TECHNICAL CATALOGUE

HITACHI

VRF AIR-CONDITIONER
(HEAT RECOVERY)

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

Technical Catalogue for Outdoor Unit

Technical Catalogue



Models

< Outdoor Units >

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

TCY12025006A

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 air conditioner is designed for standard air conditioning only. Do not use this 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.
- No part of this manual may be reproduced without written permission.
- It is assumed that this 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 air conditioner which you operate as well for other models.

- This air conditioner has been designed for the following temperatures. Operate the air conditioner within this range.

Temperature (°C)

		Maximum	Minimum
Cooling Operation	Indoor	23 WB	15 WB
	Outdoor	55 DB (*)	-10 DB
Heating Operation	Indoor	27 DB	15 DB
	Outdoor	24 WB	-25 WB

DB: Dry Bulb, WB: Wet Bulb

(*) NOTES:

1. Cooling operation at maximum 55°C DB (48°C~55°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 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.

- TABLE OF CONTENTS -

< Technical Data >

1. Features 1
2. General Data 21
3. Component Data 33
4. Dimensional Data 42
5. Selection Data 49
   5.1 Capacity Characteristic Curve 49
   5.2 Correction Factor According to Piping Length 53
   5.3 Correction Factor According to Defrosting Operation 55
6. Electrical Data 56
7. Sound Data 57
8. Working Range 59
9. Piping System 61
   9.1. Connection of Refrigerant Pipes for 3 Pipes Heat Recovery System 61
   9.2. Connection of Refrigerant Pipes for 2 Pipes Heat Pump System 68
   9.3. Pipe Connection Design Guidance for 3 Pipes Heat Recovery System 74
   9.4. Pipe Connection Design Guidance for 2 Pipes Heat Pump System 77
   9.5. Piping Connection Kit Dimensions (optional) 80
10. Control System 84
   10.1 Refrigeration Cycle 84
   10.2 Control System 88
   10.3 Standard Operation Sequence 99
   10.4 Safety and Control Device Setting 114
11. Miscellaneous Notes 118
12. Standard Specifications 119
13. Caution for Refrigerant Leakage 120

< SERVICE >

1. Troubleshooting 122
   1.1 Initial Troubleshooting 122
   1.2 Troubleshooting Procedure 164
   1.3 Test Run 232
2. Servicing 240
   2.1 Removing Front Service Cover 240
   2.2 Attaching Front Service Cover 242
   2.3 Removing Upper Cover 243
   2.4 Removing Electrical Box Cover 246
   2.5 Removing Electrical Box 248
   2.6 Removing Air Grille 253
   2.7 Removing Outdoor Fan 254
   2.8 Removing Compressor 258
   2.9 Removing Thermistor for Liquid Pipe 268
   2.10 Removing Thermistor for Ambient Temperature 269
   2.11 Removing other electrical components 270
3. Main Parts 282
   3.1 Outdoor Unit PCB (PCB3: PO034H) 282
   3.2 Inverter (INV1, INV2: PV164) 283
   3.3 Scroll Compressor 294
   3.4 Fan Motor 297
   3.5 Thermistor 298

3.6 Electronic Expansion Valve (MV, MVB) 300
3.7 Pressure Sensor (Pd) 302
3.8 High Pressure Protection Device 303
3.9 Noise Filter (NF1, NF2) 304
3.10 Reactor (DCL1, DCL2) 305
4. Optional Function 306
4.1 Setting Method 306
4.2 External Input and Output Setting 307
4.3 Function Setting 316
5. Field Work Instruction 330
5.1 Caution for Refrigerant Leakage 330
5.2 Maintenance Work 331
5.3 Service and Maintenance Record by 7-Segment Display 332
5.4 Service and Maintenance Record by Remote Control Switch 333
5.5 Service and Maintenance Record 335
5.6 Saturation Curve for Refrigerant 336
5.7 Mollier Chart for R410A 337

APPENDIX
INSTALLATION

Technical Data

1. Features

New RNBCLQ Series VRF Air Conditioning System

HITACHI proudly introduces the New RNBCLQ 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, RNBCLQ 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.

■ **RNBCLQ 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.

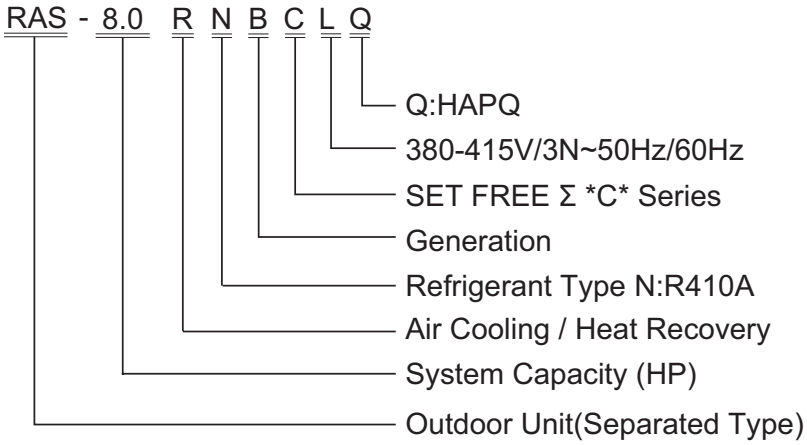
This system provides the end user with greater flexibility for installation, which means that the air-conditioning systems will integrate better with the whole of the installations that make up the building.

■ **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 RNBCLQ 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 “RNBCLQ” can build the capacity from 26 to 96HP by combining maximum 4 outdoor units from 8 to 24HP.



<Base Module>

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

<Combination Module> ※

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

※: 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 - 12RNBCLQ (8 - 12HP)	RAS-14 - 18RNBCLQ (14 - 18HP)	RAS-20 - 24RNBCLQ (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 - 28RNBCLQ (26 - 28HP)	RAS-30 - 34RNBCLQ (30 - 34HP)	RAS-36 - 42RNBCLQ (36 - 42HP)







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







FEATURES

RAS-60- 66RNBCLQ (60 - 66HP)



RAS-68 - 72RNBCLQ (68 - 72HP)



RAS-74RNBCLQ (74HP)



RAS-76 - 78RNBCLQ (76 - 78HP)

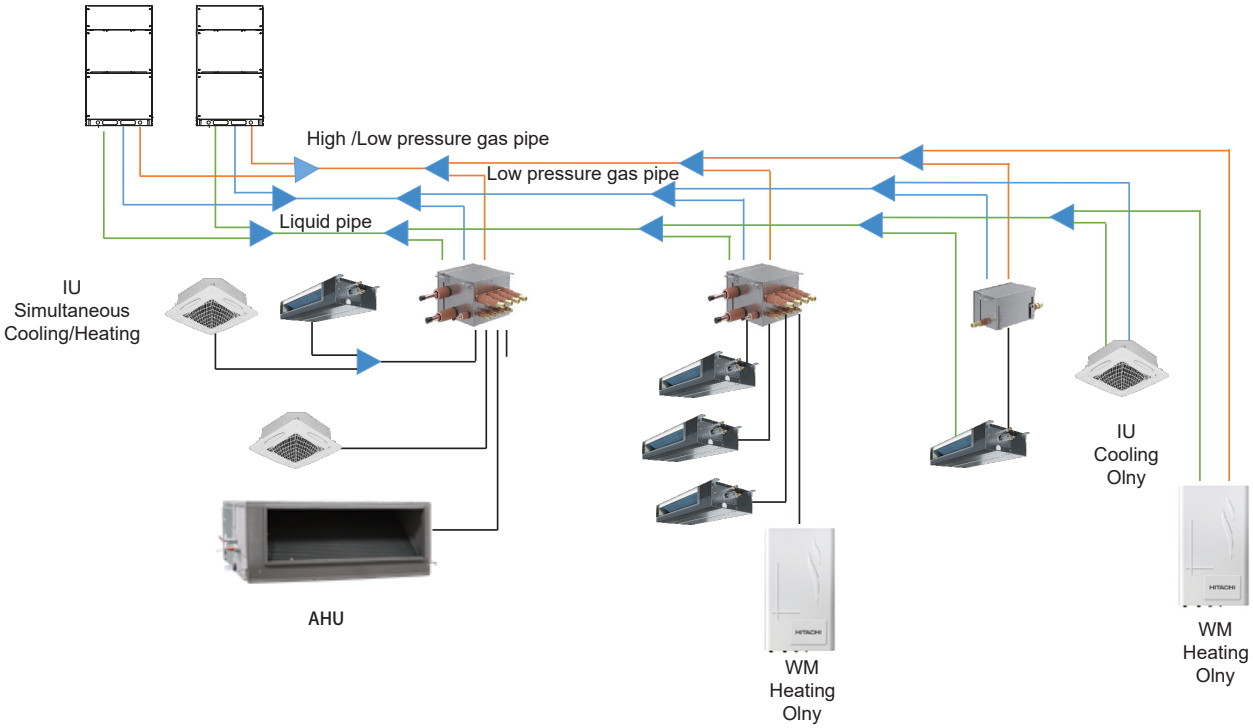


RAS-80 - 96RNBCLQ (80 - 96HP)



■ Application Case

Application Case 1: Three Pipes Heat Recovery System with Switch Box.



Capacity Ratio

Total Capacity Ratio	Indoor Unit	Indoor Unit Without SW Box(Cooling Only)	Water Module
50%~200%	50%~150%	0~50%	0~100%

NOTE :

(1) The function setting of “H4” must be set to 0 on the outdoor unit PCB.

(2) The function setting of “n3” must be set to correct value equal to the quantity of water module connectedon the outdoor unit PCB.

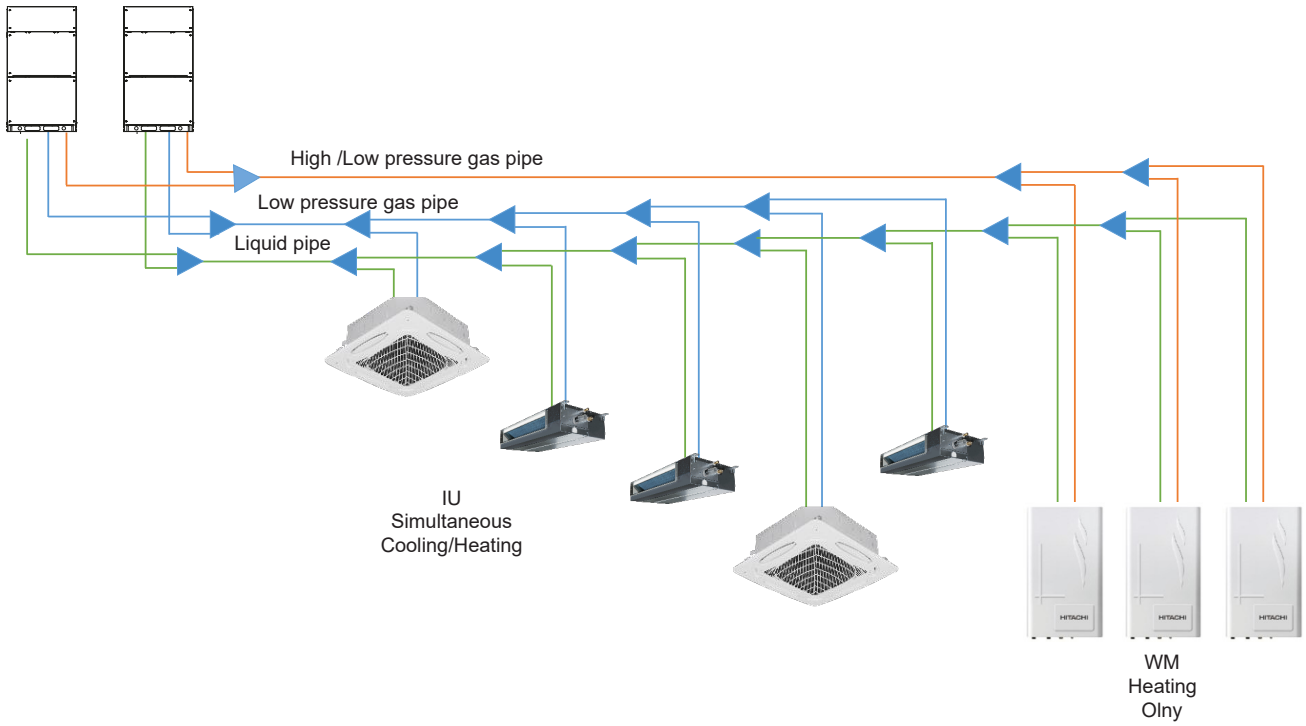
(3) WM with simultaneous cooling/heating must occupy one branch of SW Box exclusively.

(4) When switched off, the WM will automatically switch to the high-pressure state.

(5) After switched off, do not force the water flow of the water module.

(6) The DSW7-4 of the WM must be set to ON.

Application Case 2: Three Pipes Heat Recovery System without Switch Box.



Capacity Ratio

Total Capacity Ratio	Indoor Unit	Water Module	Capacity Ratio of Indoor Unit to Water Module
100%~200%	50%~100%	50~100%	80%~130%

NOTE :

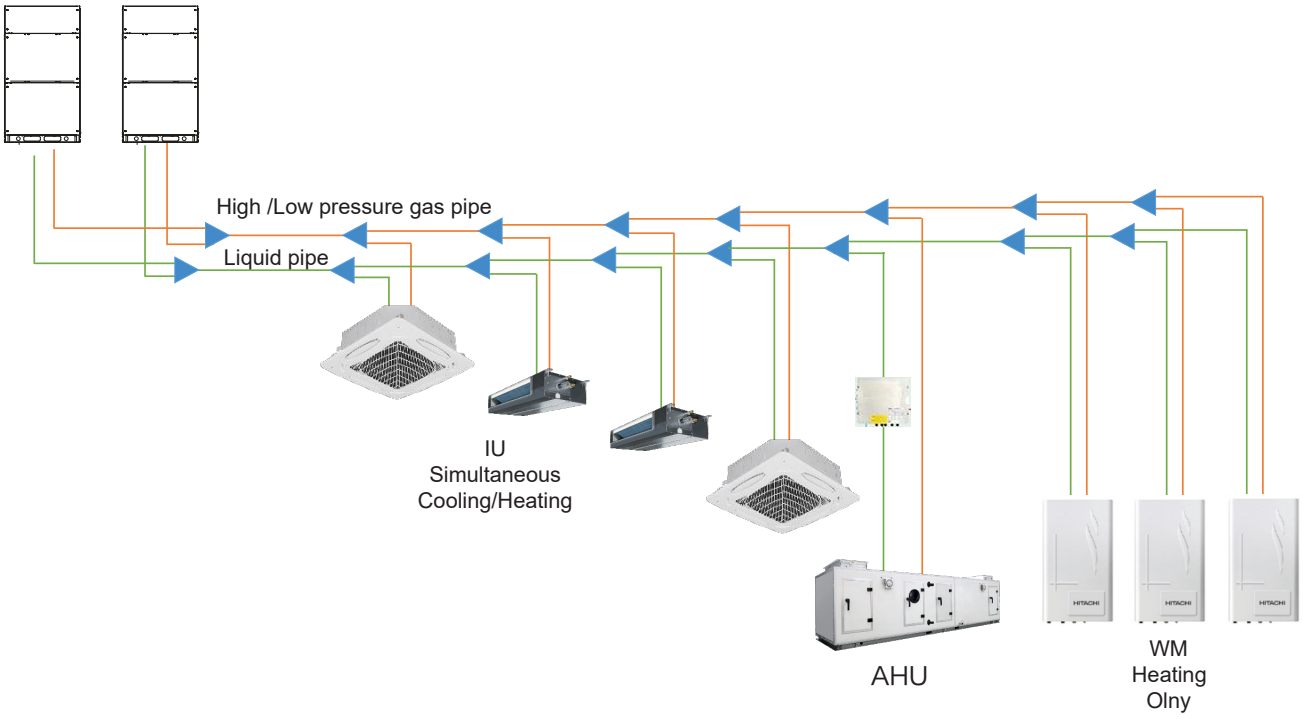
(1) The function setting of “H4” must be set to 0 on the outdoor unit PCB.

(2) The function setting of “n3” must be set to correct value equal to the quantity of water module connectedon the outdoor unit PCB.

(3) After switched off, do not force the water flow of the water module.

(4) The DSW7-4 of the WM must be set to ON.

Application Case 3: Two Pipes Heat Pump System.



Capacity Ratio

Total Capacity Ratio	Indoor Unit	Water Module
50%~200%	50%~150%	0~100%

NOTE :

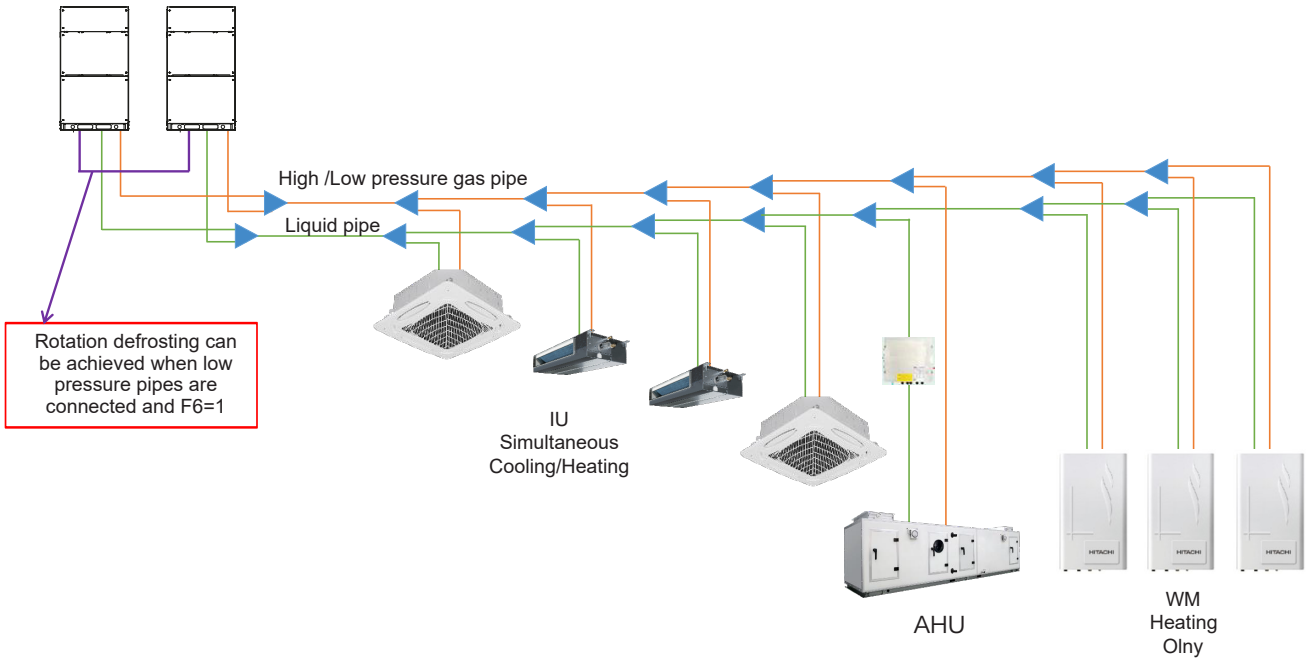
(1) The function setting of “H4” must be set to 2 on the outdoor unit PCB.

(2) The function setting of “n3” must be set to correct value equal to the quantity of water module connectedon the outdoor unit PCB.

(3) After switched off, do not force the water flow of the water module.

(4) The DSW7-4 of the WM must be set to OFF.

Application Case 4: Two Pipes Heat Pump System Rotation defrosting can be achieved.



Capacity Ratio

Total Capacity Ratio	Indoor Unit	Water Module
50%~200%	50%~150%	0~100%

NOTE :

(1) The function setting of “H4” must be set to 2 on the outdoor unit PCB.

(2) The function setting of “n3” must be set to correct value equal to the quantity of water module connectedon the outdoor unit PCB.

(3) After switched off, do not force the water flow of the water module.

(4) The DSW7-4 of the WM must be set to OFF.

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

- The number of indoor units connectable to RNBCLQ 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 150% for RNBCLQ and a minimum total capacity of 50% against the nominal outdoor unit capacity can be obtained by combination of the indoor units.

< RNBCLQ>

Outdoor Unit (HP)	Minimum Unit Operating Capacity (100W)	Maximum Quantity of Indoor Units That Can be Connected	Recommended Number of Indoor Units	Combined Capacity	Max. Number of Connectable Water Modules for Application Case 1 and Case 3	Max. Number of Connectable Water Modules for Application Case 2
8	22	13	8	50%~150%	1	3
10		16	10		2	3
12		19	10		2	4
14		23	16		3	5
16		26	16		3	6
18		26	16		4	7
20		33	18		4	7
22		36	20		5	8
24		40	26		5	9
26		43	26		6	10
28		47	32		6	11
30		50	32		7	11
32		53	32		7	12
34		56	32		8	12
36		59	32		8	12
38		64	38		9	12
40		64	38		9	12
42		64	38		10	12
44		64	38		10	12
46		64	38		11	12
48		64	38		12	12
50		64	38		12	12
52		64	38		12	12
54		64	38		12	12
56		64	38		12	12
58		64	38		12	12
60		64	38		12	12
62		64	38		12	12
64		64	38		12	12
66		64	38		12	12
68		64	38		12	12
70		64	38		12	12
72		64	38		12	12
74		64	38		12	12
76		64	38		12	12
78		64	38		12	12
80		64	38		12	12
82		64	38		12	12
84		64	38		12	12
86		64	38		12	12
88		64	38		12	12
90		64	38		12	12
92		64	38		12	12
94		64	38		12	12
96		64	38		12	12

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 150% 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 150%, 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.

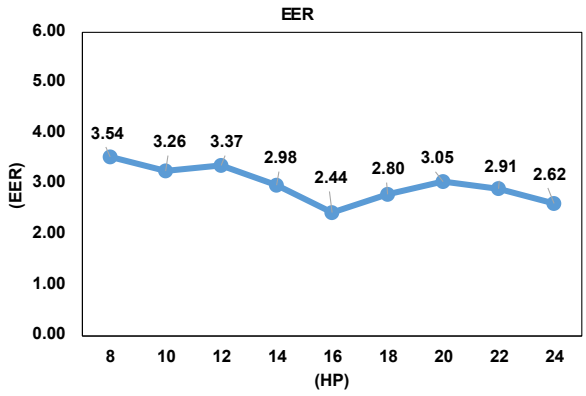
The load capacity per hour or the possibility of all indoor units simultaneous operation is unknown at the design stage, the total capacity of combined indoor units should be not over 100% against the outdoor unit capacity.

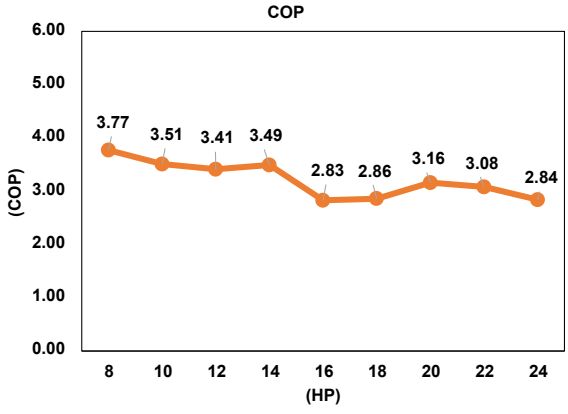
High Efficiency and Energy Saving

(1) High EER / COP Design

The new RNBCLQ 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))	6.33	8.59	9.94	13.42	18.44	17.86	18.36	21.13	25.95	27.03	28.38	31.87	36.89
	EER	3.54	3.26	3.37	2.98	2.44	2.80	3.05	2.91	2.62	2.70	2.77	2.67	2.44
Heating	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)	5.94	7.98	9.8	11.5	15.9	17.5	17.7	20.0	23.9	23.9	25.7	27.36	31.80
	COP	3.77	3.51	3.41	3.49	2.83	2.86	3.16	3.08	2.84	3.06	3.05	3.11	2.83

	HP	34	36	38	40	42	44	46	48	50	52	54	56	58
Cooling	Capacity (KW)	95.0	101.0	106.5	112.0	117.5	123.0	129.5	136.0	140.0	146.0	151.5	158.0	163.0
	Power Input(KW)	36.30	36.80	39.58	36.72	39.49	42.27	47.09	51.91	54.74	55.25	58.02	62.84	62.25
	EER	2.62	2.74	2.69	3.05	2.98	2.91	2.75	2.62	2.56	2.64	2.61	2.51	2.62
Heating	Capacity (KW)	95.0	101.0	106.5	112.0	117.5	123.0	129.5	136.0	140.0	146.0	151.5	158.0	163.0
	Power Input(KW)	33.38	33.62	35.87	35.44	37.69	39.94	43.91	47.89	49.28	49.52	51.77	55.75	57.33
	COP	2.85	3.00	2.97	3.16	3.12	3.08	2.95	2.84	2.84	2.95	2.93	2.83	2.84

	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)	62.76	65.53	70.35	69.77	70.27	73.04	77.86	80.70	81.20	83.97	73.44	76.22	81.04
	EER	2.69	2.66	2.57	2.67	2.73	2.70	2.62	2.58	2.64	2.61	3.05	3.01	2.91
Heating	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)	57.57	59.81	63.79	65.37	65.61	67.85	71.83	73.23	73.47	75.71	70.89	73.13	77.11
	COP	2.94	2.92	2.84	2.85	2.93	2.91	2.84	2.84	2.91	2.90	3.16	3.14	3.06

	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)	83.81	88.63	91.40	96.22	99.00	103.8
	EER	2.88	2.80	2.77	2.70	2.68	2.62
Heating	Capacity (KW)	241.5	248.0	253.5	260.0	265.5	272.0
	Power Input(KW)	79.35	83.3	85.58	89.55	91.80	95.77
	COP	3.04	2.98	2.96	2.90	2.89	2.84

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

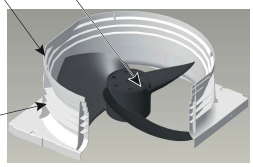
<Long Bell-mouth Structure>

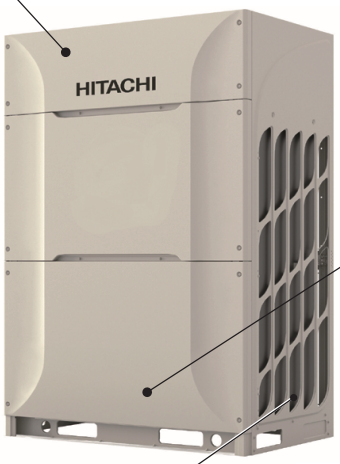
Create smooth air flow and reduce fan input by adopting multi-stage enhanced structure.

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.



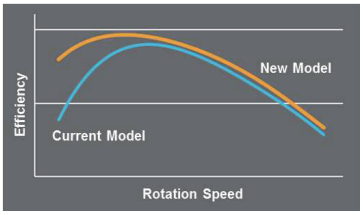


Compressor

<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

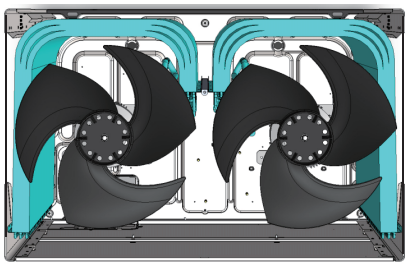
Efficiency of Compressor (image)



Heat Exchanger

<Σ Shape Heat Exchanger>

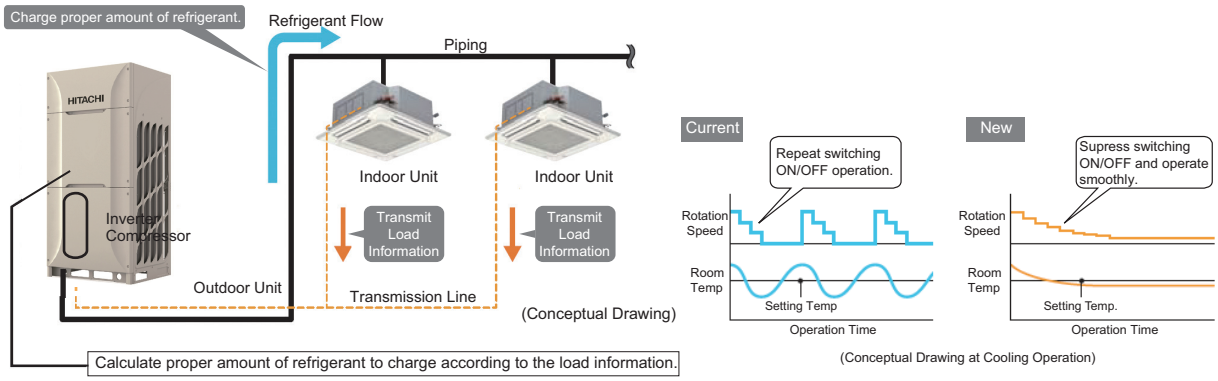
(≥14HP)
Adopt two fan structure for improve efficiency at low load operation. Adopt Σ shape heat exchanger to maximize the effect of the two fan structure for better energy saving.



Operation Control

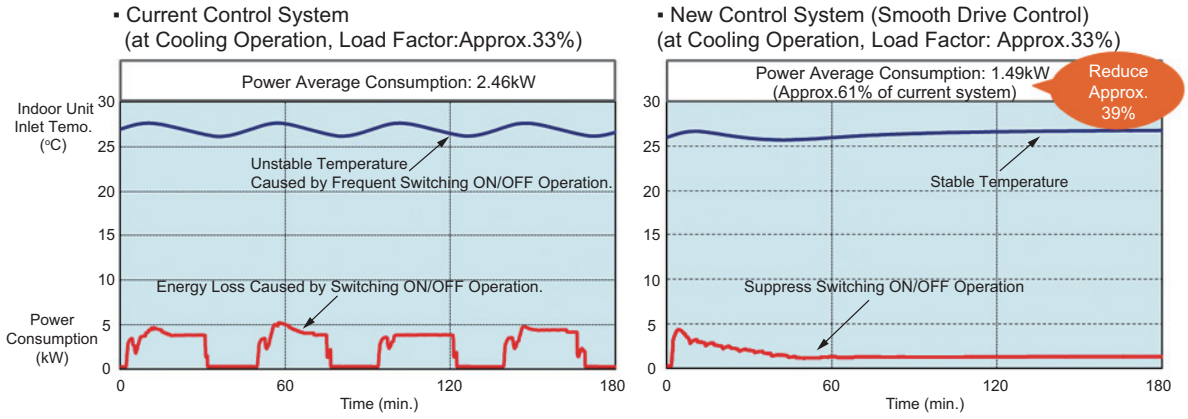
- Smooth Drive Control System:
  Calculate the amount of refrigerant to charge based on the load information from the indoor units. Control inverter compressor rotation speed and charge proper amount of refrigerant to indoor unit at each loading condition. Suppress compressor switching ON/OFF at low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

● Concept of Smooth Drive Control



- Verification Result of Energy Saving Effect from Smooth Drive Control

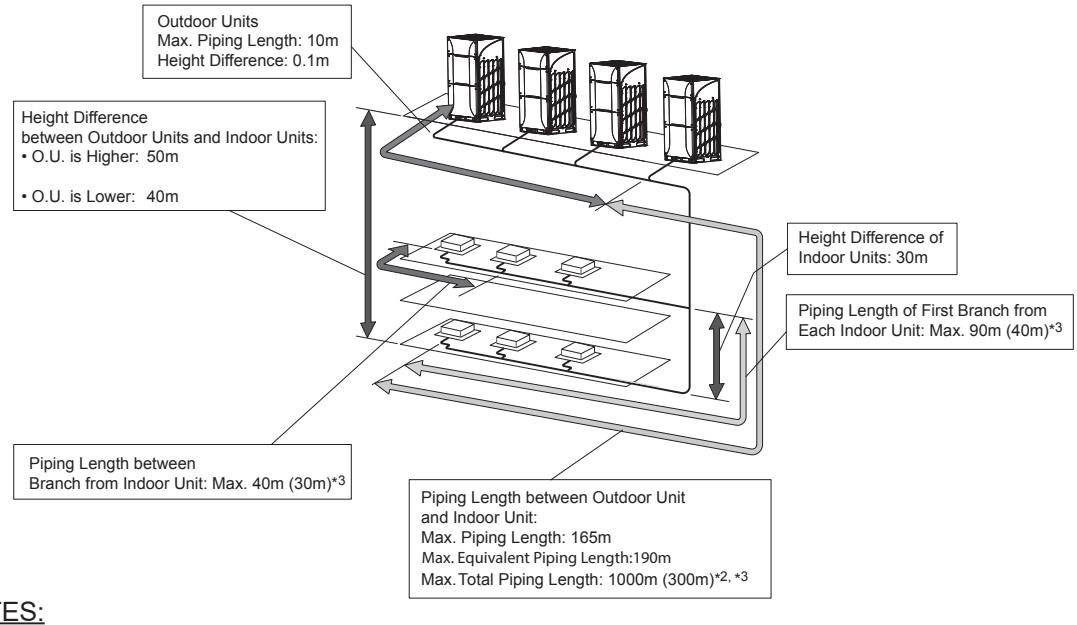
  The verification result of energy saving effect at part load testing chamber is shown below. The “Smooth Drive Control System” suppress the compressor switching ON/OFF operation and keep room temperature stable. The reduction of power consumption has been verified.



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
		RNBCLQ
Height Difference between Outdoor Units and Indoor Units	Outdoor Unit is Higher	≤50m
	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, 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

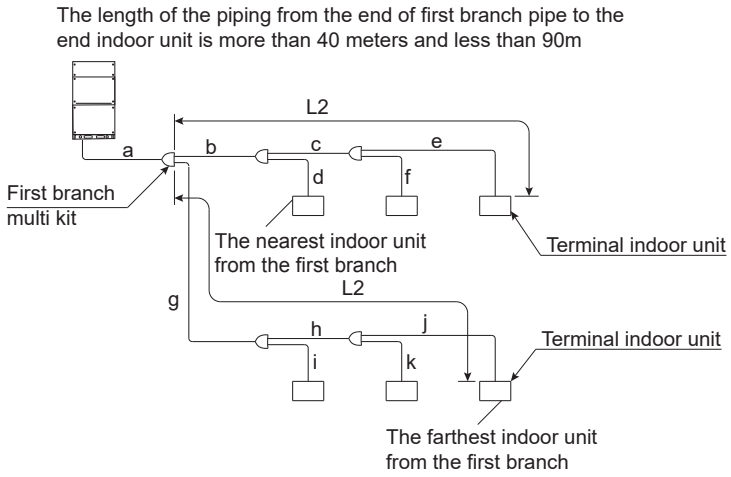
If the length of the pipe from the first branch pipe to the farthest indoor unit is more than 40m, follow the following conditions during installation:

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.

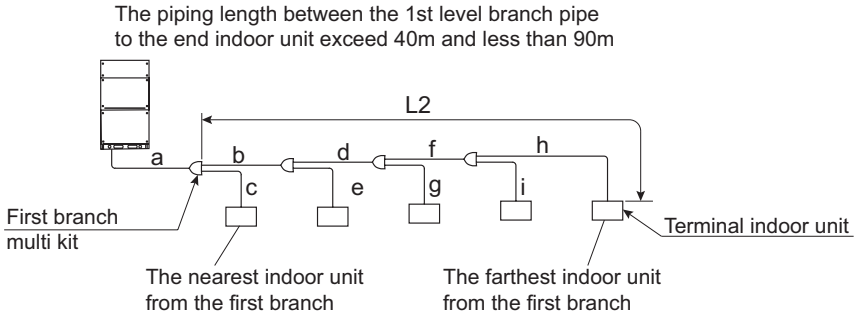
(2) Piping length difference between piping from farthest indoor unit to the first branch and piping from nearest indoor unit to the first branch pipe should be less than 40m.
(g + h + j) - (b + d)≤ 40m.



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.

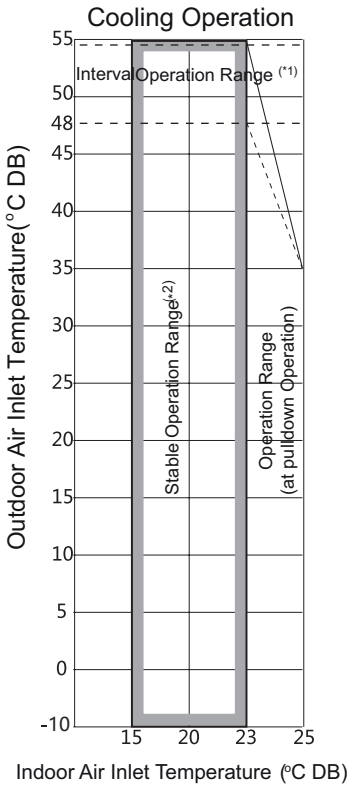


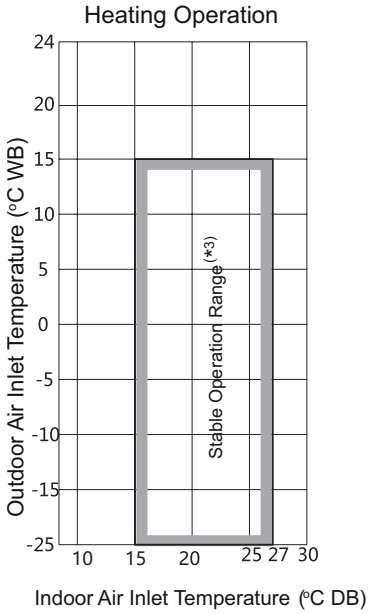
Notes:

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 150% 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 150%, please refer to the Technical Bulletin for details.

Wide Operation Range

This unit has been designed for cooling operation under low ambient temperatures down to -10°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 -25°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	-10 to 55°C DB (*1)	-25 to 24°C WB

Notes:

*1. (1) Cooling operation at maximum 55°C DB (48°C~55°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.

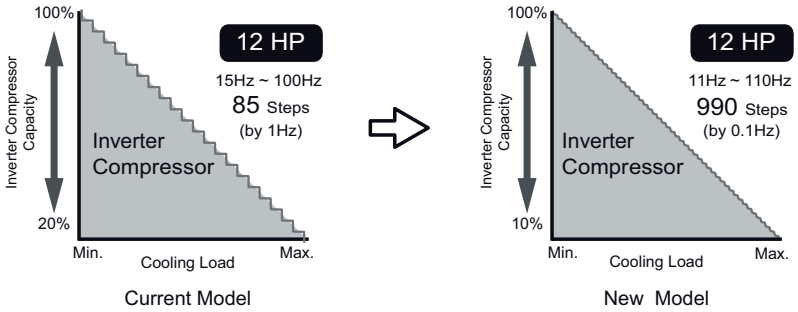
*3. There might be the possibility of thermo-OFF when heating load is low and outdoor air inlet temperature is high (higher than 15°C DB) to prevent the outdoor unit. The outdoor unit operation stops when outdoor air inlet temperature exceeds 26°C DB.

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.

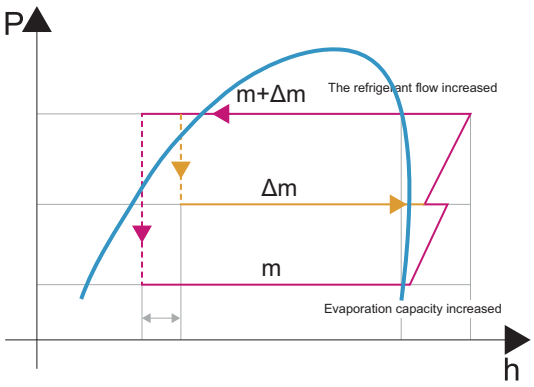
Other Advance Technologies

- 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.



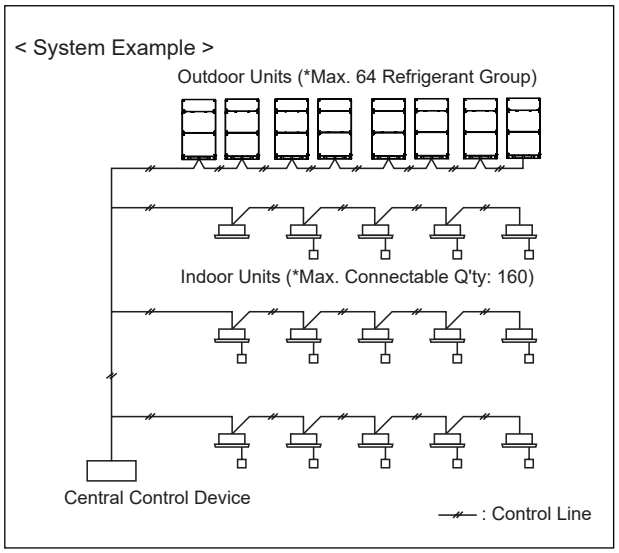
- EVI (Enhanced Vapor Injection) Technology
  - To increase about 20% capacity at low ambient heating compared to without EVI function;
  - To improve EER/COP at rated running conditions;



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 RNBCLQ 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

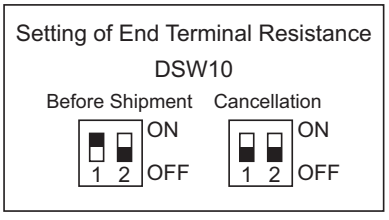
The H-LINK II wiring system requires only two transmission wires to connect each indoor unit and outdoor unit for up to 64 refrigerant cycles, and to connect wires for all indoor units and outdoor units.

<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

Capacity				8HP	10HP	12HP	14HP
Model				RAS-8.0RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ	RAS-14RNBCLQ
Combination				RAS-8.0RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ	RAS-14RNBCLQ
				/	/	/	/
				/	/	/	/
				/	/	/	/
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	22.4	28.0	33.5	40.0
			Btu/h	76400	95500	114300	136500
	Power Consumption		kW	6.33	8.59	9.94	13.42
	EER		W/W	3.54	3.26	3.37	2.98
	SEER		—	6.87	6.75	6.20	5.73
Heating Operation	Nominal Capacity		kW	22.4	28.0	33.5	40.0
			Btu/h	76400	95500	114300	136500
	Power Consumption		kW	5.94	7.98	9.82	11.46
	COP		W/W	3.77	3.51	3.41	3.49
	SCOP		—	3.85	4.10	4.17	4.18
Sound Power			dB(A)	84	86	87	89
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	958	958	958	1218
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1020	1020	1020	1280
	Depth		mm	841	841	841	841
Net Weight			kg	225	226	245	310
Gross Weight			kg	242	243	262	328
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	AA50PHDG	AA50PHDG	DC80PHDG	DC80PHDG
	Compressor Quantity		—	1	1	1	1
	Compressor Motor Output		kW	4.10	6.20	7.40	9.30
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	1.1	1.1	1.1	1.1
		Charge(Total)	L	6.0	6.0	6.0	6.9
	Refrigerant Charge Before Shipment		kg	5.0	5.0	7.2	8.9
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ9.53	Φ9.53	Φ12.70	Φ12.70
	High/Low Pressure Gas Pipe		mm	Φ15.88	Φ19.05	Φ22.2	Φ22.2
	Low Pressure Gas Pipe		mm	Φ19.05	Φ22.2	Φ25.4	Φ25.4
Fan	Condenser Fan Quantity		—	1	1	1	1
	Air Flow Rate		m^3/min	225	225	275	275
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

※1.The above noise values are measured in the anechoic chamber without refiected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

GENERAL DATA

Capacity				16HP	18HP	20HP	22HP
Model				RAS-16RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ
Combination				RAS-16RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ
				/	/	/	/
				/	/	/	/
				/	/	/	/
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	45.0	50.0	56.0	61.5
			Btu/h	153500	170600	191000	209800
	Power Consumption		kW	18.44	17.86	18.36	21.13
	EER		W/W	2.44	2.80	3.05	2.91
	SEER		—	5.71	5.97	6.28	5.51
Heating Operation	Nominal Capacity		kW	45.0	50.0	56.0	61.5
			Btu/h	153500	170600	191000	209800
	Power Consumption		kW	15.90	17.48	17.72	19.97
	COP		W/W	2.83	2.86	3.16	3.08
	SCOP		—	4.00	3.94	3.91	4.12
Sound Power			dB(A)	90	90	91	91
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1218	1218	1608	1608
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1280	1280	1680	1680
	Depth		mm	841	841	841	841
Net Weight			kg	311	357	403	421
Gross Weight			kg	329	376	427	445
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	DC80PHDG	AA50PHDG+ AA50PHDG	AA50PHDG+ AA50PHDG	DC80PHDG+ DC80PHDG
	Compressor Quantity		—	1	2	2	2
	Compressor Motor Output		kW	10.80	6.4×2	6.5×2	7.5×2
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	1.1	2.2	2.2	2.2
		Charge(Total)	L	6.9	7.9	8.4	8.4
	Refrigerant Charge Before Shipment		kg	9.9	10.7	11.3	11.3
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ12.70	Φ15.88	Φ15.88	Φ15.88
	High/Low Pressure Gas Pipe		mm	Φ22.2	Φ22.2	Φ22.2	Φ25.4
	Low Pressure Gas Pipe		mm	Φ28.58	Φ28.58	Φ28.58	Φ28.58
Fan	Condenser Fan Quantity		—	2	2	2	2
	Air Flow Rate		m^3/min	256	256	329	329
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

Piping Length: 7.5 meters, Piping Lift: 0 meter

※1.The above noise values are measured in the anechoic chamber without refiected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

Capacity				24HP	26HP	28HP	30HP
Model				RAS-24RNBCLQ	RAS-26RNBCLQ	RAS-28RNBCLQ	RAS-30RNBCLQ
Combination				RAS-24RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ	RAS-14RNBCLQ
				/	RAS-16RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ
				/	/	/	/
				/	/	/	/
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	68.0	73.0	78.5	85.0
			Btu/h	232000	249076	267800	290000
	Power Consumption		kW	25.95	27.03	28.38	31.87
	EER		W/W	2.62	2.70	2.77	2.67
	SEER		—	5.35	-	-	-
Heating Operation	Nominal Capacity		kW	68.0	73.0	78.5	85.0
			Btu/h	232000	249076	267800	290000
	Power Consumption		kW	23.94	23.88	25.73	27.36
	COP		W/W	2.84	3.06	3.05	3.11
	SCOP		—	4.39	-	-	-
Sound Power			dB(A)	91	-	-	-
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1608	958+1218	958+1218	1218+1218
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1680	1020+1280	1020+1280	1280+1280
	Depth		mm	841	841	841	841
Net Weight			kg	422	226+311	245+311	310+311
Gross Weight			kg	446	243+329	262+329	328+329
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	DC80PHDG+ DC80PHDG	AA50PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG
	Compressor Quantity		—	2	2	2	2
	Compressor Motor Output		kW	8.6×2	6.2+10.8	7.4+10.8	9.3+10.8
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	2.2	1.1+1.1	1.1+1.1	1.1+1.1
		Charge(Total)	L	8.4	12.9	12.9	13.8
	Refrigerant Charge Before Shipment		kg	12.6	5+9.9	7.2+9.9	8.9+9.9
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ15.88	Φ19.05	Φ19.05	Φ19.05
	High/Low Pressure Gas Pipe		mm	Φ25.4	Φ25.4	Φ28.6	Φ28.6
	Low Pressure Gas Pipe		mm	Φ28.58	Φ31.75	Φ31.75	Φ31.75
Fan	Condenser Fan Quantity		—	2	3	3	4
	Air Flow Rate		m^3/min	348	426	446	495
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

※1.The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

GENERAL DATA

Capacity				32HP	34HP	36HP	38HP
Model				RAS-32RNBCLQ	RAS-34RNBCLQ	RAS-36RNBCLQ	RAS-38RNBCLQ
Combination				RAS-16RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ
				RAS-16RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ
				/	/	/	/
				/	/	/	/
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	90.0	95.0	101.0	106.5
			Btu/h	307000	324140	344612	363300
	Power Consumption		kW	36.89	36.30	36.80	39.58
	EER		W/W	2.44	2.62	2.74	2.69
	SEER		—	-	-	-	-
Heating Operation	Nominal Capacity		kW	90.0	95.0	101.0	106.5
			Btu/h	307000	324140	344612	363300
	Power Consumption		kW	31.80	33.38	33.62	35.87
	COP		W/W	2.83	2.85	3.00	2.97
	SCOP		—	-	-	-	-
Sound Power			dB(A)	-	-	-	-
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1218+1218	1218+1218	1218+1608	1218+1608
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1280+1280	1280+1280	1280+1680	1280+1680
	Depth		mm	841	841	841	841
Net Weight			kg	311+311	311+357	311+403	311+421
Gross Weight			kg	329+329	329+376	329+427	329+445
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	DC80PHDG+ DC80PHDG	DC80PHDG+ AA50PHDG+ AA50PHDG	DC80PHDG+ AA50PHDG+ AA50PHDG	DC80PHDG+ DC80PHDG+ DC80PHDG
	Compressor Quantity		—	2	3	3	3
	Compressor Motor Output		kW	10.8+10.8	10.8+6.4×2	10.8+6.5×2	10.8+7.5×2
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	1.1+1.1	1.1+2.2	1.1+2.2	1.1+2.2
		Charge(Total)	L	13.8	14.8	15.3	15.3
	Refrigerant Charge Before Shipment		kg	9.9+9.9	9.9+10.7	9.9+11.3	9.9+11.3
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ19.05	Φ19.05	Φ19.05	Φ19.05
	High/Low Pressure Gas Pipe		mm	Φ28.6	Φ28.6	Φ28.6	Φ31.75
	Low Pressure Gas Pipe		mm	Φ31.75	Φ31.75	Φ31.75	Φ38.1
Fan	Condenser Fan Quantity		—	4	4	4	4
	Air Flow Rate		m^3/min	512	512	585	585
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

※1.The above noise values are measured in the anechoic chamber without refiected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

Capacity				40HP	42HP	44HP	46HP
Model				RAS-40RNBCLQ	RAS-42RNBCLQ	RAS-44RNBCLQ	RAS-46RNBCLQ
Combination				RAS-20RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ	RAS-22RNBCLQ
				RAS-20RNBCLQ	RAS-22RNBCLQ	RAS-22RNBCLQ	RAS-24RNBCLQ
				/	/	/	/
				/	/	/	/
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	112.0	117.5	123.0	129.5
			Btu/h	382144	400910	419600	441800
	Power Consumption		kW	36.72	39.49	42.27	47.09
	EER		W/W	3.05	2.98	2.91	2.75
	SEER		—	-	-	-	-
Heating Operation	Nominal Capacity		kW	112.0	117.5	123.0	129.5
			Btu/h	382144	400910	419600	441800
	Power Consumption		kW	35.44	37.69	39.94	43.91
	COP		W/W	3.16	3.12	3.08	2.95
	SCOP		—	-	-	-	-
Sound Power			dB(A)	-	-	-	-
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1608+1608	1608+1608	1608+1608	1608+1608
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1680+1680	1680+1680	1680+1680	1680+1680
	Depth		mm	841	841	841	841
Net Weight			kg	403+403	403+421	421+421	421+422
Gross Weight			kg	427+427	427+445	445+445	445+446
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	AA50PHDG+ AA50PHDG	AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG
	Compressor Quantity		—	4	4	4	4
	Compressor Motor Output		kW	6.5×2+6.5×2	6.5×2+7.5×2	7.5×2+7.5×2	7.5×2+8.6×2
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	2.2+2.2	2.2+2.2	2.2+2.2	2.2+2.2
		Charge(Total)	L	16.8	16.8	16.8	16.8
	Refrigerant Charge Before Shipment		kg	11.3+11.3	11.3+11.3	11.3+11.3	11.3+12.6
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ19.05	Φ19.05	Φ19.05	Φ19.05
	High/Low Pressure Gas Pipe		mm	Φ31.75	Φ31.75	Φ31.75	Φ31.75
	Low Pressure Gas Pipe		mm	Φ38.1	Φ38.1	Φ38.1	Φ38.1
Fan	Condenser Fan Quantity		—	4	4	4	4
	Air Flow Rate		m^3/min	658	658	658	677
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

※1.The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

GENERAL DATA

Capacity				48HP	50HP	52HP	54HP
Model				RAS-48RNBCLQ	RAS-50RNBCLQ	RAS-52RNBCLQ	RAS-54RNBCLQ
Combination				RAS-24RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ
				RAS-24RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ
				/	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ
				/	/	/	/
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	136.0	140.0	146.0	151.5
			Btu/h	464000	477680	498152	516918
	Power Consumption		kW	51.91	54.74	55.25	58.02
	EER		W/W	2.62	2.56	2.64	2.61
	SEER		—	-	-	-	-
Heating Operation	Nominal Capacity		kW	136.0	140.0	146.0	151.5
			Btu/h	464000	477680	498152	516918
	Power Consumption		kW	47.89	49.28	49.52	51.77
	COP		W/W	2.84	2.84	2.95	2.93
	SCOP		—	-	-	-	-
Sound Power			dB(A)	-	-	-	-
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1608+1608	1218+1218+1218	1218+1218+1608	1218+1218+1608
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1680+1680	1280+1280+1280	1280+1280+1680	1280+1280+1680
	Depth		mm	841	841	841	841
Net Weight			kg	422+422	311+311+357	311+311+403	311+311+421
Gross Weight			kg	446+446	329+329+376	329+329+427	329+329+445
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG+ AA50PHDG+ AA50PHDG	DC80PHDG+ DC80PHDG+ AA50PHDG+ AA50PHDG	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG
	Compressor Quantity		—	4	4	4	4
	Compressor Motor Output		kW	8.6×2+8.6×2	10.8+10.8+6.4×2	10.8+10.8+6.5×2	10.8+10.8+7.5×2
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	2.2+2.2	1.1+1.1+2.2	1.1+1.1+2.2	1.1+1.1+2.2
		Charge(Total)	L	16.8	22.2	22.2	22.2
	Refrigerant Charge Before Shipment		kg	12.6+12.6	9.9+9.9+10.7	9.9+9.9+11.3	9.9+9.9+11.3
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ19.05	Φ19.05	Φ19.05	Φ19.05
	High/Low Pressure Gas Pipe		mm	Φ31.75	Φ31.75	Φ31.75	Φ31.75
	Low Pressure Gas Pipe		mm	Φ38.1	Φ38.1	Φ38.1	Φ38.1
Fan	Condenser Fan Quantity		—	4	6	6	6
	Air Flow Rate		m^3/min	696	768	841	841
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

※1.The above noise values are measured in the anechoic chamber without refiected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

Capacity				56HP	58HP	60HP	62HP
Model				RAS-56RNBCLQ	RAS-58RNBCLQ	RAS-60RNBCLQ	RAS-62RNBCLQ
Combination				RAS-16RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ
				RAS-16RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ
				RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ
				/	/	/	/
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	158.0	163.0	169.0	174.5
			Btu/h	539096	556156	576628	595394
	Power Consumption		kW	62.84	62.25	62.76	65.53
	EER		W/W	2.51	2.62	2.69	2.66
	SEER		—	-	-	-	-
Heating Operation	Nominal Capacity		kW	158.0	163.0	169.0	174.5
			Btu/h	539096	556156	576628	595394
	Power Consumption		kW	55.75	57.33	57.57	59.81
	COP		W/W	2.83	2.84	2.94	2.92
	SCOP		—	-	-	-	-
Sound Power			dB(A)	-	-	-	-
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1218+1218+1608	1218+1218+1608	1218+1608+1608	1218+1608+1608
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1280+1280+1680	1280+1280+1680	1280+1680+1680	1280+1680+1680
	Depth		mm	841	841	841	841
Net Weight			kg	311+311+422	311+357+422	311+403+422	311+421+422
Gross Weight			kg	329+329+446	329+376+446	329+427+446	329+445+446
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG
	Compressor Quantity		—	4	5	5	5
	Compressor Motor Output		kW	10.8+10.8+8.6×2	10.8+6.4×2+ 8.6×2	10.8+6.5×2+ 8.6×2	10.8+7.5×2+ 8.6×2
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	1.1+1.1+2.2	1.1+2.2+2.2	1.1+2.2+2.2	1.1+2.2+2.2
		Charge(Total)	L	22.2	23.2	23.7	23.7
	Refrigerant Charge Before Shipment		kg	9.9+9.9+12.6	9.9+10.7+12.6	9.9+11.3+12.6	9.9+11.3+12.6
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ22.2	Φ22.2	Φ22.2	Φ22.2
	High/Low Pressure Gas Pipe		mm	Φ38.1	Φ41.3	Φ41.3	Φ41.3
	Low Pressure Gas Pipe		mm	Φ41.3	Φ44.5	Φ44.5	Φ44.5
Fan	Condenser Fan Quantity		—	6	6	6	6
	Air Flow Rate		m^3/min	860	860	933	933
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

Piping Length: 7.5 meters, Piping Lift: 0 meter

※1.The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene.

Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

GENERAL DATA

Capacity				64HP	66HP	68HP	70HP
Model				RAS-64RNBCLQ	RAS-66RNBCLQ	RAS-68RNBCLQ	RAS-70RNBCLQ
Combination				RAS-16RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ
				RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ
				RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ
				/	/	/	/
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	181.0	186.0	192.0	197.5
			Btu/h	617572	634632	655104	673870
	Power Consumption		kW	70.35	69.77	70.27	73.04
	EER		W/W	2.57	2.67	2.73	2.70
	SEER		—	-	-	-	-
Heating Operation	Nominal Capacity		kW	181.0	186.0	192.0	197.5
			Btu/h	617572	634632	655104	673870
	Power Consumption		kW	63.79	65.37	65.61	67.85
	COP		W/W	2.84	2.85	2.93	2.91
	SCOP		—	-	-	-	-
Sound Power			dB(A)	-	-	-	-
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1218+1608+1608	1218+1608+1608	1608+1608+1608	1608+1608+1608
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1280+1680+1680	1280+1680+1680	1680+1680+1680	1680+1680+1680
	Depth		mm	841	841	841	841
Net Weight			kg	311+422+422	357+422+422	403+422+422	421+422+422
Gross Weight			kg	329+446+446	376+446+446	427+446+446	445+446+446
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG
	Compressor Quantity		—	5	6	6	6
	Compressor Motor Output		kW	10.8+8.6×2+ 8.6×2	6.4×2+8.6×2+ 8.6×2	6.5×2+8.6×2+ 8.6×2	7.5×2+8.6×2+ 8.6×2
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	1.1+2.2+2.2	2.2+2.2+2.2	2.2+2.2+2.2	2.2+2.2+2.2
		Charge(Total)	L	23.7	24.7	25.2	25.2
	Refrigerant Charge Before Shipment		kg	9.9+12.6+12.6	10.7+12.6+12.6	11.3+12.6+12.6	11.3+12.6+12.6
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ22.2	Φ22.2	Φ25.4	Φ25.4
	High/Low Pressure Gas Pipe		mm	Φ41.3	Φ41.3	Φ44.5	Φ44.5
	Low Pressure Gas Pipe		mm	Φ44.5	Φ44.5	Φ50.8	Φ50.8
Fan	Condenser Fan Quantity		—	6	6	6	6
	Air Flow Rate		m^3/min	952	952	1025	1025
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

Piping Length: 7.5 meters, Piping Lift: 0 meter

※1.The above noise values are measured in the anechoic chamber without refiected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

Capacity				72HP	74HP	76HP	78HP
Model				RAS-72RNBCLQ	RAS-74RNBCLQ	RAS-76RNBCLQ	RAS-78RNBCLQ
Combination				RAS-24RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ
				RAS-24RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ	RAS-16RNBCLQ
				RAS-24RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ
				/	RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	204.0	208.0	214.0	219.5
			Btu/h	696048	709696	730168	748934
	Power Consumption		kW	77.86	80.70	81.20	83.97
	EER		W/W	2.62	2.58	2.64	2.61
	SEER		—	-	-	-	-
Heating Operation	Nominal Capacity		kW	204.0	208.0	214.0	219.5
			Btu/h	696048	709696	730168	748934
	Power Consumption		kW	71.83	73.23	73.47	75.71
	COP		W/W	2.84	2.84	2.91	2.90
	SCOP		—	-	-	-	-
Sound Power			dB(A)	-	-	-	-
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1608+1608+1608	1218+1218+1218 +1608	1218+1218+1608 +1608	1218+1218+1608 +1608
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1680+1680+1680	1280+1280+1280 +1680	1280+1280+1680 +1680	1280+1280+1680 +1680
	Depth		mm	841	841	841	841
Net Weight			kg	422+422+422	311+311+357 +422	311+311+403 +422	311+311+421 +422
Gross Weight			kg	446+446+446	329+329+376 +446	329+329+427 +446	329+329+445 +446
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG+ AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG+ AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG
	Compressor Quantity		—	6	6	6	6
	Compressor Motor Output		kW	8.6×2+8.6×2+ 8.6×2	10.8+10.8+ 6.4×2+8.6×2	10.8+10.8+ 6.5×2+8.6×2	10.8+10.8+ 7.5×2+8.6×2
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	2.2+2.2+2.2	1.1+1.1+2.2+2.2	1.1+1.1+2.2+2.2	1.1+1.1+2.2+2.2
		Charge(Total)	L	25.2	30.1	30.6	30.6
	Refrigerant Charge Before Shipment		kg	12.6+12.6+12.6	9.9+9.9+ 10.7+12.6	9.9+9.9+ 11.3+12.6	9.9+9.9+ 11.3+12.6
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ25.4	Φ25.4	Φ25.4	Φ25.4
	High/Low Pressure Gas Pipe		mm	Φ44.5	Φ44.5	Φ44.5	Φ44.5
	Low Pressure Gas Pipe		mm	Φ50.8	Φ50.8	Φ50.8	Φ50.8
Fan	Condenser Fan Quantity		—	6	8	8	8
	Air Flow Rate		m^3/min	1044	1116	1189	1189
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

Piping Length: 7.5 meters, Piping Lift: 0 meter

※1.The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

GENERAL DATA

Capacity				80HP	82HP	84HP	86HP
Model				RAS-80RNBCLQ	RAS-82RNBCLQ	RAS-84RNBCLQ	RAS-86RNBCLQ
Combination				RAS-20RNBCLQ	RAS-20RNBCLQ	RAS-20RNBCLQ	RAS-20RNBCLQ
				RAS-20RNBCLQ	RAS-20RNBCLQ	RAS-20RNBCLQ	RAS-20RNBCLQ
				RAS-20RNBCLQ	RAS-20RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ
				RAS-20RNBCLQ	RAS-22RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	224.0	229.5	236.0	241.5
			Btu/h	764288	783054	805232	823998
	Power Consumption		kW	73.44	76.22	81.04	83.81
	EER		W/W	3.05	3.01	2.91	2.88
	SEER		—	-	-	-	-
Heating Operation	Nominal Capacity		kW	224.0	229.5	236.0	241.5
			Btu/h	764288	783054	805232	823998
	Power Consumption		kW	70.89	73.13	77.11	79.35
	COP		W/W	3.16	3.14	3.06	3.04
	SCOP		—	-	-	-	-
Sound Power			dB(A)	-	-	-	-
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1608+1608+1608 +1608	1608+1608+1608 +1608	1608+1608+1608 +1608	1608+1608+1608 +1608
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1680+1680+1680 +1680	1680+1680+1680 +1680	1680+1680+1680 +1680	1680+1680+1680 +1680
	Depth		mm	841	841	841	841
Net Weight			kg	403+403+403 +403	403+403+403 +421	403+403+403 +422	403+403+421 +422
Gross Weight			kg	427+427+427 +427	427+427+427 +445	427+427+427 +446	427+427+445 +446
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG	AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG	AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG	AA50PHDG+ AA50PHDG+ AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG
	Compressor Quantity		—	8	8	8	8
	Compressor Motor Output		kW	6.5×2+6.5×2+ 6.5×2+6.5×2	6.5×2+6.5×2+ 6.5×2+7.5×2	6.5×2+6.5×2+ 6.5×2+8.6×2	6.5×2+6.5×2+ 7.5×2+8.6×2
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	2.2+2.2+2.2+2.2	2.2+2.2+2.2+2.2	2.2+2.2+2.2+2.2	2.2+2.2+2.2+2.2
		Charge(Total)	L	33.6	33.6	33.6	33.6
	Refrigerant Charge Before Shipment		kg	11.3+11.3+ 11.3+11.3	11.3+11.3+ 11.3+11.3	11.3+11.3+ 11.3+12.6	11.3+11.3+ 11.3+12.6
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ25.4	Φ25.4	Φ25.4	Φ25.4
	High/Low Pressure Gas Pipe		mm	Φ44.5	Φ44.5	Φ44.5	Φ44.5
	Low Pressure Gas Pipe		mm	Φ50.8	Φ50.8	Φ50.8	Φ50.8
Fan	Condenser Fan Quantity		—	8	8	8	8
	Air Flow Rate		m^3/min	1316	1316	1335	1335
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

Piping Length: 7.5 meters, Piping Lift: 0 meter

※1.The above noise values are measured in the anechoic chamber without refiected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

Capacity				88HP	90HP	92HP	94HP
Model				RAS-88RNBCLQ	RAS-90RNBCLQ	RAS-92RNBCLQ	RAS-94RNBCLQ
Combination				RAS-20RNBCLQ	RAS-20RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ
				RAS-20RNBCLQ	RAS-22RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ
				RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ
				RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ	RAS-24RNBCLQ
Power Supply				3N,380-415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	248.0	253.5	260.0	265.5
			Btu/h	846176	864942	887120	905886
	Power Consumption		kW	88.63	91.40	96.22	99.00
	EER		W/W	2.80	2.77	2.70	2.68
	SEER		—	-	-	-	-
Heating Operation	Nominal Capacity		kW	248.0	253.5	260.0	265.5
			Btu/h	846176	864942	887120	905886
	Power Consumption		kW	83.33	85.58	89.55	91.80
	COP		W/W	2.98	2.96	2.90	2.89
	SCOP		—	-	-	-	-
Sound Power			dB(A)	-	-	-	-
Cabinet Color※2			—	Natural White (ID8000-100036)			
Outer Dimensions	Height		mm	1725	1725	1725	1725
	Width		mm	1608+1608+1608 +1608	1608+1608+1608 +1608	1608+1608+1608 +1608	1608+1608+1608 +1608
	Depth		mm	782	782	782	782
Packing Dimensions	Height		mm	1888	1888	1888	1888
	Width		mm	1680+1680+1680 +1680	1680+1680+1680 +1680	1680+1680+1680 +1680	1680+1680+1680 +1680
	Depth		mm	841	841	841	841
Net Weight			kg	403+403+422 +422	403+421+422 +422	403+422+422 +422	421+422+422 +422
Gross Weight			kg	427+427+446 +446	427+445+446 +446	427+446+446 +446	445+446+446 +446
Refrigerating Installation	Compressor		—	Scroll Comp			
	Compressor Model		—	AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	AA50PHDG+ AA50PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG
	Compressor Quantity		—	8	8	8	8
	Compressor Motor Output		kW	6.5×2+6.5×2+ 8.6×2+8.6×2	6.5×2+7.5×2+ 8.6×2+8.6×2	6.5×2+8.6×2+ 8.6×2+8.6×2	7.5×2+8.6×2+ 8.6×2+8.6×2
	Refrigeration Oil	Type	—	FV68H			
		Brand	—	Idemitsu Kosan			
		Charge(Comp)	L	2.2+2.2+2.2+2.2	2.2+2.2+2.2+2.2	2.2+2.2+2.2+2.2	2.2+2.2+2.2+2.2
		Charge(Total)	L	33.6	33.6	33.6	33.6
	Refrigerant Charge Before Shipment		kg	11.3+11.3+ 12.6+12.6	11.3+11.3+ 12.6+12.6	11.3+12.6+ 12.6+12.6	11.3+12.6+ 12.6+12.6
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube			
	Liquid Pipe		mm	Φ25.4	Φ25.4	Φ25.4	Φ25.4
	High/Low Pressure Gas Pipe		mm	Φ44.5	Φ44.5	Φ44.5	Φ44.5
	Low Pressure Gas Pipe		mm	Φ50.8	Φ50.8	Φ50.8	Φ50.8
Fan	Condenser Fan Quantity		—	8	8	8	8
	Air Flow Rate		m^3/min	1354	1354	1373	1373
Hole for Power Supply Wiring			mm	65	65	65	65
Hole for Control Line Wiring			mm	52	52	52	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

Piping Length: 7.5 meters, Piping Lift: 0 meter

※1.The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

GENERAL DATA

Capacity				96HP
Model				RAS-96RNBCLQ
Combination				RAS-24RNBCLQ
				RAS-24RNBCLQ
				RAS-24RNBCLQ
				RAS-24RNBCLQ
Power Supply				3N,380-415V/50Hz/60Hz
Cooling Operation	Nominal Capacity		kW	272.0
			Btu/h	928064
	Power Consumption		kW	103.82
	EER		W/W	2.62
	SEER		—	-
Heating Operation	Nominal Capacity		kW	272.0
			Btu/h	928064
	Power Consumption		kW	95.77
	COP		W/W	2.84
	SCOP		—	-
Sound Power			dB(A)	-
Cabinet Color※2			—	Natural White (ID8000-100036)
Outer Dimensions	Height		mm	1725
	Width		mm	1608+1608+1608+1608
	Depth		mm	782
Packing Dimensions	Height		mm	1888
	Width		mm	1680+1680+1680+1680
	Depth		mm	841
Net Weight			kg	422+422+422+422
Gross Weight			kg	446+446+446+446
Refrigerating Installation	Compressor		—	Scroll Comp
	Compressor Model		—	DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG+ DC80PHDG
	Compressor Quantity		—	8
	Compressor Motor Output		kW	8.6×2+8.6×2+ 8.6×2+8.6×2
	Refrigeration Oil	Type	—	FV68H
		Brand	—	Idemitsu Kosan
		Charge(Comp)	L	2.2+2.2+2.2+2.2
		Charge(Total)	L	33.6
	Refrigerant Charge Before Shipment		kg	12.6+12.6+12.6+12.6
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve
	Heat Exchanger Type		—	Multi-Pass Cross-Finned Tube
	Liquid Pipe		mm	Φ25.4
	High/Low Pressure Gas Pipe		mm	Φ44.5
	Low Pressure Gas Pipe		mm	Φ50.8
Fan	Condenser Fan Quantity		—	8
	Air Flow Rate		m^3/min	1392
Hole for Power Supply Wiring			mm	65
Hole for Control Line Wiring			mm	52

Notes:

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66°F WB)
Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB / (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB / (45°F DB)
6°C WB / (43°F WB)

※1.The above noise values are measured in the anechoic chamber without refiected echo, therefore the impact of the reflected echo must be included at the scene.
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

※2.The final appearance of outdoor units is subject to the actual products.

3. Component Data

Model		RAS-8.0RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ	RAS-14RNBCLQ	RAS-16RNBCLQ
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		DC Motor				
Starting Method		Soft driving				
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-18RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ	RAS-24RNBCLQ	RAS-26RNBCLQ
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		DC Motor				
Starting Method		Soft driving				
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-28RNBCLQ	RAS-30RNBCLQ	RAS-32RNBCLQ	RAS-34RNBCLQ	RAS-36RNBCLQ
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		DC Motor				
Starting Method		Soft driving				
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

COMPONENT DATA

Model		RAS-38RNBCLQ	RAS-40RNBCLQ	RAS-42RNBCLQ	RAS-44RNBCLQ	RAS-46RNBCLQ
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	329 + 329	329 + 329	329 + 329	329 + 348
Outdoor Fan Motor		DC Motor				
Starting Method		Soft driving				
Nominal Output	W	390 + 390 + 480 + 480	480 + 480 + 480 + 480	480 + 480 + 480 + 480	480 + 480 + 480 + 480	480 + 480 + 560 + 560
Quantity		4	4	4	4	4
Insulation Class		E + E	E + E	E + E	E + E	E + E

Model		RAS-48RNBCLQ	RAS-50RNBCLQ	RAS-52RNBCLQ	RAS-54RNBCLQ	RAS-56RNBCLQ
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		DC Motor				
Starting Method		Soft driving				
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

COMPONENT DATA

Model		RAS-58RNBCLQ	RAS-60RNBCLQ	RAS-62RNBCLQ	RAS-64RNBCLQ	RAS-66RNBCLQ
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		DC Motor				
Starting Method		Soft driving				
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-68RNBCLQ	RAS-70RNBCLQ	RAS-72RNBCLQ	RAS-74RNBCLQ	RAS-76RNBCLQ
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 + 544 + 644 + 644	544 + 544 + 544 + 544 + 544 + 544 + 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		DC Motor				
Starting Method		Soft driving				
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

COMPONENT DATA

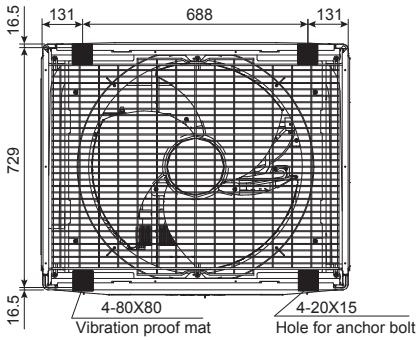
Model		RAS-78RNBCLQ	RAS-80RNBCLQ	RAS-82RNBCLQ	RAS-84RNBCLQ	RAS-86RNBCLQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3
Number of Tube/ Coil		180 + 180 + 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		DC Motor				
Starting Method		Soft driving				
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

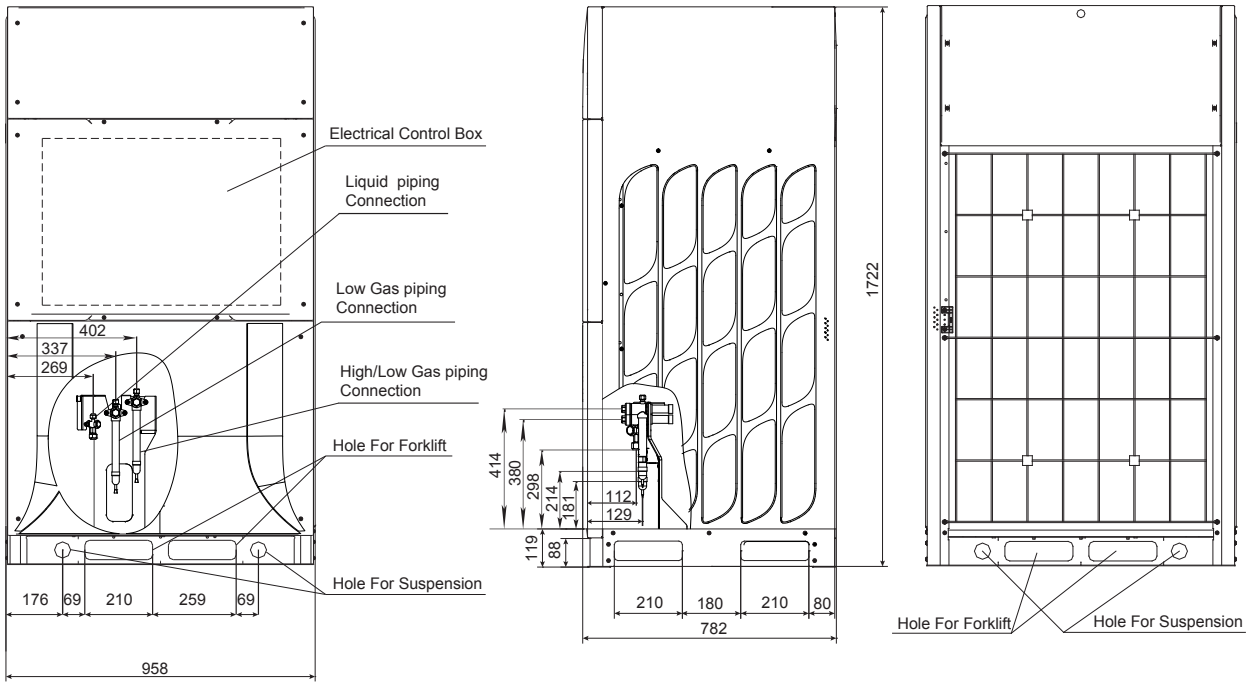
Model		RAS-88RNBCLQ	RAS-90RNBCLQ	RAS-92RNBCLQ	RAS-94RNBCLQ	RAS-96RNBCLQ
Heat Exchanger Type		Multi-Pass Cross Finned Tube				
Tube Material		Copper Tube				
Outer Diameter	Ømm	7.0	7.0	7.0	7.0	7.0
Rows		3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3	3 + 3 + 3 + 3
Number of Tube/ Coil		180 + 180 + 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		DC Motor				
Starting Method		Soft driving				
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

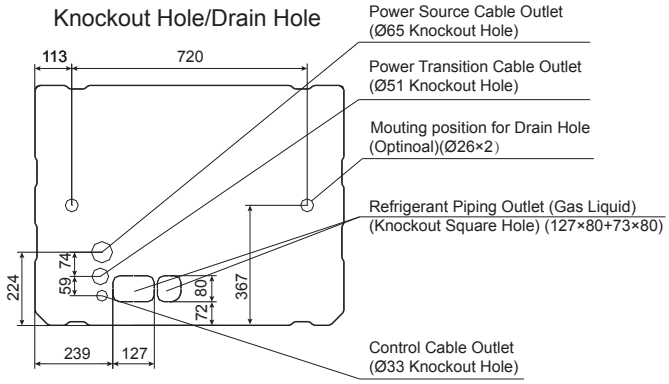
4. Dimensional Data

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

Unit: mm



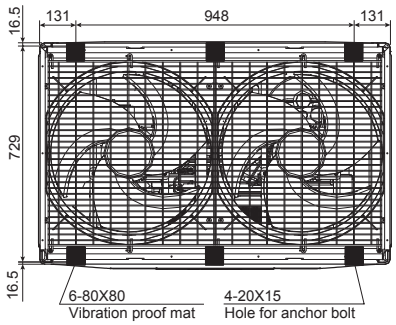


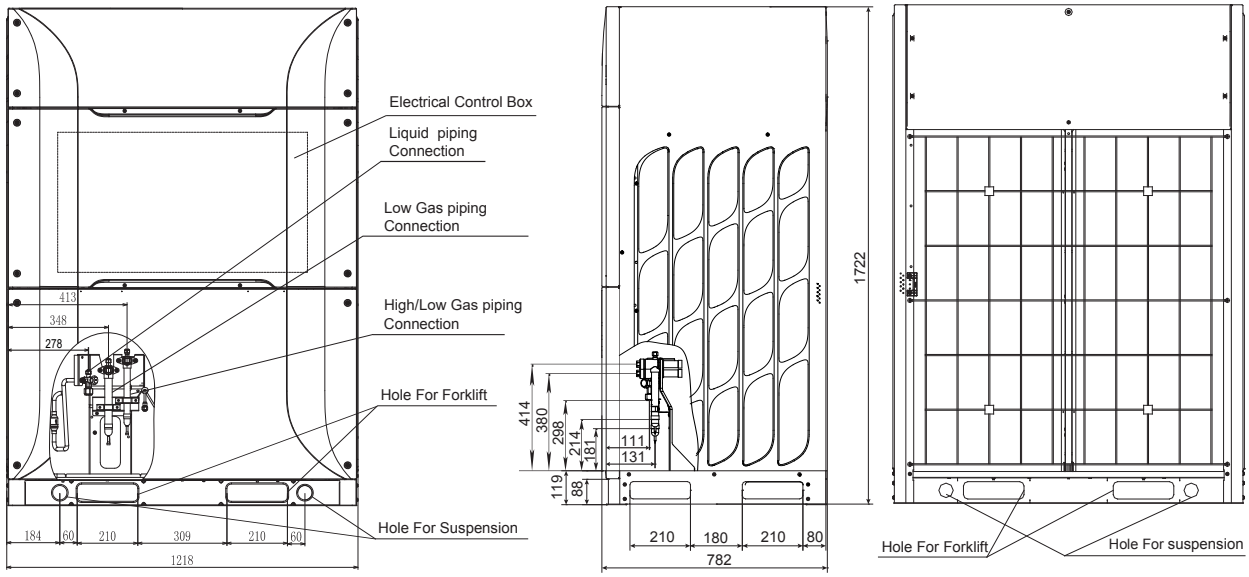


NOTES:
1. Refer to “System Pipe Drawing” for diameters.
2. Drainage to come out during heating or defrost operation and rain water too.
   Choose a well drained place to install units or provide a ditch to drain.

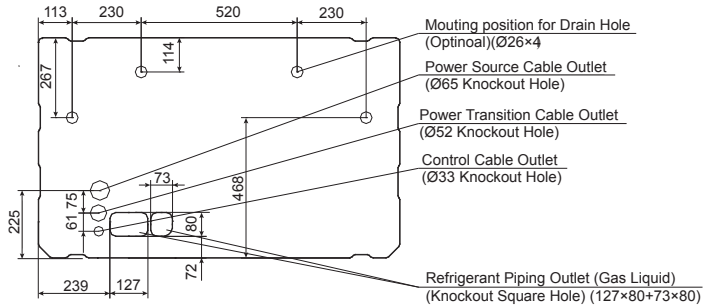
Model: RAS-14RNBCLQ, RAS-16RNBCLQ, and RAS-18RNBCLQ

Unit: mm





Knockout Hole/Drain Hole

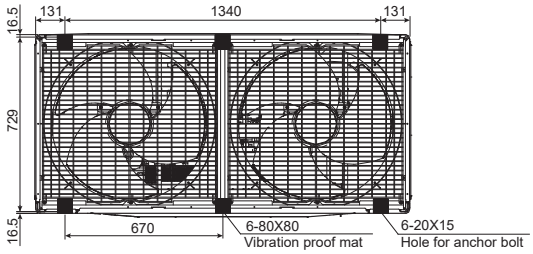


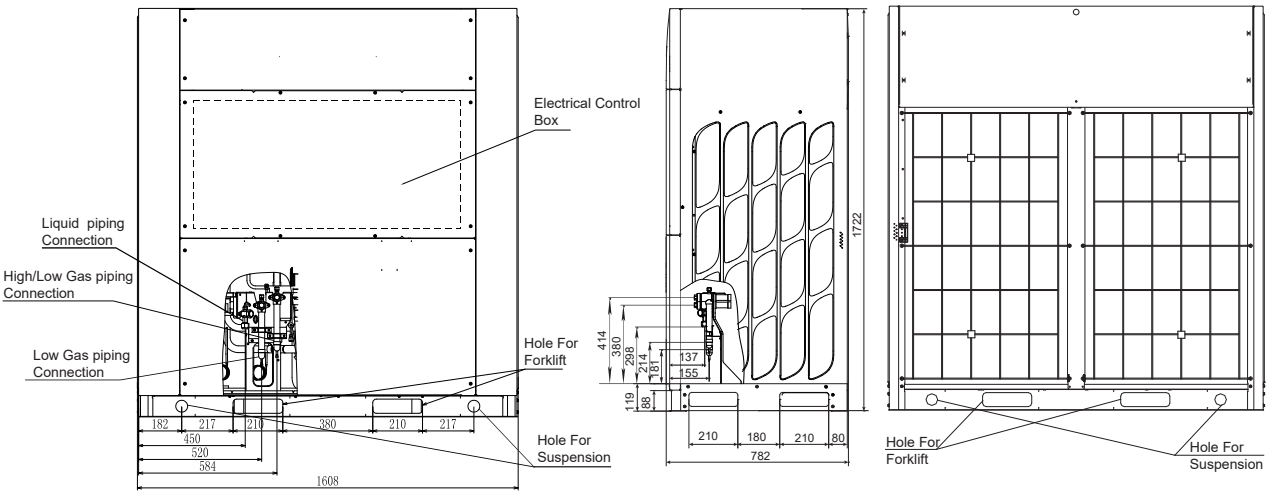
NOTES:
1. Refer to “System Pipe Drawing” for diameters.
2. Drainage to come out during heating or defrost operation and rain water too.
   Choose a well drained place to install units or provide a ditch to drain.

DIMENSIONAL DATA

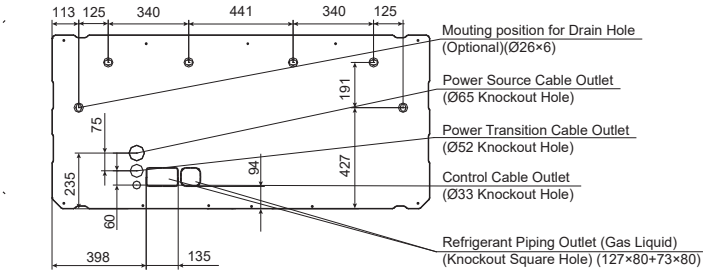
Model: RAS-20RNBCLQ, RAS-22RNBCLQ, and RAS-24RNBCLQ

Unit: mm





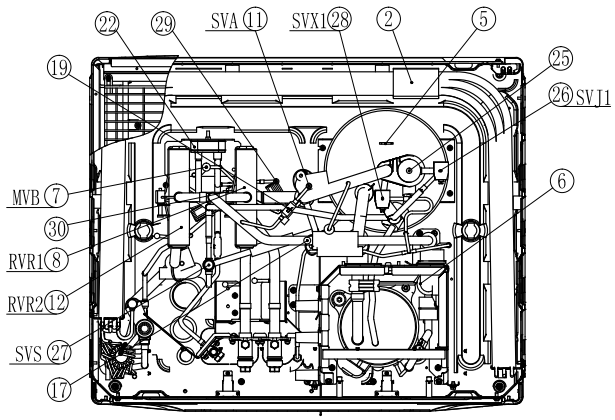
Knockout Hole/Drain Hole

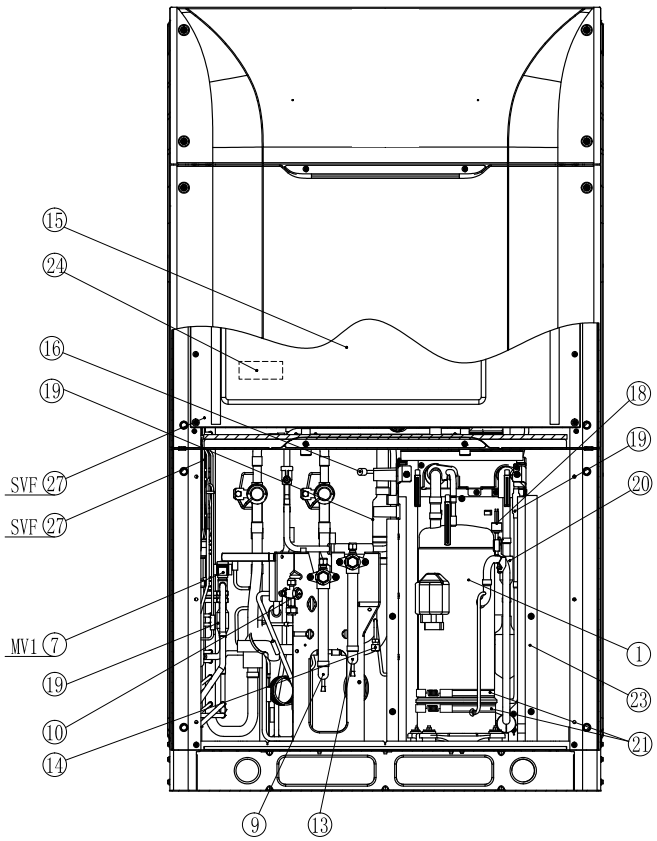


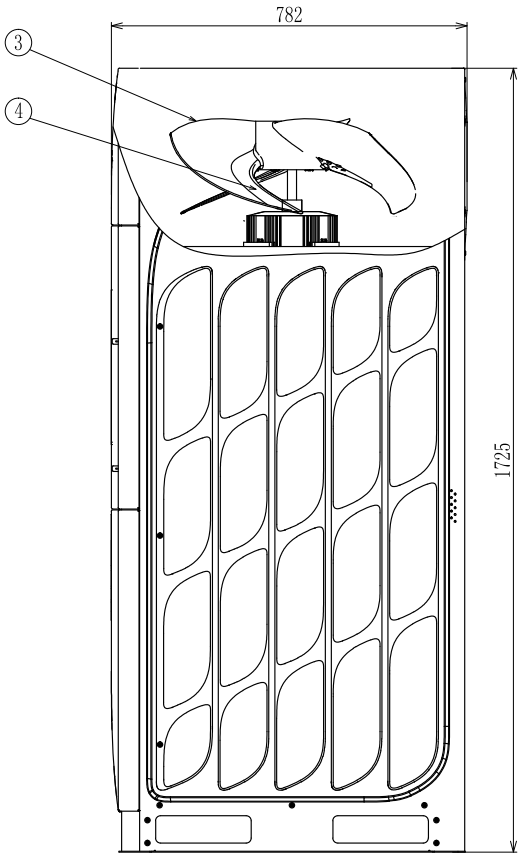
NOTES:
1. Refer to “System Pipe Drawing” for diameters.
2. Drainage to come out during heating or defrost operation and rain water too.
   Choose a well drained place to install units or provide a ditch to drain.

RAS-8.0-10-12RNBCLQ

Unit: mm





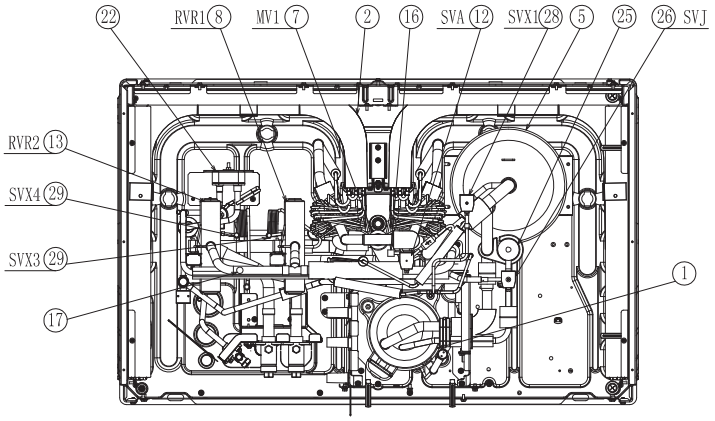


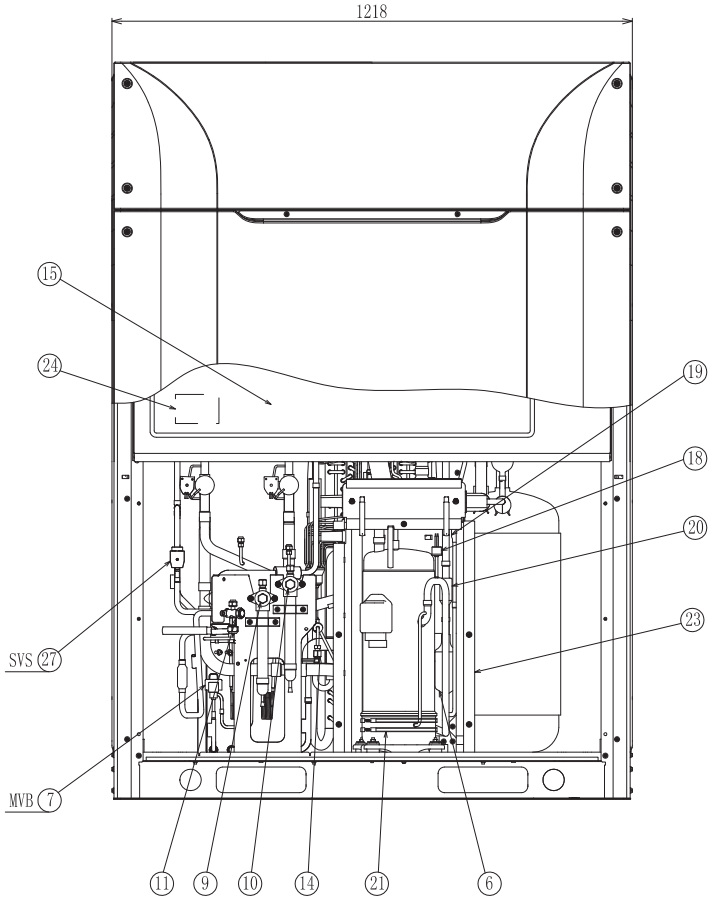
Item	Part Name	Item	Part Name
1	Compressor	16	Low Pressure Sensor
2	Heat Exchanger	17	High Pressure Sensor
3	Propeller Fan	18	High Pressure Switch for Protection
4	Fan Motor	19	Strainer
5	Accumulator	20	Check Valve
6	Oil Separator	21	Crankcase Heater
7	Micro-computer Control Expansion Valve (MVB/MV1)	22	Plate Heat Exchanger
8	4-Way Valve (RVR1)	23	Compressor Cover
9	Stop Valve (Low Pressure Gas)	24	Terminal Block Box
10	Stop Valve (Liquid)	25	Injection Muffler
11	Gas Bypass Valve (SVA)	26	Solenoid Valve (SVJ1)
12	4-Way Valve (RVR2)	27	Solenoid Valve (SVS/SVF)
13	Stop Valve (High/Low Pressure Gas)	28	Solenoid Valve (SVX1)
14	Check Joint	29	Solenoid Valve (SVX3)
15	Electrical Control Box	30	Solenoid Valve (SVX4)

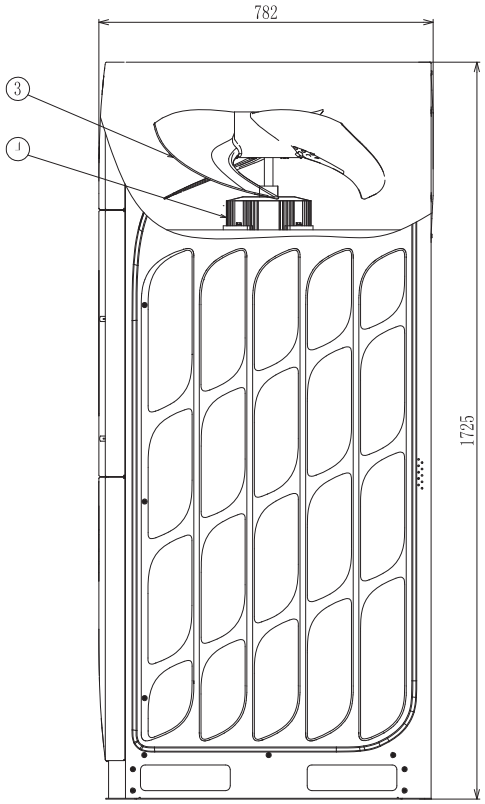
DIMENSIONAL DATA

RAS-14-16RNBCLQ

Unit: mm



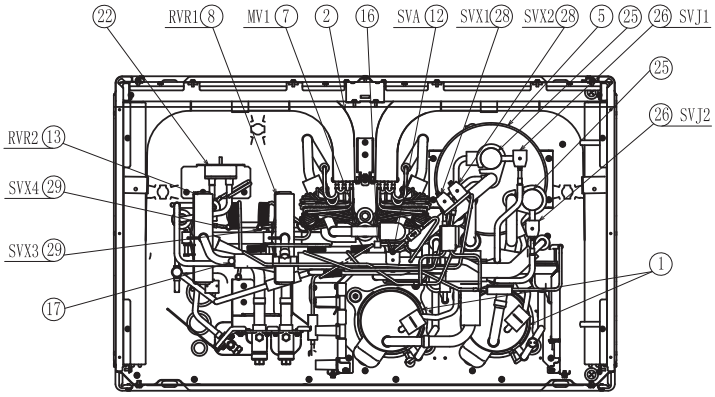


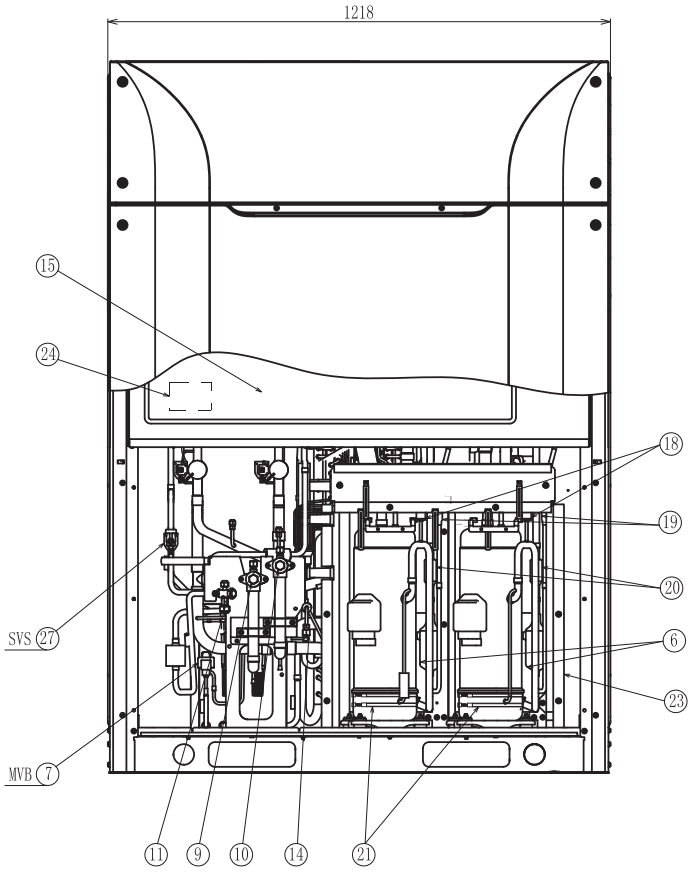


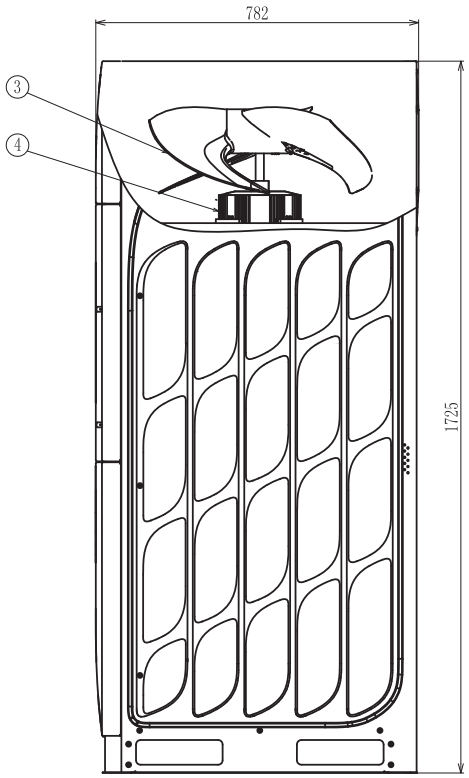
Item	Part Name	Item	Part Name
1	Compressor	16	Low Pressure Sensor
2	Heat Exchanger	17	High Pressure Sensor
3	Propeller Fan	18	High Pressure Switch for Protection
4	Fan Motor	19	Strainer
5	Accumulator	20	Check Valve
6	Oil Separator	21	Crankcase Heater
7	Micro-computer Control Expansion Valve (MVB/MV1)	22	Plate Heat Exchanger
8	4-Way Valve (RVR1)	23	Compressor Cover
9	Stop Valve (Low Pressure Gas)	24	Terminal Block Box
10	Stop Valve (High/Low Pressure Gas)	25	Injection Muffler
11	Stop Valve (Liquid)	26	Solenoid Valve (SVJ)
12	Gas Bypass Valve (SVA)	27	Solenoid Valve (SVS)
13	4-Way Valve (RVR2)	28	Solenoid Valve (SVX1)
14	Check Joint (For Oil)	29	Solenoid Valve (SVX3/SVX4)
15	Electrical Control Box		

RAS-18RNBCLQ

Unit: mm





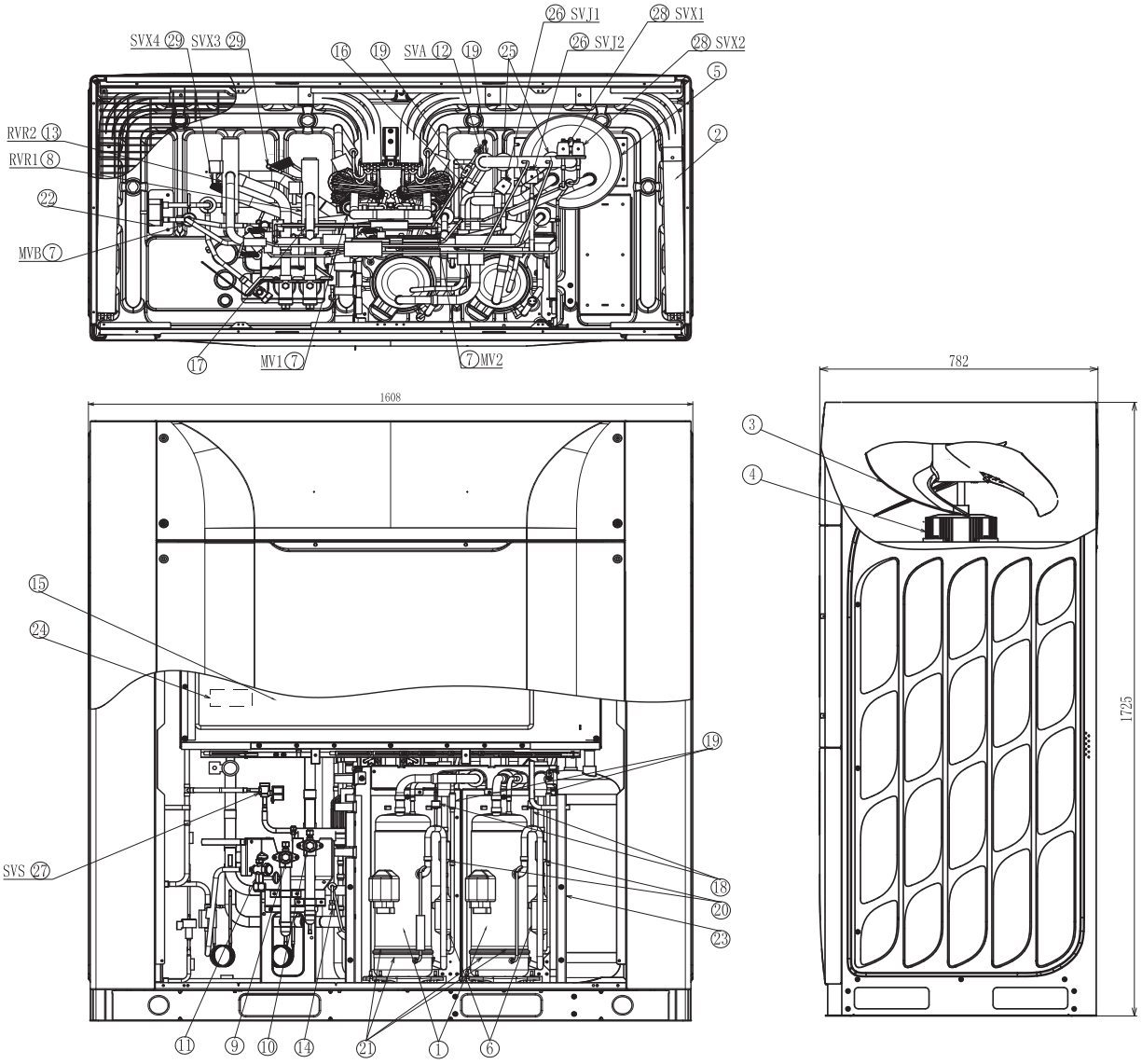


Item	Part Name	Item	Part Name
1	Compressor	16	Low Pressure Sensor
2	Heat Exchanger	17	High Pressure Sensor
3	Propeller Fan	18	High Pressure Switch for Protection
4	Fan Motor	19	Strainer
5	Accumulator	20	Check Valve
6	Oil Separator	21	Crankcase Heater
7	Micro-computer Control Expansion Valve (MVB/MV1)	22	Plate Heat Exchanger
8	4-Way Valve (RVR1)	23	Compressor Cover
9	Stop Valve (Low Pressure Gas)	24	Terminal Block Box
10	Stop Valve (High/Low Pressure Gas)	25	Injection Muffler
11	Stop Valve (Liquid)	26	Solenoid Valve (SVJ1/SVJ2))
12	Gas Bypass Valve (SVA)	27	Solenoid Valve (SVS)
13	4-Way Valve (RVR2)	28	Solenoid Valve (SVX1/SVX2)
14	Check Joint (For Oil)	29	Solenoid Valve (SVX3/SVX4)
15	Electrical Control Box		

DIMENSIONAL DATA

RAS-20-24RNBCLQ

Unit: mm



Item	Part Name	Item	Part Name
1	Compressor	16	Low Pressure Sensor
2	Heat Exchanger	17	High Pressure Sensor
3	Propeller Fan	18	High Pressure Switch for Protection
4	Fan Motor	19	Strainer
5	Accumulator	20	Check Valve
6	Oil Separator	21	Crankcase Heater
7	Micro-computer Control Expansion Valve (MVB/MV1)	22	Plate Heat Exchanger
8	4-Way Valve (RVR1)	23	Compressor Cover
9	Stop Valve (Low Pressure Gas)	24	Terminal Block Box
10	Stop Valve (High/Low Pressure Gas)	25	Injection Muffler
11	Stop Valve (Liquid)	26	Solenoid Valve (SVJ1/SVJ2))
12	Gas Bypass Valve (SVA)	27	Solenoid Valve (SVS)
13	4-Way Valve (RVR2)	28	Solenoid Valve (SVX1/SVX2)
14	Check Joint (For Oil)	29	Solenoid Valve (SVX3/SVX4)
15	Electrical Control Box		

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.

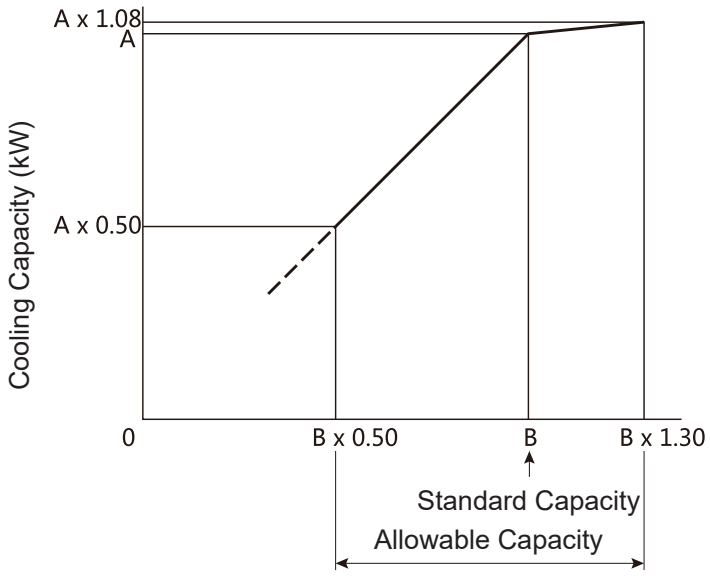
< Cooling Capacity >

• Condition

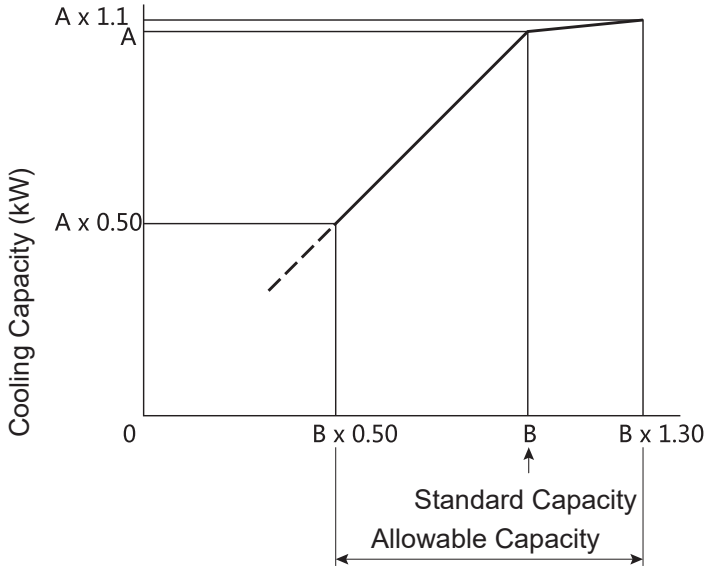
Indoor Air Inlet Temperature: 27.0°C DB (80.0°F DB), 19.0°C WB (66.2°F WB)

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

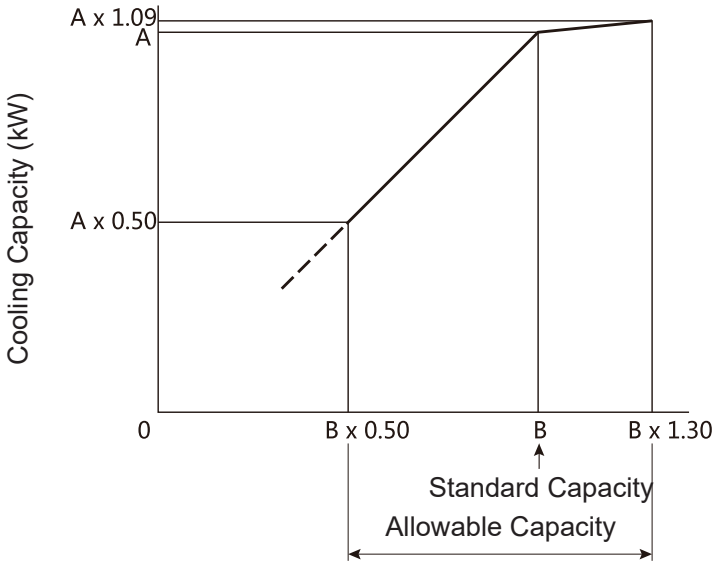
Model	A (kW)	B (HP)
RAS-8.0RNBCLQ	22.4	8



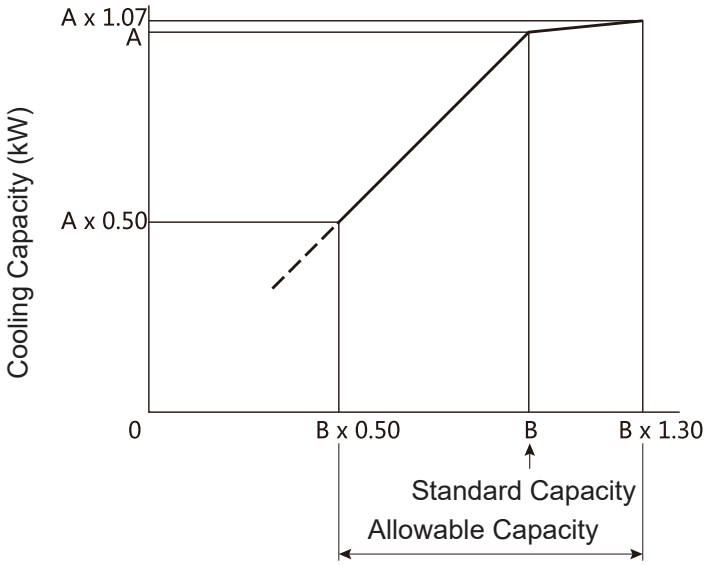
Model	A (kW)	B (HP)
RAS-12RNBCLQ	33.5	12
RAS-14RNBCLQ	40.0	14
RAS-20RNBCLQ	56.0	20
RAS-40RNBCLQ	113.0	40



SELECTION DATA



Model	A (kW)	B (HP)
RAS-16RNBCLQ	45.0	16
RAS-18RNBCLQ	50.0	18
RAS-22RNBCLQ	61.5	22
RAS-28RNBCLQ	78.5	28
RAS-30RNBCLQ	85.0	30
RAS-32RNBCLQ	90.0	32
RAS-34RNBCLQ	95.0	34
RAS-36RNBCLQ	101.0	36
RAS-38RNBCLQ	106.5	38
RAS-42RNBCLQ	118.0	42
RAS-44RNBCLQ	124.0	44



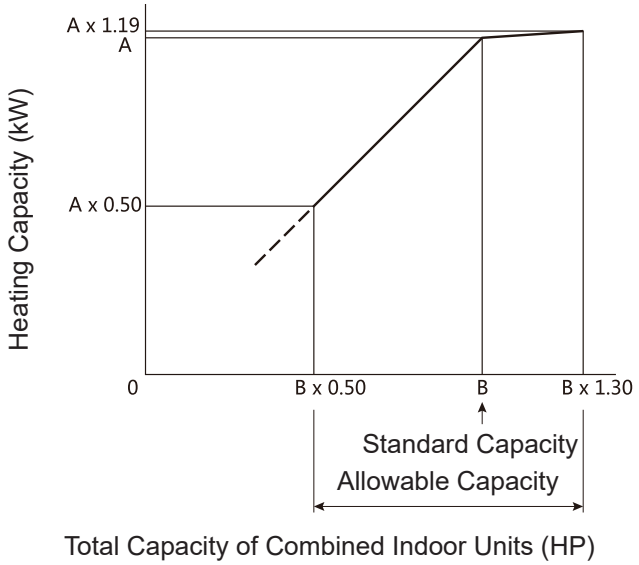
Model	A (kW)	B (HP)
RAS-10RNBCLQ	28.0	10
RAS-24RNBCLQ	68.0	24
RAS-26RNBCLQ	73.0	26
RAS-48RNBCLQ	136.0	48
RAS-50RNBCLQ	140.0	50
RAS-54RNBCLQ	151.5	54
RAS-56RNBCLQ	158.0	56
RAS-58RNBCLQ	163.0	58
RAS-60RNBCLQ	169.0	60
RAS-62RNBCLQ	174.5	62
RAS-64RNBCLQ	181.0	64
RAS-66RNBCLQ	186.0	66
RAS-68RNBCLQ	192.0	68
RAS-70RNBCLQ	197.5	70
RAS-72RNBCLQ	204.0	72
RAS-74RNBCLQ	208.0	74
RAS-76RNBCLQ	214.0	76
RAS-78RNBCLQ	219.5	78
RAS-82RNBCLQ	229.5	82
RAS-84RNBCLQ	236.0	84
RAS-86RNBCLQ	241.5	86
RAS-88RNBCLQ	248.0	88
RAS-90RNBCLQ	253.5	90
RAS-92RNBCLQ	260.0	92
RAS-94RNBCLQ	265.5	94
RAS-96RNBCLQ	272.0	96

< Heating Capacity >

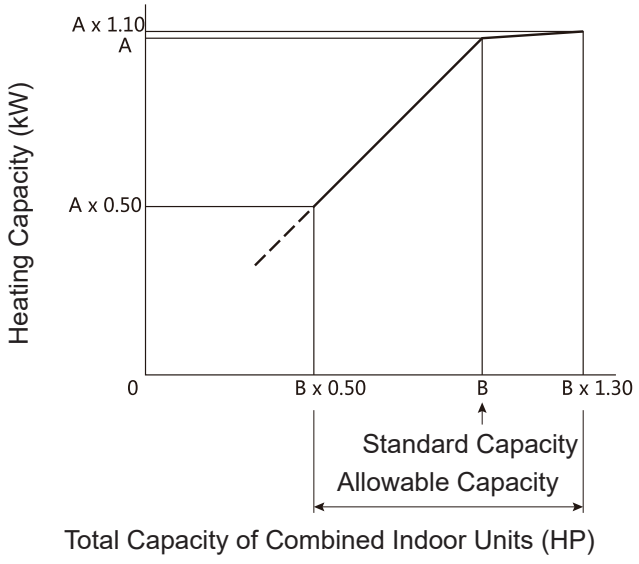
• Condition

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

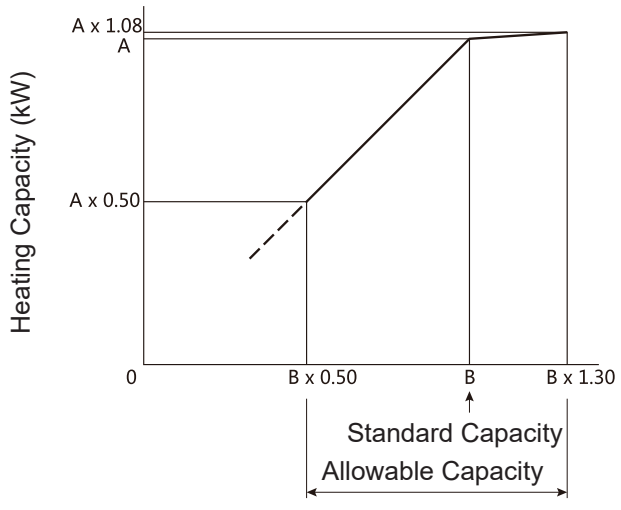
Outdoor Air Inlet Temperature: 7.0°C DB (45.0°F DB), 6.0°C WB (43.0°F WB)



Model	A (kW)	B (HP)
RAS-8.0RNBCLQ	25.0	8

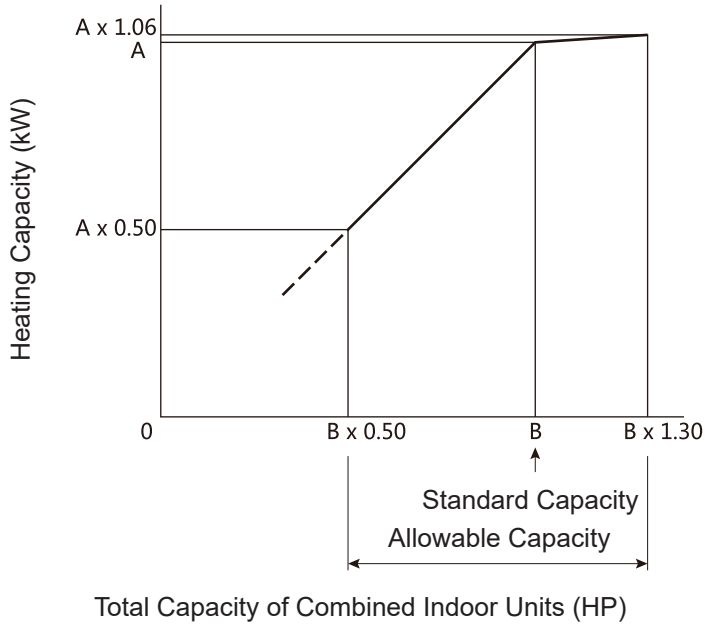


Model	A (kW)	B (HP)
RAS-14RNBCLQ	45.0	14
RAS-20RNBCLQ	63.0	20

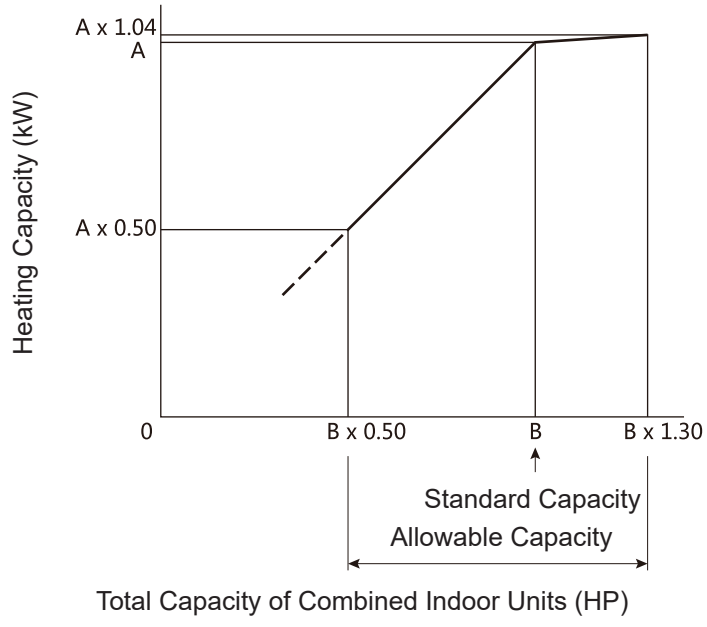


Model	A (kW)	B (HP)
RAS-10RNBCLQ	31.5	10
RAS-16RNBCLQ	50.0	16
RAS-24RNBCLQ	75.0	24
RAS-26RNBCLQ	81.5	26
RAS-30RNBCLQ	95.0	30
RAS-32RNBCLQ	100.0	32
RAS-36RNBCLQ	113.0	36
RAS-48RNBCLQ	150.0	48
RAS-52RNBCLQ	163.0	52
RAS-56RNBCLQ	175.0	56
RAS-60RNBCLQ	188.0	60
RAS-64RNBCLQ	200.0	64
RAS-68RNBCLQ	213.0	68

SELECTION DATA



Model	A (kW)	B (HP)
RAS-18RNBCLQ	56.0	18
RAS-22RNBCLQ	69.0	22
RAS-34RNBCLQ	106.0	34
RAS-38RNBCLQ	119.0	38
RAS-40RNBCLQ	125.0	40
RAS-42RNBCLQ	131.0	42
RAS-44RNBCLQ	138.0	44
RAS-46RNBCLQ	144.0	46
RAS-50RNBCLQ	156.0	50
RAS-54RNBCLQ	169.0	54
RAS-58RNBCLQ	181.0	58
RAS-62RNBCLQ	194.0	62
RAS-66RNBCLQ	206.0	66
RAS-70RNBCLQ	219.0	70
RAS-72RNBCLQ	225.0	72
RAS-74RNBCLQ	231.0	74
RAS-76RNBCLQ	238.0	76
RAS-78RNBCLQ	244.0	78
RAS-82RNBCLQ	258.0	82
RAS-84RNBCLQ	264.0	84
RAS-86RNBCLQ	270.0	86
RAS-88RNBCLQ	276.0	88
RAS-90RNBCLQ	282.0	90
RAS-92RNBCLQ	288.0	92
RAS-94RNBCLQ	294.0	94
RAS-96RNBCLQ	300.0	96



Model	A (kW)	B (HP)
RAS-12RNBCLQ	37.5	12
RAS-28RNBCLQ	87.5	28

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

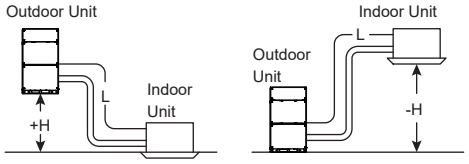
CC: Cooling Capacity in the Performance Table

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)

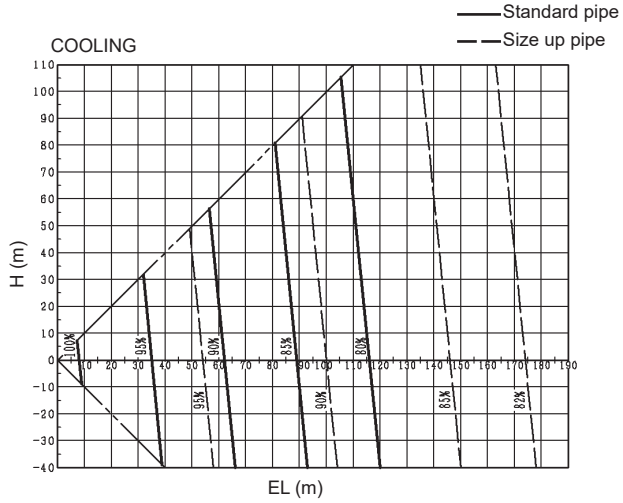
H>0: Position of Outdoor Unit Higher Than Position of Indoor Unit

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-8.0~96RNBCLQ



< Heating Capacity >

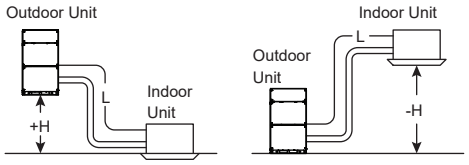
Correction Factor for Heating Capacity According to Piping Length
The heating capacity should be corrected according to the following formula:

HCA= HCxF

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

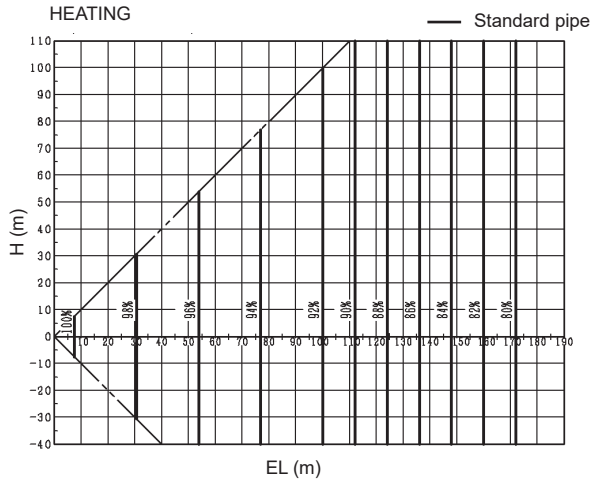
The correction factors are shown in the following figure.
Equivalent Piping Length for

- 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-8.0~96RNBCLQ



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

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

Model	Unit Main Power			Applicable Voltage		Cooling Operation		Heating Operation		Maximum Current(A)
	VOL	PH	HZ	Maximum	Minimum	RNC	IPT	RNC	IPT	
RAS-8.0RNBCLQ	380/ 400/ 415V	3	50	456	342	7.93	4.80	8.75	5.30	17.0
RAS-10RNBCLQ						11.44	6.85	11.52	6.90	21.2
RAS-12RNBCLQ						13.54	8.20	14.20	8.60	26.8
RAS-14RNBCLQ						17.11	10.25	17.87	10.70	31.3
RAS-16RNBCLQ						20.07	12.15	20.15	12.20	33.7
RAS-18RNBCLQ						22.62	13.55	22.87	13.70	41.5
RAS-20RNBCLQ						26.04	15.77	26.42	16.00	46.1
RAS-22RNBCLQ						30.55	18.30	30.39	18.20	49.2
RAS-24RNBCLQ						35.18	21.30	34.60	20.95	53.7

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

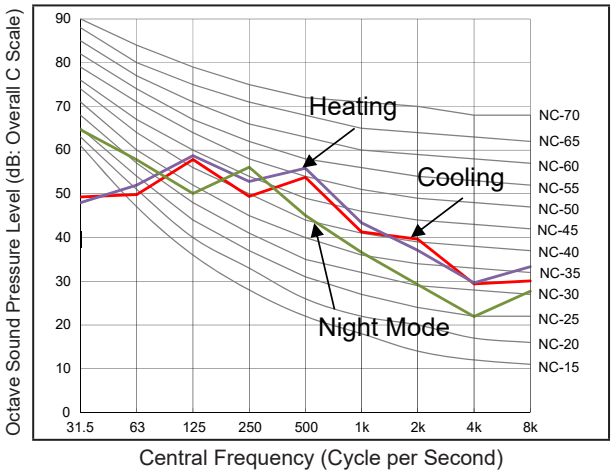
Notes:

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.

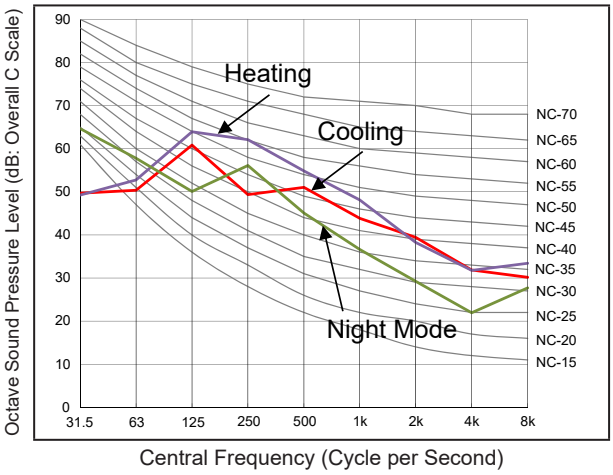
7. Sound Data

Measurement point: 1m from the service cover surface and 1.5m from floor level.

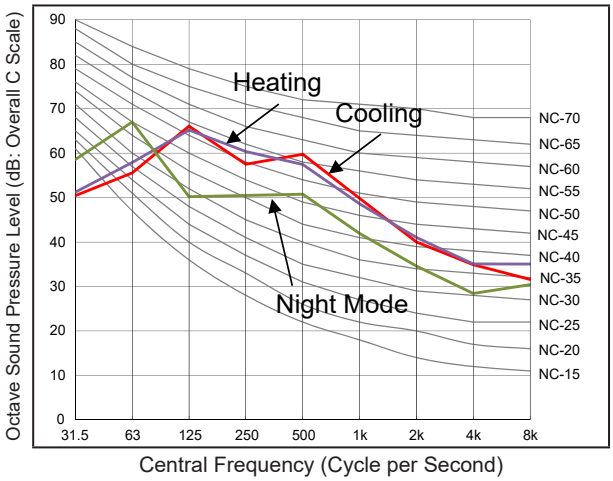
RAS-8.0RNBCLQ



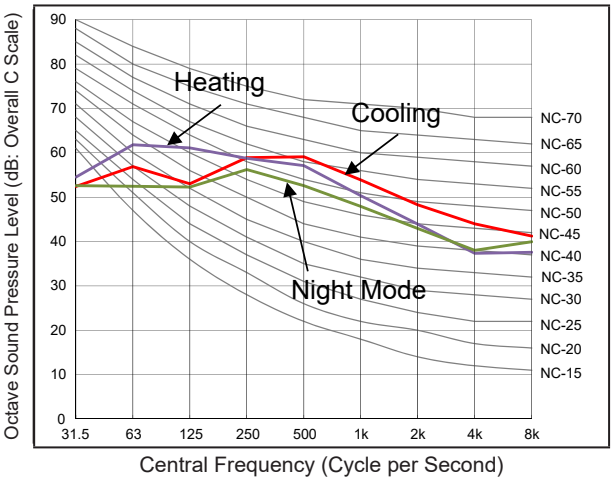
RAS-10RNBCLQ



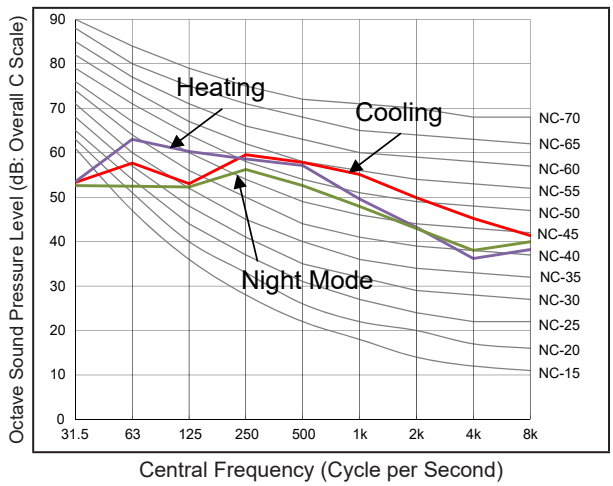
RAS-12RNBCLQ



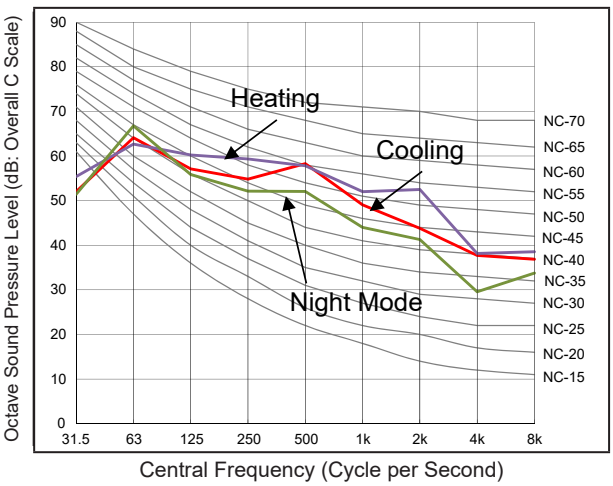
RAS-14RNBCLQ



RAS-16RNBCLQ



RAS-18RNBCLQ



NOTE:

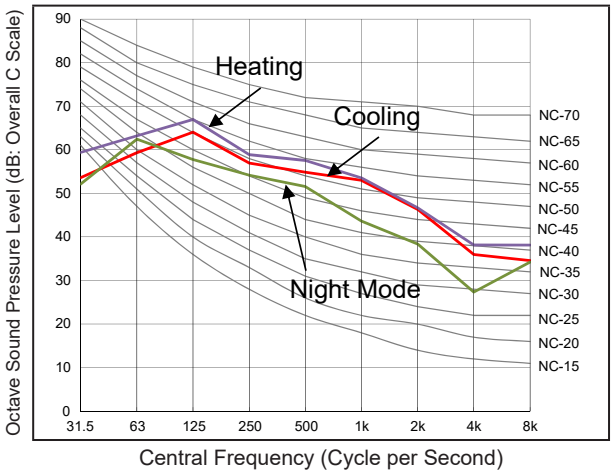
The readings were taken in an anechoic chamber. Sound in actural status may get bigger due to surrounding noise or echo. Take noise source into consideration to look for proper installation location.

(Noise on the back surface will go up 6 to 7dB higher than the front surface.)

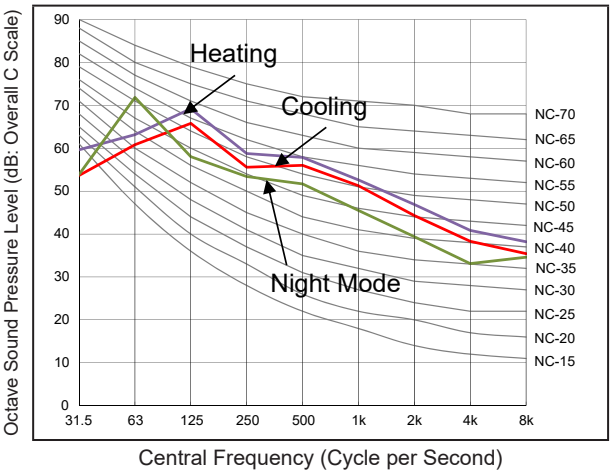
SOUND DATA

Measurement point: 1m from the service cover surface and 1.5m from floor level.

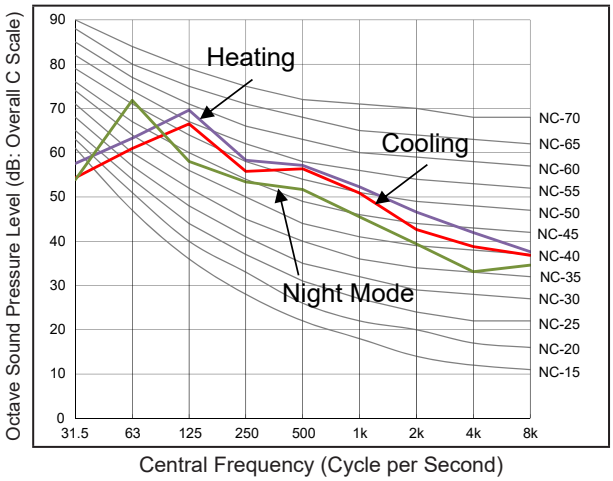
RAS-20RNBCLQ



RAS-22RNBCLQ



RAS-24RNBCLQ



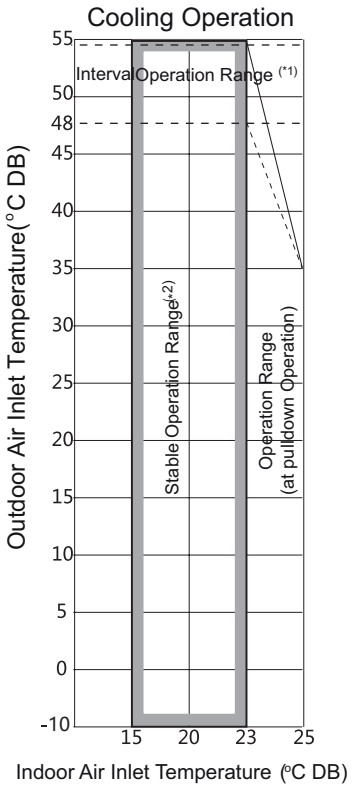
NOTE:

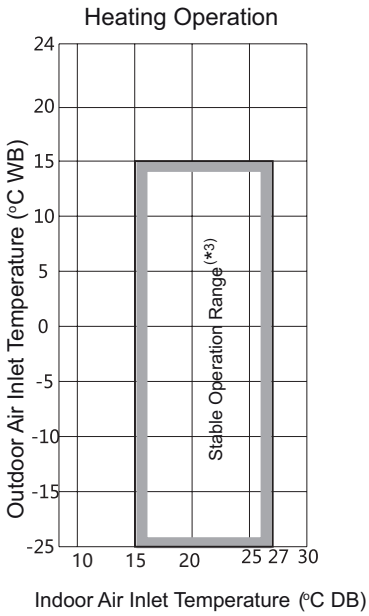
The readings were taken in an anechoic chamber. Sound in actual status may get bigger due to surrounding noise or echo. Take noise source into consideration to look for proper installation location.

(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 -10°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 -25°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	-10 to 55°C DB (*1)	-25 to 24°C WB

WORKING RANGE

Notes:

*1. (1) Cooling operation at maximum 55°C DB (48°C~55°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.

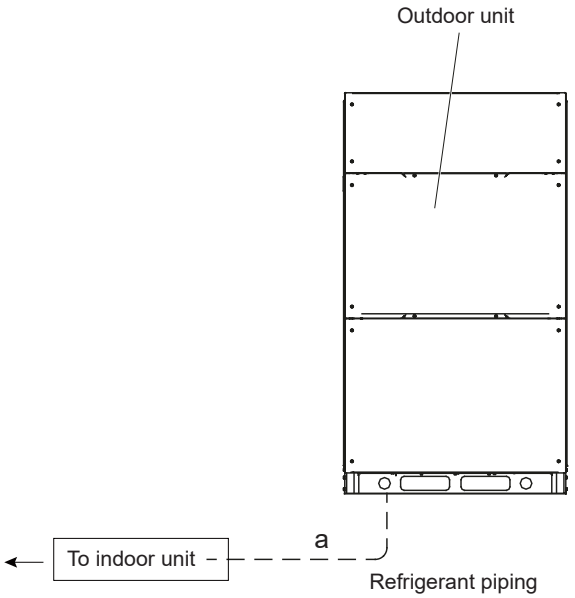
*2. There might be the possibility of thermo-OFF when cooling load is low and outdoor air inlet temperature is 10°C DB or lower to prevent frost formation on indoor unit heat exchanger.

*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.

9. Piping System

9.1. Connection of Refrigerant Pipes for 3 Pipes Heat Recovery System



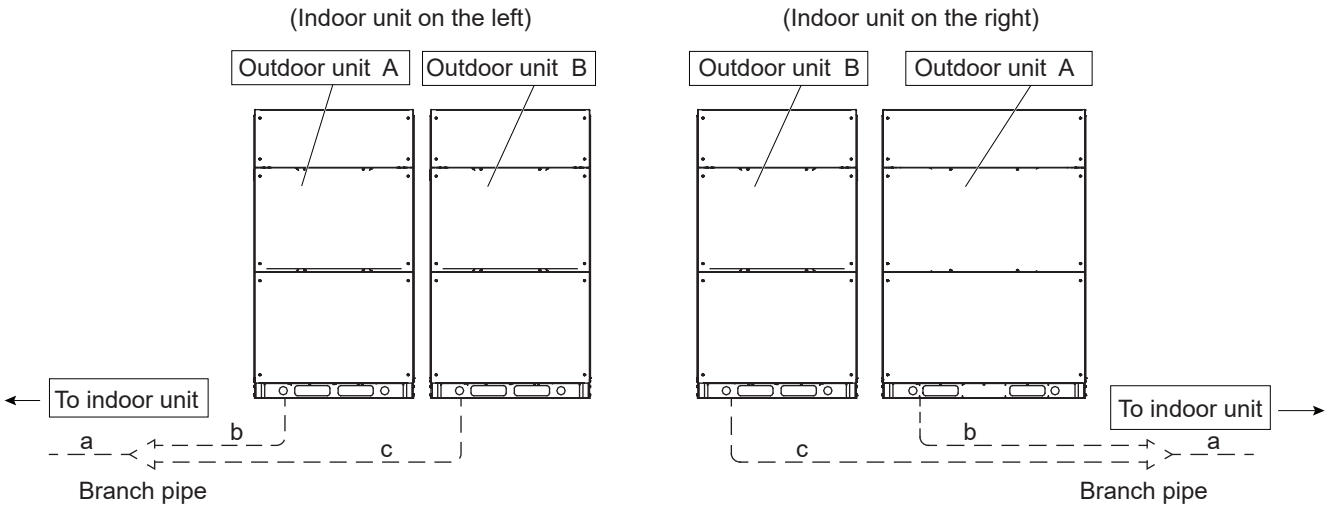
(Ømm)

Model			RAS-8.0RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ	RAS-14RNBCLQ
Pipe size	a	Low Pressure Gas	19.05	22.2	25.4	25.4
		High/Low Pressure Gas	15.88	19.05	22.2	22.2
		Liquid	9.53	9.53	12.7	12.7

Model			RAS-16RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22HRNBCLQ
Pipe size	a	Low Pressure Gas	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	25.4
		Liquid	12.7	15.88	15.88	15.88

Model			RAS-24RNBCLQ
Pipe size	a	Low Pressure Gas	28.58
		High/Low Pressure Gas	25.4
		Liquid	15.88

9.1.1 RAS-26RNBCLQ~RAS-48RNBCLQ Piping Specifications (3 pipes)



2-Module Combination Table

(Ømm)

Model			RAS-26 RNBCLQ	RAS-28 RNBCLQ	RAS-30 RNBCLQ	RAS-32 RNBCLQ	RAS-34 RNBCLQ	RAS-36 RNBCLQ
Combination Mode		The outdoor unit A	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ
		The outdoor unit B	RAS-10 RNBCLQ	RAS-12 RNBCLQ	RAS-14 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ
Branch Pipe			M-692XNQ					
Piping Size	a	Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	38.1
		High/Low Pressure Gas	25.4	28.58	28.58	28.58	28.58	28.58
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	15.88	15.88
	c	Low Pressure Gas	22.2	25.4	25.4	28.58	28.58	28.58
		High/Low Pressure Gas	19.05	22.2	22.2	22.2	22.2	22.2
		Liquid	9.53	12.7	12.7	12.7	12.7	12.7

2-Module Combination Table

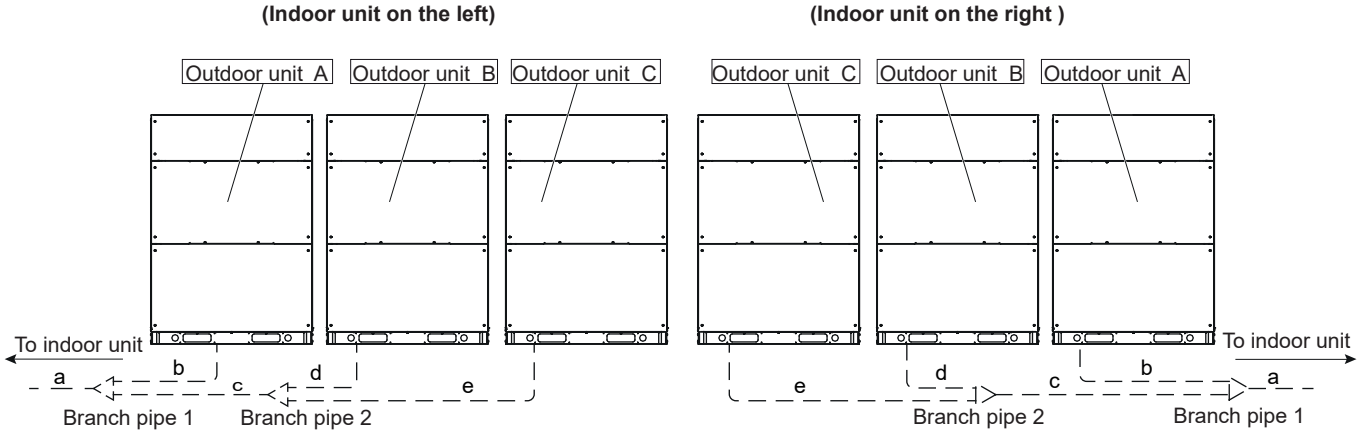
(Ømm)

Model			RAS-38 RNBCLQ	RAS-40 RNBCLQ	RAS-42 RNBCLQ	RAS-44 RNBCLQ	RAS-46 RNBCLQ	RAS-48 RNBCLQ
Combination Mode		The outdoor unit A	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe			M-902XNQ					
Piping Size	a	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	22.2	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	25.4	25.4	25.4
		Liquid	12.7	15.88	15.88	15.88	15.88	15.88

* Outdoor unit pipe constructing as per the requirements of the above table.

Refer to the table above for the outdoor model to select the Branch Pipe and pipe diameter.

9.1.2 RAS-50RNBCLQ~RAS-72RNBCLQ Piping Specifications (3 pipes)



3-Module Combination Table

(Ømm)

Model			RAS-50 RNBCLQ	RAS-52 RNBCLQ	RAS-54 RNBCLQ	RAS-56 RNBCLQ	RAS-58 RNBCLQ	RAS-60 RNBCLQ
Combination Mode		The outdoor unit A	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ
		The outdoor unit C	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ
Branch Pipe 1			M-902XNQ			M-M462XF		
Branch Pipe 2			M-692XNQ			M-692XNQ		
Piping Size	a	Low Pressure Gas	38.1	38.1	38.1	41.3	44.45	44.45
		High/Low Pressure Gas	31.75	31.75	31.75	38.1	41.3	41.3
		Liquid	19.05	19.05	19.05	22.2	22.2	22.2
	b	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	25.4	25.4	25.4	25.4
		Liquid pipe	15.88	15.88	15.88	15.88	15.88	15.88
	c	Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	38.1
		High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	15.88	15.88
	e	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	12.7	12.7

3-Module Combination Table

(Ømm)

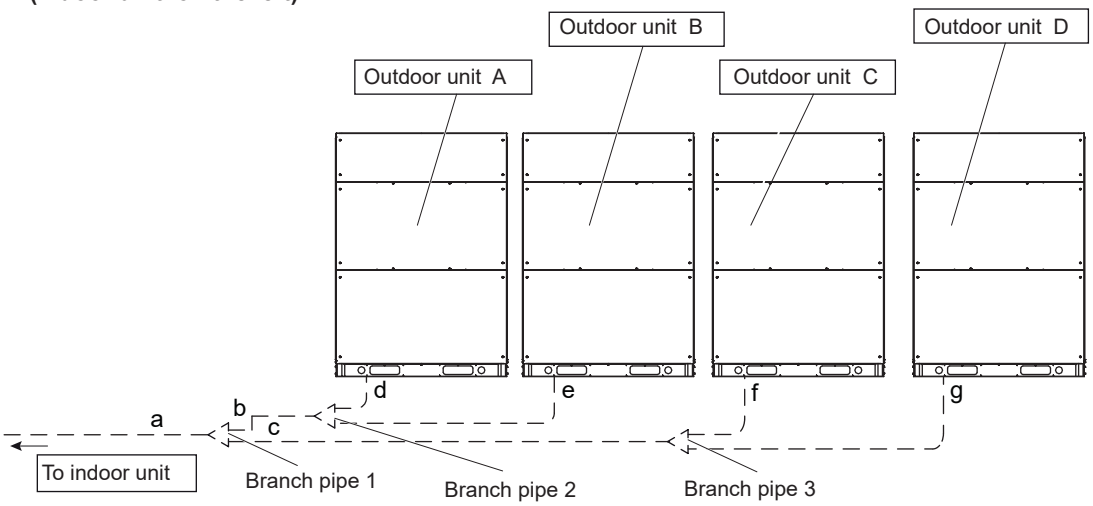
Model			RAS-62 RNBCLQ	RAS-64 RNBCLQ	RAS-66 RNBCLQ	RAS-68 RNBCLQ	RAS-70 RNBCLQ	RAS-72 RNBCLQ
Combination Mode		The outdoor unit A	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit C	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe 1			M-M462XF			M-M682XF		
Branch Pipe 2			M-902XNQ			M-902XNQ		
Piping Size	a	Low Pressure Gas	44.45	44.45	44.45	50.8	50.8	50.8
		High/Low Pressure Gas	41.3	41.3	41.3	44.5	44.5	44.5
		Liquid	22.2	22.2	22.2	25.4	25.4	25.4
	b	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	25.4	25.4
		Liquid	12.7	12.7	15.88	15.88	15.88	15.88

* Connect the pipes according to the above requirements of the outdoor unit.

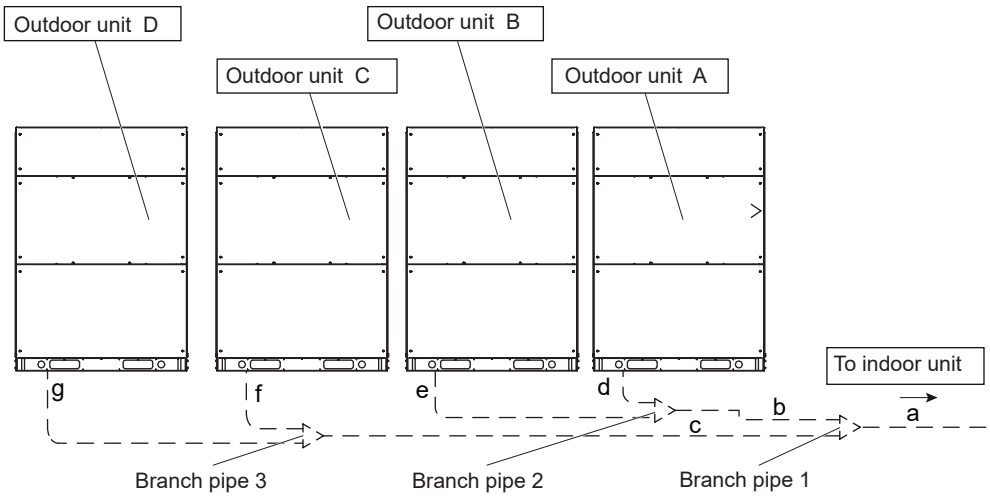
Refer to outdoor unit model that mentioned in above table, to select the Branch Pipe and piping diameter.

9.1.3 RAS-74RNBCLQ~RAS-96RNBCLQ Piping Specifications (3 pipes)

(Indoor unit on the left)



(Indoor unit on the right)



4-Module Combination Table

(Ømm)

Model			RAS-74 RNBCLQ	RAS-76 RNBCLQ	RAS-78 RNBCLQ	RAS-80 RNBCLQ	RAS-82 RNBCLQ	RAS-84 RNBCLQ
Combination Mode	The outdoor unit A		RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit B		RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
	The outdoor unit C		RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
	The outdoor unit D		RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
Branch Pipe 1			M-M682XF					
Branch Pipe 2			M-902XNQ					
Branch Pipe 3			M-692XNQ			M-902XNQ		
Piping Size	a	Low Pressure Gas pipe	50.8	50.8	50.8	50.8	50.8	50.8
		High/Low Pressure Gas	44.5	44.5	44.5	44.5	44.5	44.5
		Liquid	25.4	25.4	25.4	25.4	25.4	25.4
	b	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	Low Pressure Gas	31.75	31.75	31.75	38.1	38.1	38.1
		High/Low Pressure Gas	28.58	28.58	28.58	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	22.2	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	f	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	15.88	15.88	15.88
	g	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	15.88	15.88	15.88

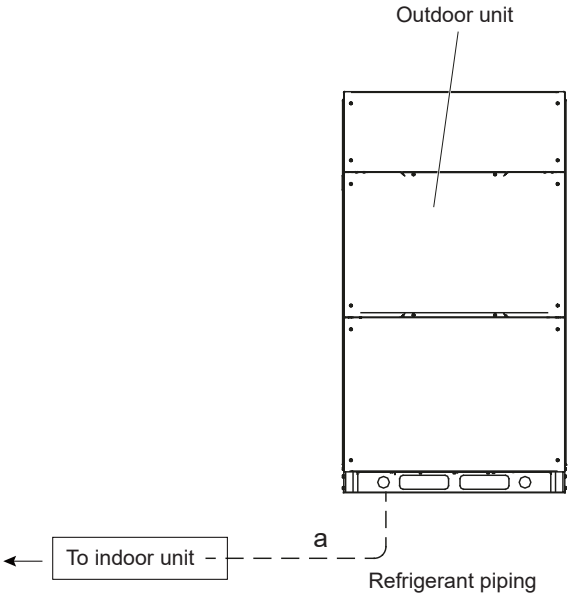
Model			RAS-86 RNBCLQ	RAS-88 RNBCLQ	RAS-90 RNBCLQ	RAS-92 RNBCLQ	RAS-94 RNBCLQ	RAS-96 RNBCLQ
Combination Mode	The outdoor unit A		RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit B		RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit C		RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 HRNBCLQ
	The outdoor unit D		RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe 1			M-M682XF					
Branch Pipe 2			M-902XNQ					
Branch Pipe 3			M-902XNQ					
Piping Size	a	Low Pressure Gas	50.8	50.8	50.8	50.8	50.8	50.8
		High/Low Pressure Gas	44.5	44.5	44.5	44.5	44.5	44.5
		Liquid pipe	25.4	25.4	25.4	25.4	25.4	25.4
	b	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	Low Pressure Gas pipe	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	f	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	g	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88

* Outdoor unit pipe constructing as per the requirements of the above table.

Refer to the table above for the outdoor model to select the Branch Pipe and pipe diameter.

9.2. Connection of Refrigerant Pipes for 2 Pipes Heat Pump System

9.2.1 RAS-8.0RNBCLQ~RAS-24RNBCLQ Piping Specifications (2 pipes))



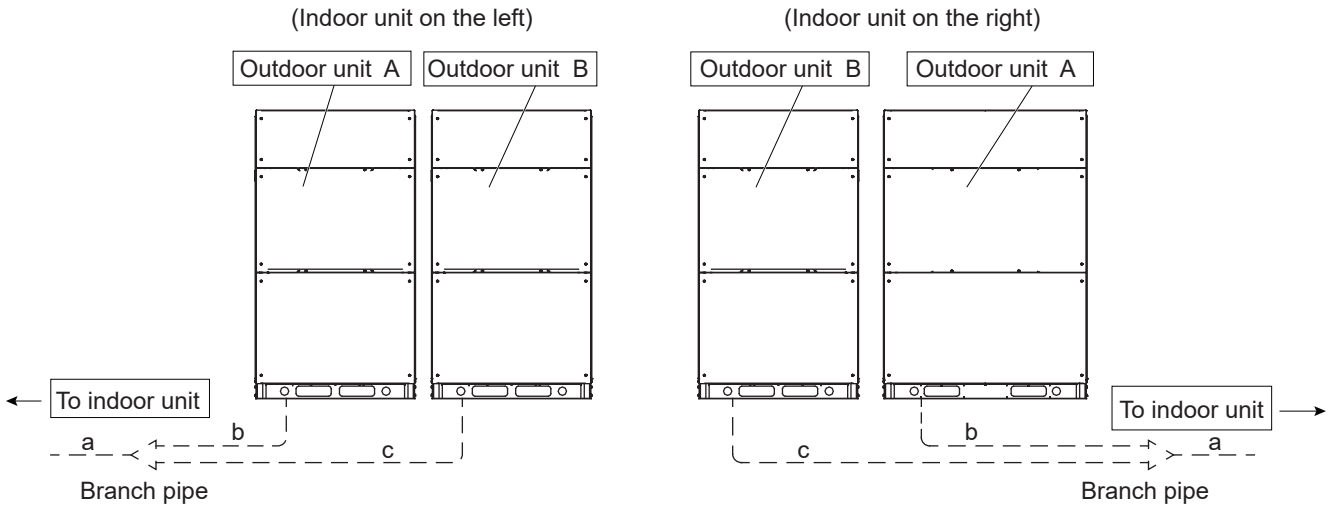
(Ømm)

Model			RAS-8.0RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ	RAS-14RNBCLQ
Pipe size	a	High/Low Pressure Gas	19.05	22.2	25.4	25.4
		Liquid	9.53	9.53	12.7	12.7

Model			RAS-16RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22HRNBCLQ
Pipe size	a	High/Low Pressure Gas	28.58	28.58	28.58	28.58
		Liquid	12.7	15.88	15.88	15.88

Model			RAS-24RNBCLQ
Pipe size	a	High/Low Pressure Gas	28.58
		Liquid	15.88

9.2.2 RAS-26RNBCLQ~RAS-48RNBCLQ Piping Specifications (2 pipes)



2-Module Combination Table (Ømm)

Model			RAS-26 RNBCLQ	RAS-28 RNBCLQ	RAS-30 RNBCLQ	RAS-32 RNBCLQ	RAS-34 RNBCLQ	RAS-36 RNBCLQ
Combination Mode		The outdoor unit A	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ
		The outdoor unit B	RAS-10 RNBCLQ	RAS-12 RNBCLQ	RAS-14 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ
Branch Pipe			M-30SNQ					M-46SNQ
Piping Size	a	High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	12.7	15.88	15.88
	c	High/Low Pressure Gas	22.2	25.4	25.4	28.58	28.58	28.58
		Liquid	9.53	12.7	12.7	12.7	12.7	12.7

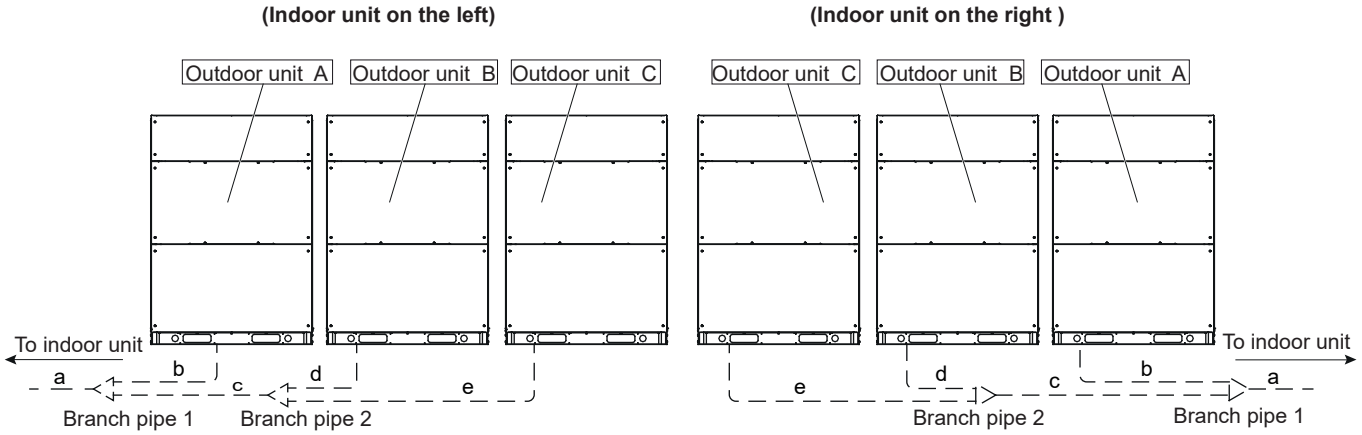
2-Module Combination Table (Ømm)

Model			RAS-38 RNBCLQ	RAS-40 RNBCLQ	RAS-42 RNBCLQ	RAS-44 RNBCLQ	RAS-46 RNBCLQ	RAS-48 RNBCLQ
Combination Mode		The outdoor unit A	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe			M-46SNQ					
Piping Size	a	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	15.88	15.88	15.88	15.88	15.88

* Outdoor unit pipe constructing as per the requirements of the above table.

Refer to the table above for the outdoor model to select the Branch Pipe and pipe diameter.

9.2.3 RAS-50RNBCLQ~RAS-72RNBCLQ Piping Specifications (2 pipes)



3-Module Combination Table

(Ømm)

Model			RAS-50 RNBCLQ	RAS-52 RNBCLQ	RAS-54 RNBCLQ	RAS-56 RNBCLQ	RAS-58 RNBCLQ	RAS-60 RNBCLQ
Combination Mode		The outdoor unit A	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ
		The outdoor unit C	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ
Branch Pipe 1			M-46SNQ			M-68SNQ		
Branch Pipe 2			M-30SNQ			M-30SNQ		
Piping Size	a	High/Low Pressure Gas	38.1	38.1	38.1	44.5	44.5	44.5
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	12.7	15.88	15.88
	e	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	12.7	12.7	12.7

3-Module Combination Table

(Ømm)

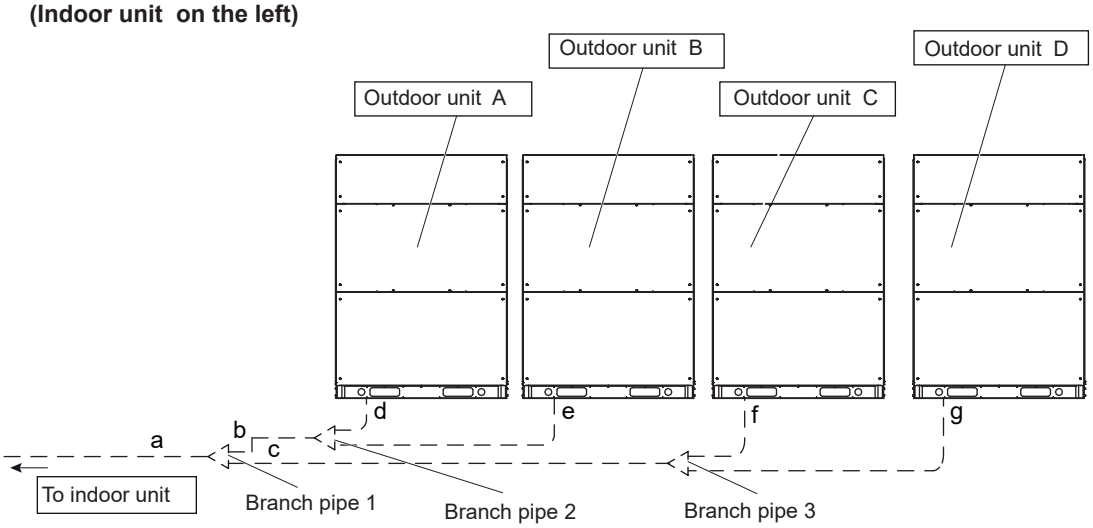
Model			RAS-62 RNBCLQ	RAS-64 RNBCLQ	RAS-66 RNBCLQ	RAS-68 RNBCLQ	RAS-70 RNBCLQ	RAS-72 RNBCLQ
Combination Mode		The outdoor unit A	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit C	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe 1			M-68SNQ					
Branch Pipe 2			M-30SNQ					
Piping Size	a	High/Low Pressure Gas	44.5	44.5	44.5	44.5	44.5	44.5
		Liquid	19.05	19.05	19.05	22.2	22.2	22.2
	b	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	15.88	15.88	15.88	15.88

* Connect the pipes according to the above requirements of the outdoor unit.

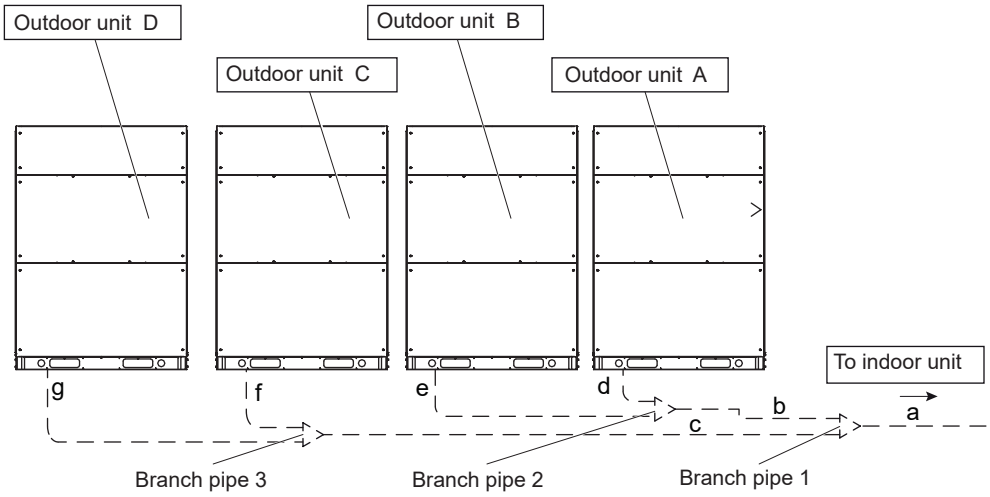
Refer to outdoor unit model that mentioned in above table, to select the Branch Pipe and piping diameter.

9.2.4 RAS-74RNBCLQ~RAS-96RNBCLQ Piping Specifications (2 pipes)

(Indoor unit on the left)



(Indoor unit on the right)



4-Module Combination Table

(Ømm)

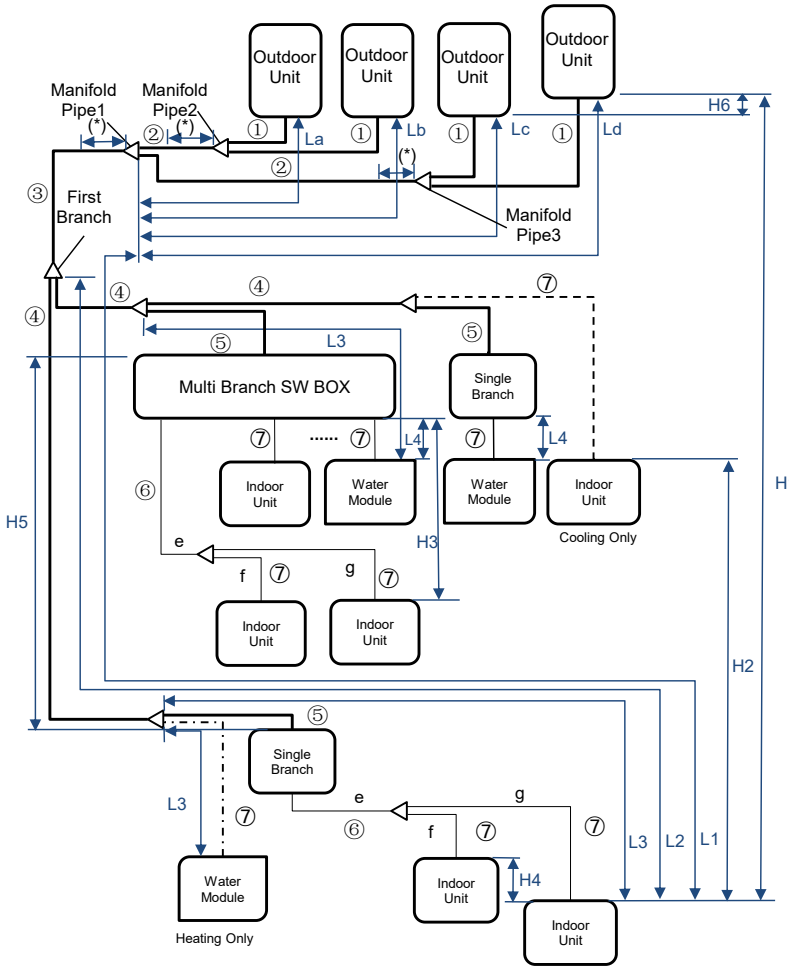
Model			RAS-74 RNBCLQ	RAS-76 RNBCLQ	RAS-78 RNBCLQ	RAS-80 RNBCLQ	RAS-82 RNBCLQ	RAS-84 RNBCLQ
Combination Mode	The outdoor unit A		RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit B		RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
	The outdoor unit C		RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
	The outdoor unit D		RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
Branch Pipe 1			M-68SNQ					
Branch Pipe 2			M-30SNQ					
Branch Pipe 3			M-30SNQ					
Piping Size	a	High/Low Pressure Gas	50.8	50.8	50.8	50.8	50.8	50.8
		Liquid	22.2	22.2	22.2	22.2	22.2	22.2
	b	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	High/Low Pressure Gas	31.75	31.75	31.75	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	f	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	15.88	15.88	15.88
	g	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	15.88	15.88	15.88

Model			RAS-86 RNBCLQ	RAS-88 RNBCLQ	RAS-90 RNBCLQ	RAS-92 RNBCLQ	RAS-94 RNBCLQ	RAS-96 RNBCLQ
Combination Mode	The outdoor unit A		RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit B		RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit C		RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 HRNBCLQ
	The outdoor unit D		RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe 1			M-68SNQ					
Branch Pipe 2			M-30SNQ					
Branch Pipe 3			M-30SNQ					
Piping Size	a	High/Low Pressure Gas	50.8	50.8	50.8	50.8	50.8	50.8
		Liquid	22.2	22.2	25.4	25.4	25.4	25.4
	b	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	f	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	g	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88

* Outdoor unit pipe constructing as per the requirements of the above table.

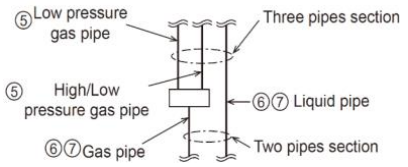
Refer to the table above for the outdoor model to select the Branch Pipe and pipe diameter.

9.3. Pipe Connection Design Guidance for 3 Pipes Heat Recovery System

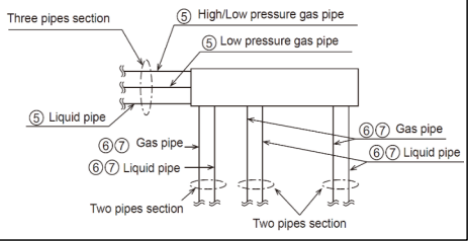


(*) Keep the straight line distance of 500mm or more after the manifold pipe

For single branch SW BOX:



For multi branch SW BOX:



: High/Low Pressure Gas Pipe, Low Pressure Gas Pipe, Liquid Pipe

: Gas Pipe, Liquid Pipe

: Low Pressure Gas Pipe, Liquid Pipe (For Cooling Only Indoor Unit)

: High/Low Pressure Gas Pipe, Liquid Pipe (For Heating Only Water Module)

Pipe Length and Height Difference

Item		Mark	Permitted Value	
			< Recommended Connectable Number of Indoor Unit and Water Module	≥ Recommended Connectable Number of Indoor Unit or Water Module
Total Piping Length		Total Liquid Piping Actual Length	≤ 1000m	≤ 300m
Piping Length between Manifold Pipe 1 and Each Outdoor Unit		La, Lb, Lc, Ld	≤ 10m	
Maximum Piping Length	Actual Length	L1	≤165	
	Equivalent Length		≤190m	
Maximum Piping Length between First Branch and Each Indoor Unit		L2	≤ 90m	≤ 40m
Maximum Piping Length between Each Branch Pipe and Each Indoor Unit		L3	≤ 40m	≤ 30m
Total Piping Length between Switch Box and Each Indoor Unit		L4 e+f+g	≤ 40m	
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	H1	≤ 50m	
	O.U. is Lower		≤ 40m	
Height Difference between Indoor Units		H2	≤ 30m	
Height Difference between Switch Box and Indoor Units		H3	≤ 15m	
Height Difference between Indoor Units using the Same Branch of Switch Box		H4	≤ 4m	
Height Difference between Switch Boxes		H5	≤ 15m	
Height Difference between Outdoor Units		H6	≤ 0.1m	

NOTE:

(1) Check the gas pipe and liquid pipe are equivalent in terms of the piping length and piping system.
(2) Piping length between outdoor units should be La≤Lb≤Lc≤Ld≤ 10m.
(3) If the piping length between branch and indoor unit (L3) is considerably longer than others, refrigerant may not flow well and also performance may be deteriorated compared to other models. (Recommended: L3≤ 15m)
(4) When the liquid piping length is longer than 15m, use Φ9.53 pipe and reducer (field-supplied).
(5) Allowable total piping length may become shorter than 1,000m due to the limitation of maximum additional refrigerant amount.
(6) Function setting of Ci is required (Ci=2), in case of height difference between indoor units: 15m < H2 ≤ 30m.
(7) In case of the height difference between outdoor units and indoor units: 50m (40m) < H1 ≤ 90m, contact technical department of the manufacture.

①② Piping between outdoor unit Refer to section 9.1.

③ Main Pipe (Basic Unit or Manifold Pipe 1 to First Branch)

Outdoor Unit Capacity	(L1<100m)			(L1≥100m)			First Branch Model
	Low Pressure Gas Φ mm	High/Low Pressure Gas Φ mm	Liquid Φ mm	Low Pressure Gas Φ mm	High/Low Pressure Gas Φ mm	Liquid Φ mm	
8 HP	19.05	15.88	9.53	22.2	19.05	12.7	M-282XNQ#E
10 HP	22.2	19.05	9.53	25.4	22.2	12.7	
12~14 HP	25.4	22.2	12.7	28.58	25.4	15.88	M-452XNQ#E
16 HP	28.58	22.2	12.7	31.75	25.4	15.88	
18~20 HP	28.58	22.2	15.88	31.75	25.4	19.05	M-562XNQ#E
22~24 HP	28.58	25.4	15.88	31.75	28.58	19.05	
26 HP	31.75	25.4	19.05	38.1	28.58	22.2	M-692XNQ#E
28~34 HP	31.75	28.58	19.05	38.1	31.75	22.2	
36 HP	38.1	28.58	19.05	41.3	31.75	22.2	
38~54 HP	38.1	31.75	19.05	41.3	38.1	22.2	M-902XNQ#E
56 HP	41.3	38.1	22.2	44.45	41.3	25.4	M-M462XF#
58~66 HP	44.45	41.3	22.2	50.8	44.45	25.4	
68~96 HP	50.8	44.5	22.2	50.8	50.8	25.4	M-M682XF#E

NOTE:

When maximum length of the equivalent refrigerant pipe (L1) from the outdoor unit/manifold pipe1 to the indoor unit is over 100m, the pipe size of low pressure gas, high/low pressure gas and liquid line from basic unit/manifold pipe1 to first branch should be increased one size with the reducer (field-supplied).

④ Pipe after first branch (3 pipes portion)

Total Indoor Unit Capacity (kW)	Low Pressure Gas Φ mm	High/Low Pressure Gas Φ mm	Liquid Φ mm	Branch Pipe Model
Q<15.9	15.88	12.7	9.53	M-142XNQ#E
15.9≤Q<25	19.05	15.88	9.53	M-282XNQ#E
25≤Q<33.5	22.2	19.05	9.53	
33.5≤Q<45	25.4	22.2	12.7	M-452XNQ#E
45≤Q<50	28.58	22.2	12.7	M-562XNQ#E
50≤Q<61.5	28.58	22.2	15.88	
61.5≤Q<73	28.58	25.4	15.88	M-692XNQ#E
73≤Q<101	31.75	28.58	19.05	
101≤Q<158.5	38.1	31.75	19.05	M-902XNQ#E
158.5≤Q<163	41.3	38.1	22.2	M-M462XF#
163≤Q<192	44.45	41.3	22.2	
192≤Q	50.8	44.45	25.4	M-M682XF#E

NOTE:

Even if the equivalent refrigerant piping length (L1) is more than 100m, no need to increase the pipe size after first branch. If the branch pipe size is larger than the first branch, adjust the branch pipe size to the first branch. In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as the one before the branch.

⑤ Pipe Diameter between Switch Box to Branch Pipe (3 pipes or 2 pipes portion)

Type	SW BOX Model	Number of Branch	Number of Connectable Indoor Unit per Branch	Maximum Combination of Indoor Unit Capacity (kW)		Low Pressure Gas	High/Low Pressure Gas	Liquid
				per SW BOX	per Branch			
Single	CHS-6.0N2	1	1-8	15.9kW(6HP)	11.2kW (4HP)	15.88	12.7	9.53
					15.9kW(6HP)	19.05	15.88	9.53
	CHS-10N2	1	1-8	28kW (10HP)	22.4kW (8HP)	19.05	15.88	9.53
					28kW (10HP)	22.2	19.05	9.53
Multi	CHM-4.0N2	4	1-6	40kW(14HP)	15.9kW (6HP)	Refer to ④		
	CHM-8.0N2	8	1-6	85kW(30HP)	15.9kW (6HP)			
	CHM-12N2	12	1-6	85kW(30HP)	15.9kW (6HP)			
	CHM-16N2	16	1-6	85kW(30HP)	15.9kW (6HP)			

NOTE:

(1) When multiple indoor units are connected to the same branch, they are controlled with the same operation mode.

(2) The liquid pipe is not required to connect to the single SW BOX.

(3) In case that the number of connectable indoor units exceeds four, the high/low pressure gas pipe, low pressure gas pipe and liquid pipe need to increase one size respectively.

⑥ Pipe after first branch (2 pipes portion)

Total Indoor Unit (kW)	Gas (Φmm)	Liquid (Φ mm)	Branch Pipe Model
Q≤15.9	15.88	9.53	E-102SN#E
15.9≤Q<25	19.05	9.53	
25≤Q<33.5	22.2	9.53	
33.5≤Q<45	25.4	12.7	E-162SN#E
45≤Q<50	28.58	12.7	
50≤Q<73	28.58	15.88	E-242SN#E
73≤Q<101	31.75	19.05	E-302SN#E
101≤Q<158.5	38.1	19.05	
158.5≤Q<163	41.3	22.2	E-462SN#E
163≤Q<192	44.45	22.2	
192≤Q	50.8	25.4	E-682SN#E

⑦ Pipe between last branch and indoor unit (2-pipe portion)

NOTE:

(1) The pipe diameter should be the same as the indoor unit piping connection size. For details, please refer to the technical catalog of the indoor unit.

(2) When the liquid piping length is longer than 15m, use Φ9.53 pipe and reducer (field-supplied) instead of Φ6.35 pipe.

Piping Branch Restrictions

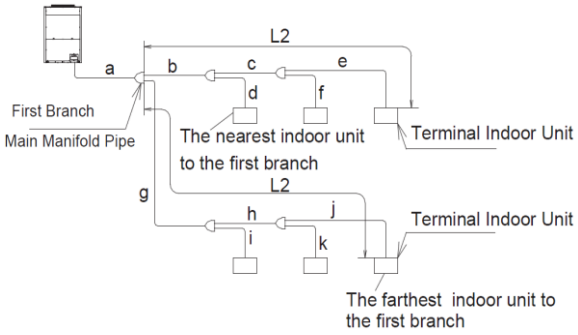
IIn the case that the piping length from the first branch to the farthest indoor unit (L2) is over 40m, follow the instructions below when performing the field-supplied piping work.

Example 1: Installation with Main Piping Branch

In the case that piping length from the first branch to the terminal indoor units is within 40-90m.

(1) If the piping length L2 is over 40m, the diameter of gas and liquid lines “b and c” or “g and h” should be increased by one size with reducers (field-supplied).

(2) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the nearest indoor unit must be within 40m.

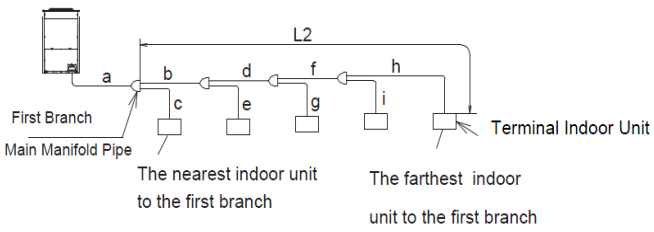


Example 2: Installation without Main Piping Branch

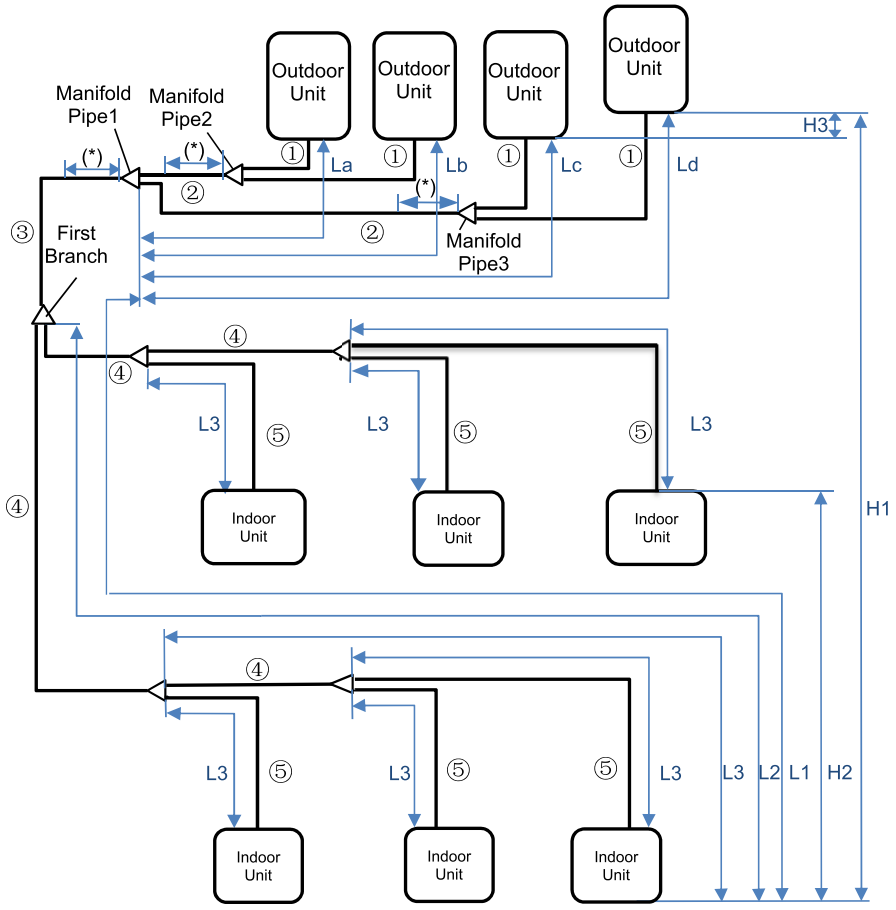
In the case that piping length from the first branch to the terminal Indoor Units is within 40-90m,

(1) If the piping length L2 is over 40m, the diameter size of gas and liquid lines “b, d and f” should be increased by one size with reducers (field-supplied). If (a) is smaller than (b) after increasing the size, increase the size of (a) to the same size as (b).

(2) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the nearest indoor unit must be within 40m.



9.4. Pipe Connection Design Guidance for 2 Pipes Heat Pump System



(*): Keep the straight distance of 500mm or more after the Manifold Pipe.

Pipe Length and Height Difference

Item		Mark	Permitted Value	
			< Recommended Connectable Number of Indoor Unit	≥ Recommended Connectable Number of Indoor Unit
Total Piping Length		Total Liquid Piping Actual Length	≤ 1000m	≤ 300m
Piping Length between Manifold Pipe 1 and Each Outdoor Unit		La, Lb, Lc, Ld	≤ 10m	
Maximum Piping Length	Actual Length	L1	≤165	
	Equivalent Length		≤190m	
Maximum Piping Length between First Branch and Each Indoor Unit		L2	≤ 90m	≤ 40m
Maximum Piping Length between Each Branch Pipe and Each Indoor Unit		L3	≤ 40m	≤ 30m
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	H1	≤ 50m	
	O.U. is Lower		≤ 40m	
Height Difference between Indoor Units		H2	≤ 30m	
Height Difference between Outdoor Units		H3	≤ 0.1m	

NOTE:

(3) Check the gas pipe and liquid pipe are equivalent in terms of the piping length and piping system.
(4) Piping length between outdoor units should be La≤Lb≤Lc≤Ld≤ 10m.
(5) If the piping length between branch and indoor unit (L3) is considerably longer than others, refrigerant may not flow well and also performance may be deteriorated compared to other models. (Recommended: L3≤ 15m)
(6) When the liquid piping length is longer than 15m, use Φ9.53 pipe and reducer (field-supplied).
(7) Allowable total piping length may become shorter than 1,000m due to the limitation of maximum additional refrigerant amount.
(8) Function setting of Ci is required (Ci=2), in case of height difference between indoor units: 15m < H2 ≤ 30m.
(9) In case of the height difference between outdoor units and indoor units: 50m (40m) < H1 ≤ 90m, contact technical department of the manufacture.

①② Piping between outdoor unit Refer to section 9.2.

③ Main Pipe (Basic Unit or Manifold Pipe 1 to First Branch)

Outdoor Unit Capacity	Maximum Pipe Length L1<100m			Maximum Pipe Length L1≥100m		
	Gas Φ mm	Liquid Φ mm	First Branch Model	Gas Φ mm	Liquid Φ mm	First Branch Model
8 HP	19.05	9.53	E-102SN#E	22.2	12.7	E-162SN#E
10 HP	22.2	9.53		25.4	12.7	
12~14 HP	25.4	12.7	E-162SN#E	28.58	15.88	E-242SN#E
16 HP	28.58	12.7		31.75	15.88	E-302SN#E
18~24 HP	28.58	15.88	E-242SN#E	31.75	19.05	
26~34 HP	31.75	19.05	E-302SN#E	38.1	22.2	E-462SN#E
36~54 HP	38.1	19.05		44.45	22.2	
56~66 HP	44.45	19.05	E-462SN#E	50.8	25.4	E-682SN#E
68~72 HP	44.45	22.2		50.8	25.4	
74~88 HP	50.8	22.2	E-682SN#E	50.8	25.4	
90~96 HP	50.8	25.4		50.8	28.58	

NOTE:

When maximum length of the equivalent refrigerant pipe (L1) from the outdoor unit/manifold pipe1 to the indoor unit is over 100m, the pipe size of low pressure gas, high/low pressure gas and liquid line from basic unit/manifold pipe1 to first branch should be increased one size with the reducer (field-supplied).

④ Pipe after first branch (2 pipes portion)

Total Indoor Unit Capacity (kW)	Gas Φ mm	Liquid Φ mm	Branch Pipe Model
Q<15.9	15.88	9.53	M-142XNQ#E
15.9≤Q<25	19.05	9.53	M-282XNQ#E
25≤Q<33.5	22.2	9.53	
33.5≤Q<45	25.4	12.7	M-452XNQ#E
45≤Q<50	28.58	12.7	M-562XNQ#E
50≤Q<61.5	28.58	15.88	
61.5≤Q<73	28.58	15.88	M-692XNQ#E
73≤Q<101	31.75	19.05	
101≤Q<158.5	38.1	19.05	M-902XNQ#E
158.5≤Q<163	41.3	22.2	M-M462XF#
163≤Q<192	44.45	22.2	
192≤Q	50.8	25.4	M-M682XF#E

NOTE:

Even if the equivalent refrigerant piping length (L1) is more than 100m, no need to increase the pipe size after first branch. If the branch pipe size is larger than the first branch, adjust the branch pipe size to the first branch. In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as the one before the branch.

⑤ Pipe between last branch and indoor unit

1. The pipe diameter should be the same as the indoor unit piping connection size. For details, refer to the technical catalog of indoor unit.
2. When the liquid piping length is longer than 15m, use Φ9.53 pipe with reducer (field-supplied) instead of Φ6.35 pipe.

Piping Branch Restrictions

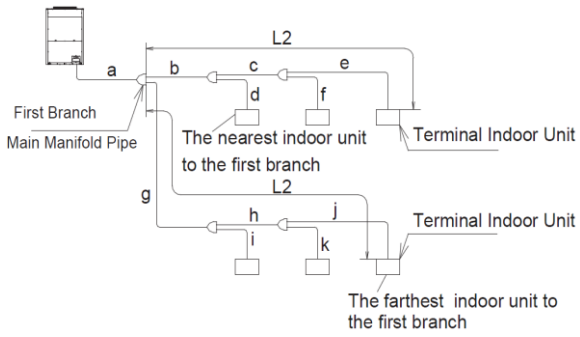
IIn the case that the piping length from the first branch to the farthest indoor unit (L2) is over 40m, follow the instructions below when performing the field-supplied piping work.

Example 1: Installation with Main Piping Branch

In the case that piping length from the first branch to the terminal indoor units is within 40-90m.

(1) If the piping length L2 is over 40m, the diameter of gas and liquid lines “b and c” or “g and h” should be increased by one size with reducers (field-supplied).

(2) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the nearest indoor unit must be within 40m.

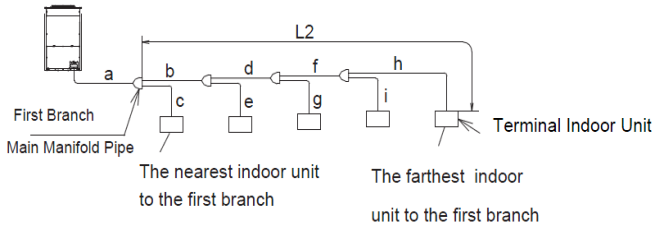


Example 2: Installation without Main Piping Branch

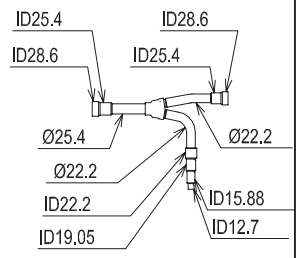
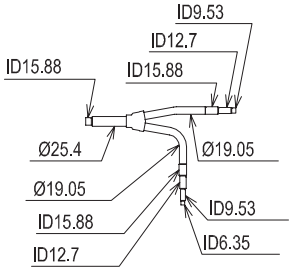
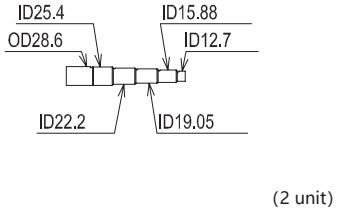
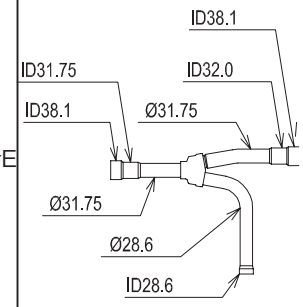
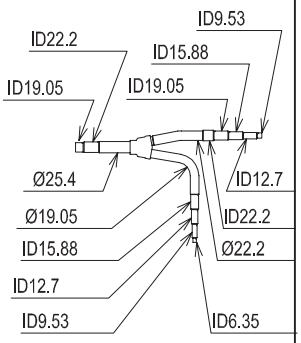
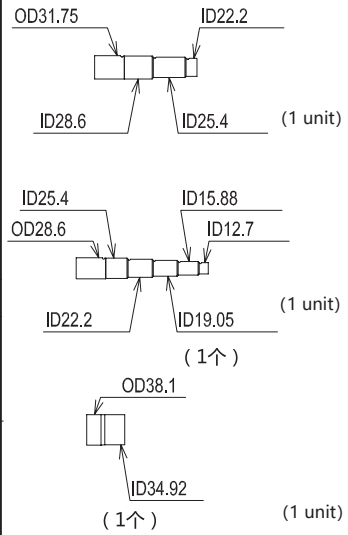
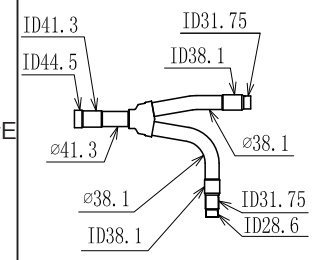
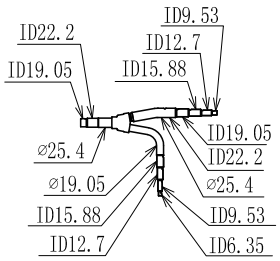
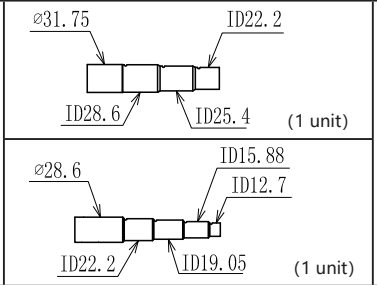
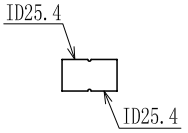
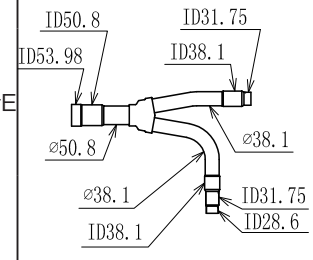
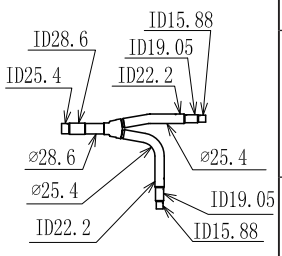
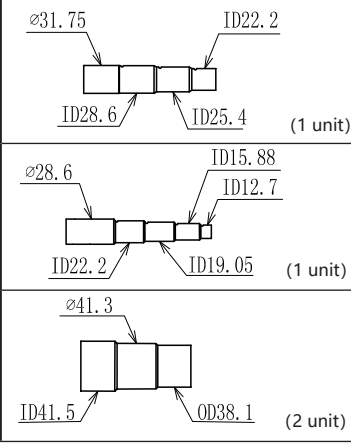
In the case that piping length from the first branch to the terminal Indoor Units is within 40-90m,

(1) If the piping length L2 is over 40m, the diameter size of gas and liquid lines “b, d and f” should be increased by one size with reducers (field-supplied). If (a) is smaller than (b) after increasing the size, increase the size of (a) to the same size as (b).

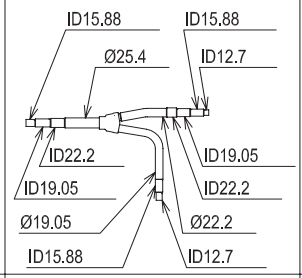
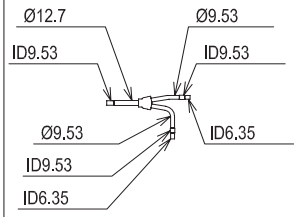
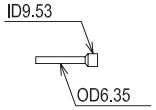
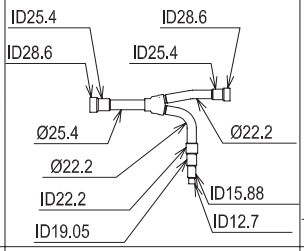
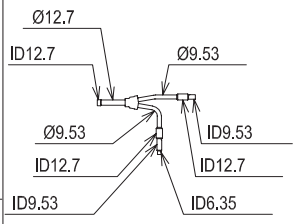
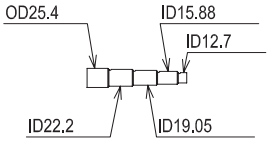
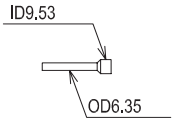
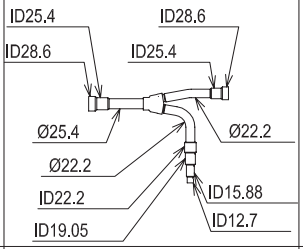
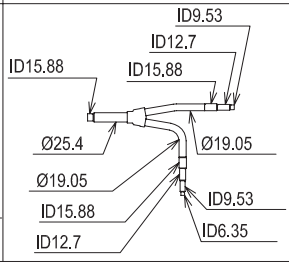
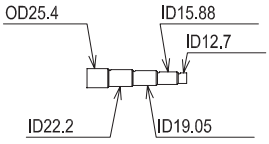
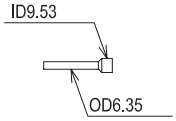
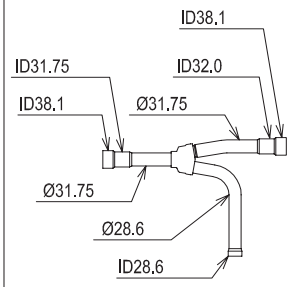
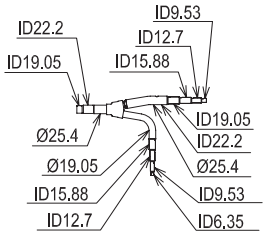
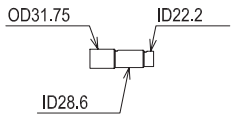
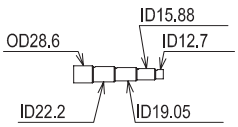
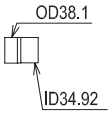
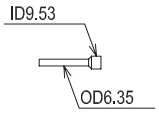
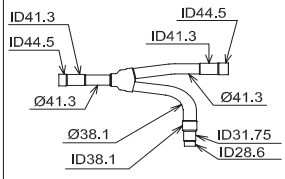
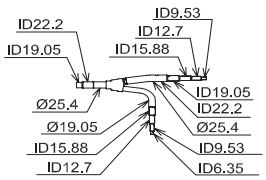
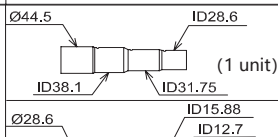
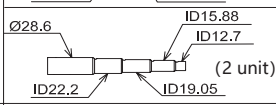
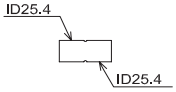
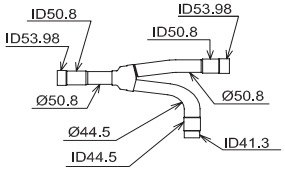
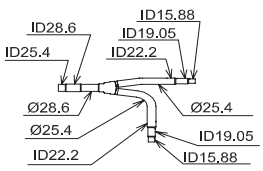
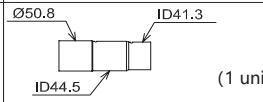
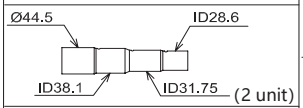
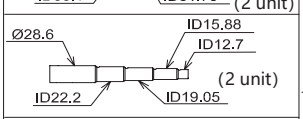
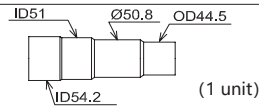
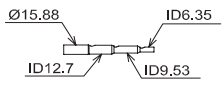
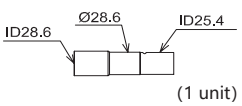
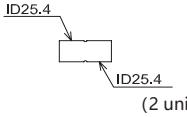
(2) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the nearest indoor unit must be within 40m.



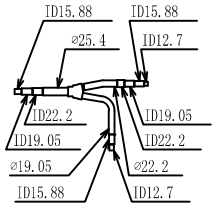
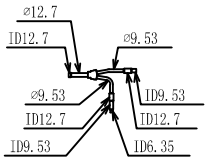
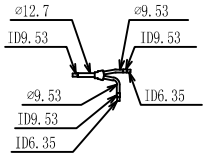
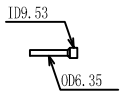
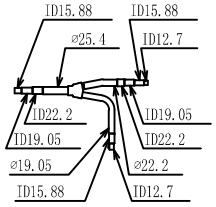
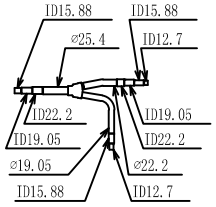
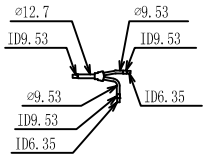
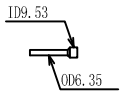
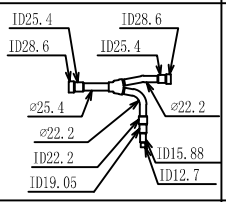
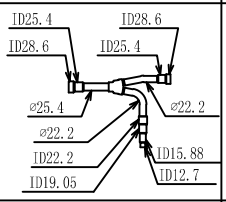
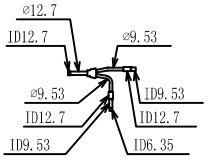
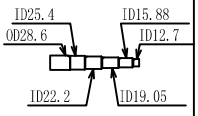
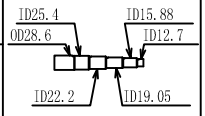
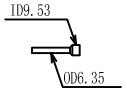
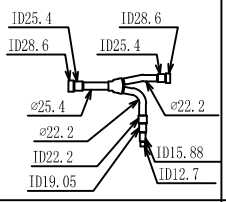
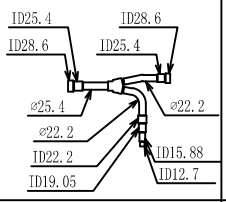
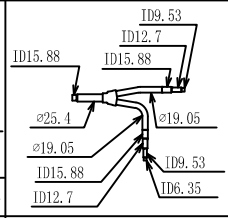
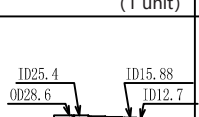
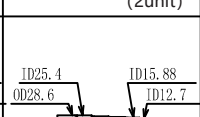
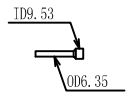
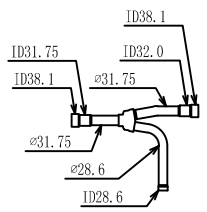
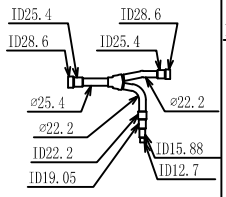
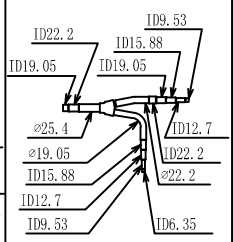
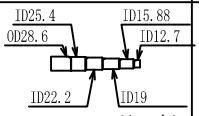
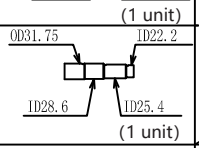
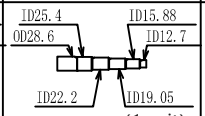
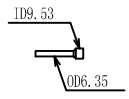
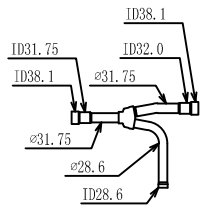
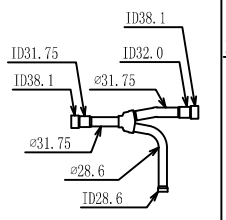
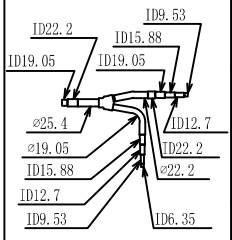
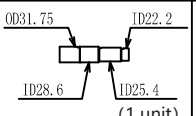
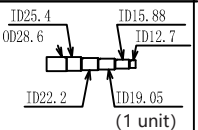
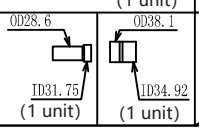
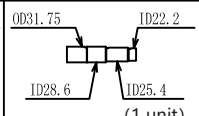
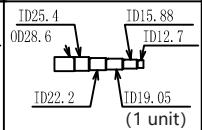
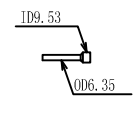
9.5. Piping Connection Kit Dimensions (optional)

Model	Gas Line	Liquid Line	Reducer for Gas Line	Reducer for Liquid Line
M-20SNQ#E				
M-30SNQ#E				
M-46SNQ#E				
M-68SNQ#E				

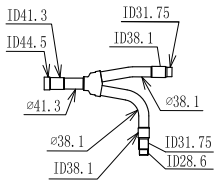
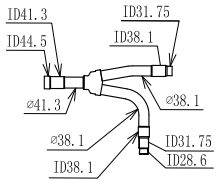
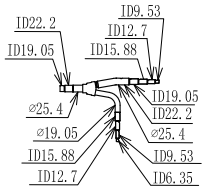
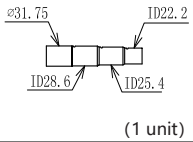
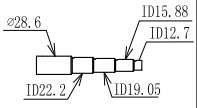
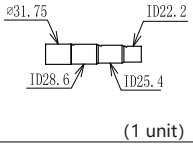
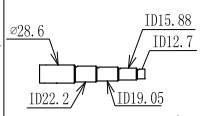
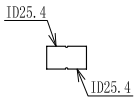
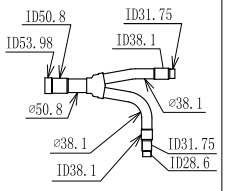
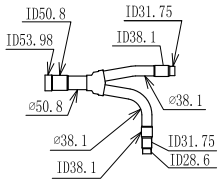
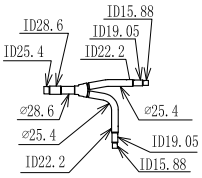
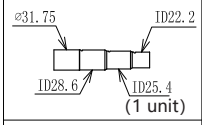
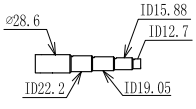
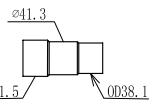
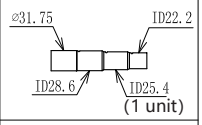
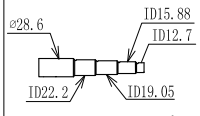
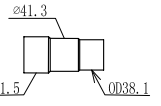
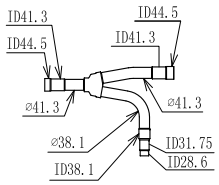
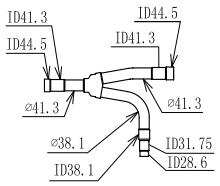
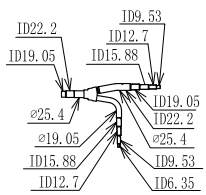
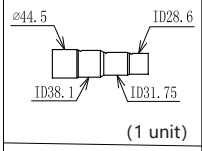
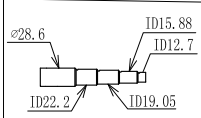
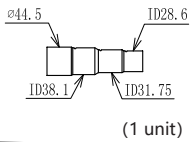
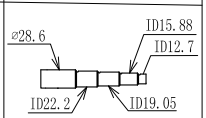
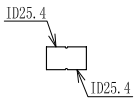
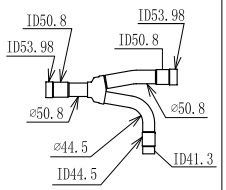
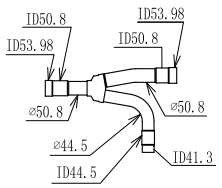
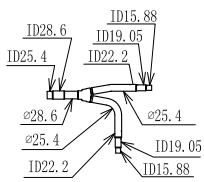
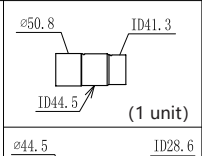
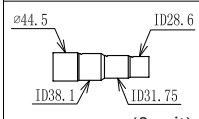
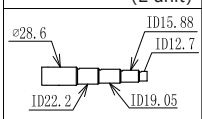
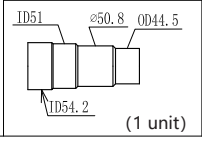
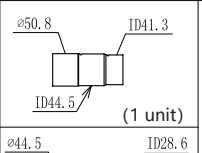
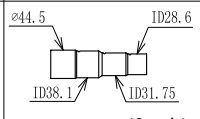
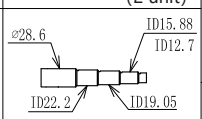
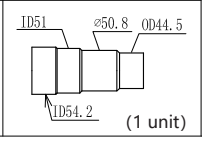
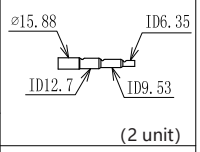
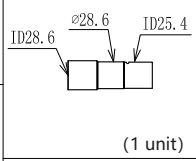
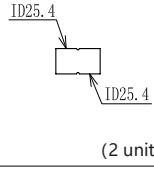
Unit: mm, ID: Inner Diameter, OD: Outer Diameter

Model	Gas Line	Liquid Line	Reducer for Gas Line	Reducer for Liquid Line
E-102 SN#E				 (2 unit)
E-162 SN#E			 (1 unit)	 (1 unit)
E-242 SN#E			 (1 unit)	 (1 unit)
E-302 SN#E			 (1 unit)  (1 unit)  (1 unit)	 (1 unit)
M-M 462 XF#E			 (1 unit)  (2 unit)	 (1 unit)
M-M 682 XF#E			 (1 unit)  (2 unit)  (2 unit)  (1 unit)	 (2 unit)  (1 unit)  (2 unit)

Unit: mm, ID: Inner Diameter, OD: Outer Diameter

Model	Low Pressure Gas Line	High Pressure Gas Line	Liquid Line	Reducer for Low Pressure Gas Line	Reducer for High Pressure Gas Line	Reducer for Liquid Line
M-142 XNQ#E						 (2 unit)
M-282 XNQ#E						 (2 unit)
M-452 XNQ#E				 (1 unit)	 (2unit)	 (1 unit)
M-562 XNQ#E				 (1 unit)	 (2 unit)	 (1 unit)
M-692 XNQ#E				 (1 unit)  (1 unit)	 (1 unit)	 (1 unit)
M-902 XNQ#E				 (1 unit)  (1 unit)  (1 unit) (1 unit)	 (1 unit)  (1 unit)	 (1 unit)

Unit: mm, ID: Inner Diameter, OD: Outer Diameter

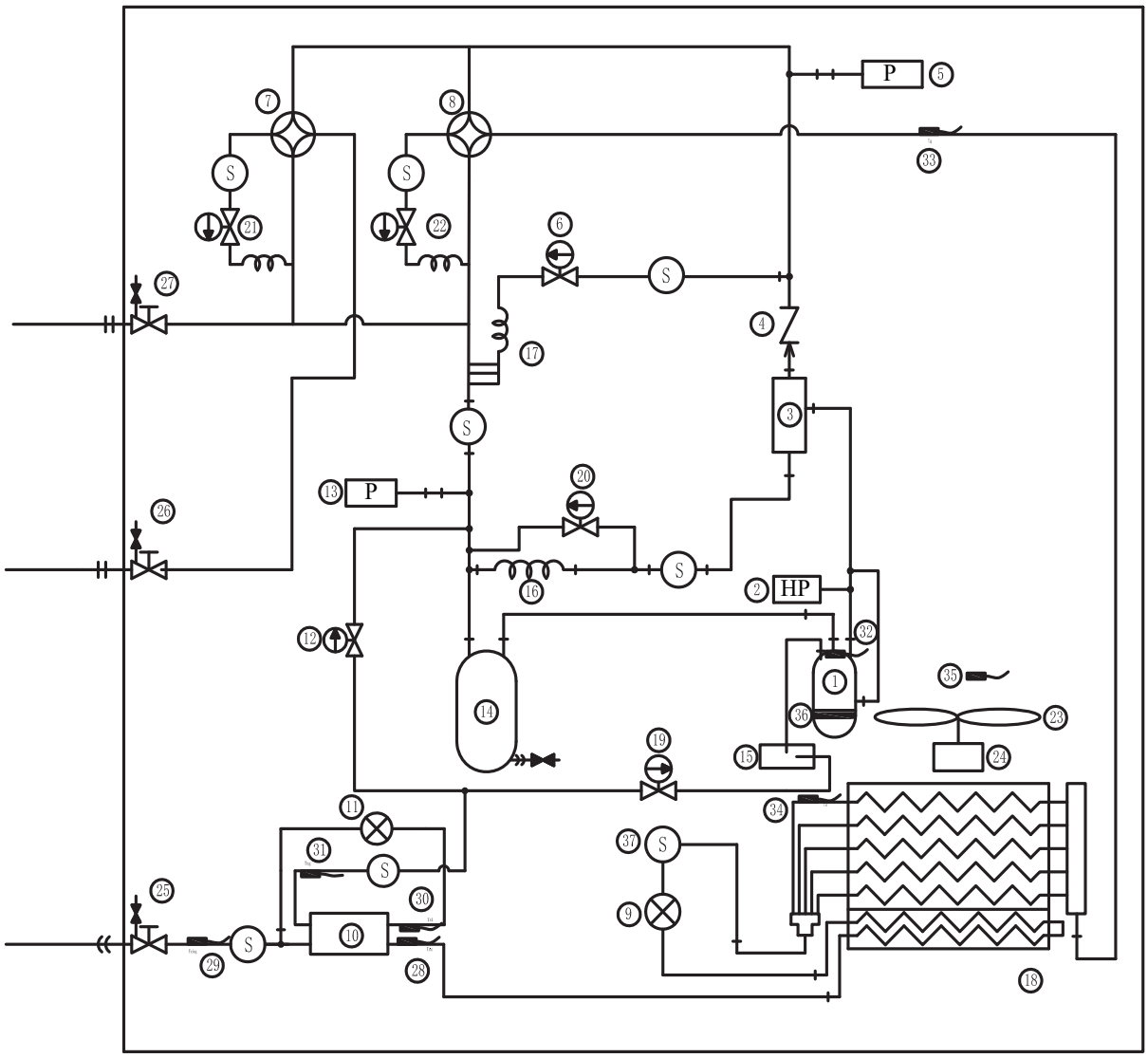
Model	Low Pressure Gas Line	High Pressure Gas Line	Liquid Line	Reducer for Low Pressure Gas Line	Reducer for High Pressure Gas Line	Reducer for Liquid Line
M-462 XF#E				 	 	
M-682 XF#E				  	  	
M-462 XF#E				 	 	
M-682 XF#E				   	   	  

Unit: mm, ID: Inner Diameter, OD: Outer Diameter

10. Control System

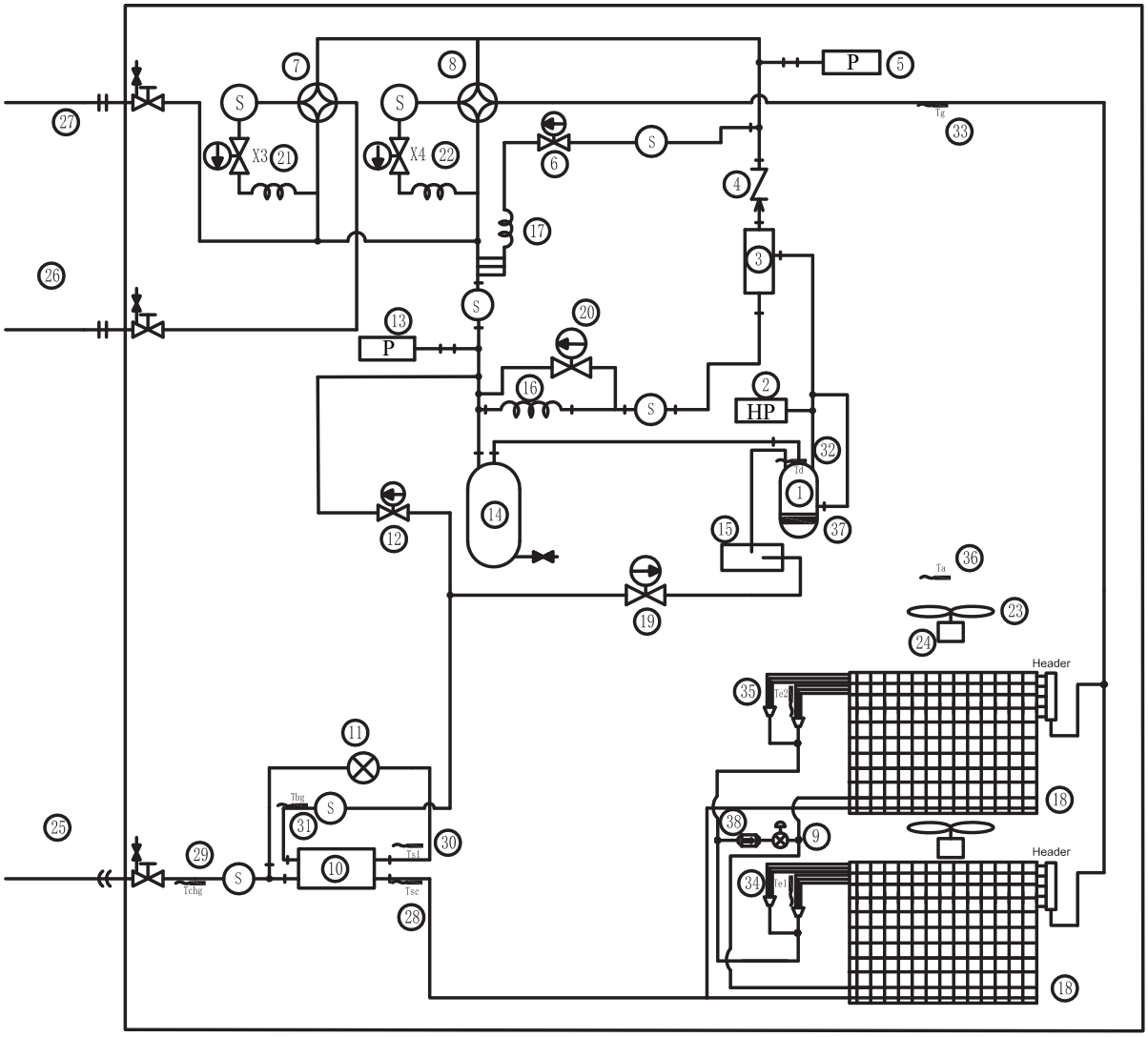
10.1 Refrigeration Cycle

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



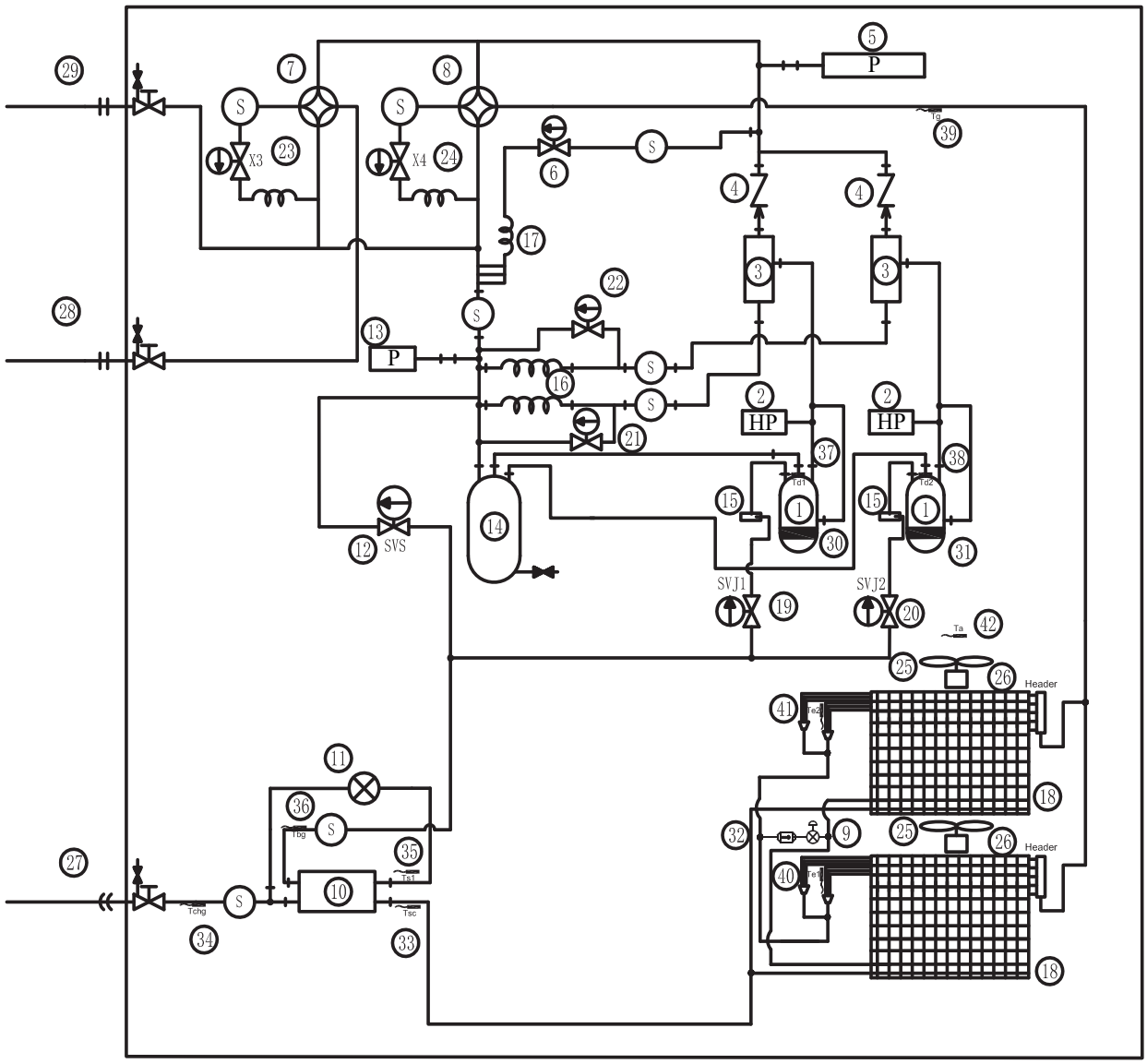
NO.	Name	NO.	Name	NO.	Name	NO.	Name
1	Compressor	11	Micro-computer Control Expansion Valve (EVB)	21	Solenoid Valve (SVX3)	31	Tbg Sensor
2	High pressure switch	12	Solenoid Valve (SVS)	22	Solenoid Valve (SVX4)	32	Td1 Sensor
3	Oil separator	13	Low pressure sensor	23	Propeller Fan	33	Tg Sensor
4	Check valve	14	Accumulator	24	Fan Motor	34	Te1 Sensor
5	High pressure sensor	15	Injection Muffler	25	Stop Valve (Liquid)	35	Ta Sensor
6	Gas Bypass Valve (SVA)	16	Capillary tube(SVF)	26	Stop Valve (High/Low Pressure Gas)	36	Crankcase Heater
7	4-Way Valve (RVR1)	17	Capillary tube(SVA)	27	Stop Valve (Low Pressure Gas)	37	Strainer
8	4-Way Valve (RVR2)	18	Heat exchanger	28	Tsc Sensor		
9	Micro-computer Control Expansion Valve (EVO)	19	Solenoid Valve(SVJ1)	29	Tchg Sensor		
10	Plate Heat Exchanger	20	Solenoid Valve(SVX1)	30	Ts1 Sensor		

Model: RAS-14RNBCLQ, RAS-16RNBCLQ



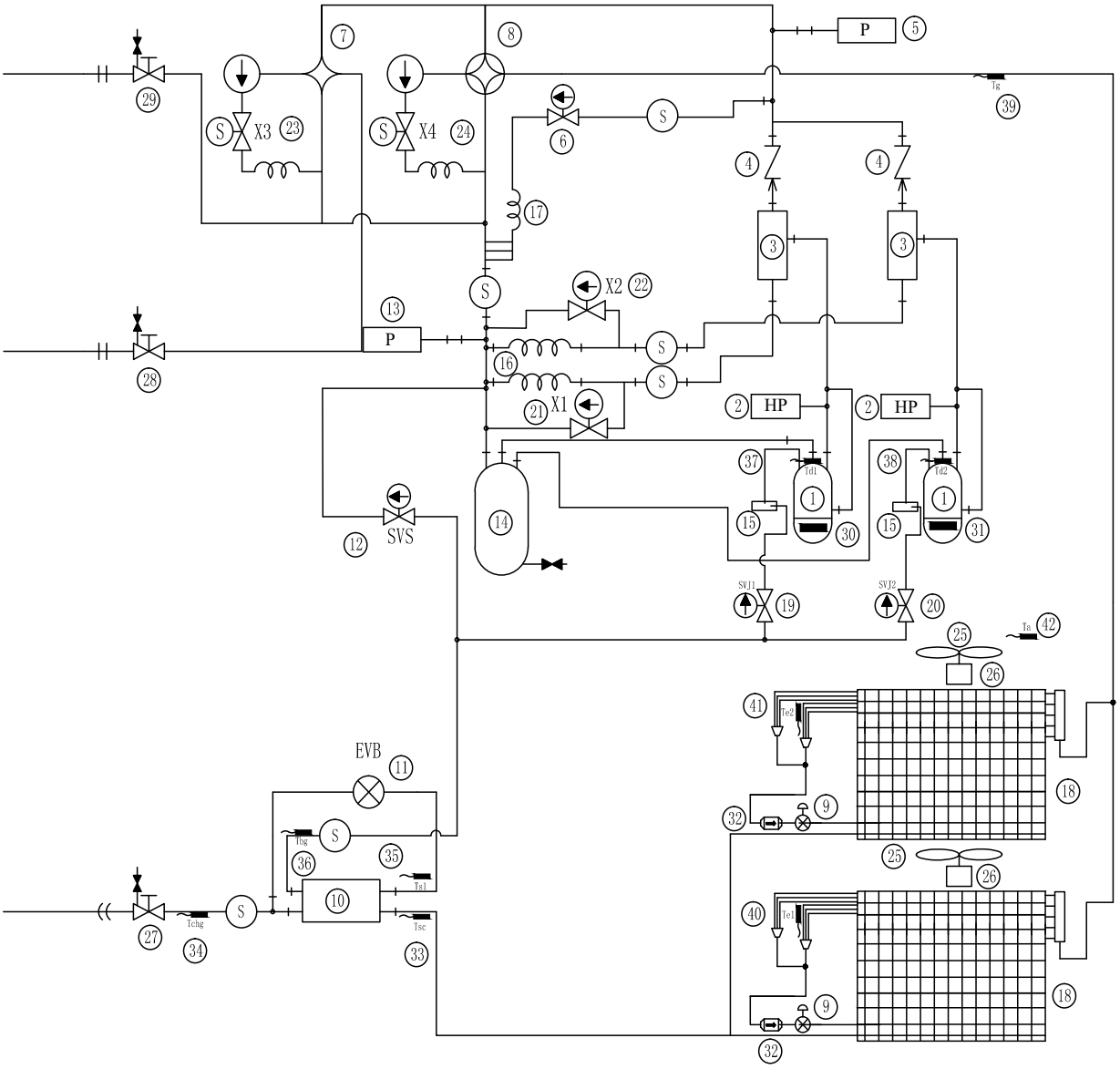
NO.	Name	NO.	Name	NO.	Name	NO.	Name
1	Compressor	11	Micro-computer Control Expansion Valve (EVB)	21	Solenoid Valve (SVX3)	31	Tbg Sensor
2	High pressure switch	12	Solenoid Valve (SVS)	22	Solenoid Valve (SVX4)	32	Td1 Sensor
3	Oil separator	13	Low pressure sensor	23	Propeller Fan	33	Tg Sensor
4	Check valve	14	Accumulator	24	Fan Motor	34	Te1 Sensor
5	High pressure sensor	15	Injection Muffler	25	Stop Valve (Liquid)	35	Te2 Sensor
6	Gas Bypass Valve (SVA)	16	Capillary tube(SVF)	26	Stop Valve (High/Low Pressure Gas)	36	Ta Sensor
7	4-Way Valve (RVR1)	17	Capillary tube(SVA)	27	Stop Valve (Low Pressure Gas)	37	Crankcase Heater
8	4-Way Valve (RVR2)	18	Heat exchanger	28	Tsc Sensor	38	Strainer
9	Micro-computer Control Expansion Valve (EVO)	19	Solenoid Valve(SVJ1)	29	Tchg Sensor		
10	Plate Heat Exchanger	20	Solenoid Valve(SVX1)	30	Ts1 Sensor		

Model: RAS-18RNBCLQ



NO.	Name	NO.	Name	NO.	Name	NO.	Name
1	Compressor	12	Solenoid Valve (SVS)	23	Solenoid Valve (SVX3)	34	Tchg Sensor
2	High pressure switch	13	Low pressure sensor	24	Solenoid Valve (SVX4)	35	Ts1 Sensor
3	Oil separator	14	Accumulator	25	Propeller Fan	36	Tbg Sensor
4	Check valve	15	Injection Muffler	26	Fan Motor	37	Td1 Sensor
5	High pressure sensor	16	Capillary tube(SVF)	27	Stop Valve (Liquid)	38	Td2 Sensor
6	Gas Bypass Valve (SVA)	17	Capillary tube(SVA)	28	Stop Valve (High/Low Pressure Gas)	39	Tg Sensor
7	4-Way Valve (RVR1)	18	Heat exchanger	29	Stop Valve (Low Pressure Gas)	40	Te1 Sensor
8	4-Way Valve (RVR2)	19	Solenoid Valve(SVJ1)	30	Crankcase Heater A	41	Te2 Sensor
9	Micro-computer Control Expansion Valve (EVO)	20	Solenoid Valve(SVJ2)	31	Crankcase Heater B	42	Ta Sensor
10	Plate Heat Exchanger	21	Solenoid Valve(SVX1)	32	Strainer		
11	Micro-computer Control Expansion Valve (EVB)	22	Solenoid Valve(SVX2)	33	Tsc Sensor		

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



NO.	Name	NO.	Name	NO.	Name	NO.	Name
1	Compressor	12	Solenoid Valve (SVS)	23	Solenoid Valve (SVX3)	34	Tchg Sensor
2	High pressure switch	13	Low pressure sensor	24	Solenoid Valve (SVX4)	35	Ts1 Sensor
3	Oil separator	14	Accumulator	25	Propeller Fan	36	Tbg Sensor
4	Check valve	15	Injection Muffler	26	Fan Motor	37	Td1 Sensor
5	High pressure sensor	16	Capillary tube(SVF)	27	Stop Valve (Liquid)	38	Td2 Sensor
6	Gas Bypass Valve (SVA)	17	Capillary tube(SVA)	28	Stop Valve (High/Low Pressure Gas)	39	Tg Sensor
7	4-Way Valve (RVR1)	18	Heat exchanger	29	Stop Valve (Low Pressure Gas)	40	Te1 Sensor
8	4-Way Valve (RVR2)	19	Solenoid Valve(SVJ1)	30	Crankcase Heater A	41	Te2 Sensor
9	Micro-computer Control Expansion Valve (EVO)	20	Solenoid Valve(SVJ2)	31	Crankcase Heater B	42	Ta Sensor
10	Plate Heat Exchanger	21	Solenoid Valve(SVX1)	32	Strainer		
11	Micro-computer Control Expansion Valve (EVB)	22	Solenoid Valve(SVX2)	33	Tsc Sensor		

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, 32RNBCLQ

< 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, 38RNBCLQ

< 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-40, 42, 44, 46, 48RNBCLQ

< 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 unit A, the inverter compressor 1 or 2 with the shortest operating time will operate preferentially.

RAS-50, 52, 54, 56RNBCLQ

< 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, 64RNBCLQ

< 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 unit A, the inverter compressor 1 or 2 with the shortest operating time will operate preferentially.

RAS-66, 68, 70, 72RNBCLQ

< 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 unit A, the inverter compressor 1 or 2 with the shortest operating time will operate preferentially.

RAS-74, 76, 78RNBCLQ

< 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, 96RNBCLQ

< Compressor Operating Sequence >

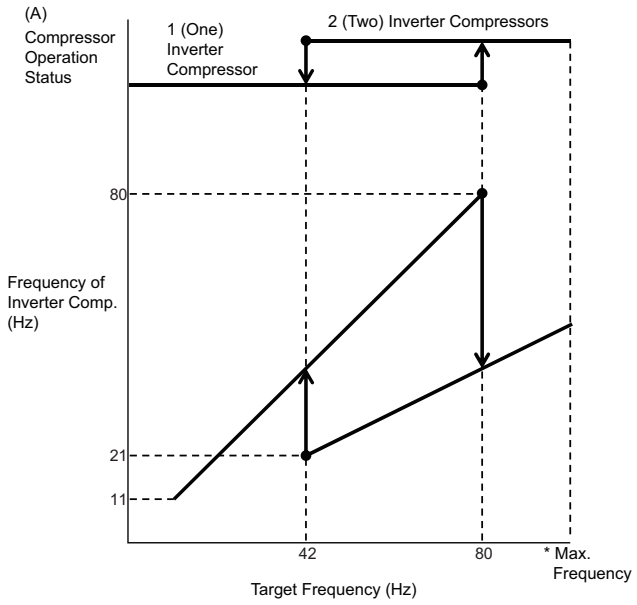
	Outdoor Unit A		Outdoor Unit B		Outdoor Unit C		Outdoor Unit D	
	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2	Inverter Compressor 1	Inverter Compressor 2
Last Time	1	5	2	5	3	5	4	5
This Time	4	5	1	5	2	5	3	5
Next Time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

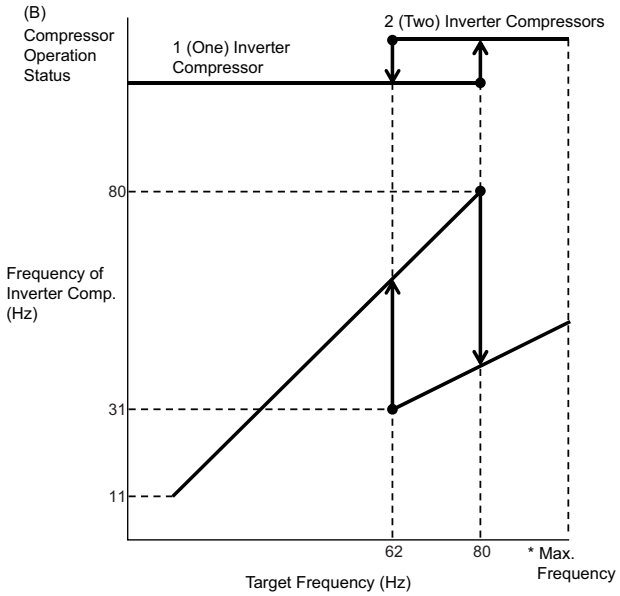
RAS-18RNBCLQ to 20RNBCLQ



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 100 for the maximum frequency.

RAS-22RNBCLQ, 24RNBCLQ

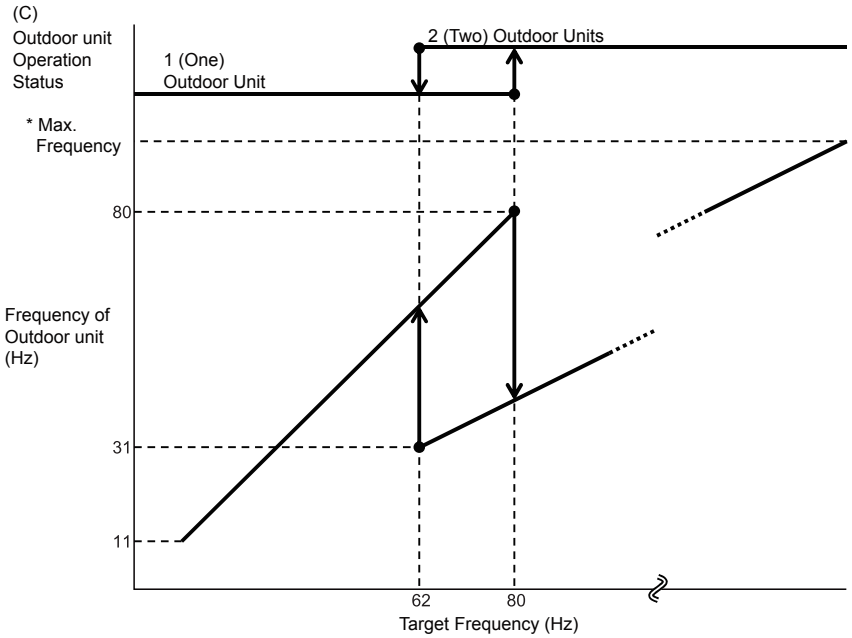


Target Frequency [Hz]	Each Compressor Frequency [Hz]					
	Increase Direction			Decrease Direction		
	Comp. Operation Status	No.1 Comp.	No.2 Comp.	Comp. Operation Status	No.1 Comp.	No.2 Comp.
11.0	1	11.0	—	1	11.0	—
61.0	1	61.0	—	1	61.0	—
62.0	1	62.0	—	2	31.0	31.0
80.0	1	80.0	—	2	40.0	40.0
81.0	2	40.5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

NOTE:
Refer to page 100 for the maximum frequency.

■ In case of multiple outdoor units

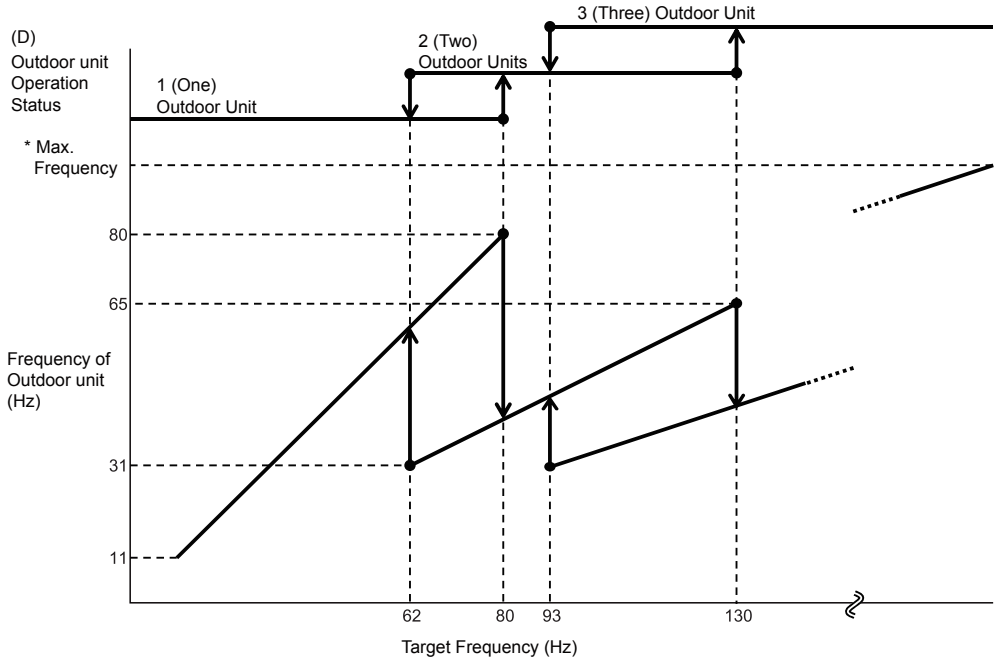
RAS-26RNBCLQ to 48RNBCLQ



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 100 for the maximum frequency.

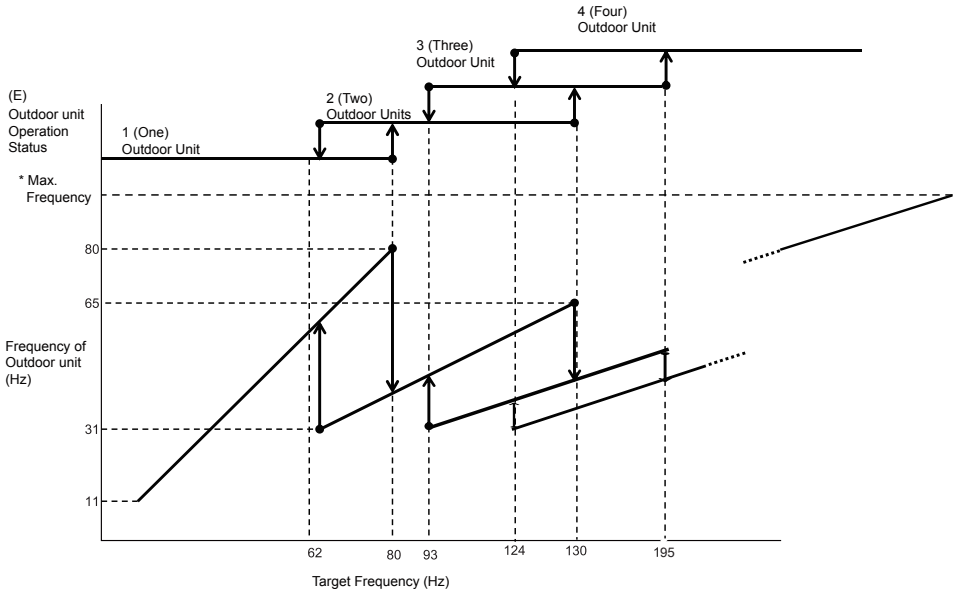
RAS-50RNBCLQ to 72RNBCLQ



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 100 for the maximum frequency.

RAS-74RNBCLQ to 96RNBCLQ



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				1	31.0	31.0		
80.0	1	80.0				1	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 100 for the maximum frequency.

Combination of Base Units and Maximum Frequency

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

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

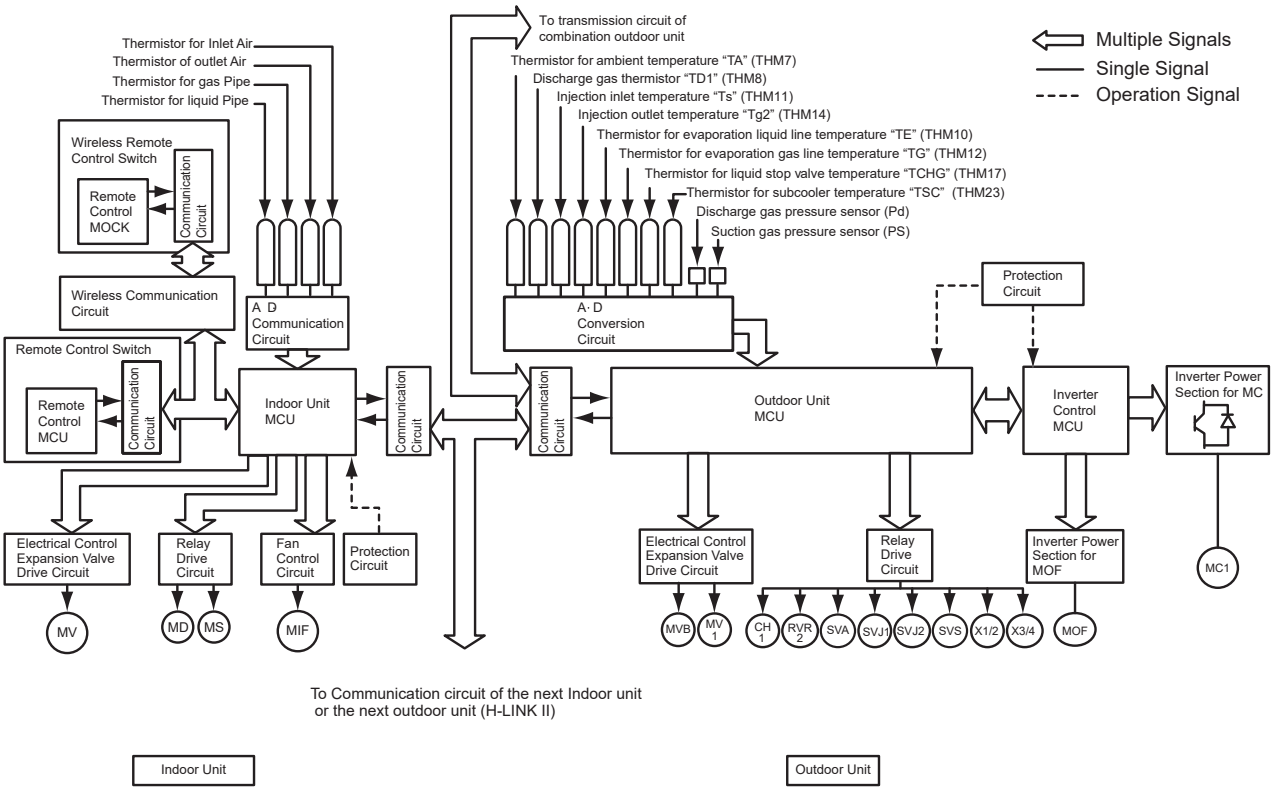
(for Heating Operation)
The coefficient becomes larger when the value of ΔT (the temperature difference between setting temperature and air inlet temperature is large) or variation of ΔT is larger.
The coefficient becomes smaller when the value of ΔT (the temperature difference between setting temperature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

CONTROL SYSTEM

The figure below is a representation of the control system.

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



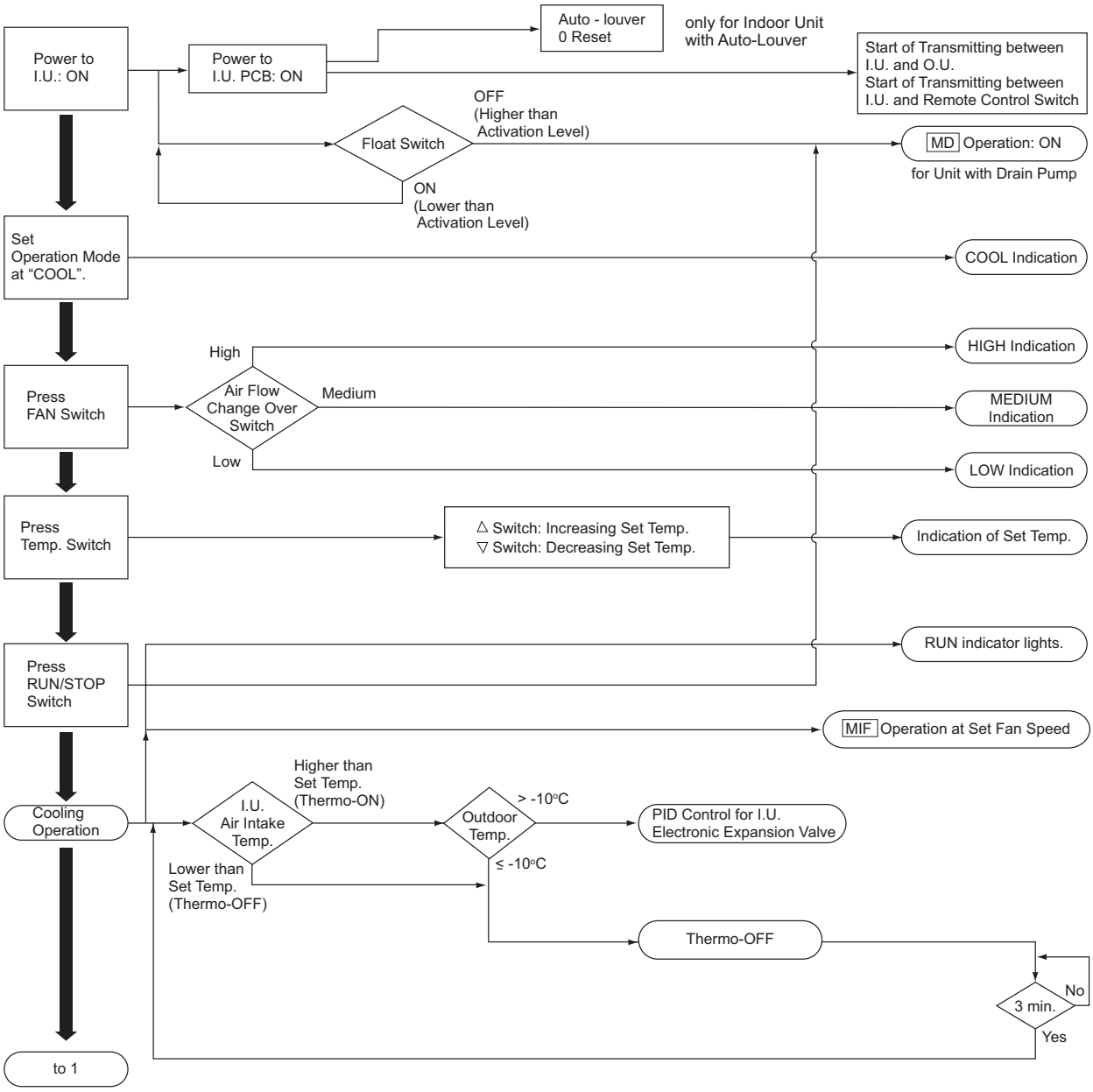
Symbol	Name
THM	Thermistor
MCU	Microcontroller
MC_1	DC Motor (for Inverter Compressor)
MOF	DC Motor (for Outdoor Fan)
MIF	Motor (for Indoor Fan)
MS	Motor (for Auto-Louver)
MD	Motor (for Drain Pump)
MV	Electronic Expansion Valve (for Indoor Unit)
MV_1	Electronic Expansion Valve (for Outdoor Unit)
MVB	Electronic Expansion Valve for Supercooling Heat Exchanger
SVA	Solenoid Valve
RVR_2	Reversing Valve
CH_1	Crankcase Heater
SVJ_1	Solenoid Valve
SVJ_2	Solenoid Valve (*)
SVS	Solenoid Valve
X_1	Solenoid Valve
X_2	Solenoid Valve (*)
X3/4	Solenoid Valve

(*) 18 to 24 HP only

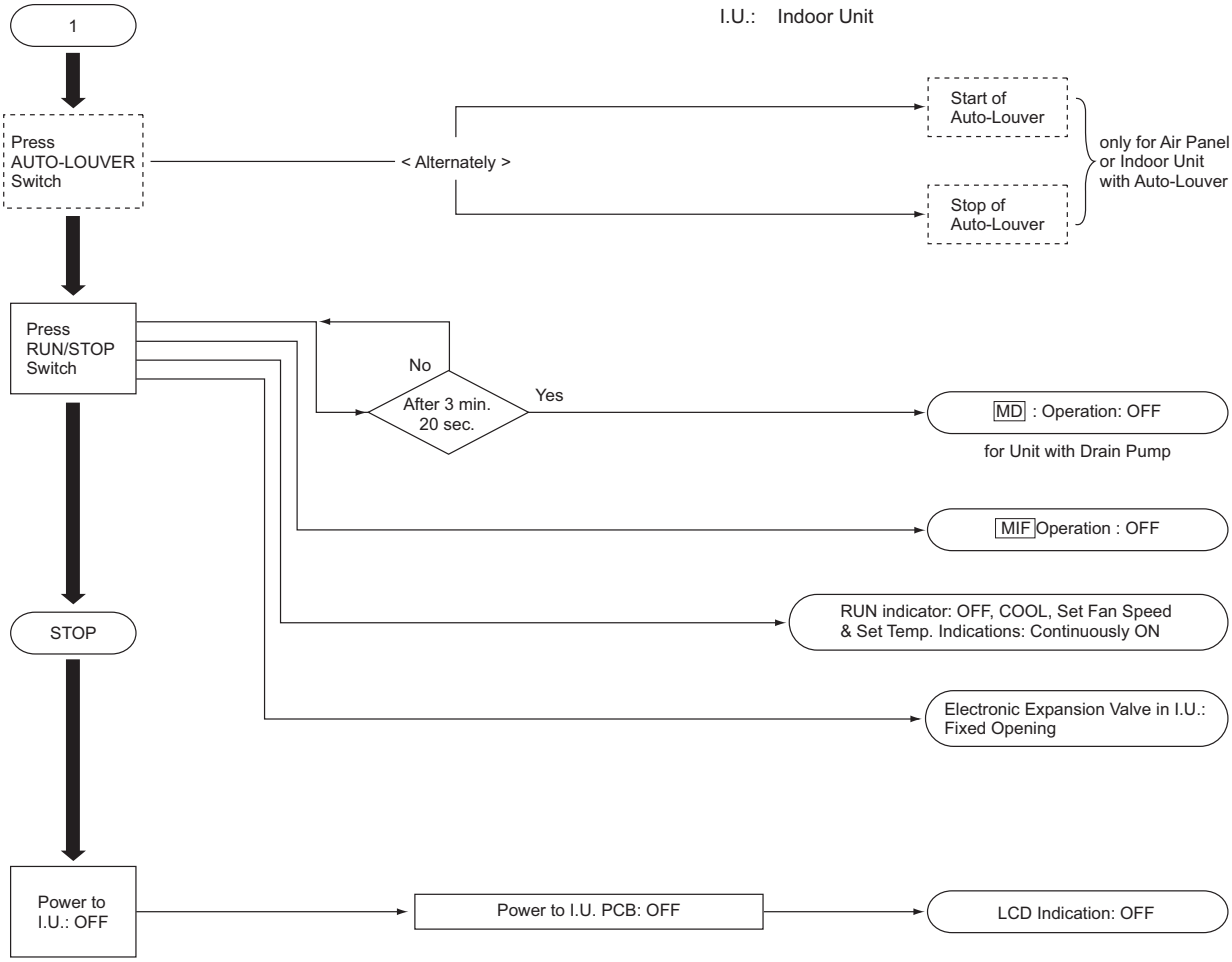
10.3 Standard Operation Sequence

■ Cooling Operation

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

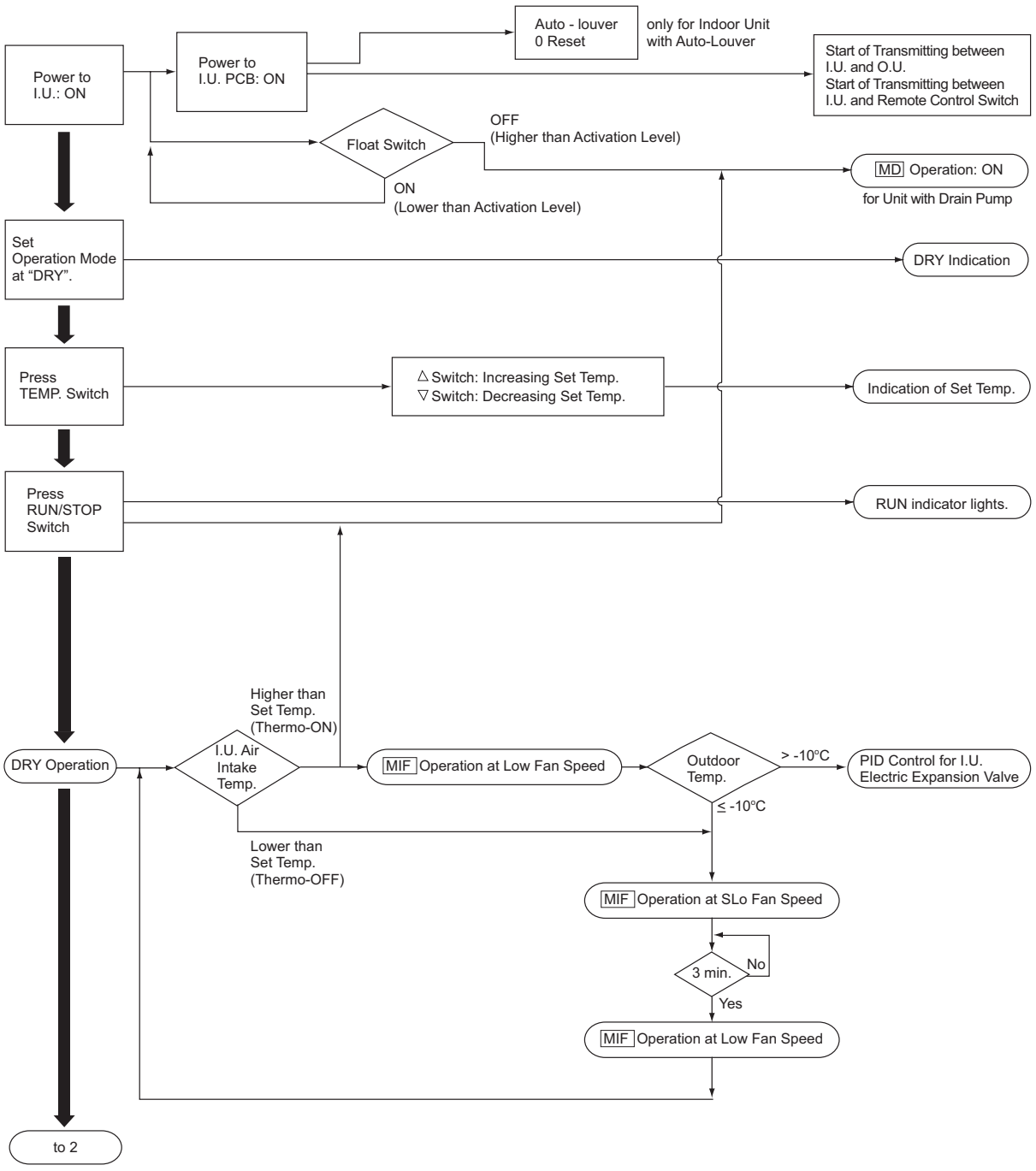


■ Cooling Operation

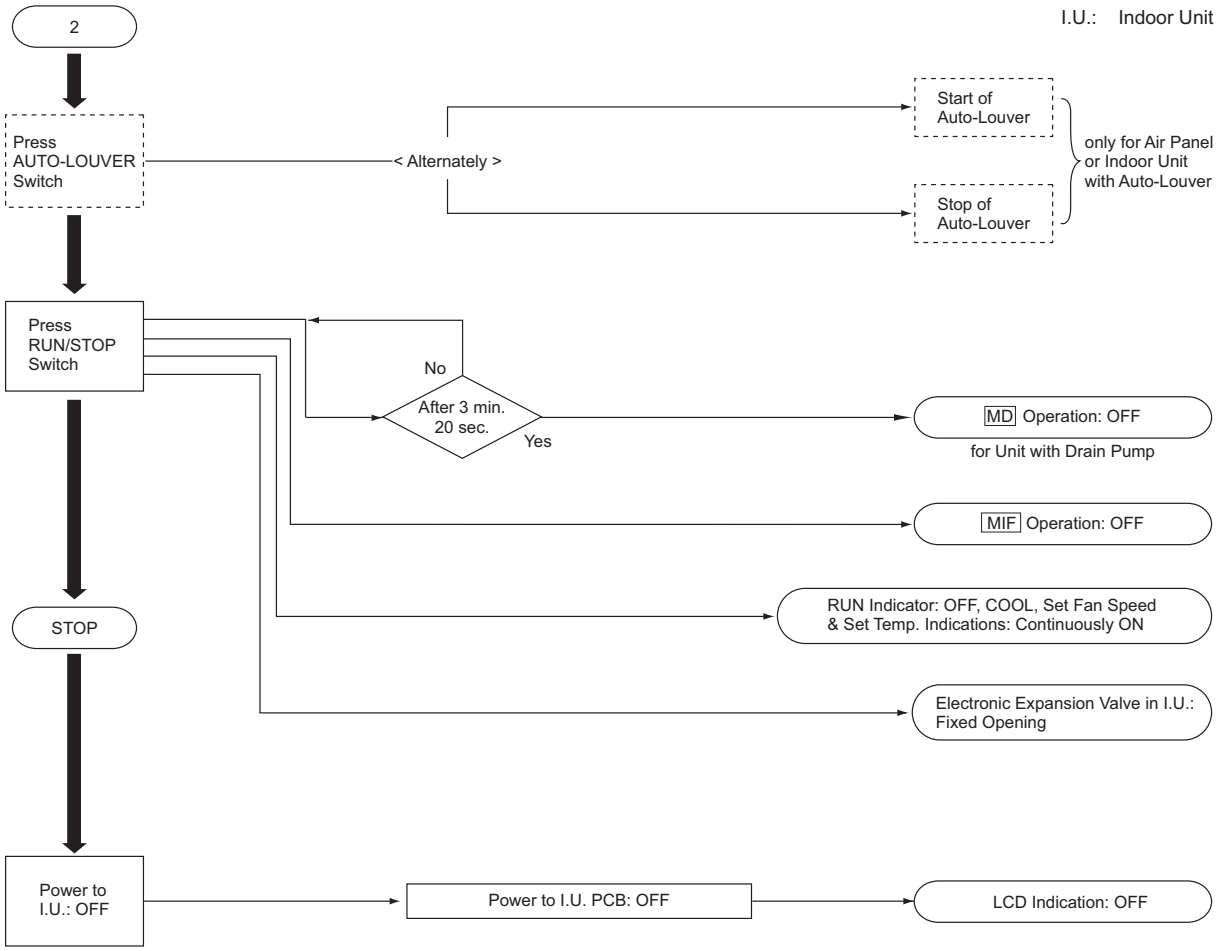


■ Dry Operation

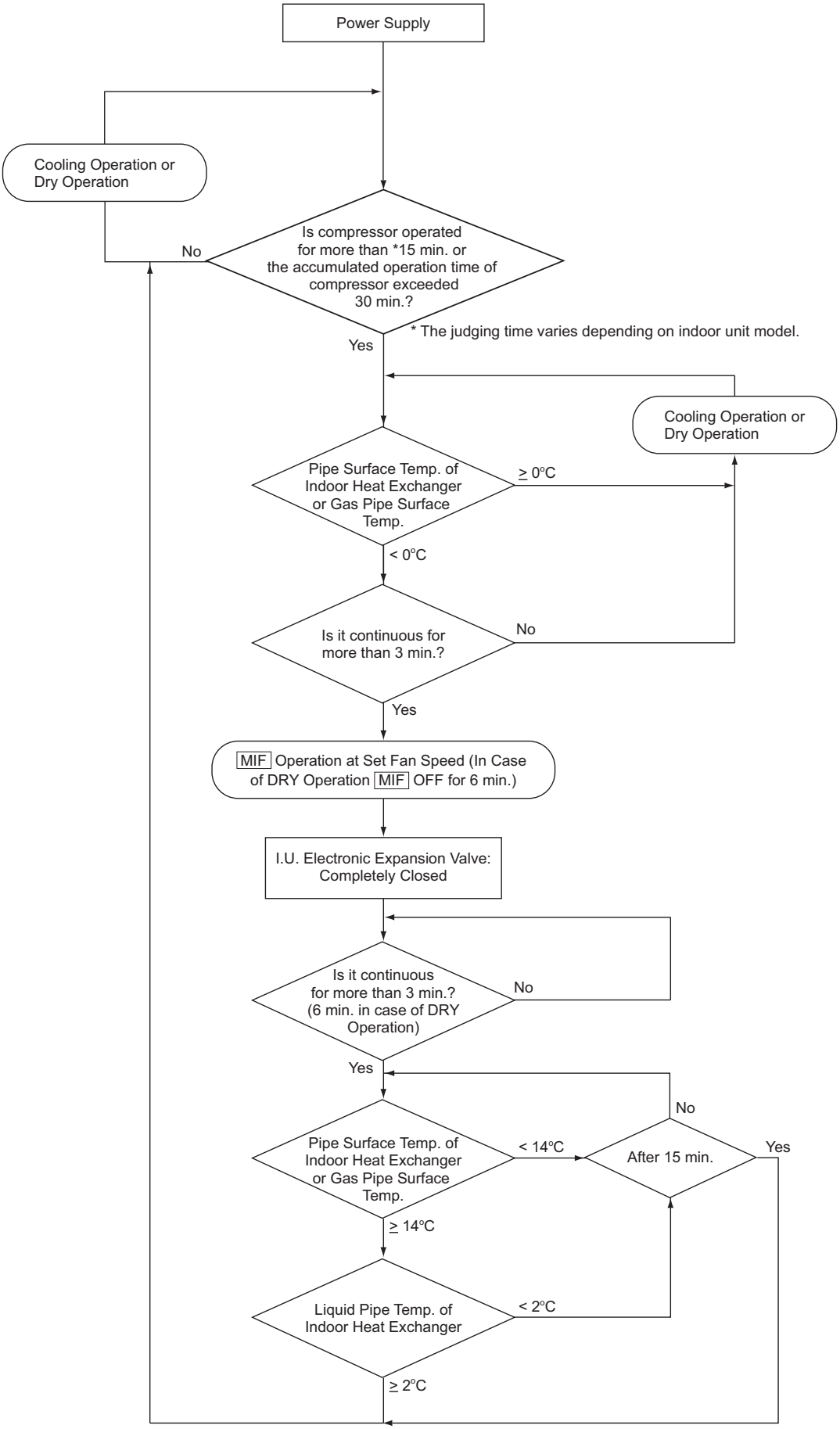
I.U.: Indoor Unit
O.U.: Outdoor Unit



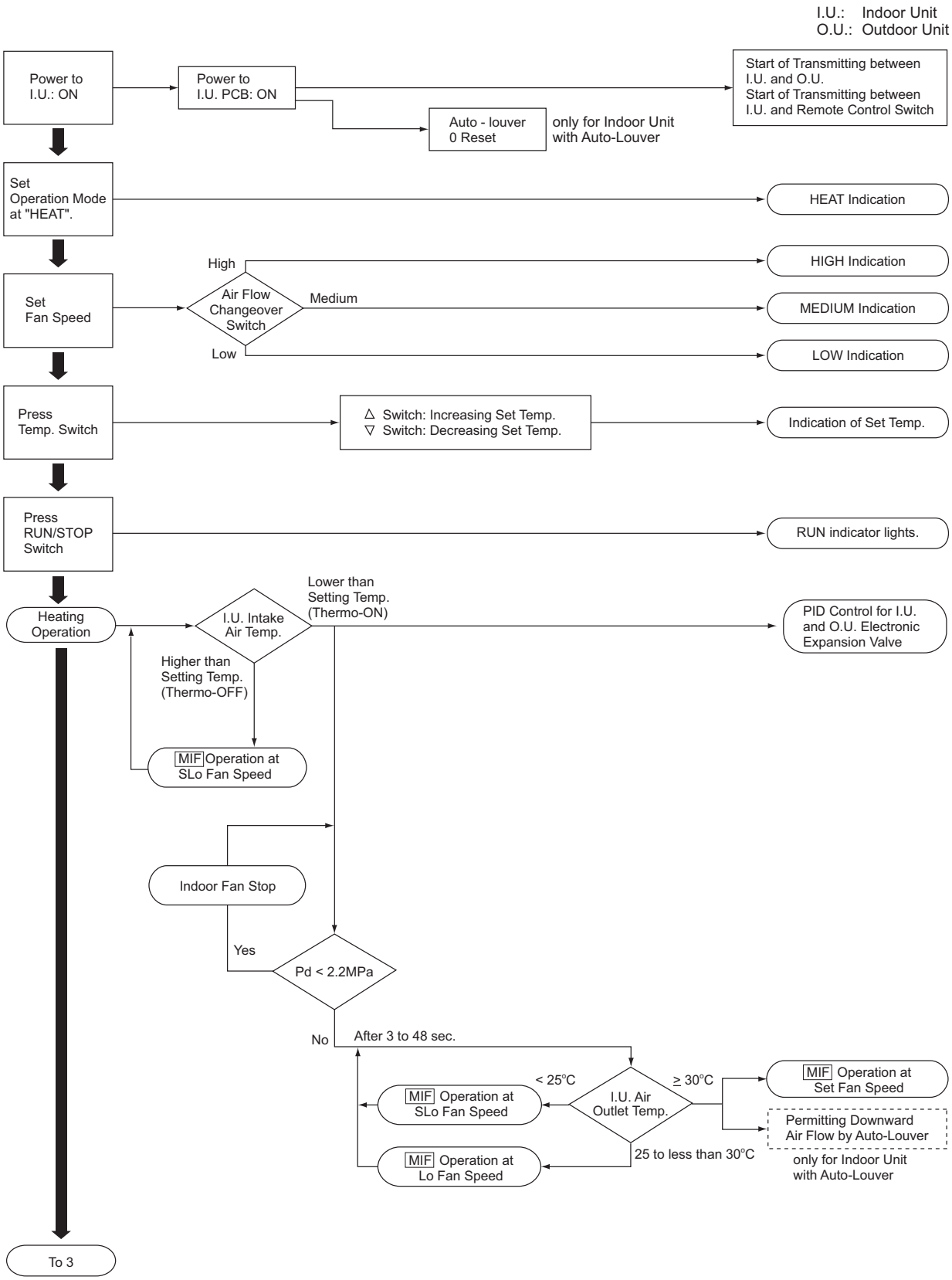
■ Dry Operation



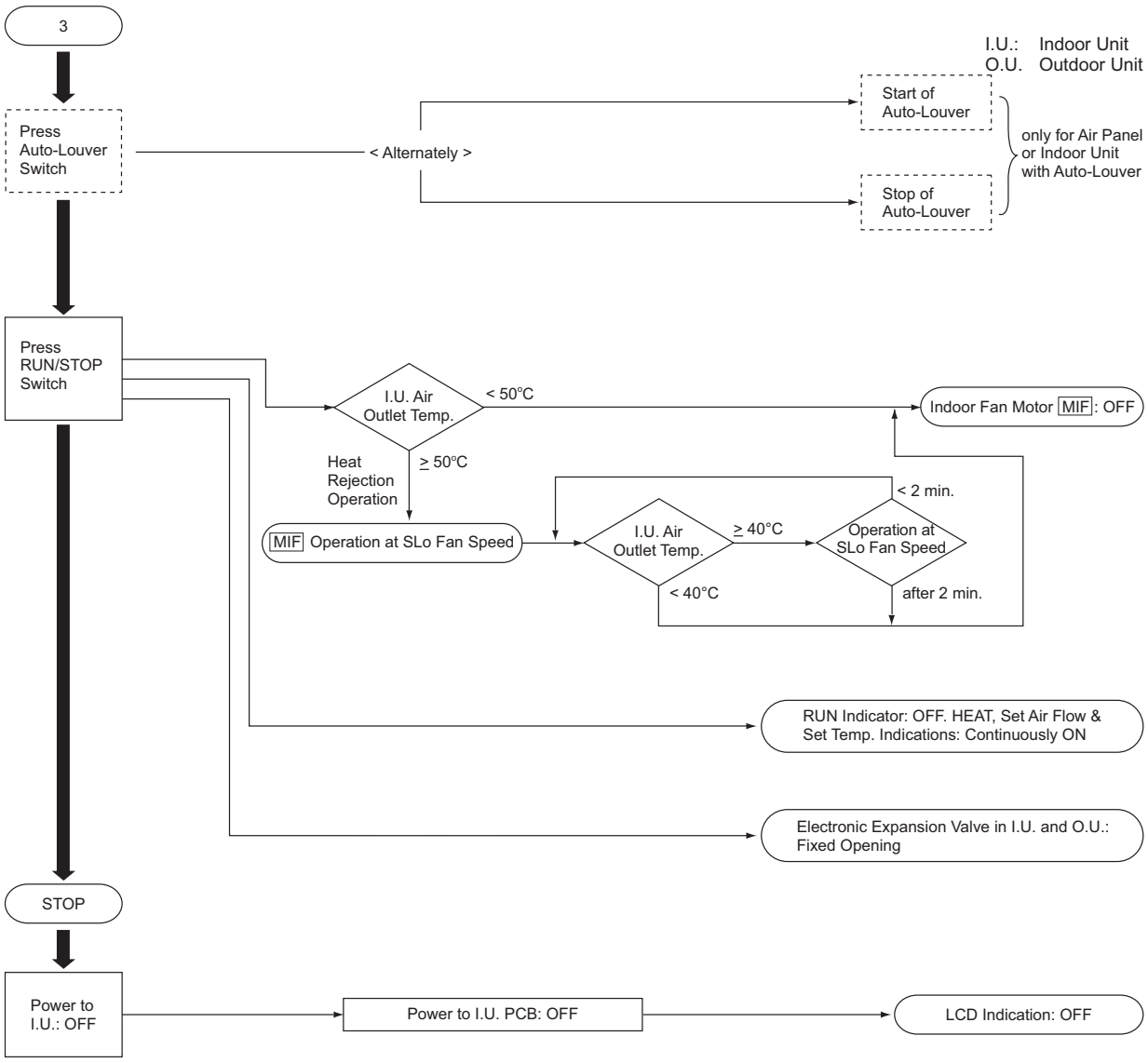
■ Freezing Protection Control during Cooling or Dry Operation



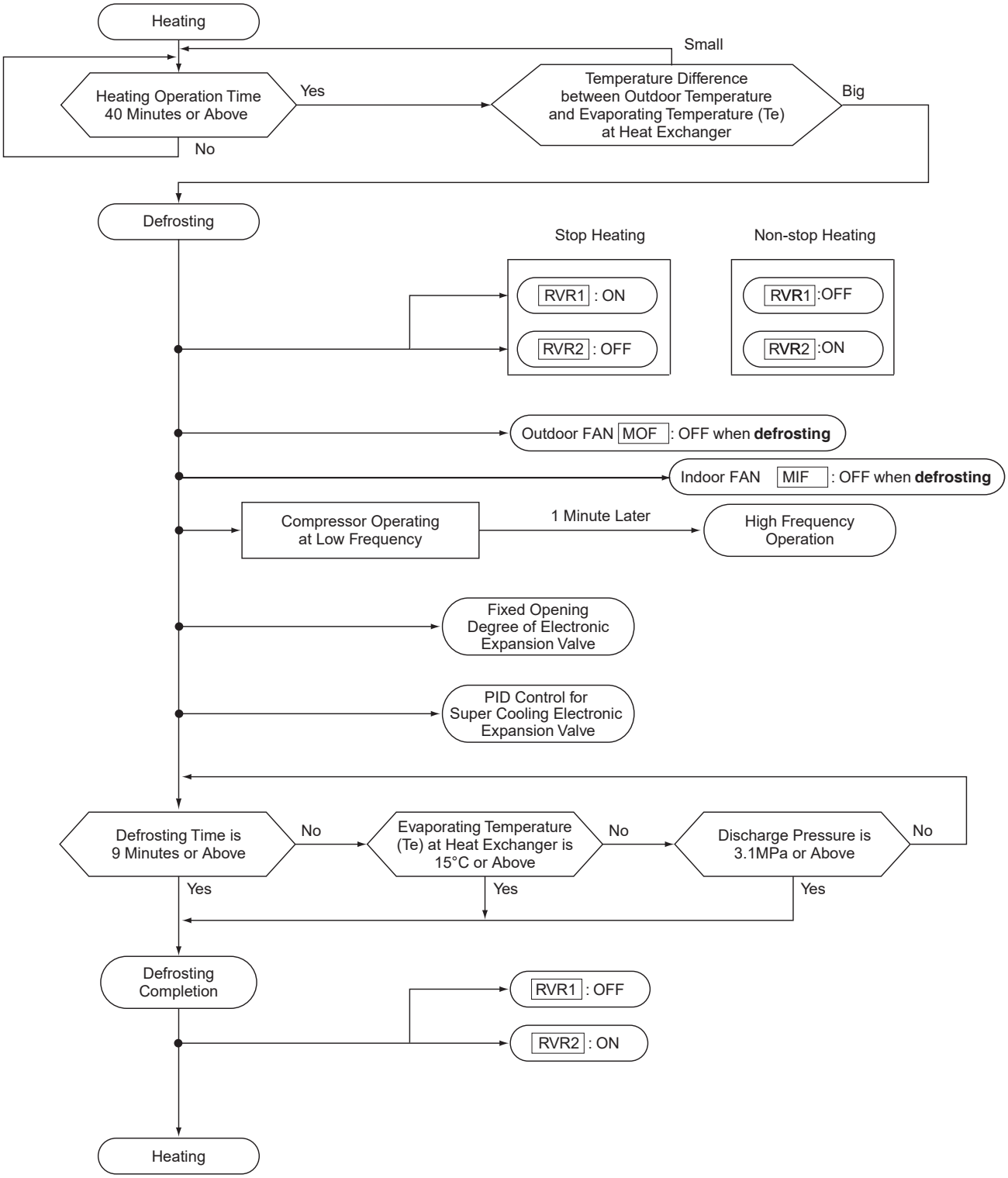
■ Heating Operation



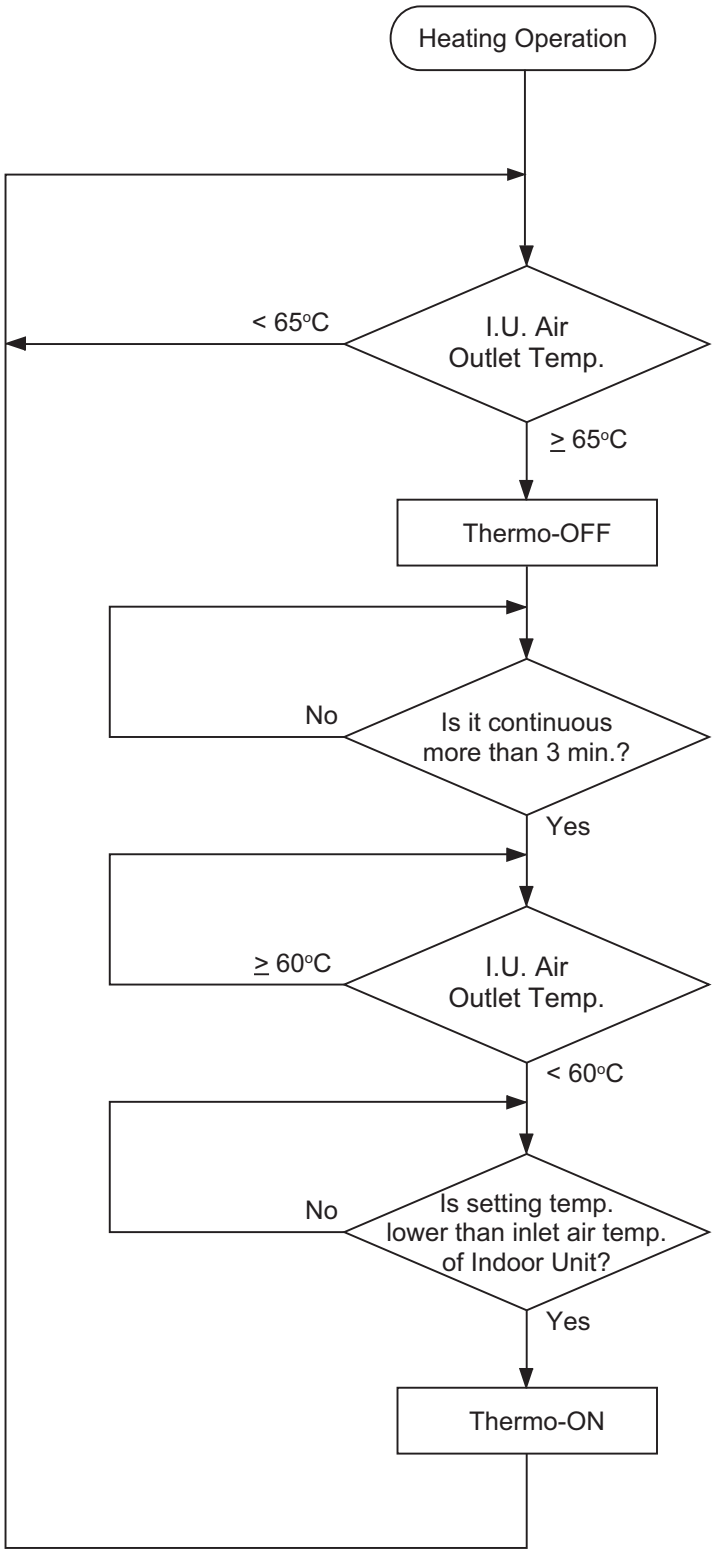
■ Heating Operation



■ Defrosting Operation



■ 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

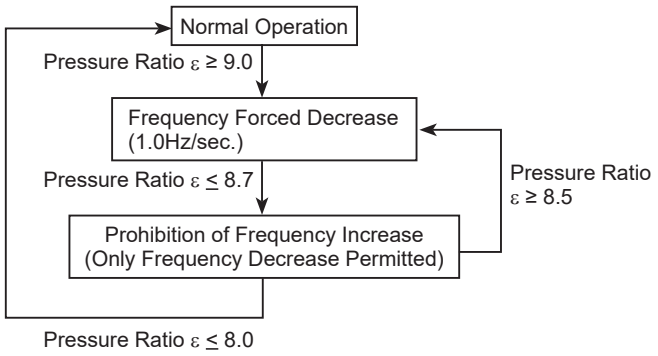
Indication	Protection Control Contents
P01	Pressure Ratio Protection Control
P02	High Pressure Increase Protection Control
P03	Inverter Current Protection Control
P04	Inverter Fin Temperature Increase Protection Control
P05	Discharge Temperature Increase Protection Control
P06	Low Pressure Decrease Protection 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>



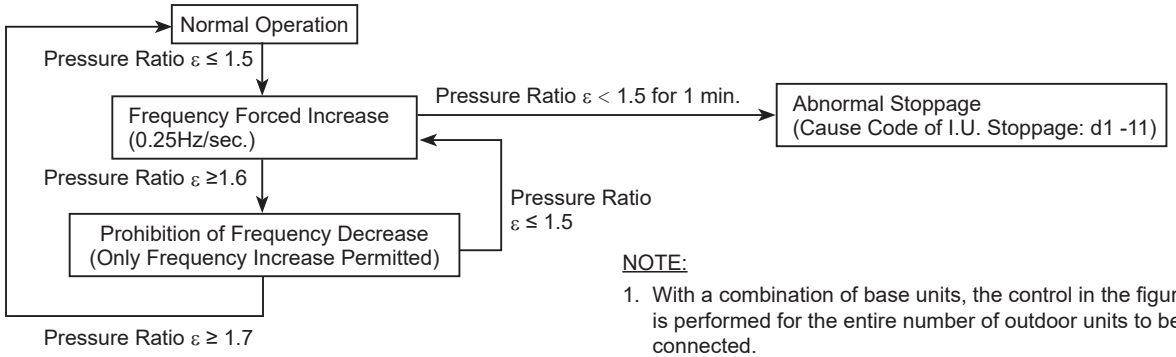
NOTE:

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>



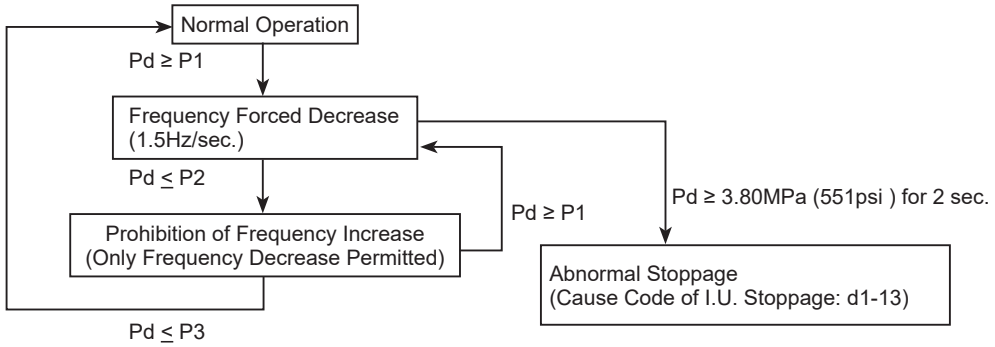
NOTE:

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	3.40	3.20
Heating	3.52	3.50	3.30

NOTE:

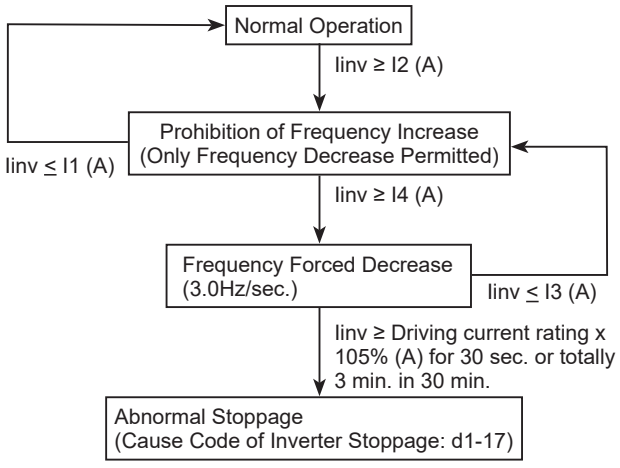
1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. High pressure is detected in each outdoor unit, and this control uses the maximum value.
   Pd: Detected Value of High Pressure Sensor [MPa(pis)]

(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

<380V>

Model	I1	I2	I3	I4
RAS-8.0RNBCLQ RAS-10RNBCLQ RAS-18RNBCLQ RAS-20RNBCLQ	22.0	22.5	23.0	23.5
RAS-12RNBCLQ RAS-14RNBCLQ RAS-16RNBCLQ RAS-22RNBCLQ RAS-24RNBCLQ	35.0	35.5	36.0	36.5

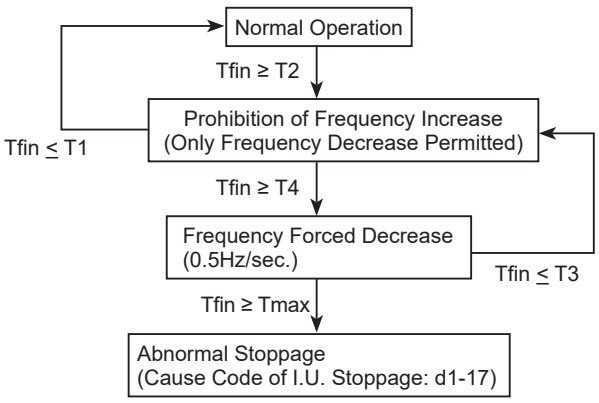
NOTE:

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]

(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

<380V> [°C]

Model	T1	T2	T3	T4	Tmax
RAS-8.0RNBCLQ RAS-10RNBCLQ RAS-18RNBCLQ RAS-20RNBCLQ RAS-12RNBCLQ RAS-14RNBCLQ RAS-16RNBCLQ RAS-22RNBCLQ RAS-24RNBCLQ	86	94	98	102	110

NOTE:

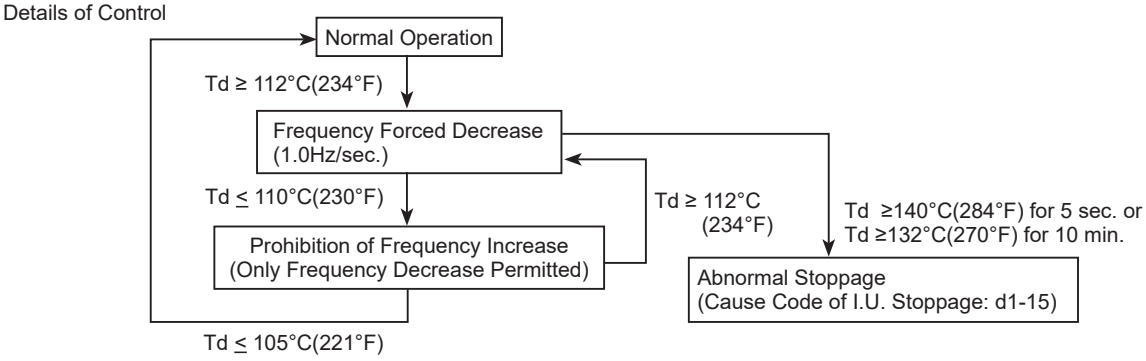
1. In case of combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease,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

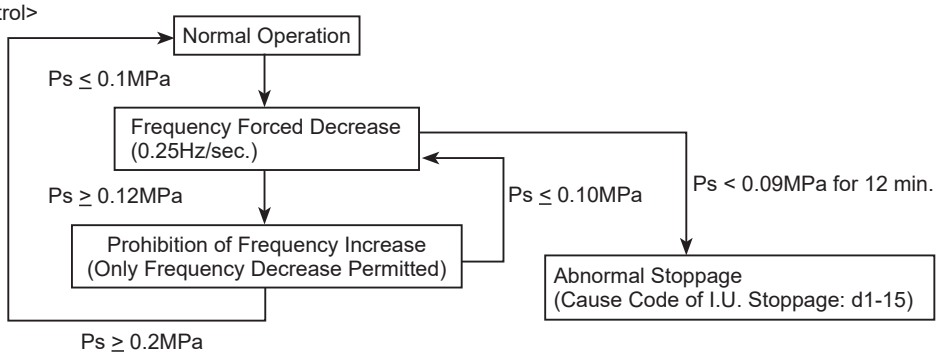
1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. Discharge temperature is detected in each outdoor unit, and this control uses the maximum value.
3. In case of two inverter compressors installed in an outdoor unit,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

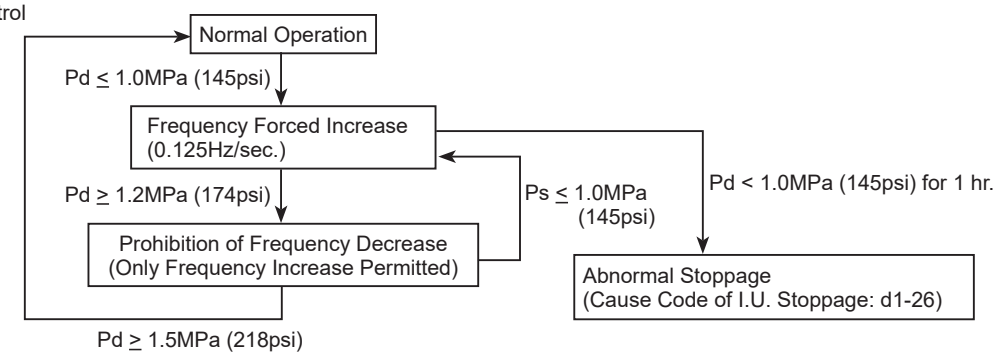
(7) P09: High Pressure Decrease Protection Control

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).

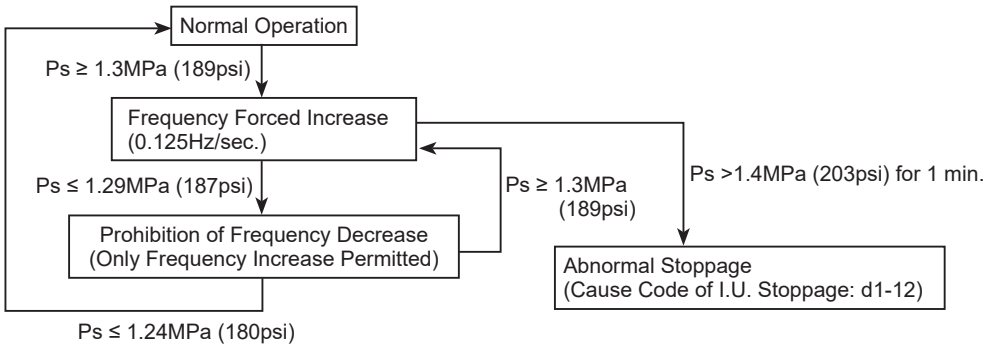
NOTE:

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*	②
	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)

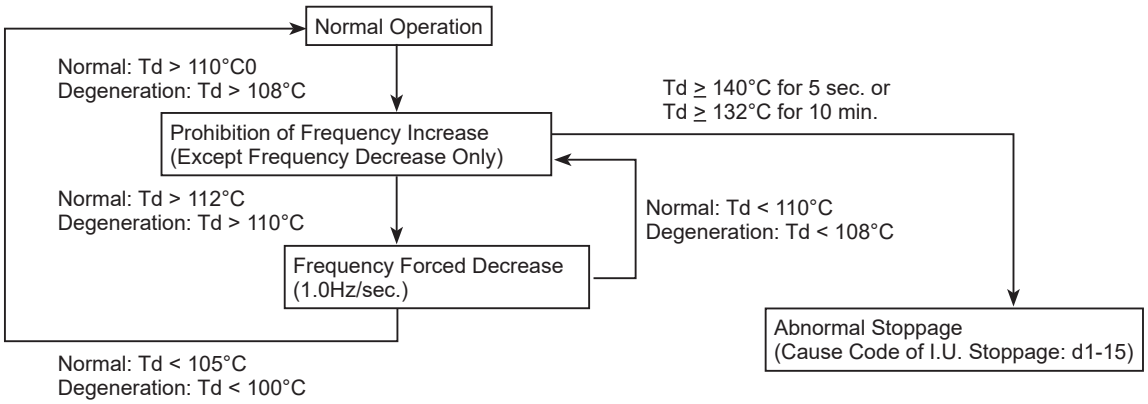
(11) Degeneration Control

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.

< RNBCLQ >

Model			RAS-8.0RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ
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

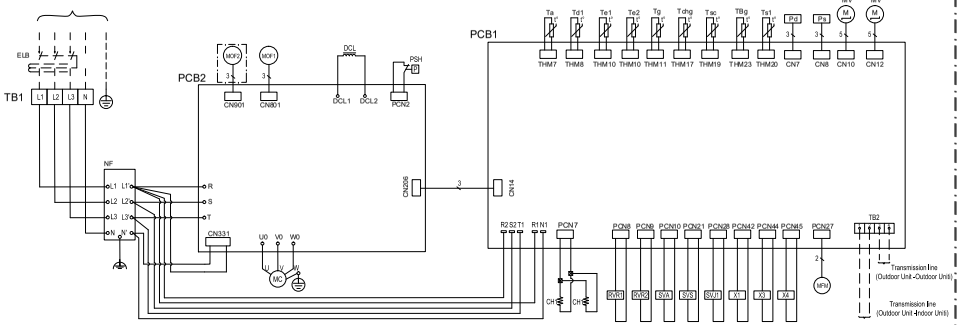
Model			RAS-14RNBCLQ	RAS-16RNBCLQ	RAS-18RNBCLQ
Compressor			Automatic reset, not adjustable		
Pressure Switch			1 pcs per compressor		
High Pressure	Cut-out	Mpa	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$
	Cut-in	Mpa	3.20±0.15	3.20±0.15	3.20±0.15
Fuse capacity		A	40	50	50
Crankcase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

Model			RAS-20RNBCLQ	RAS-22RNBCLQ	RAS-24RNBCLQ
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

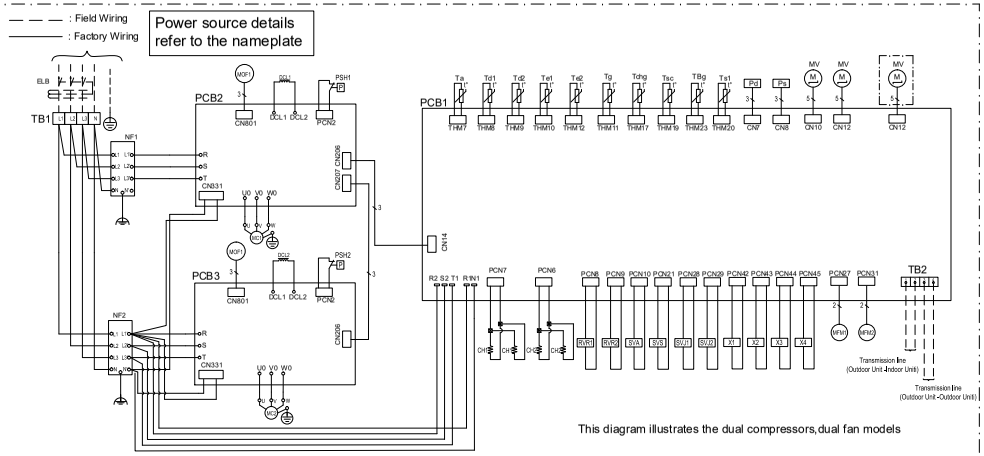
8-16HP

ELECTRICAL WIRING DIAGRAM

WARNING	Before inspecting the electrical parts set the Operation Switch to OFF,and cut OFF the power supply. Warning:Do not power on and carry out maintenance unless the unit has been powered off for at least 10 minutes.

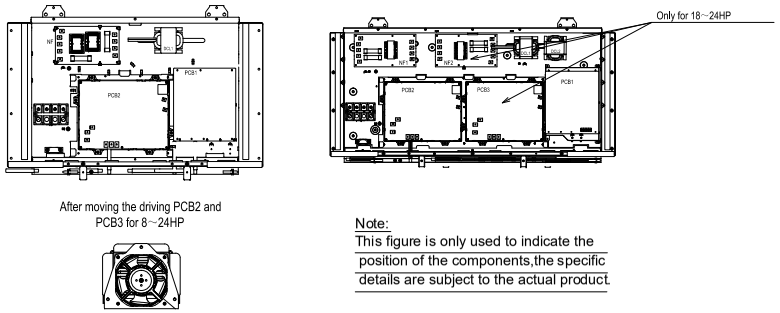


This diagram illustrates the single compressor, single fan or single compressor, dual fan modesl



This diagram illustrates the dual compressors,dual fan models

Electrical System Layout Diagram



Note:
This figure is only used to indicate the position of the components,the specific details are subject to the actual product.

Refrigerant Charge

(1) Calculation of Additional Refrigerant

① Additional refrigerant charge calculation for liquid piping (W1)

Pipe Diameter Ø/mm	Total Piping Length (L)/m	Refrigerant Charge	Additional Charge
28.6	m	×0.67 kg/m = kg	kg
25.4	m	×0.52 kg/m = kg	kg
22.2	m	×0.36 kg/m = kg	kg
19.05	m	×0.28 kg/m = kg	kg
15.88	m	×0.19 kg/m = kg	kg
12.7	m	×0.12 kg/m = kg	kg
9.52	m	×0.06 kg/m = kg	kg
6.35	m	×0.03 kg/m = kg	kg

Note: When the indoor units are 4-way Cassete Type, additional refrigerant charge calculation for liquid piping (W1)

Hp	8/10	12~18	20~24	26	28~34	36~38	40~48
W1min(Kg)	2	3	4	5	6	7	8
Hp	50	52~58	60~66	68~72	74	76~78	80~96
W1min(Kg)	9	10	11	12	13	14	16

②Additional refrigerant charge calculation for indoor unit and water module (W2)

Ordinary/Cooling only	Additional Charge(kg/unit)
0.8~1.3	0.3/0.15
1.5~6.0	0.5/0.25
≥8.0	1.0/0.5

Note: Ø2max=6.0Kg; Water module:0.5Kg/unit

③Additional refrigerant charge calculation for connection ratio (W3)

Connection Ratio (Total Capacity of Indoor Unit and Water Module / Outdoor Unit Capacity)	Refrigerant Charge
≤100%	0.0 kg
>100%	0.5 kg

④ Additional refrigerant charge calculation for SW BOX (W4)

SW BOX Model	Number of SW BOX Connected	Refrigerant Charge	Additional Charge
CHM-4.0N2		×0.1 kg/unit = kg	kg
CHM-8.0N2		×0.2 kg/unit = kg	kg
CHM-12N2		×0.3 kg/unit = kg	kg
CHM-16N2		×0.4 kg/unit = kg	kg
Total Additional Charge For SW BOX =			kg

Note: Ensure that the total additional charge should not be exceeded the max.additional refrigerant charge quantity as shown in the table below

Outdoor (HP)	8 ~10	12	14 ~24	26~66	68~88	90~96
Wmax (kg)	28.0	36.0	40.0	63.0	73.0	93.0

Marking table

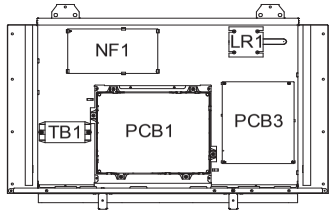
Mark	Name
MC	Motor for Compressor
MOF	Motor for Outdoor Fan
Ps,Pd	Sensor for refrigerant pressure
SVS,SVA	Solenoid Valve
RVR	Reversing valve relay
MV	Micro-Computer control Expansion valve
DCL	Reactor
PSH	High pressure switch for control
TB	Terminal board
NF	Noise filter
PCB	Printed Circuit Board
THM	Thermistor
CH	Crankcase Heater
SVJ,X	Solenoid Valve
CN	Connector
PCN	Connector
⏚	Functional earthing
⏚	Protective earthing
ELB	Earth leakage breaker
○	Terminals

Note :
1. All the field wiring and equipme must comply with local codes.
2. The items in the dotted box are optional parts, toolings,

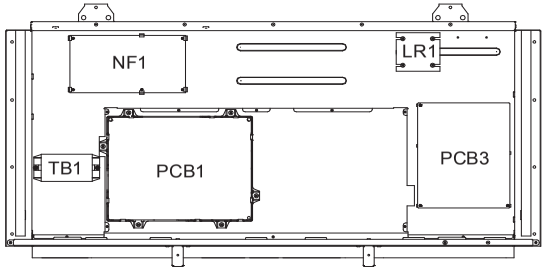
8-24HP

Electric box layout

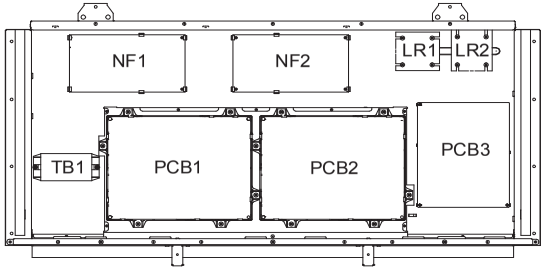
8-12HP Electric box layout



14-16HP Electric box layout



18-24HP Electric box layout



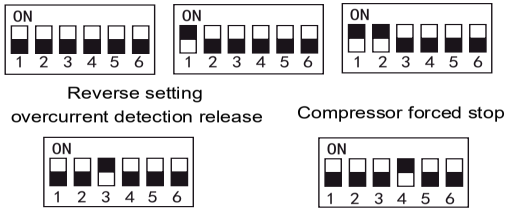
DIP Switch pattern

DSW1 DSW8 Refrigerant system setting

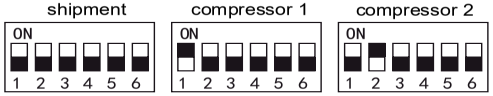
DSW1 (Tens digit) / DSW8 (Ones digit)



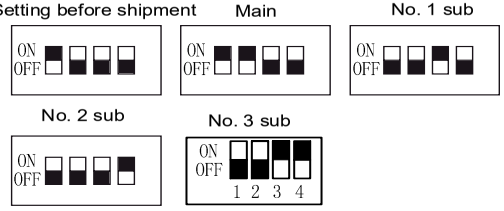
DSW4 (Test run/service setting)



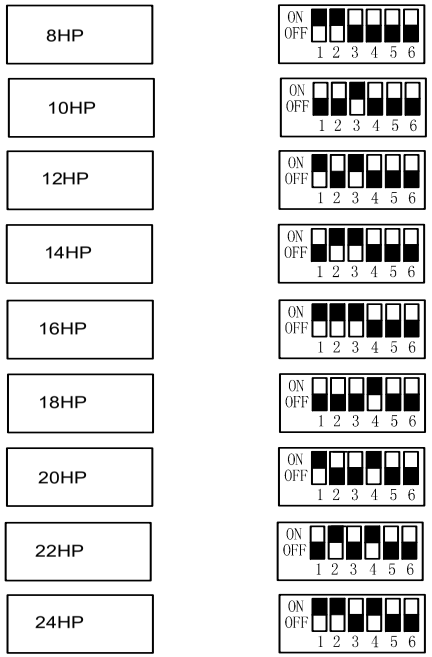
DSW5 Emergency operation setting



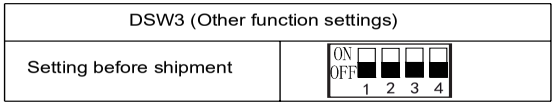
DSW6 Outdoor unit No.setting



DSW2 (Capacity setting)



DSW3 (Other function settings)

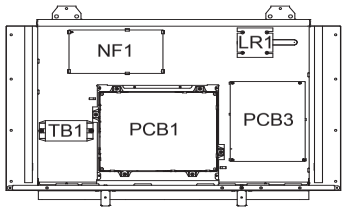


All the contents in this label are for reference only, the manufacturer reserves the right for any necessary change without prior notice.

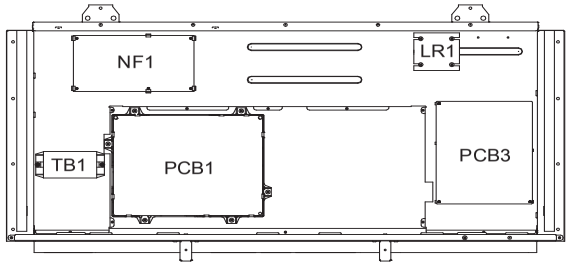
8-24HP

Electric box layout

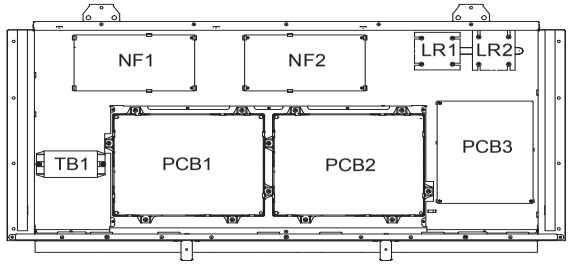
8-12HP Electric box layout



14-16HP Electric box layout



18-24HP Electric box layout



DIP Switch pattern

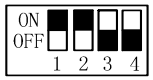
DSW3 (Other function settings)

Setting before shipment



DSW7 Voltage setting

380V voltage
(Setting before shipment)



DSW10 (For transmission)

Setting before shipment



The terminal resistance is not set



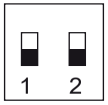
Terminal Resistance Setting

DSW10

Factory setting



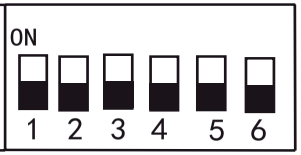
When do not use terminal resistance



DSW1 DSW8

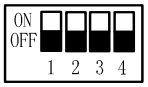
DSW1 (refrigerant system ten digit setting)

Setting before shipment



DSW8 (refrigerant system single digit setting)

Setting before shipment



DSW6 (Outdoor unit No. setting)

Setting before shipment



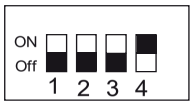
Main



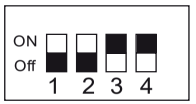
No. 1 sub



No. 2 sub



No. 3 sub



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

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.

CAUTION

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 RASRNBCLQ 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.

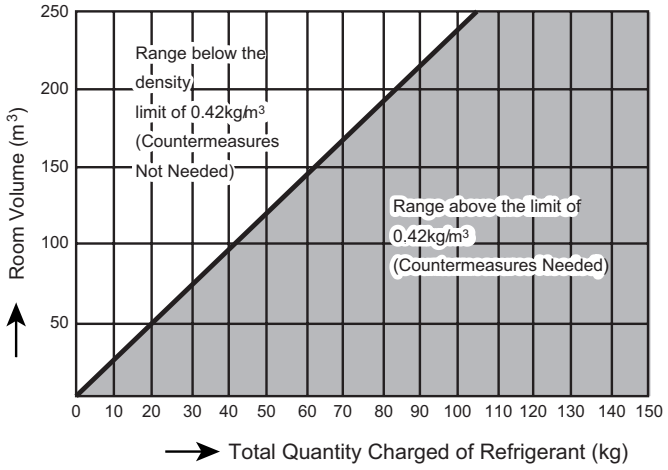
$$\frac{\text{R: Total Quantity of Charged Refrigerant (kg)}}{\text{V: Room Volume (m}^3\text{)}} = \text{C: Refrigerant Concentration}$$

≤ 0.42 (kg/m^3) 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.



SERVICE

1. Troubleshooting

1.1 Initial Troubleshooting

1.1.1 Checking of Electrical Wiring and Power Source

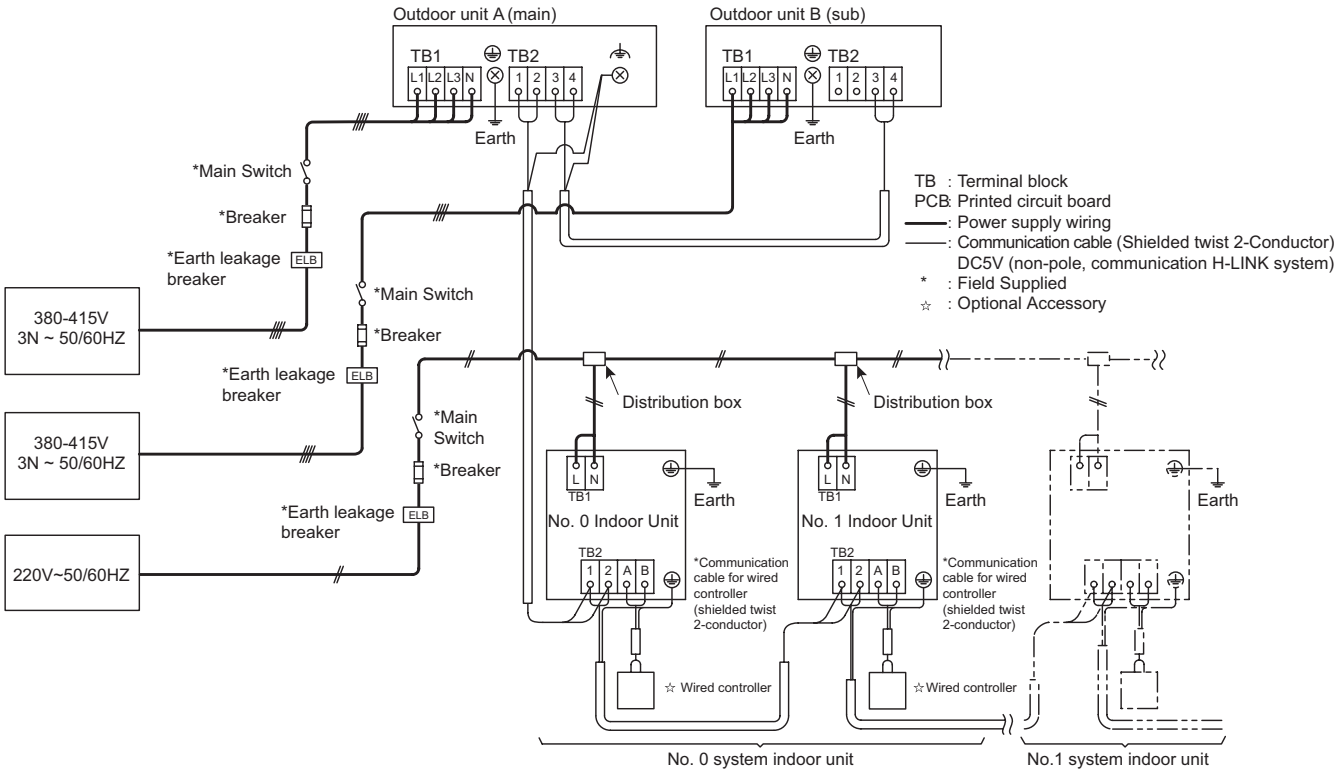
Check the following items if there is any abnormality in the activation of the air conditioner.

No.	Check Item	Check Method
1	Is any power source breaker or fuse blown out?	Check the voltage (secondary side) of the breaker and the continuity of fuse with a tester.
2	Is voltage at the secondary side of the transformer correct?	Disconnect the wires at the secondary side of the transformer and measure voltage with a tester.
3	Is wiring firmly fixed or correctly connected?	Check that the following wiring connections on O.U./I.U. PCBs is not loosened. • The connection for thermistors • The connection for the communication cable • The communication cable connects to a terminal block at the O.U./I.U., not PCB. • Power supply wiring is connected to a terminal block, not PCB. • The connection for transformer • Each connection for power source line Check that the wiring connections on O.U./I.U. PCBs is not loosened or wrongly connected on the site according to “Electrical Wiring Diagram” of the technical catalogue.

NOTE:

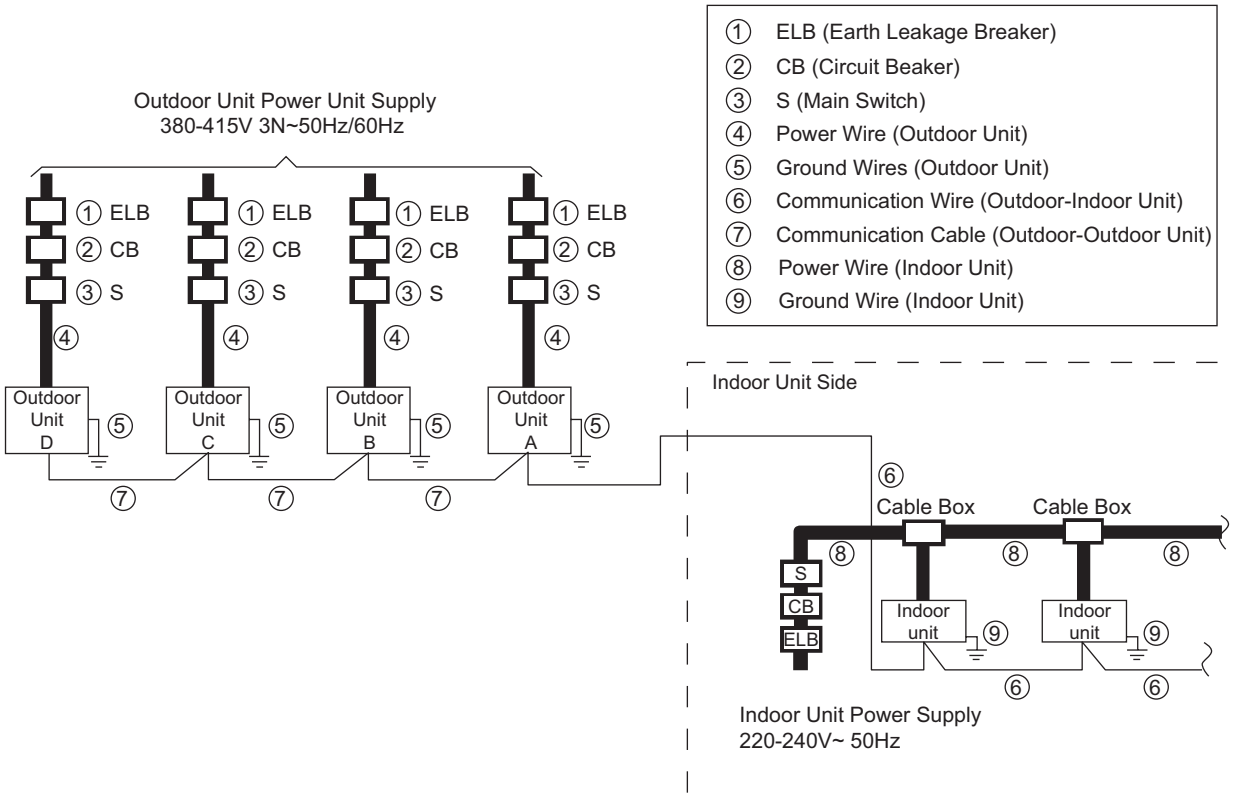
If the fuse(s) on an I.U. PCB is blown, diagnose the cause of overcurrent and replace the fuse(s). In addition, check the power source of optional parts because the fuses may blow out by the power source failure. Turn off power for safety.

Example for Electrical Wiring Connection



● Power Source Wiring

Supply the power sources to each outdoor unit and indoor unit group respectively. Power source wiring is fundamentally according to this method.



● The recommended wiring size and main switch are shown in Table 1.1.

Please refer to the indoor units installation manual for other cables.

● Select the capacity of power transformer according to the maximum running current.

● When the power supply wiring is too long, select the minimum wiring size whose voltage drop is within 2%.

● Power supply voltage should comply with the following requirements.

Supply Voltage: Rated Voltage within ±10%
Starting Voltage: Rated Voltage within -15%
Operating Voltage: Rated Voltage within ±10%
Imbalance between Phases: within 3%

● Calculate short-circuit current from the power transformer and electrical wiring length and size, and select the appropriate rated capacity for ELB (earth leakage breaker).

● Select ELB which can be used for the high harmonic wave.

⚠ WARNING

Do not connect the earth wire to the gas pipe, water pipe or lightening conductor.
Gas Pipe: An explosion and ignition may occur when gas leaks.
Water Pipe: Earth wire becomes ineffective when a hard vinyl pipe is used.
Lightning Conductor: The earth electric potential abnormally increases when a lightening conductor is used.

The recommended wiring, ELB, and the breaker size are shown in Table 1.1.

Table 1.1 Electrical Data and Recommended Wiring, Breaker Size/1 Outdoor Unit

Model	Power Supply	Maximum Operating Current	Power Wire	Communication Wire	ELB		Circuit Breaker
					Rated Current	Current Sensitivity	
		(A)	(mm^2)	(mm^2)	(A)	(mA)	(A)
RAS-8.0RNBCLQ	380-415V 3N~50/60Hz	17	2.5	0.75	20	30	20
RAS-10RNBCLQ		21.2	2.5	0.75	25	30	25
RAS-12RNBCLQ		26.8	4	0.75	32	30	32
RAS-14RNBCLQ		31.3	4	0.75	40	30	40
RAS-16RNBCLQ		33.7	6	0.75	40	30	40
RAS-18RNBCLQ		41.5	10	0.75	50	30	50
RAS-20RNBCLQ		46.1	10	0.75	63	30	63
RAS-22RNBCLQ		49.2	10	0.75	63	30	63
RAS-24RNBCLQ		53.7	10	0.75	63	30	63

ELB: Earth leakage Breaker

Install main switch and ELB for each system separately. Select the high response type of ELB that acts within 0.1 second.

- Field Minimum Wiring Sizes for Power Source and Transmission

Model	Power Supply	Maximum Running Current (A)	Power Source Cable Size	Transmitting Cable Size	Earth Wiring Size (mm^2)
			(mm^2)	(mm^2)	
RAS-8.0RNBCLQ	380-415V 3N~50/60Hz	17	2.5	0.75	2.5
RAS-10RNBCLQ		21.2	2.5	0.75	2.5
RAS-12RNBCLQ		26.8	4	0.75	4
RAS-14RNBCLQ		31.3	4	0.75	4
RAS-16RNBCLQ		33.7	6	0.75	6
RAS-18RNBCLQ		41.5	10	0.75	10
RAS-20RNBCLQ		46.1	10	0.75	10
RAS-22RNBCLQ		49.2	10	0.75	10
RAS-24RNBCLQ		53.7	10	0.75	10

Refer to the table below for selection of the power source cable size.

NOTE:

1. Follow the local codes and regulations when selecting field wiring.
2. The wiring sizes in the table below are selected at the maximum current of the unit. Use the wiring which are not lighter than the ordinary tough rubber sheathed flexible cord or ordinary polychloroprene sheathed flexible cord.
3. Use a shielded cable for the transmitting circuit and connect it to the ground.

Current (A)	Wire Size (mm^2)
i≤24	2.5
24<i≤32	4
32<i≤40	6
40<i≤55	10
55<i≤73	16
73<i≤96	25
96<i≤116	35

NOTE:

Use 2-core cable size: 0.75mm^2 to 1.25mm^2 for the control cable between the outdoor unit and the indoor unit.
The total transition wiring length between the indoor unit and the outdoor unit should be less than 1000m and the total transition wiring length between outdoor units should be less than 30m.

⚠ CAUTION

Install a multi-pole main switch with a space of 3.5mm or more between each phase.

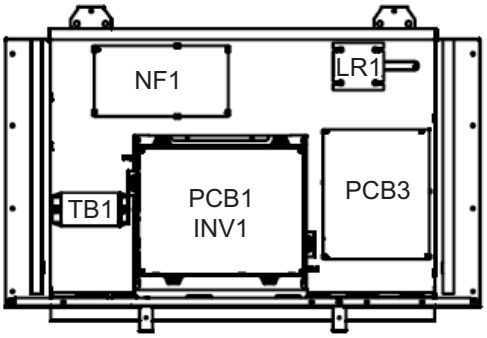
1.1.2 Function of RSW, DSWs and LEDs

Location of Print Circuit Boards (PCBs)

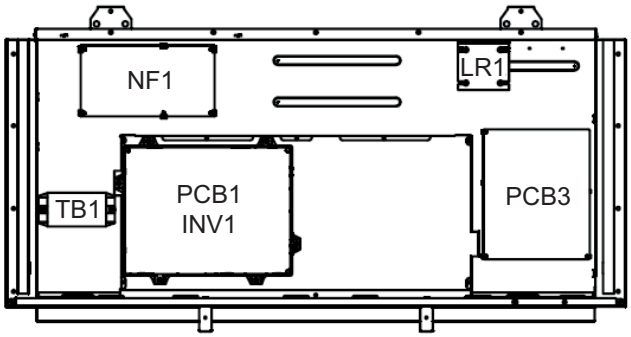
*Electrical Control Box of Outdoor Unit: Front Side

380-415V 50Hz/60Hz

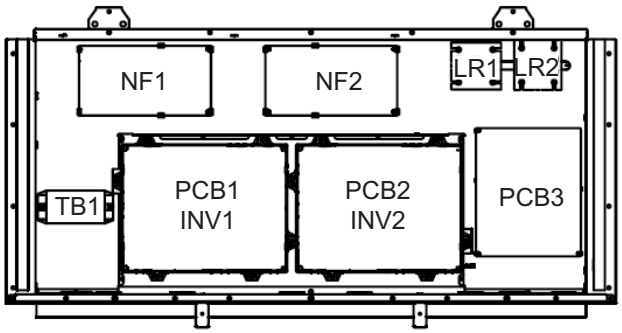
RAS-8.0RNBCLQ – RAS-12RNBCLQ



RAS-14RNBCLQ – RAS-16RNBCLQ



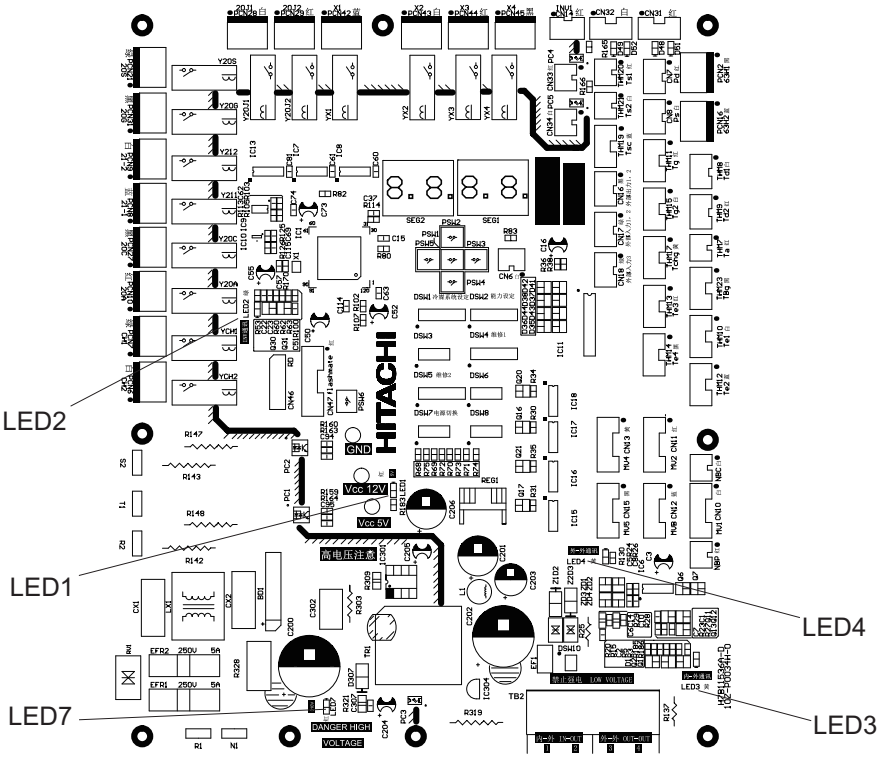
RAS-18RNBCLQ – RAS-24RNBCLQ



● Purpose

Symbol	PCB	Purpose
PCB3	Outdoor Unit PCB	1. Transmitting between Indoor Unit and Outdoor Unit 2. Processing for Sensor Input 3. Processing for DIP Switch Input 4. Operation Control for Above Items 1 to 3. Compressor Operation Control, Bypass Valve Control, Fan Control and Overcurrent Control 5. 7-Segment Indication 6. Processing of Safety Device Input 7. Processing of Relay Output 8. Reverse Phase Detection for Power Source
INV1, 2 (For 380-415V 50Hz/60Hz)	Inverter PCB	1. Inverter power part is driven by outdoor unit PCB to drive compressor. 2. Overcurrent Control 3. Protection Control for Inverter Part 4. DC Fan Motor Speed Control

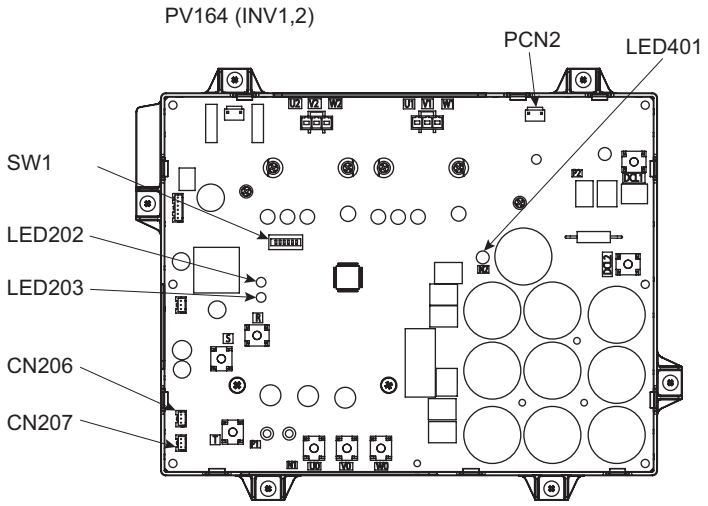
a. Control Printed Circuit Board:
PCB3 (Outdoor Unit PCB)



Part Name		Function Information
LEDs	LED1 (Red)	Power Source Indicator for Outdoor Unit PCB (Low Voltage) Normal Condition: Activated / ON Abnormal Condition: Deactivated / OFF
	LED2 (Green)	This LED2 indicates the communication state between the outdoor unit PCB and inverter PCB. Normal Condition: Flashing Abnormal Condition: Activated / ON or Deactivated / OFF
	LED3 (Yellow)	This LED3 indicates the communication state between the indoor unit and outdoor unit. Normal Condition: Flashing Abnormal Condition: Activated / ON or Deactivated / OFF
	LED4 (Orange)	This LED4 indicates the communication state between the outdoor units. Normal Condition: Flashing Abnormal Condition: Activated / ON or Deactivated / OFF
	LED7 (Red)	Power Source Indicator for Outdoor Unit PCB (High Voltage) Normal Condition: Activated / ON Abnormal Condition: Deactivated / OFF
SEGs	SEG1, SEG2	These indicate: “Alarm”, “Protective Safety Device has Tripped” or “Checking Items”.

b. Inverter Printed Circuit Board

INV1, 2 (Inverter PCB)



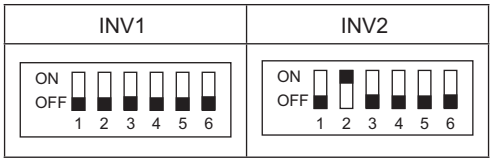
Part Name	Function Information
LED401 (Red)	Power source indicator for inverterPCB Normal Condition: Activated / ON Abnormal Condition: Deactivated / OFF
LED202 (Yellow) LED203 (Green)	This indicates the states of microcomputer Normal Condition: Activated / ON Abnormal Condition: Deactivated / OFF

LED202	LED203	Function
flash	OFF	Compressor stop
OFF	flash	Fan motor 1 stop
flash	flash	Fan motor 2 stop

● SW1

No setting is required for outdoor unit installation. When setting the No. 1 pin to ON, the electric current detection is cancelled.

The No. 1 pin should be set back to OFF after electrical work.



1.1.3 Outdoor Unit Rotary Switch and DIP Switch Setting

Turn off the electrical power supply to all units before setting the DIP switches. Otherwise DIP switch fails to work and the setting becomes invalid.

But the DIP switch DSW4-No. 1, 2, 4 is valid when the power is turned ON under the status of power ON setting.

■ Symbol indicates DIP switch position. Refer to Figure 1 for setting DIP switch settings and positions.

NOTICE

- 10-20 seconds after DIP setting on DSW4, the unit will be start or stop.
- Outdoor unit is numbered to distinguish it from other outdoor unit for repair and maintenance. Ensure to write a number in the box on the right.

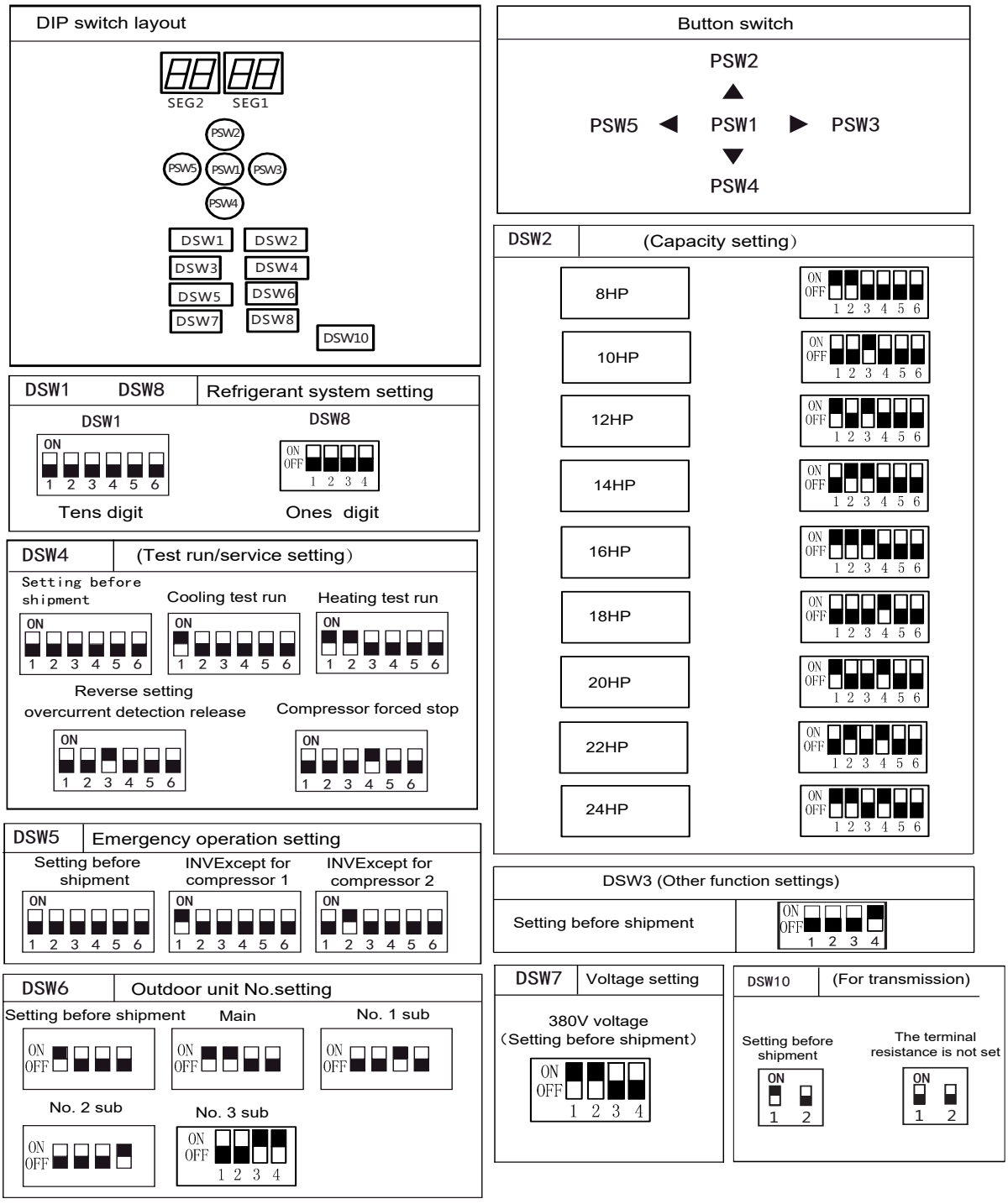


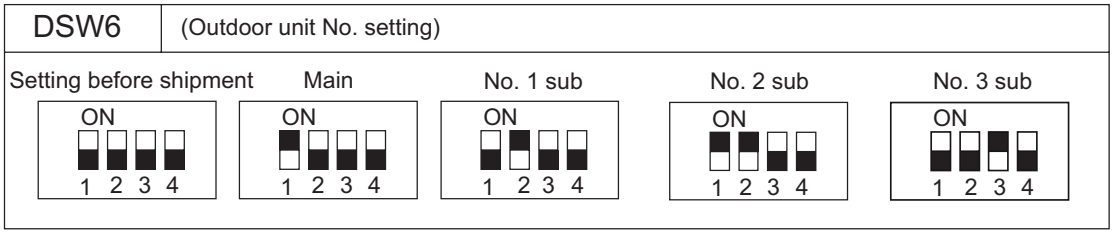
Figure 1 DIP Setting

● Communications settings:

Set the outdoor unit number, the refrigerant system number, and the terminal resistance for the H-LINK or H-LINK II system.

● Outdoor number setting:

When you combine base model module, set the DSW6 as shown below:

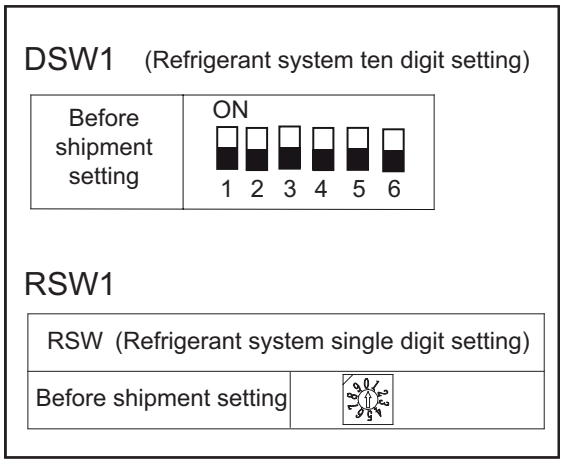


● Refrigerant system setting:

Set the refrigerant system no. for the outdoor unit within the same refrigerant system, as shown in the figure:

NOTE:

Within the same refrigerant system, refrigerant no. for the outdoor unit and indoor unit should be set to the same.

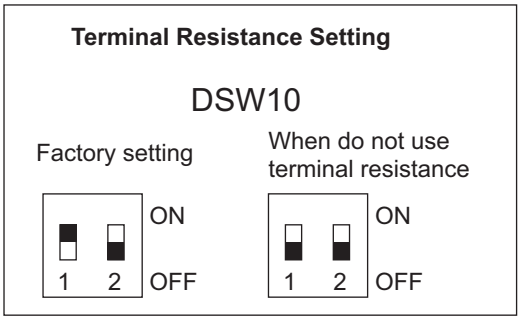


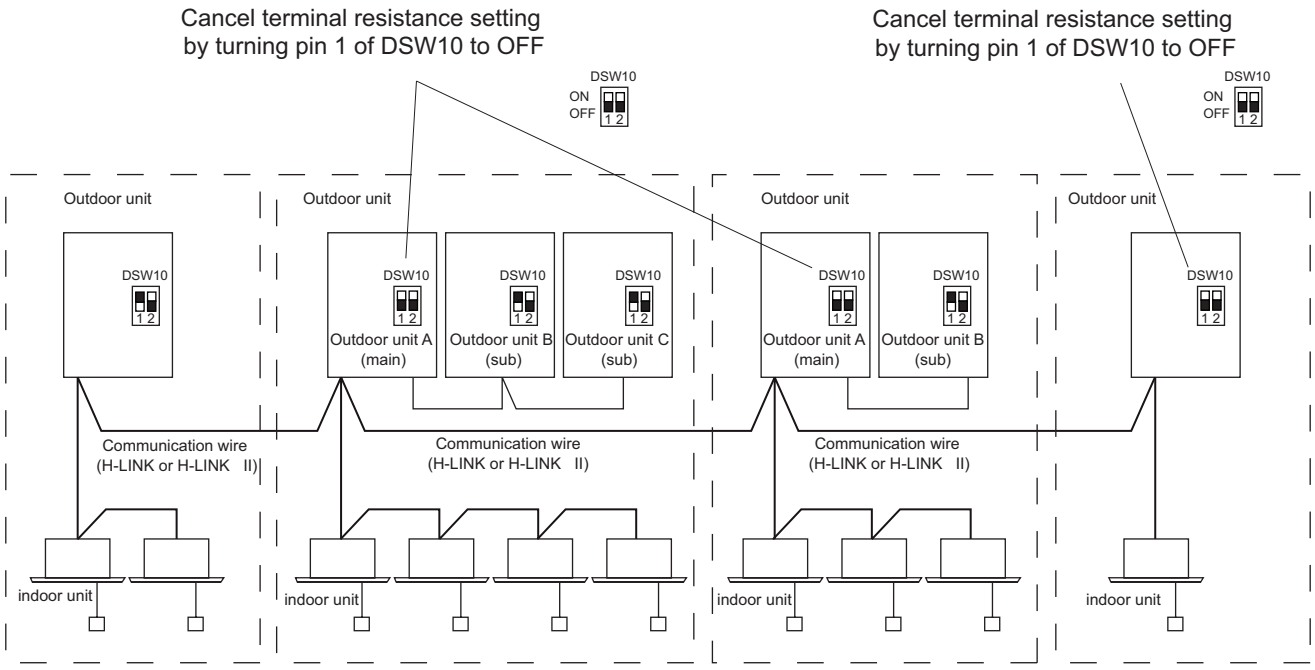
DSW1 and RSW1 factory set to the 0.

The maximum number of refrigerant system is set to 63.

● Terminal resistance setting:

At the factory, position 1 of the DSW10 is set to ON. If the number of outdoor units in the same H-LINK or H-LINK II system is 2 or more, the position 1 of the DSW10 is set to OFF from the outdoor unit of the second refrigerant system. In this case, no need for setting if only one outdoor unit is used.





[External Input/Output Setting]

■ Start of Setting

Turn ON DSW4-No. 4 and turn ON DSW4-No. 6.

■ Exit Setting Mode

Turn OFF DSW4-No. 6 during indicated
External Input/Output Setting Mode.
Then, turn OFF DSW4-No. 4.

External Input/Output and Function Setting:

Press PSW3 (►) and PSW5 (◄) to select function No. PSW4 (▼): forward, PSW2 (▲): backward

	Item	SEG2	SEG1	Set
1	Input setting 1 CN17 [1-2pin]	i 1	1	
2	Input setting 2 CN17 [2-3pin]	i 2	2	
3	Input setting 3 CN18 [1-2pin]	i 3	3	
4	Output setting 1 CN16 [1-2pin]	o 1	1	
5	Output setting 2 CN16 [1-3pin]	o 2	2	

Setting External Input/Output Function:

Function No.	Input	Output
1	Fixed Heating Mode	Operation Signal
2	Fixed Cooling Mode	Alarm Signal
3	Demand Stoppage	Compressor ON Signal
4	Outdoor Fan Motor Start/Stop	Defrost Signal
5	Forced Stoppage	-
6	Demand Current Control 40%	-
7	Demand Current Control 60%	-
8	Demand Current Control 70%	-
9	Demand Current Control 80%	-
10	Demand Current Control 100%	-
11	Low noise setting	-
12	Low noise setting	-
13	Low noise setting	-
0	No Setting	No set

Same input/output function cannot be set to different input/output terminal. Otherwise, the larger function number setting will be invalid.

*When ambient temperature is higher than 44°C low noise setting mode is invalid.

[Function Setting]

(1) Function selection Setting Method

■ Start of Setting

Turn ON DSW4-No. 4 and turn ON DSW4-No. 5.

■ Exit Setting Mode

Turn OFF DSW4-No. 5 during indicated Function Setting Mode.

Then, turn OFF DSW4-No. 4.

(2) Function Setting Option

By pressing the push-switches PSW3 (►) and PSW5 (◄) the setting can be changed.

PSW4 (▼): forward, PSW2 (▲): backward

Refer to the Technical Manual for more details.

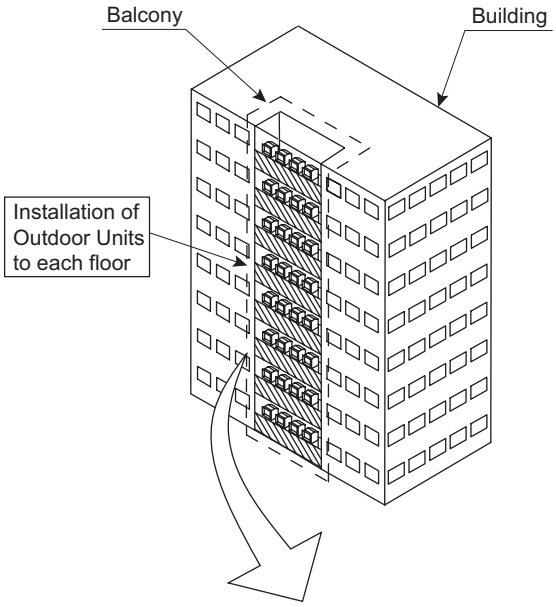
Fill out the selected function No. in the space provided in the following table:

	Item	SEG2	SEG1	SET		Item	SEG2	SEG1	SET
1	Circulator Function at Heating Thermo-Off	FA	0		25	N/A	F1	0	
2	Switch to Night Mode (Low Noise)	n1	0		26	Crankcase Heating Band Control During Stoppage	F2	0	
3	Cancellation of Outdoor Ambient Temperature Limit	CS	0		27	Indoor Fan Warm Start Period Setting	F3	0	
4	Defrost in Cold Area (Change Of Defrost Condition)	Jo	0		28	Intermittent Operation of Outdoor Fan Motor	F4	0	
5	Gentle Fan Speed Defrost Setting	bJ	0		29	Indoor Expansion Valve Target Value Control for Cooling (Only For 4-Way Cassette Type)	F5	0	
6	Cancellation of Outdoor Unit warm Start	HF	0		30	Indoor Expansion Valve Minimum Opening Limit During Heating Switch-Off	F6	0	
7	Capacity Priority Mode	nU	0		31	N/A	F7	0	
8	Minimum Evaporating Temperature Setting for Cooling	Hc	0		32	Forced Defrosting After Forced Stoppage Of Defrosting Cycle	F8	0	
9	Compressor Frequency Target Value Control for Heating	Hh	0		33	Indoor Expansion Valve Control Change for Stoppage Indoor Unit in Heating Mode	F9	0	
10	Indoor Expansion Valve Target Value Control for Cooling	SC	0		34	Compressor Maximum Frequency Suppression	FC	0	
11	Indoor Expansion Valve Target Value Control for Heating	SH	0		35	Convert Unit in Checking Mode	Fd	0	
12	Indoor Expansion Valve Opening Control During Heating Operation Stoppage	S1	0		36	Indoor Fan ON/OFF Setting during Forced Stoppage	FE	0	
13	Indoor Expansion Valve Opening Control During Heating Thermo-Off	So	0		37	N/A	FF	0	
14	Indoor Expansion Valve Initial Opening Control During Heating Thermo-On	c1	0		38	High difference setting	FG	0	
15	Indoor Expansion Valve Initial Opening Control for Cooling	cb	0		39	N/A	FH	0	
16	Outdoor Expansion Valve Initial Opening Control for Heating	ch	0		40	Oil return control	F1	0	
17	Low Noise Setting*	db	0		41	Performance correction	FJ	0	
18	Demand Function Setting	dE	0		42	Outdoor temperature range	FL	0	
19	Wave Function Setting	UE	0		43	Cooling mode Start control 2 Hz change speed	Fn	0	
20	Protection of Decrease in Outlet Temperature for Cooling	Fb	0		44	Cooling mode Start control 2 Hz change speed	FP	0	
21	Outlet Temperature Control	Fr	0		45	Compressor Maximum Frequency Change during Defrosting Mode	Fr	0	
22	Adjustment of Fan Running (For Multiple Installation)	Fo	0		46	Oil return mode of indoor unit	FU	0	
23	N/A	Lr	0		47	N/A	F9	0	
24	Thermo-Off Setting for Outdoor Unit After Defrosting Operation	dS	0						

*when ambient temperature is higher than 44°C, silence and low noise setting mode is invalid.

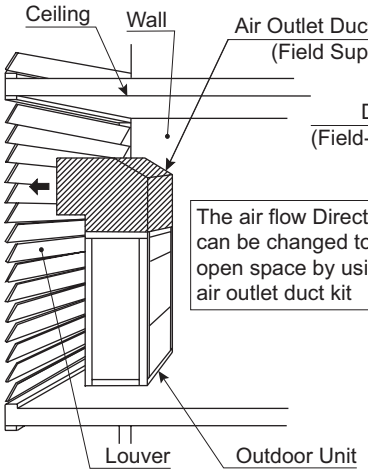
High Static Pressure Setting (DSW8: ON)

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.

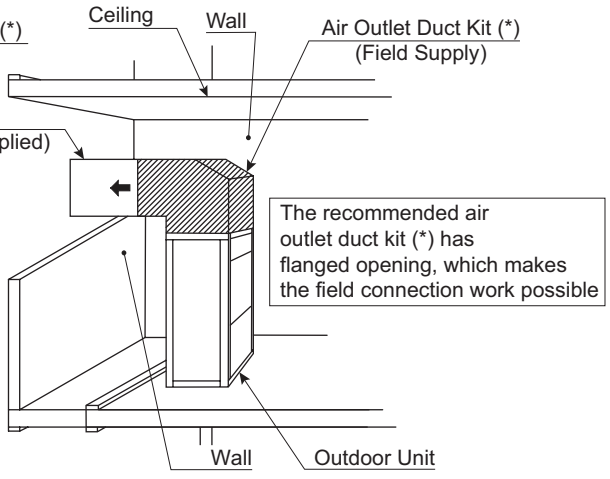


Setting for External Static Pressure	DSW8		
	#1	#2	#3
0Pa	OFF	OFF	OFF
Max 30Pa	ON	OFF	OFF
Max 60Pa	OFF	ON	OFF
Max 80Pa	ON	ON	OFF

Case that Open Space is Louver



Case that Open Space is Wall



NOTE:

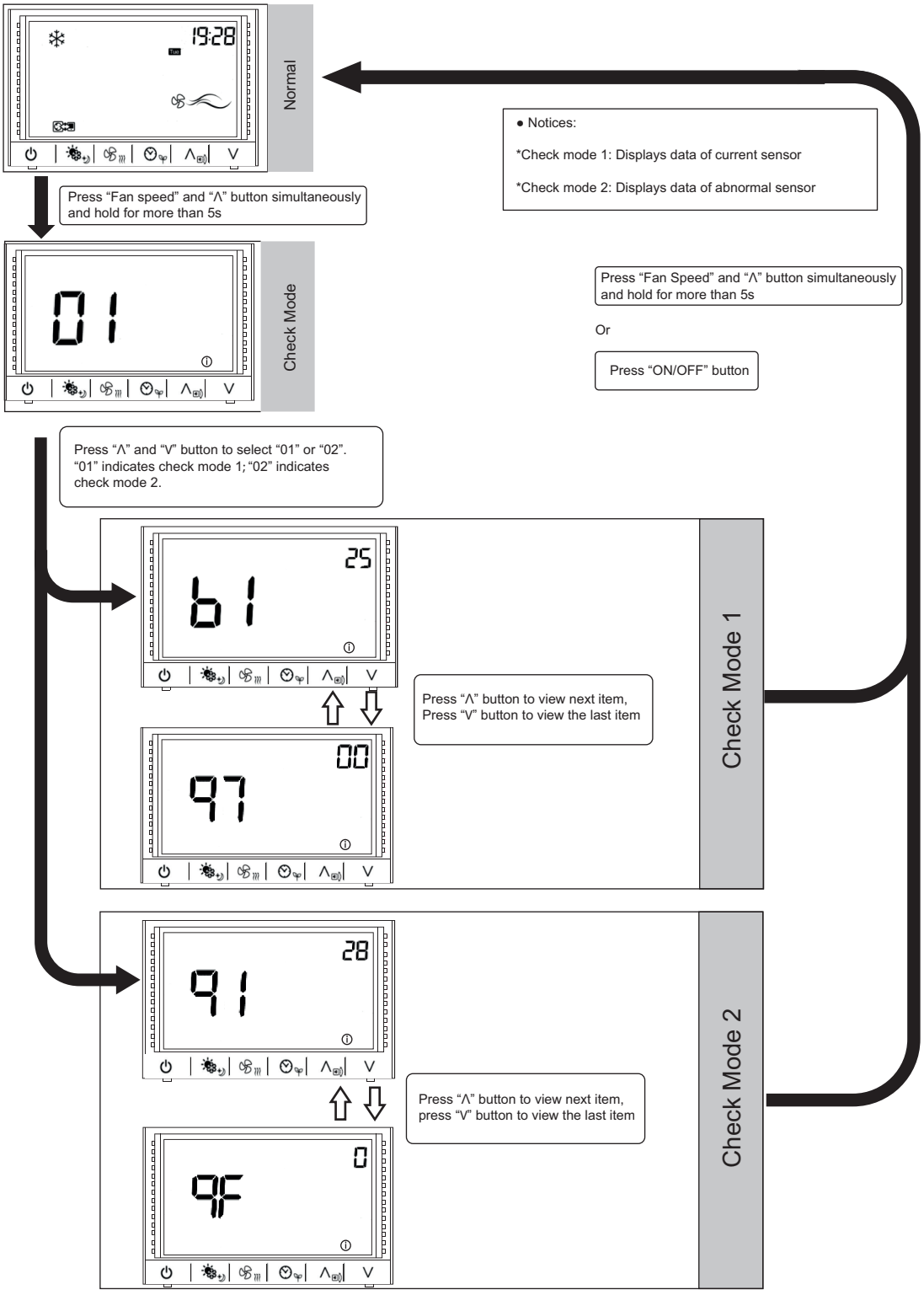
1. Pay attention to the following case at the design and the installation. If the outlet air intakes by short-circuit, the operation range is limited due to increasing high pressure in the cooling operation or decreasing low pressure in the heating operation so that may cause failure of unit.
2. (*):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

1.1.4 Troubleshooting in Check Mode by Wired Controller

1.1.4.1 Check mode by wired controller with a touch screen

(1) Use wired controller to enter in “Check Mode” under following conditions:

1) On the alarm code interface screen, alarm icon ⚠ flashes.
2) The unit stops after quitting alarm interface (press “Fan Speed” to quit) and restarts for alarm code cause.
3) Enter “Check Mode” (Check 1 or Check 2) under normal operation state or during stoppage.
4) View data such as temperatures of indoor inlet air or out let air, and so on.



Features of Check Mode 1

No.	Item	Data Name
1	b1	Set Temperature for I.U. (°C)
2	b2	Inlet Air Temperature for I.U. (°C)
3	b3	Outlet Air Temperature for I.U. (°C)
4	b4	Liquid Pipe Temp. for I.U. (°C)
5	b5	Remote thermistor Temp. (°C)
6	b6	Outdoor ambient air Temp. (°C)
7	b7	Gas Pipe Temp. for I.U. (°C)
8	b8	Evaporating Temp. at Heating for O.U. (°C)
9	b9	Condensing Temp. (°C)
10	bA	Comp. Top Temp. (°C)
11	bb	Wired Controller detected Temp. (°C)
12	bC	Not prepared
13	C1	I.U. control Input / Output status
14	C2	I.U. control Input / Output status
15	d1	Cause Code of Unit Stoppage
16	E1	Times of Abnormality occurrence
17	E2	Times of I.U. instantaneous stoppage
18	E3	Times of Abnormality occurrence of Communication between Wired controller and I.U.
19	E4	Times of Inverter Tripping occurrence
20	F1	Louver Sensor State
21	H1	Discharge Pressure (×0.1Mpa)

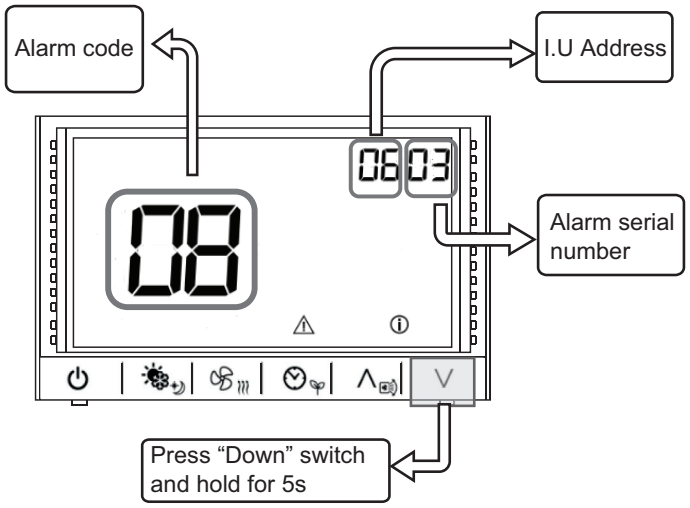
No.	Item	Data Name
22	H2	Suction Pressure (×0.1Mpa)
23	H3	Order frequency (Hz)
24	H4	Operating Frequency (Hz)
25	J1	I.U. Capacity
26	J2	O.U. Model Code
27	J3	Refrigerant System No.
28	J4	Refrigerant System No.
29	L1	I.U. Expansion Valve opening (%)
30	L2	O.U. Expansion Valve opening 1 (%)
31	L3	O.U. Expansion Valve opening 2 (%)
32	L4	O.U. Expansion Valve opening 3 (%)
33	P1	Comp. Operating Current
34	P2	Accumulated Operation Time of Comp.(×10 hours)
35	q1	Motion Sensor Reaction Rate (%)
36	q2	Radiation Sensor Temp.
37	q3	Motion Sensor Reaction Rate1 (%)
38	q4	Motion Sensor Reaction Rate 2 (%)
39	q5	Motion Sensor Reaction Rate 3 (%)
40	q6	Motion Sensor Reaction Rate 4 (%)
41	q7	Setting Temp. Corrected Value (°C)

Features of Check Mode 2

No.	Item	Data Name
1	q1	Inlet Air Temperature for I.U. (°C)
2	q2	Outlet Air Temperature for I.U. (°C)
3	q3	Liquid Pipe (Freezing) emp. for I.U. (°C)
4	q4	Outdoor ambient air Temp. (°C)
5	q5	Gas Pipe Temp. for I.U. (°C)
6	q6	Evaporating Temp. at Heating
7	q7	Condensing Temp. (°C)
8	q8	Comp. Top Temp. (°C)
9	q9	Discharge Pressure (×0.1Mpa)
10	qA	Suction Pressure (×0.1Mpa)
11	qb	Order Frequency (Hz)
12	qC	Operating Frequency (Hz)
13	qd	I.U. Expansion Valve opening (%)
14	qE	O.U. Expansion Valve opening 1 (%)
15	qF	Comp. Operating Current (A)

(2)Alarm History

1) Procedure to display Alarm History



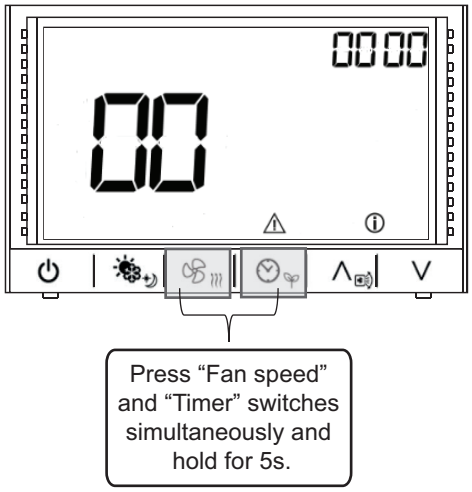
a) Press any switch to light the backlight.

b) Press “Down” switch and hold for 5s to enter “Alarm History Display” mode interface as shown below.

c) Press “Up” switch or “Down” switch once to view the alarm history.

d) Press “ON/OFF” switch once or press “Down” switch and hold for 5s to quit Alarm History Display mode and return to normal interface screen

2) Deleting Alarm History



a) Press any switch to light the backlight.

b) Press “Down” switch and hold for 5s to enter “Alarm History Display” mode interface.

c) Press “Fan Speed” & “Timer” switches simultaneously and hold for 5s to delete all alarm history data. “00” is displayed at “Minute” area when there is no alarm as shown in above figure.

d) Press “ON/OFF” once or press “Down” switch and hold for 5s to quit “Alarm History Display” mode and return to normal interface screen.

NOTE:

- With Alarm History Display on wired controller, maximum of 30 alarm items can be recorded.

1.1.5 Checking Using 7-Segment Display

⚠ DANGER

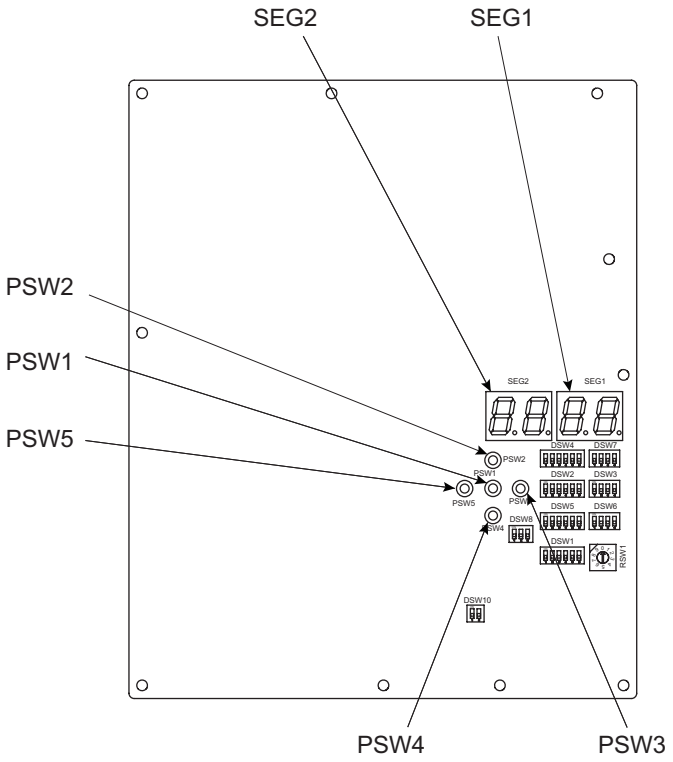
Only an authorized person can check using this method.

● Before Checking

1) Turn ON the main power source. Wait for more than 20 seconds to start checking.
2) Checking Items
   * Connecting Information
   * Outdoor Unit Information
   * Indoor Unit Information
   * Cause of Alarm Code Information
   * Alarm Code History Information
3) Check the locations of 7-segment and push switches.
4) AC380-415V is applied to the PCB and electrical parts. Never touch electrical parts and wiring without appropriate personal protective equipment (PPE) when checking.

● Location of Push Switches and 7-Segment Display

The push switches and 7-segment display are located on the PCB3.



TROUBLESHOOTING

● Simple Checking by 7-Segment Display

1 Turn on All Indoor Units *1)

*1): All the Indoor Units Connected to the Outdoor Unit

2 Turn on the Outdoor Unit

3 Auto-addressing Starts

Outdoor Unit Printed Circuit Board (PCB3)

During auto-addressing, the following items can be checked using the outdoor unit's on-board 7-segment LED display.
(1) Disconnection of power supply to the indoor unit.
(2) Reverse connection of the communication cable between the outdoor and indoor units.
In this case, "03" appears after 30 seconds.
(3) Duplication of indoor unit number. See Alarm Code 35.

Normal Case

(1) The outdoor unit's on-board 7-segment LED display is not indicated.

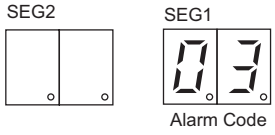
Abnormal Case

(2) The outdoor unit's on-board 7-segment LED display indicates the followings if there is something wrong.

(A) Alarm code will be displayed on the 7-segment when an alarm is received from an indoor unit in normal mode.
As for the following alarm codes, however, alarm code will be displayed on the 7-segment LED when an alarm is detected by an outdoor unit itself.
• Alarm Code “03” (Abnormal communication between Indoor Unit and Outdoor Unit)
• Alarm Code “35” (Incorrect Indoor and Outdoor Unit No. Setting)

(B) Alarm code of lower number indoor unit address No. will be displayed when alarm is received from multiple indoor units.

(C) The following 7-segment LED is displayed and flashed every 0.5 seconds.



(D) SEG1 and SEG2 are as follows.

7-Segment Display
<In Case of Unit No. 63, Alarm Code “01”>
SEG2: Indoor Unit No. (0~63) SEG1: Alarm Code



● Checking Method using Checking Mode

Operating conditions and each part of a system can be checked using the 7-segment display on the PCB3 in the outdoor unit.

NOTE:

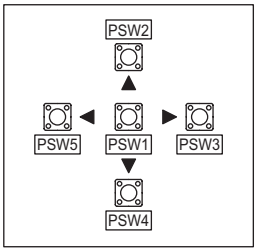
1. Change the Indication Group by pressing PSW5 (◄) and PSW3 (►).
   The first indication of the next or the previous Indication Group will be indicated no matter where the current step is at.
2. The indications compatible for all the outdoor units and indoor units connected will be indicated for the case of Group (B) and Group (C).

(Example)

(0-1) Outdoor Unit (No.0) [od 0] →・・・(0-36) Cause Code of Fan Controller Stoppage Code [F 20]

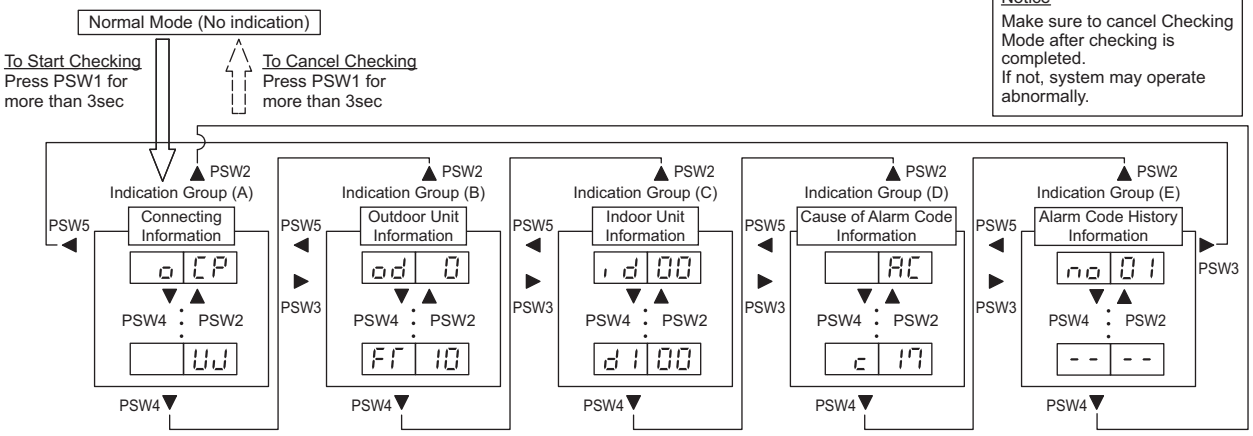
・・・→ (2-1) Outdoor Unit (No.0) [od 2] →・・・(2-36) Cause Code of Fan Controller Stoppage Code [F 20]

Arrangement of Push Switches



Notice

Make sure to cancel Checking Mode after checking is completed.
If not, system may operate abnormally.



(A) Connecting Information

This information is indicated at the main outdoor unit (Unit A) only.

Press PSW4 (▼) to forward or PSW2 (▲) to backward.

The information will be indicated alternately as “Item” → “Details”.

Details of Indication

Item		7-Segment Display SEG2	7-Segment Display SEG1	Details
1	Total Capacity of Connected Outdoor Units	o	CP	Total Capacity of O.U. Combination Refer to “Outdoor Unit Capacity Table”.
2	Connected O.U. Number	o	AA	Connected Outdoor Unit Number
3	Total Capacity of Connected Indoor Units	i	CP	Total Capacity of Connected Indoor Units
4	Connected I.U. Number	i	AA	Connected Indoor Unit Number
5	Refrigerant Cycle No.		GA	Refrigerant Cycle No.
6	Total Capacity of Operated I.U.		oP	Total Capacity of Operated Indoor Units Refer to “Indoor Unit Capacity Table”.
7	Total Comp. Frequency		Hz	[Hz]
8	Accumulated Operation Time		UJ	[10 Hour]

Outdoor Unit Capacity Table

Indication	Capacity (kW)	Horsepower (HP)
40	14.0	5.0
48	16.0	6.0
64	22.4	8.0
80	28.0	10.0
96	33.5	12.0
112	40.0	14.0
128	45.0	16.0
144	50.0	18.0
160	56.0	20.0
176	61.5	22.0
192	67.0	24.0

NOTE:

In case of combination unit, the indication of outdoor unit capacity is total capacity of each unit.

< Example >
In case of 432 type

432 type = 144 type x 3
144 x 3 = 432
Indication “432” will be displayed.

Indoor Unit Capacity Table

Indication	Capacity (kW)	Horsepower (HP)	Indication	Capacity (kW)	Horsepower (HP)
3	1.1	0.4	20	7.1	2.8
5	1.8	0.6	22	8.0	3.0
6	2.2	0.8	26	9.0	3.3
7	2.5	0.9	28	10.0	3.6
8	2.8	1.0	32	11.2	4.0
9	3.2	1.2	35	12.5	4.5
10	3.6	1.3	40	14.0	5.0
11	4.0	1.5	48	16.0	6.0
13	4.5	1.8	64	22.4	8.0
14	5.0	2.0	80	28.0	10.0
16	5.6	2.3	128	45.0	16.0
18	6.3	2.5	160	56.0	20.0

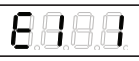
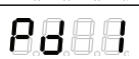
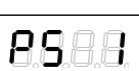
(B) Outdoor Unit Information

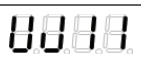
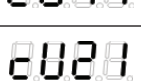
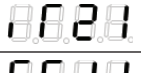
Select the outdoor unit number to be displayed only for the example of Unit A (No.0). Units B and C (Nos.1 and 2) show each unit number only.
When the selection is changed, press PSW3 (►) to forward or PSW5 (◄) to backward.

Unit	Indication
Unit A (No.0)	od 0
Unit B (No.1)	od 1
Unit C (No.2)	od 2
Unit D (No.3)	od 3

Select the outdoor unit number for indication.
Press PSW4 (▼) for detailed information of selected unit number.
Press PSW4 (▼) to move forward or PSW2 (▲) to move backward. The information will be indicated alternately as “Item” → “Details”.
Press PSW3 (►) or PSW5 (◄) to change the Outdoor Combination Unit No. to be indicated or to move other Indication Group.

Details of Indication

No	Item	7 SEG Display SEG2 SEG1	Details
1	Outdoor Unit No.		0~4 (Outdoor Unit No.)
2	Outdoor Unit Capacity		Unit Capacity Indication Refer to "Outdoor Unit Capacity Table"
3	Output State of Outdoor MCU		Output State of Outdoor Micro-Computer Indication
4	Running Frequency of Inverter Compressor MC1		Running Frequency of No.1 Compressor Indication [Hz]
5	Running Frequency of Inverter Compressor MC2		Running Frequency of No.2 Compressor Indication [Hz]
6	Total Number of Running Compressor		Total Number of Running Compressor Indication
7	Outdoor Fan Step		Outdoor Fan Step Indication (0 to 27 [Step])
8	Outdoor Expansion Valve MV1 Opening		0~100%
9	Outdoor Expansion Valve MV2 Opening		0~100%
10	Bypass Expansion Valve MVB Opening		0~100%
11	High (Discharge) Pressure (Pd)		Unit: MPa Indication of Pressure Sensor Open Circuit: 5.62 Indication of Pressure Sensor Short Circuit: -0.62
12	Low (Suction) Pressure (Ps)		Unit: MPa Indication of Pressure Sensor Open Circuit: 2.25 Indication of Pressure Sensor Short Circuit: -0.25
13	Ambient Air Temperature (Ta)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
14	Discharge Gas Temperature on Top of Compressor MC1 (Td1)		Unit: °C Indication of Thermistor Open Circuit: 0 Indication of Thermistor Short Circuit: 255
15	Discharge Gas Temperature on Top of Compressor MC2 (Td2)		Unit: °C Indication of Thermistor Open Circuit: 0 Indication of Thermistor Short Circuit: 255
16	Outdoor Heat Exchanger Liquid Temperature (Te1)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
17	Outdoor Heat Exchanger Liquid Temperature (Te2)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
18	Outdoor Heat Exchanger Gas Temperature (Tg)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
18a	Subcooling Heat Exchanger Temperature (Tg2)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
19	Liquid Stop Valve Temperature (Tchg)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
20	Subcooling Heat Exchanger Temperature (Tsc)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
20a	Subcooling Heat Exchanger outlet Temperature (Ts)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
21	Inverter Fin Temperature 1		-40～127°C

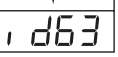
No	Item	7 SEG Display SEG2 SEG1	Details
22	Inverter Fin Temperature 2		-40～127°C
23	Fan Controller Fin Temperature 1		-40～127°C
24	Fan Controller Fin Temperature 2		-40～127°C
25	Compressor MC1 Current		0～255A
26	Compressor MC2 Current		0～255A
27	Fan Motor MOF1 Current		0～255A
28	Fan Motor MOF2 Current		0～255A
29	Accumulated Operation Time of Compressor MC1		0～9999(×10 Time)
30	Accumulated Operation Time of Compressor MC2		0～9999(×10 Time)
31	Accumulated Operation Time of Compressor MC1 (Resettable)		0～9999(×10 Time)
32	Accumulated Operation Time of Compressor MC2 (Resettable)		0～9999(×10 Time)
33	Cause Code of Inverter Stoppage 1		0～63
34	Cause Code of Inverter Stoppage 2		0～63
35	Cause Code of Fan Controller Stoppage 1		0～63

(C) Indoor Unit Information

This information is indicated at the main outdoor unit (Unit A) only.

Select the indoor unit number for the information indication. Press PSW4 (▼) to move forward or PSW2 (▲) to move backward.

The information will be indicated alternately as “Item” → “Details”.

Unit No.	Indication
No.0	
No.1	
↓	↓
No.63	

Details of Indication

Item		7-Segment Display SEG2	7-Segment Display SEG1 *1)	Details
1	Indoor Unit No.			Outdoor Unit No. Indication
2	Indoor Unit Capacity			Unit Capacity Indication Refer to "Indoor Unit Capacity Table"
3	Indoor Expansion Valve Opening			[%]
4	Indoor Heat Exchanger Liquid Piping Temperature			°C)
5	Indoor Heat Exchanger Gas Piping Temperature			°C)
6	Air Inlet Temperature			°C)
7	Air Outlet Temperature			°C)
8	Cause Code of Indoor Unit Stoppage			Cause of Indoor Unit Stoppage Refer to "Cause Code of Indoor Unit Stoppage"

*1): The indoor unit No. is indicated on the one digit of "SEG1".

(D) Cause of Alarm Code Information

This information is indicated at the main outdoor unit (Unit A) only.

Press PSW4 (▼) to forward of press PSW2 (▲) for backward.

The information will be indicated alternately as “Item”→“Details”.

Details of Indication

Item		7-Segment Display		Details
		SEG2	SEG1	
1	Alarm Cause Code		AC	Latest O.U. Stoppage Alarm Code Indication Refer to “Alarm Code Table”.
2	Degeneracy Control for Pressure Ratio Decrease Protection	c	11	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
3	Degeneracy Control for High Pressure Increase Protection	c	13	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
4	Degeneracy Control for Inverter Fin Temperature Increase Protection	c	14	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
5	Degeneracy Control for Discharge Gas Temperature Increase Protection	c	15	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
6	Degeneracy Control for TdSH Decrease Protection	c	16	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
7	Degeneracy Control for Overcurrent Protection	c	17	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.

(E) Alarm Code History Information

This information is indicated at the main outdoor unit (Unit A) only.

If a history of abnormality exists, it is indicated up to a maximum of 15 instances in chronological order.

Press PSW4 (▼) to move forward or PSW2 (▲) to move backward.

Press PSW3 (►) for detailed information.

Press PSW4 (▼) to move forward or PSW2 (▲) to move backward.

Press PSW5 (◄) to return to Data No. Selection.

Data No.	7-Segment Display	
	SEG2	SEG1
1 (Latest Data)	no	01
↓	↓	↓
15 (Oldest Data)	no	15

Details of Indication

Item		7-Segment Display		Details
		SEG2	SEG1	
1	Unit Accumulated Operation Time	07	08	O.U. Accumulated Operation Time at Stoppage [10 Hours]
2	Cause of Stoppage	AC		Alarm Stoppage
		d1		Retry Stoppage
		C,		Control Information
3	Alarm Code/ Cause Code of Stoppage	01	48	O.U. No. is indicated on 10 digit of SEG2. Compressor and fan controller No. are indicated on one digit of SEG2. Alarm and Cause Code of Stoppage are indicated on SEG1.
4	Abnormal Data Indication	iF	12	Cause Code of Inverter Stoppage is indicated when it is existing on SEG2.
		FF	12	Cause Code of Fan Controller Stoppage is indicated when it exists on SEG2.
		--	--	Except for the above.

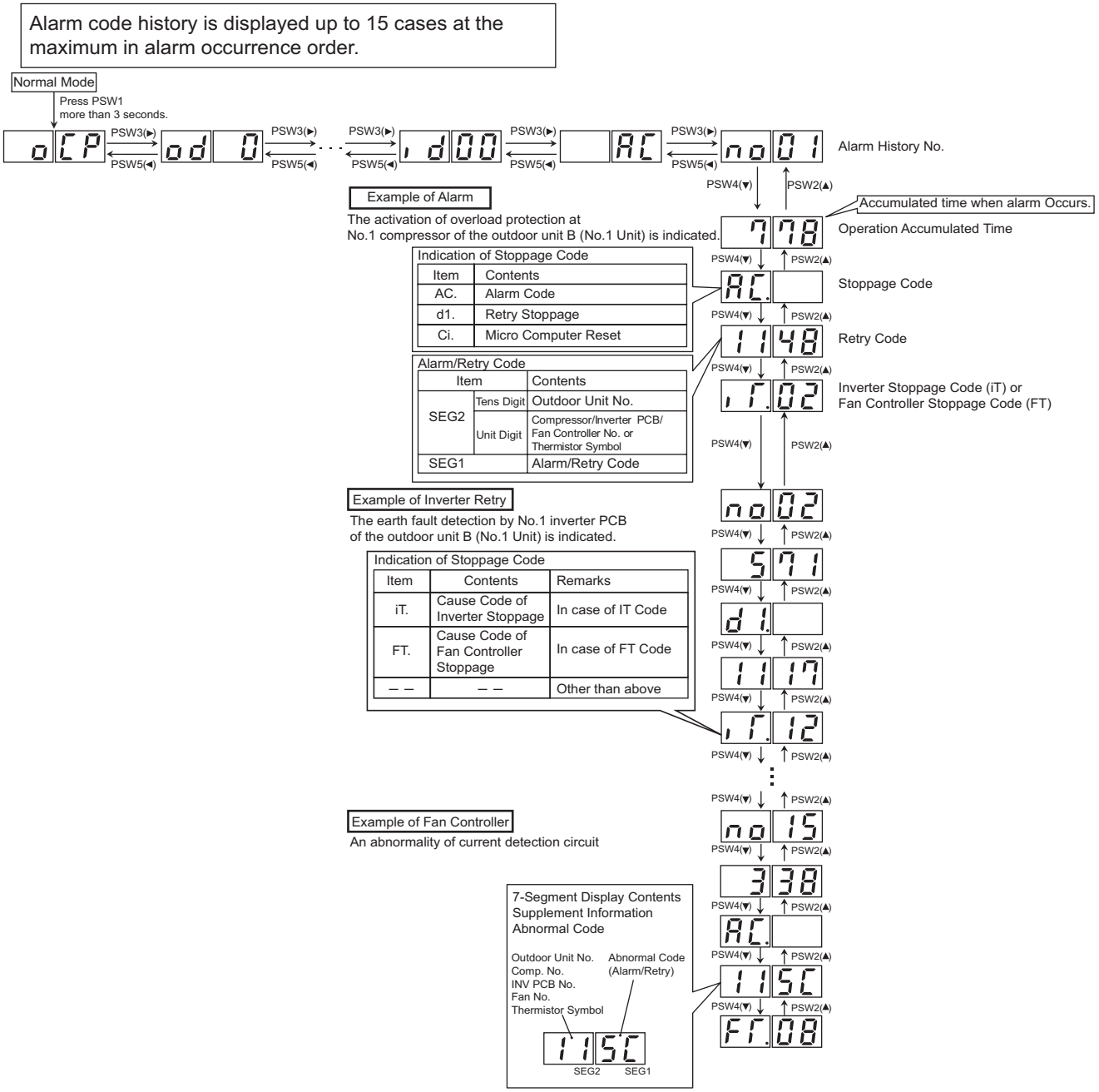
1.1.6 Checking of Alarm Code History

Alarm code history is indicated in the following order while the check mode is displayed.

"no01" (latest) history data ⟷ "no15" (oldest) ⟷ history data

Refer to the figure below as an example.

The alarm code is displayed only on PCB3 of the outdoor unit A.



Applicable Compressors and Fan Motors
During Abnormal Code (Alarm or Retry Code) Occurrence

Example: RAS-54RNBCLQ

	Outdoor Unit A		Outdoor Unit B		Outdoor Unit C	
Constitution of Compressors and Fan Motors	FAN FAN INV Comp.		FAN FAN INV Comp.		FAN FAN INV Comp.	INV Comp.
Unit No.	0		1		2	
Compressor No.	1		1		1	2
Fan No.	1	2	1	2	1	2

(1) Register of Alarm Code History

Cause of Stoppage (Alarm Code or Stoppage Code)	Contents	Indication of Alarm Code History					
		Time	Alarm *1)	Alarm Code			Abnormal Data
				O.U. Unit No.	Comp.No. Inverter PCB No.	Fan No.	
02	Activation of protection device	Accumulated Time	AC.	○	○		--
03	Abnormality transmitting between indoor units and outdoor units	Accumulated Time	AC.				--
04	Abnormality transmitting between inverter PCB and outdoor unit PCB	Accumulated Time	AC.	○	○		--
05	Abnormality of power source phase	Accumulated Time	AC.	○			--
06	Abnormality of inverter voltage	Accumulated Time	AC.	○	○		iTC
d1-18		Accumulated Time	d1.	○	○		iTC
07	Decrease in discharge gas superheat	Accumulated Time	AC.	○			--
d1-16		Accumulated Time	d1.	○			--
08	Increase in discharge gas temperature at the top of compressor	Accumulated Time	AC.	○			--
d1-15		Accumulated Time	d1.	○			--
0A	Abnormality transmitting between outdoor units	Accumulated Time	AC.				--
0b	Incorrect outdoor unit address setting	Accumulated Time	AC.				--
0c	Incorrect outdoor main unit setting	Accumulated Time	AC.				--
21	Abnormality of high pressure sensor	Accumulated Time	AC.	○			--
22	Abnormality of thermistor for outdoor air temperature	Accumulated Time	AC.	○			--
23	Abnormality of thermistor for discharge gas temp. on top of compressor	Accumulated Time	AC.	○	○		--
24	Abnormality of thermistor for outdoor unit heat exchanger liquid pipe (Te/Tchg/Tsc)	Accumulated Time	AC.	○	Thermistor Signal Te1: 1, Te2: 2 Tchg: C, Tsc: S		--
25	Abnormality of thermistor for outdoor unit heat exchanger gas pipe (Tg/Tg2/Ts)	Accumulated Time	AC.	○			--
29	Abnormality of low pressure sensor	Accumulated Time	AC.	○			--
30	Incorrect connection of change-over box	Accumulated Time	AC.				--
31	Incorrect capacity setting of indoor unit and outdoor unit	Accumulated Time	AC.				--
35	Incorrect indoor unit No. setting	Accumulated Time	AC.				--
36	Incorrect indoor unit combination	Accumulated Time	AC.				--
38	Abnormality of picking up circuit for protection in outdoor unit	Accumulated Time	AC.	○			--
3A	Abnormality of outdoor unit capacity	Accumulated Time	AC.				--
3b	Incorrect setting of outdoor unit model combination or voltage	Accumulated Time	AC.				--
3d	Abnormality transmitting between main unit and sub unit(s)	Accumulated Time	AC.				--
3E	Abnormal Combination between Inverter PCB and outdoor unit PCB	Accumulated Time	AC.	○			--

*1): (Details of Alarm)

AC.: Alarm

d1.: Retry

Ci.: Control Information

iTC: Inverter Stoppage Code

FTC: Fan Controller Stoppage Cod

Cause of Stoppage (Alarm Code or Stoppage Code)	Contents	Indication of Alarm Code History					
		Time	*Alarm	Alarm Code			Abnormal Data
				O.U. Unit No.	Comp.No. Inverter PCB No.	Fan No.	
43	Abnormality of low compression ratio	Accumulated Time	AC.	○			--
d1-11		Abnormality of low-pressure increase	AC.	○			--
44	Abnormality of low-pressure increase	Accumulated Time	AC.	○			--
d1-12		Accumulated Time	AC.	○			--
45	Abnormality of high-pressure increase	Accumulated Time	AC.	○			--
d1-13		Accumulated Time	d1.	○			--
47	Activation of low-pressure decrease protection device (Vacuum operation protection)	Accumulated Time	AC.	○			--
d1-15		Accumulated Time	d1.	○			--
48	Activation of inverter overcurrent protection device	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	d1.	○	○		iTC
51	Abnormality of inverter current sensor	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	AC.	○	○		iTC
53	Inverter error signal detection	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	AC.	○	○		iTC
54	Abnormality of inverter fin temperature	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	AC.	○	○		iTC
55	Inverter failure	Accumulated Time	AC.	○	○		iTC
d1-18		Accumulated Time	AC.	○	○		iTC
57	Activation of fan controller protection device	Accumulated Time	AC.	○		○	FTC
5A	Abnormality of fan controller fin temperature	Accumulated Time	AC.	○		○	FTC
5b	Activation of overcurrent protection	Accumulated Time	AC.	○		○	FTC
5C	Abnormality of fan controller sensor	Accumulated Time	AC.	○		○	FTC
A1	Detection of External Abnormality	Accumulated Time	AC.	○			--
b5	Incorrect setting of indoor unit connection number	Accumulated Time	AC.				--
EE	Compressor protection alarm	Accumulated Time	AC.				--
d1-05	Instantaneous power failure	Accumulated Time	AC.				--
d1-18	Abnormality of inverter and other	Accumulated Time	AC.				iTC
d1-26	Abnormality of high pressure decrease	Accumulated Time	AC.				--
d1-32	Retry stoppage by indoor unit auto address setting	Accumulated Time					--
Control Information	Micro-computer reset by abnormality of inverter transmission	Accumulated Time					1
	Micro-computer reset by abnormality of indoor unit transmission	Accumulated Time					3
	Micro-computer reset by abnormality transmitting between outdoor unit and outdoor unit	Accumulated Time					4
	Micro-computer reset for abnormality of control state	Accumulated Time					6

* (Details of Alarm)

AC.: Alarm

d1.: Retry

Ci.: Control Information

iTC: Inverter Stoppage Code

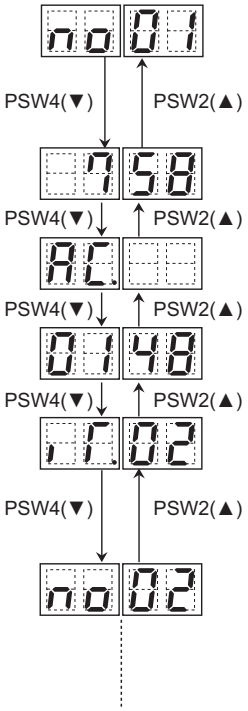
FTC: Fan Controller Stoppage Code

*Thermo-ON: The outdoor unit and some indoor units are running.

Thermo-OFF: The outdoor unit and some indoor units stay on, but do not run.

(2) Deletion of Alarm Code History

Press PSW1 and PSW3 for five seconds to clear the alarm code history while the history data is displayed.
(All history can be deleted.)



To delete all the history,
press PSW1 and PSW3 (►)
for five seconds
while history is displayed.

(3) Protection Control Code on 7-Segment Display

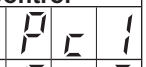
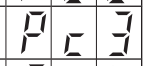
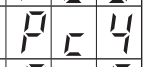
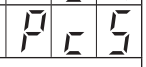
* Protection control code is displayed on 7-segment during operation when a protection control is activated.
* Protection control code is displayed while function is working, and goes out when released.
* When several protection controls are activated, code number with higher priority will be indicated (see below for the priority order).

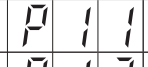
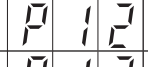
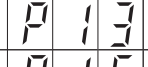
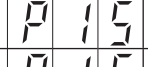
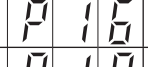
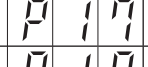
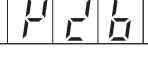
(a) Higher priority is given to the protection control related to frequency control than the others.

<Priority Order>

<1> Pressure Ratio Control
<2> High-Pressure Increase Protection
<3> Current Protection
<4> Inverter Fin Temperature Increase Protection
<5> Discharge Gas Temperature Increase Protection
<6> Low-Pressure Decrease Protection
<7> Demand Current Control (Running Current Limit Control)
<8> Low-Pressure Increase Protection
<9> High-Pressure Decrease Protection

(b) In relation to retry control, the latest retry code will be indicated unless a protection control related to frequency control is indicated.

Code	Protection Control	Code during Degeneration Control
	Pressure Ratio Protection Control	
	High-Pressure Increase Protection	
	Inverter Current Protection	
	Inverter Fin Temperature Increase Protection	
	Discharge Gas Temperature on Top of Compressor Increase Protection	
	Low-Pressure Decrease Protection	Without
	High-Pressure Decrease Protection	
	Demand Current Protection Control	
	Low-Pressure Increase Protection	

Code	Retry Control	Code during Degeneration Control
	Pressure Ratio Decrease Retry	Without
	Low-Pressure Increase Retry	
	High-Pressure Increase Retry	
	Discharge Gas Temperature Increase Retry/Low-Pressure Decrease Retry	
	Discharge Gas SUPERHEAT Decrease Retry	
	Inverter Abnormality Retry	
	Abnormal Inverter Voltage Retry/Inverter Failure Retry	
	High-Pressure Decrease Retry	

NOTE:

(1) Retry indication continues for 30 minutes unless a protection control is indicated.

(2) Retry indication disappears if the stop signal comes from all rooms.

(3) The protection control code indicated on 7-segment display changes to an alarm code when an abnormal operation occurs. Also, the same alarm code is indicated on the wired controller.

(4) In case that the degeneration control is activated, the indications Pc1 to Pc5 are indicated instead of P01 to P05.

(4) Activating Condition of Protection Retry Control Code

Protection Control or Retry Control is performed to prevent the abnormal operation.
The activating conditions are shown in the table below.

Code	Protection Control	Activating Condition	Remarks
P01	Pressure Ratio Protection Control	Compression Ratio e>8.5 or Compression Ratio e<1.5	e = (Pd[MPa] + 0.1) / (Ps [MPa] + 0.06)
P02	High-Pressure Increase Protection	Discharge Pressure Pd>3.45MPa (at Cooling Mode) Pd>3.35MPa (at Heating Mode)	-
P03	Inverter Current Protection	Inverter Output Current>(Control Value) A	Control Value: Refer to 1-32, 1-33
P04	Inverter Fin Temperature Increase Protection	Inverter Fin Temperature>(Control Value) °C	Control Value: Refer to 1-34
P05	Discharge Gas Temperature Increase Protection	Temperature at the Top of Compressor Td>112°C	-
P06	Low-Pressure Decrease Protection	Suction Pressure Ps<0.1MPa	-
P09	High-Pressure Decrease Protection	Discharge Pressure Pd<1.0MPa	-
P0A	Demand Current Protection Control	Running Current for Compressor>Demand Current Setting Value	Demand Current Setting Value: Upper limit of total running current is set 100%, 80%, 70%, 60% and 40% at normal operation.
P0d	Low-Pressure Increase Protection	Suction Pressure>1.3MPa	-

Code	Protection Control	Activating Condition	Remarks
P11	Pressure Ratio Decrease Retry	Pressure Ratio e<1.5 over 1 minute	When activating 3 times in 30 minutes, “43” alarm is indicated.
P12	Low-Pressure Increase Retry	Ps>1.4MPa over 1 minute	When activating 3 times in 30 minutes, “44” alarm is indicated.
P13	High-Pressure Increase Retry	Pd>3.8MPa over 2 seconds	When activating 3 times in 30 minutes, “45” alarm is indicated.
P15	Discharge Gas Temperature Increase Retry	Discharge Gas Temperature>132°C over 10 minutes or Discharge Gas Temperature>140°C over 5 seconds	When activating 3 times in 60 minutes, “08” alarm is indicated.
	Low-Pressure Decrease Retry	Ps<0.09MPa over 12 minutes	When activating 3 times in 60 minutes, “47” alarm is indicated.
P16	Discharge Gas SUPERHEAT Decrease Retry	Discharge Gas SUPERHEAT<Tc+10 deg. over 30 minutes. Tc: Saturation Temperature	When activating 3 times in 120 minutes, “07” alarm is indicated.
P17	Inverter Abnormality Retry	Instantaneous Overcurrent	When activating 6 times in 30 minutes, “48” alarm is indicated.
		Abnormality of Current Sensor	When activating 3 times in 30 minutes, “51” alarm is indicated.
		IPM Error, Earth Fault, Motor Step-Out	When activating 7 times in 30 minutes, “53” alarm is indicated.
		Fin Temperature>106 to 110°C	When activating 3 times in 30 minutes, “54” alarm is indicated.
P18	Abnormal Inverter Voltage Retry	Insufficient Voltage at Inverter Circuit	When activating 3 times in 30 minutes, “06” alarm is indicated.
		Excessive Voltage at Inverter Circuit	When activating 3 times in 30 minutes, “06” alarm is indicated.
	Inverter Failure Retry	Actual Inverter Frequency continues to be 0Hz for 3 seconds, 3 minutes after Inverter Frequency is output.	When activating 3 times in 30 minutes, “55” alarm is indicated.
P26	High-Pressure Decrease Retry	Pd<Ta/130+0.1MPa over 4 minutes or Pd<1.0MPa over 60 minutes Ta: Ambient Temperature	Without Alarm

Ps: Suction Pressure of Compressor, Pd: Discharge Pressure of Compressor.

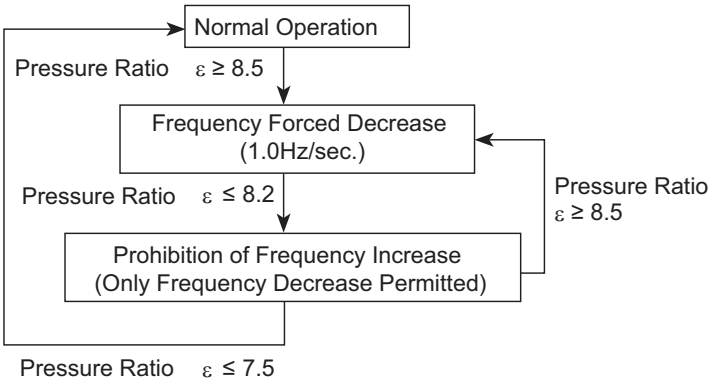
■ Protection Control

(1) P01: Pressure Ratio Protection Control

(a) Pressure Ratio Increase Protection Control

Pressure Ratio Increase Protection Control is performed 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)

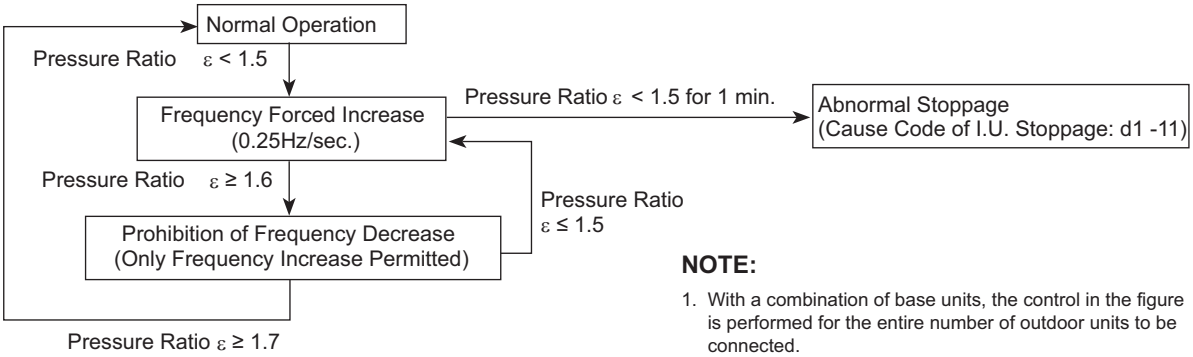
   Pd: Detected Value of High Pressure Sensor [MPa (psi)]

   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>



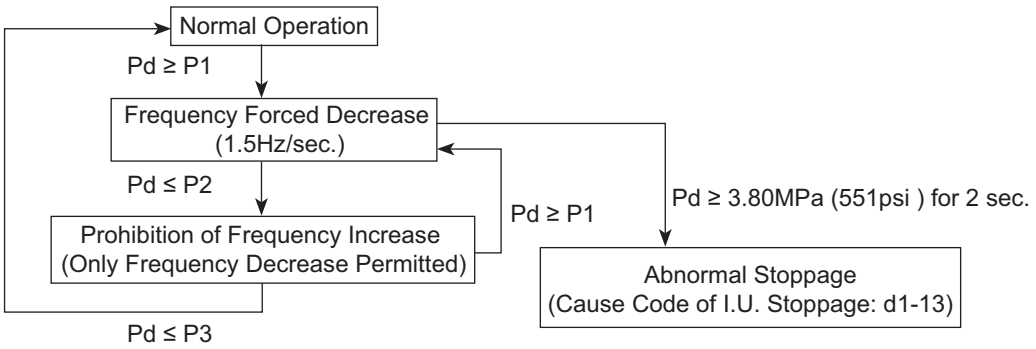
NOTE:

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 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 unit, the control in 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.

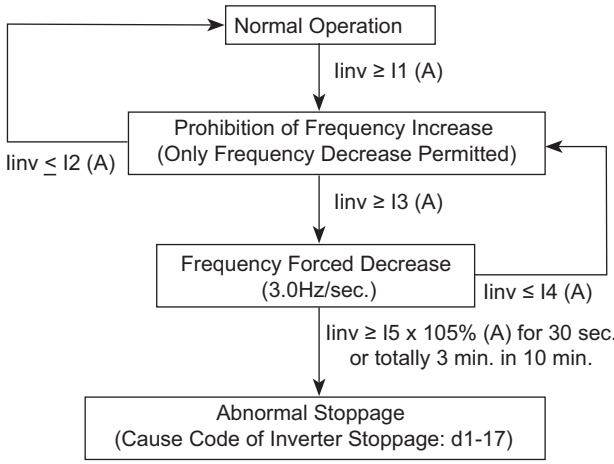
Pd: Detected Value of High Pressure Sensor [MPa(pis)]

(3) P03: Inverter Current Protection Control

Inverter Current Protection Control is performed 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 50Hz/60Hz

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

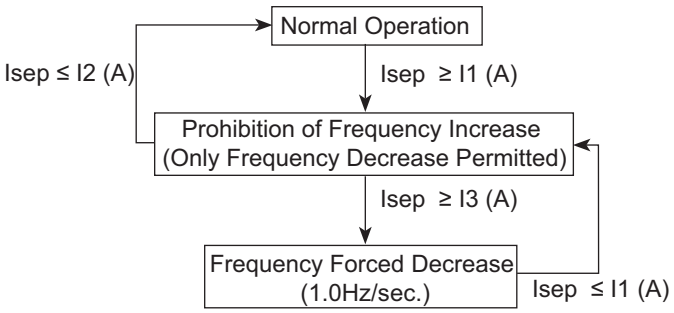
NOTE:

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 50Hz/60Hz

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

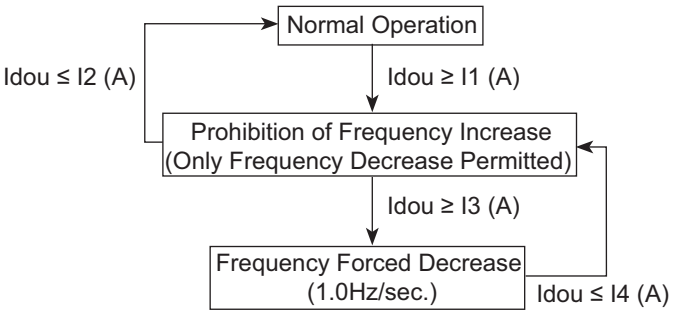
NOTE:

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 50Hz/60Hz

[A]

Model	I1	I2	I3	I4
RAS-8.0RNBCLQ	14.8	13.8	15.3	14.8
RAS-10RNBCLQ	20.4	19.4	20.9	20.4
RAS-12RNBCLQ	24.4	23.4	24.9	24.4
RAS-14RNBCLQ	28.6	27.6	29.1	28.6
RAS-16RNBCLQ	32.2	31.2	32.7	32.2
RAS-18RNBCLQ	41.6	40.6	42.1	41.6
RAS-20RNBCLQ	41.6	40.6	42.1	41.6
RAS-22RNBCLQ	48.2	47.2	48.7	48.2
RAS-24RNBCLQ	57	56	57.5	57

NOTE:

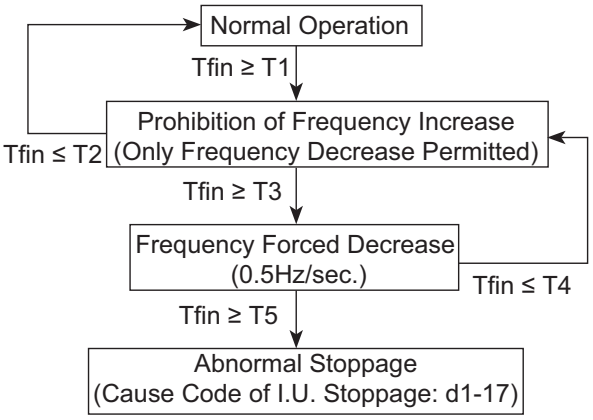
1. With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, 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 to prevent an inverter trip caused by a temperature increase of the inverter fin.

<Detail of Control>



Control Value

380-415V 50Hz/60Hz [°C(°F)]

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

NOTE:

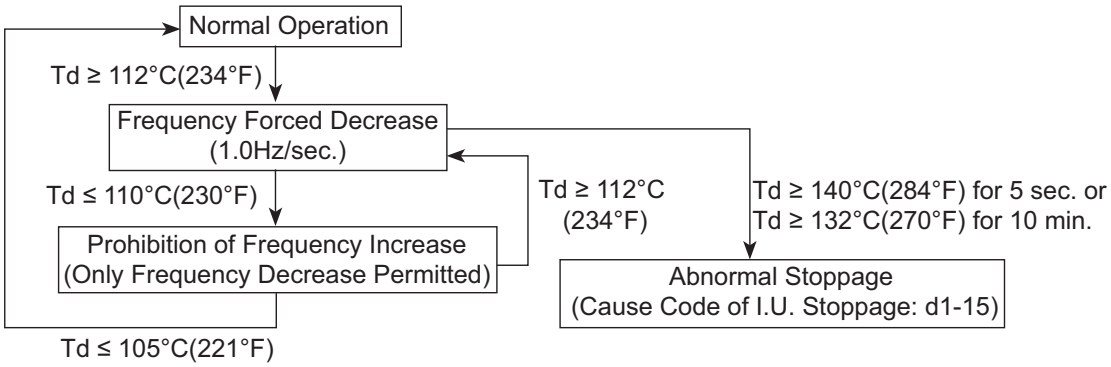
1. In case of combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, 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 to protect the compressor motor coil from an increase of discharge temperature during an abnormality.

<Details of Control>



NOTE:

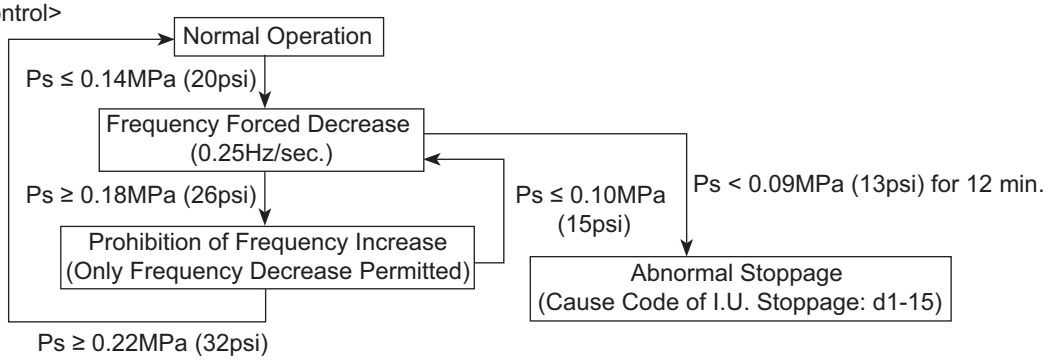
1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. Discharge temperature is detected in each outdoor unit, and this control uses the maximum value.
3. In case of two inverter compressors installed in an outdoor unit,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

<Details of Control>



NOTE:

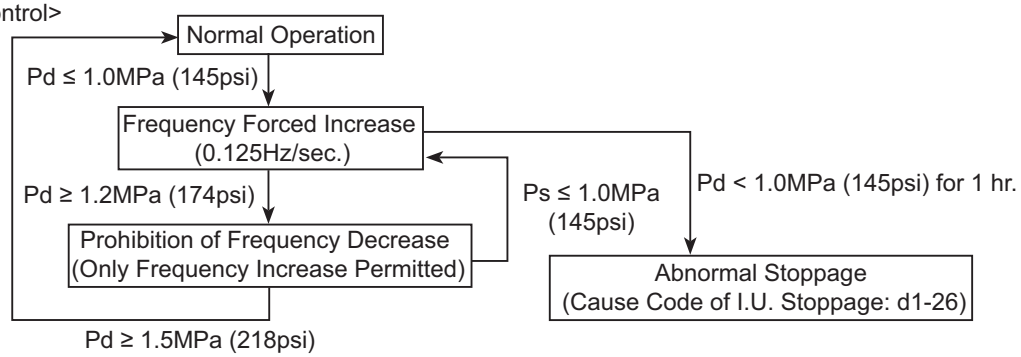
1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. Low pressure is detected in each outdoor unit, and this control uses the minimum value.
   Ps: Detected Value of Low Pressure Sensor [MPa(pis)]

(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).

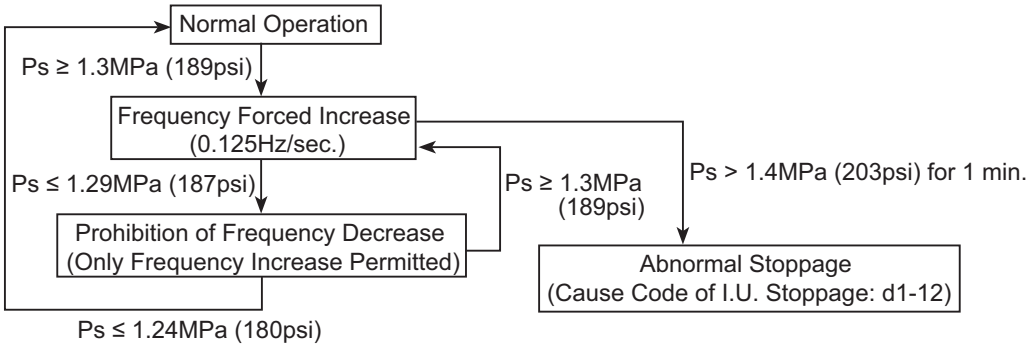
NOTE:

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)	①
	Prohibited Decrease	②	②	②	②

*1): Discharge Temperature Increase Protection Control (P05) is higher than the following protection controls.

a) Low Pressure Decrease Protection Control (P06)

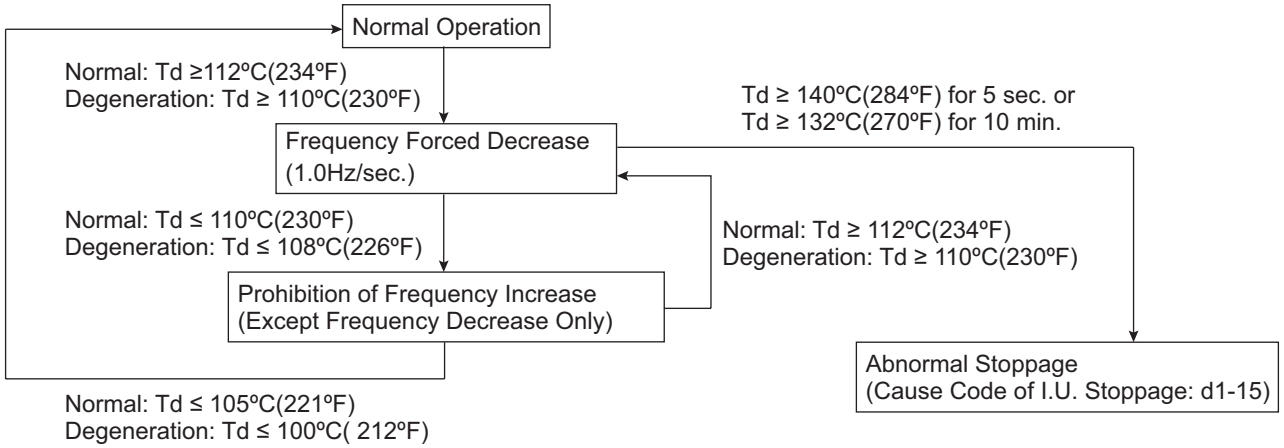
b) Demand Current Control (P0A)

(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)



(12) Oil Return Control

Oil return control is performed 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>

[Hz]

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).

■ Alarm Code Table

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device (Float Switch)	Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drain Pipe, Float Switch, or Drain Pan)
02	Outdoor Unit	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing)
03	Communication	Abnormal Communication between Indoor Units and Outdoor Units	Incorrect Wiring, Loose Terminals, Disconnected Communication Cable, Blowout of Fuse, Indoor Unit Power OFF
04		Abnormal Communication between Inverter PCB and Outdoor PCB	Inverter PCB - Outdoor PCB Communication Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
05	Supply Phase	Abnormality of Power Supply Phases	Incorrect Power Supply, Connection to Reversed Phase, Open-Phase
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Decrease, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Closed Position (Disconnect Connector)
0A	Communication	Abnormal Communication between Outdoor Units	Incorrect Wiring, Breaking Wire, Loose Terminals
0b	Outdoor Unit	Incorrect Outdoor Unit Address Setting	Duplication of Address Setting for Outdoor Units (Sub Units) in Same Refrigerant Cycle Number
0C		Incorrect Outdoor Unit Main Unit Setting	Two (or more) Outdoor Units Set as “Main Unit” Exist in Same Refrigerant Cycle Number
11	Sensor on Indoor Unit	Abnormality of Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
12		Abnormality of Outlet Air Thermistor	
13		Abnormality of Freeze Protection Thermistor	
14		Abnormality of Gas Piping Thermistor	
15		Abnormality of Outdoor Air Thermistor (for EconoFresh)	
16		Abnormality of Remote Sensor (for DOAS*1))	
17		Abnormality of Thermistor Built-in Wireless Controller (for DOAS*1))	
18	Indoor Fan Motor	Abnormality of Indoor Fan System	Abnormality of Indoor Fan Motor (Step-Out), Indoor Fan Controller Failure
19		Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Lockup
1A	Indoor Fan Controller	Abnormality of Fan Controller Fin Temperature	Abnormality of Fin Thermistor or Fan Controller, Heat Exchanger Clogging, Abnormality of Fan Motor
1b		Activation of Overcurrent Protection	Abnormality of Fan Motor
1C		Problem with Current Sensor	Abnormality of Fan Controller Current Sensor
1d		Activation Fan Controller Protection	Driver IC Error Signal Detection, Instantaneous Overcurrent
1E		Abnormality of Indoor Fan Controller Voltage	Power Supply Wiring Indoor Voltage Decrease, Insufficient Capacity of
21	Sensor on Outdoor Unit	Abnormality of High Pressure Sensor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
22		Abnormality of Outdoor Air Thermistor	
23		Abnormality of Discharge Gas Thermistor on Top of Compressor	
24		Abnormality of Heat Exchanger Liquid Pipe Thermistor	
25		Abnormality of Heat Exchanger Gas Pipe Thermistor	
29		Abnormality of Low Pressure Sensor	

*1): Dedicated Outdoor Air System, All Fresh Air Indoor Unit

Code	Category	Content of Abnormality	Leading Cause
30	System	Incorrect Connection of CH-Box	Connection of CH-Box to Heat Pump System, Disconnection of CH-Box to Heat Recovery System
31		Incorrect Capacity Setting of Outdoor Unit and Indoor Unit	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit, Excessive or Insufficient Indoor Unit Total Capacity Code
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. In same Refrigerant Cycle Number
36		Incorrect of Indoor Unit Combination	Indoor Unit is Designed for R22
38		Abnormality of Picking up Circuit for Protection in Outdoor Unit	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
3A	Outdoor Unit	Abnormality of Outdoor Unit Capacity	Outdoor Unit Capacity > 96Hp
3b		Incorrect Setting of Outdoor Unit Models Combination or Voltage	Incorrect Setting of Main and Sub Units(s) Combination or Voltage
3d		Abnormal Communication between Main Unit and Sub Unit(s)	Incorrect Wiring, Disconnect Wire, Breaking Wire, PCB Failure
3E		Abnormal Combination between Inverter PCB (INV1, INV2) and Outdoor PCB (PCB3)	Incorrect Combination between Inverter PCB (INV1, INV2) and Outdoor PCB (PCB3) Incorrect DSW Setting of Inverter PCBs (INV1, INV2)
43	Protection Device	Activation of Pressure Ratio Decrease Protection	Defective Compression (Failure of Compressor or Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection	Overload at Cooling, High Temperature at Heating, Expansion Valve Locking at Open Position (Loose Connector)
45		Activation of High Pressure Increase Protection	Overload Operation (Heat Exchanger Clogging, Short Circuit of Airflow), Piping Clogging, Excessive Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection	Insufficient Refrigerant, Piping Clogging, Expansion Valve Locking at Close Position (Loosen Connector)
48		Activation of Inverter Overcurrent Protection	Overload Operation, Compressor Failure
51	Sensor	Abnormal Inverter Current Sensor	Current Sensor Failure
53	Inverter	Inverter Error Signal Detection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
54		Abnormality of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure
55		Inverter Failure	Inverter PCB Failure
57	Fan Controller	Activation of Fan Controller Protection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
5A		Abnormality of Fan Controller Fin Temperature	Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
5b		Activation of Overcurrent Protection	Fan Motor Failure
5C		Abnormality of Fan Controller Sensor	Failure of Current Sensor (Instantaneous Overcurrent, Increase of Fin Temperature, Voltage Decrease, Grand Fault, Step-Out)
A1	External Input	Detection of External Abnormality	Input Signal by External Abnormality Detection Setting
b0	Indoor Unit	Incorrect Setting of Unit Model Code	Incorrect Setting of Indoor Unit Model
b1		Incorrect Setting of Unit and Refrigerant Cycle Number	64 or More Number is Set for Address or Refrigerant Cycle
b2		Abnormality of EEPROM	EEPROM failure, Incorrect Data of EEPROM
b5		Incorrect Indoor Unit No. Setting	There are 17 or More Non-Corresponding to H-LINK II Units are Connected to One System.
b6		Abnormal Communication between Indoor PCB and Indoor Fan Controller	Communication Failure, Disconnected Communication Cable, Abnormal Connection
C1	CH-Box	Incorrect CH-Box Connection	2 or More CH-Boxes are Connected between Outdoor Unit and Indoor Unit
C2		Incorrect Indoor Unit Connection Number	9 or More Indoor Units Connected to CH-Box
C3		Incorrect Indoor Unit Refrigerant Number Setting	Indoor Units of Different Refrigerant Cycle Number are Connected to CH-Box
EE	Compressor	Compressor Protection Alarm (It cannot be reset from Wired Controller)	This alarm code appears when the following alarms*1) occurs three times within 6 hours. *1): 02, 07, 08, 39, 43 to 45, 47

■ Cause of Indoor Unit Stoppage

Code	Cause	Code	Cause
0	Operation OFF, Power OFF	16	Retry due to Decrease of Discharge Gas Superheat
1	Thermo-OFF	17	Retry due to Inverter Tripping
2	Alarm (Not always indicated)	18	Retry due to Voltage Decrease/ Increase, Other Retry of Inverter
3	Freeze Protection, Overheating Protection	19	Expansion Valve Opening Difference Protection
5	Instantaneous Power Failure at Outdoor Unit	21	Forced Thermo-OFF for Oil Return
6	Instantaneous Power Failure at Indoor Unit	22	Enforced Thermo-OFF for Hot Start Control at Crankcase Heater Preheating
7	Stoppage of Cooling Operation due to High/Low Outdoor Air Temperature Stoppage of Heating Operation due to High Outdoor Air Temperature	26	Retry due to High Pressure Decrease
9	Stoppage of Reversing Valve Switching Control	28	Stoppage due to Outlet Temperature Decrease in Cooling
10	Demand Enforced Stoppage	30	Stoppage of Thermo-OFF due to Compressor Excepting
11	Retry due to Pressure Ratio Decrease	32	Retry due to Abnormal Communication of Outdoor Unit
12	Retry due to Low Pressure Increase	36	Retry after Defrosting Operation
13	Retry due to High Pressure Increase	39	Stoppage of Thermo-OFF due to Power Saving Control
15	Retry due to Discharge Gas Temperature Increase, Retry due to Low Pressure Decrease		

NOTE:

Even if stoppage Alarm, “02” is not always indicated.

Cancellation of Enforced Thermo-OFF Press PSW5 for more than 3 seconds. This function may damage compressor. Use this function only in avoidable condition.

- Thermo-ON: The outdoor unit and some indoor units are running.
- Thermo-OFF: The outdoor unit and some indoor units stay on, but do not run.

■ Cause of Inverter Stoppage

Code	Cause
1	Driver IC Error Signal Detection
2	Instantaneous Overcurrent
3	Inverter Fin Temp. Increase
4	Electronic Thermal Protection (Inverter Overcurrent)
5	Inverter Voltage Decrease
6	Inverter Voltage Increase
8	Abnormal Current Sensor
9	Instantaneous Power Failure Detection
11	Micro Computer Reset
12	Ground Fault Detection
13	Open-Phase Detection
15	Driving Prohibition Area
17	Abnormal Control
18	Forced Stoppage by High Pressure Detection
19	Abnormality of Picking up Circuit for Protection
20	63H Early Recovery
21	Abnormal Compressor Motor (Step-Out)
22	Abnormal Combination of PCB
25	Abnormal Instruction Frequency
26	Pre-Charge Failure

■ Cause of Fan Controller Stoppage

Code	Cause
1	Driver IC Error Signal Detection
2	Instantaneous Overcurrent
3	Fan Controller Fin Temp. Increase
4	Electronic Thermal Protection (Overcurrent)
8	Abnormal Current Sensor
12	Ground Fault Detection
15	Reverse Driving
21	Abnormal Fan Motor (Step-Out)
25	Abnormal Instruction Frequency

1.1.7 Emergency Operation

Emergency Mode Operation from Outdoor Unit PCB for Compressor Failure

1. For Combination of Outdoor Units

(RAS-26RNBCLQ - RAS-96RNBCLQ Only)

<Alarms Corresponding to Inverter Compressor Failure>

04: Abnormal Transmitting between inverter PCB and Outdoor Unit PCB

06: Abnormality of Inverter Voltage

23: Abnormality of Discharge Gas Thermistor

48: Activation of Overcurrent Protection Device

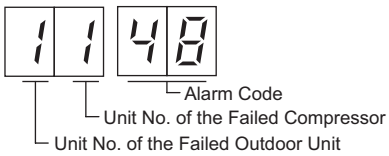
51: Abnormality of Inverter Current Sensor

53: Inverter Error Signal Detection

54: Abnormality of Inverter Fin Temperature

<Alarm Code Indication>

The unit No. of the failed outdoor unit, the unit No. of the failed compressor and the alarm code are displayed on 7-segment of the outdoor unit PCB3.



(a) Emergency Mode Operation Procedure

1. Turn OFF all the main switches of outdoor and indoor units.

2. Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV1 or INV2) terminals according to the following procedure. Be sure insulate the disconnected terminals.

The No. of Failed Compressor	Procedure
Inverter Compressor 1	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV1) terminals.
Inverter Compressor 2	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV2) terminals.

3. Set DSW5 of outdoor unit PCB (PCB3) with the failed compressor according to the following procedure. Fully close the stop valves (for gas and liquid) of the failed outdoor unit.

The No. of Failed Compressor	Procedure
Inverter Compressor 1	Turn ON DSW5-No.1
Inverter Compressor 2	Turn ON DSW5-No.2

4.Turn ON the power supply.

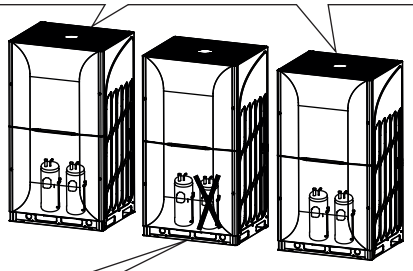
5.Start the operation by wired controller.

NOTE:

- Measure the insulation resistance of inverter compressor. Do not perform the emergency operation when the insulation resistance is 0Ω
- The other compressors may be damaged because there is a possibility that refrigerant oil is oxidized.
- In this emergency operation, compressor frequency cannot be controlled normally.
- Therefore, alarm code “07”, “43”, “44”, “45” or “47” may be indicated on LCD.
- This emergency operation may not provide sufficient cooling and heating capacity.
- This operation is a temporary emergency operation when the inverter compressor is damaged.
- Therefore, replace it with the new one as soon as possible.
- Turn OFF DSW5-No.1, No.2 of outdoor unit PCB after replacing the compressor.
- If this setting is not performed, the inverter compressor will be damaged.

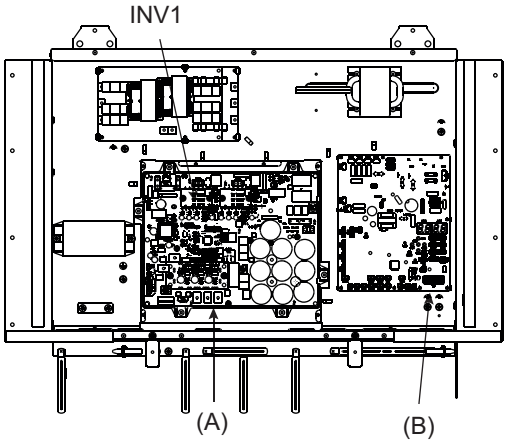
(b) Location of Inverter PCB Terminals for Inverter Compressor Power Supply and DSW5 on Outdoor Unit PCB.

Even if one compressor fails, the others can operate continuosly.

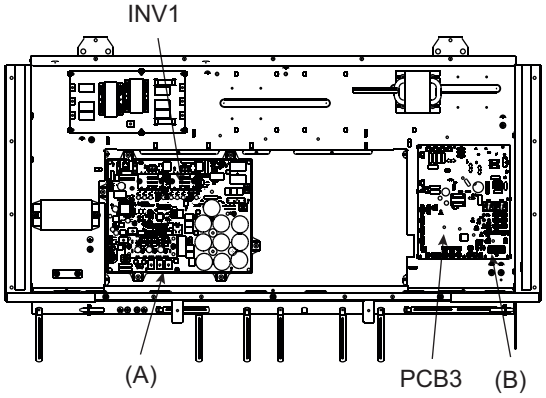


<380-415V 50Hz/60Hz>

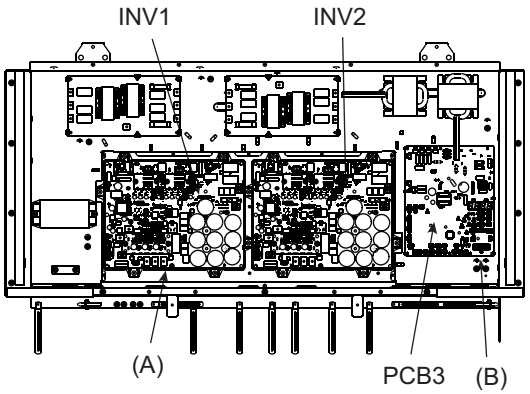
RAS-8.0-12RNBCLQ



RAS-14-16RNBCLQ

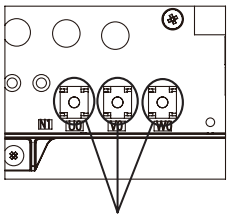


RAS-18-24RNBCLQ



(A) Part

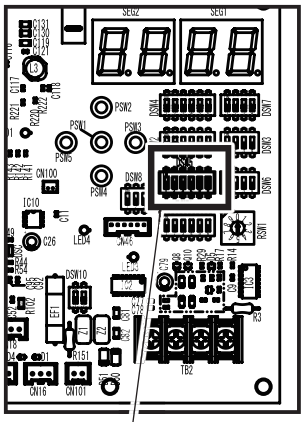
Inverter PCB (INV1 or INV2)



Terminals of Inverter Compressor Wiring (3 pcs.)

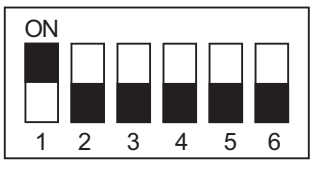
(B) Part

Outdoor Unit PCB (PCB3)



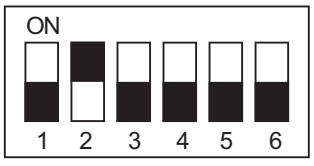
Inverter Compressor 1 Failure

DSW5



Inverter Compressor 2 Failure

DSW5



2. For Outdoor Unit without Combination

[At Inverter Compressor Failure]
(RAS-18RNBCLQ - RAS-24RNBCLQ Only)

<Alarms Corresponding to Inverter Compressor Failure>

04: Abnormal Transmitting between inverter PCB and Outdoor Unit PCB
06: Abnormality of Inverter Voltage
23: Abnormality of Discharge Gas Thermistor
48: Activation of Overcurrent Protection Device
51: Abnormality of Inverter Current Sensor
53: Inverter Error Signal Detection
54: Abnormality of Inverter Fin Temperature

(a) Procedure

1. Turn OFF all the main switches of outdoor and indoor units.
2. Disconnect all the power supply wiring for the inverter compressor from the inverter PCB (INV1 or INV2) terminals according to the following procedure. Be sure to insulate the disconnect terminals.

The No. of Failed Compressor	Procedure
Inverter Compressor 1	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV1) terminals.
Inverter Compressor 2	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV2) terminals.

3. Set DSW5 of the outdoor unit PCB (PCB3) with the failed compressor according to the following procedure. Be sure to insulate the disconnect terminals.

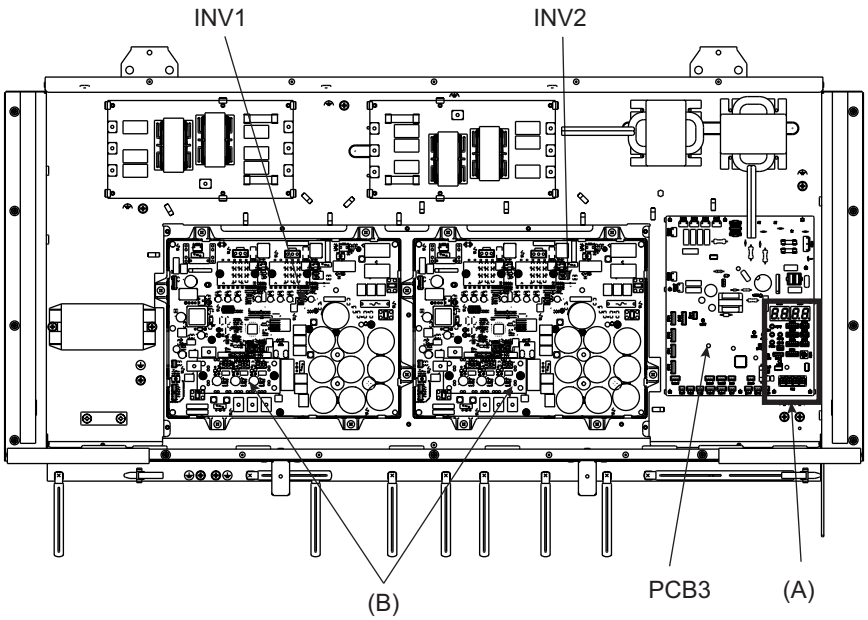
The No. of Failed Compressor	Procedure
Inverter Compressor 1	Turn ON DSW5-No.1
Inverter Compressor 2	Turn ON DSW5-No.2

4. Turn ON the power supply.
5. Start the operation by wired controller.

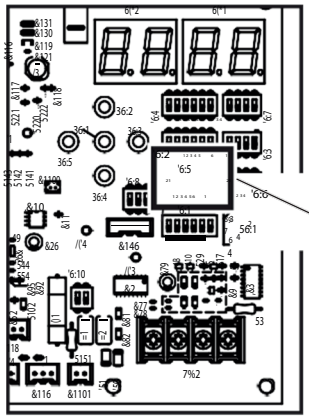
NOTE:

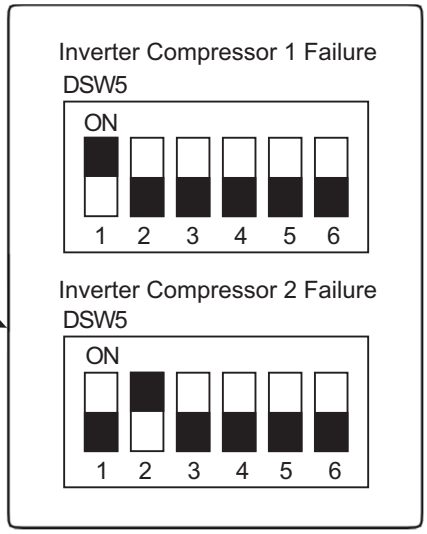
- Not all the compressors in the failed outdoor unit will stop the operation. If two compressors are stopped simultaneously, the stoppage cause is supposed to be d1-30.
- Measure the insulation resistance of inverter compressor.
- Do not perform the emergency operation when the insulation resistance is 0Ω
- The other compressors may be damaged because there is a possibility that refrigerant oil is oxidized.
- In this emergency operation, compressor frequency cannot be controlled normally.
- Therefore, alarm code “07”, “43”, “44”, “45” or “47” may be indicated on LCD.
- This emergency operation may not provide sufficient cooling and heating capacity.
- This operation is a temporary operation when the inverter compressor is damaged.
- Therefore, replace it with the new one as soon as possible.
- Turn OFF DSW5-No.1, No.2 of outdoor unit PCB after replacing the compressor.
- If this setting is not performed, the inverter compressor will be damaged.

<380-415V 50Hz/60Hz>

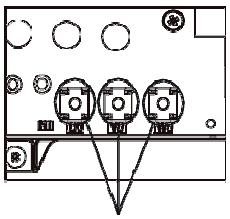


(A) Part
Outdoor Unit (PCB3)





(B) Part
Inverter PCB (INV1 or INV2)

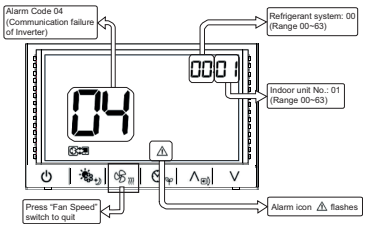


Terminals of Inverter
Compressor Wiring (3 pcs.)

1.2 Troubleshooting Procedure

● Alarm Code Indication of Wired Controller

<HCWA10NEGQ>



1.2.1 Alarm Code Table

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device (Float Switch)	Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drain Pipe, Float Switch, or Drain Pan)
02	Outdoor Unit	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing)
03	Communication	Abnormal Communication between Indoor Units and Outdoor Units	Incorrect Wiring, Loose Terminals, Disconnected Communication Cable, Blowout of Fuse, Indoor Unit Power OFF
04		Abnormal Communication between Inverter PCB and Outdoor PCB	Inverter PCB - Outdoor PCB Communication Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
05	Supply Phase	Abnormality of Power Supply Phases	Incorrect Power Supply, Connection to Reversed Phase, Open-Phase
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Decrease, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Closed Position (Disconnect Connector)
0A	Communication	Abnormal Communication between Outdoor Units	Incorrect Wiring, Breaking Wire, Loose Terminals
0b	Outdoor Unit	Incorrect Outdoor Unit Address Setting	Duplication of Address Setting for Outdoor Units (Sub Units) in Same Refrigerant Cycle Number
0C		Incorrect Outdoor Unit Main Unit Setting	Two (or more) Outdoor Units Set as “Main Unit” Exist in Same Refrigerant Cycle Number
11	Sensor on Indoor Unit	Abnormality of Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
12		Abnormality of Outlet Air Thermistor	
13		Abnormality of Freeze Protection Thermistor	
14		Abnormality of Gas Piping Thermistor	
15		Abnormality of Outdoor Air Thermistor (for EconoFresh)	
16		Abnormality of Remote Sensor (for DOAS*1))	
17		Abnormality of Thermistor Built-in Wireless Controller (for DOAS*1))	
18	Indoor Fan Motor	Abnormality of Indoor Fan System	Abnormality of Indoor Fan Motor (Step-Out), Indoor Fan Controller Failure
19		Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Lockup
1A	Indoor Fan Controller	Abnormality of Fan Controller Fin Temperature	Abnormality of Fin Thermistor or Fan Controller, Heat Exchanger Clogging, Abnormality of Fan Motor
1b		Activation of Overcurrent Protection	Abnormality of Fan Motor
1C		Problem with Current Sensor	Abnormality of Fan Controller Current Sensor
1d		Activation Fan Controller Protection	Driver IC Error Signal Detection, Instantaneous Overcurrent
1E		Abnormality of Indoor Fan Controller Voltage	Power Supply Wiring Indoor Voltage Decrease, Insufficient Capacity of
21	Sensor on Outdoor Unit	Abnormality of High Pressure Sensor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
22		Abnormality of Outdoor Air Thermistor	
23		Abnormality of Discharge Gas Thermistor on Top of Compressor	
24		Abnormality of Heat Exchanger Liquid Pipe Thermistor	
25		Abnormality of Heat Exchanger Gas Pipe Thermistor	
29		Abnormality of Low Pressure Sensor	

Code	Category	Content of Abnormality	Leading Cause
30	System	Incorrect Connection of CH-Box	Connection of CH-Box to Heat Pump System, Disconnection of CH-Box to Heat Recovery System
31		Incorrect Capacity Setting of Outdoor Unit and Indoor Unit	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit, Excessive or Insufficient Indoor Unit Total Capacity Code
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. In same Refrigerant Cycle Number
36		Incorrect of Indoor Unit Combination	Indoor Unit is Designed for R22
38		Abnormality of Picking up Circuit for Protection in Outdoor Unit	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
3A	Outdoor Unit	Abnormality of Outdoor Unit Capacity	Outdoor Unit Capacity > 96Hp
3b		Incorrect Setting of Outdoor Unit Models Combination or Voltage	Incorrect Setting of Main and Sub Units(s) Combination or Voltage
3d		Abnormal Communication between Main Unit and Sub Unit(s)	Incorrect Wiring, Disconnect Wire, Breaking Wire, PCB Failure
3E		Abnormal Combination between Inverter PCB (INV1, INV2) and Outdoor PCB (PCB3)	Incorrect Combination between Inverter PCB (INV1, INV2) and Outdoor PCB (PCB3) Incorrect DSW Setting of Inverter PCBs (INV1, INV2)
43	Protection Device	Activation of Pressure Ratio Decrease Protection	Defective Compression (Failure of Compressor or Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection	Overload at Cooling, High Temperature at Heating, Expansion Valve Locking at Open Position (Loose Connector)
45		Activation of High Pressure Increase Protection	Overload Operation (Heat Exchanger Clogging, Short Circuit of Airflow), Piping Clogging, Excessive Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection	Insufficient Refrigerant, Piping Clogging, Expansion Valve Locking at Close Position (Loosen Connector)
48		Activation of Inverter Overcurrent Protection	Overload Operation, Compressor Failure
51	Sensor	Abnormal Inverter Current Sensor	Current Sensor Failure
53	Inverter	Inverter Error Signal Detection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
54		Abnormality of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure
55		Inverter Failure	Inverter PCB Failure
57	Fan Controller	Activation of Fan Controller Protection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
5A		Abnormality of Fan Controller Fin Temperature	Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
5b		Activation of Overcurrent Protection	Fan Motor Failure
5C		Abnormality of Fan Controller Sensor	Failure of Current Sensor (Instantaneous Overcurrent, Increase of Fin Temperature, Voltage Decrease, Grand Fault, Step-Out)
A1	External Input	Detection of External Abnormality	Input Signal by External Abnormality Detection Setting
b0	Indoor Unit	Incorrect Setting of Unit Model Code	Incorrect Setting of Indoor Unit Model
b1		Incorrect Setting of Unit and Refrigerant Cycle Number	64 or More Number is Set for Address or Refrigerant Cycle
b2		Abnormality of EEPROM	EEPROM failure, Incorrect Data of EEPROM
b5		Incorrect Indoor Unit No. Setting	There are 17 or More Non-Corresponding to H-LINK II Units are Connected to One System.
b6		Abnormal Communication between Indoor PCB and Indoor Fan Controller	Communication Failure, Disconnected Communication Cable, Abnormal Connection
C1	CH-Box	Incorrect CH-Box Connection	2 or More CH-Boxes are Connected between Outdoor Unit and Indoor Unit
C2		Incorrect Indoor Unit Connection Number	9 or More Indoor Units Connected to CH-Box
C3		Incorrect Indoor Unit Refrigerant Number Setting	Indoor Units of Different Refrigerant Cycle Number are Connected to CH-Box
EE	Compressor	Compressor Protection Alarm (It cannot be reset from Wired Controller)	This alarm code appears when the following alarms*1) occurs three times within 6 hours. *1): 02, 07, 08, 39, 43 to 45, 47

*1): Dedicated Outdoor Air System, All Fresh Air Indoor Unit

1.2.2 Failure of Power Supply to Indoor Unit and Wired Controller

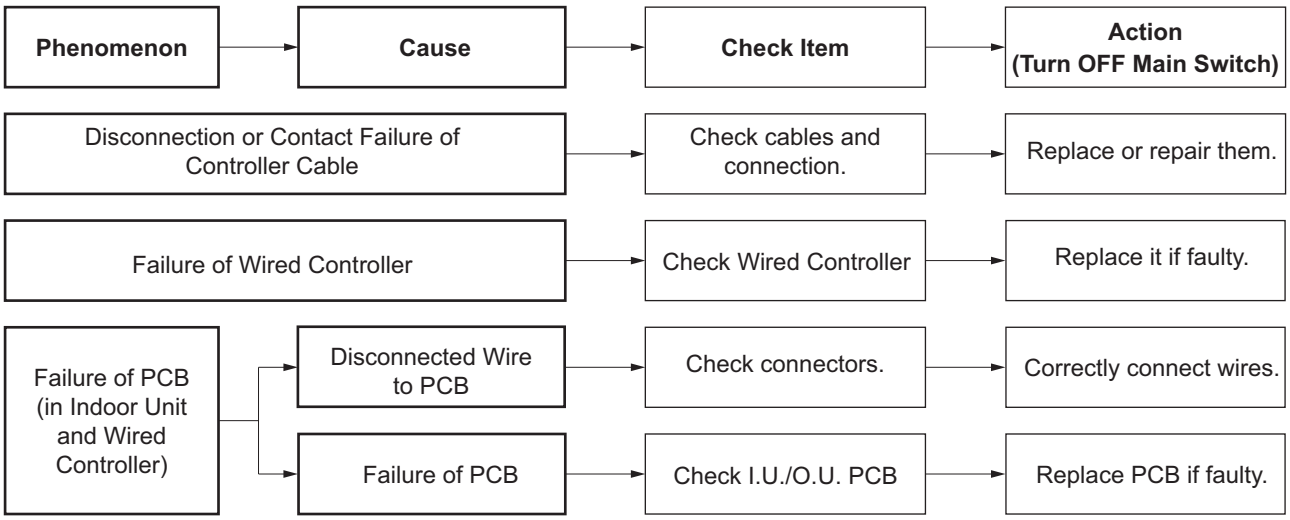
- Lights and LCD on the wired controller are not Indicated.
- Not Operated

If fuses are melted or a breaker is activated, investigate the cause of over current and take necessary action.

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Power Failure or Power is Not ON		Measure voltage with voltmeter	Supply power.
Melted Fuse or Activation of Breaker at Power Source	Short Circuit Supplied between Wires	Check for any uncovered part of wires	Remove cause of short circuit and replace fuse.
	Short Circuit of Wires to Earth	Measure insulation resistance	Remove cause of short circuit and replace fuse.
	Failure of Indoor Unit Fan Motor	Measure resistance between wires and insulation resistance	Replace fan motor if faulty.
Melted Fuse for Control Circuit	Short Circuit Supplied between Wires	Check for any uncovered part of wires	Remove cause of short circuit and replace fuse.
	Short Circuit of Wires to Earth	Measure insulation resistance	Remove cause of short circuit and replace fuse.
	Failure of Indoor Unit Fan Motor	Measure resistance between wires and insulation resistance	Replace fan motor or fuse if faulty.
Disconnected Cable of Wired Controller		Connect cable	Replace or repair it.
Contact Failure at Connectors of Wired Controller	Contact Failure or Incorrect Connection of Indoor Unit PCB	Check connectors	Correctly connect them
	Contact Failure or Incorrect Connection of PCB in Wired Controller		
Failure of Wired Controller		Check Wired Controller	Replace wired controller if faulty.
Failure of Each PCB	Disconnected Wire to Each PCB	Check connectors	Correctly connect wires.
	Failure of Each PCB	Check each PCB in I.U./O.U. PCB	Replace PCB if faulty.
Incorrect Wiring Connection		Take action according to the procedure indicated in "TEST RUN CHECK."	

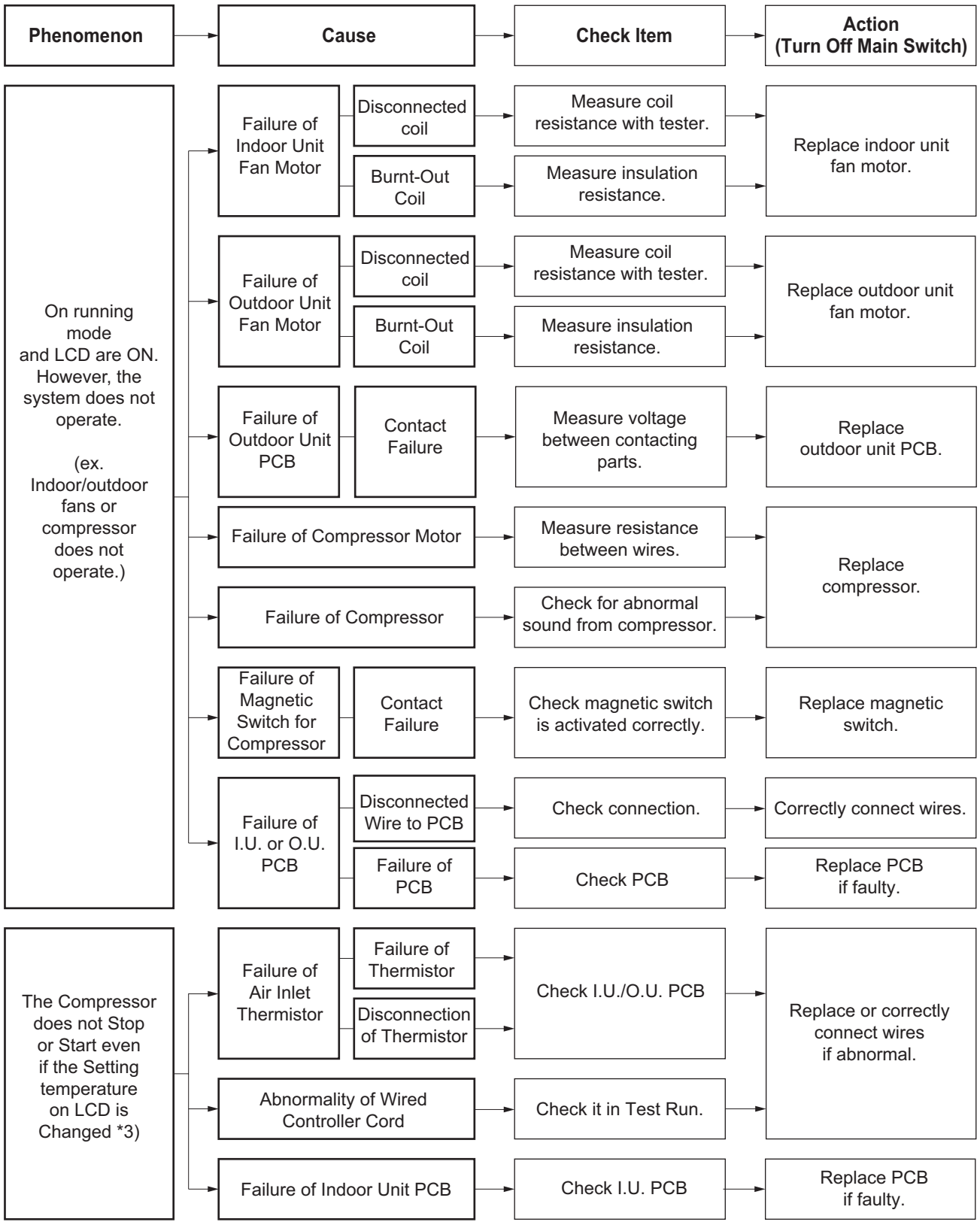
1.2.3 Abnormal Transmission between Wired Controller and Indoor Unit

● Alarm code screen flashes on wired controller

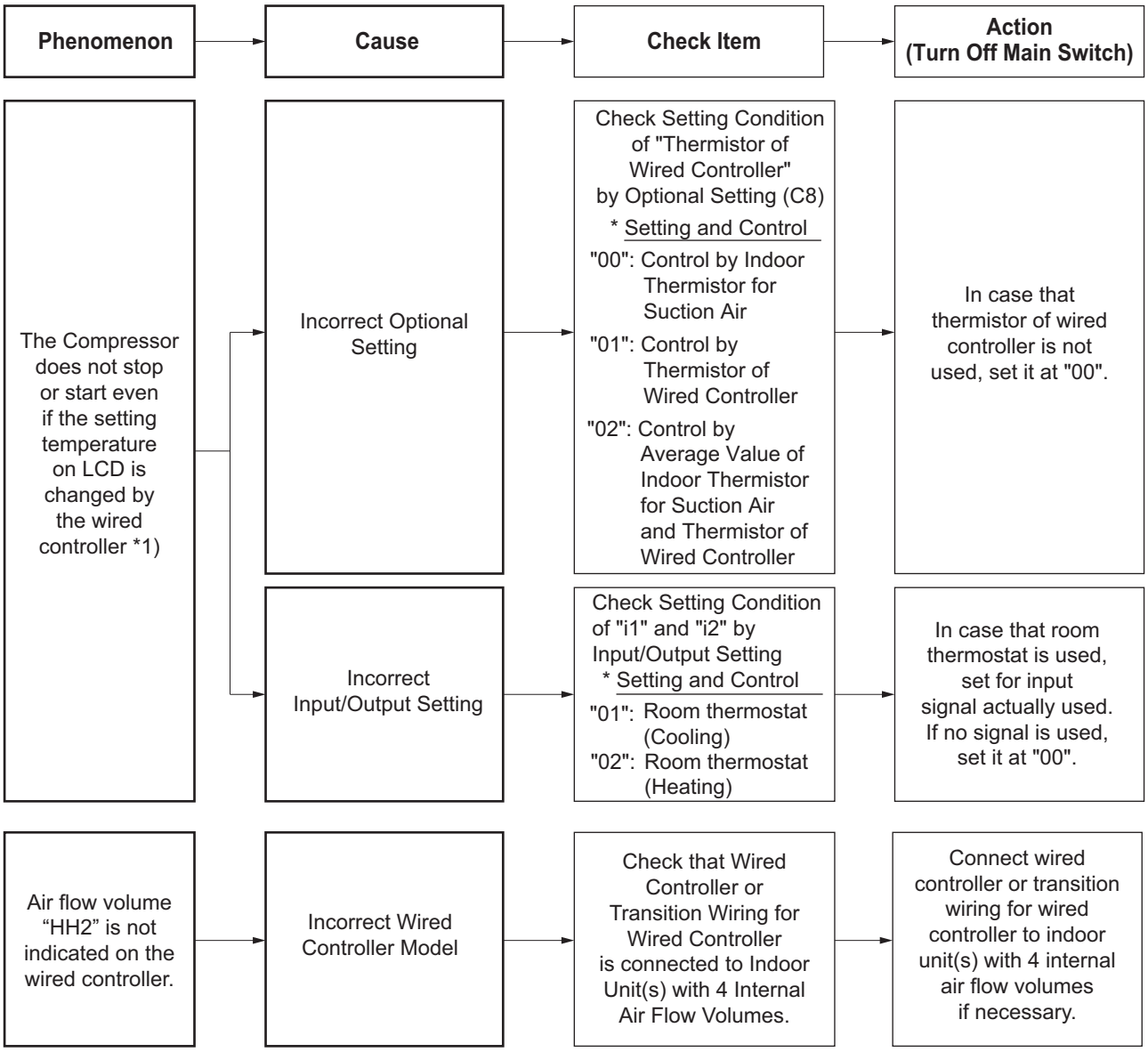


1.2.4 Abnormalities of Devices

In the case that no abnormality (Alarm Code) is indicated on the wired controller, and normal operation is not available, take necessary action according to the procedures mentioned below.



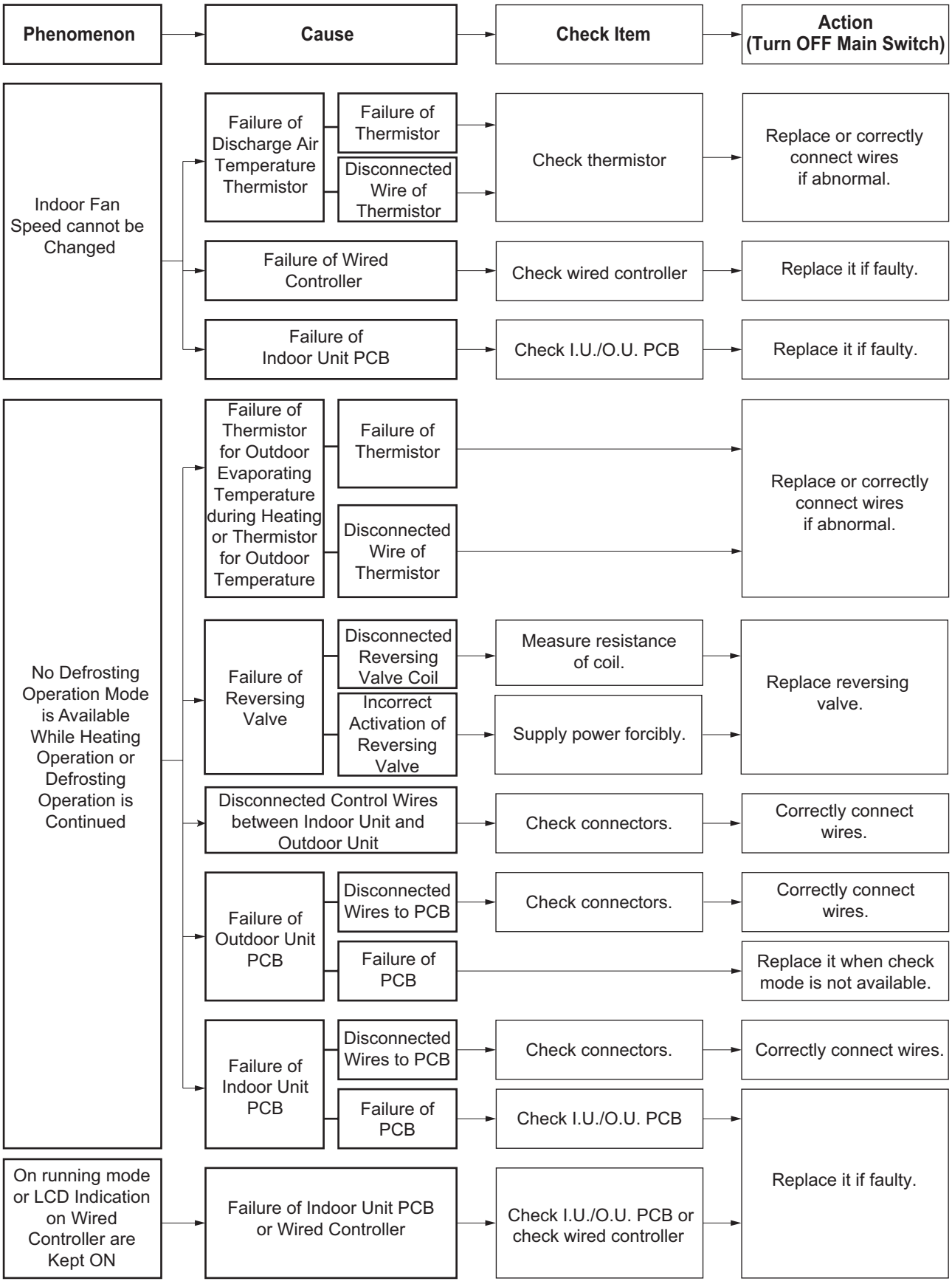
(1.2.4 Abnormalities of Devices)



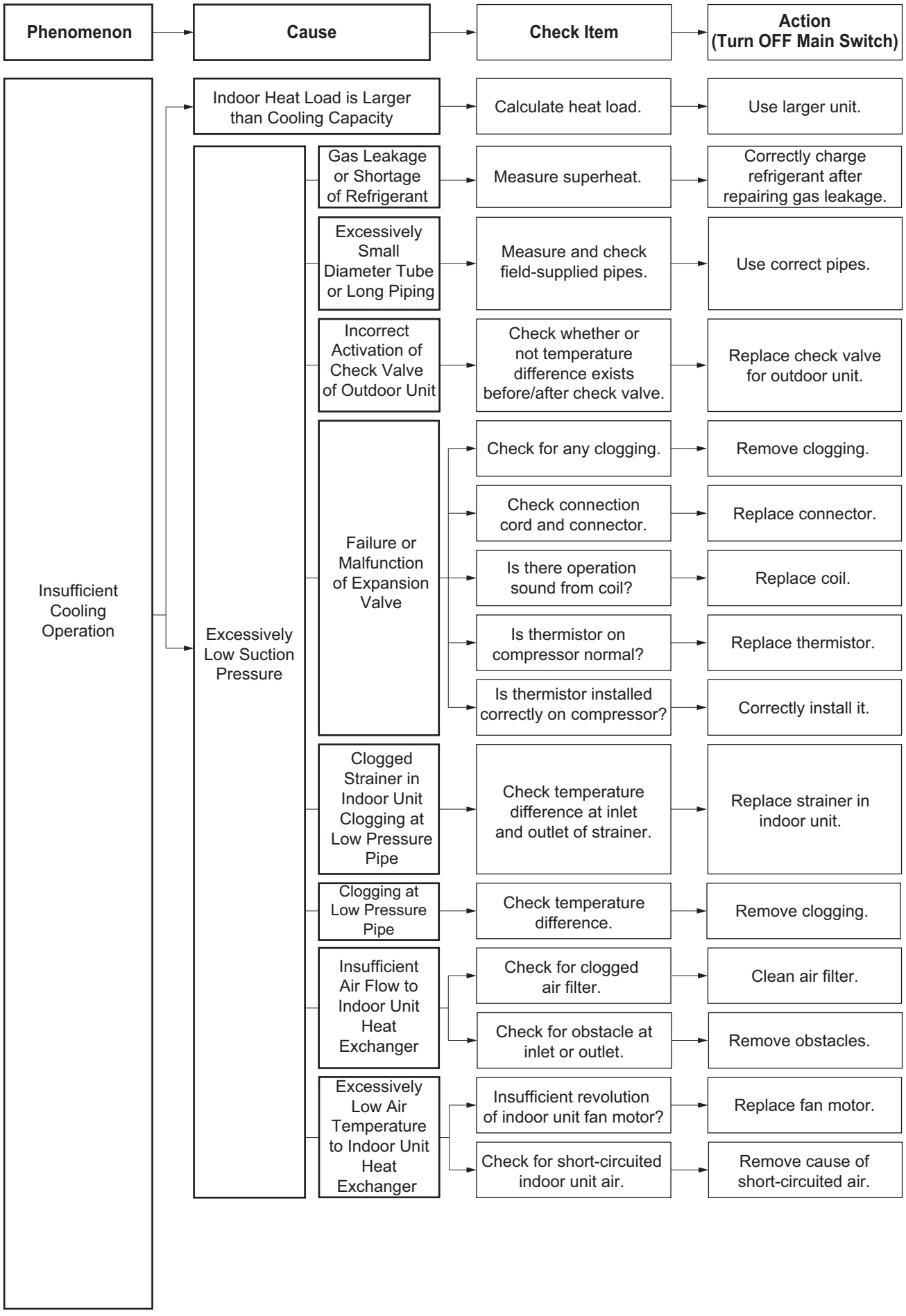
*1): Even if controllers are normal, the compressor does not operate under the following conditions.

* Indoor Air Temp. is lower than 21°C or Outdoor Air Temp. is lower than -5°C during cooling operation.
* Indoor Air Temp. is higher than 30°C or Outdoor Air Temp. is higher than 23°C during heating operation.
* Outdoor Air Temp. is lower than -20°C during heating operation.
* When a cooling (or heating) operation signal is given to the outdoor unit and a different mode as heating (or cooling) operation signal is given to indoor units.
* When an emergency stop signal is given to outdoor unit.

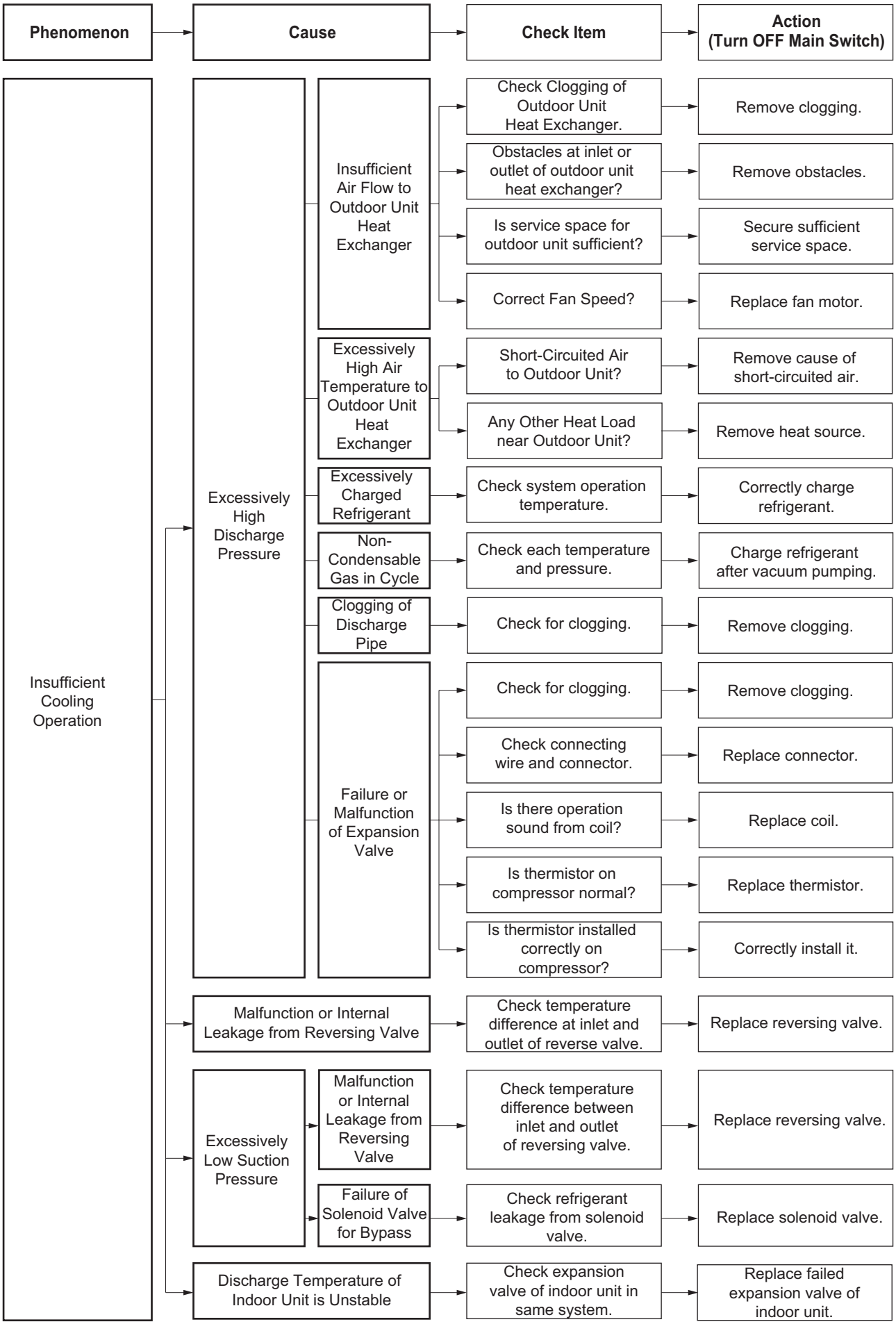
(1.2.4 Abnormalities of Devices)



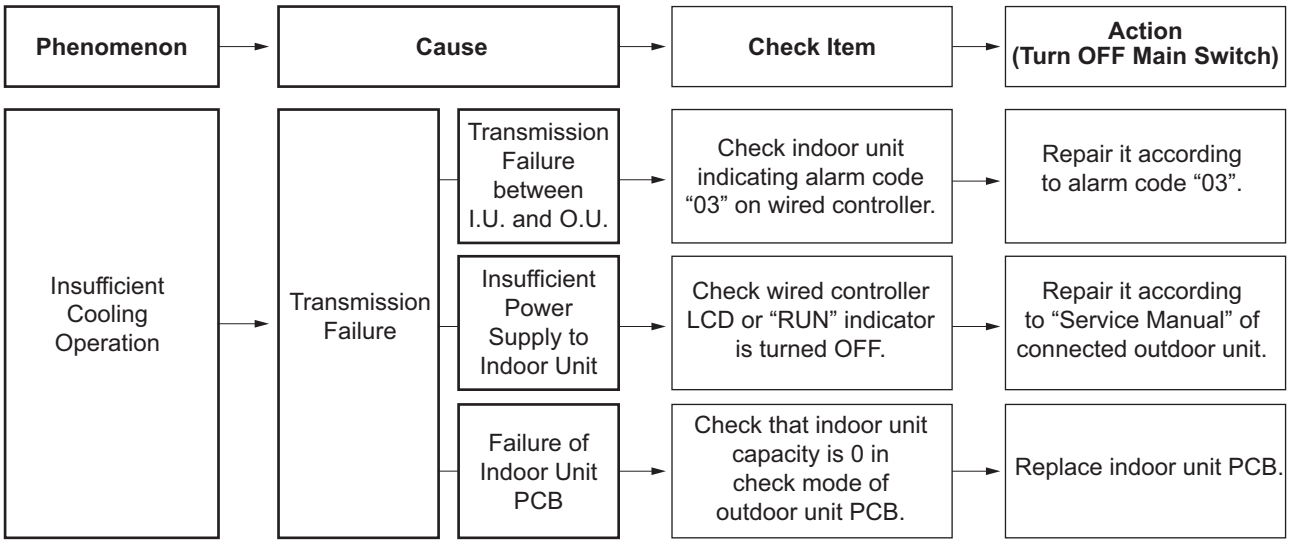
(1.2.4 Abnormalities of Devices)



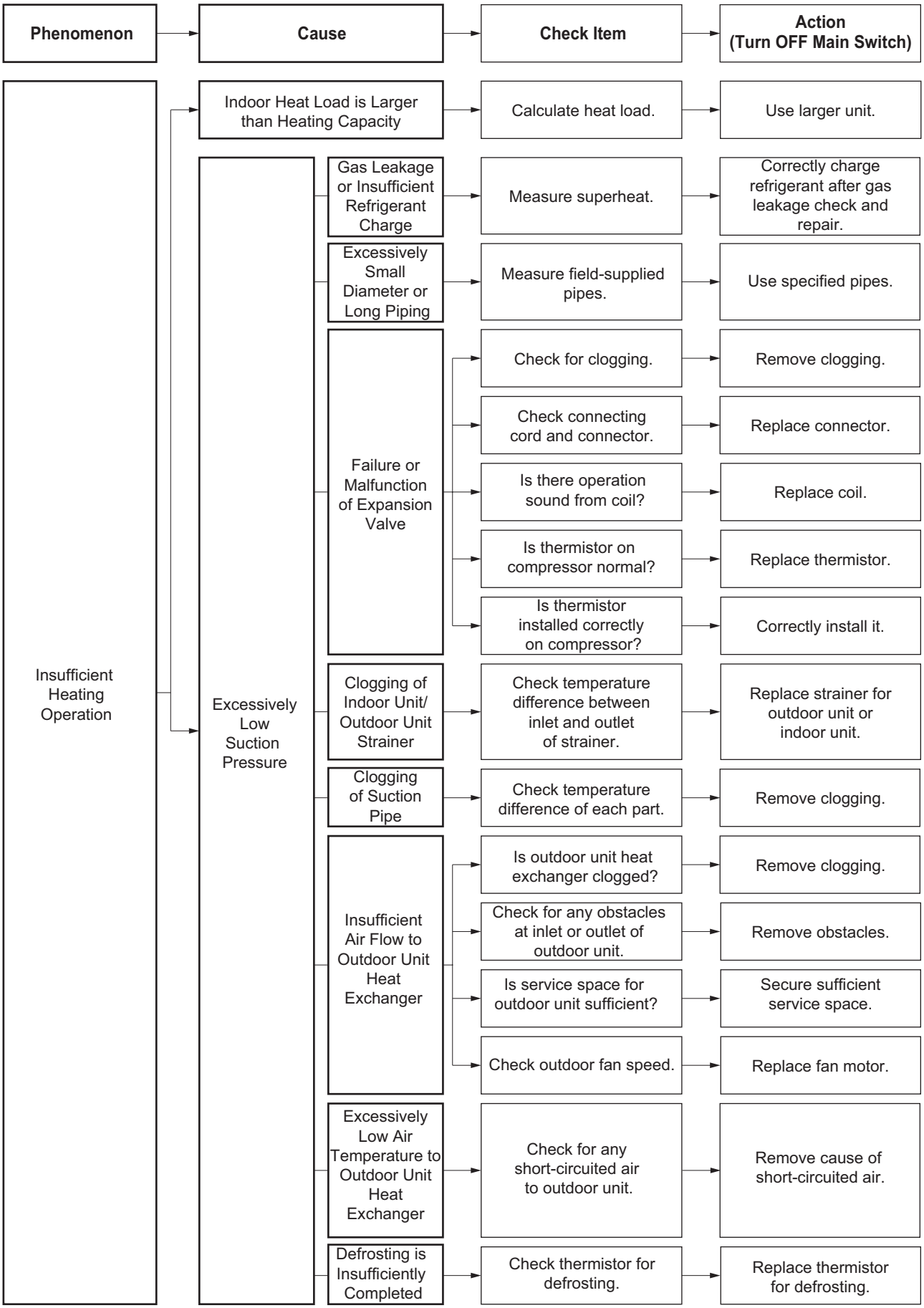
(1.2.4 Abnormalities of Devices)



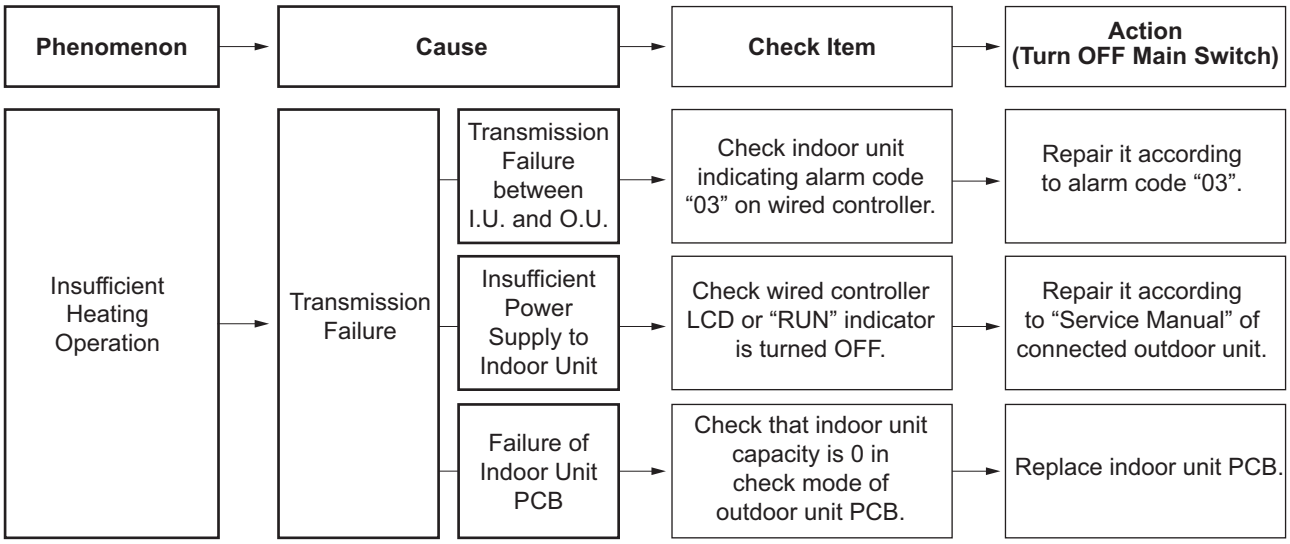
(1.2.4 Abnormalities of Devices)



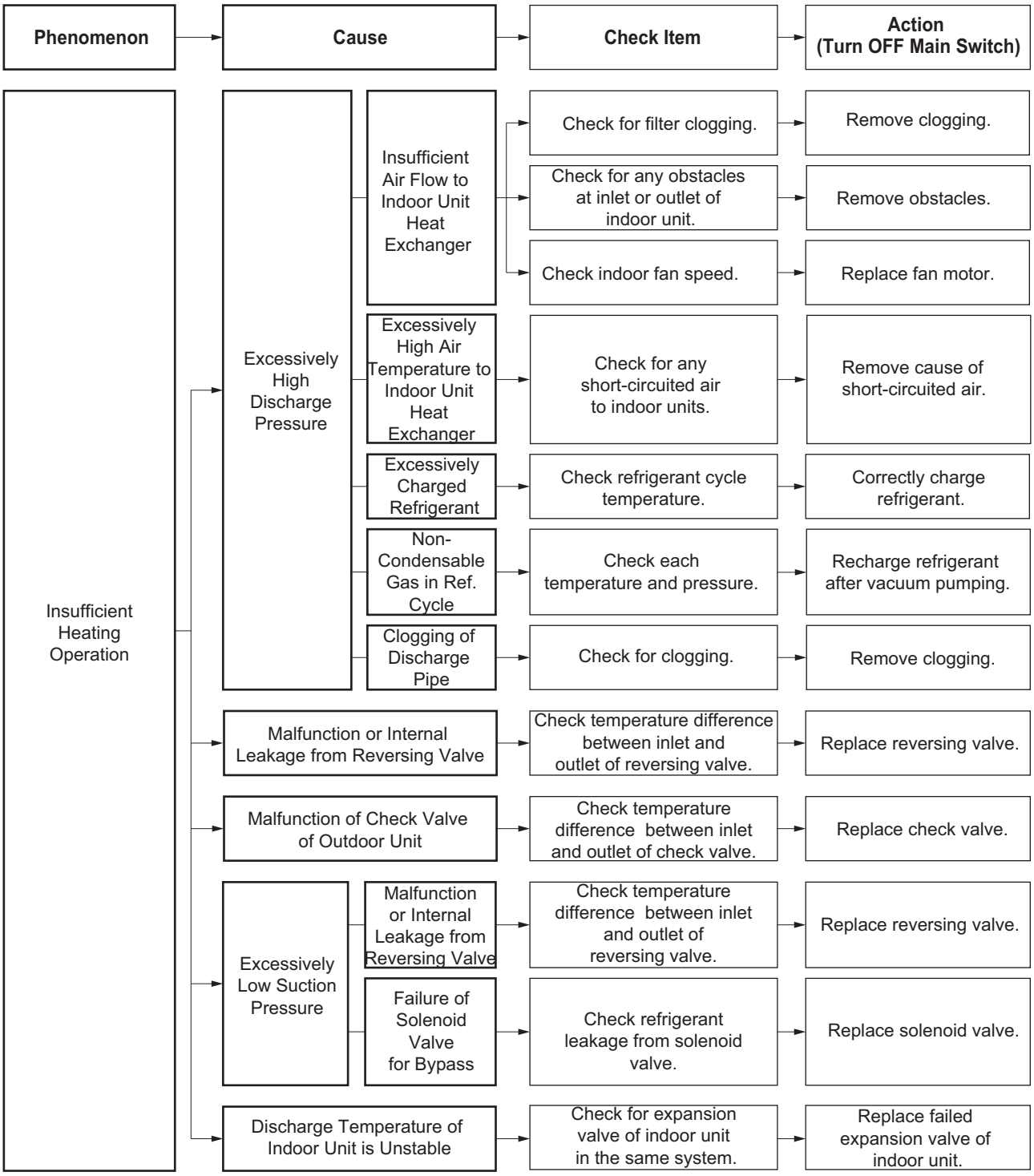
(1.2.4 Abnormalities of Devices)



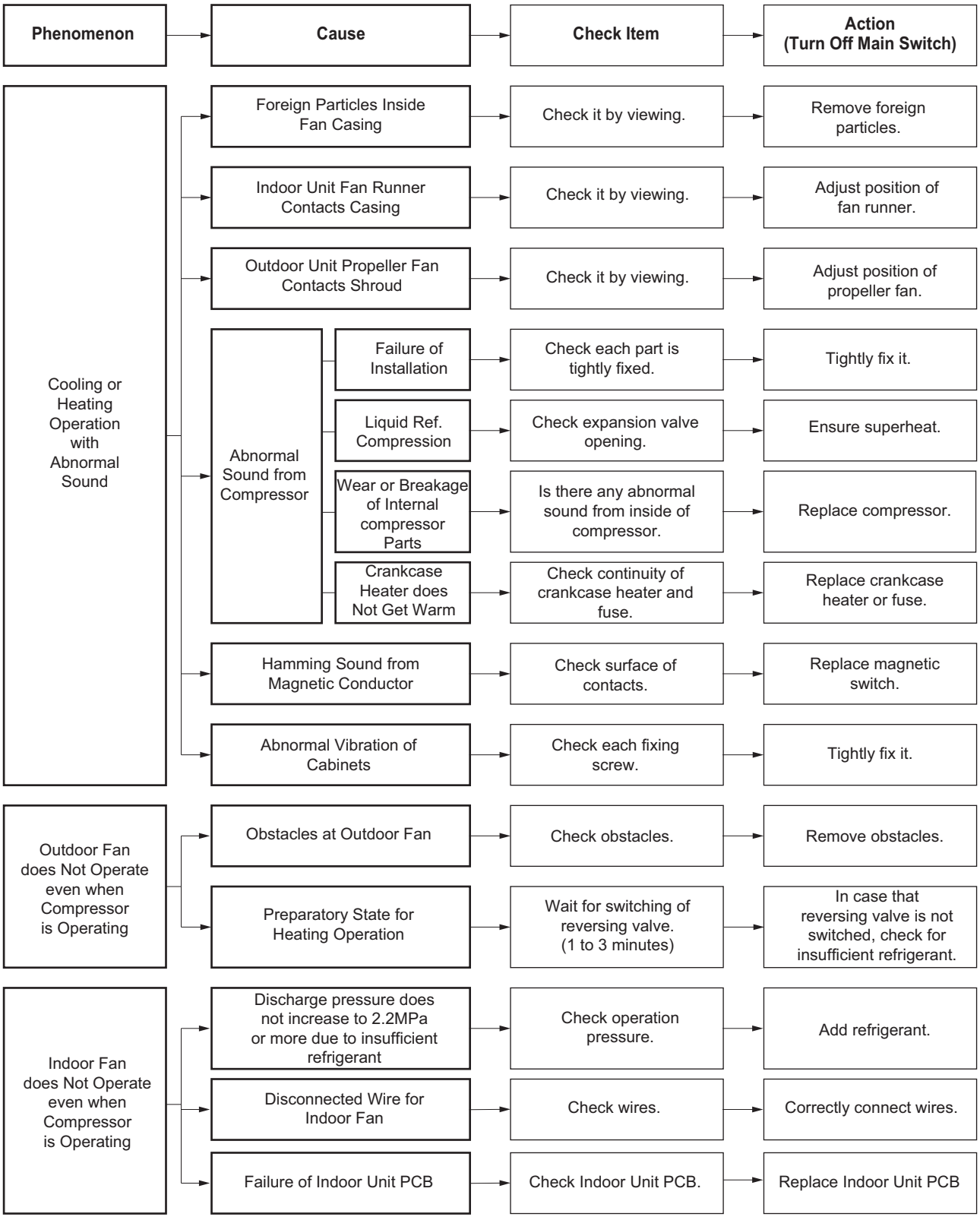
(1.2.4 Abnormalities of Devices)



(1.2.4 Abnormalities of Devices)



(1.2.4 Abnormalities of Devices)

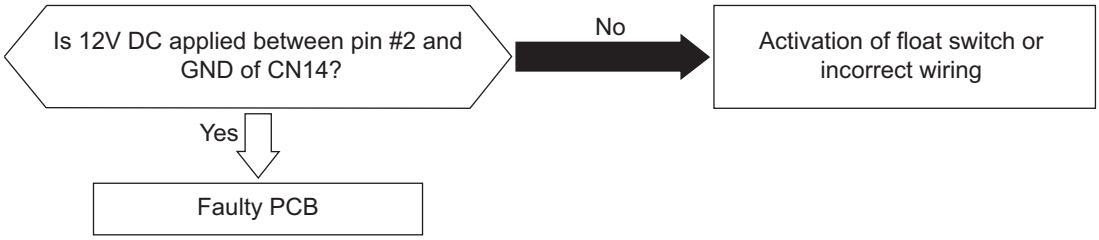


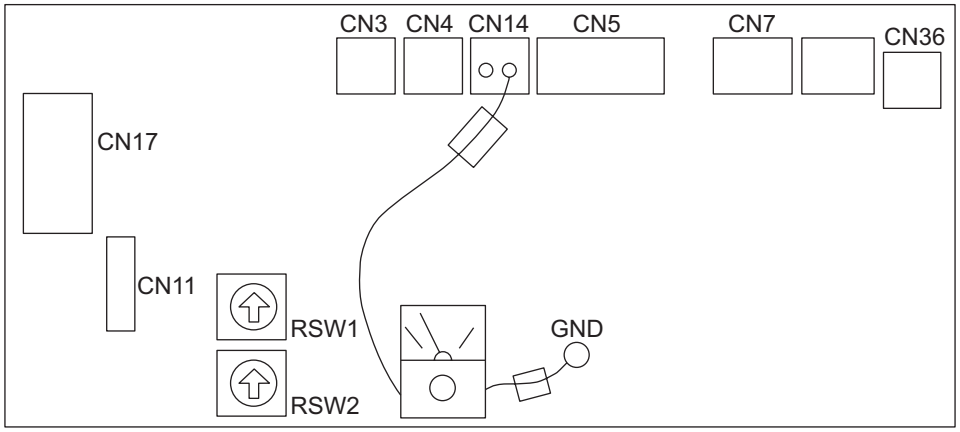
1.2.5 Troubleshooting by Alarm code

Alarm code	Activation of Indoor Unit Protection Device (Float Switch)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when the pin #1 and pin #2 of CN14 on the I.U. PCB are short circuited for more than 120 seconds during the Cooling, Dry, Fan, or Heating operation.





Phenomenon	Cause		Check Items	Actions
Fuse Blown or Activation of Breaker at Power Source	Power Failure or Power is not ON	Short Circuit between Wires	Measure voltage by voltmeter	Supply power
	Check for any Uncovered Part of Wires	Short Circuit Between Wires and Earth	Check for any uncovered part of wires	Fix the short circuit and replace fuse.
		Failure of Indoor Unit Fan Motor	Measure insulation resistance	Fix the short circuit and replace fuse.
		Fix the Short Circuit	Measure resistance between wiring and insulation resistance	Replace fan motor if failed.
Short Circuit Between Wires				Fix the short circuit and replace fuse.

Alarm code 02	Activation of Protection Device in Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the high pressure switch (PSH) is activated during the compressor operation (Y52C is turned ON).

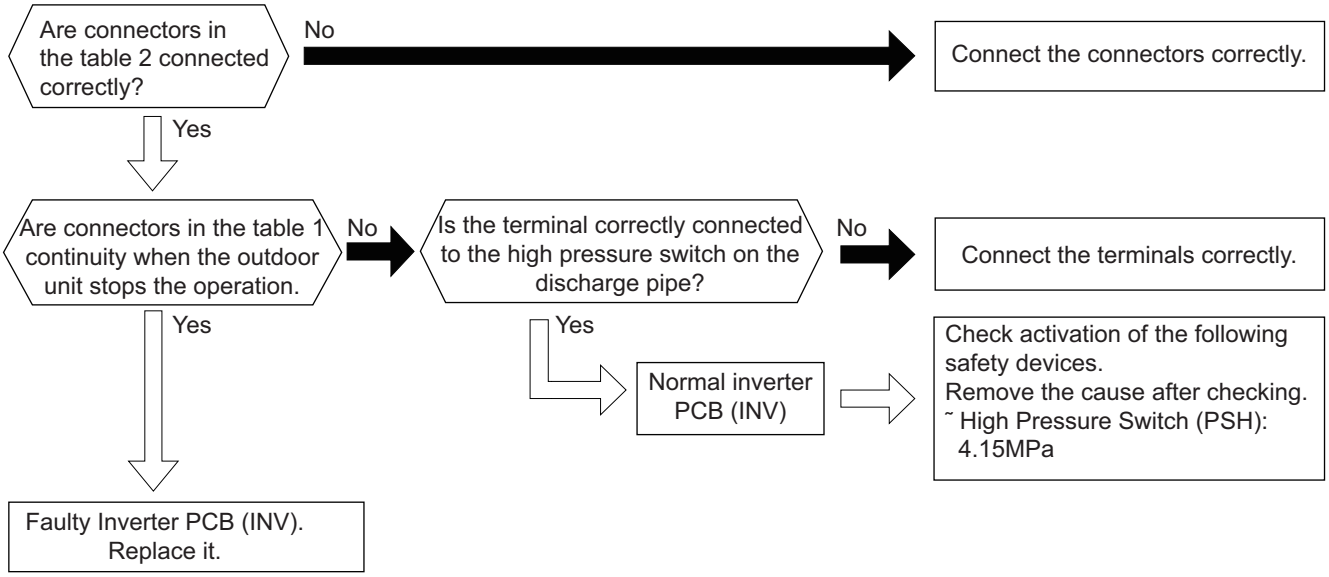


Table 2. Connector Number

PCB	Inverter PCB (INV)
Connector	PCN2
Pin No.	#1, #3

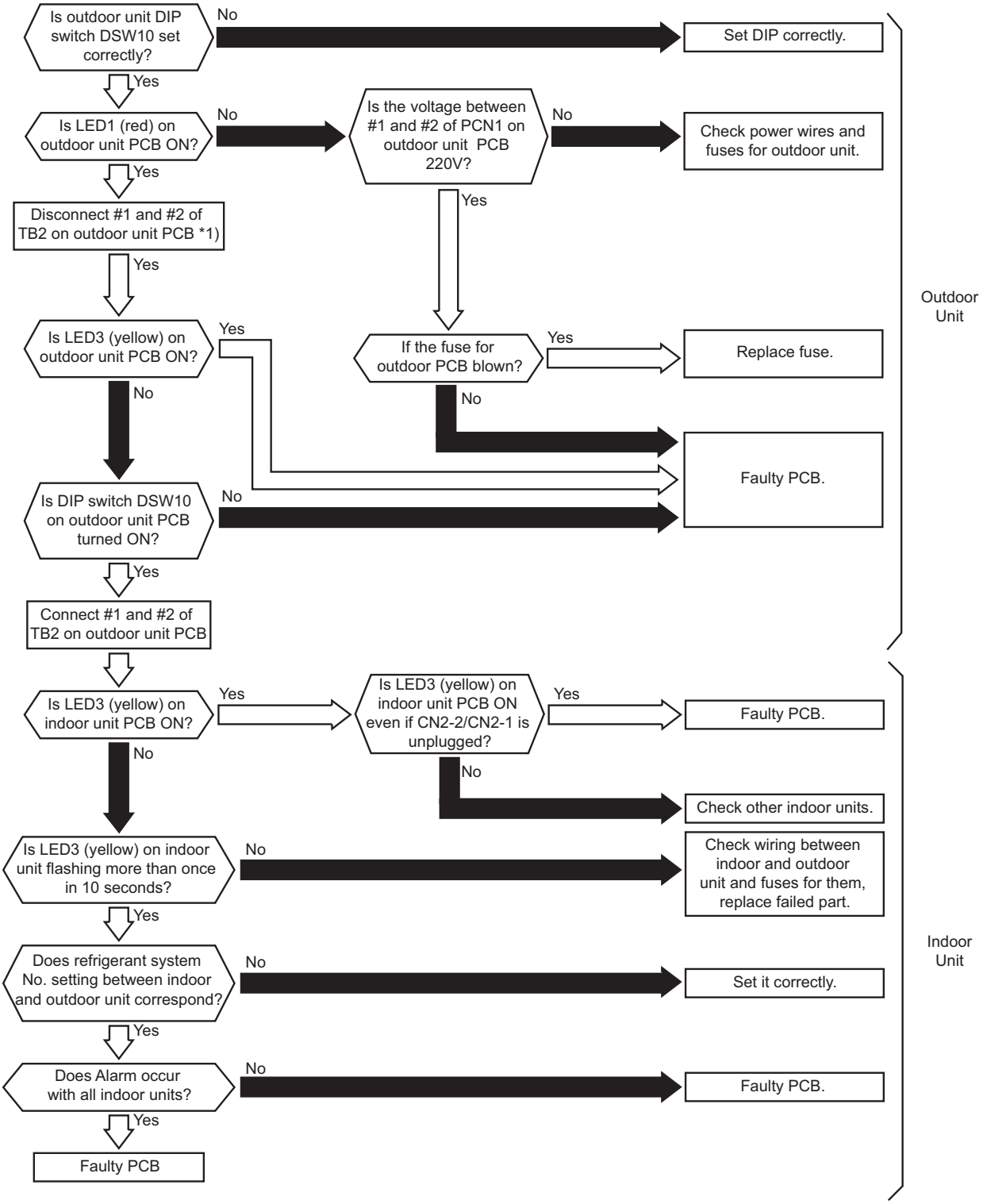
Event	Cause	Check Item	Action (Turn OFF Main Switch)
Activation of High Pressure Switch due to Excessively High Discharge Pressure	Insufficient Airflow to Heat Exchanger(Outdoor Heat Exchanger during Cooling Operation or Indoor Heat Exchanger during Heating Operation)	Clogging of Heat Exchanger?	Remove clogging.
		Check for dust on air filter.	Remove dust.
		Check for any obstacles at inlet or outlet of heat exchanger.	Remove obstacles.
		Check service space is sufficient.	Secure sufficient service space.
		Check fan motor speed. (Outdoor Fan: Cooling, Indoor Fan: Heating)	Replace fan motor if faulty.

Alarm code 03	Abnormality of communication between Indoor unit and Outdoor unit (For outdoor unit RAS-8.0~24RNBCLQ, RAS-26~96RNBCLQ)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when abnormality is maintained for 3 minutes, and when abnormality is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is indicated by the indoor unit when the abnormal communication is maintained for 30 seconds from starting of the outdoor unit.

Investigate the cause of overcurrent and take necessary action when fuses are blown or the breakers for the outdoor unit are activated.



*1): If H-LINK is connected, need to set terminal resistance (DSW10) to OFF. Set the terminal resistance to ON if #1 and #2 of TB2 are not connected and set terminal resistance to OFF if #1 and #2 of TB2 are connected.

Phenomenon	Cause	Check	Actions
No Power Supply		Measure voltage by tester	Supply power
Fuse Blown for Power Source or Activation of Outdoor Unit Breaker	Short Circuit between Wires	Check for breakage of insulation	Fix the short circuit and replace fuse
	Faulty Grounding	Measure insulation resistance.	Fix the short circuit to GND and replace fuse
	Faulty Compress Motor Coil	Measure resistance between wires and insulation resistance	Replace Comp. and fuse. Replace outdoor unit inverter module if faulty
	Faulty Outdoor Unit Fan Motor	Measure resistance between wires and insulation resistance.	Replace outdoor unit fan motor and fuse. Replace outdoor unit PCB if faulty
Fuse Blown for Control Circuit	Short Circuit between Wires	Check for breakage of insulation	Fix the short circuit and replace fuse
	Short Circuit between DC Fan Motor Power Wire and GRD	Measure insulation resistance.	Fix the short circuit and replace fuse
	Faulty Coil of Magnetic Switch (CMC) for Compressor	Measure resistance of coil.	Replace magnetic switch (CMC) and fuse
	Failure of Outdoor Unit Fan Motor	Measure resistance between wires and insulation resistance.	Replace fan motor and fuse
Failure of power supply to outdoor unit PCB		Measure output of outdoor unit PCB *2)	Replace outdoor unit PCB
Wires Unconnected, Bad Contact or Connection Incorrected	Between Outdoor Unit and Indoor Unit	Check continuity of wires. Check for looseness of connection screws. Check terminal numbers.	Replacing wires, repair and tighten screws
	Power Source Wiring for Outdoor Unit		
Faulty PCB (Outdoor Unit, Indoor Unit)	Incorrect Wiring of PCB	Check connections	Correctly connect
	Faulty PCB		Replace PCB if failed
Incorrect Wiring	Incorrect Wiring Bad Contact	Check wiring and looseness of connection screws.	Replacing wires, repair and tighten screws
	Incorrect Wiring	Check terminal Nos	Correctly connect wires.

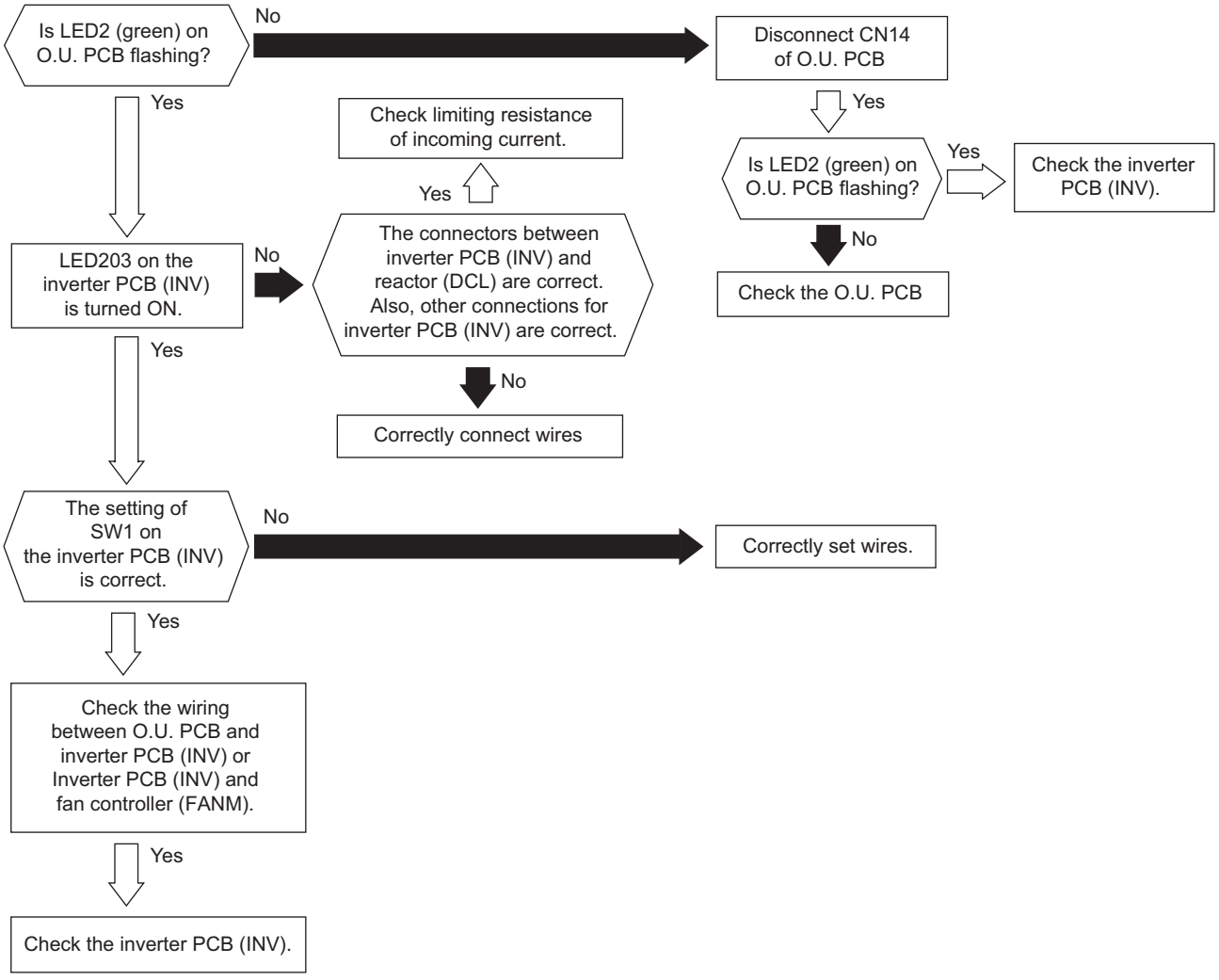
*2): Voltage between GND1—VCC13: 13V DC;
Voltage between GND1—VCC05: 5V DC;
Voltage between VDC-1—VCC15: 15V DC.

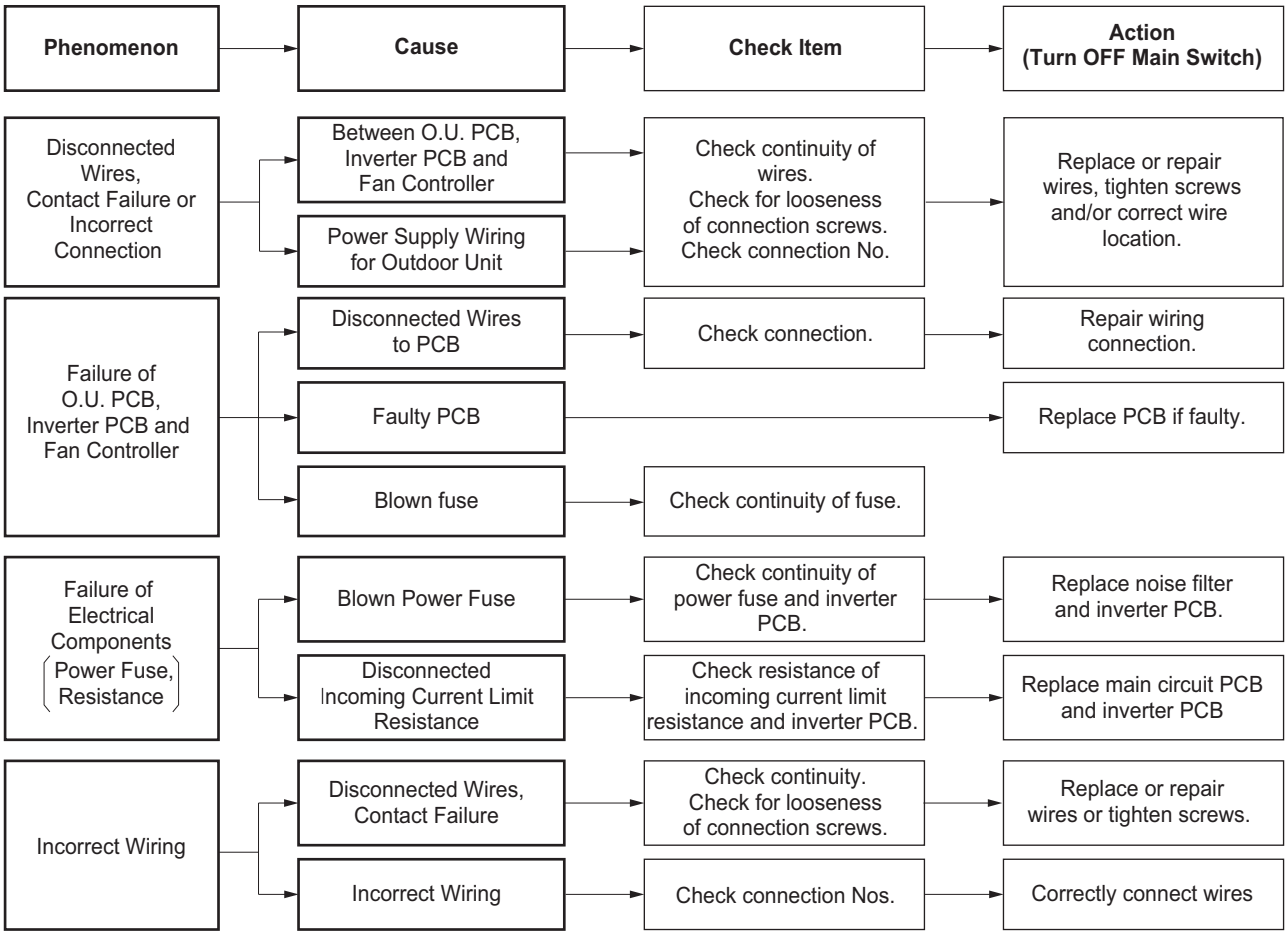
Alarm code 04	Abnormal Transmitting between Inverter PCB and Outdoor Unit PCB

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when an abnormal condition continues for 30 seconds after normal transmission between the outdoor unit PCB and the inverter PCB, and when the abnormal condition continues for 30 seconds even after the micro-computer is automatically reset. If transmission failure occurs from the beginning, the alarm code is displayed after 30 seconds from start up.

O.U. PCB: Outdoor Unit PCB (PCB3)





NOTE:

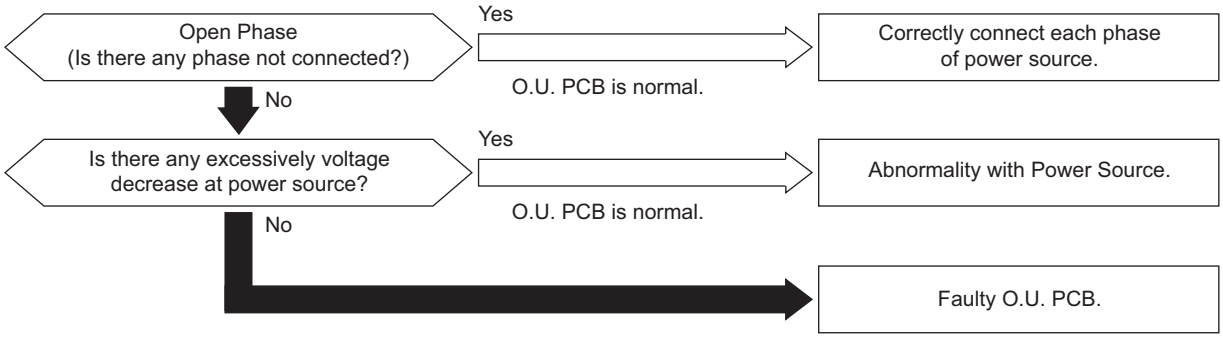
1. When replacing or checking for the inverter part, make sure to perform the electric discharge work according to Section 3.2.1. “High Voltage Discharge Work for Replacing Parts”.

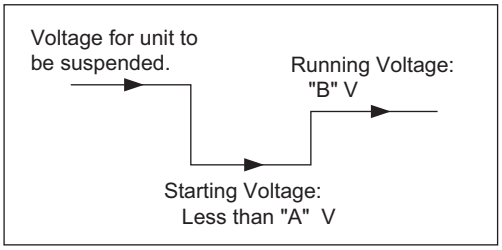
Alarm code 05	Abnormality Power Source Phase

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when the main power source phase is incorrect, or one phase is not connected.

O.U. PCB: Outdoor Unit PCB (PCB3)





Check Item

Power Supply	"A"	"B"
380-415V/50Hz/60Hz	323	342 to 456

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Activation of Open Phase Sensor in Outdoor Unit	Open Phase	Check it according to electrical wiring.	Replace wires, repair and tighten screws or correct wiring.
	Faulty O.U. PCB		Replace O.U. PCB if faulty.

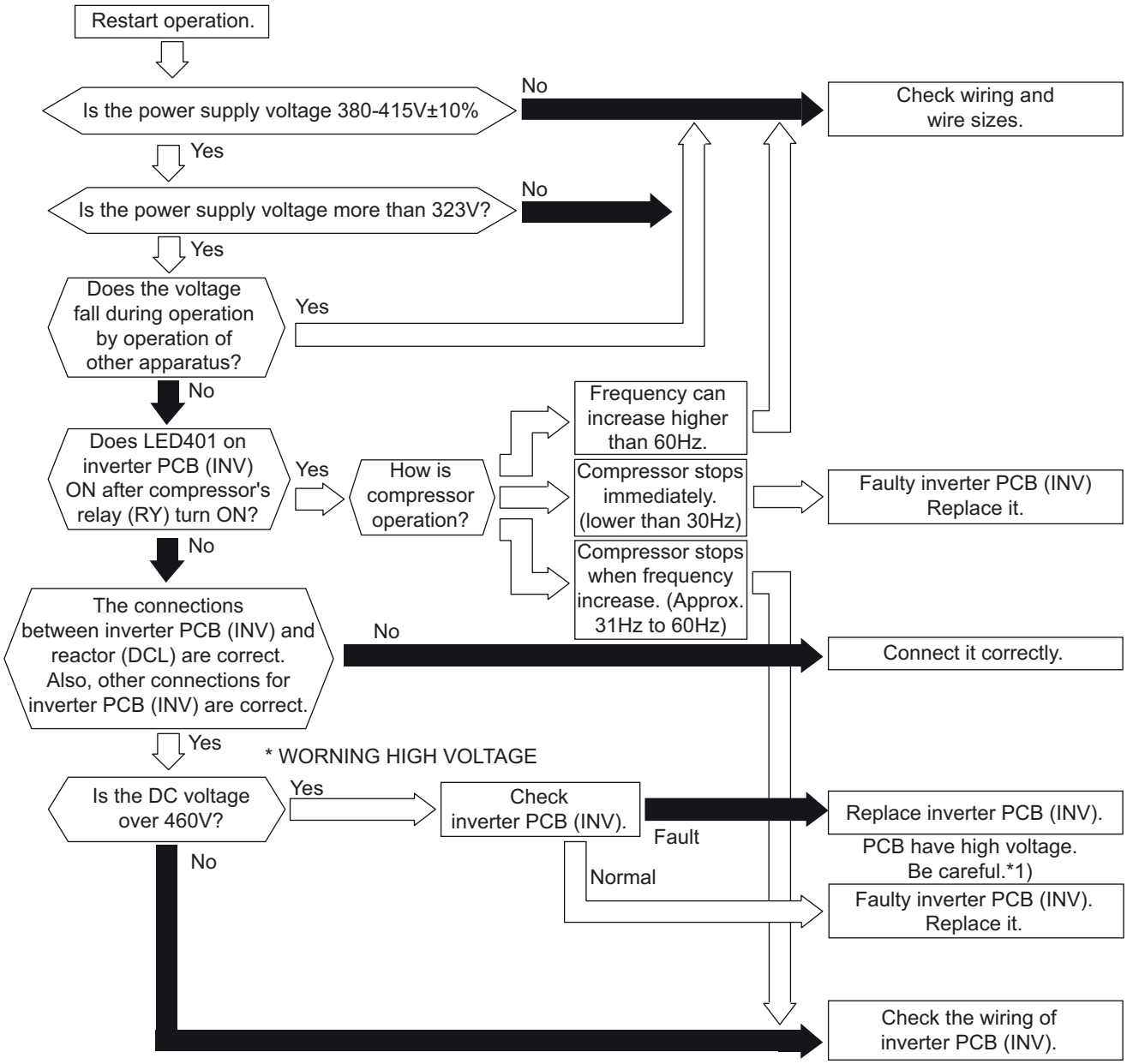
Alarm code 06	Abnormal Inverter Voltage (Insufficient Inverter Voltage or Overvoltage)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ When insufficient voltage is detected between the terminals “P” and “N” of the inverter PCB 3 times in 30 minutes, the operation stops and this alarm code is displayed. If this occurs less than 3 times in 30 minutes, the operation is automatically retried.

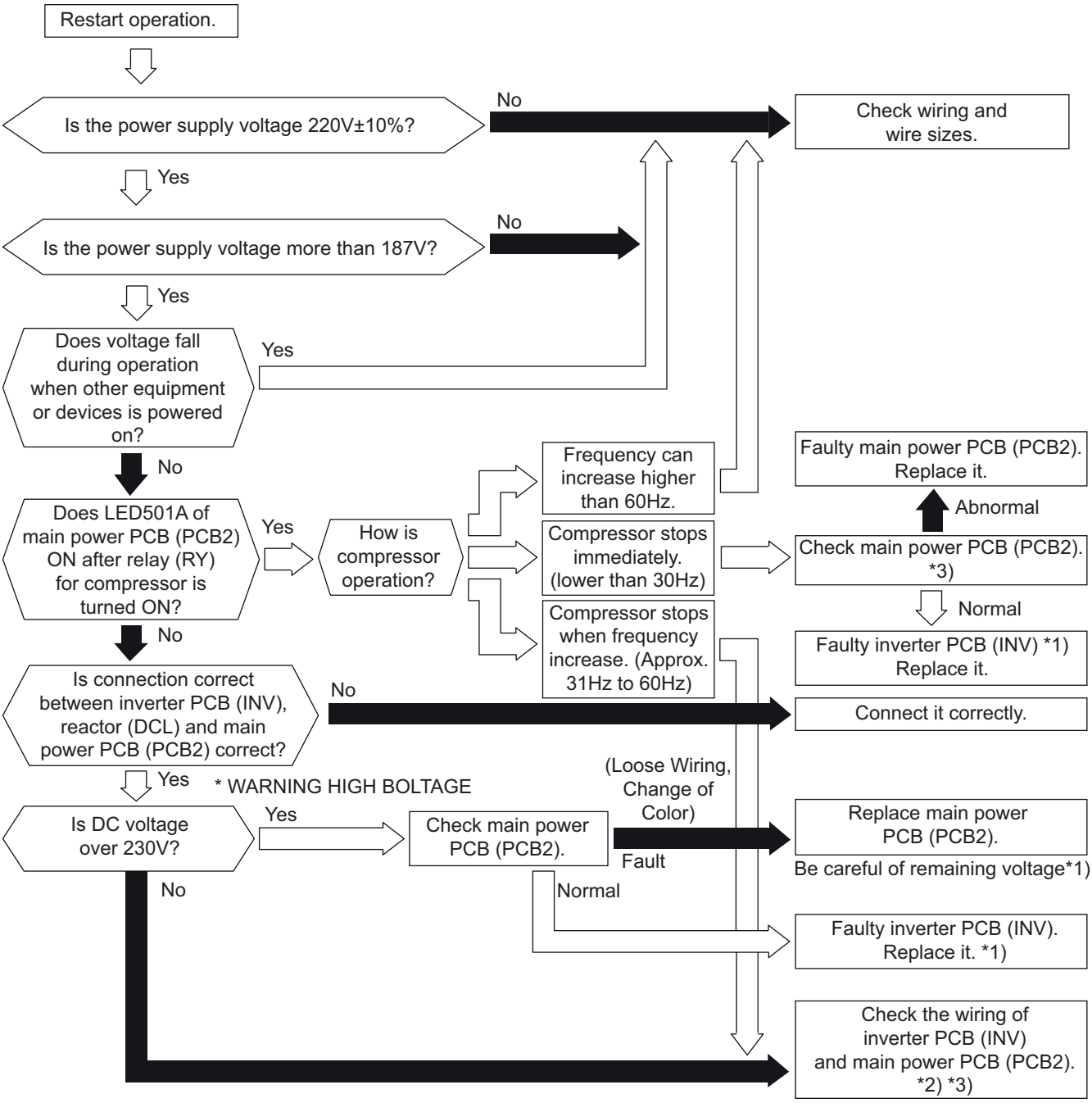
<Outdoor Unit PCB Display Indication>

□□ 06 Abnormality of Inverter



*1): Refer to the item 3.2.1 for checking procedures of the inverter PCB.
If high voltage remains, perform the high voltage discharge work according to this item.

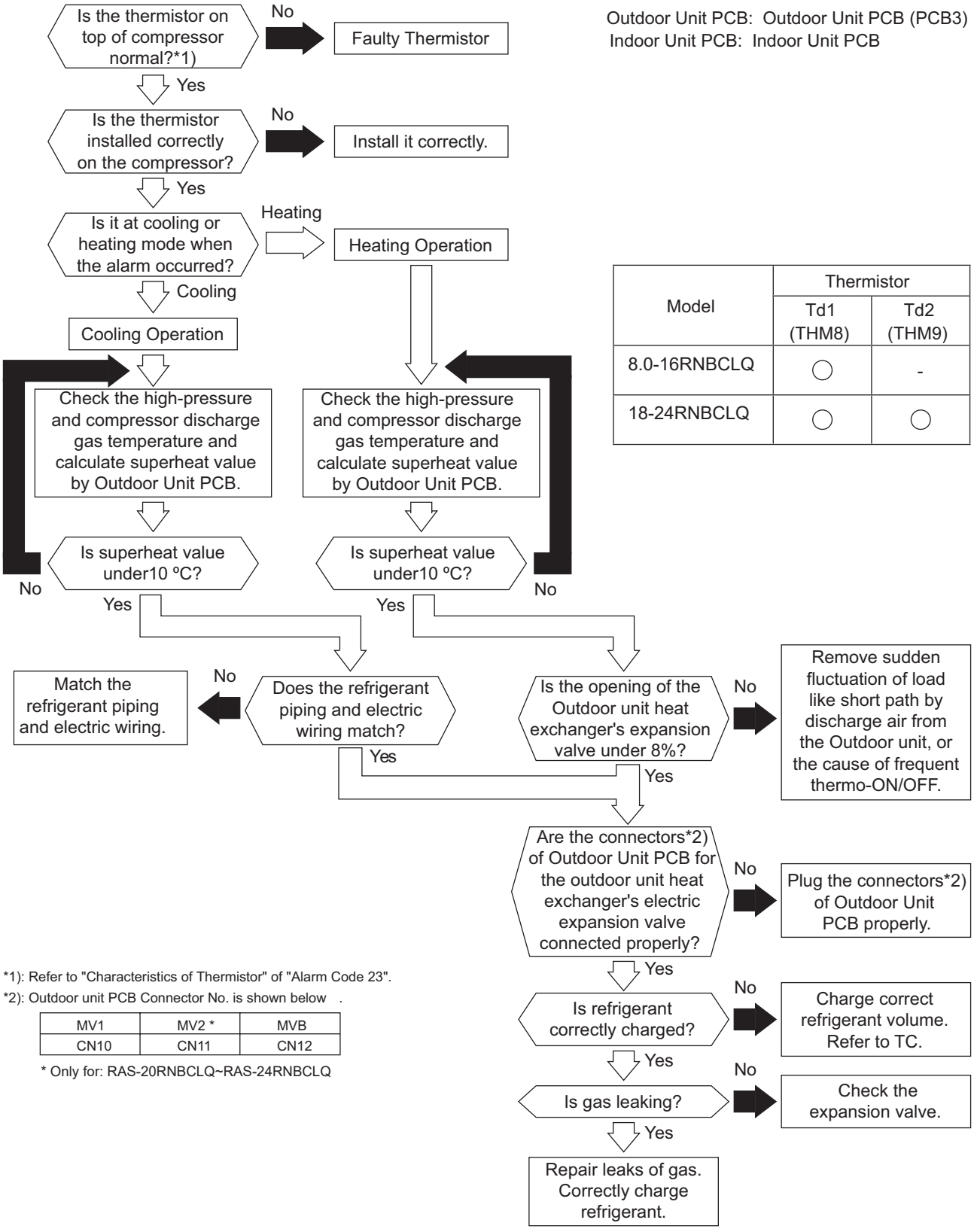
TROUBLESHOOTING



Alarm code 07	Decrease in Discharge Gas Superheat

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ In the case that the discharge gas superheat less than 10 deg. at the top of the compressor continues for 30 minutes, retry operation is performed. However, when the alarm occurs twice within 120 hours, this alarm code is indicated.



Model	Thermistor	
	Td1 (THM8)	Td2 (THM9)
8.0-16RNBCLQ	○	-
18-24RNBCLQ	○	○

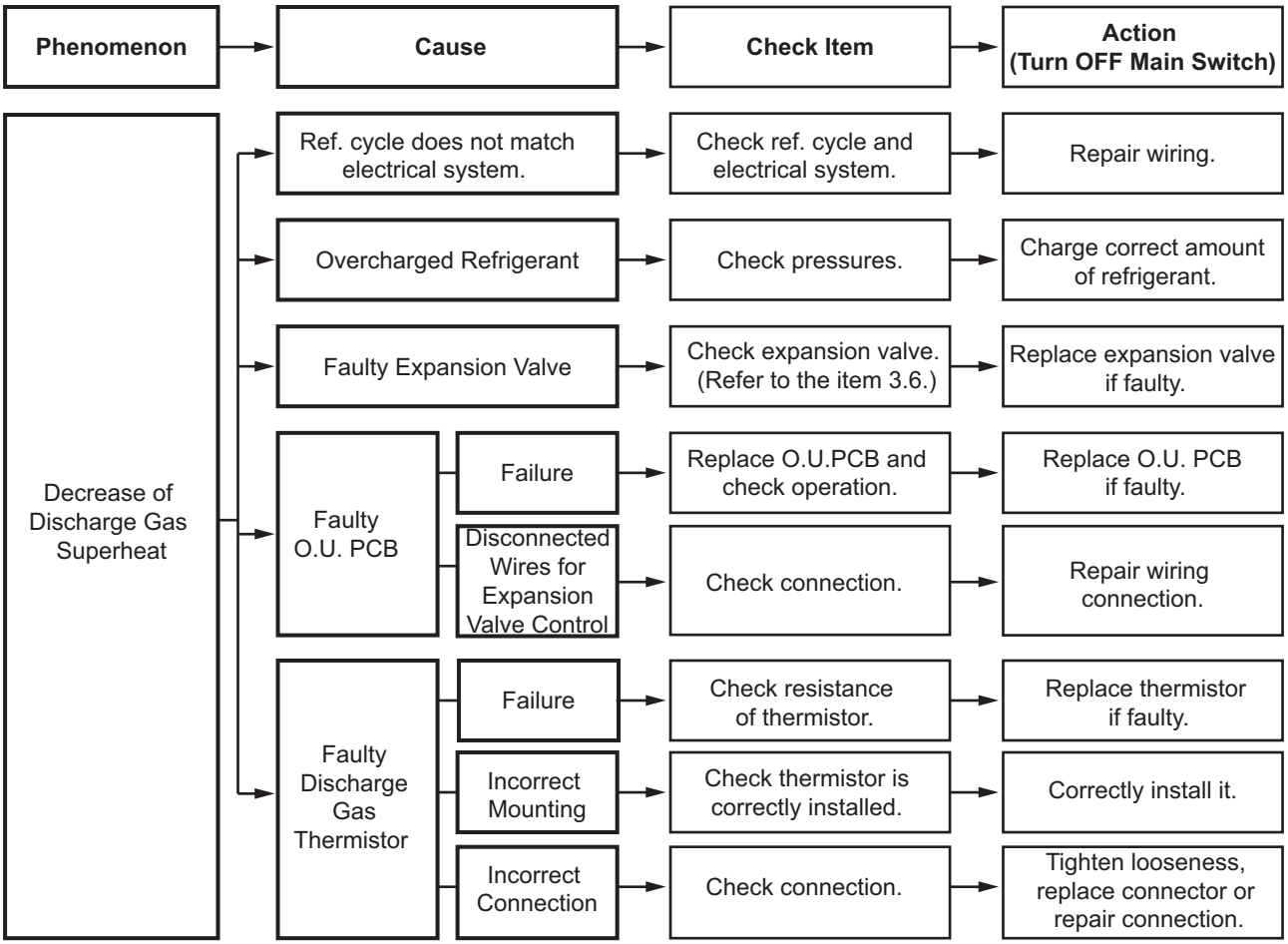
*1): Refer to "Characteristics of Thermistor" of "Alarm Code 23".

*2): Outdoor unit PCB Connector No. is shown below .

MV1	MV2 *	MVB
CN10	CN11	CN12

* Only for: RAS-20RNBCLQ~RAS-24RNBCLQ

TROUBLESHOOTING

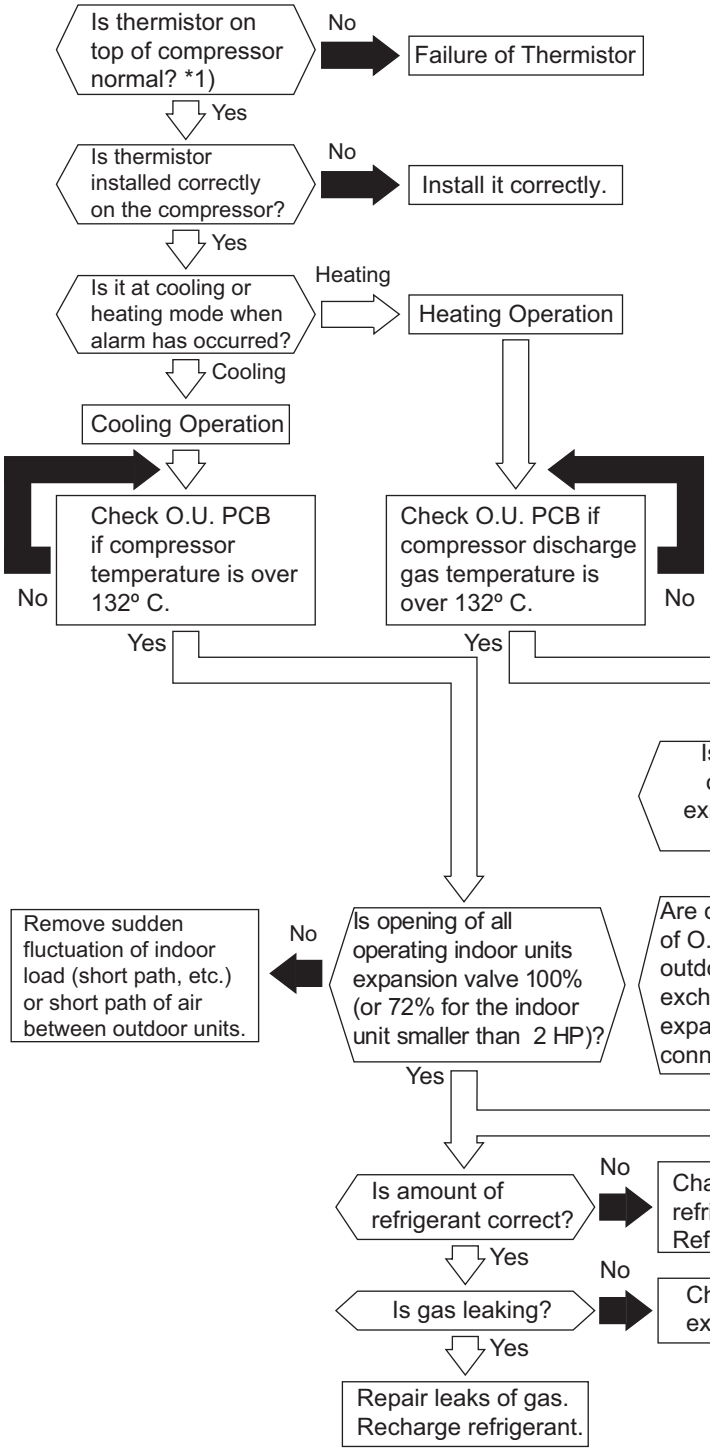


Alarm code 08	Increase in Discharge Gas Temperature at the Top of Compressor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ If the temperature at the top of the compressor is above 132°C for 10 minutes or above 140°C for 5 seconds during operation, the compressor stops and then the operation is automatically retried. If this occurs again twice in the next 60 minutes, this alarm code is displayed.

O.U. PCB: Outdoor Unit PCB (PCB3)



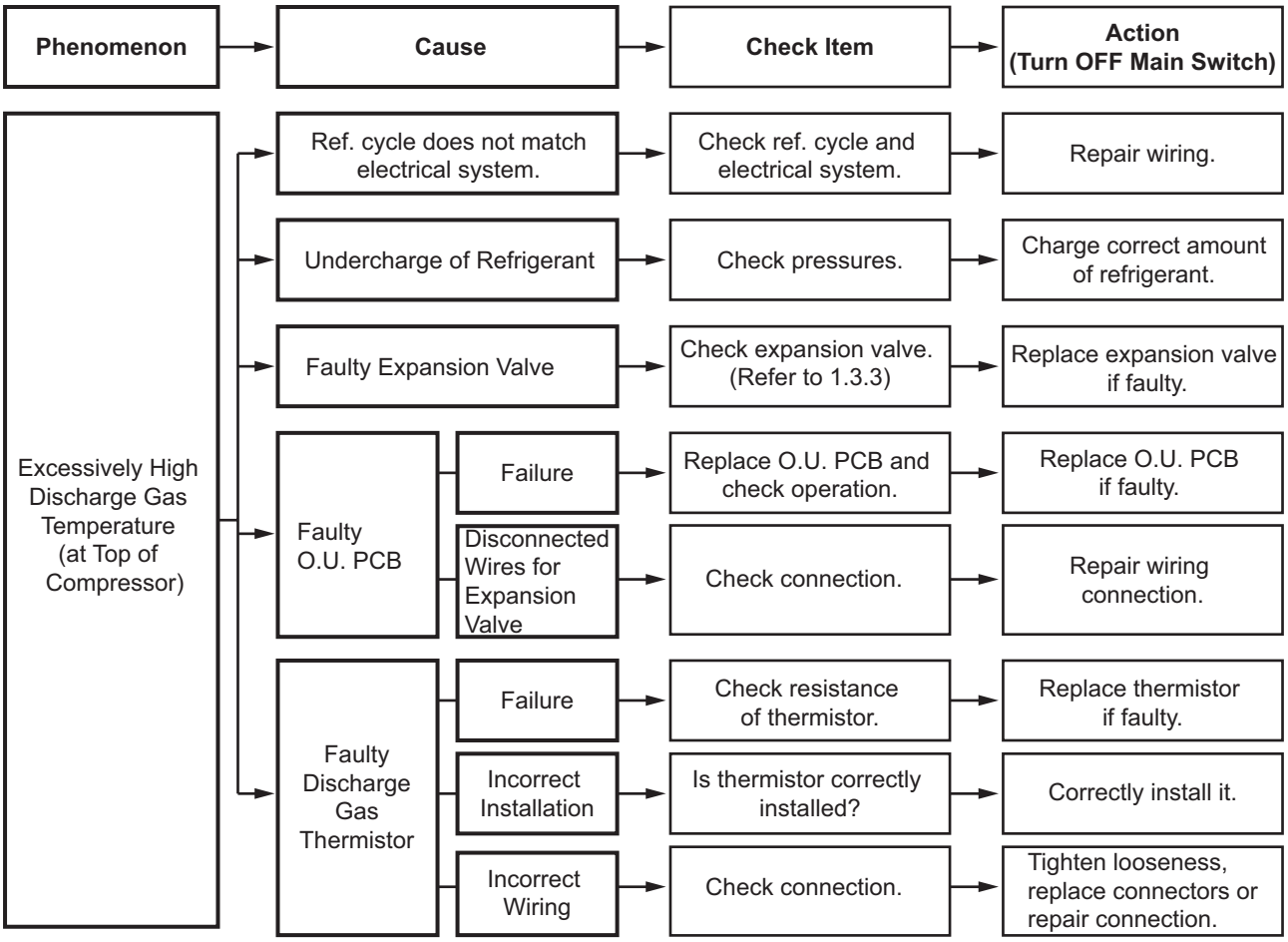
Model	Thermistor	
	Td1 (THM8)	Td2 (THM9)
8.0-16RNBCLQ	○	-
18-24RNBCLQ	○	○

*1): Refer to "Characteristics of Thermistor" of "Alarm Code 23".
*2): O.U. PCB Connector No. is shown in the below table.

MV1	MV2 *	MVB
CN10	CN11	CN12

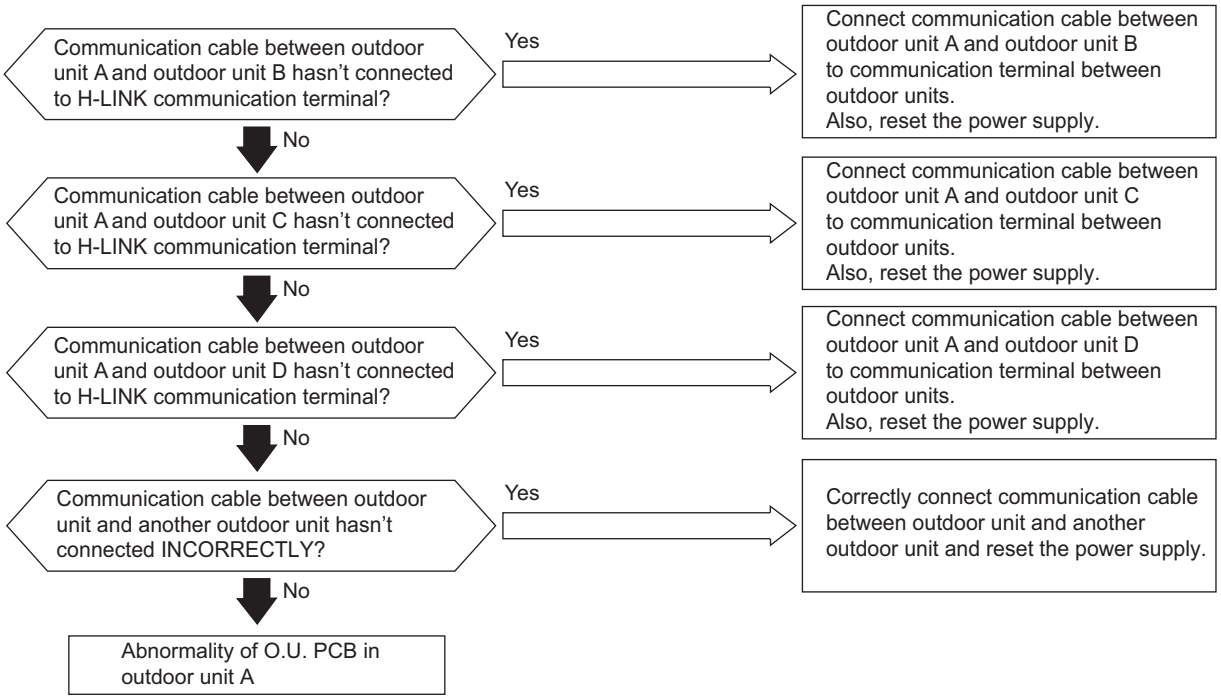
* Only for: RAS-20RNBCLQ
RAS-26RNBCLQ

TROUBLESHOOTING

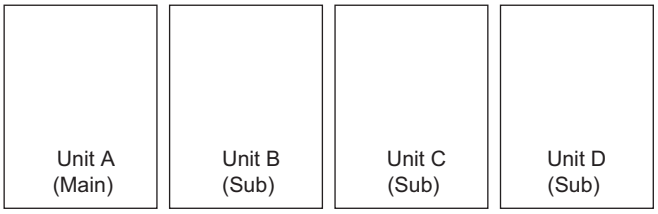


Alarm code 08	Abnormal Transmitting between Outdoor Units

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

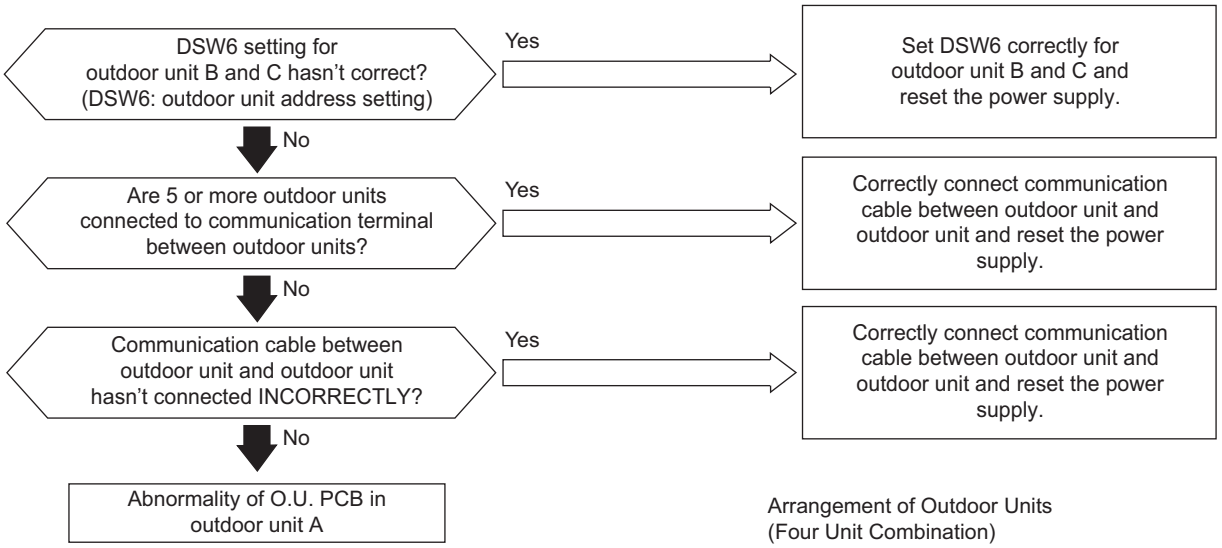


Arrangement of Outdoor Units
(Four Unit Combination)

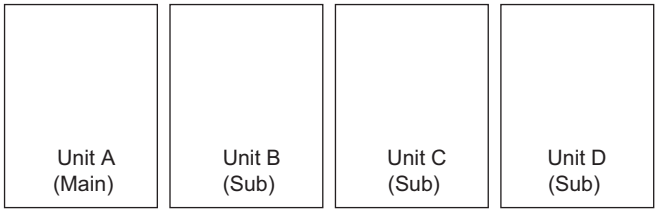


Alarm code 06	Incorrect Outdoor Unit Address Setting

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

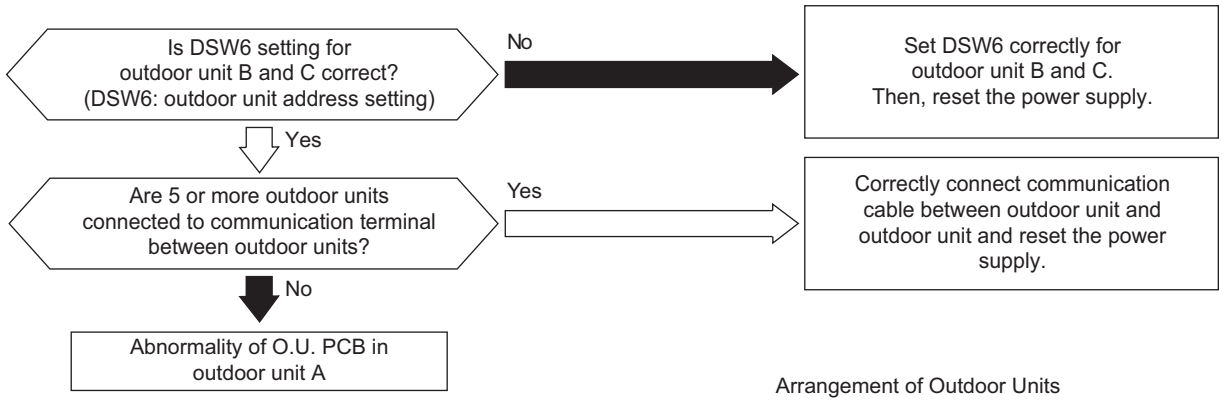


Arrangement of Outdoor Units
(Four Unit Combination)

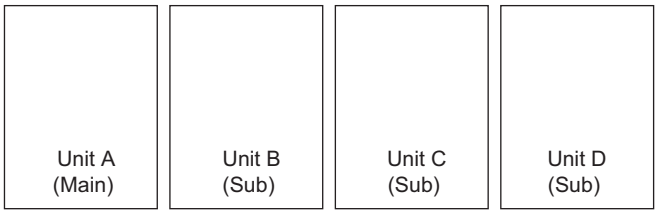


Alarm code 0C	Incorrect Setting of Main Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.



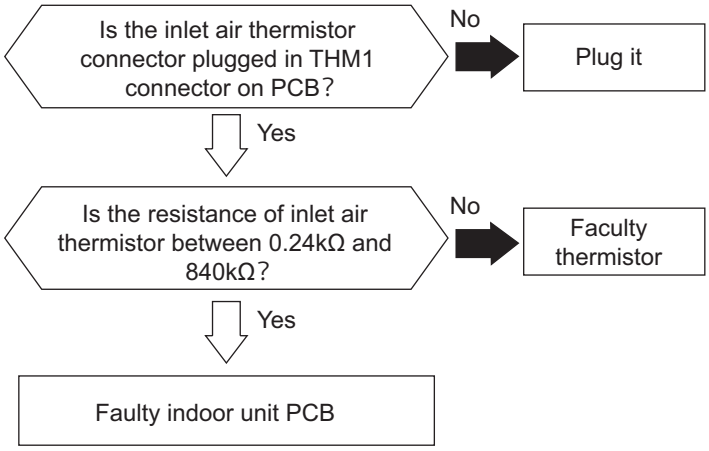
Arrangement of Outdoor Units
(Four Unit Combination)

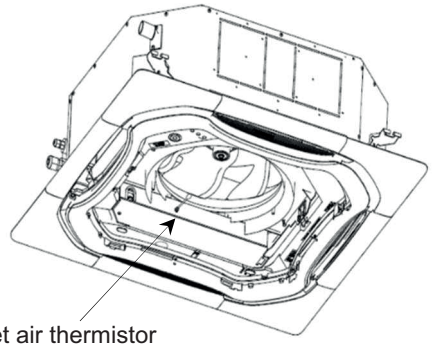


Alarm code	Abnormal inlet air thermistor for indoor unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the indoor unit inlet air thermistor is short-circuited (resistance is less than 0.24 kΩ) or open circuited (resistance is greater than 840 kΩ) during the operation, except “FAN Mode”. The indoor unit will be automatically restarted with the operation state before the failure when the fault is fixed.



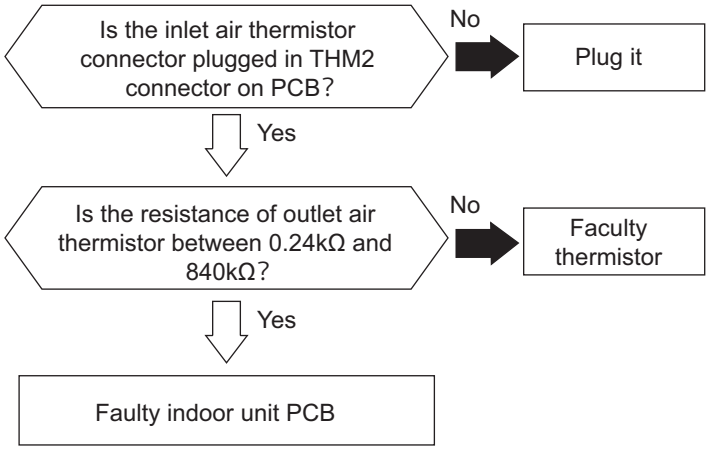


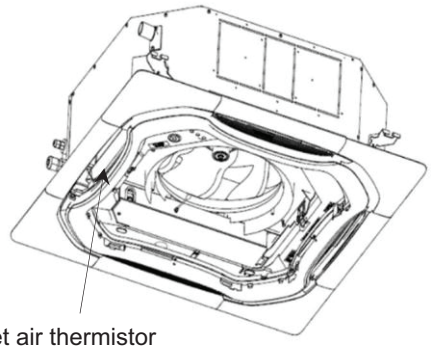
Phenomenon	Cause	Inspection items	Actions
Faulty inlet air thermistor	Failure	Measure resistance	Replace thermistor if failed
	Incorrect connection	Check connection	Connect wiring correctly
Faulty indoor unit PCB		Replace PCB and check operation	Replace PCB if failed

Alarm code 12	Abnormal Outlet Air Thermistor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the indoor unit outlet air thermistor is short-circuited (resistance is less than 0.24 kΩ) or open circuited (resistance is greater than 840 kΩ) during the operation, except “FAN Mode”. The indoor unit will be automatically restarted with the operation state before the failure when the fault is fixed.



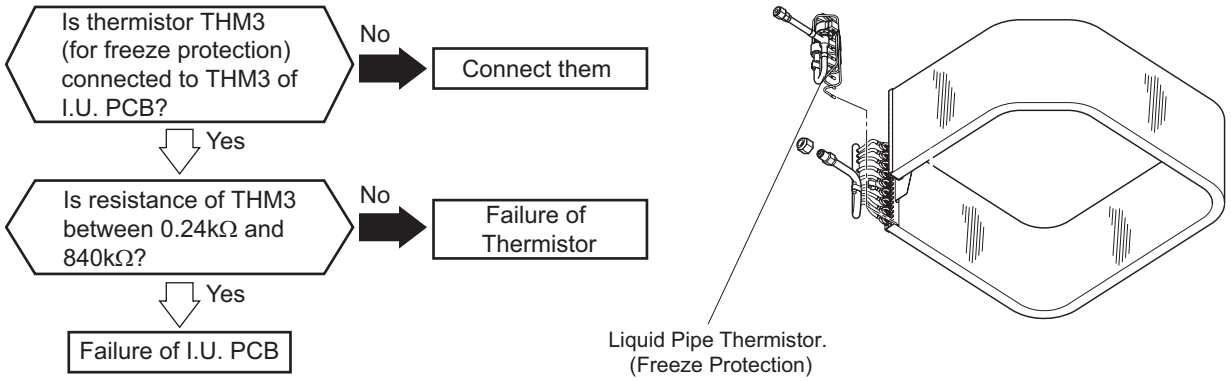


Phenomenon	Cause	Inspection items	Actions
Faulty outlet air thermistor	Failure	Measure resistance	Replace thermistor if failed
	Incorrect connection	Check connection	Connect wiring correctly
Faulty indoor unit PCB		Replace PCB and check operation	Replace PCB if failed

Alarm code	Abnormal Liquid Pipe Thermistor (Freeze Protection Thermistor) for Indoor Unit Heat Exchanger

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the liquid pipe thermistor for indoor unit heat exchanger is short-circuited (resistance is 0.24 kΩ or below) or open circuited (resistance is 840 kΩ or above) during the operation, except “FAN Mode”. The indoor unit will be automatically restarted with the operation state before the failure when the fault is fixed.



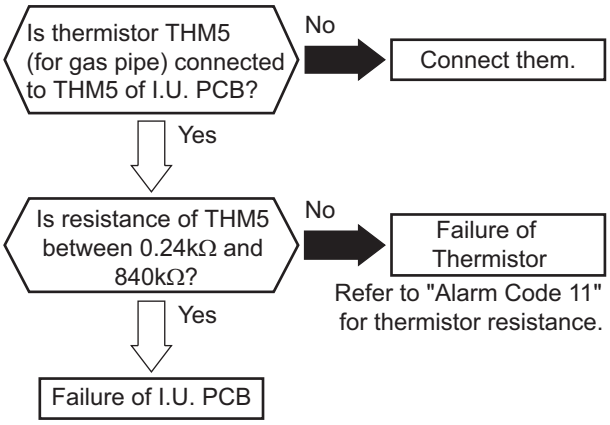
In Case of 4-way Cassette Type

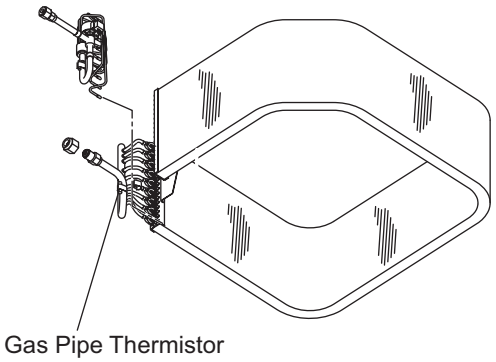
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Freeze Protection Thermistor	Failure	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to I.U. PCB.	Correctly connect wires.
Failure of I.U. PCB		Replace I.U. PCB and check operation.	Replace I.U. PCB if faulty.

Alarm code 14	Abnormal Gas Pipe Thermistor for Indoor Unit Heat Exchanger

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the gas pipe thermistor for indoor unit heat exchanger is short-circuited (resistance is 0.24 kΩ or below) or open circuited (resistance is 840 kΩ or above) during the operation except “FAN Mode”. The indoor unit will be automatically restarted with the operation state before the failure when the fault is fixed.





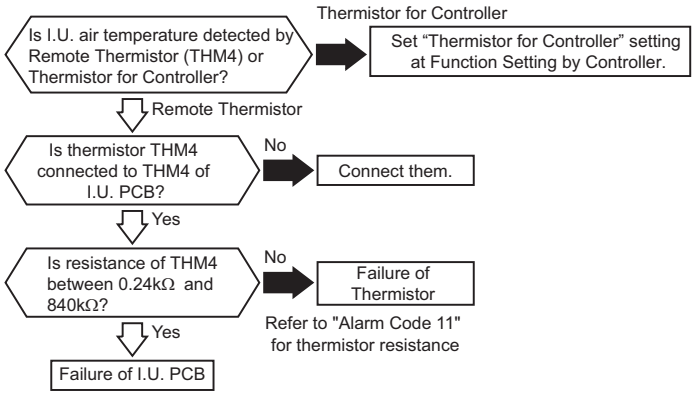
In Case of 4-way Cassette Type

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Thermistor for Indoor Unit Heat Exchanger Gas Pipe Temperature	Failure	Check resistance.	Replace thermistor if faulty
	Incorrect Connection	Check wiring to I.U. PCB.	Correctly connect wires.
Failure of I.U. PCB		Replace I.U. PCB and check operation.	Replace I.U. PCB if faulty.

Alarm code	16	Abnormality of Remote Thermistor (for DOAS*1)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.24 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during a heating, cooling or fan operation.



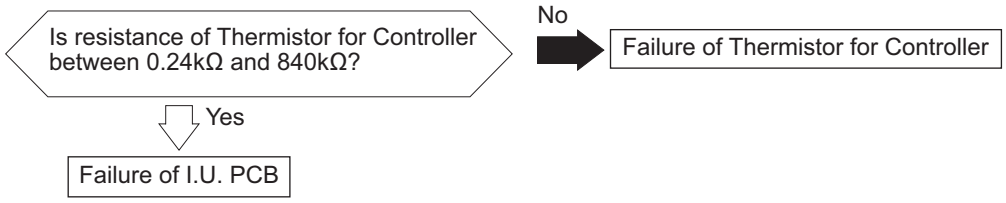
Event	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Remote Thermistor	Failure	Check resistance.	Replace remote thermistor if faulty.
	Incorrect Connection	Check wiring to Indoor Unit PCB.	Correctly connect wires.
Failure of Indoor Unit PCB		Replace Indoor Unit PCB and check operation.	Replace Indoor Unit PCB if faulty.

*1): Dedicated Outdoor Air System, All Fresh Air Indoor Unit

Alarm code 17	Abnormality of Thermistor for Controller (for DOAS*1)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.24 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during a heating, cooling or fan operation.



Event	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Thermistor for Controller	Failure	Check short-circuit and disconnection wiring.	Replace controller if faulty.
Failure of I.U. PCB		Replace I.U. PCB and check operation.	Replace I.U. PCB if faulty.

NOTE:

The DOAS*1) can operate while utilizing the Remote Thermistor and the Controller Thermistor under certain mode.

While operating in this mode:

- If one of the thermistors fail, operation can be continued by using the value measured from the only thermistor working,
- If both of thermistors fail, this alarm code is displayed.

This alarm code will only appear when both thermistors are being used and both have failed.

For checking, follow page 197 “Alarm Code 16”.

*1): Dedicated Outdoor Air System, All Fresh Air Indoor Unit

Alarm code 19	Activation of Protection Device for Indoor Fan Motor, DC Motor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

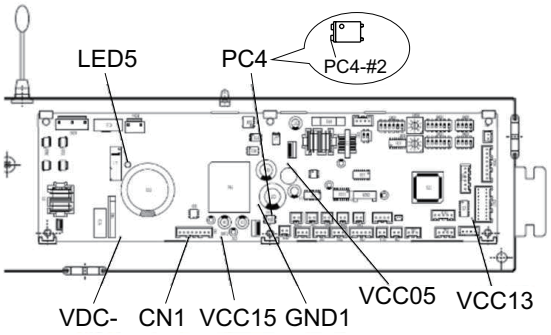
★ During operation of indoor fan motor, if the indoor fan motor speed is less than 70rpm for 5s and this case occurs 3 times in 30 minutes, this alarm code will be indicated.

Alarm code"19"

⚠ Caution

- Go through following check procedures after indoor fan is set to "High" speed.
- Electrical part is applied with high voltage, be careful during operation to avoid electric shock.

Note:
Turn off power source before performing inspection of wiring. Otherwise, DC motor failure may occur.



Check connection of PCN7 and CN1 on PCB

Is 220V applied between terminal L and N of TB 220V?

Is LED4 on PCB OFF?(*1) — Yes → I.U. PCB failure

(*1) If no power supplied to PCB, LED4 is OFF.

I.U. PCB failure → Replace PCB

No

Is LED5 on PCB OFF? (*2) — Yes → I.U. PCB failure

(*2) Power supply to fan motor is abnormal (Normal DC310V)

I.U. PCB failure → Replace PCB

No

Is output voltage of PCB normal ?(*3) — No → I.U. PCB failure

(*3) Measure voltage between VCC15 and VDC - (should be 15V±10%)

I.U. PCB failure → Replace PCB

Yes

Is output DC voltage of PCB ? (*4) — No → I.U. PCB failure

(*4) Measure following voltages:
Between VCC05 and GND:5V±4%;
Between VCC13 and GND:13.1V±10%

I.U. PCB failure → Replace PCB

Yes

(*5)
Unplug CN1 and start operation, if the voltage between pin #3 of CN1 and VDC - (Check point) over 1V after 10s, the RPM transmitting by PCB is normal.
Notes:
1. Voltage between pins as stated above should be 0.3 to 0.4V even the operation is stopped.
2. If failure outlined in this section occurs, there will be no voltage between pins as stated above.

Is fan RPM transmitted correctly? (*5) — Yes → Does fan motor rotate? — No → Fan motor failure — (*5) → Replace fan motor

No

Indoor unit PCB failure

Yes

Replace I.U. PCB

Yes

(*6)
Plug CN1 and start, if there is voltage output between pin #2 of PC4 and VDC-(Check point), it proves this function is normal.

Is feedback pulse of fan speed from motor to PCB correct? (*6) — Yes → I.U PCB failure — (*6) → Replace PCB

Note: Detected voltage as stated above should be appx. 0.2V even the operation is stopped.

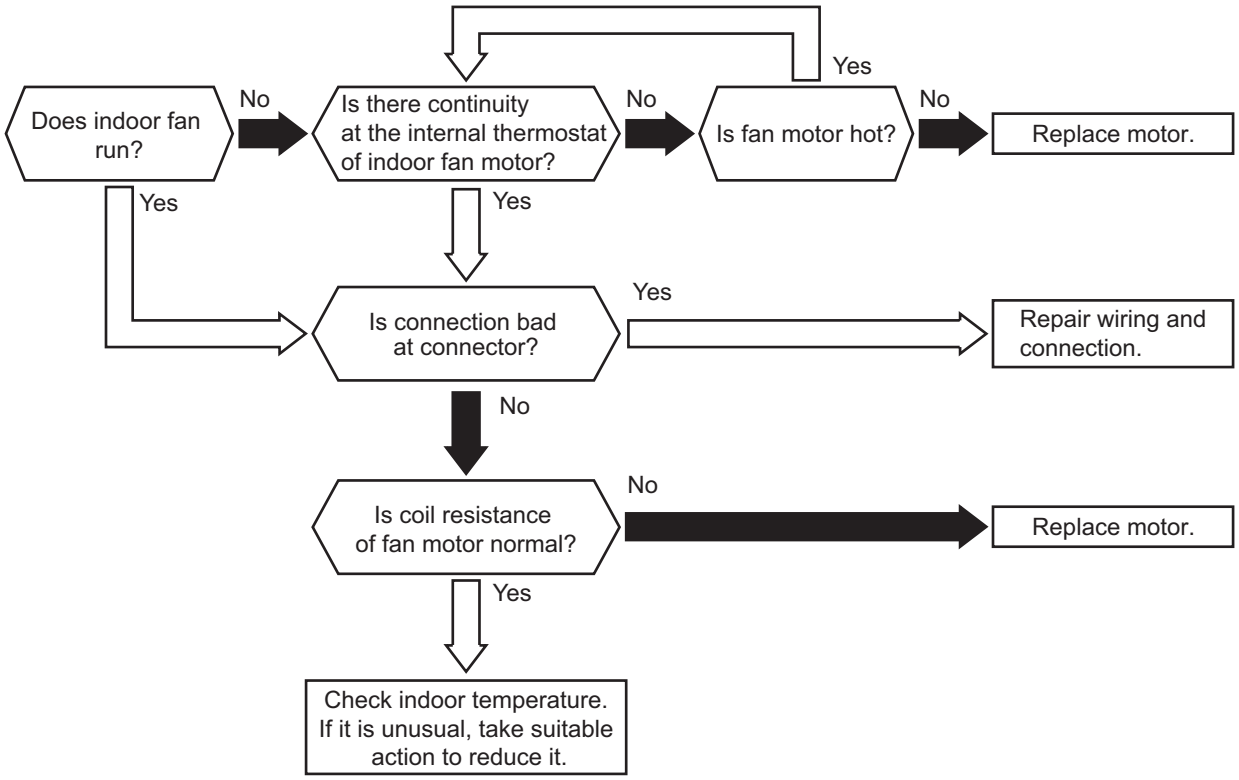
No

Fan motor failure → Replace fan motor

Alarm code	19	Activation of Protection Device for Indoor Fan Motor (Indoor Unit with AC Motor)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when over approximately 1A is applied to the indoor unit fan motor.



Phenomenon	Cause		Check Item	Action (Turn OFF Main Switch)
Activation of Internal Thermostat for Indoor Unit Fan Motor	Faulty Indoor Unit Fan Motor		Measure coil resistance and insulation resistance.	Replace motor if faulty.
	Faulty Internal Thermostat	Failure	Check continuity after fan motor temperature decreases to room temp.	Replace fan motor if no continuity.
		Contact Failure	Measure resistance with a tester.	Correct looseness. Replace connectors.
		Incorrect Connection	Check connection.	Repair connection.

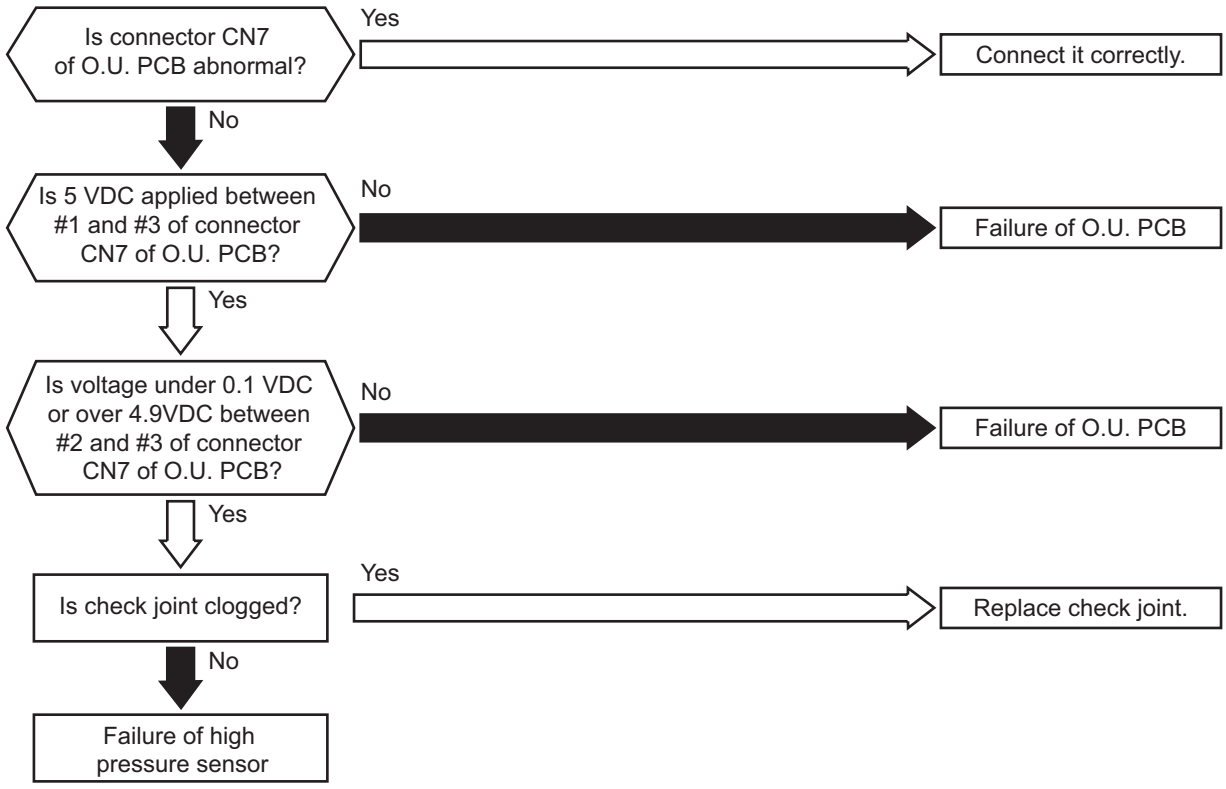
For other items, refer to “Service Manual” of indoor unit.

Alarm code 21	Abnormality of High Pressure Sensor for Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when output voltage of the pressure sensor decreases to 0.1V or less, or increases to 4.9V or more during operation.

O.U. PCB: Outdoor Unit PCB (PCB3)



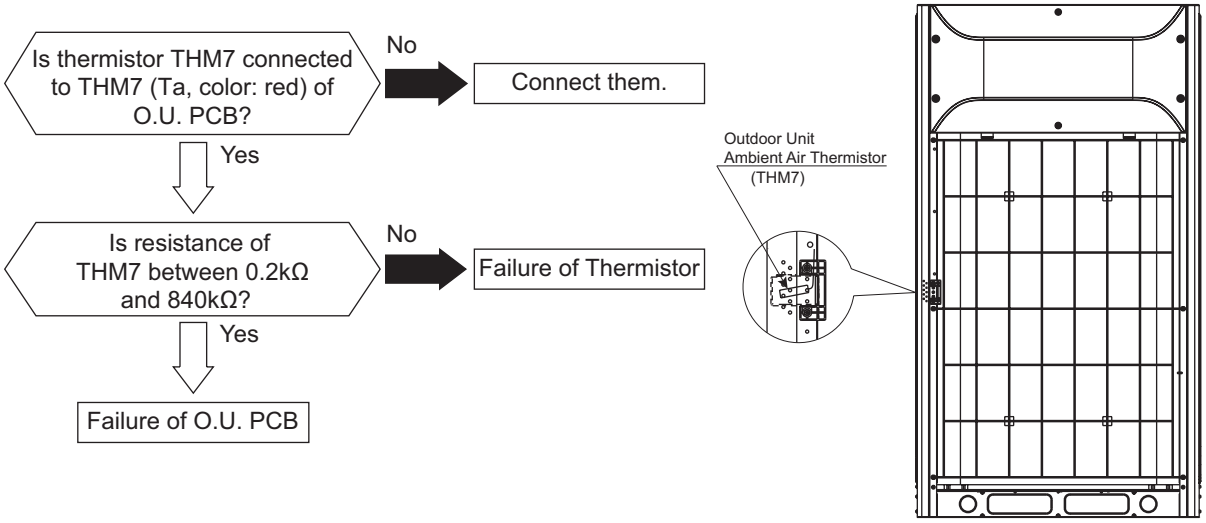
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of High Pressure Sensor	Failure	Check resistance.	Replace thermistor connection.
	Incorrect Connection	Check wiring to O.U. PCB.	Repair wiring and connection.
Failure of O.U. PCB		Replace O.U. PCB and check operation.	Replace O.U. PCB if faulty.
Indicated Value of Pressure Value is Excessively High or Low	Malfunction of Pressure Sensor due to Faulty Check Joint	Check for clogging of check joint	Replace check joint.

Alarm code 22	Abnormality of Thermistor for Outdoor Air Temperature (Outdoor Unit Ambient Thermistor)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.2 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during operation.

O.U. PCB: Outdoor Unit PCB (PCB3)

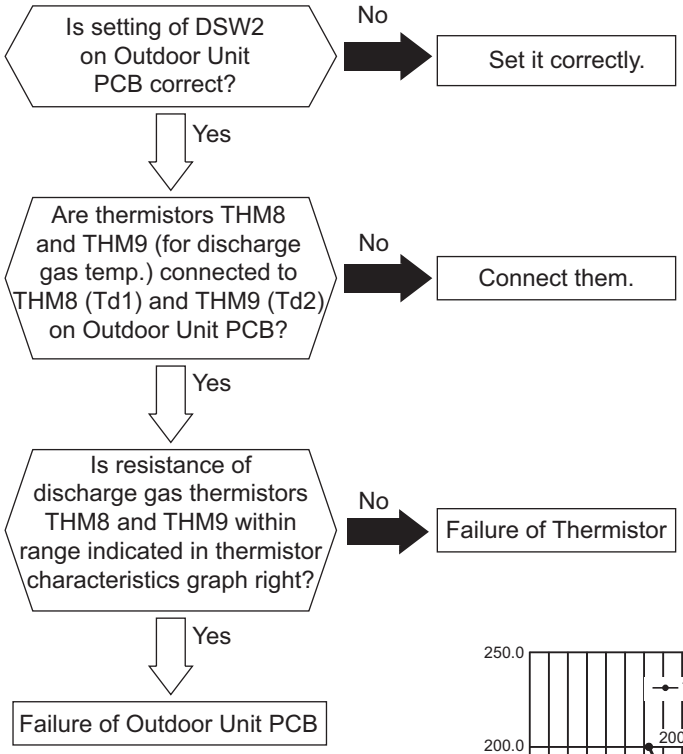


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Thermistor for Outdoor Air Temperature	Failure	Check resistance	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to O.U. PCB	Repair wiring and connection.

Alarm code 23	Abnormality of Thermistor for Discharge Gas Temperature on the Top of Compressor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.9 kΩ or less) or open sensor (5946 kΩ or more) of the thermistor is detected during operation.



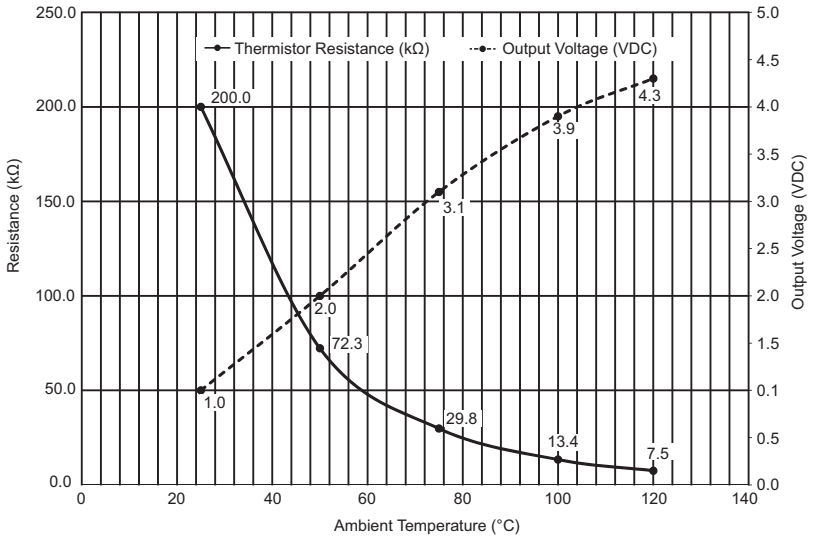
O.U. PCB: Outdoor Unit PCB (PCB3)

Model	Thermistor	
	Td1 (THM8)	Td2 (THM9)
8.0-16RNBCLQ	○	-
18-24RNBCLQ	○	○

In the case of the combination of outdoor units, each outdoor unit detect abnormality.

R25 = 200k°
When T = 25°C, RT = 200k°
B = 3920K

RT = R25 • exp B(1/T[K] - 1-298)



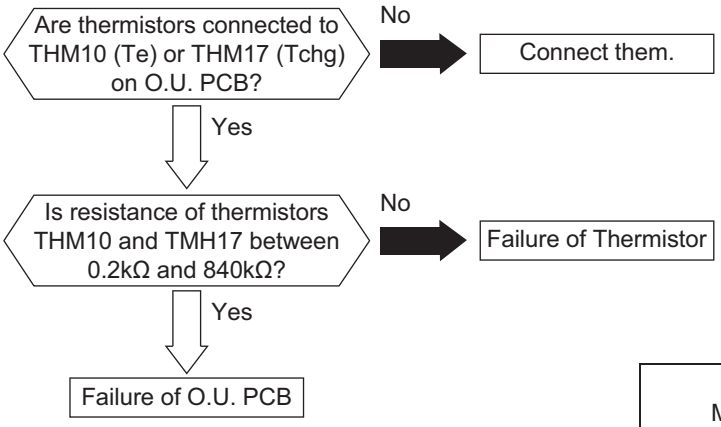
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Discharge Gas Thermistor	Failure	Check resistance	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to Outdoor Unit PCB	Repair wiring and connection.
Faulty Outdoor Unit PCB		Replace Outdoor Unit PCB and check operation	Replace Outdoor Unit PCB if faulty.
Incorrect Setting of DSW2 on Outdoor Unit PCB		Check Setting of DSW2 on Outdoor Unit PCB	Correctly set DSW2 on Outdoor Unit PCB.

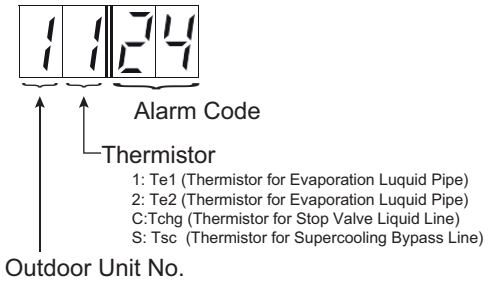
Alarm code	Abnormality of Thermistor for Evaporating Temperature during Heating Operation (Outdoor Unit Evaporating Thermistor)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB. (For the combination of outdoor units, the alarm code is displayed on PCB of outdoor unit A.) Additionally for the outdoor unit number and compressor number with abnormal thermistor, check the alarm code history.

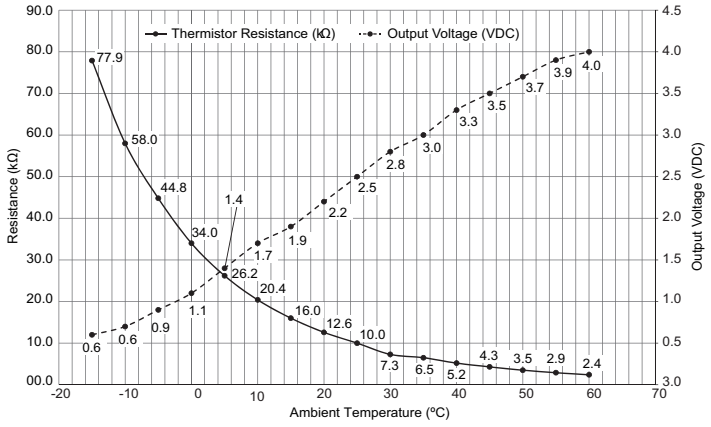
★ This alarm code is displayed when a short circuit (0.2 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during operation.

O.U. PCB: Outdoor Unit PCB (PCB3)





Model	Thermistor			
	Te1 (THM10)	Te2 (THM11)	Tchg (THM17)	Tsc (THM23)
8.0-18RNBCLQ	○	-	○	○
20-24RNBCLQ	○	○	○	○



Note:
This data is applicable to the following thermistors.

1. Ambient Temperature Thermistor (THM7),
2. Evaporation Liquid Line Thermistor (THM10,THM11)
3. Evaporation Gas Line Thermistor (THM12),
4. Stop Valve Liquid Line Thermistor (THM17),
5. Super Cooling Bypass Line Thermistor (THM23)

R_{25} = 200kˇ
When T = 25ºC, RT = 200kˇ
B = 3920K

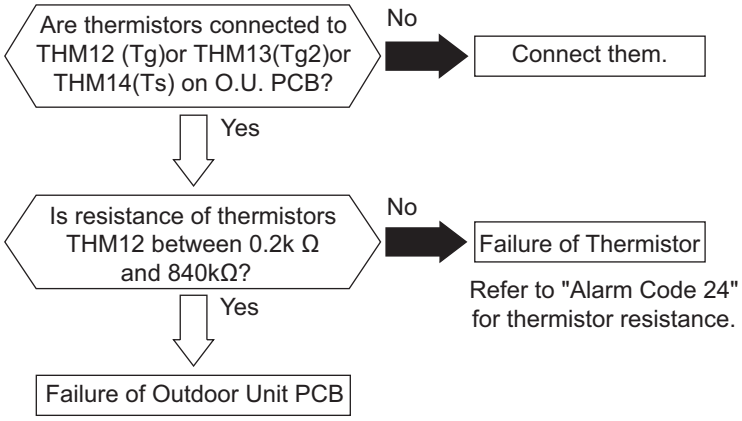
$RT = R_{25} \cdot \exp B(1/T[K] - 1/298)$

Phenomenon	Cause	Check Item	Action (Turn Off Main Switch)
Failure of Thermistor for Evaporating Temperature during Heating	Failure	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to O.U. PCB.	Repair wiring and connection.
Failure of O.U. PCB		Replace O.U. PCB and check operation.	Replace O.U. PCB if faulty.

Alarm code	25	Abnormality of Thermistor for Outdoor Unit Heat Exchanger Gas Pipe (Tg/Tg2/Ts)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.2 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during operation.



Tg:Thermistor for Evaporation Gas Line
Outdoor Unit PCB: Outdoor Unit PCB (PCB3)

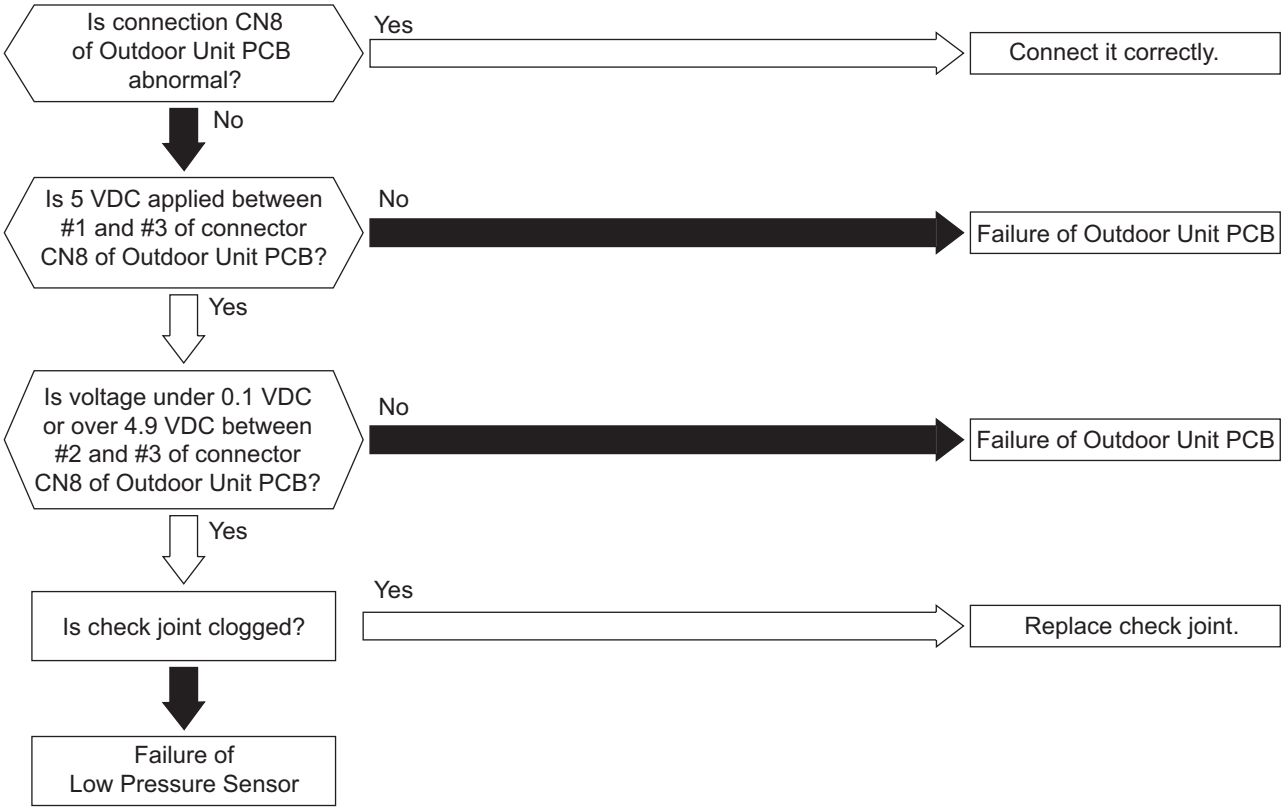
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Outdoor Unit Gas Pipe Thermistor	Failure	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to Outdoor Unit PCB.	Repair wiring and connection.
Failure of Outdoor Unit PCB		Replace Outdoor Unit PCB and check operation.	Replace Outdoor Unit PCB if faulty.

Alarm code 29	Abnormality of Low Pressure Sensor for Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when output voltage of the pressure sensor decreases to 0.1V or less or increases to 4.9V or more during running.

Outdoor Unit PCB: Outdoor Unit PCB (PCB3)



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Low Pressure Sensor	Failure	Check output voltage is correct.	Replace pressure Failure sensor if faulty.
	Incorrect Connection	Check wiring to Outdoor Unit PCB.	Repair wiring and connection.
Faulty Outdoor Unit PCB		Replace Outdoor Unit PCB and check operation.	Replace Outdoor Unit PCB if faulty.
Indicated Value of Pressure Value is Excessively High or Low	Malfunction of Pressure Sensor due to Faulty Check Joint	Check for clogging of check joint.	Replace check joint.

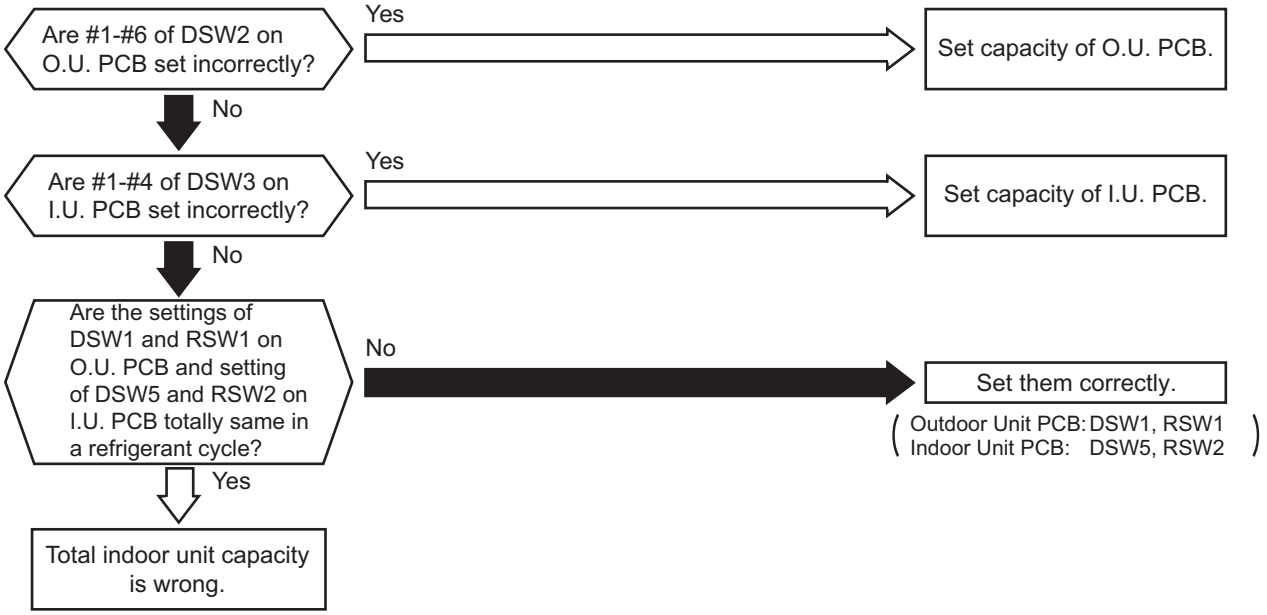
Alarm code 31	Incorrect Capacity Setting of Indoor Unit and Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the capacity setting DIP switch, DSW2 on the outdoor unit PCB, is not set (all the settings from #1 to #6 are OFF) or set incorrectly.

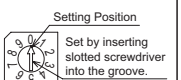
★ This alarm code is displayed when the total indoor unit capacity is less than 50% or more than A% of the combined outdoor unit capacity.

O.U. PCB: Outdoor Unit PCB (PCB3)
I.U. PCB: Indoor Unit PCB



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Incorrect Capacity Setting of Indoor Unit		Check combination of indoor units and capacity setting of I.U. PCB.	Correctly set dip switch, DSW3.
Incorrect Capacity Setting of Outdoor Unit		Check capacity setting of O.U. PCB.	Correctly set dip switch, DSW2.
Total Indoor Unit Capacity Connected to Outdoor Unit is Beyond Permissible Range		Check outdoor unit model by calculating total indoor units capacity.	Ensure that total indoor unit capacity is from 50% to A%.
Refrigeration Cycle Setting of Outdoor Unit and Indoor Unit is Different		Check refrigeration cycle setting of O.U. PCB and I.U. PCB.	Set them correctly.

Refrigerant Cycle No. Setting

	Setting Switch	
	10 digit	1 digit
		
Outdoor Unit	DSW1	RSW1
Indoor Unit (H-LINK II)	DSW5	RSW2

Example of setting Refrigerant Cycle No.25



Turn ON No. 2 pin. Set Dial No.5.

DSW and RSW setting before shipment is 0.
Maximum in setting refrigerant cycle No. is 63.

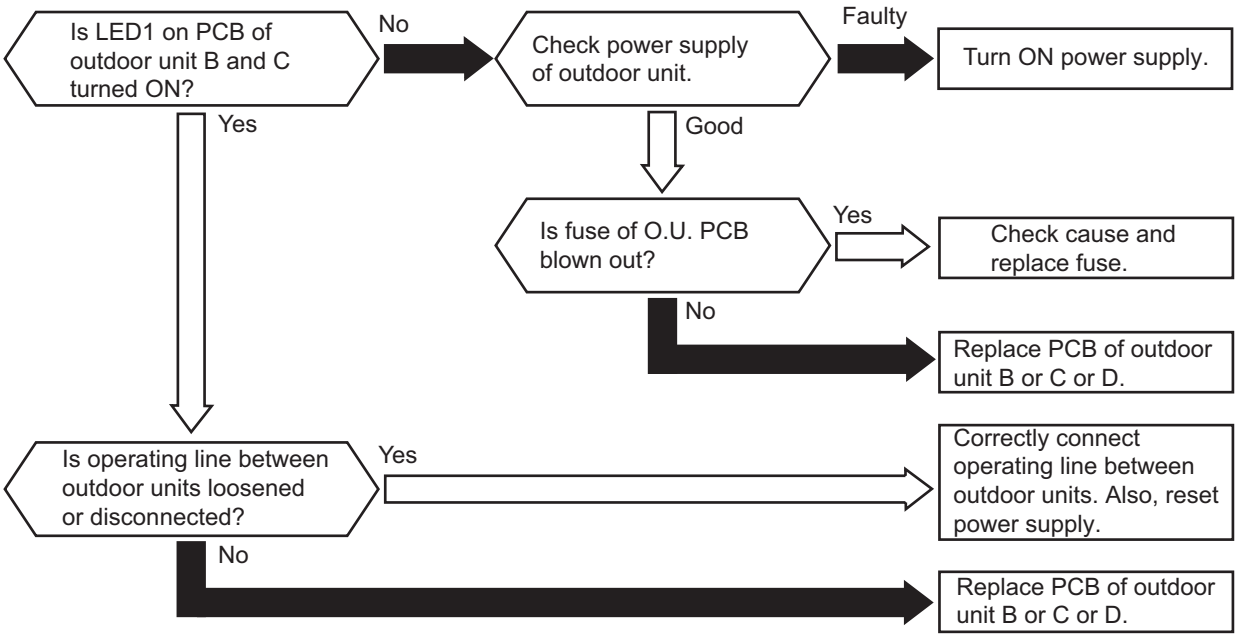
For other items, refer to Service Manual of Indoor Unit.

Alarm code 31	Abnormal Transmitting between Outdoor Units

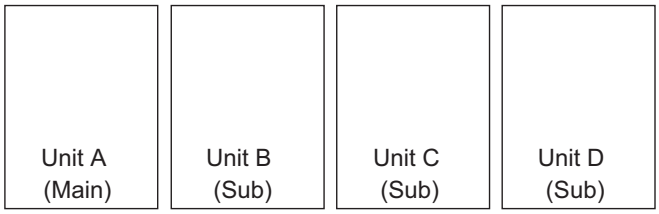
- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when an abnormal condition continues for 30 seconds after normal transmission between outdoor units, also if the abnormal condition continues for 30 seconds even after the micro-computer is automatically reset.

O.U. PCB: Outdoor Unit PCB (PCB3)



Arrangement of Outdoor Units
(Four Unit Combination)



Alarm code 35	Incorrect Indoor Unit No. Setting

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed after 5 minutes power-on of the outdoor unit No. set by RSW6 and RSW2 duplicates in the same refrigerant group.

NOTE:

In case of H-LINK system, this alarm code is displayed when DSW1 and RSW1 of the outdoor unit PCB and DSW5 and RSW1 of the indoor unit PCB are incorrectly set.

In this case, set them correctly after turning OFF the main switch, and again turn ON the main switch. When the refrigerant No. setting of outdoor unit (H-LINK II) and that of outdoor unit (H-LINK) are duplicated, the alarm “35” may go ON and OFF repeatedly.

Alarm code 36	Incorrect Indoor Unit Combination

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

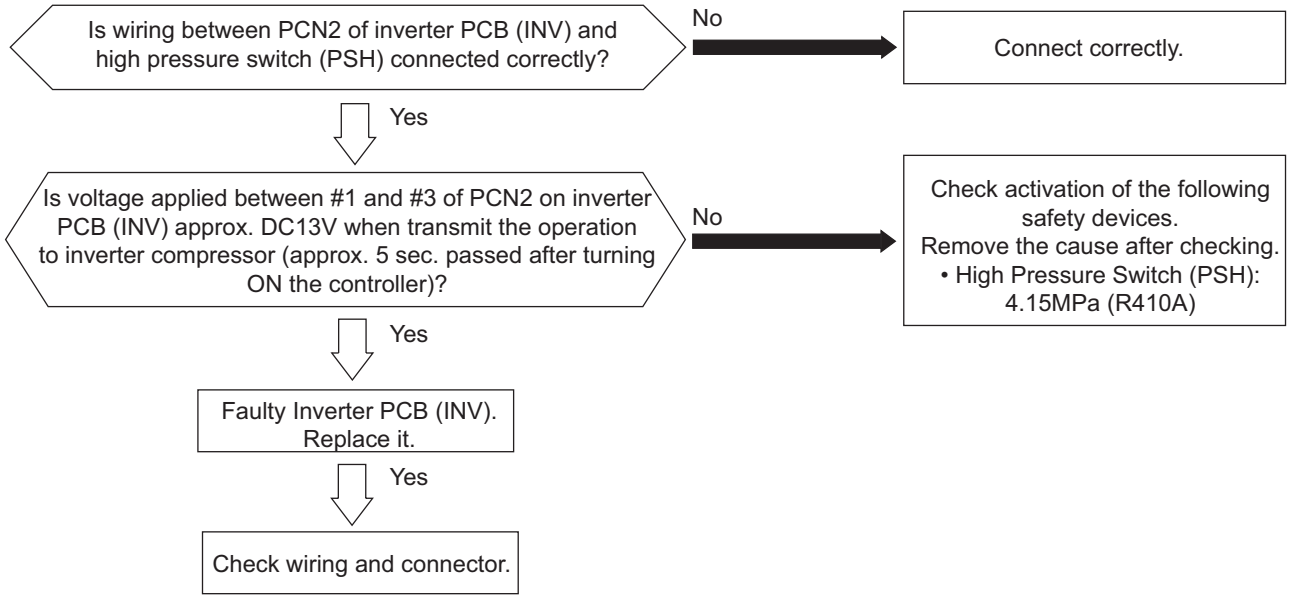
Alarm code	38	Abnormality of Picking up Circuit for Protection in Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

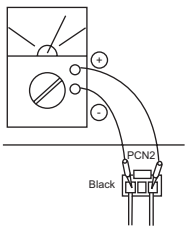
★ This alarm code is displayed when DC13V is applied to the main circuit PCB(s) connector at the time inverter compressor operation command is transmitted to O. U. PCB3 (approximately 5 sec passed after turning ON RUN/STOP switch). For trouble shooting, make sure to connect each wiring to PCN2, CN5, CN5-1 and CN5-2 before use tester. If PCN2 wiring is not connected correctly when using the tester, DC13V is continuously detected and end in checking failure.

<380-415V/50Hz/60Hz>

O.U. PCB: Outdoor Unit PCB (PCB3)



PCB	Inverter PCB (INV)
Connector	PCN2
Pin No.	#1, #3



NOTE:

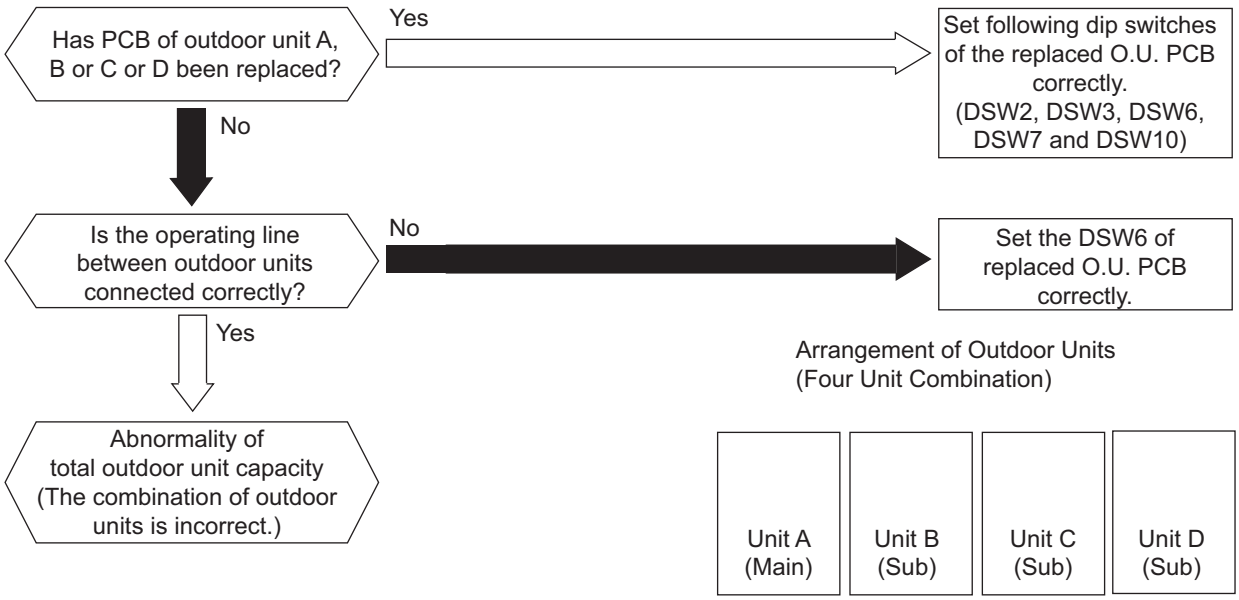
1. For the maintenance or replacement of inverter PCB, perform the high voltage discharge work according to the item 3.2.1.
2. If the high pressure switch (PSH) failure (open phase or disconnecting wiring), this alarm code may occur. Check alarm code 02 trouble shooting too.

Alarm code 3A	Abnormality of Outdoor Unit Capacity

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the total capacity of outdoor unit connected to the transmission terminal between outdoor units exceeds 96HP for standard outdoor unit;

O.U. PCB: Outdoor Unit PCB (PCB3)

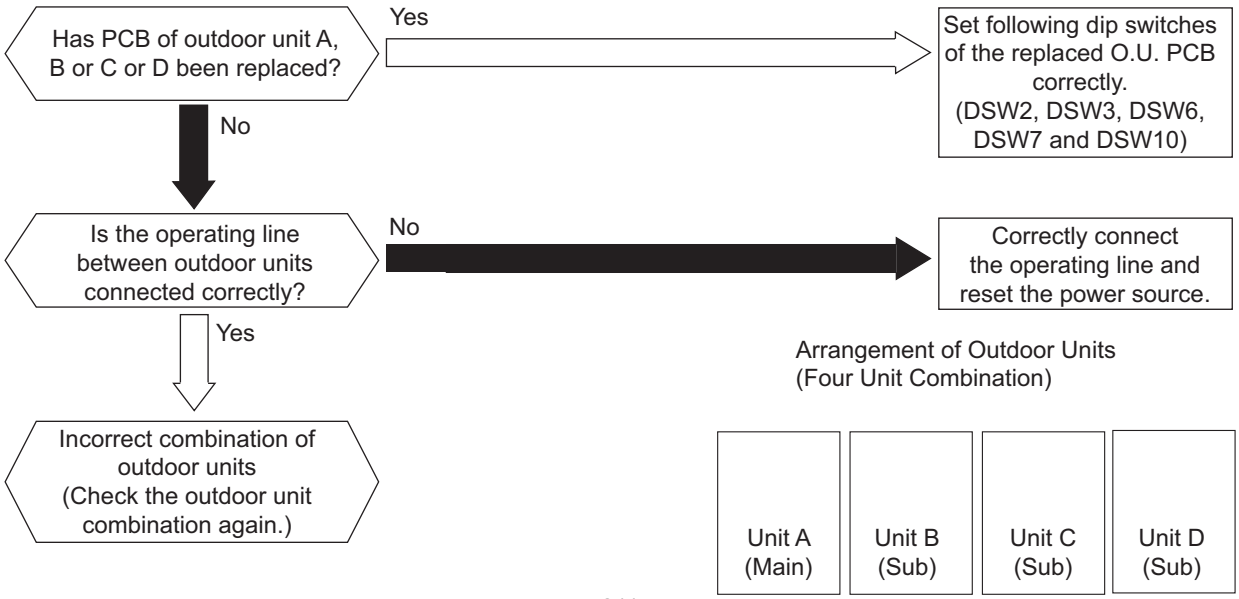


Alarm code 3b	Incorrect Setting of Outdoor Unit Model Combination or Voltage

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when the model setting for outdoor unit connected to the transmission terminal between outdoor units is incorrect.

O.U. PCB: Outdoor Unit PCB (PCB3)

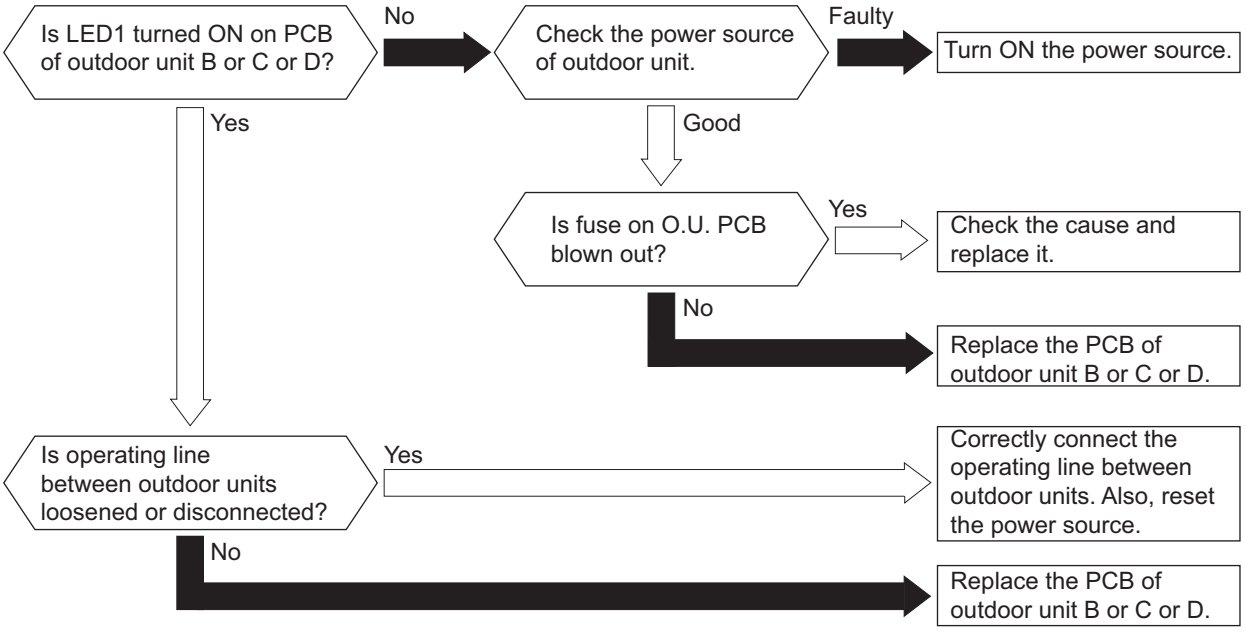


Alarm code	Transmission Failure between Main Unit and Sub Unit(s)

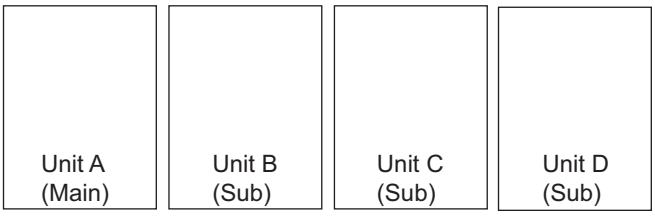
- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ For the combination of outdoor units, this alarm code is displayed when transmission to outdoor unit B, or C is NOT provided for 30 seconds.

(Alarm code “31” will be displayed when transmission to all the outdoor units connected to the transmission terminals between outdoor units is NOT provided.)



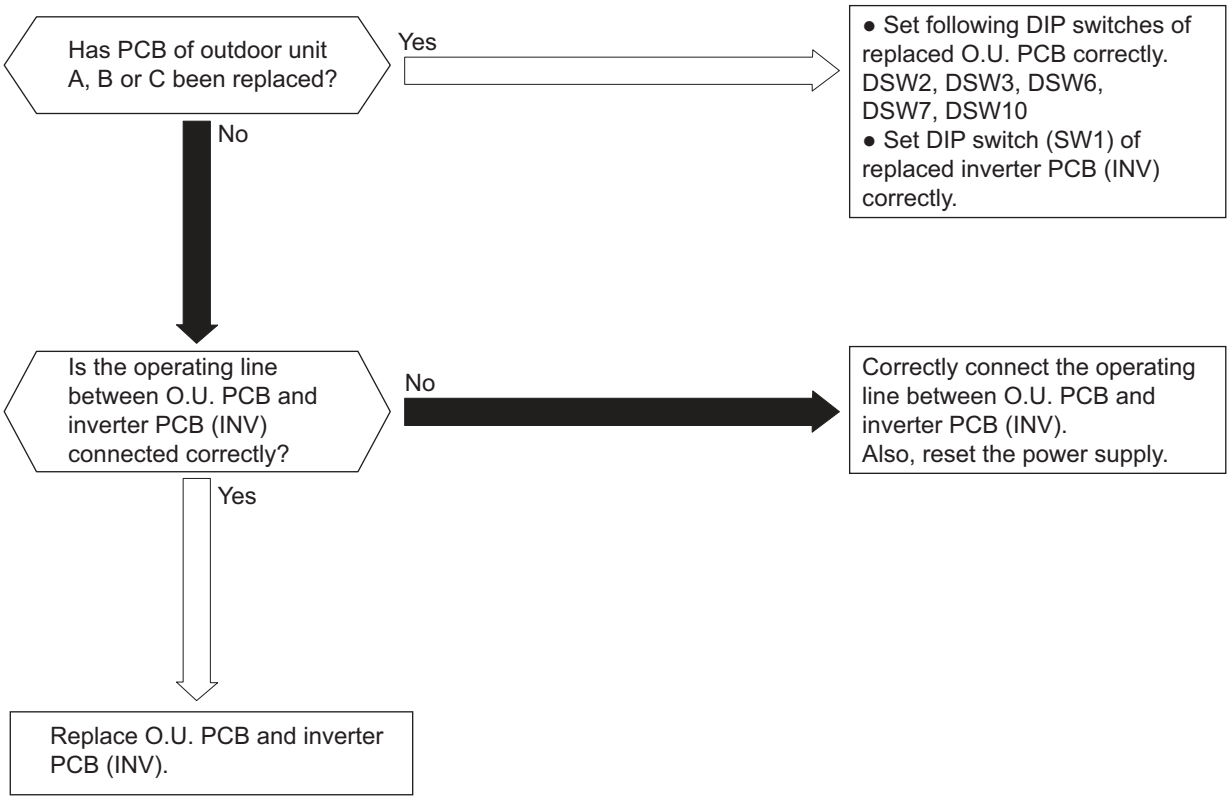
Arrangement of Outdoor Units
(Four Unit Combination)



Alarm code 3E	Abnormality of Inverter PCBs Combination of Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when an incorrect model code setting of the outdoor unit is connected to the terminals between the outdoor units' communication terminal (TB2 No. 3 and 4 terminals on the PCB3 for the outdoor unit combination).

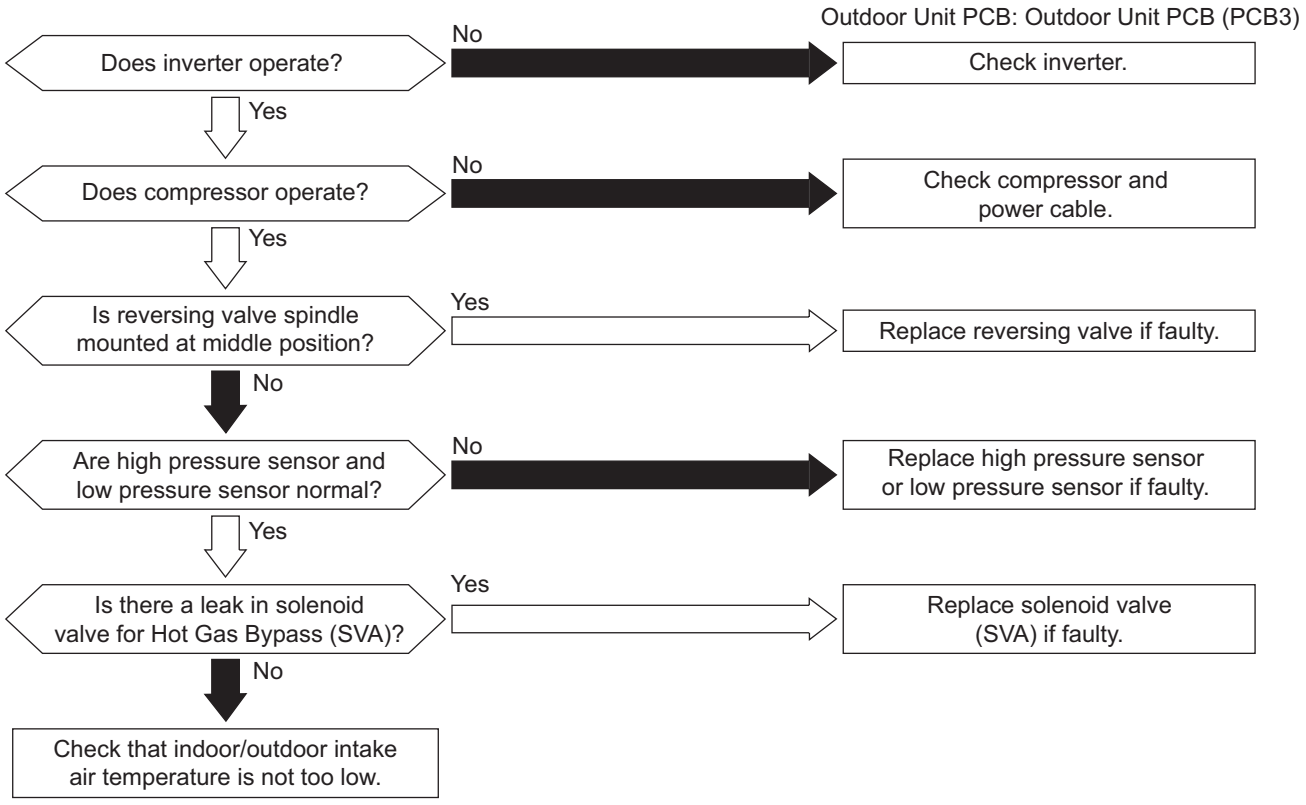


Alarm code 43	Activation of Low Compression Ratio Protection Device

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ The alarm code 43 is displayed when the following condition occurs more than twice in an 30 minutes. If the following condition is continued for one minute, all the compressors may be stopped and the unit automatically retried after 3 minutes.

Compression ratio ε = {(Pd + 0.1) / (Ps + 0.06)}, calculated from a discharge pressure (Pd MPa) and suction pressure (Ps MPa) is lower than 1.5.



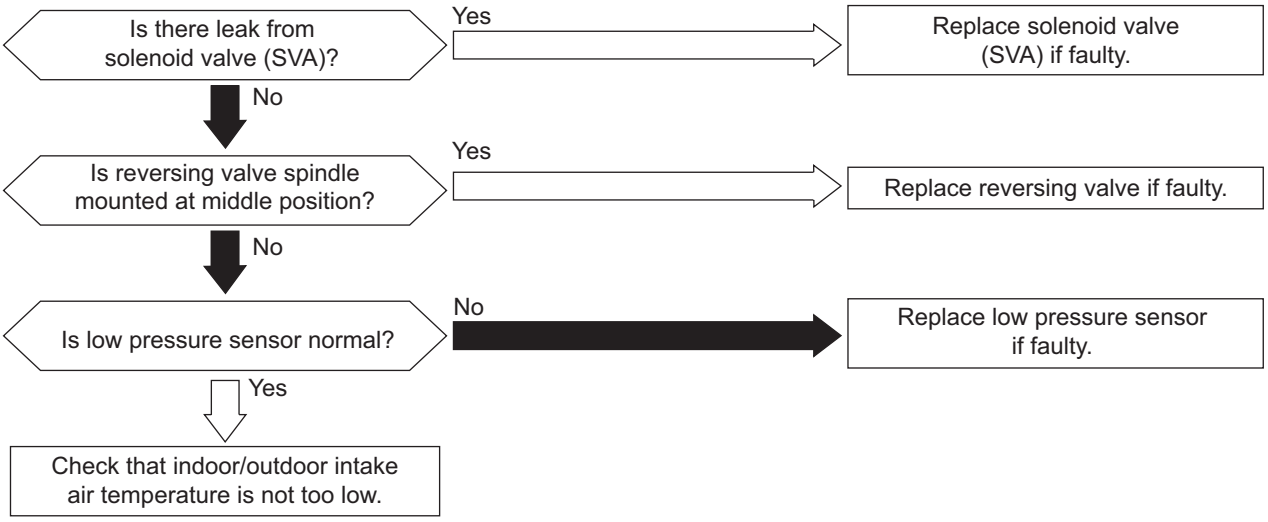
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Compression Ratio	Inverter is not functioning.	Check inverter.	Relace inverter PCB if faulty.
	Compressor is not Operating.	Check compressor.	Replace compressor if faulty
	Valve Stoppage at Middle Position of Reversing Valve	Measure suction pipe temperature of reversing valve	Replace reversing valve if faulty.
	Abnormality of High or Low Pressure Sensor	Check connector for Outdoor Unit PCB, power source and pressure indication.	Replace sensor if faulty.
	Excessively Low Indoor Intake Air Temperature	Check indoor unit and outdoor unit air temp. thermistor.	Replace thermistor if faulty.
	Leakage from Solenoid Valve (SVA)	Check Solenoid Valve.	Replace SVA if there is leakage.

Alarm code 44	Activation of Low Pressure Increase Protection Device

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ IF the suction pressure (Ps) of the compressor is more than P1* for 1 minute, all the compressors stop and then the operation is automatically retried after 3 minutes. If this occurs again twice in the next 30 minutes, this alarm code is displayed.

O.U. PCB: Outdoor Unit PCB (PCB3)



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Suction Pressure	Leakage from Solenoid Valve (SVA)	Check outlet pipe temp. of solenoid valve (SVA).	Check connecting wires. Replace solenoid valve (SVA) if faulty.
	Valve Stoppage at Middle Position of Reversing Valve	Measure suction gas pipe temp. of reversing valve	Replace reversing valve if faulty.
	Abnormal Low Pressure Sensor	Check connectors of O.U. PCB and power source.	Replace sensor if faulty.
	Excessively High Indoor Unit and Outdoor Unit Suction Air Temperature	Check indoor unit and outdoor unit suction air temp. thermistor.	Replace thermistor if faulty.

* P1

Tamin>44°C, 1.80Mpa

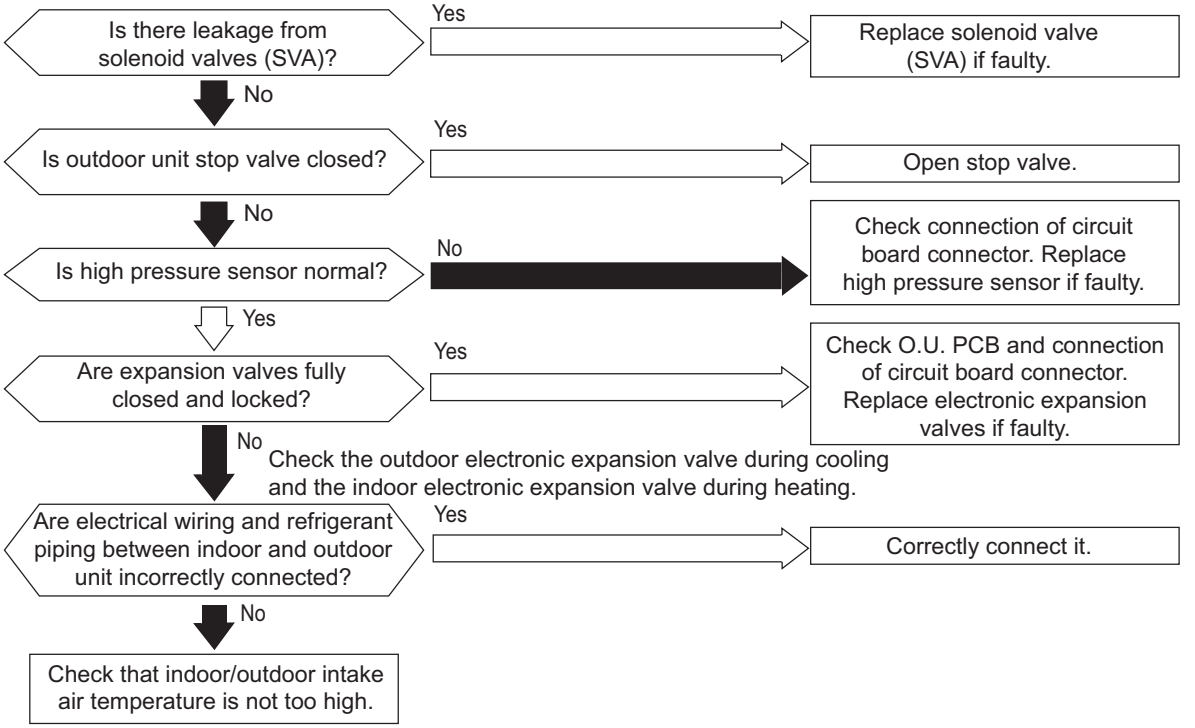
Except stated as above: 1.40Mpa.

Alarm code 45	Activation of High Pressure Increase Protection Device

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ If the discharge pressure (Pd) of the compressor is more than 3.8MPa for 2 seconds, all the compressors stop and then the operation is automatically retried after 3 minutes. If this occurs again twice in the next 30 minutes, this alarm code is displayed.

O.U. PCB: Outdoor Unit PCB (PCB3)
I.U. PCB: Indoor Unit PCB



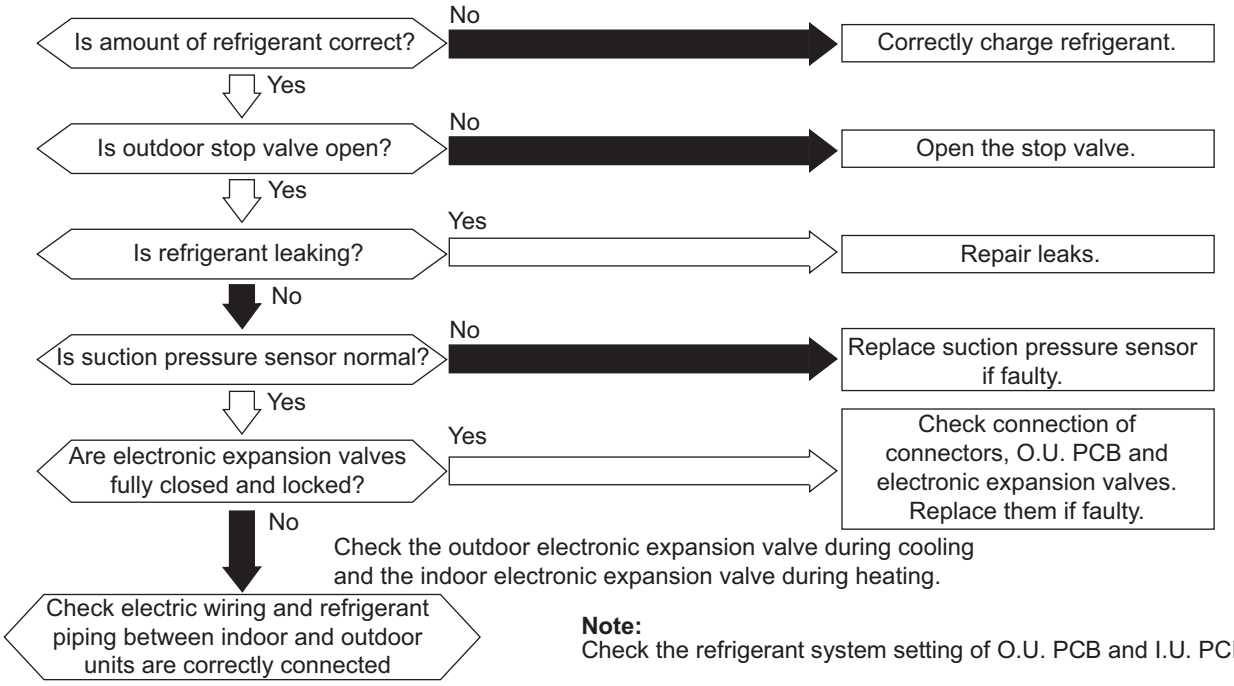
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively High Discharge Pressure	Leakage from Solenoid Valve (SVA)	Check outlet temp. of solenoid valve (SVA).	Check connection. Replace solenoid valve (SVA) if faulty.
	Closed Stop Valve	Check stop valve.	Open stop valve.
	Abnormal High Pressure Sensor	Check connectors for O.U. PCB.	Replace pressure sensor if faulty.
	Excessively High Indoor Unit and Outdoor Unit Inlet Air Temp.	Check thermistor for indoor unit and outdoor unit inlet air temp.	Replace thermistor if faulty.
	Incorrect Connection between Indoor Unit and Outdoor Unit	Check electrical system and ref. cycle.	Correctly connect them.
	Locked Expansion Valve (Fully Closed)	Check connector for O.U. PCB.	Repair connector for O.U. PCB or expansion valve. Replace it if faulty.
Stoppage of Indoor Fan <Wall Type 1.0 to 3.0HP Only>	Melted Fuses	Check continuity of fuses	Replace fuses.
	Faulty I.U. PCB	Replace I.U. PCB and check operation.	Replace I.U. PCB if faulty

Alarm code 47	Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

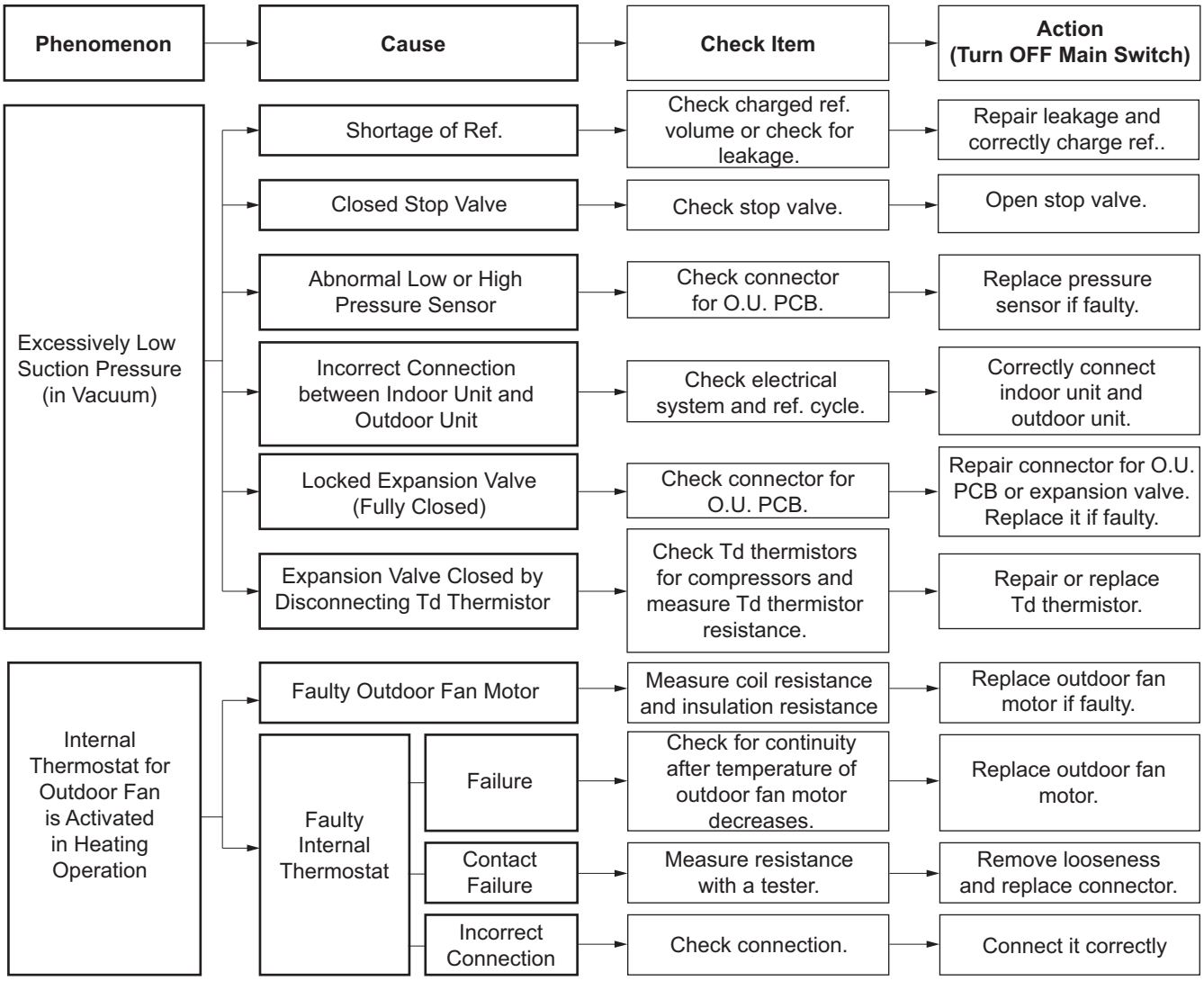
★ If the suction pressure (Ps) of the compressor is less than 0.09MPa for 12 minutes, the compressor stops. If this occurs again twice in the next 60 minutes, this alarm code is displayed.

O.U. PCB: Outdoor Unit PCB (PCB3)
I.U. PCB: Indoor Unit PCB



Note:
Check the refrigerant system setting of O.U. PCB and I.U. PCB.

TROUBLESHOOTING



Alarm code 48	Activation of Inverter Overcurrent Protection Device

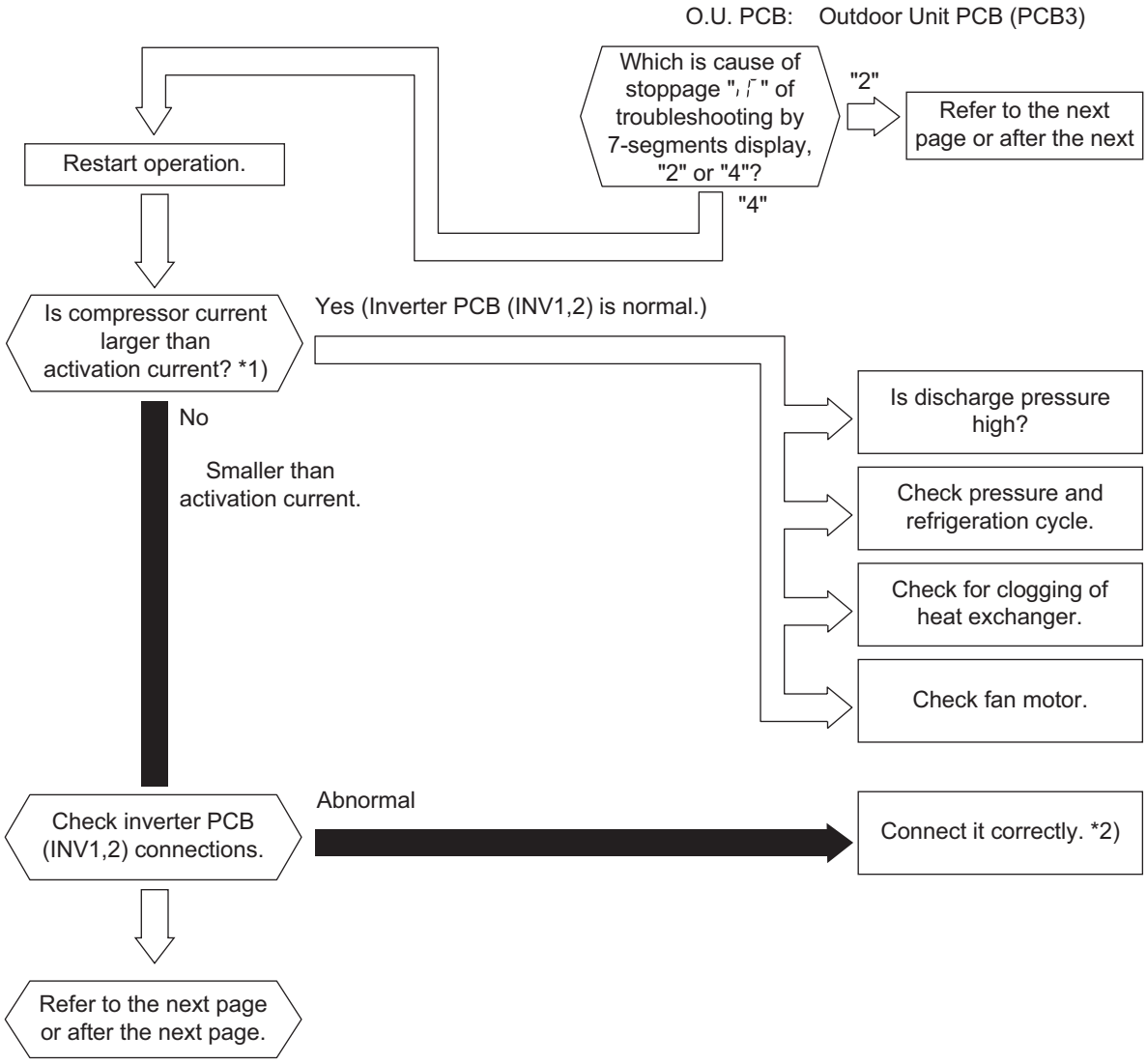
- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when inverter electronic thermal protection is activated 6 times within 30 minutes. If this occurs less than 6 times in 30 minutes, the operation is automatically retried.

Conditions of Activation:

(1) Inverter current with 105% of the rated current runs for 30 seconds continuously.

(2) Inverter current runs intermittently and the accumulated time reaches up to 3 minutes, in 10 minutes.



*1): Regarding the setting value of activation current, refer to the item 3.2.1.

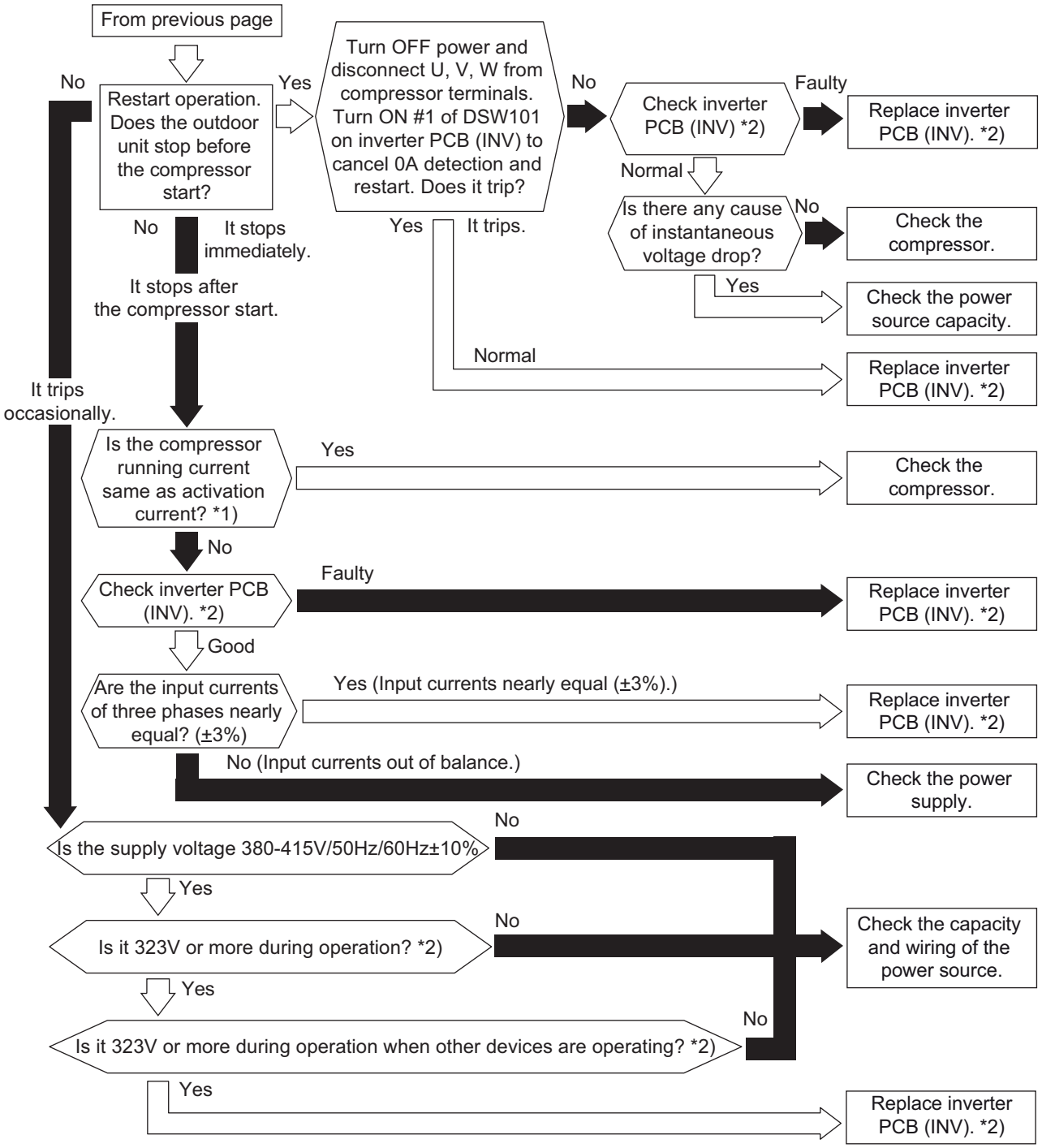
*2): Regarding replacing or checking method for inverter parts, refer to the item 3.2.1.

Inverter Stoppage Code

iTC	Cause of Inverter Stoppage
2	Instantaneous Overcurrent
4	Inverter Overcurrent

TROUBLESHOOTING

<380-415V/50Hz/60Hz>



*1): Regarding the setting value of activation current, refer to the item 3.2.1.

*2): For the maintenance and replacement of inverter PCB, perform the high voltage discharge work according to the item 3.2.1.

Alarm code 51	Abnormality of Current Sensor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

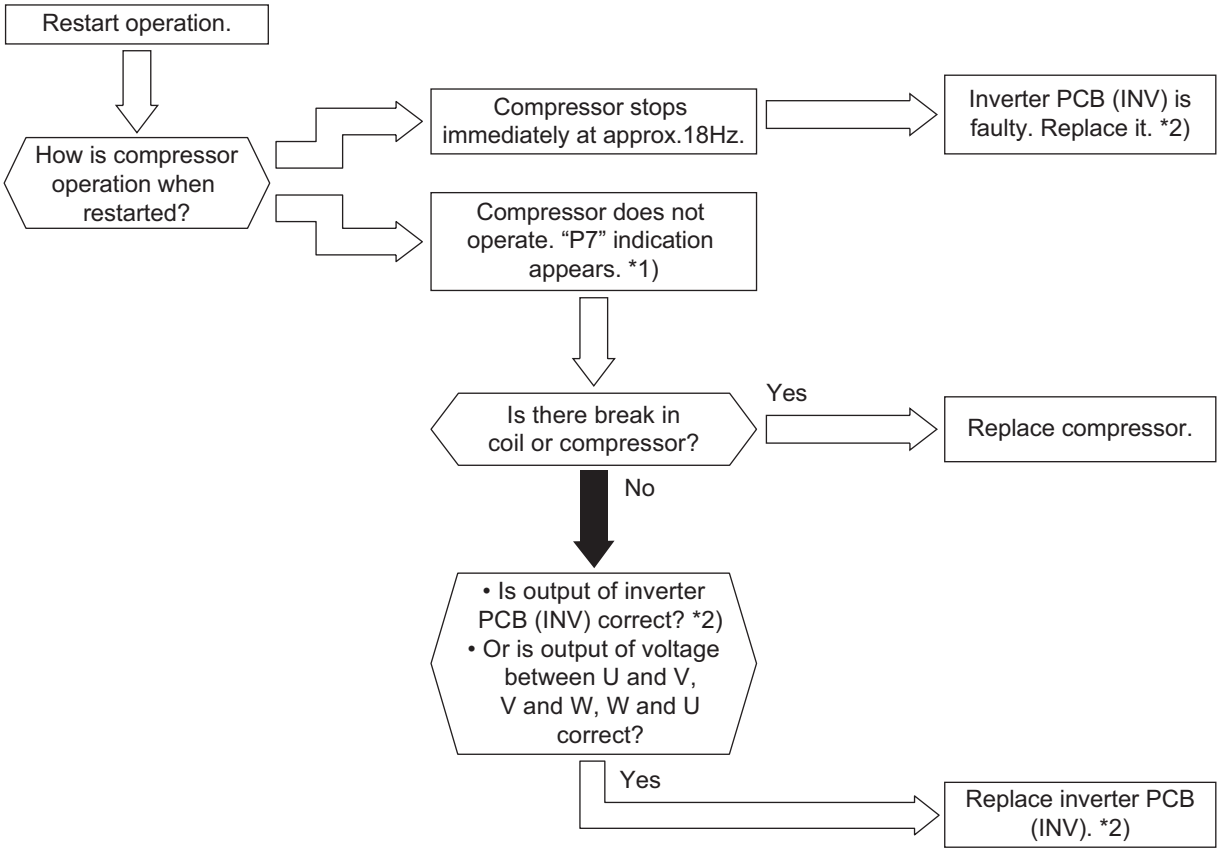
★ In case that the abnormality of current transformer (0A detecting) occurs 3 times within 30 minutes, this alarm code is displayed. If this occurs less than 3 times in 30 minutes, the operation is automatically retried.

Conditions of Activation:

This alarm code is displayed when the following conditions occur.

(1) Before the fan motor operation is started, the fan controller current beyond +60% of the rated current.

(2) After phase positioning is completed, the running current for the phase positioning is lower than criterion value.



*1): "P7" appears on 7-segment on the outdoor unit PCB.

*2): For the maintenance and replacement of inverter PCB, perform the high voltage discharge work according to the item 3.2.1.

Inverter Stoppage Code

iTC	Cause of Inverter Stoppage
1	Activation of Transistor Module Protection
8	Abnormal Current Sensor
12	Ground Fault Detection
21	Out-of-Synchronism Detection

Alarm code 53	Inverter Error Signal Detection

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ The inverter PCB has the abnormality detection function (Inverter Current Sensor). This alarm is displayed when any of the following conditions is met 7 times in 30 minutes. If this occurs less than 7 times in 30 minutes, the operation is automatically retried.

Conditions of Activation:

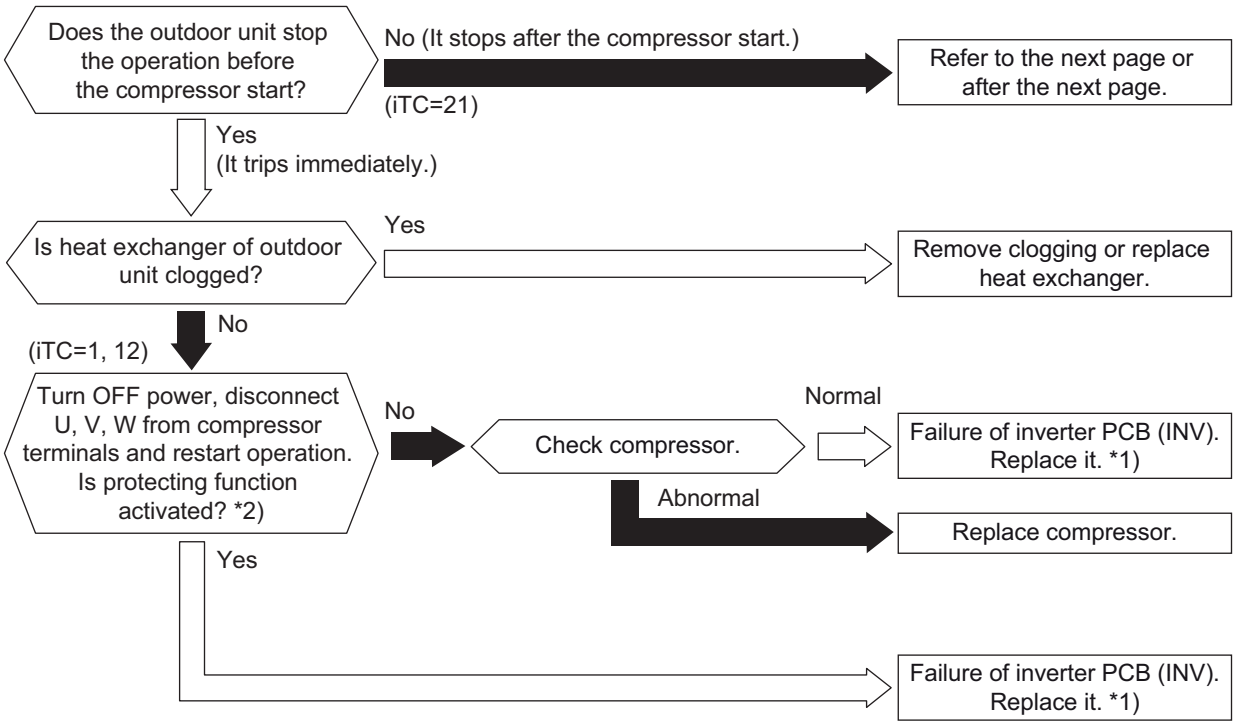
This alarm code is displayed when the following conditions occur.

(1) An abnormal current is applied to the inverter current sensor due to a short circuit, a ground fault or overcurrent.

(2) The temperature at the inverter current sensor increases abnormally.

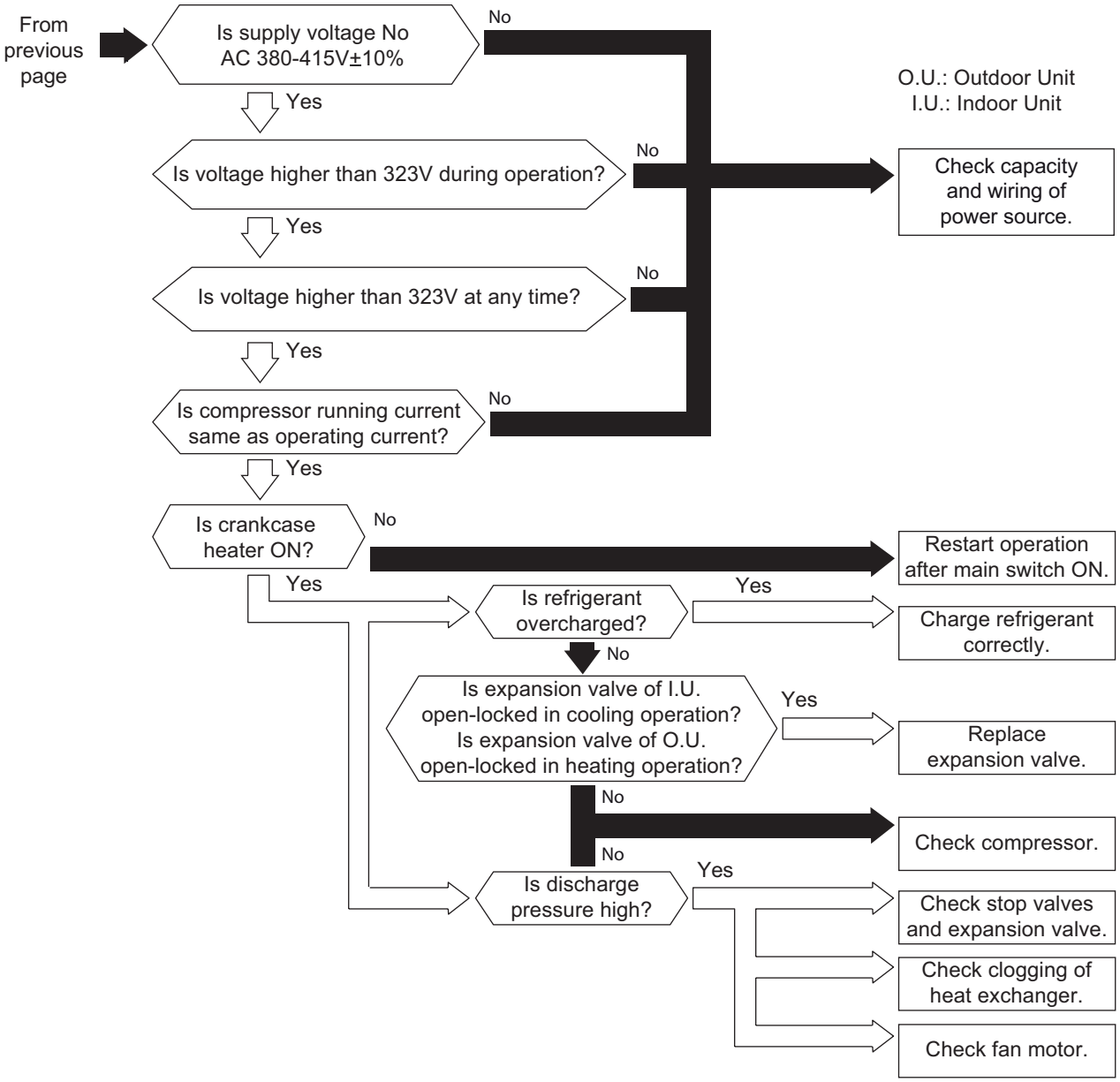
(3) The control voltage decreases.

(4) The angle difference between the shaft in compressor and the shaft in the control program exceeds 60°.



Reference to footnote of 1 and 2, here are on next page.

Inverter Stoppage Code	
iTC	**Cause of Inverter Stoppage**
1	Activation of Transistor Module Protection
12	Ground Fault Detection
21	Out-of-Synchronism Detection



These references are for previous page:

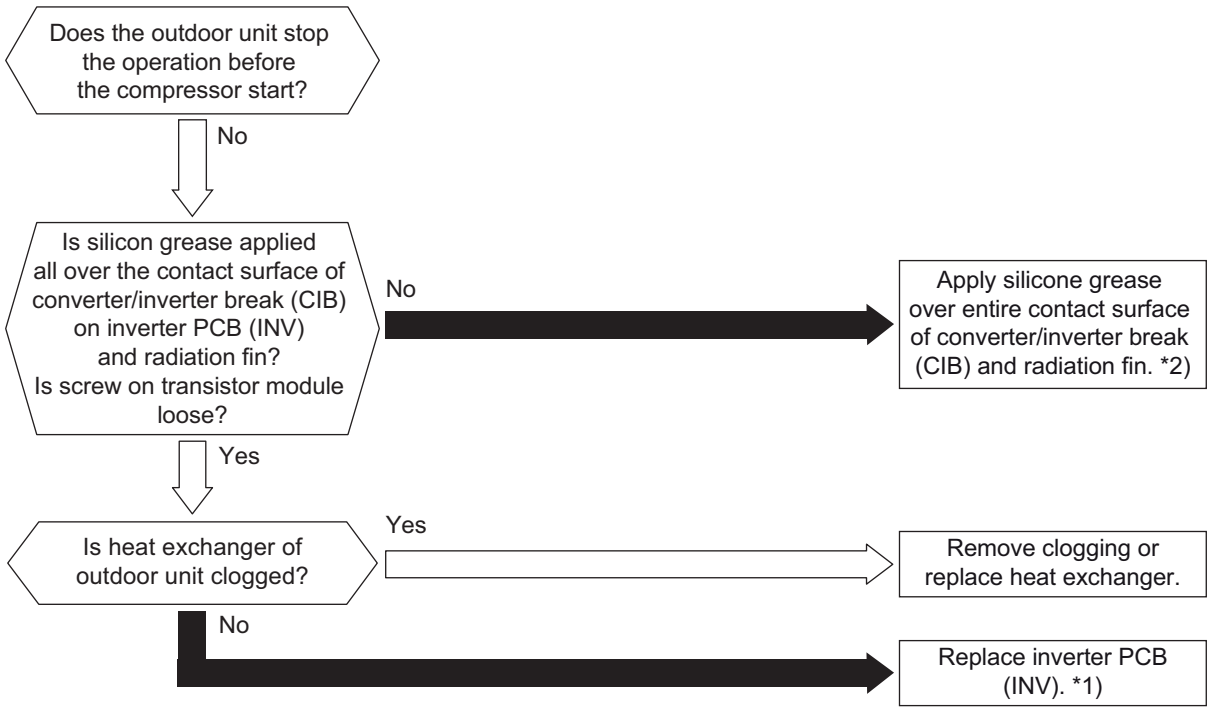
*1): For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to Section 3.2.1

*2): Turn ON the No.1 switch of SW1 on the inverter PCB (INV) when restarting the operation with the terminals of the compressor disconnected. After troubleshooting, turn OFF the No.1 switch of SW1 on inverter PCB (INV).

Alarm code 54	Abnormality of Inverter Fin Temperature

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ If the temperature of the radiation is reached 110°C, 3 times in 30 minutes this alarm code is displayed. The temperature to activate the alarm is depend on the outdoor unit model.



*1): For the maintenance and replacement of inverter PCB (INV), perform the high voltage discharge work according to the item 3.2.1.

*2): Use the silicon grease provided as an accessory.

Inverter Stoppage Code

iTC	Cause of Inverter Stoppage
3	Abnormal Inverter Fin Temperature

Alarm code	55	Inverter Failure

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ An abnormality is detected when the actual frequency from the inverter PCB is less than 10Hz after the inverter frequency is output from the outdoor unit PCB to the inverter PCB. This alarm code is displayed when this occurs 3 times in 30 minutes. If it occurs less than 3 times in 30 minutes, the operation is automatically retried.

Conditions of Activation: Inverter PCB does not operate normally.



Inverter Stoppage Code

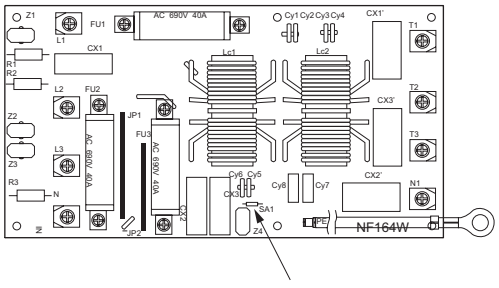
iTC	Cause of Inverter Stoppage
17	Abnormal Control

*1): When an excessive surge current is applied to the unit due to lighting or other causes, this alarm code “55” or the inverter stoppage code (iTC) “11” will be indicated and the unit cannot be operated. In this case, check the surge absorber/surge arrester (SA) on the noise filter (NF1, NF2). The surge absorber may be damaged if the inner surface of the surge absorber is black. In that case, replace the surge absorber.

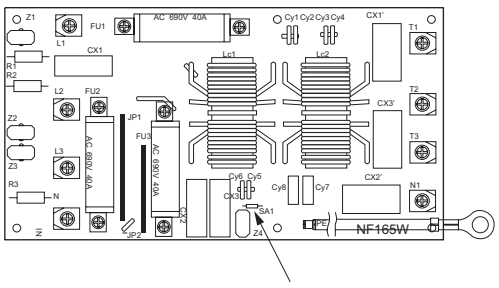
If the inside of the surge absorber is normal, turn OFF the power once and wait for LED401 (red) on the inverter PCB (INV) (400V, 380-415V, 380V) OFF (approximately five minutes) and turn it ON again.

< Position of Surge Absorber >

NF164W



NF165W



Alarm code	57	Activation of Fan Controller Protection

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

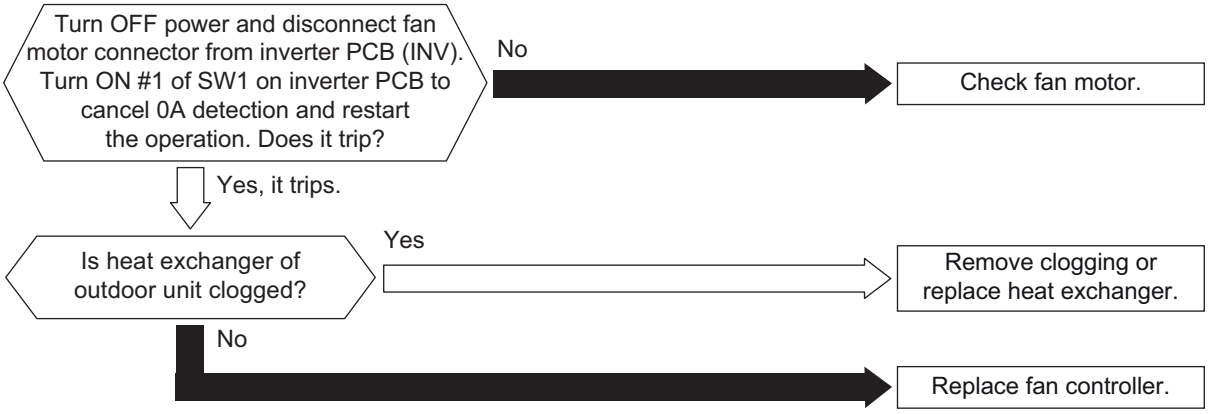
★ Inverter PCB has abnormality-detecting function.

This alarm code is displayed when the abnormality is detected 10 times within 30 minutes. If this occurs less than 10 times in 30 minutes, the operation is automatically retried.

Conditions of Activation:

(1) The conditions creating abnormal current flow such as a short-circuit current, a ground-fault current or the overcurrent occurring at the transistor module.

(2) The control voltage decreases.



Inverter Stoppage Code

iTC	Cause of Inverter Stoppage
1	Drive IC Error Signal Detection
12	Grand Fault Detecting

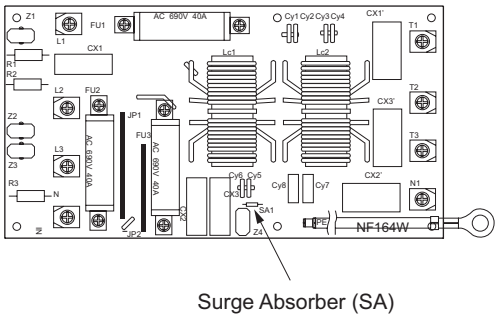
NOTE:

When an excessive surge current is applied to the unit due to lightning or other causes, this alarm code “57” or the inverter stoppage code (iTC) “11” will be indicated and the unit cannot be operated. In this case, check to ensure the surge absorber/surge arrester (SA) on the noise filter (NF1, NF2). The surge absorber may be damaged if the inner surface of the surge absorber is black. In that case, replace the surge absorber.

If the inside of the surge absorber is normal, turn OFF the power once and wait for LED401 (red) on the inverter PCB (INV) OFF (approximately five minutes) and turn it ON again.

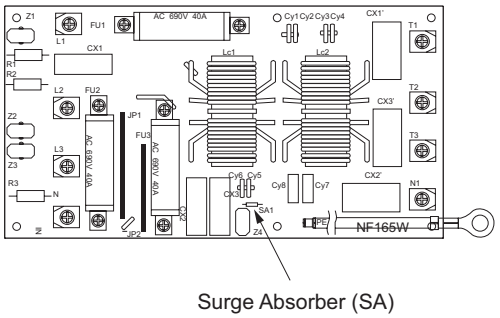
< Position of Surge Absorber >

NF164W



Surge Absorber (SA)

NF165W



Surge Absorber (SA)

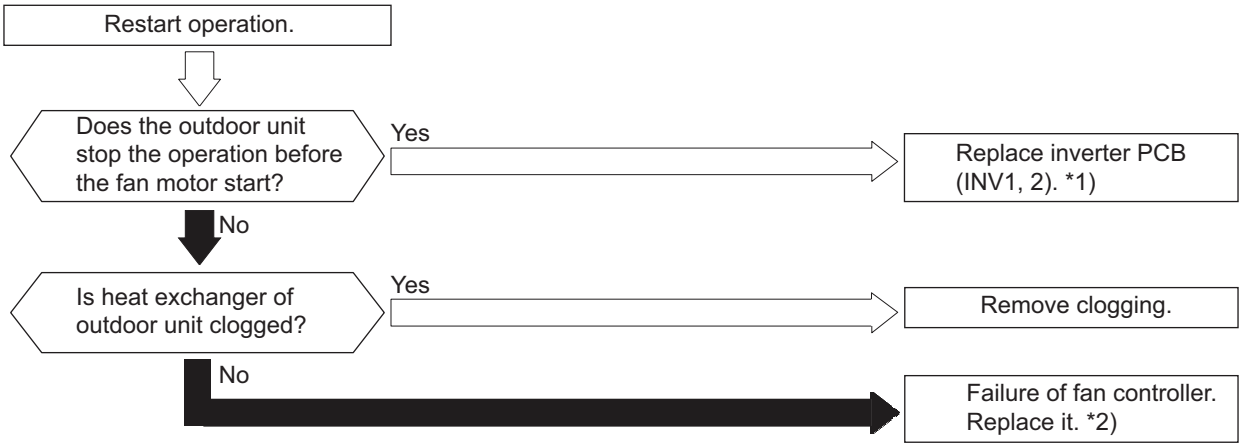
NOTE:

For the maintenance and replacing of the fan controller, perform the high voltage discharge work according to the item 3.2.1.

Alarm code	5A	Abnormality of Fan Controller Fin Temperature

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB. Check the fan controller stoppage code (FTC) when this alarm code is displayed.

★ If the temperature of thermistor inside the CIB exceeds 110°C or IPM exceeds 100°C 10 times in 30 minutes, the operation stops and this alarm code is displayed. If this occurs less than 10 times in 30 minutes, the operation is automatically retried.



Fan Controller Stoppage Code

ftc	Cause of Inverter Stoppage
3	Fin Temperature Increase

*1): For the maintenance and replacement of the inverter PCB (PV164), perform the high voltage discharge work according to item 3.2.1.

*2): For the maintenance and replacement of the fan controller, perform the high voltage discharge work according to item 3.2.1.

Alarm code 56	Activation of Fan Controller Overcurrent Protection Device

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB. *) Check the fan controller stoppage code (FTC) when this alarm code is displayed.

  *): the outdoor unit number of abnormal inverter PCB and abnormal inverter PCB number are displayed.

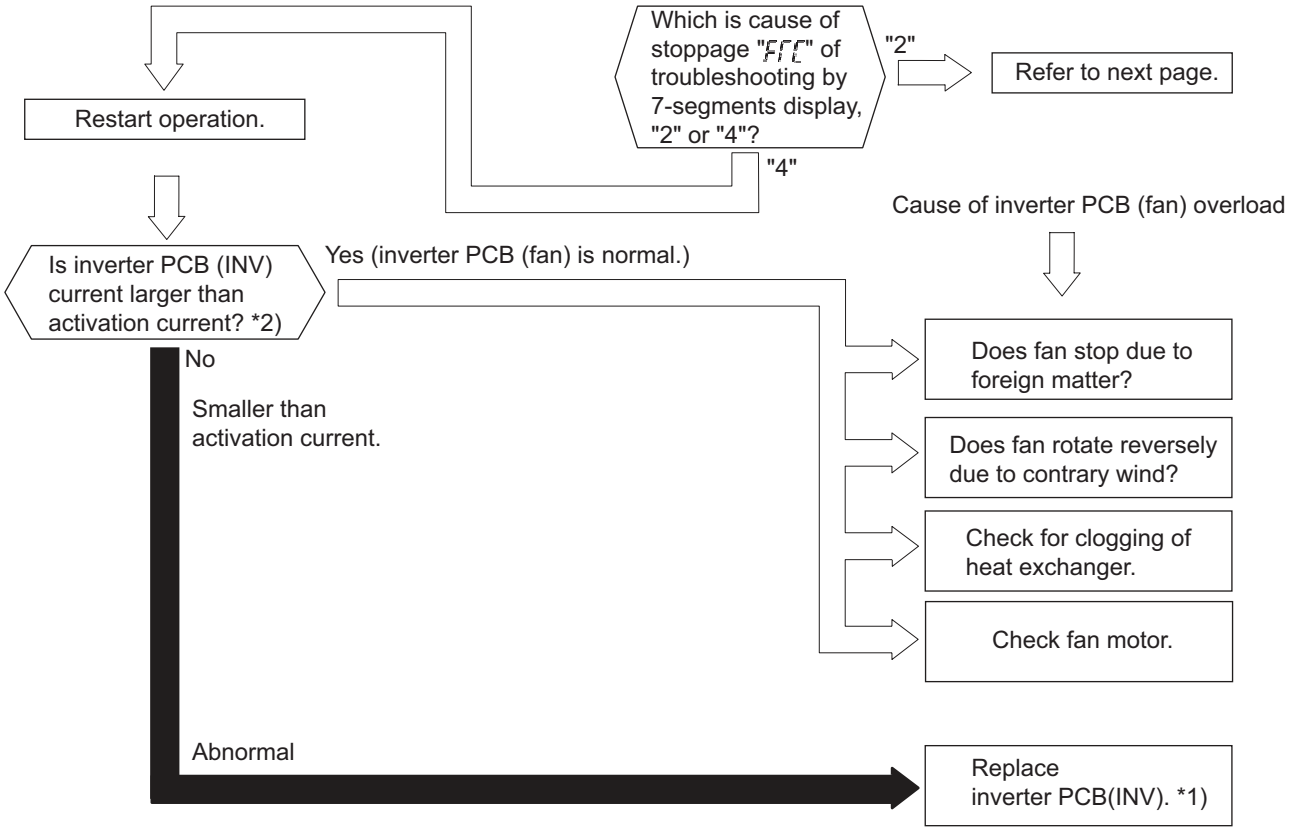
Check the fan controller stoppage code when this alarm code is displayed.

★ This alarm code is displayed when the fan controller electronic thermal protection is activated 10 times within 30 minutes. If this occurs less than 10 times in 30 minutes, the operation automatically restarts.

Conditions of Activation:

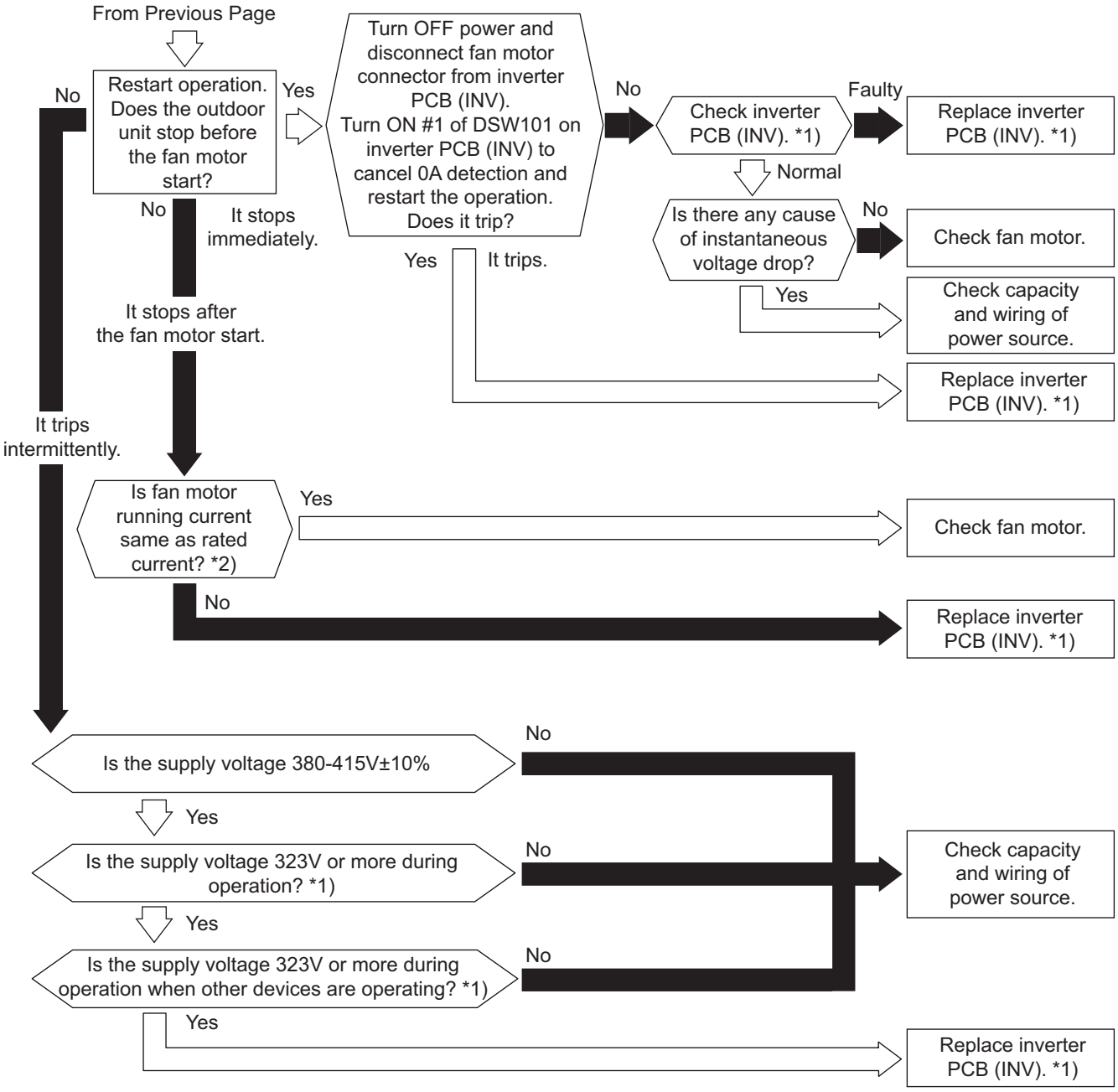
(1) Electric current with 105% of the rated current runs for 30 seconds continuously.

(2) Electric current runs intermittently and the accumulated time reaches up to three minutes, in 10 minutes.



*1): For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to item 3.2.1.

*2): Regarding the setting value of activation current, refer to Section 3.2.1.



*1): For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to item 3.2.1.

*2): Regarding the setting value of activation current, refer to Section 3.2.1.

Alarm code	5C	Abnormality of Fan Controller Sensor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB. *) Check the fan controller stoppage code (FTC) when this alarm code is displayed.

  *): the outdoor unit number of abnormal inverter PCB and abnormal inverter PCB number are displayed.

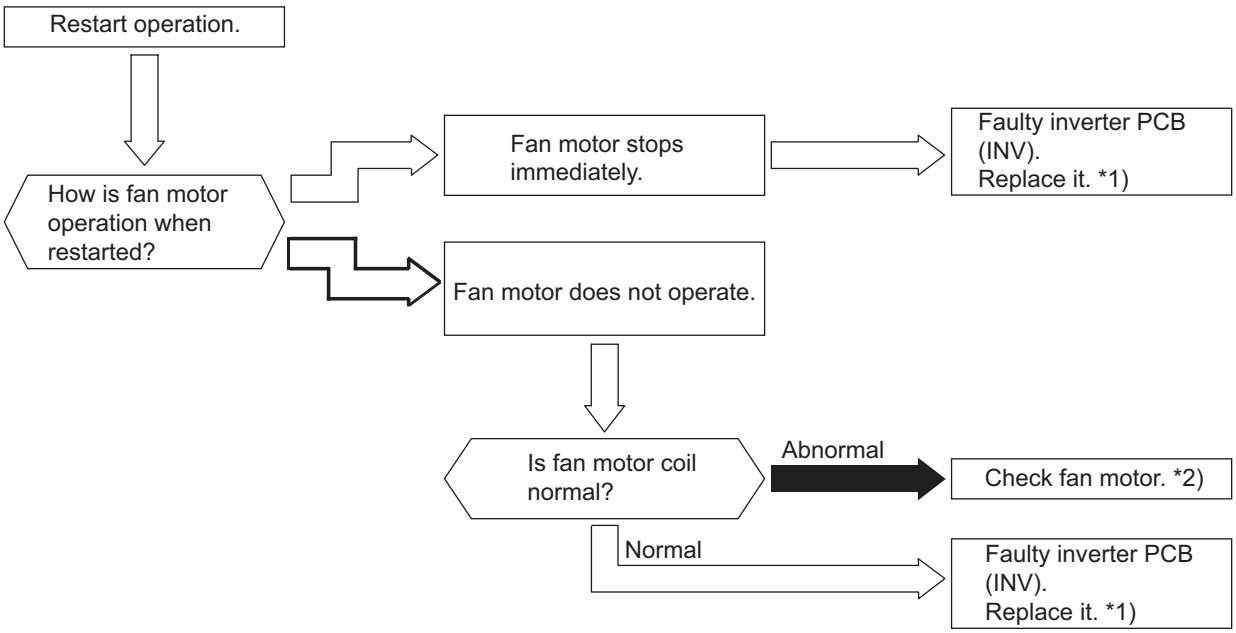
Check the fan controller stoppage code when this alarm code is displayed.

★ This alarm code is displayed when the fan controller electronic thermal protection is activated 10 times within 30 minutes. If this occurs less than 10 times in 30 minutes, the operation automatically restarts.

Conditions of Activation:

(1) Electric current with 105% of the rated current runs for 30 seconds continuously.

(2) Before the fan motor operation is started (at completing the phase positioning), the wave height value of the running current for the phase positioning is less than criterion value.



*1): For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to item 3.2.1.

*2): For checking fan motor, refer to the fan motor specification of Section 3.4.

Alarm code	Compressor Protection

★ This alarm code is displayed when any of the following alarms causing serious compressor damages occurs 3 times in 6 hours. While this alarm is displayed, alarm reset is unavailable.

Alarm Code	Content of Abnormality
02	Activation of Protection Device (High Pressure Cut)
07	Decrease in Discharge Gas Superheat
08	Increase in Discharge Gas Temperature
43	Activation of Low Compression Ratio Protection Device
44	Activation of Low Pressure Increase Protection Device
45	Activation of High Pressure Increase Protection Device
47	Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)

These alarms can be checked by the CHECK Mode 1. Follow the action indicated in each alarm chart. These alarms are cleared only by turning OFF the main power switch to the system. **However, great care must be taken before starting, since there is a possibility of causing serious damages to the compressors.**

Alarm code	External Abnormality Detection

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

This alarm code is displayed when the external input is set the control function No.14 is detected an abnormality (input terminals are short-circuited).

Alarm code	External Abnormality Detection

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

The alarm code displayed on the wired controller is “35”.

Condition	Action
The number of the connected indoor units not supporting H-LINK II is 17 or greater.	The number of the connected indoor units shall be 16 or less.

1.3 Test Run

Turn OFF all the power source switches.
Use a tester and make sure that all the switches are turned OFF.

Before test run, check that the unit is appropriately installed according to Installation & Maintenance Manual. After that, inspect the following items.

Check Item		Contents
1	Damage	Are the unit appearance and inside of the unit damaged?
2	Fan Motor	Is the propeller fan mounted in the center of the fan cover? Is the propeller fan mounted away from the fan cover? (The propeller fan should NOT be touched with the fan cover.)
3	Screw Part	Are the screws loosened due to the vibration during transportation? Check that the fasteners are secured firmly during installation, especially for the electrical wiring.
4	Refrigerant Leakage	Check that there is NO refrigerant leakage. The tightening part of pipe (flare part) may be loosened due to the vibration during transportation.
5	DSW Setting	Check that the DSW setting. (Refer to the item 1.1.2 and 1.1.3.)
6	Insulation Resistance *1)	Measure resistance between electrical component terminal and ground with a tester. It is normal if the resistance is 1MW and over. If 1MW or less, do not perform the operation due to insulation failure of electrical part. Do NOT apply electricity to the terminal board of operating line. (Control PCB may be damaged.)
7	Stop Valve Fully Opening	Prior to test run, check that the stop valve of the outdoor unit is completely open.
8	Power Source Phase	The operation is NOT available with the lacking phase. ● Alarm “03” or “05” will be indicated on the LCD of Wired Controller. ● Alarm “03” or “05” will be indicated on the 7-segment of outdoor unit. Check the power source phase according to the caution label attached close to the outdoor unit terminal block or inside of the service cover.
9	Turn ON Crankcase Heater *2)	After completion of the item checks 1 to 8, turn ON the power supply of the outdoor unit. The electricity is supplied for the crankcase heater to preheat the compressor. The compressor may be damaged without preheating. Apply power to the outdoor unit(s) at least 12 hours prior to operation of system for preheating of the compressor(s).
10	Indoor and Outdoor Temperature	<For Use in both Cooling and Heating Operation> Is indoor temperature DB27°C or less during heating operation? (Heating operation may not be operated due to the activation of the overload operation prevention under the ambient temperature of 19°C or over.) To perform the test run, set the test run mode by the Wired Controller.

*1): Insulation Resistance

- In case that the unit has been turned OFF for long periods, insulation resistance may decrease to 1MW or less because the refrigerant is retained in the compressor. Check the following points.

  (a) Disconnect the cables of the compressor and measure the insulation resistance of the compressor itself. If the resistance is 1MW or less, insulation failure of another electrical charge part has occurred.

  (b) If the resistance is 1MW or less, reconnect the compressor and turn ON the main power supply. The compressor will warm up automatically. Check the insulation resistance again after applying current for at least 3 hours. (Preheating time depends on the air condition, piping length or refrigerant condition.)

- Before the leakage breaker is activated, check the rated capacity.

*2): Stoppage of Compressor Operation

The compressor may NOT be operated for a maximum of 4 hours if the power supply is NOT turned ON in advance.

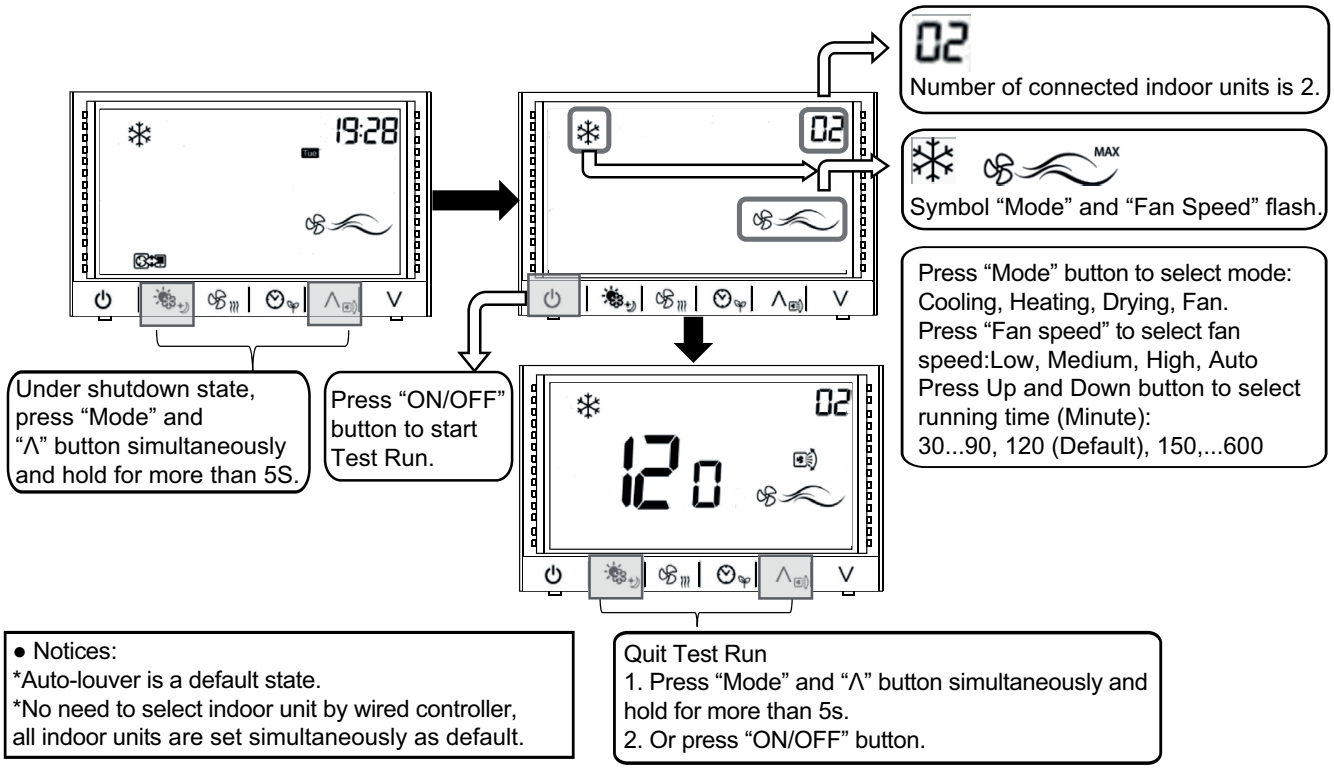
At this time, the stoppage Code (d1-22) is displayed on the LCD of wired controller and the forced Thermo-OFF function starts.

If operating compressor is necessary, turn ON the power supply of outdoor unit, wait for 30 seconds and press PSW5 on the outdoor unit PCB for at least 3 seconds. The forced Thermo-OFF function (d1-22) will be cancelled and the compressor operation will be available.

1.3.1 Perform Test Run by Wired Controller

1) Turn on the power (to Indoor unit and outdoor unit; power on the outdoor unit for more than 12 hours).

2) Operation method to perform “Test Run by Wired Controller”: Under shutdown state, press “Mode” and “Λ”switches simultaneously and hold for more than 5s. Enter “Test Run” mode interface screen. Display and operation are as below:

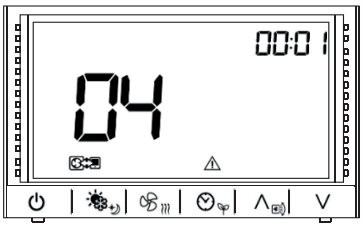


3) Setting of Test Run and Fan Speed: Press ”Mode” switch to select operation mode (Cooling or Heating). Press “Fan Speed” switch to set the fan speed to “High 2”.

4) Press “ON/OFF” switch to start Test Run.

5) Test Run will be ended after two hours of operation or just press “ON/OFF” switch to stop Test Run.

Abnormalities of Test Run:

Indication	Failure	Check Items
No Indication	Indoor unit is not powered on. Incorrect wiring of wired controller. Incorrect wiring of power supply.	1. Check the connection between wires and terminals. 2. Check the connection of wired controller. 3. Check if the connector of wired controller is firmly secured. 4. Check the wiring sequence on the terminal block. Check if the screws are firmly secured
Indicated number of indoor units mismatches with the actual number of indoor units.	Indoor unit is not powered on. Communication wires unconnected. Incorrect wiring between indoor units and wired controller.	5. Check if DIP switch set correctly. 6. Check if the wiring connection of PCB correct. 7. The same as above item 1, 2, and 3.
Alarm code indicated 	Activation of protection device Failure of sensor or other type failures. (refer left figure as an example) Refrigerant system: No. 00 (Range 0~63) Indoor unit No.: No. 01 (Range 0 ~ 63) Alarm code: 04 (Communication failure of Inverter), ⚠ icon flashes.	Refer to “Alarm code table”

1.3.2 Test Run from Outdoor Unit Side

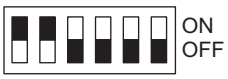
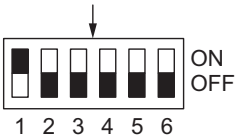
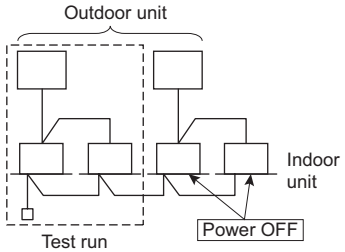
The procedure of test run from the outdoor unit side is indicated below. Setting of this DIP switch is available with the power source ON.

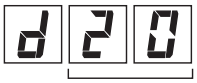
Setting of DIP Switch (Before Shipment)

DSW4
Switch for Setting of Service Operation and Function    1. Test Run 2. COOL/HEAT Setting (ON: Heating Operation) (OFF: Cooling Operation) 3. OFF (Fixed) 4. Manual Compressor OFF 5. Function Selection 6. External Input Signal Selection

⚠ WARNING

- **Do not touch any other electrical part when operating switches on the PCB.**
- **Do not attach or detach service cover when the power source for the outdoor unit is supplied and the outdoor unit is operated.**
- **Turn all the DIP switches of DSW4 OFF when the test run operation is completed.**

	DIP Switch Setting	Operation	Remarks
Test Run	1. Setting of Operation Mode Cooling: Set DSW4-1 ON.  Heating: Set DSW4-1 and DSW4-2 ON.  2. Starting Test Run Set DSW4-1 ON and the operation is started after a few seconds. If heating operation, leave DSW4-2 at ON.  	1. The indoor unit automatically starts operating when the test run of the outdoor unit is set. 2. The ON/OFF operation can be performed from the wired controller or DSW4-1 of the outdoor unit. 3. The operation continues for 2 hours without Thermo-OFF.	* Note that the indoor units operate in conjunction with the test run operation of the outdoor unit. * If the test run is started from the outdoor unit and stopped from the Wired Controller, the test run function of the wired controller is cancelled. However, the test run function of the outdoor unit is not cancelled. Check to ensure that the DSW4-1 of the outdoor unit PCB is turned OFF. * If multiple indoor units are connected with one Wired Controller, perform the test run operation individually for each refrigerant system one by one. Then, make sure to turn the power source OFF for the indoor units in other refrigerant systems not to operate test run.  * The setting of DSW4 is not required for the test run from the Wired Controller.

	DIP Switch Setting	Operation	Remarks
Manual OFF of Comp.	1. Setting *Compressor Manual OFF: Set DSW4-4 ON.  2. Cancelling *Compressor ON: Set DSW4-4 OFF.  	1. When DSW4-4 is ON during compressor operation, the compressor stops operating immediately and the indoor unit is under the condition of Thermo- OFF. Continuous indoor unit fan operations is available by setting the function selection “FE=1”. 2. When DSW4-4 is OFF, the compressor starts operating after the cancellation of 3-minutes guard.	* Do not repeat compressor ON/OFF frequently.
Manual Defrost	1. Manual Defrost Operation Press PSW5 for more than 3 seconds during heating operation, and the defrosting operation starts after 2 minutes. This function is not available within 5 minutes after starting heating operation. 2. Manual Defrost Operation Completion Defrosting operation automatically ends and the heating operation restarts.	1. Defrosting operation is available regardless of frost condition and total time of heating operation. 2. Defrosting operation is not performed when the temperature of outdoor heat exchanger is higher than 10°C, high pressure is higher than 3.2MPa or the unit is Thermo-OFF.	* Do not repeat defrosting operation frequently. * When manual defrosting operation is accepted by PSW5, the time left before starting defrosting operation is indicated on the 7-segment indicator on the PCB.  Time left (Every 4 seconds)

When the test run operation is completed, turn all switches of DSW4 OFF.

(1) If the wired controller is set to a different mode, the test run function will not start. In this case, perform the following actions before the test run.

Wired Controller: STOP

Central Station: STOP and wired controller is available mode.

COOL/HEAT Changeover Switch: Connector (CN17) of outdoor unit PCB is opened.

During the test run mode, do not control the Wired Controller, the central station and cool/heat changeover switch. Otherwise, the operation mode will be changed or the test run will be ended. If necessary, control them after the test run is completed.

(2) If an alarm code is indicated during the test run, reset the system by turning the main power supply OFF then back on. The system should then operate.

1.3.3 Checking at Test Run

(1) Indoor and Outdoor Fan

Check that the indoor fan and outdoor fan rotate correctly and the air flow is smooth.

(2) Power Supply Voltage

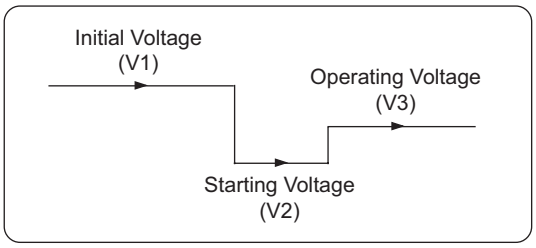
Check the power supply.

If the power supply is abnormal, contact with electric power company.

Usually, voltage drop will occur when starting the operation as shown in the figure (V2).

In order to protect the device, comply with the following normal range of the power supply voltage.

< Voltage Change >



<Normal Range of Power Supply Voltage>

- Supply Voltage: Rated Voltage < ±10%
- Starting Voltage (V2): Rated Voltage > -15%

Operating Voltage (V3): Rated Voltage < ±10%

Voltage Imbalance between Phase: < 3%

(2) Normal Operating Pressure

Normal operating suction pressure is 0.2 to 1.1MPa and normal operating discharge pressure is 1.0 to 3.5MPa when the refrigerant charge quantity is correct. Check the operation pressure in the test run mode.

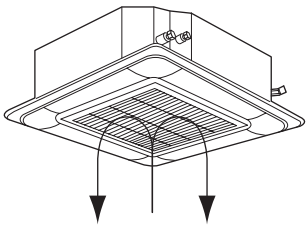
(3) High Pressure Switch

Check the operation pressure of the high pressure switch in the table below:

Refrigerant	Operation Pressure
R410A	4.15MPa

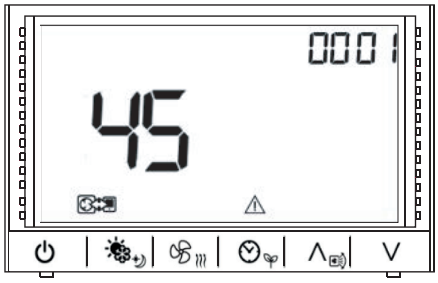
(4) High Pressure Increase Retry (Protection Control)

(a) The high pressure will increase when the following procedure is performed.

Cover the air inlet of outdoor unit during cooling operation.	Cover the air inlet of indoor unit during heating operation.
	

(b) When the high pressure retry control is activated, alarm code "P13" will be indicated on the 7-segment of outdoor unit PCB. If the high pressure retry control occurs 3 times or more within 30 minutes, alarm code "45" will be indicated on the LCD of wired controller or the 7-segment of outdoor unit PCB.

< For HCWA10NEGQ >



NOTE:

The high pressure may not increase until the high pressure switch is activated due to the temperature condition.

1.3.4 Checking List for Refrigerant Cycle

The refrigerant cycle data can be checked on 7-segment of outdoor unit PCB during the test run and the troubleshooting. However, it may take time for the checking because the operation cycle changes depending on the operating condition.

To check the quality of refrigerant cycle, the following check list shall be used at the test run, troubleshooting and emergency check.

(1) Refrigerant Cycle Check

The most important thing in the refrigerant cycle check is to check that each expansion valve opening and the operating frequency is within the specified range. Each item varies in the value depending on the operating frequency, indoor temperature and ambient temperature.

(2) The service system tester, which automatically calculates Td and SH, facilitates the refrigerant cycle check. If possible, record the operating cycle data by the service system tester.

CHECK LIST ON TEST OPERATION

CLIENT: INSTALLER: DATE:

O.U. MODEL: O.U. SERIAL NO.: CHECKER:

Indoor unit Model								
Indoor unit Serial No.								

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

Piping Length: m Additional Refrigerant Charge: kg

(1) General

No.	Check Item	Result
1	<Combination of Base Units> Is DSW6 setting for outdoor unit No. correct?	
2	Are the power source wiring and the transmitting wiring apart from refrigerant piping?	
3	Is an earth wiring connected?	
4	Is there any short circuit?	
5	Is there any voltage abnormality among each phase? (L1-L2, L2-L3, L3-L1)	

(2) Refrigerant cycle

a. Operation (Cooling/Heating)

No.	Check Item	Result
1	Operate all the indoor units ("TEST RUN" mode).	
2	Operate all the indoor units at "HIGH" speed.	
3	In case that the constant compressor is turned ON and OFF repeatedly, switch off an indoor unit (with a small capacity).	

b. Sampling Data

No.	Check Item	Result
1	After the operation for more than 20 min.	
2	Check Pd and Td. Is Td-SH 15 to 45°C ?	
3	Is Ps 0.15 to 1.3 MPa?	
4	Is Pd 1.0 to 3.6 MPa? (If the outdoor temperature is high, Pd becomes high.)	

NOTE:

The symbol with an underline ___ indicates checking item.

(3) Check Item after Sampling Data

a. Cooling Operation (It is applicable when outdoor temperature is higher than 15°C.)

No.	Check Item	Standard	Causes	Result
1	Is fan actually running when Fo (Air Flow Rate of O.U. Fan) is not “0”?	-	● Fan Motor Failure ● O.U. PCB Failure ● Condenser Failure	
2	Is TL (Liquid Pipe Temp. of I.U. Heat Exchanger) lower than Ti (Intake Air Temp. of I.U.)?	It is normal when TL-Ti < -5°C.	● TL Thermistor Failure ● I.U. Ex. Valve; Fully Closed ● Short-Circuit	
3	Is TG (Gas Pipe Temp. of I.U. Heat Exchanger) lower than Ti (Intake Air Temp. of I.U.)? (It is applicable when Intake Air Temp. is 3°C. higher than Setting Temp.)	It is normal when TG-Ti < -5°C.	● TG Thermistor Failure ● I.U. Ex. Valve; Fully Closed or Slightly Open ● Short-Circuit	
4	Is there any excessive difference in SH (TG-TL) of I.U. heat exchanger among I.U.s? (It is applicable when Intake Air Temp. is 3°C. higher than Setting Temp.)	It is normal if the difference among units is within 7°C.	● TL/TG Thermistor Failure ● I.U. Ex. Valve; Fully Open, Slightly Open or Fully Closed	
5	Is there any I.U. with the I.U. heat exchanger SH (TG-TL) excessively lower than the other units’ value and is iE (I.U. Ex. Valves Opening) lower than “5”?	of the unit is up to -3°C lower than the other units.	● I.U. Ex. Valve; Locked and Fully Open ● Mismatched Wiring and Piping	
6	Is there any I.U. with the I.U. heat exchanger SH (TG-TL) excessively lower than the other units’ value and is iE (I.U. Ex. Valves Opening) lower than “100”?	It is normal if SH of the unit is up to 3°C higher than the other units.	● I.U. Ex. Valve; Locked and Slightly Open or Closed ● Mismatched between Wiring and Piping	
7	Is the temperature difference between I.U.s* more than 7°C? * The temperature difference between I.U.s means the following; b3 (Discharge Air Temp.) - b2 (Intake Air Temp.) indicated on the wired controller by check mode.	7°C and over	-	

b. Heating Operation (It is applicable when outdoor temperature is higher than 15°C.)

No.	Check Item	Standard	Causes	Result
1	Is TdSH “15 - 45°C”? TdSH = Td - Saturated vapor refrigerant temperature	15 - 45°C	● Low → Excessive Refrigerant ● High → Insufficient Refrigerant ● O.U. Ex. Valve; Locked and Slightly Open or Closed.	
2	Is Pd “1.5” to “3.3”?	1.5 -3.3 (Pd is high when the indoor temperature is high.)	● Low → Solenoid Valve SVA Leakage ● High → Excessive Gas Pipe Pressure Loss	
3	s Ps “0.15” to “1.3”?	0.15 - 1.3	● Low → O.U. Short-circuit Low/High → O.U. Fan ● Motor Failure, Fan Module Failure or Outdoor Ambient Thermistor Failure	

4	Is the temperature difference between I.U.s* more than 10°C when iE (I.U. Ex. Valve) is "100"? * The temperature difference between I.U.s means the following; b3 (Discharge Air Temp.) - b2 (Intake Air Temp.) indicated on the wired controller by check mode. However, this is applicable only when b2 (Intake Air Temp.) - b1 (Setting Temp.) is higher than 3°C.	10°C and over	• Failure in PCB, Wiring, I.U. Ex. Valve and Coil • Excessive Pipe Pressure Loss • Thermistor Failure for Discharge Air	

NOTE:

The symbol with an underline ___ indicates checking item and the mark " " indicates checking data.

1.3.5 Reset for Accumulated Operation Time of Compressor 1-2 (cU1□ - cU2□)

(□: Outdoor Unit No.)

There are accumulated operation times of the compressor after maintenance and after starting operation. The following procedures show how to reset the accumulated operation time of the compressor after maintenance. Perform it for each outdoor unit.

<Procedure>

Press PSW1 and PSW3 for five seconds while the accumulated operation time of compressor data is displayed. The accumulated operation time of the compressor is reset.

<Example of Outdoor Unit No. 1/Compressor 1>

<Procedure>
Press PSW1 and PSW3 for five seconds while the accumulated operation time of compressor data is displayed. The accumulated operation time of the compressor is reset.

<Example of Outdoor Unit No. 1/Compressor 1>



Press PSW4 to display the accumulated operation time of the compressor 1.
(Press PSW2 to return to the indication "cU11".)

PSW4 ↑↓ PSW2

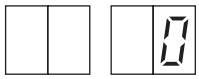


Press PSW1 and PSW3 for five seconds while the accumulated operation time is displayed.

⇩

The indication will be changed to "0".

(The accumulated operation time of the compressor 1 is reset.)



NOTE:

In the case of 26HP to 96HP, it is required to reset the accumulated operation time for each outdoor units.

2. Servicing

⚠ DANGER

Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. DO NOT charge materials other than R410A into the unit such as hydrocarbon refrigerants (propane or etc.), oxygen, flammable gases (acetylene or so on.) or poisonous gases when installing, maintaining and moving the unit. These flammables are extremely dangerous and may cause an explosion, fire, and injury.

⚠ WARNING

TURN OFF all power source switches.

2.1 Removing Front Service Cover

(1) Removing Service Cover

(a) Remove eight (8) screws fixing the service cover.

(b) Put your hands on the groove at the bottom of the service cover. Then, lift the cover up slightly and draw it frontward. Remove the cover from the hooks on the right and left sides. (Refer to Figure 1)

(2) Removing Front Cover

(a) Remove four (4) screws fixing the front cover.

(b) Hold the upper side of the front cover and lift it obliquely upward. Remove the cover from the hooks on the right and left sides. Then, draw the cover frontward. (Refer to Figure 2)

(3) Removing Front Left or Right Cover (only for RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ)

(a) Remove all the front cover, and Remove seven (7) screws fixing the front left or right cover.

(b) Hold the middle side of the front left or right cover. Then, lift the cover up slightly and draw it frontward.

NOTE:

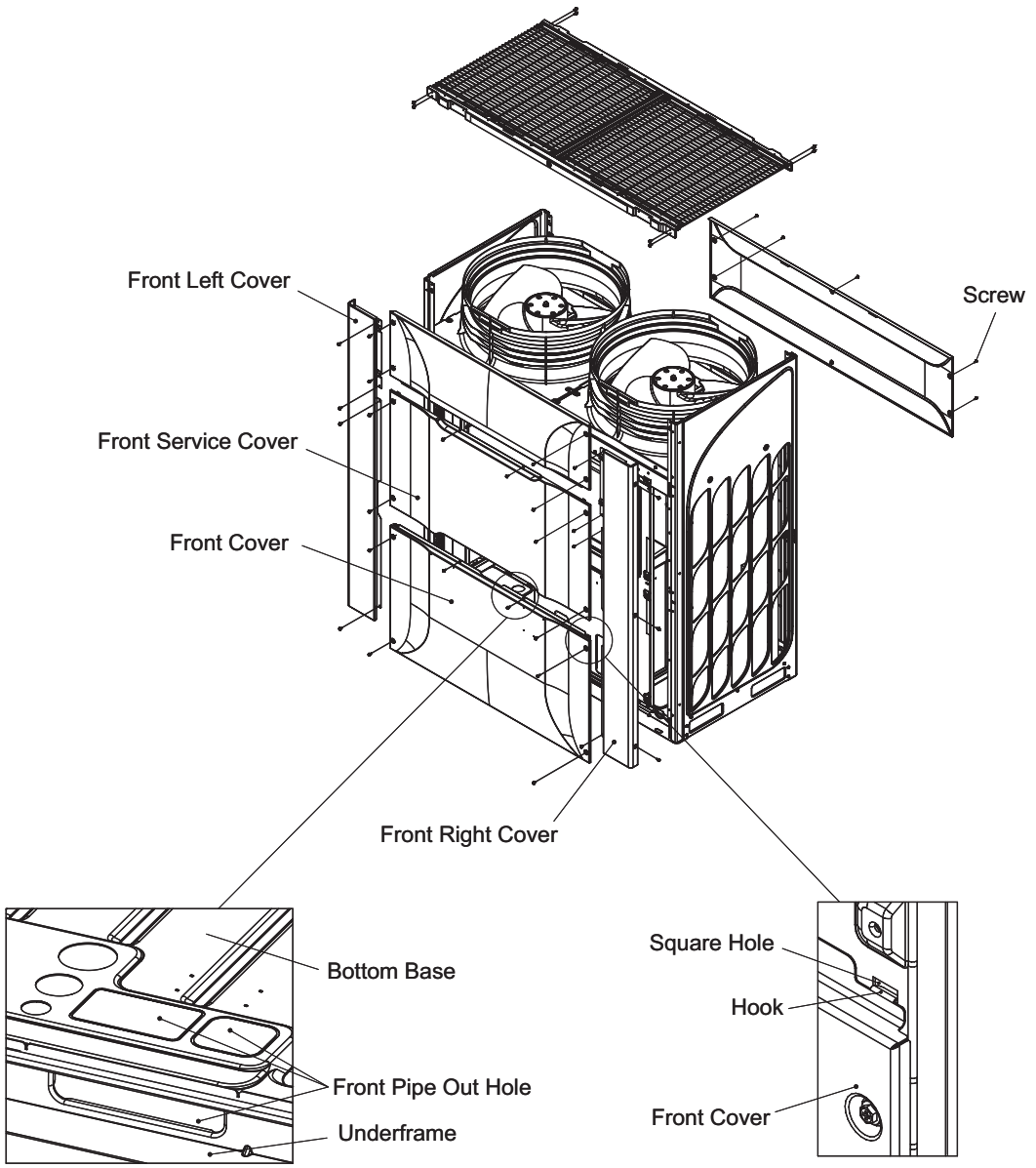
When attaching/removing the front service cover, take special care not to be injured with the plate edges.

⚠ WARNING

TURN OFF all power source switches.

Tool	Adjustable Wrench or Spanner

● RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ



⚠ WARNING

TURN OFF all power source switches.

2.2 Attaching Front Service Cover

(1) Attaching Front Right Cover (only for RAS-20RNBCLQ, RAS-22RNBCLQ and RAS-24RNBCLQ)

(a) Insert the hooks of the front right cover into the square holes of the side cover.

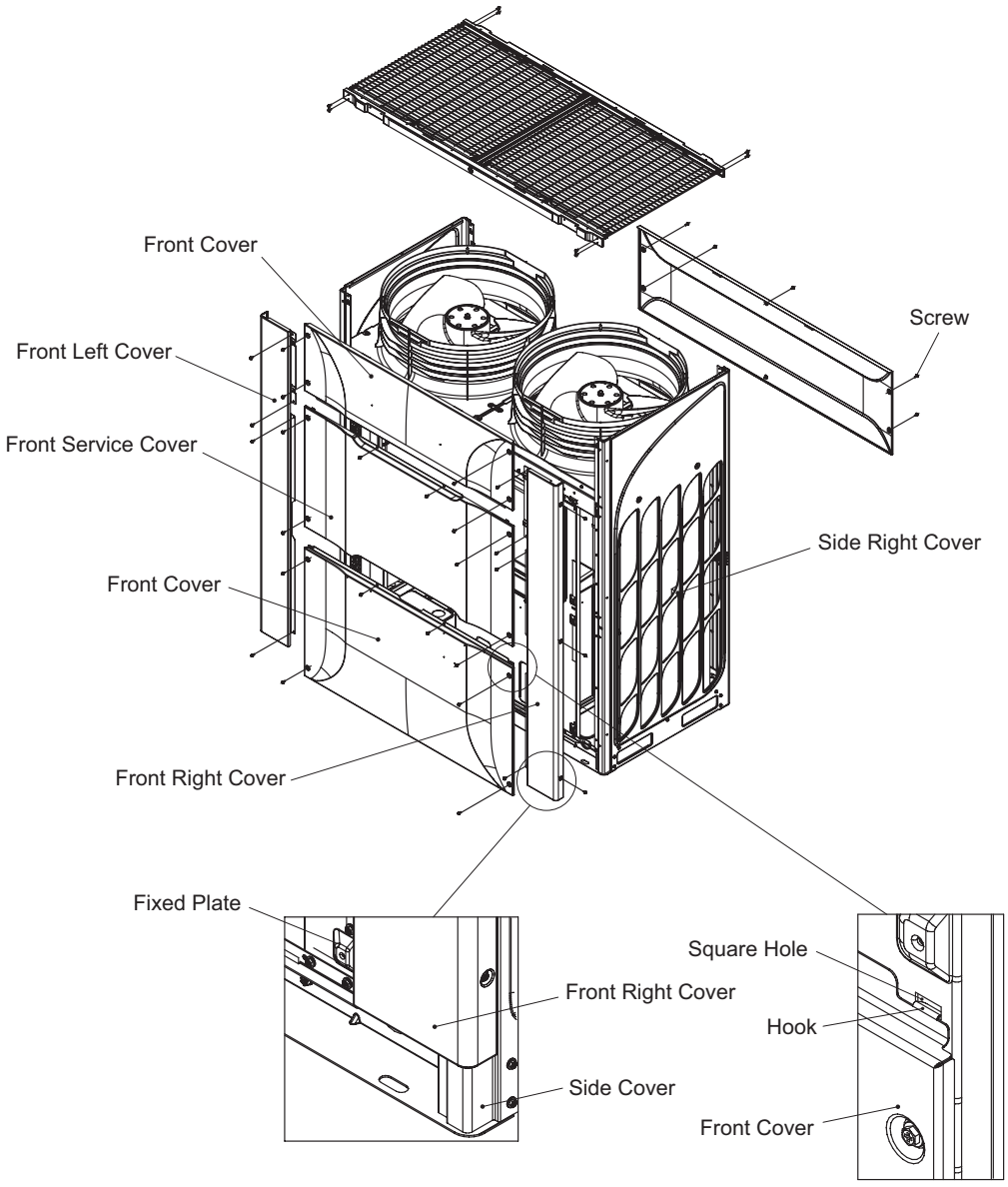
(2) Attaching Front Cover

(a) Insert the hooks of the front cover into the square holes of the side cover.

(b) Fix the front cover with the screws.

Tool	Phillips Screwdriver

● RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ



(3) Attaching Service Cover

(a) Service cover shall be attached after attaching the front cover. Insert the hooks of the service cover into the square holes of the side cover.

(b) Fix the front cover with the screws.

NOTE:

When attaching the front cover, insert the hooks into the square holes of the side cover as shown in the figure. DO NOT insert the lower end of the front cover into the inside of the bottom base.

⚠ WARNING

TURN OFF all power source switches.

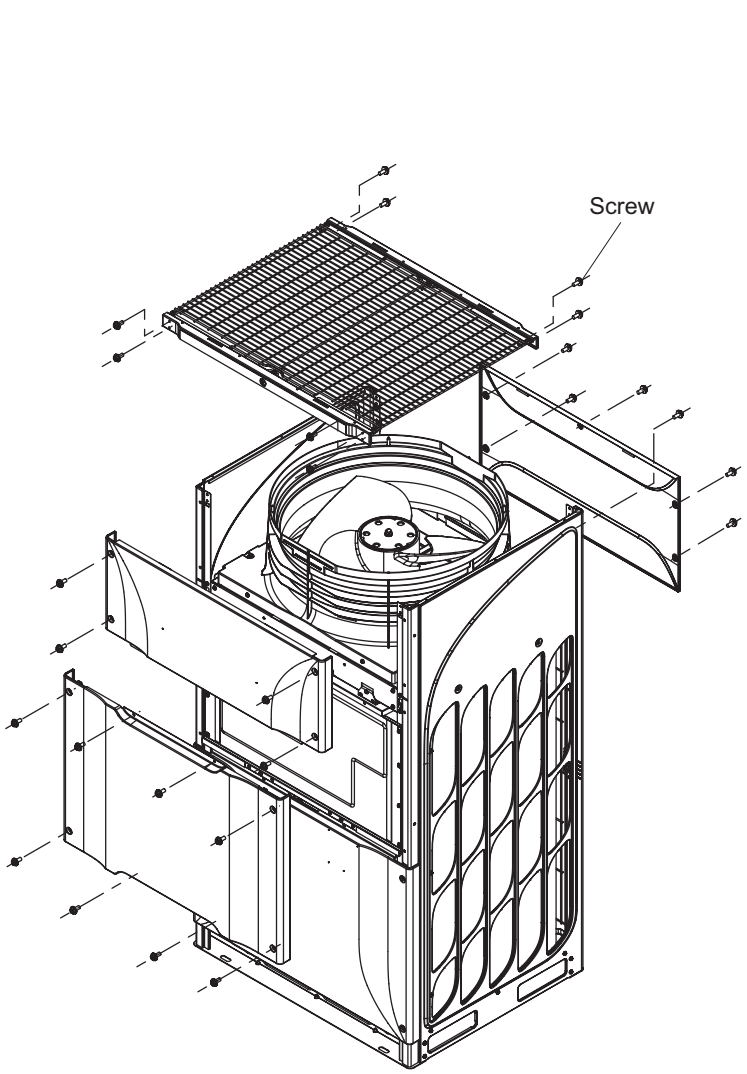
2.3 Removing Upper Cover

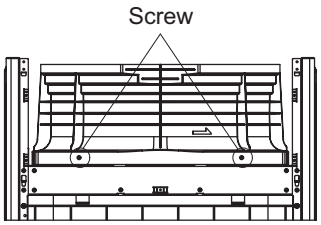
(1) Remove the screws fixing the upper cover.
RAS-8.0RNBCLQ/RAS-10RNBCLQ/RAS-12RNBCLQ: 34 screws
RAS-14RNBCLQ/RAS-16RNBCLQ/RAS-18RNBCLQ: 42 screws
RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ: 60 screws

(2) Lift up the upper cover. When removing the upper cover, make sure that it does not contact the propeller fan.

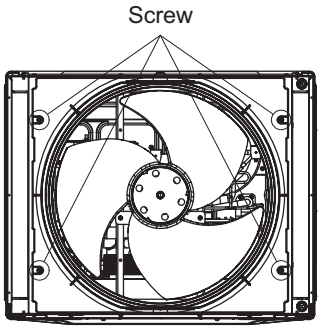
Tool	Phillips Screwdriver

● RAS-8.0RNBCLQ/RAS-10RNBCLQ/RAS-12RNBCLQ

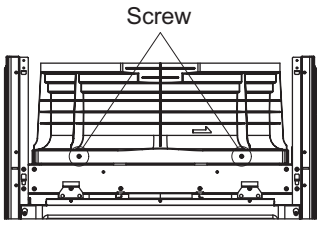




Rear Side



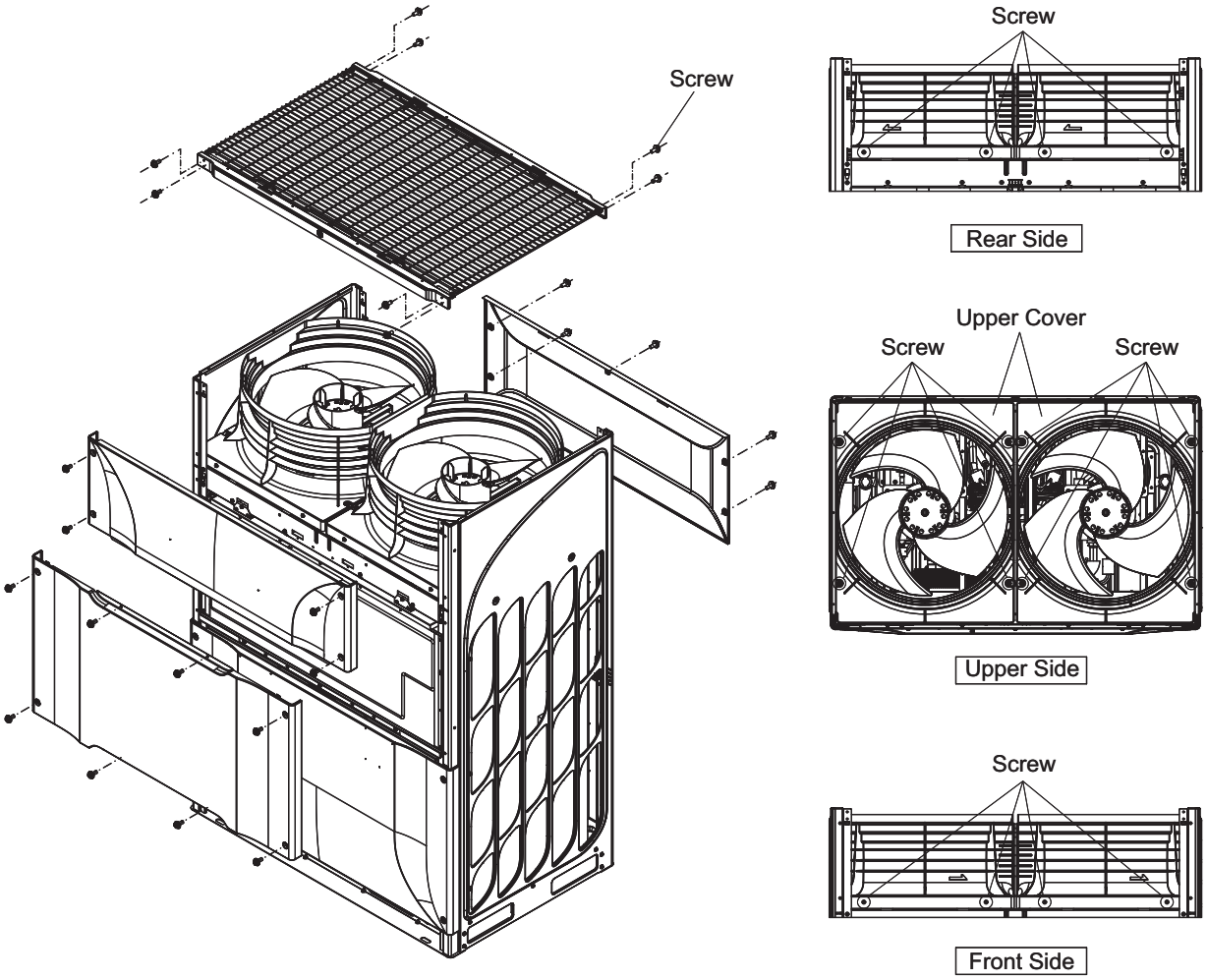
Upper Side



Front Side

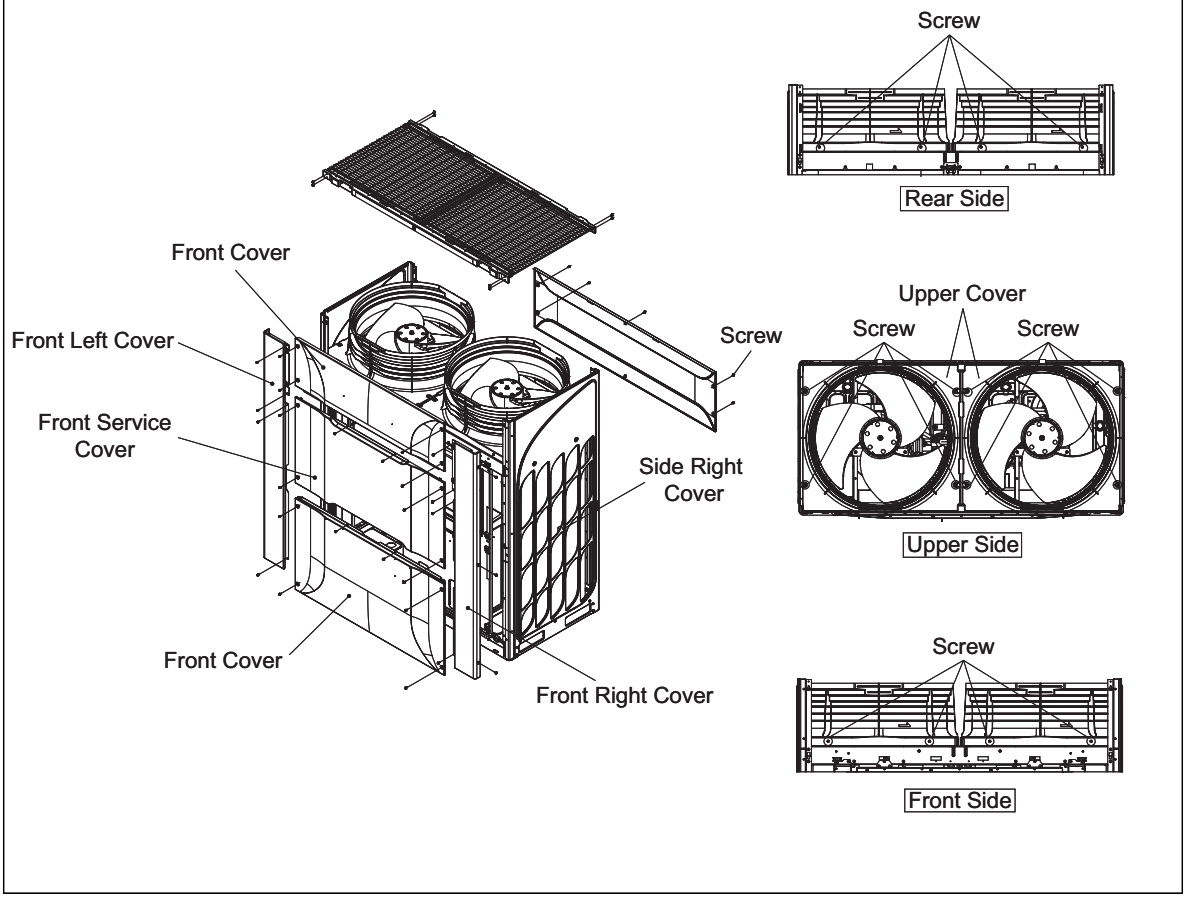
Tool	Phillips Screwdriver

● RAS-14RNBCLQ/RAS-16RNBCLQ/RAS-18RNBCLQ



Tool	Phillips Screwdriver

● RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ



⚠ WARNING

TURN OFF all power source switches.

2.4 Removing Electrical Box Cover

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Remove 5 screws fixing the electrical box cover and loosen the other two (2) fall-prevention Screws.

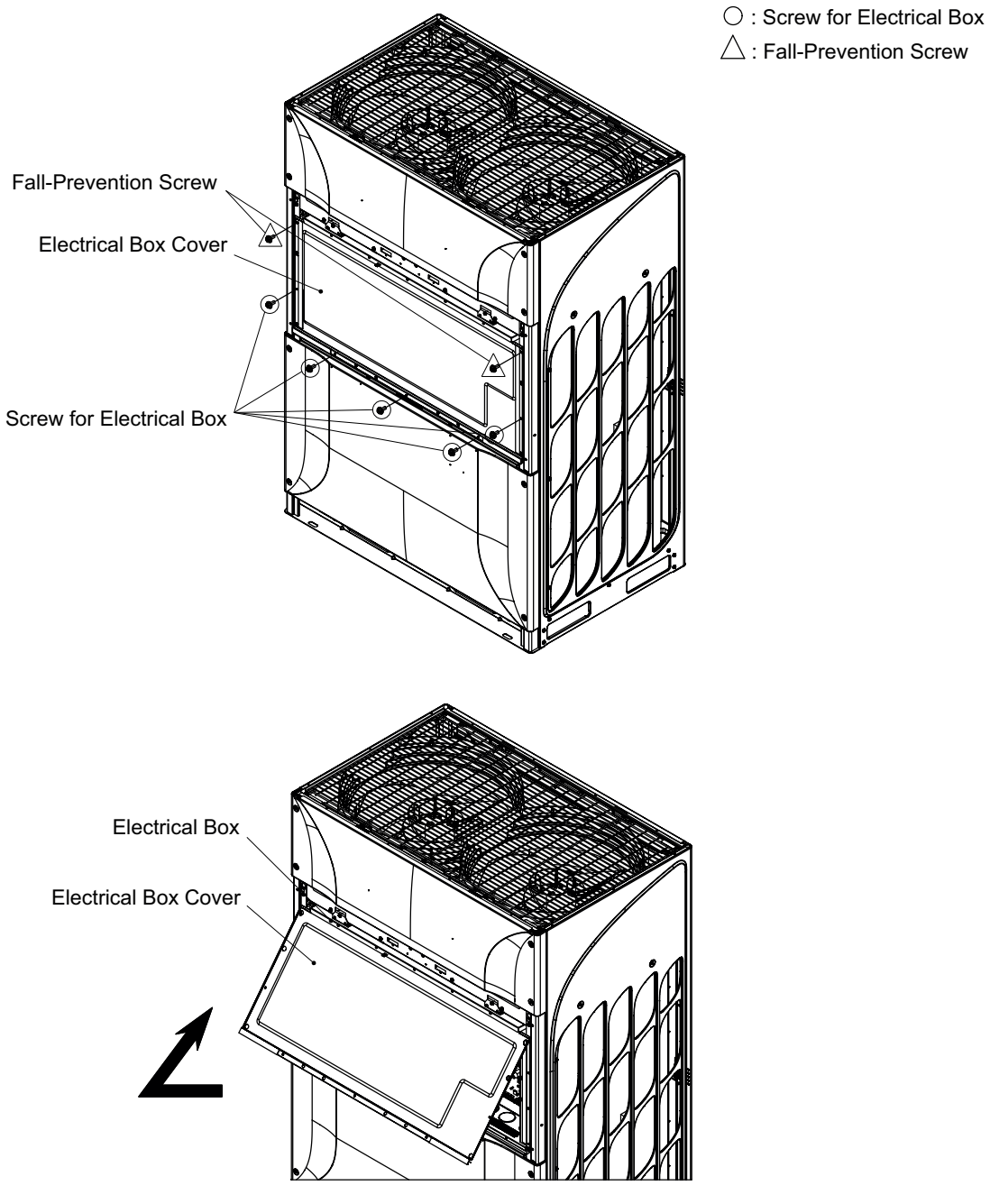
(3) Push the electrical box cover up and draw it frontward from the fall-prevention screws.

NOTE:

1. Before removing the screws fixing the electrical box cover, check that the fall-prevention screws are attached to the cover in order to prevent the electrical box cover from dropping off.
2. Take special care not to be injured with the front cover edges when removing the electrical box cover.

Tool	Phillips Screwdriver

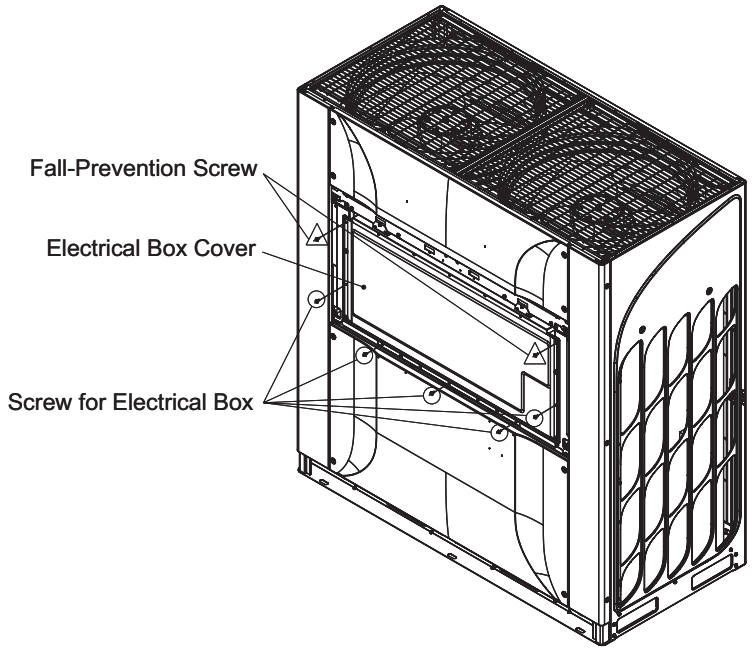
● RAS-8.0RNBCLQ/RAS-10RNBCLQ/RAS-12RNBCLQ
RAS-14RNBCLQ/RAS-16RNBCLQ/RAS-18RNBCLQ

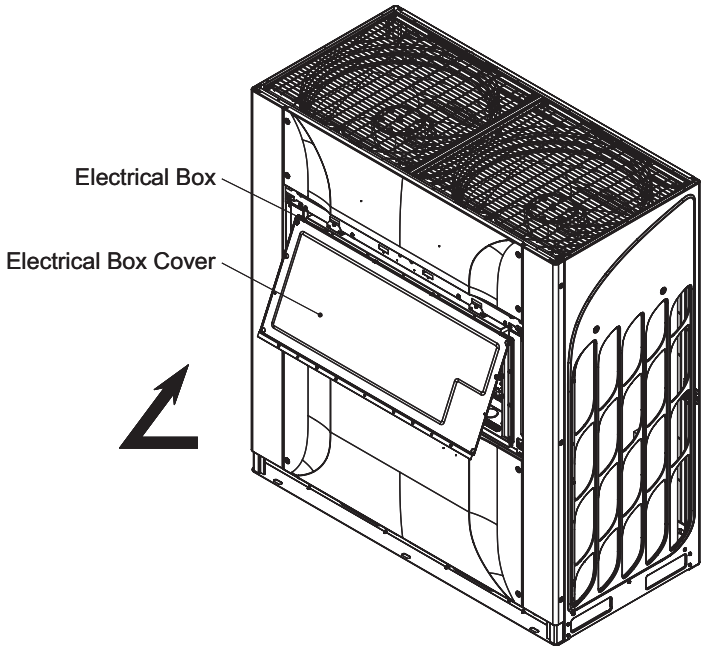


Tool	Phillips Screwdriver

● RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ

○ : Screw for Electrical Box
△ : Fall-Prevention Screw





⚠ WARNING

TURN OFF all power source switches.

2.5 Removing Electrical Box

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.
(2) Remove the electrical box cover according to the item 2.4 “Removing Electrical Box Cover”.
(3) Unfix the wiring from the code clamps at the bottom of the electrical box.
(4) Remove the screws fixing the power source wiring, compressor wiring, transmission wiring and earth wiring.
(5) Disconnect the connectors for the fan motor, solenoid valve and crankcase heater.
(6) Disconnect the connectors for each thermistor, the electronic expansion valve and pressure sensor on the outdoor unit PCB (PCB3).
(7) (Disconnect the connector for high pressure switch on the main power PCB (PCB3).
(8) Remove six (6) screws fixing the upper side of the electrical box and remove two (2) fall prevention screws.

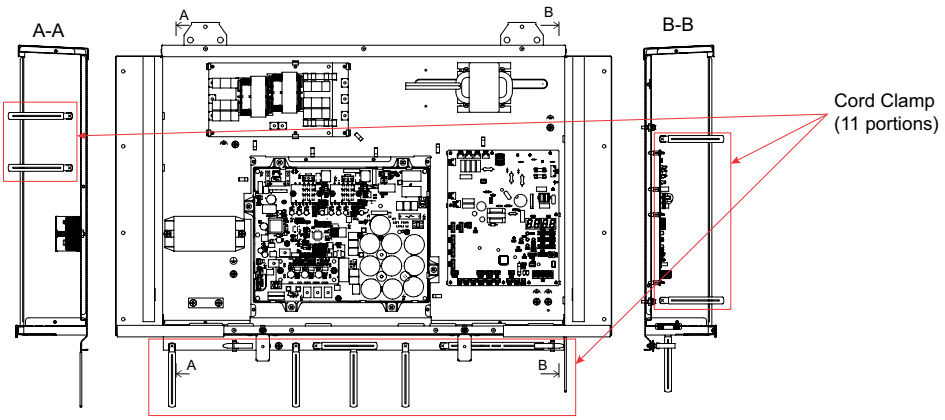
NOTE:

When removing the electrical box from the outdoor unit, hold the bottom side of the hook on the electrical box. DO NOT hold the center of the electrical box. It may cause deformation of the electrical box.

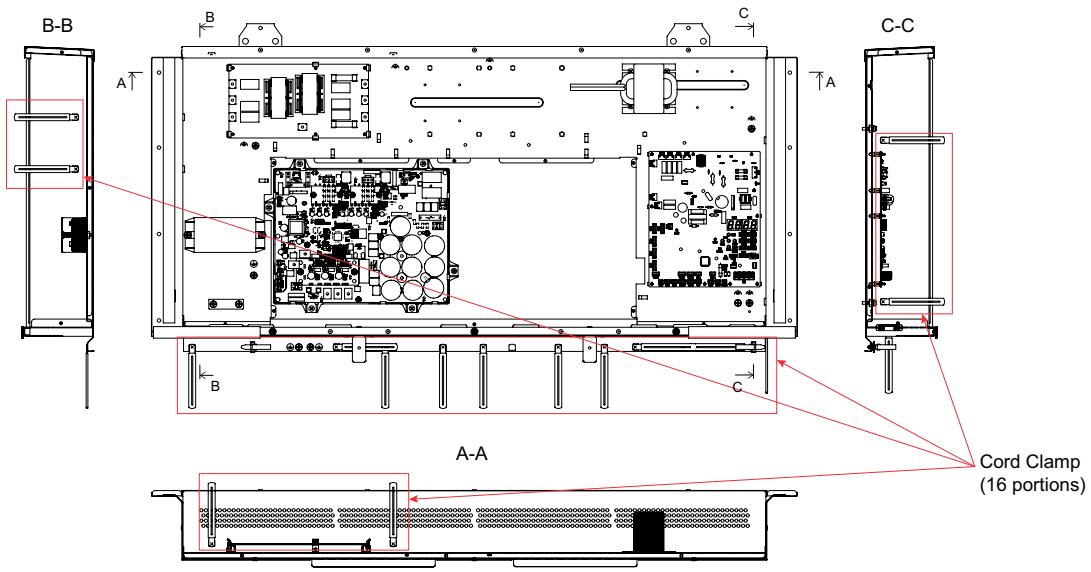
Tool	Phillips Screwdriver

<380-415V 50/60Hz>

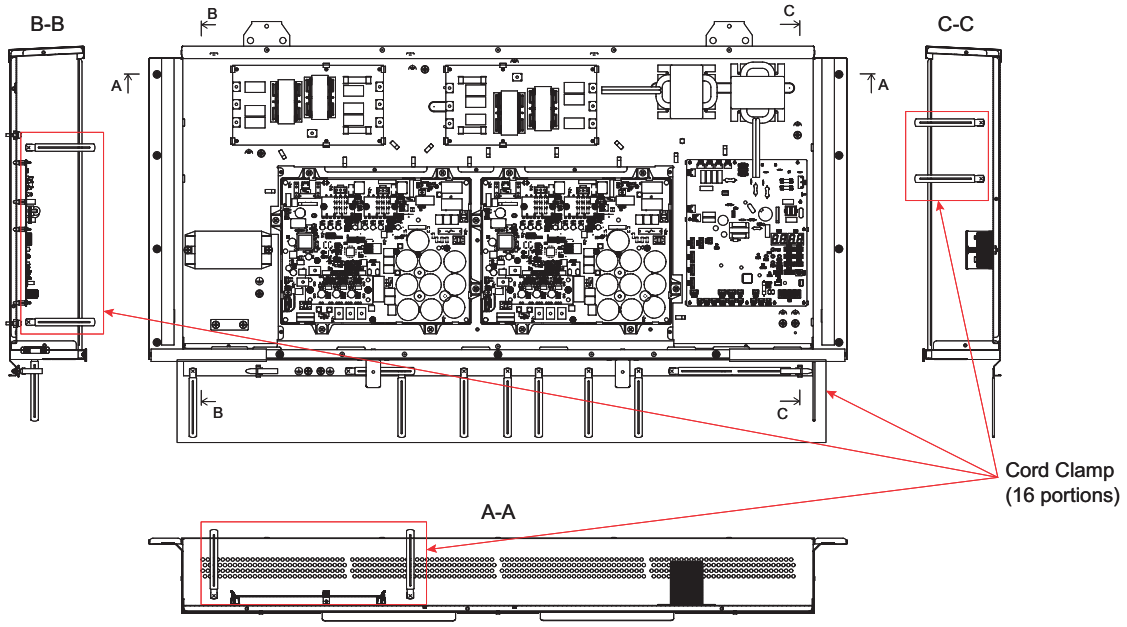
● RAS-8.0-12RNBCLQ



● RAS-14-16RNBCLQ



● RAS-18-24RNBCLQ

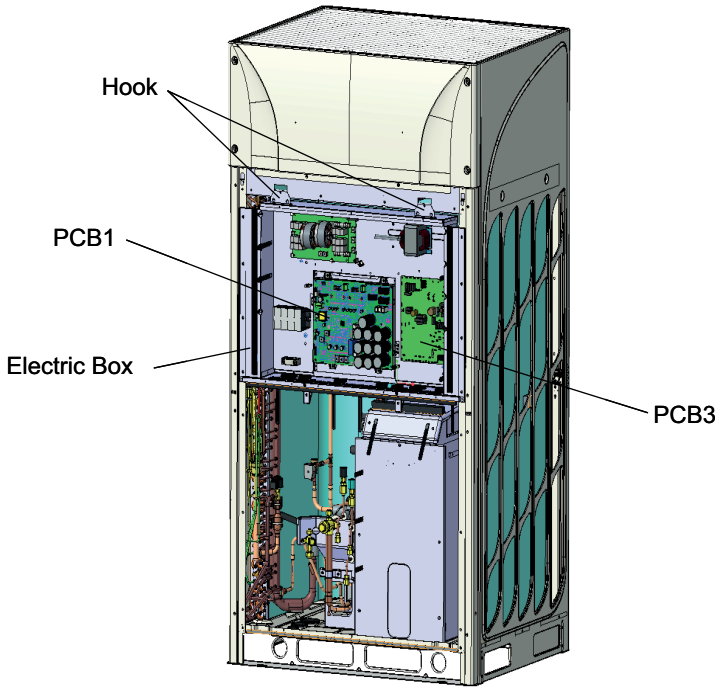


WARNING

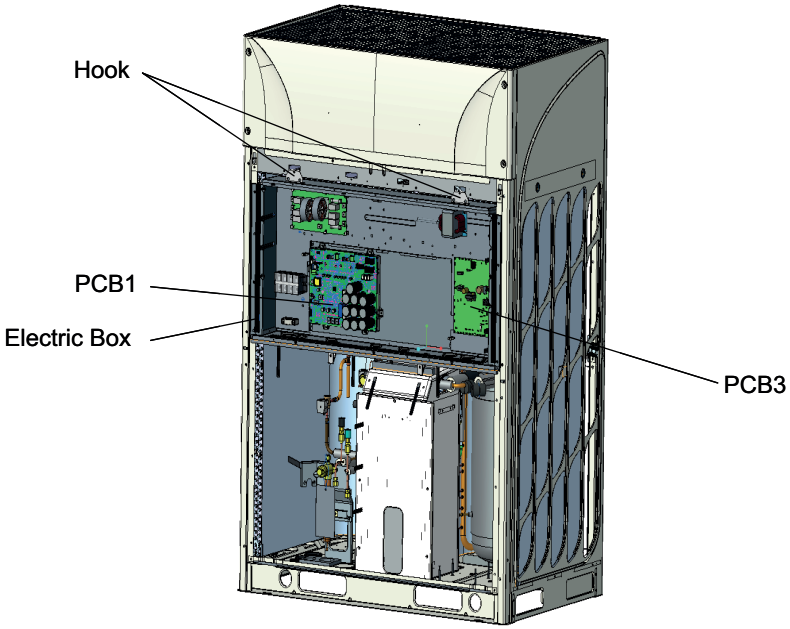
TURN OFF all power source switches.

Tool	Phillips Screwdriver

RAS-8.0-12RNBCLQ



RAS-14-16RNBCLQ

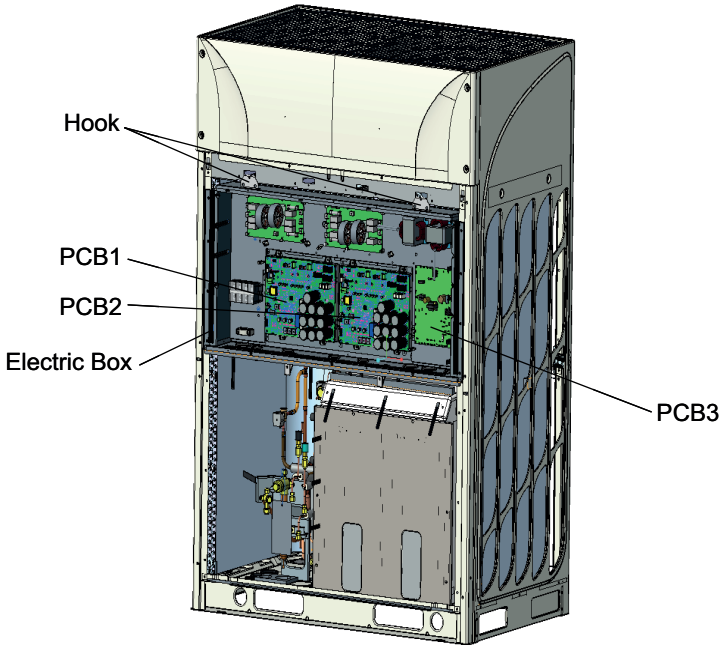


WARNING

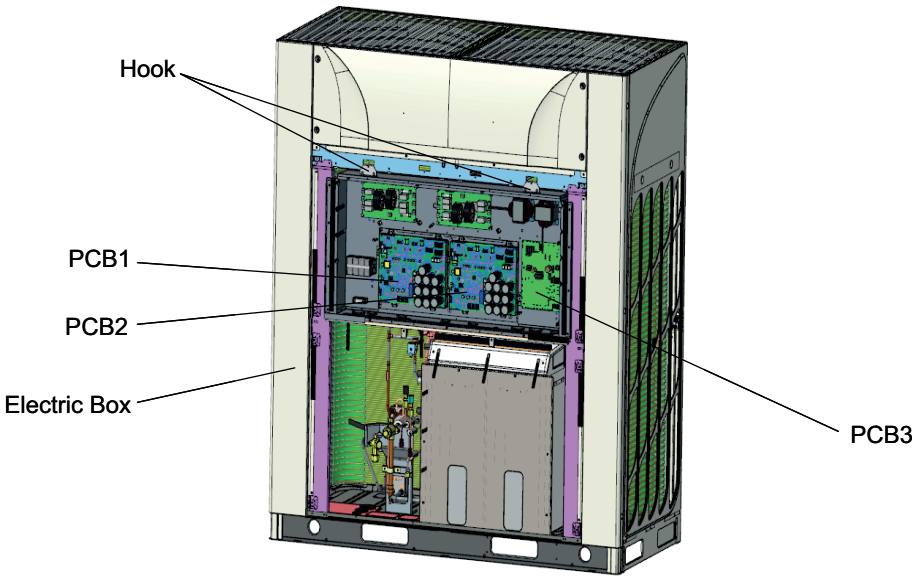
TURN OFF all power source switches.

Tool	Phillips Screwdriver

RAS-18RNBCLQ



RAS-20-24RNBCLQ



⚠ WARNING

TURN OFF all power source switches.

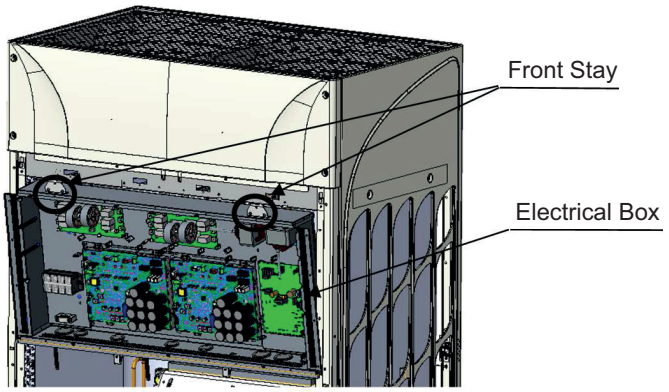
(9) Remove the electrical box from the outdoor unit.

NOTE:

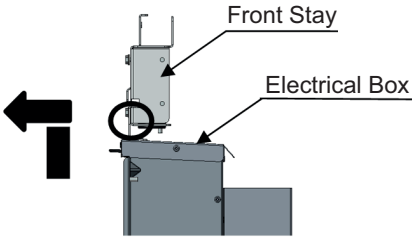
Be sure to wear the protection and take special care not to be injured with the plate edges.

Tool	Phillips Screwdriver

Work in pairs



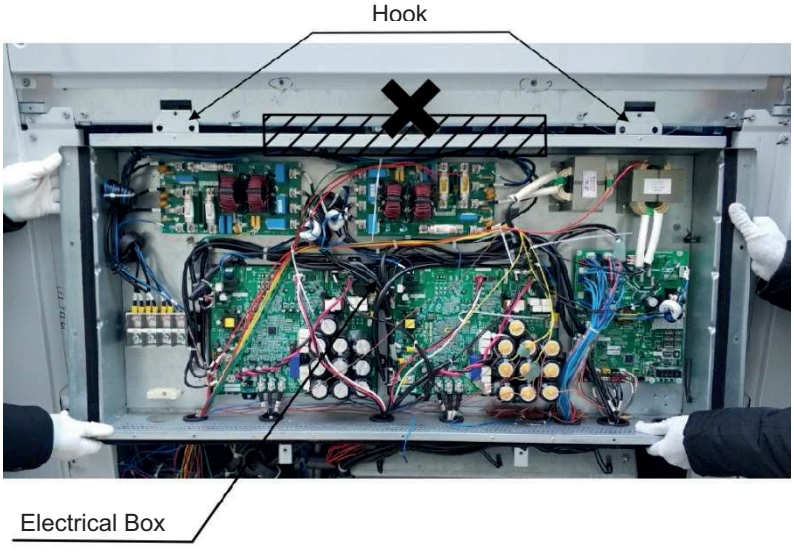
Lift the electrical box up and remove



⚠ CAUTION

When removing the electrical box from the outdoor unit, hold the bottom side of the hook on the electrical box as shown in the figure below.

DO NOT hold the center of the electrical box. It may cause deformation of the electrical box.



⚠ WARNING

TURN OFF all power source switches.

2.6 Removing Air Grille

Remove screws fixing the air grille.

RAS-8.0RNBCLQ/RAS-10RNBCLQ/RAS-12RNBCLQ: 6 screws
RAS-14RNBCLQ/RAS-16RNBCLQ/RAS-18RNBCLQ: 10 screws
RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ: 16 screws

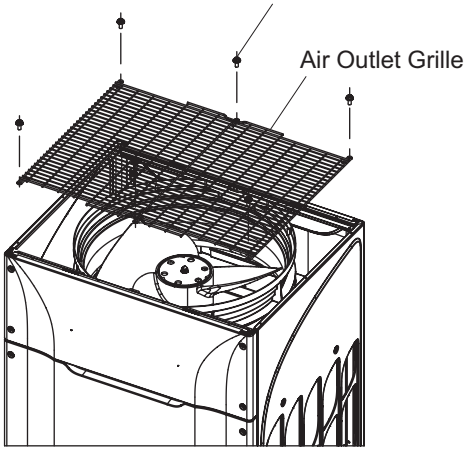
Remove the air grille.

NOTE:

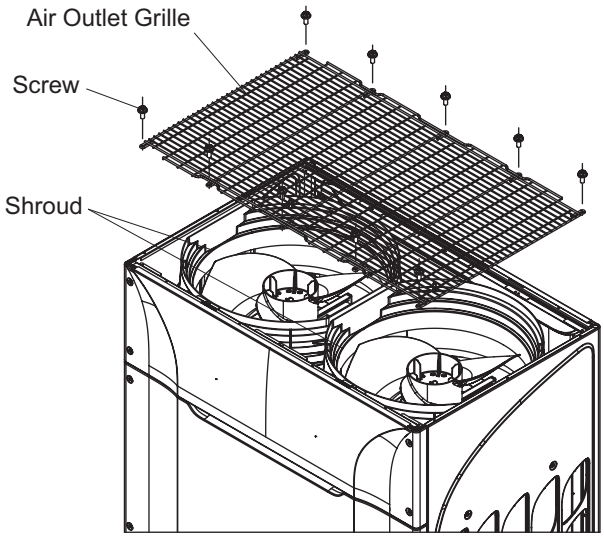
DO NOT apply an excessive force to the shroud (plastic part). Otherwise, deformation and breakage may occur.

Tool	Phillips Screwdriver

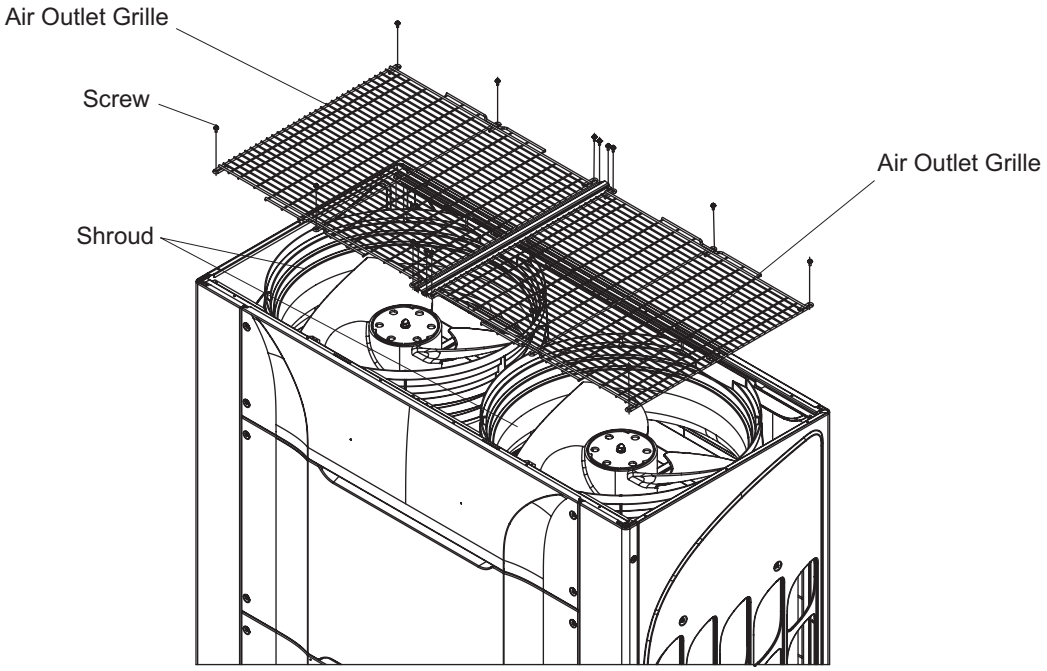
● RAS-8.0RNBCLQ/RAS-10RNBCLQ/RAS-12RNBCLQ



● RAS-14RNBCLQ/RAS-16RNBCLQ/RAS-18RNBCLQ



● RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ



⚠ WARNING

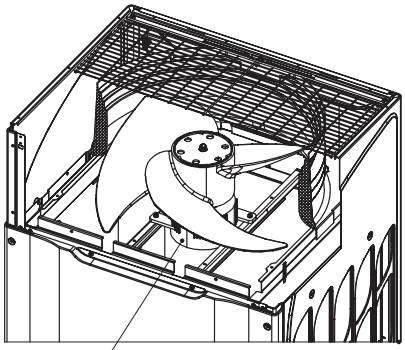
TURN OFF all power source switches.

2.7 Removing Outdoor Fan

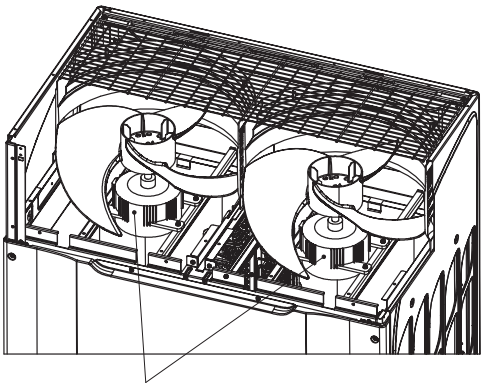
(1) Remove the air grille according to the item 2.6 “Removing Air Grille”.

Tool	Adjustable Wrench, Spanner, Puller, Phillips Screwdriver, Nippers, Box Wrench

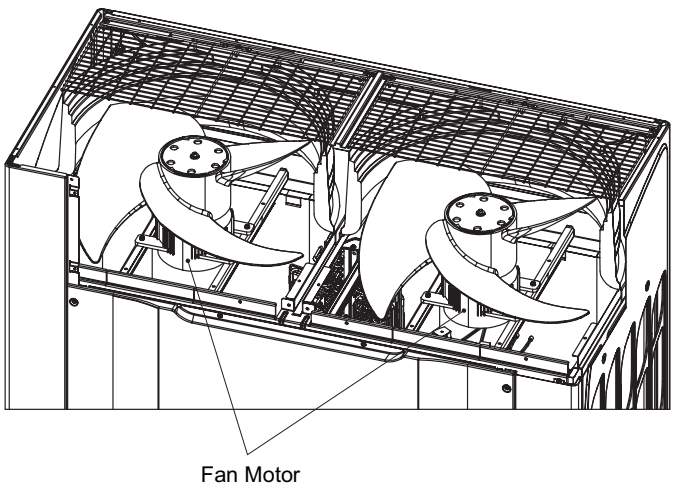
● RAS-8.0RNBCLQ/RAS-10RNBCLQ/RAS-12RNBCLQ



● RAS-14RNBCLQ/RAS-16RNBCLQ/RAS-18RNBCLQ



● RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ



⚠ WARNING

TURN OFF all power source switches.

(2) Remove the closing nut and the flat washer fixing the propeller fan onto the motor shaft with a box wrench.

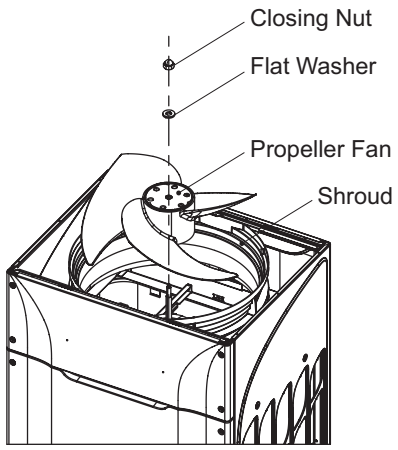
(3) Remove the propeller fan from the motor shaft (Lift the propeller fan up). When attaching the propeller fan to the motor shaft, make the D-Cut at the boss portion connected to the D-Cut of the fan motor shaft.

NOTE:

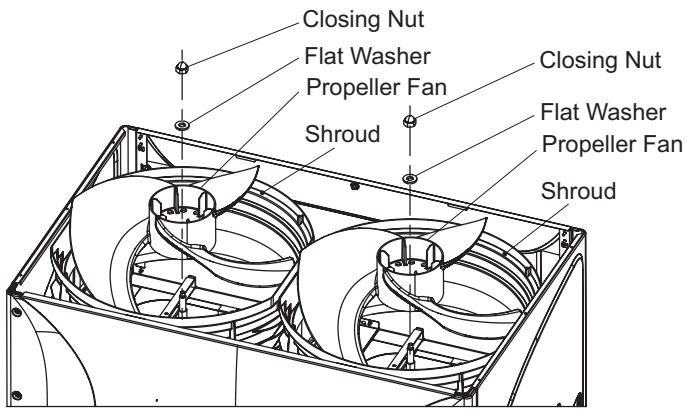
DO NOT apply an excessive force to the shroud (plastic part). Otherwise, deformation and breakage may occur.

Tool	Adjustable Wrench, Spanner, Puller, Phillips Screwdriver, Nippers, Box Wrench

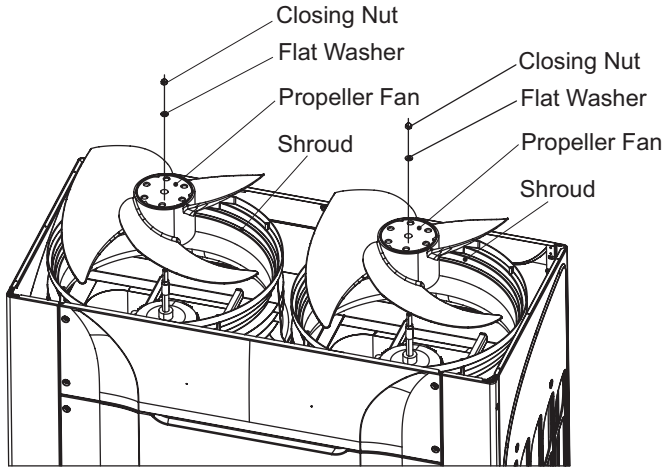
● RAS-8.0RNBCLQ/RAS-10RNBCLQ/RAS-12RNBCLQ



● RAS-14RNBCLQ/RAS-16RNBCLQ/RAS-18RNBCLQ



● RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ



⚠ WARNING

TURN OFF all power source switches.

(4) Removing Fan Motor Wiring

(a) Remove the service cover and the electrical box cover according to the item 2.1 “Removing Front Service Cover” and the item 2.4 “Removing Electrical Box Cover”.

(b) Disconnect the wiring connector for the fan motor in the electrical box.

(c) Unfix the wiring connecting the electrical box and the fan motor. Then cut the plastic tie fixing the piping insulation.

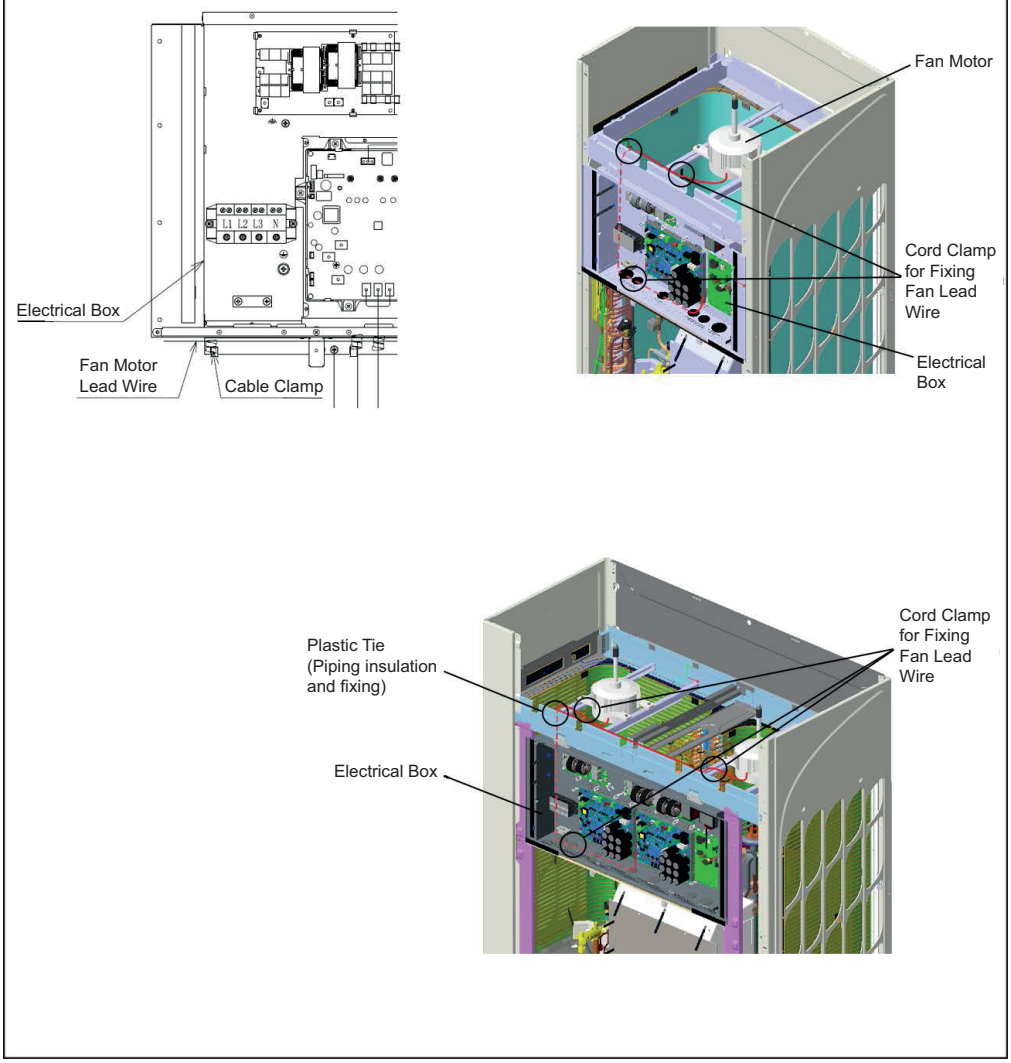
(d) Remove four M6 bolts fixing the fan motor, and remove the fan motor.

RAS-8.0~16RNBCLQ: 4 screws

RAS-18~24RNBCLQ: 8 screws

Adjustable Wrench, Spanner, Puller, Phillips Screwdriver, Nippers, Box Wrench

<380 - 415V 50/60Hz>



⚠ WARNING

TURN OFF all power source switches.

(5) When reassembling the outdoor unit fan, perform the procedures for removal in reverse.

NOTE:

1. Put the edge of the protection tube inside the electrical box when mounting the fan motor. (Make a wire trap.)
2. Fix the motor wiring to the motor clamp with a plastic tie to avoid contact with the propeller fan. Fix the piping insulation with plastic tie.
3. When mounting the propeller fan on the motor shaft, make the D-Cut at the boss portion ⊖ mark part) connected to the D-Cut of the fan motor shaft. Firmly fix the propeller fan with 30N•m torque after the head of the fan shaft comes up.

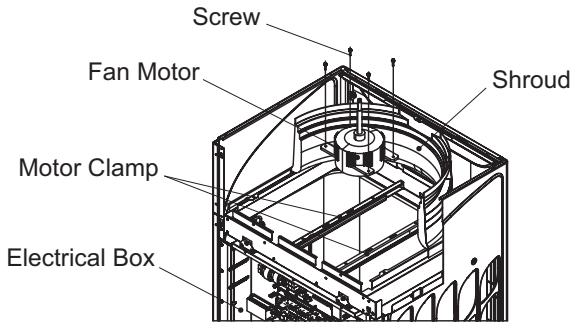
Torque for Tightening Propeller Fan
30N•m

4. Connect the wiring connector for the fan motor with the wiring connector in the electrical box.

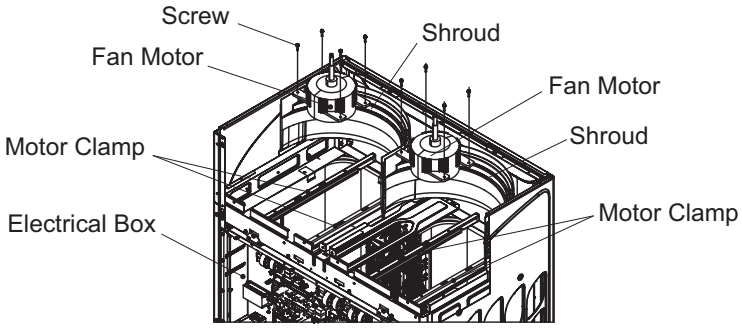
(6) After mounting the fan motor, check from above that gap between the propeller fan and the shroud is even.
Also check that there is no noise caused by contact between the propeller fan and the shroud during the propeller fan operation.

Tool	Adjustable Wrench, Spanner, Puller, Phillips Screwdriver, Nippers, Box Wrench

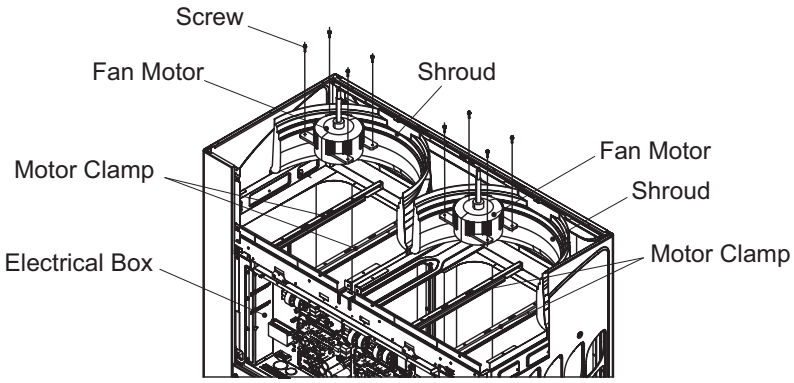
● RAS-8.0RNBCLQ/RAS-10RNBCLQ/RAS-12RNBCLQ



● RAS-14RNBCLQ/RAS-16RNBCLQ/RAS-18RNBCLQ



● RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ



⚠ WARNING

TURN OFF all power source switches.

2.8 Removing Compressor

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”. In the case that the outdoor unit is installed close to the wall, remove the refrigerant piping and move the outdoor unit away from the wall.

(2) Close the gas stop valve and the liquid stop valve.

(3) Collect the refrigerant in the outdoor unit from the low pressure check joint and the high pressure check joint. Check that the pressure does not increase at this time. If the pressure increase, collect all the refrigerant in the refrigerant cycle.

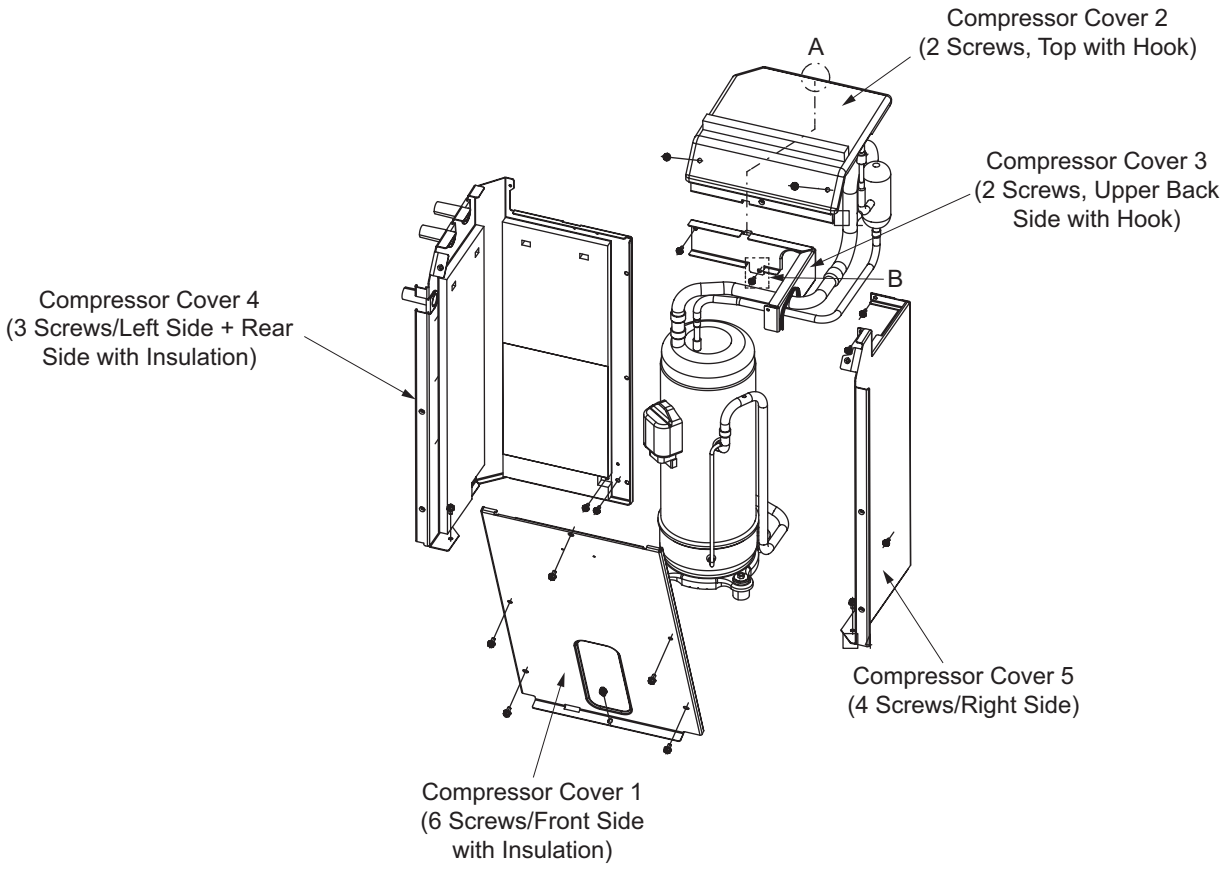
(4) Remove the compressor cover (C-cover) by following the numbers in the figure below.

NOTE:

1. Pay attention not to deform the piping around the compressor when removing the C-cover. It may cause the damage on brazing parts.
2. Be careful not to get injured by the sheet metal edge or heat exchanger fin when removing the Compressor’s cover.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Pilers, Burner(Welder), Pipe Cutter, Nippers

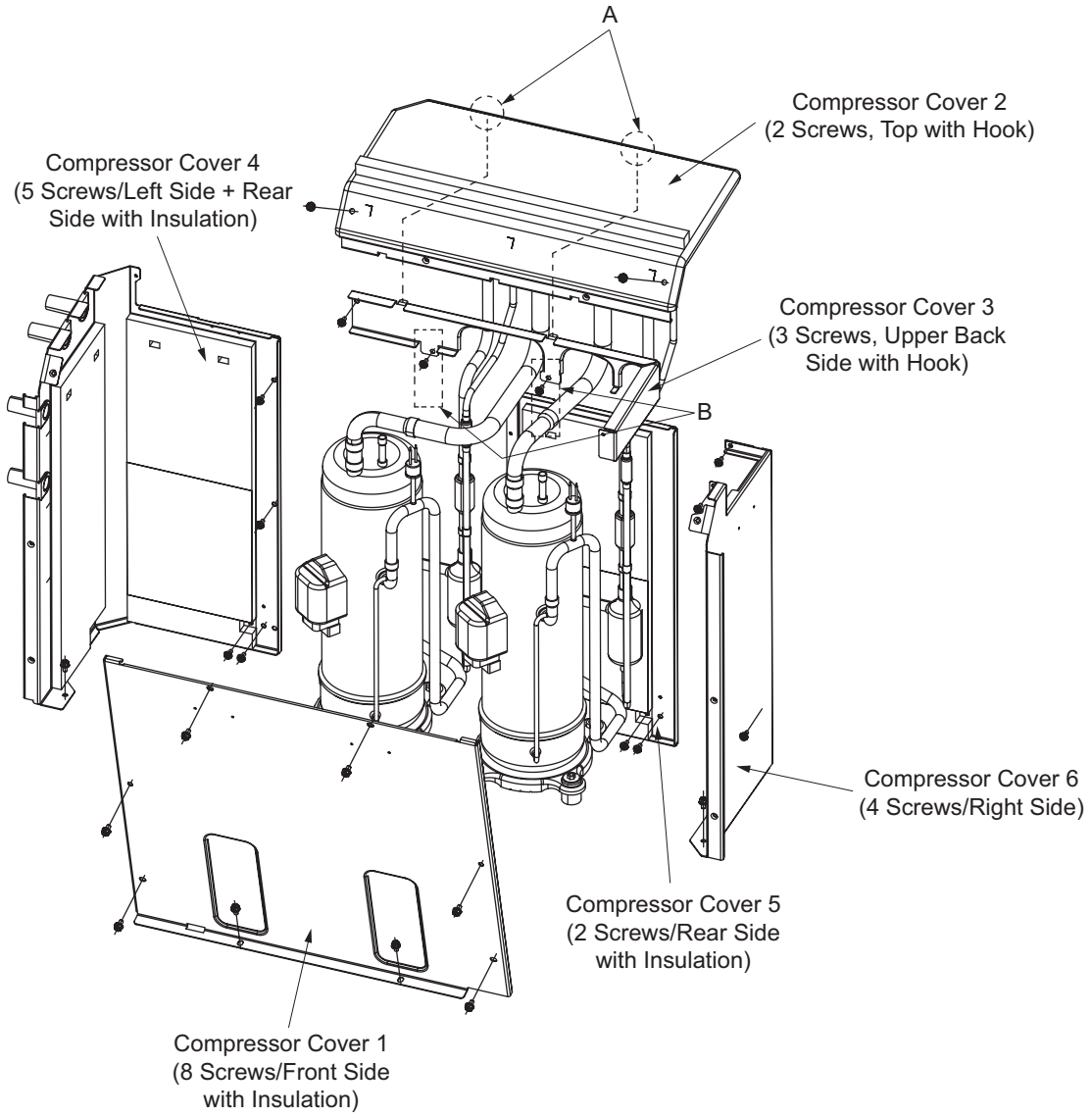
● RAS-8.0RNBCLQ/RAS-10RNBCLQ/RAS-12RNBCLQ
RAS-14RNBCLQ/RAS-16RNBCLQ



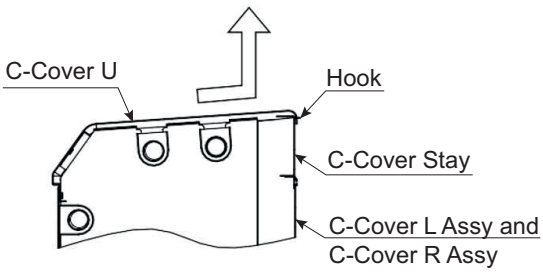
⚠ WARNING

TURN OFF all power source switches.

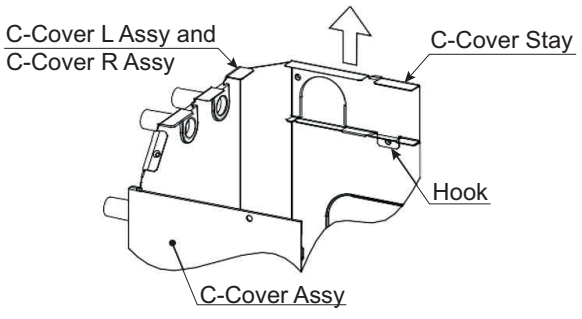
● RAS-18RNBCLQ/RAS-20RNBCLQ/RAS-22RNBCLQ/RAS-24RNBCLQ



Details of A
Hook of C-Cover Stay is hooked to the square hole of C-Cover U.
Lift up then remove C-Cover U.



Details of B
Hook of C-Cover Stay is inserted into the square hole of C-Cover L Assy and C-Cover R Assy.
Lift up then remove C-Cover Stay.



⚠ WARNING

TURN OFF all power source switches.

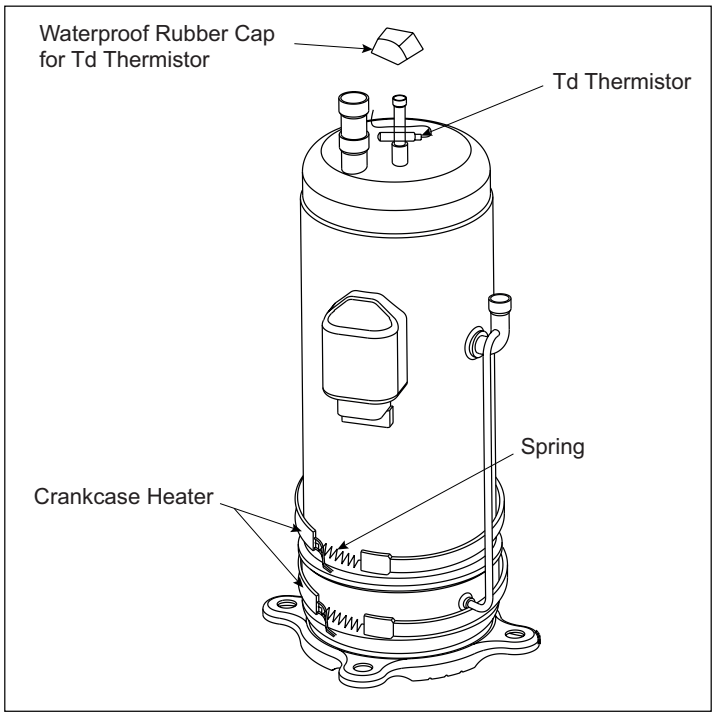
(5) Remove the Td thermistor on the top of the compressor.

(6) Release the spring for the crankcase heater to remove it.

NOTE:

The waterproof rubber cap will be used again when reassembling. Keep them in a container so that the parts are stored correctly.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Pilers, Burner(Welder), Pipe Cutter, Nippers



⚠ WARNING

TURN OFF all power source switches.

(7) Remove the terminal block box cover for the compressor and disconnect the wiring to the compressor terminals. Match the terminal numbers with the mark band numbers when reassembling. If wiring is connected incorrectly, the compressor may be damaged due to reverse rotation.

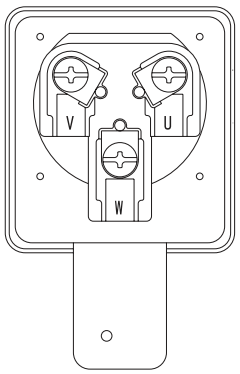
NOTE:

1. When replacing the compressor, check for the ring terminal condition. If the ring terminal is damaged, replace it with a new one.
2. Fix the wiring firmly with plastic ties.
3. Re-tighten the compressor screws after the replacement.

Type	Outdoor Unit Models	Inverter Compressor		
		380-415V 50/60Hz	AA50PHDG-D1Y2	DC80PHDG-D1Y2
Standard Type	RAS-8.0RNBCLQ		1	
	RAS-10RNBCLQ		1	
	RAS-12RNBCLQ			1
	RAS-14RNBCLQ			1
	RAS-16RNBCLQ			1
	RAS-18RNBCLQ		2	
	RAS-20RNBCLQ		2	
	RAS-22RNBCLQ			2
	RAS-24RNBCLQ			2

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Pilers, Burner(Welder), Pipe Cutter, Nippers

Details of Terminal Block Box



⚠ WARNING

TURN OFF all power source switches.

(8) Disconnect the discharge and suction pipes and the oil discharge pipe from the compressor. Check that the air pressure in the piping is equal to the atmospheric pressure. Then, cut the pipes at the closer position to the compressor from each brazing part. After cutting the pipes, remove the pipes from the brazing parts of the compressor.

NOTE:

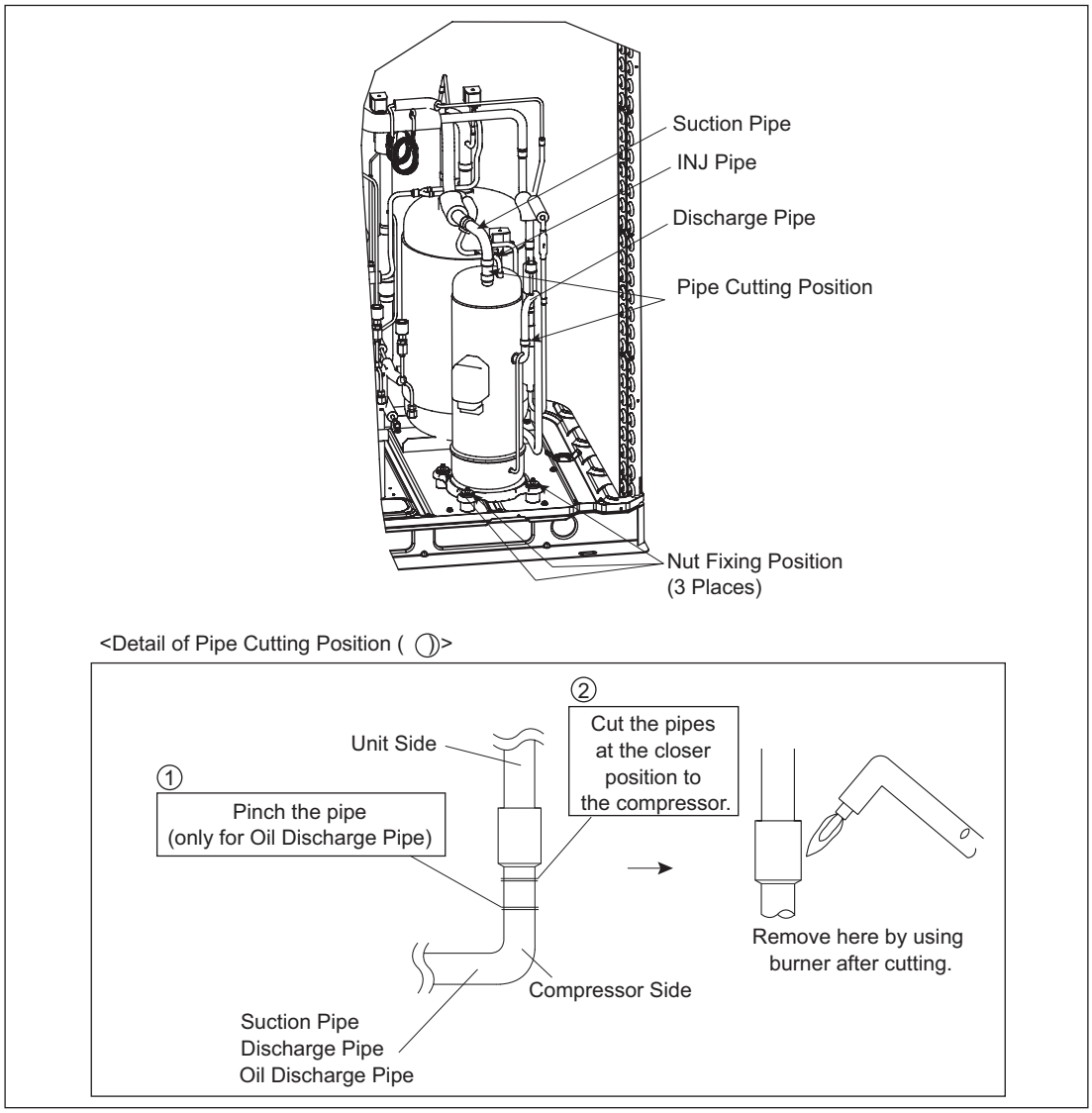
1. All the pipes are connected by brazing. When applying the burner to the pipe connections, the oil adhered inside the pipes may burn. Clear the flammable materials from around the compressor before starting the burner work.
2. Burner work under applying gas pressure is very dangerous. Make sure to cut the pipes first before starting the burner work.

(9) Disconnect the oil discharge pipe from the compressor. Before disconnecting it, pinch and cut the pipe at the closer position to the compressor from the brazing part so that the refrigerant oil remaining inside the compressor does not spill from the oil discharge pipe.

NOTE:

1. If the oil discharge pipe is disconnected without performing the above procedure (for example, applying burner directly to the brazing part), the refrigerant oil may spill from the oil discharge pipe and catch fire. Make sure to follow the procedure for safety.
2. When disconnecting the oil discharge pipe, use an oil pan in case the remaining refrigerant oil spills.
3. DO NOT throw out the oil collected in the oil pan. The oil quantity is measured afterward.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Pilers, Burner(Welder), Pipe Cutter, Nippers



⚠ WARNING

TURN OFF all power source switches.

(10) Remove three (3) nuts fixing the compressor and remove the compressor.

NOTE:

1. When removing the compressor, take special care not to contact with the surrounding pipes. If contacted, the pipes may be deformed.
2. Take special care not to be injured with the sheet metal edges while working.
3. When removing the compressor fixed with the oil discharge pipe, seal the pipe end with tapes so that the refrigerant oil remaining inside the compressor will not spill out from the oil discharge pipe.
4. To prevent water and foreign particles entering the refrigerant cycle, mount the new compressor immediately after removing the old one.
5. When removing the compressor, remove the electrical box located above the compressor to make the work easier. The box wrench (10 mm) is required to remove the nuts fixing the compressor.

(11) Take the remaining refrigerant oil in the compressor from the discharger pipe and measure the oil quantity.

NOTE:

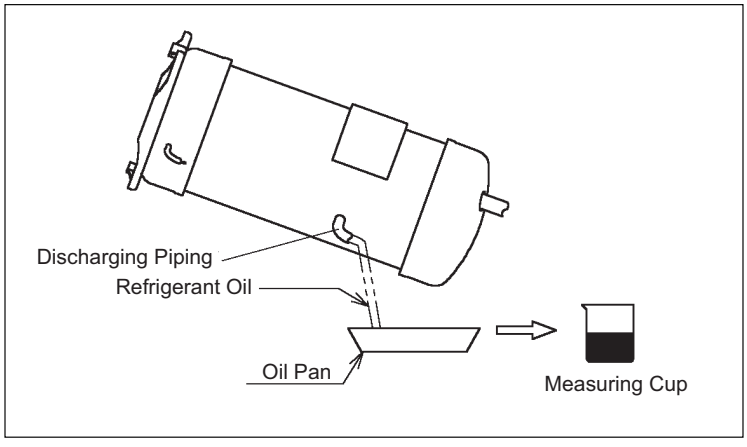
1. Additional refrigerant oil charge is required if remaining refrigerant oil quantity in the old compressor is more than the pre-charged refrigerant oil in the new compressor.
2. No additional oil charge is required if remaining refrigerant oil quantity in the old compressor is less than the pre-charged refrigerant oil in the new compressor.
3. The recharged quantity of the refrigerant oil to the cycle is calculated as follows: (Remaining quantity in the old compressor + Collected quantity + 200cc *1)) - (Initial charged quantity in the compressor for each model)

Compressor	Initial Charged Refrigerant Oil
AA50PHDG-D1Y2	1100cc
DC80PHDG-D1Y2	1100cc

*1): This value (200cc) is considered not to be removed from the chamber.

1. If the refrigerant oil is contaminated, exchange all with new refrigerant oil. (Refer to the item 2.9 for the detail of refrigerant oil replacing procedure).

Tool	Oil Pan, Measure Cup



(12) Mount the new compressor. When attaching the nut at the front side, take care not to deform the oil discharge pipe.

NOTE:

When mounting the new compressor on the base, take special care not to contact with piping. If contacted, piping may be deformed.

⚠ WARNING

TURN OFF all power source switches.

(13) File away brazing material remaining on the end of the refrigerant pipes (refer to the figure 1).

1. Be careful that filed brazing material does not enter the pipes.
2. Insert the pipes fully in to prevent brazing material from entering them (refer to figure 2).
3. Refer to the table 1 for the recommended amount of brazing material. If using more brazing material than the recommended amount, brazing material may drop into the pipes. When brazing the pipes, prevent oxidized scale formation by nitrogen substitution.
4. Perform brazing work according to the following order.
   (a) Oil Discharge Pipe
   (b) Discharge Pipe
   (d) Suction Pipe

NOTE:

1. For piping connection, perform securely non-oxidation brazing with nitrogen substitution. If brazing the pipes without the nitrogen substitution, a large amount of oxidized scale will be generated in the pipes. This oxidized scale may cause clogging in the expansion valve, solenoid valve, accumulator and compressor, which can prevent the unit from operating properly.
2. Do not use field-supplied antioxidant, etc., which may corrode pipes and deteriorate the refrigerant oil.
3. Connect the charging hose with the check joint at the low pressure side to release pressure.
4. When brazing the suction pipe, make sure that the connecting part is firmly inserted into the compressor and piping root is cooled, in order to prevent the brazing material entering the compressor.

Tool	Burner, Wet Cloth, Pliers

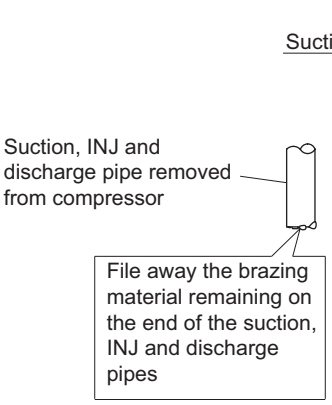


Fig.1 Brazing material Treatment

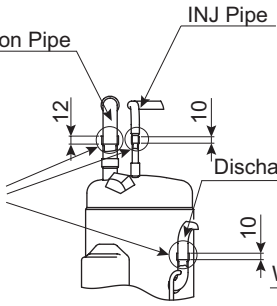


Fig. 2 Dimension of Piping connection

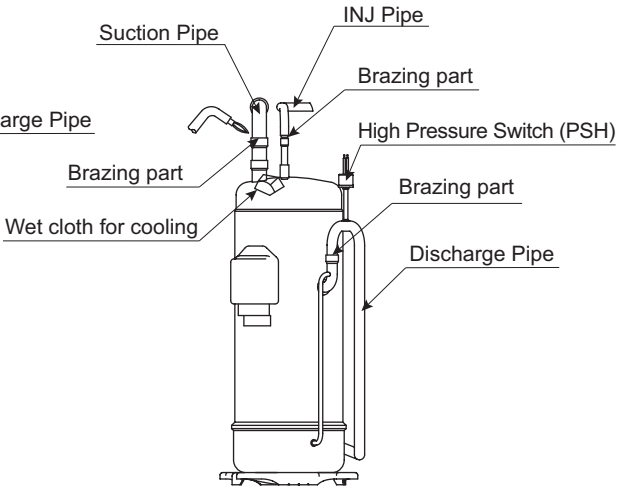


Fig. 3 Welding Portions

Thickness of Brazing Material	Piping Diameter (Refrigerant Cycle Side)						
	ϕ6.4	ϕ9.5	ϕ12.7	ϕ15.9	ϕ19.1	ϕ22.2	ϕ28.2
ϕ1.6mm	25mm	30mm	35mm	75mm	100mm	110mm	225mm
ϕ2.0mm	15mm	15mm	20mm	45mm	55mm	70mm	135mm
ϕ2.4mm	10mm	10mm	15mm	30mm	35mm	45mm	90mm

⚠ WARNING

TURN OFF all power source switches.

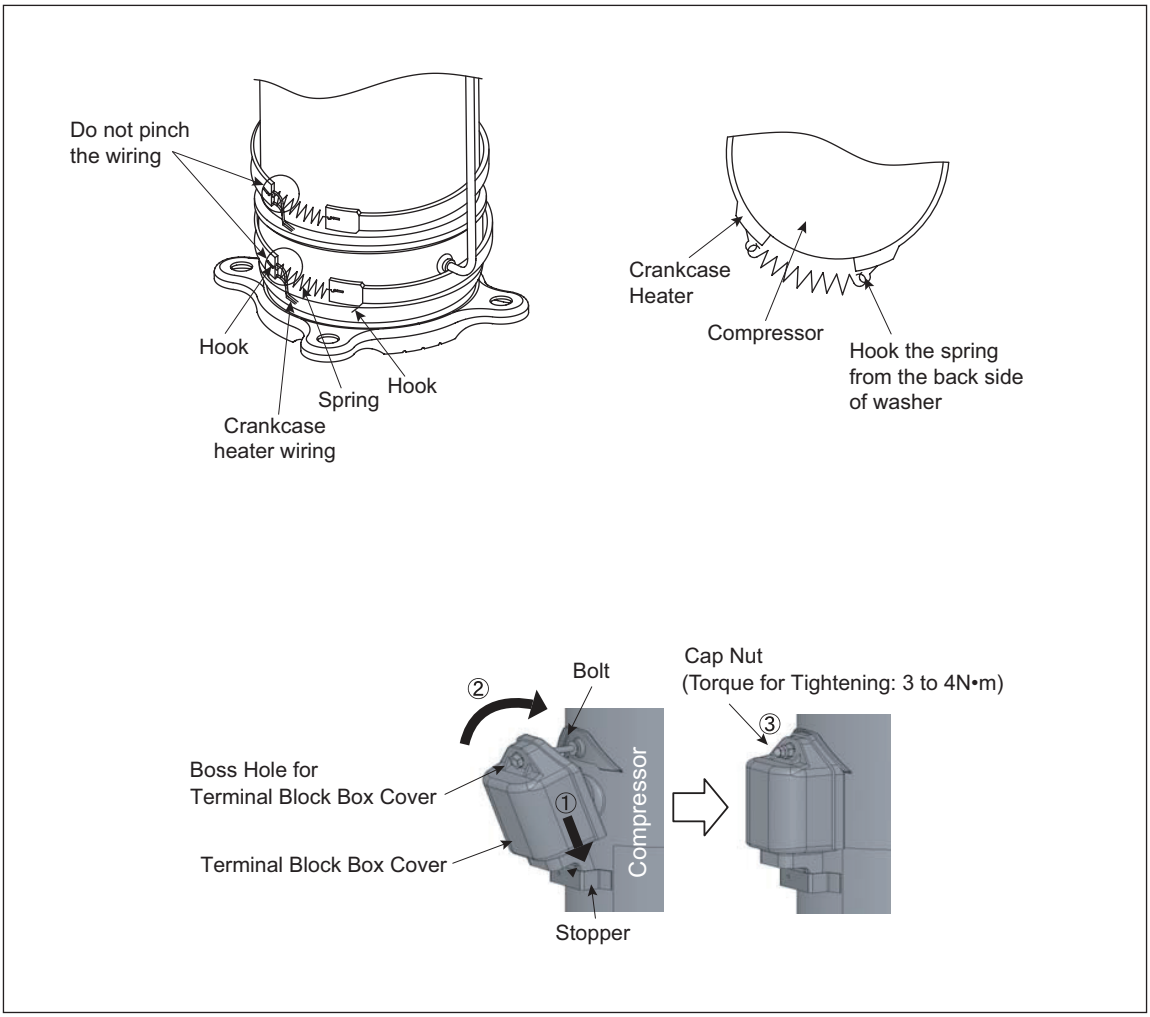
(14) Wind the crankcase heater around the compressor. Each crankcase heater shall be apart approximately 20mm.

(15) Reassemble the compressor cover (C-cover) using reverse procedure of the item 2.8 “Removing Compressor”, (2).

(16) Reconnect all wiring according to the procedure on the following pages.

NOTE:

If power line or the crankcase heater lead line touches a high temperature part such asoil discharge pipe of compressor chamber, the wiring may be cut or fired.
Check that the all wiring not contact with the compressor, pipe and the edge of the sheet metal.
If contact, wiring may be cut or fired.



NOTE:

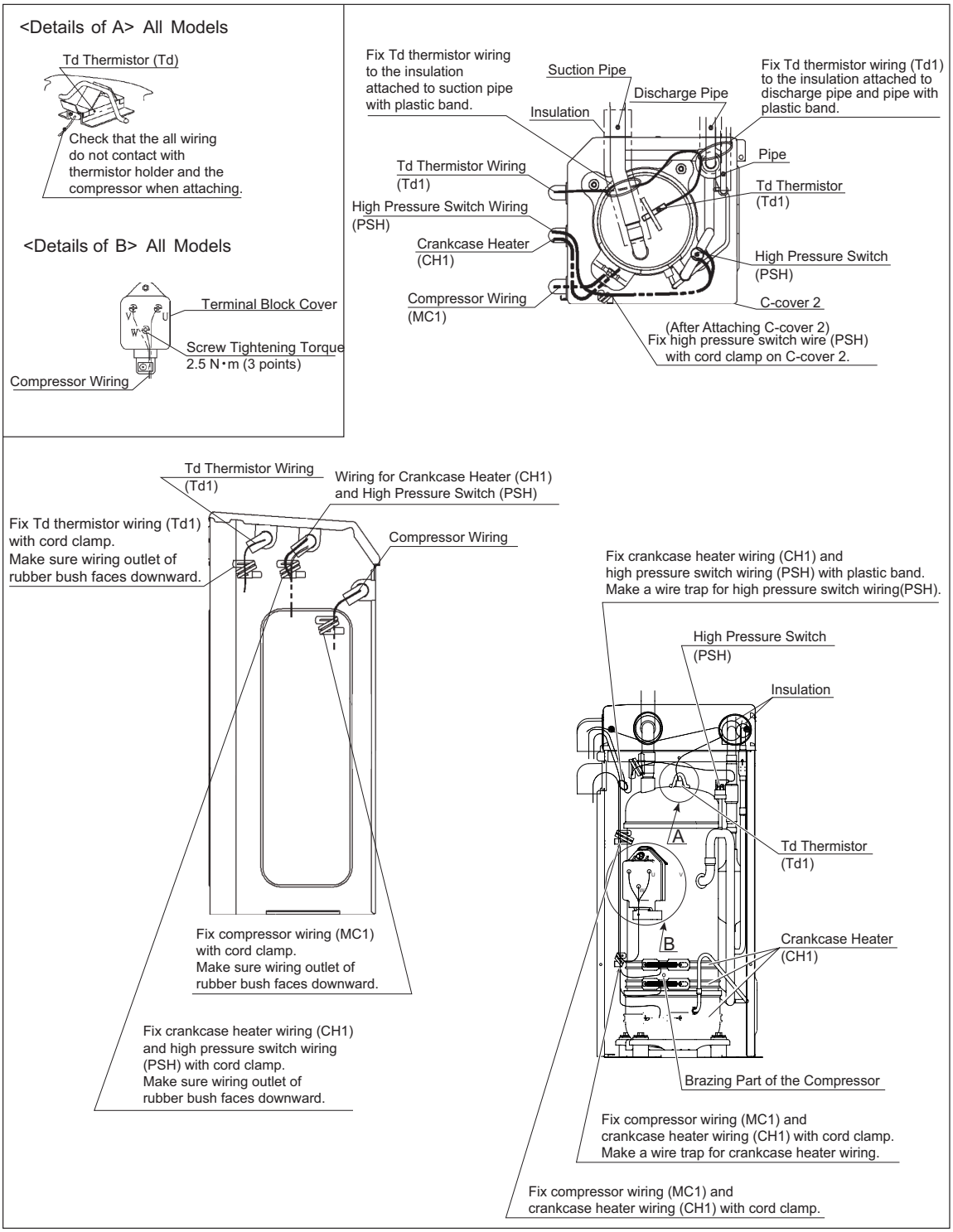
1. Attach the crankcase heater firmly to the compressor and fix it with springs as shown in the figure.
2. If there is clearance between the crankcase heater and the compressor due to wiring overlapping, excessive heat will be generated there. Then crankcase heater may break down due to overheating. When mounting the reassembled crankcase heater, this point should be considered.
3. If the crankcase heater wiring catches on the springs, the wiring may be cut due to vibration. When reassembling the crankcase heater, attention should be paid to the wiring.

⚠ WARNING

TURN OFF all power source switches.

● RAS-8.0~16RNBCLQ

Tool	Adjustable Wrench or Spanner, Burner (Welder), Pipe Cutter

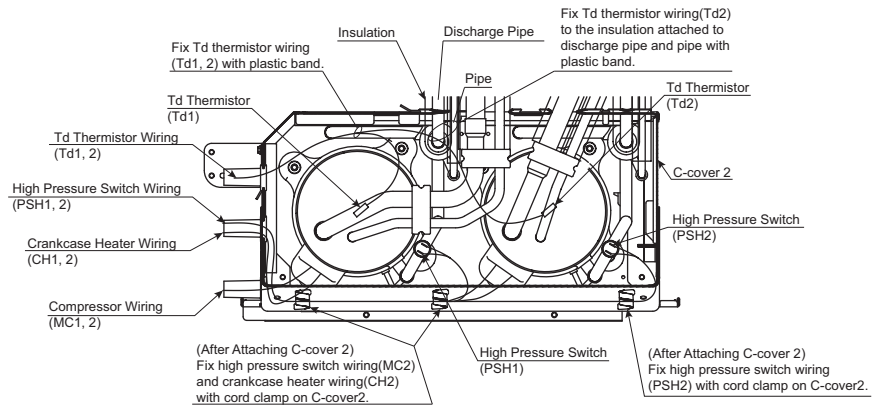


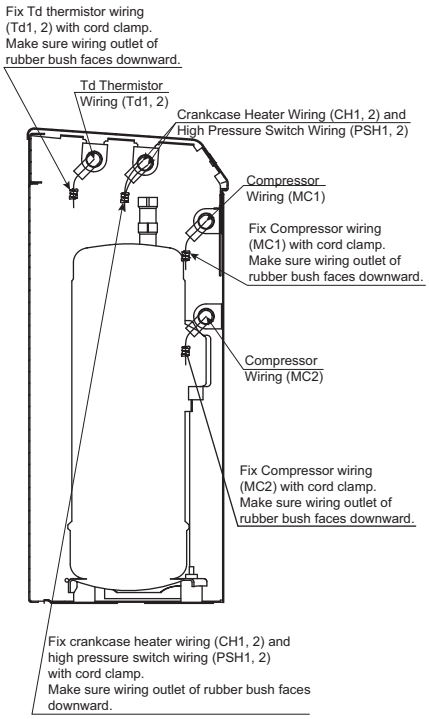
⚠ WARNING

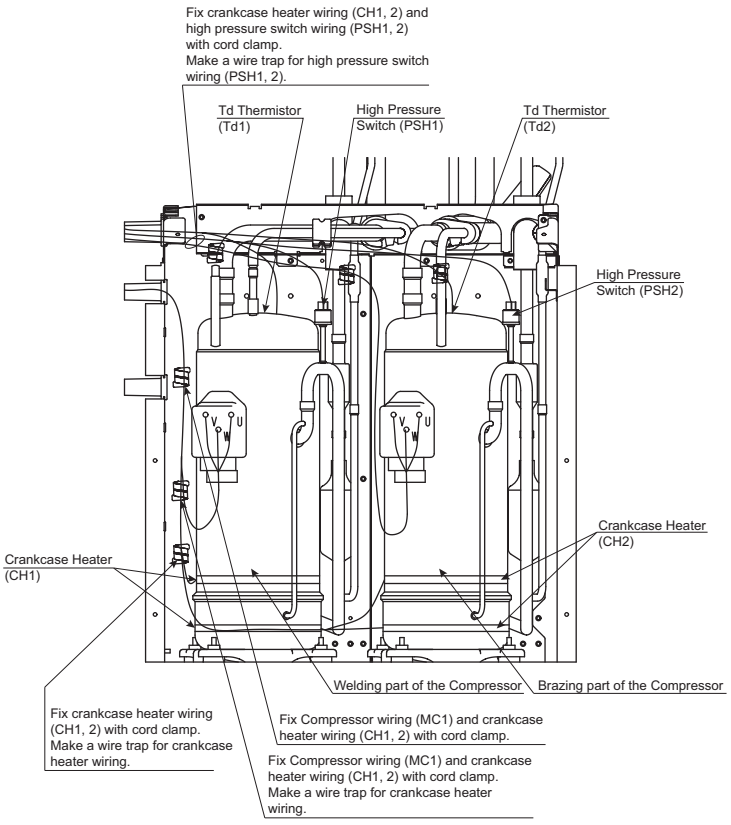
TURN OFF all power source switches.

● RAS-18~24RNBCLQ

Tool	Adjustable Wrench or Spanner, Burner (Welder), Pipe Cutter







⚠ WARNING

TURN OFF all power source switches.

2.9 Removing Thermistor for Liquid Pipe

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Remove the electrical box cover according to the item 2.4 “Removing Electrical Box Cover”.

(3) Remove the butyl sheet. Then, remove the thermistor for the liquid pipe by pulling out the thermo-clip from the pipe.

NOTE:

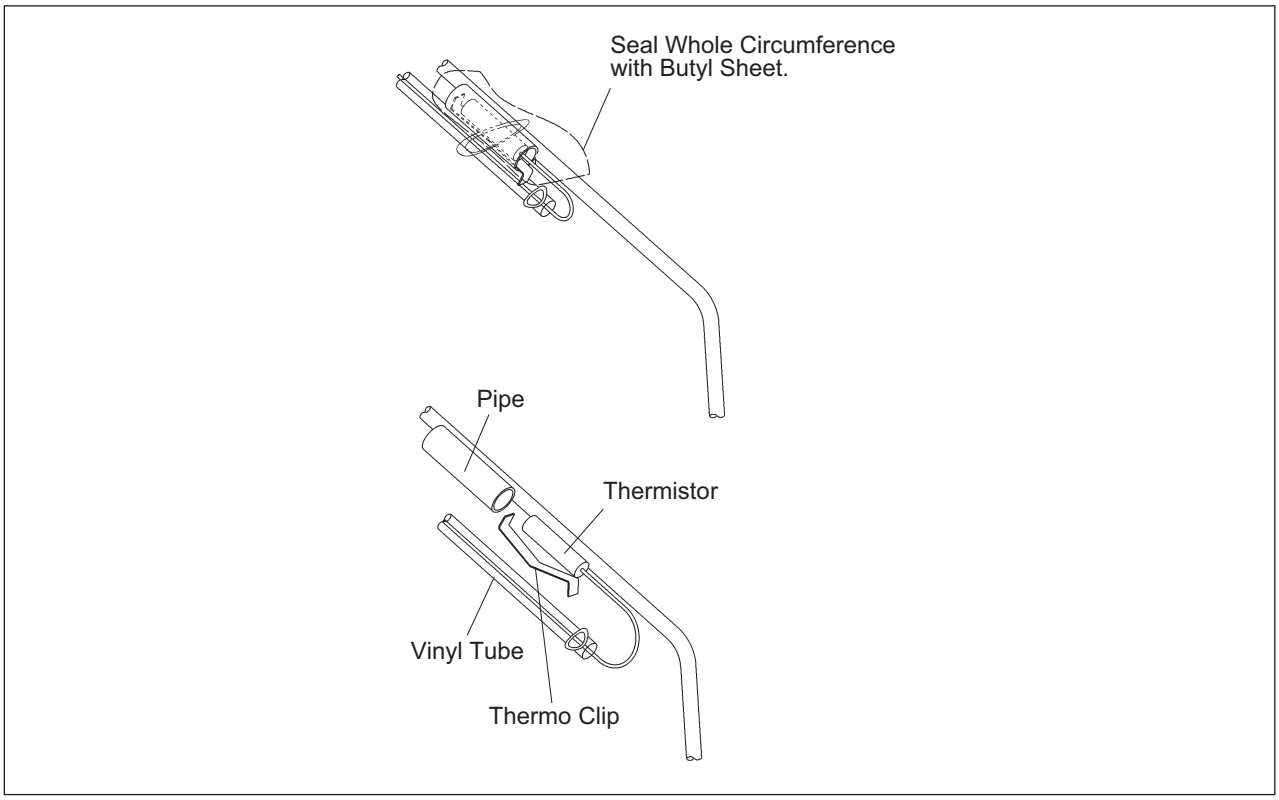
When removing the thermistor for the liquid pipe, take special care not to cause damage to your hands or the thermistor with the valve support fixing the stop valve.

(4) Reassemble the thermistor for liquid pipe in the reverse procedure.

NOTE:

When reassembling the thermistor, fix the thermistor with the vinyl pipe end downwards to prevent water from entering the pipe.

Tool	Wet Cloth, Burner, Pliers, Phillips Screwdriver, Nippers



⚠ WARNING

TURN OFF all power source switches.

2.10 Removing Thermistor for Ambient Temperature

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Remove the electrical box cover according to the item 2.4 “Removing Electrical Box Cover”.

(3) Remove the upper cover according to the item 2.3 “Removing Upper Cover”.

(4) Remove the screws fixing the container for the thermistor to the outdoor unit side cover. Hold the container and lift it upward. Remove the container from the hook on the outdoor unit side cover.

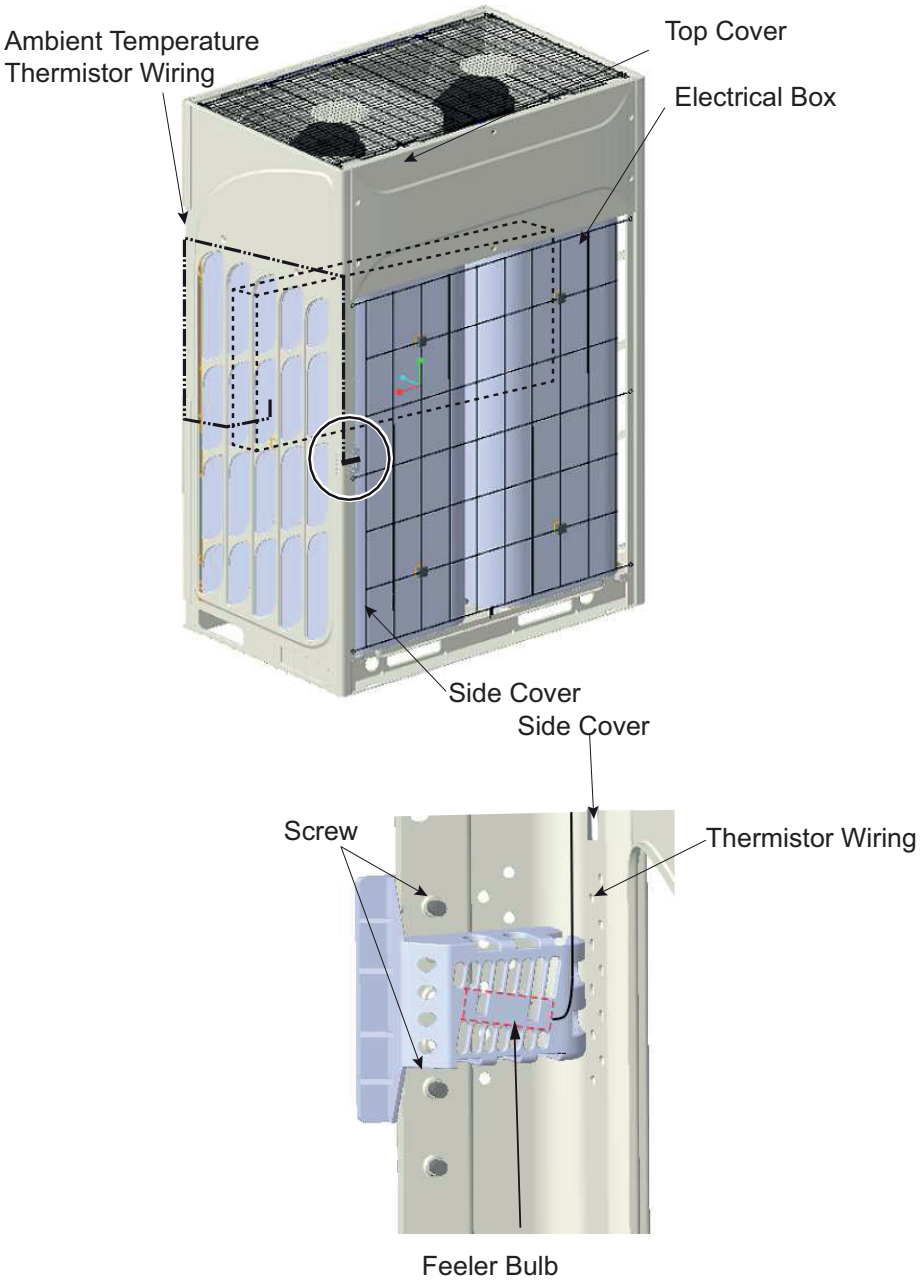
(5) Remove the feeler bulb of the thermistor from the container for the thermistor.

(6) Thermistor wiring is fixed at the heat changer, piping’s and such. Remove the fixing clamps for the wiring.

(7) Reassemble the thermistor for ambient temperature in the reverse procedure.

Tool	Phillips Screwdriver, Nippers

<Thermistor Position for Ambient Temperature (Example: RAS-16RNBCLQ)>



⚠ WARNING

TURN OFF all power source switches.

2.11 Removing other electrical components

NOTE:

1. When replacing the components of the radiation fin such as Inverter PCB (INV) and Main Power PCB (PCB2), apply conductive silicon grease slightly over the contact surface of the fin.
2. When reassembling the electrical components, match the terminal numbers with the mark band numbers.
   If incorrectly connected, malfunction may occur or the electrical components may be damaged.
3. When fixing PCBs or sheet metals for outdoor unit PCB, protect the electric wiring from caught on the sheet metals or the electrical components.
4. Make sure to use screws, bushes and collars when fixing inverter PCBs.
   If not, it may cause equipment malfunction.
5. When replacing the outdoor unit PCB and inverter PCB, set the dip switches the same as before replacing the PCBs. An incorrect setting will cause malfunction. Refer to the instruction manual attached to servicing outdoor unit PCB.
6. Do not apply an excessive force to the electrical components on PCBs or PCBs themselves. It may lead to PCBs failure.

2.11.1 Removing Outdoor Unit PCB and Electrical Components for Electrical Box

< Removing Outdoor Unit PCB >

(1) Remove all the connectors for wiring connected to the outdoor unit PCB.

(2) Hold the convex part of the holder fixing the outdoor unit PCB (10 portions) with a long-nose pliers and pull it out to remove.

< Removing Electrical Components >

(1) Remove all the wiring connected with the electrical components.

(2) Remove the screws fixing the electrical components.

NOTE:

Do not touch the electrical components on the outdoor unit PCBs while LED (red) of the PCB is ON to avoid electrical shock.
Do not bend or apply an excessive force to the outdoor unit PCB. Otherwise, it may cause outdoor unit PCB failure.

NOTE:

1. When reassembling the electrical components, match the terminal numbers with the mark band numbers. If incorrectly connected, malfunction may occur or the electrical components may be damaged.
2. When closing the outdoor unit PCB fixing plate for reassembly, protect the cables from catching on the plate edges or electrical components.
3. The capacitor can also be stored with electricity even when the power source is turned off. DO NOT touch the terminals, to avoid an electrical shock.

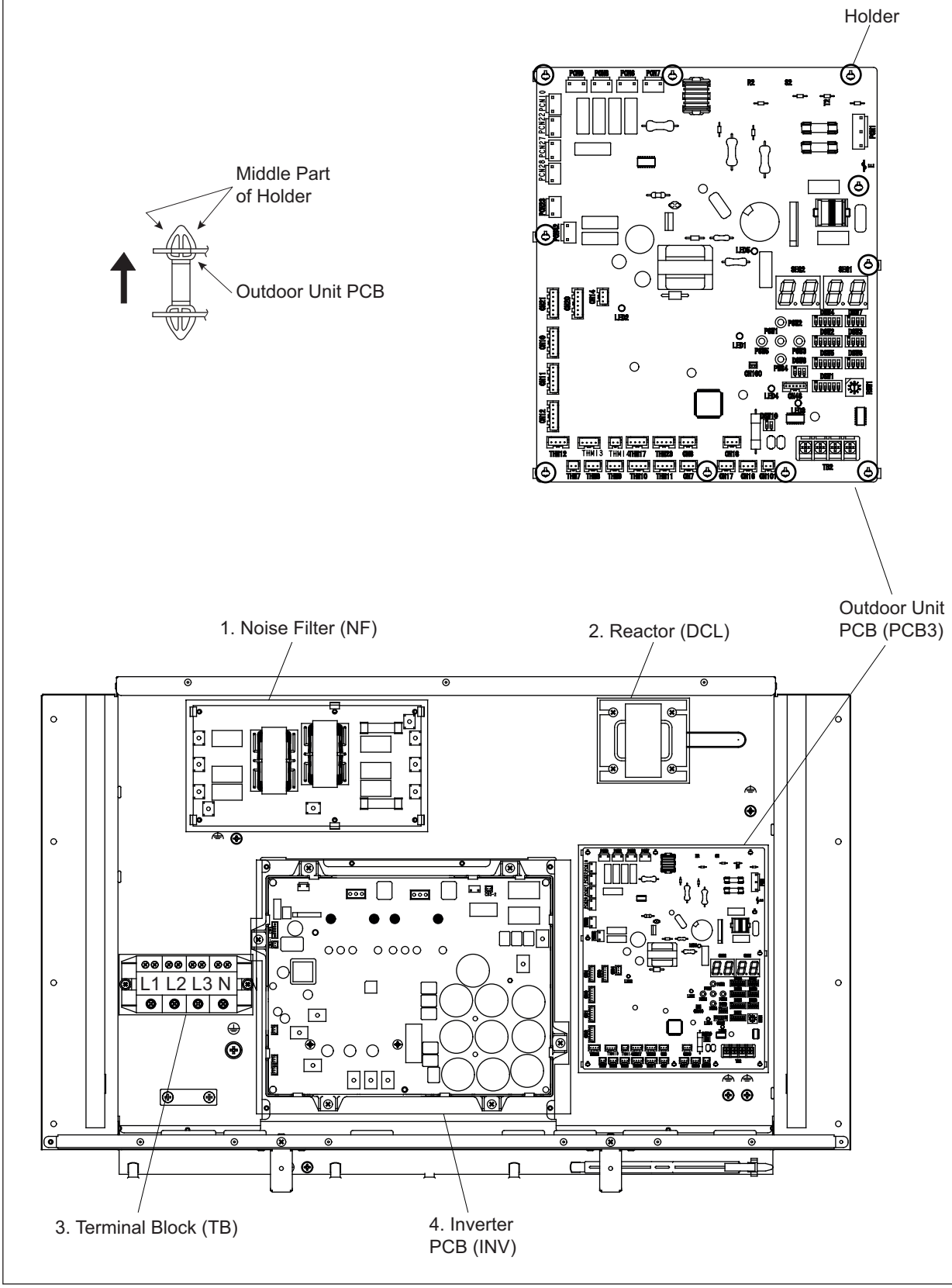
⚠ WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

<380 - 415V 50/60Hz>

RAS-8.0-12RNBCLQ



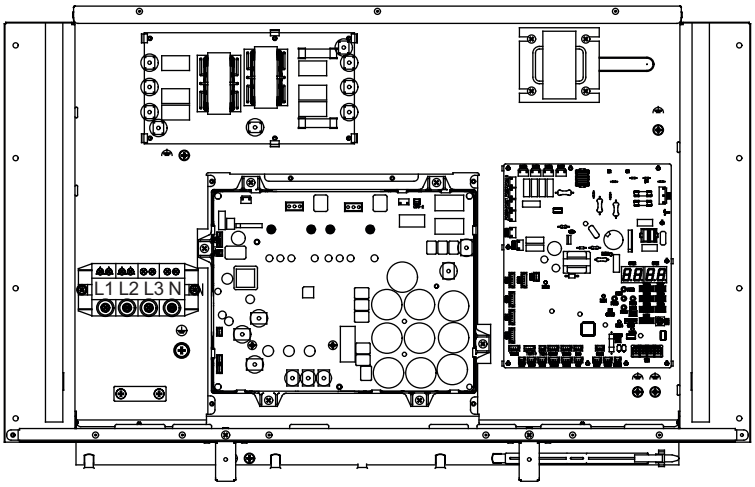
WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

<380 - 415V 50/60Hz>

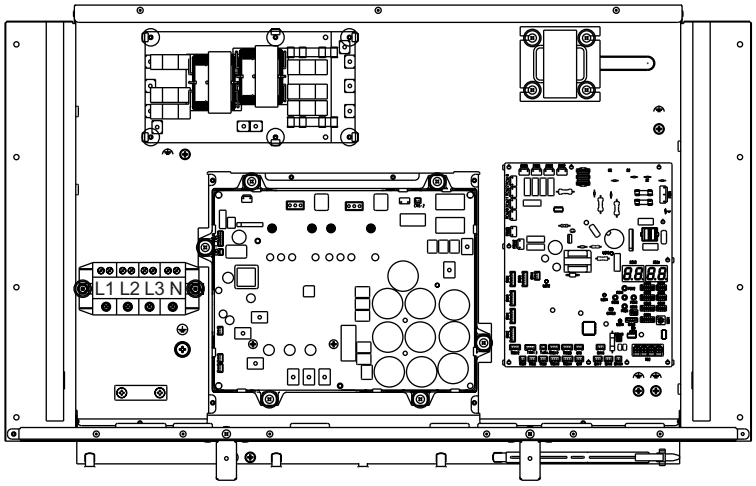
Remove the wiring connected to each electrical component.



○: Fixing Screw for Wire (M4)
△: Fixing Screw for Wire (M5)
O: Fixing Screw for Wire (M8)

1. Noise Filter (NF)
   Fixing Screw (M4) for wire (Nine portions)
3. Terminal Block (TB)
   Fixing Screw (M5) for wire (four portions)
   Fixing Screw (M8) for wire (four portions)
4. Inverter PCB (INV)
   Fixing Screw (M4) for wire (eight portions)

Remove the screws fixing the electrical components to the electrical box.



○: Fixing Holder
O: Fixing screw for part

1. Noise Filter (NF)
   Fixing Holder (six portions)
2. Reactor (DCL)
   Fixing Screw for part (M4) (four portions)
3. Terminal Block (TB)
   Fixing Screw for part (M5) (two portions)
4. Inverter PCB (INV)
   Fixing Screw for part (M4) (six portions)

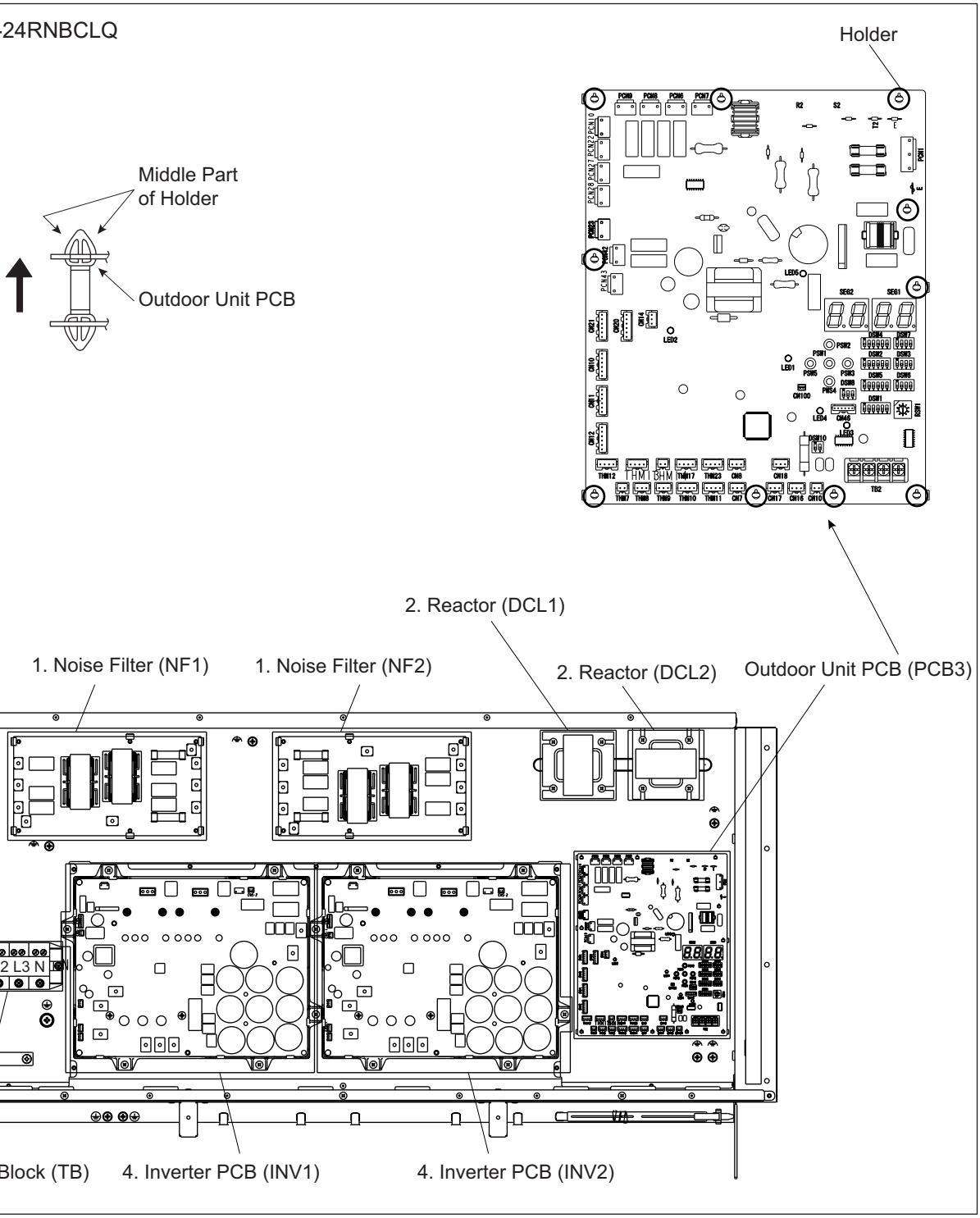
⚠ WARNING

TURN OFF all power source switches.

<380 - 415V 50/60Hz>

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

RAS-18-24RNBCLQ



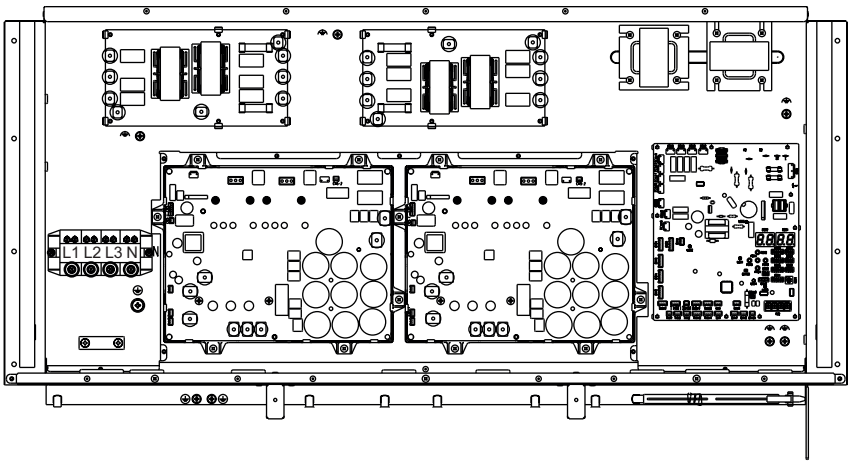
⚠ WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

<380 - 415V 50/60Hz>

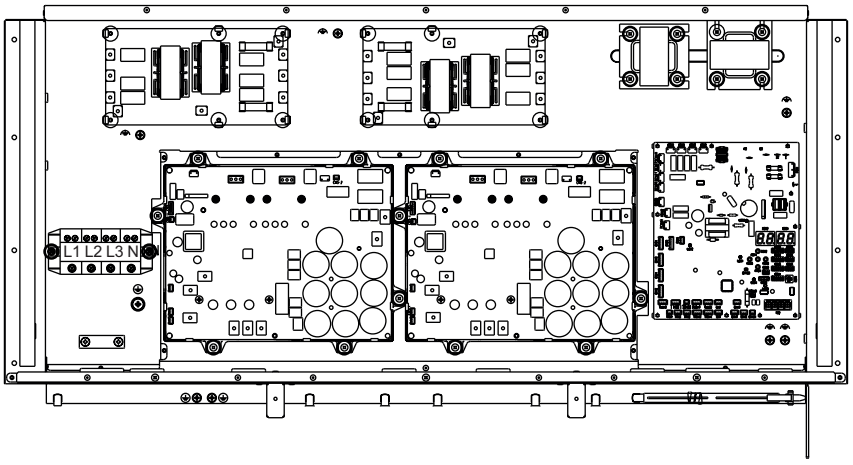
Remove the wiring connected to each electrical component.



○ : fixing screw for wire(M4)
△ : fixing screw for wire(M5)
O : fixing screw for wire(M8)

1. Noise Filter (NF1, 2)
   Fixing Screw (M4) for Wire (18 portions)
3. Terminal Block (TB1)
   Fixing Screw (M5) for Wire (eight portions)
   Fixing Screw (M8) for Wire (four portions)
4. Inverter PCB (INV1,2)
   Fixing Screw (M4) for Wire (16 portions)

Remove the screws fixing the electrical components to the electrical box.



○ : Fixing Holder
O : Fixing Screw for Part

1. Noise Filter (NF1, 2)
   Fixing Holder (12 Portions)
2. Reactor (DCL1, 2)
   Fixing Screw for Part (M4) (eight portions)
3. Terminal Block (TB1)
   Fixing Screw for Part (M5) (two portions)
4. Inverter PCB (INV1, 2)
   Fixing Screw for Part (M4) (12 Portions)

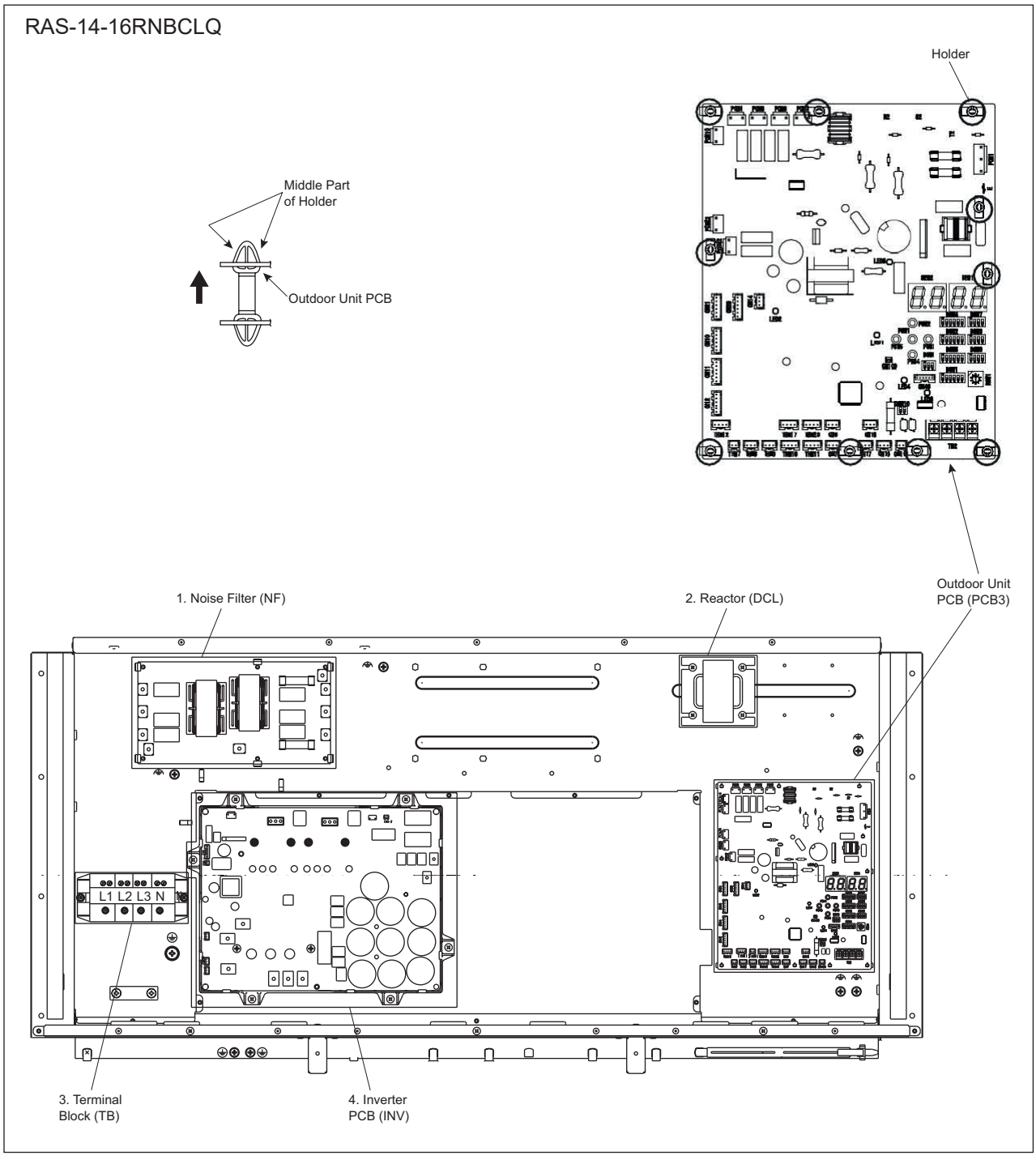
WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

<380 - 415V 50/60Hz>

RAS-14-16RNBCLQ



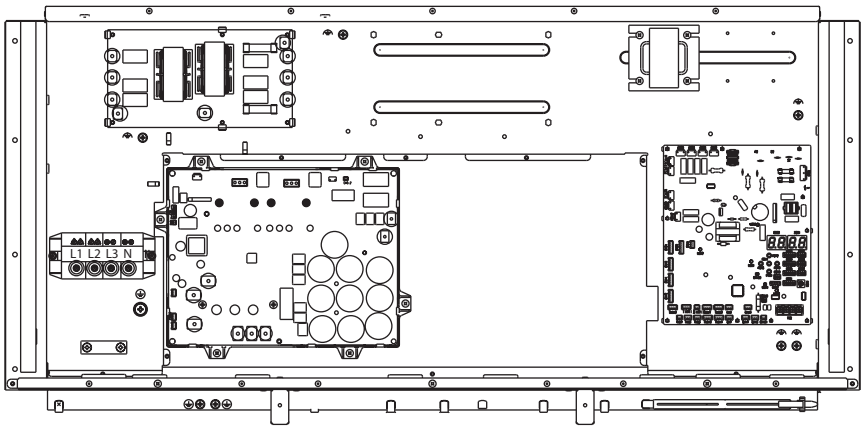
WARNING

TURN OFF all power source switches.

<380 - 415V 50/60Hz>

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

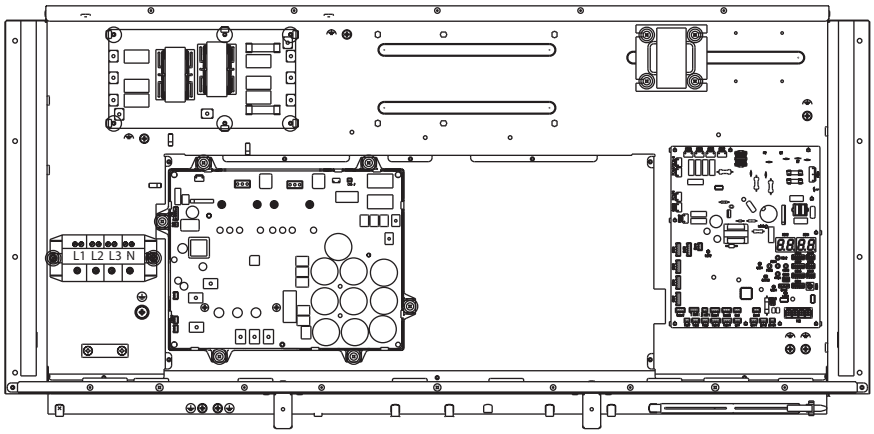
Remove the wiring connected to each electrical component.



○ : Fixing Screw for Wire (M4)
△ : Fixing Screw for Wire (M5)
O : Fixing Screw for Wire (M8)

1. Noise Filter (NF)
   Fixing Screw (M4) for Wire (9 portions)
3. Terminal Block (TB)
   Fixing Screw (M5) for Wire (4 portions)
   Fixing Screw (M8) for Wire (4 portions)
4. Inverter PCB (INV)
   Fixing Screw (M4) for Wire (8 portions)

Remove the screws fixing the electrical components to the electrical box.



○ : Fixing Holder
O : Fixing Screw for Part

1. Noise Filter (NF)
   Fixing Holder (6 portions)
2. Reactor (DCL)
   Fixing Screw for Part (M4) (4 portions)
3. Terminal Block (TB)
   Fixing Screw for Part (M5) (2 portions)
4. Inverter PCB (INV)
   Fixing Screw for Part (M4) (6 portions)

⚠ WARNING

Turn OFF all power source switches.
Do not touch any electrical components while LED401 (Red) on Inverter PCB is ON.
Otherwise, an electric shock will occur.

2.11.2 Removing Inverter PCB

(1) Disconnect all the wiring on the Inverter PCB.

U1, V1, W1, CN206, CN207, CN801, CN901, CN5, PCN2 and PCN331

NOTE:

CN206, CN207, CN5 and PCN2 may not be connected to same models.

(2) Disconnect all the terminal blocks on the Inverter PCB.

DCL1, DCL2, U0,V0,W0, R, S and T

(3) After removing screws (◎) portions, remove the inverter PCB.

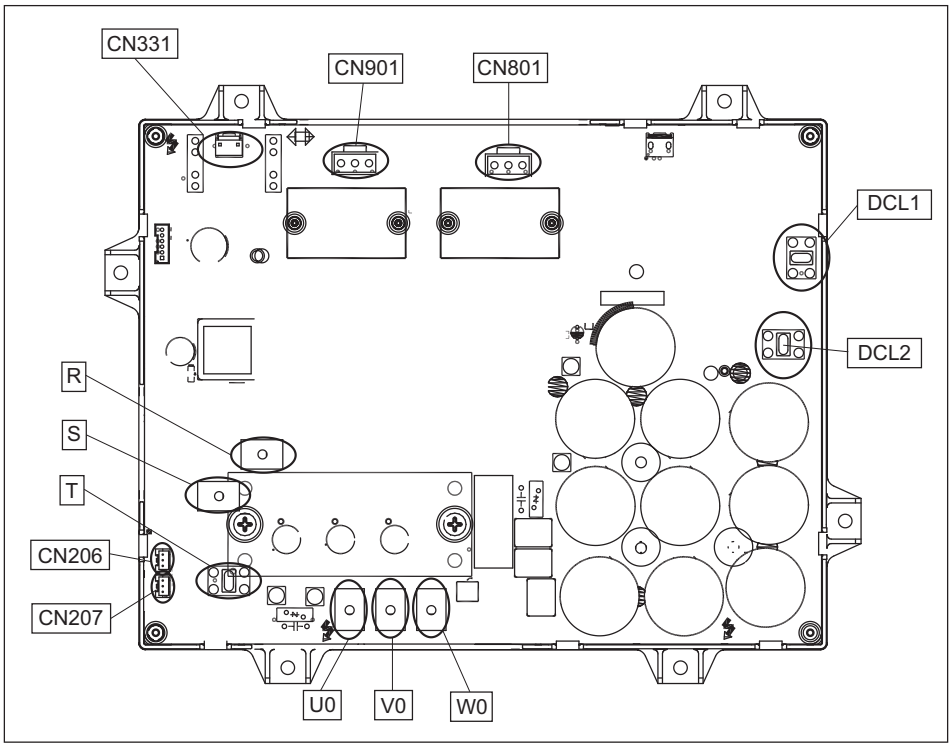
NOTE:

Do not touch any electrical components while LED401 (red) of inverter PCB is ON. Otherwise, it may lead to an electrical shock.

NOTE:

- When reassembling the electrical components, match the terminal numbers with the mark numbers. If incorrectly connected, malfunction may occur or the electrical components may be damaged.
- When closing the outdoor unit PCB fixing plate for reassembly, protect the cables from catching on the plate edges or electrical components.

Tool	Phillips Screwdriver



⚠ WARNING

Turn OFF all power source switches.
Do not touch any electrical components while LED401 (Red) on Inverter PCB is ON.
Otherwise, an electric shock will occur.

2.11.3 Removing Inverter PCB from Radiation Fin

When removing or mounting the inverter PCB from / to radiation fin, refer to the item 3.2.1 “Arrangement of Inverter Power Unit.”

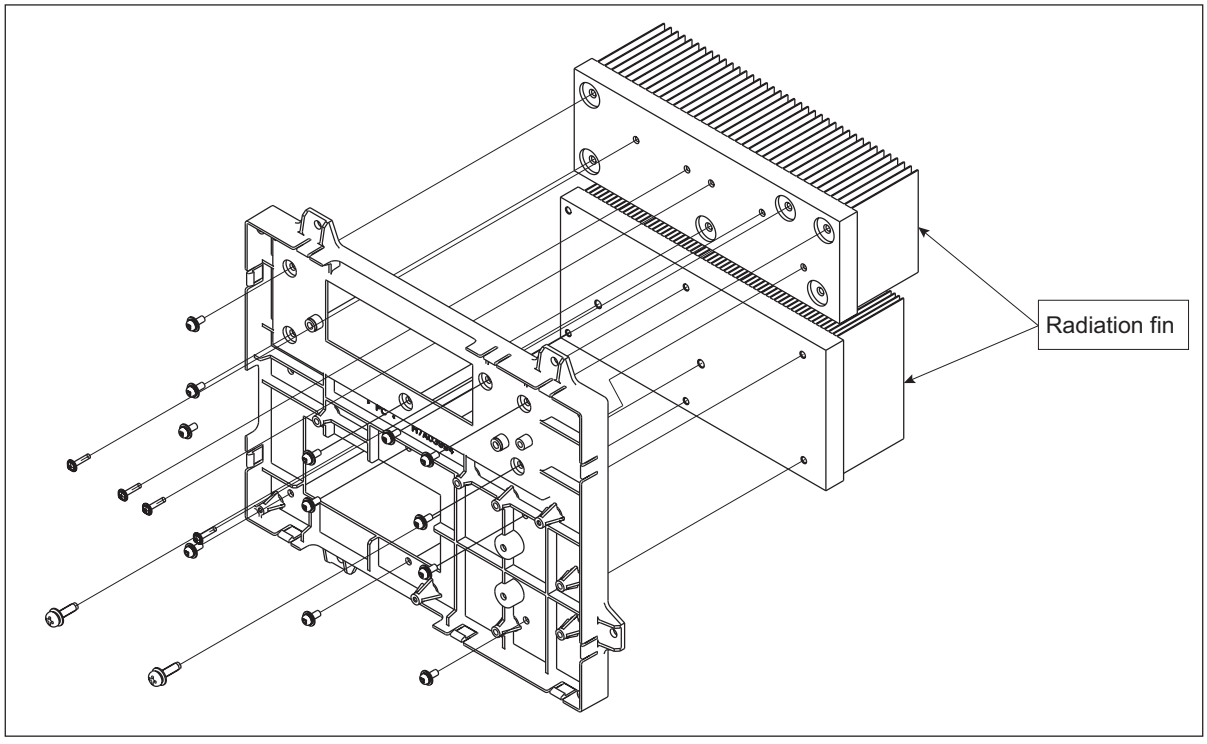
NOTE:

1. Do not touch any electrical components while LED401 (red) of inverter PCB is ON. Otherwise, it may lead to an electrical shock.
2. Turn OFF all power source switches before start checking the electrical components. Make sure to perform the electric discharge work after turning OFF all the power source. Otherwise, electrical shock may occur cause by residual voltage.
3. Refer to the 1.1.3 “Checking of Rotary Switch and Dip Switch Setting” when replacing service parts set the DIP switch the same as before replacing.

NOTE:

1. Make sure to perform the electrical discharge work when checking and replacing the inverter components. Refer to 3.2.1 “High Voltage Discharge Work for Replacing Parts” for details.
2. When reassembling the electrical components, match the terminal No. with the mark band No. If they are incorrectly connected, malfunction may occur or the electrical components may be damaged.
3. When mounting the diode module and transistor module, apply silicon grease evenly over the whole back side of the diode module and the transistor module. Use Silicon grease provided as accessory.

Tool	Phillips Screwdriver



⚠ WARNING

TURN OFF all power source switches.

2.11.4 Removing Electrical Box

< Removing Electrical Box >

Remove the electrical box according to the item 2.5 “Removing Electrical Box”.

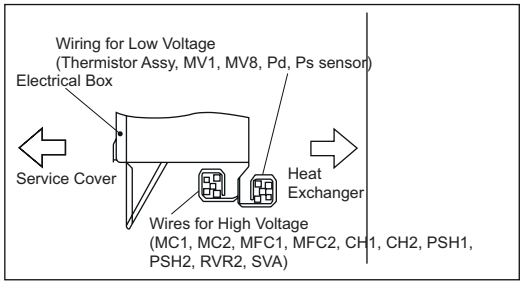
NOTE:

1. Proper handling of removing work must be performed by at least two people to avoid serious injuries.
2. Check that all wiring does not contact the sheet metal or pipes during wiring work. It may cause fire if the film of wiring are deteriorated due to the vibration of the operation.

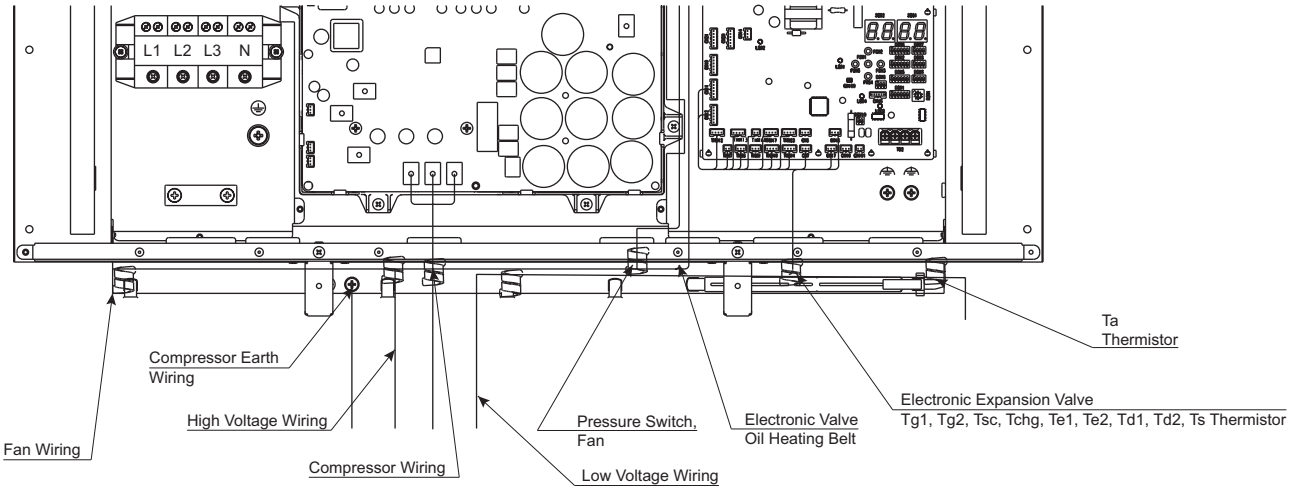
< 380 - 415V 50/60Hz>

<Wiring Work>

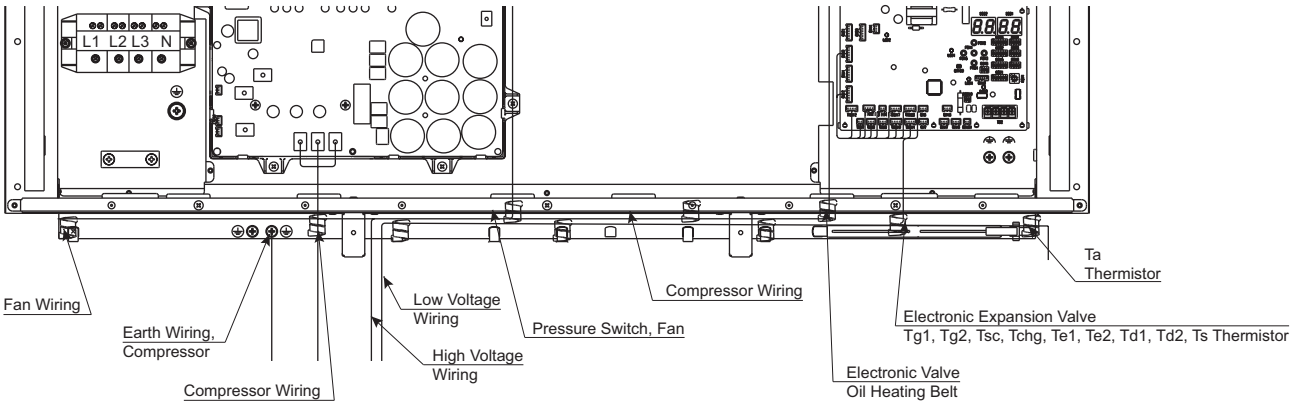
The figure below shows the side view of electrical box. Wiring for high and low voltage is separately bundled.



RAS-8.0-12RNBCLQ



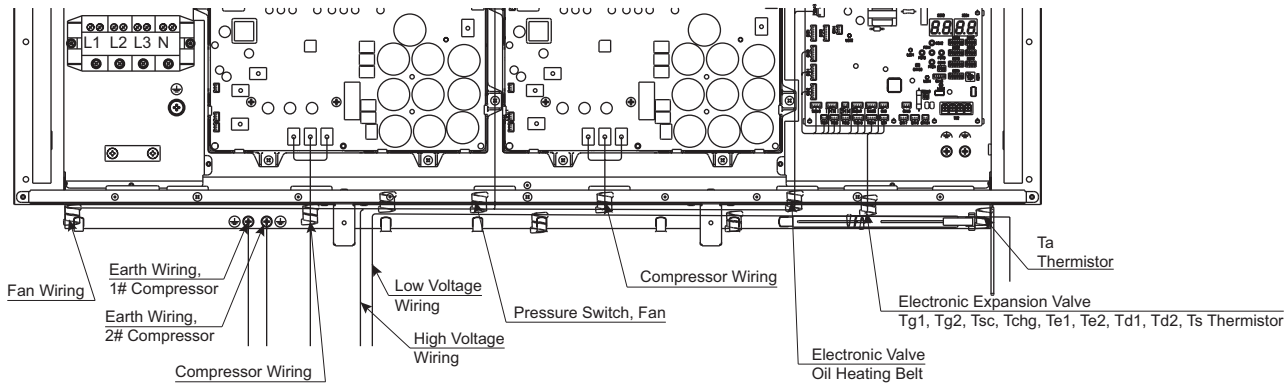
RAS-14-16RNBCLQ



⚠ WARNING

TURN OFF all power source switches.

RAS-18-24RNBCLQ



⚠ WARNING

TURN OFF all power source switches.

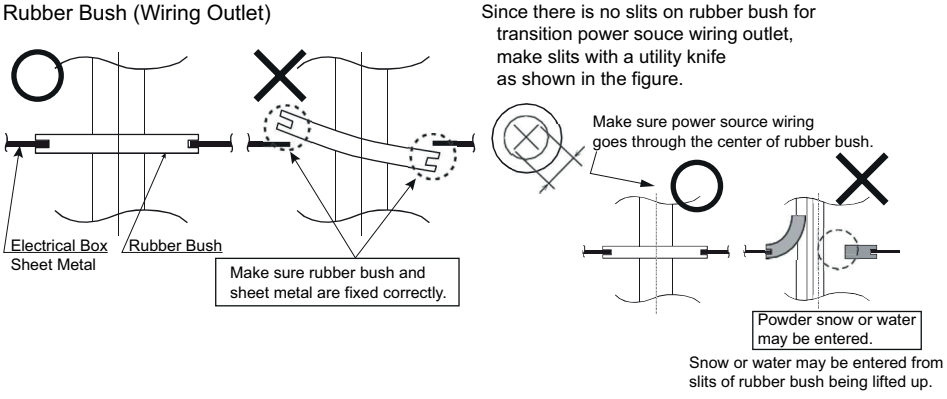
< Reassembling Electrical Box >

Reassemble the electrical box in the reverse procedure.

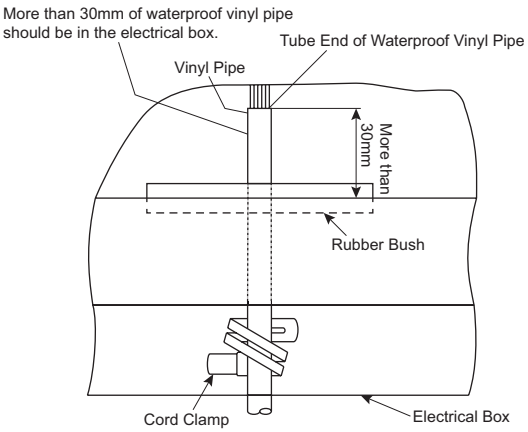
NOTE:

1. Check to ensure that the tube end of waterproof vinyl pipe and the connectors are in the electrical box. Fix them firmly with a cord clamp when wiring as shown in the figure below.
2. Fix the wiring connecting each electrical part and the electrical box with a plastic band to avoid direct contact with the compressor, piping and plate edges.
3. Fix the wiring neatly with a cord clump and make sure that the wiring will not be held down by the electrical box cover. Otherwise, the wiring may be damaged when the cover is closed.
4. Fix the fan motor wiring with a cord clamp as shown in the figure.
5. Make sure rubber bush and sheet metal are fixed correctly. If not, electric components may be damaged by water.

<Details of Cable Installation (Rubber Bush)>



<Details of Fixing the Vinyl Pipe Edge>



NOTE:

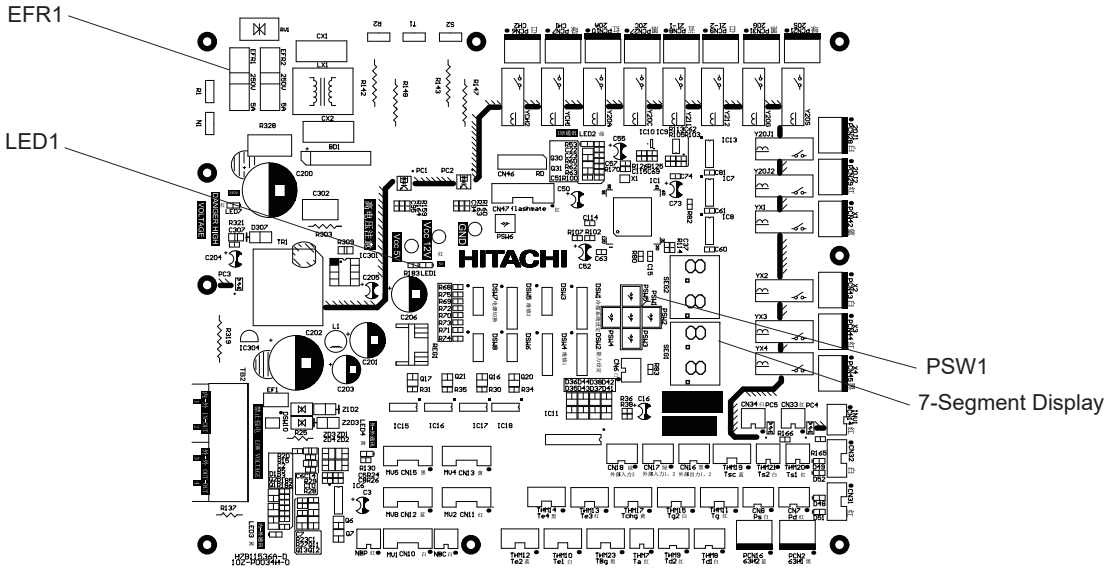
1.When reassembling the electrical component, match the terminal numbers with the mark band numbers. If incorrectly connected, malfunction may occur or the electrical components may be damaged.

2. Settings of DIP switches differ according to the model. When replacing the outdoor unit PCB, refer to “Field Work Installations.”

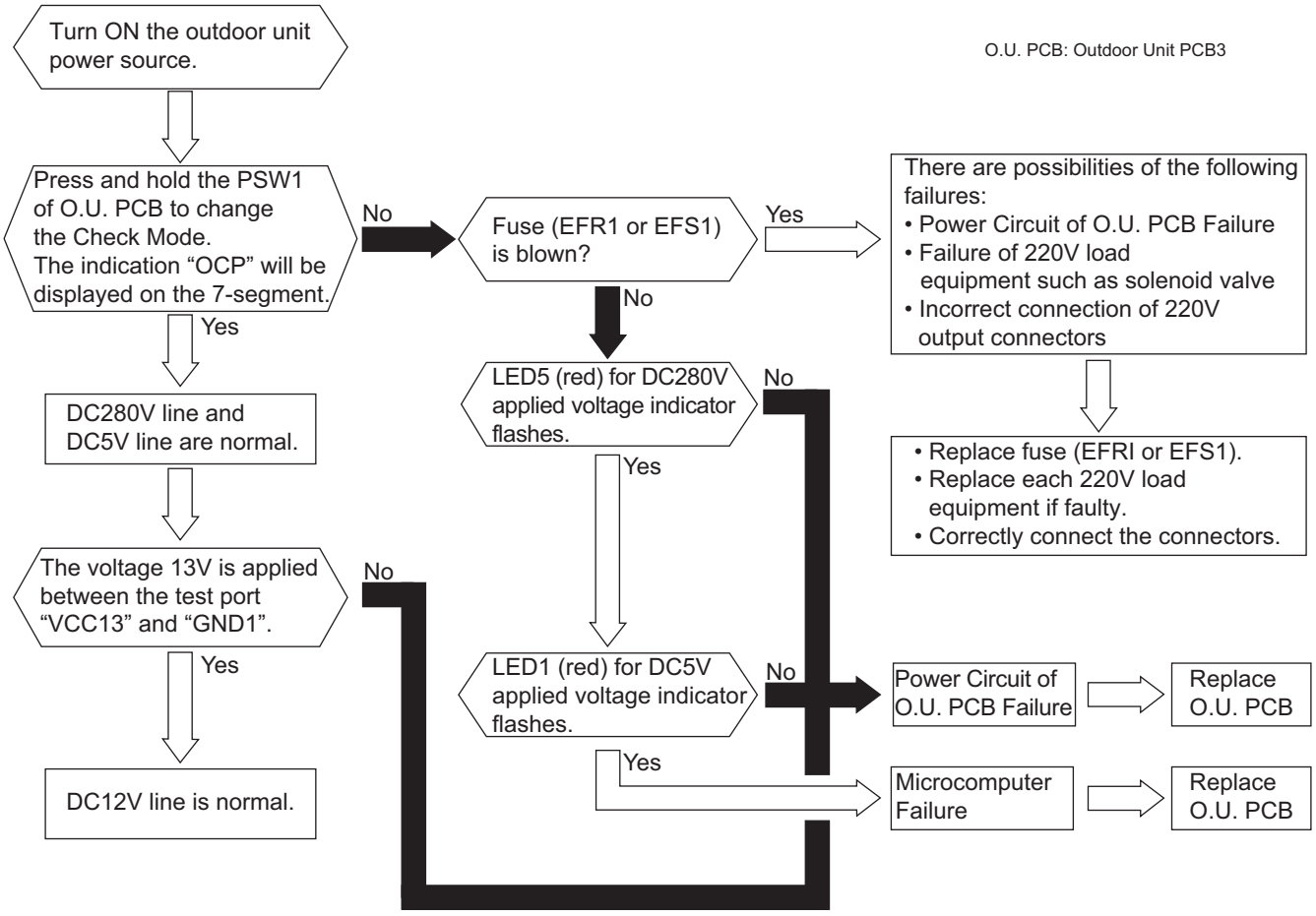
3. Main Parts

3.1 Outdoor Unit PCB (PCB3: PO034H)

● Arrangement of Connectors and Check Points.



● Checking Procedures for Outdoor Unit PCB

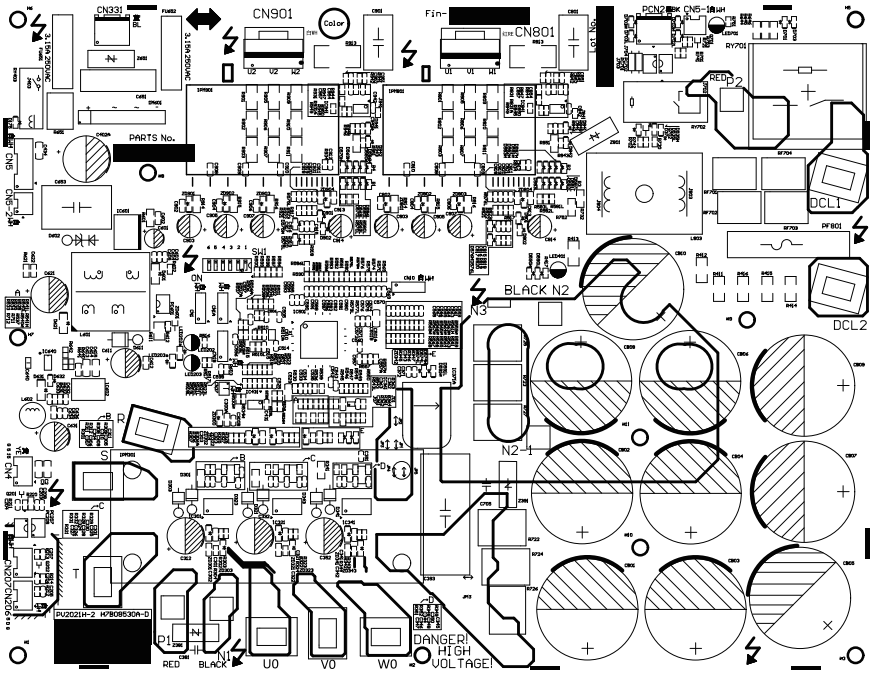


3.2 Inverter (INV1, INV2: PV164)

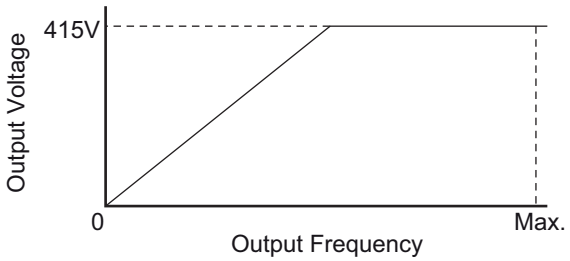
3.2.1 Inverter

● Arrangement of Inverter Power Unit

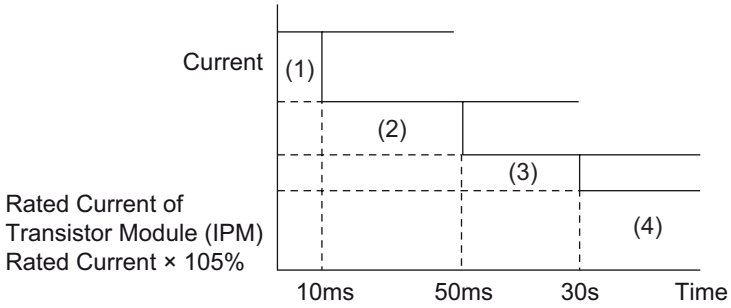
Inverter PCB (INV)



● Specification of Inverter

Applicable Model	RASQ Series	RAS-8.0, 10, 18, 20 RNBCLQ	RAS-14, 16 RNBCLQ	RAS-12, 22, 24 RNBCLQ
Applicable Power Source		3 PH (380-415V 50/60Hz)		
Output Voltage (Maximum)		415V (Depends on Power Source Voltage)		
Output Current (Maximum)	Inverter PCB	24A	38A	
	Fan Controller	3.5A		
Control Method		Vector PWM Control		
Range Output Frequency	Inverter PCB	15Hz to 140Hz	10Hz to 130Hz	10Hz to 130Hz
	Fan Controller	1.8rps to 21.2rps		
Accuracy of Frequency		0.1Hz		
Output / Characteristics				
Speed Rate		0.125rps/s, 0.25rps/s, 0.5rps/s, 1rps/s, 3rps/s (5 Steps)		

MAIN PARTS

Applicable Model	RASQ Series	RAS-8.0~24RNBCLQ
	Power Source	3 PH (380-415V 50/60Hz)
Protection Function	Excessive High or Low Voltage for Inverter	● Stoppage Code for Inverter (iTC) = 5 ● Excessive Low Voltage at DC Voltage is Lower than 396V ● Stoppage Code for Inverter (iTC) = 6 ● Excessive High Voltage at a DC Voltage is Higher than 844V
	Abnormality of Current Sensor	● Stoppage Code for Inverter (iTC) = 8 ● The wave height value of running current for the phase positioning is less than the determination value before the compressor is started (at completion of the phase positioning).
	Protection Function Overcurrent Protection for Inverter	 ● Stoppage Code for Inverter (iTC) = 1 (1) Short-Circuit Trip of Arm (2) Instantaneous Overcurrent Trip ● Stoppage Code for Inverter (iTC) = 2 (3) Instantaneous Overcurrent Trip When detecting current is more than rated current of Transistor Module, overcurrent is detected. ● Stoppage Code for Inverter (iTC) = 4 (4) Electronic Thermal Trip When the current detected by current sensor exceeds 105% of the rated current continuously for 30 seconds or for 3 minutes in total during a 10-minute period, overcurrent is detected.
	Protection of Power Module (CIB, IPM)	● Stoppage Code for Inverter (iTC) = 1 Power Module (CIB, IPM) has three protection function for self-protection. (1) Some of the output terminals between “U” and “V”, “V and “W”, “W” and “U” have a short-circuit. (2) Running current reaches the maximum rated current. (3) Control voltage decreases abnormally.
	Overload Control	The overload control is controlled as follows. ● Condition of Activation: When the running current is more than 105% of the rated current. ● Condition of Cancellation: When the running current is less than 88% of the rated current.
	Fin Temperature Increase	● Stoppage Code for Inverter (iTC) = 3 The unit is stopped when the temperature of CIB is higher than 110°C and IPM is higher than 100°C.
	Earth Detection	● Stoppage Code for Inverter (iTC) = 12 The unit is stopped when the compressor is grounded.

■ Checking Method for Inverter Parts

● High Voltage Discharge Work for Replacing Parts

⚠ CAUTION

Perform this high voltage discharge work to avoid an electric shock.
Take special care to avoid a short circuit between terminal P and N.

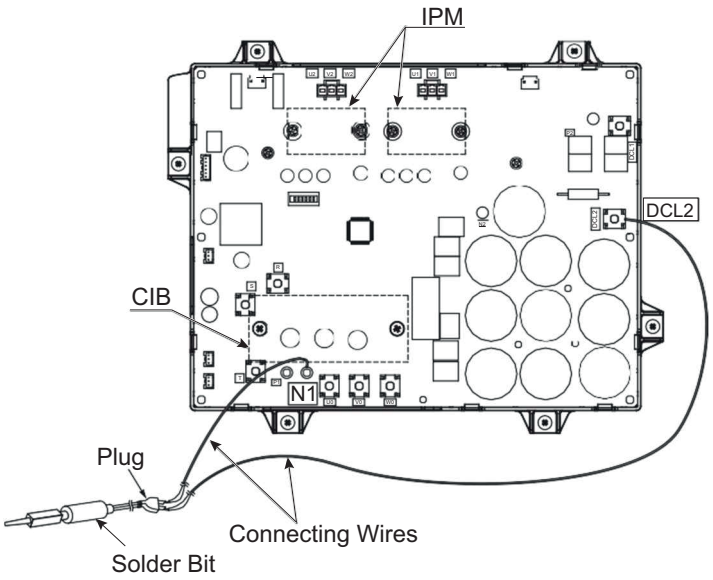
< Procedures >

(a) Turn OFF the main switches and wait for ten minutes. Check to ensure that no high voltage exists. If LED401 on INV is OFF after turning OFF power source, the voltage will decrease to DC50V or less.

(b) Connect connecting wires to an electrical solder bit.

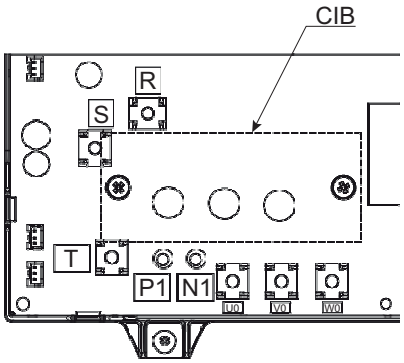
(c) Connect the wires to terminals, N1 and DCL2 on the inverter PCB (INV). => Discharging is started, resulting in hot solder bit.

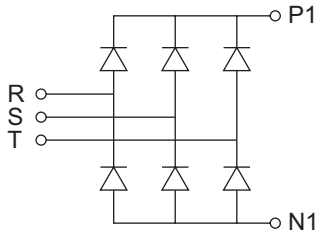
(d) Wait for two or three minutes and measure the voltage again. Check to ensure that no voltage is charged.



● Checking Method of Inverter PCB (INV: PV164)

(1) Outer Appearance and Rectifier Circuit of CIB



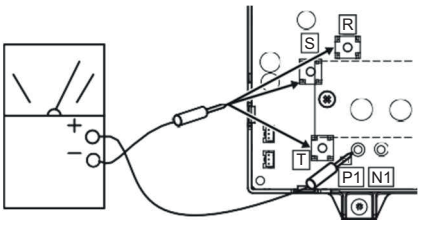


If procedures (a) to (d) are performed and the results are satisfactory, the CIB on the inverter PCB is normal.

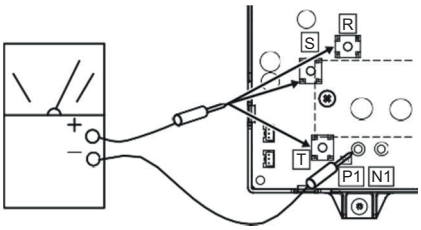
NOTICE

Recommended using an analogue tester.

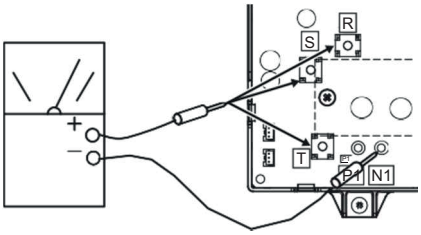
(a) By touching the + side of the tester to the P1 terminal of the inverter PCB and the - side of tester to R, S, and T of the inverter PCB, measure the resistance.



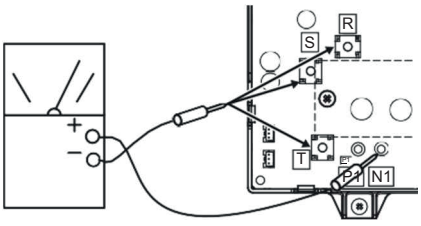
(b) By touching the - side of the tester to the P1 terminal of the inverter PCB and the + side of tester to R, S, and T of the inverter PCB, measure the resistance.



(c) By touching the - side of the tester to the N1 terminal of the inverter PCB and the + side of tester to R, S, and T of the inverter PCB, measure the resistance.

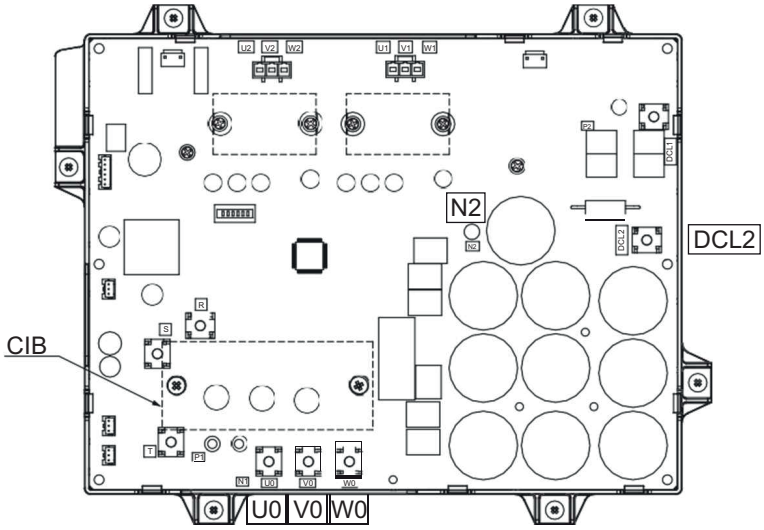


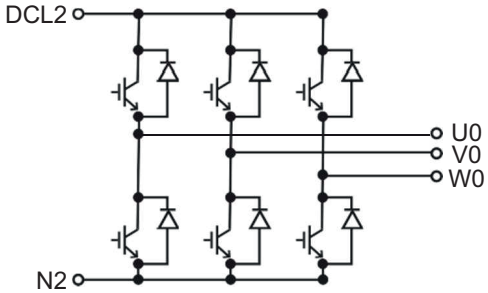
(d) By touching the + side of the tester to the N1 terminal of the inverter PCB and the - side of tester to R, S, and T of the inverter PCB, measure the resistance.



Measurement Point			Criterion	
Item	Tester		Analogue Tester	Digital Tester
	(+)	(-)		
(a)	P1	R/S/T	1kΩ or more (Measured Range: 1kΩ)	Overload
(b)	R/S/T	P1	30kΩ or more (Measured Range: 10kΩ)	1.0V or less
(c)	R/S/T	N1	1kΩ or more (Measured Range: 1kΩ)	Overload
(d)	N1	R/S/T	30kΩ or more (Measured Range: 10kΩ)	1.0V or less

(1) Internal Circuit of CIB Outlet Part



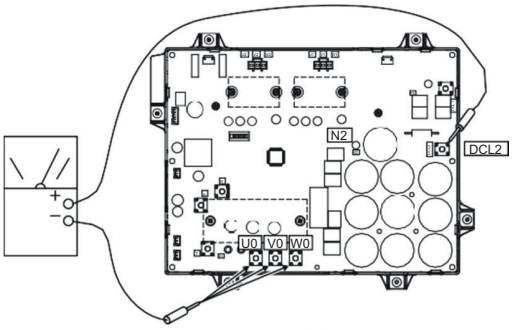


If procedures (a) to (d) are performed and the results are satisfactory, the CIB on the inverter PCB is normal.

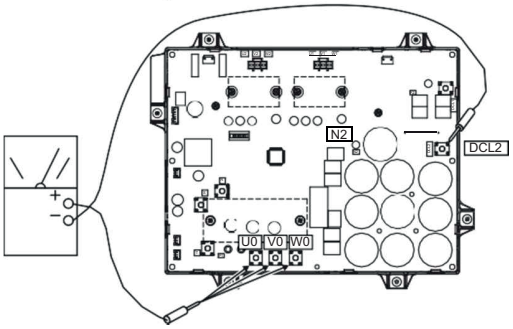
NOTICE

Recommended using an analogue tester.

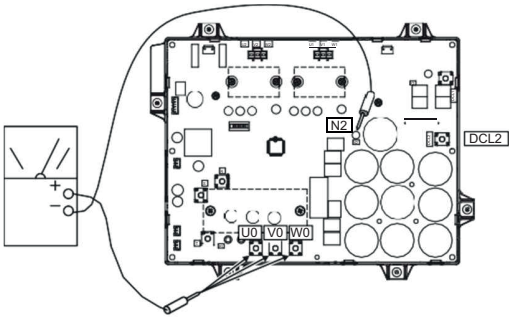
(a) By touching the + side of the tester to the DCL2 terminal of the inverter PCB and the - side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.



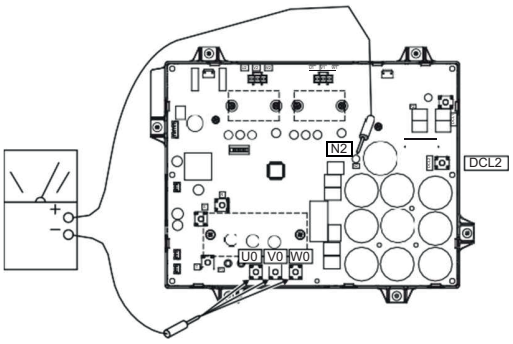
(b) By touching the - side of the tester to the DCL2 terminal of the inverter PCB and the + side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.



(c) By touching the - side of the tester to the N2 terminal of the inverter PCB and the + side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.



(d) By touching the + side of the tester to the N2 terminal of the inverter PCB and the - side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.



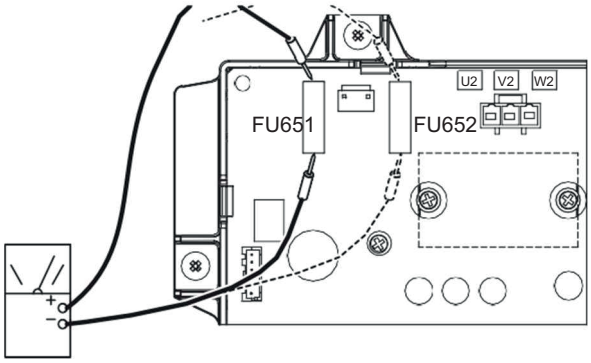
Measurement Point			Criterion	
Item	Tester		Analogue Tester	Digital Tester
	(+)	(-)		
(a)	DCL2	U0/V0/W0	1kΩ or more (Measured Range: 1kΩ)	Overload
(b)	U0/V0/W0	DCL2	20kΩ or more (Measured Range: 10kΩ)	1.0V or less
(c)	U0/V0/W0	N2	1kΩ or more (Measured Range: 1kΩ)	Overload
(d)	N2	U0/V0/W0	20kΩ or more (Measured Range: 10kΩ)	1.0V or less

(1) Testing the Fuse for Inverter Power

By touching the + and - side of the tester on each side of the fuse (FU651, FU652), measure the resistance. If the resistance is 0Ω, it is normal.

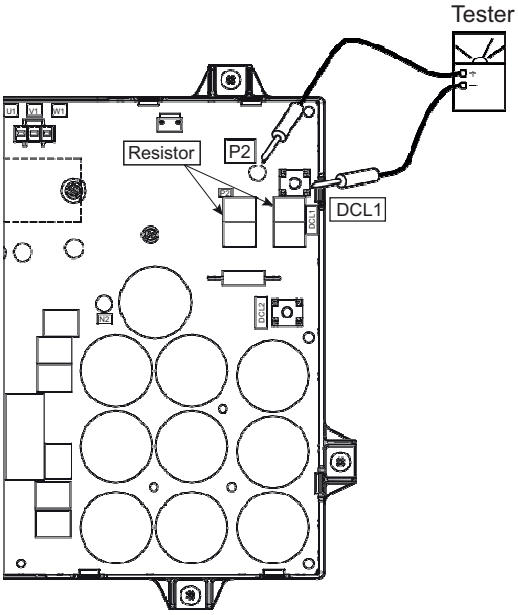
NOTICE:

Set analog, or digital tester at 1kΩ.



(2) Testing the Resistor

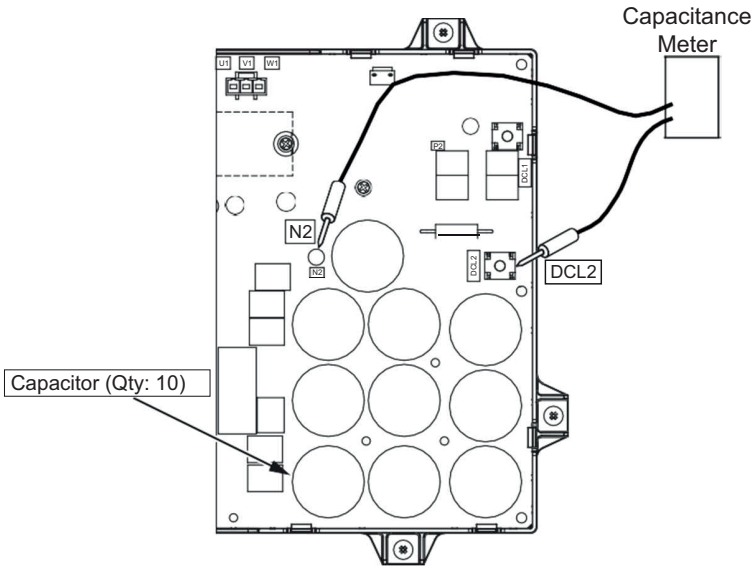
Measure the resistance using the tester between the DCL1 and P2 terminal.
If the resistance is 1kΩ±5%, it is normal. (0Ω or ∞Ω: abnormal)



(1) Testing the Capacitor

(a) Check that the capacitor does not show signs of burns or it is not swollen.

(b) Measure the capacitance using the capacitance meter between the DCL2 and N2 terminal. If the capacitance is 2000μF±10%, it is normal.



MAIN PARTS

(1) Testing the IPM for Fan Motor

⚠ CAUTION

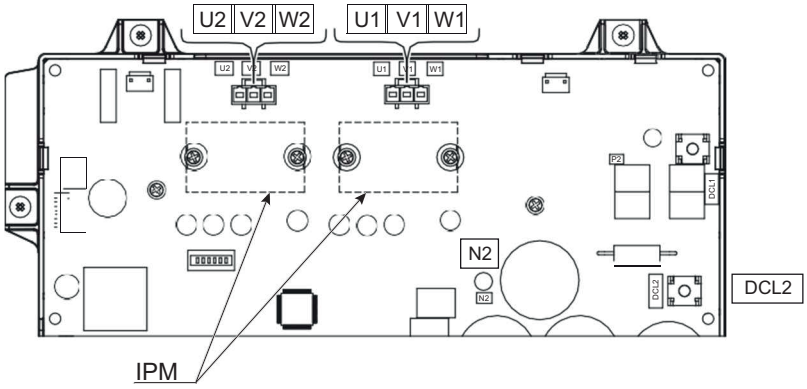
Perform this high voltage discharge work to avoid an electric shock.

NOTICE

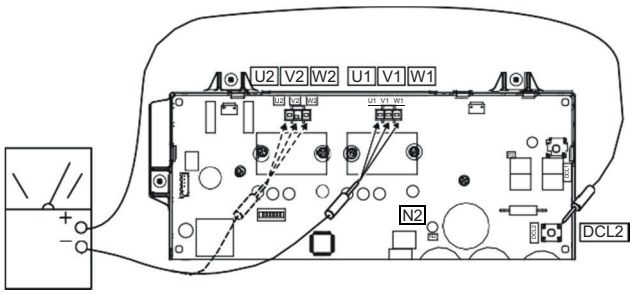
Recommended to use an analogue tester.

(a) Turn OFF the main source before this work.
Ensure that LED401 on the inverter (INV) is turned OFF.
If LED401 on INV is turned ON, an electrical shock may occur from residual voltage over DC 50V to the inverter PCB (INV).

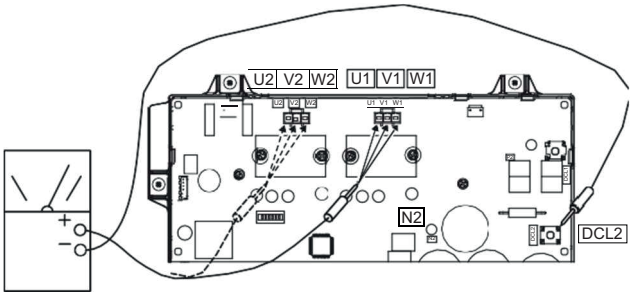
(b) Disconnect all the wirings connected to the inverter PCB (INV).



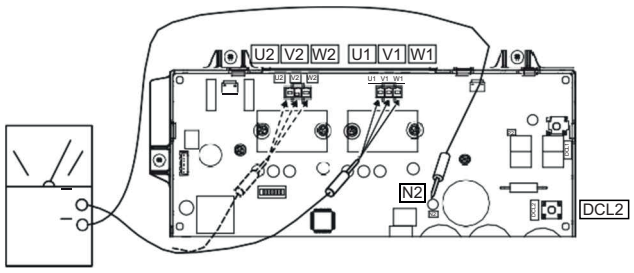
(c) By touching the + side of the tester to the DCL2 terminal of fan controller and the - side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



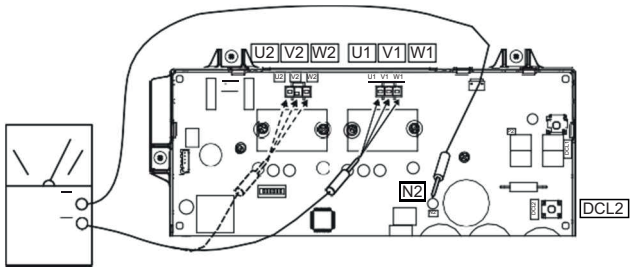
(d) By touching the - side of the tester to the DCL2 terminal of fan controller and the + side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



(e) By touching the - side of the tester to the N2 terminal of fan controller and the + side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



(f) By touching the + side of the tester to the N2 terminal of fan controller and the - side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



NOTICE:

In case of the outdoor unit is RAS-14, 16RNBCLQ, additional test will be required by replacing “U1/V1/W1” with “U2/V2/W2”.

Measurement Point			Criterion	
Item	Tester		Analogue Tester	Digital Tester
	(+)	(-)		
(c)	DCL2	U1/V1/W1 (U2/V2/W2)	1kΩ or more (Measured Range: 1kΩ)	Overload
(d)	U1/V1/W1 (U2/V2/W2)	DCL2	20kΩ or more (Measured Range: 10kΩ)	1.0V or less
(e)	U1/V1/W1 (U2/V2/W2)	N2	1kΩ or more (Measured Range: 1kΩ)	Overload
(f)	N2	U1/V1/W1 (U2/V2/W2)	20kΩ or more (Measured Range: 10kΩ)	1.0V or less

3.2.2 Protective Function

(1) Excessive High or Low Voltage for Inverter

(a) Level of Detection

When the voltage of direct current is greater than 844V, abnormalities are detected.

When the voltage of direct current is smaller than 396V, abnormalities are detected.

(b) Function

When abnormalities are detected, the inverter compressor is stopped and transmits the signal code of stoppage cause to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage cause is cancelled when wired controller is off or main power source is cut off.

(2) Abnormality of Current Sensor

(a) Level of Detection

The wave height value of running current for the phase positioning is less than the determination value before the compressor is started (at completion of the phase positioning).

(b) Function

When abnormalities are detected, the inverter compressor is stopped, and transmits the signal code for the cause of the stoppage to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage cause is cancelled when wired controller is off or main power source is cut off.

(3) Overcurrent Protection for Inverter

(a) Level of Detection

① When the compressor current detected by current sensor exceeds the rated current of power module (CIB, IPM), overcurrent is detected. (Instantaneous Overcurrent)

② When the current detected by current sensor exceeds 105% of the rated current continuously for 30 seconds or for 3 minutes in total during a 10-minute period, overcurrent is detected. (Electric Thermal Relay)

(b) Function

When abnormalities are detected, the inverter compressor is stopped and transmits the signal code for the cause of the stoppage to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage cause is cancelled when wired controller is off or main power source is cut off.

(4) Protection of Power Module (CIB, IPM)

(a) Level of Detection

① When some of the output terminals between “U” and “V”, “V” and “W”, “W” and “U” of power module (CIB, IPM) are short-circuited, an abnormality is detected.

② When the running current of power module (IPM) reaches the maximum rated current, an abnormality is detected.

③ When the control voltage of power module (IPM) abnormally decreases, an abnormality is detected.

(b) Function

When abnormalities are detected, the inverter compressor is stopped and the signal code for the cause of the stoppage is transmitted to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal the cause of the stoppage cause is cancelled when wired controller is off or main power source is cut off.

(5) Fin Temperature Increase

(a) Level of Detection

When the temperature of internal CIB exceeds 110°C or IPM exceeds 100°C, an abnormality is detected.

(b) Function

When abnormalities are detected, the inverter compressor is stopped and the signal code for the

cause of the stoppage is transmitted to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage is cancelled when wired controller is off or main power source is cut off.

(6) Earth Detection

(a) Level of Detection

① When the terminal U, V, W and earth of the compressor are short-circuited before compressor activation, abnormalities are detected.

② When the output terminals (U, V, W) of power module (CIB, IPM) are short-circuited, abnormalities are detected.

(b) Function

When abnormalities are detected, the inverter compressor is stopped and the signal code for the cause of the stoppage is transmitted to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage is cancelled when wired controller is off or main power source is cut off.

3.2.3 Overload Protection Control

(a) Level of Detection

When the output current exceeds 105% of the maximum output current, an abnormality is detected.

(b) Function

An overload signal is transmitted to the outdoor unit PCB when output current exceeds 105% of the maximum output current, and the frequency decreases.

For 10 seconds after the output current decreases lower than 88% of the rated current, the compressor maximum frequency is limited to the specified value.

However, if the frequency order is smaller than the maximum value, the operation is performed according to the order.

(c) Cancellation of Protection Function

After the operation described in the above item (b) is performed for 10 seconds, this control gets cancelled.

3.3 Scroll Compressor

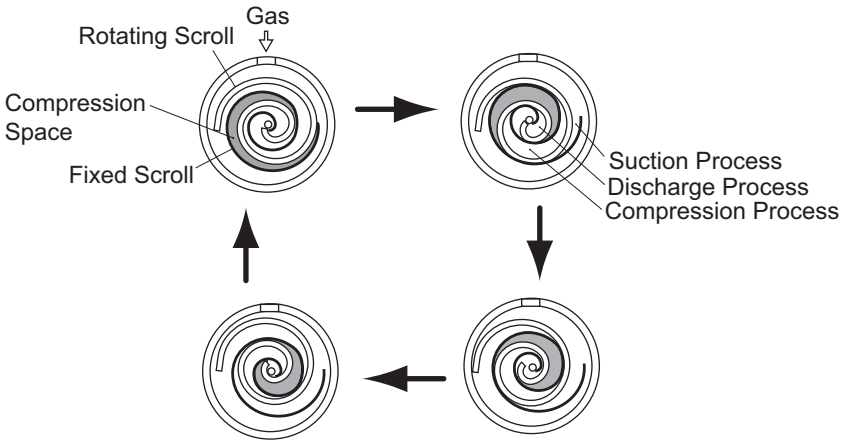
- Reliable Mechanism for Low Vibration and Low Sound
  (1) The rotating direction is definite.
  (2) The pressure inside the chamber is high and the surface temperature of the chamber is 60°C to 110°C.
- Principle of Compression

(1) Gas enters the compressor from top at the suction inlet.

(2) Hot gas leaves the compressor from the side mounted discharge gas outlet.

(3) Compressor starts at the beginning of the scroll at a lower pressure, and continues to the outer edge of the scroll where the pressure is greatest and discharged through the side discharge gas port at the center of the compressor.

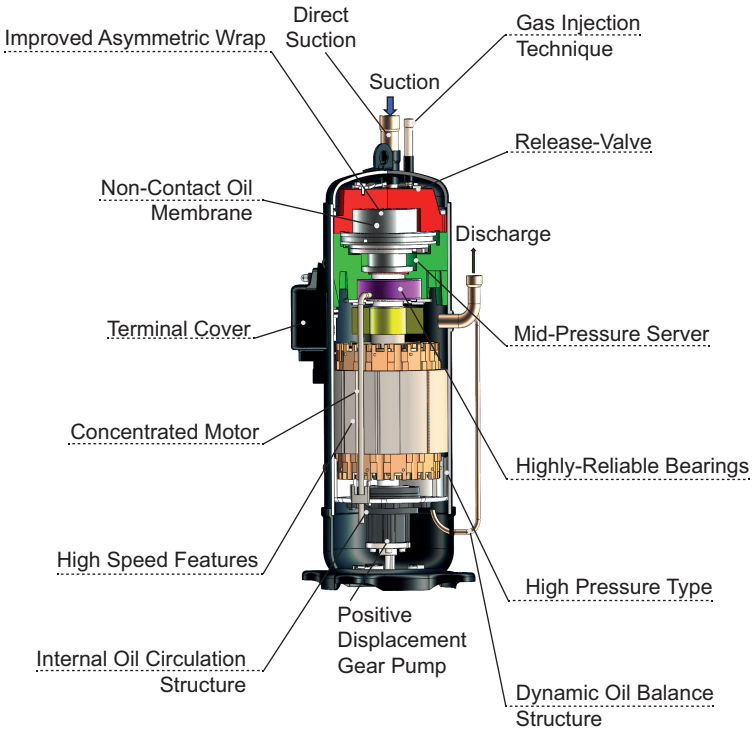
(4) The above procedures (Suction → Compression → Discharge) are repeated continuously.



● Structure

The compressor has the structure for oil supply from the outer oil separator.

The inside of the oil separator is at high pressure, and the surface temperature of the oil separator is as high (60°C to 110°C) as the compressor.



● Compressor Type

Model	Voltage	Inverter Compressor 1	Inverter Compressor 2	Total Quantity
RAS-8.0, 10RNBCLQ	380-450V/50Hz/60Hz	AA50PHDG-D1Y2	-	1
RAS-12, 14, 16RNBCLQ		DC80PHDG-D1Y2	-	1
RAS-18, 20RNBCLQ		AA50PHDG-D1Y2	AA50PHDG-D1Y2	2
RAS-22, 24RNBCLQ		DC80PHDG-D1Y2	DC80PHDG-D1Y2	2

● Checking of Compressor Motor

Inverter Compressor	Resistance between terminals Rs(Ω): at 20°C
AA50PHDG-D1Y2	0.197
DC80PHDG-D1Y2	0.124

MAIN PARTS

● Checking of Compressor

CHECK LIST ON COMPRESSOR

CLIENT: MODEL: DATE:

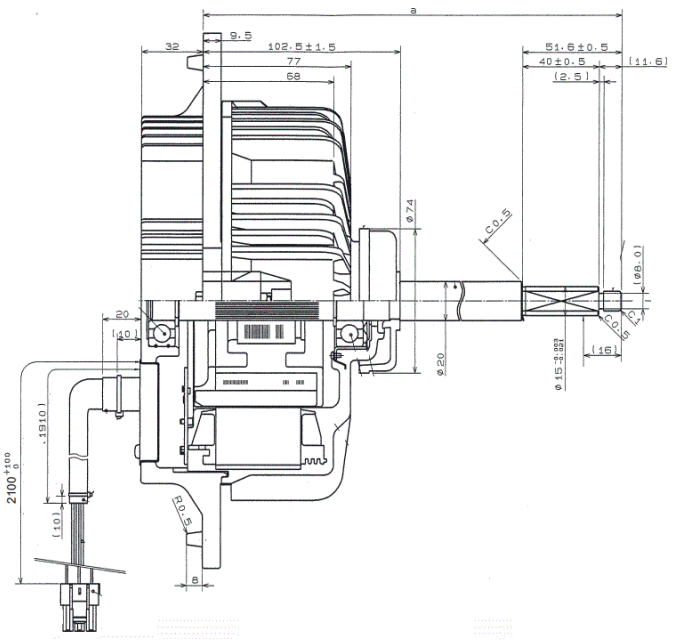
Serial No.: Production Date: Checker:

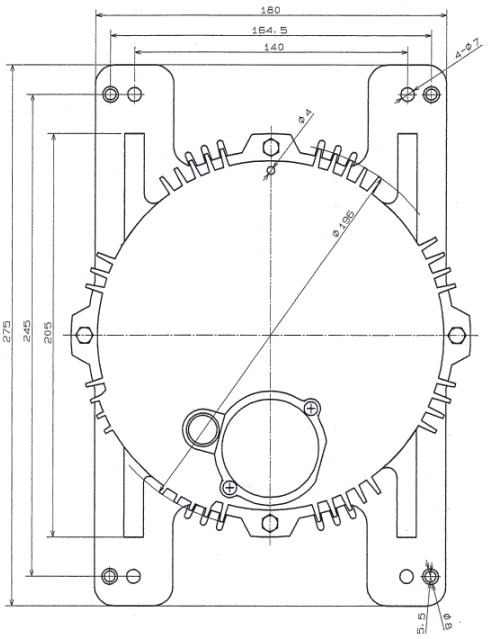
No.	Check Item	Check Method	Result	Remarks
1	Are THM8 and THM9 correctly connected? THM8 and THM9: Discharge Gas Thermistor	(1) Are wires of each thermistor correctly connected by viewing? (2) Check to ensure that 7-segment indication of Td1 is higher than Td2 when No.1 comp. is operating. Td1: Temperature of THM8 Td2: Temperature of THM9		
2	Are thermistor, THM8 and THM9 disconnected?	(1) Check to ensure that thermistor on the top of comp. is correctly installed. (2) Check to ensure that actually measured temp. are greatly different from the indication (Td1, Td2) during check mode.		
3	Is current sensing part on inverter PCB (INV) faulty?	(1) Check to ensure that 7-segment indication A1 and A2 are 0 during compressor stopping. (2) Check to ensure that indication A1 and A2 are not 0 during compressor running. (However, A2 is 0 during stopping of No.2 comp.)		
4	Are expansion valves (MV1, MV2 and MVB) correctly connected?	Check to ensure that MV1 to CN10, MV2 to CN11 and MVB to CN12 are correctly connected.		
5	Are expansion valve coils (MV1, MV2 and MVB) correctly installed?	Check to ensure that each coil is correctly installed on the valve.		
6	Are the refrigeration system and electrical wiring system incorrectly connected?	Check to ensure that refrigerant is flowing into indoor units by operating one system only from the outdoor unit.		
7	Is opening of expansion valve completely closed (locked)?	Check the following using the check mode of outdoor units. (1) Liquid Pipe Temp. (TL) < Air Intake Temp. (Ti) during Cooling Operation (2) Liquid Pipe Temp. (TL) > Air Intake Temp. (Ti) during Heating Operation		
8	Is opening of expansion valve fully opened (locked)?	Check to ensure that liquid pipe temp. is lower than air intake temp. of stopped indoor unit when the other indoor units are operating under cooling operation.		
9	Are the relay on the main power PCB (PCB2) faulty?	Check the main power PCB (PCB2).		
10	Is there any voltage abnormality among L1-L2, L2-L3 and L3-L1?	Check to ensure that voltage imbalance is smaller than 3%. Please note that power source voltage must be within 220V or 400V/380 - 415V/ 380V±10%.		
11	Is the comp. oil acidified during compressor motor burning?	Check to ensure that the oil color is not black.		

Additional Information for “CHECK LIST ON COMPRESSOR”

Check Item	Additional Information (Mechanism of Compressor Failure)
1, 2	The liquid refrigerant return volume to the compressor is controlled by the discharge gas temperature Td1 when only No.1 compressor is operating. If Td1 and Td2 are reversely connected, the liquid refrigerant return volume will become smaller by detecting the temperatures even if the actual discharge gas temperature is high. Therefore, this abnormal overheating operation will result in insulation failure of the motor winding.
3	Overcurrent control (operating frequency control) is performed by detecting current by the current sensor. In this case, winding insulation failure will occur, since control is not available in spite of actually high current.
4, 5	During a cooling operation, Pd is controlled by fan revolution of outdoor unit, and Td and SH are controlled by MV of each indoor unit. During a heating operation, Td and SH are controlled by MV1 and MV2. If expansion valves are incorrectly connected, correct control is not available, resulting in compressor failure depending on liquid refrigerant returning conditions or motor winding insulation failure depending on overheating conditions.
6	If the refrigeration system and electrical system are incorrectly connected, abnormally low suction pressure operation is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
7	For additional information, refer to page 301 in this document.
8	The compressor may be locked due to the liquid return operation during the cooling operation.
9	If the contacting resistance increases, voltage imbalance among each phase will cause abnormal overcurrent.
10	In this case, overcurrent will occur, efficiency will decrease or the motor winding will be excessively heated.
11	In this case, it will result in motor burning or a failed compressor.

3.4 Fan Motor





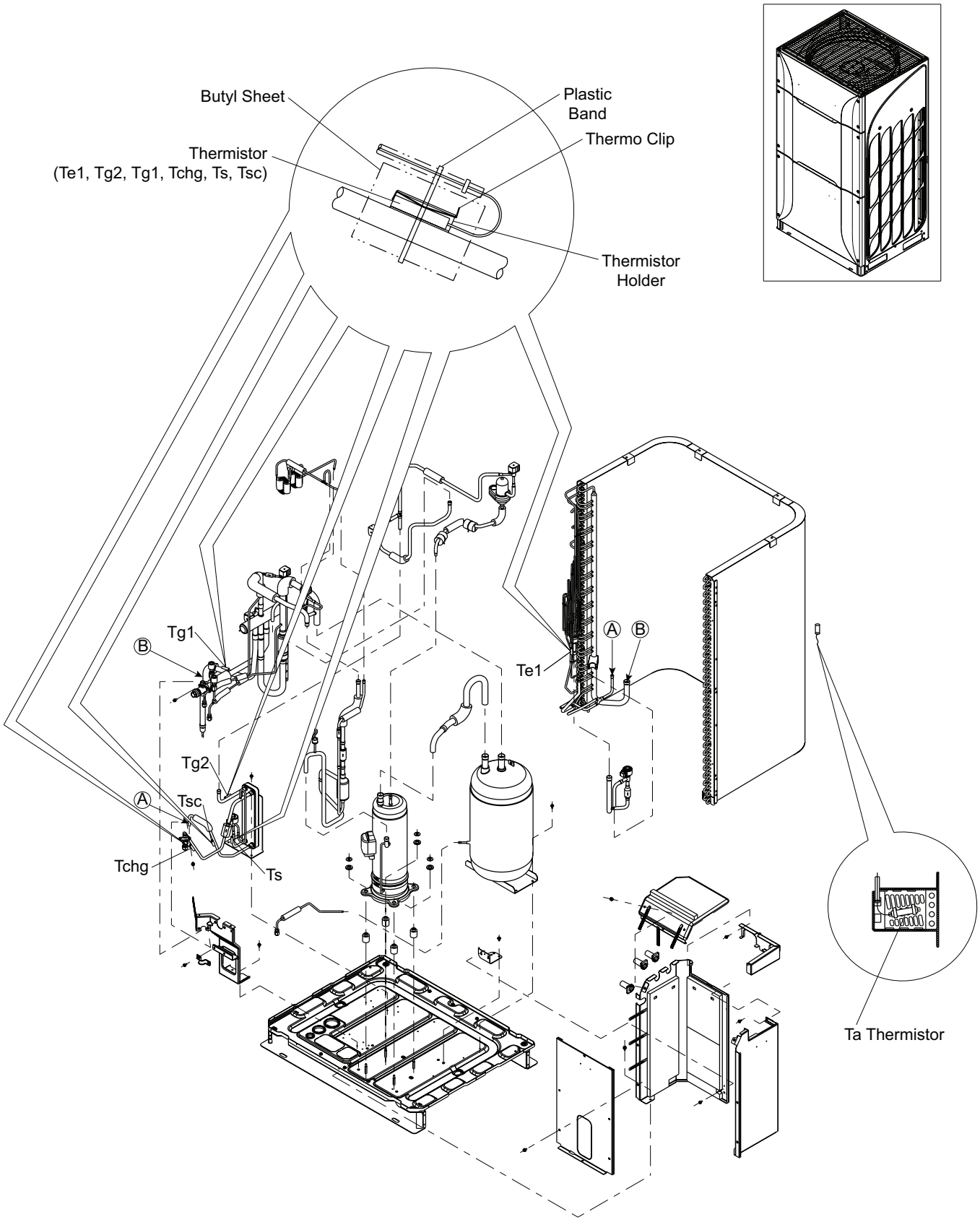
Unit: mm

Model	a	Resistance
8HP/10HP/12HP/20HP/22HP/24HP	268.5 ±1.5	9.2+1Ω at 20°C
14HP/16HP/18HP	227.0 ±1.5	9.2+1Ω at 20°C

3.5 Thermistor

(1) Position of Thermistor

<Example: RAS-8.0RNBCLQ>

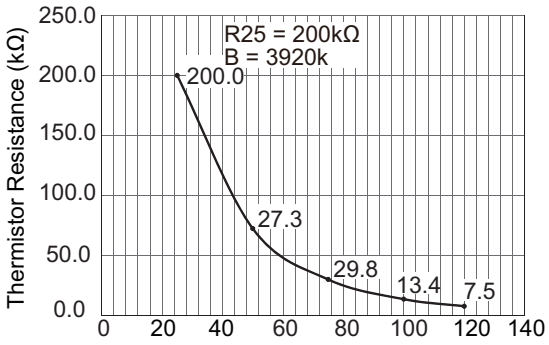


(2) Thermistor for Upper Part Temperature of Compressor

a. A thermistor for the upper part temperature of the compressor is installed to prevent discharge gas from overheating. If discharge gas temperature increases excessively, lubricating oil deterioration occurs and lubricating properties deteriorate, resulting in short compressor life.

b. When discharge gas temperature increases excessively, compressor temperature increases. In extreme cases, compressor motor winding burns out.

c. When the upper part temperature of compressor increases during heating operation, the unit is controlled according to the following method.



Resistance Characteristics of Thermistor for Discharge Gas Overheating Protection

- An electronic expansion valve of outdoor units is (are) opened to return the liquid refrigerant to the compressor through the accumulator, decreasing compressor temperature.
- If the compressor's upper part temperature increases exceeding 132°C even if an electronic expansion valve opens, the compressor stops, in order to protect the compressor.

  In cooling operation, the above function is also available.

d. If compressor upper part temperature increases excessively, the protection control is activated and the compressor's is stopped according to the following method.

Operation	Upper Part Temperature of Compressor	Defecting Period
Cooling	Over 132°C	10 minutes (Continuously)
	Over 140°C	5 seconds (Continuously)
Heating	Over 132°C	10 minutes (Continuously)
	Over 140°C	5 seconds (Continuously)
Defrosting	Over 132°C	5 seconds (Continuously)

(3) Thermistor for Outdoor Ambient Temperature

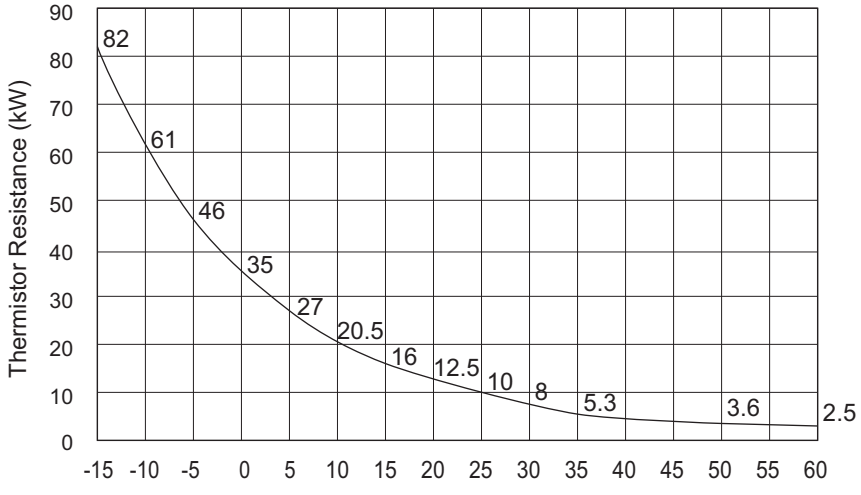
The thermistor resistance characteristics are shown in the figure below.

(4) Thermistor for Evaporating Temperature of Outdoor Unit in Heating Operation (For Defrosting)

The characteristics for the thermistor are the same as those of outdoor ambient temperature thermistor shown in the figure below.

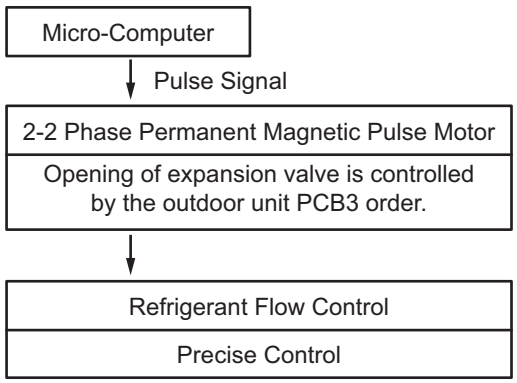
(5) Thermistor for Super Cooling Bypass and Main Line Temperature of Outdoor Unit

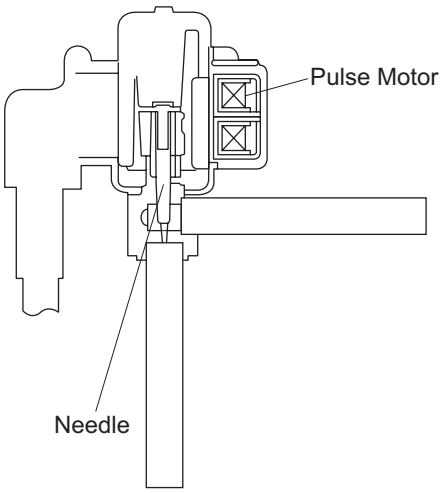
The characteristics for the thermistor are the same as those of outdoor ambient temperature thermistor shown in the figure below.



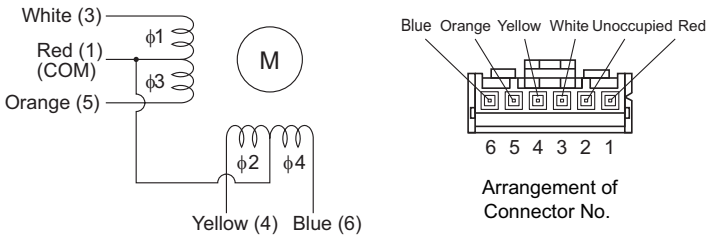
Thermistor Characteristics

3.6 Electronic Expansion Valve (MV, MVB)

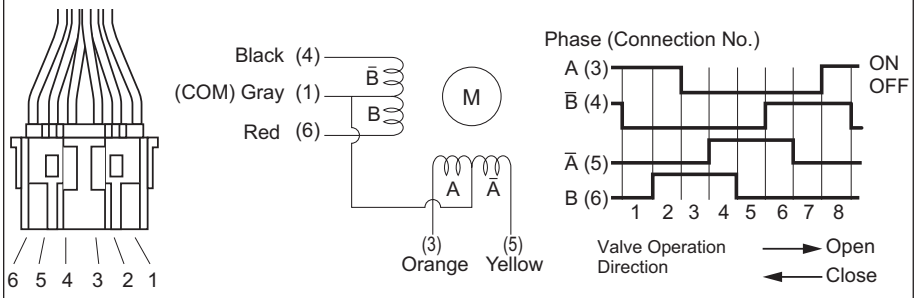




● Specifications for MV1 and MV2

Model	PAM-BBOYGHS-1 (MV)
Working Temperature Range	-30°C to 70°C
Refrigerant Used	R410A
Insulation Resistance	Min. 100MΩ (at 500VDC Megger)
Withstand Voltage	500VAC for 1 Minute or 600VAC for 1 Second
Rated Voltage	DC12V±1.2V
Drive Condition	100 - 200 PPS 2-2 Phase Excitation
Coil Resistance	100Ω (at 20°C)
Insulation Class	Class E
Wiring Diagram, Drive Circuit and Activation Mode	 Phase 1 2 3 4 ϕ1 ON OFF OFF ON ϕ2 ON ON OFF OFF ϕ3 OFF ON ON OFF ϕ4 OFF OFF ON ON OPEN: 4 → 3 → 2 → 1 → 4 CLOSE: 1 → 2 → 3 → 4 → 1 < Checking Method > Measure the coil resistances between Red (common) and each phase. The measured resistance value is normal if approximately 100Ω*1). *1: Ambient Temperature 20°C

● Specifications for MVB

Model	UKV-025D174
Working Temperature Range	-30°C to 70°C
Refrigerant Used	R410A
Insulation Resistance	Min. 100MΩ (at 500VDC Megohmmeter)
Withstand Voltage	1800VAC for 1 Second
Rated Voltage	DC12V±1.2V
Drive Condition	83±5 PPS 1-2 Phase Excitation
Coil Resistance	46±3Ω (at 20°C)
Insulation Class	Class E
Wiring Diagram, Drive Circuit and Activation Mode	

Order of Excitation (1-2 Phase Excitation)

Connector No.	Color of Lead Wire	Phase
1	Grey	Common (+)
2	-	-
3	Orange	A
4	Black	$\overline{B}$
5	Yellow	$\overline{A}$
6	Red	B

< Checking Method >
Measure the coil resistances between connector No.1 (common) and each phase.
The measured resistance value is normal if approximately 46Ω*.
(* Ambient Temperature 20°C)

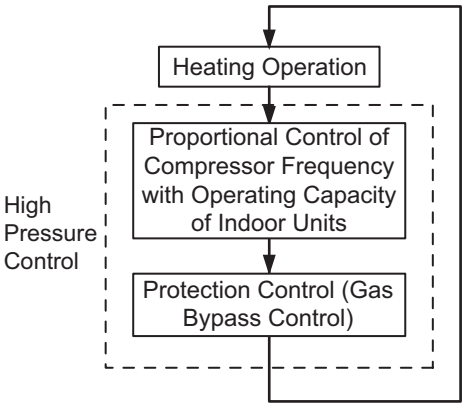
● Checking Method of Electronic Expansion Valve

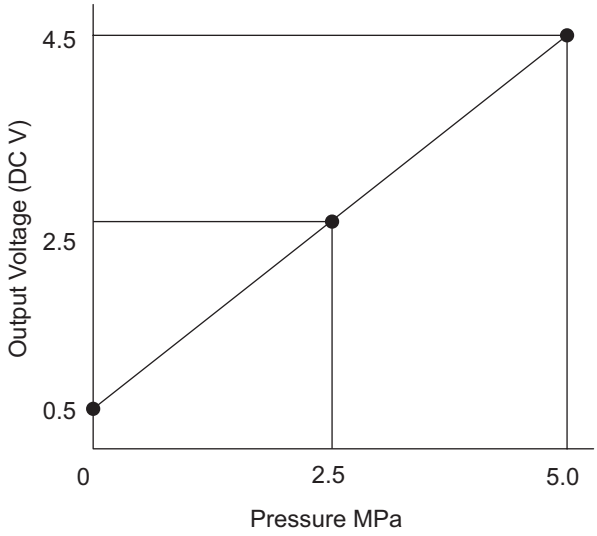
	Outdoor Unit Electronic Expansion Valve
Locked (Fully Closed)	It is abnormal if the liquid pipe pressure does not increase during cooling operation.
Locked (Slightly Open)	It is abnormal if the liquid pipe pressure does not increase and the outlet temperature of the expansion valve decreases after the cooling operation is started.
Locked (Fully Open)	It is abnormal under the following conditions. After heating operation for more than 30 min., the discharge gas temperature of compressor is not 10°C higher than the condensing temperature and there is no other fault such as excessive charge of refrigerant.

3.7 Pressure Sensor (Pd)

(1) High Pressure Control

The high pressure during heating operation is detected by a high pressure sensor, and compressor frequencies are controlled by the proportional controlling method with operating capacity of indoor units (or PID Control for Compressor Frequency) so that the high pressure is controlled in an appropriate range. The output of the high pressure sensor during heating operation performs protective control; gas by-pass control.



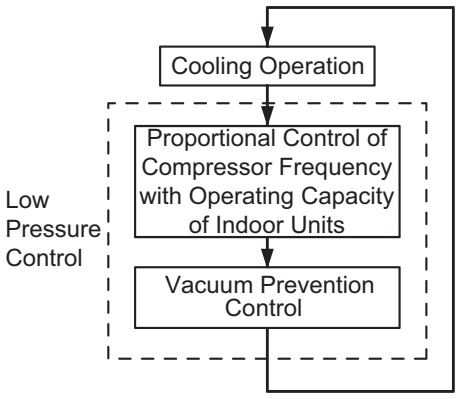


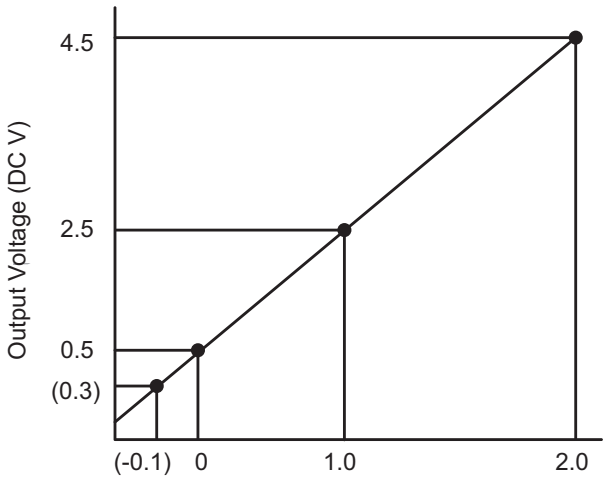
Output Characteristics of High Pressure Sensor

(2) Low Pressure Control (Ps)

The suction pressure during cooling operation is detected by a low pressure sensor, and compressor frequencies are controlled by the proportional controlling method with operating capacity of indoor units (or PID Control for Compressor Frequency) so that the suction pressure is controlled in an appropriate range.

If the suction pressure is excessively low, the cooling can be insufficient and parts composing the refrigeration cycle can be damaged. For this reason, if the output of the low pressure sensor indicates vacuum and the value is maintained for 12 minutes or longer, the compressor is stopped for the purpose of protection.



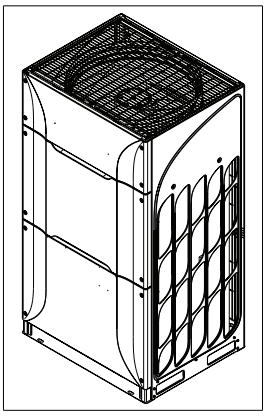


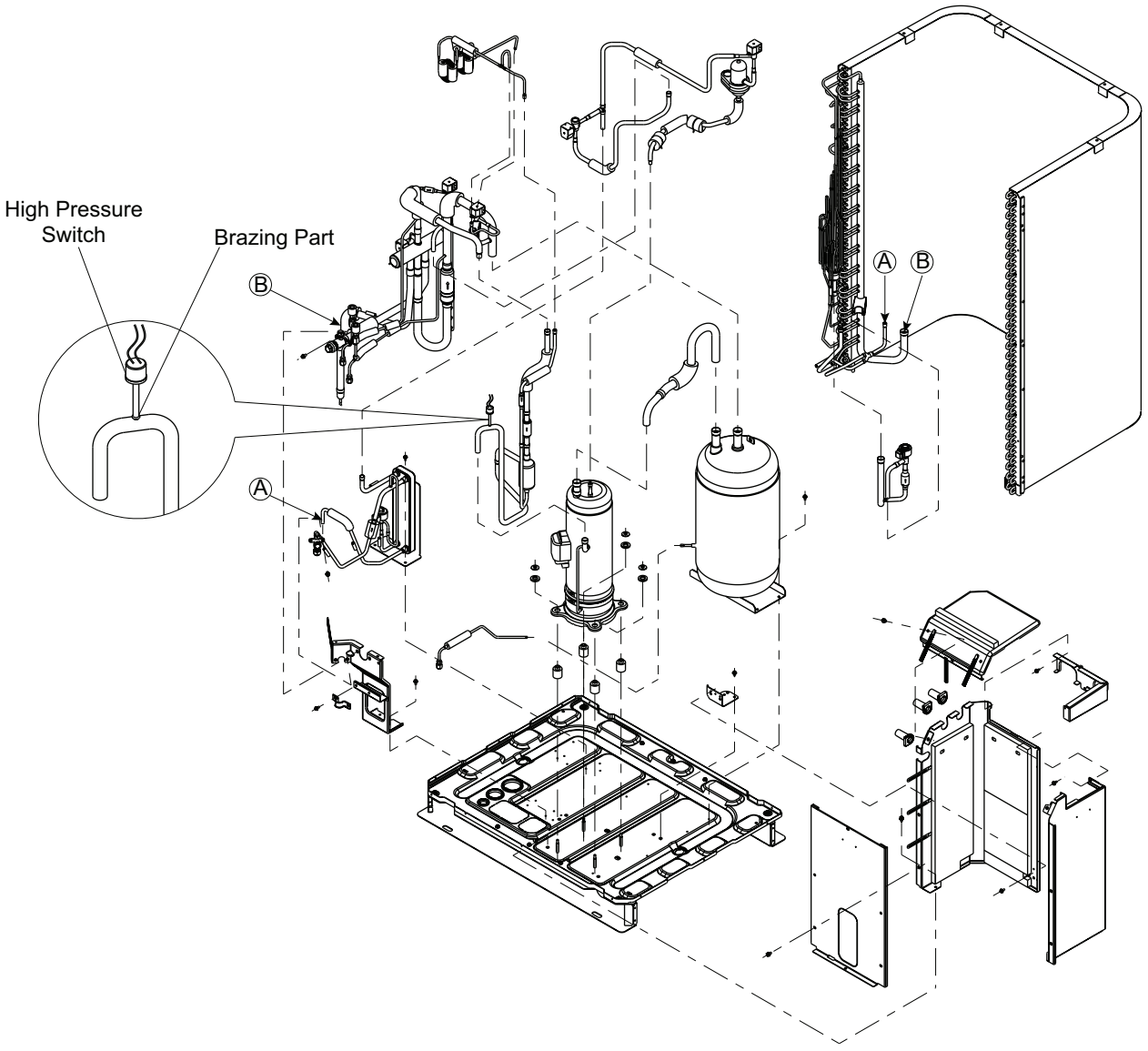
Output Characteristics of Low Pressure Sensor

3.8 High Pressure Protection Device

If the discharge pressure is excessively high, the compressor and the component parts of the refrigeration cycle can be damaged. Therefore, in case that the discharge pressure is higher than 4.15MPa (R410A), the protection control is activated and the compressor is stopped.

<Example: RAS-8.0RNBCLQ>

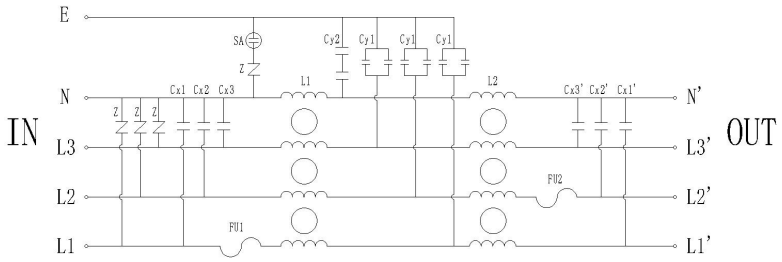


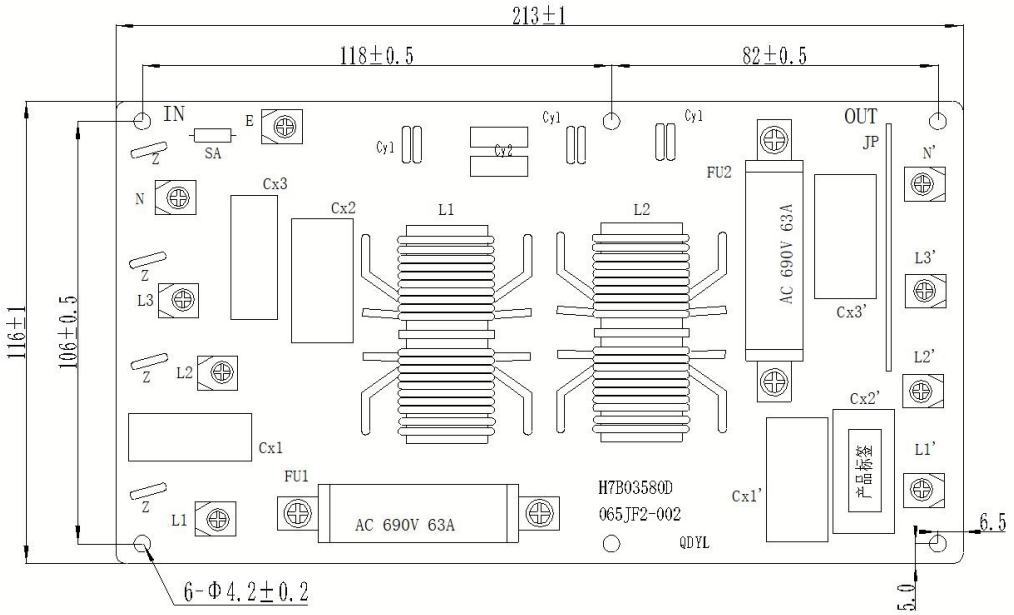


3.9 Noise Filter (NF1, NF2)

The noise filter decreases the leakage of noise made by the inverter to the power supply side. . Terminals indicated with “T1”, “T2”, “T3” are connected to the inverter side and terminals indicated with “L1”, “L2”, “L3” to the power supply side.

(1) Noise Filter

Item	Specification
Rated voltage	AC 400V, 380-415V, 380V
Rated current	37A
Circuit diagram	



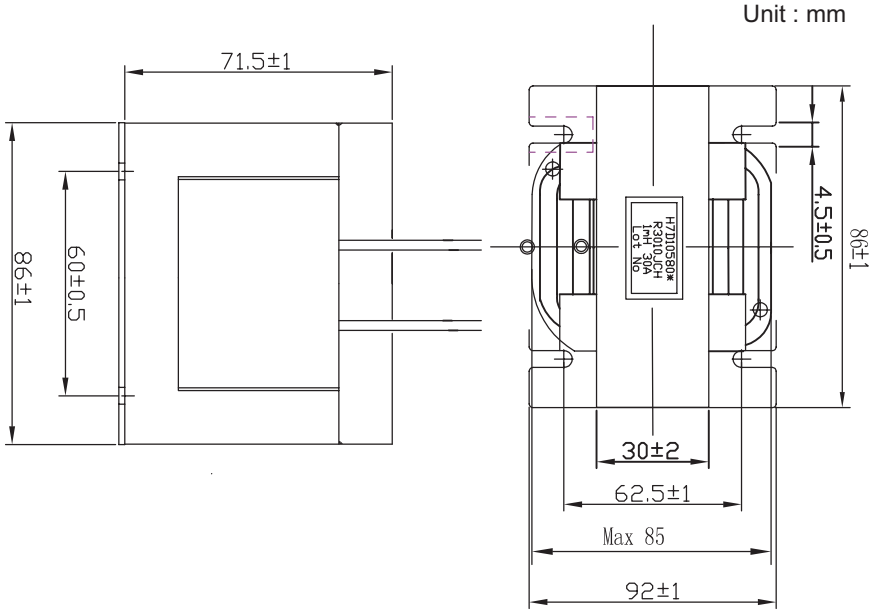
3.10 Reactor (DCL1, DCL2)

This part is used for changing the alternative current to the direct current for the inverter.

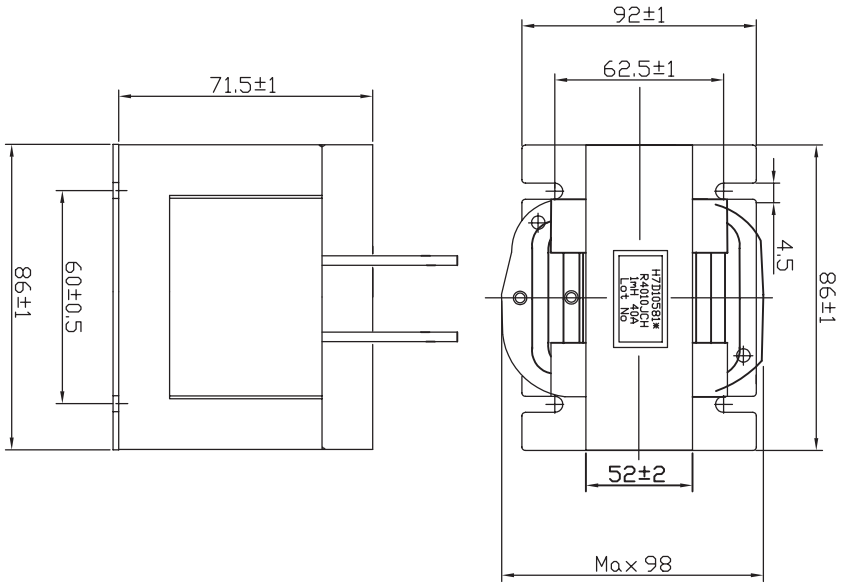
(1) Reactor

Items	Specifications	
Applicable Model	R3010JCH(A)/R3010JCH(B)	R4010JCH(A)/R4010JCH(B)
Character	1mH±10% (1kHz)	
Rated Current	30A	40A
Direct Current Resistance	(A)23.6mΩ±20% (B)21.7mΩ±20%	(A)14.2mΩ±20% (B)13.2mΩ±20%

R3010JCH
Unit : mm



R4010JCH
Unit : mm

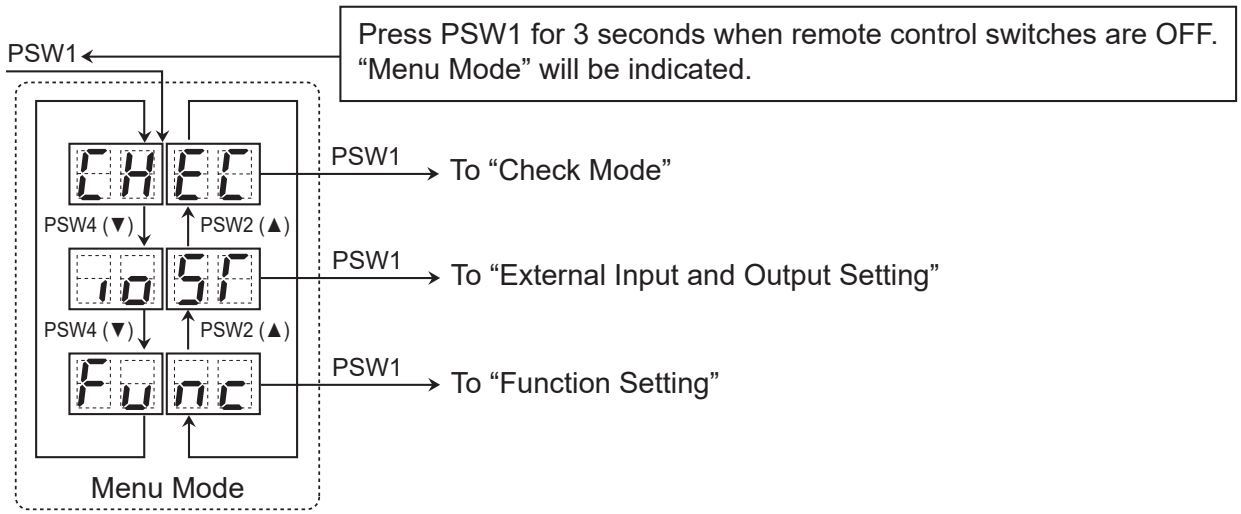


4. Optional Function

4.1 Setting Method

Setting PSW on the outdoor unit PCB is required for “External Input and Output Setting” and “Function Setting”. As for a combination of outdoor units, this must be set from PSW in outdoor unit A. (Setting from the PSW in outdoor unit B,C and D is invalid.) After the setting is completed, press PSW1 for 3 seconds when "Menu Mode" is indicated. The display will be back to the normal indication.

< Setting Method >



In the menu mode, the followings can be selected.
(1) Check Mode:

It indicates the alarm code history for outdoor unit and indoor unit. It is mainly used at service. Refer to the “Checking of Alarm Code History” for the detail of check mode.

(2) External Input and Output Setting:

It is used to set the functions by the external input and output signals.

(3) Function Setting:

It is used to set the change of operating target, night-shift, etc.

4.2 External Input and Output Setting

On the outdoor unit PCB, there are three input terminals (CN17, CN18 as shown below) to receive external signals and two output terminals (CN16) to send signals out. Control functions shown in these tables are available when setting input and output terminals.

<Input>

Control Function No.	Setting Function for Input
1	Fixing Heating Operation Mode
2	Fixing Cooling Operation Mode
3	Demand Stoppage
4	Outdoor Fan Motor Start/Stop
5	Forced Stoppage
6	Demand Current Control 40%
7	Demand Current Control 60%
8	Demand Current Control 70%
9	Demand Current Control 80%
10	Demand Current Control 100%
11	Low Noise Setting 1
12	Low Noise Setting 2
13	Low Noise Setting 3
0	Not Available (Default Setting)

<Output>

Control Function No.	Setting Function for Output
1	Operation Signal
2	Alarm Signal
3	Compressor ON Signal
4	Defrosting Signal
0	Not Available (Default Setting)

The following functions have been already set before shipment.

<Input Terminal>

Input Terminal Name	Connector (Pin No.)	Setting Function	Control Function No.
Input 1	CN17 (1-2)	Fixed Heating Operation Mode	1
Input 2	CN17 (2-3)	Fixed Cooling Operation Mode	2
Input 3	CN18 (1-2)	Demand Stoppage	3

<Output Terminal>

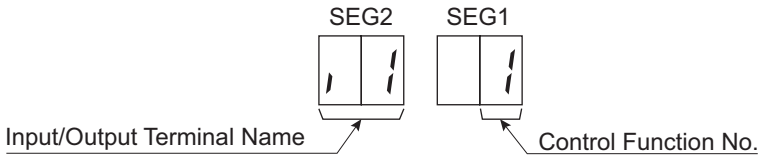
Output Terminal Name	Connector (Pin No.)	Setting Function	Control Function No.
Output 1	CN16 (1-2)	Operation Signal	1
Output 2	CN16 (1-3)	Alarm Signal	2

● Setting of External Input and Output

If an alternative setting is required at a site, perform the following procedures.

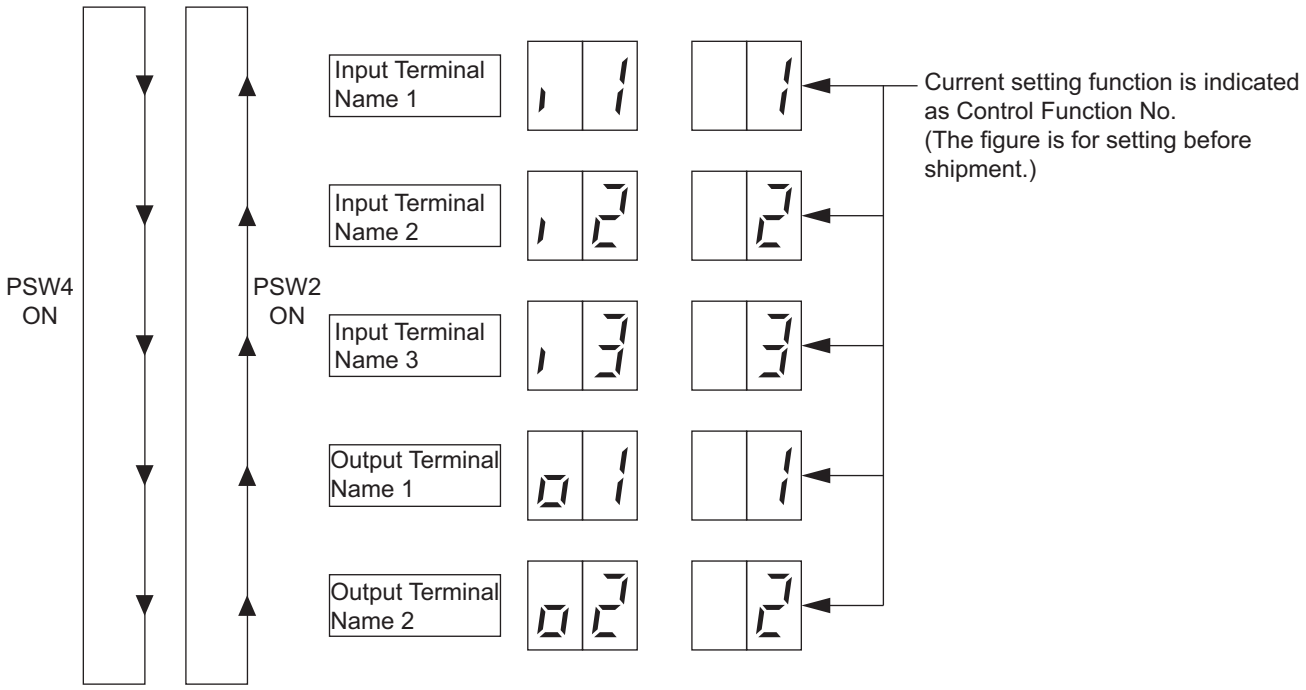
For the combination of outdoor units, perform the setting to the outdoor unit A.

(1) By selecting “External Input and Output Setting”, the following appears on the 7-segment display. (The setting should be performed during the outdoor unit stoppage.)

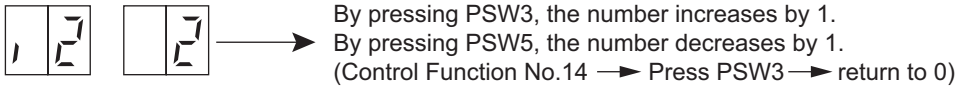


This display indicates that the control function No. 1 (Fixed Heating Operation Mode) is set at input 1.

(2) By pressing PSW2 or PSW4, input/output terminal name is changed.
The following shows the display changes when PSW2 or PSW4 are pushed.



(3) After selecting Input/Output Terminal Name, press PSW3 or PSW5, and then choose Control Function No.



(4) After selecting the control function No., press PSW1 for 3 seconds. The display will be back to the normal indication. The selected contents are memorized in the outdoor unit PCB and “External Input and Output Setting” is completed. The memorized data is maintained even when power source is cut OFF. Refer to the table 4.1 for the notes for the electrical wiring connection and the required parts.

● External Input Function Setting

The following signals can be received by the outdoor unit PCB. Refer to the table 4.1 for the required main parts.

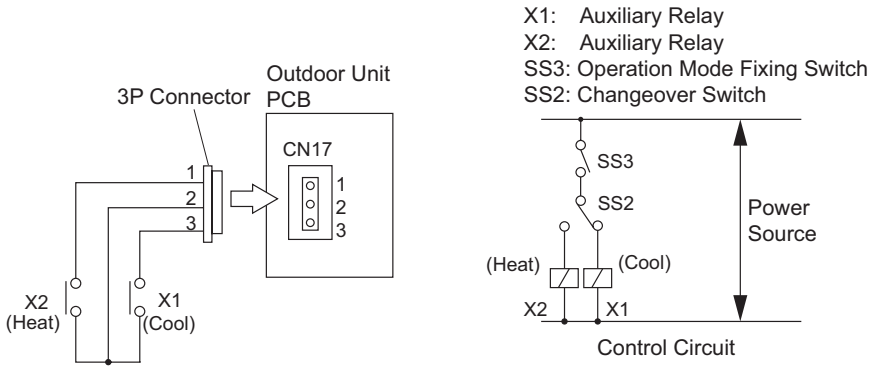
4.2.1 Input Fixing Heating Operation Mode (Control Function No. 1), Input Fixing Cooling Operation Mode (Control Function No. 2)

When the input terminals for fixing operation mode on the outdoor unit PCB are short-circuited, the operation mode can be fixed at the cooling or heating mode:
Short Circuit between Terminals 1 and 2 of CN17: Fixed Heating Operation Mode

Short Circuit between Terminals 2 and 3 of CN17: Fixed Cooling Operation Mode

During this fixed heating (or cooling) mode, no cooling (or heating) operation is available. The indoor units under the cooling or dry operation (or heating operation) will be changed to the Thermo-OFF condition during this mode, and stoppage code No. “20” is given.

• Setting Example
Fixing Heating Operation at Input 1 (between 1 and 2 pins of CN17)
Fixing Cooling Operation at Input 2 (between 3 and 2 pins of CN17)



Wiring Diagram Example of Fixing Operation Mode

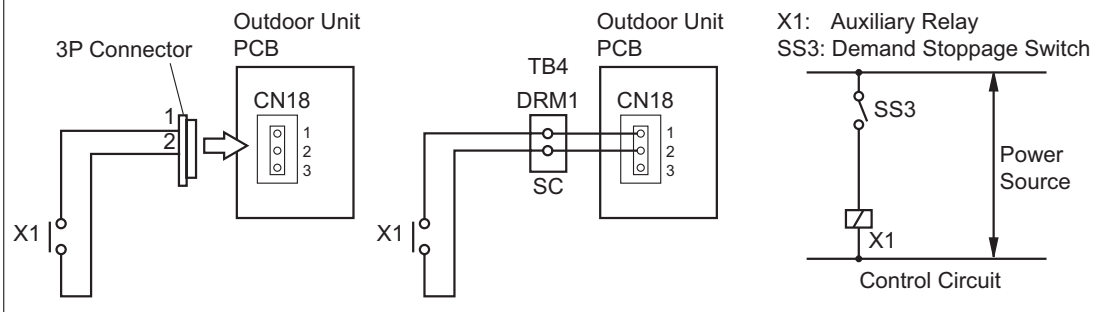
4.2.2 Input Demand Stoppage (Control Function No. 3),

When the input terminals for demand stoppage on the outdoor unit PCB are short-circuited, compressor(s) is stopped. (In this case, the indoor unit(s) is put under Thermo-OFF condition. Cooling operation: Air-flow setting, Heating operation: Lo setting)
The stoppage code No. “10” is given. By disconnecting the demand switch contact, restarting is available.

NOTE:

When demand control (ON/OFF) is performed, it is recommended that the control (ON/OFF) time is set as appropriately according to the heat load. Also, set the demand control time approximately once in 30 minutes at the minimum in consideration for saving energy.

• Setting Example
Demand Stoppage at Input 3 (between 1 and 2 pins of CN18)



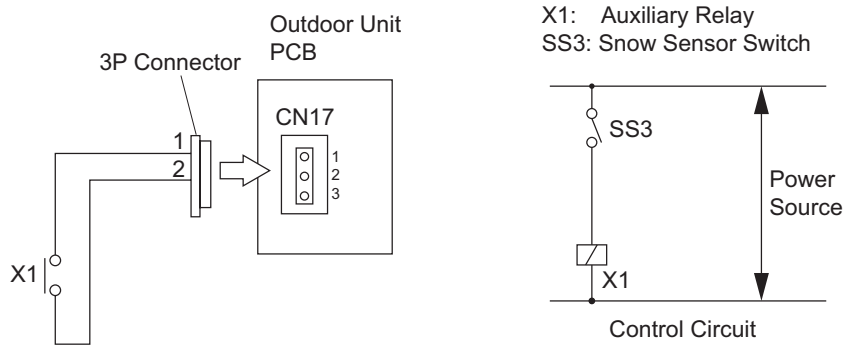
Wiring Diagram Example of Demand Stoppage

4.2.3 Input Outdoor Fan Motor Start/Stop (Control Function No. 4)

This is an auxiliary function to protect the outdoor unit from snow. When the input terminals for Outdoor Fan Motor Start/Stop on the outdoor unit PCB are short-circuited during the compressor stoppage, all the outdoor fan motors start operating. If the compressor restarts operating, the outdoor fan motors will be restored to normal operation. If the input terminals of Outdoor Fan Motor Start/Stop are opened during the outdoor fan motor operation following the short circuit of these terminals, the outdoor fan motor will stop. This function is possible only during the compressor stoppage (during the compressor power-OFF or thermo-OFF of the compressor power-ON) and the ambient temperature must greater than or equal to 10°C. Therefore, this function will not be available even if the input signal is sent during the normal cooling or heating operation.

An example of basic wiring when the Outdoor Fan Motor Start/Stop (Input 2) is set to 2 and 3 pins of CN17 by an external signal is shown below.

• Setting Example
Outdoor Fan Motor Start/Stop at Input 2 (between 2 and 3 pins of CN17)



Wiring Diagram Example of Outdoor Fan Motor Start/Stop

NOTE:

1. This is an auxiliary function to protect the unit from snow. In snowy regions, make sure to protect the unit with a snow-prevention roof, fence (Field-Supplied) or snow-prevention hood (optional), etc..Otherwise, abnormal vibrations will be caused due to imbalanced propeller fan.
2. If the fan motor or fan controller fail during the outdoor fan motor start/stop operation, stop all the outdoor fan motor to suspend the operation. Check the alarm code and deal properly with the failure next time the compressor is operated.
3. When setting the snow sensor switch for Outdoor Fan Motor Start/Stop, make sure that the continuous operation time is 30 seconds or more. Also the outdoor fan motor start/stop intervals shall be at least 10 minutes. Otherwise, outdoor fan motors malfunction will be caused by frequent start/stop.

⚠ WARNING

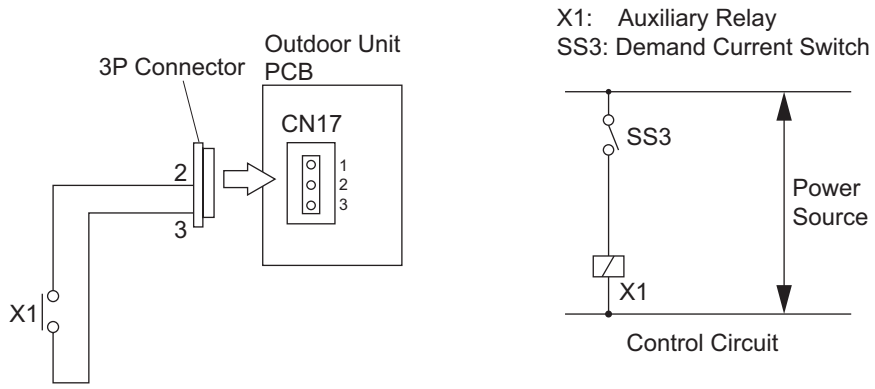
Because of this setting, the outdoor fan can operate even while the outdoor unit (compressor) stops. Display a notice to that effect on a readily visible part of the unit body, in order to avoid injuries caused by an unintended outdoor fan operation.

4.2.4 Input Demand Current Control 40, 60, 70, 80, 100% (Control Function No. 6 to 10)

When the input terminals for Demand Current Control on the outdoor unit PCB are short-circuited, the compressor frequency is controlled so that the maximum limit of the outdoor running current is set to 100%, 80%, 70%, 60% or 40% of the reference power consumption.

If the outdoor unit running current exceeds the maximum limit, the indoor unit is put under thermo-OFF condition. The stoppage code No. “10” is given. When the input terminal is opened during the demand current control, its control is reset.

- Setting Example
  Demand Current Control at Input 2 (between 2 and 3 pins of CN17), Control Function No. 6 to 10



Wiring Diagram Example of Demand Current Control

NOTE:

1. The Demand Current Control (%) is value criterion. The value used for this control is calculated from the current, and therefore is different from the value indicated by a wattmeter. If it is required that the maximum power consumption is managed precisely, a field-supplied demand controller should be used.
2. The actual value may temporarily be higher than the indicated value (by 40% to 100%) depending on the operating control conditions such as protection control.

4.2.5 Input Low Noise Setting 1, 2, 3 (Control Function No. 11 to 13)

When the input terminals for low noise setting on the outdoor unit PCB are short-circuited, the compressor frequency and outdoor fan rotation frequency are controlled and the operating sound of the outdoor unit will be given as shown in the table below.

The operating sound can be set by selecting the control function No.

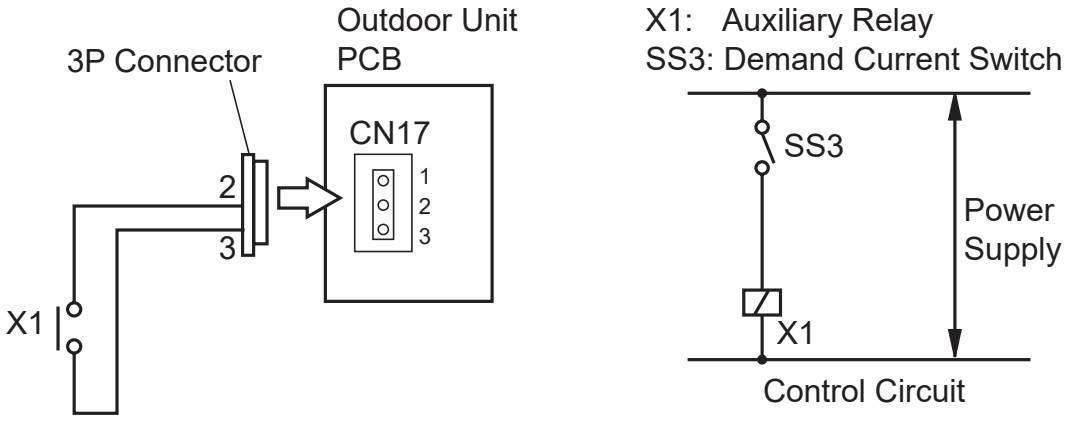
NOTE:

(a) The outdoor unit capacity will decrease because the compressor frequency and outdoor fan motor frequency decrease forcibly. The operating range will also be restricted.

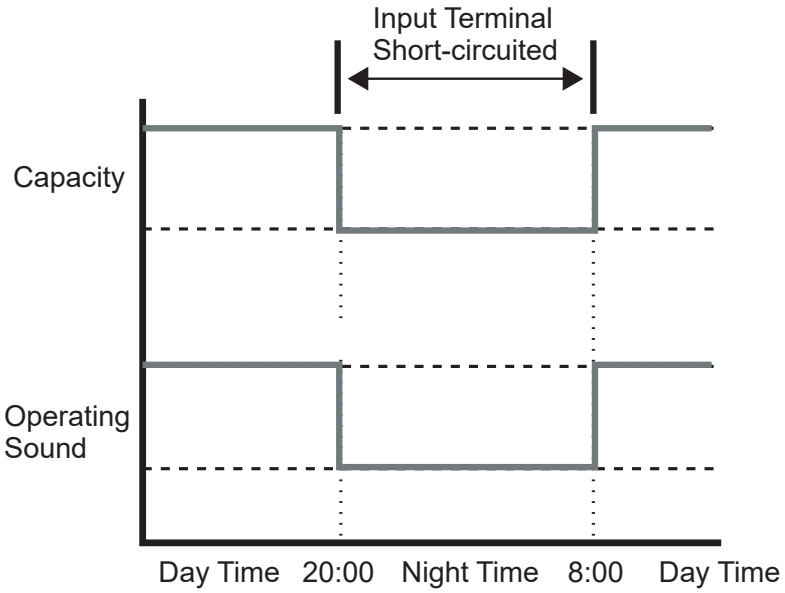
(b) In some cases, the operating sound may be temporarily higher than the value in the table below (targeted value).

• Setting Example

Low Noise Setting at Input 2 (between 2 and 3 pins of CN17), Control Function No. 12



Wiring Diagram Example of Low Noise Setting



[Example] "Low Noise Setting 2" during Night Time Only

Table 4.1 Specifications of Required Main Part

Parts		Specification	Remarks
Auxiliary Relay (X1, X2)		Mini-Power Relay, (Model: MY1F or MY2F) made by OMRON	220V/240V
Change-Over Switch (SS2, SS3)		Manual Switch	220V/240V
3 Pin Connector Cord		Model: PCC-1A (Connected to JST Connector, XARP-3)	Five Cords with Connectors as One Set
Electric Wiring (Inside of Unit)	Low Voltage	0.3mm^2	Lower than 24V
	220/240V	0.5 to 0.75mm^2	
Electric Wiring (Outside of Unit)	Low Voltage	0.5 to 0.75mm^2	Lower than 24V
	220/240V	2mm^2	

NOTE:

1. Make the wire to the terminals as short as possible.
2. Do not run the wires along high voltage cable. Keep at least 30cm between the wire and the high voltage cable. (Crossing is applicable.)

   If it is necessary to run the wires along the high voltage cable, insert the low voltage cable(s) into metal tube and ground it at one end. If sealed wires are used at the low voltage wire side, ground it at one end of the shield wires.
3. The maximum length should be within 70m.

● External Output Function Setting

The following signals can be picked up from the outdoor unit PCB.

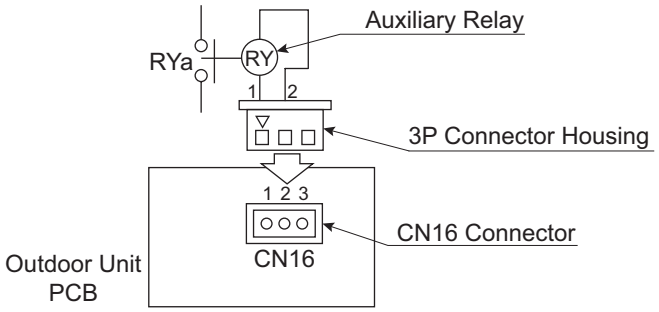
Refer to the table 4.2 for the required main parts.

4.2.6 Output Operation Signal (Control Function No. 1)

This function is utilized to receive the operation signal.

Auxiliary relay contacting (RYa) is closed during the operation. Operation signal will be sent to output terminals when the indoor units are operating. (Even when one (1) indoor unit is operating, the signal will be sent.) This function can be used for circulator or humidifier operation.

- Setting Example
  Operation Signal at Output 1 (between 1 and 2 pins of CN16)



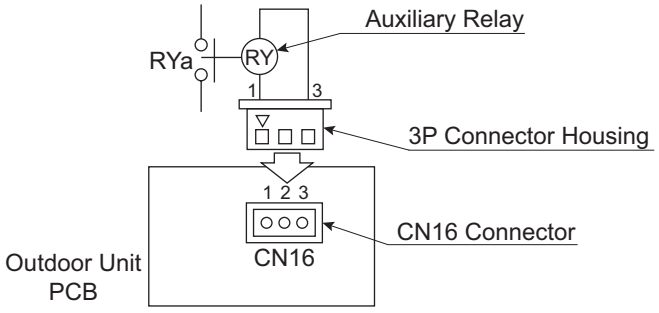
Wiring Diagram Example of Operation Signal

4.2.7 Output Alarm Signal (Control Function No. 2)

This function is utilized to receive the alarm signal.

Auxiliary relay contacting (RYa) is closed when the alarm occurs. Alarm signal will be sent to output terminals when the alarm occurs from the indoor units. (The signal will be sent even when the alarm occurs from one (1) indoor unit.)

- Setting Example
  Alarm Signal at Output 2 (between 1 and 3 pins of CN16)

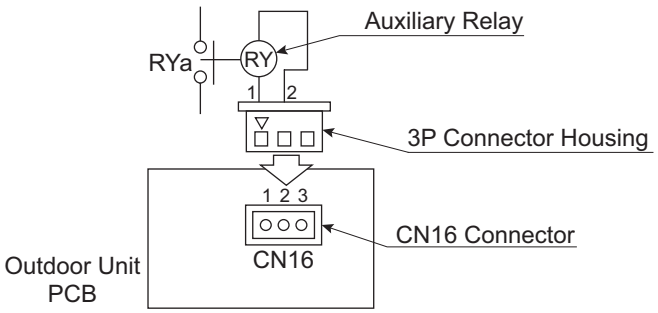


Wiring Diagram Example of Alarm Signal

4.2.8 Output Compressor ON Signal (Control Function No. 3)

This function is utilized to receive the compressor operation signal.
Auxiliary relay contacting (RYa) is closed during the compressor operation.

- Setting Example
  Compressor ON Signal at Output 2 (between 1 and 3 pins of CN16)

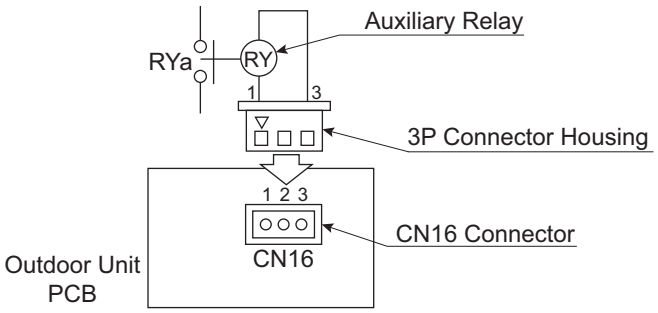


Wiring Diagram Example of Compressor ON Signal

4.2.9 Output Defrosting Signal (Control Function No. 4)

This function is utilized to receive the defrosting signal.
Auxiliary relay contacting (RYa) is closed during the defrosting.

- Setting Example
  Defrosting Stoppage at Output 2 (between 1 and 3 pins of CN16)



Wiring Diagram Example of Defrosting Signal

Table 4.2 Specifications of Required Main Part

Parts	Specification
Auxiliary Relay *	High-Power Relay, LY2F 12V DC made by OMRON

* Do not use the relay with diode built-in.
* Refer to the table 4.1 for the connector parts.

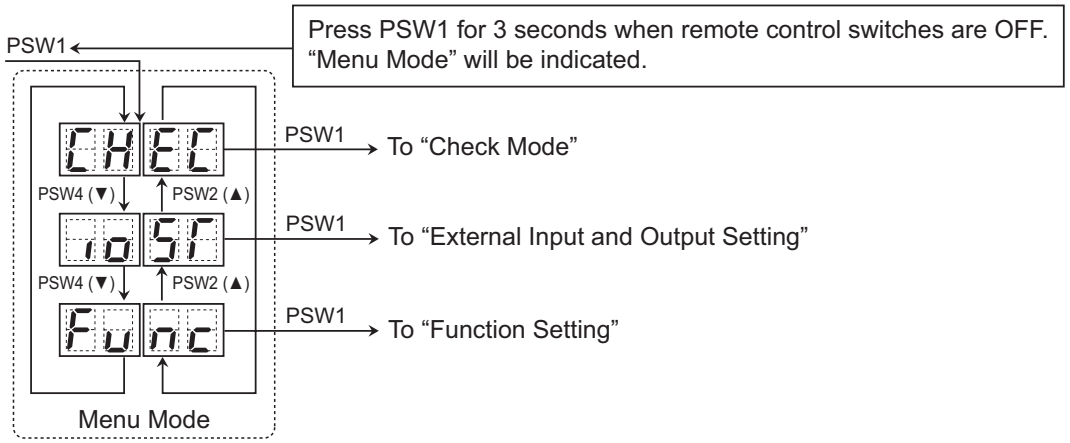
4.3 Function Setting

(1) The setting should be performed during the outdoor unit stoppage.

For the combination of outdoor units, set it to the outdoor unit A. (The setting can not be performed to the outdoor unit B, C and D.) The outdoor unit A is the unit to which the control cable between outdoor unit and indoor unit is connected.

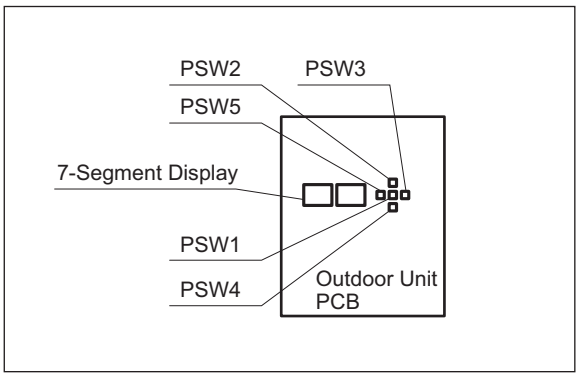
(2) Press PSW1 for more than 3 seconds.

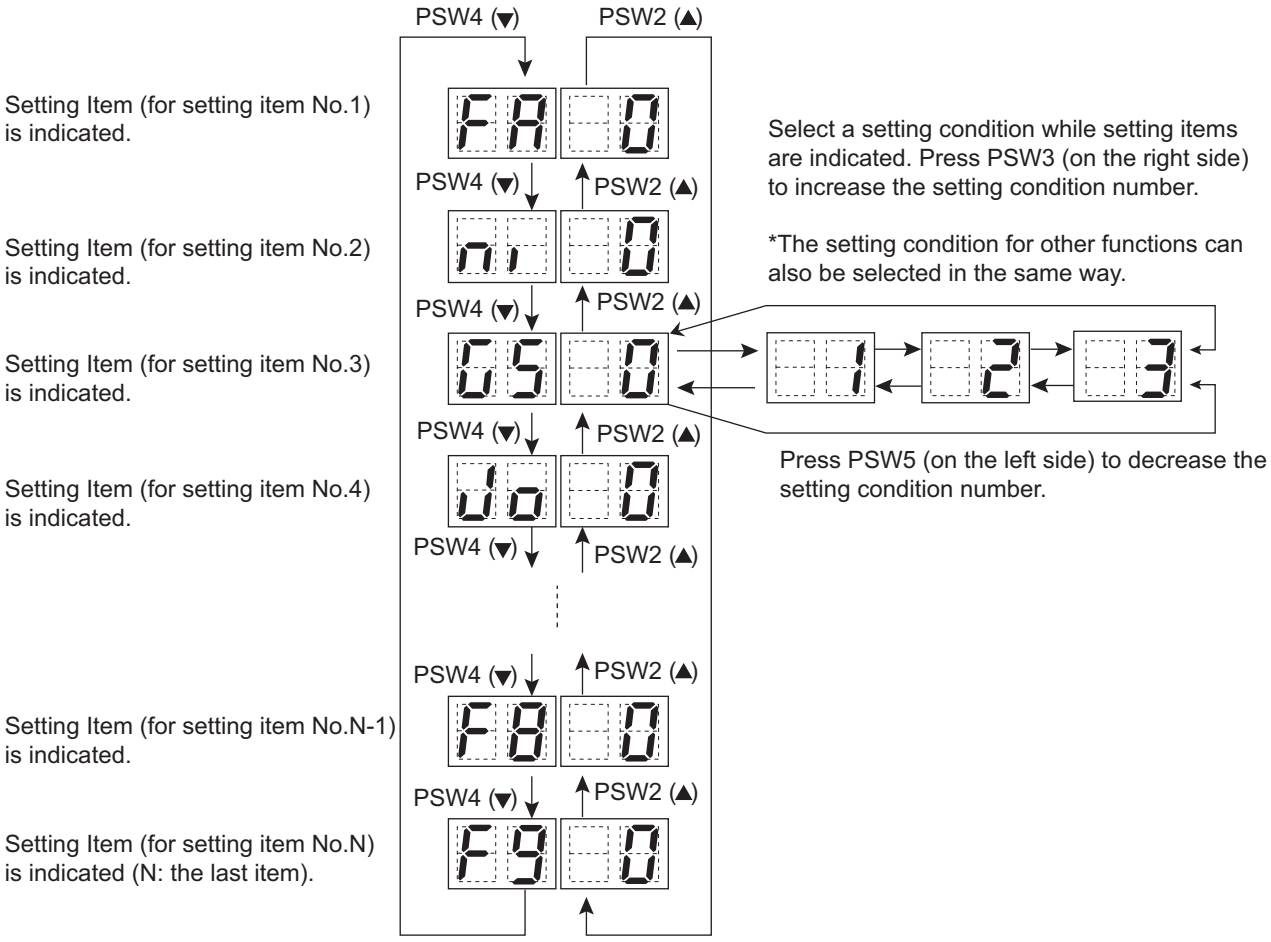
"Menu" will be indicated on the 7-segment display. The menu indication is changed by pressing PSW2 or PSW4 and displayed in the following order.



Select the function setting mode indicated as "Func" on the 7-segment display.

Arrangement of Push Switches on Outdoor Unit PCB





(3) After selecting the Function Setting, turn OFF DSW4-No.5. The display will be back to the normal operation. Then turn OFF DSW4-No.4. Confirm if DSW4 is set to factory settings.

The selected data is stored in the outdoor unit PCB3 and the “Function Setting” is completed. The stored data is maintained even when the power source is cut OFF.

4.3.1 Function Setting

No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
1	Circulator Function at Heating Thermo-OFF	FA	00	No setting
			01	Indoor unit fan forced ON and OFF (2 min. ON / 6 min. OFF)
			02	Indoor unit fan forced ON and OFF (2 min. ON / 13 min. OFF)
			03	Indoor unit fan forced ON and OFF (2 min. ON / 28 min. OFF)
			04	Indoor unit fan stop
2	Night-Shift	ni	00	No setting
			01	Setting of night-shift 1 (for Cooling / Heating)
			02	Setting of night-shift 2 (for Cooling only)
3	Cancellation of Outdoor Ambient Temperature Limit	CS	00	No setting
			01	For heating
			02	For cooling
			03	For cooling/heating
4	Defrost for Cold Area (Change of Defrost Condition)	do	00	No setting
			01	Condition 2 of defrost operation
			02	Not used
5	SLo (Fan Speed) Defrost Setting	bJ	00	Indoor unit fan stop when heating operation is activated/during defrost operation
			01	Indoor unit fan SLo operation during defrost operation
			02	Indoor unit fan SLo operation when heating operation is activated
			03	Fan operation when heating operation is activated/ Indoor fan SLo operation during defrost operation
			04	Indoor unit fan SLo operation when heating operation is activated (including Start Up after Defrost)
6	Cancellation of Hot Start	HF	00	Hot start control is available
			01	Cancellation of hot start
			02	α = 15ºC
			03	α = 10ºC
7	Priority Capacity Mode	nU	00	No setting
			01	Change of frequency maximum limit value
			02	Change of current limit value
			03	Change of frequency maximum limit value, current limit value and fan speed limit
8	Minimum Evaporating Temperature Setting for Cooling	Hc	00	Minimum 6ºC
			01	Minimum 7ºC
			02	Minimum 8ºC
			03	Minimum 9ºC
			04	Minimum 10ºC
			05	Minimum 11ºC
			06	Minimum 12ºC
			07	Minimum 13ºC
			08	Minimum 14 ºC
			09	Minimum 2ºC
			10	Minimum 3ºC
			11	Minimum 4ºC
			12	Minimum 5ºC
9	Compressor Frequency Control Target Pd Correction Value for Heating	Hh	00	Initial setting (Pd targeted value 0.00(MPa))
			01	Pd Targeted value -0.15(MPa)
			02	Pd Targeted value -0.10(MPa)
			03	Pd Targeted value -0.05(MPa)
			04	Pd Targeted value -0.03(MPa)
			05	Pd Targeted value +0.03(MPa)
			06	Pd Targeted value +0.05(MPa)
			07	Pd Targeted value +0.10(MPa)
10	Indoor Expansion Valve Control Target SH Correction Value for Cooling	SC	00	Initial setting (SH targeted value +0ºC)
			01	SH Targeted value -2ºC
			02	SH Targeted value -1ºC
			03	SH Targeted value +1ºC
			04	SH Targeted value +2ºC
11	Indoor Expansion Valve Control Target SC Correction Value for Heating	SH	00	Initial setting (SC targeted value +0ºC)
			01	SC Targeted value -6ºC
			02	SC Targeted value -3ºC
			03	SC Targeted value +3ºC
			04	SC Targeted value +6ºC

No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
12	Indoor Expansion Valve Opening Change for Stoppage Indoor Unit in Heating Mode	5,	00	Initial setting (stoppage unit expansion valve opening) 0.8~2.0HP: 100~300 pulse, 2.5HP or over: 200~400 pulse
			01	Expansion valve opening: 150~325 pulse
			02	Expansion valve opening 0.8~2.0HP: 175 pulse, 2.5HP or over: 300 pulse
			03	Expansion valve opening 0.8~2.0HP: 100 pulse, 2.5HP or over: 150 pulse
			04	Expansion valve opening 0.8~2.0HP: 90 pulse, 2.5HP or over: 100 pulse
			05	Expansion valve opening 0.8~2.0HP: 40 pulse, 2.5HP or over: 40 pulse
13	Indoor Expansion Valve Opening Change for Thermo-OFF Indoor Unit in Heating Mode	5o	00	Thermo-OFF unit expansion valve opening (150~325 pulse)
			01	Expansion valve opening 0.8~2.0HP: 175 pulse, 2.5HP or over: 300 pulse
			02	Expansion valve opening 0.8~2.0HP: 100 pulse, 2.5HP or over: 150 pulse
			03	Expansion valve opening 0.8~2.0HP: 40 pulse, 2.5HP or over: 40 pulse
14	Indoor Expansion Valve Initial Opening of Thermo-ON Indoor Unit in Heating Mode	c,	00	Initial setting (600~1300 pulse)
			01	Expansion Valve Opening 600~1300 pulse
			02	Expansion Valve Opening 600~650 Pulse
			03	Expansion Valve Opening 0.8~2.0HP: 950 Pulse 2.5 and 3HP or greater: 1500 Pulse
			04	Expansion Valve Opening 0.8~2.0HP: 1440 Pulse 2.5 and 3HP or greater: 2000 Pulse
15	Fine Adjustment of Indoor Expansion Valve Initial Opening in Cooling Mode	cb	00	Initial setting
			01	Cooling operation initial opening -5%
			02	Cooling operation initial opening +3%
			03	Cooling operation initial opening +5%
			04	Cooling operation initial opening +10%
16	Fine Adjustment of Indoor Expansion Valve Initial Opening in Heating Mode	ch	00	Initial setting
			01	Heating operation initial opening -5%
			02	Heating operation initial opening +3%
			03	Heating operation initial opening +5%
			04	Heating operation initial opening +10%
17	Low Noise Setting (In the case of low noise setting, cooling/heating operation range will be restricted.)	db	00	Initial setting
			01	Fan rotation maximum limit 1
			02	Fan rotation maximum limit 2
			03	Fan rotation maximum limit 3
			04	Frequency limit 1
			05	Frequency limit 2
			06	Frequency limit 3
			07	Operation sound value Setting, Target 55dB
			08	Operation sound value Setting, Target 50dB
			09	Operation sound value Setting, Target 45dB
18	Demand Function Setting	dE	00	No demand control
			01	Demand control 40%
			02	Demand control 60%
			03	Demand control 70%
			04	Demand control 80%
			05	Demand control 100%
19	Wave Function Setting	UE	00	No Wave function
			01	Minimum limit 40%
			02	Minimum limit 60%
			03	Minimum limit 70%
			04	Minimum limit 80%
20	Cold Draft Protection (Protection in Decrease in Indoor Temperature for Cooling)	Fb	00	Initial setting
			01	Indoor unit outlet temperature ≥ 10ºC
			02	Indoor unit outlet temperature ≥ 12ºC
			03	Indoor unit outlet temperature ≥ 14ºC

OPTIONAL FUNCTION

No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
21	Outlet Air Temperature Control for DOAS*1)	F1	00	Initial Setting
			01	Performance suppression mode
			02	Outlet air temperature control mode
22	Adjustment of Fan Rotation (To avoid a whining sound for the multiple installation.)	Fo	00	Initial Setting
			01	Change of fan rotation -15rpm
			02	Change of fan rotation -30rpm
23	Not Prepared	L1	00	-
24	Thermo-OFF Setting for Outdoor Unit After Defrosting Operation	d5	00	No setting
			01	Thermo-OFF stoppage setting for outdoor unit after defrosting operation
25	Not Prepared	F1	00	-
26	Crankcase Heater Control during Turning OFF Operation Switch	F2	00	No setting
			01	Optional Switch OFF for 20 Days
			02	Optional Switch OFF for 15 Days
			03	Optional Switch OFF for 10 Days
			04	Optional Switch OFF for 5 Days
			05	Optional Switch OFF for 3 Days
			06	Optional Switch OFF for 2 Days
27	Changing of OFF Time for Indoor Unit Fan during Turning ON Heating Operation Switch	F3	00	Initial Setting (Max. 12minutes)
			01	Max. 3 minutes
			02	Max. 6 minutes
			03	Max. 9 minutes
			04	Max. 15 minutes
			05	Max. 30 minutes
			06	Max. 60 minutes
28	Intermittent Operation of Outdoor Fan Motor	F4	00	No intermittent operation
			01	Set outdoor temperature ≤ 3ºC
			02	Set outdoor temperature ≤ 0ºC
			03	Set outdoor temperature ≤ 1ºC
			04	Set outdoor temperature ≤ 2ºC
			05	Set outdoor temperature ≤ 4ºC
			06	Set outdoor temperature ≤ 5ºC
29	Indoor Heat Exchanger SH Target Value Control for Cooling (Only for RCI Series)	F5	00	Initial setting (Heat Exchange target value +0ºC)
			01	Heat Exchange SH target value +1ºC
			02	Heat Exchange SH target value +2ºC
			03	Heat Exchange SH target value +3ºC
			04	Heat Exchange SH target value +4ºC
30	Indoor Expansion Valve Opening Minimum Limitation Change for Stoppage Indoor Unit in Heating Mode	F6	00	Initial Setting (Stoppage Unit Expansion Valve Opening) 0.8HP~2.0HP: 90 Pulse, 2.5~3.0HP or greater: 90 Pulse
			01	Expansion Valve Opening 150~325 Pulse
			02	Expansion Valve Opening 0.8HP~2.0HP: 175 Pulse 2.5HP or greater: 300 Pulse
			03	Expansion Valve Opening 0.8HP~2.0HP: 100 Pulse 2.5HP or greater: 150 Pulse
			04	Expansion Valve Opening 0.8HP~2.0HP: 90 Pulse 2.5HP or greater: 100 Pulse
			05	Expansion Valve Opening 0.8HP~2.0HP: 40 Pulse 2.5HP or greater: 40 Pulse
31	Not Prepared	F7	00	-
32	Forced Defrosting during Stoppage	F8	00	Initial Setting (OFF)
			01	This function is ON.
33	Indoor Expansion Valve Control Change for Stoppage Indoor Unit in Heating Mode	F9	00	SC Control for Stoppage Unit
			01	40 Pulse
			02	SC Control for Operation Unit

*1): Dedicated Outdoor Air System, All Fresh Air Unit

No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
34	Compressor Maximum Frequency Suppression	FC	00	Initial Setting (Maximum Frequency: 130Hz)
			01	Maximum Frequency: 110Hz
35	Convert Unit in Checking Mode	Fd	00	Initial Setting (Temp: ºF, Pressure: psi)
			01	Temp: ºC, Pressure: MPa
36	Indoor Fan ON/OFF Setting during Forced Stoppage	FE	00	Initial Setting (Indoor Unit Fan: OFF)
			01	Indoor Unit Fan: ON
37	Not Prepared	FF	00	-
38	High difference setting	FG	00	100m
			01	90m
			02	80m
			03	70m
			04	60m
			05	-
39	Not Prepared	FH	00	-
40	Oil return control	F1	00	Initial Setting
			01	Oil return control avoided valid
41	Performance correction	FJ	00	Initial Setting
			01	Capacity correction by long pipe
42	Outdoor temperature range	FL	00	Initial Setting
			01	Outdoor temperature range change under cooling mode
43	Cooling mode Start control 2 Hz change speed	Fn	00	3.0Hz/s
			01	2.0Hz/s
			02	1.0Hz/s
			03	0.5Hz/s
			04	0.25Hz/s
			05	0.125Hz/s
44	Cooling mode Start control 2 Hz change speed	FP	00	3.0Hz/s
			01	2.0Hz/s
			02	1.0Hz/s
			03	0.5Hz/s
			04	0.25Hz/s
			05	0.125Hz/s
45	Compressor Maximum Frequency Change during Defrosting Mode	Fr	00	Initial Setting
			01	Maximum Frequency Setting 1
			02	Maximum Frequency Setting 2
			03	Maximum Frequency Setting 3
46	Oil return mode of indoor unit	FU	00	Initial Setting
			01	Oil return mode of indoor unit invalid
47	Not Prepared	FY	00	-

NOTE:

Contact your distributor or dealer for details on the items “29,” “30,” “32,” “33,” “34,” and “45.”

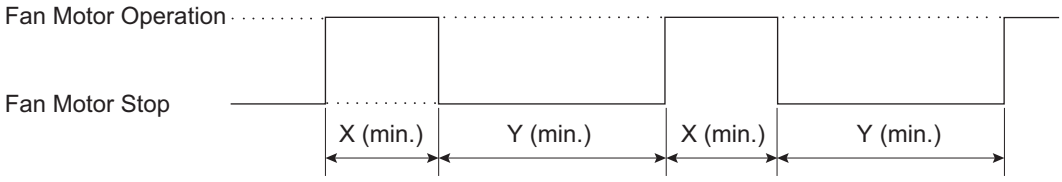
4.3.2 Circulator Function at Heating Thermo-OFF (Control Function FA)

Press “PSW3” and select the setting conditions “0” to “4” in Circulator Function at Heating Thermo-OFF “FA”. Normally, the fan speed is changed to “LOW” at heating Thermo-OFF. (There is a case that the room temperature is too high at the heating Thermo-OFF.) However, the indoor fan motor is operated at “LOW” and stopped repeatedly by setting this function.

NOTE:

When the compressor is stopped, the indoor fan motor operates at “LOW” speed continuously.

The action when the indoor fan motor operates at the circulator function is indicated as follows.



Contents of Function Setting Item “FA”

	Contents of Function Setting Item “FA”				
	0	**1**	**2**	**3**	**4**
Indoor Fan Motor “LOW” Operation Time X (min.)	(Continuous Operation)	2	2	2	0
Indoor Fan Motor Stop Time Y (min.)	0	6	13	28	Stopped

NOTE:

In case of using the function setting No.2 to 4, install the remote sensor. Because the time period of stopping the indoor fan becomes longer, the detected value of the suction air thermistor for indoor unit becomes high, and it may take time to Thermo-ON.

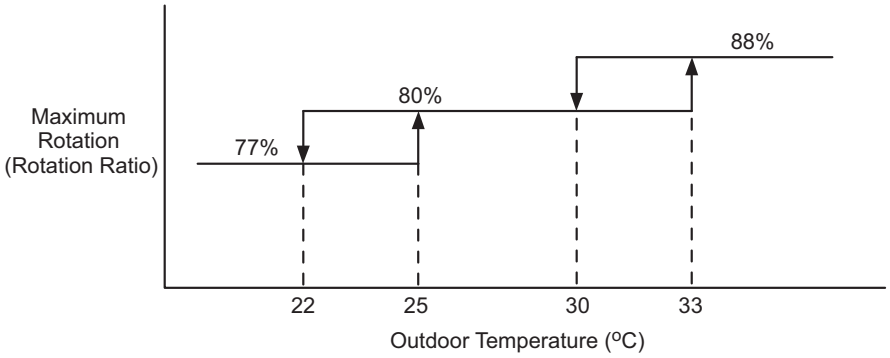
4.3.3 Night-Shift (Low Noise) (Function Setting “ni”)

Press “PSW3” and select the setting condition “1” at the Night Shift (Low Noise) “ni”. Then, this function can be set. This setting is available when the ambient temperature is 30°C or less at the cooling operation.

The outdoor fan operation is controlled by fan controller as shown below.

The Night Shift operation should be used if the capacity has the margin to be allowed for the capacity decrease and the low sound operation is required especially in the night time.

(1) Outdoor Fan



(2) Frequency Range (Cooling Operation)

50/60Hz

	Outdoor Unit Capacity (HP)	Maximum Frequency (Hz)	Conditions
When Night Shift is not Set ni=0	8	75	Except for the Conditions on the Right
	10	81	
	12	110	
	14	130	
	16	130	
	18	170	
	20	185	
	22	210	
	24	220	

Conditions	Outdoor Unit Capacity (HP)	Maximum Frequency (Hz)	Target Operating Noise(dB)
When Night Shift is Set ni=1	8	46	49
	10	46	49
	12	74	51
	14	74	53
	16	74	54
	18	92	55
	20	92	52
	22	148	52
	24	148	52

NOTE:

For the combination of outdoor units, the frequency for each outdoor unit becomes less than the value above.

4.3.4 Cancellation of Outdoor Ambient Temperature Limit (Function Setting “GS”)

Press “PSW3” and select the setting condition “0” to “3” at Cancellation of Outdoor Ambient Temperature Limit of “GS”. Then, this function can be set.

The heating operation is continued even under a high outdoor temperature or the cooling operation is continued even under a low temperature.

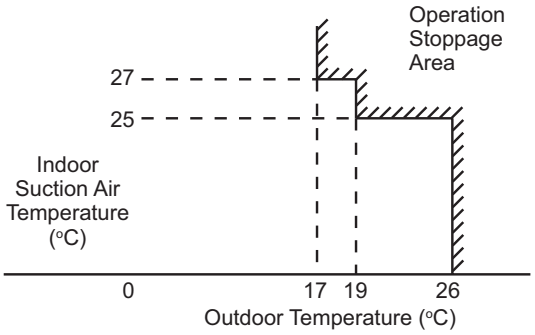
Setting Condition	Operation Mode for Cancellation
0	Not Available (Default Setting)
1	Heating
2	Cooling
3	Heating/Cooling

Heating Operation

The limitation of the permissible outdoor temperature area in heating operation (factory setting) shown in the figure at the right is cancelled.

NOTE:

When the outdoor ambient temperature limit for heating operation is cancelled, the operation may stop due to increasing high pressure since the protection control is not cancelled.

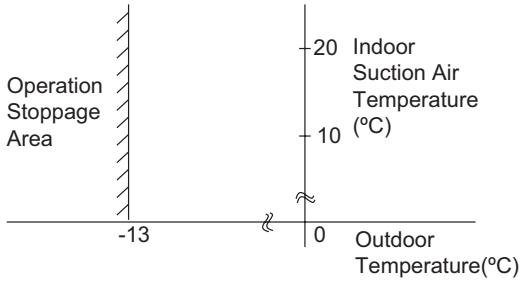


Cooling Operation

The limitation of the permissible outdoor temperature area in cooling operation (factory setting) shown in the figure at the right is cancelled.

NOTE:

When the outdoor ambient temperature limit for cooling operation is cancelled, the operation may stop due to decreasing low pressure since the protection control is not cancelled.

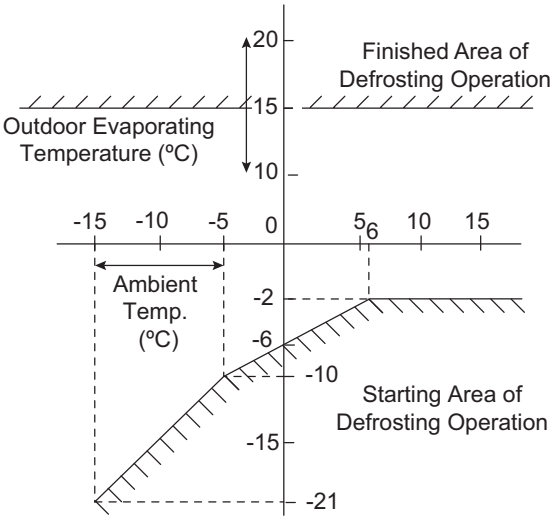
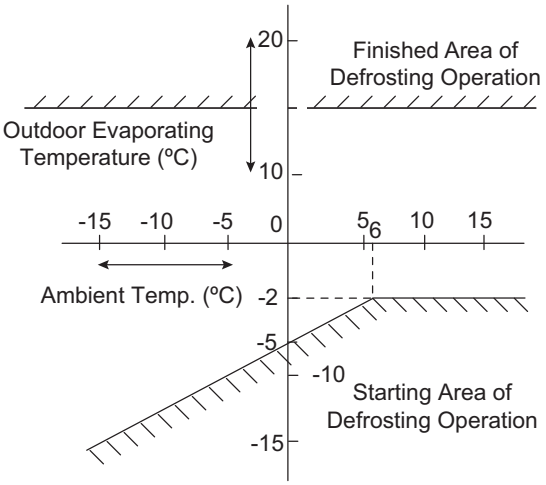


NOTE:

If this function is set and the outdoor unit operates in the operation stoppage area shown in the above figure for a long time, the outdoor unit may be damaged since protection control is canceled.

4.3.5 Defrost for Cold Area (Function Setting “Jo”)

Press “PSW3” and select the setting condition “1” at the Defrost for Cold Area “Jo” to change the temperature condition for starting defrost operation.

Setting Condition	Standard Specifications	Cold Area Specifications
	“Jo = 0”	“Jo = 1”
Temperature Conditions under Defrosting Operation		

4.3.6 SLo Defrost Setting (Function Setting “bJ”)

Press “PSW3” and select the setting condition “0” to “3” at SLo Defrost Setting “bJ”.

Indoor fan operation is stopped during the defrost operation and at the start of the heating operation. However, this function can operate the indoor fan at low speed during the defrosting operation and at the start of the heating operation..

“bJ” Setting Condition	Indoor Fan Operation
0	Not Available (Default Setting)
1	Indoor fan SLo when heating operation is activated/during defrost operation
2	-
3	-

4.3.7 Capacity-Focused Mode Setting (Function Setting “nU”)

If the unit capacity seems insufficient during the normal operation, press “PSW3” and select the setting condition “0” to “3” Capacity-Focused Mode Setting “nU”. By setting this function, the maximum frequency, current limit of the compressor and the fan-speed maximum limit value and discharge pressure limit value are set higher.

NOTE:

1.Do not use the setting condition “2” and “3” unless the power supply wiring is of sufficient ampacity, because the target frequency and current limit of the compressor during the operation are set higher.

“nU” Setting Condition	Compressor Frequency and Current Operation
0	Not Available (Default Setting)
1	Frequency maximum limit value is set higher.
2	Frequency maximum limit value and current limit value are set higher.
3	Frequency maximum limit value, current limit value and the fan-speed maximum limit value are set higher.
4	Maximum discharge pressure limit value is set higher.

4.3.8 Low Noise Setting (Function Setting “dB”)

Press “PSW3” and select the setting condition “0” to “9” at the Low Noise Setting “dB” to reduce the compressor frequency and the outdoor fan motor rotation frequency.

The operating noise (targeted value) can be set by selecting the setting condition shown below.

NOTE:

1. By setting this function, the compressor frequency and the outdoor fan motor rotation frequency are forcibly reduced and so the outdoor unit capacity decreases and the unit operation range is limited.
2. The operating noise values for a single unit are shown below. These are targeted values and so the actual values can temporarily be higher depending on operation conditions. The operating noise values for combination units are higher than the values below.

Setting Condition	Compressor Frequency Limit	Outdoor Fan Motor Step Limit	Operating Noise (Target Value)
0	Not Changed	Not Changed	Catalog Value
1	Not Changed	20 Steps	-
2	Not Changed	18 Steps	-
3	Not Changed	16 Steps	-
4	Low	Not Changed	-
5	Lower	Not Changed	-
6	Lowest	Not Changed	-
7	Low	20 Steps	Catalog Value-2dB
8	Lower	18 Steps	Catalog Value-5dB
9	Lowest	16 Steps	Catalog Value-8dB

	db=9		db=8		db=7	
Outdoor Unit Capacity (HP)	Operating Noise (Targeted Value (dB)	Capacity (Compared to db=0)	Operating Noise (Targeted Value (dB)	Capacity (Compared to db=0)	Operating Noise (Targeted Value (dB)	Capacity (Compared to db=0)
8	45	59%	47	71%	49	82%
10	47	50%	49	60%	51	70%
12	48	55%	51	64%	53	73%
14	50	50%	53	59%	55	79%
16	53	47%	55	55%	57	73%
18	53	41%	56	52%	57	87%
20	50	35%	53	45%	55	75%
22	50	33%	54	43%	55	71%
24	50	33%	54	42%	55	70%

4.3.9 Demand Function Setting (Function Setting “dE”)

Press “PSW3” and select the setting condition “0” to “5”, so that Demand Function Setting “dE” can be set. This function is available by setting to “1” for the demand current control without inputting the signal to the external input terminal on the outdoor unit PCB. The table below is shown for the limit of the operating current for this function.

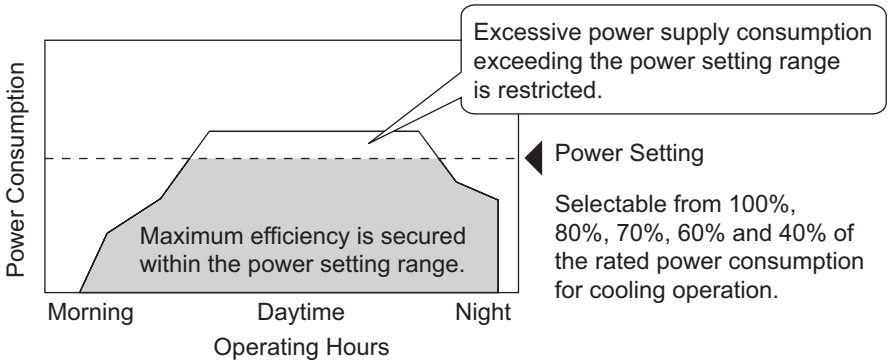
NOTE:

In the case that the demand current control by external input is set and the external input signal is available, this function is not available even when the demand current control by external input signal is performed.

Setting Condition	Demand Running Current Control
0	Not Available (Default Setting)
1	40%
2	60%
3	70%
4	80%
5	100%

● Demand Control

Adopting self-demand function, which drastically decreases power consumption, has largely improved energy saving.



< Notes at Facility Design >

1. The demand current control (%) is value criterion. The value used for this control is calculated from the current, and therefore is different from the value indicated by a wattmeter. If it is required that the maximum power consumption is managed precisely, a field-supplied demand controller should be used.
2. The actual value may temporarily be higher than the indicated value shown above depending on the operating control conditions such as protection control.

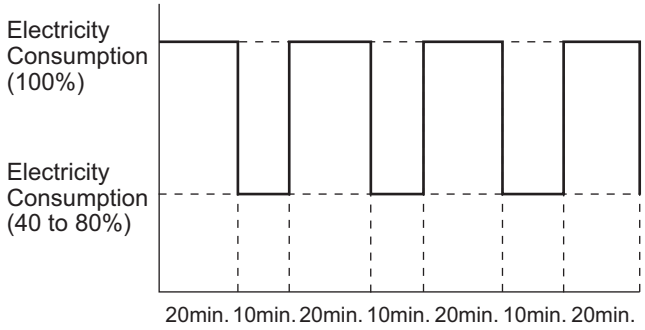
4.3.10 Wave Function Setting (Function Setting “UE”)

Press “PSW3” and select the setting condition “0” to “4”, so that Wave Function Setting “UE” can be set. While this function is activated, the maximum limit of running current is changed from 40% to 80% as shown in the figure.

NOTE:

In the case that the demand current control by external input is set and the external input signal is available, this function is not available even when the demand current control by external input signal is performed.

Setting Condition	Running Current Lower Limit Setting
0	Not Available (Default Setting)
1	40%
2	60%
3	70%
4	80%



NOTE:

The current limit value is targeted value. The actual current value may temporarily be higher than the value shown in the table above depending on the operating control condition.

When the scheduled operation of “Demand Function Setting” is set from the centralized controller, refer to “Technical Catalogue” and “Installation & Maintenance Manual” of the centralized controller.

For this function, the central station is applicable.

4.3.11 Cold Draft Protection (Function Setting “Fb”)

Press “PSW3” and select the setting condition “0” to “3” at Cold Draft Protection “Fb”, so the Cold Draft Protection can be set. When the indoor unit discharge air temperature falls down at cooling operation, outdoor fan stops and compressor frequency forcibly decreases to prevent a drop in discharge air temperature. If the outlet temperature decreases and the temperature is less than Thermo-OFF condition even after the compressor frequency decreases, the indoor unit enters Thermo-OFF condition. (When Thermo-OFF is activated under this condition, the operation will be restarted after 3 minutes.)

Setting Condition	Outlet Temperature	
	Target Value	At Thermo-OFF
0	-	-
1	10°C	7°C
2	12°C	9°C
3	14°C	11°C

4.3.12 Adjustment of Fan Rotation (Function Setting “Fo”)

Press “PSW3” and select the setting condition “0” to “2” at Adjustment of Fan Rotation “Fo”, so Adjustment of Fan Rotation can be set. If the outdoor unit fans make a whining sound in the case of the multiple installation, set this function to the relevant outdoor units.

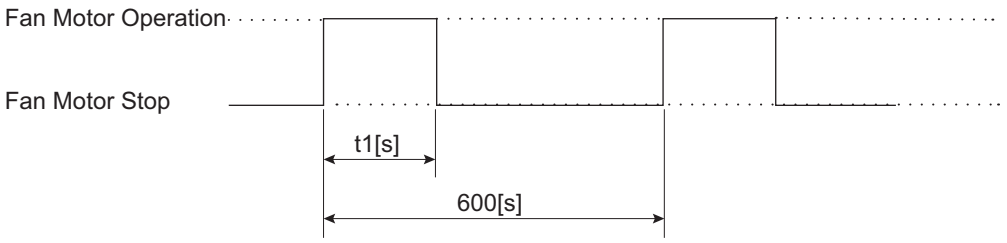
Setting Condition	Adjustment of Fan Rotation
0	Not Available (Default Setting)
1	-15 rpm
2	-30 rpm

4.3.13 Intermittent Operation of Outdoor Fan Motor (Function Setting “F4”)

Press “PSW3” and set Outdoor Fan Motor Intermittent Operation Setting “F4” (auxiliary function) to protect the outdoor fan motor from snow.

Set this function to the outdoor unit PCB set as the main outdoor unit.

All the outdoor fan motors start intermitted operation(t1/600s). **This function is available only during the input control function No.4 is valid.**
If the compressor restarts operating, the outdoor fan motors will be restored to normal operation.



Setting Condition	Operating time of outdoor fan t1(s)
0	Continuous operation(600s)
1	30
2	60
3	120
4	300

NOTE:

1. This is an auxiliary function to protect the unit from snow. In snowy regions, make sure to protect the unit with a snow-prevention roof, fence or snow-prevention hood (Field-Supplied), etc.. Otherwise, abnormal vibrations will be caused due to imbalanced propeller fan.
2. If the fan motor or fan controller fail during the outdoor fan motor start/stop operation, stop all the outdoor fan motor to suspend the operation. Check the alarm code and deal properly with the failure next time the compressor is operated

⚠ WARNING

Because of this setting, the outdoor fan can operate even while the outdoor unit (compressor) stops. Display a notice to that effect on a readily visible part of the unit body, in order to avoid injuries caused by an unintended outdoor fan operation.

5. Field Work Instruction

Refer to “Troubleshooting” when dealing with troubles.

If the trouble cannot be solved, contact your dealer.

5.1 Caution for Refrigerant Leakage

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

The incombustible and non-toxic refrigerant R410A is used in this unit. By chance the refrigerant gas leaks and fills the room, suffocation may occur.

Accordingly, the refrigerant charge quantity is more than general individual unit.

Before the indoor unit installation, confirm that the room can keep the gas concentration lower than the limit value in order to take the emergency countermeasures when the gas leakage occurs.

● The limit concentration is calculated according to the following formula:

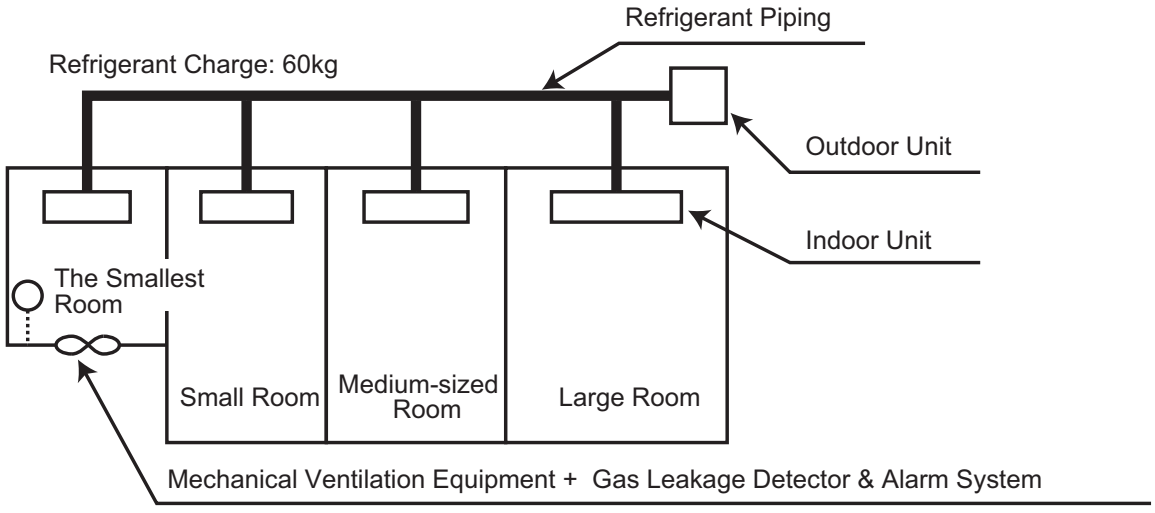
$$\frac{\text{Totally Charged Refrigerant Quantity in System (kg)}}{\text{Room Space for each Indoor Unit (m}^3\text{)}} = \text{Critical Concentration *}$$

$$\leq 0.42 \text{ (kg/m}^3\text{) for R410A}$$

* This value should be decided according to each country’s regulation.

If the room to install this unit is not able to keep the gas concentration lower than the limit value, please take the following actions.

● Make the effective opening for ventilation (such as opening without door or opening with over 0.15% of the floor area at the upper and lower part of the door) between one room and the next in order to keep the lower gas concentration than the limit.



NOTE:

1. The gas leakage quantity for each room (large, medium-sized, small and the smallest) should be calculated as 60kg.
2. The gas concentration of each room should not exceed the limit value. *

* This value should be decided according to each country’s regulation.

5.2 Maintenance Work

(1) For Outdoor Unit and Indoor Unit

(a) Fan and Fan Motor

- Lubrication - All fan motors are pre-lubricated and sealed at the factory. Therefore, no lubrication maintenance is required.
- Sound and Vibration - Inspect for abnormal sounds or vibration.
- Rotation - Inspect for clockwise rotation and rotating speed.
- Insulation - Inspect for electrical insulation resistance.

(b) Heat Exchanger

- Clogging - Inspect the heat exchanger and remove any accumulated dirt or dust from the heat exchanger at regular intervals. As for outdoor unit, other obstacles such as growing grass and pieces of paper, which might restrict air flow, should also be removed.

(c) Piping Connection

- Leakage - Inspect for refrigerant leakage at piping connections.

(d) Cabinet

- Stain and Lubrication- Inspect and remove any stain or lubrication.
- Fixing Screw - Inspect and fix loosened or lost screws
- Insulation - Inspect and repair peeled thermal insulation material on cabinet.

(e) Electrical Equipment

- Activation - Inspect for abnormal activation of the magnetic contactor, auxiliary relay, PCB and etc.
- Line Condition - Pay attention to working voltage, amperage and phase balance.
- Inspect for faulty contact caused by loosened terminal connections, oxidized contacts, foreign matter, and other items. Inspect for electrical insulation resistance.

(f) Control and Protective Devices

- Setting - Do not readjust the setting in the field unless the setting is maintained at a point other than the point listed in “Safety and Control Device Setting” of TC.

(2) For Outdoor Unit Only

(a) Compressor

- Sound and Vibration - Inspect for abnormal sounds or vibration.
- Activation - Check that the voltage drop of the power supply line is within 16% at start and within 2% during operation.

(b) Reversing Valve

- Activation - Inspect for any abnormal activating sound.

(c) Strainer

- Clogging - Check that there is no temperature difference between the ends.

(d) Ground Wiring

- Ground Line - Inspect for continuity to the earth ground.

(e) Crankcase Heater

- Activation - The crankcase heater should be activated at least 12 hours before start-up, by switching ON the main power source.

(3) For Indoor Unit Only

(a) Air Filter

- Cleaning - Inspect and remove any accumulated dirt or dust according to “Filter Cleaning” of manual.

(b) Drain Pan, Drain-Up Mechanism and Drain Pipe

- Drain Line - Inspect and clean the condensate line at least twice a year.
- Drain-Up Mechanism - Inspect for activation of drain-up mechanism.

(c) Float Switch

- Activation - Inspect for activation of float switch.

5.3 Service and Maintenance Record by 7-Segment Display

Customer's Name _____ DATE: - -

Outdoor Unit Model (Serial No.)		(Serial No.)								(Serial No.)							
(1) Operation Mode																	
(2) Test Run Start Time																	
(3) Data Collect Start Time																	
(4) Read Out Data from 7-Segment in Outdoor Unit																	
Protection Control Code																	
Operating Capacity																	
Outdoor Total Connecting Capacity	oCP																
Outdoor Connecting Quantity	oAA																
Indoor Total Connecting Capacity	iCP																
Indoor Connecting Quantity	iAA																
Refrigerant System Address	GA																
Indoor Operating Capacity	oP																
Total Frequency	Hz																
Accumulated Operation Time of Unit	UJ																
Outdoor Unit Information																	
Outdoor Capacity	CA																
Outdoor Microcomputer Output	SC	$52C_1$	$52C_2$	CH_1	CH_2	A_1	A_2	21_1	21_2	$52C_1$	$52C_2$	CH_1	CH_2	A_1	A_2	21_1	21_2
		FAN	20B	20C	$20A_1$	$20A_2$	20CHG	X_1	X_2	FAN	20B	20C	$20A_1$	$20A_2$	20CHG	X_1	X_2
Inverter Frequency	H1																
Compressor Running Quantity	CC																
Outdoor Fan Step	Fo																
Outdoor Expansion Valve Opening	E1																
	Eb																
Discharge Pressure	Pd																
Suction Pressure	Ps																
Outdoor Temperature	To																
Discharge Gas Temperature	Td1																
	Td2																
Heat Exchanger Liquid Temperature	TE																
Heat Exchanger Gas Temperature	TG																
Liquid stop valve Temperature	Tchg																
Gas Bypass Temperature	TbG																
Inverter Fin Temperature	TFi																
Fan Controller Temperature	TFF																
Compressor Running Current	A1																
	A2																
Accumulated Operation Time of Compressor	UJ1																
	UJ2																
Accumulated Operation Time of Compressor (Available for Timer Reset)	cU1																
	cU2																
Inverter Stoppage Cause Code	iT																
Fan Controller Stoppage Cause Code	FT																
Indoor Unit Information																	
Indoor Capacity	CA																
Indoor Expansion Valve Opening	iE																
Heat Exchanger Liquid Temperature	TL																
Heat Exchanger Gas Temperature	TG																
Intake Air Temperature	Ti																
Outlet Air Temperature	To																
Indoor Unit Stoppage Cause Code	d1																

Mark	Description of Mark	Parts Mark in Wiring Diagram
$52C_1$	-	-
$52C_2$	-	-
CH_1	Contactor of Relay (Y_{CH1}) on O.U. PCB for Crankcase Heater	CH1
CH_2	Contactor of Relay (Y_{CH2}) on O.U. PCB for Crankcase Heater	CH2
$20A_1$	Contactor of Relay (Y_{20A}) on O.U. PCB for Solenoid Valve	SVA
$20A_2$	-	-
21_1	Contactor of Relay (Y_{211}) on O.U. PCB for Reversing Valve	RVR1
21_2	Contactor of Relay (Y_{212}) on O.U. PCB for Reversing Valve	RVR2

Mark	Description of Mark	Parts Mark in Wiring Diagram
FAN	-	-
20B	-	-
20C	Contactor of Relay (Y_{20C}) on O.U. PCB for Solenoid Valve	SVC
$20F_1$	-	-
$20F_2$	-	-
20CHG	Contactor of Relay (Y_{20S}) on O.U. PCB for Solenoid Valve	SVS
X_1	Contactor of Relay (Y_{X1}) on O.U. PCB for Solenoid Valve	SVJ1
X_2	Contactor of Relay (Y_{X2}) on O.U. PCB for Solenoid Valve	SVJ2

5.4 Service and Maintenance Record by Remote Control Switch

Data Sheet for Checking by Remote Control Switch

Time				:	:	:	:	:
I.U. Model								
I.U. Serial No.								
I.U. No. / Alarm Code								
		Check Mode 1	Check Mode 2	1 • 2	1 • 2	1 • 2	1 • 2	1 • 2
B	Temp. Indication							
	Set Temp.	b1	- -					
	Inlet Air Temp.	b2	q1					
	Outlet Air Temp.	b3	q2					
	Liquid Pipe Temp.	b4	q3					
	Remote Thermistor Temp.	b5	- -					
	Outdoor Air Temp.	b6	q4					
	Gas Pipe Temp.	b7	q5					
	Heat Exchanger Coil Temp. of O.U.	b8	q6					
	Number of Running Compressors	b9	q7					
	Comp. Top Temp.	bA	q8					
	Thermo Temp. of Remote Control Switch	bb	- -					
C	Micro-Computer State Indication							
	I.U. Micro-Computer	C1	- -					
	O.U. Micro-Computer	C2	- -					
D	Stopping Cause State Indication							
	Stopping Cause State Indication	d1	- -					
E	Alarm Occurrence							
	Times of Abnormality	E1	- -					
	Times of Power Failure	E2	- -					
	Times of Abnormal Communication	E3	- -					
	Times of Inverter Tripping	E4	- -					
F	Automatic Louver State							
	Louver Sensor State	F1	- -					
H	Pressure, Frequency State Indication							
	Discharge Pressure	H1	q9					
	Suction Pressure	H2	qA					
	Target frequency	H3	qb					
	Operating Frequency	H4	qC					
J	I.U. Capacity Indication							
	I.U. Capacity (X1/8HP)	J1	- -					
	O.U. Model Code	J2	- -					
	Refrigerant System Number	J3	- -					
	Refrigerant System Number	J4	- -					
L	Opening of Expansion Valve							
	I.U. Expansion Valve	L1	qd					
	O.U. Expansion Valve 1	L2	qE					
	O.U. Expansion Valve 2	L3	- -					
	O.U. Expansion Valve B	L4	- -					

FIELD WORK INSTRUCTION

P	Running Current Indication (Reference)							
	Comp. Current	P1	qF					

Client:	
Installation Date:	
System No.:	
Date Checked:	
Checked by:	

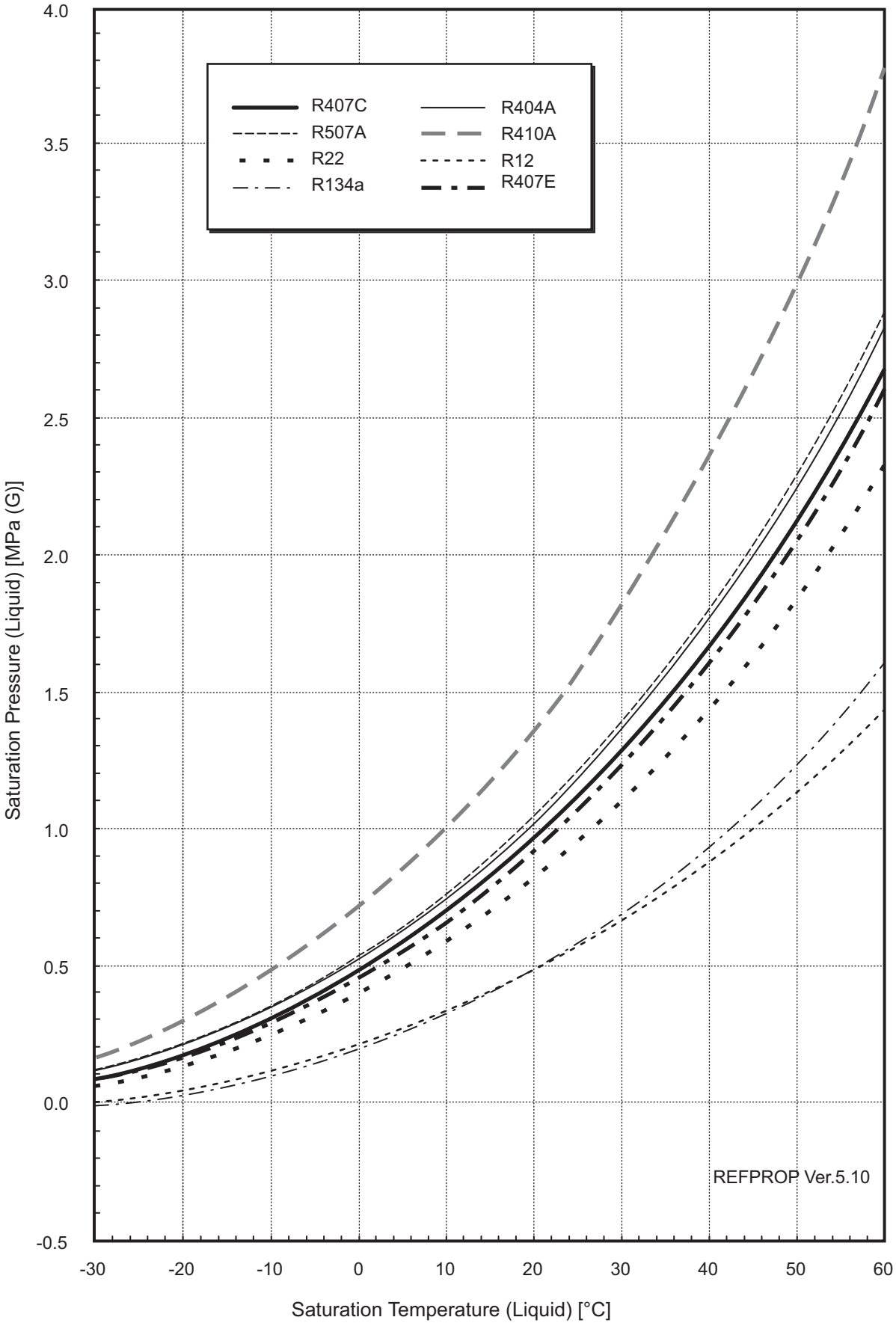
Result	

5.5 Service and Maintenance Record

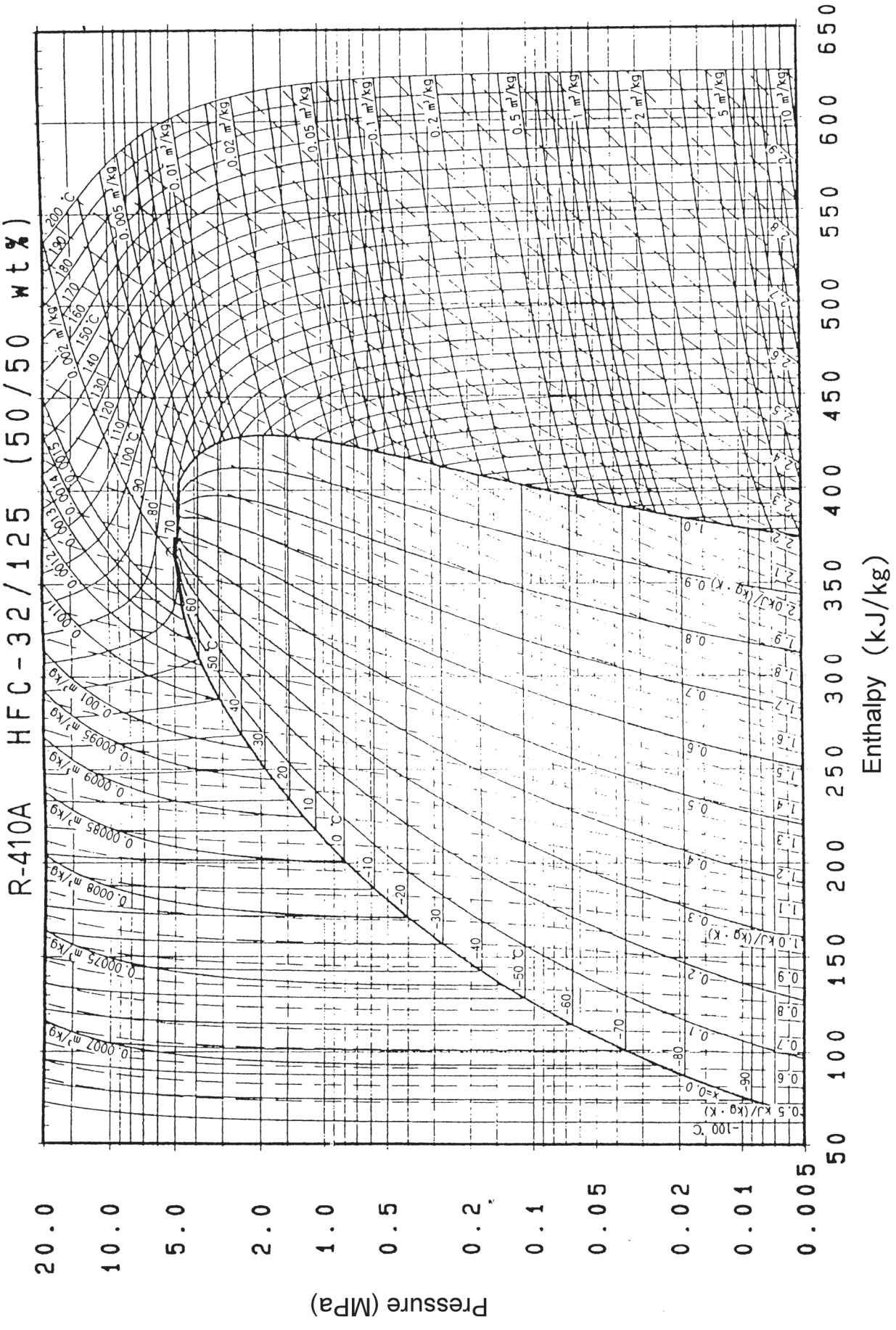
Service and Maintenance Record

No.	Check Item	Action	Judgment
1	Is service space sufficient?		YES or NO
2	Short Circuit of Discharged Air?		YES or NO
3	Any Heat Influence?		YES or NO
4	Is ground wiring connected?		YES or NO
5	Refrigeration Piping		GOOD or NOT GOOD
6	Fixing of Units		GOOD or NOT GOOD
7	Any Damage on External or Internal Surface?		YES or NO
8	Checking of Screws and Bolts	Tighten them if they are loosened.	TIGHTENED or NOT TIGHTENED
9	Tightening of Terminal Screws	Tighten all terminal screws with a Phillips screwdriver.	TIGHTENED or NOT TIGHTENED
10	Are compressor terminals tightly fixed?	Check all compressor terminals are tightly fixed.	GOOD or NOT GOOD
11	Insulation Resistance	Measure insulation resistance with insulation resistance-meter. Comp. and Fan Motor Fan Motor: greater than 3MΩ Others: greater than 3MΩ	GOOD or NOT GOOD
12	Does drain water smoothly flow?	Check for smooth flow by pouring water.	GOOD or NOT GOOD
13	Check for leakage at compressor.	Check for any leakage.	GOOD or NOT GOOD
14	Check for leakage at outdoor heat exchanger.	ditto	GOOD or NOT GOOD
15	Check for leakage at indoor heat exchanger.	ditto	GOOD or NOT GOOD
16	Check for leakage at reversing valve.	ditto	GOOD or NOT GOOD
17	Check for leakage at check valve.	ditto	GOOD or NOT GOOD
18	Check for leakage at accumulator.	ditto	GOOD or NOT GOOD
19	Check for leakage at strainer.	ditto	GOOD or NOT GOOD
20	Check for leakage at electronic expansion valve.	ditto	GOOD or NOT GOOD
21	Check for leakage at piping.	ditto	GOOD or NOT GOOD
22	Check direction of fans.	By Viewing or Airflow Volume	GOOD or NOT GOOD
23	Voltage among each phase.	Check the voltage is within the specified range.	GOOD or NOT GOOD
24	Vibration and Sound	Check fan, compressor, piping.	GOOD or NOT GOOD
25	Activation of Each Operation Mode	Check activation of COOL, HEAT, STOP and TEMP. switches.	GOOD or NOT GOOD
26	High Pressure Cut-out Switch	Check actual activation value.	GOOD or NOT GOOD
27	Check activation of drain-up mechanism.	Check it during cooling operation.	GOOD or NOT GOOD
28	Indoor Inlet Air Temp. (DB/WB)		°C DB/ °C WB
29	Indoor Outlet Air Temp. (DB/WB)		°C DB/ °C WB
30	Outdoor Inlet Air Temp. (DB/WB)		°C DB/ °C WB
31	Outdoor Outlet Air Temp. (DB/WB)		°C DB/ °C WB
32	High Pressure Switch		MPaG
33	Low Pressure Switch		MPaG
34	Operating Voltage		V
35	Operating Current		A
36	Instruction for Cleaning of Air Filter to Client		DONE or NOT YET
37	Instruction for Cleaning Method to Client		DONE or NOT YET
38	Instruction for Operation to Client		DONE or NOT YET

5.6 Saturation Curve for Refrigerant



5.7 Mollier Chart for R410A



APPENDIX

INSTALLATION

HITACHI

Installation & Maintenance Manual

AIR CONDITIONER
OUTDOOR UNIT



Basic Models:

RAS-8.0RNBCLQ
RAS-10RNBCLQ
RAS-12RNBCLQ
RAS-14RNBCLQ
RAS-16RNBCLQ
RAS-18RNBCLQ
RAS-20RNBCLQ
RAS-22RNBCLQ
RAS-24RNBCLQ

Combination Models:

RAS-26~96RNBCLQ

IMPORTANT:

READ AND UNDERSTAND THIS MANUAL BEFORE USING THIS HEAT-PUMP AIR CONDITIONER.
KEEP THIS MANUAL FOR FUTURE REFERENCE.

P02486Q

Original Instructions

CE

(EN) Declaration of Conformity (Manufacturer's Declaration)

(FR) Déclaration de conformité (Déclaration du fabricant)

(ES) Declaración De Conformidad (Declaración del Fabricante)

(IT) Dichiarazione di Conformità (Chiarazione del produttore)

(DE) Konformitätserklärung (Erklärung des Herstellers)

(PT) Declaração de conformidade (declaração do fabricante)

(NL) Conformiteitsverklaring (Fabrikanterklaring)

(PL) Deklaracja Zgodności（Deklaracj a wytwórcy）

(TR) Uygunluk Beyanı (Üretici Beyanı)

(RO) Declarație de conformitate (Declarația producătorului)

(GR) ΔΗΛΩΣΗ ΣΥΜΜΟΡΦΩΣΗΣ (Δήλωση του κατασκευαστή)

CE

Qingdao Hisense Hitachi Air-conditioning Systems Co., Ltd. ,

01 (EN) declares under its sole responsibility that the equipment to which this declaration relates:
02 (FR) déclare sous sa seule responsabilité que l'équipement visé par la présente déclaration:
03 (ES) declara bajo su única responsabilidad que el equipo al que hace referencia la declaración:
04 (IT) dichiara sotto la propria responsabilità che gli apparecchi a cui è riferita questa dichiarazione:
05 (DE) erklärt auf seine alleinige Verantwortung daß die Ausrüstung für die diese Erklärung bestimmt ist:
06 (PT) declara sob sua exclusiva responsabilidade que os equipamentos a que esta declaração se refere:
07 (NL) verklaart hierbij op eigen exclusieve verantwoordelijkheid dat de apparatuur waarop deze verklaring betrekking heeft:
08 (PL) deklaruje na własną i wyłączną odpowiedzialność, że urządzenia, których ta deklaracja dotyczy:
09 (TR) tamamen kendi sorumluluğunda olmak üzere bu bildirinin ilgili olduğu donanımının aşağıdaki gibi olduğunu beyan eder:
10 (RO) declară pe proprie răspundere că echipamentele la care se referă această declaraţie:
11 (GR) δηλώνει με αποκλειστική της ευθύνη ότι ο εξοπλισμός στον οποίο αναφέρεται η παρούσα δήλωση:

RAS-8.0RNBCLQ, RAS-10RNBCLQ, RAS-12RNBCLQ, RAS-14RNBCLQ, RAS-16RNBCLQ, RAS-18RNBCLQ, RAS-20RNBCLQ, RAS-22RNBCLQ, RAS-24RNBCLQ

01 (EN) are in conformity with the following standard(s) or other normative document(s), provided that these are used in accordance with our instructions:
02 (FR) sont conformes à la/aux norme(s) ou autre(s) document(s) normatif(s), pour autant qu'ils soient utilisés conformément à nos instructions:
03 (ES) están en conformidad con la(s) siguiente(s) norma(s) u otro(s) documento(s) normativo(s), siempre que sean utilizados de acuerdo con nuestras instrucciones:
04 (IT) sono conformi al(i) seguente(i) standard(s) o altro(i) documento(i) a carattere normativo, a patto che vengano usati in conformità alle nostre istruzioni:
05 (DE) der/den folgenden Norm(en) oder einem anderen Normdokument oder -dokumenten entspricht/entsprechen, unter der Voraussetzung, daß sie gemäß unseren Anweisungen eingesetzt werden:
06 (PT) estão em conformidade com a(s) seguinte(s) norma(s) ou outro(s) documento(s) normativo(s), desde que estes sejam utilizados de acordo com as nossas instruções:
07 (NL) conform de volgende norm(en) of één of meer andere bindende documenten zijn, op voorwaarde dat ze worden gebruikt overeenkomstig onze instructies:
08 (PL) spełniają wymogi następujących norm i innych dokumentów normalizacyjnych, pod warunkiem że używane są zgodnie z naszymi instrukcjami:
09 (TR) ürünün, talimatlarımıza göre kullanılması koşuluyla aşağıdaki standartlar ve norm belirten belgelerle uyumludur:
10 (RO) sunt în conformitate cu următorul (următoarele) standard(e) sau alt(e) document(e) normativ(e), cu condiţia ca acestea să fie utilizate în conformitate cu instrucţiunile noastre:
11 (GR) είναι σύμφωνα με το(α) ακόλουθο(α) πρότυπο(α) ή άλλο έγγραφο(α) κανονισμών, υπό την προϋπόθεση ότι χρησιμοποιούνται σύμφωνα με τις οδηγίες μας:

EN IEC 55014-1:2021
EN 55014-1:2017+A11:2020
EN IEC 55014-2:2021
EN 55014-2:2015
EN IEC 61000-3-11:2019
EN 61000-3-12:2011

EN 60335-1:2012 + A11:2014 + A13:2017 + A1:2019 + A14:2019 + A2:2019 + A15:2021
EN 60335-2-40:2003 + A11:2004 + A12:2005 + A1:2006 + A2:2009 + A13:2012
EN 62233:2008

01 (EN) following the provisions of:
02 (FR) conformément aux stipulations des:
03 (ES) siguiendo las disposiciones de:
04 (IT) secondo le prescrizioni per:
05 (DE) gemäß den Vorschriften der:
06 (PT) de acordo com o previsto em:
07 (NL) overeenkomstig de bepalingen van:
08 (PL) zgodnie z postanowieniami Dyrektyw:
09 (TR) bunun koşullarına uygun olarak:
10 (RO) în urma prevederilor:
11 (GR) με τήρηση των διατάξεων των:

2014/30/EU
2012/19/EU
2011/65/EU
2014/68/EU
(EU) No 517/2014
(EC) No 1907/2006
2009/125/EC
(EU) 2017/1369
2006/42/EC
(EU) No 2016/2281
2014/35/EU
(EU) No 813/2013
(EU) No 811/2013

01 (EN) Directives, as amended.
02 (FR) Directives, telles que modifiées.
03 (ES) Directivas, según lo enmendado.
04 (IT) Direttive, come da modifica.
05 (DE) Direktiven, gemäß Änderung.
06 (PT) Directivas, conforme alteração em.
07 (NL) Richtlijnen, zoals geamendeerd.
08 (PL) z późniejszymi poprawkami.
09 (TR) Değiştirilmiş halleriyle Yönetmelikler.
10 (RO) Directivelor, cu amendamentele respective.
11 (GR) Οδηγιών, όπως έχουν τροποποιηθεί.

01 (EN) * and judged positively by:
02 (FR) * et approuvé par:
03 (ES) * y considerado favorablemente por:
04 (IT) * e valutato positivamente da:
05 (DE) * und positiv bewertet von:
06 (PT) * e considerado positivo por:
07 (NL) * en goedgekeurd door:
08 (PL) * i pozytywną opinią:
09 (TR) * ve şu kurum tarafından olumlu olarak değerlendirildiği üzere:
10 (RO) * și a fost apreciat pozitiv de:
11 (GR) * και εκτιμάται θετικά από:

NB0035
Conformity Assessment Procedure: module H
Category: II

Pressure Equipment Components	Category under 2014/68/EU	Assessment Procedure
Compressor	Category II	Module A2
Oil Separator	Art.4.3	---
Heat Exchanger(Fin and tube)	Art.4.3	---
Piping pressure accessories	Art.4.3	---
Accumulator	Category II	Module A2
Safety Pressure Switch	Category IV	Module B(Production type) +D

Refrigerant: R410A
Maximum allowable pressure(high pressure sides) : 4.15MPa
Maximum allowable pressure(low pressure sides) : 2.21MPa

01 (EN) * Manufacturing number and manufacturing year: refer to model Nameplate.
Note:This declaration becomes invalid, if technical or operational modifications are introduced without the manufacturer's consent.
02 (FR) * Numéro de fabrication et année de fabrication : se référer à la plaque signalétique du modèle.
Remarque : Cette déclaration devient invalide si des modifications techniques ou opérationnelles sont introduites sans le consentement du fabricant.
03 (ES) * Número de fabricación y año de fabricación: consulte la placa de identificación del modelo.
Nota: esta declaración deja de tener validez si se introducen modificaciones técnicas u operativas sin el consentimiento del fabricante.
04 (IT) * Numero di fabbricazione e anno di fabbricazione: fare riferimento alla targhetta del modello.
Nota: questa dichiarazione non è valida se vengono introdotte modifiche tecniche o operative senza il consenso del produttore.
05 (DE) * Herstellungsnummer und Herstellungsjahr: siehe Typenschild des Modells.
Hinweis: Diese Erklärung verliert ihre Gültigkeit, wenn ohne Zustimmung des Herstellers technische oder betriebliche Änderungen vorgenommen werden.
06 (PT) * Número de fabricação e ano de fabricação: consulte a placa de identificação do modelo.
Nota: Esta declaração torna-se inválida se modificações técnicas ou operacionais forem introduzidas sem o consentimento do fabricante.
07 (NL) * Fabricagenummer en fabricagejaar: zie het typeplaatje van het model.
Opmerking: Deze verklaring wordt ongeldig als technische of operationele wijzigingen worden aangebracht zonder toestemming van de fabrikant.
08 (PL) * Numer produkcyjny i rok produkcji: patrz tabliczka znamionowa modelu.
Uwaga: Niniejsza deklaracja traci ważność w przypadku wprowadzenia zmian technicznych lub eksploatacyjnych bez zgody producenta.
09 (TR) * Üretim numarası ve üretim yılı: model Etiketine bakın.
Not: Üreticinin izni olmadan teknik veya operasyonel değişiklikler yapılırsa bu beyan geçersiz olur.
10 (RO) * Numărul de fabricație și anul de fabricație: consultați plăcuța de identificare a modelului.
Notă: Această declarație devine nulă dacă sunt introduse modificări tehnice sau operaționale fără acordul producătorului.
11 (GR) * Αριθμός και έτος κατασκευής: δείτε στον πινακα χαρακτηριτικών μοντέλου.
Σημείωση: Η παρούσα δήλωση ακυρώνεται, αν πραγματοποιηθούν τεχνικές ή λειτουργικές τροποποιήσεις χωρίς τη συγκατάθεση του κατασκευαστή.

Johnson Controls Hitachi Air Conditioning Europe SAS
(Ad.:Rue de Lombardie,Parc Aktiland II - 69800 Saint Priest,France)

01 (EN) is authorised to Compile the Technical Construction File.
02 (FR) est autorisé à constituer le dossier technique de constructions.
03 (ES) está autorizado a compilar el expediente técnico de construcción.
04 (IT) è autorizzato a compilare il fascicolo tecnico della costruzione.
05 (DE) ist berechtigt die Technische Dokumentation zu erstellen.
06 (PT) está autorizada a compilar o arquivo técnico de construção.
07 (NL) is bevoegd om het Technisch Constructie Dossier samen te stellen.
08 (PL) jest upoważniona do opracowania Dokumentacja techniczno-konstrukcyjna.
09 (TR) Teknik Yapı Dosyasını Derlemeye yetkilidir.
10 (RO) este autorizat să întocmească Dosarul Tehnic de Construcție.
11 (GR) έχει την άδεια να συντάσσει τον Τεχνικό Φάκελο Κατασκευής.

HITACHI

Name, Surname : Song Zhenxing
Position/Title: Director
Date: Dec 25, 2024

Add.: No. 218, Qianwangang Road, Economic and Technological Development Zone, Qingdao, China

[B2B PRODUCTS ONLY]

Информация за опаковката (BG) / Packaging information(En)

Следните материали могат да се съдържат в този продукт/
The following materials may be contained in this product package

Включена опаковка / Packaging included	Вид материал / Material information	Включена опаковка / Packaging included	Вид материал / Material information
КАШОН кутия + защити / **CARTON** box + protections	20 PAP	**Аерофолио** / Bubbles **PLASTIC** bag	4 LDPE
Външна + Ръководство в **найлонова** торба / External + manual **PLASTIC** bag	4 LDPE	**полиестерен** чембер / External **PLASTIC** strapping band/	5 PP
/ **пластмасова** тръбна защита **PLASTIC** tubular protection /	4 LDPE	**Дървен** палет / **WOODEN** pallet	50 FOR
ПОЛИСТИРОЛ / POREXPAN	6 PS	Мека **пенополиетилен** защита с висока плътност / Soft high-density protection **PLASTIC**	2 HDPE

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 a 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.
- No part of this manual may be reproduced without written permission.
- 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 distributor 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.

Temperature (ºC)

DX Indoor Unit		Maximum	Minimum
Cooling operation	Indoor	32DB/23WB	21DB/15WB
	Outdoor	55DB*	-10DB**
Heating operation	Indoor	27DB	15DB
	Outdoor	24DB/16.5WB	-25DB/-26WB

Water Module		Maximum	Minimum
Heating operation	Water Inlet	54DB	10DB
	Outdoor	43DB***	-25DB/-26WB

DB: Dry Bulb, WB: Wet Bulb

NOTE:

(*) 48ºC DB ~ 55ºC DB, Interval operation

(**) -10ºC DB ~ -5ºC DB, Interval operation.

(***) 43ºC DB ~ 48ºC DB, Heat recovery operation

- To protect the environment, do not discard the product at will, the company as per the relevant provisions of the country can provide recycling services, according to the national standards can provide replaceable components.

Note:

This manual should be considered as a permanent part of the unit and should remain with the unit.

CHECKING PRODUCT RECEIVED

- **Upon receiving this product, inspect it for any shipping damage.**
  Claims for damage, either apparent or concealed, should be filed immediately with the shipping company.
- **Check the model number, electrical characteristics (power supply, voltage and frequency) and accessories to determine if they are correct.**

The standard utilization of the unit shall be explained in these instructions.
Therefore, the utilization of the unit other than those indicated in these instructions is not recommended. Please contact your local agent as the occasion arises.

The company's liability shall not cover defects arising from the alteration performed by a customer without company's consent in a written form.

CONTENT

1. Safety Instructions 1
2. Structure 3
   2.1 Outdoor Unit and Refrigerating System 3
   2.2 Tools and Instruments Required for Installation 3
3. Prepare Before Installation 5
   3.1 Outdoor Model Number 5
4. Transport and Handling 6
   4.1 Transport 6
   4.2 Lifting Method 7
5. Installation of Outdoor Unit 8
   5.1 Factory Accessories 8
   5.2 Installation 9
   5.3 Maintenance Space 9
   5.4 Foundation 12
   5.5 Condensation Water Treatment 14
6. The Refrigerant Piping Construction 15
   6.1 Piping Material 15
   6.2 Flare and Joints 16
   6.3 Precautions for Installation of Outdoor Unit 17
   6.4 System Piping Connection 19
      6.4.1 RAS-8.0RNBCLQ~RAS-24RNBCLQ Piping Specifications (3 pipes) 20
      6.4.2 RAS-26RNBCLQ~RAS-48RNBCLQ Piping Specifications (3 pipes) 20
      6.4.3 RAS-50RNBCLQ~RAS-72RNBCLQ Piping Specifications (3 pipes) 22
      6.4.4 RAS-74RNBCLQ~RAS-96RNBCLQ Piping Specifications (3 pipes) 24
      6.4.5 RAS-8.0RNBCLQ~RAS-24RNBCLQ Piping Specifications (2 pipes) 27
      6.4.6 RAS-26RNBCLQ~RAS-48RNBCLQ Piping Specifications (2 pipes) 27
      6.4.7 RAS-50RNBCLQ~RAS-72RNBCLQ Piping Specifications (2 pipes) 28
      6.4.8 RAS-74RNBCLQ~RAS-96RNBCLQ Piping Specifications (2 pipes) 30
      6.4.9 Stop Valve 33
      6.4.10 Piping Connection 35
7. Electrical Wiring 37
   7.1 General Check 37
   7.2 Wiring 40
   7.3 Outdoor Unit Wiring 41
   7.4 Electrical Wiring for Indoor and Outdoor Unit 44
   7.5 Outdoor DIP Switch Setting 47
8. Additional Refrigerant Charge 51
   8.1 Air Tightness Test 51
   8.2 Vacuum 52
   8.3 Charging 52
9. Test Run 54
   9.1 Prerequisites for Test Run 54
   9.2 Test Run 55
10. Safety And Control Device Setting 58
11. TECHNICAL PARAMETERS 59

1. Safety Instructions

<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.

⚠ DANGER

- Do not perform installation work, refrigerant piping work, drain pump, drain piping and electrical wiring connection without referring to our installation manual. If performed without following the instructions, it may result in a system leakage, electric shock or a fire.
- This appliance uses the new refrigerant R410A. The leak detection and airtight test prohibits the use of oxygen, acetylene, and flammable toxic gases. These gases are dangerous and may cause an explosion. It is recommended that this test should be carried out with compressed air, nitrogen gas, or with refrigerant.
- 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 and the PCB for the indoor and outdoor unit without turning OFF the main power supply, this may lead to serious safety accidents.
- Do not touch or adjust safety devices inside the indoor or outdoor units. If these devices are touched or readjusted, serious accidents may occur.
- Refrigerant R410A for this unit is incombustible, non-toxic and odorless; however if the refrigerant leaked and contacted with fire, toxic gas will generate. Also because the R410A is heavier than air, its accumulation near floor surface could lead to difficult breathing. Turn OFF the main switch, cut off the power, open the doors and windows for ventilation,extinguish any naked flames and contact your service contractor, if refrigerant leakage occurs.
- Make sure to perform air-tight testing.
  The refrigerant used in this product (fluorocarbon) is not flammable, non-toxic, and odourless. If there is refrigerant leakage, exposure to open flame produces toxic gases. Also, the refrigerant gas is heavier than air, if the ground is filled with refrigerant gas, it may cause suffocation to the persons in the vicinity.
- The refrigerant safety leakage standard for construction and operation systems are determined as per local regulations or standards.
- Use a high sensing speed above ELB (Earth Leakage Breaker with action time of 0.1 seconds or less). Otherwise, this may cause electric shock or fire.
- Do not install the product in places where there is high density of oil mist, flammable gas, salt spray, or toxic gases (such as sulphide), and so on.
- During installation, connect the refrigerant pipe firmly before the compressor starts running. For maintenance, stop the compressor before moving, handling and removing the refrigerant pipe.
- Do not short-circuit the protective devices (such as pressure switches and so on) during operation. Otherwise it may cause a fire or explosion.

⚠ WARNING

- Please do not use sprays such as pesticide, oil paint, hair spray or other flammable gases within 1 meter of the unit.
- If the circuit breaker acts or fuse acts frequently, please stop the system operation immediately and contact your local dealer or customer service.
- Ensure that the grounding wire is securely connected. If not, it may cause an electrical failure. Do not connect the grounding wire to the gas pipe, tap water pipe, lightning rod or telephone grounding wire.
- Use fuse of specified capacity.
- While you perform brazing, ensure that there are no combustible material around it. Please wear leather gloves while using refrigerant to prevent freezing.
- Prevent mice and other small animals damaging the wiring and the electrical components. If unprotected parts are bitten, it may lead to fire
- Securely connect and fix the wiring, do not apply external force on terminal blocks, this may cause the terminal to loosen and can cause a fire
- Ensure that the foundation is robust enough to install the unit. If not, the appliance can fall and break.
- Do not install the unit in the presence of large amounts of oil, steam, organic solvents and corrosive gases (ammonia, sulphide and acid, so on). Because corrosion may cause refrigerant leakage, electrical failure, performance degradation and unit damage.
- Please follow the installation manual and all the relevant provisions, standards for electrical, construction. Otherwise, electric failure of fire may occur due to insufficient capacity or mismatch of specification.
- Use specified wiring between the units and select the correct wiring between the appliances. Otherwise, will cause an electrical malfunction or fire.
- Make sure that the terminals are tightened with the specified torque. Otherwise it will cause a fire or electrical fault at the terminal block.
- The A-weighted emission sound pressure level at workstations does not exceed 70 dB(A).
- Before running the system, ensure that the outdoor unit is not covered by snow and ice.
- In case of fire, cut off the power immediately; do not touch the electrical parts by hand to avoid electric shock hazard.
- If the supply cord is damaged,it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.
- The appliances are not intended to be operated by means of an external timer or separate remote-control system.
- Keep the appliance and its cord out of reach of children less than 8 years.

⚠ CAUTION

- Do not tread on the product or place sundries on the product.
- Do not place or put any material on the product or inside the product.
- 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.

NOTE

- Please do not install indoor unit, outdoor unit, remote controller and wiring within 3m of strong electromagnetic radiation appliance (For example: medical device).
- After a long time shut down, if you want to restart the appliance, please power the crankcase heating band to work 12 hours prior to operation.
- Before switching on the unit, make sure that the outdoor unit is not covered by snow and ice.
- The heat pump air conditioner may not work properly if:
  * The power of the power supply transformer which supplies power is equal or less than the electric power of the air conditioner.
  * Power supply for high-power equipment is too close to the power wire of the air conditioner.

[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.]

In the case mentioned above, the power wire of the air conditioner generates a large induced surge voltage due to the abrupt change in the power consumption of the power equipment and the switch action.

Therefore, to protect the power supply to the system, before performing electric construction, please carefully check the field installation specifications and standard

- It is recommended to ventilate the room once every 3 to 4 hours.
- Reduction in heat pump air conditioner heating capacity is observed due to the degradation of outdoor environmental temperature. Therefore, in some low temperature areas, it is recommended to use auxiliary heating device while installing heat pump air conditioner.
- Only a professional maintenance personnel can perform maintenance work for this air conditioner.

2. Structure

2.1 Outdoor Unit and Refrigerating System

Refer to the technical manual for the structure diagram and system cycle diagram.

2.2 Tools and Instruments Required for Installation

The designed pressure of the unit is 4.15MPa.

To avoid mixing of refrigerant with cooling oil or other refrigerants in the system, the size of the connecting device is changed.

Before installation, it is necessary to have the following tools:

No.	Tool	No.	Tool	No.	Tool	No.	Tool
1	Handsaw	6	Pipe Bender	11	Wrench	16	Leveller
2	Screwdriver	7	Vise	12	Charging Cylinder	17	Cutter for Wires
3	Vacuum pump	8	Pipe cutter	13	Manifold valve	18	Hoist (for indoor unit)
4	Charging hose	9	Brazing tools	14	Wire cutter	19	Ammeter
5	Megohmmeter	10	Hex wrench	15	Leakage detector	20	Voltage meter

NOTE:

Use tools and measuring instruments are for the new refrigerant R410A exclusively in case of direct contact with the refrigerant.

⚠ DANGER

The pressure of the new refrigerant R410A is 1.4 times that of the conventional refrigerant. Water, oxide, grease and other impurities can easily affect the performance of the refrigerant. Ensure that the moisture, dust, other refrigerants or refrigerating oil in the refrigerating system are removed.

Therefore, if you do not use the specified material and the tool, it may cause an explosion, injury, refrigerant leak, electrical failure or fire.

○: Interchangeability is available with current R22 ■: Only for Refrigerant R410A (No Interchangeability with R22)

×: Prohibited ●: Only for Refrigerant R407C (No Interchangeability with R22)

Measuring Instrument and Tool		Interchangeability with R22		Reason of Non-Interchangeability and Attention (★ : Strictly Required)	Use
		R407C	R410A		
Refrigerant Pipe	Pipe Cutter Chamfering Reamer	○	○	—	Cutting Pipe Removing Burrs
	Flaring Tool	○	○ ■	*R410A need high pressure piping, need a larger flaring processing. When the hardness of material used is 1/2H, it cannot be flared. (R410 special tools can be used directly for R407C).	Pipe flaring processin
	Extrusion Adjustment Gauge	—	■		Calibre management after pipe
	Pipe Bender	○	○	*When the hardness of the material is 1/2H, it cannot be bended, use elbow for bend and braze.	Pipe bending processing
	Expanding Tool	○	○	* If the hardness of the material is 1/2H, it cannot be expanded tube processing, use joint for connecting piping.	Piping expansion tube processing
	Torque wrench	○	■	*For R410A when flare nut size is Ø12. and Ø15.88 spanner size should be 2mm or above.	Connection of flare nu
			○	*Ø6.35, Ø9.52, Ø19.05 Can be generic.	
	Brazing equipment	○	○	*To ensure the correct brazing (adjustable flame, heating, can feed filler	The brazing connection of the refrigerant pipe
	Nitrogen Gas	○	○	*To prevent the pipe line is contaminated (brazing blowing nitrogen to prevent oxidation).	To prevent oxidation of air tightness test
	Lubricating oil (Applied to flaring surface	●	■	*Use the same lubricating oil as the refrigeration system *Oil is easy to absorb water.	Lubricate the flaring surface
Refrigerant charging vacuum drying	Refrigerant Cylinder	●	■	*Confirm the corresponding refrigerant the cylinder. ★ Non-azeotropic mixed refrigerant should be filled in liquid state	Refrigerant Charge
	Vacuum pump	○	○	★ Can use the existing vacuum pump, but the connector should be connected to prevent the mineral oil flow back when vacuum pump stopped.	Vacuum
	Vacuum pump connector (to prevent back flow	●	※■		
	Regulating valve	●	■	*Because the pressure is higher than the R22 standard, cannot be universal, the connection diameter is different: R410A: UNF1/2, R407C: UNF7 / 16 ★ It is forbidden to use the old components before, otherwise the attached mineral oil will accumulate and may cause the circuit blocked and the compressor to malfunction.	Vacuuming, keep vacuum to charge refrigerant, detect pressure
	Charging Hose	●	■		
	Charging Cylinder	×	×	*When the refrigerant is charged, it is used for the weight gauge.	Refrigerant charge
	Weighing instrument	○	○	—	Measure the amount of refrigerant charging
	Leakage detector	●	※■	*Leakage detector for R22 cannot be generally used due to different detecting method.	Check for gas leaks

※: Common for R407C

3. Prepare Before Installation

3.1 Outdoor Model Number

<Basic Module>

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

<Combination Module> ※

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

※ Module combination are specified in above table. Do not use any other combinations beyond table

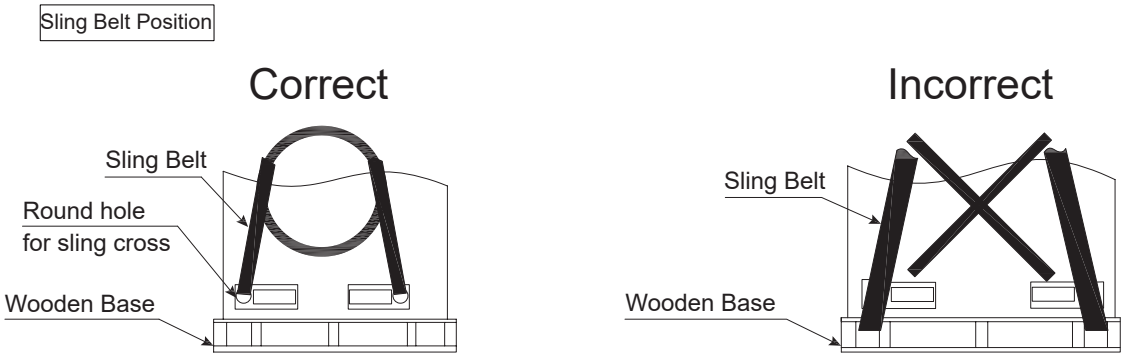
4. Transport and Handling

4.1 Transport

Transport the unit to a place as close as possible to the installation site before unpacking the unit. When handling with a hoist, follow the lifting instructions on the unit package.

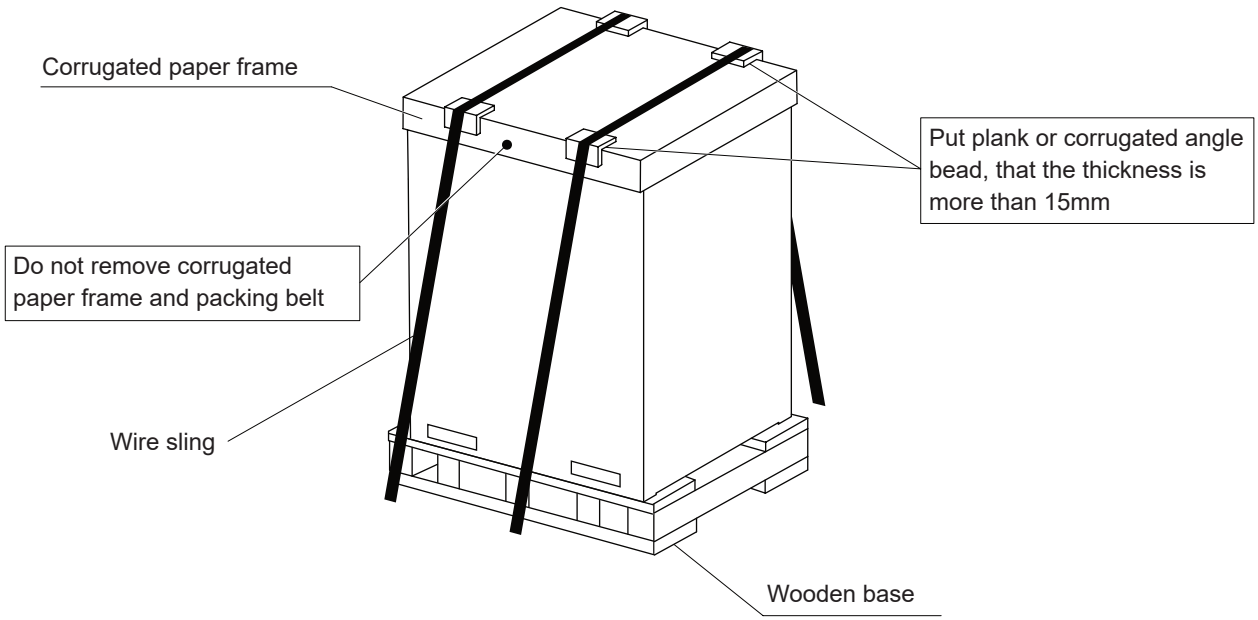
⚠ DANGER

When hanging, do not route the rope through the wooden base.



NOTICE

- **Transport and storage**
  Strength of unit packaging cardboard is limited, so please note the following:
- *** It is forbidden to tread on the unit packaging, it is strictly prohibited placing any material on the appliance.**
- *** When lifting with a crane, please use 2 slings for transporting and storing.**
- *** Do not store units which are stacked up.**
- **Transport and packing**
- *** To protect the unit, do not remove any packaging.**
- *** It is forbidden to stack up or place any material on the unit.**
- *** Unit is bundled at both sides as shown below:**



4.2 Lifting Method

When lifting the unit, ensure the balance of the unit, confirm the safety and then lift it smoothly.

1. It is strictly forbidden to remove any packing filler.
2. As shown in Figure 4.1, lift the unit with a bundle of two slings.

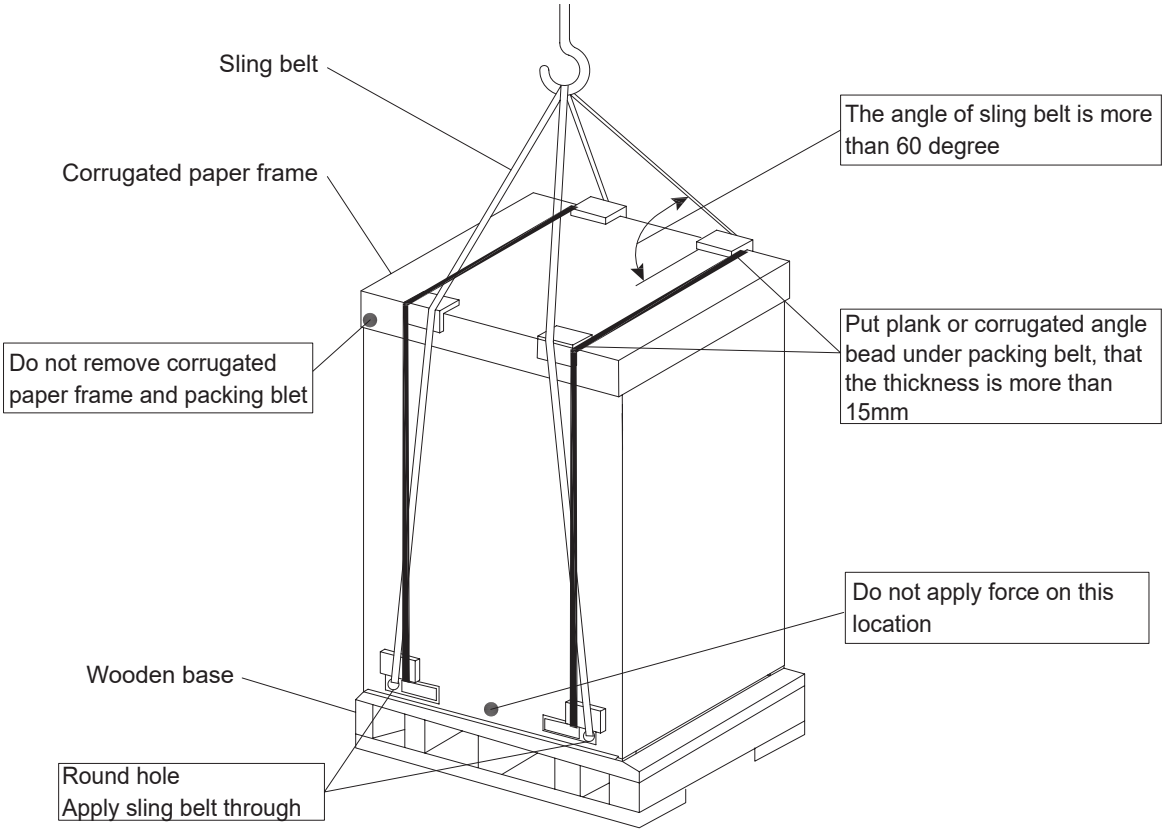


Figure 4.1 Lifting Diagram

3. Lifting/hoisting without wooden base, as shown in Figure 4.2.

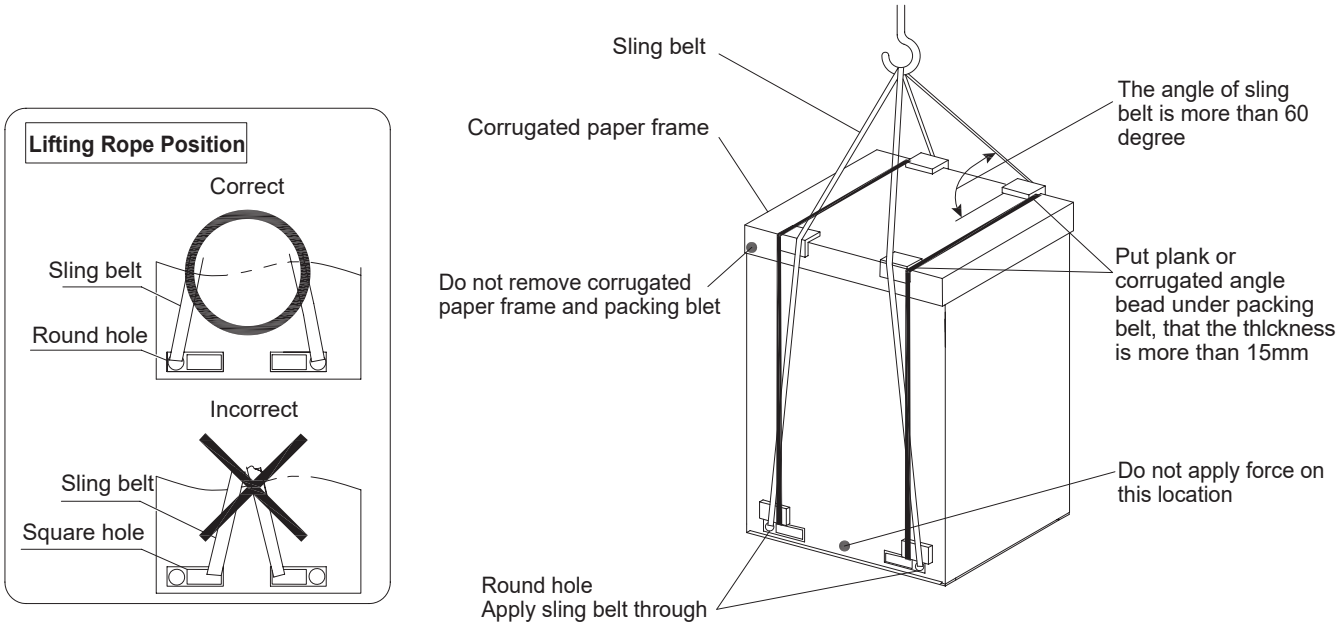
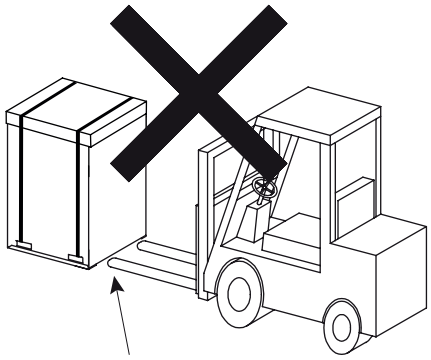


Figure 4.2 Lifting Diagram Without Wooden Base

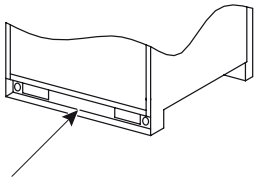
When handling the unit with a forklift, prohibit to fork the side panel of the unit with a forklift as this may damage the unit.



Fork

Prohibit to use the forklift or other tools to operate with excessive force to the square opening at the bottom of the unit. Otherwise, the bottom of the unit maybe deformed.

* Prohibit to use the forklift to push the bottom of the unit.
* Prohibit to use rollers and so on.



Do not apply force to
this location (front and rear)

NOTE

If you want to carry out transport handling after unpacking, please protect the unit with veneer, fabric and so on.

WARNING

Before installation and commissioning, do not place additional items inside the unit and ensure that no people is inside the unit. Otherwise, this may lead to fire, fault, injuries so on.

5. Installation of Outdoor Unit

5.1 Factory Accessories

Check for the following components which are outdoor unit accessories before installation:

Table 5.1 Factory Accessories

Accessory	8HP	10HP	12HP	14HP	16HP	18HP	20HP	22HP	24HP
Piping Accessories	1	1	1	1	1	1	1	1	1
Magnet Ring	2	3	3	3	3	3	3	3	3
Filter	2	2	2	2	2	2	2	2	2
Tie	2	4	5	5	5	5	8	8	8
IOM	1	1	1	1	1	1	1	1	1

NOTE

If the accessories are not shipped with the unit, please contact the dealer.

5.2 Installation

(1) Outdoor unit should be installed in a dry and well-ventilated environment.

(2) Outdoor units should be installed in a shaded place, or in a place not exposed to direct sunlight and high temperature heat radiation place.

(3) The outdoor unit should be installed in a place where the noise and the air flow discharge during operation will not affect the neighbors or the surrounding ventilation. The noise emitted on the rear, left and right sides is 6 to 7 dB (A) higher than the noise measured in the nominal front of the unit.

(4) The outdoor unit should be installed in the place where it is not allowed by the public people.

(5) Check that the foundation on which the unit is installed is a levelled surface and strong enough to hold the unit firmly.

(6) Do not install the outdoor unit in a place where dust or other debris can block the outdoor heat exchanger.

(7) When the outdoor unit is installed in a place where there is heavy snowfall, install the snow cover at the top of the outdoor unit and the inlet of the heat exchanger.

(8) When performing heating and defrosting operation, the outdoor unit discharges condensate. Provide a suitable drain around the foundation. If the outdoor unit installed on the roof, balcony or corridor and other places, prevent condensate from dropping to the people walking on the road. Otherwise during the winter condensates freezes to ice and can block the road. If the unit is installed in such place, provide an additional drain around the foundation.

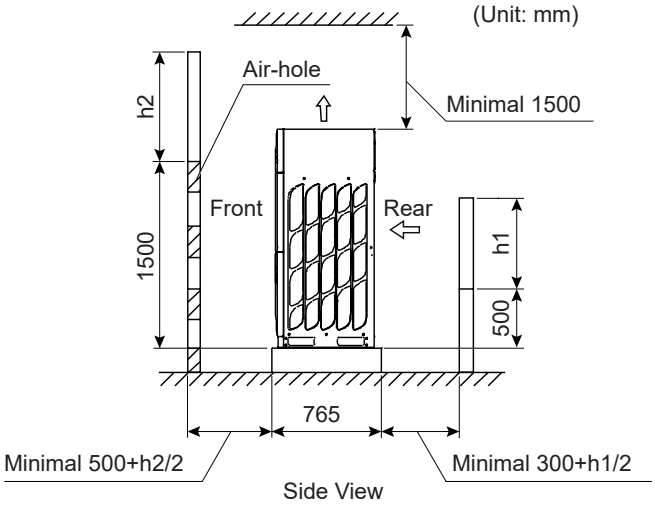
(9) Do not install the outdoor unit in a place where the rain falls directly on the outdoor unit heat exchanger or in the gap formed by the building space.

NOTE:

1. Do not install the outdoor unit in environments where there is high concentration of oil mist, corrosive gases, salt winds, and harmful gases (sulfur, acid, alkaline).
2. Do not install the outdoor unit in places where electromagnetic radiation can directly interfere with the electric box of the outdoor unit.
3. Outdoor installation should be as far as possible from the electromagnetic wave generating equipment, the distance between the unit and the equipment should be at least 3 meters.

5.3 Maintenance Space

When you install the outdoor unit, the maintenance space should be reserved as per the following requirements:



- If there is no wall in the rear and front, installation space requirements are as follows:

* Front: 500mm or more.

* Rear: more than 300mm.

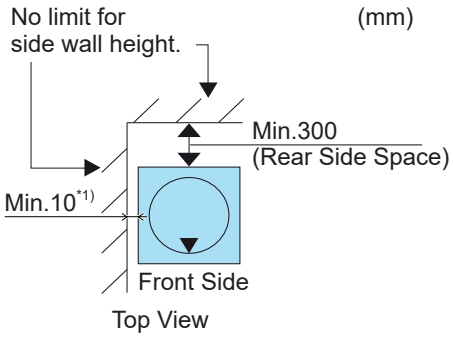
* Left and right: 10mm or more (If snow protection device is used or air outlet duct is installed, needs 50mm or more)

- If the front wall is more than 1.5 meters high, the front needs at least (500+h2/2) mm.
- If the rear wall is more than 0.5m high the rear requires at least (300+h1/2) mm.
- If the surrounding is not more than 2 walls, you must meet the above installation space.
- If the appliance is surrounded by more than 2 walls, ensure to meet the following installation space.
- When the upper obstacle and the unit is less than 1.5 meters or no space above the air outlet side of the air duct to prevent short circuit.
- When there is an obstacle above, in principle it is required that there is no any obstacle around the unit (Front, rear, left, right).

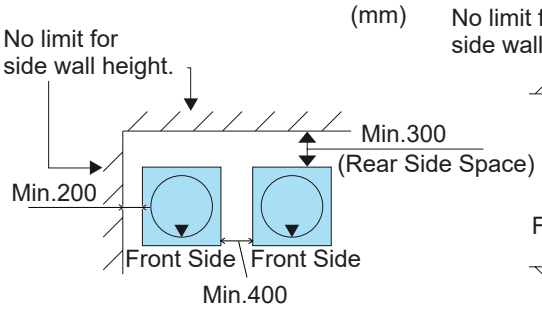
1) When both sides have walls:

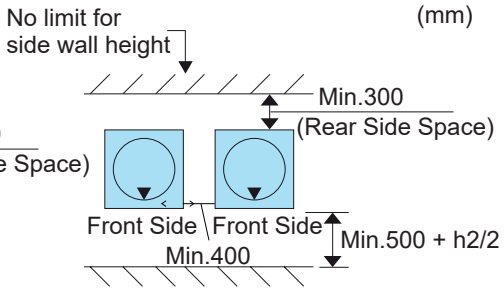
If the outdoor unit is installed adjacent to high building, and both sides without walls, the outdoor unit should be reserved for minimum 300mm maintenance space at rear side.

- Single Installation



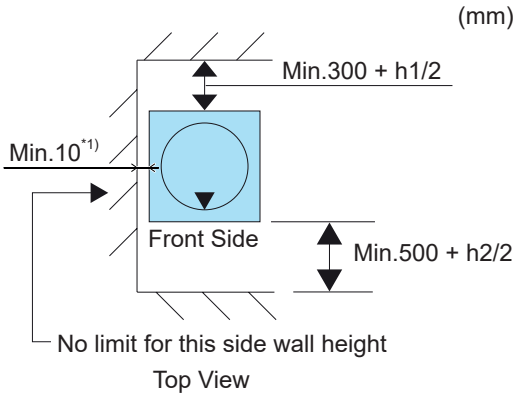
- Multiple / Serial Installation





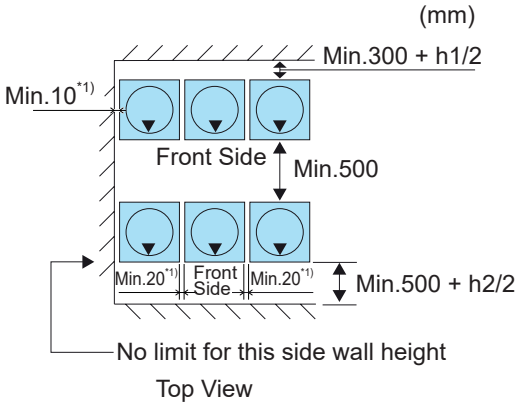
2) When the walls are on 3 sides:

- Single Installation

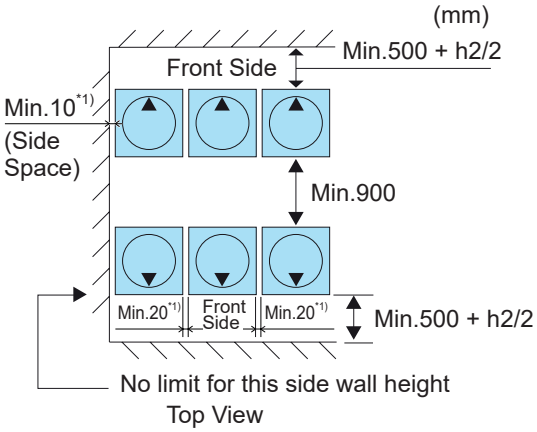


- Multiple / Serial Installation

<Installation in the Same Direction>

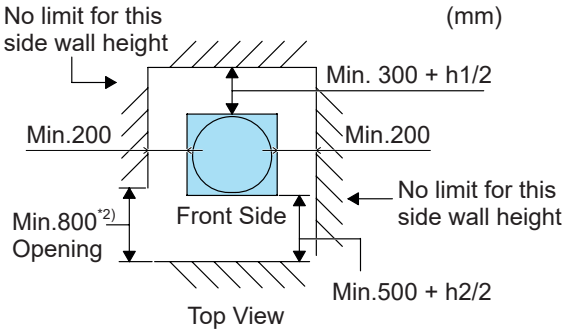


< Rear to Rear Installation>



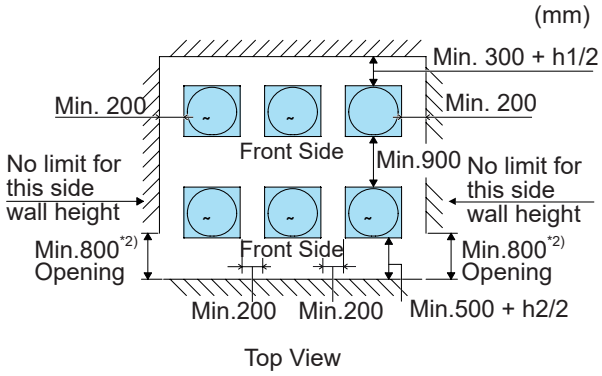
3) When surrounded by walls at 4 sides:

- Single Installation

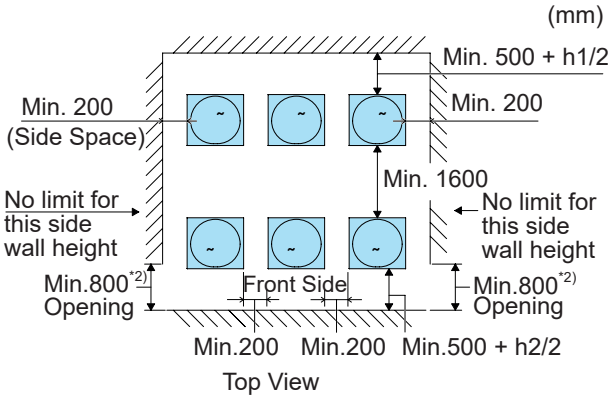


- Multiple / Serial Installation

<Installation in the Same Direction>



< Rear to Rear Installation>

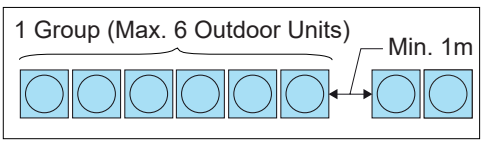


*1): In the case that the field-supplied snow protection hood or the air flow deflector duct is adopted, the space of minimum 50mm is required.

*2) Partly open a wall if the unit is surrounded by walls at four sides.

NOTE:

1. Keep the top of the outdoor unit without any obstacle to prevent short circuit due to supply air and return air of each outdoor unit.
2. The above chart provides sufficient operation and maintenance space for outdoor unit under standar operation conditions (operating mode: cooling, ambient temperature: 35 °C) If the outdoor unit ambient temperature is higher, and there is a return air short circuit, adjust the installation size depending on the actual installation conditions, and the calculation of outdoor unit return airflow.
3. When multiple outdoor units are installed in the same direction, you can install a maximum of six outdoor units. The minimum distance between two adjacent outdoor units should be at least 1m.



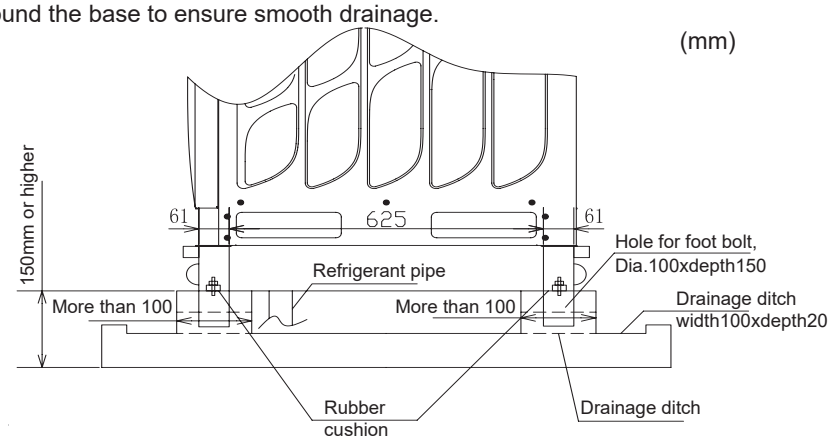
5.4 Foundation

- Concrete Foundation:

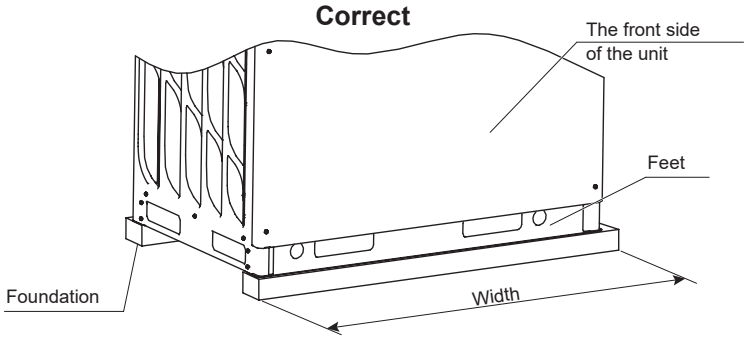
(1) The foundation should be 150 mm higher than the ground.

(2) Set the drain ditch around the base to ensure smooth drainage.

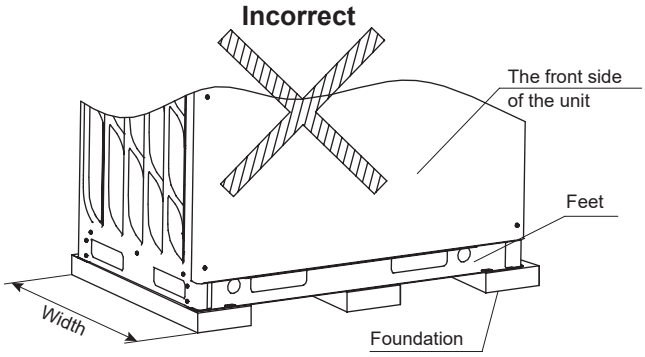
(mm)



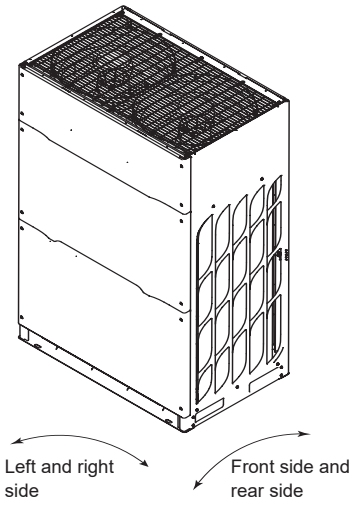
*Please set the concrete base as shown below:



*Do not setup the concrete foundation as shown below. Otherwise, the foot of the unit may be deformed:



(3) Install the outdoor unit horizontally in whole plane direction using level gauge to check that the slope in the four directions (front, rear, left, and right) tilt does not exceed 10mm.



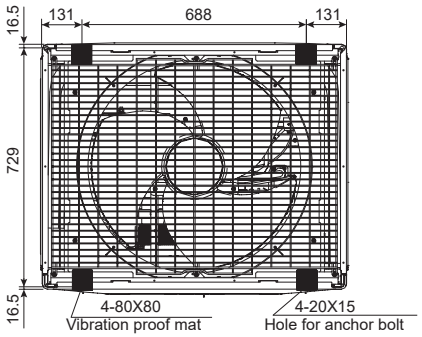
(4) Please provide a firm and correct foundation to ensure:

a. The outdoor unit is on a horizontal plane.

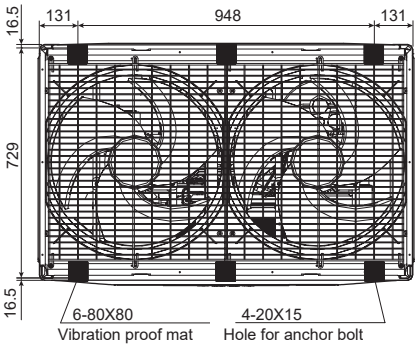
b. The outdoor unit does not make abnormal sound.

c. The outdoor unit does not get toppled by earthquake or strong winds.

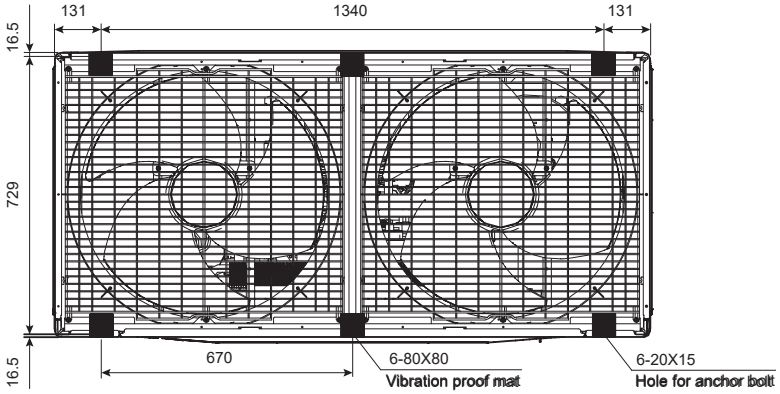
(5) When installing the outdoor unit, use the field-supplied anchor bolts to mount the unit. Refer to Figure 5.1 to confirm the position of mounting hole.



RAS-8.0~12RNBCLQ Unit: mm



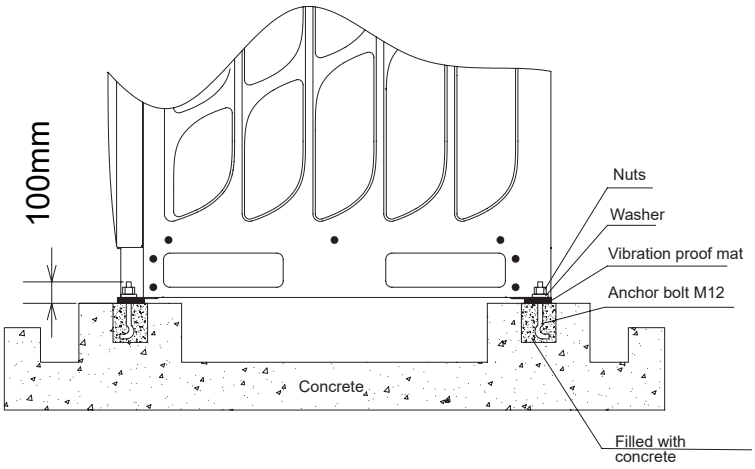
RAS-14~18RNBCLQ Unit: mm



RAS-20~24RNBCLQ Unit: mm

Figure 5.1 The Hole Position Diagram for Foot Bolt Fixing

Make sure that the outdoor foot bolts are securely tightened.



(6) When you install outdoor unit on the roof or the balcony, ice may easily accumulate around the drain ditch in the winter morning, hence do not drain the area where people often pass.

(7) When the outdoor unit needs a drain pipe, use a drain pipe joint device. In cold areas, do not use the drain pipe on the water tray as the condensed water may freeze inside the pipe resulting in drain pipe burst.

5.5 Condensation Water Treatment

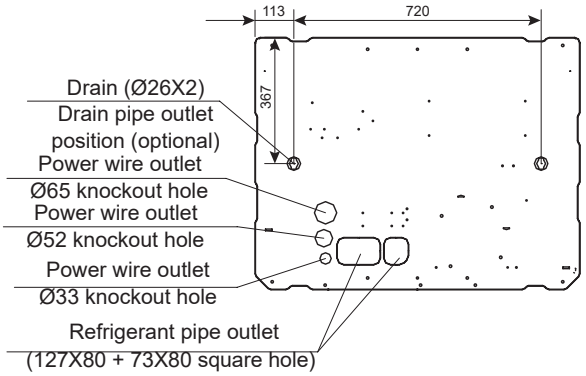
The outdoor unit discharges condensed water during heating and defrosting. (Rainwater can also be discharged through it)
Please pay attention to the following:

(1) Select a place where you can easily set up an effective drain pipe or drain.

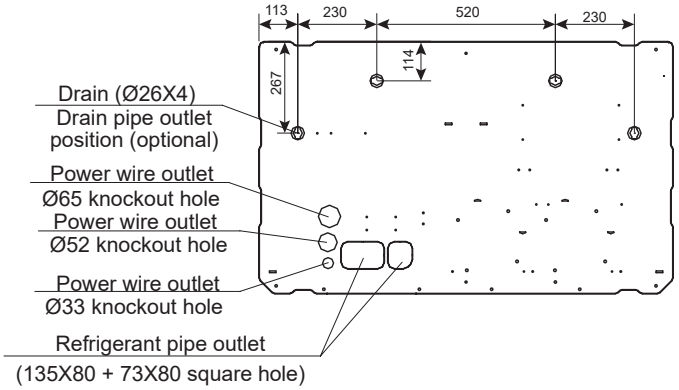
(2) Do not install the outdoor unit above the sidewalk, the condensed water may drip onto the pedestrian. Setup an additional water tray if you have to install it in such places.

(3) When the outdoor unit needs a drain pipe, use a drain pipe joint device. In cold areas, do not use the drain pipe on the water tray as the condensed water may freeze inside the pipe resulting in drain pipe burst.

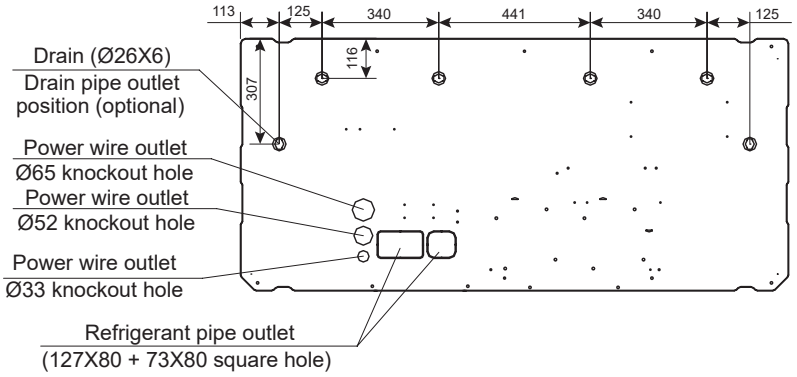
RAS-8.0~12RNBCLQ Unit: mm



RAS-14~18RNBCLQ Unit: mm

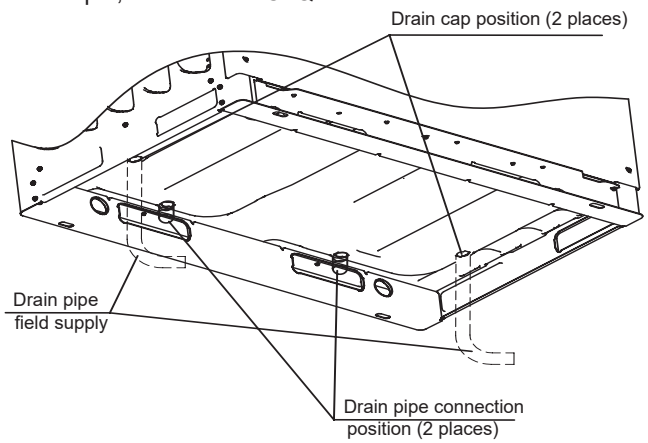


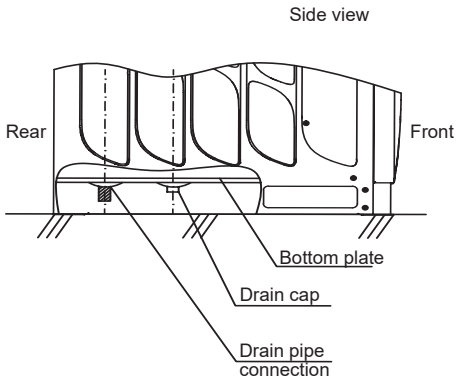
RAS-20~24RNBCLQ Unit: mm



Installation location

For example, RAS-14RNBCLQ models:





Drain cap position (2 places)

6. The Refrigerant Piping Construction

⚠ DANGER

- Refrigerant R410A is used in the refrigerant circulation system. Do not allow oxygen, acetylene or other flammable and toxic gases to fill the refrigerant pipe during leakage and air tightness test. These gases are very dangerous and may cause an explosion. It is recommended to use nitrogen.
- Ensure that there is no pressure inside the stop valve when removing the cap on the stop valve.

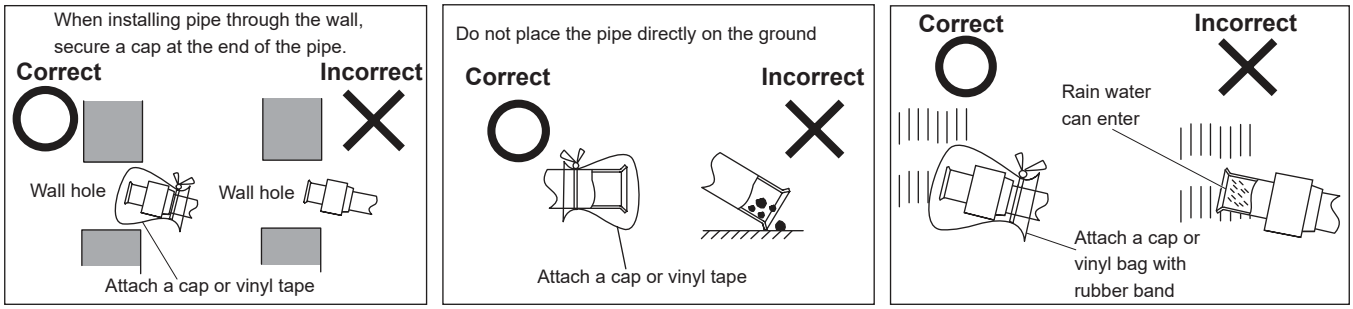
⚠ CAUTION

Make sure that the refrigerant piping is connected in the same refrigeration system.

6.1 Piping Material

(1) Prepare copper pipe for on-site construction.
(2) Select the copper pipe specifications.
(3) Choose clean copper pipes. Make sure that there is no dust and moisture inside the copper pipe inner wall. Before performing piping connection, use dry air or nitrogen to blow the inside of the copper pipe to remove internal dust or impurities. Do not cut the copper pipe with tools such as saws and grinding wheels that can produce metal debris.

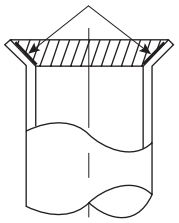
- Notice for piping end



- Piping connection construction precautions.

(1) Connect the indoor unit and the outdoor unit with a refrigerant pipe. Pay attention to the pipeline do not touch the ceiling and other weakness places. (Otherwise, the you will hear sound of piping vibration).
(2) Apply a layer of refrigerant oil gently to the inner surface of the piping flaring area before performing flar piping connection.
Use specified torque value with a double wrench operation, to tighten the flare nut.
First tighten the flare nut for liquid pipe, and then tighten the flare nut for gas pip
After the job is completed, check for leakages.

Apply refrigerant oil

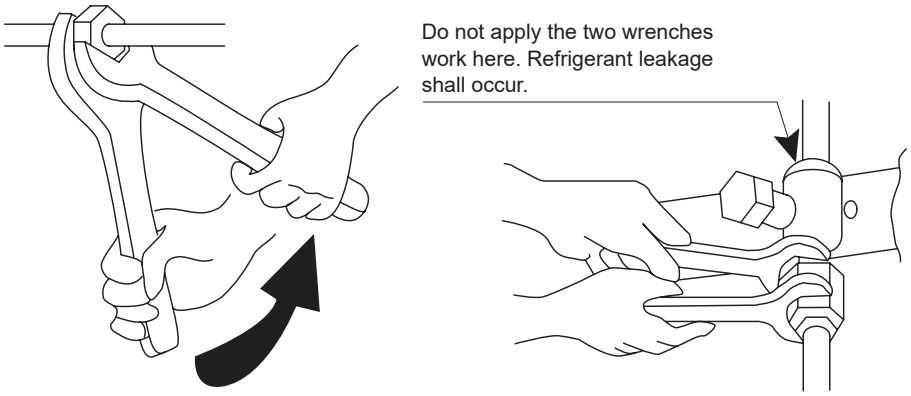


NOTE:

Refrigeration oil should be supplied on-site. [Model: FV68H].

(3) If the temperature and relative humidity inside the ceiling are more than 27°C / 80%, apply a layer of insulation pipe (about 10 mm in thickness) to the outer surface of the original insulation pipe. The insulation pipe attached to the refrigerant pipe to prevent the formation of condensed water on the surface of the refrigerant pipe. (Refrigerant pipe only).
(4) Apply a pressure of 4.15MPa to test the air tightness of the refrigerant pipe.
(5) Cover the refrigerant pipe junction, reducing pipe connection and all the outer surface of the refrigerant piping with the insulation tube, and then pack the insulation tube with teflon tape.

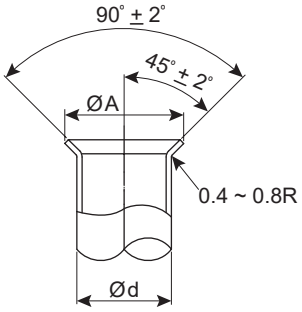
- Use double wrench while tightening the flare nut.



Tightening Work for Stop Valve of liquid pipe

6.2 Flare and Joints

- Flare size
  Flare as shown in the table below:



(mm)

Diameter (Ød)	$A^{+0}_{-0.4}$
	R410A
6.35	9.1
9.52	13.2
12.7	16.6
15.88	19.7
19.05	(*)

(*)It is impossible to perform the flaring work with 1/2H material. In this case, use an accessory pipe (with a flare)

- Joint selection

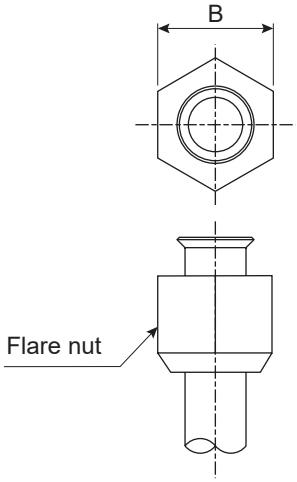
  If you use 1/2H material pipe, it cannot be flared. In this case, the joints shown in the table below can be used:

Minimum wall thickness of the joint (mm)

	R410A
Ø 6.35	0.5
Ø 9.52	0.6
Ø 12.7	0.7
Ø 15.88	0.8
Ø 19.05	0.8
Ø 22.2	0.9
Ø 25.4	0.95
Ø 28.58	1.0
Ø 31.75	1.1
Ø 38.1	1.35
Ø 41.3	1.45
Ø 44.5	1.55
Ø 50.8	2.0
Ø 53.98	2.0

Flare nut Size B (mm)

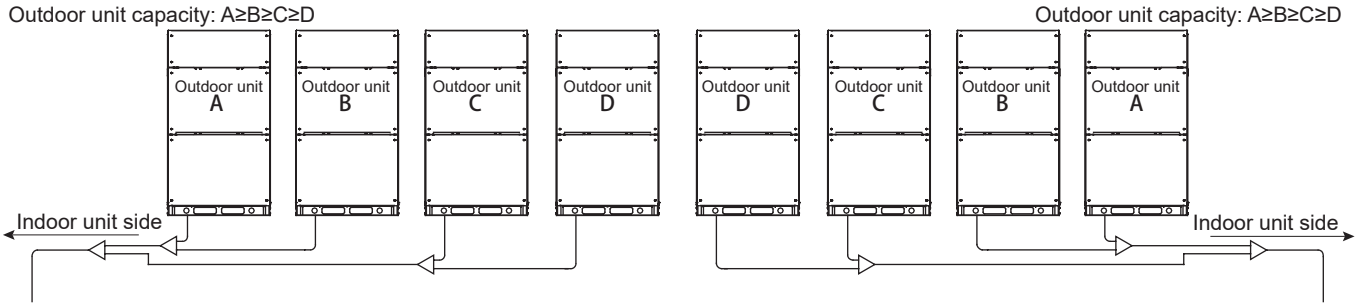
	R410A
Ø 6.35	17
Ø 9.52	22
Ø 12.7	26
Ø 15.88	29
Ø 19.05	36



6.3 Precautions for Installation of Outdoor Unit

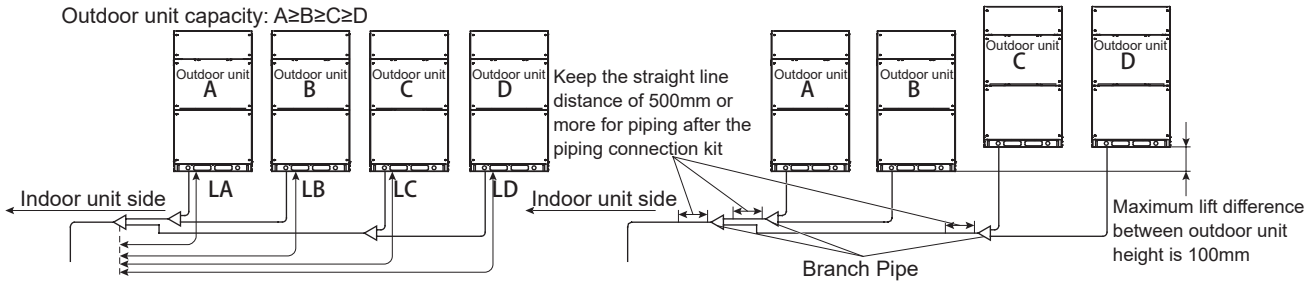
Outdoor unit arrangement

Take the 4-module combination as an example. The outdoor unit is arranged as per the order of A, B, C and D and the outdoor unit A should be installed near the indoor unit side.

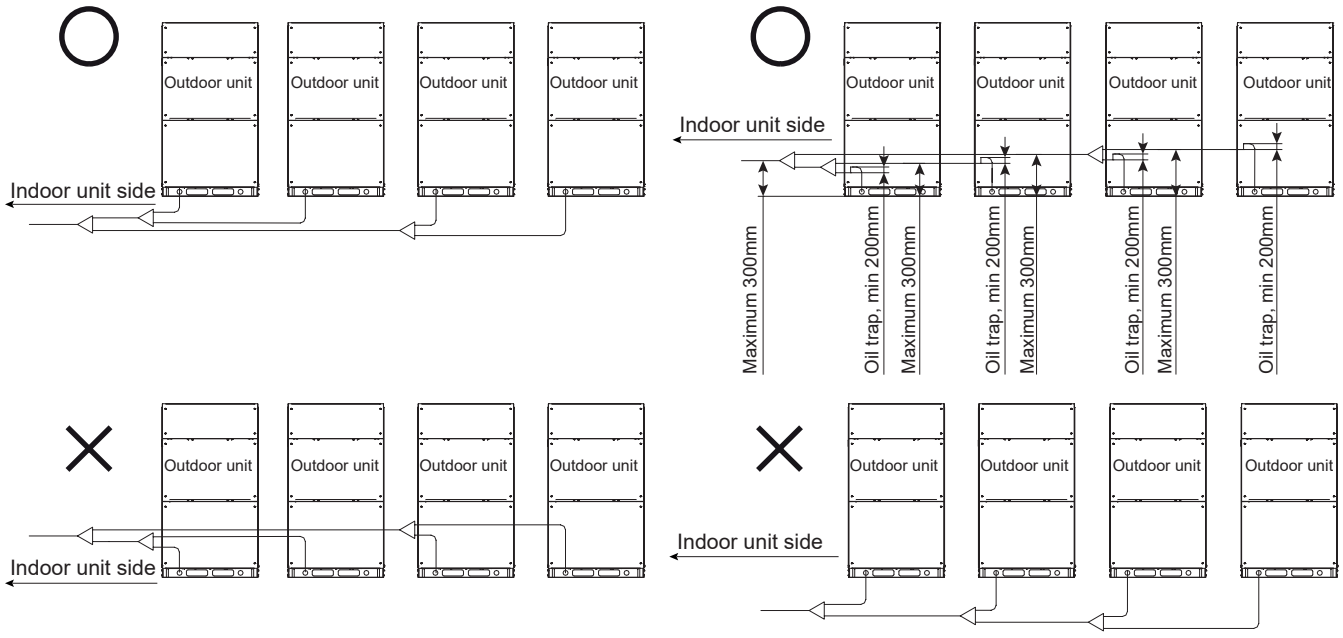


Piping construction between outdoor units

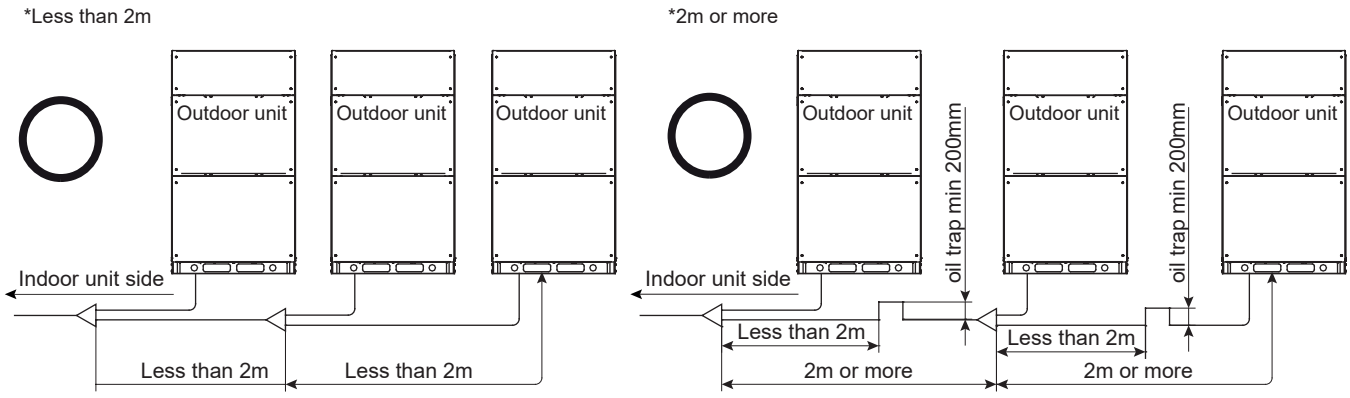
(1) The length of the piping between the outdoor unit side branch pipe and the outdoor unit shall be LA ≤ LB ≤ LC ≤ LD ≤ 10m.



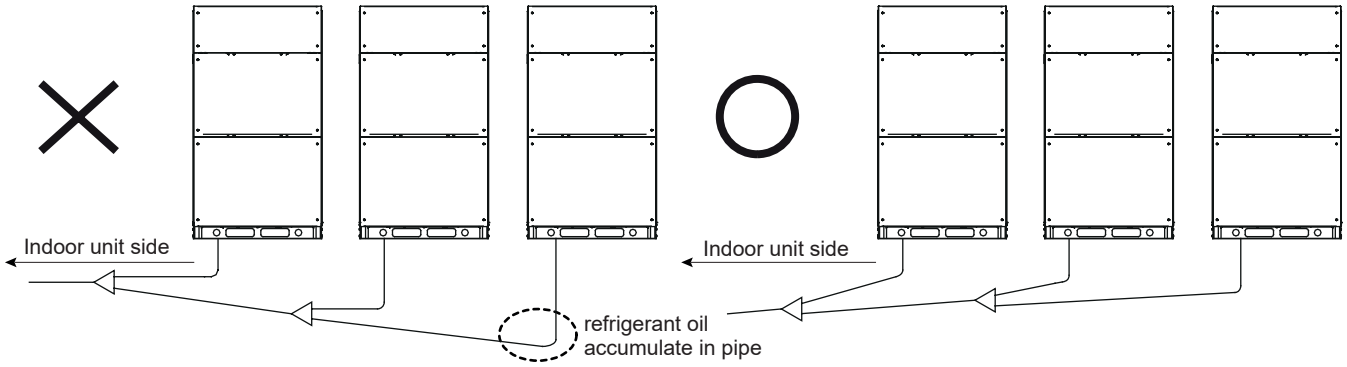
(2) Take 4-module combination of outdoor units as an example:
Installation position of branch pipe at outdoor unit side should be lower than the position of outdoor unit piping outlet. If the installation position of the branch pipe is higher than the position of outdoor unit piping outlet, distance from the branch pipe to the bottom of outdoor unit should be kept as no less than 300mm. Meanwhile, oil trap needs to be set between outdoor unit and branch pipe (Minimum 200mm).



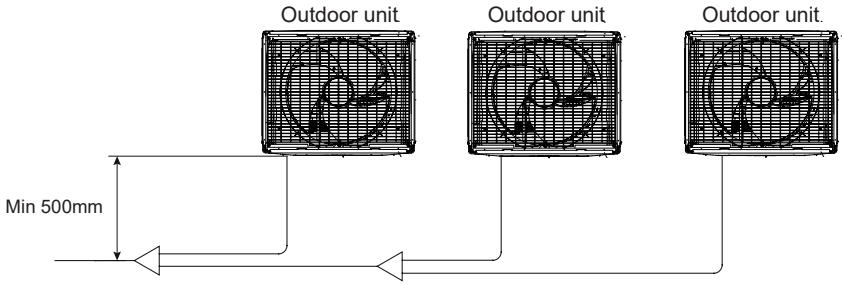
(3) Take the 3-module combination as an example. If the piping length between the outdoor unit is no less than 2m, set the oil pool so that oil pool can prevent the accumulation of cooling oil accumulation inside individual outdoor unit.



(4) Take the 3-module combination as an example. Install the outdoor unit piping in a horizontal plane, or with the indoor side of the pipe connected to the downward tilt state, otherwise, the system may accumulate cooling oil in the pipeline.

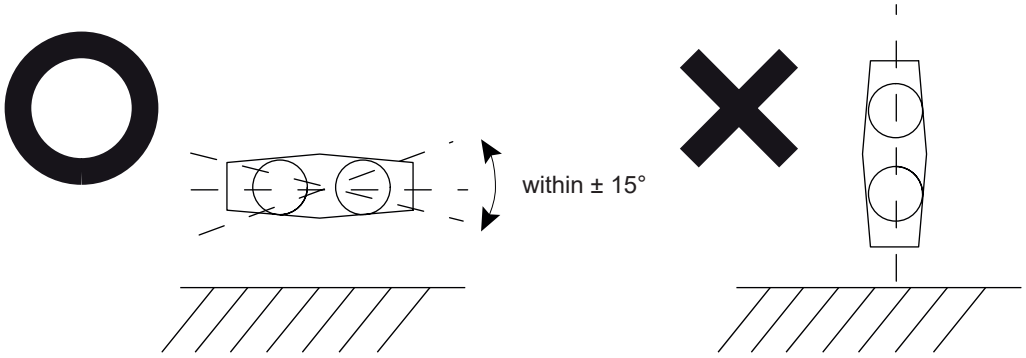


(5) Take the 3-module combination as an example. For maintenance, if the piping is installed in front of the outdoor unit, ensure that the minimum vertical distance between the outdoor unit and the branch pipe is 500mm. (During the replacement of the compressor, keep a minimum of 500mm maintenance space).



(6) Branch pipe direction

The direction of the branch pipe is as shown below, install the branch pipe closer to the ground (with an horizontal inclination angle ≤15 degrees):



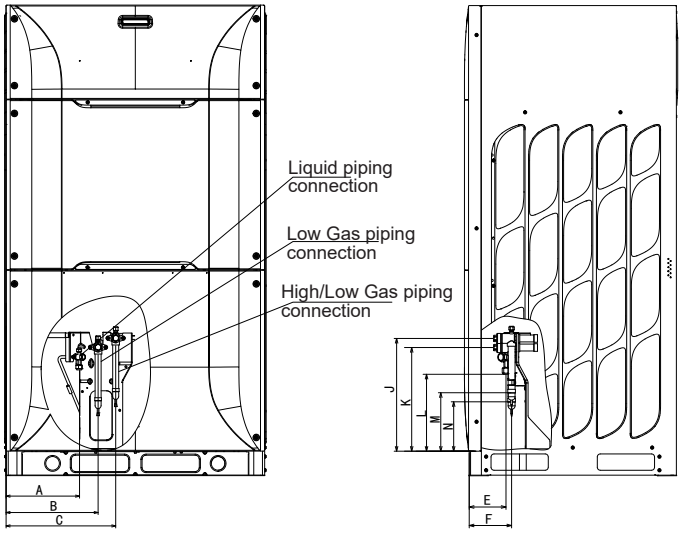
6.4 System Piping Connection

Piping connection must be carried out for each outdoor unit.

NOTE:

Verify that the refrigerant piping is connected in the same refrigerant circulation system.

- Site preparation for the use of refrigerant piping.
  Refer to the position as shown in Figure 6.1 when you connect the pipes



（mm）

Model	8HP	10HP	12HP	14HP	16HP	18HP	20HP	22HP	24HP
A	269	269	269	278	278	278	450	450	450
B	337	337	337	348	348	348	520	520	520
C	402	402	402	413	413	413	584	584	584
E	112	112	112	111	111	111	137	137	137
F	129	129	129	131	131	131	155	155	155
J	414	414	414	414	414	414	414	414	414
K	380	380	380	380	380	380	380	380	380
L	298	298	298	298	298	298	298	298	298
M	214	214	214	214	214	214	214	214	214
N	181	181	181	181	181	181	181	181	181

Figure 6.1 Refrigerant Piping Connection

- Refrigerant piping directions.
  Fix the refrigerant piping properly to avoid vibration and external force on the stop valve.

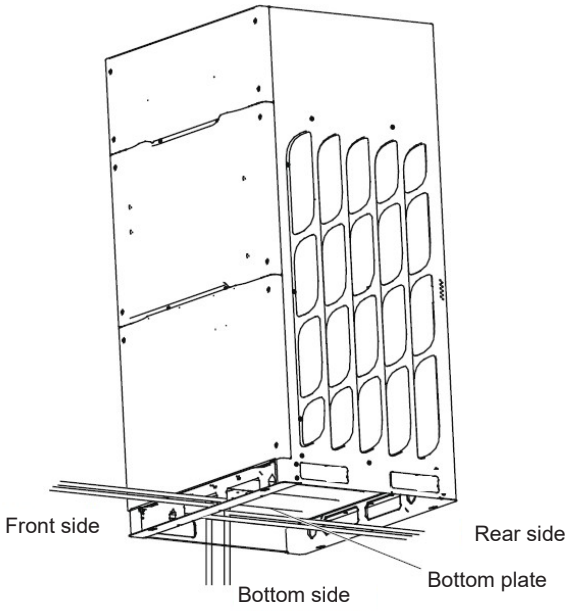
(1) Refrigerant piping can be connected in three directions of the outdoor unit:
Front: Connect the piping from the piping entrance at the unit bottom plate and then run it through the front opening of the bottom plate.
Bottom: Directly connect the piping from the piping entrance at the unit bottom plate.
Rear: Connect the piping from the piping entrance at the unit bottom plate and then run it through the rear opening of the bottom plate.

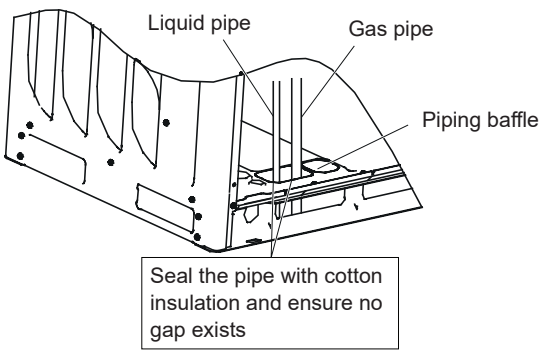
(2) Operate the stop valve as per Clause 6.4.9.

(3) Refer to section 6.4.10 for piping connection.

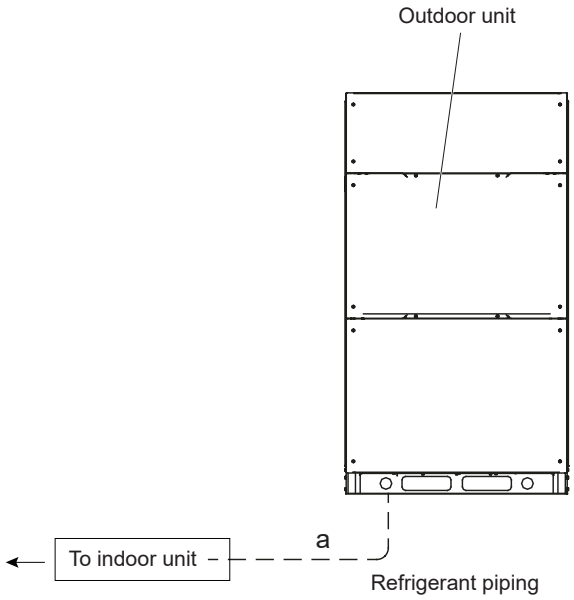
(4) If the piping is connected from the front side of the unit, the connection piping of the unit should be sealed completely with thermal insulation tube so as to prevent water or snow from entering into the unit.

(5) If the piping is connected from the bottom or rear side of the unit, need apply thermal insulation tube to the piping which is going through the bottom of the unit, so as to prevent water or snow from entering into the unit.





6.4.1 RAS-8.0RNBCLQ~RAS-24RNBCLQ Piping Specifications (3 pipes)



(Ømm)

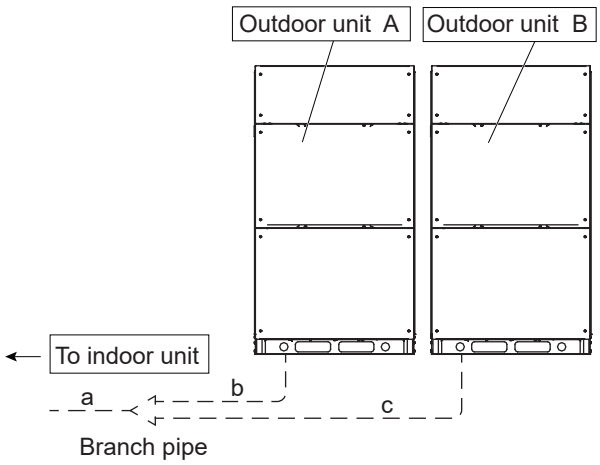
Model			RAS-8.0RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ	RAS-14RNBCLQ
Pipe size	a	Low Pressure Gas	19.05	22.2	25.4	25.4
		High/Low Pressure Gas	15.88	19.05	22.2	22.2
		Liquid	9.53	9.53	12.7	12.7

Model			RAS-16RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22HRNBCLQ
Pipe size	a	Low Pressure Gas	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	25.4
		Liquid	12.7	15.88	15.88	15.88

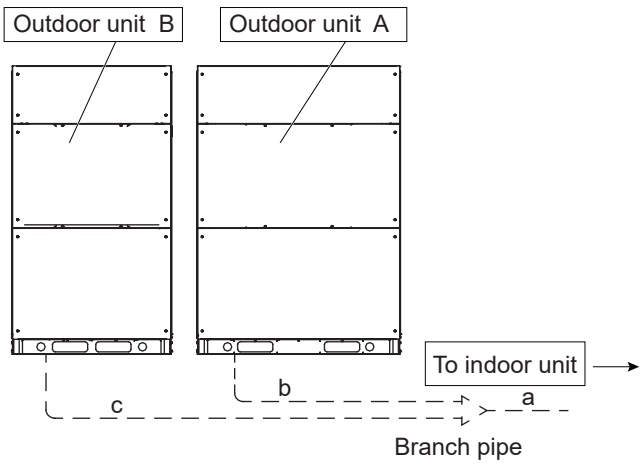
Model			RAS-24RNBCLQ
Pipe size	a	Low Pressure Gas	28.58
		High/Low Pressure Gas	25.4
		Liquid	15.88

6.4.2 RAS-26RNBCLQ~RAS-48RNBCLQ Piping Specifications (3 pipes)

(Indoor unit on the left)



(Indoor unit on the right)



2-Module Combination Table

(Ømm)

Model			RAS-26 RNBCLQ	RAS-28 RNBCLQ	RAS-30 RNBCLQ	RAS-32 RNBCLQ	RAS-34 RNBCLQ	RAS-36 RNBCLQ
Combination Mode		The outdoor unit A	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ
		The outdoor unit B	RAS-10 RNBCLQ	RAS-12 RNBCLQ	RAS-14 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ
Branch Pipe			M-692XNQ					
Piping Size	a	Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	38.1
		High/Low Pressure Gas	25.4	28.58	28.58	28.58	28.58	28.58
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	15.88	15.88
	c	Low Pressure Gas	22.2	25.4	25.4	28.58	28.58	28.58
		High/Low Pressure Gas	19.05	22.2	22.2	22.2	22.2	22.2
		Liquid	9.53	12.7	12.7	12.7	12.7	12.7

2-Module Combination Table

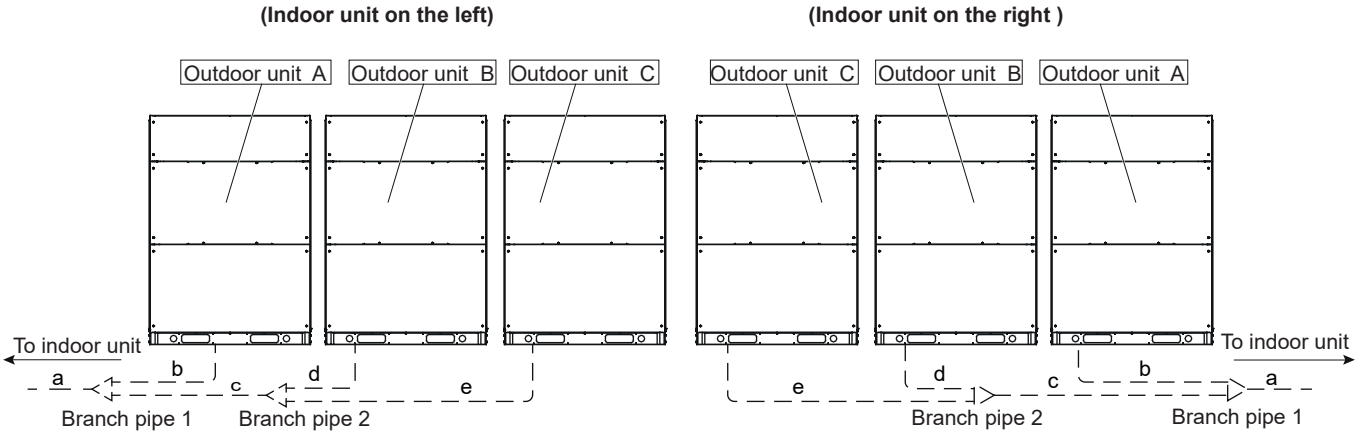
(Ømm)

Model			RAS-38 RNBCLQ	RAS-40 RNBCLQ	RAS-42 RNBCLQ	RAS-44 RNBCLQ	RAS-46 RNBCLQ	RAS-48 RNBCLQ
Combination Mode		The outdoor unit A	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe			M-902XNQ					
Piping Size	a	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	22.2	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	25.4	25.4	25.4
		Liquid	12.7	15.88	15.88	15.88	15.88	15.88

* Outdoor unit pipe constructing as per the requirements of the above table.

Refer to the table above for the outdoor model to select the Branch Pipe and pipe diameter.

6.4.3 RAS-50RNBCLQ~RAS-72RNBCLQ Piping Specifications (3 pipes)



3-Module Combination Table

(Ømm)

Model			RAS-50 RNBCLQ	RAS-52 RNBCLQ	RAS-54 RNBCLQ	RAS-56 RNBCLQ	RAS-58 RNBCLQ	RAS-60 RNBCLQ
Combination Mode		The outdoor unit A	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ
		The outdoor unit C	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ
Branch Pipe 1			M-902XNQ			M-M462XF		
Branch Pipe 2			M-692XNQ			M-692XNQ		
Piping Size	a	Low Pressure Gas	38.1	38.1	38.1	41.3	44.45	44.45
		High/Low Pressure Gas	31.75	31.75	31.75	38.1	41.3	41.3
		Liquid	19.05	19.05	19.05	22.2	22.2	22.2
	b	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	25.4	25.4	25.4	25.4
		Liquid pipe	15.88	15.88	15.88	15.88	15.88	15.88
	c	Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	38.1
		High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	15.88	15.88
	e	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	12.7	12.7

3-Module Combination Table

(Ømm)

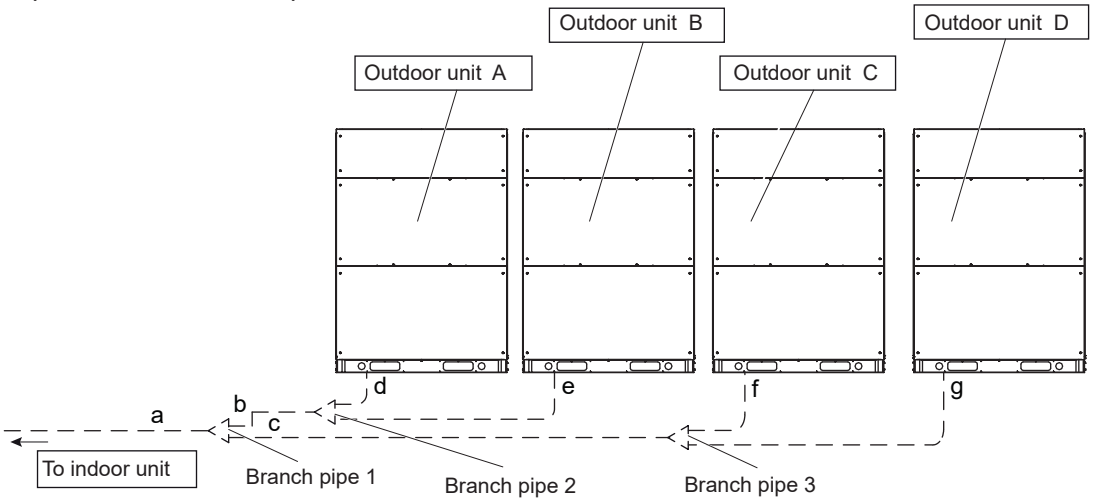
Model			RAS-62 RNBCLQ	RAS-64 RNBCLQ	RAS-66 RNBCLQ	RAS-68 RNBCLQ	RAS-70 RNBCLQ	RAS-72 RNBCLQ
Combination Mode		The outdoor unit A	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit C	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe 1			M-M462XF			M-M682XF		
Branch Pipe 2			M-902XNQ			M-902XNQ		
Piping Size	a	Low Pressure Gas	44.45	44.45	44.45	50.8	50.8	50.8
		High/Low Pressure Gas	41.3	41.3	41.3	44.5	44.5	44.5
		Liquid	22.2	22.2	22.2	25.4	25.4	25.4
	b	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	25.4	25.4
		Liquid	12.7	12.7	15.88	15.88	15.88	15.88

* Connect the pipes according to the above requirements of the outdoor unit.

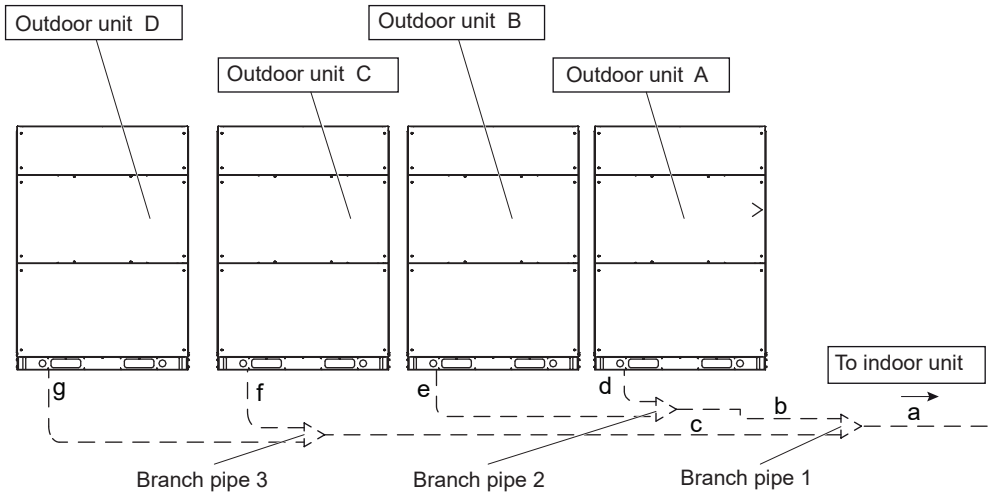
Refer to outdoor unit model that mentioned in above table, to select the Branch Pipe and piping diameter.

6.4.4 RAS-74RNBCLQ~RAS-96RNBCLQ Piping Specifications (3 pipes)

(Indoor unit on the left)



(Indoor unit on the right)



4-Module Combination Table

(Ømm)

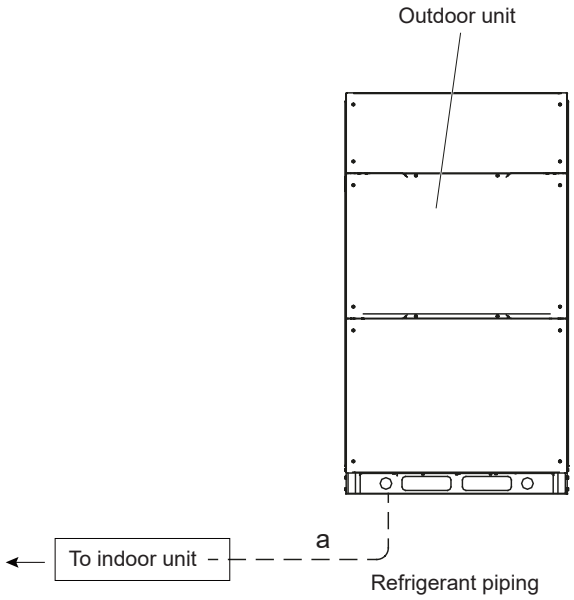
Model			RAS-74 RNBCLQ	RAS-76 RNBCLQ	RAS-78 RNBCLQ	RAS-80 RNBCLQ	RAS-82 RNBCLQ	RAS-84 RNBCLQ
Combination Mode	The outdoor unit A		RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit B		RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
	The outdoor unit C		RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
	The outdoor unit D		RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
Branch Pipe 1			M-M682XF					
Branch Pipe 2			M-902XNQ					
Branch Pipe 3			M-692XNQ			M-902XNQ		
Piping Size	a	Low Pressure Gas pipe	50.8	50.8	50.8	50.8	50.8	50.8
		High/Low Pressure Gas	44.5	44.5	44.5	44.5	44.5	44.5
		Liquid	25.4	25.4	25.4	25.4	25.4	25.4
	b	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	Low Pressure Gas	31.75	31.75	31.75	38.1	38.1	38.1
		High/Low Pressure Gas	28.58	28.58	28.58	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	22.2	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	f	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	15.88	15.88	15.88
	g	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	15.88	15.88	15.88

Model			RAS-86 RNBCLQ	RAS-88 RNBCLQ	RAS-90 RNBCLQ	RAS-92 RNBCLQ	RAS-94 RNBCLQ	RAS-96 RNBCLQ
Combination Mode	The outdoor unit A		RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit B		RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit C		RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 HRNBCLQ
	The outdoor unit D		RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe 1			M-M682XF					
Branch Pipe 2			M-902XNQ					
Branch Pipe 3			M-902XNQ					
Piping Size	a	Low Pressure Gas	50.8	50.8	50.8	50.8	50.8	50.8
		High/Low Pressure Gas	44.5	44.5	44.5	44.5	44.5	44.5
		Liquid pipe	25.4	25.4	25.4	25.4	25.4	25.4
	b	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	Low Pressure Gas pipe	38.1	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	f	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	25.4	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	g	Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88

* Outdoor unit pipe constructing as per the requirements of the above table.

Refer to the table above for the outdoor model to select the Branch Pipe and pipe diameter.

6.4.5 RAS-8.0RNBCLQ~RAS-24RNBCLQ Piping Specifications (2 pipes)



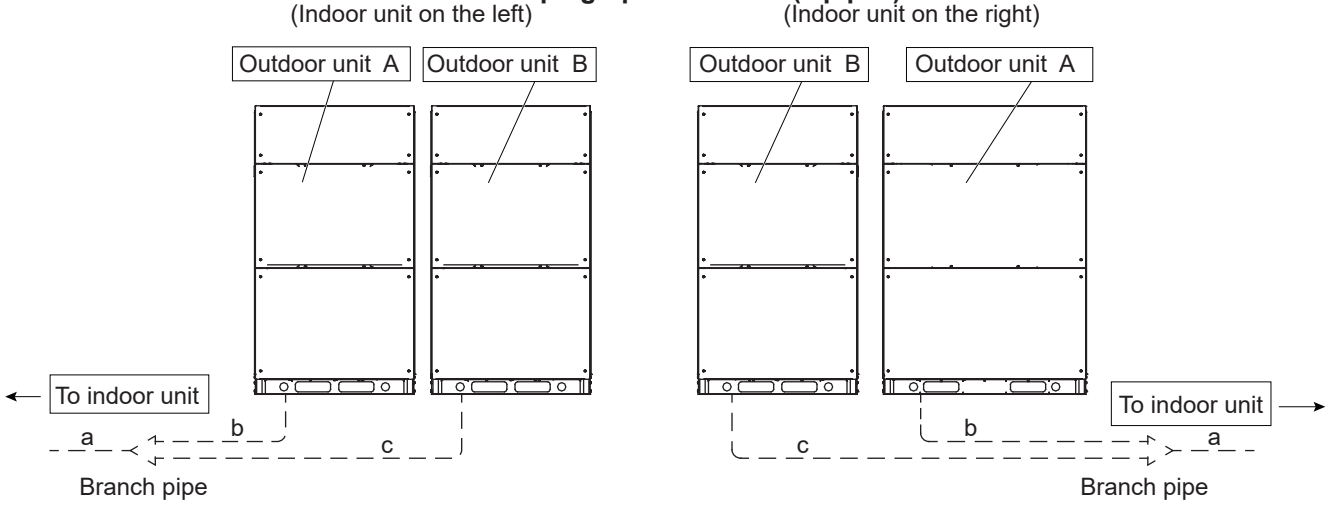
(Ømm)

Model			RAS-8.0RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ	RAS-14RNBCLQ
Pipe size	a	High/Low Pressure Gas	19.05	22.2	25.4	25.4
		Liquid	9.53	9.53	12.7	12.7

Model			RAS-16RNBCLQ	RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22HRNBCLQ
Pipe size	a	High/Low Pressure Gas	28.58	28.58	28.58	28.58
		Liquid	12.7	15.88	15.88	15.88

Model			RAS-24RNBCLQ
Pipe size	a	High/Low Pressure Gas	28.58
		Liquid	15.88

6.4.6 RAS-26RNBCLQ~RAS-48RNBCLQ Piping Specifications (2 pipes)



2-Module Combination Table (Ømm)

Model			RAS-26 RNBCLQ	RAS-28 RNBCLQ	RAS-30 RNBCLQ	RAS-32 RNBCLQ	RAS-34 RNBCLQ	RAS-36 RNBCLQ
Combination Mode		The outdoor unit A	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ
		The outdoor unit B	RAS-10 RNBCLQ	RAS-12 RNBCLQ	RAS-14 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ
Branch Pipe			M-30SNQ					M-46SNQ
Piping Size	a	High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	12.7	15.88	15.88
	c	High/Low Pressure Gas	22.2	25.4	25.4	28.58	28.58	28.58
		Liquid	9.53	12.7	12.7	12.7	12.7	12.7

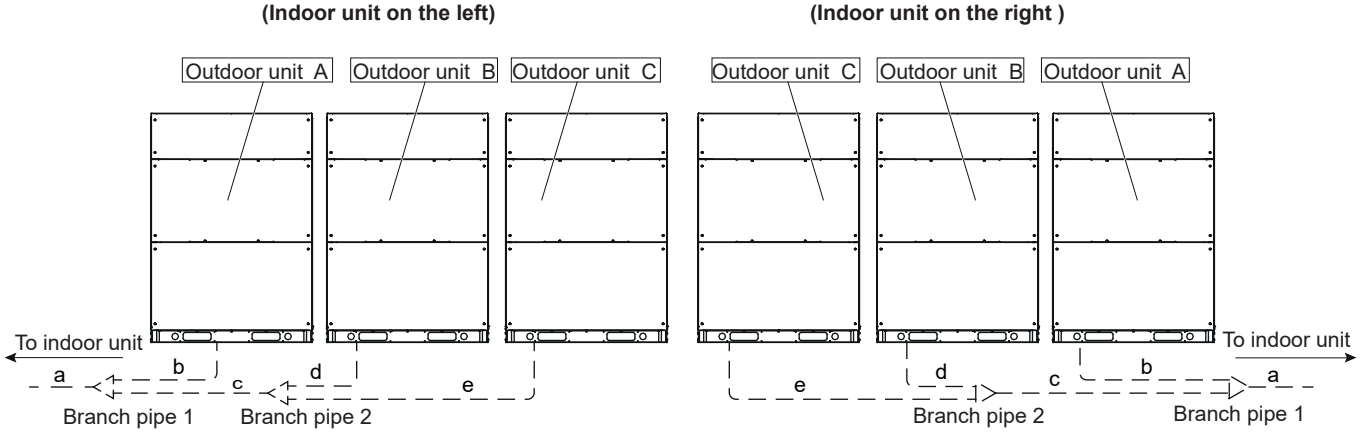
2-Module Combination Table (Ømm)

Model			RAS-38 RNBCLQ	RAS-40 RNBCLQ	RAS-42 RNBCLQ	RAS-44 RNBCLQ	RAS-46 RNBCLQ	RAS-48 RNBCLQ
Combination Mode		The outdoor unit A	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe			M-46SNQ					
Piping Size	a	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	15.88	15.88	15.88	15.88	15.88

* Outdoor unit pipe constructing as per the requirements of the above table.

Refer to the table above for the outdoor model to select the Branch Pipe and pipe diameter.

6.4.7 RAS-50RNBCLQ~RAS-72RNBCLQ Piping Specifications (2 pipes)



3-Module Combination Table

(Ømm)

Model			RAS-50 RNBCLQ	RAS-52 RNBCLQ	RAS-54 RNBCLQ	RAS-56 RNBCLQ	RAS-58 RNBCLQ	RAS-60 RNBCLQ
Combination Mode		The outdoor unit A	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ
		The outdoor unit C	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ
Branch Pipe 1			M-46SNQ			M-68SNQ		
Branch Pipe 2			M-30SNQ			M-30SNQ		
Piping Size	a	High/Low Pressure Gas	38.1	38.1	38.1	44.5	44.5	44.5
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	12.7	15.88	15.88
	e	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	12.7	12.7	12.7

3-Module Combination Table

(Ømm)

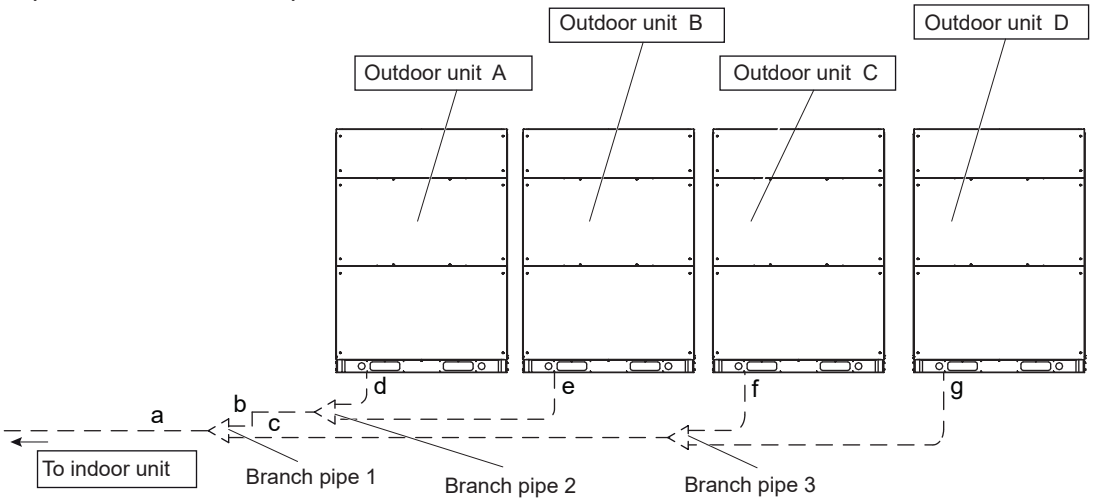
Model			RAS-62 RNBCLQ	RAS-64 RNBCLQ	RAS-66 RNBCLQ	RAS-68 RNBCLQ	RAS-70 RNBCLQ	RAS-72 RNBCLQ
Combination Mode		The outdoor unit A	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit B	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
		The outdoor unit C	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe 1			M-68SNQ					
Branch Pipe 2			M-30SNQ					
Piping Size	a	High/Low Pressure Gas	44.5	44.5	44.5	44.5	44.5	44.5
		Liquid	19.05	19.05	19.05	22.2	22.2	22.2
	b	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	c	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	15.88	15.88	15.88	15.88

* Connect the pipes according to the above requirements of the outdoor unit.

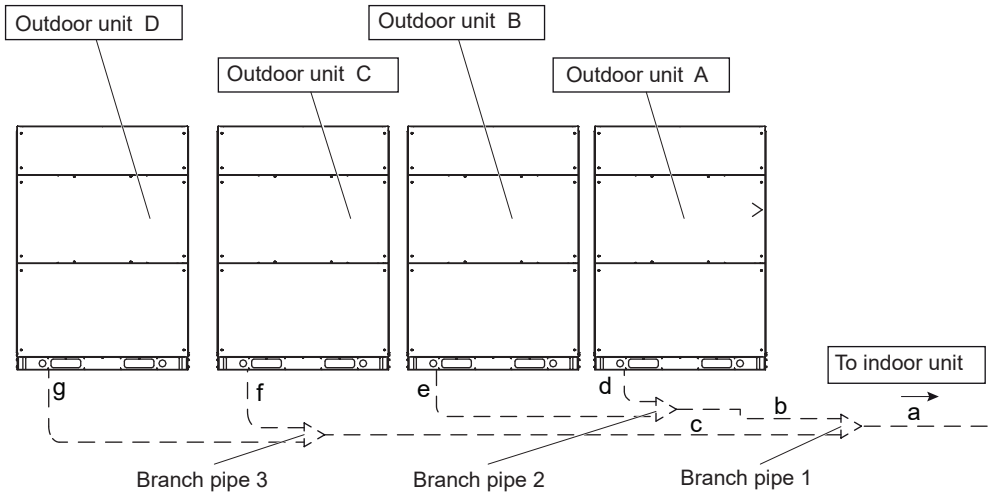
Refer to outdoor unit model that mentioned in above table, to select the Branch Pipe and piping diameter.

6.4.8 RAS-74RNBCLQ~RAS-96RNBCLQ Piping Specifications (2 pipes)

(Indoor unit on the left)



(Indoor unit on the right)



4-Module Combination Table

(Ømm)

Model			RAS-74 RNBCLQ	RAS-76 RNBCLQ	RAS-78 RNBCLQ	RAS-80 RNBCLQ	RAS-82 RNBCLQ	RAS-84 RNBCLQ
Combination Mode	The outdoor unit A		RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit B		RAS-18 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
	The outdoor unit C		RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
	The outdoor unit D		RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-16 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ
Branch Pipe 1			M-68SNQ					
Branch Pipe 2			M-30SNQ					
Branch Pipe 3			M-30SNQ					
Piping Size	a	High/Low Pressure Gas	50.8	50.8	50.8	50.8	50.8	50.8
		Liquid	22.2	22.2	22.2	22.2	22.2	22.2
	b	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	High/Low Pressure Gas	31.75	31.75	31.75	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	f	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	15.88	15.88	15.88
	g	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	12.7	12.7	12.7	15.88	15.88	15.88

Model			RAS-86 RNBCLQ	RAS-88 RNBCLQ	RAS-90 RNBCLQ	RAS-92 RNBCLQ	RAS-94 RNBCLQ	RAS-96 RNBCLQ
Combination Mode	The outdoor unit A		RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit B		RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ
	The outdoor unit C		RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ	RAS-24 RNBCLQ	RAS-24 HRNBCLQ
	The outdoor unit D		RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-20 RNBCLQ	RAS-22 RNBCLQ	RAS-24 RNBCLQ
Branch Pipe 1			M-68SNQ					
Branch Pipe 2			M-30SNQ					
Branch Pipe 3			M-30SNQ					
Piping Size	a	High/Low Pressure Gas	50.8	50.8	50.8	50.8	50.8	50.8
		Liquid	22.2	22.2	25.4	25.4	25.4	25.4
	b	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	e	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	f	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88
	g	High/Low Pressure Gas	28.58	28.58	28.58	28.58	28.58	28.58
		Liquid	15.88	15.88	15.88	15.88	15.88	15.88

* Outdoor unit pipe constructing as per the requirements of the above table.

Refer to the table above for the outdoor model to select the Branch Pipe and pipe diameter.

6.4.9 Stop Valve

(1) Ensure that the valve is completely closed.

(2) Connect the fluorine hose to stop the valve check joint, and release the refrigerant gas in the gas-side stop valve pipe.

(3) Cut off the thin (Ø6.35) at the end of stop valve cap to ensure no gas existed in the stop valve.

(4) Remove the stop valve cap with brazing at the brazing position of the stop valve cap, ensure that the flame does not touch valve body during brazing to prevent valve damage due to brazing sparks

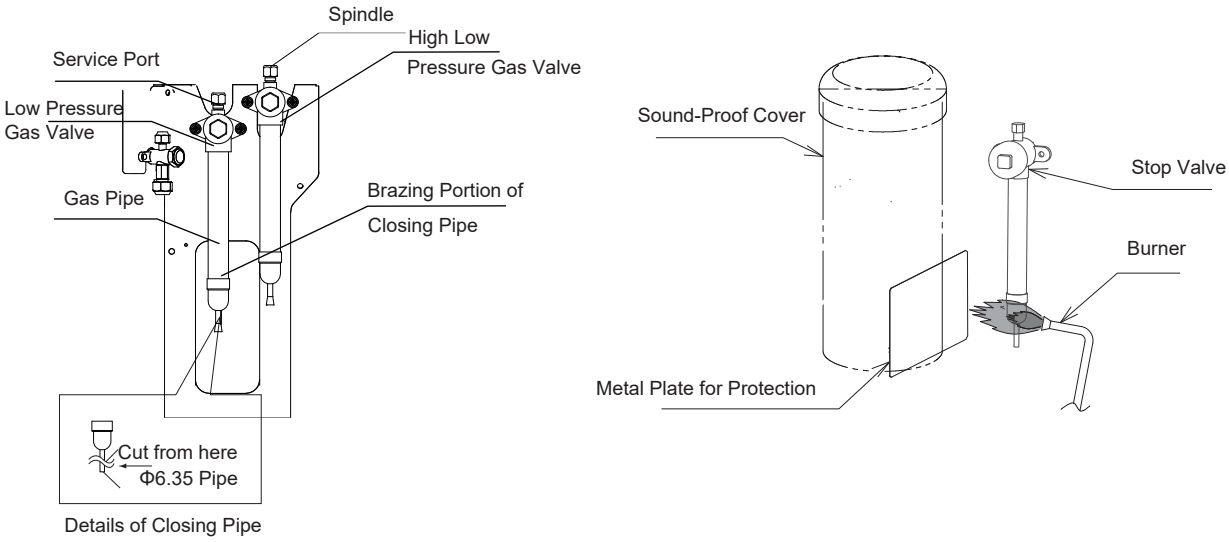
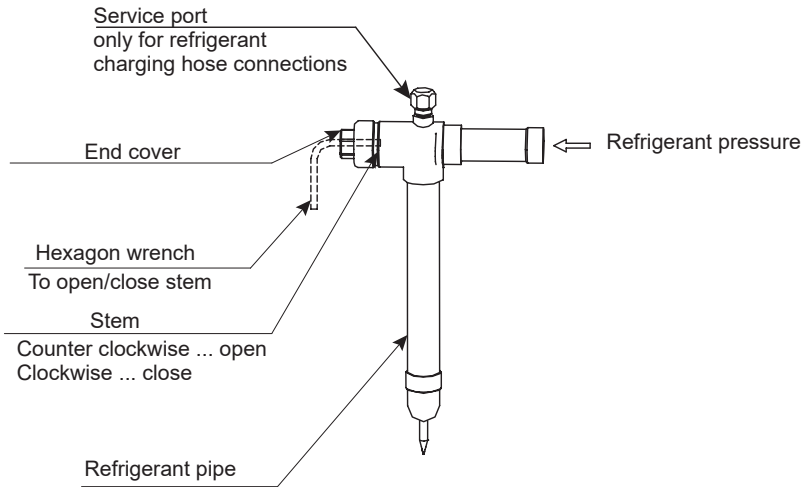


Figure 6.2 Gas Pipe Brazing

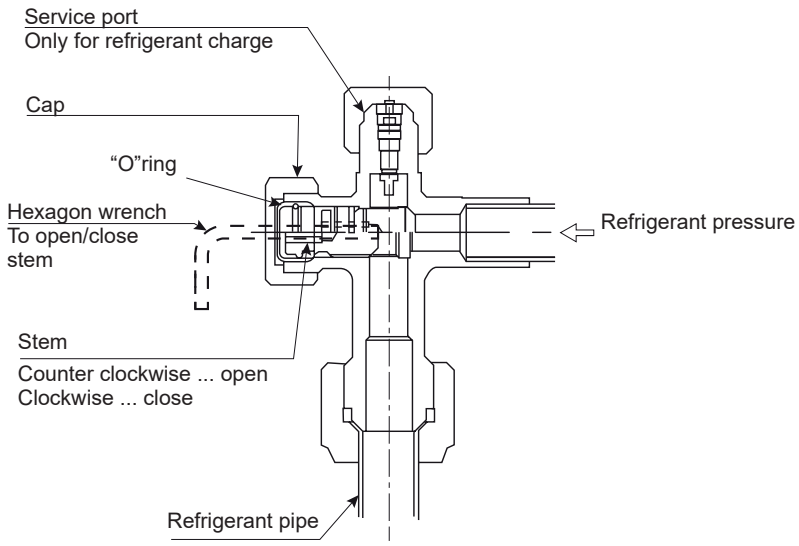
⚠ CAUTION

- Ensure that there is no gas inside the pipe when removing the closing pipe.
  Otherwise, the pipe may be blown out and it may lead to injury.
- Do not expose surrounding parts and the oil return pipe of the compressor to flames when torch is used. If the oil return piping is exposed to the fire, high temperature oil will spurt and cause a fire or injury.

Gas side stop valve



Liquid side stop valve



NOTICE

- After you fully open the stop valve, do not force the stem back again, otherwise it damages the stop valve.
- When you run the test, fully open the stem. If stem is not completely open, it may damage the unit.

6.4.10 Piping Connection

(1) Confirm that the stop valve is fully closed.

(2) As shown in Figure 6.2, when you braze the gas side pipe, use a metal plate to protect the compressor and the sound insulation cover of the compressor. The brazing sparks should not burn the valve body.

(3) Connect the indoor unit and the outdoor unit with the refrigerant piping and make sure the refrigerant piping does not contact with the weak parts of the facility (wall, false ceiling, etc.). Otherwise, you can hear a noise due to the vibration of the pipe.

(4) During the brazing operation, the pipe interiors should be filled with nitrogen for protection

(5) Apply thermal insulation to the gas & liquid pipes when performing assembling work.

(6) After connecting the pipes, install a pipe baffle on the unit. If not, snow, rain, and so on can damage the unit.

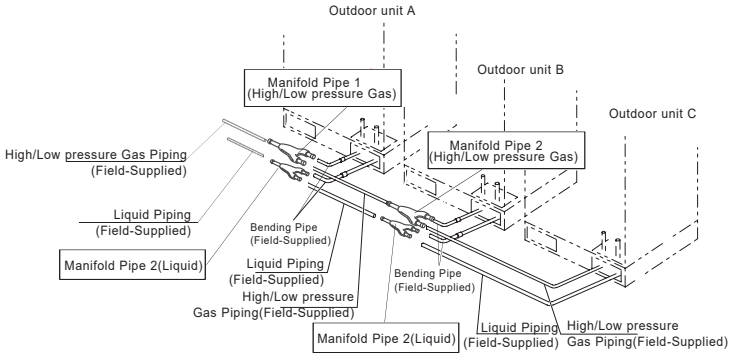
NOTE:

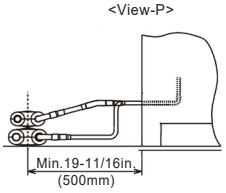
1.Ensure that the closing pipe of the gas stop valve(1 place) is removed firstly.

2.Refer to the item 6.2 for flaring work.

Construction Example

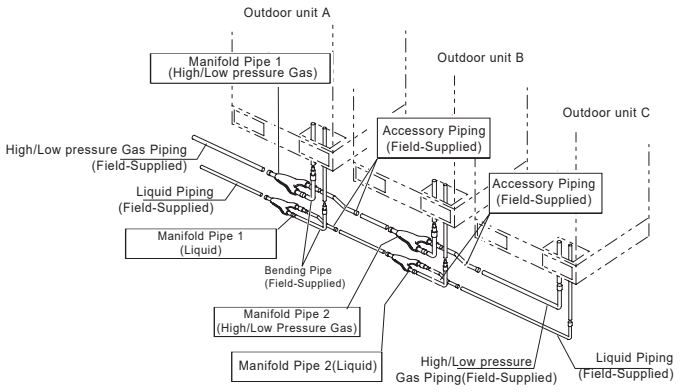
< Heat Pump System >(2 pipes).

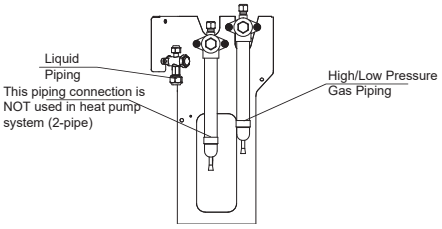




NOTE:

< Front Side Piping Connection >





< Downward Piping Connection >

NOTE:

The figure shows the case that the refrigerant pipes are pulled out from the front side piping cover. They can be also pulled out from the bottom base hole.

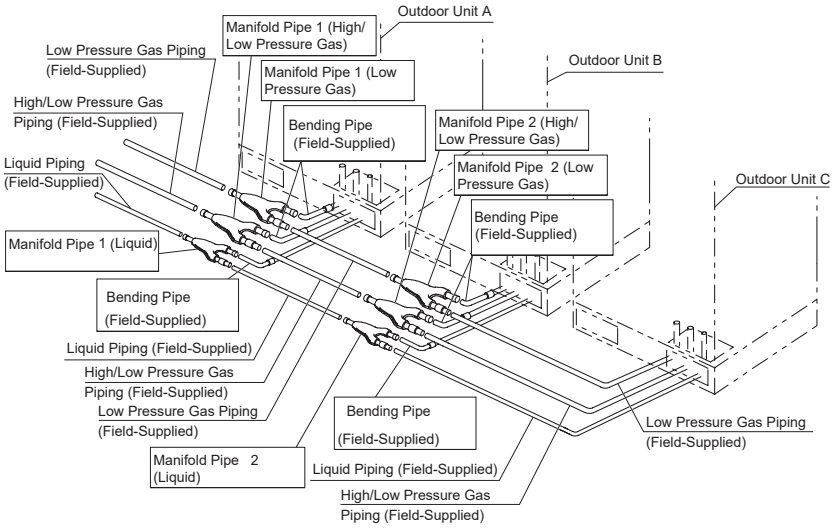
Construction Example

< Heat Pump System >(2 pipes).

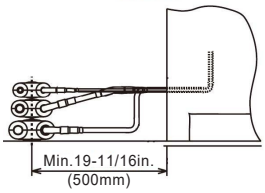
NOTE:

1. Ensure to remove the cap (1) of the high pressure gas stop valve.
2. Perform flare machining according to the sketch in section 6.2

< Heat Recovery System >(3 pipes)

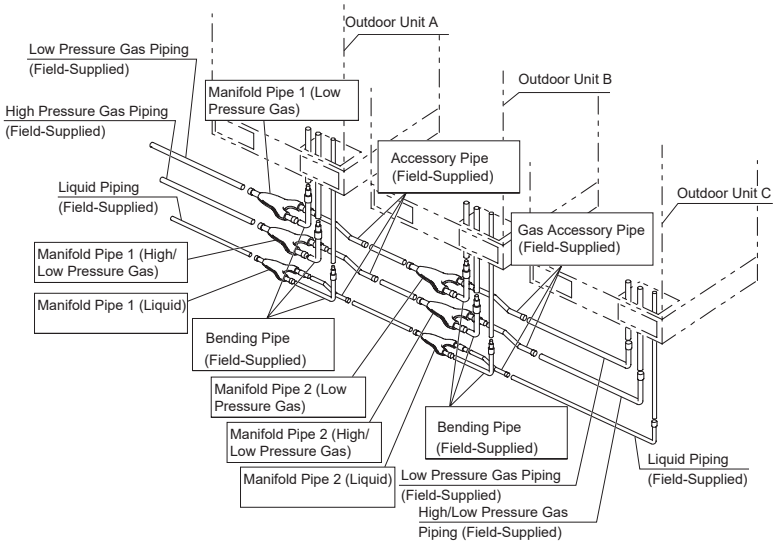


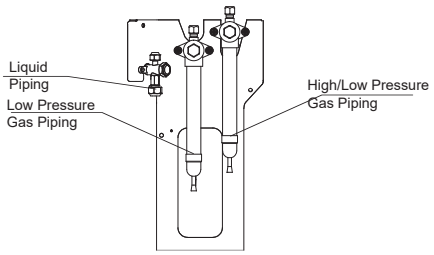
<View-P>



NOTE:

< Front Side Piping Connection >





There are three piping connections in outdoor units

< Downward Piping Connection >

NOTE:
The figure shows the case that the refrigerant pipes are pulled out from the front side piping cover. They can be also pulled out from the bottom base hole.

7. Electrical Wiring

WARNING

- Before performing wiring connection or regular check, turn off the main power supply of the indoor and outdoor units. Wait for at least ten minutes after shutting off the power supply.
- Before performing wiring connection or regular inspection, ensure that the indoor and outdoor fan is stopped.
- Protect wires, electrical components and so on in order to prevent mice or other small animals from destroying them. If not protected, the mouse may bite the unprotected components, which may cause fire.
- Avoid the wiring from touching the refrigerant pipes, sheet metal edges, and the electrical components inside the unit. This can damage the wires and can also cause fire.
- Use a high sensing speed type ELB (Earth Leakage Breaker, activation speed of 0.1 sec. or less). If not, it will lead to an electric shock or a fire.
- Fix the wires firmly, this may lead to fire incidents if the terminals is forced by outside.
- Do not use the air conditioner power supply terminal block to connect the power cord. Use the power distribution box inside the unit to extend the power supply wiring. Take care of the wiring capacity calculation. It may easily lead to fire, if the wiring capacity is too small.
- Fasten the screws according to the following torque:
  M4:1.0~1.3 N • m
  M5:2.0~2.4 N • m
  M6:4.0~5.0 N • m
  M8:9.0~11.0 N • m
  M10:18.0~23.0 N • m

7.1 General Check

(1) Ensure that the electrical components (main power, circuit breakers, wires, electrical conduit connections and terminals) used in the installation site are selected as per the requirements specified in technical manual. The specifications are compliant with national electrical code.

- Power on each outdoor unit. Each outdoor unit should use earth leakage circuit breakers, circuit breakers and main switches. Otherwise, may cause a fire or electric shock.
- Indoor unit and outdoor unit should be powered separately.
  For each indoor unit (connected to the same outdoor unit) connect a power wire.

(2) Check that the power supply voltage is within ±10% of the rated voltage. If the power supply voltage is too low, the system fails to start due to voltage drop.

(3) Check the wire specifications.

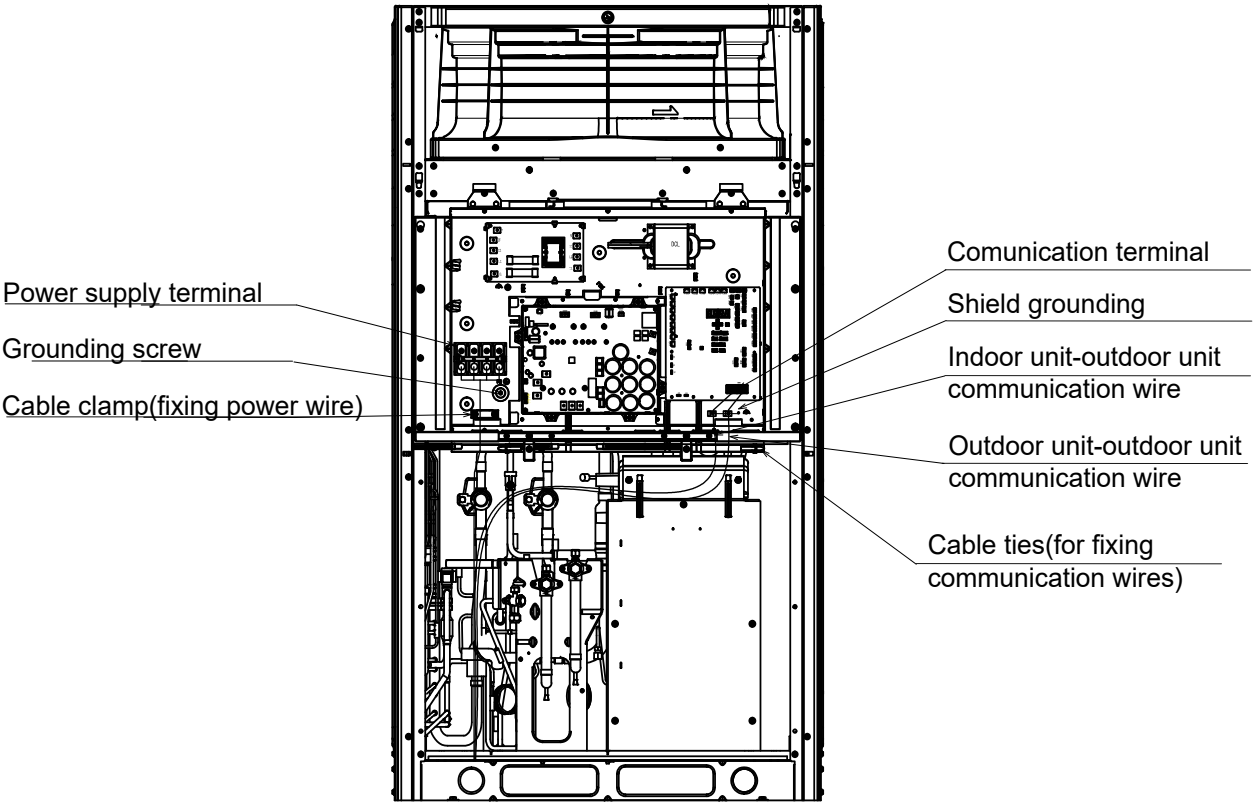
(4) The air conditioner may not work due to the following reasons in some scenarios:

- Air conditioner and some high power consuming equipment are powered by the same transformer *.
- The equipment * and air conditioner lines are too close to each other.

* (For example) elevators, container cranes, electric rectifiers, inverters, electric arc furnaces, electric furnaces and large induction motor and a large switch. In the cases mentioned above, due to the rapid changes in power consumption and switching devices, air conditioning power induction surge occurs. Therefore, to protect the air conditioner's power wires, electric pre-job inspection must be performed at the installation site specifications and standards.

(5) Check that the grounding wire is connected for both, outdoor and indoor unit.

〈8-12HP〉



〈14-16HP〉

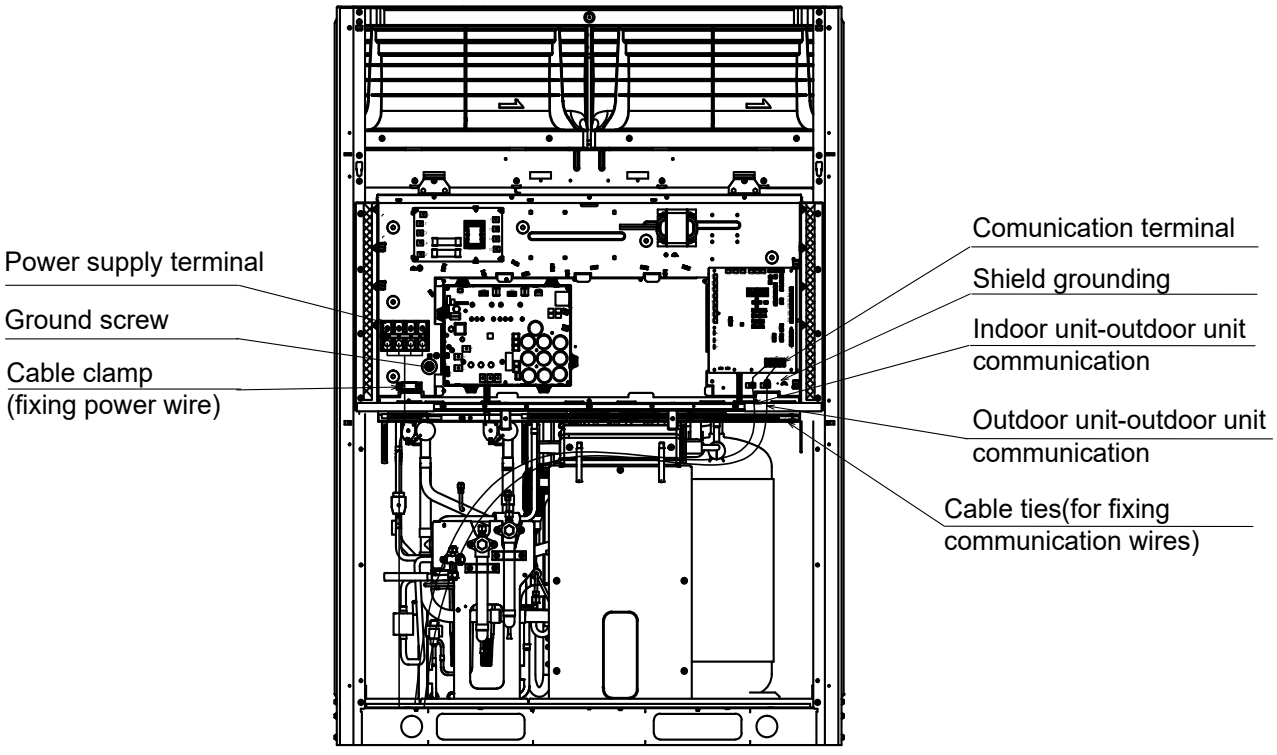
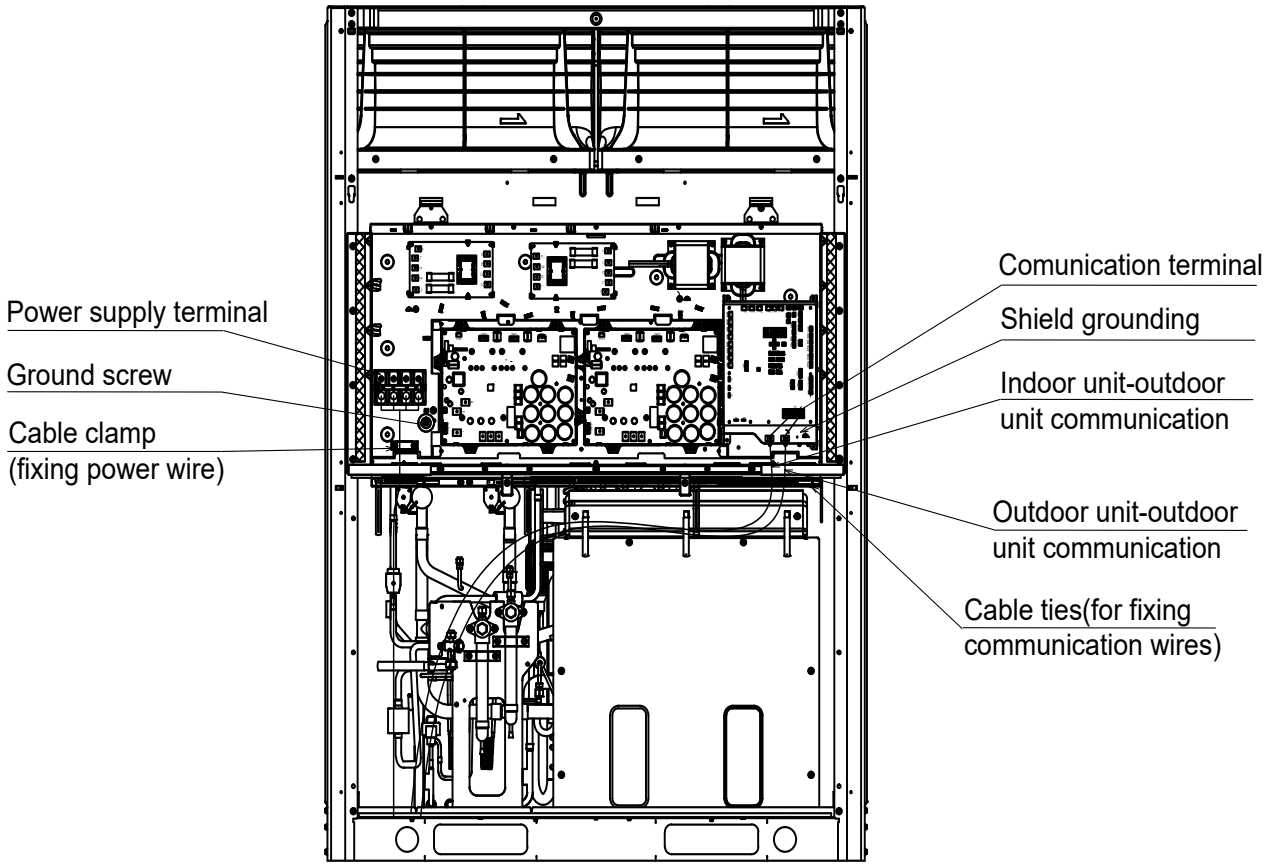


Figure 7.1 Electrical wiring（8-16HP)

〈18HP〉



〈20-24HP〉

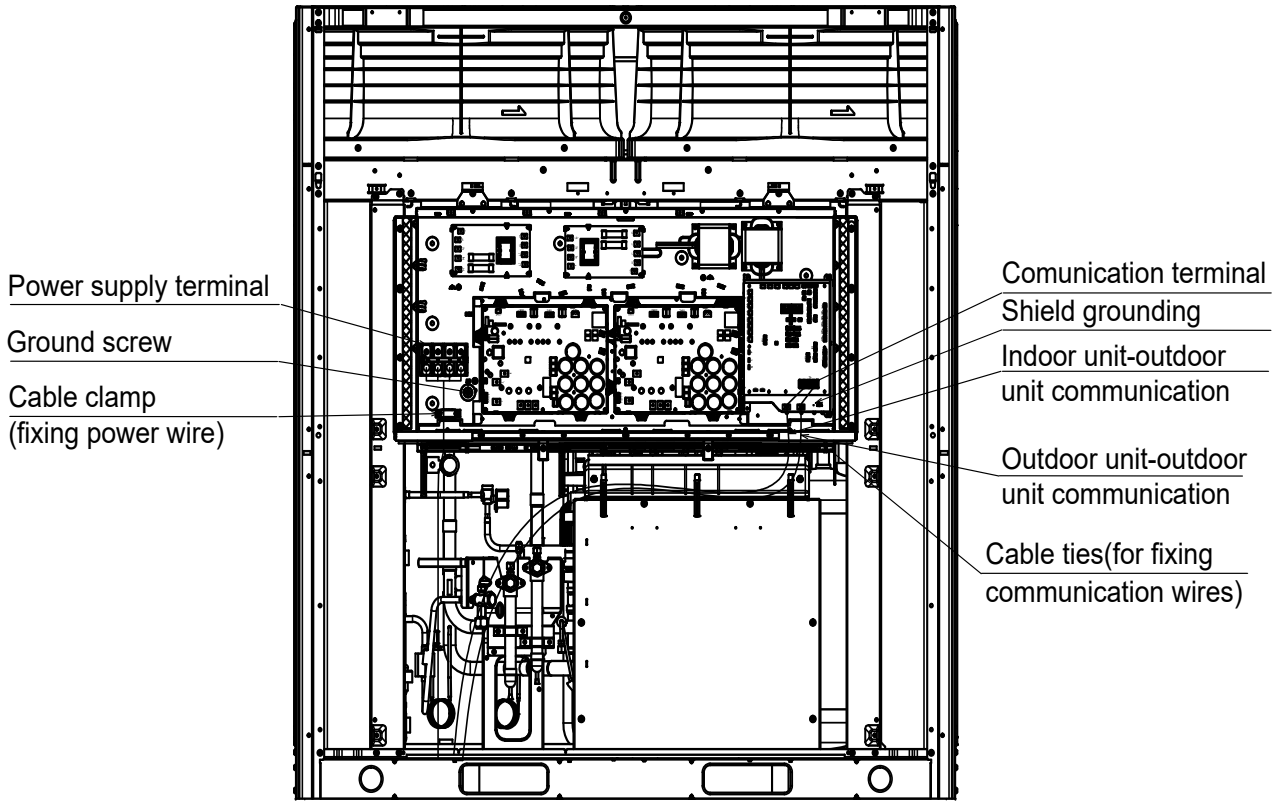


Figure7. 2 Electrical wiring (18-24HP)

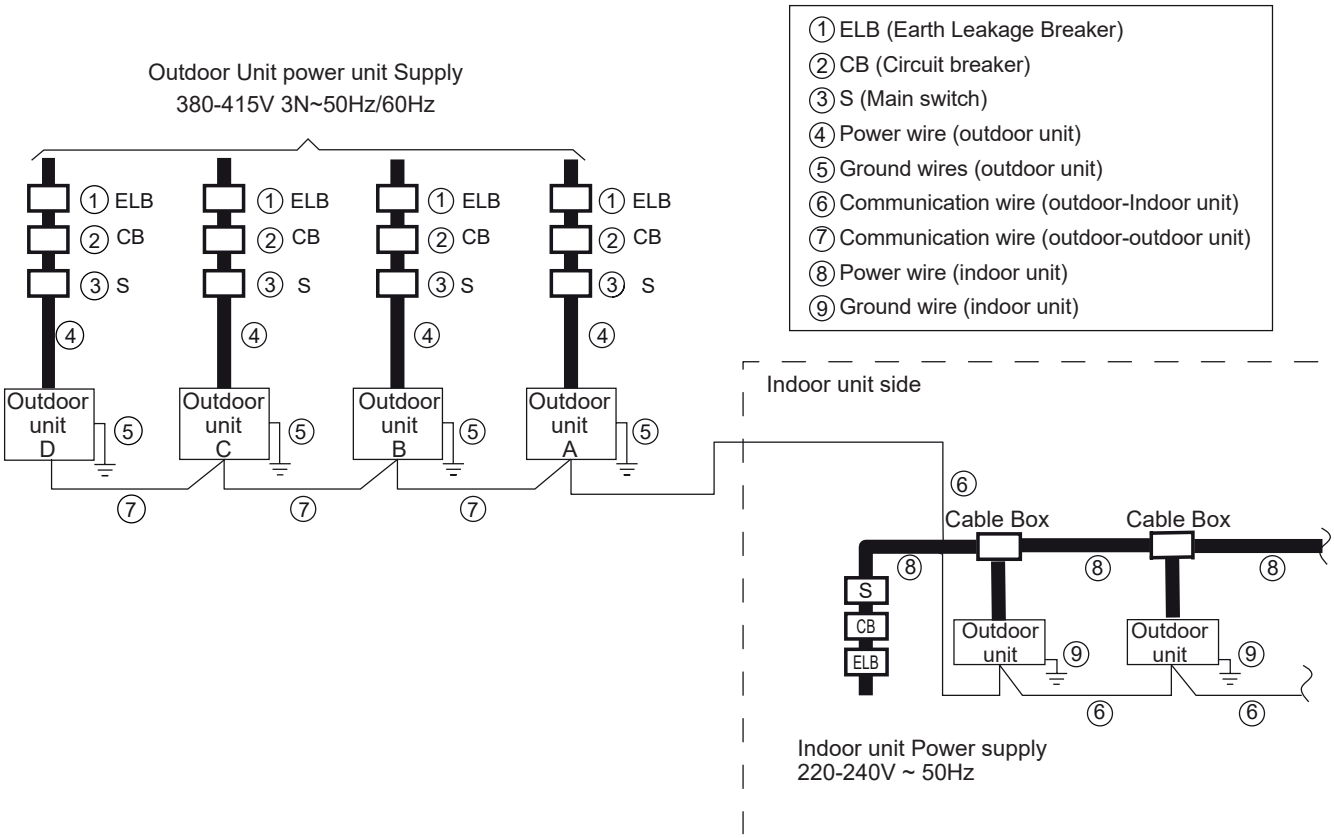
7.2 Wiring

WARNING

It is a must to connect ELB (Earth Leakage Breaker), CB (Circuit Breaker) and S (Main Switch) to each outdoor unit's power supply. Otherwise, it may cause electric shock or fire.

Remark:
Connect power wires to indoor unit and outdoor unit separately.

(1) Power wire
Separate power wires for each outdoor unit as per the following method (Don't connect power wire from other module):



(2) Recommended wire, ELB, and switching capacity is shown in Table 7.1
Table 7.1 Electrical Parameters And Recommendations Wires, ELB (Earth Leakage Breaker), capacity per outdoor unit

Model	Power Supply	Rated Current	Power Wire ④	Communication Wire ⑥⑦	ELB		Circuit Breaker ②	Ground Wire ⑤
					Rated Current	Current Sensitivity		
		(A)	(mm²)	(mm²)	(A)	(mA)	(A)	(mm²)
RAS-8.0RNBCLQ	380-415V 3N~50/60Hz	17.0	2.5	0.75	25	30	25	4
RAS-10RNBCLQ		21.2	2.5	0.75	25	30	25	4
RAS-12RNBCLQ		26.8	4	0.75	32	30	32	4
RAS-14RNBCLQ		31.3	4	0.75	40	30	40	6
RAS-16RNBCLQ		33.7	6	0.75	40	30	40	6
RAS-18RNBCLQ		41.5	10	0.75	50	30	50	10
RAS-20RNBCLQ		46.1	10	0.75	63	30	63	16
RAS-22RNBCLQ		49.2	10	0.75	63	30	63	16
RAS-24RNBCLQ		53.7	10	0.75	63	30	63	16

NOTE:

(1) Ensure that field wiring is as per provisions of local laws and regulations, and that a qualified or certified personnel performs all the wiring operations is must.

(2) Refer power cable dimensions specified in the above table must be according to relevant standards.

(3) If power wire is connected using a distribution box, sum up the current value and select the wires as per the below table specifications.

(4) As a minimum, the chosen wires shall not be lighter than the polychloroprene sheathed flexible wire (code designation 60245 IEC 57).Power cables shall be copper cables.

(5) The wiring specification of weak electricity communication circuit is not lower than RVV (S) P shielded wire or equivalent, the shield layer need to be grounded.

(6) The switch, that ensure all poles can disconnect, should be installed between the power supply and the air conditioner, the switch contact spacing should be not less than 3 mm.

(7) If the power wire is damaged, must contact the professional of dealer or the designated service for repairing and exchanging.

(8) When installing the power wire, the ground wire should be longer than the current-carrying wire.

Table 7.2 Power wire selection principle

Current (A)	Wire size (mm^2)
i≤6	2.5
6<i≤10	2.5
10<i≤16	2.5
16<i≤25	4
25<i≤32	6
32<i≤40	10
40<i≤63	16

⚠ CAUTION

To install multi-stage master switch between each phase, its phase distance is 3.5mm or more.

NOTE:

(1) When the power supply wire is too longer, select the minimum wiring size whose voltage drop is within 2%.

(2) The supply voltage must meet the following conditions:

Power supply voltage:	Voltage fluctuations within ±10
Starting voltage:	Voltage fluctuations within -15
Operating voltage:	Voltage fluctuations within ±10
Inter-phase imbalance rate:	Less than 3%

(3) Do not connect the ground wire to the gas pipe, water pipes and lightning rods.
Gas pipe: happens when a gas leak explosion and fire
Plumbing: when you use hard vinyl tubes ground is not valid.
Lightning rod: When the lightning rod is used, the earth potential increases abnormally.

7.3 Outdoor Unit Wiring

Perform the wiring connection as per the following:

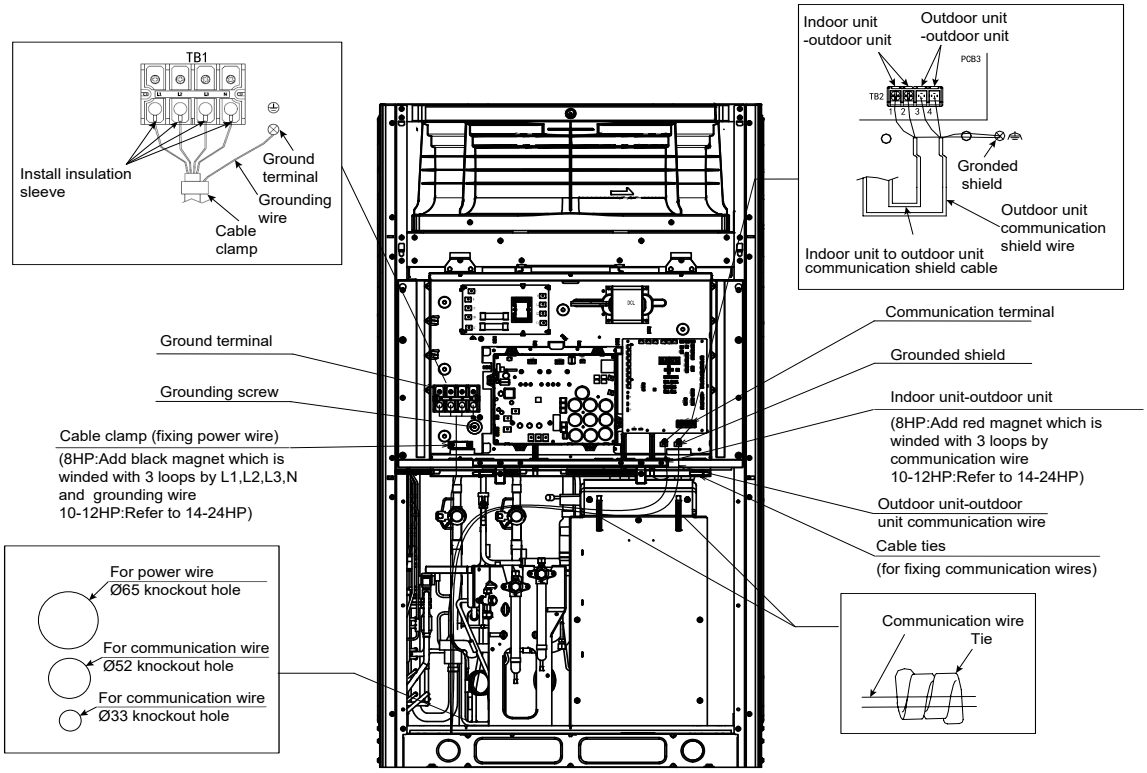
(1) Connect three-phase electric power wire to the terminal L1, L2, L3, and N (380V) of the block and connect the ground wire to the ground terminal in the electrical box.

(2) Connect the communication cable between the indoor and the outdoor unit to terminals 1 and 2 of the terminal block TB2 on the PCB3. The communication wires between the outdoor units of the same refrigerant system are connected to terminals 3 and 4 of the terminal block TB2 on the PCB3.

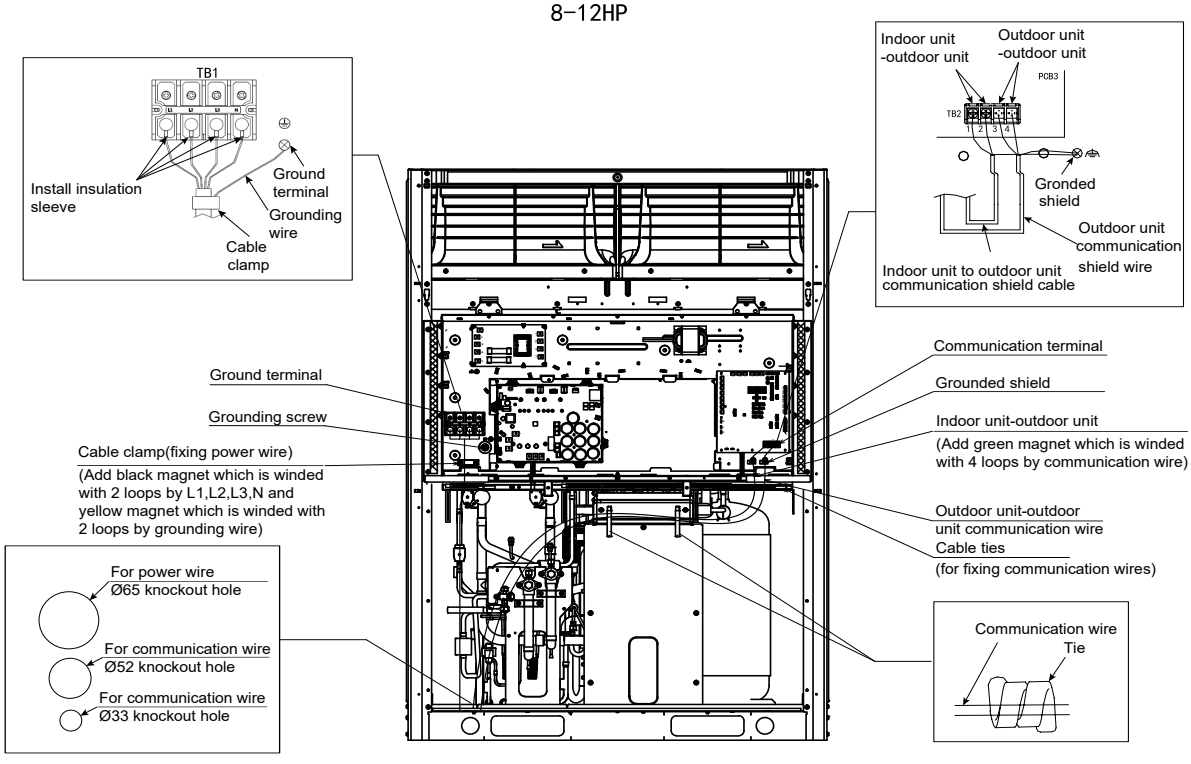
(3) Fasten the screws on the terminal block according to the following table:

Required Tightening Torque

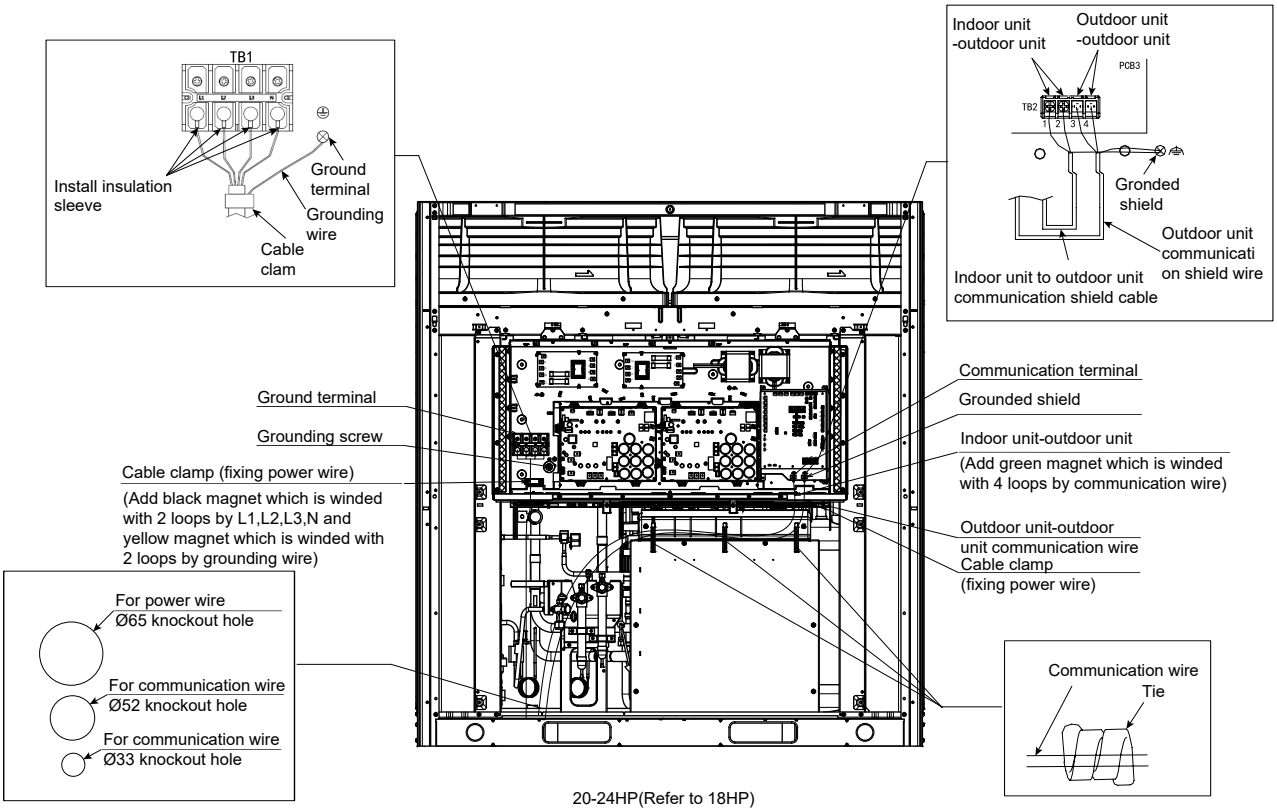
Size	Tightening Torque
M4	1.0 ~ 1.3 N ● m
M5	2.0 ~ 2.4 N ● m
M6	4.0 ~ 5.0 N ● m
M8	9.0 ~ 11.0 N ● m
M10	18.0 ~ 23.0 N ● m



8-12HP



14-16HP



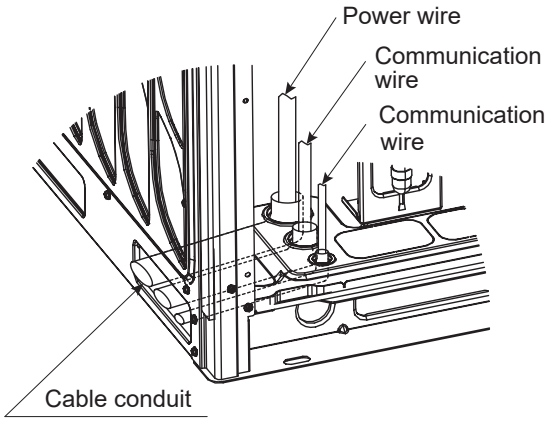
20-24HP(Refer to 18HP)

NOTICE

When running the cable at side of the unit, follow the procedure carefully to route the cable through the bottom of the unit using the conduit.

NOTE:

1. With a screwdriver and hammer, knock off the cover along with the dotted outline to give a knock-out hole in the bottom of the side panel, then polish the edge of the hole and install the insulation sleeve (provided on site) to protect the wire.
2. Do not put the power and communication cables in the same cable conduit. In addition, keep a distance of at least 5 cm between the power wires and communication wires.
3. Put the cable through the rubber rings and fix it to the entrance hole to protect the cable.
4. Avoid the wires to touch the pipes, metal sheet edges, and electrical components inside the unit.
5. Use sealing material to completely seal cable conduit to prevent rain water entering cable conduit.



⚠ CAUTION

Tighten the power wire with a clamp in the unit.

7.4 Electrical Wiring for Indoor and Outdoor Unit

(1) Connect the power cable to each of the outdoor unit. Each of the outdoor unit connection should consist of a ELB (Earth Leakage Breaker), circuit breaker, and the main switch (S).

(2) Connect the power wire to each group of the indoor units. Indoor units refer to all the indoor units connected to the same outdoor unit. Each group of indoor units is connected with a earth leakage breaker, circuit breaker and the main switch (S).

(3) As shown in the figure of chapter 7.4, connect the communication cable between indoor and outdoor unit.

(4) Connect the communication wire between the units in the same refrigerant system (connect the communication cable to the same indoor unit in the case where the refrigerant pipe of the indoor unit is connected to the outdoor unit). If you connect the refrigerant pipe and communication wires to different refrigerant circulation system, malfunction may be caused.

(5) Use 2-core cable communication wire such as shielded twisted pair. (Do not use 3-core or 3 more core wire).

(6) Use the same specifications provided in the H-LINK II system of the same refrigerant system.

(7) Separate the communication wire from the power cable. Maintain at least 5cm spacing between the communication wire and the power wire. Maintain at least 1.5m spacing between the communication wire and other electrical devices. If not, place the power wire in a metal conduit to isolate it from other wires.

(8) Connect the following communication wires to terminals 1 and 2 of the terminal block TB2 of the outdoor unit A (main unit):

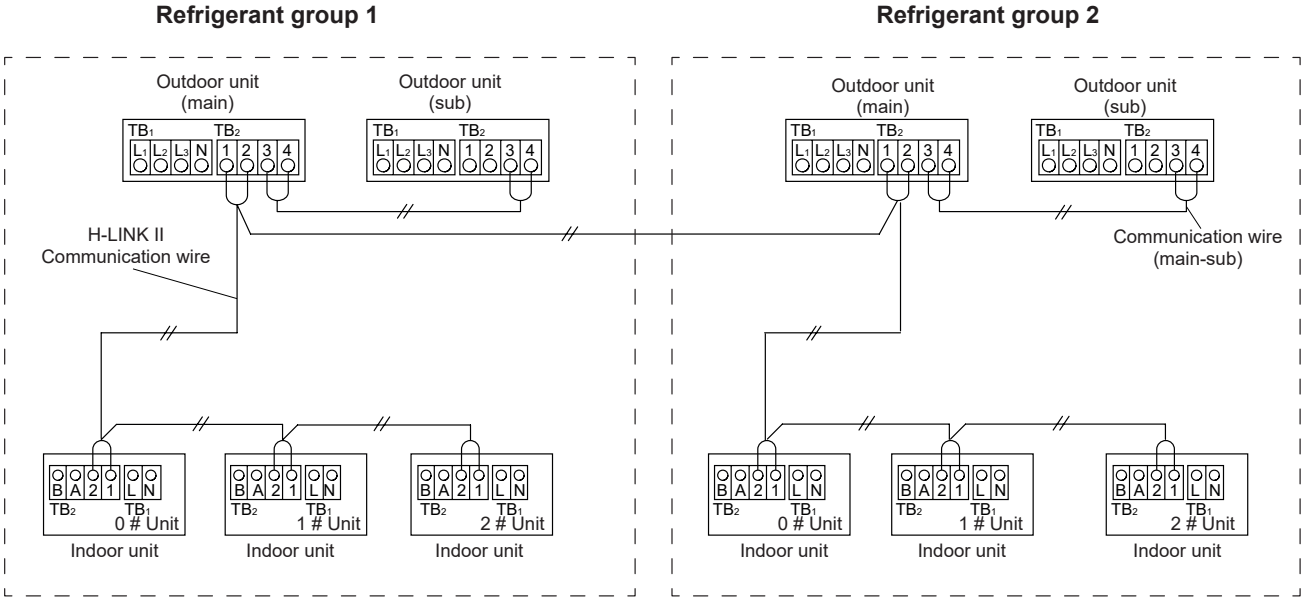
- Between the outdoor unit and indoor unit
- Between outdoor unit and indoor unit of other refrigerant system

(9) Do not connect the power wire to the communication terminal block TB2. This may damage the printed circuit board.

(10) Connect GRD wire to the outdoor/indoor unit. GRD wire with grounding resistance of 100Ω (Max) should be connected by qualified personnel.

(11) Communication wires between the outdoor units within the same refrigerant system will be connected to the terminal 3 and 4 of the terminal block TB2.

- Communication wire

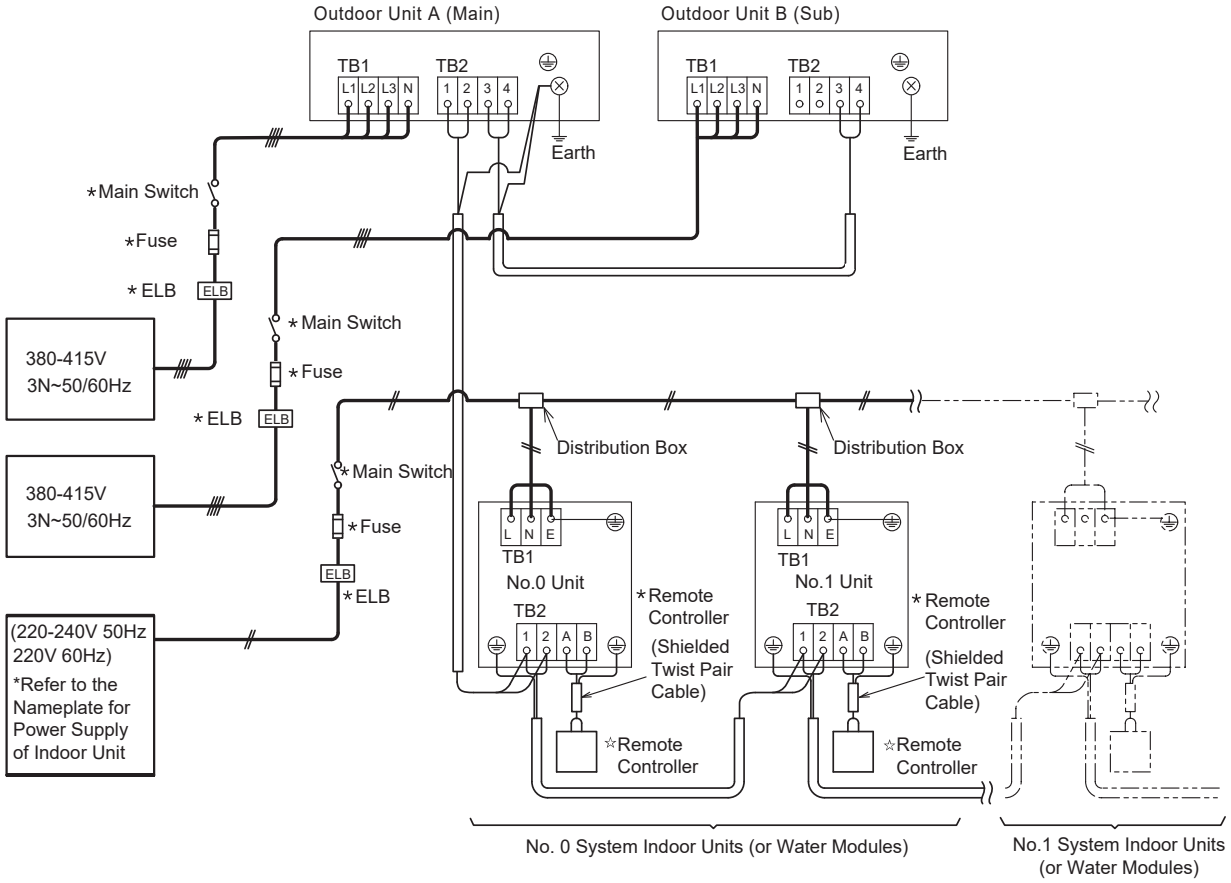


Remarks:

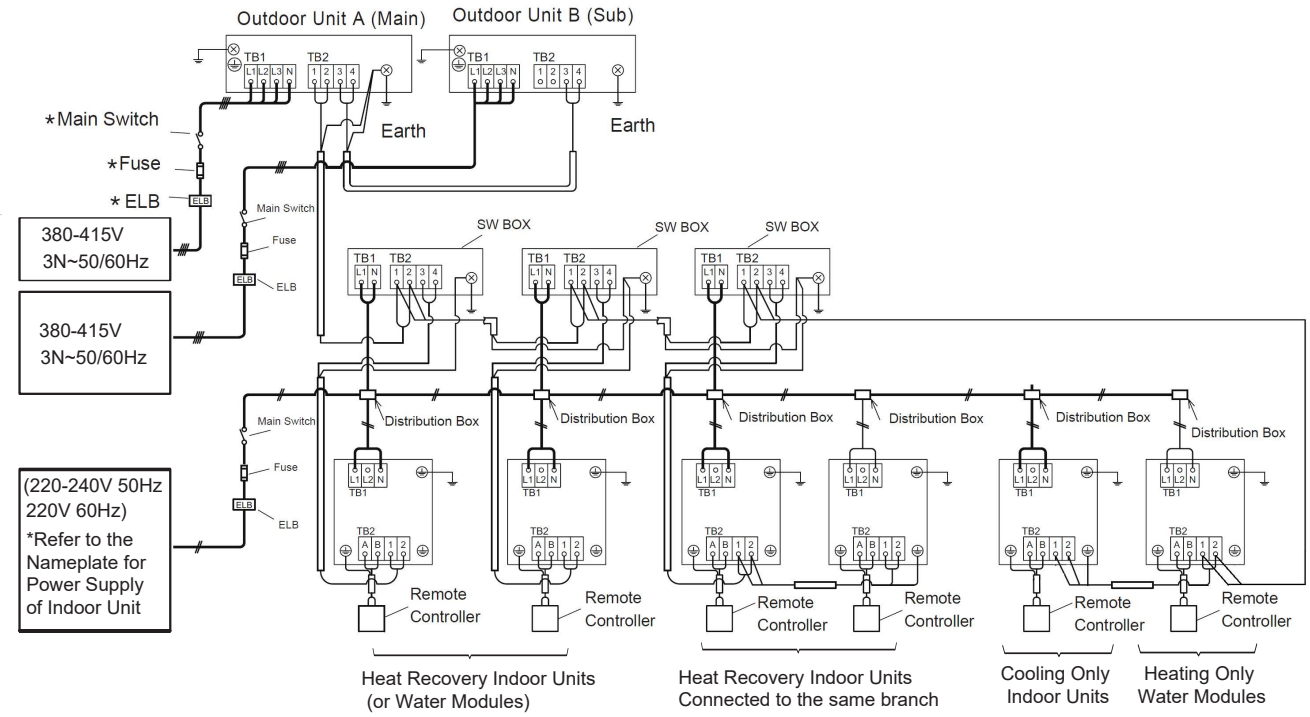
1. For modular combination units (26 HP ~ 96 HP), set the master-slave through DSW.
2. An alarm will appear if the communication wires between the outdoor units are connected to the terminal 1 and 2 of H-LINK II.
3. If there is an alarm on the LCD of the master outdoor unit, please go through spot check according to 7-segement code indication of the master outdoor unit.
4. Set the function for master outdoor unit.
5. Connectable a maximum of refrigerant groups with one central controller is 64 .
   For H- Link II Maximum number of indoor unit connectable is 160.
6. Wire specification

* Transmission Wire: 2-Wire
* Polarity of Transmission Wire: Non-Polar Wire
* Maximum Wiring Length: Total 1,000m
* Recommended Cable: Twist-Pair Cable with Shield, over 0.75mm^2
* Voltage: DC5V

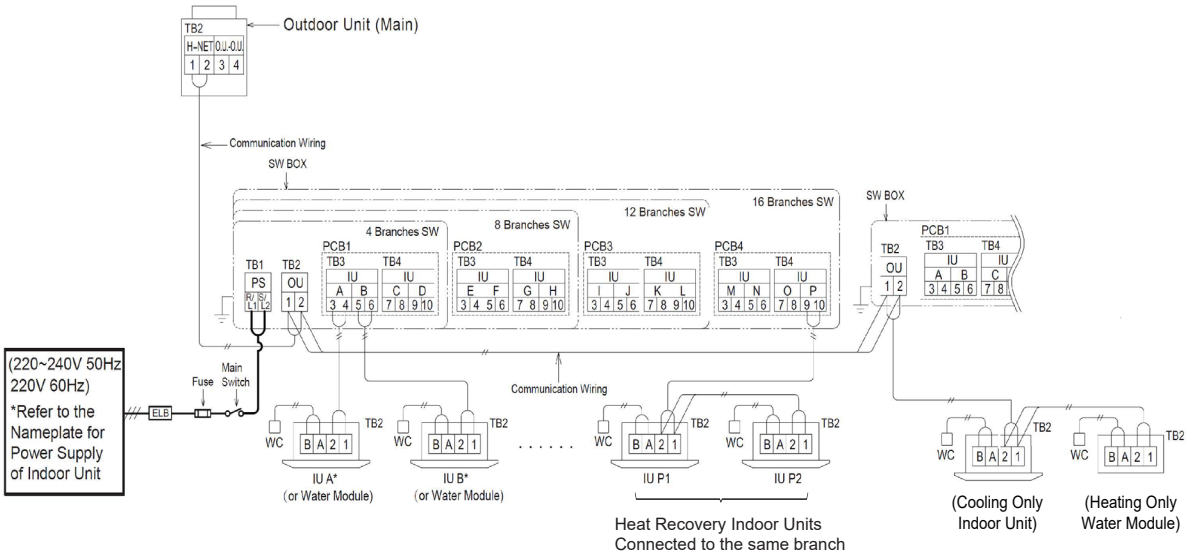
< Heat Pump System & Heat Recovery System Without Switch Box >



For Single Branch SW BOX



For Multi Branch SW BOX



NOTES:

- When multiple indoor units are connected to the same single SW BOX, they are controlled with the same operation mode.
- When multiple indoor units are connected to the same branch of the multi SW BOX, they are controlled with the same operation mode.
- Do not apply excessive voltage to the communication cable DC5V (non-polarity) between the outdoor unit and the SW BOX, between the SW BOX and the indoor unit or between SW BOXES.
- Use 2-Conductor shielded communication cable for the communication cable. (Do not use 3-Conductor cable or over.)
- Connect the communication cable for the outdoor unit to terminals “1” and “2” on TB2 in the SW BOX.
- Connect the communication cable for the cooling only indoor unit or heating only water module to the terminal “1” and “2” on TB2 in the SW BOX.
- For a SW BOX in the same refrigerant cycle, an electrical power supply can be supplied by one main switch.
- Do not connect the power supply line to the terminal block for transmission line.
- Connect the ground wiring for the outdoor/indoor units and SW BOX. When ground resistance is less than 100 ohms, ground wiring work should be performed by the qualified electrician.
- Do not run the communication cables along with power supply wirings in the SW BOX. Separate communication cables from the power supply wirings.
- Water module should be connected to an exclusive branch of the SW BOX.

7.5 Outdoor DIP Switch Setting

Turn off the electrical power supply to all units before setting the DIP switches. Otherwise DIP switch fails to work and the setting becomes invalid.

But the dip switch DSW4-No. 1, 2, 4 is valid when the power is turned ON under the status of power ON setting.

Symbol ■ indicates dip switch position. Refer to Figure 7.3 for setting dip switch settings and positions.

NOTICE

- 10-20 seconds after DIP setting on DSW4, the unit will be start or stop.
- Outdoor unit is numbered to distinguish it from other outdoor unit for repair and maintenance. Ensure to write a number in the box on the right.

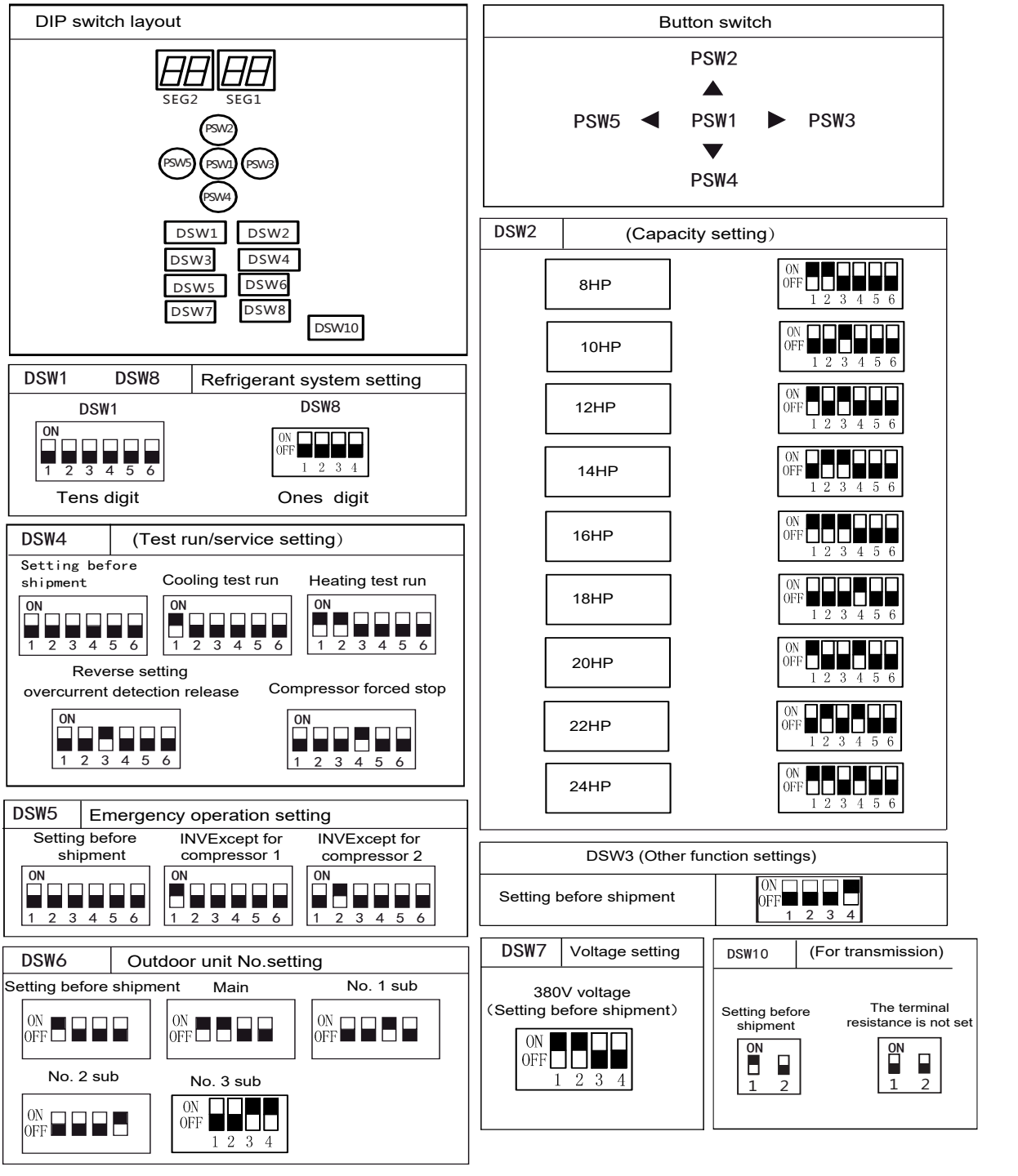
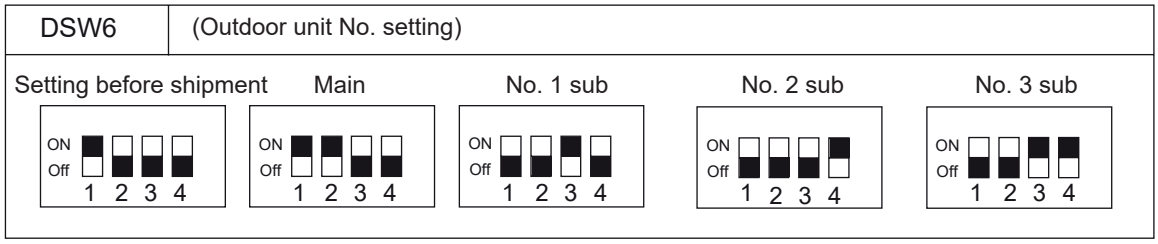


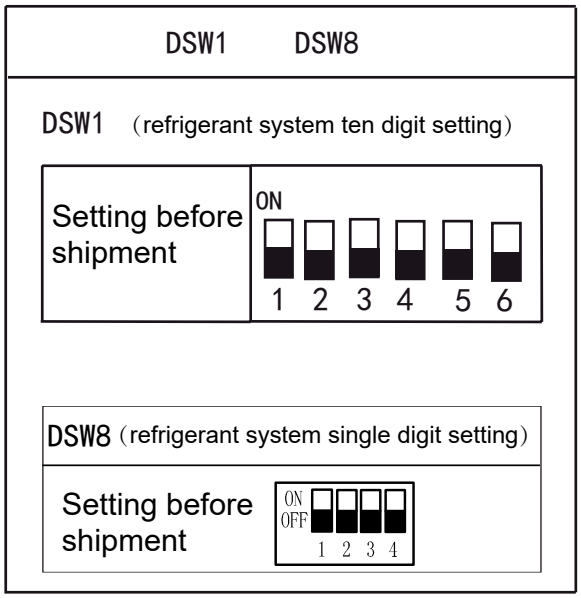
Figure 7.3 DIP Setting

- Communications settings:
  Set the outdoor unit number, the refrigerant system number, and the terminal resistance for the H-LINK or H-LINK II system.
- Outdoor number setting:
  When you combine base model module, set the DSW6 as shown below:



- Refrigerant system setting:
  Set the refrigerant system no. for the outdoor unit within the same refrigerant system, as shown in the figure:

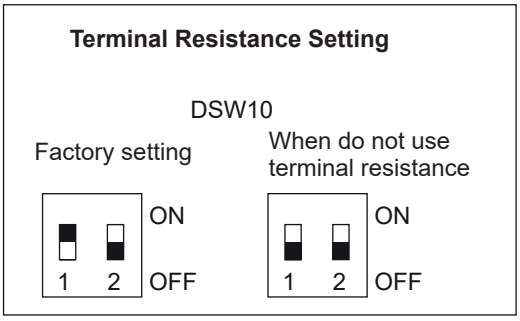
NOTE:
Within the same refrigerant system, refrigerant no. for the outdoor unit and indoor unit should be set to the same.

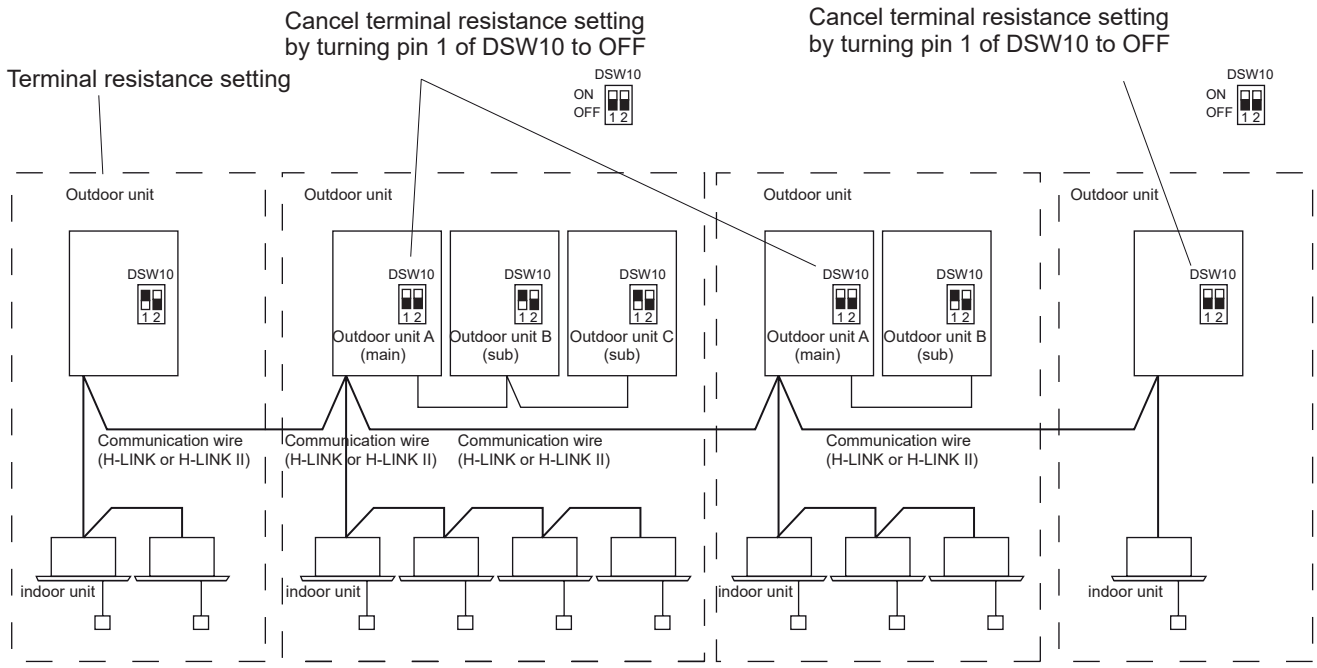


DSW1 and RSW1 factory set to the 0.

The maximum number of refrigerant system is set to 63.

- Terminal resistance setting:
  At the factory, position 1 of the DSW10 is set to ON. If the number of outdoor units in the same H-LINK or H-LINK II system is 2 or more, the position 1 of the DSW10 is set to OFF from the outdoor unit of the second refrigerant system. In this case, no need for setting if only one outdoor unit is used.





- Function Setting

1. External Input/Output and Function Setting

(1) External Input/Output and Function Setting Method:

1) Setting start

when unit is stopped, set DSW4-No.4 to ON and DSW4-No.6 to ON

2) Setting end

Set DSW4-No.6 to OFF and set DSW4-No.4 to OFF

(2) External Input/Output and Function Setting:

Press PSW3 (►) and PSW5 (◄) to select function. No. PSW4 (▼): forward

PSW2 (▲): backward

Item		SEG2	SEG1	Set
1	Input setting 1 CN17 [1-2pin]	i1	1	
2	Input setting 2 CN17 [2-3pin]	i2	2	
3	Input setting 3 CN18 [1-2pin]	i3	3	
4	Output setting 1 CN16 [1-2pin]	o1	1	
5	Output setting 2 CN16 [1-3pin]	o2	2	

Setting External Input/Output Function:

Function No.	Input	Output
1	Fixed Heating Mode	Operation Signal
2	Fixed Cooling Mode	Alarm Signal
3	Demand Stoppage	Compressor ON Signal
4	Outdoor Fan Motor Start/Stop	Defrost Signal
5	Forced Stoppage	-
6	Demand Current Control 40%	-
7	Demand Current Control 60%	-
8	Demand Current Control 70%	-
9	Demand Current Control 80%	-
10	Demand Current Control 100%	-
11	Low noise setting 1	-
12	Low noise setting 2	-
13	Low noise setting 3	-
0	No Setting	No setting

Same input/output function cannot be set to different input/output terminal. Otherwise, the larger function number setting will be invalid.

(3) Function Setting

By pressing the push-switches PSW3 (►) and PSW5 (◄) the setting can be changed. PSW4 (▼): forward, PSW2 (▲): backward

Refer to the Technical manual for more details.

Fill out the selected function No. in the space provided in the following table:

Item		SEG2	SEG1	SET	Item		SEG2	SEG1	SET
1	Circulator Function at Heating Thermo-Off	Fr	0		25	N/A	F1	0	
2	Switch to Night Mode (Low Noise)	n1	0		26	Crankcase Heating Band Control During Stoppage	F2	0	
3	Cancellation of Outdoor Ambient Temperature Limit	CS	0		27	Indoor Fan Warm Start Period Setting	F3	0	
4	Defrost in Cold Area (Change Of Defrost Condition)	Jo	0		28	Intermittent Operation of Outdoor Fan Motor	F4	0	
5	Gentle Fan Speed Defrost Setting	bJ	0		29	Indoor Expansion Valve Target Value Control for Cooling (Only For 4-Way Cassette Type)	F5	0	
6	Cancellation of Outdoor Unit warm Start	hr	0		30	Indoor Expansion Valve Minimum Opening Limit During Heating Switch-Off	F6	0	
7	Capacity Priority Mode	nU	0		31	N/A	F7	0	
8	Minimum Evaporating Temperature Setting for Cooling	Hc	0		32	Forced Defrosting After Forced Stoppage Of Defrosting Cycle	F8	0	
9	Compressor Frequency Target Value Control for Heating	Hh	0		33	Indoor Expansion Valve Control Change for Stoppage Indoor Unit in Heating Mode	F9	0	
10	Indoor Expansion Valve Target Value Control for Cooling	SC	0		34	Compressor Maximum Frequency Suppression	FC	0	
11	Indoor Expansion Valve Target Value Control for Heating	SH	0		35	Convert Unit in Checking Mode	Fd	0	
12	Indoor Expansion Valve Opening Control During Heating Operation Stoppage	S1	0		36	Indoor Fan ON/OFF Setting during Forced Stoppage	FE	0	
13	Indoor Expansion Valve Opening Control During Heating Thermo-Off	So	0		37	N/A	FF	0	
14	Indoor Expansion Valve Initial Opening Control During Heating Thermo-On	c1	0		38	High difference setting	FG	0	
15	Indoor Expansion Valve Initial Opening Control for Cooling	cb	0		39	N/A	FH	0	
16	Outdoor Expansion Valve Initial Opening Control for Heating	ch	0		40	Oil return control	F1	0	
17	Low Noise Setting*	db	0		41	Performance correction	FJ	0	
18	Demand Function Setting	dE	0		42	Outdoor temperature range	FL	0	
19	Wave Function Setting	UE	0		43	Cooling mode Start control 2 Hz change speed	Fn	0	
20	“Protection of Decrease in Outlet Temperature for Cooling”	Fb	0		44	Cooling mode Start control 2 Hz change speed	FP	0	
21	Outlet Temperature Control	Fr	0		45	Compressor Maximum Frequency Change during Defrosting Mode	Fr	0	
22	Adjustment of Fan Running (For Multiple Installation)	Fo	0		46	Oil return mode of indoor unit	FU	0	
23	N/A	Lr	0		47	N/A	F9	0	
24	Thermo-Off Setting for Outdoor Unit After Defrosting Operation	dS	0						

* when ambient temperature is higher than 44°C, silence and low noise setting mode is invalid.

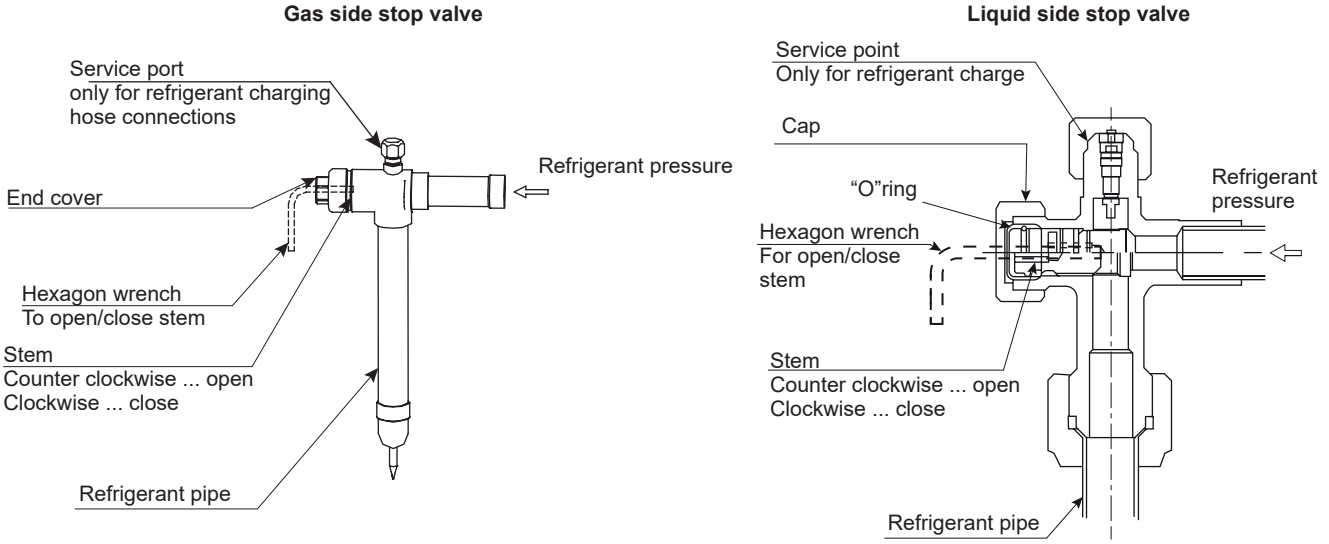
8. Additional Refrigerant Charge

8.1 Air Tightness Test

(1) Ensure that the stop valve is completely closed before airtight inspection.
<Air tightness detection>

(a) After you connect the liquid pipe, open the liquid side stop valve bonnet. Do not connect low pressure piping and gas side stop valve. Seal the low-pressure side of the pipe line by brazing with a filed supplied cap.

(b) After the above test is completed, carry out the air tightness detection.

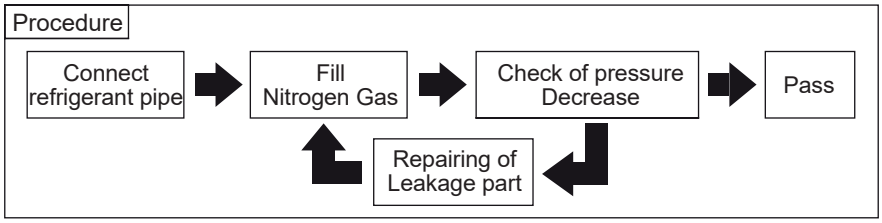


(2) Connect the indoor and outdoor units with the refrigeration pipe provided on the site.
Provide support at regular intervals to prevent the cooling pipe touching the wall, ceiling of the building. (Piping vibrations cause abnormal sounds, hence pay much more attention when the piping length is shorter).

(3) Connect the regulating valve and the vacuum pump or the nitrogen tank specially to the test joint of the liquid valve. Conduct air tightness test. Connect the regulating valve to the check joint of the outdoor liquid side valve, and do not open the liquid side stop valve. Ensure that the nitrogen pressure is 4.15MPa.

⚠ DANGER

Ensure that you carry out air tightness test only with nitrogen. If other gases such as oxygen, acetylene, or carbon hydrocarbon gas are used for airtight test, it can cause explosion or toxication.



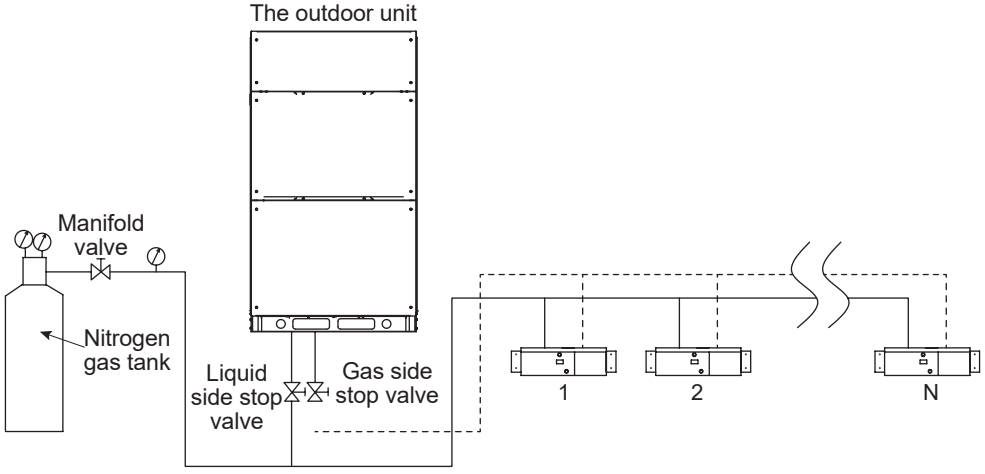


Figure 8.1 Air tightness test

(4) Use leakage detector or bubble to detect if there is leakage at the flare nut and brazing position
(5) After the airtight test, release the nitrogen, remove the low-pressure side pipe brazing sealing cap, and brazing then the gas side stop valve and low pressure side piping brazing.
(6) After completion of piping connection, install the pipe insulation material.

⚠ CAUTION

- Isolate and protect the gas side stop valve, and do not directly charge to the gas side stop valve (see Figure 8.1).
- Before charging, ensure that the electronic expansion valve of the indoor unit is in the open state. Make sure that the piping is connected with the indoor unit.
- Gas side stop valve and low pressure pipe brazing joints cannot be detected by air tightness to confirm whether leakage occurs, pay attention to brazing quality during brazing operation.

8.2 Vacuum

(1) Connect the regulating valve and the vacuum pump to the liquid side stop valve detection joint.
(2) vacuuming for 1 or 2 hours to create vacuum space until the pressure reaches -0.1Mpa (-756 mm Hg) or less. After the vacuuming finished, close the valve of the regulating valve. Stop vacuuming and hold for 1 hour. Make sure that the pressure on the regulating valve does not go high.
(3) After vacuuming, tighten the inspection joint valve cap of liquid side stop valve torque: 14-18 N●m.

Prompt:

1. In case of direct touch with the new refrigerant R410A, use specified tools and instruments.
2. If the pressure for vacuum cannot reach - 0.1MPa (-756mm Hg), indicates that there may be leakage. In this case perform leakage detection. If there is no leakage, pump for 1 or 2 hours to create vacuum space.

NOTICE

- Apply thermal insulation to the refrigerant pipes as shown in Fig 8.2. After completion of piping connection, use field supplied insulation material to apply thermal insulation to the gas pipe, liquid pipe and check joint, connecting part such as connecting nut, etc., and use adhesive tap to wrap the exterior surface of them so as to prevent heat loss and condensation on the pipe surface.

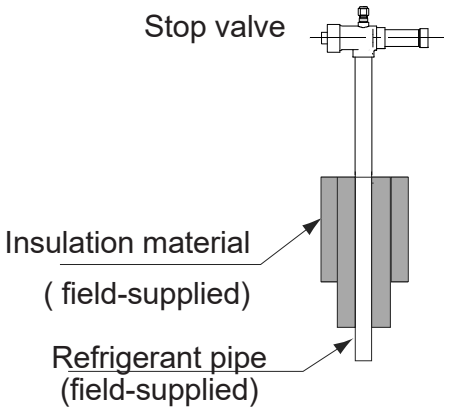


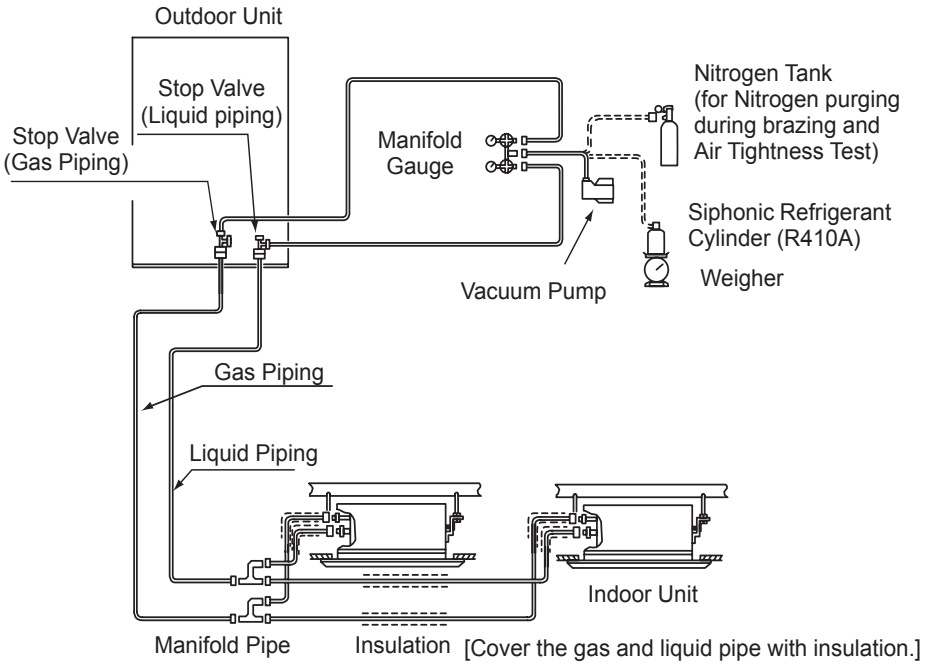
Figure 8.2

8.3 Charging

Pro After vacuum pumping, check that the gas and liquid stop valve is fully closed.

Charge the additional refrigerant from the check joint of liquid stop valve (charge tolerance: 0.5kg).

If the specified refrigerant quantity can not be charged, follow the procedure below.
(1) Fully open the stop valve for gas side.
(2) Operate the compressor at the cooling mode and charge the refrigerant from the check joint of the gas stop valve. At this time, the liquid stop valve is slightly opened (charge tolerance: 0.5kg).
(3) After refrigerant charging, fully open the stop valve for both liquid and gas sides.



Charge the correct refrigerant quantity.
If not, a compressor may be damaged due to an excess or insufficient refrigerant charge.

Refrigerant charge from check joint of gas stop valve may lead to compressor failure. Be sure to charge refrigerant from the check joint of liquid stop valve.

Insulate the liquid pipe and gas pipe completely to avoid decreasing of performance and dewing on the surface of the pipe.

Insulate the flare nut and union of the piping connection with insulation.

Check to ensure that there is no gas leakage. If a severe refrigerant leakage occurs, it will lead to difficult breathing or harmful gases would occur if a fire was lit up in the room.

- Special Attention Regarding Refrigerant Gas Leakage

Pay attention to the critical gas concentration to avoid accidental refrigerant gas leakage before installing air conditioning systems.

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

* This value should be decided according to each country's regulation such as ISO5149, EN378 and ASHRAE Standard 15. In the case that the calculated critical concentration is higher than this value, take the following actions:

1) Provide a gas leakage detector and exhaust fan controlled by its gas leakage detector.
2) Provide effective opening in the wall or door for ventilation to next door so that the critical gas concentration can be maintained lower than the above value. (Provide an opening with area greater than 0.15% of the floor surface at the lower part of a door.)

⚠ CAUTION

1. Maximum Permissible Concentration of HFC GAS R410A
   The refrigerant R410A is an incombustible and non-toxic gas.
   However, if leakage occurs and gas fills a room, it may cause suffocation.
   Once leakage occurs, it is a must to take effective actions to make the concentration of R410A lower than 0.42 kg/m^3.
2. Calculation of Refrigerant Concentration
   (1) Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of target rooms.
   (2) Calculate the volume of the room installing this unit V (m^3).
3. Calculate the refrigerant concentration C (kg/m^3) of the room according to the equation on last page.

Please follow local codes or regulations, if any.

NOTE

Fill in the label attached to the unit with the amount of refrigerant charged and Tonnes of CO_2 equivalent of fluorinated greenhouse gases contained on the installation.

NOTE

- This equipment Contains fluorinated greenhouse gases.
- Refrigerant: R410A, global warming potential (GWP) value: 2088.
- Weight (kg) of Refrigerant charged before shipment: Reference to the nameplate [_ _ _] ① kg.
- Weight (kg) of Refrigerant charged additionally on site: Reference to the manual [_ _ _] ② kg.
- Weight (kg) of Refrigerant charged totally: ③=(①+②), [_ _ _] kg.
- Tonnes of CO_2 equivalent of fluorinated greenhouse gases contained: ③ x 2088/1000, [_ _ _] tCO_2eq.

H7D09278A

⚠WARNING

- **Only use R410A as refrigerant. Other substances may cause explosions and accidents.**
- **R410A is fluorinated greenhouse gases. Its global warming potential (GWP) value is 2088. Do NOT vent these gases into the atmosphere.**
- **Tonnes of CO_2 equivalent of fluorinated greenhouse gases contained is calculated by GWP value of the refrigerant × Total refrigerant charge [kg]/1000 on the label.**

9. Test Run

Perform trial run according to Chapter 9.2. Record the values as per Table 9.1.

⚠ CAUTION

- Start the unit only when all the check points are checked and cleared.
  For indoor unit test run, refer to the installation manual and which is attached to the indoor unit.

9.1 Prerequisites for Test Run

1. Ensure that the indoor and outdoor refrigerant pipe and communication wires are connected to the same refrigeration system. Otherwise, it leads to abnormal and serious accidents. Check the refrigerant system no. for indoor/outdoor units (DSW1 and RSW1 [outdoor unit], DSW5 and RSW2 [indoor unit]) and indoor unit number (RSW). Make sure that the DIP switch on the base board of the indoor and outdoor unit is set correctly. In particular, pay attention to the indoor and outdoor unit height difference, refrigerant system number setting and terminal resistance setting. Refer to wiring diagram in chapter 7 for more details.
2. Ensure that the terminal resistance to ground exceeds 1MΩ, Otherwise, find out the earth leakage point and fix it before starting the system. Do not apply strong electricity to the communication terminals (outdoor unit: TB2 1.2.3.4 / indoor unit:TB2 1.2.A.B).
3. Ensure that the power wire L1, L2, L3 and N are connected correctly.
4. The power supply is connected for 12 hours or more to ensure that the crank case heating the compressor oil.
   After the power is turned on, if the compressor oil temperature is low, the units do not run immediately (stop code d1-22) .
   If starting operation within 2hours of power on, follow the steps below to lift the protection:
   1. Turn on the power to the outdoor unit.
   2. Wait for 30 seconds.
   3. Press and hold the PSW5 button on the outdoor unit for more than 3 seconds to release the protection code d1-22.

NOTICE

Insulation resistance precautions

If the total insulation resistance is lesser than 1MΩ, then the compressor insulation resistance can go low due to the refrigerant remaining in the compressor. This occurs when the unit idle for a long time.

1. Disconnect the compressor power wire. Measure the insulation resistance of the compressor body. If the resistance is higher than 1MΩ, the lower insulation resistance is caused by other electrical components.
2. If the compressor insulation resistance is lesser than 1MΩ,disconnect the inverter cable and then, turn on the compressor crankcase heating belt and turn on the power.
   After 3 hours of powering measure the insulation resistance of the compressor body again. (Duration of time should be longer to depending on outdoor weather conditions, piping length and refrigerant status.) Measure the insulation resistance and connect the compressor power wire.
   If the ELB acts, check and confirm if the ELB specification meets the recommended specification sh
   in table 7.1.

NOTICE

1. Ensure that the electrical components provided on the site (the main power switch, circuit breaker, wire, cable conduit connection, and terminal) are chosen as per the technical manual. Verify that the device complies with the national electrical code.
2. Use shielded wire (≥ 0.75 mm^2) for wiring connections to shield the electrical interference. (The total length of the shielded wire should be less than 1000m and the wire specification and size should b compliant with local regulations).
3. Ensure that the terminal block wiring is correct (Terminal L1 and N of the terminal block and voltage 380V). Wrong wiring connections damages the appliance and the associated components.

9.2 Test Run

(1) Ensure that the outdoor unit stop valve is completely open and then start the unit. (If there is a module combination, make sure that all stop valves that connect to the outdoor unit are fully open.)

(2) Turn on the indoor units one after other and ensure that refrigerant pipe setting and electric setting of the indoor unit is set in the same system. (If you start multiple indoor units at the same time, you cannot detect indoor unit and the corresponding outdoor unit .)

(3) Follow the steps below to perform the test run operation. Make sure that test run operation runs smoothly:

Prompt:

If the two-wired controller (Main and Auxiliary) first start through the main wired controlle .

(a) Holding down the run mode and up button on the remote control for more than 5 seconds enables the test mode.

- For other optional wired controllers (wireless remote contoller and micro controller), refer to the installation and operation manual attached to the wired controller.
- If a wired controller controls multiple indoor units operational at the same time, check the number of units connected to the indoor unit on the LCD screen.
- If the number of displays is incorrect, the address cannot be obtained automatically because the wrong connection. In such cases, disconnect the power wire and check for the following points and correct the wiring connection: (do not repeat the switch within 10 seconds of this action).
  * The power of the indoor unit is not connected or the connection is not correct.
  * The connection between the indoor unit cable is incorrect or the communication wire is incorrect
  * The rotary switch on indoor unit board and the DIP switch are not set correctly (set address repeat).

(b) Press the Run Mode button to set the operating mode.

(c) Press the Run/Stop button.

The run indicator lights turns on before the start of commissioning.

It is automatically set to 2 hours for test run, though the initial set of fan speed is Low, (This mode is the same as the normal mode) the set can be changed.

- Check the operation range according to “IMPORTANT NOTICE“.
- When the unit is running, note the following:
  *Do not touch the edges of any components of exhaust because the compressor and pipe in the exhaust end temperature up to 90°C or more.
  *Do not press the AC contractor button, it leads to serious accidents.
- Do not touch any electrical components within 10 minutes after disconnecting the main power supply.
- Through running of indoor unit one after the other, ensure that the refrigerant line and electrical wire are set in the same system.

(d) During the run, temperature control is invalid though the protection device is valid. If an alarm comes, please figure out the cause of the abnormality according to alarm code shown in table 9.2, and re-start the test run after the failure being solved. As per the spot check label attached on the back surface of the front panel of the outdoor unit, temperature, pressure, operation frequency and connection can be displayed with 7-segment code.

(e) To stop the test run, press Run/Stop button again or wait for two hours.

Table 9.1 Trial Run and Maintenance Record

Model:	Serial no.	Compressor no.
User name and address:		Date:

1. Is the indoor fan rotation direction correct? ☐
2. Is the outdoor fan rotation direction correct? ☐
3. Is there any abnormal sound from operation of compressor? ☐
4. If the system has been running for at least 20 minutes? ☐
5. Inspect indoor temperature:

Inlet:	No.1 DB /WB °C,	No.2 DB /WB °C,	No.3 DB /WB °C,	No. 4 DB /WB °C
Outlet:	DB /WB °C,	DB /WB °C,	DB /WB °C,	DB /WB °C
Inlet:	No.5 DB /WB °C,	No.6 DB /WB °C,	No.7 DB /WB °C,	No.8 DB /WB °C
Outlet:	DB /WB °C,	DB /WB °C,	DB /WB °C,	DB /WB °C

6. Inspect outdoor temperature:

Inlet:	DB °C,	WB °C
Outlet:	DB °C,	WB °C

7. Inspect refrigerant temperature:

Liquid pipe temperature:	°C
Exhaust temperature:	°C

8. Inspect pressure:

Exhaust pressure:	MPa
Intake pressure:	MPa

9. Inspect voltage:

Rated voltage:	V		
Operation voltage:	L1-L2 V,	L1-L3 V,	L2-L3 V
Start voltage	V		
Imbalance between phrases:	$1-\frac{V}{Vm}=$		

10. Inspect compressor input operation current:

Input power:	kW
Operation current:	A

11. Is the charge amount of refrigerant appropriate? ☐
12. Is the operation control device correct? ☐
13. Does the safety device act correctly? ☐
14. If the system refrigerant leakage detection has been conducted? ☐
15. If cleaning work has been done inside/outside the unit? ☐
16. If all the covers of the unit are being fixed securely ☐
17. If there is any abnormal sound from all the unit covers? ☐
18. Is the filter cleaned ☐
19. Is the heat exchange cleaned? ☐
20. Is the stop valve opened? ☐
21. Is the condensed water being drained smoothly through drain pipe? ☐
22. Do the components of the system change and replace? ☐

Table .9.2 Alarm Code

Code	Classification	Alarm Content	Main Reason
01	Indoor Unit	Indoor protection device action (float switch)	Water level is too high, drain, or float switch is abnormal.
02	The Outdoor Unit	Outdoor protection device action (high pressure switch)	Piping clogging, excessive refrigerant, non- condensable gas mixed
03	Communication	Communication between indoor and outdoor units is abnormal	Wrong wiring, loose terminal, disconnected, outdoor unit power off, outdoor fuse blown
04		Communication between the inverter board and the outdoor PCB is abnormal	Terminals loose, wire disconnected, outdoor unit powered off, outdoor unit fuse blows off.
04.		Communication between fan control board and outdoor PCB is abnormal	Terminals loose, broken, fuse blown
05	Power Supply	Power phase anomaly	Power supply error, power phase error, power wiring phase missing
06		Inverter voltage is abnormal	Outdoor unit voltage is too low, power capacity is not enough
06.		Fan control voltage is abnormal	Outdoor unit voltage is too low, power capacity is not enough
07	Circulatory System	Exhaust superheat TdSH is too low	Excessive refrigerant, expansion valve lock, wiring, piping connection error, thermistor fault, valve room - outdoor unit, refrigerant, electrical system connection error
08		Exhaust temperature Td (top of compressor) is too high	Insufficient refrigerant, expansion valve lock, wiring, piping connection error, thermistor fault, valve room - outdoor unit, refrigerant, electrical system connection error
0A	Communication	Communication abnormal between outdoor units	Communication wire connection error, wire disconnected, terminal loosening.
0b	The Outdoor Unit	The outdoor unit address is incorrect	The same system has two sets of the same set of outdoor unit (slave unit)
0C		The main outdoor unit is set incorrectly	There are 2 or more master units in the same system
11	Indoor Unit Sensor	Return air thermistor abnormal	Indoor thermistor wiring is wrong, broken, not connected or shorted.
12		Air supply thermistor error	
13		Heat exchanger liquid pipe (anti-freeze) thermistor abnormal (indoor unit)	
14		Ambient Thermistor Abnormal (Indoor)	
15		Ambient thermistor abnormality (indoor unit)	
16		Wired controller thermistor exception (fresh air treatment)	
17		Wired controller built-in thermistor abnormal (fresh air treatment)	
19	Fan Motor	Indoor fan protection device action	Indoor fan motor overheats or stuck

10. Safety And Control Device Setting

- Compressor Protection

High Pressure Switch:This switch cuts out the operation of the compressor when the discharge pressure exceed the setting

Outdoor unit model(kBtu/h)		RAS-8.0RNBCLQ	RAS-10RNBCLQ	RAS-12RNBCLQ	RAS-14RNBCLQ	RAS-16RNBCLQ
Pressure switch high pressure		Automatic Reset,Non-Adjustable				
Cut-Out	MPa	4.15	4.15	4.15	4.15	4.15
Cut-In	MPa	3.2	3.2	3.2	3.2	3.2
Fuse on Main Circuit	A	63	63	63	63	63
CCP Timer Set Time	minutes	3	3	3	3	3
Control Circuit Fuse	A	5	5	5	5	5

Outdoor unit model(kBtu/h)		RAS-18RNBCLQ	RAS-20RNBCLQ	RAS-22RNBCLQ	RAS-24RNBCLQ
Pressure switch high pressure		Automatic Reset,Non-Adjustable			
Cut-Out	MPa	4.15	4.15	4.15	4.15
Cut-In	MPa	3.2	3.2	3.2	3.2
Fuse on Main Circuit	A	80	80	80	80
CCP Timer Set Time	minutes	3	3	3	3
Control Circuit Fuse	A	5	5	5	5

11. TECHNICAL PARAMETERS

RAS-8.0RNBCLQ

Outdoor side heat exchanger of air conditioner/heat pump: air

Indoor side heat exchanger of air conditioner/heat pump: air

Type: compressor driven vapour compression

Driver of compressor: electric motor

Indication if the heater is equipped with a supplementary heater: no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
cooling							
Rated cooling capacity	$P_{rated,c}$	22.4	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	271.8	%
Declared capacity (*) for cooling, at indoor temperature 27(19)°C and outdoor temperature Tj				**Declared energy efficiency ratio (*), at indoor temperature 27(19)°C and outdoor temperature Tj**			
Tj = 35°C	Pdc	22.4	kW	Tj = 35°C	EERd	3.54	–
Tj = 30°C	Pdc	16.6	kW	Tj = 30°C	EERd	5.51	–
Tj = 25°C	Pdc	10.5	kW	Tj = 25°C	EERd	8.43	–
Tj = 20°C	Pdc	5.9	kW	Tj = 20°C	EERd	11.35	–
co-efficient for air conditioners (*)	Cdc	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.051	kW	crankcase heater mode	P_{CK}	0.011	kW
thermostat-off mode (cooling)	P_{TO}	0.011	kW	standby mode	P_{SB}	0.051	kW
heating							
Rated heating capacity	$P_{rated,h}$	25	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	151	%
Declared heating capacity for part load at indoor temperature 20°C and outdoor temperature Tj				**Declared coefficient of performance (*)/Average season, at indoor temperature 20°C and outdoor temperature Tj**			
Tj = -7°C	Pdh	14.2	kW	Tj = -7°C	COPd	2.28	–
Tj = 2°C	Pdh	8.7	kW	Tj = 2°C	COPd	3.39	–
Tj = 7°C	Pdh	5.7	kW	Tj = 7°C	COPd	6.69	–
Tj = 12°C	Pdh	5.3	kW	Tj = 12°C	COPd	6.91	–
Tj = bivalent temperature	Pdh	14.2	kW	Tj = bivalent temperature	COPd	2.28	–
Tj = operating limit	Pdh	16.1	kW	Tj = operating limit	COPd	1.91	–
Bivalent temperature				Operating limit temperature			
heating/Average	Tbiv	-7	°C	heating/Average	Tol	-10	°C
heating/Warmer	Tbiv	—	°C	heating/Warmer	Tol	—	°C
heating/Colder	Tbiv	—	°C	heating/Colder	Tol	—	°C
Degradation coefficient heat pumps (**)	Cdh	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.061	kW	Back-up heating capacity (*)	elbu	0	kW
thermostat-off mode (heating)	P_{TO}	0.061	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.011	kW	standby mode	P_{SB}	0.061	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		9900	m^3/h
Sound power level, indoor/outdoor measured	LWA	-/84	dB(A)				
Global warming potential	GWP	2088	$kgCO_2$ eq.				

Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of Ceiling Ducted Type indoor units.
Contact details	JOHNSON CONTROLS HITACHI AIR CONDITIONING EUROPE SAS Parc Aktiland II – 2, Rue de Lombardie – 69800 SAINT PRIEST, FRANCE

RAS-10RNBCLQ

Outdoor side heat exchanger of air conditioner/heat pump: air

Indoor side heat exchanger of air conditioner/heat pump: air

Type: compressor driven vapour compression

Driver of compressor: electric motor

Indication if the heater is equipped with a supplementary heater: no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
cooling							
Rated cooling capacity	$P_{rated,c}$	28.0	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	267.1	%
Declared capacity (*) for cooling, at indoor temperature 27(19)°C and outdoor temperature Tj				**Declared energy efficiency ratio (*), at indoor temperature 27(19)°C and outdoor temperature Tj**			
Tj = 35°C	Pdc	28.0	kW	Tj = 35°C	EERd	3.26	–
Tj = 30°C	Pdc	20.7	kW	Tj = 30°C	EERd	4.95	–
Tj = 25°C	Pdc	13.2	kW	Tj = 25°C	EERd	8.53	–
Tj = 20°C	Pdc	6.9	kW	Tj = 20°C	EERd	11.31	–
co-efficient for air conditioners (*)	Cdc	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.051	kW	crankcase heater mode	P_{CK}	0.011	kW
thermostat-off mode (cooling)	P_{TO}	0.011	kW	standby mode	P_{SB}	0.051	kW
heating							
Rated heating capacity	$P_{rated,h}$	31.5	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	161.0	%
Declared heating capacity for part load at indoor temperature 20°C and outdoor temperature Tj				**Declared coefficient of performance (*)/Average season, at indoor temperature 20°C and outdoor temperature Tj**			
Tj = -7°C	Pdh	17.7	kW	Tj = -7°C	COPd	2.42	–
Tj = 2°C	Pdh	10.9	kW	Tj = 2°C	COPd	3.81	–
Tj = 7°C	Pdh	7.1	kW	Tj = 7°C	COPd	6.28	–
Tj = 12°C	Pdh	5.9	kW	Tj = 12°C	COPd	7.36	–
Tj = bivalent temperature	Pdh	17.7	kW	Tj = bivalent temperature	COPd	2.42	–
Tj = operating limit	Pdh	20.2	kW	Tj = operating limit	COPd	1.97	–
Bivalent temperature				Operating limit temperature			
heating/Average	Tbiv	-7	°C	heating/Average	Tol	-10	°C
heating/Warmer	Tbiv	—	°C	heating/Warmer	Tol	—	°C
heating/Colder	Tbiv	—	°C	heating/Colder	Tol	—	°C
Degradation coefficient heat pumps (**)	Cdh	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.061	kW	Back-up heating capacity (*)	elbu	0	kW
thermostat-off mode (heating)	P_{TO}	0.061	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.011	kW	standby mode	P_{SB}	0.061	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		10200	m^3/h
Sound power level, indoor/outdoor measured	LWA	-/86	dB(A)				
Global warming potential	GWP	2088	$kgCO_2$ eq.				

Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of Ceiling Ducted Type indoor units.
Contact details	JOHNSON CONTROLS HITACHI AIR CONDITIONING EUROPE SAS Parc Aktiland II – 2, Rue de Lombardie – 69800 SAINT PRIEST, FRANCE

RAS-12RNBCLQ

Outdoor side heat exchanger of air conditioner/heat pump: air

Indoor side heat exchanger of air conditioner/heat pump: air

Type: compressor driven vapour compression

Driver of compressor: electric motor

Indication if the heater is equipped with a supplementary heater: no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
cooling							
Rated cooling capacity	$P_{rated,c}$	33.5	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	245.0	%
Declared capacity (*) for cooling, at indoor temperature 27(19)°C and outdoor temperature Tj				**Declared energy efficiency ratio (*), at indoor temperature 27(19)°C and outdoor temperature Tj**			
Tj = 35°C	Pdc	33.5	kW	Tj = 35°C	EERd	3.37	–
Tj = 30°C	Pdc	24.8	kW	Tj = 30°C	EERd	5.22	–
Tj = 25°C	Pdc	15.7	kW	Tj = 25°C	EERd	7.07	–
Tj = 20°C	Pdc	10.8	kW	Tj = 20°C	EERd	9.91	–
co-efficient for air conditioners (*)	Cdc	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.064	kW	crankcase heater mode	P_{CK}	0.011	kW
thermostat-off mode (cooling)	P_{TO}	0.011	kW	standby mode	P_{SB}	0.064	kW
heating							
Rated heating capacity	$P_{rated,h}$	37.5	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	163.8	%
Declared heating capacity for part load at indoor temperature 20°C and outdoor temperature Tj				**Declared coefficient of performance (*)/Average season, at indoor temperature 20°C and outdoor temperature Tj**			
Tj = -7°C	Pdh	20.7	kW	Tj = -7°C	COPd	2.28	–
Tj = 2°C	Pdh	12.7	kW	Tj = 2°C	COPd	3.90	–
Tj = 7°C	Pdh	8.2	kW	Tj = 7°C	COPd	6.81	–
Tj = 12°C	Pdh	9.1	kW	Tj = 12°C	COPd	7.65	–
Tj = bivalent temperature	Pdh	20.7	kW	Tj = bivalent temperature	COPd	2.28	–
Tj = operating limit	Pdh	23.4	kW	Tj = operating limit	COPd	1.83	–
Bivalent temperature				Operating limit temperature			
heating/Average	Tbiv	-7	°C	heating/Average	Tol	-10	°C
heating/Warmer	Tbiv	—	°C	heating/Warmer	Tol	—	°C
heating/Colder	Tbiv	—	°C	heating/Colder	Tol	—	°C
Degradation coefficient heat pumps (**)	Cdh	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.074	kW	Back-up heating capacity (*)	elbu	0	kW
thermostat-off mode (heating)	P_{TO}	0.074	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.011	kW	standby mode	P_{SB}	0.074	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		11400	m^3/h
Sound power level, indoor/outdoor measured	LWA	-/87	dB(A)				
Global warming potential	GWP	2088	$kgCO_2$ eq.				

Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of Ceiling Ducted Type indoor units.
Contact details	JOHNSON CONTROLS HITACHI AIR CONDITIONING EUROPE SAS Parc Aktiland II – 2, Rue de Lombardie – 69800 SAINT PRIEST, FRANCE

RAS-14RNBCLQ

Outdoor side heat exchanger of air conditioner/heat pump: air

Indoor side heat exchanger of air conditioner/heat pump: air

Type: compressor driven vapour compression

Driver of compressor: electric motor

Indication if the heater is equipped with a supplementary heater: no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
cooling							
Rated cooling capacity	$P_{rated,c}$	40.0	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	226.4	%
Declared capacity (*) for cooling, at indoor temperature 27(19)°C and outdoor temperature Tj				**Declared energy efficiency ratio (*), at indoor temperature 27(19)°C and outdoor temperature Tj**			
Tj = 35°C	Pdc	40.0	kW	Tj = 35°C	EERd	2.98	–
Tj = 30°C	Pdc	29.6	kW	Tj = 30°C	EERd	4.63	–
Tj = 25°C	Pdc	18.8	kW	Tj = 25°C	EERd	6.67	–
Tj = 20°C	Pdc	9.8	kW	Tj = 20°C	EERd	8.71	–
co-efficient for air conditioners (*)	Cdc	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.063	kW	crankcase heater mode	P_{CK}	0.011	kW
thermostat-off mode (cooling)	P_{TO}	0.011	kW	standby mode	P_{SB}	0.063	kW
heating							
Rated heating capacity	$P_{rated,h}$	45.0	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	164.2	%
Declared heating capacity for part load at indoor temperature 20°C and outdoor temperature Tj				**Declared coefficient of performance (*)/Average season, at indoor temperature 20°C and outdoor temperature Tj**			
Tj = -7°C	Pdh	24.6	kW	Tj = -7°C	COPd	2.24	–
Tj = 2°C	Pdh	15.1	kW	Tj = 2°C	COPd	4.00	–
Tj = 7°C	Pdh	9.8	kW	Tj = 7°C	COPd	6.60	–
Tj = 12°C	Pdh	9.1	kW	Tj = 12°C	COPd	7.34	–
Tj = bivalent temperature	Pdh	24.6	kW	Tj = bivalent temperature	COPd	2.24	–
Tj = operating limit	Pdh	28.0	kW	Tj = operating limit	COPd	1.83	–
Bivalent temperature				Operating limit temperature			
heating/Average	Tbiv	-7	°C	heating/Average	Tol	-10	°C
heating/Warmer	Tbiv	—	°C	heating/Warmer	Tol	—	°C
heating/Colder	Tbiv	—	°C	heating/Colder	Tol	—	°C
Degradation coefficient heat pumps (**)	Cdh	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.073	kW	Back-up heating capacity (*)	elbu	0	kW
thermostat-off mode (heating)	P_{TO}	0.073	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.011	kW	standby mode	P_{SB}	0.073	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		14340	m^3/h
Sound power level, indoor/outdoor measured	LWA	-/89	dB(A)				
Global warming potential	GWP	2088	$kgCO_2$ eq.				

Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of Ceiling Ducted Type indoor units.
Contact details	JOHNSON CONTROLS HITACHI AIR CONDITIONING EUROPE SAS Parc Aktiland II – 2, Rue de Lombardie – 69800 SAINT PRIEST, FRANCE

RAS-16RNBCLQ

Outdoor side heat exchanger of air conditioner/heat pump: air

Indoor side heat exchanger of air conditioner/heat pump: air

Type: compressor driven vapour compression

Driver of compressor: electric motor

Indication if the heater is equipped with a supplementary heater: no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
cooling							
Rated cooling capacity	$P_{rated,c}$	45.0	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	225.4	%
Declared capacity (*) for cooling, at indoor temperature 27(19)°C and outdoor temperature Tj				**Declared energy efficiency ratio (*), at indoor temperature 27(19)°C and outdoor temperature Tj**			
Tj = 35°C	Pdc	45.0	kW	Tj = 35°C	EERd	2.44	–
Tj = 30°C	Pdc	33.3	kW	Tj = 30°C	EERd	4.08	–
Tj = 25°C	Pdc	21.2	kW	Tj = 25°C	EERd	6.57	–
Tj = 20°C	Pdc	9.5	kW	Tj = 20°C	EERd	11.68	–
co-efficient for air conditioners (*)	Cdc	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.06	kW	crankcase heater mode	P_{CK}	0.011	kW
thermostat-off mode (cooling)	P_{TO}	0.011	kW	standby mode	P_{SB}	0.06	kW
heating							
Rated heating capacity	$P_{rated,h}$	50.0	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	156.9	%
Declared heating capacity for part load at indoor temperature 20°C and outdoor temperature Tj				**Declared coefficient of performance (*)/Average season, at indoor temperature 20°C and outdoor temperature Tj**			
Tj = -7°C	Pdh	27.7	kW	Tj = -7°C	COPd	2.07	–
Tj = 2°C	Pdh	17.0	kW	Tj = 2°C	COPd	3.97	–
Tj = 7°C	Pdh	11.0	kW	Tj = 7°C	COPd	6.10	–
Tj = 12°C	Pdh	9.3	kW	Tj = 12°C	COPd	6.38	–
Tj = bivalent temperature	Pdh	27.7	kW	Tj = bivalent temperature	COPd	2.07	–
Tj = operating limit	Pdh	31.5	kW	Tj = operating limit	COPd	1.71	–
Bivalent temperature				Operating limit temperature			
heating/Average	Tbiv	-7	°C	heating/Average	Tol	-10	°C
heating/Warmer	Tbiv	—	°C	heating/Warmer	Tol	—	°C
heating/Colder	Tbiv	—	°C	heating/Colder	Tol	—	°C
Degradation coefficient heat pumps (**)	Cdh	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.07	kW	Back-up heating capacity (*)	elbu	0	kW
thermostat-off mode (heating)	P_{TO}	0.07	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.011	kW	standby mode	P_{SB}	0.07	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		15360	m^3/h
Sound power level, indoor/outdoor measured	LWA	-/90	dB(A)				
Global warming potential	GWP	2088	$kgCO_2$ eq.				

Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of Ceiling Ducted Type indoor units.
Contact details	JOHNSON CONTROLS HITACHI AIR CONDITIONING EUROPE SAS Parc Aktiland II – 2, Rue de Lombardie – 69800 SAINT PRIEST, FRANCE

RAS-18RNBCLQ

Outdoor side heat exchanger of air conditioner/heat pump: air

Indoor side heat exchanger of air conditioner/heat pump: air

Type: compressor driven vapour compression

Driver of compressor: electric motor

Indication if the heater is equipped with a supplementary heater: no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
cooling							
Rated cooling capacity	$P_{rated,c}$	50.0	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	235.7	%
Declared capacity (*) for cooling, at indoor temperature 27(19)°C and outdoor temperature Tj				**Declared energy efficiency ratio (*), at indoor temperature 27(19)°C and outdoor temperature Tj**			
Tj = 35°C	Pdc	50.0	kW	Tj = 35°C	EERd	2.80	–
Tj = 30°C	Pdc	37.0	kW	Tj = 30°C	EERd	4.32	–
Tj = 25°C	Pdc	23.5	kW	Tj = 25°C	EERd	7.11	–
Tj = 20°C	Pdc	12.8	kW	Tj = 20°C	EERd	10.96	–
co-efficient for air conditioners (*)	Cdc	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.074	kW	crankcase heater mode	P_{CK}	0.011	kW
thermostat-off mode (cooling)	P_{TO}	0.011	kW	standby mode	P_{SB}	0.074	kW
heating							
Rated heating capacity	$P_{rated,h}$	56.0	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	154.7	%
Declared heating capacity for part load at indoor temperature 20°C and outdoor temperature Tj				**Declared coefficient of performance (*)/Average season, at indoor temperature 20°C and outdoor temperature Tj**			
Tj = -7°C	Pdh	30.8	kW	Tj = -7°C	COPd	2.30	–
Tj = 2°C	Pdh	18.9	kW	Tj = 2°C	COPd	3.77	–
Tj = 7°C	Pdh	12.3	kW	Tj = 7°C	COPd	5.87	–
Tj = 12°C	Pdh	10.9	kW	Tj = 12°C	COPd	6.44	–
Tj = bivalent temperature	Pdh	30.8	kW	Tj = bivalent temperature	COPd	2.30	–
Tj = operating limit	Pdh	35.0	kW	Tj = operating limit	COPd	1.89	–
Bivalent temperature				Operating limit temperature			
heating/Average	Tbiv	-7	°C	heating/Average	Tol	-10	°C
heating/Warmer	Tbiv	—	°C	heating/Warmer	Tol	—	°C
heating/Colder	Tbiv	—	°C	heating/Colder	Tol	—	°C
Degradation coefficient heat pumps (**)	Cdh	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.084	kW	Back-up heating capacity (*)	elbu	0	kW
thermostat-off mode (heating)	P_{TO}	0.084	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.011	kW	standby mode	P_{SB}	0.084	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		15360	m^3/h
Sound power level, indoor/outdoor measured	LWA	-/90	dB(A)				
Global warming potential	GWP	2088	$kgCO_2$ eq.				

Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of Ceiling Ducted Type indoor units.
Contact details	JOHNSON CONTROLS HITACHI AIR CONDITIONING EUROPE SAS Parc Aktiland II – 2, Rue de Lombardie – 69800 SAINT PRIEST, FRANCE

RAS-20RNBCLQ

Outdoor side heat exchanger of air conditioner/heat pump: air

Indoor side heat exchanger of air conditioner/heat pump: air

Type: compressor driven vapour compression

Driver of compressor: electric motor

Indication if the heater is equipped with a supplementary heater: no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
cooling							
Rated cooling capacity	$P_{rated,c}$	56.0	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	248.3	%
Declared capacity (*) for cooling, at indoor temperature 27(19)°C and outdoor temperature Tj				**Declared energy efficiency ratio (*), at indoor temperature 27(19)°C and outdoor temperature Tj**			
Tj = 35°C	Pdc	56.0	kW	Tj = 35°C	EERd	3.05	–
Tj = 30°C	Pdc	41.4	kW	Tj = 30°C	EERd	4.61	–
Tj = 25°C	Pdc	26.3	kW	Tj = 25°C	EERd	7.80	–
Tj = 20°C	Pdc	13.2	kW	Tj = 20°C	EERd	9.83	–
co-efficient for air conditioners (*)	Cdc	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.07	kW	crankcase heater mode	P_{CK}	0.011	kW
thermostat-off mode (cooling)	P_{TO}	0.011	kW	standby mode	P_{SB}	0.07	kW
heating							
Rated heating capacity	$P_{rated,h}$	63.0	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	153.3	%
Declared heating capacity for part load at indoor temperature 20°C and outdoor temperature Tj				**Declared coefficient of performance (*)/Average season, at indoor temperature 20°C and outdoor temperature Tj**			
Tj = -7°C	Pdh	33.5	kW	Tj = -7°C	COPd	2.39	–
Tj = 2°C	Pdh	20.6	kW	Tj = 2°C	COPd	3.20	–
Tj = 7°C	Pdh	13.3	kW	Tj = 7°C	COPd	7.40	–
Tj = 12°C	Pdh	12.0	kW	Tj = 12°C	COPd	8.72	–
Tj = bivalent temperature	Pdh	33.5	kW	Tj = bivalent temperature	COPd	2.39	–
Tj = operating limit	Pdh	38.1	kW	Tj = operating limit	COPd	1.92	–
Bivalent temperature				Operating limit temperature			
heating/Average	Tbiv	-7	°C	heating/Average	Tol	-10	°C
heating/Warmer	Tbiv	—	°C	heating/Warmer	Tol	—	°C
heating/Colder	Tbiv	—	°C	heating/Colder	Tol	—	°C
Degradation coefficient heat pumps (**)	Cdh	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.08	kW	Back-up heating capacity (*)	elbu	0	kW
thermostat-off mode (heating)	P_{TO}	0.08	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.011	kW	standby mode	P_{SB}	0.08	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		19740	m^3/h
Sound power level, indoor/outdoor measured	LWA	-/91	dB(A)				
Global warming potential	GWP	2088	$kgCO_2$ eq.				

Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of Ceiling Ducted Type indoor units.
Contact details	JOHNSON CONTROLS HITACHI AIR CONDITIONING EUROPE SAS Parc Aktiland II – 2, Rue de Lombardie – 69800 SAINT PRIEST, FRANCE

RAS-22RNBCLQ

Outdoor side heat exchanger of air conditioner/heat pump: air

Indoor side heat exchanger of air conditioner/heat pump: air

Type: compressor driven vapour compression

Driver of compressor: electric motor

Indication if the heater is equipped with a supplementary heater: no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
cooling							
Rated cooling capacity	$P_{rated,c}$	61.5	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	217.6	%
Declared capacity (*) for cooling, at indoor temperature 27(19)°C and outdoor temperature Tj				**Declared energy efficiency ratio (*), at indoor temperature 27(19)°C and outdoor temperature Tj**			
Tj = 35°C	Pdc	61.5	kW	Tj = 35°C	EERd	2.91	–
Tj = 30°C	Pdc	45.5	kW	Tj = 30°C	EERd	4.30	–
Tj = 25°C	Pdc	28.9	kW	Tj = 25°C	EERd	6.47	–
Tj = 20°C	Pdc	20.5	kW	Tj = 20°C	EERd	8.73	–
co-efficient for air conditioners (*)	Cdc	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.07	kW	crankcase heater mode	P_{CK}	0.011	kW
thermostat-off mode (cooling)	P_{TO}	0.011	kW	standby mode	P_{SB}	0.07	kW
heating							
Rated heating capacity	$P_{rated,h}$	69.0	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	161.8	%
Declared heating capacity for part load at indoor temperature 20°C and outdoor temperature Tj				**Declared coefficient of performance (*)/Average season, at indoor temperature 20°C and outdoor temperature Tj**			
Tj = -7°C	Pdh	36.8	kW	Tj = -7°C	COPd	2.22	–
Tj = 2°C	Pdh	22.6	kW	Tj = 2°C	COPd	3.61	–
Tj = 7°C	Pdh	14.7	kW	Tj = 7°C	COPd	7.67	–
Tj = 12°C	Pdh	17.3	kW	Tj = 12°C	COPd	9.07	–
Tj = bivalent temperature	Pdh	36.8	kW	Tj = bivalent temperature	COPd	2.22	–
Tj = operating limit	Pdh	41.8	kW	Tj = operating limit	COPd	1.74	–
Bivalent temperature				Operating limit temperature			
heating/Average	Tbiv	-7	°C	heating/Average	Tol	-10	°C
heating/Warmer	Tbiv	—	°C	heating/Warmer	Tol	—	°C
heating/Colder	Tbiv	—	°C	heating/Colder	Tol	—	°C
Degradation coefficient heat pumps (**)	Cdh	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.08	kW	Back-up heating capacity (*)	elbu	0	kW
thermostat-off mode (heating)	P_{TO}	0.08	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.011	kW	standby mode	P_{SB}	0.08	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		19740	m^3/h
Sound power level, indoor/outdoor measured	LWA	-/91	dB(A)				
Global warming potential	GWP	2088	$kgCO_2$ eq.				

Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of Ceiling Ducted Type indoor units.
Contact details	JOHNSON CONTROLS HITACHI AIR CONDITIONING EUROPE SAS Parc Aktiland II – 2, Rue de Lombardie – 69800 SAINT PRIEST, FRANCE

RAS-24RNBCLQ

Outdoor side heat exchanger of air conditioner/heat pump: air

Indoor side heat exchanger of air conditioner/heat pump: air

Type: compressor driven vapour compression

Driver of compressor: electric motor

Indication if the heater is equipped with a supplementary heater: no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
cooling							
Rated cooling capacity	$P_{rated,c}$	68.0	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	210.9	%
Declared capacity (*) for cooling, at indoor temperature 27(19)°C and outdoor temperature Tj				**Declared energy efficiency ratio (*), at indoor temperature 27(19)°C and outdoor temperature Tj**			
Tj = 35°C	Pdc	68.0	kW	Tj = 35°C	EERd	2.62	–
Tj = 30°C	Pdc	50.3	kW	Tj = 30°C	EERd	4.19	–
Tj = 25°C	Pdc	32.0	kW	Tj = 25°C	EERd	6.20	–
Tj = 20°C	Pdc	20.3	kW	Tj = 20°C	EERd	8.72	–
co-efficient for air conditioners (*)	Cdc	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.07	kW	crankcase heater mode	P_{CK}	0.011	kW
thermostat-off mode (cooling)	P_{TO}	0.011	kW	standby mode	P_{SB}	0.07	kW
heating							
Rated heating capacity	$P_{rated,h}$	75.0	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	172.4	%
Declared heating capacity for part load at indoor temperature 20°C and outdoor temperature Tj				**Declared coefficient of performance (*)/Average season, at indoor temperature 20°C and outdoor temperature Tj**			
Tj = -7°C	Pdh	40.7	kW	Tj = -7°C	COPd	2.14	–
Tj = 2°C	Pdh	25.0	kW	Tj = 2°C	COPd	3.96	–
Tj = 7°C	Pdh	16.1	kW	Tj = 7°C	COPd	8.31	–
Tj = 12°C	Pdh	17.0	kW	Tj = 12°C	COPd	9.85	–
Tj = bivalent temperature	Pdh	40.7	kW	Tj = bivalent temperature	COPd	2.14	–
Tj = operating limit	Pdh	46.2	kW	Tj = operating limit	COPd	1.73	–
Bivalent temperature				Operating limit temperature			
heating/Average	Tbiv	-7	°C	heating/Average	Tol	-10	°C
heating/Warmer	Tbiv	—	°C	heating/Warmer	Tol	—	°C
heating/Colder	Tbiv	—	°C	heating/Colder	Tol	—	°C
Degradation coefficient heat pumps (**)	Cdh	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.08	kW	Back-up heating capacity (*)	elbu	0	kW
thermostat-off mode (heating)	P_{TO}	0.08	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.011	kW	standby mode	P_{SB}	0.08	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		20880	m^3/h
Sound power level, indoor/outdoor measured	LWA	-/91	dB(A)				
Global warming potential	GWP	2088	$kgCO_2$ eq.				

Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of Ceiling Ducted Type indoor units.
Contact details	JOHNSON CONTROLS HITACHI AIR CONDITIONING EUROPE SAS Parc Aktiland II – 2, Rue de Lombardie – 69800 SAINT PRIEST, FRANCE

1241822

Qingdao Hisense Hitachi Air-conditioning Systems Co., Ltd.

Add.: No. 218, Qianwangang Road, Economic and Technological Development Zone, Qingdao, China

The Company is committed to continuous product improvement. We reserve the right, therefore, to alter the product information at any time and without prior announcement.

P02486Q 01.2025 V01