation
To prevent initiation of defrosting operation within minimum time when start operation after long time stoppage, reset the accumulated heating operation hour according to outdoor temperature (Ta) and compressor down time when turning ON the power.	





■ Prevention Control for Excessively High Discharge Air Temperature



■ Protection Control

- Whenever protection control sequences are activated, the corresponding code is displayed on the 7-segment LED array of the main control board.
- Protection control code is displayed when a unit protection mode has been initiated. The code will disappear once the cause of protection has been addressed.

Indicated Contents

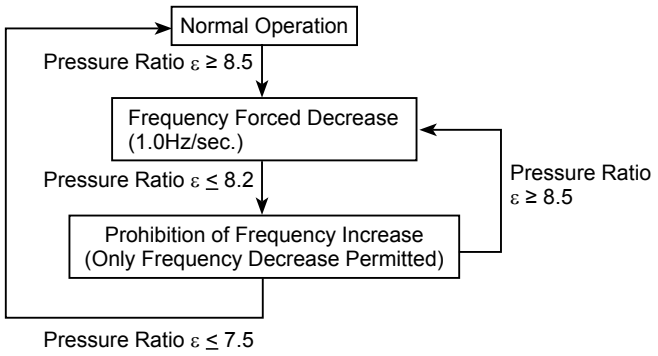
Indication	Protection Control Contents	Code During Degeneration Control
P01	Pressure Ratio Protection Control	Pc1
P02	High Pressure Increase Protection Control	Pc2
P03	Inverter Current Protection Control	Pc3
P04	Inverter Fin Temperature Increase Protection Control	Pc4
P05	Discharge Temperature Increase Protection Control	Pc5
P06	Low Pressure Decrease Protection Control	—
P09	High Pressure Decrease Protection Control	
P0A	Demand Current Control	
P0d	Low Pressure Increase Protection Control	

(1) P01: Pressure Ratio Protection Control

(a) Pressure Ratio Increase Protection Control

Pressure Ratio Increase Protection Control is performed in order to protect the compressor from an increase of pressure ratio.

<Details of Control>



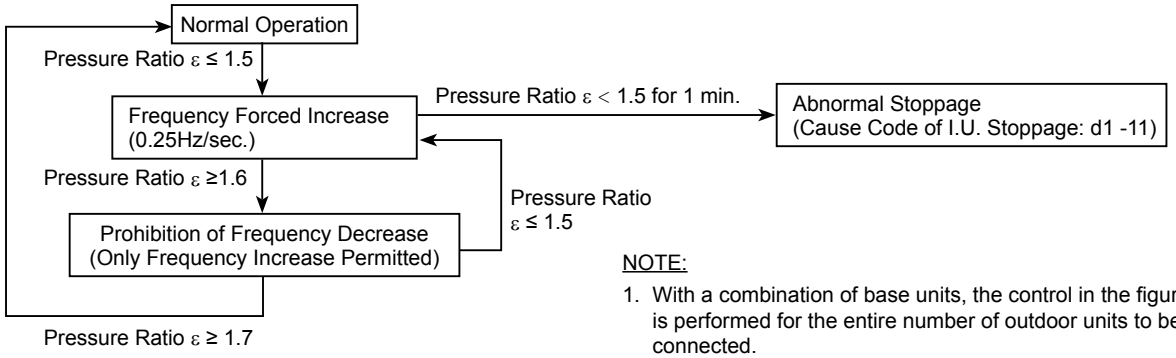
NOTE:

1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. The pressure ratio is calculated in each outdoor unit, and this control uses the maximum value.
   ε= (Pd [MPa]+0.1) / (Ps [MPa]+0.06)
   ε= (Pd [psi]+15) / (Ps [psi]+9)
   Pd: Detected Value of High Pressure Sensor [MPa (psi)]
   Ps: Detected Value of Low Pressure Sensor [MPa (psi)]

(b) Low Compression Ratio Protection Function

This function is activated to protect the compressor during occurrences of low compression ratio.

<Details of Control>



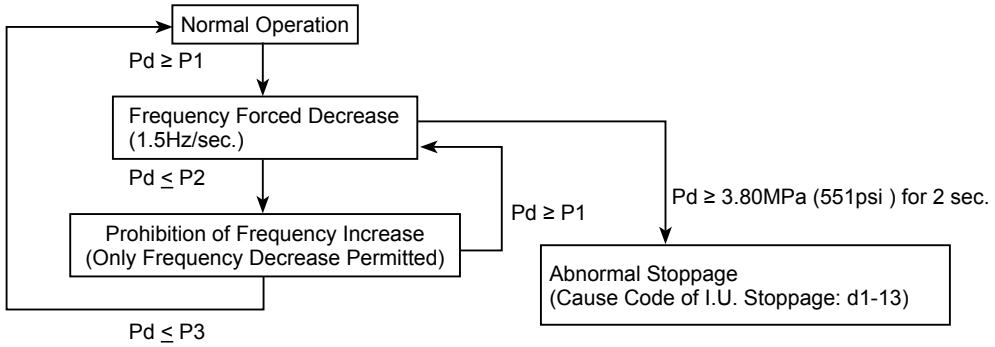
NOTE:

1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. The pressure ratio is calculated in each outdoor unit, and this control uses the minimum value.

(2) P02: High Pressure Increase Protection Control

High Pressure Protection Control is performed in order to prevent activation of a protection device caused by a high pressure increase during an abnormality and to protect the compressor from an excessive increase of discharge pressure.

<Details of Control>



Control Value [MPa(psi)]

Operation Mode	P1	P2	P3
Cooling	3.45 (500)	3.40 (493)	3.20 (464)
Heating	3.35 (486)	3.30 (479)	3.10 (450)

NOTE:

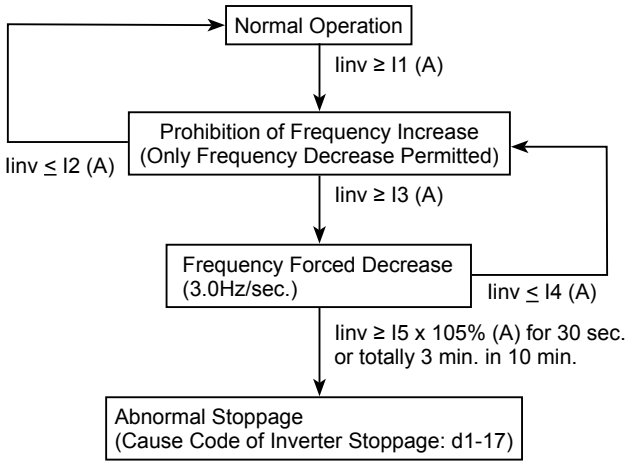
1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. High pressure is detected in each outdoor unit, and this control uses the maximum value.
   Pd: Detected Value of High Pressure Sensor [MPa(pis)]

(3) P03: Inverter Current Protection Control

Inverter Current Protection Control is performed in order to prevent an inverter trip caused by an increase of inverter secondary current value.

(a) Inverter Secondary Current Protection

<Details of Control>



Control Value

<380-415V>

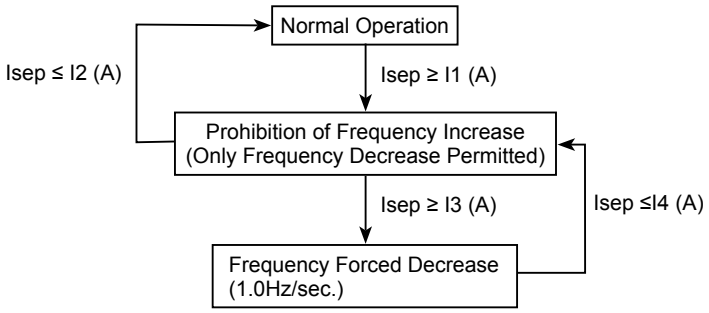
Model	I1	I2	I3	I4	I5
RAS-8.0HNBCMQ RAS-10HNBCMQ RAS-18HNBCMQ RAS-20HNBCMQ	22.8	22.3	23.8	23.3	23.8
RAS-12HNBCMQ RAS-14HNBCMQ RAS-16HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ	36.2	35.7	37.2	36.7	37.2

NOTE:

1. With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.
2. In case of two inverter PCB installed in an outdoor unit, the max. current value detected at each inverter PCB is utilized.
   Iinv: Detected Value of Inverter Secondary Current Sensor[A]

(b) Primary Current Protection for each Inverter PCB

<Details of Control>



Control Value

<380-415V>

Model	I1	I2	I3	I4
RAS-8.0HNBCMQ RAS-10HNBCMQ RAS-18HNBCMQ RAS-20HNBCMQ	24.7	23.7	25.2	24.7
RAS-12HNBCMQ RAS-14HNBCMQ RAS-16HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ	39.1	38.1	39.6	39.1

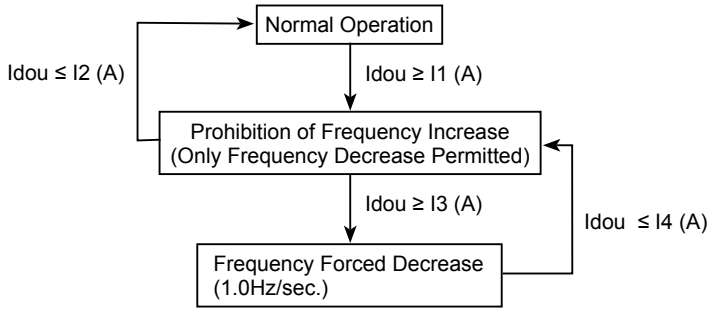
NOTE:

1. With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.
2. In case of two inverter PCB installed in an outdoor unit, the max. current value detected at each inverter PCB is utilized.

   Isep: Inverter Primary Current[A]

(c) Primary Current Protection for each Outdoor Unit

<Details of Control>



Control Value

<380-415V>

Model	I1	I2	I3	I4
RAS-8.0HNBCMQ	14.8	13.8	15.3	14.8
RAS-10HNBCMQ	20.4	19.4	20.9	20.4
RAS-12HNBCMQ	24.4	23.4	24.9	24.4
RAS-14HNBCMQ	28.6	27.6	29.1	28.6
RAS-16HNBCMQ	32.2	31.2	32.7	32.2
RAS-18HNBCMQ	41.6	40.6	42.1	41.6
RAS-20HNBCMQ	41.6	40.6	42.1	41.6
RAS-22HNBCMQ	48.2	47.2	48.7	48.2
RAS-24HNBCMQ	57.0	56.0	57.5	57.0

NOTE:

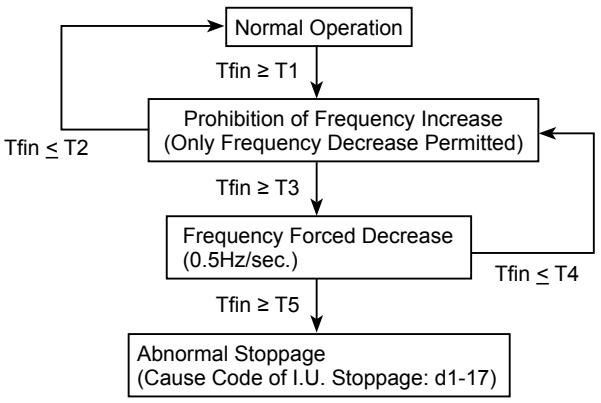
1. With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.

   Idou: Total Value of Primary Current of all the Inverter PCB in an Outdoor Unit[A]

(4) P04: Inverter Fin Temperature Increase Protection Control

Inverter Fin Temperature Increase Protection Control is performed in order to prevent an inverter trip caused by a temperature increase of the inverter fin.

<Detail of Control>



Control Value

<380-415V> [°C]

Model	T1	T2	T3	T4	T5
RAS-8.0HNBCMQ RAS-10HNBCMQ RAS-18HNBCMQ RAS-20HNBCMQ	98	96	100	98	103
RAS-12HNBCMQ RAS-14HNBCMQ RAS-16HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ	103	101	105	103	108

NOTE:

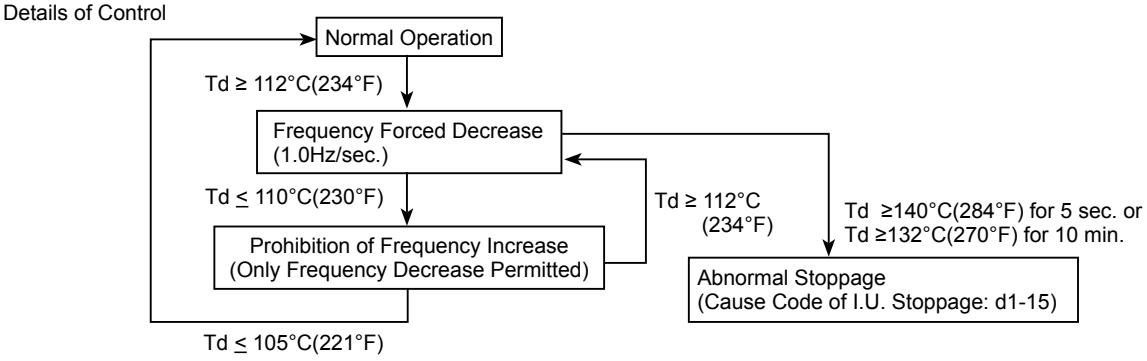
1. In case of combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.
2. In case of two inverter PCB installed in an outdoor unit, the max. temperature detected at each inverter PCB is utilized.

   Tfin: Inverter Fin Temperature Sensor Detected Value [°C]

(5) P05: Discharge Temperature Increase Protection Control

Discharge Temperature Increase Protection Control is performed in order to protect the compressor motor coil from an increase of discharge temperature during an abnormality.

Details of Control



NOTE:

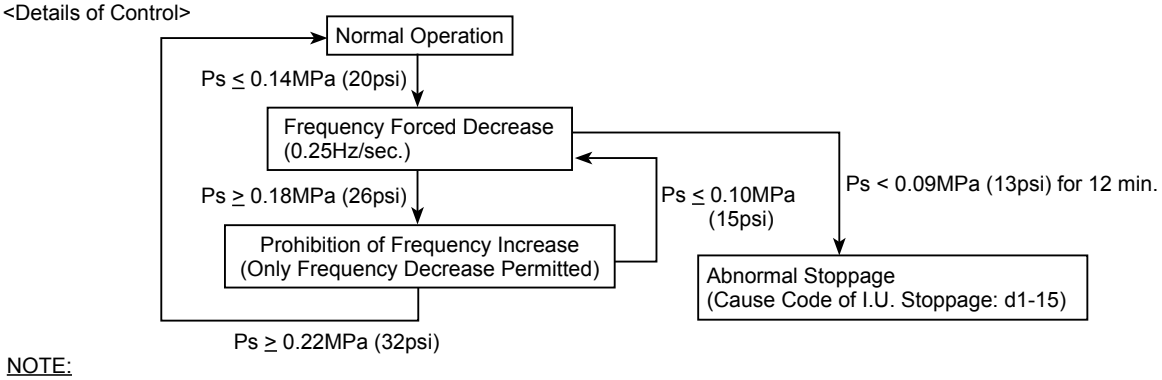
1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. Discharge temperature is detected in each outdoor unit, and this control uses the maximum value.
3. In case of two inverter compressors installed in an outdoor unit, the max. temperature detected at each inverter compressor is utilized.

   Td: Detected Value of Discharge Gas Thermistor [°C]

(6) P06: Low Pressure Decrease Protection Control

Low Pressure Decrease Protection Control is performed in order to protect the compressor from a transitional decrease of suction pressure.

<Details of Control>



NOTE:

1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. Low pressure is detected in each outdoor unit, and this control uses the minimum value.

   Ps: Detected Value of Low Pressure Sensor [MPa(pis)]

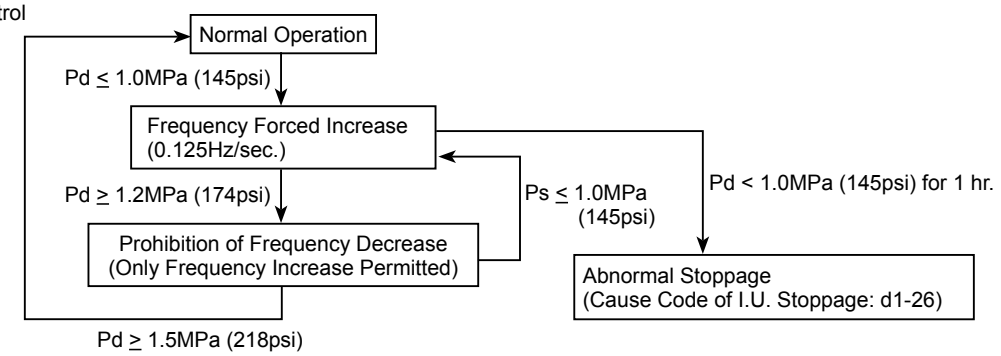
(7) P09: High Pressure Decrease Protection Control

When decreasing high pressure, the compressor operation frequency is controlled by this protection control for the following purposes.

• To prevent insufficient refrigerant supply to indoor units installed at different height locations.

• To keep the refrigerant oil supply in the compressor.

Details of Control



NOTE:

1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. High pressure is detected in each outdoor unit, and this control uses the minimum value.
   Pd: Detected Value of High Pressure Sensor [MPa (psi)]

(8) P0A: Demand Current Control

The compressor operation frequency is controlled to set at the setting value of the outdoor unit inverter primary current (40% to 100% of rated current of cooling operation). This function is detailed in the "External Input and Output Setting". Refer to the Service Manual for details.

Operating Conditions

The demand current control can be performed under the following conditions.

(a) The demand signal is input from the centralized operation controller.
(b) The demand signal is input at the external input terminals of the outdoor unit from external equipment such as a building management system or a utility with a smart meter.
(c) The demand function settings are set from the outdoor unit PCB.
(d) The wave function is set from the outdoor unit PCB.
(e) The demand signal is input from the indoor unit (wired controller).

If the operation current exceeds each setting function value, the compressor operation frequency is controlled.

Cancellation Condition

The input signal is stopped at each condition (a) to (e).

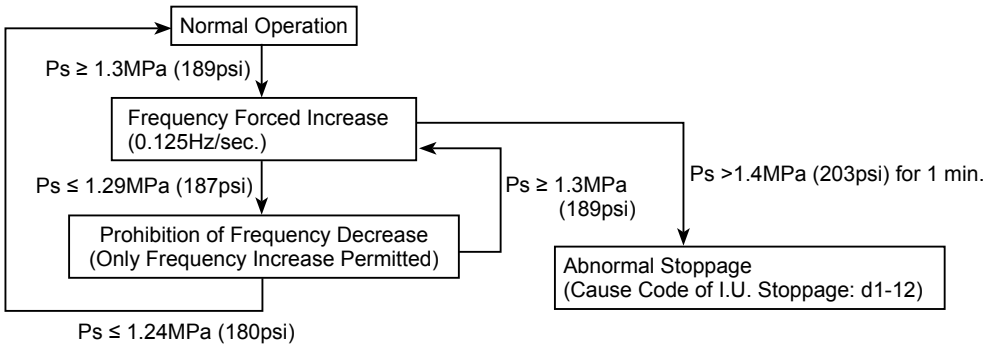
NOTE:

This function is not available when the compressor starts or during a defrosting operation.

(9) P0d: Low Pressure Increase Protection Control

The compressor operation frequency is controlled to protect the compressor from suction pressure transitional increasing.

Details of Control



NOTE:

1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. Low pressure is detected in each outdoor unit, and this control uses the maximum value.
   Ps: Detected Value of Low Pressure Sensor [MPa(psi)]

(10) Priority of Protection Control

If two or more protection controls meet a condition, the protection controls perform according to the following.

Rank Order.	Indication	Protection Control Performed
1	P01	Pressure Ratio Protection Control
2	P02	High Pressure Increase Protection Control
3	P03	Inverter Current Protection Control
4	P04	Inverter Fin Temperature Increase Protection Control
5	P05	Discharge Temperature Increase Protection Control
6	P06	Low Pressure Decrease Protection Control
7	P0A	Demand Current Control
8	P0d	Low Pressure Increase Protection Control
9	P09	High Pressure Decrease Protection Control

		② Lower Rank Order of Protection Control Function			
		Forced Decrease	Forced Increase	Prohibition of Increase	Prohibition of Decrease
① Higher Rank Order of Protection Control Function	Forced Decrease	①	①	①	①
	Forced Increase	①	①	①	①
	Prohibited Increase	②	①	②*	①
	Prohibited Decrease	②	②	②	②

*: Discharge Temperature Increase Protection Control (P05) is higher than the following protection controls.
a) Low Pressure Decrease Protection Control (P06)
b) Demand Current Control (P0A)

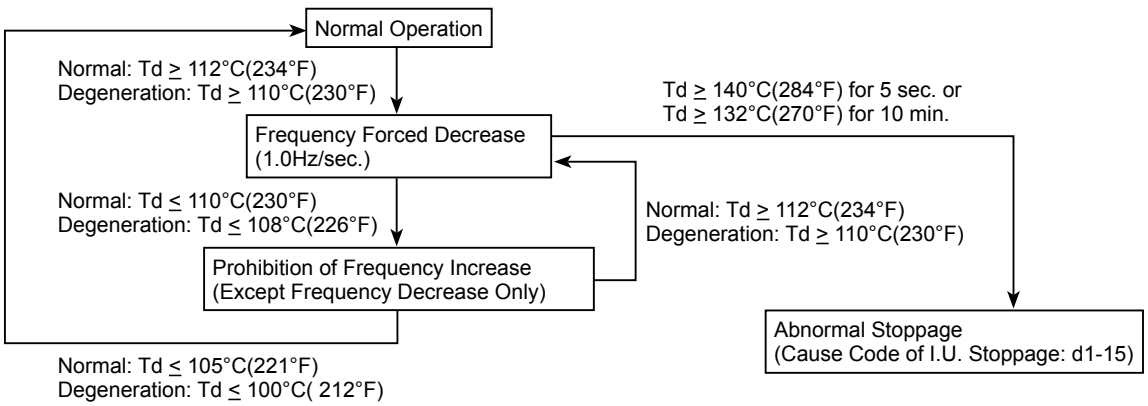
(11) Degeneration Control

Degeneration Control is performed to change the protection control range.
This control sequence will suppress re-occurring alarms in response to repeated equipment restarts during protection control conditions listed below.

Related Protection Control

(1) Pressure Ratio Decrease Protection Control (P01)
(2) High Pressure Increase Protection Control (P02)
(3) Inverter Current Protection Control (P03)
(4) Inverter Fin Temperature Increase Protection Control (P04)
(5) Discharge Temperature Increase Protection Control (P05)

<Example of Discharge Temperature Increase Protection Control>



(12) Oil Return Control

Oil return control is performed in order to avoid insufficient oil supply to the compressor caused by long time low frequency operation. This control is utilized to return the oil flow out to the indoor unit side from the compressor.

<Activating Condition>

This control function is started the compressor runs below the specified speed for 1 hour continuously (refer to the table below).

<Compressor Speed for Oil Return Control>

Type of Unit	Cooling Operation	Heating Operation
≤ 8HP	32.0	32.0
10HP	38.0	38.0
12HP, 14HP	50.0	54.0
16HP to 24HP	66.0	72.0
26HP to 36HP	96.0	108.0
38HP to 54HP	132.0	156.0
56HP to 72HP	176.0	190.0
74HP to 96HP	240.0	240.0

<Detail of Control>

Compressor:

Increase the compressor speed above the required value to return the oil to the compressor

Expansion Valve:

(In the Case of Cooling Operation) Open the expansion valve of the indoor unit under thermo-ON.

(In the Case of Heating Operation) Open the expansion valve of the outdoor unit.

<Deactivating Condition>

This control function is canceled when the oil return control continues for more than 60 sec. (for cooling operation) /120sec. (for heating operation).

10.4 Safety and Control Device Setting

- Compressor Protection
  The compressor is protected by the following devices and their combinations.
  (1) High Pressure Switch: This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.
  (2) Oil Heater: This band type heater protects against oil foaming during cold starting, as it is energized while the compressor is stopped.

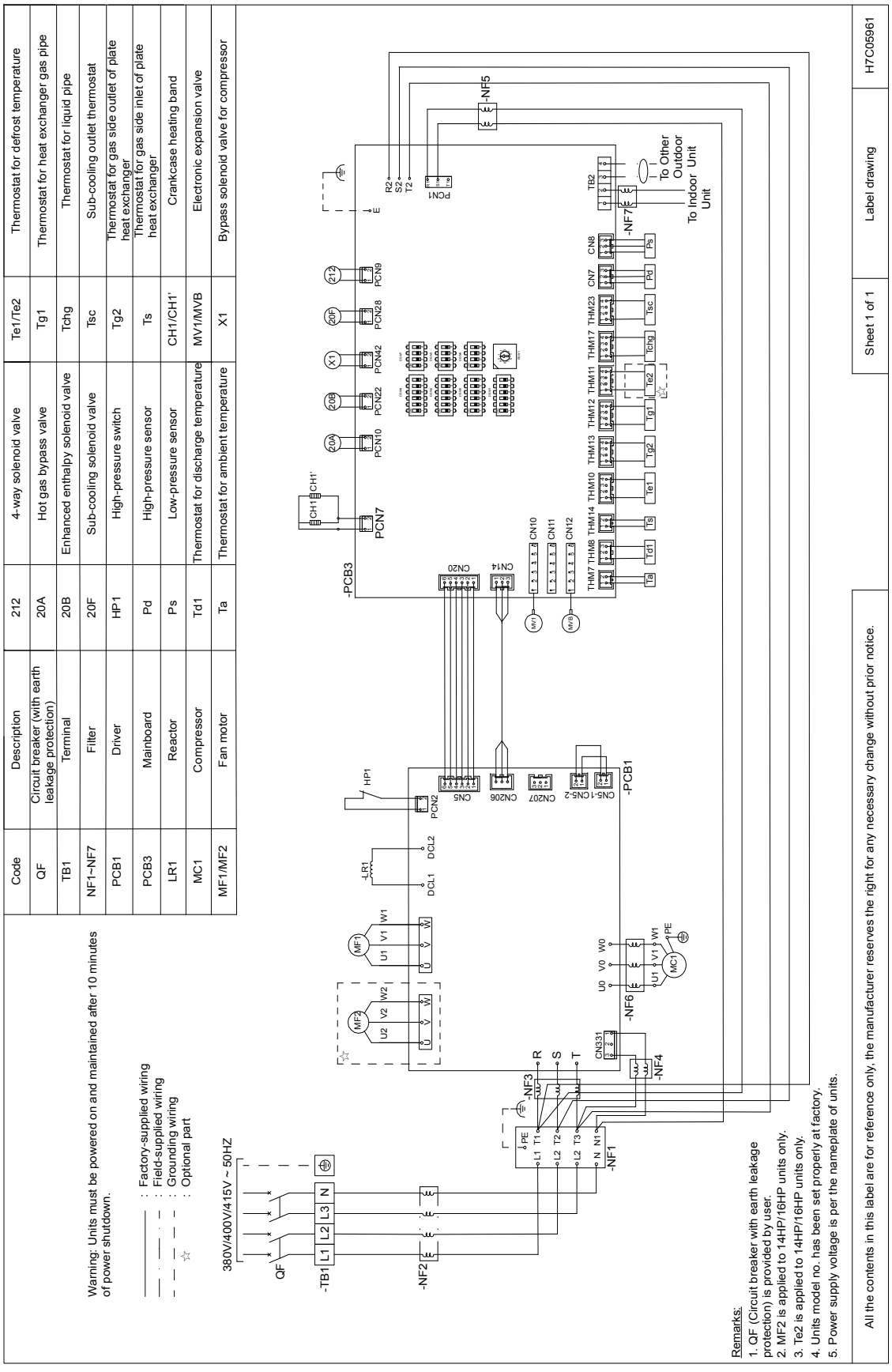
< HNBCMQ >

Model			RAS-8.0HNBCMQ	RAS-10HNBCMQ	RAS-12HNBCMQ
Compressor			Automatic reset, not adjustable		
Pressure Switch			1 pcs per compressor		
High Pressure	Cut-out	Mpa	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$
	Cut-in	Mpa	3.20±0.15	3.20±0.15	3.20±0.15
Fuse capacity		A	25	32	32
Crankcase heating capacity		W	40×2	40×2	40×2
CCP timer setting time		min	3	3	3

Model			RAS-14HNBCMQ	RAS-16HNBCMQ	RAS-18HNBCMQ
Compressor			Automatic reset, not adjustable		
Pressure Switch			1 pcs per compressor		
High Pressure	Cut-out	Mpa	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$
	Cut-in	Mpa	3.20±0.15	3.20±0.15	3.20±0.15
Fuse capacity		A	40	50	50
Crankcase heating capacity		W	40×2	40×2	40×4
CCP timer setting time		min	3	3	3

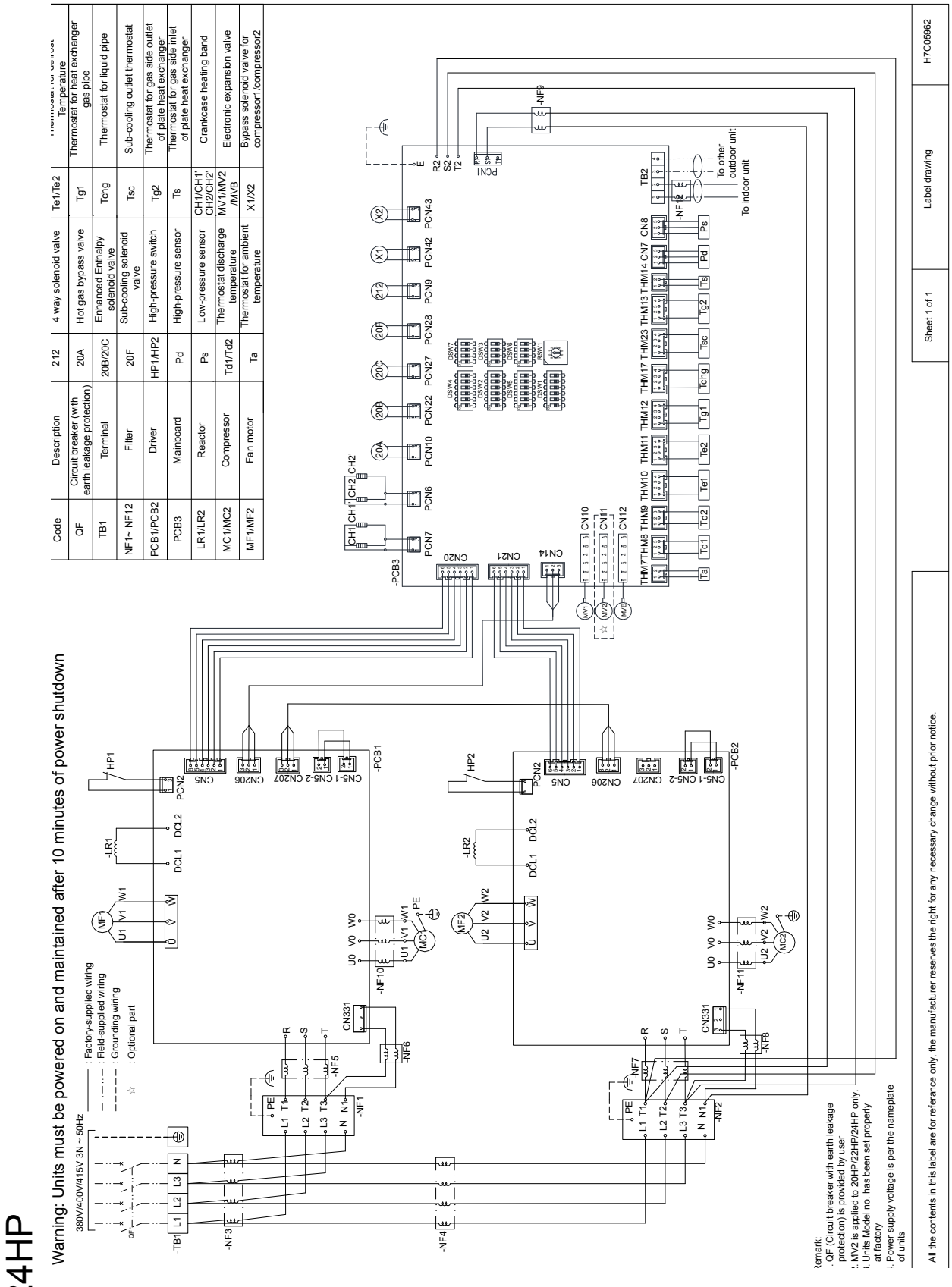
Model			RAS-20HNBCMQ	RAS-22HNBCMQ	RAS-24HNBCMQ
Compressor			Automatic reset, not adjustable		
Pressure Switch			1 pcs per compressor		
High Pressure	Cut-out	Mpa	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$
	Cut-in	Mpa	3.20±0.15	3.20±0.15	3.20±0.15
Fuse capacity		A	63	63	80
Crankcase heating capacity		W	40×4	40×4	40×4
CCP timer setting time		min	3	3	3

8-16HP



Code	Description	212	4-way solenoid valve	Te1/Te2	Thermostat for defrost temperature
QF	Circuit breaker (with earth leakage protection)	20A	Hot gas bypass valve	Tg1	Thermostat for heat exchanger gas pipe
TB1	Terminal	20B	Enhanced enthalpy solenoid valve	Tchg	Thermostat for liquid pipe
NF1~NF7	Filter	20F	Sub-cooling solenoid valve	Tsc	Sub-cooling outlet thermostat
PCB1	Driver	HP1	High-pressure switch	Tg2	Thermostat for gas side outlet of plate heat exchanger
PCB3	Mainboard	Pd	High-pressure sensor	Ts	Thermostat for gas side inlet of plate heat exchanger
LR1	Reactor	Ps	Low-pressure sensor	CH1/CH1'	Crankcase heating band
MC1	Compressor	Td1	Thermostat for discharge temperature	MV1/MVB	Electronic expansion valve
MF1/MF2	Fan motor	Ta	Thermostat for ambient temperature	X1	Bypass solenoid valve for compressor

18-24HP



Code	Description	212	4 way solenoid valve	Te1/Te2	Thermistor for Temperature
QF	Circuit breaker (with earth leakage protection)	20A	Hot gas bypass valve	Tg1	Thermostat for heat exchanger gas pipe
TB1	Terminal	20B/20C	Enhanced Enthalpy solenoid valve	Tchg	Thermostat for liquid pipe
NF1~ NF12	Filter	20F	Sub-cooling solenoid valve	Tsc	Sub-cooling outlet thermostat
PCB1/PCB2	Driver	HP1/HP2	High-pressure switch	Tg2	Thermostat for gas side outlet of plate heat exchanger
PCB3	Mainboard	Pd	High-pressure sensor	Ts	Thermostat for gas side inlet of plate heat exchanger
LR1/LR2	Reactor	Ps	Low-pressure sensor	CH1/CH1' CH2/CH2'	Crankcase heating band
MC1/MC2	Compressor	Td1/Td2	Thermostat discharge temperature	MV1/MV2 /MVB	Electronic expansion valve
MF1/MF2	Fan motor	Ta	Thermostat for ambient temperature	X1/X2	Bypass solenoid valve for compressor1/compressor2

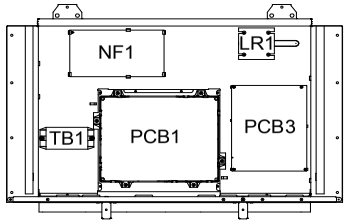
Sheet 1 of 1 | Label drawing | H7C05962

All the contents in this label are for referance only, the manufacturer reserves the right for any necessary change without prior notice.

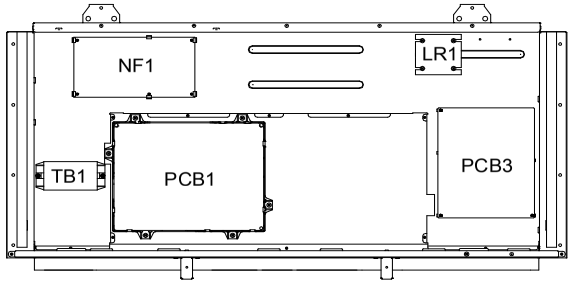
8-24HP

Electric box layout

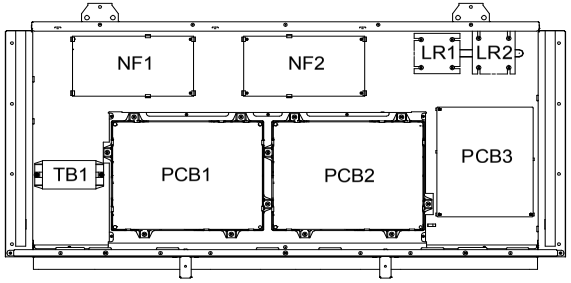
8-12HP Electric box layout



14-16HP Electric box layout



18-24HP Electric box layout



DIP Switch pattern

DSW1 (Refrigerant system tens digit setting)

Factory setting	ON 1 2 3 4 5 6

RSW1 (Refrigerant system single digit setting)

Factory setting	

DSW2 (Capacity setting)

YVOH080VPEMBQ JVOH080VPEMBQ RAS-8.0VNMBQ	ON 1 2 3 4 5 6
YVOH100VPEMBQ JVOH100VPEMBQ RAS-10VNMBQ	ON 1 2 3 4 5 6
YVOH120VPEMBQ JVOH120VPEMBQ RAS-12VNMBQ	ON 1 2 3 4 5 6
YVOH140VPEMBQ JVOH140VPEMBQ RAS-14VNMBQ	ON 1 2 3 4 5 6
YVOH160VPEMBQ JVOH160VPEMBQ RAS-16VNMBQ	ON 1 2 3 4 5 6
YVOH180VPEMBQ JVOH180VPEMBQ RAS-18VNMBQ	ON 1 2 3 4 5 6
YVOH200VPEMBQ JVOH200VPEMBQ RAS-20VNMBQ	ON 1 2 3 4 5 6
YVOH220VPEMBQ JVOH220VPEMBQ RAS-22VNMBQ	ON 1 2 3 4 5 6
YVOH240VPEMBQ JVOH240VPEMBQ RAS-24VNMBQ	ON 1 2 3 4 5 6

DSW10 (Used for transmission)

Factory setting	ON 1 2
No setting for terminal resistance	ON 1 2

SW1 (Driver DIP)

#1 driver (Left driver)	ON 1 2 3 4 5 6
#2 driver (Right driver)	ON 1 2 3 4 5 6

DSW3 (Other function setting)

Domestic (China)	ON 1 2 3 4

DSW4 (Test run / Service setting)

Factory setting	ON 1 2 3 4 5 6
Cooling test run	ON 1 2 3 4 5 6
Heating test run	ON 1 2 3 4 5 6
Reverse phase overcurrent detection release	ON 1 2 3 4 5 6
Forced stop of compressor	ON 1 2 3 4 5 6

DSW8 (Unit function setting)

Factory setting	ON 1 2 3
High ESP setting (30Pa)	ON 1 2 3
High ESP setting (60Pa)	ON 1 2 3
High ESP setting (80Pa)	ON 1 2 3
Forced available of LO type signal	ON 1 2 3

DSW5 (Emergency operation setting)

Factory setting	ON 1 2 3 4 5 6
INV Except #1 compressor	ON 1 2 3 4 5 6
INV Except #2 compressor	ON 1 2 3 4 5 6

DSW6 (Outdoor unit setting)

Factory setting	ON 1 2 3 4
Main unit	ON 1 2 3 4
#1 Auxiliary-unit	ON 1 2 3 4
#2 Auxiliary-unit	ON 1 2 3 4
#3 Auxiliary-unit	ON 1 2 3 4

DSW7 (Voltage setting)

Factory setting	ON 1 2 3 4
380 Voltage	ON 1 2 3 4
400 Voltage	ON 1 2 3 4
415 Voltage	ON 1 2 3 4

Sheet 1 of 1	Label drawing	H7C05992

11. Miscellaneous Notes

Special Notes

1. Provide a service access door near the unit piping connection part on the false ceiling for the cassette type units.
2. Consider the air distribution from the unit to the space of the room, and select a suitable location so that uniform air temperature in the room can be obtained.
   Cassette and Ceiling Types - Avoid unit installation in a room where the ceiling height (distance between the floor to the false ceiling) exceeds three meters. If the indoor unit is installed in a room with a ceiling more than three meters in height, it is recommended that an air circulation fan be installed separately to obtain uniform air temperature in the room, especially during the heating operation.
3. Check to ensure that the ceiling slab is strong enough and that the false ceiling is flat and level.
4. Avoid obstacles which may restrict the air intake or the discharge flow.
5. Do not install the unit in a machinery shop or kitchen where vapor from oil or its mist can enter the unit.
   The oil will deposit on the heat exchanger, which may reduce the unit performance, cause deformation, and in the worst case, break the plastic parts of the unit.
6. Pay attention to the following points when the unit is installed in a hospital or other facilities where electromagnetic wave is radiated from medical equipment.
   (A) Do not install the unit where the electromagnetic wave is directly radiated to the electrical box, remote control cable or remote control switch.
   (B) Install the unit and components as far from an electromagnetic wave radiator (at least three meters) as possible.
   (C) Prepare a steel box and install the remote control switch in it. Prepare a steel conduit pipe and wire the remote control cable in it. And then, connect earth wire with the box and the pipe.
   (D) Install a noise filter when the power supply emits harmful noise.
7. Do not install the units in an acid or alkaline environment, as the heat exchanger will be damaged by corrosive action. In the case that outdoor units are installed near the sea, it is recommended that optional corrosion-resistant-type outdoor unit be used.
8. Do not install the units in a flammable environment, as there is a danger of an explosion.
9. Regarding cassette type indoor units, consider the direct and reflected sound level, when selecting the unit for spaces where extremely low sound is required.
10. During heating operation, the outdoor heat exchanger produces dew condensation or melted frost water.
    Install the outdoor unit where such water can be drained, or provide a drain passage.
11. Heating Performance: The heating capacity normally decreases when outdoor temperatures decrease. Therefore, provide an auxiliary heating unit if outdoor temperatures are very low.
12. In the case that an outdoor temperature is low and humidity is high, the outdoor heat exchanger will be covered with frost, resulting in lower heating capacity. In order to remove the frost, the unit operation mode automatically changes to the defrosting mode. During this defrosting operation, the unit stops for approximately 3 to 10 minutes.
13. As this unit is heat pump type by circulating hot air in the whole room space, it takes some time to raise the room temperature.
14. The operating sound data is based on an anechoic chamber. Therefore, the actual operating sound will be higher due to reflected sound from the floor and wall.
15. In the case that the unit is operated for a long time at an indoor temperature of over 27°C DB, or at an indoor humidity of over 80%, dew condensation may occur on the cabinets, resulting in dew drops.
    If dew condensation occurs, it is required to add thermal insulator on the cabinets.
16. Provide snow-protection hoods to prevent snow from clogging the outdoor heat exchanger.
    If the unit is operated in an area where it snows heavily, provide a base under the outdoor unit, which should be 50cm higher than the presumable maximum snow height.
17. It is recommended that periodical service and maintenance be performed by authorized service engineers before air conditioning seasons, in order to avoid performance decrease due to dust or dirt.
18. This heat pump air conditioner has been designed for normal air conditioning for men. Do not use the product for other purposes such as for food, animals, plants, high precision machines or work of art. Also do not use the product for vehicles or vessels. It will results in water leakage or electrical leakage.
19. It is recommended that the system be installed by authorized engineers. If not, it may cause water leakage, electric shock or fire.
20. In a place where fibers or dusts are floating, the air filter or heat exchangers or the drain pipe may be clogged, resulting in water leakage from the drain pan.

12. Standard Specifications

UNIT - The unit shall be a multi-split system inverter-driven heat pump air conditioner for application with R410A refrigerants, and shall be composed of 4-way cassette type indoor units, or in-the-ceiling type indoor units, 2-way cassette type indoor units, ceiling type indoor units, wall type indoor units, floor type indoor units and an outdoor unit, with a distributed refrigeration cycle, electrical components and enclosing cabinets. Optional accessories shall also be provided upon customer request. The indoor unit shall be constructed for installation, and the outdoor unit shall be completely weather-proofed for outdoor installation. Both indoor unit and the outdoor unit shall be properly assembled, internally piped and wired, throughly tested, and charged with R410A refrigerant at the factory and shall comply with Japanese Industrial Standards and other Japanese standardization statues.

CAPACITY - The total capacity of the multi-split system inverter-driven heat pump air conditioner shall be _____kW or greater with _____°C air inlet dry bulb, _____°C air inlet wet bulb, _____°C outdoor air inlet temperature and _____m^3/min. indoor air flow. The total compressor power inputs shall not exceed _____kW. The total heating capacity of the split-type air conditioners shall be _____kW or greater, with _____°C indoor heat exchanger air inlet dry bulb, _____°C outdoor heat exchanger air inlet dry bulb, _____°C outdoor heat exchanger air inlet wet bulb, and _____m^3/min. indoor air flow.
The total compressor power input shall not exceed _____kW.

OUTDOOR UNIT

CABINET - The cabinet shall be constructed of galvanized steel sheet, baked with synthetic resin paint. The service panel shall be easily removable for service access to the electrical components and the compressor section.

REFRIGERATION CYCLE - Each refrigeration cycle shall be equipped with (a) scroll compressor(s), a solenoid valve, a heat exchanger, an accumulator, a 4-Way valve and flare connection parts.

COMPRESSOR PROTECTION - The compressor shall be protected against breakdown by a quick response overcurrent relay, a high pressure switch, a wrap-around type oil heater and a discharge gas thermistor.

OUTDOOR FAN AND FAN MOTOR - The outdoor fan(s) shall be the plastic propeller type, dynamically balanced, and the fan shall be directly driven by a _____W motor for vertical-flow air discharge. The fan motor shall be permanently lubricated and be protected from ingress of water.

OUTDOOR HEAT EXCHANGER - The heat exchanger shall be the multi-pass, cross-finned tube type, equipped with highly-efficient aluminum fins, mechanically bonded to oxygen-free copper tubes. The coil shall be cleaned, dehydrated and tested for leakage at the factory.

CONTROL - All electrical control devices, shall be enclosed in the indoor and outdoor units.

In addition to the compressor protection devices, the indoor fan motor shall be equipped with an internal thermostat. The outdoor fan motor shall be protected by an internal thermostat. The indoor fan motor shall be directly supplied with the power source from the control circuit. The functions of these control devices shall compose an electrical sequence of manual starting and stopping, automatic continuous operation whenever the room thermostat requires, and the protection devices allow the operation.

CABINET - The cabinet shall be constructed of galvanized steel sheet.

REFRIGERATION CYCLE - The refrigeration cycle shall be equipped with solenoid valves and flare connections to changeover the cycle in mediating between outdoor unit and indoor unit.

13. Caution for Refrigerant Leakage

The room where the packaged air conditioner is installed, the refrigerant gas should be controlled not to exceed the limit concentration in case of the refrigerant leakage.

The refrigerant R410A of incombustible and non-toxic is adopted with this unit. If by any chance the refrigerant gas is leaked and filled in the room, the possibility of suffocation may occur.

Especially for the RASHNBCMQ series, the outdoor unit is multi-type air conditioner by connecting multiple indoor units with long distance piping. Accordingly, the refrigerant charging quantity is larger than general individual unit. Before the indoor unit installation, confirm that the room can keep the lower gas concentration than the limit value in order to take the emergency countermeasures even if the gas leakage is occurred.

- Calculation of Refrigerant Concentration

  (1) Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of rooms to be air-conditioned.

  (2) Calculate the room Volume V (m^3) of each room.

  (3) Calculate the refrigerant concentration C (kg/m^3) of the room according to the following equation.

$$\frac{\text{R: Total Quantity of Charged Refrigerant (kg)}}{\text{V: Room Volume (m}^3\text{)}} = \text{C: Refrigerant Concentration} \leq 0.42 \text{ (kg/ m}^3\text{) for R410A}$$

⚠WARNING

The refrigerant R410A is non-toxic and inflammable in its original state.

However, in consideration of a state where the refrigerant leaks into the room, measures against refrigerant leaks must be taken in small rooms where the tolerable level could be exceeded. Take counter measures by installing ventilation devices, etc.