

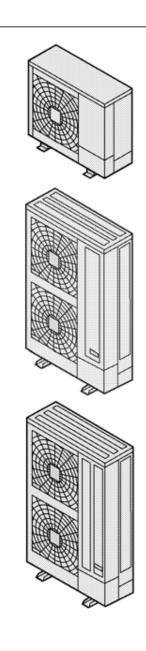


UTOPIA IVX PREMIUM / IVX STANDARD SERIES H(V)N(P/C)(E)

Service Manual

RAS-(2-6)HVNP(E) RAS-(4-12)HNP(E)

RAS-(3-6)HVNC(E) RAS-(4-12)HNC(E)



Contents

General information

Unit Installation

Piping work and refrigerant charge

Electrical Wiring

Control System

Optional functions

Test Run

Troubleshooting

Spare Parts

Servicing

Electrical checks of main parts

Maintenace notes

.11

Index

Contents	i
1. General information	1
1.1 General information	2
1.1.1 General notes	2
1.1.2 Introduction	2
1.1.3 Environment-friendly units	2
1.2 Safety	3
1.2.1 Applied symbols	3
1.2.2 Norms and Regulations	3
1.3 Product guide	4
1.3.1 Classification of outdoor unit models	4
1.3.2 Classification of indoor unit models	
1.3.3 Product guide: Outdoor units	
1.3.4 Outdoor unit accessory code list	
1.3.5 Product guide: Indoor units & complementary systems	
1.3.6 Product guide: complementary systems	
2. Unit Installation	13
2.1 Safety summary	14
2.2 Transportation of outdoor unit	15
2.3 Center of gravity	16
2.4 Factory-supplied accessories for RAS-12HN(P/C)	
2.5 Installation space (Initial ckeck)	18
2.5.1 Basic sizes	
2.5.2 RAS-(2-2.5)HVNP / RAS-3HVNC	
2.5.3 RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / RAS-12HN(P/C)	
2.6 Place provision	23
2.6.1 Place provision for RAS-(2-2.5)HVNP / RAS-3HVNC	23
2.6.2 Place provision for RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / RAS-12HN(P/C)	
2.7 Optional parts and installation	29
2.7.1 Optional parts and installation for RAS-(2-2.5)HVNP / RAS-3HVNC	
2.7.2 Optional parts and installation RAS-3HVNPE / RAS-(4-6)H(V)NCE	
2.7.3 Optional parts and installation RAS-(4-6)H(V)NPE / RAS-(8-10)HN(P/C)E	
2.7.4 Optional parts and installation RAS-12HN(P/C)	

iii

3. Piping work and refrigerant charge	51
3.1 General notes before performing pipe work	52
3.1.1 Piping Materials	52
3.1.2 Three principles on refrigerant piping work	54
3.1.3 Suspension of refrigerant piping	54
3.1.4 Brazing work	55
3.2 Piping connection for outdoor unit	56
3.2.1 RAS-(2-2.5)HVNP / RAS-3HVNC	56
3.2.2 RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / RAS-12HN(P/C)	57
3.2.3 Outdoor unit stop valve	60
3.3 Refrigerant piping range	62
3.3.1 Refrigerant piping length	62
3.3.2 Piping system for header branch	62
3.3.3 Piping system for line branch	65
3.3.4 Combinations of piping size and piping length	66
3.3.5 Refrigerant piping size and multikit/distributor selection	67
3.3.6 System installation	
3.3.7 Connecting flare adapter	71
3.4 Refrigerant charge	72
3.4.1 Caution of the pressure by check joint	73
3.4.2 Refrigerant charge quantity	74
3.5 Caution in case of refrigerant leakage	78
3.5.1 Maximum permitted concentration of hydrofluorocarbon (HFC)	78
3.5.2 Calculation of refrigerant concentration	78
3.5.3 Countermeasure for refrigerant leakage	78
3.6 Piping work for compatibility with the piping of current installations where is used R22 or R407C	79
3.6.1 Installation procedure for existing pipes	79
3.6.2 When existing Air-Conditioner is a product of another manufacturer	79
3.6.3 Permissible range for existing Air-Conditioning Pipes (Pipe length in the case of "without cleaning process"	80
3.6.4 Renewal kit selection model	81
3.7 Drain piping	85
3.7.1 Drain discharging boss	85
4. Electrical wiring	87
4.1 General notes	
4.1.1 General check	
4.2 Electrical wiring connection for the outdoor unit	90
4.3 Setting the DIP switches for the outdoor unit	92

iv

4.3.1 Quantity and position of DIP switches	
4.3.2 Function of the of DIP switches and RSW switches	
4.3.3 Jumpers	
4.3.4 LED's indication	
4.4 Common wiring	
4.4.1 Electrical wiring between outdoor and indoor unit	
4.4.2 Wire size	
4.5 H-LINK II system	101
4.5.1 Features	101
4.5.2 Specifications	101
4.5.3 DIP Switch setting for twin, triple and quad systems	102
4.5.4 Examples of the system of connection between H-LINK and H-LINK II units	103
4.5.5 Examples of H-LINK II system	104
4.6 System Control	
4.6.1 Individual Operation	106
4.6.2 Simultaneous Operation	107
4.7 Electrical wiring diagrams	
4.7.1 RAS-(2-2.5)HVNP / RAS-3HVNC (1~ 230V 50Hz)	108
4.7.2 RAS-3HVNPE (1~ 230V 50Hz)	109
4.7.3 RAS-(4-6)HVNPE (1~ 230V 50Hz)	110
4.7.4 RAS-(4-6)HNPE (3N~ 400V 50Hz)	111
4.7.5 RAS-(4-6)HVNCE (1N~ 230V 50Hz)	112
4.7.6 RAS-(4-6)HNCE (3N~ 400V 50Hz)	113
4.7.7 RAS-(8-10)HN(P/C)E (3N~ 400V 50Hz)	114
4.7.8 RAS-12HNP (3N~ 400V 50Hz) - Preliminary data	115
4.7.9 RAS-12HNC (3N~ 400V 50Hz) - Preliminary data	116
5. Control System	117
5.1 Device control system	118
5.2 Outdoor units PCB	120
5.2.1 RAS-(2-2.5)HVNP / RAS-3HVNC	120
5.2.2 RAS-3HVNPE	121
5.2.3 RAS-(4-6)H(V)NPE	122
5.2.4 RAS-(4-6)H(V)NCE	123
5.2.5 RAS-(8-10)HN(P/C)E	124
5.2.6 RAS-12HNP - Preliminary data	125
5.2.7 RAS-12HNC - Preliminary data	126
5.3 Protection and safety control	127
5.4 Standard operation sequence	128

v

5.4.1 Cooling operation	
5.4.2 Dry operation	130
5.4.3 Heating operation	
5.4.4 Automatic cooling and heating operation	
5.4.5 Defrost operation control	
5.5 Standard control functions	
5.5.1 Freezing protection during cooling process or dry operation	138
5.5.2 Prevention Control for High Pressure Increase during Cooling Operation	
5.5.3 Prevention control for excessively high discharge gas temperature	
5.5.4 Activation for protection device control	141
5.5.5 Preheating control of compressor	
5.5.6 Prevention control for high pressure increase	143
6. Optional functions	145
6.1 Optional input and output signals (By 7-segment display)	
6.1.1 Available ports	
6.1.2 Available optional signals	
6.1.3 Setting of the optional signals	
6.1.4 Description of optional signals	
6.2 Optional functions (By 7-segment display)	
6.2.1 Setting of the optional functions	
6.2.2 Description of the optional functions	
6.3 Optional functions (By remote control switch)	
7. Test run	
7.1 Checking procedure before the test run	
7.2 Test run procedure using the remote control switch (PC-ART)	
7.3 Test run procedure using the remote control switch (PC-ARF)	
7.4 Test run procedure using the wireless remote control switch (PC-LH3A/B)	
7.5 Test run procedure from the outdoor unit side	
7.6 Check list	
7.6.1 Check list on test run	
7.6.2 Check list on compressor	
8. Troubleshooting	
8.1 Initial troubleshooting	
8.1.1 Checking by means of the 7-segment display	
8.1.2 Failure of the power supply to the indoor unit and the remote control switch	185

vi

8.1.3 Abnormal transmission between the remote control switch and the indoor unit	
8.1.4 Abnormal operation of the devices	
8.2 Troubleshooting procedure	
8.2.1 Alarm display	
8.2.2 Alarm codes for the outdoor and indoor units	
8.2.3 Troubleshooting by alarm code for the outdoor and indoor units	
8.2.4 Alarm codes for the KPI (E/H/X)3E Series and DX Interface	
8.3 Troubleshooting in check mode	
8.3.1 Troubleshooting using the remote controller PC-ART	
8.3.2 Troubleshooting using the remote controller PC-ARF	
8.3.3 Troubleshooting using the 7 segment display	
8.4 Checking procedure for main parts	
8.4.1 Procedure for checking the DIP-IPM inverter for indoor and outdoor units	
8.4.2 Checking capacitors CB1 & CB2	
8.4.3 Fault diagnosis of DC fan motor	
8.4.4 Checking procedure for the electronic expansion valve for indoor and outdoor unit	
8.4.5 Checking procedure for AC fan motor	
8.4.6 Checking procedure for other parts	
9. Spare parts	289
	200
	200
9.1 RAS-(2-2.5)HVNP	
9.1.1 Cycle and structural parts	
9.1.1 Cycle and structural parts 9.1.2 Parts table	
9.1.1 Cycle and structural parts 9.1.2 Parts table 9.2 RAS-3HVNC	
 9.1.1 Cycle and structural parts	
 9.1.1 Cycle and structural parts	
 9.1.1 Cycle and structural parts	
 9.1.1 Cycle and structural parts	
 9.1.1 Cycle and structural parts	
 9.1.1 Cycle and structural parts	
 9.1.1 Cycle and structural parts	
 9.1.1 Cycle and structural parts	290 291 292 292 293 293 294 294 294 295 295 296 297
 9.1.1 Cycle and structural parts	290 291 292 292 293 293 294 294 294 294 295 295 296 297
 9.1.1 Cycle and structural parts	290 291 292 292 293 293 294 294 294 294 295 296 297 297 297
 9.1.1 Cycle and structural parts	290 291 292 292 293 293 294 294 294 294 295 296 296 297 297 297 298 300
 9.1.1 Cycle and structural parts	290 291 292 292 293 293 294 294 294 294 295 295 296 297 297 297 298 300 302
 9.1.1 Cycle and structural parts. 9.1.2 Parts table 9.2 RAS-3HVNC 9.2.1 Cycle and structural parts. 9.2.2 Parts table 9.3 RAS-3HVNPE. 9.3.1 Cycle and structural parts. 9.3.2 Electrical parts. 9.3.3 Parts name 9.4 RAS-(4-6)H(V)NPE. 9.4.1 Cycle and structural parts. 9.4.2 Electrical parts. 9.4.3 Parts name 9.5 RAS-(4-6)H(V)NCE. 	290 291 292 292 293 293 294 294 294 294 295 295 295 295 297 297 297 297 297 297 300 302
 9.1.1 Cycle and structural parts	290 291 292 292 293 293 294 294 294 294 295 296 297 297 297 297 298 300 302 302

vii

9.6.1 Cycle and structural parts	308
9.6.2 Electrical parts	310
9.6.3 Parts name	311
9.7 RAS-12HN(P/C)	314
9.7.1 Cycle and structural parts	
9.7.2 Electrical parts	315
9.7.3 Parts name	
10. Convicing	240
10. Servicing	
10.1 Introduction	
10.2 Servicing for Outdoor Units RAS-(2-2.5)HVNP and RAS-3HVNC	324
10.2.1 Removing pipe cover	324
10.2.2 Removing front cover	324
10.2.3 Removing outdoor fan	324
10.2.4 Removing the compressor	325
10.2.5 Removing high pressure switch and pressure switch for control	327
10.2.6 Removing four-way valve coil	328
10.2.7 Removing electronic expansion valve coil	328
10.2.8 Removing electrical components	329
10.3 Servicing for Premium series	
10.3.1 Outdoor unit RAS-3HVNPE	332
10.3.1.1 Removing service cover	332
10.3.1.2 Remove outlet grille	332
10.3.1.3 Removing upper cover	333
10.3.1.4 Removing bottom service cover and rear cover	333
10.3.1.5 Removing outdoor fan motor	334
10.3.1.6 Removing electrical box	335
10.3.1.7 Removing the compressor	336
10.3.1.8 Removing the High pressure switch and Pressure switch for control	339
10.3.1.9 Opening electrical box (P plate)	
10.3.1.10 Removing Reversing valve coil	
10.3.1.11 Removing electronic expansion valve coil	341
10.3.1.12 Removing solenoid valve coil (SVC)	
10.3.1.13 Removing reversing valve	
10.3.1.14 Removing Electronic expansion Valve and Solenoid Valve	343
10.3.1.15 Removing electrical components	343
10.3.1.16 Removing other electrical components	345
10.3.2 Outdoor units RAS-(4-6)H(V)NPE	346
10.3.2.1 Removing service cover	346
10.3.2.2 Removing air outlet grille	346
10.3.2.3 Removing upper cover	347
10.3.2.4 Removing the bottom service cover and rear cover	

viii

10.3.2.5 Removing outdoor fan motor	
10.3.2.6 Removing electrical box	
10.3.2.7 Removing the compressor	
10.3.2.8 Removing the High pressure switch and Pressure switch for control	353
10.3.2.9 Opening electrical box (P plate)	354
10.3.2.10 Removing Reversing valve coil	
10.3.2.11 Removing electronic expansion valve coil	355
10.3.2.12 Removing solenoid valve coil (SVA and SVC)	355
10.3.2.13 Removing reversing valve	
10.3.2.14 Removing Electronic expansion Valve and Solenoid Valve	
10.3.2.15 Removing electrical components	
10.3.2.16 Removing other electrical components	359
10.3.3 Oudoor units RAS-(8-10)HNPE	
10.3.3.1 Removing service cover	
10.3.3.2 Removing air outlet grille	
10.3.3.3 Removing upper cover	
10.3.3.4 Removing the bottom service cover and rear cover	
10.3.3.5 Removing outdoor fan motor	
10.3.3.6 Removing electrical box	
10.3.3.7 Removing the compressor	
10.3.3.8 Removing High pressure switch and pressure switch for control	
10.3.3.9 Opening electrical box (P-Mounting Plate)	
10.3.3.10 Removing reversing valve coil	
10.3.3.11 Removing electronic expansion valve coil	
10.3.3.12 Removing solenoid valve coil (SVA and SVC)	
10.3.3.13 Removing reversing valve	
10.3.3.14 Removing Electronic expansion Valve and Solenoid Valve	
10.3.3.15 Removing electrical components	
10.3.3.16 Removing other electrical components	
10.3.4 Outdoor Units RAS-12HNP	
10.3.4.1 Removing service cover	
10.3.4.2 Removing air outlet grille	
10.3.4.3 Removing upper cover	
10.3.4.4 Removing the bottom service cover and rear cover	
10.3.4.5 Removing outdoor fan motor	
10.3.4.6 Removing electrical box	
10.3.4.7 Removing the compressor	
10.3.4.8 Removing High pressure switch and pressure switch for control	
10.3.4.9 Removing reversing and solenoid valves coils	
10.3.4.10 Removing electronic expansion valve coil	
10.3.4.11 Removing reversing valve	
10.3.4.12 Removing Electronic expansion Valve and Solenoid Valve	
10.3.4.13 Removing electrical components	

	10.3.4.14 Removing other electrical components	390
10.4	Servicing for Standard Series	
	10.4.1 Outdoor Units RAS-(4-6)H(V)NCE	391
	10.4.1.1 Removing service cover	391
	10.4.1.2 Remove outlet grille	391
	10.4.1.3 Removing upper cover	
	10.4.1.4 Removing bottom service cover and rear cover	
	10.4.1.5 Removing outdoor fan motor	393
	10.4.1.6 Removing electrical box	394
	10.4.1.7 Removing the compressor	395
	10.4.1.8 Removing the High pressure switch and Pressure switch for control	401
	10.4.1.9 Opening electrical box (P plate)	402
	10.4.1.10 Removing Reversing valve coil	402
	10.4.1.11 Removing electronic expansion valve coil	403
	10.4.1.12 Removing solenoid valve coil (SVA)	403
	10.4.1.13 Removing reversing valve	404
	10.4.1.14 Removing Electronic expansion valve and Solenoid valve	405
	10.4.1.15 Removing electrical components	405
	10.4.1.16 Removing other electrical components	407
	10.4.2 Outdoor Units RAS-(8-10)HNCE	408
	10.4.2.1 Removing service cover	408
	10.4.2.2 Removing air outlet grille	408
	10.4.2.3 Removing upper cover	409
	10.4.2.4 Removing the bottom service cover and rear cover	409
	10.4.2.5 Removing outdoor fan motor	410
	10.4.2.6 Removing electrical box	411
	10.4.2.7 Removing the compressor	412
	10.4.2.8 Removing High pressure switch and pressure switch for control	415
	10.4.2.9 Opening electrical box (P-Mounting Plate)	415
	10.4.2.10 Removing reversing valve coil	416
	10.4.2.11 Removing electronic expansion valve coil	417
	10.4.2.12 Removing solenoid valve coil (SVA)	417
	10.4.2.13 Removing reversing valve	
	10.4.2.14 Removing Electronic expansion Valve and Solenoid Valve	
	10.4.2.15 Removing electrical components	420
	10.4.2.16 Removing other electrical components	
	10.4.3 Outdoor Units RAS-12HNC	
	10.4.3.1 Removing service cover	423
	10.4.3.2 Removing air outlet grille	
	10.4.3.3 Removing upper cover	424
	10.4.3.4 Removing the bottom service cover and rear cover	424
	10.4.3.5 Removing outdoor fan motor	425

х

10.4.3.6 Removing electrical box	
10.4.3.7 Removing High pressure switch and pressure switch for control	
10.4.3.8 Opening electrical box (P-Mounting Plate)	
10.4.3.9 Removing reversing and solenoid valves coils	431
10.4.3.10 Removing electronic expansion valve coil	
10.4.3.11 Removing reversing valve	
10.4.3.12 Removing Electronic expansion Valve and Solenoid Valve	
10.4.3.13 Removing electrical components	
10.4.3.14 Removing other electrical components	
11. Electrial checks of main parts	
11.1 Inverter	
11.1.1 Specifications of inverter	
11.1.2 Inverter time chart	
11.1.3 Protective function	
11.1.4 Overload control	
11.2 Thermistor	
11.3 Electronic expansion valve	447
11.4 High pressure protection device	448
11.5 Noise filter (NF)	450
11.5.1 Noise filter for 3N~ (400V/50Hz)	
11.5.2 Noise filter for 1~ (230V/50Hz)	
11.6 Capacitor (CB1 CB2)	452
11.7 Reactor (DCL)	453
11.7.1 Reactor (DCL) for 3N~ (400V/50Hz)	
11.7.2 Reactor (DCL) for 1~ (230V/50Hz)	453
11.8 Scroll compressor	454
11.8.1 Reliable mechanism for low vibrating and low sound	
11.8.2 Principle of compression	
12. Maintenance notes	
12.1 General notes	
12.1.1 Checking the power source and the wiring connection	
12.1.2 Burnt-out compressor due to an insufficient refrigerant charge	
12.1.3 Insufficient cooling performance when a long piping is applied	457
12.1.4 Abnormally high operation sound (in the ceiling type indoor unit).	
12.1.5 Alarm code "31"	
12.1.6 Not cooling well due to insufficient installation space for the outdoor unit	
12.2 Maintenance work	459

xi

12.3	Service and maintenance record	460
12.4	Service and maintenance record using the 7-segment display	461
12.5	Service and maintenance record by remote control switch	463
12.6	Pump-down method for replacing the compressor	464

. General information

1

Index

1.1.	.1. General information				
	1.1.1.	General notes	2		
	1.1.2.	Introduction	2		
	1.1.3.	Environment-friendly units	2		
1.2.	Safety		3		
	1.2.1.	Applied symbols	3		
	1.2.2.	Norms and Regulations	3		
1.3.	Produc	t guide	4		
	1.3.1.	Classification of outdoor unit models	4		
	1.3.2.	Classification of indoor unit models	4		
	1.3.3.	Product guide: Outdoor units	5		
	1.3.4.	Outdoor unit accessory code list	6		
	1.3.5.	Product guide: Indoor units & complementary systems	7		
	1.3.6.	Product guide: complementary systems	10		

1.1 General information

1.1.1 General notes

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1.1.2 Introduction

Hitachi UTOPIA series is an outdoor unit series designed with the goal to cover the requirements of the split and multisplit systems, for installations where from one indoor unit (single system) to up to 8 indoor units, are connected to the same IVX Premium outdoor unit (depending on model).

New UTOPIA series consists in two different outdoor unit series: IVX Premium and IVX Standard, which compliant with the Seasonal Efficiency driven by the EU's Energy Product Directive (Eco Design Directive (EuP Lot 10)) and Seasonal Efficiency design concept in order to meet the European Directive on seasonal efficiency (Lot 6/21 coming in 2015) (depending on the model). The Seasonal Energy Efficiency Ratio (SEER) in cooling and the Seasonal Coefficient of Performance (SCOP) in heating, show an approach values to the real energy consumption.

UTOPIA series incorporate the Hitachi inverter technology, which makes possible to adapt automatically and without the user operation the capacity of the unit, so the power input, to the real demand of the installation, increasing the system efficiency to unattainable levels with other technologies. All UTOPIA units are equipped with a heat pump, resulting in an air conditioning system valid for the whole year, in which the installation of additional and specific systems a not necessary.

IVX Premium

Nominal capacity from 5 kW to 30 kW (cooling mode). Connectable indoor units up to 8 units (depending on model) and total combination power from 50% up to 120%, outdoor units from 3 to 12HP, or 90% up to 110% for 2 and 2.5 HP outdoor units.

IVX Standard

Nominal capacity from 7.1 kW to 30 kW (cooling mode). Connectable indoor units up to 4 units (3 units for 3HP model) and total combination power from 90% up to 115%, outdoor units from 4 to 12HP, or 90% up to 110% for 3HP outdoor units.

Indoor Units

One of the main merits of Hitachi units range is the combinability and flexibility of its indoor units SYSTEM FREE. This outstanding technology makes possible to use the same indoor units with both UTOPIA and SET FREE outdoor units, making easier the design, installation and control of the air conditioning installations.

1.1.3 Environment-friendly units

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This range of HITACHI outdoor units uses environmentally-friendly R410A gas refrigerant, and the RoHS and Green Dot regulations are applied throughout the manufacturing and installation process to reflect HITACHI's awareness of environmental respect and commitment.

R410A is totally environmentally-friendly since it does not contain any substances that damage the ozone layer:

ODP (ozone depleting product) =0.

HITACHI's UTOPIA series are very efficient and allow significant energy savings compared with conventional systems.

This energy efficiency means less production of CO2, which causes the greenhouse effect.



1.2 Safety

1.2.1 Applied symbols

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

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

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

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

🛆 DANGER

- The text following this symbol contains information and instructions relating directly to your safety and physical wellbeing.
- Not taking these instructions into account could lead to serious, very serious or even fatal injuries to you and
 others in the proximities of the unit.

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

Δ caution

- The text following this symbol contains information and instructions relating directly to your safety and physical wellbeing.
- Not taking these instructions into account could lead to minor injuries to you and others in the proximities of the unit.
- Not taking these instructions into account could lead to unit damage.

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

i NOTE

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

1.2.2 Norms and Regulations

Following Regulation EC N° 842/2006 on Certain Fluorinated Greenhouse gases, the total amount of refrigerant charged in the unit is indicated on the specification label.

Do not vent R410A/R407C into the atmosphere. R410A & R407C are fluorinated greenhouse gases covered by the Kyoto protocol global warming potential (GWP) R410A/R407C: = 1975/1652.5.

1.3 Product guide

1.3.1 Classification of outdoor unit models

IVX series

Unit type (Outdoor unit): RAS

	Position-separating hyphen (fixed)									
		Capacity (HP): 2, 2.5, 3, 4, 5, 6, 8, 10, 12								
			H = He	I = Heat pump						
				V = Single phase unit (1~ 230V 50Hz)						
				- = Three phase unit (3N~ 400V 50Hz)						
				N = R410A refrigerant						
				P: Premium series C: Standard series						
								ade in Europe de in Japan		
ххх	_	xx	Н	(X)	N	x	(X)			

1.3.2 Classification of indoor unit models

Unit type (indoor unit): RCI, RCIM, RCD, RPC, RPI, RPIM, RPK, RPF, RPFI Position-separating hyphen (fixed) Capacity (HP): 0.8, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 8.0, 10.0 FS = SYSTEM FREE N = R410A refrigerant H = Hotel (RPK-(0.8/1.5) only) 2/3/4 = seriesE = Made in Europe M = Made in Malaysia - = Made in Japan i = Version up DU = Drain Up (RPIM only) FS (H) (X) (X) i (-DU) XXX X.X Ν _

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1.3.3 Product guide: Outdoor units

IVX Premium

	🕸 🌞								
1~ 230V 50Hz						3N~ 400V 50Hz			
Q	-	0		00	-	00	-		
Unit	Code	Unit	Code	Unit	Code	Unit	Code	Unit	Code
RAS-2HVNP	60288519								
RAS-2.5HVNP	60288520								
		RAS-3HVNPE	7E304005						
				RAS-4HVNPE	7E304007	RAS-4HNPE	7E304107		
				RAS-5HVNPE	7E304008	RAS-5HNPE	7E304108		
				RAS-6HVNPE	7E304009	RAS-6HNPE	7E304109		
						RAS-8HNPE	7E310110		
						RAS-10HNPE	7E310111		
								RAS-12HNP	60278974

• IVX Standard

	🕸 🏶								
	1~ 230V 50Hz					3N~ 400V 5	0Hz		
C)-)	G		G		00			
Unit	Code	Unit	Code	Unit	Code	Unit	Code	Unit	Code
RAS-3HVNC	60288523								
		RAS-4HVNCE	7E305027	RAS-4HNCE	7E305127				
		RAS-5HVNCE	7E305028	RAS-5HNCE	7E305128				
		RAS-6HVNCE	7E305029	RAS-6HNCE	7E305129				
						RAS-8HNCE	7E311110		
						RAS-10HNCE	7E311111		
								RAS-12HNC	60288572

1.3.4 Outdoor unit accessory code list

Namo	Description	Code	Figuro
Name	Description	Code	Figure
DBS-26	Drain discharge connection	60299192	
AG-264	Air flow guide	-	
AG-335A	Air flow guide	60291431	
WSP-264	Wind guard	60291728	
WSP-335A	Wind guard	60291432	
ASG-NP80F	Snow protection hood; air outlet (Zinc plate)	-	
ASG-NP80FS2	Snow protection hood; air outlet (Stainless plate)	-	
ASG-NP335F	Snow protection hood; air outlet (Zinc plate)	60291433	
ASG-NP335FS2	Snow protection hood; air outlet (Stainless plate)	-	
ASG-NP56B	Snow protection hood; air inlet of rear side (Zinc plate)	-	~
ASG-NP63BS2	Snow protection hood; air inlet of rear side (Stainless plate)	-	ST.
ASG-NP80B	Snow protection hood; air inlet of rear side (Zinc plate)	-	
ASG-NP160BS2	Snow protection hood; air inlet of rear side (Stainless plate)	-	
ASG-NP280B	Snow protection hood; air inlet of rear side (Zinc plate)	-	
ASG-NP280BS2	Snow protection hood; air inlet of rear side (Stainless plate)	-	
ASG-NP335B	Snow protection hood; air inlet of rear side (Zinc plate)	60291434	
ASG-NP335BS2	Snow protection hood; air inlet of rear side (Stainless plate)	-	
ASG-NP56L	Snow protection hood; air inlet of left side (Zinc plate)	-	
ASG-NP63LS2	Snow protection hood; air inlet of left side (Stainless plate)	-	
ASG-NP80L	Snow protection hood; air inlet of left side (Zinc plate)	-	
ASG-NP160LS2	Snow protection hood; air inlet of left side (Stainless plate)	-	
ASG-NP280L	Snow protection hood; air inlet of left side (Zinc plate)	-	
ASG-NP280LS2	Snow protection hood; air inlet of left side (Stainless plate)	-	
ASG-NP335L	Snow protection hood; air inlet of left side (Zinc plate)	60291435	
ASG-NP335LS2	Snow protection hood; air inlet of left side (Stainless plate)	-	

i NOTE

HITACHI has a range of accessories and remote control systems that can be used with the UTOPIA outdoor units. Please, refer to the Controls Technical Catalogue.

1.3.5 Product guide: Indoor units & complementary systems

RCI and RCIM indoor units

		FSN(2/3)(E)(i) *			
	F	RCI	м		
1	1				
	4-way	cassette		4-way cassette	e (compact)
Unit	Code	Unit	Code	Unit	Code
RCI-1.0FSN3Ei	7E403014	RCI-1.0FSN3	60278119	RCIM-0.8FSN2	60278010
RCI-1.5FSN3Ei	7E403015	RCI-1.5FSN3	60278120	RCIM-1.0FSN2	60278011
RCI-2.0FSN3Ei	7E403016	RCI-2.0FSN3	60278121	RCIM-1.5FSN2	60278013
RCI-2.5FSN3Ei	7E403017	RCI-2.5FSN3	60278122	RCIM-2.0FSN2 (*)	60278014
RCI-3.0FSN3Ei	7E403018	RCI-3.0FSN3	60278123		
RCI-4.0FSN3Ei	7E403020	RCI-4.0FSN3	60278124		
RCI-5.0FSN3Ei	7E403021	RCI-5.0FSN3	60278125		
RCI-6.0FSN3Ei	7E403022	RCI-6.0FSN3	60278126		
		Panels (O	optional)		
P-N23NA	70531000	P-AP160NA1	60297215	P-N23WAM	60197160
		P-AP160NAE (With motion sensor)	60297217		

i note

- The RCI and RCIM models must be used in combination with the panels indicated above.
- (*): Single combinations with IVX Premium/Standard series not allowed

RCD and RPC indoor units



• The RCD models must be used in combination with the panels indicated above.

RPI-6.0FSN4E

7E424022

RPC, RPI and RPIM indoor units FSN(3/4)E indoor units * RPI RPIM Indoor ducted unit Unit Code Unit Code Unit Code 7E430013 RPIM-0.8FSN4E RPI-0.8FSN4E 7E424013 7E431013 RPIM-0.8FSN4E-DU 7E430014 RPIM-1.0FSN4E RPI-1.0FSN4E 7E424014 RPIM-1.0FSN4E-DU 7E431014 RPIM-1.5FSN4E 7E430015 RPI-1.5FSN4E 7E424015 RPIM-1.5FSN4E-DU 7E431015 RPI-2.0FSN4E 7E424016 RPI-2.5FSN4E 7E424017 RPI-3.0FSN4E 7E424018 RPI-4.0FSN4E 7E424020 RPI-5.0FSN4E 7E424021

RPI-8.0FSN3E

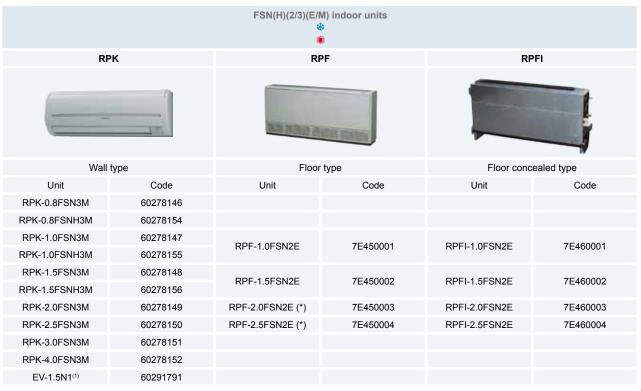
RPI-10.0FSN3E

7E424010

7E424011

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RPK, RPF and RPFI indoor units



<u>і</u> Note

• (*): Single combinations with IVX Premium/Standard series not allowed

• (1) For RPK-(0.8-1.5)FSNH3M models only.

1.3.6 Product guide: complementary systems

KPI energy / heat recovery unit

		Complemen	tary systems				
	KPI						
Energy	recovery	Heat re	ecovery	Active (Energy Recover	y+DX section)		
Unit	Code	Unit	Code	Unit	Code		
KPI-252E3E	70602000						
KPI-502E3E	70602001	KPI-502H3E	70602101	KPI-502X3E	70602201		
KPI-802E3E	70602002	KPI-802H3E	70602102	KPI-802X3E	70602202		
KPI-1002E3E	70602003	KPI-1002H3E	70602103	KPI-1002X3E	70602203		
KPI-1502E3E	70602004	KPI-1502H3E	70602104				
KPI-2002E3E	70602005	KPI-2002H3E	70602105				

1

DX-Interface

Control box	Expansion valve box
	E E
DX-	Interface
Model	Code
EXV-2.0E1	7E610900
EXV-2.5E1	7E610901
EXV-3.0E1	7E610902
EXV-4.0E1	7E610903
EXV-5.0E1	7E610904
EXV-6.0E1	7E610905
EXV-8.0E1	7E610906
EXV-10.0E1	7E610907



Index

2.1.	Safety	summary	. 14
2.2.	Transp	ortation of outdoor unit	. 15
2.3.	Center	of gravity	. 16
2.4.	Factory	v-supplied accessories for RAS-12HN(P/C)	. 17
2.5.	Installa	tion space (Initial ckeck)	. 18
	2.5.1.	Basic sizes	18
	2.5.2.	RAS-(2-2.5)HVNP / RAS-3HVNC	. 19
	2.5.3.	RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / RAS-12HN(P/C)	. 20
2.6.	Place p	provision	.23
	2.6.1.	Place provision for RAS-(2-2.5)HVNP / RAS-3HVNC	. 23
	2.6.2. RAS-12	Place provision for RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / HN(P/C)	25
2.7.	Option	al parts and installation	. 29
	2.7.1.	Optional parts and installation for RAS-(2-2.5)HVNP / RAS-3HVNC	. 29
	2.7.2.	Optional parts and installation RAS-3HVNPE / RAS-(4-6)H(V)NCE	34
	2.7.3.	Optional parts and installation RAS-(4-6)H(V)NPE / RAS-(8-10)HN(P/C)E	39
		Optional parts and installation RAS-12HN(P/C)	

SMGB0079 rev.0 - 01/2013

2.1 Safety summary



- Install the outdoor unit with sufficient clearance around it for operation and maintenance as shown in the next pages.
- Install the outdoor unit where good ventilation is available.
- Do not install the outdoor unit where exists a high level of oil mist, salty air or sulphurous atmosphere.
- Install the outdoor unit as far as practical (being at least 3 meters) from electromagnetic wave radiator such as medical equipment.
- Keep clearance between units of more than 50 mm and avoid obstacles that could hamper air intake when installing more than one unit together.
- Install the outdoor unit in the shade or not exposed to direct sunshine or direct radiation from high temperature heat source.
- Do not install the outdoor unit in a place where a seasonal wind directly blows into the outdoor fan.
- For cleaning use non-inflammable and nontoxic cleaning liquid. Use of inflammable agent may cause explosion or fire.
- Work with sufficient ventilation. Working in an enclosed space could cause oxygen deficiency. Toxic gas may be produced when cleaning agent is heated to high temperature by e.g. being exposed to fire.
- Cleaning liquid shall be collected after cleaning.
- Pay attention to do not clamp cables when attaching the service cover to avoid electric shock or fire.

- Check the foundation to be flat leveled and strongly enough.
- Install the unit in a restricted area not accessible by the general public.
- Aluminium fins have very sharp edges. Pay attention to the fins in order to avoid injury.
- Do not install the indoor units in a flammable environment to avoid a fire or an explosion.
- Check to ensure that the ceiling slab is strong enough. If not strong enough the indoor unit may fall down on you.
- Do not install the indoor units outdoor unit remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.
- Do not install the indoor units in a machinery shop or kitchen where vapour from oil or mist flows to the indoor units. The oil will deposit on the heat exchanger thereby reducing the indoor unit performance and may deform. In the worst case the oil damages the plastic parts of the indoor unit.
- To avoid any corrosive action to the heat exchangers do not install the indoor units in an acid or alkaline environment.
- When lifting or moving the indoor unit use appropriate slings to avoid damage and be careful not to damage the insulation material on units surface.
- This appliance must be used only by adult and capable people having received the technical information or instructions to handle properly and safely this appliance.
- Turn OFF all power switches before maintenance is performed.
- Do not start the cleaning procedures before 5 minutes of the stop of the unit.

MDANGER

- Avoid obstacles which may hamper the air intake or the air discharge flow.
- · Children must be supervised to ensure that they do not play with the electrical appliances.
- Before obtaining access to terminals all supply circuits must be disconnected.

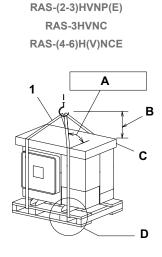
2.2 Transportation of outdoor unit

Do not put any foreign material into the outdoor unit and check to ensure that none exists in the outdoor unit before the installation and test run. Otherwise a fire or failure will occur.

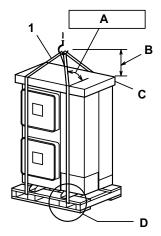
Transport the products as close to the installation location as practical before unpacking.

Hanging Method

When hanging the unit ensure the balance of the unit check safety and lift it up smoothly. Do not remove any packing materials and hang the unit under packing condition with two ropes as shown below.



RAS-(4-6)H(V)NPE RAS-(8-10)HN(P/C)E RAS-12HN(P/C)



- 1. Wire rope.
- A. Over 60°.
- B. 0.7 to 1.0 m.
- C. Do not remove the plastic band or the corrugate paper frame.
- D. Pass the wire ropes through each lifting hole in the wooden base as shown.

- · Lift the outdoor unit in its factory packaging with 2 wire ropes.
- For safety reasons ensure that the outdoor unit is lifted smoothly and does not lean.
- Do not attach lifting equipment to the plastic band or the corrugated paper frame because of the ropes will slip or break the materials.
- Ensure that the exterior of the unit is adequately protected with cloth or paper.

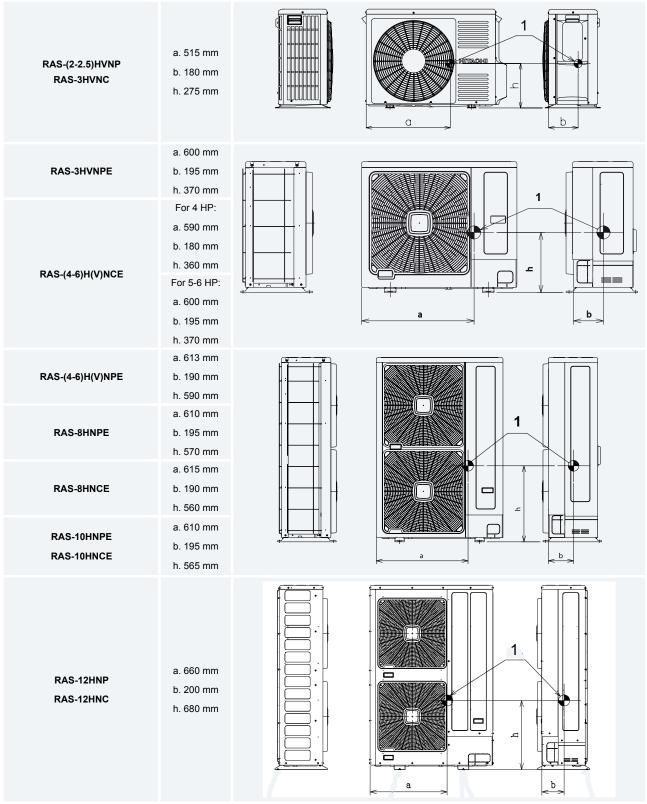
Gross weight

Premiur	Premium series		
Model	Weight (kg)		
RAS-(2-2.5)HVNP	46		
RAS-3HVNPE	77		
RAS-(4-6)H(V)NPE	116		
RAS-8HNPE	149		
RAS-10HNPE	151		
RAS-12HNP	174		

2.3 Center of gravity

Hanging Method

When hanging the unit ensure the balance of the unit check safety and lift it up smoothly. Do not remove any packing materials and hang the unit under packing condition with two ropes as shown below. At leat two persons are needed to move the unit.



1 Center of gravity

2.4 Factory-supplied accessories for RAS-12HN(P/C)

Make sure that the following accessories are packed with the unit.



If any of these accessories are not packed with the unit please contact your dealer.

Accessory	Quantity
Pipe with Flare Nut for Refrigerant Piping	1

SMGB0079 rev.0 - 01/2013

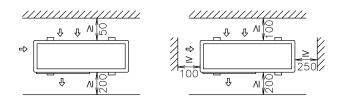
2.5 Installation space (Initial ckeck)

i_{NOTE}

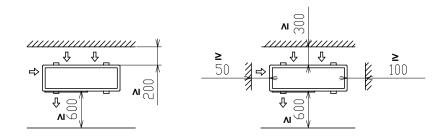
The following images are for illustration purposes only.

2.5.1 Basic sizes

RAS-2HVNP - RAS-2.5HVNP - RAS-3HVNC

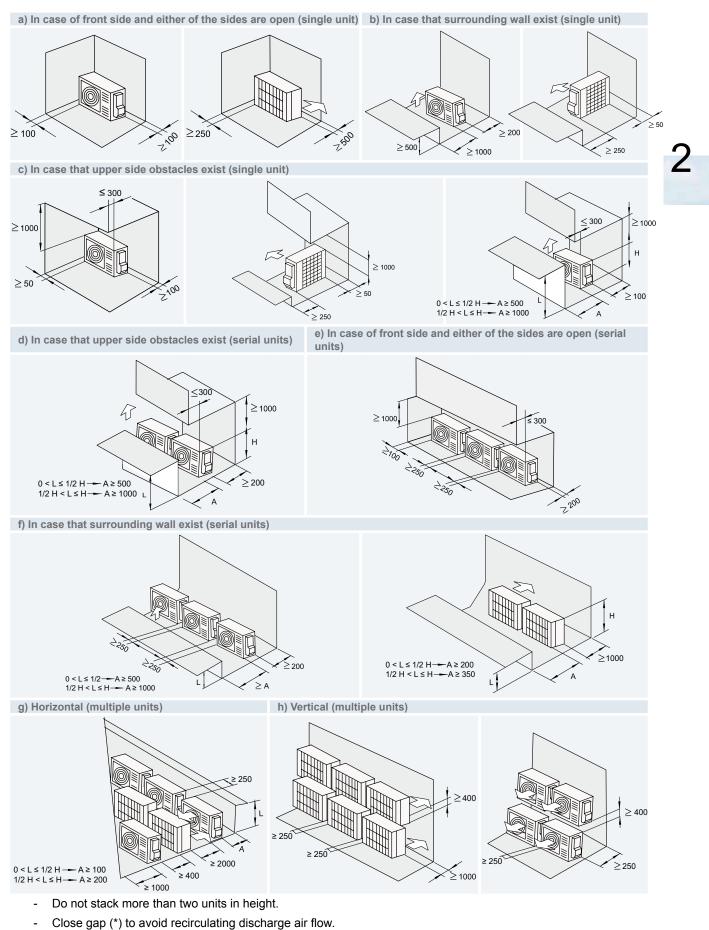


All models (except RAS-2HVNP - RAS-2.5HVNP - RAS-3HVNC)



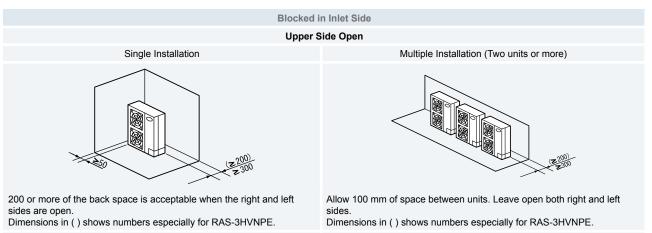
Units in mm.

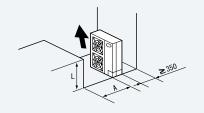
2.5.2 RAS-(2-2.5)HVNP / RAS-3HVNC



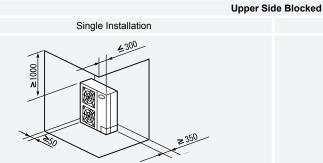
2.5.3 RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / RAS-12HN(P/C)

(Unit: mm)

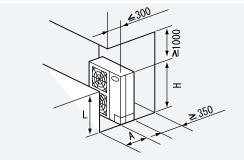




Be sure to use the fan direction guide. Leave open both right and left sides.



100 mm or more of the side space is acceptable on the service cover side.



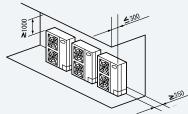
Leave open both right and left sides.

The length A is as shown in the following table:

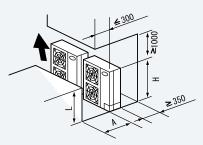
L	A
0 < L ≤ 1/2H	600 or greater
1/2H < L≤ H	1400 or greater

Be sure to use the fan direction guide. Allow 100 mm of space between units. Leave open both right and left sides.

Multiple Installation (Two units or more)

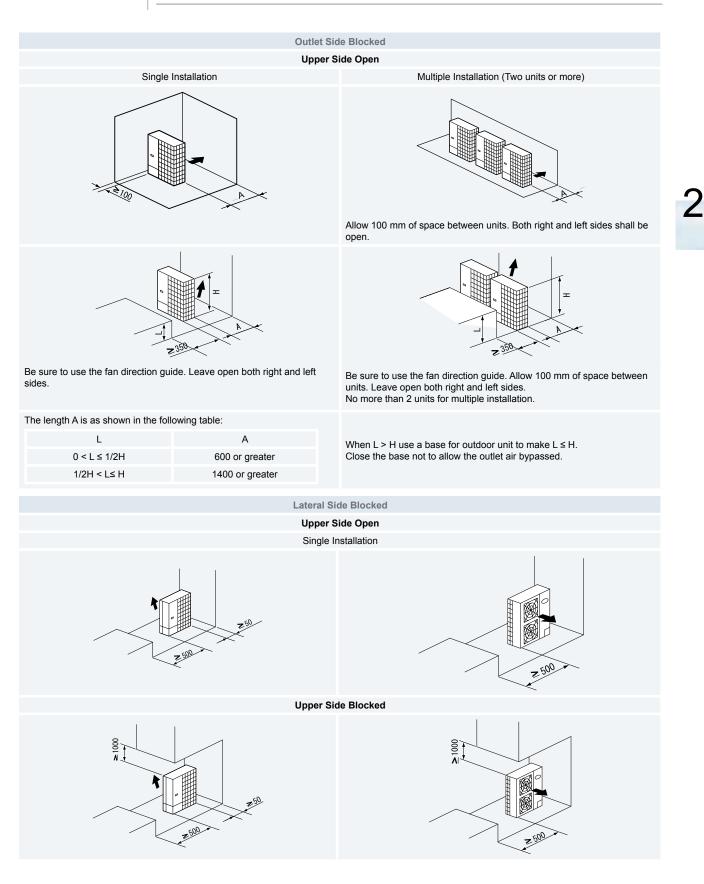


Allow 100 mm of space between units. Leave open both right and left sides..



Be sure to use the fan direction guide. Allow 100 mm of space between units. Leave open both right and left sides. No more than 2 units for multiple installation.

When L > H use a base for outdoor unit to make L \leq H. Close the base not to allow the outlet air bypassed.



Stack installation (allowed up to 2 Units)

Upper Side Open

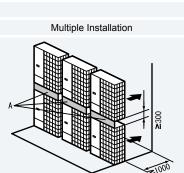


Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.

Single Installation

Allow 100 mm of space between units. Serial sideways installation allowed up to two units. Leave open both right and left sides. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.





Be sure to use the fan direction guide. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling

21000

≥600) (*

Be sure to use the fan direction guide. Allow 100 mm of space between units. Serial side way installation allowed. but leave open both right and left sides. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.

Multiple Installation in Multiple Rows

Serial Installation in Multiple Rows (E.g. Rooftop)

Allow approx. 100 mm of space from the side unit. Leave open both right and left sides.

The length A is as shown in the following table:

L	А
0 < L ≤ 1/2H	≤ 300
1/2H < L≤ H	≤ 350

on the lower unit.

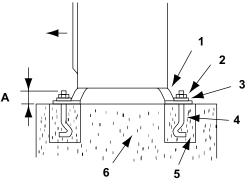
ΝΟΤΕ

When L > H use a base for outdoor unit to make L = H. Close the base not to allow the outlet air bypassed. Be sure to use the fan direction guide in order to ensure the length marked with $\ensuremath{\mathbb{X}}.$

2.6 Place provision

2.6.1 Place provision for RAS-(2-2.5)HVNP / RAS-3HVNC

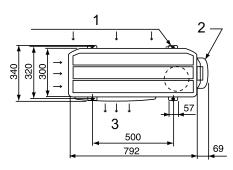
- 1 Secure the outdoor unit with the anchor
 - 1. Base of outdoor unit
 - 2. Nut
 - 3. Special washer (M12)
 - 4. Anchor bolts
 - 5. Filled mortar
 - 6. Concrete
 - A. Max. 17 mm



2

Fix the outdoor unit to the anchor bolts by special washer of factory-supplied accessory.

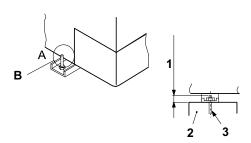
- 2 When installing the outdoor unit fix the unit by anchor bolts.Regarding the location of fixing holes.
 - 1. M10 Hole for anchor bolt (Ø12)
 - 2. Pipe cover
 - 3. Front side



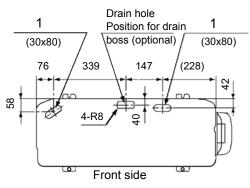
Example of fixing outdoor unit by anchor bolts.

- 1. Max. 17 mm (After cut "A")
- 2. Concrete
- 3. Anchor bolt

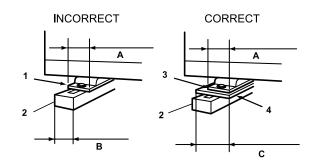
B: Cut this portion when this type of anchor bolt is used. If not done it will be difficult to remove the service cover

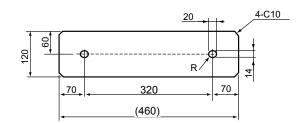


- 3 Provide an adequate drainage around the foundation. When installing the unit on a roof or a veranda drain water may turn to ice in a cold morning. Therefore avoid draining in an area where people often use because it is slippery. In case of installing such a place provide the additional drainage around the foundation.
 - 1. Drain hole (30x80)
 - 2. Drain hole (3-30x80)



- 4 The whole of the base of the outdoor unit should be installed on a foundation. When using vibration-proof mat it should also be positioned the same way. When installing the outdoor unit on a field-supplied frame use metal plates to adjust the frame width for stable installation as shown in Figure.
 - 1. Outdoor unit is unstable
 - 2. Frame
 - 3. Outdoor unit is stable
 - 4. Metal plate
 - A. 57 mm. Base width of outdoor unit
 - B. 60 mm Frame width (Field-supplied)
 - C. 100 mm or more Metal plate
- Recommended Metal Plate Size:
 - (Field-Supplied) Material: Hot-Rolled Mild Steel.
 - Plate (SPHC) Plate Thickness: 4.5 T

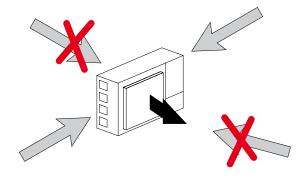




Installing location where the unit will be exposed to strong wind

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

- 1 Choose a location where the outlet or inlet side of the product will not be exposed to strong wind.
- 2 When the outlet is exposed to strong wind: Direct strong wind may cause lack of air flow and adversely affect to normal function.



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

2.6.2 Place provision for RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / RAS-12HN(P/C)

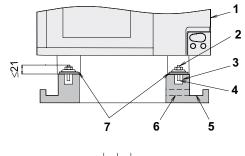
- Concrete foundation
- Foundation could be on flat and it is recommended to be 100-300 mm higher than ground level.
- Install a drainage around foundation for smooth drain. ٠
- When installing the outdoor unit fix it by M10 anchor bolts.
- When installing the unit on a roof or a veranda drain water sometimes turns into ice on a cold morning. Therefore avoid draining in an area that people often use because it may become slippery.

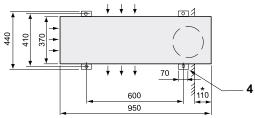
Metal plate for RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / RAS-12HN(P/C)

- 1 Outdoor unit.
- 2 Cut this portion of bolt. If not it's difficult to remove Service cover.
- 3 Mortar hole (Ø100 x Depth 150).
- 4 Anchor bolt M10 (Ø12.5 Hole).
- 5 Drainage (Wide 100 x Depth 150).
- 6 Drainage.
- 7 Vibration-proof rubber.

NOTE

(*): Space for downward piping space.

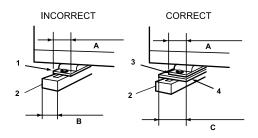




Anchor bolt location in case of RAS-12HN(P/C)⁽¹⁾.

The whole base of the outdoor unit should be installed on a foundation. When using vibration-proof material it should also be positioned in the same place. When installing the outdoor unit on a fieldsupplied frame use metal plates to adjust the frame width for stable installation as shown in the figure below.

- 1. Outdoor unit is unstable
- 2. Frame.
- 3. Outdoor unit is stable.
- 4. Metal plate.
- A. For RAS-(4-10)H(V)N(P/C)E 70 mm. Base width for outdoor unit. For RAS-12HN(P/C) 100 mm. Base width for outdoor unit.
- B. 60 mm. Frame width (Field supplied).
- C. 100 mm or more Metal plate.



Recommended Metal Plate Size

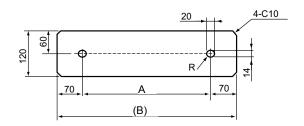
- (Field-Supplied) Material: Hot-Rolled Mild Steel.
- Plate (SPHC) Plate Thickness: 4.5 T.

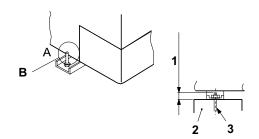
Model	RAS-3HVNPE RAS-(4-6)H(V)N(P/C)E RAS-(8-10)HN(P/C)	RAS-12HN(P/C)
A (mm)	410	420
B (mm)	550	560

Example of fixing outdoor unit by anchor bolts

- 1. Max. 21 mm (After cut "A")
- 2. Concrete
- 3. Anchor bolt

B. Cut this portion when this type of anchor bolt is used. If not done it will be dificult to remove the service cover

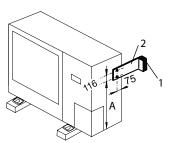




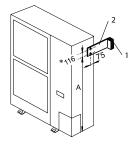
- Fix unit to the wall
- 1 Fix the unit onto the wall as shown in the figures (Field supplied bracket).
- 2 Secure the foundation to avoid noise and warping
- 3 To avoid vibrations transferring to the building use a rubber mat.



RAS-(4-6)H(V)NCE



RAS-(4-6)H(V)NPE RAS-(8-10)HN(P/C)E RAS-12HN(P/C)



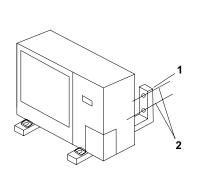
- 1. Rubber material
- 2. Fixing plate

i_{NOTE}

• (*): In RAS-12HN(P/C) are 110 mm

Model	RAS-3HVNPE RAS-(4-6)H(V)NPE	RAS-(4-6)H(V)NCE RAS-(8-10)HN(P/C)E	RAS-12HN(P/C)
A (mm)	529	1109	1173

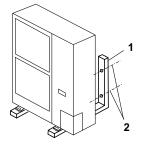
- **Suspended unit** ٠
- Suspend the unit as shown in the figures. 1
- 2 Ensure that wall can withstand the weight of the outdoor unit indicated on the specifications plate.
- 3 It is advisable that each foot support should bear the full weight of the unit (in order take account of applied stress fatigue when unit is operating).



RAS-3HVNPE

RAS-(4-6)H(V)NCE

RAS-(4-6)H(V)NPE RAS-(8-10)HN(P/C)E RAS-12HN(P/C)



1. Wall support (field supplied)

2. Anchor bolts (field supplied)

CAUTION

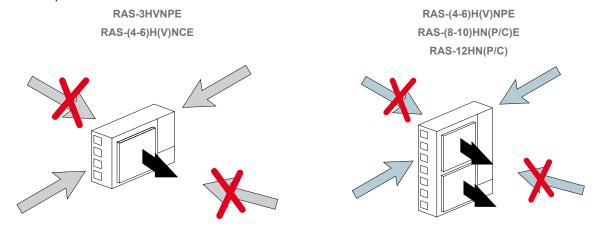
- Follow these installation procedures carefully
 - The installation must be done so as to ensure that the outdoor unit does not lean vibrate make a noise or fall in the event of strong gusts of wind or earthquakes. Calculate the resistance to vibration (caused by earthquakes) to guarantee that the installation is sturdy enough to prevent falls. Secure the unit with cables (field-supplied) when installing the unit in a place without walls or wind protection and where it is likely to be exposed to gusts of wind.
 - When using the vibration-proof rubber mat secure it at four points on the front and back.

SMGB0079 rev.0 - 01/2013

Installing location where the unit will be exposed to strong wind

Follow the instructions below to install on the roof or in a place which is not surrounded by buildings and where the product may be buffeted by strong winds.

- 1 Select a place where the input or outlet side of the product is exposed to strong winds.
- 2 When the outlet is exposed to strong winds: Strong direct winds may cause a lack of air flow and negative effects on the unit operation.



An excessively strong wind blowing against the outlet of the outdoor unit may cause reverse rotation and damage to the fan motor.

SMGB0079 rev.0 - 01/2013

2.7 Optional parts and installation

2.7.1 Optional parts and installation for RAS-(2-2.5)HVNP / RAS-3HVNC

Air flow guide wind guard and snow protection hood

Optional parts			Model	
Air flow guide			AG-264	1 2
Wind guard			WSP-264	
	Air outlet	ASG-NP80F		
	Zinc Plate	Air inlet of rear side	ASG-NP56B	
		Air inlet of side face	ASG-NP56L	
		Air outlet	ASG-NP80FS2	
		Air inlet of rear side	ASG-NP63B52	2
Snow protection hood	Stainless plate (NSSC180)	Air inlet of side face	ASG-NP63LS2	 3 1 Air flow guide 2 Wind Guard 3 Snow protection hood

Air flow guide

Model	AG-264	
Quantity	1 per unit	
Air discharge direction	Upward (downward) left & right	A-A
Material	Weather proof polypropylene resin	
Color	Gray	1 A 30
Weight	1.4 kg	
Accessories	Fixing screw 4x [M5 (SUS) x 12]+4x [M5 (SUS) x 30] Installation manual Self-screw 2x [M4 x 13]	
Installation restriction	"Wind Guard" or "Snow protection hood" is not available to install with air flow guide. ("Guard net" is available to be installed together.)	 Mounting dimension Air flow guide

Attaching example of air flow guide

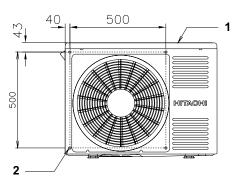
- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.

If the air guide is installed without discharge grille it may cause injury due to rotating fan.

Locations of fixing holes

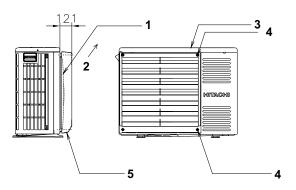
The holes Location shall be made by using self-screws (M4x13) and later shall be used SUS screw (M5x12) for fixing air flow guide.

- 1 Outdoor Unit
- 2 Hole (4 locations)



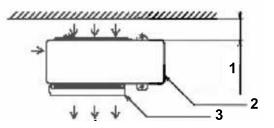
One flow guide installation

- 1 Air discharge grille
- 2 Air flow
- 3 Outdoor unit
- 4 M5 fixing screw x4 (Accessories)
- 5 Air flow guide



Service space (In case of upward air discharge)

- In case of right and left sides air discharge enough space for air discharge is required.
- The downward air discharge is also available. In such case install the base under the unit to secure enough space for air discharge.
- In case of serial units installation air discharge should be upward.
- 1 Min.150 mm
- 2 Outdoor unit
- 3 Air flow guide
- 4 Passage side



SMGB0079 rev.0 - 01/2013

• Wind guard

Specifications

CHI

Model	WSP-264	
Quantity	1 per unit	ji l
Material	Galvanized sheet metal + baked painting	ļ
Color	UTOPIA Beige	
Weight	4.0 kg	568 202
	Fixing screw x 4 [M5 (SUS) x 30]- Unit	
Accessories	Fixing Screw x 10 [M5 (SUS) x 12]- Wind Ward	
	Installation manual	
Installation restriction	"Guard net" "Air flow guide" or "Snow protection hood" is not available to install with Wind guard	 1 4-6x10 Long Hole 2 5 (Both Sides) - M5 Screw (attachement)

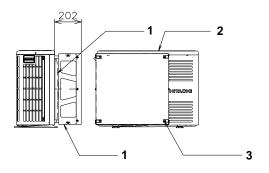
Attaching example of air wind guard

- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.

• If the air guide is installed without discharge grille it may cause injury due to rotating fan.

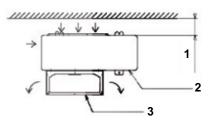
Two windguard covers installation

- 1 Air discharge grille
- 2 Outdoor unit
- 3 M5 fixing screw x4 (Accessories)



Service space

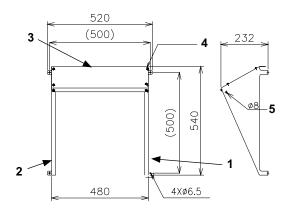
- Both sides of the outdoor unit should be open.
- No obstacles should be placed in the air discharge side.
- 1 Min.150 mm
- 2 Outdoor unit
- 3 Wind guard



Snow protection hood

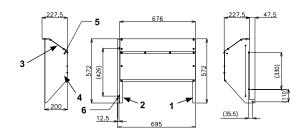
Air discharge hood

N°	Part name	Quantity	
1	Right side plate	1	
2	Left side plate	1	
3	Front panel	1	
4	Fixing screw (Accessories)		
5	Hole for safety wire rope to prevent overturning		



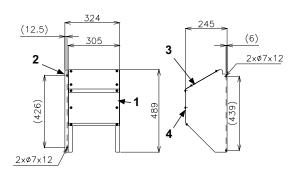
Rear suction hood

Nº	Part name	Quantity
1	Right side plate	1
2	Left side plate	1
3	Upper front panel (Upside)	1
4	Upper front panel (Downside). 1	
5	Hole for safety wire rope to prevent overturning	
6	Fixing screw (Accessories)	

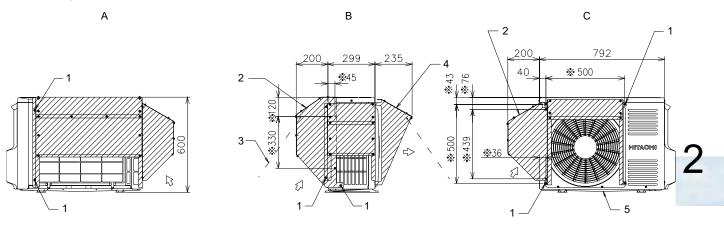


Left suction hood

N°	Part name	Quantity
1	Right side plate	1
2	Left side plate	1
3	Upper front panel (Upside)	1
4	Upper front panel (Downside).	1



Attaching example of snow protection hood



- 1. Fixing screw (accessories)
- 2. Air inlet hood
- 3. Wire rope (optional for over turning protection)
- 4. Air discharge hood
- 5. Outdoor unit
- A. Rear side
- B. Left side
- C Front side



• The holes locations marked with a mark shall be made by using sel screw (M4X13) and later shall be used SUS Screw for fixing protection hood.

Specifications of snow protection hood

Product nam	Product name Air discharge hood		Rear suction hood		Left suction hood		
Model		ASG-NP80F ASG-NP80FS		ASG-NP56B	ASG-NP63BS2	ASG-NP56L	ASG-NP63LS2
Quantity		1 per unit					
Material		Bonderized steel sheet Iron	Stainless (NSSC180)	Bonderized steel sheet Iron	Stainless (NSSC180)	Bonderized steel sheet Iron	Stainless (NSSC180)
Color		Gray (1.0Y8.5/0.5 or approximation)	-	Gray (1.0Y8.5/0.5 or approximation)	_	Gray (1.0Y8.5/0.5 or approximation)	_
Weight	Weight		3 kg 6 kg 3 kg		۶g		
Assembling		Knockingdown parts (assembled at field)					
Components	Hood	For air discharge part x 1		For rear side air intake x 1		For left side air intake x 1	
	Unit Fixing screw	4 (M5x12 tapping screw)		5 (M5x12 tapping screw)		4 (M5x12 tapping screw)	
	Hood Fixing screw (SUS)	6 (M5x12 tapping screw)	6 (M5x14)	14 (M5x12 tapping screw)	14 (M5x14)	10 (M5x12 tapping screw)	10 (M5x14)
	Self-screw	2 (M4	4x13)	2 (M4x13)		2 (M4x13)	
		Installation manual		n manual			
Installation restr	Installation restriction		Installation with "Guard net" "Wind guard" or is not available Installation with "Guard net" is not available				
Safety wire rope for overturning preven- tion (optional parts)				ASG-S	W20A		

2.7.2 Optional parts and installation RAS-3HVNPE / RAS-(4-6)H(V)NCE

♦ Air flow guide wind guard and snow protection hood

Optional parts			Model	
Air flow guide			AG-335A	1 2
Wind guard			WSP-335A	
		Air outlet	ASG-NP335F	
	Zina plata	Air inlet of rear side	ASG-NP80B	
	Zinc plate	Air inlet of side face	ASG-NP80L	
		Air outlet	ASG-NP335F52	
		Air inlet of rear side	ASG-NP160BS2	3
Snow protection hood	Stainless plate (SUS304)	Air inlet of side face	ASG-NP160LS2	 Air flow guide Wind Guard Snow protection hood

Air flow guide

Specifications

opeointeation		
Model	AG-335A	
Quantity	1 per unit	620 A-A
Air discharge direction	Upward (downward) left & right	
Material	Weather proof polypropylene resin	- A 30.0
Color	Gray	
Weight	1.9 kg	
Accessories	Fixing screw x 4 [M5 (SUS) x 20] Installation manual	
Installation restriction	"Wind Guard" or "Snow protection hood" is not available to install with air flow guide. ("Guard net" is available to be installed together.)	 1 Mounting dimension 2 Air flow guide

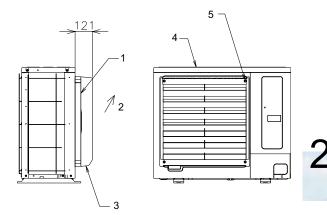
Attaching example of air flow guide

- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.

• If the air guide is installed without discharge grille it may cause injury due to rotating fan.

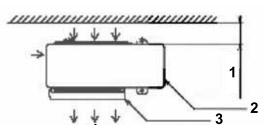
One flow guide installation

- 1 Air discharge grille
- 2 Air flow
- 3 Air flow guide
- 4 Outdoor unit
- 5 M5 fixing screw x4 (Accessories)



Service space (In case of upward air discharge)

- In case of right and left sides air discharge enough space for air discharge is required.
- The downward air discharge is also available. In such case install the base under the unit to secure enough space for air discharge.
- In case of serial units installation air discharge should be upward.
- 1 Min. 200 mm
- 2 Outdoor unit
- 3 Air flow guide
- 4 Passage side



Wind guard

Specifications

-		
Model	WSP-335A	
Quantity	1per unit	[++]
Material	Galvanized sheet metal + baked painting	
Color	Gray (1.0Y8.5/0.5)	
Weight	5.5 kg	
Accessories	Fixing screw x 4 [M5 (SUS) x 12] Installation manual	
Installation restriction	"Guard net" "Air flow guide" or "Snow protection hood" is not available to install with Wind guard	2 3 1 1 1 1 1 1 1 1 1 1 1 1 1

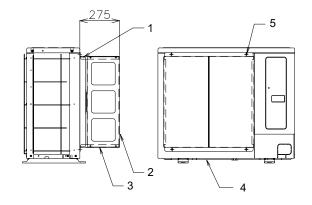
Attaching example of air wind guard

- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.

• If the air guide is installed without discharge grille it may cause injury due to rotating fan.

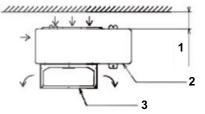
One windguard cover installation

- 1 Air discharge grille
- 2 Wind guard
- 3 Air discharge grille
- 4 Outdoor unit
- 5 M5 fixing screw x4 (Accessories)



Service space

- Both sides of the outdoor unit should be open.
- No obstacles should be placed in the air discharge side.
- 1 Min. 200 mm
- 2 Outdoor unit
- 3 Wind guard

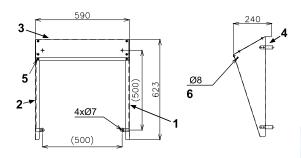


2

Snow protection hood

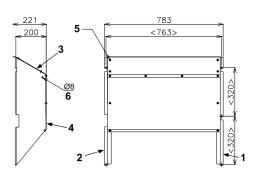
Air discharge hood

N°	Part name	Quantity	
1	Right side plate	1	
2	Left side plate	1	
3	Front panel	1	
4	Stay 4		
5	Fixing screw (Accessories)		
6	Hole for safety wire rope to prevent overturning		



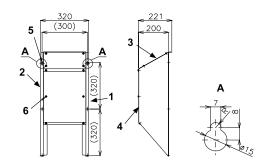
Rear suction hood

N°	Part name	Quantity	
1	Right side plate	1	
2	Left side plate	1	
3	Upper front panel (Upside)	1	
4	Upper front panel (Downside) 1		
5	Fixing screw (Accessories)		
6	Hole for safety wire rope to prevent overturning		

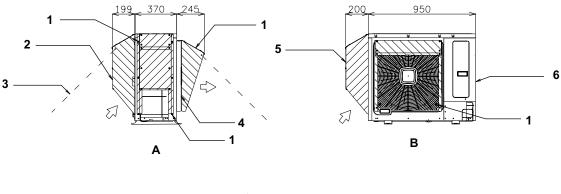


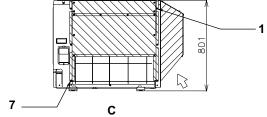
Left suction hood

N°	Part name	Quantity	
1	Right side plate	1	
2	Left side plate	1	
3	Front panel (Upside) 1		
4	Front panel (Downside) 1		
5	Fixing hole x 2		
6	Fixing screw (Accessories)		
Α	Enlarged view of A (Fixing Hole)		



Attaching example of snow protection hood





- 1. Fixing screw (Accessories).
- 2. Rear suction hood
- 3. Wire rope (Optional. For overturning protection)
- 4. Air discharge grille
- 5. Left suction hood
- 6. Air discharge hood
- A. Left side
- B. Front side
- C. Rear side

Specifications of snow protection hood

•	•							
Produc	ct name	Air discharge hood		Rear suction hood		Left suction hood		
Mc	odel	ASG-NP335F ASG-NP335FS2		ASG-NP80B	ASG-NP160BS2	ASG-NP80L	ASG-NP160LS2	
Qua	antity	2 p	er unit		1 pe	r unit		
Mat	terial	Bonderized steel sheet	Stainless	Bonderized steel sheet	Stainless (NSSC 180)	Bonderized steel sheet	Stainless (NSSC 180)	
		Iron	(NSSC 180)	Iron	100)	Iron	100)	
Co	blor	Gray (1.0Y8.5/0.5 or approximation)	_	Gray (1.0Y8.5/0.5 or approximation)	—	Gray (1.0Y8.5/0.5 or approximation)	—	
We	Weight 3 kg		14 kg 8 kg			٩g		
Asse	mbling			Knockingdown parts (assembled at field)				
Components	Hood	For oir diag	For air discharge part x 1		For rear side air intake x 1		For left side air intake x 1	
Components	HOOU		narge part x 1	(Upper side x 1 lowe side x 1)				
	Unit Fixing screw	4 (M5x12 ta	apping screw)	5 (M5x14 tapping screw)		6 (M5x12 tapping screw)		
	Unit Fixing screw (SUS)	6 (M5x12 tapping screw)	6 (M5x14)	12 (M5x12 tapping screw)	12 (M5x14)	10 (M5x12 tapping screw)	10 (M5x14)	
		Installation			n manual			
Installation	n restriction	Installation with "Guard net" or "Wind guard" is not available			Installation with "Guar	rd net" is not available		
	e for overturning optional parts)			ASG-S	W20A			

2.7.3 Optional parts and installation RAS-(4-6)H(V)NPE / RAS-(8-10)HN(P/C)E

♦ Air flow guide wind guard and snow protection hood

	Optiona	al parts	Model	
Air flow guide			AG-335A X 2	1 ~ 2 ~
Wind guard			WSP-335A X 2	
Zinc plate	Air outlet ASG-NP335F X 2			
	Zinc plate Air inlet of rear side	ASG-NP280B		
		Air inlet of side face	ASG-NP280L	
		Air outlet	et ASG-NP335FS 2X 2	
	Air inlet of rear side	ASG-280BS2	3	
Snow protection hood	Stainless plate (NSSC 180)	Air inlet of side face	ASG-NP280LS2	 Air flow guide Wind Guard Snow protection hood

♦ Air flow guide

Specifications

Model	AG-335A	Image
Quantity	2 per unit	620 A-A
Air discharge direction	Upward (downward) left & right	1 1 1
Material	Weather proof polypropylene resin	
Color	Gray	
Weight	1.9 kg	
Accessories	Fixing screw x 4 [M5 (SUS) x 20] Installation manual	
Installation restriction	"Wind Guard" or "Snow protection hood" is not available to install with air flow guide. ("Guard net" is available to be installed together.)	 Mounting dimension Air flow guide

Attaching example of air flow guide

- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.

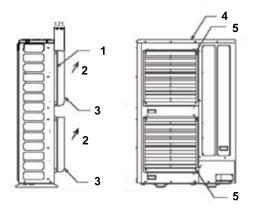
• If the air guide is installed without discharge grille it may cause injury due to rotating fan.

Two flow guides installation

- 1 Air discharge grille
- 2 Air flow
- 3 Air flow guide (see the note)
- 4 Outdoor Unit
- **5** M5 fixing screw x4 (Accessories)

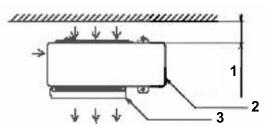


• Air flow direction of both air flow guides should be the same.



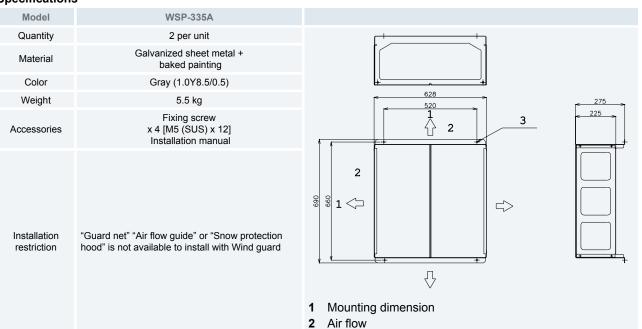
Service space (In case of upward air discharge)

- In case of right and left sides air discharge enough space for air discharge is required.
- The downward air discharge is also available. In such case install the base under the unit to secure enough space for air discharge.
- In case of serial units installation air discharge should be upward.
- 1 Min. 200 mm
- 2 Outdoor unit
- 3 Air flow guide
- 4 Passage side



Wind guard

Specifications



Attaching example of air wind guard

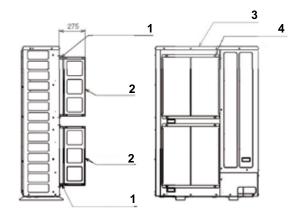
- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.



If the air guide is installed without discharge grille it may cause injury due to rotating fan.

Two windguard covers installation

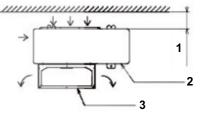
- 1 Air discharge grille
- 2 Wind guard
- 3 Outdoor unit
- 4 M5 fixing screw x4 (Accessories)



Inspire the Next

Service space

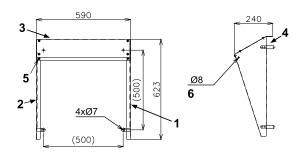
- · Both sides of the outdoor unit should be open.
- No obstacles should be placed in the air discharge side.
- 1 Min. 200 mm
- 2 Outdoor unit
- 3 Wind guard



Snow protection hood

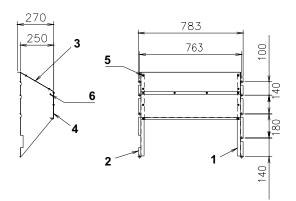
Air discharge hood

N°	Part name	Quantity	
1	Right side plate	1	
2	Left side plate	1	
3	Front panel	1	
4	Stay 4		
5	Fixing screw (Accessories)		
6	Hole for safety wire rope to prevent overturning		



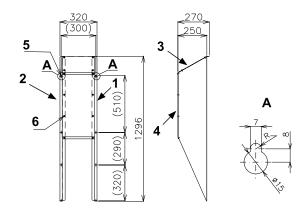
Rear suction hood

N°	Part name	Quantity	
1	Right side plate	1	
2	Left side plate 1		
3	Upper front panel (Upside) 1		
4	Upper front panel (Downside) 1		
5	Fixing screw (Accessories)		
6	Hole for safety wire rope to prevent overturning		

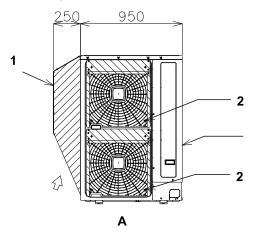


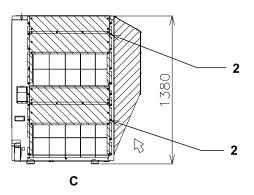
Left suction hood

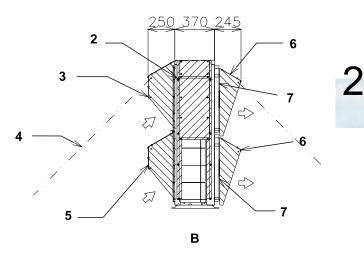
N°	Part name	Quantity	
1	Right side plate	1	
2	Left side plate	1	
3	Front panel (Upside) 1		
4	Front panel (Downside) 1		
5	Fixing hole x 2		
6	Fixing screw (Accessories)		
Α	Enlarged view of A (Fixing Hole)		



Attaching example of snow protection hood







- 1. Left suction hood
- 2. Fixing screw (Accessories)
- 3. Rear suction hood Upper side
- 4. Wire rope (Optional. For overturning protection)
- 5. Rear suction hood Lower side
- 6. Air discharge hood
- 7. Air discharge grille
- 8. Air discharge grille
- A. Front side
- B. Left side
- C. Rear side

Specifications of snow protection hood

Product nan	ne	Air discha	arge hood	Rear suction hood		Left suction	Left suction hood	
Model		ASG-NP335F ASG-NP335FS2		ASG-NP280B	ASG-NP280BS2	ASG-NP280L	ASG- NP280LS2	
Quantity		2 pe	2 per unit		1 per unit			
Material		Bonderized steel sheet Iron	Stainless (NSSC 180)	Bonderized steel sheet Iron	Stainless (NSSC 180)	Bonderized steel sheet Iron	Stainless (NSSC 180)	
Color		Gray (1.0Y8.5/0.5 or approximation)	—	Gray (1.0Y8.5/0.5 or approximation)	—	Gray (1.0Y8.5/0.5 or approximation)	_	
Weight	Weight		3 kg 14 kg 8		8 kg	3 kg		
Assembling	9		l	Knockingdown parts (assembled at field)				
Components	Hood	For air disch	For air discharge part x 1		air intake x 1 I lowe side x 1)	For left side air intake x 1		
	Fixing screw	4 (M5x12 ta)	oping screw)	11 (M5x14 tapping screw)		8 (M5x12 tapping screw)		
	Fixing screw (SUS)	6 (M5x14 tapping screw)	6 (M5x14)	24 (M5x14 tapping screw)	24 (M5x14)	12 (M5x12 tapping screw)	12 (M5x14)	
				Installation	manual			
Installation restr	Installation restriction Installation with "Guard net" "Wind guard" or "Air flow guide" is not available		Ir	stallation with "Guard	net" is not available			
Safety wire rope for overturning preven- tion (optional parts)		ASG-SW	/20A					

2.7.4 Optional parts and installation RAS-12HN(P/C)

♦ Air flow guide wind guard and snow protection hood

Optional parts			Model	
	Air flow guide			1 2
	Wind g	guard	WSP-335A X 2	
		Air outlet	ASG-NP335F X 2	
	Zinc plate	Air inlet of rear side	ASG-NP335B	
		Air inlet of side face	ASG-NP335L	
		Air outlet	ASG-NP335FS2 X 2	
		Air inlet of rear side	ASG-335BS2	3
Snow protection hood	Strainless plate(NSSC 180)	Air inlet of side face	ASG-NP335LS2	
				 Air flow guide Wind Guard
				3 Snow protection hood

Air flow guide

Specifications

Model	AG-335A	
Quantity	2 per unit	620 A-A
Air discharge direction	Upward (downward) left & right	
Material	Weather proof polypropylene resin	
Color	Gray	
Weight	1.9 kg	
A	Fixing screw x 4 [M5 (SUS) x 20]	
Accessories	Installation manual	
Installation restriction	"Wind Guard" or "Snow protection hood" is not available to install with air flow guide. ("Guard net" is available to be installed together.)	 1 Mounting dimension 2 Air flow guide

Attaching example of air flow guide

- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.

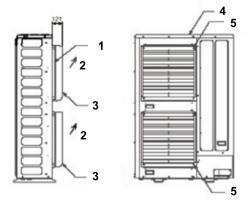
• If the air guide is installed without discharge grille it may cause injury due to rotating fan.

Two flow guides installation

- 1 Air discharge grille
- 2 Air flow
- 3 Air flow guide (see the note)
- 4 Outdoor Unit
- **5** M5 fixing screw x4 (Accessories)

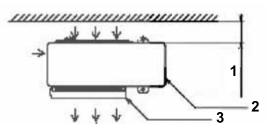


Air flow direction of both air flow guides should be the same.



Service space (In case of upward air discharge)

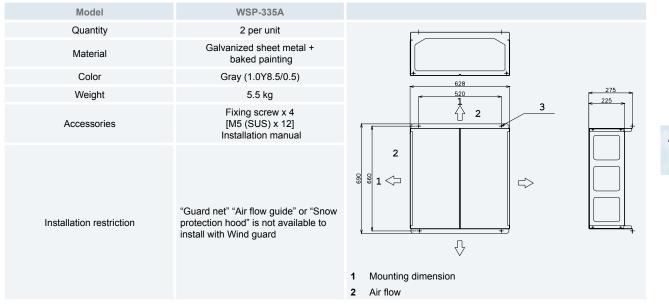
- In case of right and left sides air discharge enough space for air discharge is required.
- The downward air discharge is also available. In such case install the base under the unit to secure enough space for air discharge.
- In case of serial units installation air discharge should be upward.
- 1 Min. 200 mm
- 2 Outdoor unit
- 3 Air flow guide
- 4 Passage side



• Wind guard

Specifications

Inspire the Next



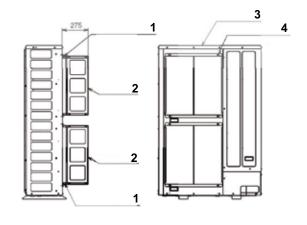
Attaching example of air wind guard

- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.

If the air guide is installed without discharge grille it may cause injury due to rotating fan.

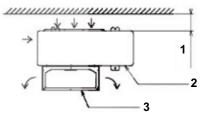
Two windguard covers installation

- 1 Air discharge grille
- 2 Wind guard
- 3 Outdoor unit
- 4 M5 fixing screw x4 (Accessories)



Service space

- Both sides of the outdoor unit should be open.
- No obstacles should be placed in the air discharge side.
- 1 Min. 200 mm
- 2 Outdoor unit
- 3 Wind guard



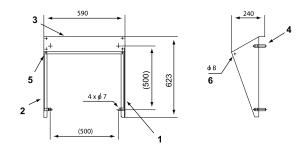
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SMGB0079 rev.0 - 01/2013

Snow protection hood

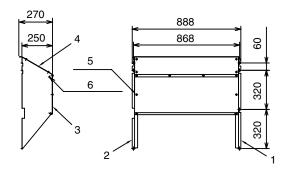
Air discharge hood

N°	Part name	Quantity			
1	Right side plate 1				
2	Left side plate	1			
3	Front panel	1			
4	Stay	4			
5	Fixing screw (Accessories)				
6	Hole for safety wire rope to prevent overturning				



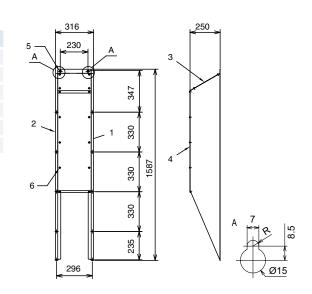
Rear suction hood

N°	Part name	Quantity			
1	Right side plate 1				
2	Left side plate	1			
3	Upper front panel (Downside)	1			
4	Upper front panel (Upside)	1			
5	Fixing screw (Accessories)				
6	Hole for safety wire rope to prevent overturning				



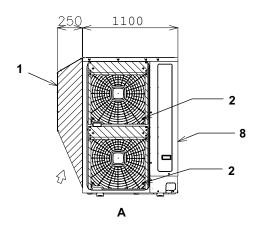
Left suction hood

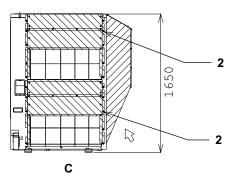
N°	Part name	Quantity		
1	Right side plate	1		
2	Left side plate	1		
3	Front panel (upside)	1		
4	Front side (downside)	1		
5	Fixing hole x 2			
6	Fixing screw (Accessories)			

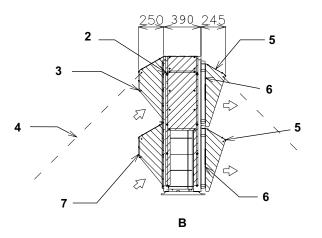


2

Attaching example of snow protection hood







- 1. Left suction hood
- 2. Fixing screw (Accessories)
- 3. Rear suction hood Upper side
- 4. Wire rope (Optional. For overturning protection)
- 5. Air discharge hood
- 6. Air discharge grille
- 7. Rear suction hood Lower side
- 8. Outdoor unit
- A. Front side
- B. Left side
- C. Rear side

Specifications of snow protection hood

Product name		Air discharge hood		Rear suction hood		Left suction hood		
Model		ASG-NP335F	ASG-NP335FS2	ASG-NP335B	ASG-NP335BS2	ASG-NP335L	ASG- NP335LS2	
Quantity		2 per unit		1 per unit				
Material		Bonderized steel sheet Stainless (NSSC180) Iron		Bonderized steel sheet Iron	Stainless (NSSC180)	Bonderized steel sheet Iron	Stainless (NSSC180)	
Color		Gray (1.0Y8.5/0.5		Gray (1.0Y8.5/0.5 or approximation)	-	Gray (1.0Y8.5/0.5 or approximation)	-	
Weight		3	kg	14 kg 8 kg				
Assembling		Knockingdown parts (assembled at field)						
Components Hood		For air discherge part x 1		For rear side air intake x 1		For left side air intake x 1		
Componente	Hood			(Upper side x 1 lowe side x 1)				
	Fixing screw	4x(M5x12 ta	apping screw)	10x (M5x14 I tapping screw)		8x (M5x12 I tapping screw)		
	Fixing screw (SUS)	6x (M5x12 I tap- ping screw) 6x (M5x14 I)		24x (M5x14 I tapping screw)	24x (M5x14I)	14x (M5x12 tap- ping screw)	14x (M5x14)	
			Installation manual					
Installation restriction		Installation with "Guard net" "Wind guard" or "Air flow guide" is not available Installation with "Guard net" is not available						
Safety wire rope for overt tion (optional particular)		ASG-SW20A						

3

3. Piping work and refrigerant charge

Index

3.1.	Gener	al notes before performing pipe work	52
	3.1.1.	Piping Materials	52
	3.1.2.	Three principles on refrigerant piping work	54
	3.1.3.	Suspension of refrigerant piping	54
	3.1.4.	Brazing work	55
3.2.	Piping	connection for outdoor unit	56
	3.2.1.	RAS-(2-2.5)HVNP / RAS-3HVNC	56
	3.2.2.	RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / RAS-12HN(P/C)	57
	3.2.3.	Outdoor unit stop valve	60
3.3.	Refrig	erant piping range	62
	3.3.1.	Refrigerant piping length	62
	3.3.2.	Piping system for header branch	62
	3.3.3.	Piping system for line branch	65
	3.3.4.	Combinations of piping size and piping length	66
	3.3.5.	Refrigerant piping size and multikit/distributor selection	67
	3.3.6.	System installation	70
	3.3.7.	Connecting flare adapter	71
3.4.	Refrig	erant charge	72
	3.4.1.	Caution of the pressure by check joint	73
	3.4.2.	Refrigerant charge quantity	74
3.5.	Cautio	on in case of refrigerant leakage	78
	3.5.1.	Maximum permitted concentration of hydrofluorocarbon (HFC)	78
	3.5.2.	Calculation of refrigerant concentration	78
	3.5.3.	Countermeasure for refrigerant leakage	78
3.6.	Piping	work for compatibility with the piping of current installations where is used R22 or R407C.	79
	3.6.1.	Installation procedure for existing pipes	79
	3.6.2.	When existing Air-Conditioner is a product of another manufacturer	79
	3.6.3. (Pipe le	Permissible range for existing Air-Conditioning Pipes ength in the case of "without cleaning process"	80
	3.6.4.	Renewal kit selection model	81
3.7.	Drain	piping	85
	3.7.1.	Drain discharging boss	85

3.1 General notes before performing pipe work

3.1.1 Piping Materials

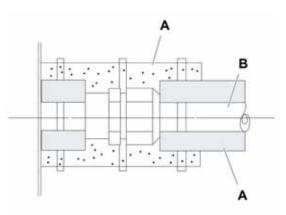
1 In order to avoid supply problems in terms of local regulations and quality, prepare locally-supplied copper pipes.

inote

In case of using copper pipes for piping sections bigger than Ø19.05 mm (3/4 inches), flaring work cannot be performed. If necessary, use a joint adapter.

- 2 Select the piping size with the correct thickness and correct material able to withstand sufficient pressure.
- 3 Select clean copper pipes. Make sure there is no dust and moisture inside. Blow the inside of the pipes through with oxygen-free nitrogen to remove any dust and foreign materials before connecting pipes.
- 4 After connecting the refrigerant piping, seal the open space between the knockout hole and refrigerant pipes by using insulation material as shown below:
- A. Insulator material.
- B. Field-supplied refrigeration pipe.

- Do not use saws, grindstones or other tools which cause copper powder.
- When cutting pipes, secure the part for brazing in accordance with both national and local regulations.
- Use security glasses and gloves for cutting or welding works.



Piping Connection

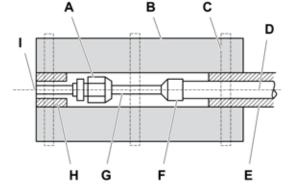
When connecting liquid piping for units with piping longer than 15 meters, apply a piping size of Ø9.52 mm (3/8 inches). Fix the connecting pipe as shown in the following figure using the insulation attached to the Indoor Unit.

- A. Use the flare nut of the indoor unit.
- B. Insulate this part with the attached insulation.
- C. Fix this part with the attached cord band or with tape.
- D. Field-supplied refrigerant piping.
- E. Field-supplied insulation.
- F. Brazing.

G. Make flares after attaching flare nut to the connecting pipe in the Multi-kit package.

H. Insulation attached to indoor unit.

I. Indoor unit.





- A system with no moisture or oil contamination will give maximum performance and lifecycle compared to a poorly prepared system. Take particular care to ensure that all copper piping is clean and dry internally.
- To ensure this, blow oxygen-free nitrogen through the pipes.

\triangle caution

- Cap the end of the pipe when pipe is to be inserted through a wall hole.
- Do not put pipes on the ground directly without a cap or vinyl tape at the end of the pipe.



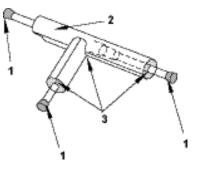
- If piping installation is not completed until next day or over a longer period of time, braze off the ends of the
 piping and charge with oxygen free nitrogen through a Schrader valve type access fitting to prevent moisture
 and particle contamination.
- Do not use insulation material that contains NH3, as it can damage copper pipe material and become a source of future leakage.
- Insulate the unions and flare-nuts at the piping connection part completely.
- Completely insulate both refrigerant gas and liquid piping between the indoor unit and the outdoor unit to avoid a decrease of performance; if not, dew will occur on the piping surface.
- Refrigerant circuit and Water circuit must be performed and inspected by a licensed technician and must comply with all relevant European and national regulations.
- Insulation

Attach the pipe insulation to each branch using vinyl tape. Attach also insulation to field supplied pipes in order to prevent the capacity decrease according to the ambient air conditions and dewing on the low pressure pipe surface.

- 1. Cap.
- 2. Field supplied insulation.
- 3. Do not make a gap.



When polyethylene foam is applied, it is recommended the usage of a wall thickness of 10 mm for the liquid piping and 15 mm to 20 m for the gas piping.



- Perform the insulation work after the pipe surface temperature decreases to the room temperature, if not the insulation material may melt.
- If the ends of the piping system are open after ending the piping work, attach caps or vinyl bags securely to the ends of the piping, avoiding moisture and dust entering.

3.1.2 Three principles on refrigerant piping work

In case of using refrigerant R410A in the refrigeration cycle, the refrigeration oil should be of a synthetic type one.

In order to avoid oxidation, pay much careful attention to basic piping work control to avoid infiltration of moisture or dust during the refrigerant piping work.

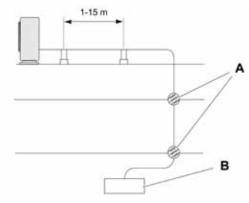
daming the reingeral			
Three principles	Cause of failure	Presumable failure	Preventive action
	 Water infiltration due to insufficient protection at pipe ends 	Icing inside tube at ex. valve (Water choking)	Pipe protection 1 Pinching
	 Dewing inside of pipes Insufficient vacuum pumping 	+ Generation of hydration and oxida-	2 Taping
1. Dry	time	tion of oil ↓	Flushing
Keep good dryness		Clogged strainer, etc., insulation failure and compressor failure	↓ Vacuum Drying • One gram of water turns into gas (approx. 1000 lrs) at 1 Torn • Therefore, it takes long time to vacuum-pump by a small vacuum pump
2. Clean No dust inside of pipes	 Infiltration of dust or other through the pipe ends. Oxidation film during brazing without blowing nitrogen. Insufficient flushing by nitrogen after brazing 	Clogging of expansion valve, capil- lary tube and filter →Oxidation of oil →Compressor failure ↓ Insufficient cooling or heating com- pressor failure	Pipe Protection 1 Mounting Caps 2 Taping 3 Pinching ↓ Flushing
3. No leakage No leakage shall exist	 Brazing failure Failed flaring work and insufficient torque of squeezing flare Insufficient torque of squeezing flanges 	Refrigerant shortage →Performance decrease →Oxidation of oil →Overheating of compressor ↓ Insufficient cooling or heating com- pressor failure	Careful Basic Brazing Work ↓ Basic Flaring Work ↓ Basic Flange Connecting Work ↓ Air Tight Test ↓ Holding of Vacuum

3.1.3 Suspension of refrigerant piping

Suspend the refrigerant piping at certain points and prevent the refrigerant piping from touching weak parts of the building such as walls, ceiling, etc. (If touched, abnormal noises may occur due to the vibration of the piping. Pay special attention in case of short piping length).

A. Fire-proof section treatment.

B. Indoor unit.



In order to fix the piping to wall or ceilings use suspension and clamping systems as shown in the following figure.



SMGB0079 rev.0 - 01/2013

3.1.4 Brazing work

The most important work in the refrigerant piping installation work is the brazing of the pipes. If it accidentally occurs a leakage due to a careless brazing process, it will cause clogged capillary pipes or serious compressor failure.

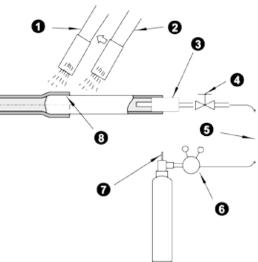
In order to guarantee a proper brazing neck between different pipes surfaces, accurate pipe dimensions after the expansion process (see the table below):

It is important to control the clearance of the pipe fitting portion as shown below. In the case that a cooper tube expansion jig is used, following dimensions should be secured.

9 2											
Copper p	oipe size	Ø	11	Gap	а	Copper p	oipe size	Ø	11	Gap	а
Ø6.35	+0.08	ac e	+0.1	0.33	6	Ø22.22	+0.09	Ø22.42	+0.1	0.39	10
0.35	-0.08	Ø6.5	0	0.07	0	WZZ.ZZ	-0.09	Ø22.42	0	0.11	10
Ø9.52	+0.08	Ø9.7	+0.1	0.35	8	Ø25.4	+0.12	Ø25.6	+0.1	0.42	12
Ø9.52	-0.08	09.7	0	0.09	0	Ø25.4	-0.12		0	0.08	
Ø12.7	+0.08	Ø12.9	+0.1	0.38	8	Ø28.58	+0.12	Ø28.78	+0.1	0.42	12
012.7	-0.08	012.9	0	0.19	0	020.00	-0.12		0	0.08	
Ø15.88	+0.09	Ø16.1	+0.1	0.41	8	Ø31.75	+0.12	Ø32.0	+0.1	0.47	12
Ø15.00	-0.09	010.1	0	0.13	0	\$31.75	-0.12		0	0.13	
Ø19.05	+0.09	Ø10.2	+0.1 0.44	0.44	10	G 20 4	+0.12	Ø38.3	+0.1	0.52	14
19.05	-0.09	Ø19.3	0	0.16	10	Ø38.1	-0.12		0	0.18	

A basic brazing method is shown below.

- 1. Pre-heat the outer tube for better flowing of the filler metal.
- 2. Heat inner side tube evenly.
- 3. Rubber plug.
- 4. Packless valve.
- 5. High pressure hose.
- 6. 0.03 to 0.05 MPa (0.3 to 0.5 Kg/cm² G).
- 7. Reducer valve: open this valve only when the gas is needed.
- 8. Nitrogen gas flow 0.05 m³/h or smaller.



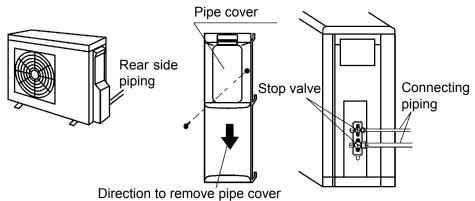


- Use nitrogen gas for blowing during pipe brazing. If oxygen, acetylene or fluorocarbon gas is used, it will cause an explosion or poisonous gas.
- During the brazing work, a lot of oxidation film will be generated inside of the pipes if no oxygen-free nitrogen gas is blown through the pipes. This film will be flecked off after operation and will circulate in the refrigeration cycle, resulting in clogged expansion valves, etc. This could origin problems in the compressor.
- Use a reducer valve when nitrogen gas blowing is performed during brazing. The gas pressure should be maintained within 0.03 to 0.05 MPa. If an excessively high pressure is applied to a pipe, it could origin an explosion.

3.2 Piping connection for outdoor unit

3.2.1 RAS-(2-2.5)HVNP / RAS-3HVNC

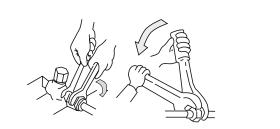
1 Take the piping cover away from the unit. Then fetch the pipes through the rear side and route piping according to the installation place as shown in the figure. Make holes by cutting along the guideline at the rear of the cover or punching with a driver. Remove the burr with a cutter, and place a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

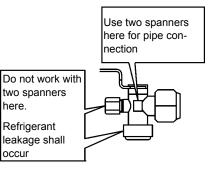


- 2 Attach the pipe cover in order to prevent rainwater from entering inside the cabinet.
- 3 Use a pipe bender for pipe bending work when connecting pipes.
- 4 Check to ensure that the stop valves are completely closed before connecting pipes.
- **5** Connect the field supplied refrigerant pipes to the indoor unit and outdoor unit. Apply the oil thinly at the seat flare nut and pipe before tightening.

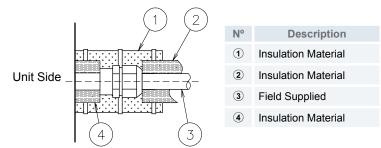
The required tightening torque is as follows:

Pipe Size	Tightening Torque (Nm)
Ø 6.35 mm (1/4)	20
Ø 9.52 mm (3/8)	40
Ø 12.70 mm (1/2)	60
Ø 15.88 mm (5/8)	80
Ø 19.05 mm (3/4)	100





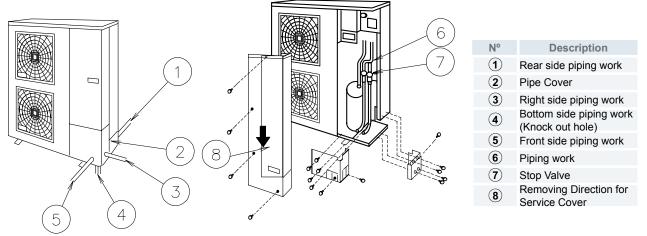
6 After connecting the refrigerant piping, seal the open space between knockout hole and refrigerant pipes by using insulation material.



7 Operation of stop valve should be performed according to the Outdoor unit stop valve explanation.

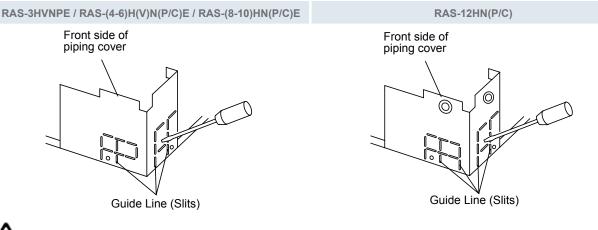
3.2.2 RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E / RAS-(8-10)HN(P/C)E / RAS-12HN(P/C)

1 The pipes can be connected from 4 directions. Make holes in the piping cover or cabinet for taking out pipes.



(picture as example)

Take the piping cover away from the unit and make holes by cutting along the guideline at the rear of the cover or punching with a driver. Remove the burr with a cutter and place a insulation (field supplied) to protect cables and pipes.



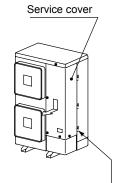
\triangle caution

Notes to open/close the service cover:

- Remove the screws following the instructions to the above figure.
- Slowly press down the cover.

NOTE

Hold the cover with a hand to remove screws as the cover may fall down.

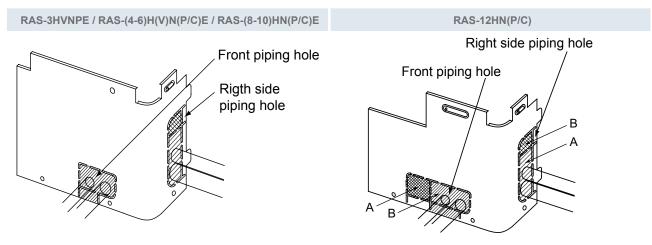


Hook (three places): two fans Hook (two places): one fan

(picture as example)

For the front and side piping

Select the correct knock-out size depending on whether it is for power wiring or transition wiring

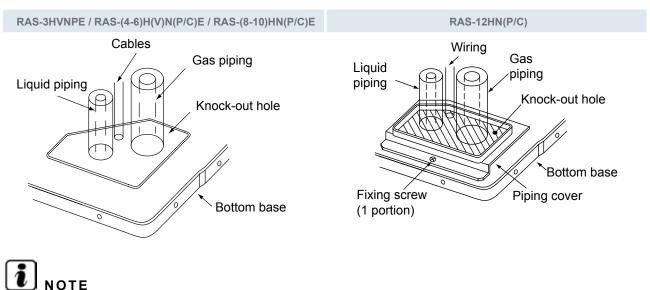


To use racking or conduit tubes, check the size and remove more part following the slit.

INOTE Place insulation (field supplied) to protect cables and pipes from being damaged by plate edges.

• For the downward piping

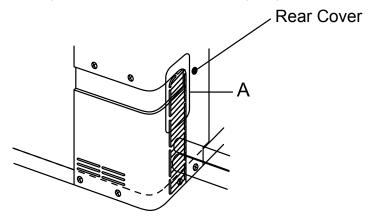
After removing the bottom of the piping cover, perform piping and wiring works.



Cables shall not contact directly to the pipes.

• For the rear side piping

After removing the rear-side piping cover, punch out the "A" holes along the guide line.



i NOTE

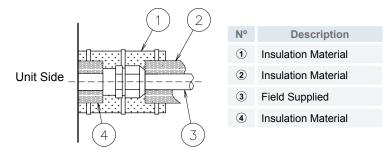
Remove the rear pipe cover under the rear cover and remove ZZZZ part following the slit.

- 2 Mount the piping cover in order to avoid water entering into the unit. Seal the holes where pipes and wires are inserted, by using insulation (field-supplied).
- 3 If the field-supplied piping is connected with stop valves directly, it is recommended to use a tube bender.
- 4 Check to ensure that the stop valves are completely closed before connecting pipes.
- 5 Connect the field supplied refrigerant pipes to the indoor unit and outdoor unit. Apply the oil thinly at the seat flare nut and pipe before tightening.

The required tightening torque is as follows:

Pipe Size	Tightening Torque (Nm)
Ø 6.35 mm (1/4)	20
Ø 9.52 mm (3/8)	40
Ø 12.70 mm (1/2)	60
Ø 15.88 mm (5/8)	80
Ø 19.05 mm (3/4)	100

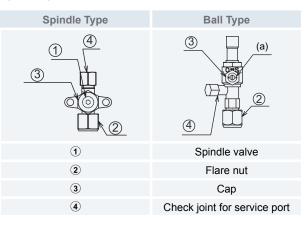
6 After connecting the refrigerant piping, seal the open space between knockout hole and refrigerant pipes by using insulation material.



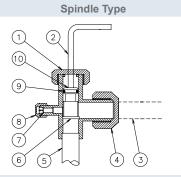
7 Operation of stop valve should be performed according to the Outdoor unit stop valve explanation.

3.2.3 Outdoor unit stop valve

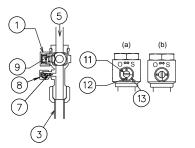
- 1 Remove the stop valve cap before performing the air tight test after connecting the flare nut. Tighten the spindle valve in clockwise according to the following table "Tightening Torque of Stop Valves."
- 2 Tighten the flare nut according the specified torque. If the tightening torque is excessive, it may cause refrigerant leakage from the spindle part.
- 3 Perform the air tight test after the tightening work. It is more effective to perform this work after fix the flare nuts for the piping connection to the stop valves.
- 4 Use the charging hose for the check joint connection. When removing the charging hose from the check joint, a sound may be heard by a small quantity of refrigerant leak. However it is not abnormality. Do not apply excessive force to the end of opening the spindle. (Tightening Torque: < 5.0N-m)



				Tightening 1	Forque (Nm)				
Outdoor unit	(1)	(2)	(3	4		
	Gas valve	Liquid valve	Gas valve	Liquid valve	Gas valve	Liquid valve	Gas valve	Liquid valve	
RAS-(2-2.5)HVNP	7-9	7-9	33-42	33-42	33-42	33-42	14-18	14-18	
RAS-3HVNC RAS-3HVNPE	9-11	7-9	68-82	33-42	33-42	33-42	14-18	14-18	
RAS-(4-6)H(V)NCE	9-11	7-9	68-82	33-42	33-42	33-42	14-18	14-18	
RAS-(4-6)H(V)NPE	-	7-9	68-82	33-42	20-25	33-42	14-18	14-18	
RAS-8HN(P/C)E	-	7-9	100-120	33-42	20-25	33-42	14-18	14-18	
RAS-10HN(P/C)E	-	7-9	100-120	50-62	20-25	33-42	14-18	14-18	
RAS-12HN(P/C)	-	7-9	100-120	50-62	12-14	33-42	12-14	14-18	

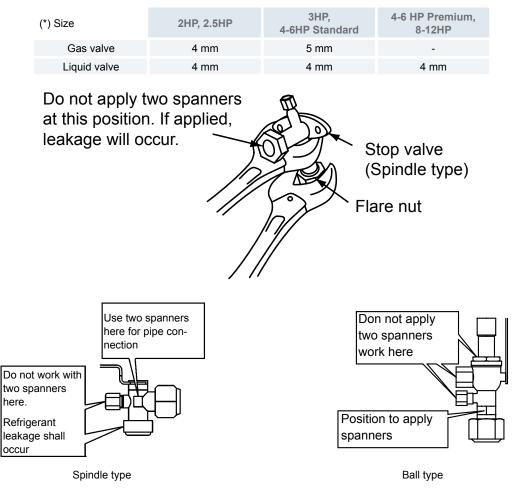






N٥	Description	Remarks
1	Сар	
2	Allen wrench	Hex 4 mm *
3	Refrigerant Piping	Field Supplied
4	Flare nut	
5	Refrigerant Pressure	To Outdoor Unit
6	Seat Surface	Fully closed position
7	Check Joint	Only the charging those can be connected
8	Charge port cap	
9	O-Ring	Rubber
10	Spindle valve	Open – Counterclockwise Close – Clockwise
11	Shaft	
12	Pin	
13	Stopper	
(a)	Closed	This valve is opened or closed with rotating 90 degrees at the ball valve part. Rotate the shaft until the pin touches the stopper. Do not apply the
(b)	Opened	extra force. Use a slotted screwdriver to control the shaft. Do not leave the ball valve partly open

Hexagonal wrench size used for spindle valve:





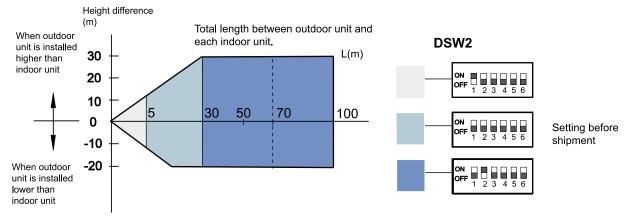
- At the test run, fully open the spindle and ball stop valve.
- If not fully opened, the devices will be damaged.
- Do not attempt to turn service valve rod beyond its stop.
- Do not loosen the stop ring. If the stop ring is loosened, it is dangerous since the spindle will hop out.
- An excess or a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

3.3 Refrigerant piping range

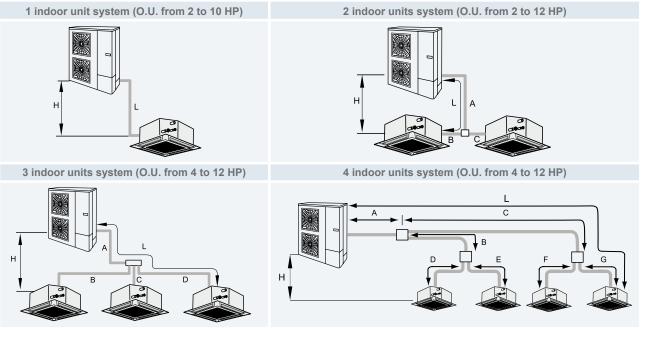
3.3.1 Refrigerant piping length

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

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



3.3.2 Piping system for header branch



(pictures are as example)

3

Maximum refrigerant piping length

IVX Premium series

											(m)		
Outdoor Unit						4HP	5HP	6HP	8HP	10HP	12HP		
Maximum piping length	um piping length Actual Length (L)				50			75			100		
between the outdoor uni	it												
and the farthest indoor		Equivalent Length (EL)		70			95		125				
unit													
	2 u	nits (A+B+C)	4	50	60		85		100	11	5		
Total piping length	3 u	nits (A+B+C+D)			60		95		100	13	30		
fotal piping longth	4 u	nits					95		100	1/	15		
	(A	+B+C+D+E+F+G+)					90		100 145		i O		
Maximum piping line	2 a	nd 3 units (B, C, D)	10			10			15				
after first branch	4 u	nits				10			15				
arter mot branen	(B-	+D, B+E, C+F, C+G)					10			15			
Main piping length A						A > B	, C, D, E	, F, G					
Maximum height differen	nce												
Outdoor / Indoor (H)							30 / 20						
(Outdoor Unit is Higher	Lo	wer.)											
Maximum height differer	nce	Indoor / Indoor		3				10					
Maximum height differen	Maximum height difference:												
branch pipe/Indoor (2,3 a					3								
branch pipe/branch pipe													
(B-C) / (B-D) / (C-D) / (C+					< 8								
(C+F)-(B+E) / (C+F)-(B+D))						~0						

IVX Standard series

								(m)	
Outdoor Unit		3HP	4HP	5HP	6HP	8HP	10HP	12HP	
Maximum piping length	Actual Length (L)	50	50 70 75						
between the outdoor un	it								
and the farthest indoor	the farthest indoor Equivalent Length (EL)			9	5		125		
unit									
	2 units (A+B+C)			8	5	100	115		
Total piping length	3 units (A+B+C+D)		90	9	5	100	130		
Total piping length	4 units		90	9	F	100	145		
	(A+B+C+D+E+F+G+)		90	9	5	100	145		
Maximum piping line	2 and 3 units (B, C, D)		1		15				
after first branch	4 units		10				15		
alter first branch	(B+D, B+E, C+F, C+G)			10			15		
Main piping length A				A > [B, C, D, E,	F, G			
Maximum height differe	nce								
Outdoor / Indoor (H)					30 / 20				
(Outdoor Unit is Higher	/ Lower.)								
Maximum height differe	nce Indoor / Indoor				3				
Maximum height differe	nce:								
branch pipe/Indoor (2,3	branch pipe/Indoor (2,3 and 4 indoor units system)				3				
branch pipe/branch pipe	pranch pipe/branch pipe (4 indoor units system)								
(B-C) / (B-D) / (C-D) / (C+	3-C) / (B-D) / (C-D) / (C+G)-(B+E) / (C+G)-(B+D) /				- 0				
(C+F)-(B+E) / (C+F)-(B+I	D)				< 8				

i note

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

OU 3 HP 8 HP 10 HP 4 HP 5 HP 6 HP 12 HP IU **IVX Premium** 2 -3 2 - 5 2 - 6 2 - 8 quantity **IVX Standard** 2 - 4 allowed L3 L3 L3 L3 L3 Δ L1

3.3.3 Piping system for line branch

(picture is as example)

Maximum refrigerant piping length (Line branch system)

IVX Premium series

								(m)	
Outdoor Unit	3HP	4HP 5HP 6HP			8HP	10HP	12HP		
Maximum piping length between the	Actual Length (L1)	50		75			100		
outdoor unit and the farthest indoor unit	Equivalent Length (EL)	70		95			125		
Maximum piping length from first branch	to each indoor unit (L2)	20		30			40		
Maximum piping length from branch to in	ndoor unit (L3)		1	0			15		
Total piping length L4 + (L3 ₁ +L3 ₂ +L3 ₃)		60		95		100	14	45	
Maximum height difference									
Outdoor / Indoor (H)					30 / 20				
(Outdoor Unit is Higher / Lower.)									
Maximum height Difference Indoor / Indo	or	10							
Maximum height difference:									
Branch pipe/Indoor				3					
Branch pipe/branch pipe									

IVX Standard series

							(m)
Outdoor Unit	4HP	5HP	6HP	8HP	10HP	12HP	
Maximum piping length between the	Actual Length (L1)	70	7	5		100	
outdoor unit and the farthest indoor unit	Equivalent Length (EL)	90	9	5		125	
Maximum piping length from first branch	to each indoor unit (L2)		20			25	
Maximum piping length from branch to in	door unit (L3)		10			15	
Total piping length L4 + (L3 $_1$ +L3 $_2$ +L3 $_3$)		70	7	5	100	14	15
Maximum height difference							
Outdoor / Indoor (H)				30	/ 20		
(Outdoor Unit is Higher / Lower.)							
Maximum height Difference Indoor / Indoo	or	3					
Maximum height difference:							
Branch pipe/Indoor			:	3			
Branch pipe/branch pipe							

3

3.3.4 Combinations of piping size and piping length

Liquid		Ø6	5.35				Ø9.52					Ø12.70				Ø15.88	
Gas	Ø9.52	Ø12.70	Ø15.88	Ø19.05	Ø12.70	Ø15.88	Ø19.05	Ø22.20	Ø25.40	Ø15.88	Ø19.05	Ø22.20	Ø25.40	Ø28.60	Ø22.20	Ø25.40	Ø28.60
Performance capacity																	(m)
2 HP	15 ⁽¹⁾	50	30	-	15 ⁽³⁾	15 (3)	-	-	-	-	-	-	-	-	-	-	-
2.5 HP	-	50	30	-	20 (3)	$20^{(3)}$	-	-	-	-	-	-	-	-	-	-	-
3 HP	-	30 (1)(2)	30 (2)	-	30 (1)	50	-	-	-	-	-	-	-	-	-	-	-
4 - 5 - 6 HP	-	-	5 (2)	5 (2)	40 (1)	75	50 (4)	-	-	30 (3)	30 (3) (4)	-	-	-	-	-	-
8 HP	-	-	-	-	-	-	50 (1)(4)(6)	50 (1)(6)	70 (5)(7)	-	50 (1)(3)(4)	50 (1)(3)	100	-	50 (1)(3)	50 ⁽³⁾	-
10 - 12 HP	-	-	-	-	-	-	-	-	-	-	-	50 (1)	100	50	50 (1)(3)	50 ⁽³⁾	50 (3)

IVX Premium series

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

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

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

(4).When using Ø19.05 gas pipe (soft-annealed), please switch ON DSW2-4# in the Outdoor Unit PCB.

(5) In case that pipe length exceeds 70m in 8 HP, please use a Ø12.7 pipe as a liquid pipe.

(6).In case of exceeding the recommended number of connected Indoor Units of 8 HP (more than 5 Units), please use a Ø12.7 pipe as a liquid

Standard

IVX Standard series

Liquid		Ø6	5.35				Ø9.52					Ø12.70				Ø15.88	
Gas	Ø9.52	Ø12.70	Ø15.88	Ø19.05	Ø12.70	Ø15.88	Ø19.05	Ø22.20	Ø25.40	Ø15.88	Ø19.05	Ø22.20	Ø25.40	Ø28.60	Ø22.20	Ø25.40	Ø28.60
Performance capacity																	(m)
3 HP	-	30 (1)(2)	30 (2)	-	30 (1)	50	-	-	-	-	-	-	-	-	-	-	-
4 HP	-	-	5 (2)	5 (2)	40 (1)	70	50 (4)	-	-	30 (3)	30 (3) (4)	-	-	-	-	-	-
5 - 6 HP	-	-	5 (2)	5 (2)	40 (1)	75	50 (4)	-	-	30 (3)	30 (3) (4)	-	-	-	-	-	-
8 HP	-	-	-	-	-	-	50 (1)(4)	50 (1)	70 (5)	-	50 (1)(3)(4)	50 (1)(3)	100		50 (1)(3)	50 ⁽³⁾	
10 - 12 HP	-	-	-	-	-	-	-	-	-	-	-	50 (1)	100	50	50 (1)(3)	50 ⁽³⁾	50 (3)

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

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

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

(4).When using Ø 19.05 gas pipe (soft-annealed), please switch ON DSW2-4# in the Outdoor Unit PCB.

(5) In case that pipe length exceeds 70m in 8 HP, please use a Ø12.7 pipe as a liquid pipe.

(6).In case of exceeding the recommended number of connected Indoor Units of 8 HP (more than 5 Units), please use a Ø12.7 pipe as a liquid

Standard

3.3.5 Refrigerant piping size and multikit/distributor selection

\triangle caution

- Do not use refrigerant pipe sizes other than those indicated in this Technical Catalogue. The diameter of the refrigerant pipes depends directly on the outdoor unit capacity.
- If larger diameter gas refrigerant pipes are used, the circuit lubrication oil tends to separate from the gas carrying it. The compressor will be seriously damaged due to a lack of lubrication.
- If smaller diameter gas refrigerant pipes are used, the gas or liquid refrigerant will have serious difficulties in circulating. System performance will be affected. The compressor will run under more severe conditions than foreseen and will be damaged in a short space of time.

Select the piping connection sizes according to the following procedures

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

1 indoor unit system

			(mm)
	Outdoor Unit HP	Pipe S	size (L)
-		Gas	Liquid
17	2 / 2.5	Ø12.70	Ø6.35
L	3 - 6	Ø15.88	Ø9.52
	8	Ø25.40	Ø9.52
	10 / 12	Ø25.40	Ø12.70

2 indoor units system



		(mm)	Mult	I-KIT
Outdoor Unit HP	Pipe S	ize (A)	IVX Premium Series	IVX Standard Series
	Gas	Liquid		
2 / 2.5	Ø12.70	Ø6.35	TW-22AN	TE-03N1
3 / 4	Ø15.88	Ø9.52	TW-52AN	3HP: TE-03N1 4HP: TE-04N1
5/6	Ø15.88	Ø9.52	TW-52AN	TE-56N1
8	Ø25.40	Ø9.52	TW-102AN	TE-08N
10 / 12	Ø25.40	Ø12.70	TW-102AN	TE-10N

(mm)

N 4. . 141 1/14

		(mm)
Indoor Linit consoity	Pipe S	Size (B, C)
Indoor Unit capacity	Gas	Liquid
≤ 1.5 HP	Ø12.70	Ø6.35
1.8 / 2.0 HP	Ø15.88	Ø6.35
> 2.3 HP	Ø15.88	Ø9.52

3 indoor units system

			(mm)	Mu	lti-kit
Rep 1	Outdoor Unit HP	Pipe S	Size (A)	IVX Premium Series	IVX Standard Series
		Gas	Liquid		
	4 / 5 / 6	Ø15.88	Ø9.52	TG-53AN	TRE-46N1
	8	Ø25.40	Ø9.52	TG-103AN	TRE-812N1
	10 /12	Ø25.40	Ø12.70	TG-103AN	TRE-812N1

(1) In case that pipe length (A+B or A+C or A+D) exceeds 70m in 8 HP, please use a Ø12.7 pipe as a liquid pipe.

		(mm)	
Indoor Unit capacity	Pipe Size (B, C, D)		
	Gas	Liquid	
≤ 1.5 HP	Ø12.70	Ø6.35	
1.8 / 2.0 HP	Ø15.88	Ø6.35	
> 2.3 HP	Ø15.88	Ø9.52	

4 indoor units system

Total Indoor Unit capacity

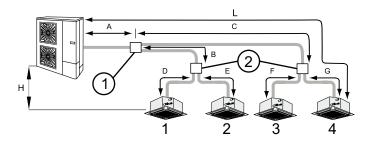
after branch pipe

1+2 or 3+4

≤ 1.5 HP

from 1.8 to 2.0 HP

≥ 2.3 HP



(mm)				
Outdoor Pipe Size (A)		Multi-kit (1)		
Unit HP	Gas	Liquid	IVX Premium Series	IVX Standard Series
4 / 5 / 6	Ø15.88	Ø9.52	TW-52AN	4HP: TE-04N1 5/6HP: TE-56N1
8	Ø25.40	Ø9.52 ⁽¹⁾	TW-102AN	TE-08N QE-812N1 ⁽²⁾
10	Ø25.40	Ø12.70	TW-102AN	TE-10N QE-812N1 ⁽²⁾

(mm)

Liquid

Ø6.35

Ø6.35

Ø9.52

Pipe Size

(B,C)

Gas

Ø12.70

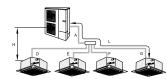
Ø15.88

Ø15.88

[]	
	NOTE

(1) In case that total pipe length (A+B+D or A+B+E or A+C+F or A+C+G) exceeds of 70m in 8 HP unit, please use a Ø12.7 pipe as a liquid pipe.

(2) When is used Multi-kit model QE-812N1 it is not necesary the multi.kit 2.



Indoor Unit capacity	Pipe Size (D,E,F,G)			
	Gas	Liquid		
≤ 1.5 HP	Ø12.70	Ø6.35		
1.8/2.0HP	Ø15.88	Ø6.35		
≥ 2.3 HP	Ø15.88	Ø9.52		

Connections including Indoor Units 8 and 10 HP are not possible

If the capacity ratio between IU group 1+2 and 3+4 is higher than 60/40% please install a line branch system or contact with your Hitachi Dealer

Multikit 2

IVX Standard

Series

TE-03N1 TE-03N1

<4: TE-03N1

=4HP: TE-04N1

≥ 5HP: TE-56N1

IVX Premium

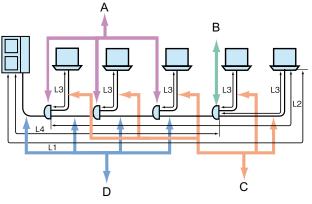
Series

TW-22AN

TW-52AN

TW-52AN

Line branch system



		(mm)	Multi-kit model A		Multi-kit model B	
Outdoor Unit HP	Pipe S	ize (D)	IVX Premium Series	IVX Standard Series	IVX Premium Series	IVX Standard Series
	Gas	Liquid				
3/4/5/6	Ø15.88	Ø9.52	E-102SN2	E-102SN2	E-102SN2	E-102SN2
8	Ø25.40	Ø9.52 ⁽¹⁾	E-162SN2	E-162SN2	E-102SN2	E-102SN2
10 /12	Ø25.40	Ø12.70	E-162SN2	E-162SN2	E-102SN2	E-102SN2

(1) In case that total pipe length from the outdoor to the farthest indoor unit exceeds of 70m in 8 HP unit, please use a Ø12.7 pipe as a liquid pipe.

		(mm)	
Indoor Unit capacity	Pipe Size (C)		
	Gas	Liquid	
≤ 1.5 HP	Ø12.70	Ø6.35	
1.8 / 2.0 HP	Ø15.88	Ø6.35	
> 2.3 HP	Ø15.88	Ø9.52	
≤ 1.5 HP 1.8 / 2.0 HP	Gas Ø12.70 Ø15.88	Liquid Ø6.35 Ø6.35	

3

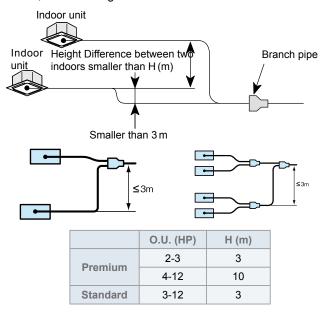
SMGB0079 rev.0 - 01/2013

3.3.6 System installation



- Pipe connection size on outdoor units, indoor units and the multikit or distributor vary according to the system.
- The sizes of the indoor and outdoor units could be different. Adjust the flare adapter (accessory) to the indoor
 pipe connection in these cases.
- ♦ Height Difference Between Indoor Units and Distributor

It is recommended to install all indoor units at the same height. When the height difference between the indoor units due to building construction is necessary, this should be less than the value indicated in the table. Install the branch pipe at the same height of indoor units or lower, but never higher.



Installing Distributor

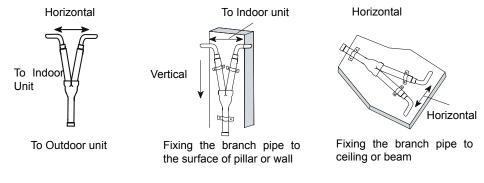
1 Install the Distributor supplied by HITACHI on request.

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



2 Installing the distributor

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



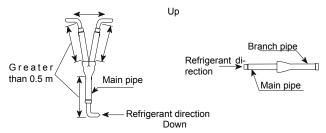
1 ΝΟΤΕ

70

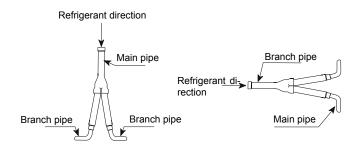
Fix the piping from outside of insulation or inserting absorber between the pipe and a fixing metal.

SMGB0079 rev.0 - 01/2013

- 3 Correct position of distributor (available also for quad installation)
- This is the correct position:

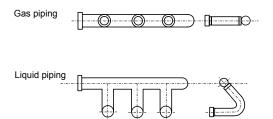


• This is wrong position.

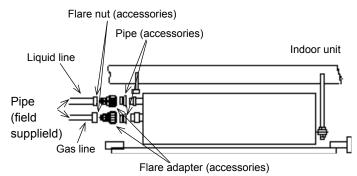


- 4 Correct position of Triple Branch Pipe (Standard series only).
- Install the header horizontally

Sample: Triple Branch pipe



3.3.7 Connecting flare adapter



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

Use the adequate flare adapter as follows:

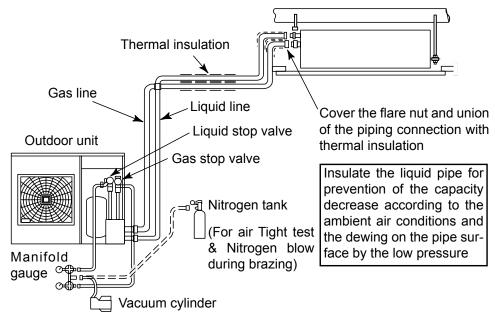
Indoor unit	Flare adapter		
indoor unit	Gas pipe	Liquid pipe	
2.0 HP	Big size (⊘15.88→⊘12.70)	-	
2.5 HP	Big size (⊘15.88→⊘12.70)	Small size (⊘9.52→⊘6.35)	

3.4 Refrigerant charge

- Do not charge OXYGEN, ACETYLENE, or other flammable and poisonous gases into the refrigerant, as an explosion could occur. It is recommended that oxygen free nitrogen be charged for these types of test cycles when performing a leakage test or an airtight test. These types of gases are extremely dangerous.
- Insulate the unions and flare-nuts at the piping connection part completely.
- Insulate the liquid piping completely to avoid a decreased performance; if not, it will cause sweating on the surface of the pipe.
- Charge refrigerant correctly following the procedures of the manuals. Overcharging or insufficient charging could cause a compressor failure.Insulate the unions and flare-nuts at the piping connection part completely.
- Check for refrigerant leakage in detail. If a large refrigerant leakage occurred, it would cause difficult breathing.
- If the flare nut is tightened too hard, the flare nut may crack after a long time and cause refrigerant leakage.

Follow the next procedure to charge the R410A refrigerant inside the indoor unit:

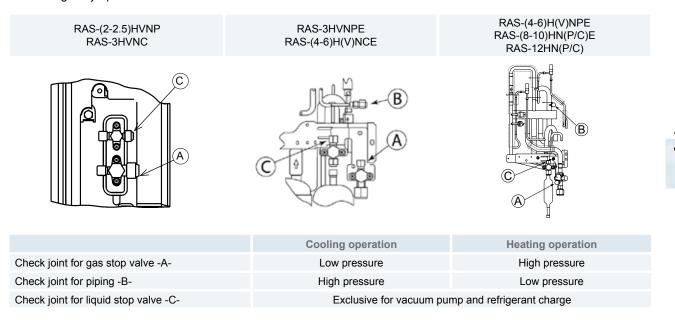
- 1 Connect the gauge manifold using charging hoses with a nitrogen cylinder to the outdoor unit check joints of the liquid line and the gas line stop valves.
- 2 Supply power to the indoor unit and switch the DSW1-2 ON of its PCB1. Thereby the indoor unit SV1 and SV2 open to allow the vacuum and refrigerant charge operation inside the indoor unit. Very important to remind to switch the DSW1-2 OFF when finishing the whole procedure.
- 3 Check for any gas leakage at the flare nut connection by using nitrogen gas inside of the field-supplied piping to increase the pressure at 4.15 MPa.
- 4 Connect the vacuum pump to the gauge manifold and operate it for 1 to 2 hours until the pressure decreases lower than a pressure of 756 mmHg in vacuum.
- 5 Fully open the outdoor unit gas and liquid stop valves.
- 6 Operate the outdoor unit in cooling operation for more than 10 minutes to circulate the refrigerant through the whole circuit.



3.4.1 Caution of the pressure by check joint

When the pressure is measured, use the check joint of gas stop valve (A), and use the check joint of liquid piping (B) in the figure below.

At that time, connect the pressure gauge according to the following table because of high pressure side and low pressure side changes by operation mode.



inote

Be careful that refrigerant and oil do not splash to the electrical parts at removing the charge hoses.

SMGB0079 rev.0 - 01/2013

3.4.2 Refrigerant charge quantity

Although refrigerant has been charged into this unit, additional refrigerant charge is required according to piping length.

- 1 The additional refrigerant quantity should be determined and charged into the system according to the following procedure.
- 2 Record the additional refrigerant quantity in order to facilitate maintenance and servicing activities.

Refrigerant charge before shipment (W0 (kg))

W0 is the outdoor unit refrigerant charge before shipment explained before, and it's shown in the following table:

IVX Premium series

Model	Refrigerant charge before shipment (W₀ (kg))	Additional refrigerant charge (P) (g/m)	Maximum additional charge (kg)	Chargeless length (m)
RAS-2HVNP	1.6	30	1.5	30 (1)
RAS-2.5HVNP	1.6	30 (for 2 indoor units system: 24)	1.2	30 (1)
RAS-3HVNPE	2.3	40	1.2	30
RAS-4HVNPE	4.1	60	3.9	30
RAS-5HVNPE	4.2	60	3.9	30
RAS-6HVNPE	4.2	60	3.9	30
RAS-4HNPE	4.1	60	3.9	30
RAS-5HNPE	4.2	60	3.9	30
RAS-6HNPE	4.2	60	3.9	30
RAS-8HNPE	5.7	(2)	10.3	30
RAS-10HNPE	6.2	(2)	12.1	30
RAS-12HNP	6.7	(2)	12.1	30

IVX Standard series

Model	Refrigerant charge before shipment (W₀ (kg))	Additional refrigerant charge (P) (g/m)	Maximum additional charge (kg)	Chargeless length (m)
RAS-3HVNC	1.9	40	1.2	20
RAS-4HVNCE	2.9	40	1.6	30
RAS-5HVNCE	2.9	60	2.7	30
RAS-6HVNCE	2.9	60	2.7	30
RAS-4HNCE	2.9	40	1.6	30
RAS-5HNCE	2.9	60	2.7	30
RAS-6HNCE	2.9	60	2.7	30
RAS-8HNCE	5.7	(2)	10.3	30
RAS-10HNCE	6.2	(2)	12.1	30
RAS-12HNC	6.7	(2)	12.1	30

(1) For 2 indoor units system configuration, the chargeless length is considered to be 0 m.

(2) Calculated multiplying a constant factor.



- When charging refrigerant, measure the amount precisely.
- Overloading or underloading of refrigerant may cause compressor problems.
- If the actual piping length is less than 5 m consult your dealer.

Additional refrigerant charge calculation method

Calculate the additional refrigerant charge amount according to the following steps:

Step 1: Additional refrigerant charge calculation for liquid piping (W_1 (kg))

Outdoor units have been charged with refrigerant for 30m (20m for RAS-3HVNC) of actual piping length, an additional refrigerant charged is required in systems with actual piping length longer.

For all UTOPIA units except RAS-(8-12)HN(P/C)(E)

Use the following formula:

W₁ = (L-30) x P (*)

L: Total piping length (m)

P: Additional refrigerant charge (g/m)

i NOTE

(*): In case of RAS-(2-2.5)HVNP units installed in 2 indoor units system, the unit is considered to be charged with refrigerant for 0 m. In these cases, the formula for calculating the additional refrigerant charge is:

W, = (L-0) x P

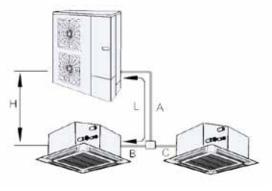
In case of RAS-3HVNC, the unit is charged with refrigerant for 20 m. In these cases, the formula for calculating the additional refrigerant charge is:

W, = (L-20) x P

Example:

- A. 30 m.
- B. 8 m.
- C. 8 m.
- Chargeless Length *l*: for RAS-4HVNPE is 30 m according to the table before.
- Additional Correction Value P : for RAS-4HVNPE, "60" according to the table above.
- Additional Charge amount W will be:

 $W = (L-\ell) \times P$



For UTOPIA units RAS-(8-12)HN(P/C)(E)

The additional refrigerant charge for RAS-(8-12)HN(P/C)(E) units must be calculated by multiplying the total piping length of each diameter per its calculation factor according to the following table. The result is the additional refrigerant charge for liquid piping. (Fill the table with the values)

Pipe size (mm)	Additional refrigerant charge factor (kg/m)
Ø15.88	x 0.19
Ø12.7	x 0.12
Ø9.52	x 0.065
Ø6.35	x 0.065

Step 2: Additional refrigerant charge calculation for indoor unit (W₂ (kg))

When the outdoor unit is combined with indoor units RPI-(8/10)HP, it's necessary an additional refrigerant charge (W_2) = 1 kg/unit. For indoor units lower than 8 HP, an additional refrigerant charge it's not needed.

•	
Indoor unit capacity	Additional refrigerant charge (W ₂ (kg))
≥ 8 HP	1
< 8 HP	0

Example: W₁= (46-30) x 60= 960 (g)

Step 3: Calculation of total additional refrigerant charge (W (kg))

For all UTOPIA units except RAS-(8-12)HN(P/C)(E)

Put weight W_1 and W_2 calculated in step 1 and step 2 into the following formula:

System example (W) = + = kg

 $W = W_1 + W_2$

• For UTOPIA units RAS-(8-12)HN(P/C)(E)

In case of RAS-(8-12)HN(P/C)(E), it must be used the following formula:

 $W = W_1 + W_2 - C$

System example (W) =

- = kg

C: Compensation value (kg) (Refer to the following table)

Model	Compensation value (C (kg))
RAS-8HN(P/C)E	1.6
RAS-10HN(P/C)E	2.0
RAS-12HN(P/C)	2.0

Do not exceed the allowed maximum additional charge

Step 4: Charging work

Charge refrigerant (R410A) into the system according to the instructions in the Service Manual.

Step 5: Total refrigerant charge of the system (W_{TOT} (kg))

The total refrigerant charge of this system is calculated by the following formula:

 $\mathbf{W}_{\tau \sigma \tau} = \mathbf{W} + \mathbf{W}_{o}$ System example (W_{TOT}) = + = kg

W_o is the outdoor unit refrigerant charge before shipment explained before, and it's shown in its specific table.

Finally, record the refrigerant charge quantity in order to facilitate maintenance and servicing activities.

/		
	Total additional charge W	kg
	Total ref. charge of this system	kg
	Date of ref. charge work	
	Year Month Day	

Setting of pipe length DSW.

DSW2 setting will be required only when the refrigerant pipe length is shorter than 5 m or longer than 30 m. Pipe length setting shall be performed as shown below.

(The side in the DIP switch show the position.)

	DSW2 on outdoor PCB1	
Factory setting Piping length between 5 m and {(m)	Pipe Length 5 m or shorter	Pipe Length 30 m or longer
ON 1 2 3 4 5 6	ON 1 2 3 4 5 6	ON 1 2 3 4 5 6

Pump down refrigerant

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

- 1 Attach the manifold gauge to the gas stop valve and the liquid stop valve.
- 2 Turn ON the power source.
- 3 Set the DSW1-1 pin of the outdoor unit PCB at the "ON" side for cooling operation. Close the liquid stop valve and collect the refrigerant.
- 4 When the pressure at lower pressure side (gas stop valve) indicates -0.01 MPa (-100 mmHg), perform the following procedures immediately.
 - Close the gas stop valve. •
 - Set the DSW1-1 pin at the "OFF" side (To stop the unit operation).
- 5 Turn OFF the power source.



Measure the low pressure by the pressure gauge and keep it in a measurement higher than -0.01 MPa. If the pressure is lower than -0.01 MPa, the compressor may be faulty.

3.5 Caution in case of refrigerant leakage

The installers and those responsible for drafting the specifications are obliged to comply with local safety codes and regulations in the case of refrigerant leakage.

3.5.1 Maximum permitted concentration of hydrofluorocarbon (HFC)

The refrigerant R410A, charged in the UTOPIA series system, is an incombustible and non-toxic gas. However, if leakage occurs and gas fills a room, it may cause suffocation. The maximum permissible concentration of HFC gas, R410A in air is 0.44 kg/m³, according to EN378-1.

Therefore, some effective measure must be taken to lower the R410A concentration in air below 0.44 kg/m³ to prevent suffocation in case of leakage.

3.5.2 Calculation of refrigerant concentration

- 1 Calculate the total quantity of refrigerant **R (kg)** charged in the system by connecting all the indoor units in the rooms to be air-conditioned.
- 2 Calculate the room volume V (m³) of each room.
- 3 Calculate the refrigerant concentration **C** (kg/m³) of the room according to the following equation:

C = R / V

R: Total quantity of refrigerant charged (kg).

V: Room volume (m³).

C: Refrigerant concentration ($\leq 0.44 \text{ kg/m}^3$ for R410A).

3.5.3 Countermeasure for refrigerant leakage

The room must have the following features to prevent suffocation in case a refrigerant leakage occurs:

- 1 Provide a shutterless opening which will allow fresh air to circulate into the room.
- 2 Provide a doorless opening of 0.15% or more size to the floor area.
- 3 There must be a ventilator fan connected to a gas leak detector, with a ventilator capacity of 0.4 m³/min or higher per Japanese refrigeration ton (= compressor displacement volume / 5.7 m³/h) of the air conditioning system using the refrigerant.

IVX Premium series

Tonnes
0.88
1.14
1.17
2.27
3.16
4.11

IVX Standard series

Model	Tonnes
RAS-3HVNC	1.35
RAS-4H(V)NCE	1.64
RAS-(5/6)H(V)NCE	2.27
RAS-8HNCE	3.16
RAS-10HNCE / RAS-12HNC	4.11

4 Pay a special attention to the place, such as a basement, etc., where refrigerant can stay, since refrigerant is heavier than air.

3.6 Piping work for compatibility with the piping of current installations where is used R22 or R407C.



Contact your Hitachi dealer for specific support on your instalation.

The new IVX Premium and IVX Standard are compatible with those installations that have been operating with R22 or R407C. This allows installing the IVX Premium/Standard Outdoor Units, which operate with R410A, without having to change piping installation.

3.6.1 Installation procedure for existing pipes

i note

- For systems with several indoor units, branch pipes shall be changed to Hitachi-specified model for IVX Premium and Standard (R410A).
- Existing outdoor and indoor units for R22 or R407C can not be used.
- 1 Recover refrigerant (R22 or R407C):
 - a. Compressor of the existing unit is working Pump down. Perform refrigerant recovery operation of existing air conditioner without stopping during 30 minutes in cooling mode.
 - **b.** Compressor of the existing unit is not working Recover refrigerant with a refrigerant recovery device.
- 2 Remove existing air conditioning system (Outdoor and Indoor unit).
- 3 For the existing pipes, proceed with one of the following operation:
 - **a.** Clean the existing piping (see section 3.6.1.1)
- b. Connect renewal kit (optional accessory)(see section 3.6.1.2)
- 4 Connect new UTOPIA IVX Premium/Standard series
- 5 Vacuum process.
- 6 Refrigerant charge (R410A)

Follow the normal process described for determinate if it is necessary additional refrigerant charge..

Recovering R22 and R407C is mandatory to remove an existing air conditioner and piping. Do not vent into the atmosphere.

3.6.1.1 Conditions to use a existing pipes with cleaning process

After the piping cleaning process, follow the normal installation process as a new piping installed, considering all the restrictions and limitations. Special atention is required for control the piping thickness.

3.6.1.2 Conditions to use a existing pipes without cleaning process

A Renewal Kit (sold separately) can be used even in cases where there is a history of Compressor failure, allowing diversion to existing piping without cleaning. Thus, the burden of installation works at renewal can be reduced.

Existing pipes can be used without cleaning if the following conditions are satisfied:

- 1 Install the Renewal kit (mandatory).
- 2 Maximum piping length 50 m. (If the pipe is longer than 50m, existing pipes can be used if cleaning is performed)
- 3 The capacity of the new unit must be equivalent at the one installed previously.
- 4 No corrosion No cracks, No scratches or deformations in existing pipes.
- 5 Dirt insider the pipes shall not be noticeable.
- 6 Piping thickness, Flare Nuts, gaskets, etc. shall be compliant products.
- 7 Flare shall be reprocessed.
- 8 Piping airtight or vacuuming shall be performed precisely as new piping.

3.6.2 When existing Air-Conditioner is a product of another manufacturer

Existing pipes made by other manufacturer can also be used if the following conditions satisfied:

- 1 For systems with several indoor units, branch pipes shall be changed to Hitachi-specified model.
- **2** Please perform a pipe cleaning.

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SMGB0079 rev.0 - 01/2013

3.6.3 Permissible range for existing Air-Conditioning Pipes (Pipe length in the case of "without cleaning process".

Liquid		Ø6	5.35				Ø9.52					Ø12.70				Ø15.88	
Thickness (mm)		0	.8				0.8					0.8				1.0	
Gas	Ø9.52	Ø12.70	Ø15.88	Ø19.05	Ø12.70	Ø15.88	Ø19.05	Ø22.20	Ø25.40	Ø15.88	Ø19.05	Ø22.20	Ø25.40	Ø28.58	Ø22.20	Ø25.40	Ø28.58
Thickness (mm)	0.8	0.8	1.0	1.0	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Material Soft- annealed	х	x	x	х	x	x	x			x	x						
Material Draw				х			х	х	х		х	х	х	х	х	х	х
Performance capacity																	(m)
2 HP	15(1)	50	30	-	15 (3)	15 (3)	-	-	-	-	-	-	-	-	-	-	-
2.5 HP	-	50	30	-	20 (3)	20 (3)	-	-	-	-	-	-	-	-	-	-	-
3 HP	-	30 (1)(2)	30 (2)	-	30 (1)	50	-	-	-	-	-	-	-	-	-	-	-
4 - 5 - 6 HP	-	-	5 (2)	5 (2)	40 (1)	50	50 (4)	-	-	30 (3)	30 (3) (4)	-	-	-	-	-	-
8 HP	-	-	-	-	-	-	50 (1)(4)	50 (1)	50	-	50 (1)(3)(4)	50 (1)(3)	50 ⁽³⁾	-	50 (1)(3)	50 ⁽³⁾	-
10 - 12 HP	-	-	-	-	-	-	-	-	-	-	-	50 ⁽¹⁾	50	50	50 (1)(3)	50 ⁽³⁾	50 ⁽³⁾

IVX Premium series

(1).Reducing gas pipe size will lower cooling capacity due to larger pressure loss in gas piping and narrow operation range.
 (2).Reducing liquid pipe size will narrow operation range due to indoor unit relation with expansion valve capacity.
 (3).Increasing liquid pipe size will require additional refrigerant charge.
 (4).When using Ø 19.05 gas pipe (soft-annealed), please switch ON DSW2-4# in the Outdoor Unit PCB.

Standard

IVX Standard series

Liquid	Liquid Ø6.35			Ø9.52			Ø12.70				Ø15.88						
Thickness (mm)		0	.8				0.8					0.8				1.0	
Gas	Ø9.52	Ø12.70	Ø15.88	Ø19.05	Ø12.70	Ø15.88	Ø19.05	Ø22.20	Ø25.40	Ø15.88	Ø19.05	Ø22.20	Ø25.40	Ø28.58	Ø22.20	Ø25.40	Ø28.58
Thickness (mm)	0.8	0.8	1.0	1.0	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Material Soft- annealed	х	x	x	х	x	х	x			х	x						
Material Draw				х			х	x	x		х	х	х	x	х	х	х
Performance capacity																	(m)
3 HP	-	30 (1)(2)	30 (2)	-	30 (1)	50	-	-	-	-	-	-	-	-	-	-	-
4 HP	-	-	5 (2)	5 (2)	40 (1)	50	50 (4)			30 (3)	30 (3)(4)	-	-	-	-	-	-
5 - 6 HP	-	-	5 (2)	5 (2)	40 (1)	50	50 (4)			30 (3)	30 (3)(4)	-	-	-	-	-	-
8 HP	-	-	-	-	-	-	50 (1)(4)	50 (1)	50	-	50 (1)(3)(4)	50 (1)(3)	50 ⁽³⁾	-	50 (1)(3)	50 ⁽³⁾	-
10 - 12 HP	-	-	-	-	-	-	-	-	-	-	-	50 (1)	50	50	50 (1)(3)	50 ⁽³⁾	50 ⁽³⁾

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

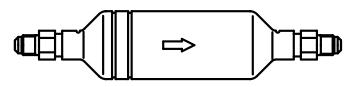
(2).Reducing liquid pipe size will narrow operation range due to indoor unit relation with expansion valve capacity.

(4).When using Ø 19.05 gas pipe (soft.annealed), please switch ON DSW2-4# in the Outdoor Unit PCB.

Standard

3.6.4 Renewal kit selection model

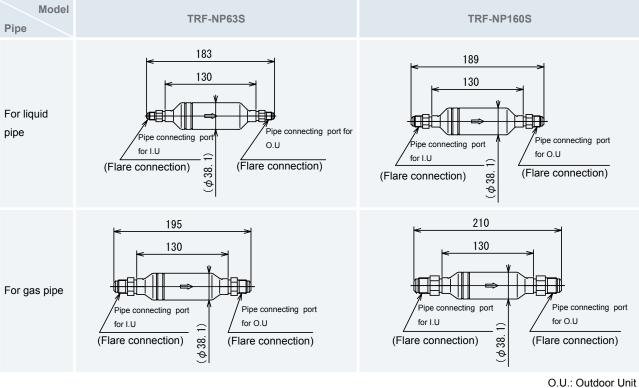
Hitachi offers, as an accessory, a renewal kit:



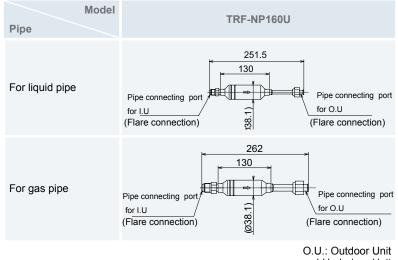
Recommended renewal kit

	Renev	val Kit		Renewal Kit		
IVX Premium	External Attachment to Outdoor Unit [Short Pipe (local) + Kit + Existing Piping]	Internal Attachment to Outdoor Unit [Kit + Existing Piping]	IVX Standard	External Attachment to Outdoor Unit [Short Pipe (local) + Kit + Existing Piping]	Internal Attachment to Outdoor Unit [Kit + Existing Piping]	
RAS-(2/2.5)HVNP	TRF-NP63S					
RAS-3HVNPE	TRF-NP160S		RAS-(3-6)H(V)NCE	TRF-NP160S		
RAS-(4-6)H(V)NPE	(TRF-NP160S)	TRF-NP160U				
RAS-8HNPE		TRF-NP280U	RAS-8HNCE		TRF-NP280U	
RAS-(10/12)HNPE		TRF-NP335U1	RAS-(10/12)HNC		TRF-NP335U1	

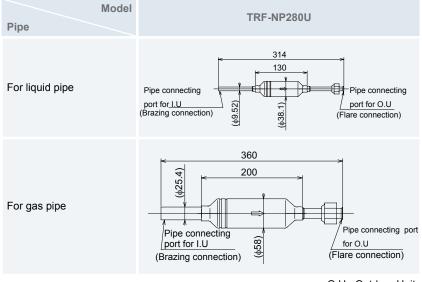
Details of renewal kit



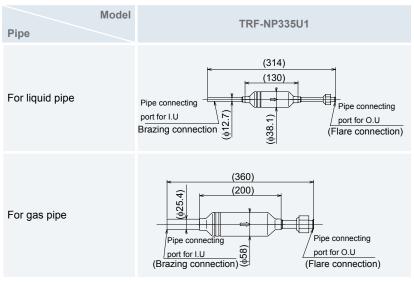
I.U.: Indoor Unit



I.U.: Indoor Unit



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



O.U. : Outdoor Unit I.U. : Indoor Unit Renewal kit installation (Example)

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Strainer for liquid pipe

Flare connection

(for liquid) Existing refrigerant pipe

(for gas)

Existing refrigerant pipes

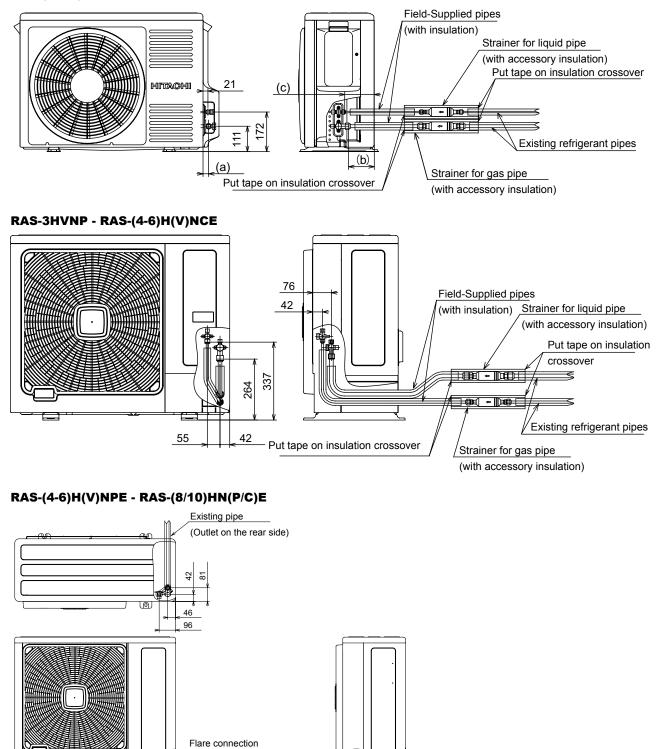
a

e

ΰ

(p)



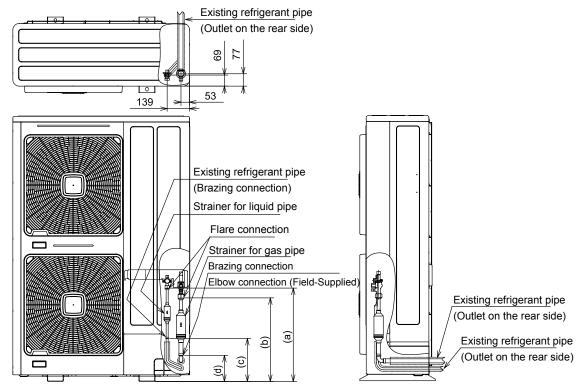


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Existing refrigerant pipe (Outlet on the rear side)

Existing refrigerant pipe (Outlet on the rear side)

RAS-12HV(P/C)



i note

Sizes (a) to (g) depend on the outdoor unit model

	RAS-(2/2.5)HVNP	RAS-3HVNC	RAS-(4-6)H(V)NPE	RAS-8HN(P/C)E	RAS-10HN(P/C)E	RAS-12HV(P/C)
а	22	26	581	596	578	580
b	109	103	491	497	497	521
С	129	127	329	282	264	266
d			229	137	137	161
е			46	47		
f			96	98		
g			81	69		

3.7 Drain piping

3.7.1 Drain discharging boss

When the base of the outdoor unit is temporarily utilized as a drain receiver and the drain water in it is discharged, this drain boss is utilized to connect the drain piping.

Model	Applicable Model
DBS-12L	RAS-(2/2.5)HVNP RAS-3HVNC
DBS-26	RAS-3HVNPE RAS-(4-6)H(V)N(P/C)E RAS-(8-10)HN(P/C)E RAS-12HN(P/C)

- 1 Insert the plastic cap into the drain boss up to the extruded portions.
- 2 Insert the boss into the unit base up to the extruded portions.
- 3 Size of the drain boss is:

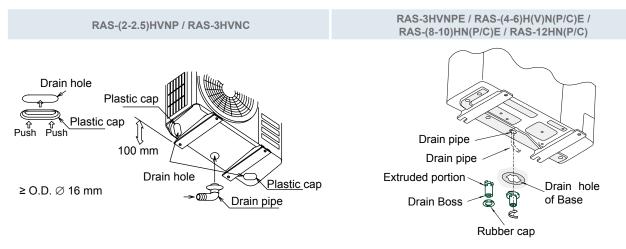
Connecting procedure

- For DBS-12L: 15 mm (O.D.)
- For DBS-26: 32 mm (O.D.)
- 4 A drain pipe should be field-supplied.

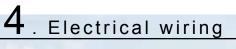
i) NOTE

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- Do not use this drain boss set in a cold area, because the drain water may freeze.
- This drain boss is not sufficient to collect all the drain water. If collecting drain water is completely required, provide a drain-pan that is bigger than the unit base and install it under the unit with drainage.



4



Index

4.1.	Gener	al notes	88
	4.1.1.	General check	88
4.2.	Electri	cal wiring connection for the outdoor unit	90
4.3.	Setting	g the DIP switches for the outdoor unit	92
	4.3.1.	Quantity and position of DIP switches	92
	4.3.2.	Function of the of DIP switches and RSW switches	93
	4.3.3.	Jumpers	97
	4.3.4.	LED's indication	97
4.4.	Comm	on wiring	98
	4.4.1.	Electrical wiring between outdoor and indoor unit	98
	4.4.2.	Wire size	99
4.5.	H-LINI	K II system	101
	4.5.1.	Features	101
	4.5.2.	Specifications	101
	4.5.3.	DIP Switch setting for twin, triple and quad systems	102
	4.5.4.	Examples of the system of connection between H-LINK and H-LINK II units	103
	4.5.5.	Examples of H-LINK II system	104
4.6.	Syster	n Control	106
	4.6.1.	Individual Operation	106
	4.6.2.	Simultaneous Operation	107
4.7.	Electri	cal wiring diagrams	108
	4.7.1.	RAS-(2-2.5)HVNP / RAS-3HVNC (1~ 230V 50Hz)	108
	4.7.2.	RAS-3HVNPE (1~ 230V 50Hz)	109
	4.7.3.	RAS-(4-6)HVNPE (1~ 230V 50Hz)	110
	4.7.4.	RAS-(4-6)HNPE (3N~ 400V 50Hz)	111
	4.7.5.	RAS-(4-6)HVNCE (1N~ 230V 50Hz)	112
	4.7.6.	RAS-(4-6)HNCE (3N~ 400V 50Hz)	113
	4.7.7.	RAS-(8-10)HN(P/C)E (3N~ 400V 50Hz)	114
	4.7.8.	RAS-12HNP (3N~ 400V 50Hz) - Preliminary data	115
	4.7.9.	RAS-12HNC (3N~ 400V 50Hz) - Preliminary data	116

4.1 General notes

- Before any electrical wiring work or regular inspections, switch off the main power supply switches of the indoor and outdoor units. Wait three minutes before starting installation or maintenance work.
- Make sure that the indoor and outdoor are completely stopped before starting work on the electrical wiring or regular inspections.
- Protect cables, drain hose, electric parts, etc. from rodents and insects; otherwise these might damage unprotected components and, in the worst case, cause a fire.
- Wrap the accessory packing around the wires, and plug the wiring connection hole with the seal material to protect the product from any condensed water and insects.
- Do not allow cables to come into contact with the refrigerant pipes, metal edges, printed circuit boards (PCB) or the electric parts inside the unit; the cables may be damaged and, in the worst case, cause a fire.
- Tightly secure the wires with the cord clamp inside the indoor unit.
- Lead the wires through the knockout hole in the side cover when using conduit.
- Secure the cable of the remote control switch with the cord clamp inside the electrical box.
- Electrical wiring must comply with national and local codes. Contact your local authority in regards to standards, rules, regulations, etc.

🛆 danger

- Do not connect of adjust any wiring or connections unless the main power switch is OFF.
- Use an earth leakage breaker with medium sensitivity, and an activation speed of 0.1 sec or less. If this is not fitted, there is a risk of electric shock and/or fire.
- Install an earth leakage breaker, fuse and circuit breaker for each outdoor unit power line. Not fitting it may cause an electric shock or fire.
- Never connect the earth cable to the refrigerant pipes. The gas in the pipes could cause a fire.
- Do not connect the earth cable to the lighting arrest system. The electrical potential of earth would increase abnormally.

i NOTE

• Fix the rubber bushes with adhesive when the outdoor unit ducts are not used.

4.1.1 General check

- 1 Ensure that the field-supplied electrical components (mains power switches, circuit breakers, wires, connectors and wire terminals) have been properly selected according to the electrical data indicated. Make sure that they comply with national and regional electrical codes.
- 2 Following the Council Directive 2004/108/EC(89/336/EEC), relating to electromagnetic compatibility, next table indicates: Maximum permissible system impedance Z_{max} at the interface point of the user's supply, in accordance with EN61000-3-11.

MODEL	Z max (Ω)	MODEL	Z max (Ω)
RAS-2HVNP	-		
RAS-2.5HVNP	-		
RAS-3HVNPE	0.39	RAS-3HVNC	
RAS-4HVNPE	0.27	RAS-4HVNCE	0.27
RAS-5HVNPE	0.27	RAS-5HVNCE	0.27
RAS-6HVNPE	0.27	RAS-6HVNCE	0.27
RAS-4HNPE	-	RAS-4HNCE	
RAS-5HNPE	-	RAS-5HNCE	-
RAS-6HNPE	-	RAS-6HNCE	
RAS-8HNPE	-	RAS-8HNCE	-
RAS-10HNPE	-	RAS-10HNCE	-
RAS-12HNP	-	RAS-12HNC	-

3 Harmonics situation of each model regarding IEC 61000-3-2 and IEC 61000-3-12 is as follows:

MODELS SITUATION REGARDING IEC 61000-3-2 and IEC 61000-3-12	MODEL	
	RAS-2HVNP	
	RAS-2.5HVNP	
	RAS-3HVNC	
Equipment complying with IEC 61000-3-2	RAS-4HNPE (*)	
	RAS-5HNPE (*)	
(*) professional use	RAS-6HNPE (*)	
	RAS-4HNCE (*)	
	RAS-5HNCE (*)	
	RAS-6HNCE (*)	
	RAS-3HVNPE	
	RAS-4HVNPE	
	RAS-5HVNPE	
Equipment complying with IEC 61000-3-12	RAS-6HVNPE	
	RAS-4HVNCE	
	RAS-5HVNCE	
	RAS-6HVNCE	
This equipment complies with IEC 61000-3-12 provided that the short-circuit power Ssc is greater than or	MODEL	Ssc "xx" (KVA)
equal to xx (see Ssc column) at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power Ssc greater than or equal to xx (see Ssc column)		
	MODEL	
Installation restrictions may be applied by supply authorities in relation to harmonics	RAS-8HNPE	
	RAS-8HNCE	
	RAS-10HNPE	
	RAS-10HNCE	
	RAS-12HNP	
	RAS-12HNC	

▲ DANGER

- Never connect the earth cable to the refrigerant pipes. The gas in the pipes could cause a fire.
- Do not connect the earth cable to the lighting arrest system. The electrical potential of earth would increase abnormally.
- 5 Check to ensure that the power supply voltage is within +/-10% of the rated voltage.
- 6 Check to ensure that power supply has an impedance low enough to warranty not reduce the starting voltage more than 85% of the rated voltage.
- 7 Check to ensure that the ground wire is connected.
- 8 Connect a fuse of specified capacity.

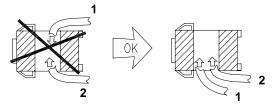
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SMGB0079 rev.0 - 01/2013

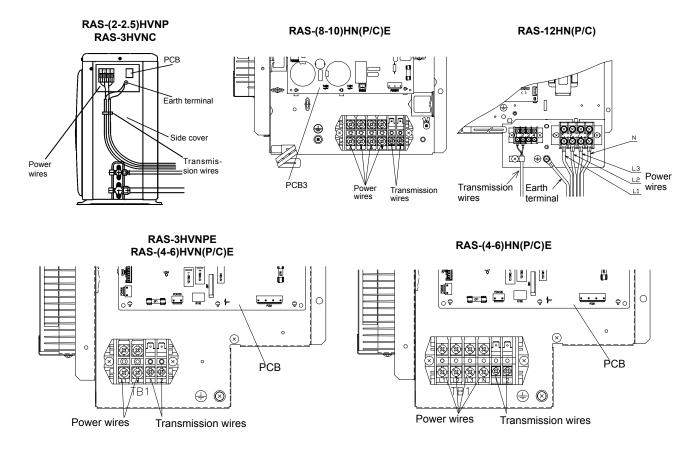
4.2 Electrical wiring connection for the outdoor unit

The correct electrical wiring connection for the outdoor unit is shown below.

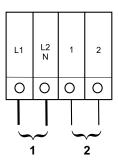
- 1 Insert the power source cables L1, L2, L3 and N (for 400V/50Hz) or L1 and N (for 230V/50Hz) and the ground cable into the ring core, coiling them with two turns and fix the cables using the cable tie (accessory). As shown in next figure, do not insert the cables from different sides into the ring core.
- 1. N/(L2) Wire.
- 2. L1 Wire.

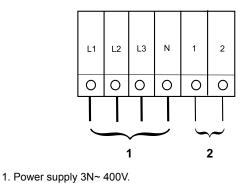


2 Connect the three-phase power supply source wires L1, L2, L3 and N (for 400V/50Hz) or L1 and N (for 230V/50Hz) to the terminal board. Connect the ground wire to the plate in the electrical box.



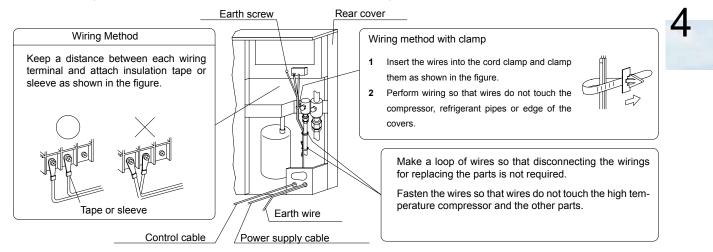
3 Connect the wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board.





- 1. Power supply 1~ 230V.
- 2. Control cable (5V).

- 2. Control cable (5V).
- 4 Fix the cable with the clamp supplied in the Electrical Box to ensure strain relief.
- 5 When routing out cable, make sure that it does not obstruct mounting of the outdoor service cover.

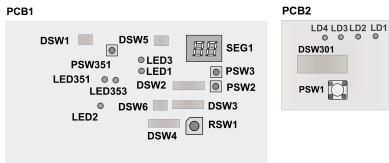


4.3 Setting the DIP switches for the outdoor unit

4.3.1 Quantity and position of DIP switches

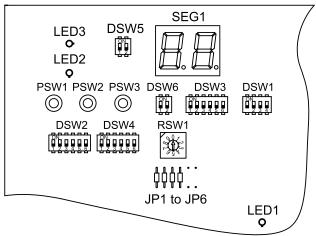
The PCB in the outdoor unit is operating with DIP switches and push switches. The location is as follows:

RAS-(2/2.5)HVNP / RAS-3HVNC



RAS-(3-12)H(V)N(P/C)(E)

PCB



4.3.2 Function of the of DIP switches and RSW switches

inote

- The mark "" indicates the position of dips switches.
- No mark "=" indicates pin position is not affecting.
- The figures show the settings before shipment or after selection.

MDANGER

Before setting dips switches, first turn the power source off and then set the position of the dips switches. In case of setting the switches without turning the power source off, the contents of the setting are invalid.

DSW301 (Only RAS-(2/2.5)HVNP and RAS-3HVNC units): Test run mode

Setting before shipment	ON 1 2 3 4 5 6
Cooling	ON 1 2 3 4 5 6
Heating	ON 1 2 3 4 5 6
Forced stop of compressor	ON 1 2 3 4 5 6

DSW1 (Only RAS-(2/2.5)HVNP and RAS-3HVNC units): No setting is required

ON

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

DSW1 (RAS-(3-12)H(V)N(P/C)(E): For Test Run

Factory setting	ON 1 2 3 4
Cooling	ON 1 2 3 4
Heating	ON 1 2 3 4
Cooling for intermediate season	ON 1 2 3 4
Heating for intermediate season	ON 1 2 3 4
Forced stop of compressor	ON 1 2 3 4

inote

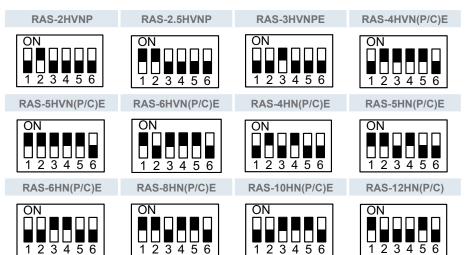
- This operation is reset once the compressor is in Thermo-ON mode.
- During the test run operation the units will operate continuously during 2 hours without Thermo-OFF and the 3-minute guard for compressor protection will be effective.

DSW2: Pipe length setting (setting is required) / Optional function setting

Pipe length setting should be performed as follows according to the on-site pipe length.	Setting before shipment
	ON 1 2 3 4 5 6
	Pipe length (≤5m)
	ON 1 2 3 4 5 6
	Pipe length (≥30m)
	ON 1 2 3 4 5 6
Cooling only	ON 1 2 3 4 5 6
Control to support existing pipes	ON 1 2 3 4 5 6
Optional function setting	ON 1 2 3 4 5 6
External input/output setting mode	ON 1 2 3 4 5 6

DSW3: Capacity setting (no setting is required)

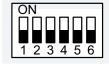
Factory setting



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

In case of using an H-Link II net it is required to set the refrigerant cycle number.

Setting for the ten digit (Factory setting)



Setting position.

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

Rotary switche's positions (RSW1) are set by inserting a screw driver into the groove.

DSW5: End terminal resistance (No setting is required)

- Before shipment, No. 1 pin of DSW5 is set at ON.
- In case of having 2 or more outdoor units connected to the same H-link, set for the second unit the pin number 1 of DSW5 at OFF.
- If only one outdoor unit is used, no setting is required.

ON 1 2	
ON 1 2	

Cancellation

Factory setting

(Setting of end terminal resistance)

i note

Setting for transmission

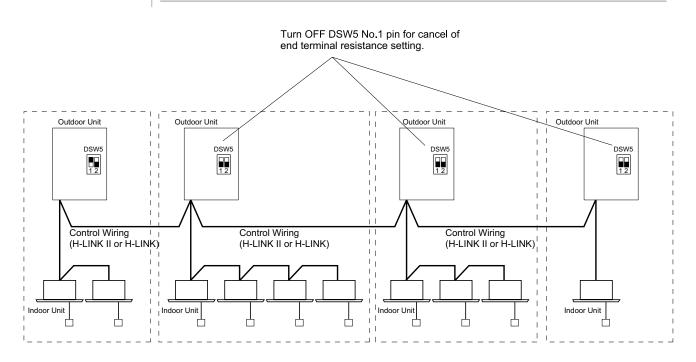
It is required to set the outdoor unit number refrigerant cycle and end terminal resistance for the H-LINK.

In the same refrigerant cycle, set the same refrigerant cycle number for the outdoor unit and the indoor units.

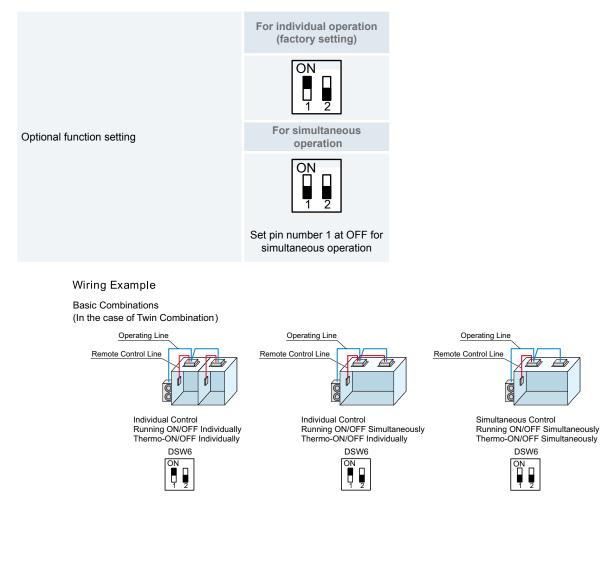
Example in case of setting before cycle number 25

DSW4: Turn ON pin number 2	ON 1 2 3 4 5 6
RSW1: set dial number 5	

In case that the outdoor units quantity in the same H-LINK II is 2 or more, set in the DSW5 the pin number 1 OFF side from the second refrigerant group outdoor units. If only one outdoor unit is used (in the same H-Link II system), no setting is required.



DSW6: Setting of multiple indoor units operation (setting is required)



SMGB0079 rev.0 - 01/2013

4.3.3 Jumpers

Jumper lead setting (JP1~6)

Setting before shipment:

J						
System	JP1	JP2	JP3	JP4	JP5	JP6
Single phase (1~)	0	1	1	1	0	0
Three-phase (3N~)	1	1	0	1	0	0



- 0: Open
- 1: Short circuit

The function selection using the jumper lead setting is shown in the tables below:

		RAS-(2-2.5)HVNP / RAS-3HVNC	
Setting	Function	Details	
JP1	Not used	-	4
JP2	Not used	-	
JP3	Not used	-	
JP4	Fixing for Cooling Only	When JP4 is set to "open", operation mode is fixed for cooling. Thermo-ON is available only by "COOL" or "DRY" mode at indoor unit.	
JP5	Selfdiagnosis	For function test of the outdoor unit control PCB.	
JP6	Phase detection release	Phase detection abnormaly not detected. Release of the Momentary Power Failure between S and T phases	

RAS-(3-12)H(V)N(P/C)(E)			
Setting	Function	Details	
JP1	220V power source voltage	When JP1 is set to "open", changes value of current protection, etc., to 220V power source voltage.	
JP2	415V power source voltage	When JP2 is set to "open", changes value of current protection, etc., to 415V power source voltage. However, in single phase units it becomes 200V power source voltage.	
JP3	380V power source voltage	When JP3 is set to "open", changes value of current protection, etc., to 380V power source voltage. However, in single phase units it becomes 200V power source voltage.	
JP4	Fixing for Cooling Only	When JP4 is set to "open", operation mode is fixed for cooling. Thermo-ON is available only by "COOL" or "DRY" mode at indoor unit.	
JP5	Selfdiagnosis	For function test of the outdoor unit control PCB. Factory default setting is open. When power ON in short condition it enters selfdiagnosis.	
JP6	Phase detection release	Phase detection abnormaly not detected. When short, doesn't affect phase detection.	

4.3.4 LED's indication

LED Indication			
LED1	Red	This LED indicates the transmission status between the indoor unit and the RCS	
LED2	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit	
LED3	Green	Power source for the PCB	

4.4 Common wiring

4.4.1 Electrical wiring between outdoor and indoor unit

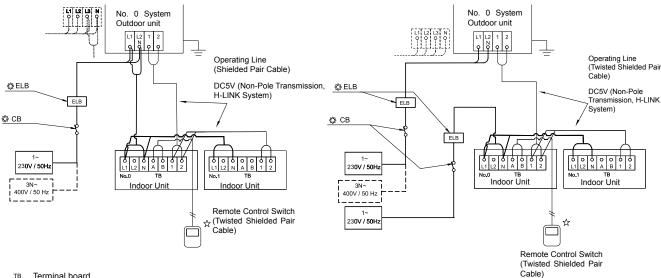
- Connect the electrical wires between the indoor unit and the outdoor unit as show in the figure.
- When installing the electrical wiring, follow local codes and regulations.
- The refrigerant piping and the control wiring are connected to the units in the same refrigerant cycle.
- Use twist pair wire (more than 0.75 mm²) for operation wiring between the outdoor unit and indoor unit, and operation wiring between indoor unit and indoor unit.
- Use a 2-core wire for the operating line (do not use wire with more than 3 cores).
- Use shielded wires for intermediate wiring to protect the units from noise interference at lengths of less than 300 m. The size must comply with local code.
- Open a hole near the connection hole of power source wiring when multiple outdoor units are connected from a single power source line.
- The recommended breaker sizes are detailed in the Wire size section.
- · In the case that a conduit tube for field-wiring is not used, fix rubber bushes with adhesive on the panel.
- All field wiring and equipment must comply with local and international codes.
- H-LINK twist pair shielded cable must be grounded in the outdoor unit side.



Take care with the connection of the operating line. Incorrect connection may cause a failure of the PCB.

Power source from the outdoor unit to the indoor unit

Independent power source of outdoor unit and indoor unit



TB Ierminal board

- ELB Earthleakage Breaker
- ----- Field Wiring
- දියි Field supplied
- ☆ Optional Accessory

4.4.2 Wire size

Connection wiring

Recommended minimum sizes for field provided wires:

N. d. l		Power source cable size	Transmitting cable size
Model	Power supply	EN60 335-1	EN60 335-1
All Indoor Units	1~ 230V 50HZ	0.75 mm²	0.75 mm²
IVX Premium Series			
RAS-2HVNP		2.5 mm ²	
RAS-2.5HVNP		4.0 mm ²	
RAS-3HVNPE	1~ 230V 50HZ	4.0 11111-	
RAS-4HVNPE	1~ 230V 30HZ		
RAS-5HVNPE		6.0 mm ²	
RAS-6HVNPE			0.75 mm²
RAS-4HNPE			0.75 11111-
RAS-5HNPE	3N~ 400V 50Hz	2.5 mm ²	
RAS-6HNPE			
RAS-8HNPE			
RAS-10HNPE		6.0 mm ²	
RAS-12HNP			
IVX Standard Series			
RAS-3HVNC		4.0 mm ²	
RAS-4HVNCE	1~ 230V 50HZ		
RAS-5HVNCE	1~ 230V 50HZ	6.0 mm ²	
RAS-6HVNCE			
RAS-4HNCE			0.75 mm²
RAS-5HNCE		4.0 mm ²	0.75 mm²
RAS-6HNCE	201-4001/5011-		
RAS-8HNCE	3N~ 400V 50Hz		
RAS-10HNCE		6.0 mm ²	
RAS-12HNC			



- Follow local codes and regulations when selecting field wires, Circuit breakers and Earth Leakage breakers
- Use the wires which are not lighter than the ordinary polychloroprene sheathed flexible cord (code designation H05RN-F)

Main switch protection

Select the main switches in according to the next table:

Model	Power supply	Max. current (A)	CB (A)	ELB (no. poles/A/mA)
All Indoor Units	1~ 230V 50Hz	5.0	6	2/40/30
ELB: Earth switch; CB: Circuit braker				

IVX Premium series

Outdoor unit	MC (A)	CB (A)	ELB
RAS-2HVNP	12.0	16	
RAS-2.5HVNP	14.0	20	
RAS-3HVNPE	19.0	20	2/40/30
RAS-4HVNPE	28.0	32	2/40/30
RAS-5HVNPE	28.0	32	
RAS-6HVNPE	28.0	32	
RAS-4HNPE	11.5	15	
RAS-5HNPE	11.5	15	
RAS-6HNPE	13.5	15	4/40/30
RAS-8HNPE	24.0	30	4/40/30
RAS-10HNPE	24.0	30	
RAS-12HNP	24.3	30	

IVX Standard series

Outdoor unit	MC (A)	CB (A)	ELB
RAS-3HVNC	16.0	20	
RAS-4HVNCE	28.0	32	2/40/30
RAS-5HVNCE	28.0	32	2/40/30
RAS-6HVNCE	28.0	32	
RAS-4HNCE	15.0	20	
RAS-5HNCE	15.0	20	
RAS-6HNCE	15.0	20	4/40/30
RAS-8HNCE	24.0	30	4/40/30
RAS-10HNCE	24.0	30	
RAS-12HNC	24.3	30	

4.5 H-LINK II system

The H-LINK II is the wiring connection system between units.

The H-LINK II wiring system only needs:

- Two transmission wires connecting each indoor and outdoor unit for a total of 64 refrigerant cycles.
- Connection wiring for all indoor and outdoor units in series.

The H-LINK II system cannot be applied to the models with the old cycle, nor to units with an old transmission.

4.5.1 Features

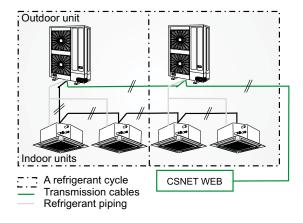
- The total wiring length is considerably reduced compared to traditional connections.
- Only one connection is required for the wiring between the indoor and outdoor units.
- The wiring connection of the complementary central control devices is easy.



• CSNET WEB is a centralized control system which allows the installation to be controlled remotely. It can be connected at any point of the local corporate network, or even via the Internet.

4.5.2 Specifications

- A: outdoor unit.
- B: indoor unit.
- C: refrigerant cycle.
- D: transmission cables.
- E: refrigerant piping.



Cable features

- Transmission cable: 2-wire.
- Polarity of transmission cable: non-polar wire.
- Maximum number of indoor units that can be connected: 4 units per cycle and 160 units per H-LINK II system.
- Maximum wiring length: total 1000 m (including CSNET WEB).
- It is possible to increase the maximum wiring length up to 5000 m by using up to four PSC-5HR units.
- Recommended cable: shielded twisted pair cable, over 0.75 mm² (Equivalent to KPEV-S).
- Voltage: 5V DC.

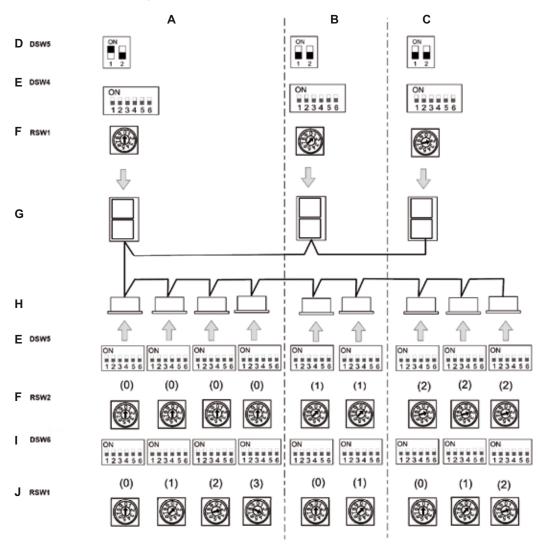
For the H-LINK II system it must be used twisted shielded pair cable or shielded pair cable.

4.5.3 DIP Switch setting for twin, triple and quad systems

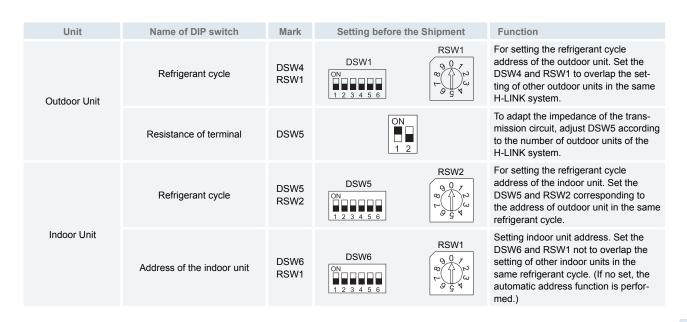
Dip switch of indoor PCB and outdoor H-LINK II

The DIP switches of all the indoor and outdoor units have to be set and the impedance of the transmission circuit adapted.

• Example of the setting of the DIP switches.

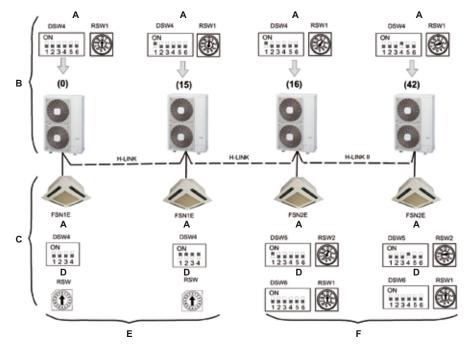


- A: Cycle No. 0.
- B: Cycle No. 1.
- C: Cycle No. 2.
- D: Terminal resistance.
- E: No. of refrigerant cycle (setting for the tenth digit).
- F: No. of refrigerant cycle (setting for the last digit).
- G: Outdoor units.
- H: Indoor units.
- I: Address of the indoor unit (setting for the tenth digit).
- J: Address of the indoor unit (setting for the tenth digit).



4.5.4 Examples of the system of connection between H-LINK and H-LINK II units

In the case of mixed systems with H-LINK and H-LINK II, set the H-LINK units in the first 16 position of the system, as in the following example where 42 systems are connected, 16 with indoor FSN1E units and 26 with indoor FSN2E units.



A: Refrigerant cycle.

- B: Outdoor unit.
- C: Indoor unit.
- D: Indoor unit address.
- E: Either the current remote control switch (H-LINK) or the new one (H-LINK II) can be used.
- F: Only the new remote control switch (H-LINK II) can be used.



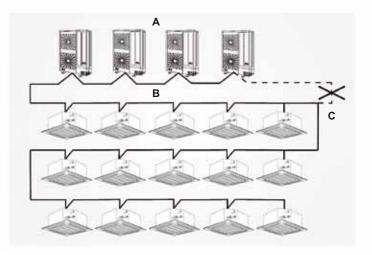
- The maximum number of indoor units than an H-LINK II can control is 160.
- If you use PSC-5S and the CSNET WEB 2.0 (systems only compatible with H-LINK) bear in mind that it will only recognize 16 indoor and 16 outdoor units.

4.5.5 Examples of H-LINK II system

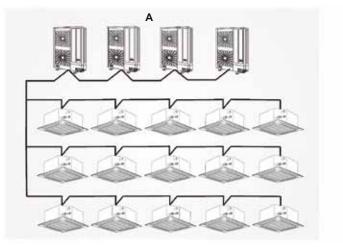
Two cases:

1. Using H-LINK II system for air conditioning systems without a central control device (CSNET WEB or PSC-A64S).

• Line connection with all units (including Utopia and/or Set Free, Mini Set Free and DC Inverter).



- A: Outdoor units.
- B: Indoor units.
- C: Do not install wiring in a loop.
- Line connection for each floor.

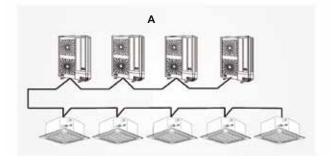


A: Outdoor units.

B: Indoor units.

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Connection with one main line and with the branch lines for the units.

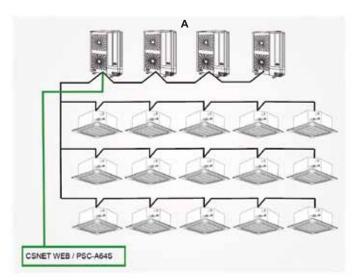


A: Outdoor units.

B: Indoor units.



- The maximum number of units than can be connected is 64 outdoor units and 160 indoor units (including Utopia and/or Set Free, Mini Set-free).
- Do not install the wiring in a loop.
- If the H-LINK II system is not used when carrying out the electrical wiring as shown above, it must be used once the wiring of the instrument is completed. The DIP switches must therefore be set as specified in the DIP switches on the PCB.
- 2. Using the H-LINK II system for air conditioning systems with a central control device (CSNET WEB or PSC-A64S)
- If the central control device is used when carrying out electrical wiring, the CS-NET WEB can be connected at any point
 of the H-LINK II wiring.



- A: Outdoor units.
- B: Indoor units.
- If the central control device is not used when electrical wiring is carried out, you must connect the H-LINK II wiring to all the systems. The easiest method is usually to connect the outdoor units.

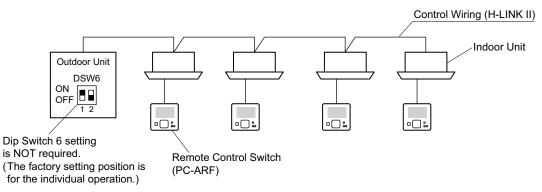


For CSNET WEB 2.0 the limitations are those corresponding to H-LINK.

105

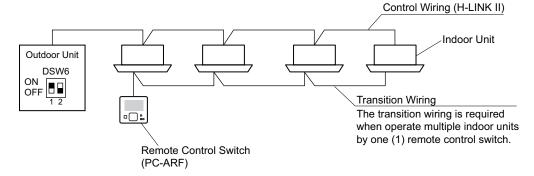
4.6 System Control

4.6.1 Individual Operation



Individual Thermo ON/OFF Operation

The individual Thermo ON/OFF is available to be controlled each indoor unit even if multiple indoor units are controlled simultaneously by one remote control switch.



	Control Method	by each Optional Remote Control Switch		
	Operation Method	by One Group		
(1)	ON/OFF	Yes		
(2)	Setting of Operation Mode	Yes	*1)	
(3)	Room Temperature Setting	Yes		
(4)	Fan Speed Setting	Yes		
(5)	Timer Setting	Yes		
(6)	ON/OFF by Timer Control	Yes		
(7)	Operation Indication	Yes		
(8)	Alarm Indication	Yes		
(9)	Self-Checking	Yes		
(10)	Test Mode	Yes		
(11)	Individual Louver Setting	Yes	*2)	
(12)	Motion Sensor Setting	Yes	*3)	

- i
- Yes: Available

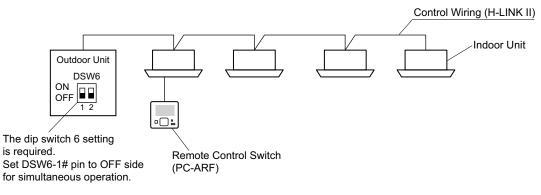
ΝΟΤΕ

- *1) Cooling and heating can not be operated simultaneously.
- *2) Only for RCI-FSN3 series with PC-ARF
- *3) Only for RCI-FSN3 + P-AP160NAE + PC-ARF
- Do not mix other indoor unit, air panel (P-AP160NA1) and remote control switch (PC-ARF)
- if set from one remote control switch.

4.6.2 Simultaneous Operation

This unit can be operated simultaneously with twin, triple and quad combinations.

One remote control switch (PC-ARF) can control without transition wiring up to 4 units of FSN2 series or later model types (H-LINK II supported models) simultaneously (Available if it is with the transition wiring.)



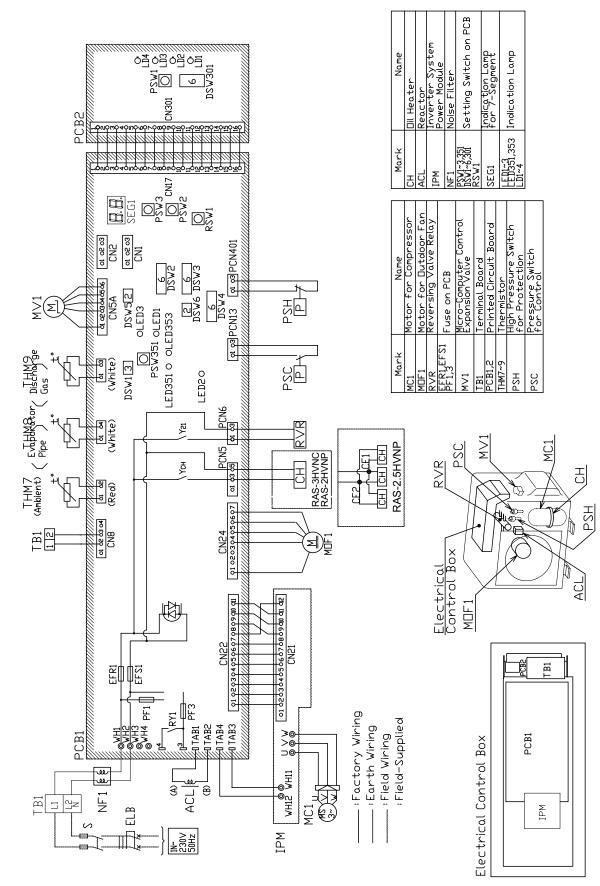
	Control Method	by each Optional Remote Control Switch		
	Operation Method	by One Group		
(1)	ON/OFF	Yes		
(2)	Setting of Operation Mode	Yes	*1)	
(3)	Room Temperature Setting	Yes		
(4)	Fan Speed Setting	Yes		
(5)	Timer Setting	Yes		
(6)	ON/OFF by Timer Control	Yes		
(7)	Operation Indication	Yes		
(8)	Alarm Indication	Yes		
(9)	Self-Checking	Yes		
(10)	Test Mode	Yes		
(11)	Individual Louver Setting	Yes	*2)	
(12)	Motion Sensor Setting	Yes	*3)	

i NOTE

- Yes: Available
- *1) Cooling and heating can not be operated simultaneously.
- *2) Only for RCI-FSN3 series with PC-ARF
- *3) Only for RCI-FSN3 + P-AP160NAE + PC-ARF
- Do not mix other indoor unit, air panel (P-AP160NA1) and remote control switch (PC-ARF)

4.7 Electrical wiring diagrams

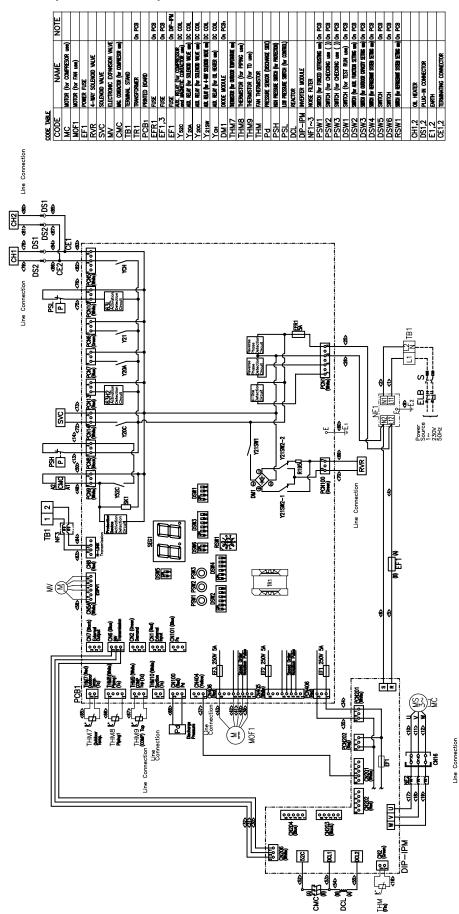
4.7.1 RAS-(2-2.5)HVNP / RAS-3HVNC (1~ 230V 50Hz)



317S139290 / 317S139291 /317S139294

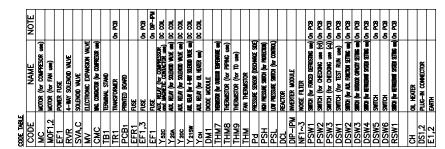
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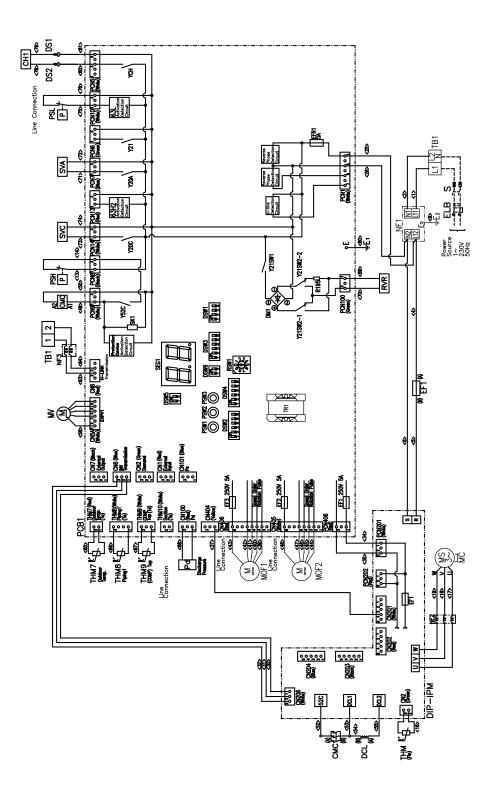
4.7.2 RAS-3HVNPE (1~ 230V 50Hz)



XEK01261_0

4.7.3 RAS-(4-6)HVNPE (1~ 230V 50Hz)

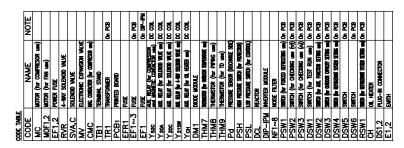


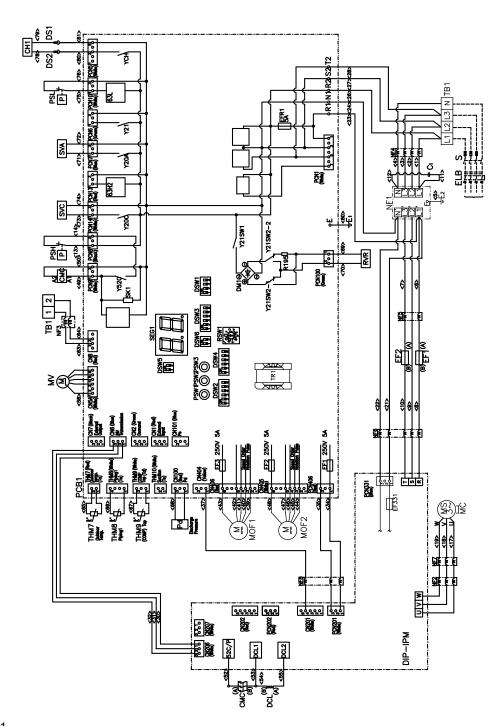


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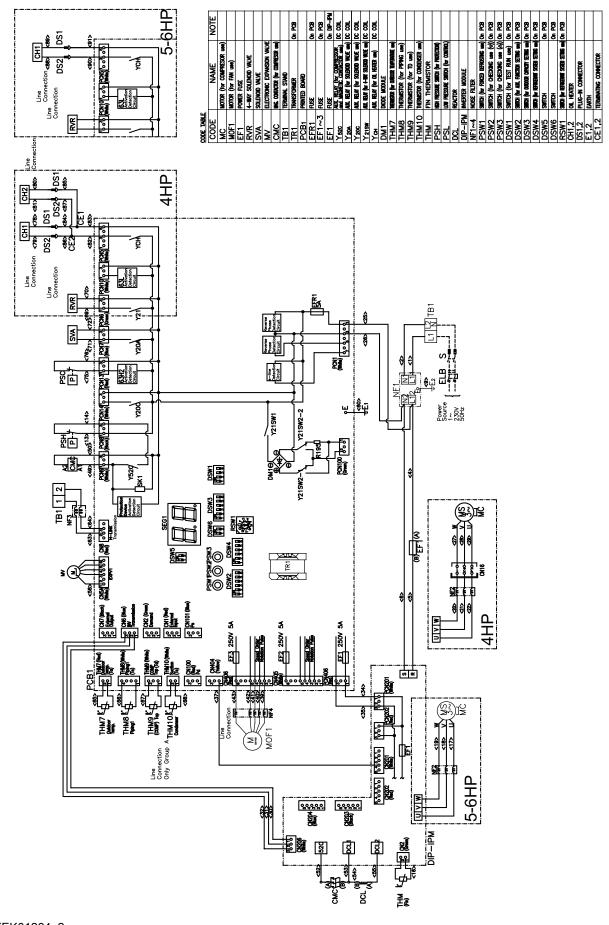
4.7.4 RAS-(4-6)HNPE (3N~ 400V 50Hz)





XEK01263_1

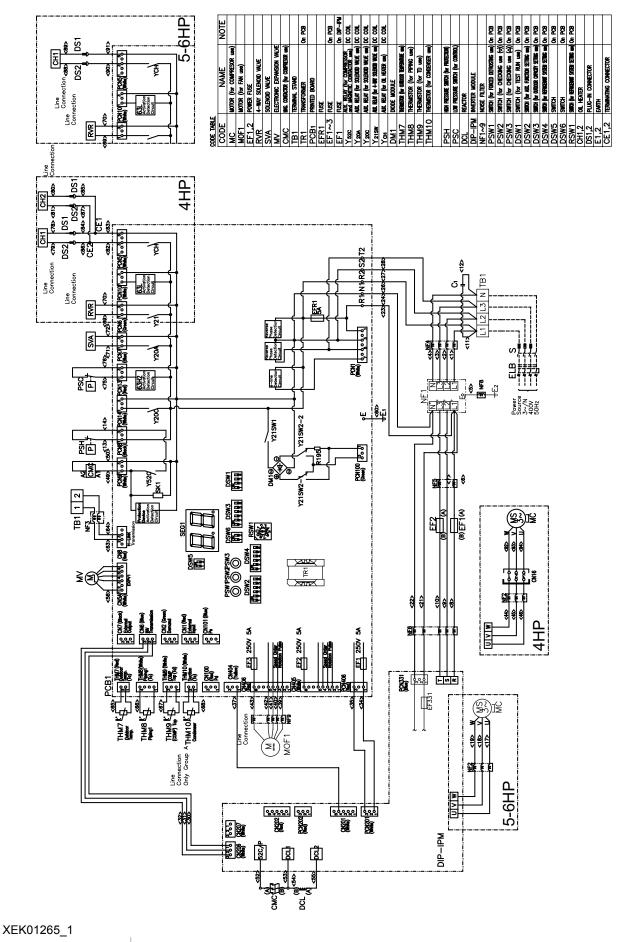
4.7.5 RAS-(4-6)HVNCE (1N~ 230V 50Hz)



XEK01264_2

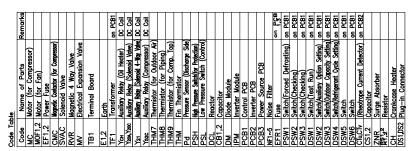
4

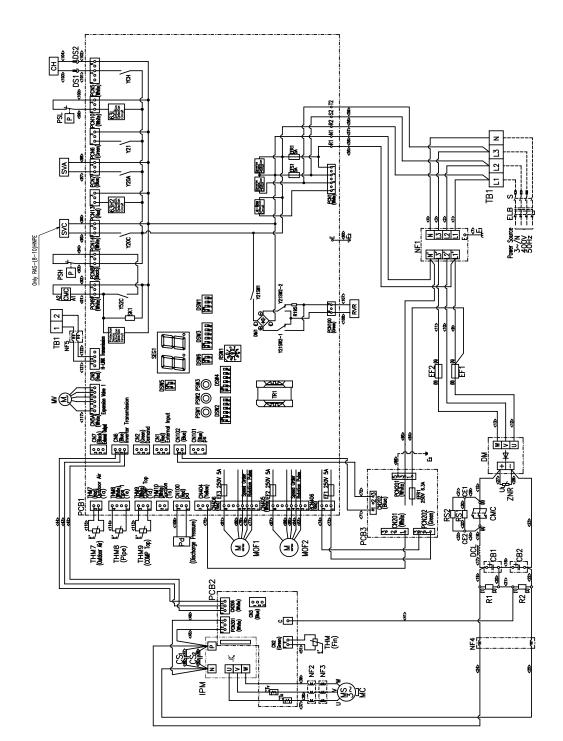
4.7.6 RAS-(4-6)HNCE (3N~ 400V 50Hz)



113

4.7.7 RAS-(8-10)HN(P/C)E (3N~ 400V 50Hz)

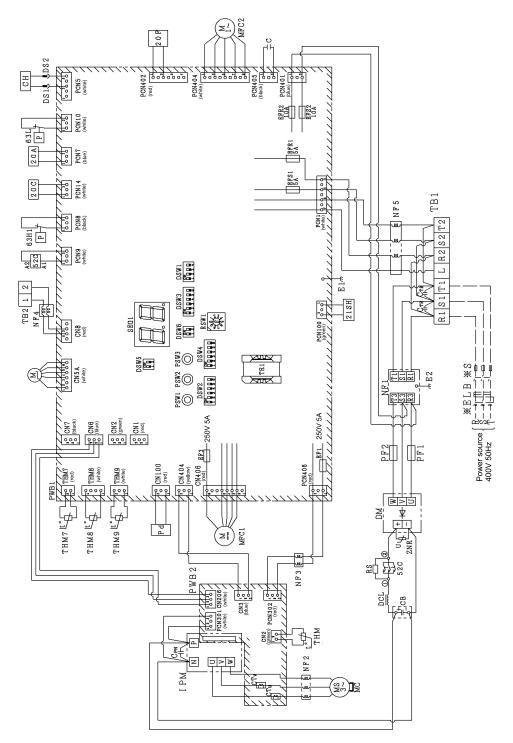




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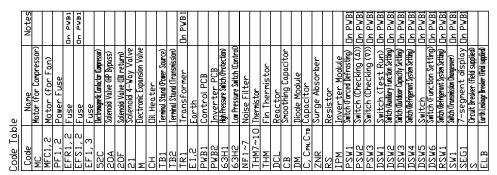
4.7.8 RAS-12HNP (3N~ 400V 50Hz) - Preliminary data

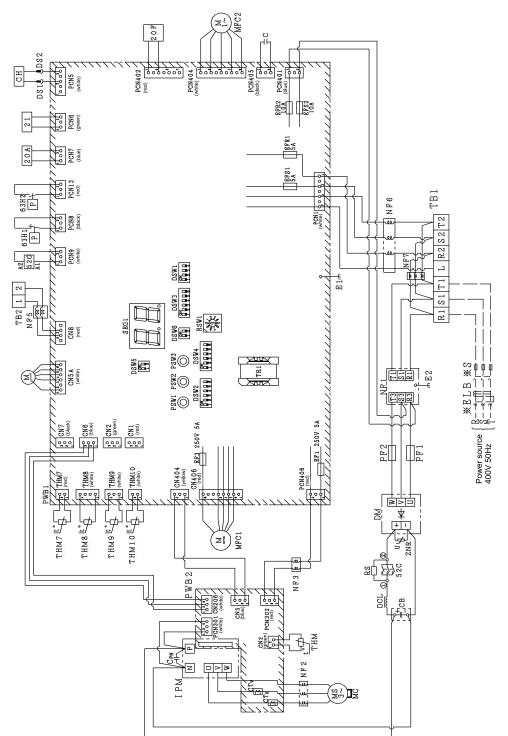
<u>Code Ta</u> bl	a	
Code MC	Name Motor (for Compressor)	Notes
MFC1, 2	Ψ	
ດ 	Power Fuse	
ЕНКІ, ² ГГО1 У	Fuse	Dn PWB1
EF1, 3	Fuse	
520	Electronognetic Contactor (Compressor)	
20A	Valve	
200	Solenoid Valve (Gas Bypass)	
ZOF	t a	
21SH	∕ay ∖	
Σ	Electronic Expansion Valve	
CH	Oil Heater	
TB1	Terninal Stand (Power Source)	
TB2	Terminal Stand (Transmission)	
TR1	Transformer	Dn PVB1
E1,2		
PWB1	٦	
PWB2	Inverter PCB	
63H1	HIGH PLESSURE SMILLEN PLEORECTION	
Pd	Pressure Sensor (Discharge Side)	
63L	Low Pressure Switch (Control)	
۳	Noise Filter	
THM7~9	Thermistor	
THM	Fin Thermistor	
DCL		
CB		
DM	Diode Module	
C, CPN, CTB		
ZNK	JAN JOSAH ANJ	
RS	Resistor	
I PM	Inverter Module	
L N N	אווירנו או חירבע שבורט אוווע. גיייו+רוא (האסרו גיאס (א))	
	Chocking V	
	SWITCH (LEST KUN)	
DAVC	Suitch (National y Lunctum Section)	
3	אוורנו התימחת התהתרולא אר הנולא	
DSW4	Smitch ukeringenunt system settings	
3	Switch	
DSW6	SWITCH (FUNCTION SETTING)	
RSV1	Sillicon ukeringenanti system setung.	م ا
		₹la
אבטן מ	/-seyneric uspuuy Tirriit Provor (fiold cumliod)	
٩	Farth I palance Province (Field Circular)	
ELB	רות או רגמיאלב זו במיכו אובא שלאימי]



317S136064

4.7.9 RAS-12HNC (3N~ 400V 50Hz) - Preliminary data







Index

5.1.	Device	Device control system	
5.2.	Outdoo	or units PCB	120
	5.2.1.	RAS-(2-2.5)HVNP / RAS-3HVNC	120
	5.2.2.	RAS-3HVNPE	121
	5.2.3.	RAS-(4-6)H(V)NPE	122
	5.2.4.	RAS-(4-6)H(V)NCE	123
	5.2.5.	RAS-(8-10)HN(P/C)E	124
	5.2.6.	RAS-12HNP - Preliminary data	125
	5.2.7.	RAS-12HNC - Preliminary data	126
5.3.	Protec	tion and safety control	127
5.4.	Standa	ard operation sequence	128
	5.4.1.	Cooling operation	128
	5.4.2.	Dry operation	130
	5.4.3.	Heating operation	132
	5.4.4.	Automatic cooling and heating operation	134
	5.4.5.	Defrost operation control	135
5.5.	Standa	ard control functions	138
	5.5.1.	Freezing protection during cooling process or dry operation	138
	5.5.2.	Prevention Control for High Pressure Increase during Cooling Operation	139
	5.5.3.	Prevention control for excessively high discharge gas temperature	140
	5.5.4.	Activation for protection device control	141
	5.5.5.	Preheating control of compressor	142
	5.5.6.	Prevention control for high pressure increase	143

5

5.1 Device control system

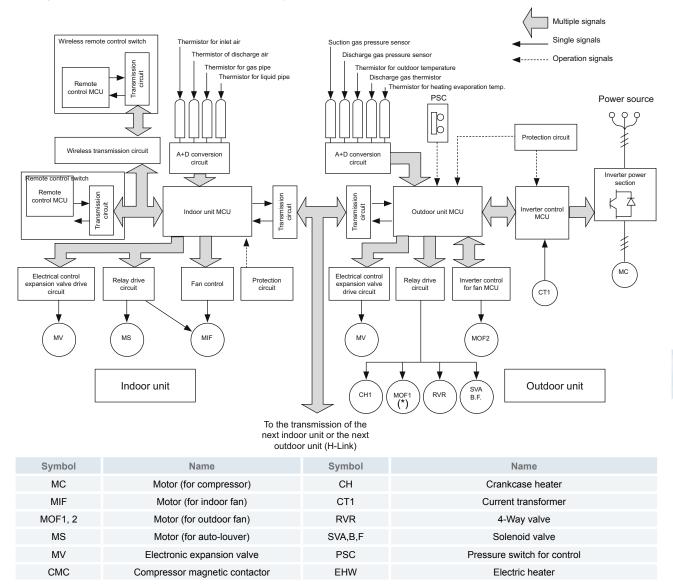
Control subject	Purpose				
Control Subject	Cooling operation	Heating operation	Defrost operation		
Control frequency of inverter compressor	 The frequency control is determined with the next parameters: Ratio (I.U. capacity/O.U. capacity) for individual operation. Temperature difference be- tween air inlet temperature and setting air temperature. 	 The frequency control is determined with the next parameters: Ratio (I.U. capacity/O.U. capacity) for individual operation. Temperature difference between air inlet temperature and setting air temperature. 	Fixed frequency (For RAS-(2-2.5)HVNP and RAS- 3HVNC: stop compressor during 30 sec. After defrosting condition was completed)		
Opening degree expansion valve of outdoor unit	Fully open	 Control range of expansion valve opening degree is deter- mined to optimize temperature. on the top of compressor. When number of I.U. is de- creased, determined with I.U. capacity. Ratio of (before/after decrease or with above condi- tion) for individual operation. 	Fully open		
Opening degree expansion valve of indoor unit	 Control range of expansion valve opening degree is deter- mined to optimize I.U. gas pipe temp. (Tg) - I.U. liquid pipe temp. (Tl) difference. The expansion valve opening degree is controlled according to the number of connected I.U for individual operation. 	 Specified opening degree at normal control starting. After- ward, controlled to optimize I.U. liquid pipe temp. (TI) The expansion valve opening degree is controlled according to the number of connected I.U for individual operation. 	Specified opening degrees control- led by temp. on the top of compres- sor. (Td).		
Outdoor fan control	 Fan step is operated for O.U. liquid pipe temp. (Te) stabiliza- tion control. 	 Fan Step is controlled accord- ing to O.U. liquid pipe temp. and temp. on the top of com- pressor. 	Fan stop.		
4-Way valve (RVR)	OFF	ON	OFF		
Solenoid valve (SVA) (Equalised pressure valve)	 Turn ON at starting. Pd increase protection control. RAS-(4-12)H(V)N(P/C)(E) 	 Turn ON at starting. Pd increase protection control. RAS-(4-12)H(V)N(P/C)(E) 	Turn ON at starting. RAS-(4-12)H(V)N(P/C)(E)		
Solenoid valve (SVC) (Hot gas discharge bypass)	_	Turn ON depending on I.U. dis- charge / suction temperature, outdoor temperature, outdoor liquid temperature, etc. RAS-(3-12)H(V)N(P/C)(E)	_		
Solenoid Valve (SVF) (Oil return)	Turn ON at compressor operation RAS-12HN(P/C)	Turn ON at compressor operation RAS-12HN(P/C)	Turn ON during defrosting RAS-12HN(P/C)		
High/Low pressure balance	RAS-(2-2.5)HVNP / RAS- 3HVN(P/C)(E): Performed at the indoor expansion valve.	RAS-(2-2.5)HVNP / RAS- 3HVN(P/C)(E): Performed at the outdoor expan- sion valve.	_		
	RAS-(4-12)H(V)N(P/C)(E): Turn ON SVA during stop.	RAS-(4-12)H(V)N(P/C)(E): Turn ON SVA during stop.			

inote

- I.U.: Indoor unit
- O.U.: Outdoor unit
- Tc / Te: Condensing temperature / Evaporating temperature

- Td: Discharge temperature
- TI: Liquid temperature
- Tg: Gas temperature
- Cap: Capacity
- Temp.: Temperature

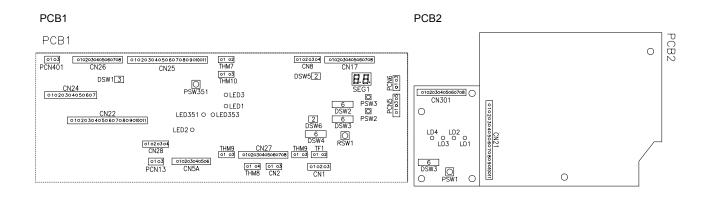
The figure below shows the outline of the control system



(*) For RAS-12HN(P/C) models. Other than this, the two fan motors are controlled by the Inverter.

5.2 Outdoor units PCB

5.2.1 RAS-(2-2.5)HVNP / RAS-3HVNC



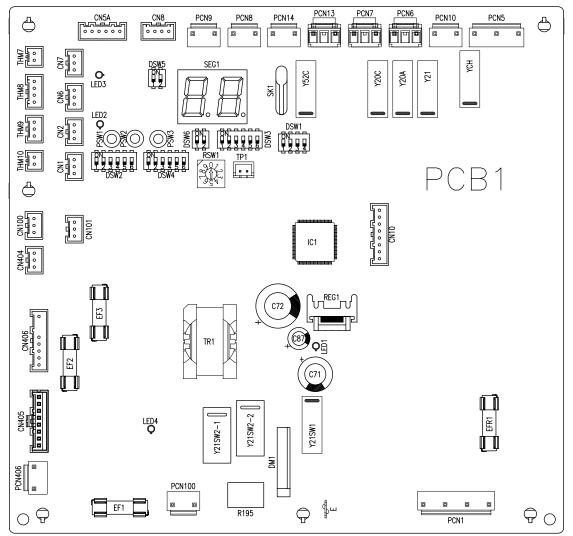
PCB1 Connector indication			
Connector	Name		
PCN5	Crankcase heater of compressor (oil)		
PCN6	Reversing valve relay		
PCN13	Pressure switch control		
PCN401	High pressure switch protection		
THM7	Outdoor air temperature thermistor		
THM8	Pipe evaporation temperature thermistor		
THM9	Compressor discharge temperature thermistor		
CN1	Input function		
CN2	Demand input		
CN5A	Micro electronic expansion valve		
CN8	Transmission from outdoor unit to indoor unit		
CN17	Transmission to PCB2		
CN22	Transmission to IPM		
CN24	Motor for outdoor fan		
CN25	For inspection		
CN26	For inspection		

	PCB1 Switch indication
Connector	Name
DSW1	No setting
DSW2	Auxiliary function setting
DSW3	Capacity code
DSW4/ RSW1	Refrigerant cycle number
DSW5	Switch
DSW6	Switch
PSW2	Available optional function. Setting can be se-
PSW3	lected using the 7-segment display
PSW351	The inverter micro-computer checking

		PCB1 LED indication
LED	Colour	Name
LED1	Red	Power source for the PCB
LED2	Green	This LED indicates the transmission status between the indoor unit and the RCS
LED3	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED351	Red	For inspection
LED353	Red	For inspection
	PC	CB2 Connector indication
Connector		Name
CN21 Trans		smission to PCB1
CN301	Trans	smission to PCB1
		PCB2 LED indication
LED	Coloui	· Name
LED1	Red	
LED2	Red	These LEDS indicate the cause of unit
LED3	Red	stoppages
LED4	Red	
PCB2 Switch indication		
		FGD2 Switch mulcation

Connector	Name
DSW301	Test run
PSW1	Manual defrost operation switch. The defrost option is manually available under the forced defrost area

5.2.2 RAS-3HVNPE



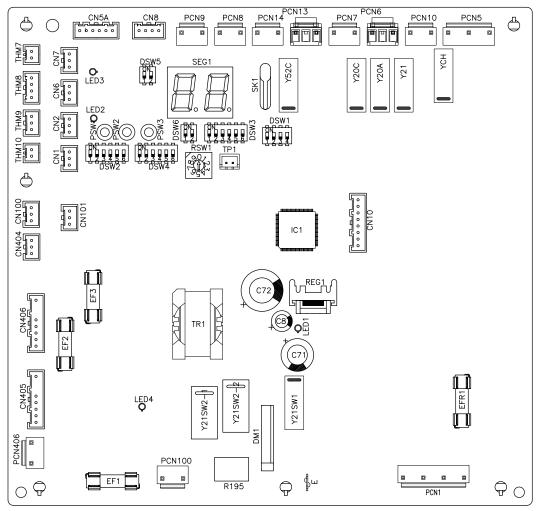
Connector indication

PCN1	Fuse
PCN5	Crankcase heater of compressor (oil)
PCN8	High pressure switch protection
PCN9	Compressor contactor
PCN10	Low pressure switch protection
PCN14	Solenoid valve
PCN100	4-way solenoid valve
PCN406	Power connection between PCB and DIP-IPM
THM7	Outdoor air temperature thermistor
THM8	Pipe evaporation temperature thermistor
THM9	Compressor discharge temperature thermistor
CN5A	Micro electronic expansion valve
CN6	Transmission between PCB and DIP-IPM
CN8	Transmission from outdoor to indoor unit
CN100	Discharge pressure (Pd)
CN404	Line connection between PCB and DIP-IPM
CN406	Motor for fan
EF1,2,3 EFR1	Power protection

	Switch indication
DSW1	Test run
DSW2	Auxiliary function setting
DSW3	Capacity code
DSW4/ RSW1	Refrigerant cycle number
DSW5	Switch
DSW6	Switch

LED indication			
LED1	Red	Power source for the PCB	
LED2	Green	This LED indicates the transmission status bet- ween the indoor unit and the RCS	
LED3	Yellow	This LED indicates the transmission status bet- ween the indoor unit and the outdoor unit	
LED4	Red	Power source at 280V for the PCB	

5.2.3 RAS-(4-6)H(V)NPE



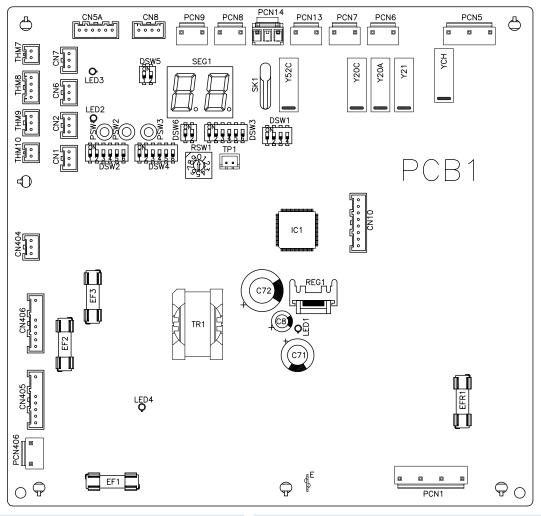
Connector indication

PCN1	Fuse
PCN5	Crankcase heater of compressor (oil)
PCN7	Solenoid valve
PCN8	High pressure switch protection
PCN9	Compressor contactor
PCN10	Low pressure switch protection
PCN14	Solenoid valve
PCN100	4-way solenoid valve
PCN406	Power connection between PCB and DIP-IPM
THM7	Outdoor air temperature thermistor
THM8	Pipe evaporation temperature thermistor
THM9	Compressor discharge temperature thermistor
CN5A	Micro electronic expansion valve
CN6	Transmission between PCB and DIP-IPM
CN8	Transmission from outdoor to indoor unit
CN100	Discharge pressure (Pd)
CN404	Line connection between PCB and DIP-IPM
CN405	Motor for fan 2
CN406	Motor for fan 1
EF1,2,3 EFR1	Power protection

	Switch indication
DSW1	Test run
DSW2	Auxiliary function setting
DSW3	Capacity code
DSW4/ RSW1	Refrigerant cycle number
DSW5	Switch
DSW6	Switch

LED indication						
LED1	Red Power source for the PCB					
LED2	Green	This LED indicates the transmission status bet- ween the indoor unit and the RCS				
LED3	Yellow	This LED indicates the transmission status bet- ween the indoor unit and the outdoor unit				
LED4	Red	Power source at 280V for the PCB				

5.2.4 RAS-(4-6)H(V)NCE



Connector indication

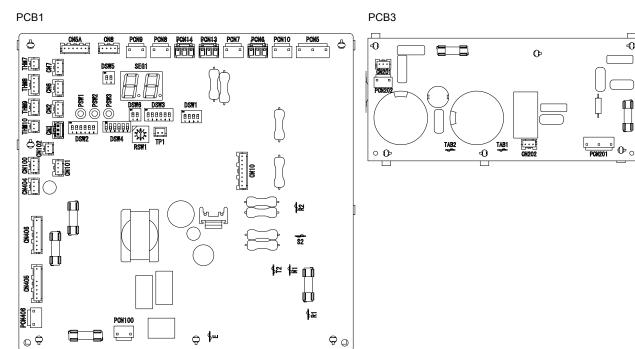
PCN1	Fuse
PCN5	Crankcase heater of compressor (oil)
PCN6	4-way solenoid valve
PCN7	Solenoid valve
PCN8	High pressure switch protection
PCN9	Compressor contactor
PCN10	Low pressure switch protection
PCN13	Pressure switch control
PCN406	Power connection between PCB and DIP-IPM
THM7	Outdoor air temperature thermistor
THM8	Pipe evaporation temperature thermistor
THM9	Compressor discharge temperature thermistor
THM10	Compressor suction temperature thermistor
CN5A	Micro electronic expansion valve
CN6	Transmission between PCB and DIP-IPM
CN8	Transmission from outdoor to indoor unit
CN404	Line connection between PCB and DIP-IPM
CN406	Motor for fan
EF1,2,3 EFR1	Power protection

Switch indication					
DSW1	Test run				
DSW2	Auxiliary function setting				
DSW3	Capacity code				
DSW4/ RSW1	Refrigerant cycle number				
DSW5	Switch				
DSW6	Switch				

LED indication						
LED1	LED1 Red Power source for the PCB					
LED2	Green	This LED indicates the transmission status between the indoor unit and the RCS				
LED3	Yellow	This LED indicates the transmission status bet- ween the indoor unit and the outdoor unit				
LED4	Red	Power source at 280V for the PCB				

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5.2.5 RAS-(8-10)HN(P/C)E

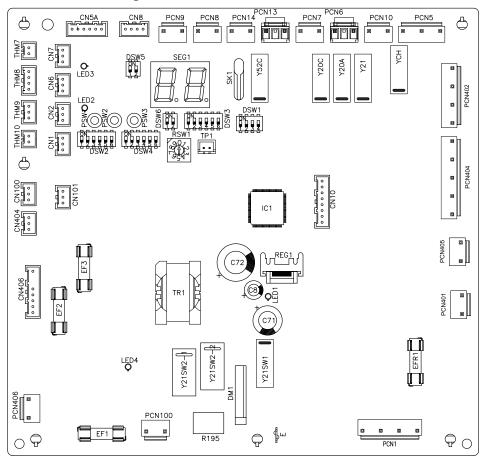


	PCB1 Connector indication
Connector	Name
PCN1	Fuse
PCN5	Crankcase heater of compressor (oil)
PCN7	Solenoid valve
PCN8	High pressure switch protection
PCN9	Compressor contactor
PCN10	Low pressure switch protection
PCN14	Solenoid valve (only RAS-(8-10)HNPE)
PCN100	4-way solenoid valve
PCN406	Power connection between PCB1 and PCB3
THM7	Outdoor air temperature thermistor
THM8	Pipe evaporation temperature thermistor
THM9	Compressor discharge temperature thermistor
CN5A	Micro electronic expansion valve
CN6	Transmission between PCB1 and DIP-IPM
CN8	Transmission from outdoor to indoor unit
CN100	Discharge pressure (Pd)
CN102	Line connection between PCB1 and PCB3
CN404	Line connection between PCB1 and PCB3
CN405	Motor for fan 2
CN406	Motor for fan 1
EF1,2,3 EFR1	Power protection

PCB1 Switch indication						
Connector	Name					
DSW1	Test run					
DSW2	Auxiliary function setting					
DSW3	Capacity code					
DSW4/ RSW1	Refrigerant cycle number					
DSW5	Switch					
DSW6	Switch					

PCB1 LED indication							
LED	Colour		Name				
LED1	Red		Power source for the PCB				
LED2	Green		This LED indicates the transmission status between the indoor unit and the RCS				
LED3	Yellow		This LED indicates the transmission status between the indoor unit and the outdoor unit				
LED4	Red		Power source at 280V for the PCB				
			PCB3 Connector indication				
Conne	Connector		Name				
PCN20	1	Fus	e				
PCN202 Por		Pov	wer connection between PCB3 and PCB1				
CN201 Line		Line	e connection between PCB3 and PCB1				
CN202 Li		Line	ine connection between PCB3 and PCB1				
EFR1		Pov	Power protection				

5.2.6 RAS-12HNP - Preliminary data



Connector indication Switch indication PCN1 Fuse DSW1 Test run PCN5 DSW2 Auxiliary function setting Crankcase heater of compressor (oil) PCN7 DSW3 Solenoid valve Capacity code DSW4/ PCN8 High pressure switch protection Refrigerant cycle number RSW1 PCN9 Compressor contactor DSW5 Switch PCN10 Low pressure switch protection DSW6 Switch PCN14 Solenoid valve **PCN100** 4-way solenoid valve LED indication PCN401 Fuse LED1 Red Power source for the PCB PCN402 Solenoid valve This LED indicates the transmission status bet-LED2 Green PCN404 Motor for fan 2 ween the indoor unit and the RCS PCN405 Capacitor This LED indicates the transmission status bet-LED3 Yellow ween the indoor unit and the outdoor unit PCN406 Power connection between PCB and DIP-IPM LED4 Power source at 280V for the PCB Outdoor air temperature thermistor Red THM7 THM8 Pipe evaporation temperature thermistor THM9 Compressor discharge temperature thermistor CN5A Micro electronic expansion valve

Discharge pressure (Pd)

Motor for fan 1

Power protection

CN6

CN8

CN100

CN404

CN406

EF1,3

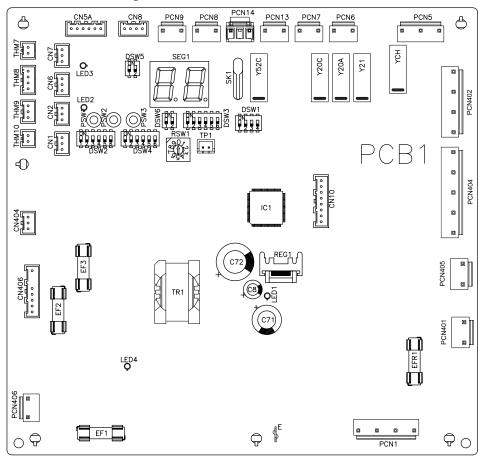
EFR1,2

Transmission between PCB and DIP-IPM

Transmission from outdoor to indoor unit

Line connection between PCB and DIP-IPM

5.2.7 RAS-12HNC - Preliminary data



Connector indication			Switch indication			
PCN1	Fuse		DSW1		Test run	
PCN5	Crankcase heater of compressor (oil)	DSW2		Auxil	iary function setting	
PCN6	4-way solenoid valve	DSW3	SW3 Capacity code		acity code	
PCN7	Solenoid valve	DSW4/		Refrigerant cycle number		
PCN8	High pressure switch protection	RSW1		reingerant bysic number		
PCN9	Compressor contactor	DSW5	SW5 Switch			
PCN10	Low pressure switch protection		DSW6 Switch		ch	
PCN13	Pressure switch control					
PCN401	Fuse		LED indication			
PCN402	Solenoid valve	LED1 Red		d	Power source for the PCB	
PCN404	Motor for fan 2	LED2	Gr	een	This LED indicates the transmission status bet- ween the indoor unit and the RCS	
PCN405	Capacitor		Va		This LED indicates the transmission status bet-	
PCN406	Power connection between PCB and DIP-IPM	LED3	Yellov	llow	ween the indoor unit and the outdoor unit	
THM7	Outdoor air temperature thermistor	LED4	Re	ed	Power source at 280V for the PCB	
THM8	Pipe evaporation temperature thermistor					
THM9	Compressor discharge temperature thermistor					
THM10	Compressor suction temperature thermistor					

Motor for fan 1

Power protection

Micro electronic expansion valve

Transmission between PCB and DIP-IPM

Transmission from outdoor to indoor unit

Line connection between PCB and DIP-IPM

CN5A

CN6

CN8

CN404

CN406

EF1,2,3

EFR1

5.3 Protection and safety control

• Compressor protection

The following devices and their combinations protect the compressor

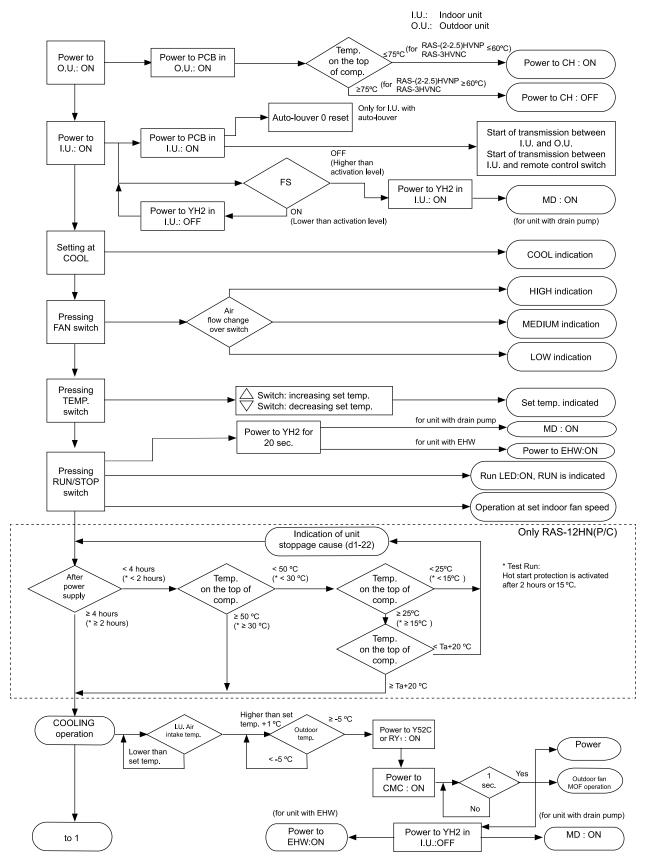
High-pressure switch	This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.
Oil heater	This band heater protects against the oil carry-over during the cold starting, as the band heater is energized while the compressor is stopped.
Fan motor protection	Internal thermostat that is embedded in the fan motor winding: this internal thermostat cuts out the operation of the fan motor when the temperature of the fan motor winding exceeds the setting. (only for some RPI models)

• Safety and control device setting for the outdoor units

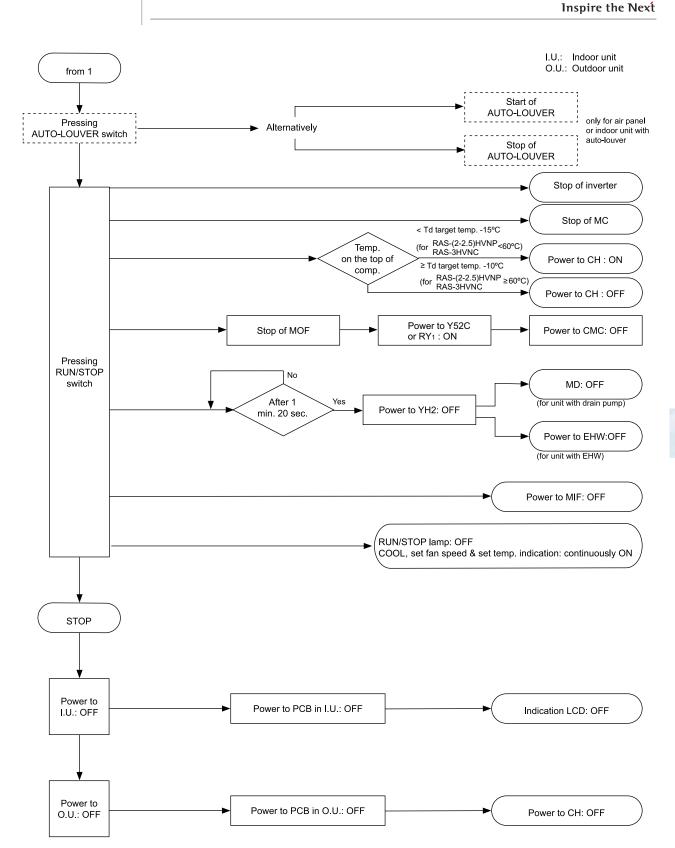
	Model		RAS-(2-2.5)HVNP RAS-3HVNC	RAS-3HVNPE	RAS-(4-6)HVN(P/C)E	RAS-(4-12)HN(P/C)(E)				
Pressure Switches			Automati	Automatic Reset, Non-Adjustable (each one for each compressor)						
For com- pressor	High	Cut-Out	MPa	-0.05 4.15 -0.15	-0.05 4.15 -0.15	-0.05 4.15 -0.15	-0.05 4.15 -0.15			
		Cut-In	MPa	3.20±0.15	3.20±0.15	3.20±0.15	3.20±0.15			
For fuse control	1~ 230V 50Hz		A	25	40	50 (RAS-4HVNCE = 40)				
control	3N~ 400V 50Hz		А				2 X 20			
CCP Time	CCP Timer			Non-Adjustable						
Setting Time		min.	3	3	3	3				
Discharge gas Thermistor		°C	115 (OFF) Cooling 115 (OFF) Heating	115 (OFF) Cooling 115 (OFF) Heating	127 (OFF) Cooling 120 (OFF) Heating	127 (OFF) Cooling 120 (OFF) Heating				
For Condenser Fan Motor										
Internal Thermostat			Automatic Reset, Non-Adjustable (each one for each motor)							
		Cut-Out	°C	-	120	120	120			
For Control Circuit		А	3	5	5	5				
Fuse Capacity on PCB		~	5	5	5	5				

5.4 Standard operation sequence

5.4.1 Cooling operation

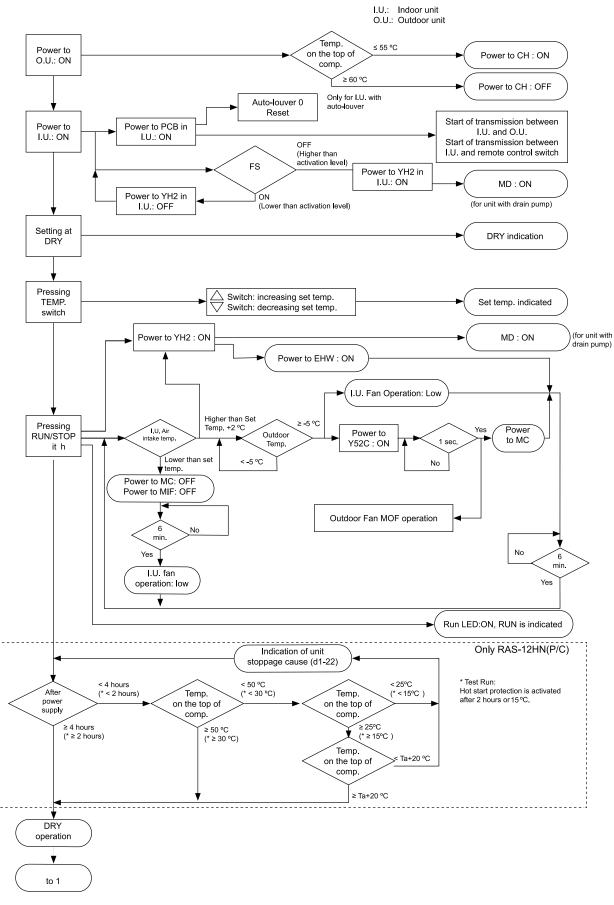


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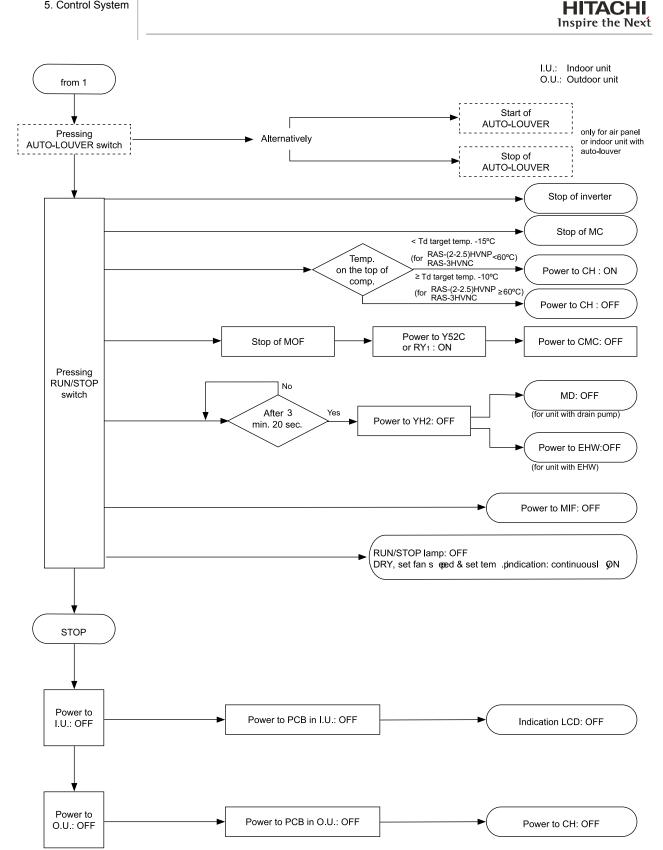
HITACHI

5.4.2 Dry operation



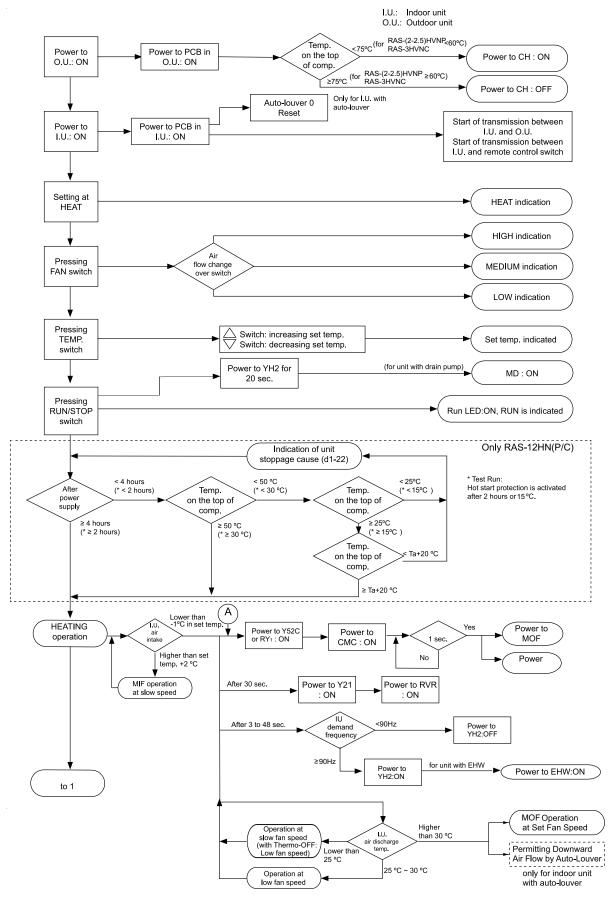
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130

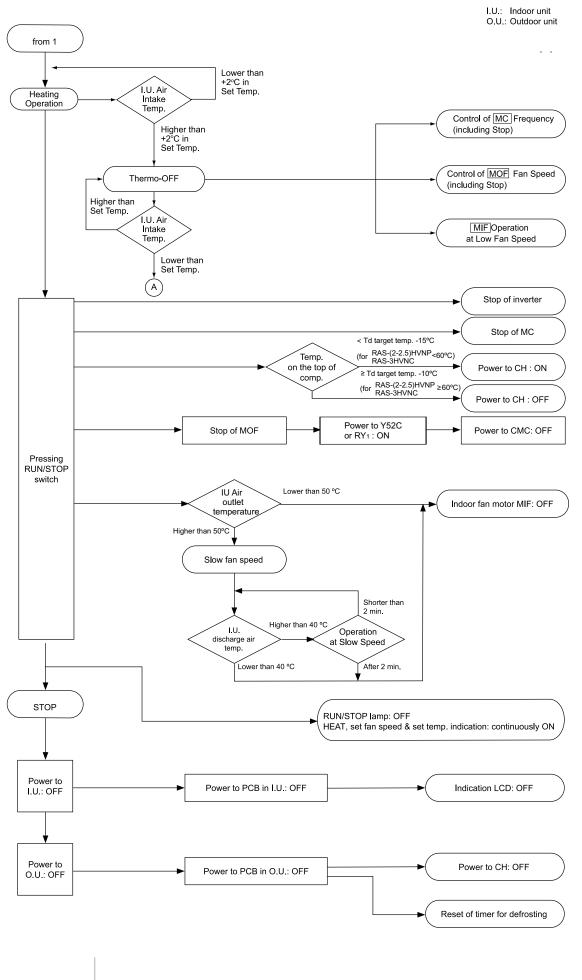


5. Control System

5.4.3 Heating operation

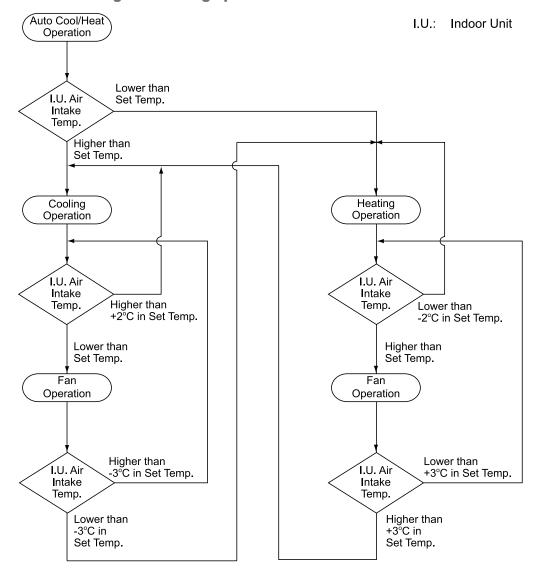


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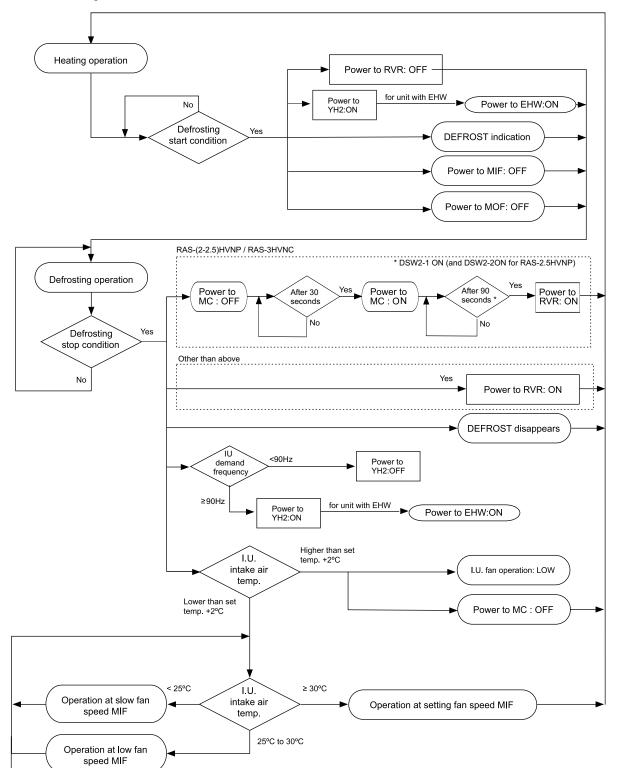


SMGB0079 rev.0 - 01/2013

5.4.4 Automatic cooling and heating operation



5.4.5 Defrost operation control



Defrosting Operation

The following defrosting operations, "Standard Defrost", "Forced Defrost" and "Manual Defrost" are available.

1 Standard Defrost

This operation is started according to the outdoor temperature, the outdoor evaporating temperature and operating time.

2 Forced Defrost

This operation starts when the indoor unit is operated Thermo-ON/OFF repeatedly and the standard defrost is not used.

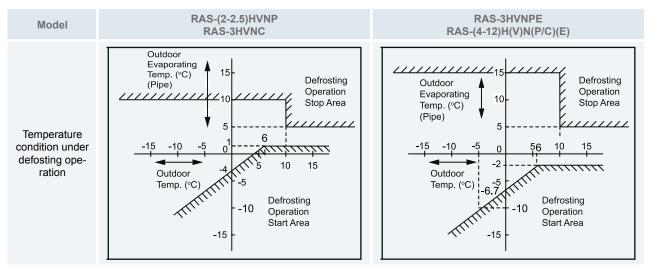
3 Manual Defrost

This operation starts when the push switch "PSW1" on the outdoor PCB is pressed and hold for more than 3 seconds during the maintenance work. (It is not performed when the defrosting operation is started, the high pressure and the outdoor evaporating temperature is high.)

i note

Do not repeat defrost operation frequently.

- Condition for Starting Defrost
- 1 Standard Defrost
 - a. Temperature Condition



b. Condition for Operating Time of Defrost Operation Start

The defrosting operation is started when the temperature condition is met "(a) Temperature Condition" after the heating operation is performed for 40 to 120 minutes. The heating operation time is determined by estimating the amount of frosting on the heat exchanger.

2 Forced Defrost

Condition for Starting

The forced defrosting operation is started when all the following conditions are met.

- a. 120 minutes are passed after the reversing valve is "ON".
- b. The outdoor temperature is lower than 10°C.
- **c.** The accumulated heating operation time is more than 60 minutes. (*1) (The accumulated time is reset when the operation is stopped or the defrosting operation is performed.)
- d. The compressor is operated continuously for more than 1 and half minutes. (*2)
- e. The outdoor evaporating temperature is lower than 5°C (*3) right before starting the operation.
- f. The pressure switch for control is "OFF".

inote

For RAS-(2-2.5)HVNP / RAS-3HVNC:

- (*1) More than 39 minutes.
- (*2) If outdoor temperature is less than -6°C then the compressor is operated continuously for more than 2 minutes. If outdoor temperature is more than -6°C then the compressor is operated continuously for more than 9 minutes.
- (*3) Less than 6°C.

Condition for Completing Defrost Operation

The defrosting operation is stopped when any of following conditions are met.

- 1 The outdoor evaporating temperature becomes more than 25°C (*1) for 2 minutes from starting the defrosting operation.
- 2 The outdoor evaporating temperature becomes more than 15°C (*2) (the outdoor temperature < 10°C) after passing 2 minutes from starting the defrosting operation.
- 3 The outdoor evaporating temperature becomes more than 5°C (the outdoor temperature ≥ 10°C) after passing 2 minutes from starting the defrosting operation.
- 4 The pressure switch for control is "ON".
- 5 More than 9 minutes (*3) are passed after starting the defrosting operation.

inote

For RAS-(2-2.5)HVNP / RAS-3HVNC:

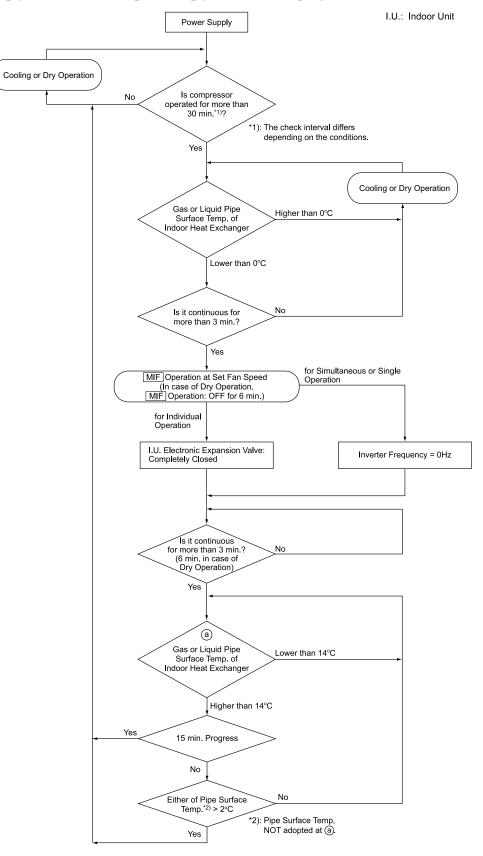
- (*1) More than 20°C.
- (*2) More than 10°C
- (*3) More than 10 minutes.



- The defrosting operation is not started immediately even if the above conditions are met. (The defrosting condition may be met temporally depending on the refrigerant cycle variability.)
- The defrosting operation is started when the conditions are met continuously for period of time.

5.5 Standard control functions

5.5.1 Freezing protection during cooling process or dry operation



5.5.2 Prevention Control for High Pressure Increase during Cooling Operation

This function is performed to prevent the abnormal condition (Alarm Code: 02) when the air flow volume is decreased by a seasonal wind against air outlet of the outdoor unit. When the following conditions are met, the forced Thermo-OFF operation will be performed.

The cause of stoppage will be 13 during Thermo-OFF.

RAS-(2-2.5)HVNP / RAS-3HVNC

- 1 Y52C is turned "ON" during the cooling operation, or RY1 is turned "ON" (during the compressor operation).
- 2 Pressure switch for control is turned "ON".

ON	3.6MPa
OFF	2.85MPa

3 Outdoor liquid pipe temperature \geq 55°C

RAS-(4-12)H(V)NC(E)

- 1 Y52C is turned "ON" during the cooling operation, or RY1 is turned "ON" (during the compressor operation).
- **2** Pressure switch for control is turned "ON".

ON	3.6MPa
OFF	2.85MPa

3 Condensation temperature $\geq 62^{\circ}$ C

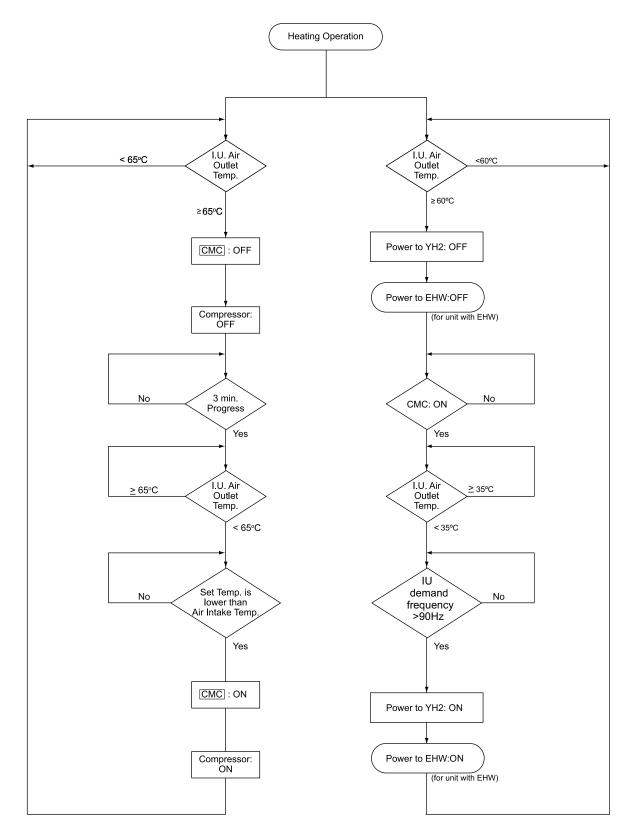
RAS-(3-12)H(V)NP(E)

1 Y52C is turned "ON" during the cooling operation, or RY1 is turned "ON" (during the compressor operation).

2 High Pressure \geq 3.8MPa

5.5.3 Prevention control for excessively high discharge gas temperature

I.U.: Indoor Unit

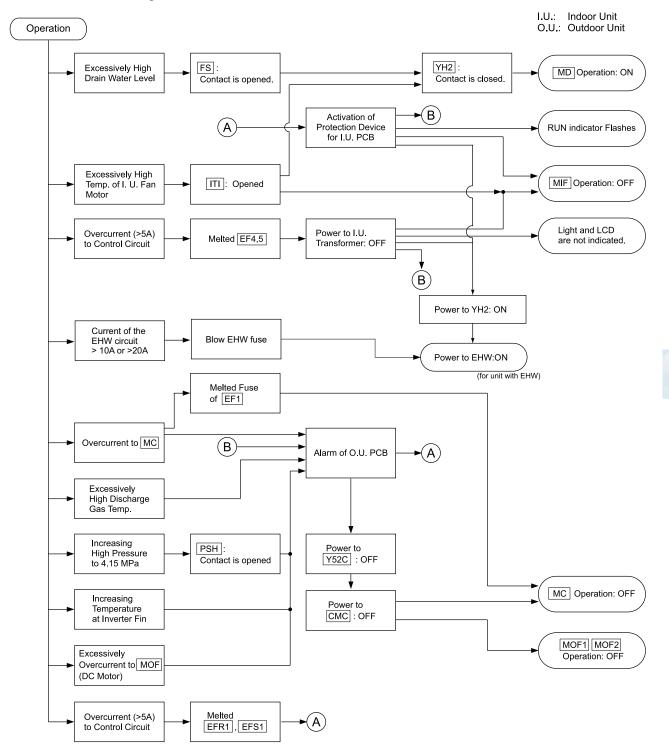


Thermo-ON/OFF Control for Indoor Unit

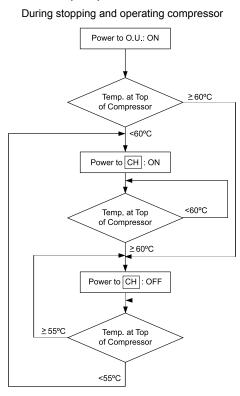
Heater control for Indoor Unit

140

5.5.4 Activation for protection device control

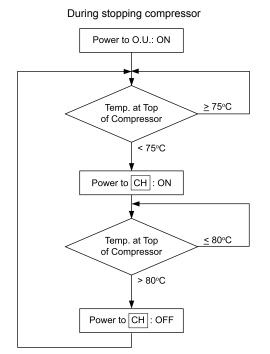


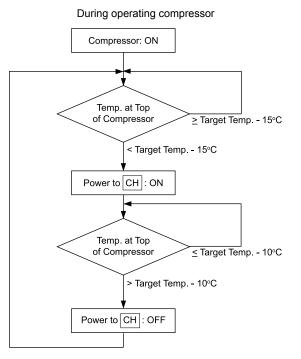
5.5.5 Preheating control of compressor



RAS-(2-2.5)HVNP / RAS-3HVNC







5.5.6 Prevention control for high pressure increase

This function is performed to prevent the abnormal condition (Alarm: 02) when the outdoor air flow is decreased by a seasonal wind against air outlet.

When the **CMC** is ON during cooling operation, **PSC** is ON and Tc is higher than Tc1+4 °C, forced thermo-off operation will be performed.

Tc: Outdoor piping temperature.

Tc1: Outdoor piping temperature when **PSC** is ON.

PSC ON: 3.60 MPa.

However, if it occurs more than 6 times during operation, forced thermo-off operation will not be performed. Cause of stoppage will be 13.

6

6. Optional functions

Index

6.1.	Option	al input and output signals (By 7-segment display)	. 146
	6.1.1.	Available ports	146
	6.1.2.	Available optional signals	148
	6.1.3.	Setting of the optional signals	150
	6.1.4.	Description of optional signals	151
6.2.	Option	al functions (By 7-segment display)	. 154
	6.2.1.	Setting of the optional functions	154
	6.2.2.	Description of the optional functions	157
6.3.	Option	al functions (By remote control switch)	. 161

6.1 Optional input and output signals (By 7-segment display)

The system has several input and output signals, which can be selected using the following connectors of the outdoor unit's PCB:

- Input connectors CN1 and CN2, which have two and one ports respectively to configure three optional input signals.
- Output connector CN1, which has two ports to configure two optional output signals.

The selection of these input and output signals represent the selection of some optional functions programmed in the PCB of the outdoor unit.

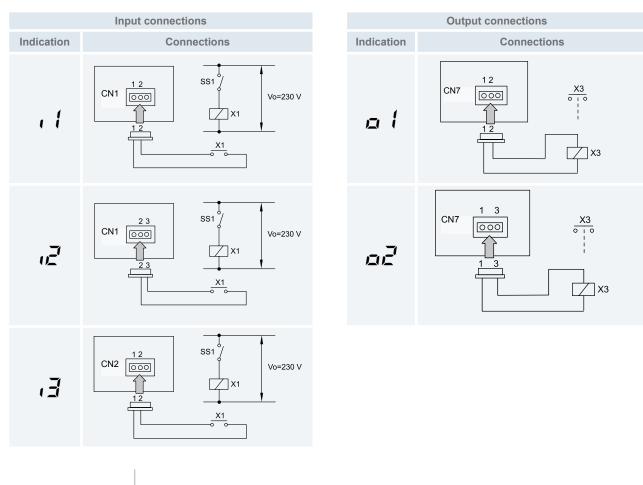
6.1.1 Available ports

The system has the following input and output ports.

Content		Setting of the port in the PCB of the indoor unit	Remarks	Outlet
	. 1	1-2 of CN1		Contact
Inputs	ιZ	2-3 of CN1		Contact
	εı	1-2 of CN2		Contact
Outouto	o (1-2 of CN7		DC 12V
Outputs	02	1-3 of CN7		DC 12V

Connection

The system has the following connections:



SMGB0079 rev.0 - 01/2013

Specification of the components for a correct installation

Со	mponent	Manufacturer or specifications	Remarks
Auxiliary relay	(X3)	OMRON mini power relay model: MY1F or equivalent	Voltage between relay terminals 12 Vdc - 75 mA
(SS1) (x1), (x2	2) contact example	Manual type	Voltage between terminals of the 230V - 5 mA contactor
3P connector	cable	Optional part PCC-1A (capable of con- necting the JST XHP –3 connector)	Five wires with connectors as one set
Wire (control	Voltage: 12V DC	0.5 mm²	
Wire (power)	Voltage: 230V	2.0 mm ²	

i note

- The connection of the input signal is only an example.
- Keep the CN1 and CN2 wires as short as possible.
- Do not run the wires along 230 V/400 V CA power cables separately install them at a distance of more than 30cm. (The cables may intersect.)
- If you install the wires along a power supply wire, insert the wires in a metal conduit tube and ground one end of the tube.
- The maximum wiring length is 70 m. If you use this function, it is recommended that you use safety devices such as an electrical leakage breaker or a smoke detector.

6.1.2 Available optional signals

The outdoor units have the following signals that are described in the following table. These signals are set up through the PCB of the outdoor unit.

RAS-(2-2.5)HVNP / RAS-3HVNC

Input signals

Ind.	Input signal	Application	Port
0	No setting application	No setting	—
1	Fixing the heating mode	This signal allows to pre-fix the operation mode, in this case the heating mode, independently of what the indoor unit requests. If the indoor units request the oposite mode than the outdoor unit, the compressor will not start. This is very useful to set up a unique operation mode.	CN1 and CN2
2	Fixing the cooling mode	This signal allows to pre-fix the operation mode, in this case the cooling mode, independently of what the indoor unit requests. If the indoor units request the oposite mode than the outdoor unit, the compressor will not start. This is very useful for computer rooms where the cooling mode is fixed throughout the year.	CN1 and CN2
З	Demand thermo OFF	This signal allows to stop the compressor if it reaches a certain power as well as to put the indoor unit in Thermo-OFF. This is very useful for installations with high power consumption.	CN1 and CN2
ч	Forced stoppage	This signal allows to control the stoppage of the compressor and the fans of the indoor as well as outdoor units. This is very useful when used with the alarm signals of the fire prevention systems.	CN1 and CN2
5	Current control demand 60%	This signal allows to regulate current consumption and establish an average consumption of 60% of the rate point. This is very useful for installations that run 24 hours a day.	CN1 and CN2
Б	Current control demand 80%	This signal allows to regulate current consumption and establish an average consumption of 80% of the rate point. This is very useful for installations that run 24 hours a day.	CN1 and CN2
Ч	Current control demand 100%	This signal allows to regulate current consumption and establish an average consumption of 100% of the rate point. This is very useful for installations that run 24 hours a day.	CN1 and CN2

Output signals

Ind.	Output signal	Application	Port
۵	No setting application	No setting	-
01	Operation signal	This signal allows to pick up the machine's operation signal. This is very useful to start up additional systems such as humidifiers, fans and other ad- ditional air-conditioning systems.	CN7
02	Alarm signal	This signal picks up the machine's alarm. This is very useful to warn that an alarm has been tripped.	CN7
03	Compressor ON signal	This single allows to pick up the compressor's operation signal. It is very useful for checking signals during remote-control operation and for the interlock of the outdoor unit.	CN7
04	Defrost operation signal	This signal allows to pick up the defrosting of the unit. This is very useful to know how the indoor unit is operating if there is an abnormal situation.	CN7

i note

Do not set same function to multiple input port. If set, the higher input terminal number will be cancelled.

6

RAS-3HVNPE / RAS-(4-12)H(V)N(P/C)(E)

Input signals

Ind.	Input signal	Application	Port
0	No setting application	No setting	—
1	Fixing the heating mode	This signal allows to pre-fix the operation mode, in this case the heating mode, independently of what the indoor unit requests. If the indoor units request the oposite mode than the outdoor unit, the compressor will not start. This is very useful to set up a unique operation mode.	CN1 and CN2
2	Fixing the cooling mode	This signal allows to pre-fix the operation mode, in this case the cooling mode, independently of what the indoor unit requests. If the indoor units request the oposite mode than the outdoor unit, the compressor will not start. This is very useful for computer rooms where the cooling mode is fixed throughout the year.	CN1 and CN2
Э	Demand thermo OFF	This signal allows to stop the compressor if it reaches a certain power as well as to put the indoor unit in Thermo-OFF. This is very useful for installations with high power consumption. This signal is only activated if function F1 has value 1.	CN1 and CN2
Ч	No setting application	No setting	—
5	Forced stoppage	This signal allows to control the stoppage of the compressor and the fans of the indoor as well as outdoor units. This is very useful when used with the alarm signals of the fire prevention systems. This signal is only activated if function F1 has value 1.	CN1 and CN2
Б	Current control demand 60%	This signal allows to regulate current consumption and establish an average consumption of 60% of the rate point. This is very useful for installations that run 24 hours a day.	CN1 and CN2
η	Current control demand 70%	This signal allows to regulate current consumption and establish an average consumption of 70% of the rate point. This is very useful for installations that run 24 hours a day.	CN1 and CN2
8	Current control demand 80%	This signal allows to regulate current consumption and establish an average consumption of 80% of the rate point. This is very useful for installations that run 24 hours a day.	CN1 and CN2
٩	Current control demand 100%	This signal allows to regulate current consumption and establish an average consumption of 100% of the rate point. This is very useful for installations that run 24 hours a day.	CN1 and CN2
10	No setting application	No setting	-

Output signals

Ind.	Output signal	Application	Port
0	No setting application	No setting	-
01	Operation signal	This signal allows to pick up the machine's operation signal. This is very useful to start up additional systems such as humidifiers, fans and other additional air-conditioning systems.	CN7
82	Alarm signal	This signal picks up the machine's alarm. This is very useful to warn that an alarm has been tripped.	CN7
03	Compressor ON signal	This single allows to pick up the compressor's operation signal. It is very useful for checking signals during remote-control operation and for the interlock of the outdoor unit.	CN7
Ωч	Defrost operation signal	This signal allows to pick up the defrosting of the unit. This is very useful to know how the indoor unit is operating if there is an abnormal situation.	CN7

i NOTE

Do not set same function to multiple input port. If set, the higher input terminal number will be cancelled.

6.1.3 Setting of the optional signals

The optional signals of the outdoor unit are set up from the PCB of the outdoor unit and can be selected by pushing switches PSW1, PSW2 and PSW3.

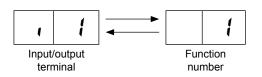
i note

Before setting the optional signals, must be complied the following conditions:

- Outdoor unit must be stopped
- Check mode must not be selected
- External optional signal must not be connected

If the initial setting has to be modified, the following instructions must be followed:

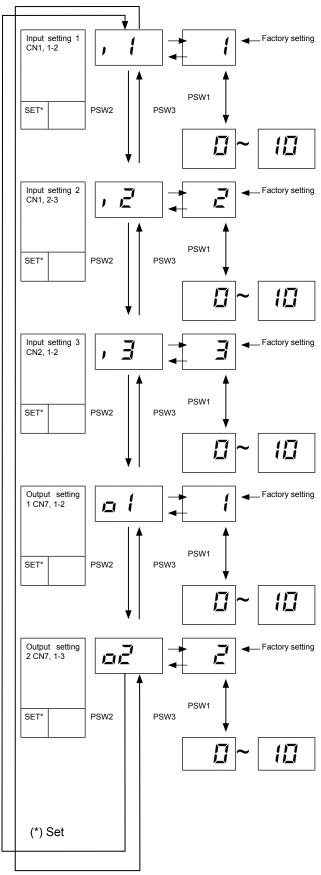
 Set pin 6 of DSW2 to ON. Set pin 4 of DSW1 to ON. Because of these settings, the input/output signals selection mode becomes available and the following indication appears on the 7-segment display.



This example indicates that function number 1 "Fixing the heating mode" is set at input 1.

- **2** By pressing the push switches PSW2 and PSW3, it can be changed the input/output terminal name. (See the flowchart show in the side).
- **3** By pressing the push switch PSW1, it can be changed the function number. (See the flowchart show in the side)
- 4 After selecting the function number, return pin 6 of DSW2 to OFF position and pin 4 of DSW1 to OFF.

The selected contents are memorized in the outdoor unit printed circuit board and the function selection mode is stopped. The memorized data is maintained even power source lines are disconnected. The connecting details of each function are described, and the required parts are also indicated in the section *Description of the optional signals* on this chapter.



6.1.4 Description of optional signals

Input signals

RAS-(2-2.5)HVNP / RAS-3HVNC

1 Fixing operation mode (heating / cooling)(1/2)

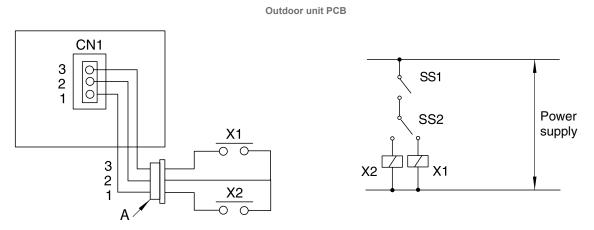
This input function is fixed in terminals CN1 or CN2 of the PCB of the outdoor unit, to use it as a cooling and heating mode. CN1 must be set up as follows.

Short circuit between the terminals 1 and 2 of CN1: set heating mode.

Short circuit between the terminals 2 and 3 of CN1: set cooling mode.

After having pre-fixed the established mode, the remote control can only be used to adjust the temperatures. Stoppage code "d1" "20" will be displayed if an attempt is made to change the operation mode of any of the indoor units with the remote control.

Example of wiring diagram of fixing the operation mode.



- A: 3P connector cable.
- X1: Cooling.
- X2: Heating.
- SS1: Fixing operation mode switch.
- SS2: Change over switch

2 Demand thermo OFF (3)

This is an input function to control the maximum power that the compressor can consume. When this option is turned on, the outdoor units are stopped completely, and the indoor units go into thermo-OFF. Alarm "10" is displayed on the remote control. If the switch of this function is disconnected it becomes available again.

Connect the cabling and use the materials as shown in Available ports.

3 Forced stoppage (4)

This is an input function that turns on when the switch receives a signal that causes the compressor and the fan motor of the indoor unit to stop; alarm "10" displays on a remote-controlled when this option turns on. If the switch of this function is disconnected it becomes available again.

Connect the cabling and use the materials as shown in Available ports.

4 Current control demand (5/6/7)

This is an input function that turns on when it detects that the frequency of the compressor reaches 60%, 80% or 100%.

The frequency of the compressor is determined when the maximum current reaches the established limit.

Connect the cabling and use the materials as shown in Available ports.

If the running current of the outdoor unit exceeds the maximum limit, the unit changes to the thermo-OFF condition. Stoppage cause code "10" will appear. When the input terminal is opened during the demand current control, the control of the input terminal is reset.

RAS-3HVNPE / RAS-(4-12)H(V)N(P/C)(E)

1 Fixing operation mode (heating / cooling)(1/2)

This input function is fixed in terminals CN1 or CN2 of the PCB of the outdoor unit, to use it as a cooling and heating mode. CN1 must be set up as follows.

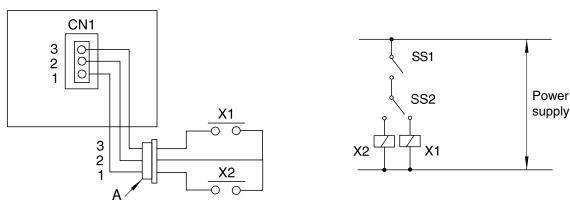
Short circuit between the terminals 1 and 2 of CN1: set heating mode.

Short circuit between the terminals 2 and 3 of CN1: set cooling mode.

After having pre-fixed the established mode, the remote control can only be used to adjust the temperatures. Stoppage code "d1" "20" will be displayed if an attempt is made to change the operation mode of any of the indoor units with the remote control.

Example of wiring diagram of fixing the operation mode.

Outdoor unit PCB



- A: 3P connector cable.
- X1: Cooling.
- X2: Heating.
- SS1: Fixing operation mode switch.
- SS2: Change over switch

2 Demand thermo OFF (3)

This is an input function to control the maximum power that the compressor can consume. When this option is turned on, the outdoor units are stopped completely, and the indoor units go into thermo-OFF. Alarm "10" is displayed on the remote control. If the switch of this function is disconnected it becomes available again.

Connect the cabling and use the materials as shown in Available ports.

3 Forced stoppage (5)

This is an input function that turns on when the switch receives a signal that causes the compressor and the fan motor of the indoor unit to stop; alarm "10" displays on a remote-controlled when this option turns on. If the switch of this function is disconnected it becomes available again.

Connect the cabling and use the materials as shown in Available ports.

4 Current control demand (6/7/8/9)

This is an input function that turns on when it detects that the frequency of the compressor reaches 60%, 70%, 80% or 100%.

The frequency of the compressor is determined when the maximum current reaches the established limit.

Connect the cabling and use the materials as shown in Available ports.

If the running current of the outdoor unit exceeds the maximum limit, the unit changes to the thermo-OFF condition. Stoppage cause code "10" will appear. When the input terminal is opened during the demand current control, the control of the input terminal is reset.

• Output signals

Operation signal (01)

This optional signal is used to pick up the operation signal. It can be used to turn on or off complementary units of the airconditioning system, such as fans, humidifiers, etc.

Connect the cabling and use the materials as shown in Available ports.

Note that the contact of auxiliary relay X3 is closed when an operation signal is issued.

Alarm signal (02)

This optional signal is used to pick up the activation of safety devices.

Connect the cabling and use the materials as shown in Available ports.

Note that the contact of auxiliary relay X3 is closed when an operation signal is issued.

Compressor on signal (03)

This optional signal is used to pick up the signal when the compressor is ON. It can be used to check how the compressor is running at all times. It is very useful for locking the compressor when the fans are locked.

Connect the cabling and use the materials as shown in Available ports.

Note that the contact of auxiliary relay X3 is closed when an operation signal is issued.

Defrost operation signal (04)

This optional signal is used to pick up when defrosting turns on. It is very useful to check if the indoor unit is in thermo-OFF.

Connect the cabling and use the materials as shown in Available ports.

Note that the contact of auxiliary relay X3 is closed when an operation signal is issued.

6.2 Optional functions (By 7-segment display)

The outdoor unit has several optional functions which can be selected through the 7-segment display of the outdoor unit PCB.

6.2.1 Setting of the optional functions

The optional functions of the outdoor unit are set up from the PCB of the outdoor unit and can be selected by pushing switches PSW1, PSW2 and PSW3.

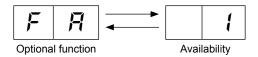


Before setting the optional functions, must be complied the following conditions:

- Outdoor unit must be stopped
- Check mode must not be selected
- External optional signal must not be connected

If the initial setting has to be modified, the following instructions must be followed:

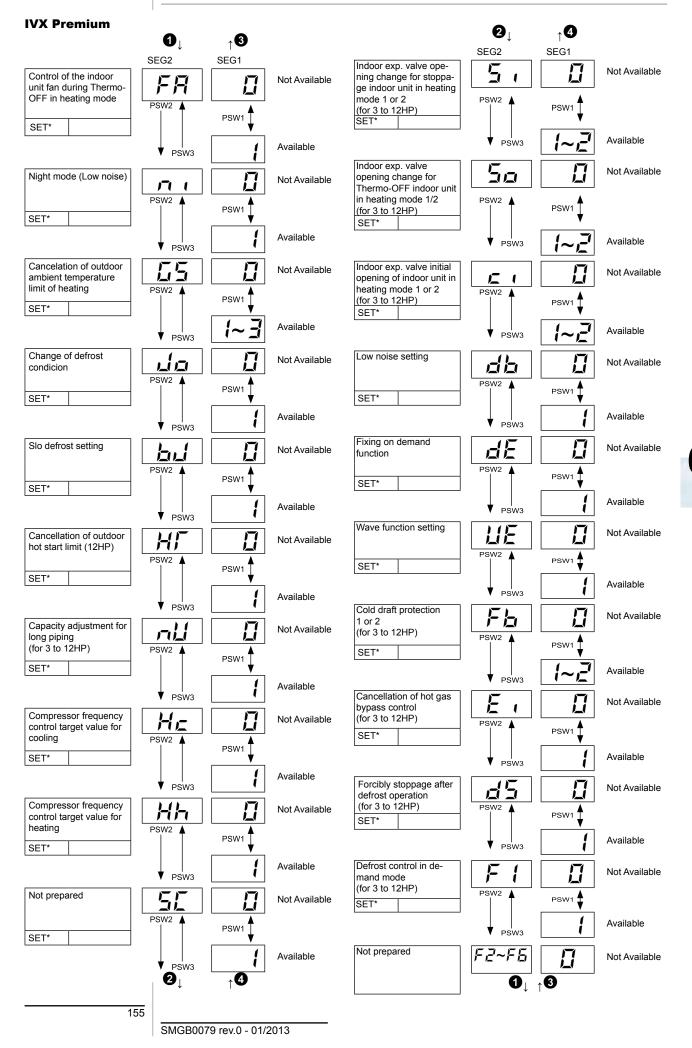
1 Set pin 5 of DSW2 to ON. Set pin 4 of DSW1 to ON. Because of these settings, the optional function selection mode becomes available and the following indication appears on the 7-segment display.

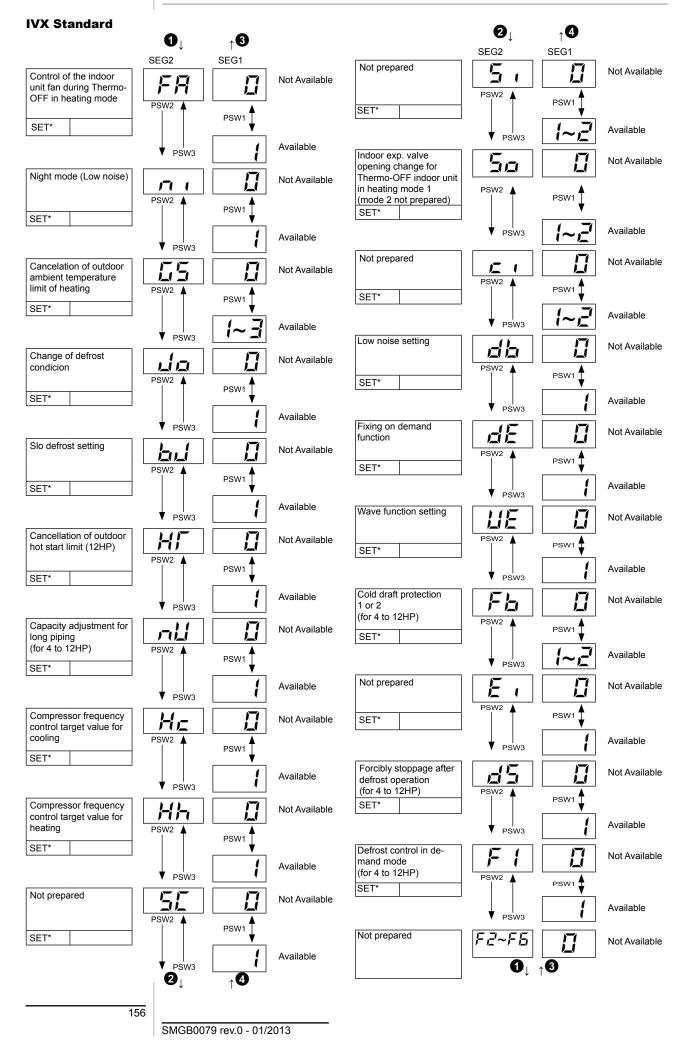


This example indicates that optional function "Control of the indoor unit fan during Thermo-OFF in heating mode" is available.

- 2 By pressing the push switches PSW2 and PSW3, it can be changed the optional function. (See the flowchart show in the next page).
- **3** By pressing the push switch PSW1, it can be selected the availability of this optional function. (See the flowchart show in the next page).
- 4 After selecting the function number, return pin 5 of DSW2 and pin 4 of DSW1 to OFF position.

The selected contents are memorized in the outdoor unit printed circuit board and the function selection mode is stopped. The memorized data is maintained even power source lines are disconnected. The details of each function are described in the section *Description of the optional functions* on this chapter.





6.2.2 Description of the optional functions

Control of the indoor unit fan during Thermo-OFF in heating mode (FR)

Press PSW1 and select the setting condition "1" at the circulator function at heating thermo-OFF "FR".

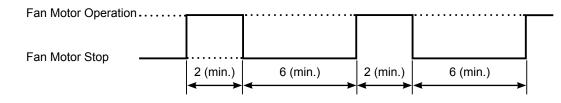
In case that the fan speed is changed to "LOW" at heating Thermo-OFF, there is a case that the room air temperature is too high at heating Thermo-OFF.

In this case, the circulator function at heating thermo-OFF is recommended, and its function explains below.

The indoor fan operates for 2 minutes and stops for 6 minutes as a cycle when the activation conditions are satisfied.

Operation

When the indoor unit is at thermo-OFF during the heating operation, the indoor fan operates and stops for 6 minutes in 2 minute cycles



i note

When the indoor fan is stopped by another control, it is not available to operate indoor fans.

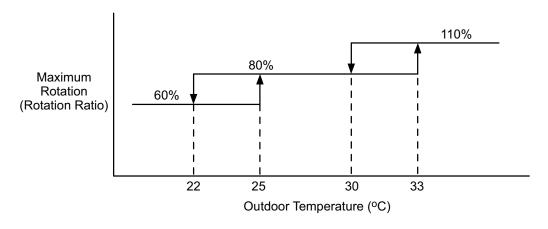
Night mode (Low noise) (rai)

Press PSW1 and select the setting condition "1" at the night shift (low noise) "n ". Then, this function can be set (only in cooling operation).

The outdoor fan operation is controlled by fan controller as shown below.

The night shift operation shall be applied in case that the cooling capacity has the margin to be allowed for the capacity decrease and the low sound operation is required especially in the nighttime.

Outdoor Fan



i) _{NOTE}

When the outdoor temperature is lower then 30°C in the cooling operation, the compressor frequency and the outdoor fan speed will be operated low. In this case, the cooling capacity decreases to approximately 60% at the same time.

Cancellation of Outdoor Ambient Temperature Limit ($\mathcal{L}5$)

Press "PSW1" and select the setting condition "0" to "3" at the cancellation of outdoor ambient temperature limit of "5". Then, this function can be set.

The heating operation is continued under a high outdoor temperature or the cooling operation is continued under a low temperature.

Setting condition*	Operation mode for cancellation
0	Not available (default setting)
1	Heating
2	Cooling
3	Heating / Cooling

Cancelled Conditions for Outdoor Unit Ambient Temperature Limit

· Heating Operation

If one of following conditions is continued for 1 second, the unit will be under Termo-OFF.

- Ta \geq 23°C and Pd \geq 3.7 MPa
- Ta \geq 21°C, Ti \geq 26°C and Pd \geq 3.7 MPa
- Ta \geq 15°C, Ti \geq 29°C and Pa \geq 3.7 MPa
- Cooling Operation

If the following condition is continued for 1 second, the unit will be under Termo-OFF.

- Ta < -7°C

Ta: Outdoor Ambient Temperature

Ti: Indoor Air Inlet Temperature

Pd: Discharge Pressure

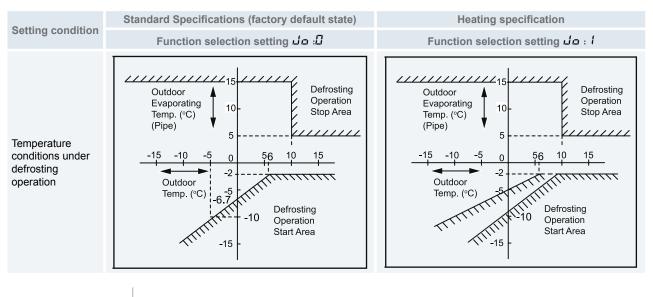
i) _{NOTE}

If this function is set and the outdoor unit operates in the stoppage area for a long time, the outdoor unit may be damaged since protection control is cancelled.

Change of defrost condition $(\Box \Box)$

Press "PSW1" and select the setting condition "1" at the change of defrost condition "الم له".

Example for RAS-(3-12)H(V)N(P/C)(E):



Slo defrost setting (bul)

Press "PSW1" and select the setting condition "1" at the slow defrost setting "buf".

Indoor fan operation is stopped during the defrost operation.

Setting condition*	Indoor fan operation
0	Indoor fan stop during defrost operation
1	Indoor fan SLo during defrost operation

Cancellation of outdoor hot start limit ($H^{(r)}$)

Press "PSW1" and select the setting condition "1" at the cancellation of hot start setting " $H\Gamma$ ", so the hot start protection control can be canceled.

Long piping setting (nL)

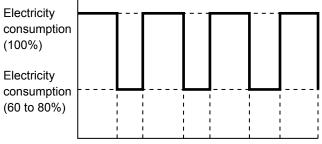
Press "PSW1" and select the setting condition "1" at the long piping setting "העה".

If cooling capacity or heating capacity is not enough under the long-distance piping condition, this function can be set the target compressor frequency higher than normal target value.

Wave function setting (UE)

Press "PSW1" and select the setting condition "1", so that the wave function setting "LE".

While this function is activated, the maximum limit of running current is changed from 60% to 100% as shown in the figure.



20min. 10min. 20min. 10min. 20min. 10min. 20min.

i _{NOTE}

- Wave function can be activated when demand function is selected at one of the input terminal indications (1, 1, 2) and (3.)
- The minimum limit of running current control is according to the set value of the demand function.
- If demand function is not set at the input terminal indication, this function can not be activated.

Fixing on demand function ($d\mathcal{E}$)

Press "PSW1" and select the setting condition "1", so that the fixing of demand function "dE" can be set.

However, it is not necessary to short-circuit the demand input terminals on the outdoor unit PCB. (Refer to section Description of optional signals in the input Current control demand)

The tables below is the limit of the running current for this function.

RAS-(2-2.5)HVNP / RAS-3HVNC

Control function number (*)	Demand running current control
1 to 4	100%
5	60%
6	80%
7	100%

RAS-3HVNPE / RAS-(4-12)H(V)N(P/C)(E)

Control function number (*)	Demand running current control
1 to 5, 10	100%
6	60%
7	70%
8	80%
9	100%

is selected at one of the input terminal indications d_1 , d_2^2

the input terminal indications $(1, n^2)$ and (3, the demand

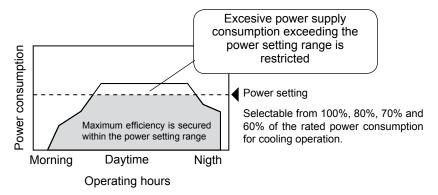
running current is selected as below.

(*) This function can be activated when demand function (*) This function can be activated when demand function is selected at one of the input terminal indications d_{1} , d^{2} and 3. In case that multiple demand functions are set at and 3. In case that multiple demand functions are set at the input terminal indications $(1, n^2)$ and (3, the demand)running current is selected as below.

6 > 7 > 8 > 9 (Control function number)

Demand Control.

Adopting self-demand function which drastically decreases power consumption has largely improved energy-saving.



Cold draft protection 1 (Fb)

Press PSW1 and select the setting condition "1" at the cold draft protection 1 "Fb", so the cold draft protection can be set. When the minimum indoor unit discharge air temperature falls down to 12°C and below at cooling operation, outdoor fan stops and compressor frequency forcibly decreases to prevent a drop in discharge air temperature.

Setting condition	Temperature (°C)	Condition
0	-	Not available (default setting)
1	< 12	The cold draft is prevented by the compressor frequency control and turning ON SVC (solenoid valve for high pressure bypass circuit).
2	< 12	The cold draft is prevented by the compressor frequency control.

6.3 Optional functions (By remote control switch)

Additionally to the possible optional functions by the 7-segment display of the outdoor unit's PCB, there are available a large quantity of optional functions for each remote control switch connected to the system.

An example of the available optional functions by one of the HITACHI remote control switches (PC-ART) is shown below:



- Please, refer to the Controller's Technical Catalogue for the specific information about the optional functions of PC-ART and for the rest of HITACHI's remote controls.
- The optional functions shown in the following table for PC-ART are the last updated at time of publication. In order to know the current optional functions, refer to the Controller's Technical Catalogue.

Items	Optional function	Individual setting	Setting condition	Contents
		0	00	Standard (Set temperature +4°C)
	Removal of heating temperature compensation		01	Removal (Set temperature)
	Compensation		02	Set temperature +2°C (*1)
			00	Not available
b2	Circulator function at heating Thermo-OFF	0	01	Available
h 0			00	Not available
b3	3 minutes OFF guard compressor	0	01	Available
			00	Standard
			01	100 hours
b4	Period for filter sign	0	02	1,200 hours
			03	2,500 hours
			04	No indication
b5	Fiving of encycling mode	×	00	Not available
55	Fixing of operation mode	~	01	Available
b6	Fixing of setting temperature	×	00	Not available
50			01	Available
b7	Fixing cooling operation	×	00	Not available
51			01	Available
b8	b8 Automatic COOL/HEAT operation	×	00	Not available
	·		01	Available
b9	Fixing fan speed	×	00	Not available
			01	Available
bA	Not prepared	×	"" Fixed	Not used
	Cooling temperature compensation		00	Standard (No compensation)
bb		0	01	Set temperature -1°C
			02	Set temperature -2°C
bC	Not prepared	_	00	Not used
~ ~			01	(Use as 00 conditions)
bd	Not prepared	_	00	Not used
24			01	(Use as 00 conditions)
bE	Not prepared	-	00	Not used
			01	(Use as 00 conditions)
C1	Not prepared	-	00	Not used
01			01	(Use as 00 conditions)

U

Items	Optional function	Individual setting	Setting condition	Contents
C2	Not prepared	-	"" Fixed	Not used
C3	Not prepared		00	Not used
03	Not prepared	-	01	(Use as 00 conditions)
C4	Not propored		00	Not used
04	Not prepared	-	01	(Use as 00 conditions)
			00	Average static pressure (factory set)
	Static pressure selection (RPI)		01	High static pressure
C5		0	02	Low static pressure
			00	Normal
	Increased fan speed (RCI, RCIM, RCD)		01	Speed increase 1
			02	Speed increase 2
C6	Increasing fan speed	0	00	Not available
			01	Available
C7	Canceling 3 minutes compressor guard	0	00	Standard
			01	Cancellation
			00	Control by indoor suction thermistor
C8	Thermistor of remote control switch	0	01	Control by thermistor of remote control switch
			02	Control by average value of indoor suction thermistor and thermistor of remote control switch
C9	Not prepared	-	"" Fixed	Not used
CA	Not prepared	-	"" Fixed	Not used
Cb	Colortion of formed standards large	×	00	Forced stoppage input: A contact
CD	Selection of forced stoppage logic	~	01	Forced stoppage input: B contact
CC Not	Not propored	×	00	Not used
CC	Not prepared		01	(Use as 00 conditions)
Cd	Not prepared	0	00	Not used
Cu	Not prepared		01	(Use as 00 conditions)
CE	Not prepared	_	00	Not used
02			01	(Use as 00 conditions)
			00	Standard (7 steps)
CF	Change of louver swing angle	0	01	Draft prevention (5 steps)
			02	High ceiling (5 steps) (*2)
d1	Power supply ON/OFF 1	0	00	Not available
			01	Available
d2	Not prepared	-	"" Fixed	Not used
d3	Power Supply ON/OFF 2	0	00	Not available
			01	Available
d4	Prevention for cooling discharge air tempera- ture decrease	0	00	Not available
			01	Available
d5	Prevention for heating discharge air tempera- ture decrease	0	00	Not available
			01 00	Available Not available
d6	Room temperature control for energy saving	0	00	Available
				Not used
d7	Not prepared	0	00~07	(Use as 00 conditions)

Items	Optional function	Individual setting	Setting condition	Contents
E1	KPI: Ventilation mode		00	Automatic ventilation
			01	Ventilation with total heat exchanger
		0	02	Ventilation with bypass (No total heat exchange)
			00	Not available
	Econofresh: all fresh mode		01/02	All fresh mode
	KPI: Increasing air supply volume		00	Not available
F 2			01	Available
E2	Foonefreeh: Entheliny concer	0	00	Not available
	Econofresh: Enthalpy sensor		01	Available
50	Network		00	Not used
E3	Not prepared	0	01	(Use as 00 conditions)
			00	Standard
	KPI: Pre-cooling / Pre-Heating period		01	30 minutes
E4		0	02	60 minutes
	Econofresh: gas sensor		00	Standard
	je i i je i i i i i i i i i i i i i i i		01/02	CO ² sensor
	Not Prepared		00	Not used
E5		0	01	(Use as 00 conditions)
			00	Not available
E6	Indoor fan operation time after cooling operation stoppage	0	01	60 min.
			02	120 min.
	Not prepared	-	00	Not used
E7			01	(Use as 00 conditions)
E8	Fan operation control at heating Thermo-OFF	0	00	Not available
EO			01	Available
E9	Not prepared	-	00	Not used
E9			01	(Use as 00 conditions)
EA	Not propared	0	00	Not used
LA	Not prepared	0	01	(Use as 00 conditions)
			00	Not available
Eb	Fan operation control at cooling Thermo-OFF	0	01	LOW
			02	SLOW
EC	Earand Thorma ON standards at appling	0	00	Not available
LC	Forced Thermo-ON stoppage at cooling	0	01	Available
Ed	Not prepared	0	00	Not used
Lu			01	(Use as 00 conditions)
EE	Automatic fan speed control	0	00	Not available
LL			01	Available
EO	Not prepared	0	00	Not used
F0	Not prepared	0	01	(Use as 00 conditions)

Items	Optional function	Individual setting	Setting condition	Contents
		×	00	Function not valid
			01	1 h
			02	2 h
			03	3 h
			04-24	(04-24) h
F1	Automatic timer OFF setting		0A	0.5 h
			0B	1.5 h
			0C	40 mins
			0D	45 mins
			0E	50 mins
			0F	55 mins
F2	Main and accordant remote control actting	×	00	Master
FΖ	Main and secondary remote control setting	~	01	Slave
F3	Automatic temporature patting release (*2)	×	00	Not available
гJ	Automatic temperature setting release (*3)	^	01	Available
			00	30 minutes (Factory setting)
Γ4			01	15 minutes
F4	Automatic release time	×	02	60 minutes
			03	90 minutes
			19	19 °C
		×	20	20 °C
			21-24	(21-24) °C
F5	Automatic cooling temperature release (*4)		25	25 °C (Factory setting)
			26-28	(26-28) °C
			29	29 °C
			30	30 °C
		×	19	19 °C
			20	20 °C
			21-24	(21-24) °C
F6	Automatic heating temperature release (*5)		25	25 °C (Factory setting)
			26-28	(26-28) °C
			29	29 °C
			30	30 °C
F7	Prevention of operation stoppage due to re-	×	00	Not available
. ,	mote control operating error (*6)		01	Available
F8	Lock function for operation mode selection	×	00	Not available
10			01	Available (Factory-setting)
F9	Lock function for temperature setting	×	00	Not available
10		~	01	Available (Factory-setting)
FA	Lock function for fan speed selection	×	00	Not available
	Look function for rail speed selection		01	Available (Factory-setting)
Fb	Lock function for swing louver operation	×	00	Not available
			01	Available (Factory-setting)

6

Items	Optional function	Individual setting	Setting condition	Contents
			00	Standard
50			01	Lower limit +1°C
			02	Lower limit +2°C
FC	Cooling lower limit for setting temperature (*4)	×		
			09	Lower limit +9°C
			10	Lower limit +10°C
			00	Standard
			01	Upper limit –1°C
Fd			02	Upper limit –2°C
гu	Heating upper limit for setting temperature (*5)	×		
			11	Upper limit –11°C
			12	Upper limit –12°C
			00	Not used
FE	Not prepared	-	01	(Use as 00 condition)
			02	
FF	Not prepared		00	Not available
		-	01	(Use as 00 condition)
H1	Not prepared		00	Not available
	Not prepared	_	01	(Use as 00 condition)
H2	Indication of hot start	×	00	Show
112			01	Hide
H3	Not prepared		00	Not available
110		-	01	(Use as 00 condition)
H4	Not prepared	_	00	Not available
	Not prepared		01	(Use as 00 condition)
H5	Not prepared		00	Not available
			01	(Use as 00 condition)
J1	Temperature indication (*7)	x	00	Not available
	, , , , , , , , , , , , , , , , , , ,		01	Available
J2	Not prepared	-	00	Not available
			01	(Use as 00 condition)
J3	Run indicator color	×	00	Green
			01	Red
J4	Not prepared	-	00	Not available
			01	(Use as 00 condition)
J5	Not prepared	x	00	Not available
			01	(Use as 00 condition)
J6	Not prepared	x	00	Not available
			01	(Use as 00 condition)
J7	Not prepared	-	00	Not available
			01	(Use as 00 condition)
J8	Eco-operation (*8)	x	00	Not available
			01	Available
J9	Not prepared	-	00	Not available
			01	(Use as 00 condition)

Items	Optional function	Individual setting	Setting condition	Contents
JA			00	Not available
57	Not prepared	-	01	(Use as 00 condition)
Jb	Not prepared		00	Not available
30	Not prepared	-	01	(Use as 00 condition)
K1	Not propared	x	00	Not available
K I	Not prepared	X	01	(Use as 00 condition)
K2		~	00	Not available
Ν2	Not prepared	x	01	(Use as 00 condition)
К3			00	Not available
КJ	Not prepared	х	01	(Use as 00 condition)
K4	Netproport		00	Not available
N4	Not prepared	-	01	(Use as 00 condition)
	K5 Motion sensor detection level -		00	Standard
K5			01	High
			02	Low

o: Allow individual setting.

- ×: Setting is used for all the outdoor units
- -: Not used



*1: The "02" setting may not be available according to the type of indoor unit.

*2: 00: Standard (7-step operation), 01: Draft Prevention (lower 2 steps cutoff), 02: High ceiling (upper 2 steps cut off)

*3: In case that the set temperature is changed and kept within the set time at "F4", the temperature is automatically changed to "F5" and "F6". (In case that the set temperature is out of range at "F5" and "F6", it is applied within upper and lower limit for the set temperature.)

*4: Applicable to fan, cooling and dry operation modes.

*5: Applicable to heating operation mode.

*6: Operation is stopped by pressing the "⁽¹⁾" (run/stop) switch for 3 seconds.

*7: The sensor value at "C8" will be indicated. When the thermistor for remote control switch is used, the average value of the thermistor for remote control switch and the thermistor for indoor inlet will be indicated.

*8: When the unit is restarted by the remote control switch, the temperature automatically changes to the setting temperature of "F5" or "F6".

- After at least 3 minutes from the power ON, not change the optional setting.
- When changing "CF" setting (change of louver swing range), restore the power supply or allow the louver to make one complete swing fully in the auto swing mode to apply the optional setting.
- The optional settings are different according to the indoor and outdoor unit models. Check to ensure that the unit has the optional setting or not.
- Record the setting conditions for each optional setting in the "Setting" column of the table.
- The above optional functions with "X" mark at the individual setting can change the condition only when "All Rooms" is set.



7

7. Test run

Index

7.1.	Checking procedure before the test run	. 168
7.2.	Test run procedure using the remote control switch (PC-ART)	. 170
7.3.	Test run procedure using the remote control switch (PC-ARF)	. 172
7.4.	Test run procedure using the wireless remote control switch (PC-LH3A/B)	. 175
7.5.	Test run procedure from the outdoor unit side	. 177
7.6.	Check list	. 179
	7.6.1. Check list on test run	. 179
	7.6.2. Check list on compressor	. 180

7.1 Checking procedure before the test run

When you have finished the installation, perform the test run according to the following procedure. After performing the test run, hand over the system to the customer.

Perform the test run of the indoor units one by one in order.

Make sure that the electrical wiring and the refrigerant piping are correctly connected.

Start the indoor units one by one in order to make sure that the indoor units are correctly numbered.

You should perform the test run according to Test run procedure using the remote control switch on next pages.

- Do not operate the system until all the check points have been cleared.
- Measure the resistance between the ground and the terminal of the electrical components. Make sure that the electrical resistance is more than 1 MΩ. Otherwise, do not operate the system until you find the electrical leakage and you repair the electrical leakage. Do not impress the voltage on the terminals for transmission 1 and 2. (*)
- Pay attention to the following items while the system is running.
 - Do not touch any of the parts at the discharge gas side with your hands because the compressor chamber and the pipes at the discharge gas side are hot at a temperature that is higher than 90 °C.
 - DO NOT PUSH THE BUTTON OF THE MAGNETIC SWITCH(ES). If you do, you will cause a serious accident.
- Do not touch any electrical components for more than three minutes after turning OFF the main switch.

Checking procedure

- 1 Make sure that the stop valve of the gas line and the stop valve of the liquid line are fully open.
- 2 Make sure that there is no refrigerant leakage. The flare nuts sometimes loosen because of the vibration during the transportation.
- 3 Make sure that the refrigerant piping and the electrical wiring belong to the same system. Make sure that the setting of the unit number of DSW1, DSW6 and RSW1 of indoor units correspond to the system.
- 4 Make sure that the setting of the DIP switches on the printed circuit board of the indoor units and the outdoor units are correct. Especially, pay attention to the setting of the lift between the indoor units and the outdoor units. Refer to chapter 4 "Electrical Wiring" for details.
- 5 Make sure that the switch on the main power source has been ON for more than twelve hours in order to warm the compressor oil by means of the oil heater.
- 6 Check whether or not the electrical wiring of the indoor units and the outdoor units are connected as shown in chapter 4 "Electrical Wiring".
- 7 Make sure that each wire terminal (L1,L2,L3 and N or L1 and N) is correctly connected at the power source.

inote

- Make sure that the field-supplied electrical components (main switch fuse, fuse-free breaker, earth leakage breaker, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data in the technical catalogue of the unit. Also, make sure that the field-supplied electrical components comply with the national codes and the local codes.
- Use the shielded cables for the field wiring in order to avoid the electrical noise. (The length of the shielded cable should be less than 1000 m. The size of shielded cable should comply with the local codes).
- Make sure that the terminals for the power supply wiring ("L1" to "L1" and "N" to "N" of each terminal board for AC 230 V and the terminals for the intermediate wires between the indoor unit and the outdoor unit (Operating Line: terminals of each terminal board for DC 12 V) match correctly. Otherwise, you may damage some components.
- For RAS-12HN(P/C) units, the operation may not be available within 4 hours after turning ON the power supply due to the unheated crankcase (stoppage code: d1-22). If the compressor should be within 4 hours, turn ON the power and wait for more than 30 seconds. Press PSW1 and PSW3 on the outdoor PCB simultaneously for more than 3 seconds. The forced thermo-OFF function (d1-22) is cancelled and the compressor operation is available..

168

- Check to ensure the operating temperature:
 - Cooling operation:
 - Indoor DB 21.5 °C and above,
 - Indoor WB 16 °C and above,
 - Outdoor DB 0 °C and above
 - Heating operation:
 - Indoor DB 27 °C and below.

(*) About insulation resistance

- The insulation may lower during a test run or after being left with the main power OFF for a long time, due to refrigerant accumulation in the compressor. Check the following when the insulation resistance lowers to 1 MΩ or below, or in case that the ground-fault circuit interrupter activates.
 - Remove compressor cables and measure the insulation resistance of the compressor alone. If the resistance is over 1 MΩ, other insulation failure of electric live part may exist.
 - 2 If the resistance is under 1 MΩ, remove compressor cables from the inverter PCB and turn the power ON and energize the oil heater. Measure the resistance after more than three hours of electric current application. If the insulation resistance recovers, the compressor does not have problems. In case that the resistance does not recover, compressor failure may exist. (More time may be required to apply the current depending on the conditions of air, pipe length or the refrigerant)

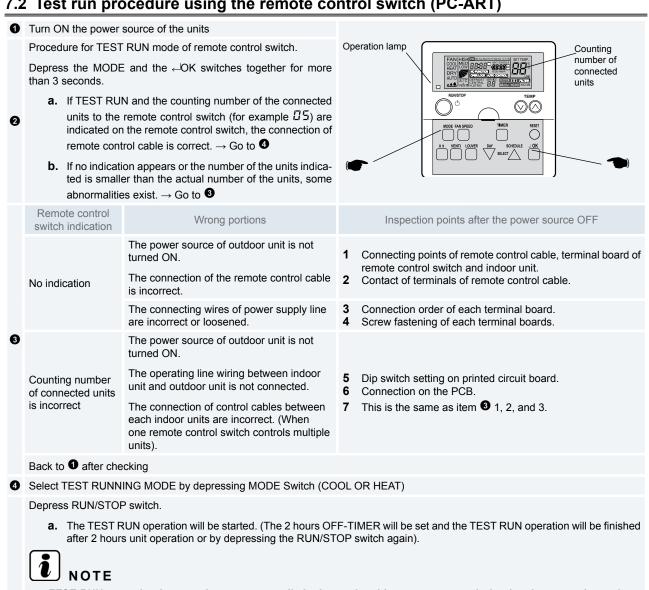


To reconnect the removed compressor cables, re-caulk the terminal using a tool like longnose pliers in order that the Faston terminal does not remain loose.

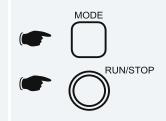
 In case of Earth Leakage Breaker (ELB) activation, please confirm the rated capacity of ELB as well. Earth leakage breaker (ELB) shall be inverter compatible, and select a high-sensitive and high-speed model for sensed current rating under 30 mA (activation time within 0.1 sec).



7.2 Test run procedure using the remote control switch (PC-ART)



- TEST RUN operation ignores the temperature limitation and ambient temperature during heating operation to have a continuous operation, but the protections are alive. Therefore, the protection may activate when the heating TEST RUN operation is performed in high ambient temperature.
- TEST RUN operation time can be modifyed / increased depressing the time switch in the Remote Control. 0
 - **b.** If the unit do not start or the operation lamp on the remote control switch is flickered, some abnormalities exist. ightarrowGo to $\mathbf{6}$

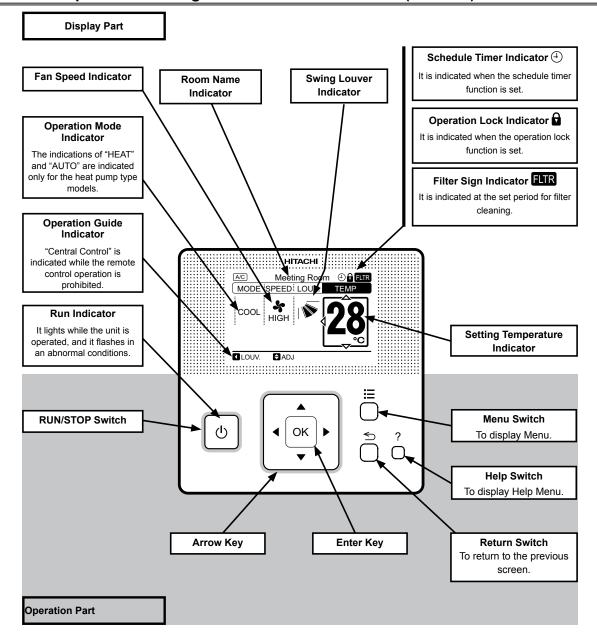


170

1

	Remote control switch indication	Linit condition		Inspection points after power source OFF
6	The operation lamp flickers. (1 time/1 sec.) and the unit number and alarm code 03 flicker.	The unit does not start.	The power source of outdoor unit in not turned ON. The connecting wires of operating line are inco- rrect or loosened.	 Connecting order of each terminal boards. Screw fastening of each terminal boards. Screw fastening of each terminal boards. NOTE Recovering method of FUSE for operating circuit. There is a fuse (FUSE4 on indoor unit PCB1, EF1 on outdoor unit PCB1) to protect operating circuit on the PCB, when the power lines are connected to operating lines. If fuse is melted, operating circuit can be recovered once by setting the dip switch on the PCB as shown in ^①
	The operation lamp flic- kers. (1 time/2 sec.)	The unit does not start.	Remote control cable is broken. Contact of connectors is not good. The connection of remote control cable is incorrect	This is the same as item ¹ 1 and 2
	Indication of flicker ex- cept above	The unit does not start, or start once and then stops	The connection of ther- mistor or other connec- tors are incorrect. Trip- ping of protector exists, or else.	Check by the abnormality mode table in the Technical Catalogue (Do it by service people).
	The operation lamp flickers. (1 Time/1s)	The unit does not start.	The connection of the remote control cable	Check by the abnormality mode table in the Technical Catalog (Do
	Unit number 🕮, alarm code 🚽 and unit code E 🕮 flicker	me unit uoes not start.	between indoor units is incorrect.	it by service people).
	Back to 1 after checking			
	Instructions for the recover circuit is blown out:	ry when the fuse of the transmission	Except RPK(0.8/1.5)	Only RPK-(0.8/1.5)
0		ne terminal board. the indoor units PCB to ON): set DSW7 on the indoor unit PCB	ON 1 2	

7.3 Test run procedure using the remote control switch (PC-ARF)



- 1 Turn ON the power supply for all the indoor units.
- 2 For the models with the auto-address function, wait for 3 minutes approximately. The addressing is automatically performed. (There is a case that 5 minutes is required according to the setting condition.) After that, select using language from "Menu". Refer to the operation manual for details.
- 3 Press and hold ""≡" (menu) and " ≤" (return) simultaneously for at least 3 seconds.
 - **a.** The test run menu will be displayed.

Test Run Menu					
Test Run					
Function Selection					
Thermistor Selection					
Input/Output			03		
[⊠] Function 5			▼		
SEL.	OK ENT.	5 R1	٦N.		

Test run screen

172



Test Run Setting: 2 units

Test Run Setting: 00 unit

Test Run Setting: 2 units

COOL MED

🕘 RUN 🕤 RTN.

COOL

MED

() RUN 🕤 RTN.

COOL

MED

() RUN S RTN.

MODE

SPEED

SEL. ADJ

MODE

SPEED

SEL. 🗘 ADJ

MODE

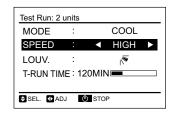
SPEED

SEL. ADJ

b. Select "Test Run" and press "OK". The test run settings will be displayed.

When "00" is indicated, the auto-address function may be performing. Cancel "Test Run" mode and set it again.

- 4 The total number of the indoor units connected is indicated on the LCD (liquid crystal display). The case of the twin combination (one (1) set with two (2) indoor units) is indicated "2 units", and the triple combination (one (1) set with three (3) indoor units) is indicated "3 units".
 - c. If the indicated number is not equal to the actual connected number of indoor unit, the auto-address function is not performed correctly due to incorrect wiring, the electric noise or etc. Turn OFF the power supply and correct the wiring after checking the following points; (Do not repeat turning ON and OFF within 10 seconds.)
 - Power supply for indoor unit is not turned ON or incorrect wiring.
 - Incorrect connection of connecting cable between indoor u nits or incorrect connection of controller cable.
 - Incorrect setting of rotary switch and dip switch (the setting is overlapped) on the indoor units PCB.
 - **d.** Press "U" (run/stop) to start the test run.
 - **e.** Press " $\Delta \nabla \triangleleft \triangleright$ " and set each item.
- 5 Press "①" (run/stop). Start the test run when indicatin the air flow volume "HIGH" (default setting) and light the operation lamp. At this time, 2-hour OFF timmer will be set automatically..
- 6 Press "∆" or "▽", select "LOUV." and select "№"" (auto swing) by pressing "⊲" or "⊳". The auto swing operation will be started. Check the operating sound at the louvers. If abnormal sound is not generated, press "⊲" or "⊳" again to stop the auto swing operation.



Test Run: 2 MODE	units :	COOL
SPEED	:	HIGH
LOUV.	:	
T-RUN TIM	IE : 120	DMIN 💻 🗆
SEL. 🗘 AD	n ()	STOP

- 7 The temperature detections by the thermistors are invalid though the protection devices are valid during the test run.
- 8 For SET-FREE Series: According to the label "Checking of Outdoor Unit by 7-Segment Display on PCB1" attached to the rear side of the front cover of the outdoor unit, check temperature, pressure and the operation frequency, and connected indoor unit numbers by 7-segment displays.

- 9 To finish the test run, press "也" (run/stop) again or pass over the set test run time. When changing the test run time, press "∆" or "▽" to select "T-RUN TIME". Then, set the test run time (30 to 600 minutes) by pressing "⊲" or "⊳"
 - The RUN indicator on the remote control switch flashes when some abnormalities such as protection devices activated occur during the test run as well as the RUN indicator (orange) on the indoor unit flashes (0.5 second ON/ 0.5 second OFF). Additionally, the alarm code, the unit model code and connected number of indoor units will be displayed on the LCD as shown in the figure below. If the RUN indicator on PC-ARF flashes (2 seconds ON/ 2 seconds OFF), it may be a failure in the transmission between the indoor unit and the remote control switch (loosening of connector, disconnecting wiring or breaking wire, etc.). In this case, check the item 8.3 "Alarm Code" and perform for troubleshooting. Consult to authorized service engineers if abnormality can not be recovered.

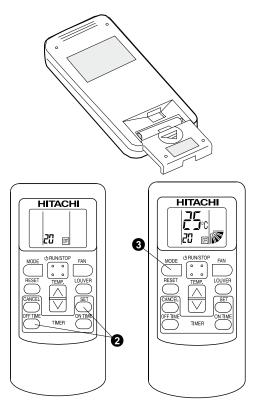
	Test Run: 2	units			
	MODE	:	COOL		
	SPEED	:	MED		
	LOUV.	:			
	T-RUN TIN	/E: ⊲ 510N	/IN		
	SEL. 🚺 AD	DJ 🕛 ST	OP		
			1-02 ►		
		n Code:			-
	MOD	EL:b.C	2	ALM RS	т
				ADDR	
	SEL.	OP M	ODE OK	ENT.	-
Refrigerant C of Indoor Unit Abnormality C	which	、 /	Indoor U / which At	Init No. onormality C	Occurs
	•	01 - 02	►		
AI	arm Code:	22 —	A	larm Code I	No.
M Unit Mod	ODEL : b . del Code	02	Same Re	of Indoor U ofrigerant Cy Abnormality	cle as

7.4 Test run procedure using the wireless remote control switch (PC-LH3A/B)

i note

If the wired remote control switch is used or if multiple units (SET-FREE, DC INVERTER and utopia series) are operating simultaneously, you cannot perform the test run by means of the remote control switch. If that is the case, perform the test run by means of the wired remote control switch.

- 1 Perform the test run after completing the installation.
 - a. Set the batteries for the remote control switch.
 - **b.** Turn ON the power source of the indoor units and the outdoor units.
 - c. The yellow '☆' LED on the receiver of the indoor unit flickers (0.25 seconds ON ↔ 0.25 seconds OFF). Then, the yellow LED turns OFF. While the LED is flickering, the unit will not operate because the unit is initializing.
- 2 Set the TEST RUN mode by pressing the SET switch and the OFF TIME switch simultaneously for more than three seconds. The LCD should look like the LCD on the right figure. The TEST RUN mode is not operating
- **3** Set the operation mode by pressing the MODE switch. The TEST RUN mode is operating.



4 Operate the test run by pointing the transmitter towards the receiver of the indoor unit. Then, press the RUN/STOP switch. When the indoor unit receives the commands, the yellow '♠' LED of the receiver will turn on briefly. Make sure that the commands are received well and the selected mode 3) is set correctly. In the TEST RUN mode, the red RUN LED of the receiver is turned ON and the green TIMER LED flickers (0.5 seconds ON ↔ 0.5 seconds OFF) (*2). Then, the timer switches off for two hours.



- If the yellow '佘' LED does not turn ON, the commands from the remote control switch may not have reached the receiver. Send the commands again.
- (*2) In the case of the RPK model, the TIMER LED is turned OFF.
- 5 Adjust the angle of the air grille as follows. The air louver has a mechanism for the auto-swing function. Do not move the louver by hand forcefully.
 - a. Select the FAN mode by pressing the MODE switch.
 - **b.** Set the louver angle by pressing the LOUVER switch.
- 6 Stop the test run (normal)
 - a. The test run stops automatically after two hours.
 - **b.** You stop the test run by pressing the RUN/STOP switch again. After the test run has finished, check that the red RUN LED and the green TIMER LED turn OFF.
- 7 Stop the test run (abnormal) for the PC-ALHD/PC-ALHZ. If you cannot use the PC-LH3A because of battery shortage or any other reason, perform the emergency operation as follows.
 - **a.** COOL switch: Press the COOL switch in order to start the cooling process. Press the COOL switch again in order to stop the cooling process.
 - **b.** HEAT switch: Press the HEAT switch in order to start the heating process. Press the HEAT switch again in order to stop the heating process.



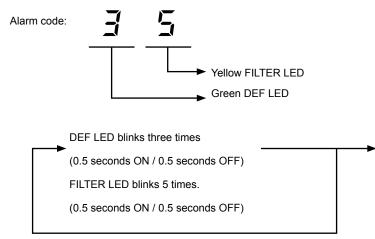
During the emergency operation, the yellow LED blinks (0.5 seconds ON / 0.5 seconds OFF).

175



- c. Alarm code display
- If some malfunction occurs because of the activation of a safety device or any other reason, the red RUN LED blinks (0.5 seconds ON / 0.5 seconds OFF).
- Refer to section Alarm codes on chapter Troubleshooting.
- The alarm code displays the number of blinks of the green DEF LED and the yellow FILTER LED as shown bellow:
- Green DEF LED: Digit 2 of the alarm code blinks.
- Yellow FILTER LED: Digit 1 of the alarm code blinks. (Alphabet code: A=10 blinks, B=11 blinks, C=12 blinks, etc.).

Example:



The red RUN LED (1 second ON / 1 second OFF) means that there is an abnormal transmission between the indoor units and the outdoor unit.

7.5 Test run procedure from the outdoor unit side

The test run procedure from the outdoor unit side is shown below.

You can set this DIP switch while the power source is ON.

Setting of dip switch

ON	4		
Ļ	23	,	

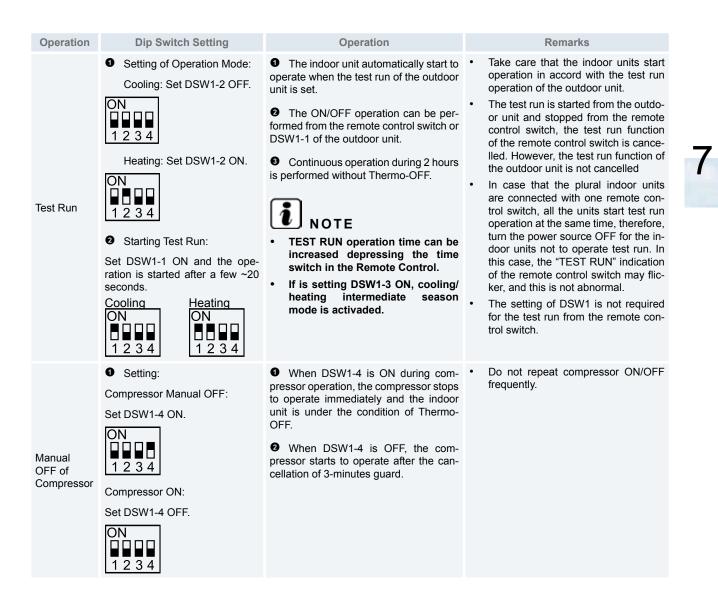
Test Run
 COOL/HEAT

- - (Setting ON: Heat Operation)
- 3 COOL / HEAT intermediate season
- 4 Manual Compressor stop

- Do not touch any other electrical components while you are setting the switches on the PCB.
- Do not attach or detach the service access panel when the power source for the outdoor unit is ON and the outdoor unit is operating.

DSW1

Set all the DIP switches of DSW1 to OFF after completing the test run.



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In case of RAS-(2-2.5)HVNP or RAS-3HVNC operation is performed by DSW301 on the PCB of the outdoor unit instead of DSW1.

7.6 Check list

7.6.1 Check list on test run

MODEL:			
SERIAL No.			
COMPRESSOR MFG No.			
NAME AND ADDRESS OF CUSTOMER:			
DATE:			

- 1 Is the rotation direction of the indoor coil fan correct?
- 2 Is the rotation direction of the outdoor coil fan correct?
- 3 Is there any abnormal compressor sound? _
- 4 Has the unit been operating for at least twenty (20) minutes?
- **5** Check the room temperature:

Inlet	No 1	DB°C WB°C	No 2	DB °C WB °C	No 3	DB°C WB°C	No 4	DB°C WB°C
Outlet		DB°C WB°C	INO 2	DB°C WB°C	NO 3	DB°C WB°C	110 4	DB°C WB°C
Inlet	No 5	DB°C WB°C	No 6	DB°C WB°C	No 7	DB°C WB°C	No 8	DB°C WB°C
Outlet	C ON	DB°C WB°C	INO O	DB°C WB°C	NO 7	DB°C WB°C	INU O	DB°C WB°C

6 Check the outdoor ambient temperature:

Inlet	DB °C WB °C
Outlet	DB °C WB °C

7 Check the refrigerant temperature: Operating mode (cool or heat).

Discharge gas temperature	Td = °C
Liquid pipe temperature	Te = °C

8 Check the pressure:

Discharge pressure	Pd =kg/cm ² G
Suction pressure	Ps =kg/cm²G

9 Check the voltage:

Rated voltage	V	_	_
Operating voltage	L1–L2V	L1–L3V	L2–L3V
Starting voltage	V	_	—
Phase imbalance	1-(V/Vm) =	_	_

10 Check the compressor input running current

Input	kW
Running current	A

- 11 Is the refrigerant charge adequate? _____
- 12 Do the operation control devices operate correctly?
- **13** Do the safety devices operate correctly?

14 Has the unit been checked for refrigerant leakage?

- 15 Is the unit clean inside and outside?
- 16 Are all the cabinet panels fixed?
- 17 Are all the cabinet panels free from rattles?
- 18 Is the filter clean?
- 19 Is the heat exchanger clean?
- 20 Are the stop valves open? _____

179

21 Does the drain water flow smoothly from the drain pipe?

7.6.2 Check list on compressor

CLIENT:		MODEL:	DATE:	
Serial N°:		Production date:	Checker:	
N°	Check item	Check method	Result	Remarks
1	Is THM9 correctly connected? THM9: Discharge gas thermistor	(1) Is wire of thermistor correctly connected by viewing?(2) Check to ensure the 7-segment indication of Td when comp. is operating.		
		Td: Temperature of THM9		
2	Is thermistor THM9 disconnected?	(1) Check to ensure that thermistor on the top of comp. is correctly mounted by viewing?(2) Check to ensure that actually measured temp. is the same as the indication during check mode.		
3	Is current sensor faulty?	(1) Check to ensure that indication A1 and A2 are 0 during compressor stopping.		
4	Is current sensing part on PCB2 faulty?	(2) Check to ensure that indication A1 and A2 are not 0 during compressor running.		
5	Is the direction of current sensor (CTU, CTV) reverse?	Check the direction => by viewing.		
6	Are power source wires, U and V inserted correctly into current sensor?	Check to ensure that wires are correctly inserted.		
7	Is exp. valve (MV1) correctly con- nected?	Check to ensure that MV1 to CN5A is correctly connected.		
8	Is exp. valve (MV1) coil correctly connected?	Check to ensure that each coil is correctly mounted on the valve.		
9	Are the refrigeration cycle and electrical wiring system incorrectly connected?	Check to ensure that refrigerant is flowing into indoor units by operating one refrigerating cycle only from the outdoor unit.		
		Check the following by the check mode of outdoor units.		
10	Is opening of exp. valve completely	(1) Liquid pipe temp. (TL) < air intake temp.		
10	closed (locked)?	(Ti) during cooling operation		
		(2) Liquid pipe temp. (TL) > air intake temp.		
		(Ti) during heating operation		
11	Is opening of exp. valve fully ope- ned (locked)?	Check to ensure that liquid pipe temp. is lower than air intake temp. of stopping indoor unit when other indoor units are operating under cooling operation		
12	Are the contacts for comp. magnetic switch CMC1 faulty?	Check the surface of each contact (L1, L2 and L3) by viewing.		
13	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 380V or 220V+10%.		
14	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 Td when compressor is operating. If Td thermistor is disconnected, the liquid refrigerant return volume will become small by detecting the temperature even if the actual discharge gas temperature is high. Therefore, this abnormal overheating by detecting the temperature operation will result in insulation failure of the motor winding.
3 & 4	Overcurrent control (operating frequency control) is performed by detecting current by the PCB2. In this case, winding insulation failure will occur, since control is not available in spite of actually high current.
5 & 6	The current sensor checks phase and adjusts output electrical wave in addition to the above mentioned items. If fault occurs, the output electrical wave becomes unstable giving stress to the motor winding, resulting in winding insulation failure.
7 & 8	During a cooling operation, SH is controlled by MV of each indoor units. During a heating operation, Td is controlled by MV1. If expansion valves are incorrectly connected, correct control is not available, resulting in compressor seizure depending on liquid refrigerant returning conditions or motor winding insulation failure depending on overheating conditions.
9	If the refrigeration cycle and electrical system are incorrectly connected, abnormally low suction pressure ope- ration is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
10	If the expansion valve and electrical system are incorrectly connected, abnormally low suction pressure opera- tion is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
11	The compressor may be locked due to the liquid return operation during the cooling operation .
12	In the case that the contacting resistance becomes big, voltage imbalance among each phase will cause abnor- mal overcurrent.
13	In this case, overcurrent will occur, efficiency will decrease or the motor winding will be excessively heated.
14	In the case, it will result in motor burning or compressor failure

8

$\mathbf{8}$. Troubleshooting

Index

8.1.	Initial	troubleshooting	184
	8.1.1.	Checking by means of the 7-segment display	
	8.1.2.	Failure of the power supply to the indoor unit and the remote control switch	185
	8.1.3.	Abnormal transmission between the remote control switch and the indoor unit	186
	8.1.4.	Abnormal operation of the devices	
8.2.	Troub	leshooting procedure	192
	8.2.1.	Alarm display	192
	8.2.2.	Alarm codes for the outdoor and indoor units	193
	8.2.3.	Troubleshooting by alarm code for the outdoor and indoor units	194
	8.2.4.	Alarm codes for the KPI (E/H/X)3E Series and DX Interface	
8.3.	Troub	leshooting in check mode	253
	8.3.1.	Troubleshooting using the remote controller PC-ART	253
	8.3.2.	Troubleshooting using the remote controller PC-ARF	
	8.3.3.	Troubleshooting using the 7 segment display	
8.4.	Check	ing procedure for main parts	277
	8.4.1.	Procedure for checking the DIP-IPM inverter for indoor and outdoor units	
	8.4.2.	Checking capacitors CB1 & CB2	
	8.4.3.	Fault diagnosis of DC fan motor	
	8.4.4.	Checking procedure for the electronic expansion valve for indoor and outdoor units	285
	8.4.5.	Checking procedure for AC fan motor	
	8.4.6.	Checking procedure for other parts	

8.1 Initial troubleshooting

8.1.1 Checking by means of the 7-segment display

Simple checking procedure by means of the 7-segment display

- 1 Turn on all the indoor units which are connected to the outdoor unit.
- 2 Turn on the outdoor unit
- 3 Auto-addressing starts. (Outdoor unit printed circuit board PCB1).

During the auto-addressing, you can check the following items by means of the 7-segment display of the outdoor unit.

- Disconnection of the power supply to the Indoor Unit.
- Disconnection of the operating line between the outdoor and the indoor units.
- Duplication of the Indoor Unit number.
- Normal case:

The 7-segment display of the outdoor unit is not indicated.

Abnormal case:

If there is something wrong, the 7-segment display of the outdoor unit displays the following indications:

Cause	Indication	Remarks
A. The indoor units are not supplied with power.	03	continues to flash after 30 seconds.
B. Disconnection of the operating line between the outdoor units and the indoor units.	03	continues to flash after 30 seconds.
C. Duplicated settings of the indoor unit number on the rotary switch RSW (Refer to the section <i>Troubleshooting by alarm code</i> , see the description of the alarm code "35").	—	_



8.1.2 Failure of the power supply to the indoor unit and the remote control switch

- The LED and the LCD are not indicated.
- Not operated

If the fuses are blown out or a breaker is activated, investigate the cause of the overcurrent and take the necessary action.

Phenomenon Cause Check item Action (Turn OFF the main switch) Power failure or power failure or power is not ON Measure the voltage by means of the voltmeter Supply the power Blown out fuse or activation of the breaker at the power source Short circuit supplied between the wres and insulation resistance Remove the cause of the short circuit and replace the fuse Failure of indoor unit fan motor Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Blown out fuse at the control cir- cuit Short circuit supplied between the wres and insulation resistance Remove the cause of the short circuit and replace the fuse Blown out fuse at the control cir- cuit Short circuit of the control circuit to earth Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Failure of the transformer Failure of indoor unit fan motor Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Failure of the transformer Failure of indoor unit fan motor Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Insufficient connection or incorrect connection of the indoor unit PCB insufficient connection or incorrect switch Insufficient connection or incorrect connection of the indoor unit PCB in the remote control switch Check					
Power failure of power is not ON the voltmeter Supprint power Blown out fuse or activation of the breaker at the power source Short circuit supplied between the wires Check for any uncovered part of the wires Remove the cause of the short circuit and replace the fuse Blown out fuse or activation of the breaker at the power source Short circuit of the wires to earth Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Blown out fuse at the control circuit cuit Short circuit supplied between the wires Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Blown out fuse at the control circuit cuit Short circuit for the control circuit to the control circuit to earth Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Failure of the transformer Short circuit for the control circuit to the control circuit to the arth Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Failure of the transformer Tailure of indoor unit fan motor Measure the voltage at the secon ondary side Replace the transformer Failure of the transformer Ta the indoor unit fan motor Measure the cable Replace the cable or repair the cable Insufficient connection or incorrect connection of the indoor unit	Phenomenon	Cause	Check item		
Blown out fuse or activation of the breaker at the power sourceShort circuit of the wires to earth Failure of indoor unit fan motorMeasure the insulation resistance mees and insulation resistanceRemove the cause of the short circuit and replace the fuseBlown out fuse at the control circuit cuitFailure of indoor unit fan motorMeasure resistance between wires and insulation resistanceRemove the cause of the short circuit and replace the fuseBlown out fuse at the control circuit cuitShort circuit supplied between the wiresCheck for any uncovered part of the wiresRemove the cause of the short circuit and replace the fuseBlown out fuse at the control circuit cuitShort circuit of the control circuit to earthMeasure the insulation resistanceRemove the cause of the short circuit and replace the fuseBlown out fuse of the transform cuitFailure of indoor unit fan motorMeasure the insulation resistanceRemove the cause of the short circuit and replace the fuseBlown out fuse at the indoor unit sideMeasure the insulation resistanceRemove the cause of the short circuit and replace the fuseDisconnected cable of the transform nectors of the remote control switchMeasure the voltage at the sec ondary sideReplace the transformerInsufficient contacting at the con- nectors of the remote control switchInsufficient connection or incorrect connection of the indoor unit PCB in the remote control switchCheck the remote control switchInsufficient contacting at the con- nectors of the remote control switchCheck the connectors ti thailedCorrectly connect the wires ti ti failed <td>Power failure or</td> <td>power is not ON</td> <td></td> <td>Supply the power</td>	Power failure or	power is not ON		Supply the power	
breaker at the power source Short circuit of the wires to earth Measure the insulation resistance Refine of the fuse Biown out fuse at the control circuit Failure of indoor unit fan motor Measure resistance between wires and insulation resistance Replace the fan motor and fuse Blown out fuse at the control circuit Short circuit supplied between the wires Check for any uncovered part of the wires Remove the cause of the short circuit and replace the fuse Blown out fuse at the control circuit Short circuit of the control circuit to earth Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Blown out fuse at the control circuit Short circuit fan motor Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Blown out fuse at the control circuit Short circuit fan motor Measure the insulation resistance Remove the cause of the short circuit and replace the fuse Failure of the transformer Te the indoor unit fan motor Measure the voltage at the secoondary side Replace the transformer Disconnected cable of the remote control switch Connect the cable Replace the cable or repair the cable Correctly connect the connector Insufficient connection or incorrect switch Insufficient connection or incorrect connection or tincorrect					
Failure of indoor unit fan motorwires and insulation resistanceReplace the fan motor and fuseBlown out fuse at the control circuit cuitShort circuit supplied between the wiresCheck for any uncovered part of the wiresRemove the cause of the short circuit and replace the fuseBlown out fuse at the control circuit cuitShort circuit of the control circuit to earthMeasure the insulation resistanceRemove the cause of the short circuit and replace the fuseFailure of the transformerFailure of indoor unit fan motorMeasure the insulation resistanceRemove the cause of the short circuit and replace the fuseFailure of the transformerTailure of indoor unit fan motorMeasure the voltage at the sec- ondary sideReplace the transformerDisconnected cable of the remote control switchConnect the cableReplace the cable or repair the cableInsufficient connection or incorrect connection of the indoor unit PCB in the remote control switchCheck the remote control switchCorrectly connect the connectorFailure of PCBUnconnected wires to PCBCheck the remote control switchReplace the remote control switchReplace the remote control switch		Short circuit of the wires to earth	Measure the insulation resistance		
Blown out fuse at the control circuit cuitShort circuit of the control circuit to earthMeasure the insulation resistanceRemove the cause of the short circuit and replace the fuseBlown out fuse at the control circuit cuitFailure of indoor unit fan motorMeasure the insulation resistanceRemove the cause of the short circuit and replace the fuseFailure of the transformerThe indoor unit fan motorMeasure the voltage at the sec- ondary sideReplace the transformerDisconnected cable of the transformerTemote control switchConnect the cableReplace the cable or repair the cableInsufficient contacting at the con- nectors of the remote control switchInsufficient connection or incorrect connection of the indoor unit PCB in the remote control switchCheck the connectorsCorrectly connect the control switchFailure of the remote control switchCheck the remote control switchReplace the remote control switchReplace the remote control switchFailure of PCBUnconnected wires to PCBCheck the connectorsCorrectly connect the wiresReplace PCB if it failed		Failure of indoor unit fan motor		Replace the fan motor and fuse	
cuitto earthMeasure the insulation resistancecircuit and replace the fuseFailure of indoor unit fan motorMeasure the insulation resistanceRemove the cause of the short circuit and replace the fuseFailure of the transformerat the indoor unit sideMeasure the voltage at the sec- ondary sideReplace the transformerDisconnected cable of the remote control switchConnect the cableReplace the cable or repair the cableInsufficient contacting at the con- nectors of the remote control switchInsufficient connection or incorrect connection of the indoor unit PCB in the remote control switchCheck the connectorsCorrectly connect the connectorFailure of the remote control switchUnconnected wires to PCBCheck the remote control switchReplace the remote control switchFailure of PCBUnconnected wires to PCBCheck PCB by means of the self- check mode *2)Correctly connect the wires					
Failure of indoor unit fan motorMeasure the insulation resistanceCircuit and replace the fuseFailure of the transformer at the indoor unit sideMeasure the voltage at the secondary sideReplace the transformerDisconnected cable of the transformer connection or incorrect connection of the indoor unit PCB insufficient connection or incorrect connection of the indoor unit PCB in the remote control switchConnect the cableReplace the cable or repair the cableInsufficient contacting at the connection of the indoor unit PCB insufficient connection or incorrect connection of the indoor unit PCB in the remote control switchCheck the connectorsCorrectly connect the connectorFailure of the remote control switchInsufficient connection or incorrect connection of the indoor unit PCB in the remote control switchCheck the remote control switchReplace the remote control switchFailure of PCBUnconnected wires to PCBCheck the connectors the indice PCB by means of the self- check mode *1)Correctly connect the wiresFailure of PCBFailure of PCBCheck PCB by means of the self- check mode *2)Replace PCB if it failed			Measure the insulation resistance		
Failure of the transformer at the indoor unit side Ondary side Replace the transformer Disconnected cable of the remote control switch Connect the cable Replace the cable or repair the cable Insufficient contacting at the connection of the indoor unit PCB in sufficient connection of the indoor unit PCB in the remote control switch Naufficient connection or incorrect connection or incorrect in the remote control switch Check the connectors Failure of the remote control switch Check the remote control switch Correctly connect the connector switch Failure of PCB Unconnected wires to PCB Check the connectors Replace the remote control switch if it failed Failure of PCB Failure of PCB Check PCB by means of the self-check mode *2) Replace PCB if it failed		Failure of indoor unit fan motor	Measure the insulation resistance		
Disconnected cable of the remote control switch Connect the cable cable Insufficient contacting at the connection of the indoor unit PCB nectors of the remote control switch Insufficient connection or incorrect connection or incorrect connection of the indoor unit PCB in the remote control switch Check the connectors Correctly connect the connector Failure of the remote control switch Insufficient connected wires to PCB Check the remote control switch by means of the self-check mode *1) Replace the remote control switch if it failed Failure of PCB Unconnected wires to PCB Check PCB by means of the self-check mode *2) Replace PCB if it failed	Failure of the transform	er at the indoor unit side	•	Replace the transformer	
Insufficient contacting at the connection of the indoor unit PCB connection of the indoor unit PCB Check the connectors Correctly connect the connector switch Insufficient connection or incorrect connection of the indoor unit PCB in the remote control switch Check the connectors Correctly connect the connector Failure of the remote control switch Check the remote control switch Replace the remote control switch if it failed Failure of PCB Unconnected wires to PCB Check the connectors Correctly connect the wires Failure of PCB Failure of PCB Check PCB by means of the self-check mode *2) Replace PCB if it failed	Disconnected cable of t	he remote control switch	Connect the cable		
Failure of PCB Unconnected wires to PCB Check the remote control switch by means of the self-check mode *1) Replace the remote control switch if it failed Failure of PCB Unconnected wires to PCB Check the connectors Correctly connect the wires Failure of PCB Failure of PCB Check PCB by means of the self-check mode *2) Replace PCB if it failed	0	connection of the indoor unit PCB	Check the connectors	Correctly connect the connector	
Failure of the remote control switch by means of the self-check mode *1) Replace the remote control switch if it failed Mathematical Self-check mode *1) Unconnected wires to PCB Check the connectors Correctly connect the wires Failure of PCB Failure of PCB Check PCB by means of the self-check mode *2) Replace PCB if it failed	switch				
Failure of PCB Failure of PCB Check PCB by means of the self-check mode *2) Replace PCB if it failed	Failure of the remote control switch		by means of the self-check mode		
Failure of PCB Failure of PCB Check roce by means of the sen- check mode *2) Replace PCB if it failed		Unconnected wires to PCB	Check the connectors	Correctly connect the wires	
Incorrect wiring connection Take action according to the procedure that is displayed in "TEST RUN"	Failure of PCB	Failure of PCB		Replace PCB if it failed	
	Incorrect wiri	ng connection	Take action according to the procedu	ure that is displayed in "TEST RUN"	

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- *1): Refer to section Self-checking of the remote control switch.
- *2): Refer to section Self-checking procedure of PCB by means of the Remote Control Switch.

8.1.3 Abnormal transmission between the remote control switch and the indoor unit

• RUN LED on the remote control switch:

Flickering every 2 seconds.

Phenomenon	Phenomenon Cause		Action (Turn OFF the main switch)
Disconnection or insufficient conta	acting of the remote control cable	Check the cable and the connec- tions	Repair the cable or connect the cable
Failure of the rem	ote control switch	Check the remote control switch by means of the self-check mode *1)	Replace the remote control switch if the remote control switch is faulty
Foilure of DCD (in the indeer unit	Disconnected wire to PCB	Check the connectors	Correctly connect the wires
Failure of PCB (in the indoor unit and the remote control switch)	Failure of PCB	Check PCB by means of the self- check mode *2)	Replace PCB if it failed

i_{note}

- *1): Refer to section Self-checking of the remote control switch.
- *2): Refer to section Self-checking procedure of PCB by means of the Remote Control Switch.

8.1.4 Abnormal operation of the devices

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
	Failure of the indoor unit	Disconnected coil	Measure the coil resistance by means of the tester	Replace the Indoor unit fan motor
	fan motor	Burnt-out coil	Measure the insulation resist- ance	
	Failure of the outdoor	Disconnected coil	Measure the coil resistance by means of the tester	Replace the outdoor unit fan
RUN LED is ON and	unit fan motor	Burnt-out coil	Measure the insulation resist- ance	motor
the LCD is indicated. However, the system does not operate (For example, the indoor	Failure of the magnetic switch for the outdoor unit fan motor	Insufficient contacting	Measure the voltage between the contacting parts	Replace PCB for the outdoor unit
fan, the outdoor fan or the compressor does	Failure of the comp. motor		Measure the resistance be- tween two wires	Replace the compressor
not operate)	Failure of the comp.		Check for an abnormal sound from the Comp.	Replace the compressor
	Failure of the magnetic switch for comp.	Insufficient contacting	Check that the magnetic switch activates correctly or not	Replace the magnetic switch
	Failure of one of PCBs	Disconnected wiring to PCB	Check the connections	Correctly connect the wiring
		Failure of PCB	Check PCB by means of the self-check mode *1)	Replace PCB if it failed

Phenomenon	Cau	ISE	Check item	Action (Turn OFF the main switch)
	Failure of air inlet thermistor Failure of thermistor Disconnection of thermistor Abnormal operation of the remote control switch cord		Check it by self-checking *2)	Replace or correctly connect the wires if Abnormal Operation exists
	Failure of the ir		Check PCB by means of the self-check mode *1)	Replace PCB if it failed
The Comp. does not stop or start even if the setting temperature on the LCD changes to *3)	Incorrect optional setting		Check the setting condition of "remote control thermostat" by means of the optional setting Setting and control: "00": Control by means of the indoor thermistor for the suc- tion air "01": Control by means of the thermostat of the remote con- trol switch "02": Control by means of the average value of the indoor thermistor for the suction air and the thermostat of the re- mote control switch	If the thermostat of the remote control switch is not used, set at "00"
	Incorrect Input/Output setting		Check setting condition of "i1" and "i2" by Input/Output setting. * Setting and Control: "01": Room thermostat (Cooling) "02": Room thermostat (Heat- ing)	In case that room thermostat is not used, set for input signal ac- tually used. If no signal is used, set at "00"
Indoor fan speed does not change	Failure of the Discharge Air Temp. Thermistor	Failure of the Thermis- tor Disconnected Wire of the Thermistor	Check the Thermistor by means of the self-check mode *2)	Replace or Correctly connect the wiring when it is abnormal
not onlingo	Failure of the Remote Control Switch		Check it by means of the self-	Replace if it failed
	Failure of PCB for	or the indoor unit	check mode *1)	Replace if PCB fails
	Failure of thermistor for outdoor evaporating temp. during heating	Failure of thermistor Disconnected wire of thermistor	Replace or correctly con	nect when it is abnormal
	Failure of 4-way valve	Disconnected 4-way valve coil	Measure the resistance of coil	Replace the 4-way valve
No defrost operation		Incorrect activation of 4-way valve	Enforced power supply	
mode is available dur- ing the heating process or the defrost operation continues	Disconnected control win and outo		Check the connectors	Correctly connect the wiring
	Failure of the outdoor	Disconnected wiring to PCB	Check the connectors	Correctly connect the wiring
	units of PCB	Failure of PCB	Check PCB by means of the self-check mode *1)	Replace PCB when the check mode is not available
	Failure of the Indoor Unit of PCB	Disconnected wiring to PCB	Check the connectors	Correctly connect the wiring
The LED and the LCD on the remote control switch remain ON	Failure of PCB in the in control		Check PCB by means of the self-check mode *1)	Replace if PCB fails

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
	Indoor cool load is greater than the cooling capac- ity		Calculate the cool load	Use a bigger unit
		Gas leakage or short- age of refrigerant	Measure superheat	Correctly charge the refrigerant after repairing the gas leakage
		Excessively small diameter tube or long piping	Measure and check the field- supplied pipes	Use the correct pipes
		Incorrect activation of the check valve of the outdoor unit	Check whether or not the temp. difference exists before/after the check valve	Replace the check valve for the outdoor unit
			Check for clogging	Remove the clogging
	Excessively low suction pressure	Failure or malfunction of the expansion valve	Check the connection cord and the connector	Replace the connector
			Is there an operation sound from the coil?	Replace the coil
Insufficient cooling process			Is the thermistor on the com- pressor normal?	Replace the thermistor
			Is the thermistor installed cor- rectly on compressor?	Correctly install the thermistor
		Clogged strainer in the indoor unit; clogging at the low pressure piping	Check the temp. difference at the inlet and the outlet of the strainer	Replace the strainer in the indoor unit
		Clogging at the low pressure piping	Check the temp. difference	Remove the clogging
		Insufficient air flow to	Check for clogged air filter	Clean the air filter
		the indoor unit heat exchanger	Check for an obstacle at the inlet or the outlet	Remove the obstacles
		Excessively low air temp. to the indoor unit heat exchanger	Insufficient speed of the indoor unit fan motor?	Replace the fan motor
			Short-circuited indoor unit air?	Remove the cause of the short- circuited air

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
		Insufficient air flow to the outdoor unit heat	Clogging of the outdoor unit heat exchanger?	Remove the clogging
			Obstacles at the inlet or the outlet of the outdoor unit heat exchanger	Remove the obstacles
		exchanger	Is the service area for the out- door unit sufficient?	Secure the service area
			Correct fan speed?	Replace the fan motor
		Excessively high air temp. to the outdoor	Short-circuited air to the out- door unit?	Remove the cause of the short- circuited air
		unit heat exchanger	Any other heat load near the outdoor unit?	Remove the heat source
	Excessively high dis- charge pressure	Excessively charged refrigerant	Expansion valve opening	Correctly charge the refrigerant
	charge pressure	Non-condensate gas in cycle	Check each temp. and each pressure	Charge the refrigerant after the vacuum pumping
		Clogging of the dis- charge piping	Check for clogging	Remove the clogging
Insufficient cooling		Failure or malfunction of the expansion valve	Check for clogging	Remove the clogging
process			Check the connection cord and the connector	Replace the connector
			Is there an operation sound from the coil?	Replace the coil
			Is the thermistor on the com- pressor normal?	Replace the thermistor
			Is the thermistor installed cor- rectly on the compressor?	Correctly install the thermistor
	Malfunction or internal leakage of the 4-way valve		Check the temp. difference at the inlet and the outlet of the 4-way valve	Replace the 4-way valve
	Excessively low suction pressure	Malfunction or internal leakage of the 4-way valve	Check the Temp. Difference be- tween the Inlet and the Outlet of 4-Way Valve	Replace the 4-way valve
		Failure of solenoid valve for bypass	Check refrigerant leakage of solenoid valve	Replace solenoid valve
	Discharge temp. of the	indoor unit is unstable	Check the expansion valve of the indoor unit in the same system	Replace the failed expansion valve of the indoor unit

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
	Indoor heat load is greater than the heating ca- pacity		Calculate the heat load	Replace the unit with a bigger unit
		Gas leakage or insuffi- cient refrigerant charge	Measure superheat	Correctly charge the refrigerant after the gas leakage check and repairing
		Excessively small di- ameter or long piping	Measure the field supplied piping	Use the specified pipes
			Check for clogging	Remove the clogging
		Failure or malfunction of the expansion valve	Check the connection cord and the connector	Replace the connector
			Is there an operation sound from the coil?	Replace the coil
			Is the thermistor on the com- pressor normal?	Replace the thermistor
			Is the thermistor installed cor- rectly on compressor?	Correctly install the thermistor
	Excessively low suction	Clogging of I.U./O.U. strainer	Check the temp. difference between the inlet and the outlet of strainer	Replace the strainer for the out- door unit or the indoor unit
	pressure	Clogging of suction piping	Check the temp. difference of each part	Remove the clogging
			Is the outdoor unit heat ex- changer clogged?	Remove the clogging
		Insufficient air flow through the outdoor unit heat exchanger	Are there any obstacles at the inlet or the outlet of outdoor unit?	Remove the obstacles
			Is the service area for the out- door unit sufficient?	Secure a sufficient service area
lana (fining the sting			Check the speed of the outdoor unit fan	Replace the fan motor
Insufficient heating process		Excessively low air temp. through the outdoor unit heat ex- changer	Check for any short-circuited air to the outdoor unit	Remove the cause of the short- circuited air
		Defrosting is insuffi- ciently completed	Check the thermistor for the defrost operation	Replace the thermistor for the defrost operation
	Excessively high dis- charge pressure		Check the filter for a clogging	Remove the clogging
		Insufficient air flow to the indoor unit heat exchanger	Check for any obstacles at the inlet or the outlet of the indoor unit	Remove the obstacles
			Check the indoor fan speed	Replace the fan motor
		Excessively high air temp. to the indoor unit heat exchanger	Check whether or not the short- circuited air exists	Remove the cause of the short- circuited air
		Excessively charged refrigerant	Check the refrigerant quantity *4)	Correctly charge the refrigerant
		Non-condensate gas in ref. cycle	Check the refrigerant quantity *4)	Recharge the refrigerant after the vacuum pumping
		Clogging of the dis- charge pr. piping	Check for clogging	Remove the clogging
	Malfunction or internal lea	akage of the 4-way valve	Check the temp. difference at the inlet and the outlet of the 4-way valve	Replace the 4-way valve
	Malfunction of the check	valve of the outdoor unit	Check the temp. difference at the inlet and the outlet of the check valve	Replace the check valve
	Excessively high suction pressure	Malfunction or internal leakage of 4-way valve	Check the temp. difference at the inlet and the outlet of the 4-way valve	Replace the 4-way valve
	Discharge temp. of the	indoor unit is unstable	Check the expansion valve of the indoor unit in the same system	Replace the failed expansion valve of the indoor unit

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
	Foreign particles inside of the fan casing		Visually inspect it	Remove the foreign particles
	Indoor unit fan runner is hitting the casing		Visually inspect it	Adjust the position of the fan runner
	Outdoor unit propeller fan is hitting the shroud		Visually inspect it	Adjust the position of the propeller fan
	Abnormal sound from the compressor	Faulty Installation	Check that each part is tightly fixed	Tightly fix each part
Cooling or heating proc- ess with an abnormal		Liquid ref. compression	Adjust the suction gas temp. and pressure	Ensure superheat
sound		Wear or breakage of the internal comp. parts	Abnormal Sound from the Inside of the Compressor	Replace the compressor
		No heating by the oil heater	Check the Resistance (Oil Heater, Fuse)	Replace the oil heater or the fuse
	Humming sound from the magnetic conductor		Check the surface of the contacts	Replace the magnetic switch
	Abnormal vibration of the cabinets		Check each fixing screw	Tightly fix each screw
Outdoor fan does not	Obstacle at the outdoor fan		Check the obstacles	Remove the obstacles
operate when the com- pressor operates	Watching condition for the heating process		Wait for the switching of the 4-Way Valve (1 ~ 3 minutes)	If the 4-Way Valve does not switch, check for insufficient refrigerant
Indoor fan does not operate when the com-	Discharge pressure does not increase higher than 1.5 Mpa due to the insufficient refrigerant		Check the operation pressure *5)	Add the refrigerant
pressor operates	Disconnected Wiring for the Indoor Fan		Check the wiring	Connect the wiring correctly



- *1): Refer to section Self-checking of the remote control switch.
- *2): Refer to section Self-checking procedure of PCB by means of the Remote Control Switch.
- *3): Even if the remote control switches are normal, the compressor does not operate under the following conditions:
 - 1. Indoor temp. is lower than 21 °C or outdoor temp. Is lower than -5 °C during the cooling process (DB).
 - 2. Indoor temp. is higher than 27 °C (DB) or outdoor temp. is higher than 15 °C (WB) during the heating process.
 - 3. When a cooling (or heating) process signal is given to the outdoor unit and a different mode as heating (or cooling) process signal is given to the indoor units.
 - 4. When an emergency stop signal is given to outdoor unit.
- *4): Refer to chapter Piping work and refrigerant charge.
- *5): Refer to chapter Test run.

8.2 Troubleshooting procedure

8.2.1 Alarm display

On-screen displays during abnormal operation

Malfunction

The RUN (red) indicator flashes. The ALARM indicator appears on the liquid crystal display. The screen also displays the indoor unit number -A-, the alarm code -B- and the model code -C-. If there are various indoor units connected, the above mentioned information is shown for each one of them -D-. Write down the indications and contact your HITACHI service supplier.

• Power supply failure

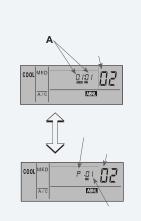
All displays disappear. If the unit stops due to a power shortage, it will not start again, even though the power comes back on. Carry out the start-up operations again. If the power failure lasts less than 2 seconds, the unit will start again automatically.

Electrical noise

The displays can disappear from the screen and the unit can stop. This is because the microcomputer has been activated to protect the unit from electrical noise.



If the wireless remote control is used for the wall-type indoor unit, remove the connectors (CN25) that are connected to the indoor PCB. Otherwise the unit will not work. The stored data cannot be erased unless the remote control is initialised.



8.2.2 Alarm codes for the outdoor and indoor units

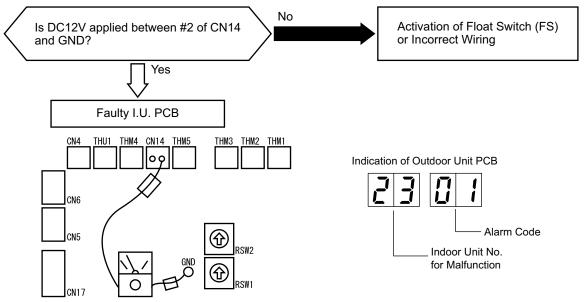
		Type of Abnormality	Main cause
01	Indoor unit	Activation of protection device (float switch)	Failure of fan motor, drain discharge, PCB, relay, float switch activated.
02	Outdoor unit	Activation of protection device (high pressure cut)	Activation of PSH, locked motor, abnormal operation in the power supply phase.
03	Transmission	Abnormality between indoor (or outdoor) and outdoor (or indoor) units	Incorrect wiring. Loose terminals, Failure of PCB. Tripping of fuse. Power supply OFF.
04	Transmission	Abnormal operation between inverter and control PCB	Transmission failure between inverter PCBs
05	Power supply	Abnormal power supply	Power source with abnormal wave pattern.
06	Voltage drop	Voltage drop due to excessively low or high voltage in outdoor unit	Voltage drop in power supply. Incorrect wiring or insufficient capacity of power supply wiring.
07		Drop in discharge gas overheating	Excessive refrigerant charge. Expansion valve lock open.
08	Cycle	Increase in discharge gas temperature	Insufficient refrigerant charge, refrigerant leakage. Expansion valve closed or clogged.
11		Inlet air thermistor	
12		Outlet air thermistor	Failure of thermistor, sensor, connection.
13	Sensor in indoor unit	Anti-freeze thermistor	
14	unit	Gas pipe thermistor	
19		Protection device for fan motor is triggered	Failure of fan motor
20		Compressor thermistor	
21	Outdoor unit	Abnormality of high pressure sensor	
22	sensor	Outside air thermistor	Failure of thermistor, sensor, connection.
24		Evaporation thermistor	
31		Incorrect setting of outdoor and indoor units	Incorrect setting of capacity code.
35		Incorrect setting of indoor unit number	Duplication of indoor unit number.
38	System	Abnormality of protective circuit in outdoor unit	Failure of indoor unit PCB; incorrect wiring; connection to indoor unit PCB.
41		Cooling overload (possible activation of high pressure device)	O.U. pipe thermistor temp. is higher than 55 °C and the compressor top temp. is higher than 95 °C, O.U. protection device is activated.
42	Pressure	Heating overload (high-pressure device may be activated)	If I.U. freeze protection thermistor temp. is higher than 55 $^{\circ}$ C and compressor top temp. is higher than 95 $^{\circ}$ C, O.U. protection device is activated.
45		Activation of high pressure increase protection device	If the discharge pressure (Pd) of the compressor is higher than 3.8MPa for 1 minute.
47		Activation of protection device for low pressure drop	Stoppage due to excessive decrease of evaporating temper- ature (Temp < -35 $^{\circ}$ C) is activated 3 times in one hour, motor locked in heating mode.
48		Activation of overcurrent protection	Overload, overcurrent. Failure of DIP IPM, IPM or PCB2, heat exchanger clogged, locked compressor.
51		Abnormality in inverter current sensor	Incorrect wiring of current sensor. Failure of control PCB, DIP IPM, IPM or PCB2.
53	Inverter	Activation of transistor module protection device	Abnormality of DIP IPM or PCB2 Compressor failure, heat exchanger clogged.
			Abnormal inverter fin thermistor
54	Abnormality of inverter fin temperature		Heat exchanger clogged.
			Abnormal outdoor fan.
55		Abnormality of inverter module	Failure of DIP-IPM, IPM or PCB2.
57	Outdoor fan	Fan motor abnormality	Disconnected wire or incorrect wiring between control PCB and inverter PCB.
			Incorrect wiring or abnormality in fan motor.
EE	Compressor	Compressor protection alarm	Compressor failure.
b0	IU Model Setting	Incorrect Setting of Unit Model	No Setting of Unit Model, Incorrect Setting of Unit Model
b1		Incorrect unit No. setting	Over 64 indoor units, setting by no. or indoor unit address.
b5	IU No.Setting	Incorrect Setting of Indoor Unit No. for H-LINK Type	An indoor unit not supporting H-LINK II is set the indoor unit No. as 16 and after.

193

8.2.3 Troubleshooting by alarm code for the outdoor and indoor units

Alarm code		Activation of the safety device in the indoor unit
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- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section.
- The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the contact between #1 and #2 of CN14 is not closed over 120 seconds during the cooling process, the heating process or the fan operation.



Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
	High Drain Level	Clogging of the drainage	Check the drain pan	Remove the clogged foreign particles
Activation of the float switch	Faulty float switch	Fault	Check the continuity when the drain level is low	Replace the float switch if faulty
		Faulty contacting	Measure the resistance by means of the tester	Fix the looseness and Replace the connector
		Faulty connection	Check the connections	Repair the connection
	Faulty indoor unit PCB		Check PCB by means of the self-check mode *1)	Replace PCB if faulty

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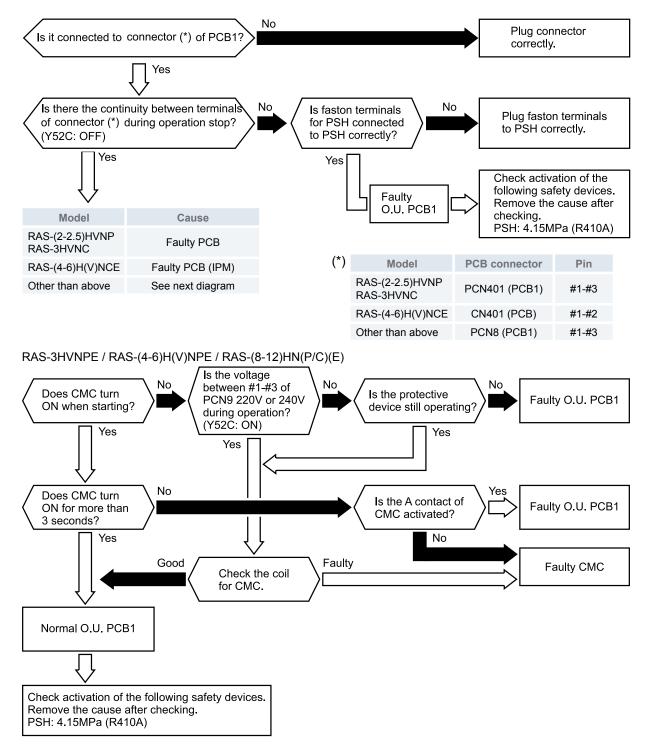
- *1): Refer to section Self-checking procedure of PCB by means of the Remote Control Switch in this chapter.
- Alarm code "01" is not displayed at the RPK series.

Alarm code



Activation of the safety device (high pressure switch) in the outdoor unit (Except Alarm codes 41 and 42)

- · The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm is indicated when one of safety devices is activated during compressor running.



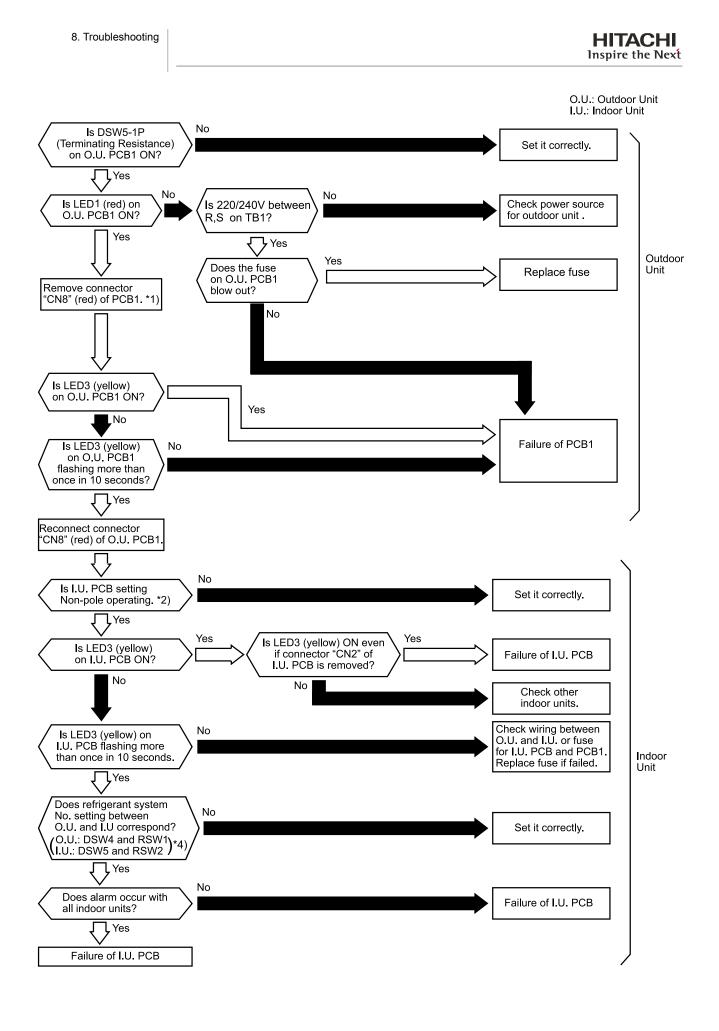
Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
			Check the heat exchanger for dust or for clogging	Remove the dust or the clogging
	Insufficient Air Flow to the Heat Exchanger (Outdoor Heat Exchanger during the Cooling Process or Indoor Heat Exchanger during the Heating Process)		Check the air filter for dust	Remove the dust
			Check for any obstacles at the inlet or the outlet of the heat exchanger	Remove the obstacles
			Check the service area	Secure service area
			Check the speed (Outdoor Fan: Cooling / Indoor Fan: Heating)	Replace the fan motor if faulty
	Excessively High Temp. Air to the Indoor Unit		Calculate the heat load	Reduce the heat load or use a bigger unit
			Check for hot air near the ceiling (Heating)	Provide good circulation
Activation of the high-pres- sure switch due to the excessively high discharge			Check for short-circuited air (Heating)	Remove the short-circuited air
pressure			Check for other heat source	Remove the heat source
process	Faulty High-Pressure Switch	Faulty Pressure Switch	Measure the discharge pressure. Check the conti- nuity after the decrease of the pressure	Replace the pressure switch if faulty
		Insufficient Contacting	Measure the resistance by means of the tester	Fix the looseness. Replace the connector
		Incorrect Connection	Check the connections	Repair the connections
	Overcharged refrigerant		Check the cycle operation temp.	Charge the refrigerant correctly
	Mixture of the non-condensate gas in the refrigerant cycle		Check the air temp. and the pressure	Recharge the refrigerant after the vacuum pumping
	Clogging of the discharge piping		Check for clogging	Remove the clogging
	Liquid line stop valve or gas line stop valve is not in operation		Check the stop valves	Fully Open the stop valves
Faulty Magnet Switch	Incorrect C	Connection	Check wiring	Repair connections. Re-
Faulty Magnet Switch	Malfunction A Contact		Check connections	place Magnet Switch

Alarm code



Abnormal transmission between the indoor units and the outdoor unit for RAS-(2-2.5)HVNP / RAS-3HVNC

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section.
- The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm is displayed when an abnormal operation is maintained for three minutes after the normal transmission between the indoor units and the outdoor unit. Also, an abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset.
 - The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.
 - Investigate the cause of the overcurrent and take the necessary action when the fuses are blown out or the breaker for the outdoor unit is activated.



SMGB0079 rev.0 - 01/2013

198

Phenomenon	Cause	Check item	Action
			(Turn OFF the main switch)
Power failure or power is not ON		Measure the voltage by means of the tester	Supply the power
	Short-circuit between the wires	Check the insulation material for breaks	Remove the short-circuit and replace the fuse
Blown out fuse for the power	Short-circuited wire to ground	Measure the insulation resistance	Remove short-circuit to ground and replace the fuse
source or activation of the outdoor unit breaker	Faulty comp. motor	Measure the resistance between the wires and the insulation resist- ance	Replace the comp. and the fuse
	Failure of outdoor unit fan motor	Measure resistance between wires and insulation resistance	Replace the unit fan motor and the fuse
	Short-circuit between the wires	Check the insulation material for breaks	Remove the short-circuit and replace the fuse
	Short-circuit of the control circuit (to ground)	Measure the insulation resistance	Remove the short-circuit and replace the fuse
Blown out fuse for control circuit or activation of outdoor unit breaker	Faulty solenoid coil for the mag- netic switch for the comp. motor	Measure the resistance of coil	Replace the magnetic switch and the fuse
	Failure of outdoor unit fan motor	Measure the resistance between the wires and the insulation resist- ance	Replace the outdoor unit fan motor and fuse
PCB1 Power	circuit failure	PCB1 Measure output voltage *1)	Replace PCB1
Disconnected wires insufficient	Between outdoor unit and indoor unit	Check the continuity of the wires Check for looseness of the con-	Replacing wires repairing and tightening the Power source wir-
contacting or incorrect connection	Power source wiring for the screws and the correct wiring outdoor unit	nection screws Check the terminal Nos.	ing for the screws and the correct wiring
Faulty PCB (outdoor unit, indoor	Disconnected wires to PCB	Check the connections	Correctly connect the wires
unit)	Faulty PCB	_	Replace PCB if faulty
Incorrect wiring	Disconnected wire; insufficient contacting	Check the continuity and the looseness of connection screws	Replacing wires, repairing and tightening the screws
	Incorrect wiring	Check the terminal Nos.	Correctly connect the wires

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- *1) In the case that the end terminal resistance (DSW5-1) is set to OFF for H-LINK connection, set the end terminal resistance to ON when CN8 is disconnected. Set the end terminal resistance to OFF when CN8 is reconnected.
- *2) Transmission Setting (SW1)

Item	Setting Position
SW1	Left Side (for H-LINK/H-LINK II)

• *3)

PCB1 output voltage	Voltage
Vcc 12 – GND2	12 VDC
Vcc 05 – GND1	5 VDC
Vcc 12 – GND1	12 VDC
Vcc 15 – GND1	15 VDC
Vcc 24 – GND1	24 VDC
Vcc 12T– GND1	12 VDC

• *4) The rotary switch (RSW2) is not available depending on the indoor unit model.

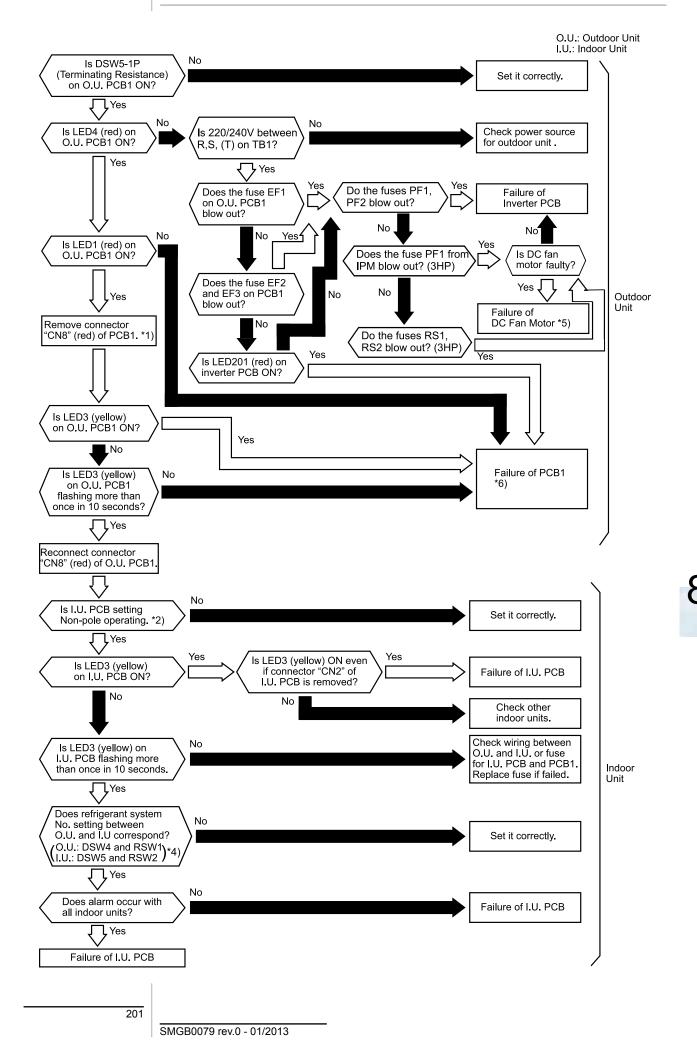
X

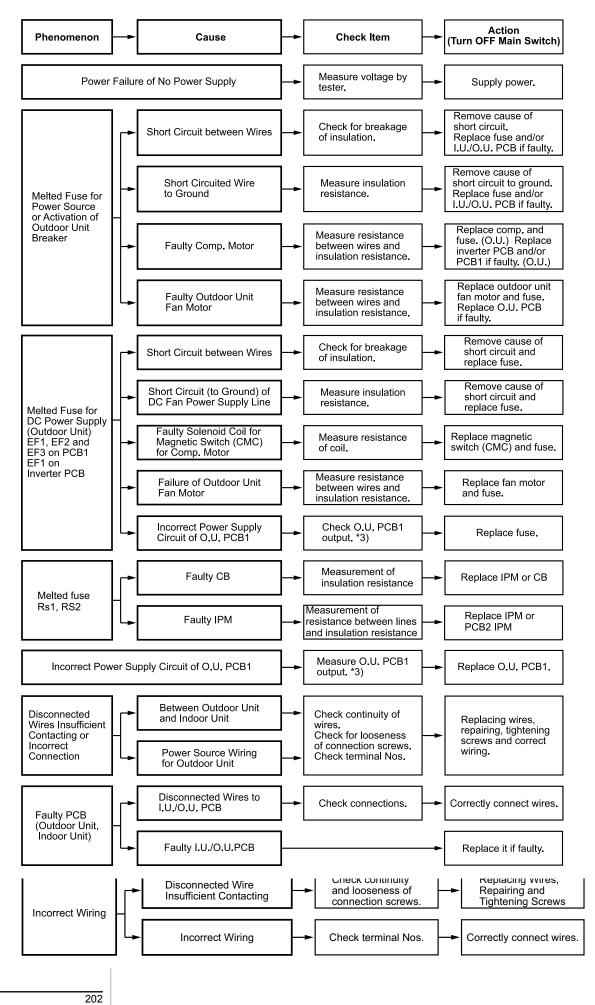
Alarm code



Abnormal transmission between the indoor units and the outdoor unit for RAS-(3-12)H(V)N(P/C)(E) $\label{eq:result}$

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section.
- The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm is displayed when an abnormal operation is maintained for three minutes after the normal transmission between the indoor units and the outdoor unit. Also, an abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset.
 - The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.
 - Investigate the cause of the overcurrent and take the necessary action when the fuses are blown out or the breaker for the outdoor unit is activated.





i_{NOTE}

- *1) In the case that the end terminal resistance (DSW5-1) is set to OFF for H-LINK connection, set the end terminal resistance to ON when CN8 is disconnected. Set the end terminal resistance to OFF when CN8 is reconnected.
- *2) Transmission Setting (SW1)

Item	Setting Position
SW1	Left Side (for H-LINK/H-LINK II)

*3)

PCB1 output voltage	Voltage
Vcc 12 – GND2	12 VDC
Vcc 05 – GND1	5 VDC
Vcc 12 – GND1	12 VDC
Vcc 15 – GND1	15 VDC
Vcc 24 – GND1	24 VDC
Vcc 12T– GND1	12 VDC

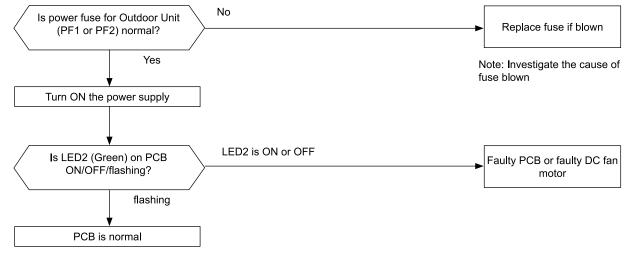
- *4) The rotary switch (RSW2) is not available depending on the indoor unit model.
- *5) Surely perform the troubleshooting of DC fan motor. If DC fan motor fails, the normal inverter PCB may be damaged.
- *6) Refer to section Checking procedure of PCB by means of the Remote Control Switch.



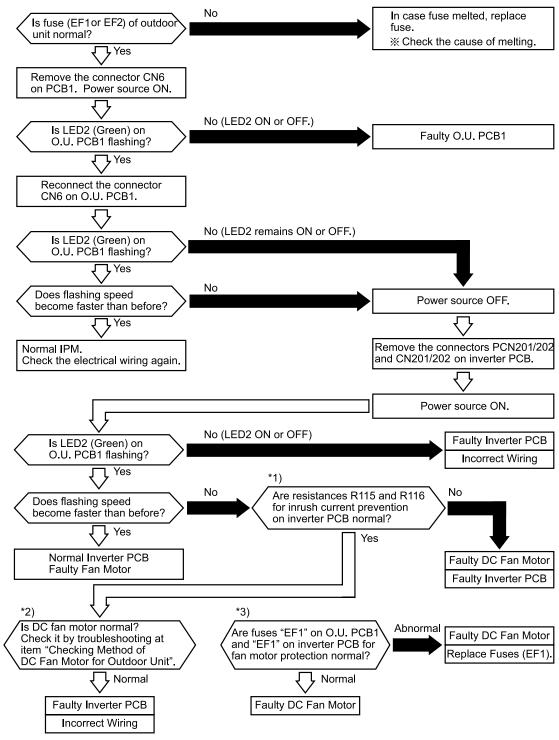
Alarm code Abnormal transmission between Inverter PCB and Outdoor PCB1

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm is displayed when the abnormal operation is maintained for 30 seconds after the normal transmission between the outdoor unit PCB1 and inverter PCB2. Also, the abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.

RAS-(2-2.5)HVNP / RAS-3HVNC / RAS-(4-6)H(V)NCE



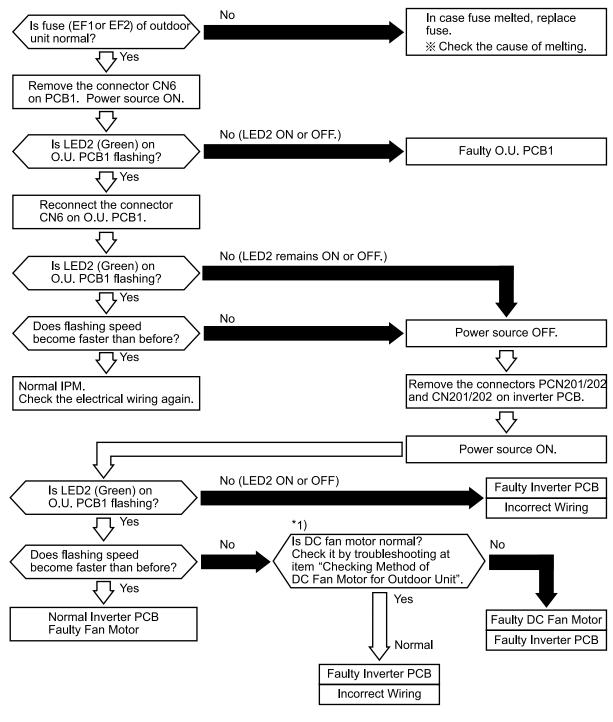
RAS-(3-6)H(V)NPE



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- *1): Surely perform the troubleshooting of the resistance for inrush current prevention (R115/R116) on inverter PCB. If the resistance for inrush current prevention (R115/R116) fails, the abnormal transmitting occurs.
- *2): Surely perform the troubleshooting of DC fan motor according to section Procedure of checking other main parts. If the DC fan motor fails, the normal inverter PCB may be damaged.
- *3): Perform the troubleshooting of the fuses "EF1" on O.U. PCB1 and "EF1" on inverter PCB for fan motor protection. If the fuses for fan motor protection fail, DC fan motor is not operated normally.

RAS-(8-12)HN(P/C)(E)

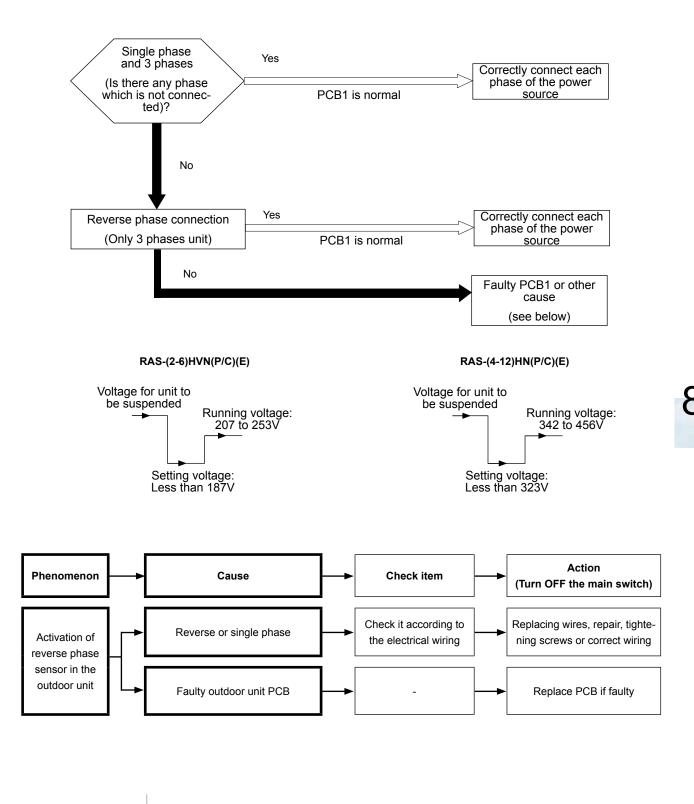


i Note

Surely perform the troubleshooting of DC fan motor according to section Procedure of checking other main parts. If the DC fan motor fails, the normal inverter PCB may be damaged.

Alarm code Code abnormal operation of picking up phase signal

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm is displayed when the main power source phase is reversely connected or one phase is not connected.

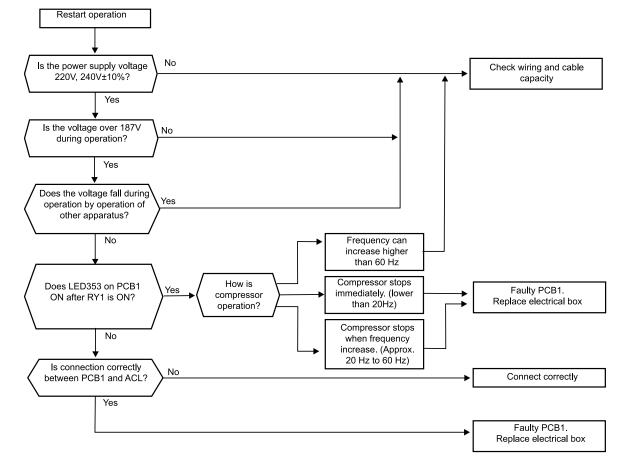




Excessively low voltage or excessively high voltage for the inverter

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section.
- The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the voltage between terminal "P" and "N" of Inverter is insufficient and the alarm has three occurrences in 30 minutes. If the number of occurrences is smaller than two, the retry operation is performed. The alarm code "06." Means fan controller Abnormal Operation.

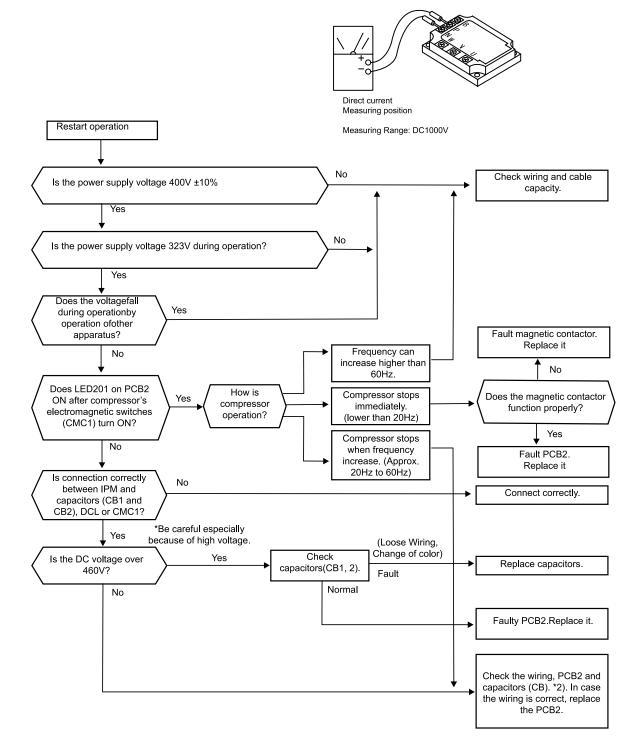
RAS-(2-2.5)HVNP / RAS-3HVNC



iNOTE Relpace electrical box only when LED is OFF.

RAS-(3-6)H(V)NPE / RAS-(8-12)HN(P/C)(E)

PCB1: Control PCB in Outdoor unit PCB2: Inverter PCB in Outdoor unit



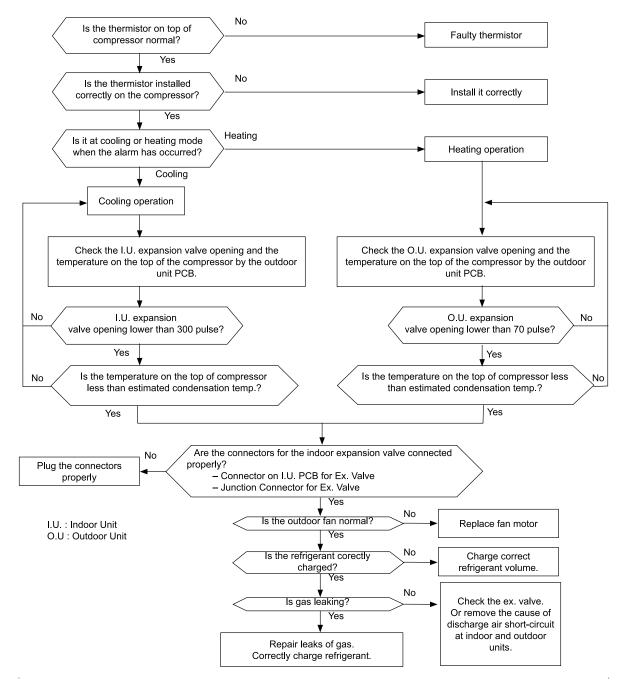
i note

- The indicated voltage is for three phase models. The power supply voltage for single phase models is 220V and 187V during operation.
- *1): If capacitor has high voltage, perform the high voltage discharge work refer to the item Procedure of checking other main parts.
- *2): Regarding replacing or checking method for the inverter PCB, refer to the item Procedure of checking other main parts.

8

Alarm code Decrease of Discharge Gas Superheat

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
- This alarm code is indicated as follows:
 - When the temperature at the top of the compressor is lower than condensing temperature and indoor expansion valve opening is lower than 300 pulse for 30 minutes in cooling operation, retry operation will be performed once. When outdoor expansion valve opening is lower than 70 pulse for 30 minutes in heating operation, retry operation will be performed once. If these occurs again within 120 minutes after the retry, the alarm code will be indicated.



8

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
	Ref. cycle is different from the electrical system		Check ref. cycle and the electrical system	Repair wiring
	Overcharged	d Refrigerant	Measure pressure	Correctly charge refrigerant
	Faulty Expa	nsion Valve	Check expansion valve *1)	Replace expansion valve if faulty
Decrease of Discharge Faulty PCB Gas Superheat	Faulty DCD	Fault	Replace PCB and check operation	Replace PCB if faulty
		Disconnected Wires for Ex.Valve Control	Check connections.	Repair wiring connections
		Fault	Measure resistance.	Replace thermistor if faulty
Fau	Faulty Discharge Gas	Incorrect Mounting	Check mounting state .(See "Alarm Code 08".)	Correctly mount thermistor.
	Thermistor	Incorrect Connection	Check connections.	Remove looseness, replace connector or repair connections.

i Note

• *1) Refer to section Procedure of checking other main parts, in part "Checking procedure for the electronic expansion valve".

Tdh2 125

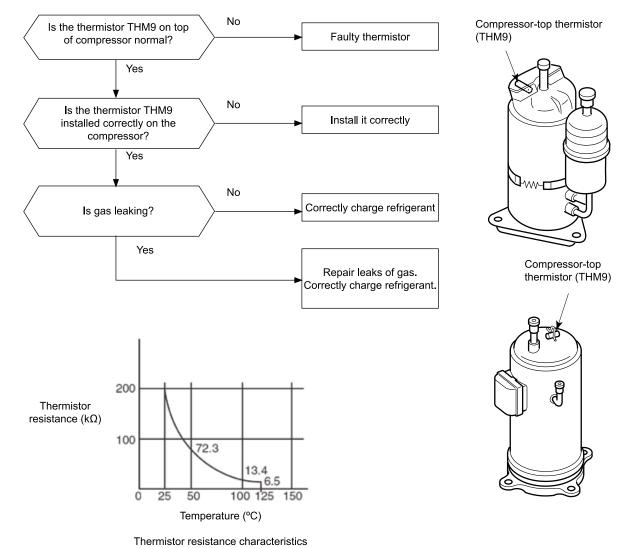
135

140



Excessively High Discharge Gas Temperature at the Top of Compressor

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - The alarm appears during cooling operation when the compressor-top thermistor remains at Tdc 1 °C or above for 10 minutes, or at Tdc 2 °C or above for 5 seconds.
 - The alarm appears during heating operation when the compressor-top thermistor remains at Tdh 1 °C or above for 10 minutes, or at Tdh 2 °C or above for 5 seconds.



Outdoor capacity	Tdc1	Tdc2	Tdh1
RAS-(2-6)H(V)N(P/C)(E)	115	125	115

127

127

135

140

120

120

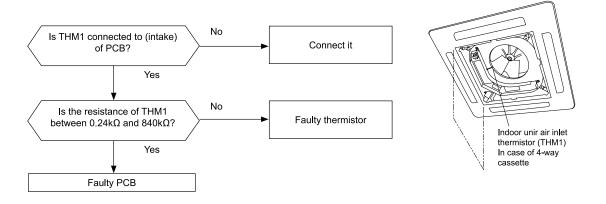
RAS-(8-12)HNP(E)

RAS-(8-12)HNC(E)



Abnormal operation of thermistor for the indoor unit air inlet temperature (air inlet thermistor)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the thermistor is short-circuited (less than 0.24 k Ω) or cut (greater than 840 k Ω) during the cooling process or the heating process. The system is automatically restarted when the fault is removed.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
	Fault	Check the resistance	Replace the thermistor if faulty
Faulty air inlet thermistor	Incorrect connection	Check the connection	Repair the wiring and the connections
Faulty DOD		Replace PCB and	
Faulty	Faulty PCB		Replace PCB if faulty

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- This data is applicable to the following thermistors:
 - Indoor unit discharge air temperature
 - Indoor unit liquid refrigerant temperature
 - Indoor unit air inlet temperature
 - Outdoor temperature
 - Outdoor unit evaporating temperature
 - Indoor unit gas piping

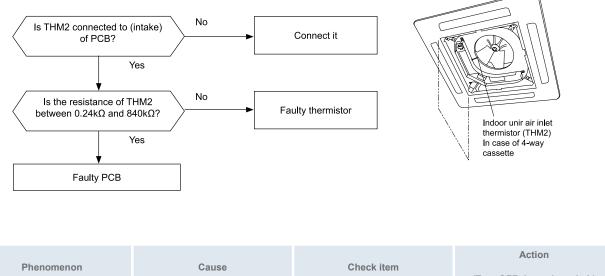
Thermistor resistance (KΩ) $\frac{90}{61}$ $\frac{82}{61}$ $\frac{10}{61}$ $\frac{10}{61}$ $\frac{10}{12.5}$ $\frac{10}{10}$ $\frac{10}{12.5}$ $\frac{10}{10}$ $\frac{10}{12.5}$ $\frac{10}{10}$ $\frac{10}{12.5}$ $\frac{10}{10}$ $\frac{10}{12.5}$ $\frac{10}{10}$ $\frac{10}{15}$ $\frac{1$

Thermistor characteristics



Abnormal operation of the thermistor for the indoor discharge air temperature (air outlet thermistor)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the thermistor is short-circuited (less than 0.24 k Ω) or cut (greater than 840 k Ω) during the cooling process or the heating process. The system is automatically restarted when the fault is removed.

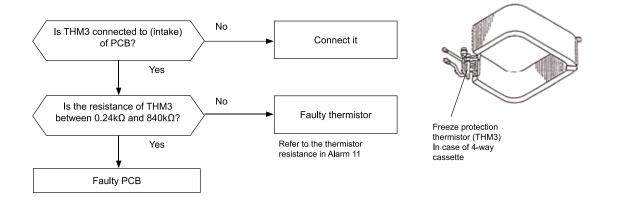


Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Eaulty air outlet thermister	Fault	Check the resistance	Replace the thermistor if faulty
Faulty air outlet thermistor	Incorrect connection	Check the connection	Repair the wiring and connections
Faulty PCB		Replace PCB and	Deplese DOD if foulty
Faulty	PCB	check the operation	Replace PCB if faulty



Abnormal operation of the thermistor for the indoor unit heat exchanger liquid pipe temperature (freeze protection thermistor)

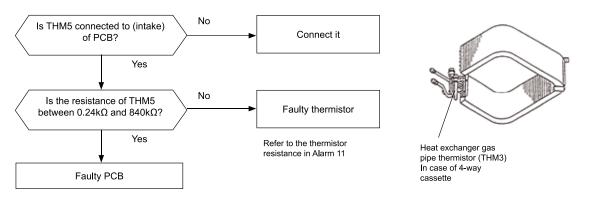
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the thermistor is short-circuited (less than 0.24 k Ω) or cut (greater than 840 k Ω) during the cooling process or the heating process. The system is automatically restarted when the fault is removed.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
	Fault	Check the resistance	Replace the thermistor if faulty
Faulty freeze protection thermistor	Incorrect connection	Check the connection	Repair the wiring and connections
Faulty PCB		Replace PCB and	Davida as DOD if faults
		check the operation	Replace PCB if faulty

Abnormal operation of the thermistor for the indoor unit heat exchanger gas pipe temperature (gas piping thermistor)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the thermistor is short-circuited (less than 0.24 k Ω) or cut (greater than 840 k Ω) during the cooling process or the heating process. The system is automatically restarted when the fault is removed.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
	Fault	Check the resistance	Replace the thermistor if faulty
Faulty gas piping thermistor	Incorrect connection	Check the connection	Repair the wiring and connections
Faulty PCB		Replace PCB and	Deplace DOD if foulty
Faulty	PCB	check the operation	Replace PCB if faulty

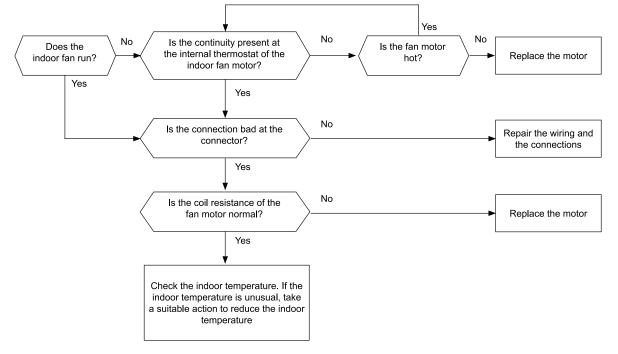
| 4



Alarm code

Activation of the protection device for the indoor fan motor (except RCI, RCIM and RPK)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the temperature of the internal thermostat for the indoor fan motor is higher than 135 °C.

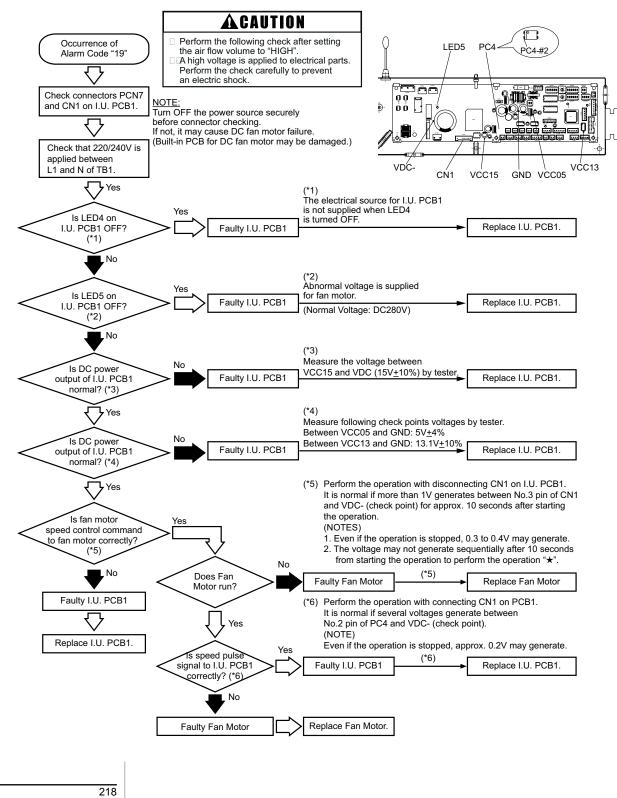


	Cause			Action
Phenomenon			Check item	(Turn OFF the main switch)
	Faulty indoor unit fan motor		Measure the coil resistance and the insulation resist- ance	Replace the motor if faulty
Activation of the internal thermostat for the indoor unit fan motor	Fault Faulty internal thermostat Insufficient contacting	Fault	Check the continuity after the fan motor temperature decreases to room temp	Replace the fan motor if there is no continuity
		Insufficient contacting	Measure the resistance	Correct looseness.
		incumorent contacting	by means of the tester	Replace the connectors
			Check the connections	Repair the connections

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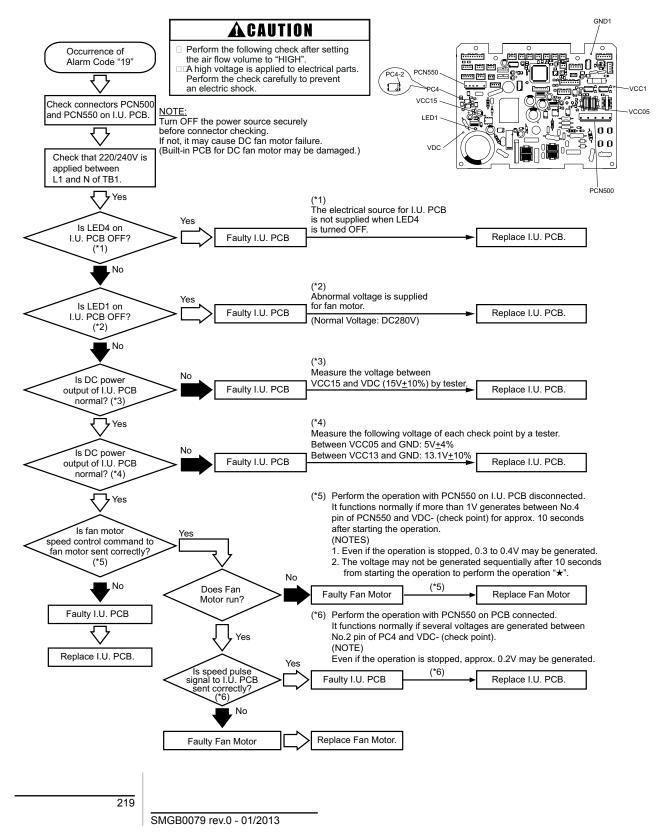
Activation of the protection device for the indoor fan motor (RCI, RCIM)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section.
- The unit number and the alarm code are displayed on the display of the outdoor unit PCB1.
 - This alarm code is displayed when the following conditions occurs three times in 30 minutes. Indoor fan rotates less than 70 rpm for 5 seconds during operation.
- · When the cause is checked by means of this flow chart, confirm that fan speed setting is Hi



Activation of the protection device for the indoor fan motor (RPK)

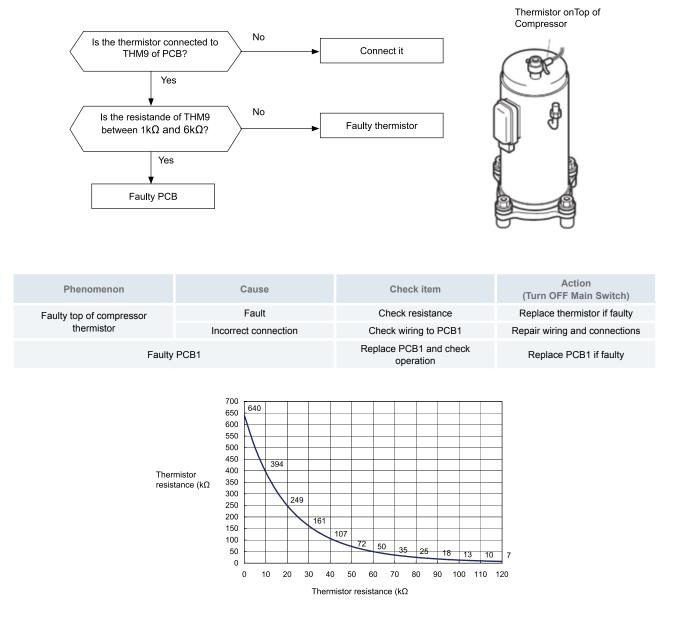
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB1.
 - This alarm code is displayed when the following conditions occurs three times in 30 minutes. Indoor fan rotates less than 70 rpm for 5 seconds during operation.
- · Set air flow volume "Hi" before starting this check.



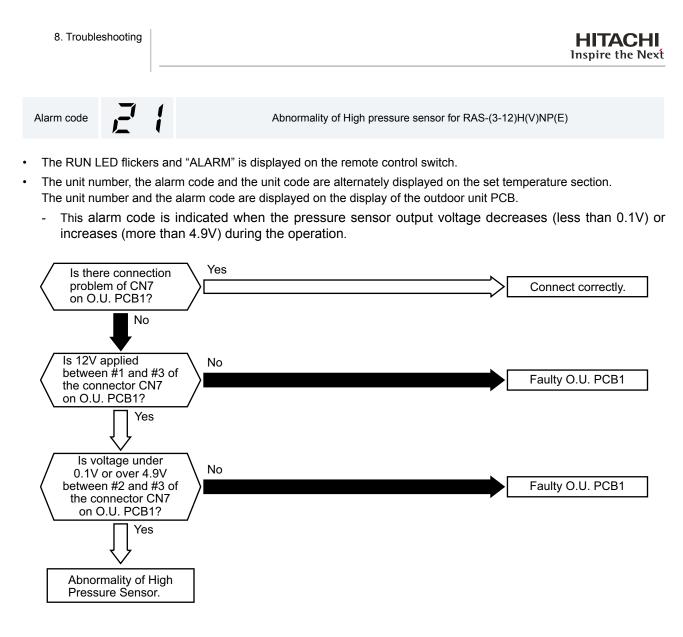


Abnormality of Thermistor for Discharge Gas Temperature (Compressor Thermistor)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is indicated when the thermistor is short-circuited (less than 1 kΩ) or cut (greater than 6 MΩ) during the cooling or heating operation.



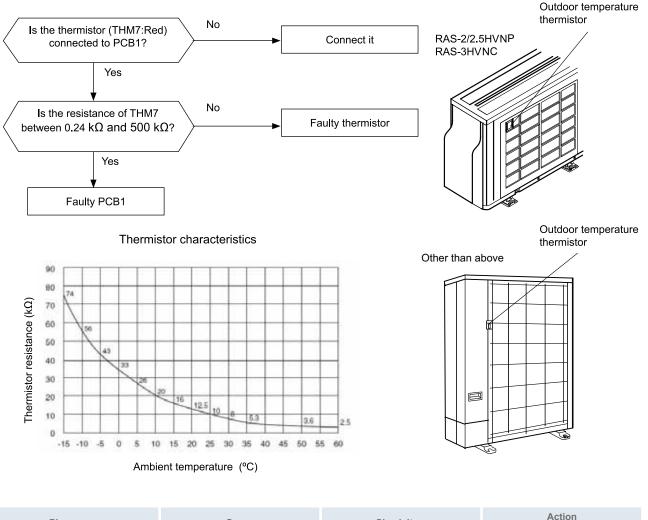
The resistance value have fudge factor (+10%).



Phenomenon	Cause	Check item	Action (Turn OFF Main Switch)
Faulty top of compressor	Fault	Check resistance	Replace thermistor if faulty
thermistor	Incorrect connection	Check wiring to PCB1	Repair wiring and connections
Faulty	PCB1	Replace PCB1 and check operation	Replace PCB1 if faulty
Indication of pressure value is excessively high or low	Malfunction of pressure sensor due to clogging wiring		Replace pressure sensor

Abnormal operation of the thermistor for the outdoor temperature (outdoor unit ambient thermistor)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the thermistor is short-circuited (less than 0.2 k Ω) or cut (greater than 500 k Ω) during the operation.

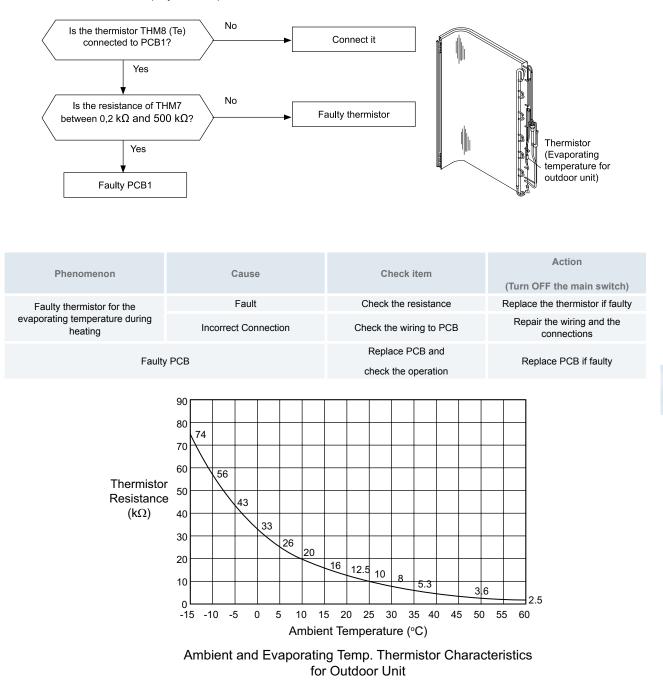


Phenomenon	Cause	Check item	(Turn OFF Main Switch)
Faulty thermistor for the outdoor	Fault	Check resistance	Replace thermistor if faulty
unit ambient	Incorrect connection	Check wiring to PCB	Repair wiring and connections
Faulty PCB1		Replace PCB1 and check operation	Replace PCB if faulty

Alarm code Abnormal operation of the the

Abnormal operation of the thermistor for the evaporating temperature during the heating process (outdoor unit)

- · The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB. (*1)
 If you find an abnormal operation of the thermistor, check all the thermistors as shown below.
 - The evaporating thermistor during the heating process is attached to the heat exchanger as shown in the figure below. If this the thermistor is faulty, such as short-circuit (less than 0,2kΩ) or cut (more than 500kΩ) during operation, this alarm is displayed. The position is indicated below.

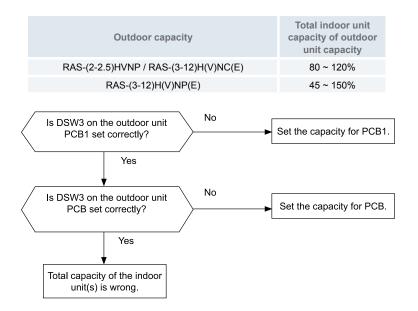


7

Incorrect Capacity Setting or Combined Capacity between Indoor Units and Outdoor Unit

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is indicated when the undefined setting is set to DSW3 on the outdoor unit PCB.
 - This alarm code is indicated when the total indoor unit capacity is not equal to the combined outdoor unit capacity. Outdoor unit capacity setting is not correct

Conditions:



Phenomenon	Cause	Check item	Action (Turn OFF Main Switch)
Incorrect Capacity Setting of Indoor Unit		Check combination of indoor units and capacity setting on PCB.	Correctly set dip switch, DSW3.
Incorrect Capacity Setting of Outdoor Unit		Check capacity setting on outdoor unit PCB.	Correctly set dip switch, DSW3.
Total Indoor Unit Capacity Connected to the Outdoor Unit is Beyond Permissible Range		Check outdoor unit model by calculating total indoor units capacity.	Ensure that total indoor unit capacity agrees with the above capacity conditions.

i_{NOTE}

- In case of H-LINK system, this alarm code is indicated when DSW4, RSW1 (for refrigerant system setting) on the outdoor unit PCB and DSW5, RSW2 (for refrigerant system setting) on the indoor unit PCB are incorrectly set.
- In this case, set correctly DSW4, RSW1, DSW5 and RSW2 after turning OFF main switch.
- (RSW2 is not equipped with some models.)

Alarm code Incorrect Indoor number setting

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, alarm code and unit model code appear alternately on the Set Temperature display of the remote control switch. The alarm code also appears on the outdoor unit PCB display.
 - The alarm code appears three minutes after the outdoor unit power activation if duplication is detected in indoor unit numbers connected to an outdoor unit (one refrigerant system). This applies when indoor unit numbers are configured using the rotary switch (RSW1).
 - The alarm code appears when the more than next indoor units are connected to one outdoor unit.

Model	Number of Indoor Units		
RAS-3HVNPE RAS-(4-12)H(V)N(P/C)(E)	>11		
RAS-(2-2.5)HVNP RAS-3HVNC	>5		

- The alarm code appears when the indoor and outdoor unit refrigerant system and address are set to 64 or above. (In such a case, the alarm code "b1" appears on the remote control switch.)

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The alarm code may appear when H-LINK system is employed for indoor–outdoor unit transmission, if there is any incorrect setting in DSW4/RSW1 on the outdoor unit PCB and DSW5/RSW2 on the indoor unit PCB; which are dip switches used for refrigerant system setting. In such a case, turn OFF the power and correctly set DSW4/RSW1 on the outdoor unit PCB and DSW5/RSW2 on the indoor unit PCB before reactivating the power.

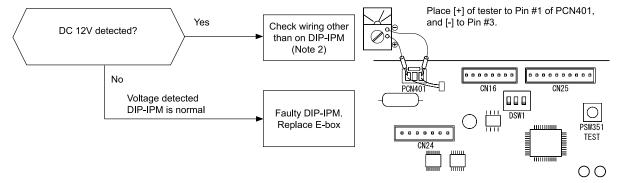
(Some indoor unit models do not have RSW2.)

Abnormality of Protective Circuit for Protection (Outdoor Unit)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - The alarm code appears if approx. DC12V is supplied to the DIP-IPM connector (see table below) when the inverter operation is commanded (after five seconds following activation of the remote control switch).

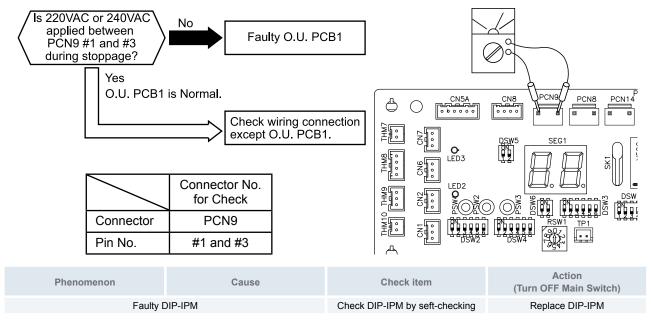
Place the tester as shown in the diagram below to check the connector of PCN401. The connector shall remain inserted. DC12V will constantly be detected and disturb the diagnosis if the connector of PCN401 is pulled out.

RAS-(2-2.5)HVNP / RAS-3HVNC



RAS-(3-6)H(V)N(P/C)E / RAS-(8-12)HN(P/C)(E)

 The alarm code appears if AC 200V or AC 240V is supplied to the connector on the outdoor unit PCB (see table below) while Y52C is OFF or CMC1 is open.

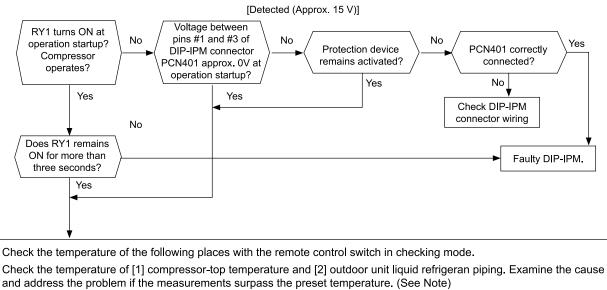


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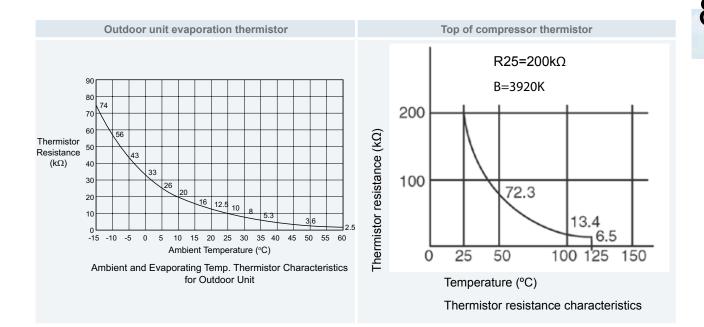
This alarm may appear if the Faston terminal of the high pressure switch (63H1) is improperly connected or damaged (open-circuit fault) when the operation is started. Besides this, check also "Alarm Code: 02 Activation of Outdoor Unit Protection Device".

Alarm code Cooling Overload (High pressure switch will be activated) for RAS-(2-2.5)HVNP and RAS-3HVNC

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - Abnormality indication will appear when the protection device is activated during compressor operation at cooling (see Note), with the outdoor unit evaporation temperature higher than 55 °C AND the compressor-top temperature higher than 95 °C.



- 1 Compressor-Top Temp.Preset Temp. 95°C
- 2 Indoor unit liquid refrigerant piping temp. Preset Temp. 55°C



Phenomenon	Cause		Check item	Action (Turn OFF main switch)
	Insufficient Air Flow to Heat Exchanger of Outdoor Unit		Clogging of Heat Exchanger?	Remover clogging
			Check for dust on air filter	Remove dust
			Check the service space	Secure service space
			Check for outdoor fan speed	Replace fan motor if faulty
	Excessively High Temp. Air to Outdoor Unit Heat Exchanger		Check for hot air near the ceiling	Make good circulation
			Check for short circuited air	Remove short-circuited air
			Check for other heat source	Remove heat source
		Faulty Pressure Switch	Measure discharge pressure.	
			Check continuity after decreasing of pressure	Replace it if faulty
	Faulty High Pressure Switch	Insufficient	Measure resistance by tester	Repair looseness.
Activation of High Pressure Switch due to Excessively High Discharge Pressure during Cooling Operation		Contacting		Replace connector
		Incorrect Connection	Check connections	Repair connections
	Overcharged Refrigerant		Check cycle operating temp.	Charge refrigerant correctly
	Mixture of Non-Condensable Gas in Refrigerant Cycle		Check ambient temp. and pressure	Recharge refrigerant after vacuum pumping
	Clogging of Discharge Piping		Check for clogging	Remove clogging
	Faulty or Malfunction of Expansion Valve		Check for clogging	Remove clogging
			Check connecting wiring and connectors	Replace connector
			Check operating sound from coil	Replace coil
			Check discharge gas thermistor	Replace thermistor
			Check attaching state of discharge gas thermistor	Reattach thermistor
	Liquid Line Stop Valve or Gas Line Stop Valve are not in Operation		Check stop valves	Fully open stop valve
	Locking up Outdoor Unit Expansion Valve Closure		Check expansion valve actuation	Replace outdoor expansion valve

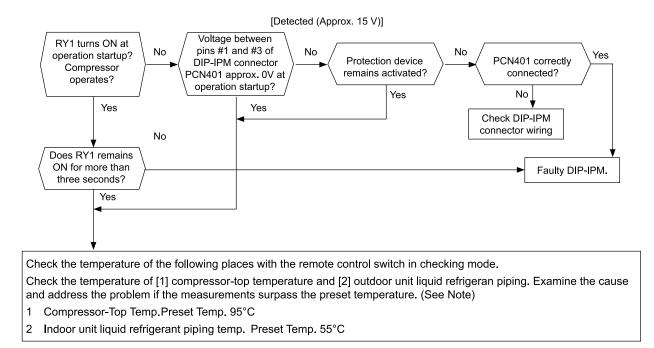
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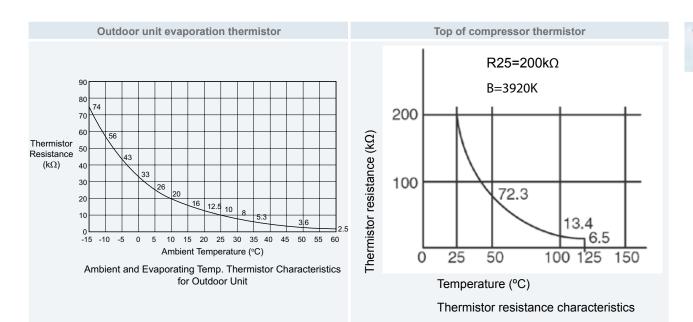
This alarm code is indicated when the outdoor unit protective device is activated by high discharge pressure during cooling operation. Accordingly, when this alarm code is indicated, there is high possibility of high pressure switch actuation and the above troubleshooting actions are based on such cases.

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Heating Overload (High pressure switch will be activated) for RAS-(2-2.5)HVNP and RAS-3HVNC

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - Abnormality indication will appear when the protection device is activated during compressor operation at heating (see Note), with the outdoor unit evaporation temperature higher than 55 °C and the compressor-top temperature higher than 95 °C.





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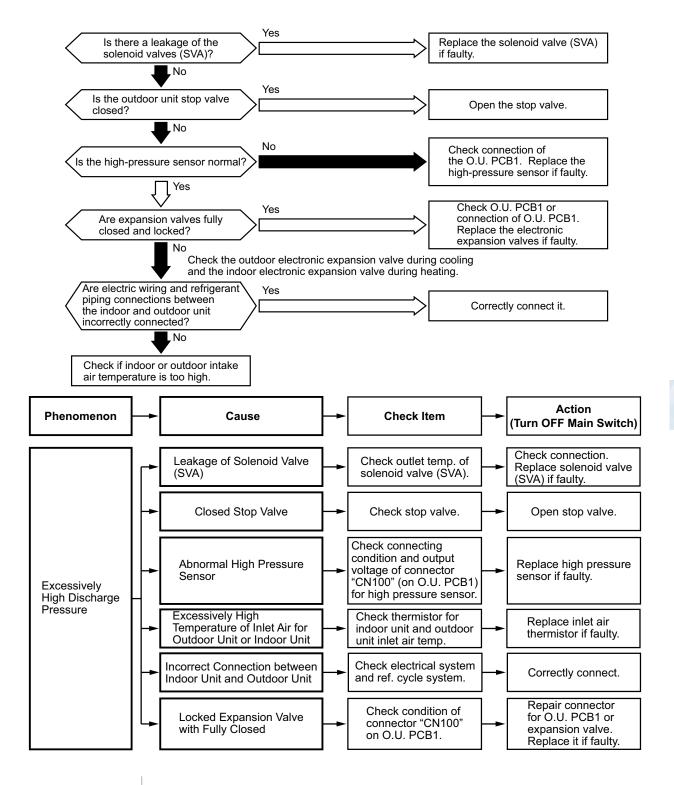
Phenomenon	Cause		Check item	Action (Turn OFF Main Switch)
Activation of High Pressure Switch due to Excessively High Discharge Pressure during Heating Operation	Insufficient Air Flow to Heat Exchanger of Indoor Unit		Clogging of Heat Exchanger	Remove it
			Check for dust on air filter	
			Check for any obstacle at inlet or outlet of heat exchanger	
			Check the service space	Secure service space
			Check for indoor fan speed	Replace fan motor if faulty
	Excessively High Temp. Air to Indoor Unit Heat Exchanger		Calculate heat load.	Reduce heat load or use a bigger unit
			Check for hot air near the ceiling	Make good circulation
			Check for short circuited air	Remove short-circuited air
			Check for other heat source	Remove heat source
		Faulty Pressure Switch	Measure discharge pressure.	
			Check continuity after decreasing of pressure	Replace it if faulty
	Faulty High Pressure Switch	Insufficient Contacting	Measure resistance by tester	Repair looseness.
				Replace connector
Activation of High Pressure Switch due to Excessively High Discharge Pressure during Heating Operation		Incorrect Connection	Check connections	Repair connections
	Faulty of Outdoor Fan Control		Check decreasing air flow volume at pressure switch for control activative	Replace thermistor for evaporating temp. if faulty
	Faulty of Pressure Switch for Control		Check activated pressure and connecting wire	Replace it if pressure switch for control is faulty
	Overcharged Refrigerant		Check cycle operating temp.	Charge refrigerant correctly
	Mixture of Non-Condensable Gas in Refrigerant Cycle		Check ambient temp. and pressure	Recharge refrigerant after vacuum pumping
	Clogging of Discharge Piping		Check for clogging	Remove clogging
	Faulty or Malfunction of Expansion Valve		Check for clogging	Remove clogging
			Check connecting wiring and connectors	Replace connector
			Check operating sound from coil	Replace coil
			Check discharge gas thermistor	Replace thermistor
			Check attaching state of discharge gas thermistor	Reattach thermistor
	Liquid Line Stop Valve or Gas Line Stop Valve are not in Operation		Check stop valves	Fully open stop valve

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This alarm code is indicated when the outdoor unit protective device is activated by high discharge pressure during heating operation. Accordingly, when this alarm code is indicated, there is high possibility of high pressure switch actuation and the above troubleshooting actions are based on such cases.

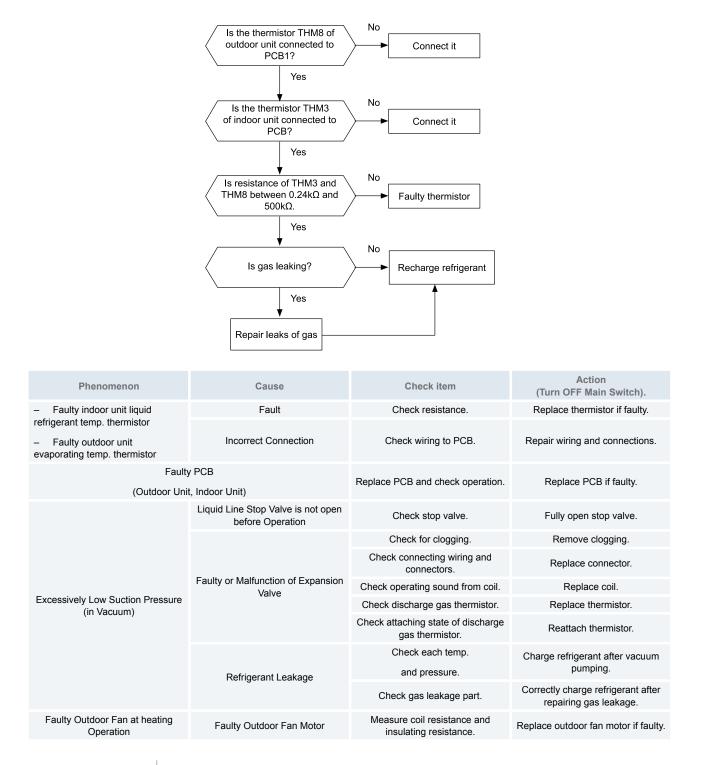
Activation of high pressure increase protection device

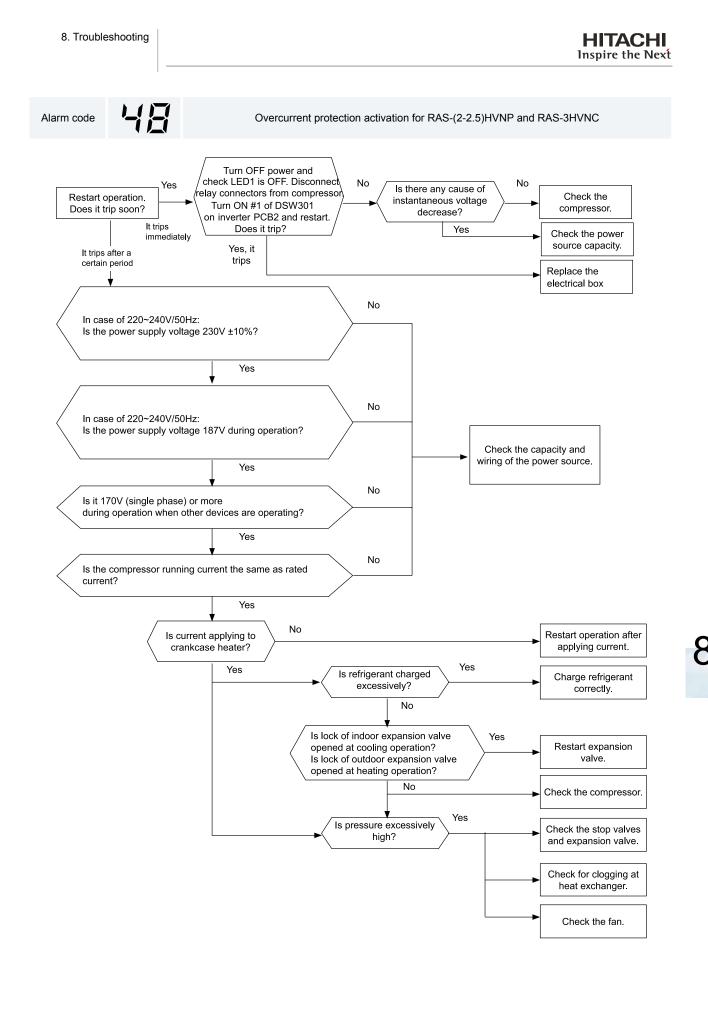
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - When the compressor is operated with the discharge pressure (Pd) higher than 3.8MPa for 1 minute, the retry operation is performed 3 minutes after all compressors are stopped. Thereafter, this alarm code is indicated when above abnormality is detected twice in 30 minutes.

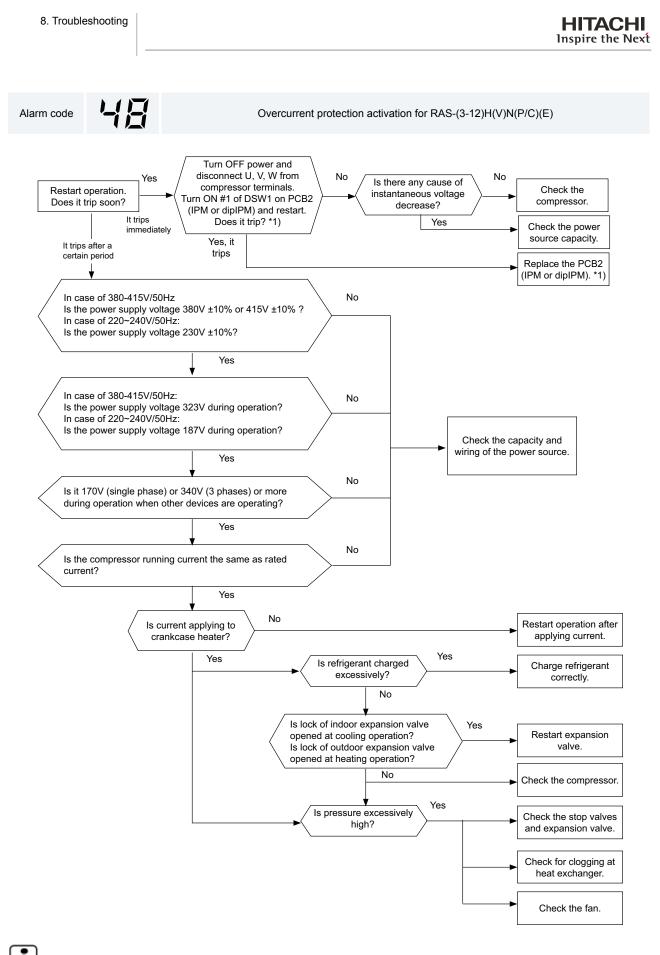


Alarm code Activation to Protect System from Excessively Low Suction Pressure (Protection from Vacuum Operation)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - In the case that the evaporating temperature (Cooling: Liquid Refrigerant Piping Temp. of Indoor Unit, Heating: Evaporating Temp. of Outdoor Unit) is lower than -37 °C (250~350 kΩ) and the thermistor on top of compressor is higher than 90 °C. for 10 minutes, retry operation is performed 3 minutes after compressor stoppage.However, when the state occurs more than 3 times including 3 in one hour, this alarm code is indicated.







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*1) Perform the high voltage discharge work by referring to section Procedure of checking other main parts before checking and replacing the inverter PCB.

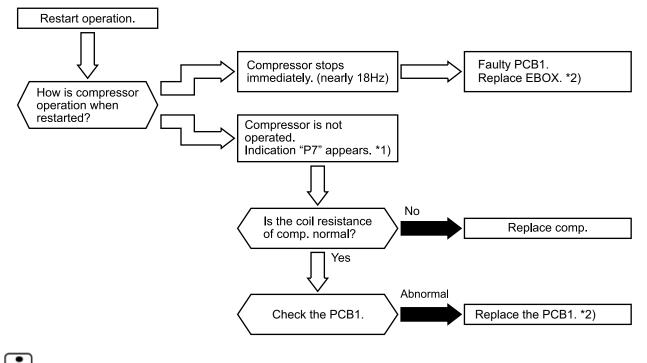
SMGB0079 rev.0 - 01/2013



5

Abnormal operation of the current sensor (RAS-(2-2.5)HVNP / RAS-3HVNC)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the current transformer is abnormal (0 A detection or 3 A alarm condition) and the alarm has more than three occurrences in 30 minutes.
 - Condition of Activation:
 - When the frequency of the compressor is maintained at 6~10 Hz after the compressor is started, one of the absolute values of the running current at each phase U+, U-, V+ and V- is less than 1.5 A (including 1.5A)
 - Before the compressor is operated (at the end of position control), the current wave value is less than 3.0 A

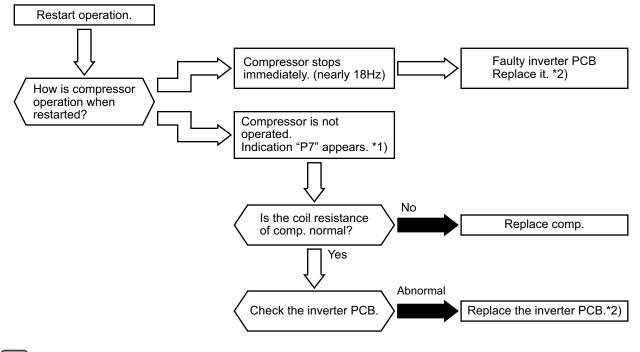


ΟΝΟΤΕ

- *1) P7 is shown at 7-segment on the outdoor unit PCB.
- *2) Make sure LED1 is OFF.

Abnormal operation of the current sensor (RAS-(3-6)H(V)N(P/C)E)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the current transformer is abnormal (0 A detection or 5 A alarm condition) and the alarm has more than three occurrences in 30 minutes.
 - Condition of Activation:
 - When the frequency of the compressor is maintained at 15~18 Hz after the compressor is started, one of the absolute values of the running current at each phase U+, U-, V+ and V- is less than 1.5 A (including 1.5A)
 - Before the compressor is operated (at the end of position control), the current wave value is less than 5.0 A

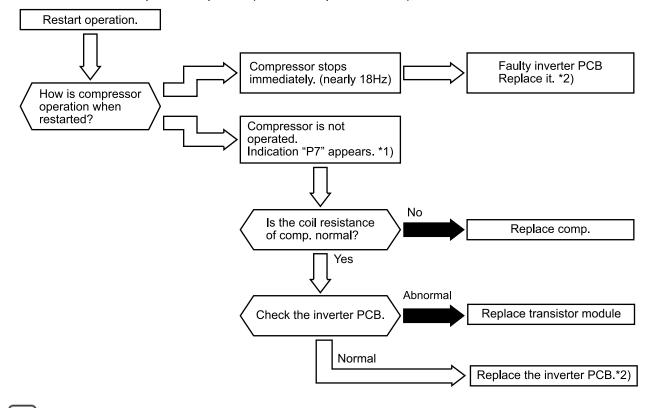


i_{NOTE}

- *1) P7 is shown at 7-segment on the outdoor unit PCB.
- *2) Perform the high voltage discharge work by referring to the item Procedure of checking other main parts, in part "Checking procedure for the electronic expansion valve" before checking and replacing the inverter parts.

Abnormal operation of the current sensor (RAS-(8-12)HN(P/C)(E))

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is displayed when the current transformer is abnormal (0 A detection or 5 A alarm condition) and the alarm has more than three occurrences in 30 minutes.
 - Condition of Activation:
 - When the frequency of the compressor is maintained at 15~18 Hz after the compressor is started, one of the absolute values of the running current at each phase U+, U-, V+ and V- is less than 1.5 A (including 1.5A)
 - Before the compressor is operated (at the end of position control), the current wave value is less than 5.0 A



INOTE

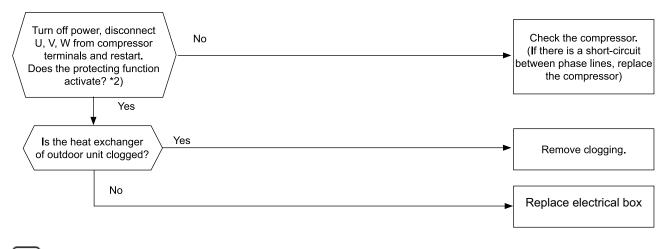
- *1) P7 is shown at 7-segment on the outdoor unit PCB.
- *2) Perform the high voltage discharge work by referring to the item Procedure of checking other main parts, in part "Checking procedure for the electronic expansion valve" before checking and replacing the inverter parts.

 Alarm code
 Activation of transistor module (RAS-(2-2.5)HVNP / RAS-3HVNC)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - ISPM has a detection function of the abnormal operation. This alarm is displayed when the ISPM module detects the abnormal operation 7 times or more than 7 times in 30 minutes. The retry operation is performed six times.

Conditions:

• The abnormal current to the ISPM, such as short-circuited, grounded, overcurrent or control voltage decrease.



i Note

- *1) Regarding replacing or checking method for ISPM, refer to item Procedure of checking other main parts.
- *2) Set the #1 pin of DIP switch on ISPM to ON when you are restarting with the terminals of the compressor disconnected. After the troubleshooting, set #1 pin of DIP switch DSW1 on ISPM to OFF.

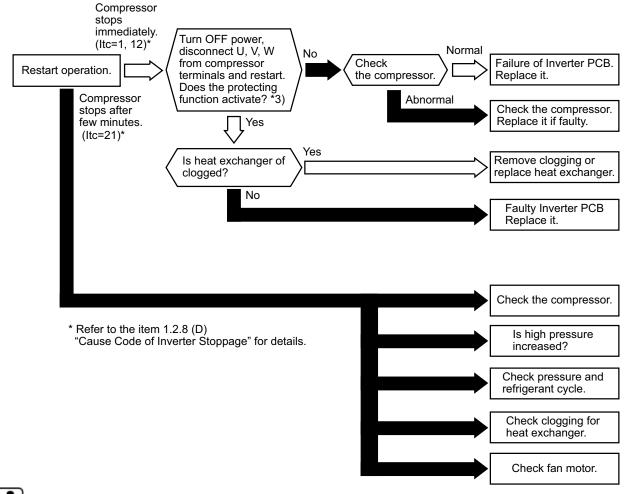
53

Activation of transistor module (RAS-3HVNPE / RAS-(4-6)H(V)NCE)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - IPM or Dip IPM and PCB2 have detecting function of abnormality. This alarm is indicated when the transistor module detect the abnormality 7 times in 30 minutes including 7. Retry operation is performed up to the occurrence of 6 times.

Conditions:

- The abnormal current such as short circuited, grounded or the overcurrent occurs at the transistor module.
- The temperature at transistor module increases abnormally.
- The control voltage decreases.
- The angle difference between the shaft in compressor and the shaft in the control program exceeds +60deg.



- *1) Perform the high voltage discharge work by referring to the item Procedure of checking other main parts, before checking and replacing the inverter components.
- *2) Regarding replacing or checking method for inverter components, refer to item Procedure of checking other main parts.
- *3) Turn ON the No.1 switch of the dip switch DSW1 on PCB2 (inverter) when restarting with disconnecting the terminals of the compressor. After troubleshooting, turn OFF the No.1 switch of the dip switch DSW1 on PCB2.
- When the alarm code "53" is indicated, the outdoor fan motor (DC motor) ensure that DC fan motor is checked according to the item Procedure of checking other main parts.

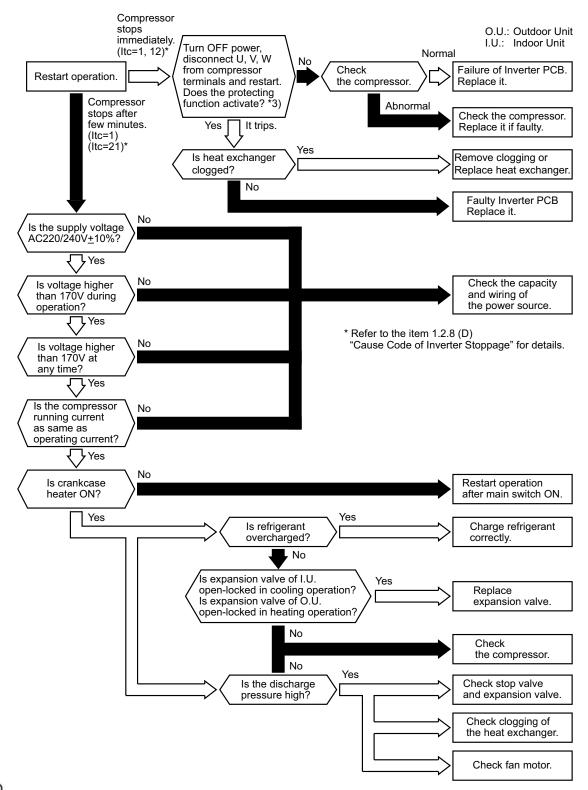


Activation of transistor module (RAS-(4-6)H(V)NPE)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - IPM or Dip IPM and PCB2 have detecting function of abnormality. This alarm is indicated when the transistor module detect the abnormality 7 times in 30 minutes including 7. Retry operation is performed up to the occurrence of 6 times.

Conditions:

- The abnormal current such as short circuited, grounded or the overcurrent occurs at the transistor module.
- The temperature at transistor module increases abnormally.
- The control voltage decreases.
- The angle difference between the shaft in compressor and the shaft in the control program exceeds +60deg.



INOTE

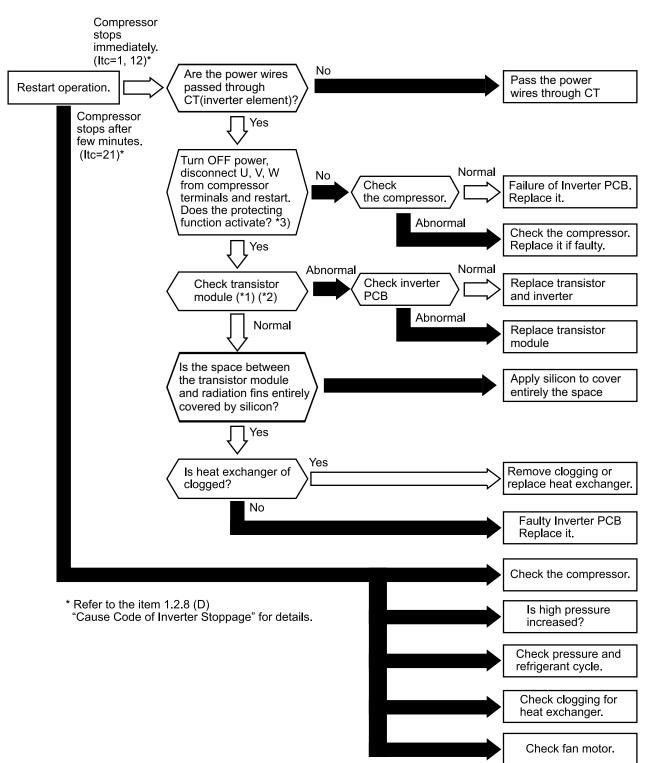
- *1) Perform the high voltage discharge work by referring to the item Procedure of checking other main parts, before checking and replacing the inverter components.
- *2) Regarding replacing or checking method for inverter components, refer to item Procedure of checking other main parts.
- *3) Turn ON the No.1 switch of the dip switch DSW1 on PCB2 (inverter) when restarting with disconnecting the terminals of the compressor. After troubleshooting, turn OFF the No.1 switch of the dip switch DSW1 on PCB2.
- When the alarm code "53" is indicated, the outdoor fan motor (DC motor) ensure that DC fan motor is checked
 according to the item Procedure of checking other main parts.

Activation of transistor module (RAS-(8-12)HN(P/C)(E))

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - IPM or Dip IPM and PCB2 have detecting function of abnormality. This alarm is indicated when the transistor module detect the abnormality 7 times in 30 minutes including 7. Retry operation is performed up to the occurrence of 6 times.

Conditions:

- The abnormal current such as short circuited, grounded or the overcurrent occurs at the transistor module.
- The temperature at transistor module increases abnormally.
- The control voltage decreases.
- The angle difference between the shaft in compressor and the shaft in the control program exceeds +60deg.



inote

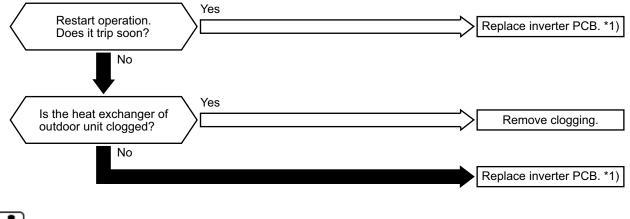
- *1) Perform the high voltage discharge work by referring to the item Procedure of checking other main parts, before checking and replacing the inverter components.
- *2) Regarding replacing or checking method for inverter components, refer to item Procedure of checking other main parts.
- *3) Turn ON the No.1 switch of the dip switch DSW1 on PCB2 (inverter) when restarting with disconnecting the terminals of the compressor. After troubleshooting, turn OFF the No.1 switch of the dip switch DSW1 on PCB2.
- When the alarm code "53" is indicated, the outdoor fan motor (DC motor) ensure that DC fan motor is checked according to the item Procedure of checking other main parts.

Abnormality of inverter fin temperature (RAS-3HVNPE / RAS-(4-6)H(V)N(P/C)E)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is indicated after the operation is stpped when the following condition occurs three times within 30 minutes. The retry operation is performed twice.

Conditions:

- When the temperature of the thermistor for inverter fin excess 80 °C (RAS-3HVNPE)
- When the temperature inside the transistor module excess 90 °C (RAS-(4-6)H(V)NPE).
- When the temperature of the thermistor for inverter fin excess 92 °C (RAS-(4-6)H(V)NCE)



i Note

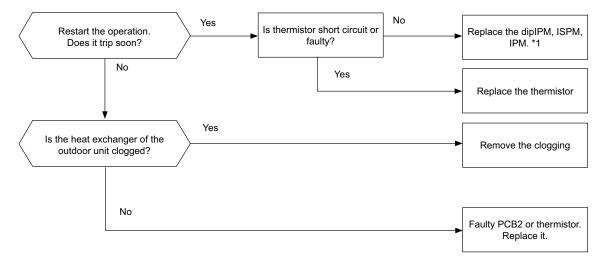
1*): Perform the high voltage discharge work by referring to the item Procedure of checking other main parts, before checking and replacing the inverter components.

Abnormality of inverter fin temperature (RAS-(8-12)HN(P/C)(E))

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is indicated after the operation is stpped when the following condition occurs three times within 30 minutes. The retry operation is performed twice.

Conditions:

• When the temperature of the thermistor for inverter fin excess 100 °C.



i_{NOTE}

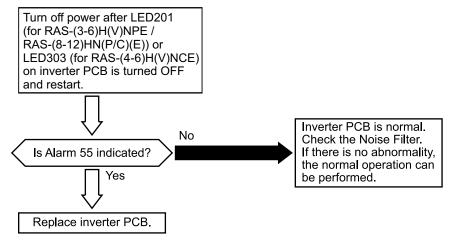
1*): Perform the high voltage discharge work by referring to the item Procedure of checking other main parts, before checking and replacing the inverter components.

Alarm code Abnormality of Inverter Module

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - Actual frequency from Inverter PCB is less than 10 Hz (after inverter frequency output form PCB1 to Inverter PCB).
 - This alarm is displayed when it occurs 3 times in 30 minutes. Retry operation is performed up to the occurrence of 2 times.

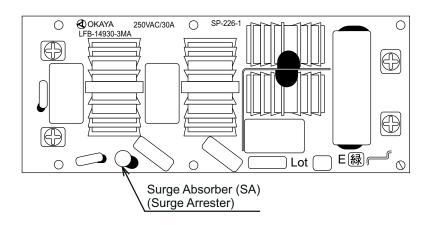
Condition of Activation:

This alarm is indicated when Inverter PCB is not performed normally.





When the excessive surge current is applied to the unit due to lighting or other causes, this alarm code or the cause code of inverter stoppage (Itc=11) will be indicated on the 7-segment display on O.U. PCB1 and the unit can not be operated. In this case, check to ensure the surge absorber (SA) on the noise filter (NF1). The surge absorber may be damaged if the inner surface of the surge absorber is changed to black. If the surge absorber is damaged, replace the noise filter. If the surge absorber does not have abnormality, turn OFF the power source once and wait until turning OFF LED201 (red) on inverter PCB for approx. 5 min. Then, turn ON again.

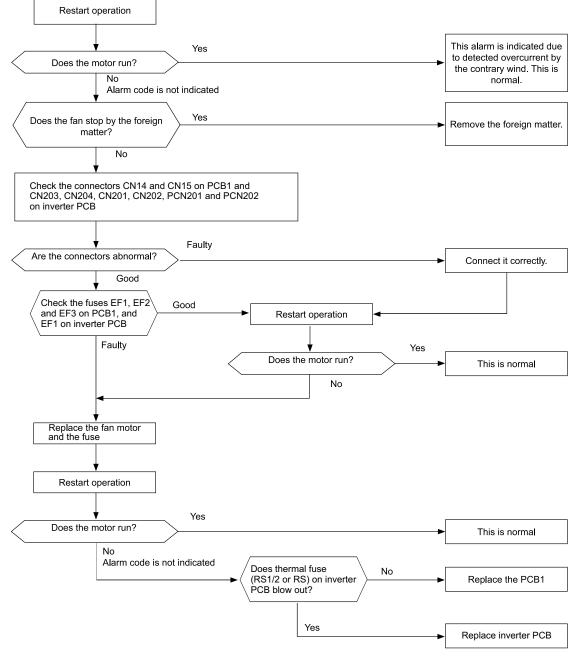


Abnormality of fan motor protection (DC fan motor) for RAS-(2-2.5)HVNP and RAS-3HVNC

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm is indicated when the revolution pulse output from the fan motor is lower than 20min⁻¹ during 30 seconds and it stops. Regarding stops, when less than 35 seconds have passed since fan start up, after the first abnormality is detected, if its occurs 4 times more within 5 minutes, it stops and alarm is displayed..

Alarm code Abnormality of fan motor protection (DC fan motor) for RAS-(3-6)H(V)NPE and RAS-(8-12)HN(P/C)(E)

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm is indicated when the revolution pulse output from the fan motor is 10 rpm or less and the reverse revolution signal is detected. The fan motor is stopped once, and restarted after 10 seconds. If it occurs more than 10 times in 5 minutes after the first abnormality occurs, this alarm is indicated. The abnormality occurs when the fan motor is stopped by slugging.

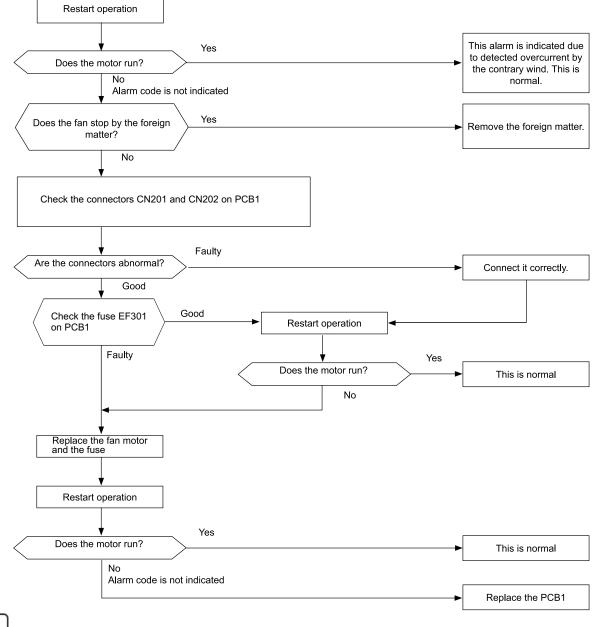


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Check to ensure that DC Fan Motor is checked according to the item Procedure of checking other main parts.

Abnormality of fan motor protection (DC fan motor) for RAS-(4-6)H(V)NCE

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm is indicated when the revolution pulse output from the fan motor is 10 rpm or less and the reverse revolution signal is detected. The fan motor is stopped once, and restarted after 10 seconds.
 If it occurs more than 10 times in 5 minutes after the first abnormality occurs, this alarm is indicated. The abnormality occurs when the fan motor is stopped by slugging.



Check to ensure that DC Fan Motor is checked according to the item Procedure of checking other main parts.

Alarm code EE

• This alarm code is displayed when one of the following alarms occurs three times within six hours. If the outdoor unit operates continuously without removing the cause of the alarm, the compressor may be seriously damaged

Alarm code	Content of abnormality
02	Tripping of protection device in outdoor unit
07	Decrease in discharge gas superheat
08	Increase in discharge gas temperature
45	Activation of high pressure increase protection device
47	Low pressure decrease protection activating

You can check these alarms using the check mode 1. Follow the action that is indicated in each alarm chart. You can clear these alarms only by turning OFF the main switch to the system. **However, you must pay careful attention before starting, because there is a possibility of causing serious damages to the compressors.**



님님

Incorrect Setting of Unit Model Code

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is indicated in the following condition. Check the unit model code setting (DSW4) of I.U. PCB after turning OFF the power source.

Condition	Action
The unit model code setting (DSW4) is not set (all pins are "OFF"), or is set for the incorrect indoor unit type.	Set DSW4 correctly according to the dip switch setting in "Installation and Maintenance Manual".

Incorrect Setting of Unit and Refrigerant Cycle No.

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
 - This alarm code is indicated in the following condition. Check the settings of the dip switch (DSW) and the rotary switch (RSW) after turning OFF the power source.

Conditions	Action
The unit No. setting (DSW6 and RSW1) or the refrigerant cycle No. setting (DSW5 and RSW2) is set as "64" or more, or more than 2 pins of DSW5 or DSW6 are set.	 a) Unit No. Setting / Ref. Cycle No. Setting Starting from "1" (recommended) Set the unit No. and the refrigerant cycle No. from "1" to "63". (Setting No. for the 64th unit shall be "0".) b) Unit No. Setting / Ref. Cycle No. Setting Starting from "0" Set the unit No. and the refrigerant cycle No. from "0" to "63." (Setting No. for the 64th unit shall be "63".)
The unit No. setting and the refrigerant cycle No. setting are set between "16" and "63," and the indoor unit does not support H-LINK II.	Set the unit No. and the refrigerant cycle No. between "0" and "15." $% \left(1,1,2,2,3,2,3,3,3,3,3,3,3,3,3,3,3,3,3,3,$

Alarm code

5

Incorrect Setting of Indoor Unit Number for H-LINK Type

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code^{*}) and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
- *): The alarm code indicated on the remote control switch is "35".

Condition	Action
The number of the connected indoor units not supporting H-LINK II is 17 and after.	The number of the connected indoor units shall be 16 and before.
	and before.

8.2.4 Alarm codes for the KPI (E/H/X)3E Series and DX Interface

Code	DX-	KPI-	KPI-	Category	Type of Abnormality	Main cause
No.	KIT2	S3	Active	Category	Type of Abnormanty	Wall Cause
01	0	-	о	Indoor	Activation of protection device	Float switch activation (high water level in drain hose or abnormality in drain pipe, float switch or drain pan).
03	0	-	о	Transmission	Transmission Error	Outdoor fuse meltdown, Indoor/outdoor connection wir- ing (breaking, wiring error, etc.)
11	0	0	0	Indoor	Air inlet thermistor (RA for KPI)	Loose, disconnected, broken or short-circuited connector
12	0	0	0	Indoor	Air outlet thermistor (OA for KPI)	Loose, disconnected, broken or short-circuited connector
13	0	-	0	Indoor	Liquid pipe thermistor	Loose, disconnected, broken or short-circuited connector
14	0	-	0	Indoor	Gas pipe thermistor	Loose, disconnected, broken or short-circuited connector
15	-	-	-	Indoor	Fresh Outdoor Air Thermistor (Econofresh)	Loose, disconnected, broken or short-circuited connector
16	-	-	0	Indoor	Air inlet DX Coil thermistor (Tincoil)	Loose, disconnected, broken or short-circuited connector
17	-	-	0	Indoor	Air outlet DX Coil thermistor (Tout- coil)	Loose, disconnected, broken or short-circuited connector
18	(0)	ο	0	Indoor	Indoor RA fan protection device activation for KP	Fan motor overheating, locking.
19	0	ο	0	Indoor	Indoor OA fan protection device activation for KPI or DX-KIT2 Fan	Fan motor overheating, locking.,
31	0	-	0	System	Incorrect setting of outdoor and indoor units	Outdoor/Indoor Unit capacity setting error, Indoor total ca- pacity excessively large/small
35	0	-	0	System	Indoor Unit Number Setting Error	Indoor units with the same number exist in a refrigerant piping system
70	0	0	0	Indoor	Abnormal transmission between PCB1 and PCB2	Loose, disconnected
71	0	0	0	Indoor	Incorrect PCBs setting	Wrong setting are performed in PCBs
EE	0	-	0	Compressor	Compressor protection alarm (can- not be reset from the remote con- troller)	This alarm code is displayed when the following alarms are triggered three times within six hours: 02,07,08,39,43 to 45, 47
74	-	-	-	Indoor	Remote sensor thermistor (Trem)	Loose, disconnected, broken or short-circuited connector

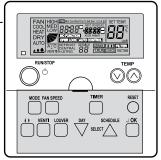
SMGB0079 rev.0 - 01/2013

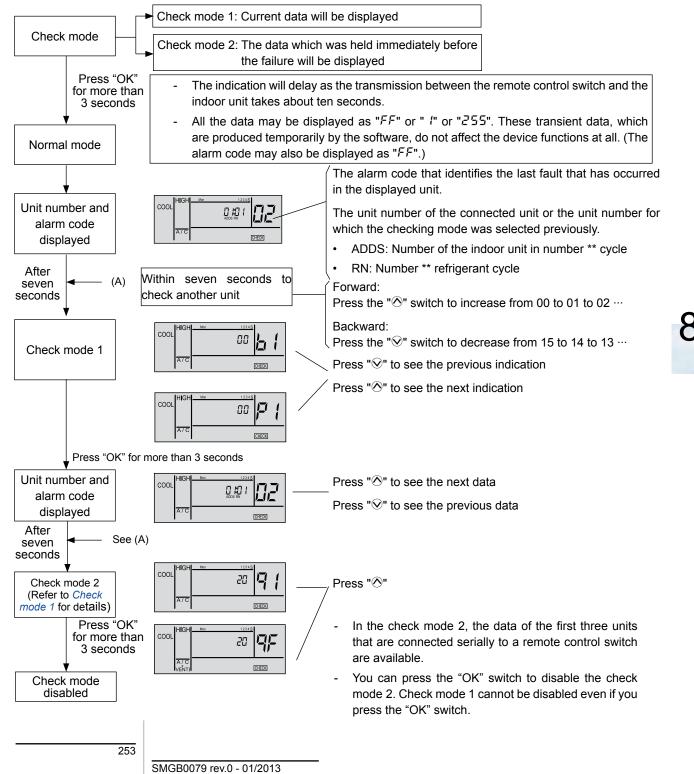
8.3 Troubleshooting in check mode

8.3.1 Troubleshooting using the remote controller PC-ART

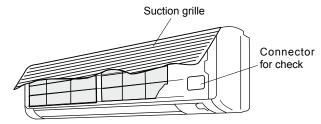
Use the "OK" switch of the remote control in the following cases:

- 1 When the RUN LED is flickering.
- 2 To trace back the cause of the malfunction after restarting from the stoppage while the RUN LED is flickering.
- **3** To check during the normal operation or during the stoppage.
- **4** To monitor the inlet air temperature and the discharge air temperature.





Although the wireless controller is used for the wall type indoor unit with the built-in receiver part, you can check the alarm code by connecting the PC-P2HTE.



i note

- The unit does not operate by pressing the operation switch.
- The above function is available only when the alarm occurs.
- The PCB check using the remote control switch is not available.
- The indication is the data when you are connecting PC-P2HTE. The indication is not the data before the alarm occurs.
- Contents of the check mode 1

The next indication is shown if you press the part " \triangle " of the TEMP switch. If you press the part " \bigtriangledown " of the TEMP switch, the previous indication is shown.

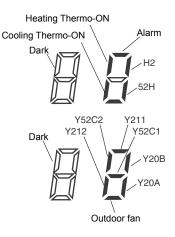
Temperature indication

		Indication of the category code Indication of the temperature, etc
1	Indoor unit temperature setting (°C)	
2	Indoor unit air inlet temperature at thermistor (°C)	Normal Temperature displayed
3	Indoor unit discharge air tempera- ture at thermistor (°C)	Abnormal (Thermistor is open-circuited or PCB is defective)
4	Indoor unit heat exchanger liquid pipe temperature (°C)	(Temperature for top of compressor)
5	Temperature at remote sensor (°C)	(Thermistor is short-circui- ted or PCB is defective)
6	Outdoor unit ambient temperature	255 or
7	Indoor unit heat exchanger gas pipe temperature (°C)	(Temperature for top of compressor)
8	Outdoor unit evaporating temperature during heating (°C)	Refer to section <i>Self-checking procedure</i> of <i>PCB</i> using the remote control switch
9	Control information	During the transient periods such as starting time and other, the indicators "" or " \square \square " may be displayed for a limited time.
10	Discharge gas temperature at the top of the compressor chamber (°C)	This is indicated only when a remote sensor is connected. The indicator "" is normally displayed. RPK series cannot connect a remote sensor. Therefore, the indicator is "".
11	Thermo temperature of the remo- te control switch	This indicates the internal information for the remote control switch. This does not have any specific meaning.
		(Ex.) During the operator of several compressors, the average

(Ex.) During the operation of several compressors, the average temperature of two compressors is indicated. If the temperature is higher than 126 °C, " lZB"

Indication of micro-computer input/output

12	Micro-computer input/output in indoor unit	
13	Micro-computer input/output in outdoor unit	<u> </u>



Indication of unit stoppage cause

- Operation OFF, power OFF
- 1 Thermo OFF (NOTE 1), activating float switch
- □ 2 Alarm (NOTE 2)
- **[]** Freeze protection, overheating protection
- []5 Instantaneous power failure at outdoor unit, reset (NOTE 3)
- **D** Instantaneous power failure at indoor unit, reset (NOTE 4)
- Outdoor temperature at cooling lower than -5°C, outdoor air 17 temperature and indoor suction temperature at heating (Overload condition), outdoor temperature at heating lower than -20°C.
- Demand, emergency stoppage (DSW 1-4 ON or forced stop)
- 11 Retry due to compression ratio decrease
- 12 Retry due to low pressure increase
- 13 Retry due to high pressure increase
- Retry due to abnormal high temperature of discharge gas, excessi-15 ve low suction pressure
- 15 Retry due to decrease of discharge gas superheat
- Retry due to inverter tripping (Instantaneous overcurrent, 17 electronic thermal acivation, current sensor abnormality)
- Retry due to inverter tripping (Inverter undervoltage, overvoltage, 18 transmission error, microcomputer reset, etc.)
- 19 Expansion valve opening change protection
- 2 1 Thermo OFF due to oil return control
- 22 Oudoor unit hot start control

NOTE 1

Explanation of term,

Thermo-ON: A condition that an indoor unit is requesting compressor to operate.

Thermo-OFF: A condition that an indoor unit is not requesting compressor to operate.





Even if stoppage is caused by "Alarm", "02" is not always indicated.



If transmission between the inverter printed circuit board and the control printed circuit board is not performed during 30 seconds, the outdoor unit is stopped.

In this case, stoppage is d1-05 cause and the alarm code "04" may be indicated.

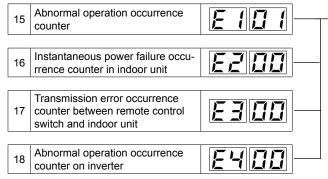


If transmission between the indoor unit and the outdoor unit is not performed during 3 minutes, indoor units are stopped.

In this case, stoppage is d1-06 cause and the alarm code "03" may be indicated.

SMGB0079 rev.0 - 01/2013

Abnormal operation occurrence counter



Indication of automatic louver condition



Compressor pressure/frequency indication

20	Discharge pressure (high) (x 0.1 MPa)	HIB	
21	Suction pressure (low) (x 0.01 MPa)	HZIY	
22	Control information		This is an indication for internal information for the remote control switch. This does not have any specific meaning
23	Operation frequency (Hz)		- This is an indication for frequency of inverter

Countable up to 99.

NOTE

switch.

Over 99 times, "99" is always displayed.

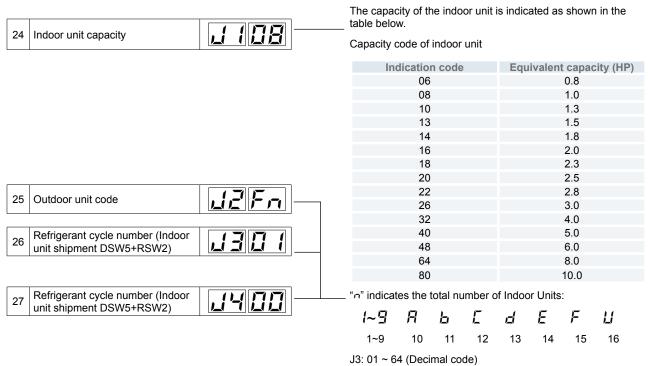
If a transmission error continues for three mi-

The memorized data can be cancelled by the method which is explained in section Self-check-

ing procedure of PCB using the remote control

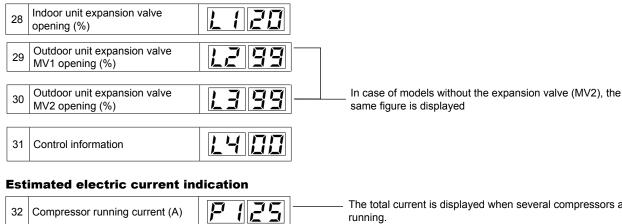
nutes, one is added to the occurrence counter.

Indoor unit capacity indication



J4: 00 ~ 3F (Hexadecimal code)

Expansion opening indication



Returns to temperature indication

The total current is displayed when several compressors are running.

In case of the inverter compressor, the running current of the primary side of the inverter is displayed.

SMGB0079 rev.0 - 01/2013

Contents of the check mode 2

When more than three indoor units are connected to one remote control switch, the latest data of only the first three indoor units that are connected serially are displayed.

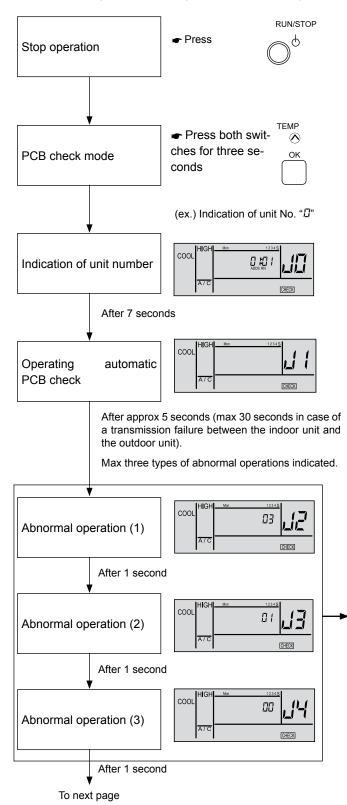
If you press the part " \odot " of the TEMP switch, the next display appears. If you press the part " \odot " of the TEMP switch, the previous display appears.

Temperature indication

		/	Indication of the category code
1	Indoor unit air inlet temperature at thermistor (°C)		Indication of the temperature, etc Corresponds to check mode 1 " bc "
2	Indoor unit discharge air tempera- ture at thermistor (°C)	9250	Corresponds to check mode 1 "占 ∃"
3	Indoor unit heat exchanger liquid pipe temperature (freeze protection) (°C)	9325	ດ້ອງການເປັນ check mode 1 "ມ່ມ"
4	Outdoor temperature (°C)	9412	Corresponds to check mode 1 " bb "
5	Indoor unit heat exchanger gas pipe temperature (°C)	7525	Corresponds to check mode 1 "b""
6	Evaporating temperature at heating (°C)	9503	Corresponds to check mode 1 " $m B$ "
7	Control information	97	Corresponds to check mode 1 "b 9"
8	Discharge gas temperature at the top of compressor chamber (°C)	7845	Corresponds to check mode 1 "占吊"
Cor	npressor pressure/frequen	cy indication	
9	Discharge pressure (high)		
5	(x 0.1 MPa)	49 (8	Corresponds to check mode 1 "H I"
10	(x 0.1 MPa) Suction pressure (low) (x 0.01 MPa)	9804	Corresponds to check mode 1 " <i>H I</i> " Corresponds to check mode 1 " <i>H Z</i> "
	Suction pressure (low)		
10	Suction pressure (low) (x 0.01 MPa) Control information		Corresponds to check mode 1 " <i>Hこ</i> "
10 11 12	Suction pressure (low) (x 0.01 MPa)	9804 9644 9544	Corresponds to check mode 1 " <i>H足</i> " Corresponds to check mode 1 " <i>H </i> ヱ"
10 11 12	Suction pressure (low) (x 0.01 MPa) Control information Operating frequency (Hz)	9804 9644 9544	Corresponds to check mode 1 " <i>H足</i> " Corresponds to check mode 1 " <i>H </i> ヱ"
10 11 12 Exp	Suction pressure (low) (x 0.01 MPa) Control information Operating frequency (Hz) Dansion opening indication Indoor unit expansion valve		Corresponds to check mode 1 " <i>H로</i> " Corresponds to check mode 1 " <i>H 로</i> " Corresponds to check mode 1 " <i>H </i> 4"
10 11 12 Exr 13 14	Suction pressure (low) (x 0.01 MPa) Control information Operating frequency (Hz) Control information Indoor unit expansion valve opening (%) Outdoor unit expansion valve mv1	9804 9644 9644 96420 9639	Corresponds to check mode 1 " $H a$ " Corresponds to check mode 1 " $H a$ " Corresponds to check mode 1 " $H 4$ " Corresponds to check mode 1 " $L t$ "

• Self-checking procedure of PCB by means of the Remote Control Switch

Use the following troubleshooting procedure for testing the PCB in the indoor unit and the outdoor unit:

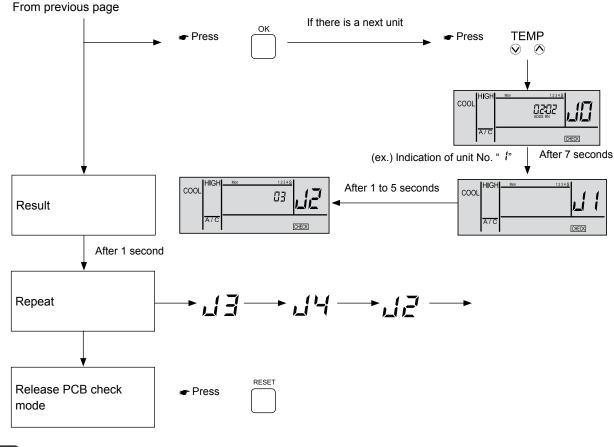


RUNSTOP		
Indi- cation	Contents	
00	Normal	
Abnorma	ity (open-circuit, short-circuit, etc.) in circuit for	
D (Air inlet temperature thermistor	
82	Discharge air temperature thermistor	
03	Liquid pipe temperature thermistor	
04	Remote thermistor abnormality	Indoor unit PCB
05	Gas pipe temperature thermistor	nit F
05	Remote sensor	or ui
08	Transmission of central station	popi
0R	EEPROM	-
ОЬ	Zero cross input failure	
EE	Transmission of indoor units during this checking operation	
רם	Transmission of outdoor unit	
FЧ	Internal thermostat fan input failure	
FS	PSW input failure	
F5	PSH protection signal detection circuit	0
F7	Phase detection	PCI
F8	Transmission of inverter	unit
FR	High-pressure sensor	oor I
FЬ	Compressor discharge gas temperature thermistor	Outdoor unit PCB
FE	Low-pressure sensor	
Fd	Heat exchanger evaporation temperature thermistor	
FF	Ambient air temperature thermistor	

If you are using a wireless remote control switch with the built-in receiver part of the wall-type indoor unit and you need to perform the above checking, perform the following procedure:

- 1 Turn OFF the power supply.
- **2** Disconnect the connector (CN25) on PWB(M).
- 3 Connect the PC-ART.
- 4 Turn ON the power supply.

After finishing the checking, turn OFF the power supply again and reconnect the connectors according to the previous situation before the checking.



i) note

• If this indication continues and the alarm code "u {" is not displayed, this means that each one of indoor unit is not connected to the remote control switch. Check the wiring between the remote control switch and the indoor unit.

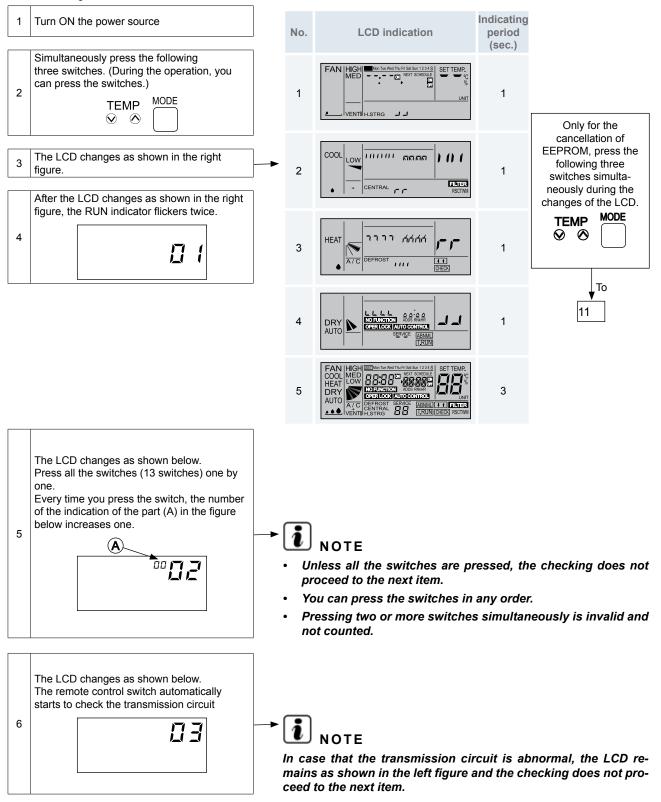


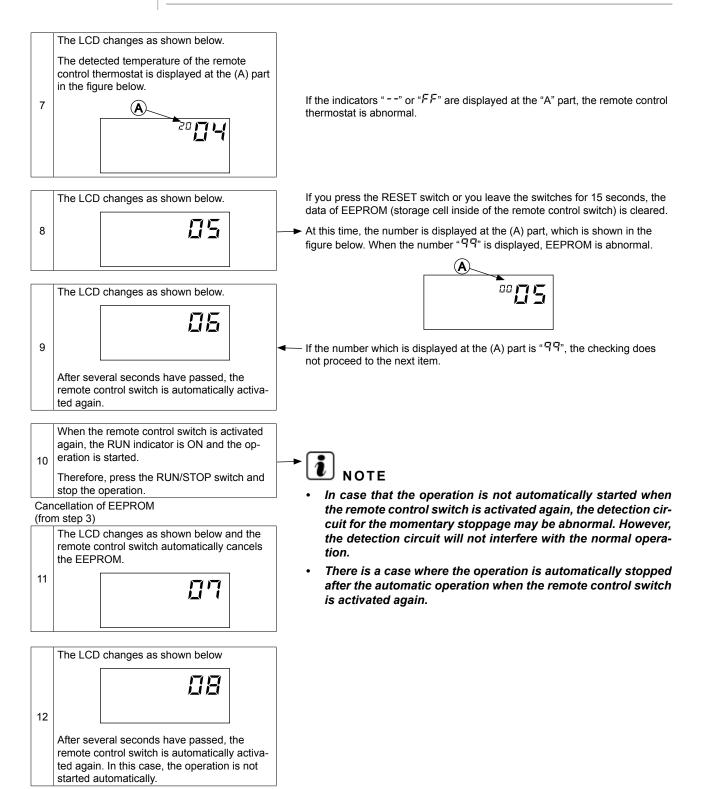
- In this troubleshooting procedure, checking of the following parts of the PCB is not available.
 PCB in indoor unit: relay circuit, DIP switch, option circuit, fan circuit, protection circuit.
 PCB in outdoor unit: relay circuit, DIP switch, option circuit.
- If this troubleshooting is performed in the system using the central station, the indication of the central station may change during this procedure. However, this is not abnormal.
- After this troubleshooting, the memory of the abnormal operation occurrence counter, which was described before, will be deleted.

Self-checking procedure of the remote control switch

Cases where the OK switch is used:

- 1 If the remote control switch displays a malfunction.
- 2 For the regular maintenance check.





262

SMGB0079 rev.0 - 01/2013

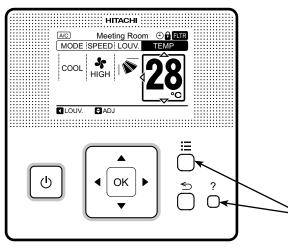
8.3.2 Troubleshooting using the remote controller PC-ARF

Each "Check Menu" item and its function are explained in the following table.

Check Menu Item	Function
Check 1	Sensor condition of air conditioner will be monitored and indicated.
Check 2	Sensor data of air conditioner prior to alarm occurrence will be indicated.
Alarm History Display	Previous alarm record (date, time, alarm code) will be indicated.
Model Display	Model name and manufacturing number will be indicated.
I.U./O.U. PCB Check	The result of PCB check will be indicated.
Self Checking	Checking of remote control switch will be carried out.

Normal mode display

Check menu display



Check Menu	
Check 1	
Check 2	01
Alarm History Display] /
Model Display	02
^I Function 5] 🗸
SEL. OK ENT. S	RTN.

Press and hold "∷" (menu) and "?" (help) simultaneously for 3 seconds during the normal mode.

• Contents of the check mode 1 and 2

(1) Press and hold "Ξ" (menu) and "?" (help) simultaneously for 3 seconds during the normal mode.The check menu is displayed.

(2) Select "Check 1" (or "Check 2") from the check menu and press "OK".

(3) Select the set indoor unit by pressing " $\Delta \nabla \triangleleft \triangleright$ " and press "OK". (This screen is NOT displayed when the number of indoor units connected with the remote control switch is 1 (one). In this case, (4) will be displayed.)

Check Menu	
Check 1	
Check 2	01
Alarm History Display] /
Model Display	02
^{III} Function 5] 🗸
SEL. OK ENT. S	RTN.

Check 1			
01-01	02-01	03-01	04-01
01-02	02-02	03-02	04-02
01-03	02-03	03-03	04-03
01-04	02-04	03-04	04-04
SEL.		OK ENT	. 🕤 RTN.

Check 1:01-03 Item Value b1 22 01 20 b2 b3 55 07 b4 20 b5 25 • Next Page S RTN.

263

(4) Press " Δ " or " ∇ " to change the screen.

Check mode 1 items

No.	Item	Data Name	No.	Item	Data Name
1	b1	Set Temp.	18	E3	Times of Abnormal Transmitting
2	b2	Inlet Air Temp.	19	E4	Times of Inverter Tripping
3	b3	Discharge Air Temp.	20	F1	Louver Sensor State
4	b4	Liquid Pipe Temp.	21	H1	Discharge Pressure
5	b5	Remote Thermistor Temp.	22	H2	Suction Pressure
6	b6	Outdoor Air Temp.	23	H3	Control Information
7	b7	Gas Pipe Temp.	24	H4	Operating Frequency
8	b8	Evaporating Temp. at Heating	25	J1	I.U. Capacity
9	b9	Condensing Temp. at Cooling	26	J2	O.U. Code
10	bA	Comp. Top Temp.	27	J3	Refrigerant Cycle Number (1)
11	bb	Thermo Temp. of Remote Control Switch	28	J4	Refrigerant Cycle Number (2)
12	bC	Not Prepared	29	L1	I.U. Expansion Valve
13	C1	I.U. Micro-Computer	30	L2	O.U. Expansion Valve 1
14	C2	O.U. Micro-Computer	31	L3	O.U. Expansion Valve 2
15	d1	Stopping Cause State Indication	32	L4	O.U. Expansion Valve B
16	E1	Times of Abnormality	33	P1	Comp. Current
17	E2	Times of Power Failure	34	q1	Motion Sensor Reaction Rate (0 ~ 100%)

Check mode 2 items

No.	Item	Data Name
1	q1	Inlet Air Temp.
2	q2	Discharge Air Temp.
3	q3	Liquid Pipe Temp.
4	q4	Outdoor Air Temp.
5	q5	Gas Pipe Temp.
6	q6	Evaporating Temp. at Heating
7	q7	Condensing Temp. at Cooling
8	q 8	Comp. Top Temp.

No.	Item	Data Name
9	q9	Discharge Pressure
10	qA	Suction Pressure
11	qb	Control Information
12	qC	Operating Frequency
13	qd	I.U. Expansion Valve
14	qE	O.U. Expansion Valve 1
15	qF	Comp. Current

Checking procedure of PCB by means of the Remote Control Switch ٠

 (1) Press and hold ":=" (menu) and "?" (help) simultaneously for 3 seconds during the normal mode. The check menu is displayed. (2) Select "I.U./O.U. PCB Check" from the check menu and press "OK". 	Check Menu I. U./O. U. PCB Check Self Checking 02 / 02 EXAMPLE SEL.
(3) Select the set indoor unit by pressing " $\Delta \nabla \lhd \triangleright$ " and press "OK". (This screen is NOT displayed when the number of indo- or units connected with the remote control switch is 1 (one). In this case, (4) will be displayed.)	I.U./O.U. PCB Check 01-01 02-01 03-01 04-01 01-02 02-02 03-02 04-02 01-03 02-03 03-03 04-03 01-04 02-04 03-04 04-04
 (4) The indoor unit PCB and the outdoor unit PCB checks are started. * If ":=" (menu) is pressed during the check, the check is canceled and the screen will return to (2). * If ":>" (return) is pressed during the check, the check is canceled and the screen will return to (3). 	I.U./O.U. PCB: Check 01-01 Check 1: Checking Check 2: Checking Check 3: Checking
(5) After completing the check, the result of PCB check will be indicated. Press "≦" (return) and return to (3).	I.U./O.U. PCB: Check 01-01 Check 1: 00 Check 2: 00 Check 3: 00

Result of check table

Indoor	Unit PCB	
ILIUUUU		

DD Normal

- 1 Abnormality of Inlet Air Temp. Thermistor
- 22 Abnormality of Outlet Air Temp. Thermistor
- **D3** Abnormality of Liquid Pipe Temp. Thermistor
- **D**4 Abnormality of Remote Thermistor
- **D5** Abnormality of Gas Pipe Temp. Thermistor
- 1 Abnormality of Transmission of Central Station
- □ B Abnormality of EEPROM
- DR Zero Cross Input Failure
- **D** Abnormality of Transmission of I.U. during Check

Outdoor Unit PCB

- **DD** Normal
- **U**7 Abnormality of Transmission of Outdoor Unit
- FY ITO Input Failure
- F5 PSH Input Failure
- FE Abnormality of Protection Signal Detection Circuit
- F7 Abnormality of Phase Detection
- FB Abnormality of Transmission of Inverter
- FR Abnormality of High Pressure Sensor
- Fb Abnormality of Comp. Discharge Gas Temp. Thermistor
- FC Abnormality of Low Pressure Sensor
- Fd Abnormality of Evaporating Temp. Thermistor at Heating
- FF Abnormality of Ambient Air Temp. Thermistor

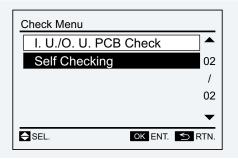
Self-checking procedure of PCB by means of the Remote Control Switch

The self checking performs to check the remote control switch and to clear EEPROM (storage cell inside of the remote control switch).

(1) Press and hold "Ξ" (menu) and "?" (help) simultaneously for 3 seconds during the normal mode (when unit is not operated).

The check menu is displayed.

(2) Select "Self Checking" from the check menu and press "OK".

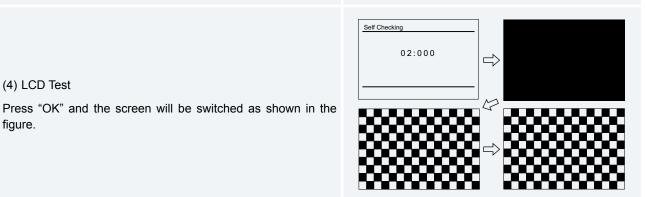


Self Checkin	9
	01:000
P-3400 ARF-8Y050	2008.11.06 12:34

*To clear EEPROM, press " ∇ " and "?" (help) simultaneously.

(3) Select the process for "Self Checking". *To start self check, press "?" (help).

See EEPROM clear process (15) (next page).



(5) Backlight Test

(4) LCD Test

figure.

LCD brightness changes gradually by pressing "OK".

(6) Contrast Test

Contrast of the LCD gradually changes by pressing "OK".

(7) Run Indicator Test

Press "OK" and the run indicator will flash in red and green twice for each.

(8) Switch Input Test

Press the 9 switches one by one. The number indicated with " (A)" will be counted up as switch being pressed.

* The order of pressing switch is at random.

Do not press more than 1 (one) button, for it will not be counted.

SMGB0079 rev.0 - 01/2013

Self Checking
03:000

Self Checking	
00.000	
06:000	

9) No Function This function is not used.	Self Checking
Press "OK" to proceed.	07:000
(10) Transmission Circuit Test The remote control switch automatically starts to check the transmission circuit.	
(11) Remote Control Switch Thermistor Test The temperature detected by remote control switch thermistor is displayed at " ^(A) " in the right figure.	Self Checking 09:025
(12) Date/Time Test The date and time is switched from "2012.03.04 12:34" to "2008. 01. 01 00:00".	Self Checking 10:000 2008.01.01 00:00
(13) EEPROM Test	
< EEPROM Clearing Cancel >	Self Checking
Press "?" (help).	
< EEPROM Clear > Press "OK" or wait 15 seconds. EEPROM data will be cleared. During the process, the numbers will be indicated on where "A	11:000
" is located.	
If $^{(A)}$ indicates "999", EEPROM is in a faulty condition.	
*In case " (A) " indicates "999", the process does not proceed to next step.	
(14) After the several seconds pass, the self checking is completed	I and the remote control switch automatically res

EEPROM process

(15) Clear EEPROM The remote control switch will automatically start EEPROM clearing process.

(16) After the several seconds pass, the self checking is completed and the remote control switch automatically restarts.

8

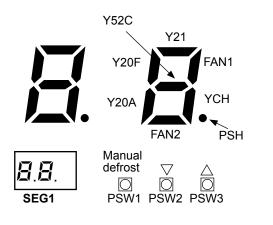
8.3.3 Troubleshooting using the 7 segment display

Simple checking by 7-segment display

1	Turn ON indoor unit connected to the outdoor unit	During auto-addressing, the following items can be checked using the outdoor unit's on-board 7-segment LED display:
2	Turn ON the outdoor unit	 Disconnection of power supply to the indoor unit. Reverse connection of the operating line between the outdoor and indoor units.
3	Auto-addressing starts	3 Duplication of indoor unit number.

Checking method by 7-segment display

Operating conditions and each part of refrigeration cycle can be checked by 7-segment and push switches (PSW) on the PCB in the outdoor unit. During checking data, do not touch the electric parts except for the indicated switches because 220-240V is applied to them. Pay attention not to contact the tools with electrical parts. If contacted, electrical parts will be damaged.



- To start checking, press PSW2 switch for more than three seconds.
- To proceed checking, press the PSW2 switch.
- To back to the previous item, press the PSW3 switch.
- To cancel this checking, press the PSW2 switch for more than 3 seconds.

Check mode items

RAS-(2-2.5)HVNP / RAS-3HVNP

	Item			Indication data			
Item	Check No.	In- dic.	In- dic.	Contents			
Input/output state of outdoor micro- computer	01	50	ā	Indicates only for the segments corresponding to the equipment in the figure. (See figure above)			
Capacity of operating indoor unit	02	٥P	11	00~199 In case that capacity is higher than 100, the last two digits flash			
Inverter order frequency to compressor	03	HI	74	0~115 (Hz) In case that frequency is higher than 100Hz, the last two digits flicker			
Indoor order frequency to compressor	04	НZ	74	0~115 (Hz) In case that frequency is higher than 100Hz, last two digits flicker			
Air flow ratio	05	Fo	80	00∼100 (%) In case that air flow ratio is 100%, "♫♫" flashes			
Outdoor unit expansion valve opening	06	Eo	30	00~100 (%) In case that expansion valve	e opening is 100%, "🖽" flashes		
Temperature at the top of compressor	07	Гd	02	00~142 (°C) In case that temperature is high	gher than 100°C, the last two digits flash		
Evaporating temperature at heating	08	ΓE	-12	-19~80°C			
Ambient air temperature	09	Γœ	- 3	-19~80°C			
Control PCB information	10	ΓF	20	Internal information of the PCB			
Control PCB information	11	R (12	Internal information of the PCB			
Inverter secondary current	12	82	20	00~199 (A) In case that current is higher t	han 100°C, the last two digits flash		
Outdoor unit address	13	nΠ	00	00~63	In case of twin/triple/guad-type unit,		
Indoor unit expansion valve opening	14	ER	20	00~100 (%) In case that opening is 100%. "印印" flashes	the information of 2nd to the 4th indo- or units is indicated repeatedly.		
Liquid pipe temperature of indoor unit (freeze protection)	15	LR	05	-19~127 (°C)	The right character of the indication represents the indoor unit setting No.		
Indoor unit intake air temperature	16	R,	28	-19~127 (°C)	Single: A Twin: A, b		
Indoor unit discharge air temperature	17	ρR	20	-19~127 (°C)	Triple: A, b, c		
Cause of indoor unit stoppage	18	dЯ	80	(See table at the next page)	Quad: A, b, c, d		
Accumulated Operating Time of Compressor	19	ដា	00	0 to 9,999 (x 10 hours) Alternately upper 2 digits an 0.5 sec.	d lower 2 digits are indicated every		
Accumulated Operating Time of Compressor	20	сЦ	00	0 to 9,999 (x 10 hours) Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.			
Alarm code for abnormal stoppage of compressor	21	RE	08	Alarm code on compressor			
Cause of stoppage at inverter	22	ď	1	(See table at the next page)			
Abnormal data record	23	n l	00	One of the abnormal data record from latest (n1) to oldest (n9) is indicated. Alarm code or cause code is indicated.			
Total capacity of indoor unit connected	24	[P	22	00~96 In case that capacity is higher than 100, the last two digits flash			
Connected indoor unit number	25	RR	Z	00~64			
Refrigerant adress	26	6A	Π	00~63			

HITACHI Inspire the Next

RAS-(3-12)H(V)NP(E)

	Item			Indica	tion data		
Item	Check No.	In- dic.	In- dic.	Contents			
Input/output state of outdoor micro- computer	01	50	ā	Indicates only for the segments corresponding to the equipment in the figure. (See figure above)			
Capacity of operating indoor unit	02	٥P	11	00~199 In case that capacity is higher than 100, the last two digits flash			
Control software No.	03	5 <i>P</i>	11	Control Software No. in use is indicated. Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.			
Inverter software No.	04	ď	11	Control Software No. in use and lower 2 digits are indicated	is indicated. Alternately upper 2 digits ted every 0.5 sec.		
Inverter order frequency to compressor	05	H I	74	0~115 (Hz) In case that frequency is high	ner than 100Hz, the last two digits flicker		
Air flow ratio	06	Fa	80	00~15			
Outdoor unit expansion valve opening	07	Eo	30	00~100 (%) In case that expansion valve	opening is 100%, "🖽" flashes		
Discharge pressure (high)	08	Pd	ЗD	0.1 to 4.9 MPa			
Temperature at the top of compressor	09	Гd	02	00~142 (°C) In case that temperature is hig	gher than 100°C, the last two digits flash		
Evaporating temperature at heating	10	ΓE	-12	-19~80°C			
Ambient air temperature	11	Γo	- 3	-19~80°C			
Inverter fin temperature	12	ΓF	20	-10~100 (°C) In case that temperature is 1	:) temperature is 100%, " 日日 " flashes		
Inverter firstly current	13	R (12	00~199 (A) In case that current is higher t	rrent is higher than 100°C, the last two digits flash		
Inverter secondary current	14	82	20	00~199 (A) In case that current is higher t	nan 100°C, the last two digits flash		
Outdoor unit address	15	лЯ	00	00~63	In case of twin/triple/quad-type unit,		
Indoor unit expansion valve opening	16	ER	20	00~100 (%) In case that opening is 100%. "대미" flashes	the information of 2nd to the 4th indo- or units is indicated repeatedly.		
Liquid pipe temperature of indoor unit (freeze protection)	17	LR	05	-19~127 (°C)	The right character of the indication represents the indoor unit setting No.		
Indoor unit intake air temperature	18	R,	28	-19~127 (°C)	Single: A Twin: A, b		
Indoor unit discharge air temperature	19	ρŔ	20	-19~127 (°C)	Triple: Á, b, c		
Cause of indoor unit stoppage	20	dЯ	05	(See table at the next page)	Quad: A, b, c, d		
Accumulated Operating Time of Com- pressor	21	ЦЛ	00	0 to 9,999 (x 10 hours) Alternately upper 2 digits an 0.5 sec.	d lower 2 digits are indicated every		
Accumulated Operating Time of Com- pressor	22	сIJ	00	0 to 9,999 (x 10 hours) Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.			
Alarm code for abnormal stoppage of compressor	23	RE	08	Alarm code on compressor			
Cause of stoppage at inverter	24	ď	1	(See table at the next page)			
Abnormal data record	25	n l	00	One of the abnormal data record from latest (n1) to oldest (n9) is indicated. Alarm code or cause code is indicated.			
Total capacity of indoor unit connected	26	[P	22	00~199 In case that capacity is higher than 100, the last two digits flash			
Connected indoor unit number	27	RR	2	00~64			
Refrigerant adress	28	6A		00~63			

RAS-(4-12)H(V)NC(E)

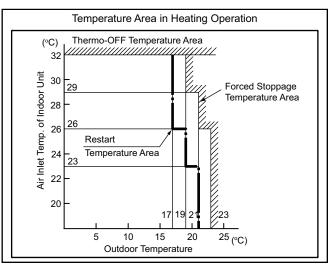
	Item		Indication data				
Item	Check No.	In- dic.	In- dic.		Contents		
Input/output state of outdoor micro- computer	01	50	ā	Indicates only for the segments corresponding to the equipment in the figure. (See figure above)			
Capacity of operating indoor unit	02	٥P	11	00~199 In case that capacity is higher than 100, the last two digits flash			
Control software No.	03	5 <i>P</i>	11	Control Software No. in use is indicated. Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.			
Inverter software No.	04	ď	11	Control Software No. in use is indicated. Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.			
Inverter order frequency to compressor	05	HI	74	0~115 (Hz) In case that frequency is higher than 100Hz, the last two digits flicker			
Air flow ratio	06	Fa	80	00~15			
Outdoor unit expansion valve opening	07	Eo	30	-	opening is 100%, "🖬 🛱" flashes		
Temperature at the top of compressor	08	Гd	82	00~142 (°C) In case that temperature is hig	gher than 100°C, the last two digits flash		
Evaporating temperature at heating	09	ΓE	-12	-19~80°C			
Ambient air temperature	10	Γa	- 3	-19~80°C			
Condensing temperature	11	ΓΕ	-1[]	-19~80°C			
Inverter fin temperature	12	ΓF	20	-10~100 (°C) In case that temperature is 1	00%, " □□ " flashes		
Inverter firstly current	13	R (12	00~199 (A) In case that current is higher than 100°C, the last two digits flash			
Inverter secondary current	14	82	20	00~199 (A) In case that current is higher t	.) at current is higher than 100°C, the last two digits flash		
Outdoor unit address	15	nΆ	00	00~63	In case of twin/triple/guad-type unit,		
Indoor unit expansion valve opening	16	ER	20	00~100 (%) In case that opening is 100%. "🗗 🛱 " flashes	the information of 2nd to the 4th indo- or units is indicated repeatedly.		
Liquid pipe temperature of indoor unit (freeze protection)	17	LR	05	-19~127 (°C)	The right character of the indication represents the indoor unit setting No.		
Indoor unit intake air temperature	18	R,	28	-19~127 (°C)	Single: A Twin: A, b		
Indoor unit discharge air temperature	19	οŔ	20	-19~127 (°C)	Triple: A, b, c		
Cause of indoor unit stoppage	20	dЯ	05	(See table at the next page)	Quad: A, b, c, d		
Accumulated Operating Time of Com- pressor	21	ដា	00	0 to 9,999 (x 10 hours) Alternately upper 2 digits an 0.5 sec.	d lower 2 digits are indicated every		
Accumulated Operating Time of Com- pressor	22	сЦ	00	0 to 9,999 (x 10 hours) Alternately upper 2 digits and lower 2 digits are indicated every 0.5 sec.			
Alarm code for abnormal stoppage of compressor	23	RE	08	Alarm code on compressor			
Cause of stoppage at inverter	24	ď	1	(See table at the next page)			
Abnormal data record	25	n l	00	One of the abnormal data record from latest (n1) to oldest (n9) is indicated. Alarm code or cause code is indicated.			
Total capacity of indoor unit connected	26	EP	22	00~199 In case that capacity is higher than 100, the last two digits flash			
Connected indoor unit number	27	RR	Z	00~64			
Refrigerant adress	28	6A		00~63			

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• Cause of indoor unit stoppage $(a_{i}^{l})^{l}$						
Indication	Contents					
00	Operation OFF, Power OFF					
01	Thermo-OFF					
02	Alarm					
ΒIJ	Freeze protection overheating protection					
05	Instantaneous power failure at outdoor unit					
06	Instantaneous power failure at indoor unit					
07	Stoppage of heating operation due to high outdoor air temperature					
10	Demand thermo OFF					
EI	Retry for Pd increase prevention					
15	Vacuum/discharge gas temperature increase retry					
15	Retry due to discharge gas SUPERHEAT decrease					
ריו	IPM error retry, instantaneous over current of in- verter retry, electronic thermal activation of inverter retry, abnormal current sensor of inverter retry					
(8	Retry due to inverter voltage decrease Retry due to Inverter Overvoltage Retry due to inverter transmission abnormality					
19	Other retry					
21	Forced Thermo-OFF					
22	Outdoor hot start control					
24	Thermo-OFF during energy saving operation mode					
25	Retry due to high pressure decrease					
28	Cooling air discharge temperature decrease					
33	Forced Thermo-OFF					
34	Forced Thermo-OFF					

<u>, 10</u>, 14 - 4 - - - - -

Demand thermo OFF:



NOTE

35

- The cause code for indoor unit stoppage is not always "[]?" (Alarm) during stoppage by the abnormality. If the unit is under Thermo-OFF by other cause of stoppage before "[]?" (Alarm) occurs, the previous cause code for indoor unit stoppage remains.
- When the transmitting between the inverter PCB and the outdoor unit PCB1 is disconnected for 30 seconds, the outdoor micro-computer will be reset. Accordingly when the alarm code ""," (Abnormal Transmitting between Inverter PCB and Outdoor Unit PCB1) occurs, the cause code for indoor unit stoppage may be indicated "05".
- When the transmitting between the indoor unit and the outdoor unit is disconnected for 3 minutes, the indoor micro-computer will be reset. Accordingly when the alarm code "[]] (Abnormal Transmitting between Indoor Unit and Outdoor Unit) occurs, the cause code for indoor unit stoppage may be indicated " $\Box 5$ ".
- For twin, triple and quad combination, if the cause code for indoor unit stoppage " \mathcal{Z} " is indicated, check the cause of stoppage for other indoor units.
- Cause code for indoor unit stoppage "22" is indicated when it is forced thermo-OFF during compressor preheating for RAS-12HN(P/C) models.

SMGB0079 rev.0 - 01/2013

Retry due to abnormal operating mode

(Reversing valve switching failure)

Cancellation of Forced Thermo OFF (\vec{L}^{\prime})

Turn ON the power source and wait for more than 30 seconds. Then press PSW1 and PSW3 simultaneously for more than 3 seconds.

Forced thermo-OFF (indoor unit error code 21) will be cancelled.

However, this function may damage the compressor, use only on inevitable occasion.

- · In case of using the remote control switch (PC-ART), the cancellation is also available with it.
- When "Operation Lock" indication flashes on the remote control LCD, press FAN SPEED and LOUVER switches simultaneously for more than 3 seconds.
- "Operation Lock" Indication is disappeared and operation is available.

• Cause of inverter stoppage $(\vec{z}' \vec{z}')$

		Cause of Stoppage	Remark		
Code	Cause	for Corresponding Unit	Indication during Retry	Alarm Code	
	Automatic Stoppage of Transistor Module				
1	(DIP-IPM Error)	ריו	РIJ	53	
_	(Overcurrent, Undercurrent, Temperature increase)	_			
2	Instantaneous Over Current	ריו	РЛ	48	
Э	Abnormal Inverter Fin Thermistor	ריו	P7	54	
Ч	Electronic Thermal Activation (Inverter overcurrent)	ריו	P7	48	
5	Inverter Voltage Decrease (Undervoltage)	(8	P8	06	
5	Over Voltage	(8	P8	06	
7	Abnormal Inverter Transmission	(8	-	-	
8	Abnormal Current Detection	ריו	P7	51	
9	Instantaneous Power Failure Detection	(8	-	-	
11	Reset of Micro-Computer for Inverter	18	-	-	
12	Earth Fault Detection from Compressor (Only Starting)	ריו	рŋ	53	
(Β	Phase detection abnormality	(8	P8	-	
14	Inverter Non-Operation	(8	-	55	
15	Inverter Non-Operation	18	-	55	
15	Inverter Non-Operation	(8	-	55	
ריו	Communication Abnormality	(8	-	55	
18	Protection Device Activation (PSH)	-	-	02	
19	Protection Detection Device Abnormality	-	-	38	
20	Early Return Protection Device	(8	РIJ	53	
21	Step-Out Detection	ריו	-	3 (

Table of capacity codes of indoor unit

Code	Equivalent horsepower	Code	Equivalent horsepower	Code	Equivalent horsepower
06	0.8	ſЧ	2.0	40	5.0
08	1.0	15	2.3	48	6.0
ID	1.3	18	2.5	<u>Б</u> Ч	8.0
11	1.5	22	3.0	80	10.0
13	1.8	32	4.0		

- Protection control code on 7-segment display
- 1 Protection control code is displayed on 7-segment when a protection control is activated.
- 2 Protection control code is displayed while function is working, and goes out when released.
- **3** When several protection control are activated, code number with higher priority will be indicated (see below for the priority order).
 - a. Higher priority is given to protection control related to frequency control than the other. Priority order:
 - High-pressure increase protection
 - Over current protection
 - Cold draft protection
 - **b.** In relation to retry control, the latest retrial will be indicated unless a protection control related to frequency control is indicated.

RAS-(2-2.5)HVNP / RAS-3HVNC

Priority	Protection control	Code
1	Low-Pressure Ratio Control at Cooling Operation	POO
2	High-pressure ratio control at heating operation	PO I
3	High-pressure rise protection	POZ
4	Current protection	PDB
5	Inverter fin temperature rise prevention	РДЧ
6	Discharge gas temperature rise protection	POS
7	Unbalance Power Source Detecting	P09
8	Demand current control	PDR
9	Low-Pressure Decrease Protection	РОЬ

RAS-(3-12)H(V)N(P/C)(E)

Priority	Protection control	Code
1	Pressure ratio control	PO I
2	High-pressure rise protection	POZ
3	Current protection	PDB
4	Inverter fin temperature rise prevention	POY
5	Discharge gas temperature rise protection	POS
6	Demand current control (running current limit control)	POR
7	High pressure decrease protection (only Premium series)	P09

i) note

The protection control code being indicated on 7-segment display is changed to an alarm code when the abnormal operation occurs. Also, the same alarm code is indicated on the remote control switch.

Activating condition of protection control code

To monitor the conditions such as the temperature change and others, the control of the frequency and other controls are performed by the protection control in order to prevent the abnormal operations. The activating conditions of protection control are shown in the table below:

RAS-(2-2.5)HVNP / RAS-3HVNC

Code	Protection Control	Activating Condition	Remarks
PD	Low-Pressure Ratio Control at Cooling Operation	If Compression Ratio ε exceeds a threshold value => Frequency Increase	-
P (High-Pressure Ratio Control at Heating Operation	If Compression Ratio ε is lower than a threshold value => Frequency Decrease	-
P2	High-Pressure Increase Protection	High Pressure Switch for Control is activated => Frequency Decrease	-
PЭ	Over Current Protection	Inverter Output Current > (*1)A => Frequency Decrease	-
РЧ	Inverter Temperature Increase Protection	Inverter Fin Temperature RAS-(2-2.5)HVNP / RAS-3HVNC ≥ 70 °C => Frequency Decrease	-
PS	Discharge Gas Temperature Increase Protection	Temperature at the top of compressor is high => Frequency Decrease	-
Pq	Unbalance Power Source Detecting	Inverter Output Current exceeds a threshold value => Frequency Decrease	-
PR	Current Demand Control	Inverter Output Current exceeds a threshold value => Frequency Decrease	In case of Demand Control Setting
РЬ	Low-Pressure Decrease Protection	Low Pressure Switch for Control is activated. => Frequency Decrease	-

(1*)

Connection		220-240V	
HP	2	2.5	3
Current (A)	8.0	8.0	10.5

RAS-(3-12)H(V)N(P/C)(E)

Code	Protection control	Activating condition	Remarks
P0 (Pressure ratio control	Compression ratio $\epsilon \ge 7.5 \Rightarrow$ frequency decrease Compression ratio $\epsilon \le 1.6 \Rightarrow$ frequency increase	ε = (Pd+0.1)/(Ps+0.1)
PD2	High-pressure increase protection	High Pressure Switch for Control is activated => Frequency Decrease	
PD3	Inverter current protection	If Inverter PCB secondary current > (*1)A => frequency decrease	
РОЧ	Inverter fin temperature increase prevention	Inverter fin temperature RAS-3HVNPE / RAS-(4-6)HN(P/C)E \geq 70 °C RAS-(4-6)HVNPE \geq 80 °C RAS-(4-6)HVNCE \geq 87 °C RAS-(8-12)HN(P/C)(E) \geq 82 °C => frequency decrease	
POS	Discharge gas temperature increase protection	Temperature at the top of compressor is high => frequency decrease (Maximum temperature is different depending on the frequency) Temperature at the top of compressor > 107 °C => Indicate P5	
P09	High-pressure decrease protection	Discharge pressure of compressor decrease under 10MPa => Frequency increase	Cooling operation and lowest step fan or heating operation
PDR	Demand current control (running current limit control)	Compressor run current ≥ demand setting value => frequency decrease	Demand setting value: upper limit of total running current is set to 100%, 80%, 70%, 60% at normal operation using input on PCB1

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Ps: Suction pressure of compressor (MPa)

Pd: Discharge pressure of compressor (MPa)

(1*)

Connection	380-415V				220-240V					
HP	4	5	6	8	10	12	3	4	5	6
Current (A)	12.0	12.0	12.0	17.5	19.0	20.0	16.0	16.0	24.0	24.0

inote

- During protection control (except during alarm stoppage), the protection control code is indicated.
- The protection control code is indicated during protection control and turns off when cancelling the protection control.
- After retry control, the condition of monitoring is continued for 30 minutes.

8.4 Checking procedure for main parts

8.4.1 Procedure for checking the DIP-IPM inverter for indoor and outdoor units

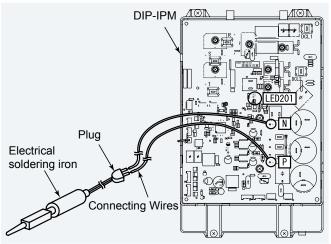
RAS-(3-6)H(V)N(P/C)E

High voltage discharge work for replacing parts

A CAUTION

Electrical hazard. Risk of electrical shock. Perform this high voltage discharge work to avoid an electric shock.

- 1 Turn OFF the main switches and wait for three minutes. Make sure that no high voltage exists. If LED201 is ON after start-up and LED201 is OFF after turning OFF power source, the voltage will decrease lower than DC50V.
- 2 Connect connecting wires to an electrical soldering iron
- 3 Connect the wires to terminals, P and N on DIP-IPM. (The discharge voltage can perform even when connecting the wires to terminals #1(P) and #3(N) of connector "PCN201") => Discharging is started, resulting in hot soldering iron. Pay attention not to shortcircuit between terminal P(+) and N(-)
- 4 Wait for 2 or 3 minutes and measure the voltage once again. Check to ensure that no voltage is charged.



Inverter module checking procedure

Rectifier circuit of inverter PCB

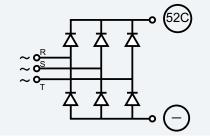
Internal circuit of rectified part of DIP-IPM

Remove all the terminals of the inverter PCB before checking.

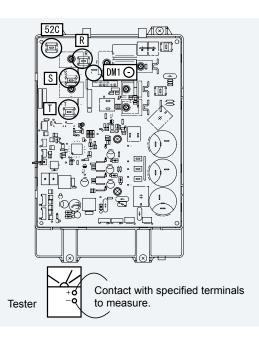
Non-faulty if [1] - [8] are checked and satisfied.

Measure with 1 k Ω range of a tester.

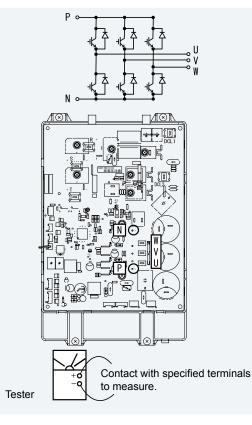




- 1 Touch [+] side of the tester to DIP-IPM 52C terminal, and [-] side to DIP-IPM R, S and T terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater.
- 2 Contrary to [1], touch [-] side of the tester to DIP-IPM 52C terminal, and [+] side to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 100 k Ω or greater.
- 3 Touch [-] side of the tester to [-] side of DIP-IPM DMI (soldered part), and [+] side of the tester to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 1 k Ω or greater
- 4 Contrary to [3], touch [+] side of the tester to [-] side of DIP-IPM DMI, and [-] side of the tester to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 100 kΩ or greater.



- 5 Touch [+] side of the tester to [P] of DIP-IPM (soldered part), and [-] side to DIP-IPM U, V, W terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater.
- 6 Contrary to [5], touch [-] side of the tester to [P] of DIP-IPM (soldered part), and [+] side to DIP-IPM U, V, W terminals to measure the resistance. Normal if all three terminals have 30 kΩ or greater. (Resistance gradually increases during measurement.)
- 7 Touch [-] side of the tester to [N] of ISPM (soldered part), and [+] side to ISPM U, V, W terminals to measure the resistance. Normal if all three terminals have 1 k Ω or greater.
- 8 Contrary to [7], touch [+] side of the tester to [N] of-DIP-IPM (soldered part), and [-] side to DIP-IPM U, V, W terminals to measure the resistance. Normal if all three terminals have 30 kΩ or greater. (Resistance gradually increases during measurement.)



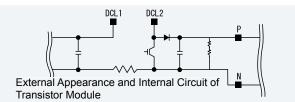
ACT circuit of inverter PCB

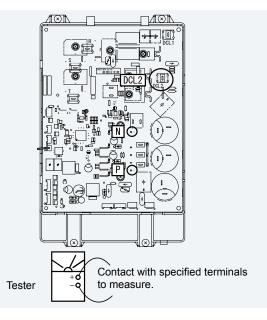
Internal circuit of ACT part of inverter module Non-faulty if [9] – [13] are checked and satisfied. (Measure with 1 k Ω range of a tester.)

i note

DO NOT use a digital tester.

- **9** Check items [1] [8].
- 10 Touch [+] side of the tester to DIP-IPM DCL2 terminal, and [-] side to [P] of ISPM/DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 100 k Ω or greater
- **11** Contrary to [10], touch [-] side of the tester to DIP-IPM DCL2 terminal, and [+] side to [P] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 1 k Ω or greater.
- 12 Touch [+] side of the tester to DIP-IPM DCL2 terminal, and [-] side to [N] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 100 k Ω or greater.
- **13** Contrary to [12], touch [-] side of the tester to DIP-IPM DCL2 terminal, and [+] side to [N] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 10 k Ω or greater. (Resistance gradually increases during measurement.)



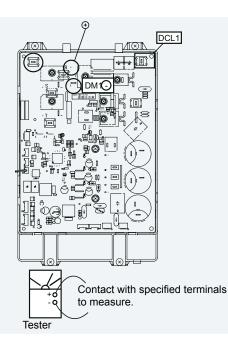


• Checking Method of Resistance for Inrush Current Prevention (Built-in Thermal Fuse)

(Measure the resistance under 1 k Ω range of a circuit tester.)

i NOTE DO NOT use a digital tester.

By placing the + side of tester to the + side of DM1 (soldering portion) on inverter PCB and the \bigcirc side of tester to DCL1 on inverter PCB, measure the resistance. If the resistance is around 500 Ω , it is normal. If the resistance is 0 Ω or infinity Ω , it is abnormal.



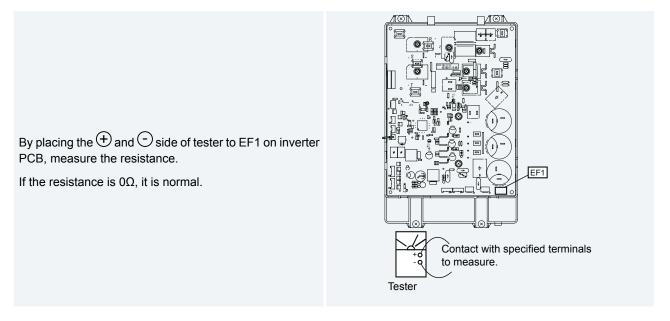
8

• Checking Method of Fuse for fan motor protection (EF1)

(Measure the resistance under 1 k Ω range of a circuit tester.)



DO NOT use a digital tester.



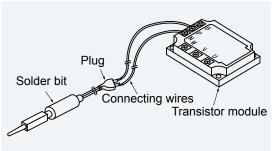
RAS-(8-12)HN(P/C)(E)

High voltage discharge work for replacing parts

\triangle caution

Electrical hazard. Risk of electrical shock. Perform this high voltage discharge work to avoid an electric shock.

- 1 Turn OFF the main switches and wait for three minutes. Check to ensure that no high voltage exists. If LED2 is ON after startup and LED2 is OFF after turning OFF power source, the voltage will decrease lower than DC50V.
- 2 Connect connecting wires to an electrical solder bit.
- 3 Connect the wires to terminals, P and N on IPM. => Discharging is started, resulting in hot solder bit. Pay attention not to shortcircuit between terminal P and N.
- **4** Wait for 2 or 3 minutes and measure the voltage once again. Check to ensure that no voltage is charged.

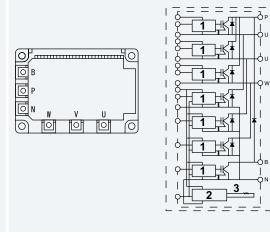


8. Troubleshooting

Transistor module checking procedure

Outer Appearance and Internal Circuit of Transistor Module

- 1. Drive circuit.
- 2. Overheating protection circuit.
- 3. Sensor.



Procedure:

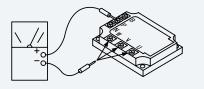
Remove all the terminals of the transistor module before check. If items [1] - [4] are performed and the results are satisfactory, the transistor module is normal.

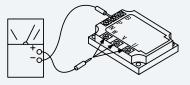
Measure it under $1k\Omega$ range of a tester.

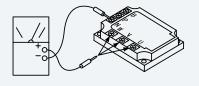
i NOTE DO NOT use a digital tester.

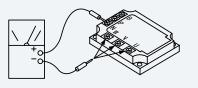
- 1 By touching the + side of the tester to the P terminal of transistor module and the side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are from 1 to $5k\Omega$, it is normal.
- 2 By touching the side of the tester to the P terminal of transistor module and the + side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than $100k\Omega$, it is normal.
- 3 By touching the side of the tester to the N terminal of transistor module and the + side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are from 1 to $5k\Omega$, it is normal.
- 4 By touching the + side of the tester to the N terminal of transistor module and the side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than $100k\Omega$, it is normal.

SMGB0079 rev.0 - 01/2013









Diode module checking procedure

Outer appearance and internal circuit of diode module:



If items [1] - [4] are performed and the results are satisfactory, the diode module is normal.

Measure it under $1k\Omega$ range of a tester.

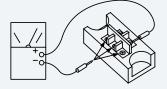
i NOTE

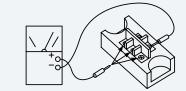
DO NOT use a digital tester.

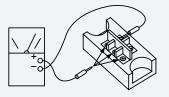
than 500k Ω , it is normal.

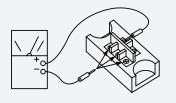
1 By touching the + side of the tester to the + terminal of diode module and the - side of tester to the ~ terminals (A) of the diode module, measure the resistance. If all the resistances are from 5 to 50kΩ, it is normal.

2 By touching the - side of the tester to the + terminal of diode module and the + side of tester to the ~ terminals (A) of the diode module, measure the resistance. If all the resistances are greater









to 50kΩ, it is normal.

3 By touching the - side of the tester to the - terminal of diode module and the + side of tester to the ~ terminals (A) of the diode module, measure the resistance. If all the resistances are from 5

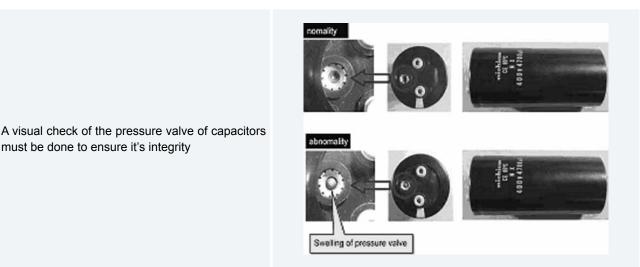
4 By touching the + side of the tester to the - terminal of diode module and the - side of tester to the ~ terminals (A) of the diode module, measure the resistance. If all the resistances are greater than $500k\Omega$, it is normal.

8.4.2 Checking capacitors CB1 & CB2.

🗥 DANGER:

- Electrical hazard. Risk of serious injuries or death.
- Before installing the electrical wiring or before performing a periodical check, turn OFF the main switch of the unit. For safety reasons, be sure that the fan is stopped.
- Prevent from touching the capacitors' terminals. High voltage should be present before discharging them.
- Turn off the unit and wait for the LED 201 to be off before touching the components.

If it's possible, check the capacitance of each capacitor : 4700μ F ± 20% (between 3760μ F to 5640μ F).



i NOTE

It is not recommended to check tension.

must be done to ensure it's integrity

PN = Power source x $\sqrt{2}$, PC=CN is nearly equal to PN/2.

R1 & R2:

- 1 If the value is different:
 - Capacitor could be damaged by overload. -
 - 04 alarm could be displayed if low supply voltage (CN) for ISPM control part is present.
- 2 R1 = 9.5Ω & R2 = 14.0Ω . If these values are different, the capacitors will be not properly charged.

Resistance between P1 & TB3 = $2k\Omega$ (white resistance in the ISPM).

In case that Mg. SW 52C (CMC1) is not ON, the compressor current will travel through these resistances, and they will be broken. Mg. SW 52C (CMC1) should be checked. Check the resistance between the primary and secondary terminal where the contact point is melted for Mg. SW 42C. If there is continuity, the contact is melted and 52C is broken (NG).

Reactor resistance can be messured between TB3 and RB = 0,2Ω. Checking this component is not necessary.

i) note

- Noise filter does not affect ISPM directly, so is not necessary to check it when ISPM fails.
- Both digital or analog testers are valid to check the values.

8.4.3 Fault diagnosis of DC fan motor.

When ISPM/DIP-IPM is faulty and Alarm 03, 04 or 53 appears, the fan motor may also be damaged. To prevent ISPM/DIP-IPM damage which may result from operation combined with a faulty fan motor, check also if the fan motor is not damaged when ISPM/DIP-IPM is replaced

- Turn OFF main power before start working.
- Working and checking with the power ON may disturb correct diagnosis and may result in failure.

Models with DC motor(s)	N° of motors
RAS-(2-2.5)HVNP RAS-3HVNC RAS-3HVNPE RAS-(4-6)H(V)NCE	1 Pieces
RAS-12HN(P/C)	1 Pieces above
RAS-(4-6)H(V)NPE RAS-(8-10)HN(P/C)E	2 Pieces

Procedure in case of error diagnosis

1 Remove fan motor connectors for DC fan motor from the control PCB, ISPM or DIP-IPM and turn the fan motor shaft by hand.

Normal	Fan motor shaft turns smoothly
Normal	The fan motor shaft turns smoothly.
Faulty	No continuous rotary torque movement felt when turning the motor by hand. This occurs because the internal magnet of the fan motor breaks the movement when the internal electronic circuit of the fan motor has a short-circuit fault.

2 Measure the fan motor resistance:

Measurement procedure

- 1 Remove the fan motor connector from the control PCB, ISPM or DIP-IPM.
- 2 Connect the black test lead of the tester to the black wire pin of the fan motor connector.
- 3 Connect the red test lead to the wire connector pin to be checked.

Results

Normal Observed values will be close to the normal values in the table below.

Internal electronic circuit fault of the fan motor including short-circuit and breakage can be checked.

Model	Motor model	Wire color for checking (Normal value)			
Model	wotor model	Red-black	White-black	Yellow-black	Blue-black
RAS-(2-2.5)HVNP RAS-3HVNC	FPD10U40S-902		$1M\Omega$ or greater		$1M\Omega$ or greater
RAS-(3-6)H(V)NPE (both)	SIC-61FW-D858	$1M\Omega$ or greater			$1M\Omega$ or greater
RAS-(4-6)H(V)NCE	EQDW04AHT	∞		∞	
RAS-(8-10)HN(P/C)E (both) RAS-12HN(P/C)	SIC-81FW-8183	$1M\Omega$ or greater			$1M\Omega$ or greater

i note

Values are shown for referential purpose. While actual values may vary depending on the type of the tester, any tester can be used to determine any short-circuit or breakage based on ∞ or several Ω or 0Ω or ∞ .

8.4.4 Checking procedure for the electronic expansion valve for indoor and outdoor units

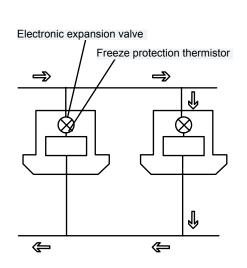
Indoor unit electronic expansion valve Outdoor unit electronic expansion valve Locked with fully closed Check the liquid pipe temperature during the hea-It is abnormal if the liquid pipe pressure ting process. It is abnormal if the temperaturedoes not increase during the pump down does not increase. process.

Locked with slightly open It is abnormal under the following condition:

cess.

It is abnormal if the liquid pipe pressure does not increase and the outlet tempe-The temperature of the freeze protection thermis tor becomes lower than the suction air tempera-_____ ture when the unit which is under chechink stops

Locked with fully open



and the other units are under the pump down pro-It is abnormal under the following conditions: after the heating process for more than 30 minutes, the discharge gas temperature of the compressor is not 10°C higher than the condensing temperature and there is no other faults, such as an excessive charge of refrigerant and others.

8.4.5 Checking procedure for AC fan motor

Part name	Unit models	Fan motor rated capacity	Wiring diagram	Lead wire colour	Resistance (Ω) (at 20°C)
Fan motor	RAS-12HN(P/C)	KFC6S-201SA3P 200W	Blue C Main coil 2 Black Main coil 1 Main coil 1 Thermo Orange Red	Black-White Black-Blue Black-Red	17.0+-10% 25.3+-10% 20.1+-10%

8.4.6 Checking procedure for other parts

Part name	Model code	Resistance (Ω)	Unit models
Solenoid Valve Coil	SR10D	1250 (at 20ºC)	RAS-(3-12)H(V)NP(E) RAS-(4-12)H(V)NC(E)
Reversing Valve Coil	VHV-01AP552B1	1473 (at 20ºC)	RAS-(3-12)H(V)NP(E)
	STF-G01AG579A1	950 (at 75°C)	RAS-(2-2.5)HVNP RAS-(3-12)H(V)NC(E)
	EU1014D9	1.138 (at 75ºC)	RAS-2HVNP
	EU140XA2	1.138 (at 75⁰C)	RAS-2.5HVNP
	EU180XA1	1.138 (at 75ºC)	RAS-3HVNC
	2YC45HXD	0.644 at 75 °C	RAS-3HVNPE
Compressor	2YC63FXD	0.310 (at 75ºC)	RAS-4H(V)NCE
	E402HHD-36A2	0.460 (at 75 °C)	RAS-(4-6)H(V)NPE
	E401HHD-36A2	0.282 (at 75 °C)	RAS-(5-6)H(V)NCE
	E507DHD-50A2	0.136 (at 75 °C)	RAS-8HNPE
	E657DHD-65A2	0.094 (at 75 °C)	RAS-(10-12)HNP(E)
	E655DHD-65D2	0.199 (at 75 °C)	RAS-(8-12)HNC(E)
Magnet Contactor	FC-1/SP	460 (at 20ºC)	RAS-(8-12)HN(P/C)(E)
magnet contactor	FC-0/SP	1150 (at 20ºC)	RAS-(3-6)H(V)NPE

• Checking procedure for the compressor

CHECK LIST ON COMPRESSOR

	Client:	Model:	Date:
	Serie No.	Production Date:	Checker:
No.	Check item	Check method	Result Remarks
1	Is THM9 correctly connected?	1. Is wire of thermistor correctly connected viewing?	ed by
	THM9: Discharge Gas Thermistor	viewing?2. Check to ensure the 7-segment indicated of the termination of terminatio of termination of t	tion of
2	Is thermistor THM9 disconnected?	1. Check to ensure that thermistor on the comp. is correctly mounted by viewing?	top of
		2. Check to ensure that actually measure temp. is the same as the indication during mode.	
3	Is current sensor faulty?	1. Check to ensure that indication A1 and are 0 during compressor stopping.	1 A2
4	Is current sensing part on PCB2 faulty?	 Check to ensure that indication A1 and are not 0 during compressor running. 	1A2
5	Is the direction of current sensor CTU, CTV) reverse?	Check the direction => by viewing.	
6	Are power source wires, U and V inserted correctly into current sensor? .	Check to ensure that wires are correctly in	iserted
7	Is exp. valve (MV1) correctly connected?	Check to ensure that MV1 to CN5A is corr connected	rectly
8	Is exp. valve coil (MV1) correctly connected?	Check to ensure that each coil is correctly mounted on the valve.	
9	Are the refrigeration cycle and electrical wiring system incorrectly connected?	Check to ensure that refrigerant is flowing indoor units by operating one refrigerating only from the outdoor unit.	
10	Is opening of exp. valve completely closed (locked)?	Check the following by the check mode of outdoor units.	
		 Liquid Pipe Temp. (TL) < Air Intake Ter (Ti) during Cooling Operation 	np.
		 Liquid Pipe Temp. (TL) > Air Intake Ter (Ti) during Heating Operation 	mp.
11	Is opening of exp. valve fully opened locked)?	Check to ensure that liquid pipe temp. is lo than air intake temp. of stopping indoor un when other indoor units are operating und cooling operation.	nit
12	Are the contacts for comp.	Check the surface of each contact (L1, L2	
	magnetic switch CMC1 faulty?	and L3) by viewing.	
	Is there any voltage	Check to ensure that voltage imbalance is	
13	abnormality among L1-L2, L2- L3 and L3-L1?	smaller than 3%. Please note that power source voltage mu within 380V or 220V+10%	ist be
14	Is the comp. oil acidified during compressor motor burning?	within 380V or 220V+10%. Check to ensure that the oil color is not bla	ack.

Additional Information for "CHECK LIST ON COMPRESSOR"

Check item	Additional information (mechanism of the compressor failure)
1 & 2	The liquid refrigerant return volume to the compressor is controlled by the discharge gas temperature Td when compressor is operating. If Td thermistor is disconnected, the liquid refrigerant return volume will become small by detecting the temperature even if the actual discharge gas temperature is high. Therefore, this abnormal overheating by detecting the temperature operation will result in insulation failure of the motor winding.
3 & 4	Overcurrent control (operating frequency control) is performed by detecting current by the PCB2.
	In this case, winding insulation failure will occur, since control is not available in spite of actually high current.
5 & 6	The current sensor checks phase and adjusts output electrical wave in addition to the above mentioned items. If fault occurs, the output electrical wave becomes unstable giving stress to the motor winding, resulting in winding insulation failure.
7 &8	During a cooling operation, SH is controlled by MV of each indoor units.
	During a heating operation, Td is controlled by MV1.
	If expansion valves are incorrectly connected, correct control is not available, resulting in compressor seizure depending on liquid refrigerant returning conditions or motor winding insulation failure depending on overheating conditions.
9	If the refrigeration cycle and electrical system are incorrectly connected, abnormally low suction pres- sure 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.
10	ditto
11	The compressor may be locked due to the liquid return operation during the cooling operation.
12	In the case that the contacting resistance becomes big, voltage imbalance among each phase will cause abnormal overcurrent.
13	In this case, overcurrent will occur, efficiency will decrease or the motor winding will be excessively heated.
14	In the case, it will result in motor burning or compressor seizure.



Index

9.1.	RAS-(2	2-2.5)HVNP	290
	9.1.1.	Cycle and structural parts	290
	9.1.2.	Parts table	291
9.2.	RAS-3	HVNC	292
	9.2.1.	Cycle and structural parts	292
	9.2.2.	Parts table	293
9.3.	RAS-3	HVNPE	294
	9.3.1.	Cycle and structural parts	294
	9.3.2.	Electrical parts	295
	9.3.3.	Parts name	296
9.4.	RAS-(4	4-6)H(V)NPE	297
	9.4.1.	Cycle and structural parts	297
	9.4.2.	Electrical parts	298
	9.4.3.	Parts name	300
9.5.	RAS-(4	4-6)H(V)NCE	302
	9.5.1.	Cycle and structural parts	302
	9.5.2.	Electrical parts	304
	9.5.3.	Parts name	306
9.6.	RAS-(8	3-10)HN(P/C)E	308
	9.6.1.	Cycle and structural parts	308
	9.6.2.	Electrical parts	310
	9.6.3.	Parts name	311
9.7.	RAS-1	2HN(P/C)	314
	9.7.1.	Cycle and structural parts	314
	9.7.2.	Electrical parts	315
	9.7.3.	Parts name	316

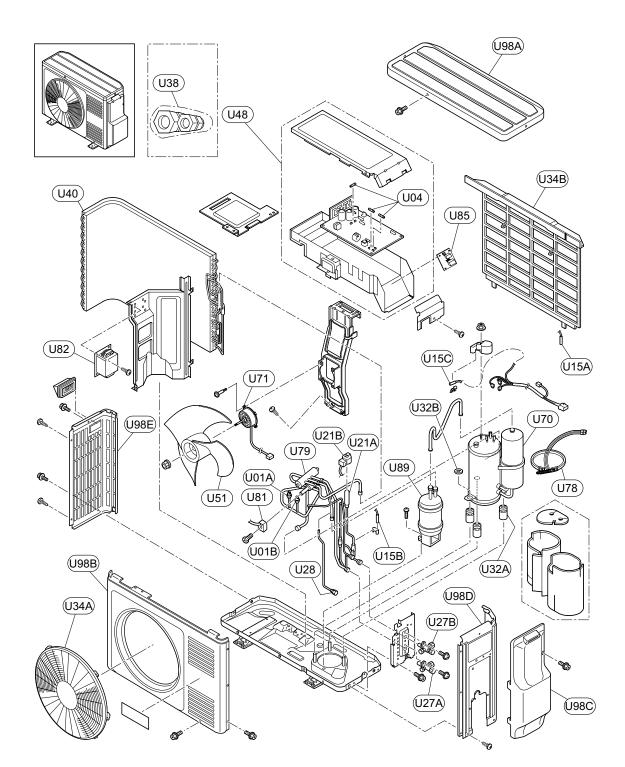
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9.1 RAS-(2-2.5)HVNP

9.1.1 Cycle and structural parts

LOCATION OF SPARE PARTS IN THE UNIT

MODEL: RAS-2HVNP RAS-2.5HVNP



Spare Parts Document: EPN-201212A

9.1.2 Parts table

Cycle and structural parts

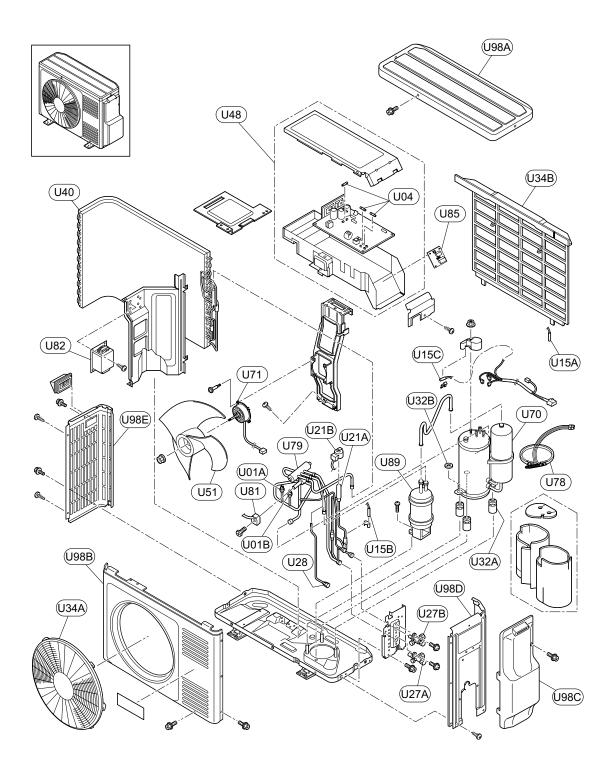
No.	Part name	Remarks
U01A	Pressure SW	High pressure
U01B	Pressure SW	For control
U04	Fuse	3A
U15A	Thermistor	Та
U15B	Thermistor	Те
U15C	Thermistor	Td
U21A	Exp. valve	
U21B	Coil for exp. valve	
U27A	Stop valve	Gas line
U27B	Stop valve	Liquid line
U28	Check joint	
U32A	Vibration absorber	
U32B	Vibration absorber	
U34A	Air grille	Outlet
U34B	Air grille	Inlet
U38	Piping set	
U40	Condenser assembly	
U48	Electrical box ass'y	
U51	Propeller fan	
U70	Compressor	
U71	Motor	
U78	Oil heater	
U79	Four-way valve ass'y	
U81	Coil for 4-way valve	
U82	Reactor	
U85	Printed circuit board	
U89	Accumulator	
U98A	Cabinet panel	
U98B	Cabinet panel	
U98C	Cabinet panel	
U98D	Cabinet panel	
U98E	Cabinet panel	

9.2 RAS-3HVNC

9.2.1 Cycle and structural parts

LOCATION OF SPARE PARTS IN THE UNIT

MODEL: RAS-3HVNC



Spare Parts Document: EPN-201212A

9.2.2 Parts table

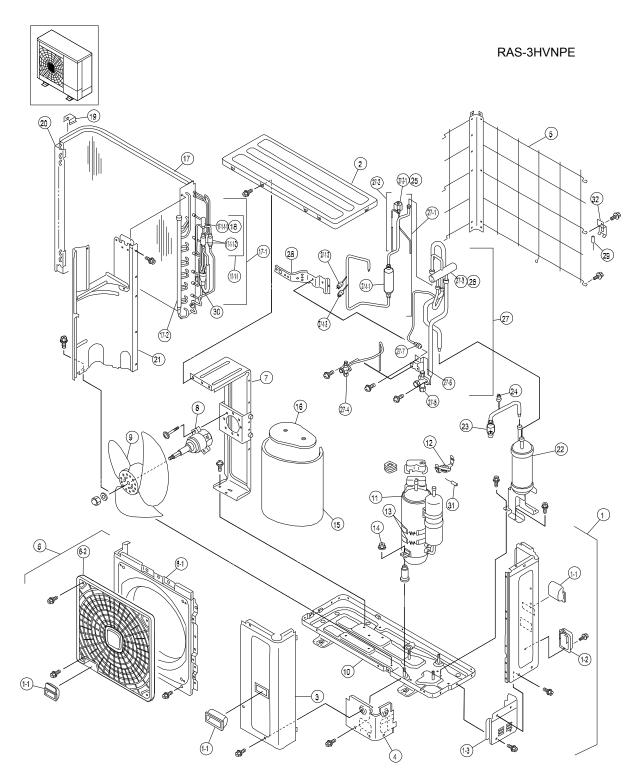
Cycle and structural parts

No.	Part name	Remarks
U01A	Pressure SW	High pressure
U01B	Pressure SW	For control
U04	Fuse	3A
U15A	Thermistor	Та
U15B	Thermistor	Те
U15C	Thermistor	Td
U21A	Exp. valve	
U21B	Coil for exp. valve	
U27A	Stop valve	Gas line
U27B	Stop valve	Liquid line
U28	Check joint	
U32A	Vibration absorber	
U32B	Vibration absorber	
U34A	Air grille	Outlet
U34B	Air grille	Inlet
U40	Condenser assembly	
U48	Electrical box ass'y	
U51	Propeller fan	
U70	Compressor	
U71	Motor	
U78	Oil heater	
U79	Four-way valve ass'y	
U81	Coil for 4-way valve	
U82	Reactor	
U85	Printed circuit board	
U89	Accumulator	
U98A	Cabinet panel	
U98B	Cabinet panel	
U98C	Cabinet panel	
U98D	Cabinet panel	
U98E	Cabinet panel	
U98E	Cabinet panel	

9.3 RAS-3HVNPE

9.3.1 Cycle and structural parts

LOCATION OF SPARE PART IN THE UNIT CABINET AND CYCLE

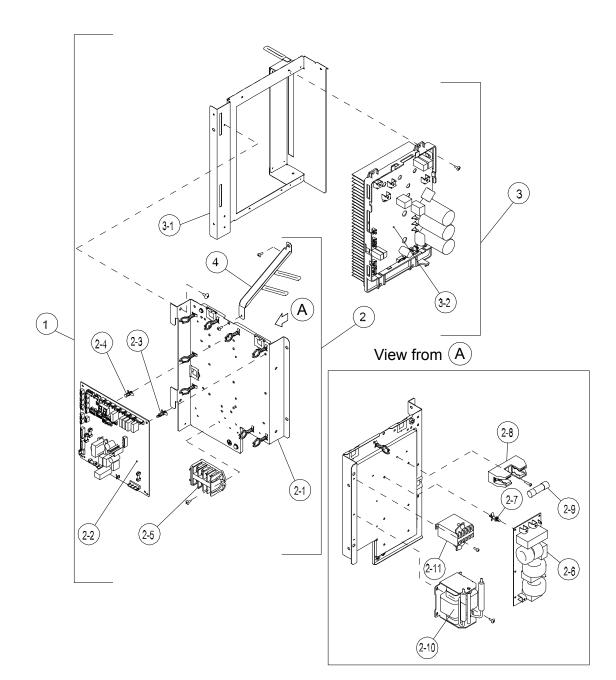


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9.3.2 Electrical parts

LOCATION OF SPARE PART IN THE UNIT ELECTRICAL PARTS

RAS-(3/4/5/6)HVNPE



Spare Parts Document: EPN-201211A

9

9.3.3 Parts name

Cycle and structural parts

No.	Part name	Remarks	No.
1	Rear Cover Assy	Assembly	18
1-1	Handle		19
1-2	H Cover		20
1-3	Pipe Cover B		21
2	Upper Cover Assy	Assembly	22
3	Service Cover S Assy	Assembly	23
4	S Cover B	Lower Service Cover	24
5	Protector Net S Assy		25
6	Shroud S Assy	Assembly	26
6-1	Shroud S	Shroud	27
6-2	Front Protector Net	Air Outlet	27-1
7	Clamp S Assy		27-1-1
8	Fan Motor	MOF, DC100W,8P	27-1-2
9	Propeller Fan	Ø544	27-1-3
10	B-Base Assy	Assembly	27-2
11	Compressor	DC Comp. 2YC45KXD	27-2-1
12	THM Support D		27-3
13	C Heater	240V-30W	27-4
14	Special Nut		27-5
15	Acoustical Cover		27-6
16	Acoustical Cover 1	Upper Cover	27-7
17	Condenser	Assembly (Heat exchanger + 17-1+17-2)	28
17-1	Header G Unit	Assembly	29
17-2-1	EVO Assy	Assembly	30
17-2-1	Expansion Valve	EVO	31
17-2-1-1	Strainer		32
17-2-1-2	Header L Unit	Assembly	
17-2		Assembly	

No.	Part name	Remarks
18	EXPV Coil	Coil for Expansion Valve
19	Stay	
20	End P Unit	
21	Partition S Assy	
22	Accumulator	
23	Strainer	
24	Pressure SW	for Low Pressure
25	Coil 20	Coil for Solenoid Valve
26	Coil	Coil for 4-Way Valve
27	4-Way Valve Assy	Assembly
27-1	D Pipe Unit	
27-1-1	Silencer	
27-1-2	Pressure SW	PSH (High)
27-1-3	P-Sensor	PSC (Control)
27-2	SVC Assy	
27-2-1	Solenoid Valve	SVA
27-3	4 Way Valve	RVR
27-4	Stop Valve	For liquid line 3/8
27-5	Stop Valve	For gas line 5/8
27-6	Valve Stay	
27-7	Check JA	
28	V-Stay	
29	Thermistor	for Outdoor Temp., THM7
30	Thermistor	for Pipe Temp., THM8
31	Thermistor	for Discharge Gas Temp. THM9
32	TH-Plate	

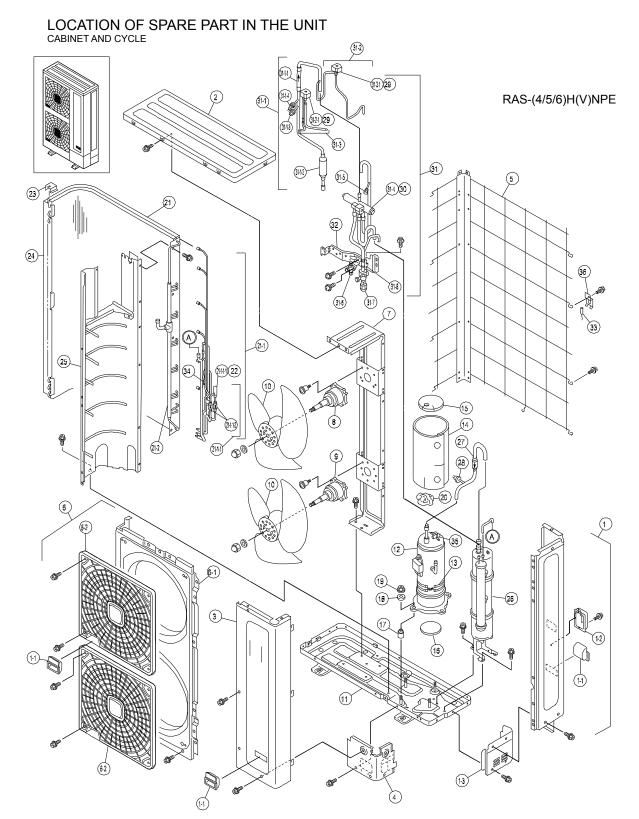
Electrical parts

No.	Part name	Remarks
1	Electrical Wiring Diagram	Assembly (2+3+Harness)
2	P Plate Unit	Assembly (2-1~2-11)
2-1	P Plate Assy	Assembly
2-2	Printed Circuit Board	PCB1, PO101A Assy
2-3	Spacer	for PCB1
2-4	Push Spacer	for PCB1
2-5	Terminal Board	ТВ
2-6	Noise Filter	NF
2-7	Spacer	for Noise Filter
2-8	Fuse Holder	
2-9	Fuse	40A
2-10	Reactor Unit	
2-11	MG SW	CMC1
3	Power Unit Assy	Assembly (3-1~3-2)
3-1	Power Stay Assy	Assembly
3-2	Inv. Fin Assy	
4	Upper Support	

296

9.4 RAS-(4-6)H(V)NPE

9.4.1 Cycle and structural parts



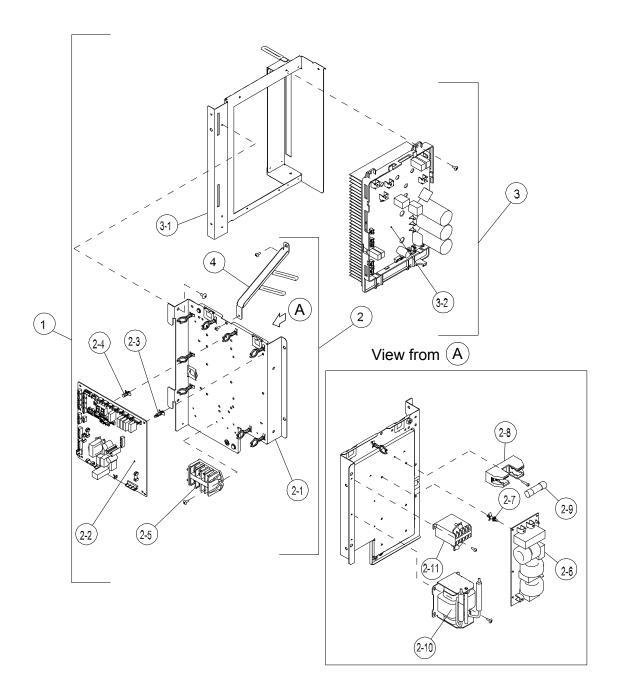
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297

9.4.2 Electrical parts

LOCATION OF SPARE PART IN THE UNIT ELECTRICAL PARTS

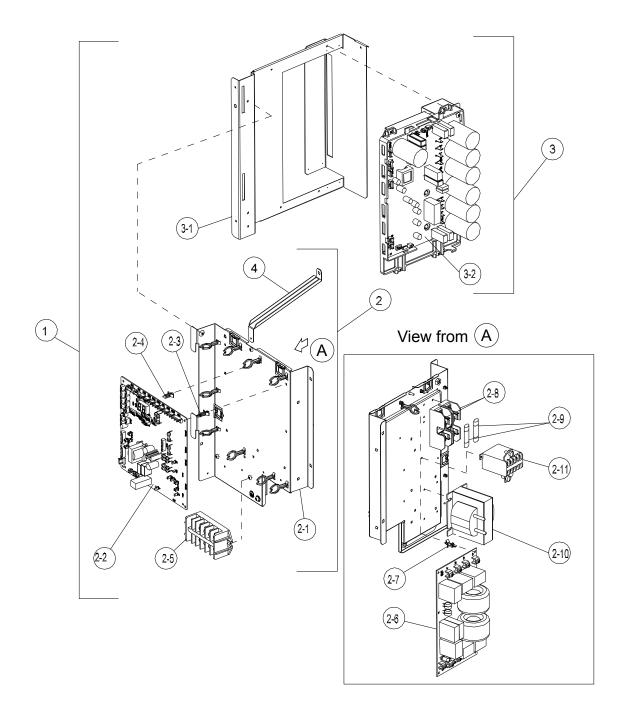
RAS-(3/4/5/6)HVNPE



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LOCATION OF SPARE PART IN THE UNIT ELECTRICAL PARTS

RAS-(4/5/6)HNPE



Spare Parts Document: EPN-201211A

9.4.3 Parts name

Cycle and structural parts

No.	Part name	Remarks	No.	Part name	Remarks
1	Rear Cover L Assy	Assembly	21-1-1-1	Expansion Valve	EVO
1-1	Handle		21-1-1-2	Strainer	
1-2	H Cover		21-2	Header G Unit	Assembly
1-3	Pipe Cover B		22	EXPV Coil	Coil for Expansion Valve
2	Upper Cover Assy	Assembly	23	Stay	
3	Service Cover L Assy	Assembly	24	End P Unit	
4	S Cover B	Lower Service Cover	25	Partition Assy	
5	Protector Net L Assy		26	Tank Assy	
6	Shroud L Unit	Assembly	27	Strainer	
6-1	Shroud L	Shroud	28	Pressure SW	for Low Pressure
6-2	Front Protector Net	Air Outlet	29	Coil 20	Coil for Solenoid Valve
7	Clamp L Assy		30	Coil	Coil for 4-Way Valve
8	Fan Motor	MOF1, DC100W,8P	31	4-Way Valve Assy	Assembly
9	Fan Motor	MOF2, DC100W,8P	31-1	D Pipe Unit	
10	Propeller Fan	Ø544	31-1-1	Check Valve	
11	B-Base Assy	Assembly	31-1-2	Silencer	
		E402HHD-36A2	31-1-3	Pressure SW	PSH (High)
12	Compressor	(RAS-(4-6)HVNPE)	31-1-4	P-Sensor	PSC (Control)
		E402HHD-36D2 (RAS-(4-6)HNPE)	31-2	SVC Assy	
13	C Heater	240V-52W	31-2-1	Solenoid Valve	SVA
14	Acoustical Cover		31-3	SVA Assy	
15	Acoustical Cover	Upper Cover	31-4	4 Way Valve	RVR
16	Acoustical Cover	Lower Cover	31-5	Check JA	
17	Vibration Absorber		31-6	Stop Valve	For liquid line 3/8
18	Vibration Absorber		31-7	Stop Valve	For gas line 5/8
19	Special Nut		31-8	Valve Stay	
20	Rubber Cap		32	V-Stay	
		Assembly(Heat exchanger	33	Thermistor	for Outdoor Temp., THM7
21	Condenser	+ 21-1+21-2)	34	Thermistor	for Pipe Temp., THM8
21-1	Header L Unit	Assembly	35	Thermistor	for Discharge Gas Temp THM9
21-1-1	EVO Assy	Assembly	36	TH-Plate	

• Electrical parts

RAS-(4-6)HVNPE

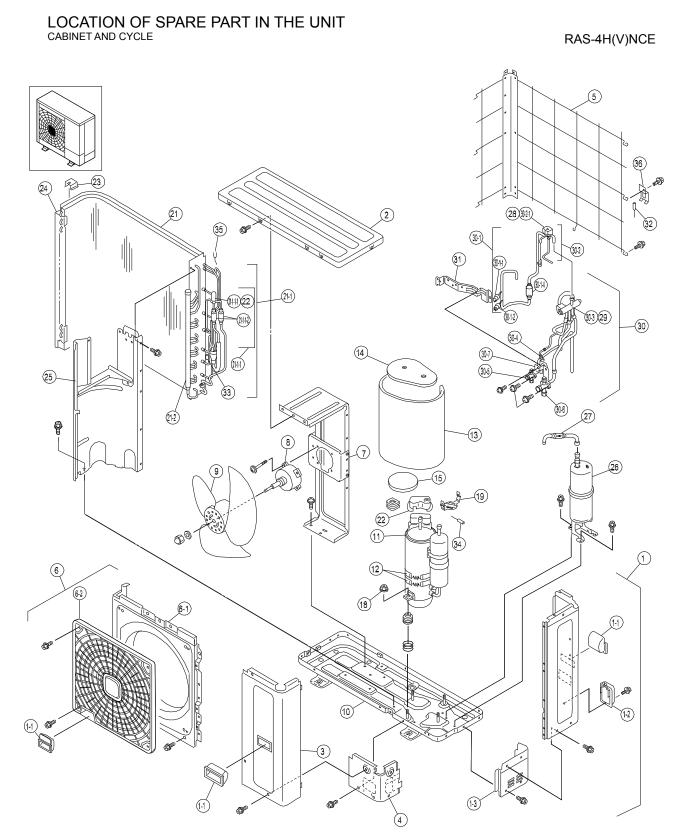
ectrical Wiring Diagram	
J	Assembly (2+3+Harness)
Plate Unit	Assembly (2-1~2-11)
Plate Assy	Assembly
nted Circuit Board	PCB1, PO101A Assy
acer	for PCB1
sh Spacer	for PCB1
rminal Board	ТВ
ise Filter	NF
acer	for Noise Filter
se Holder	
se	50A
actor Unit	
G SW	CMC1
wer Unit Assy	Assembly (3-1~3-2)
wer Stay Assy	Assembly
r. Fin Assy	
per Support	
	Plate Assy nted Circuit Board acer sh Spacer rminal Board ise Filter acer se Holder se tactor Unit S SW wer Unit Assy wer Stay Assy r. Fin Assy

RAS-(4-6)HNPE

No.	Part name	Remarks
1	Electrical Wiring Diagram	Assembly (2+3+Harness)
2	P Plate Unit	Assembly (2-1~2-11)
2-1	P Plate Assy	Assembly
2-2	Printed Circuit Board	PCB1, PO101B Assy
2-3	Spacer	for PCB1
2-4	Push Spacer	for PCB1
2-5	Terminal Board	ТВ
2-6	Noise Filter	NF
2-7	Spacer	for Noise Filter
2-8	Fuse Holder	
2-9	Fuse	20A
2-10	Reactor Unit	
2-11	MG SW	Fuji Electric,FC-0/SP
3	Power Unit Assy	Assembly (3-1~3-2)
3-1	Power Stay Assy	Assembly
3-2	Inv. Fin Assy	
4	Upper Support	

9.5 RAS-(4-6)H(V)NCE

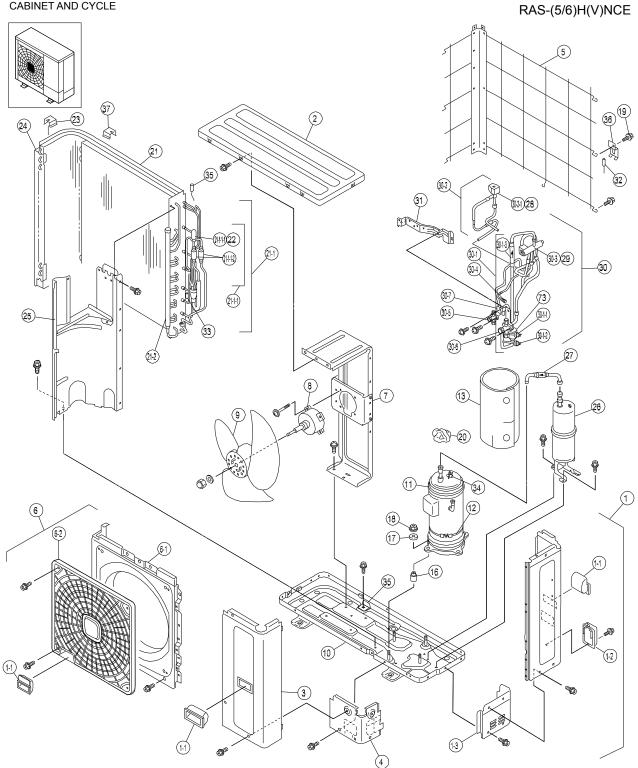
9.5.1 Cycle and structural parts



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302

LOCATION OF SPARE PART IN THE UNIT CABINET AND CYCLE

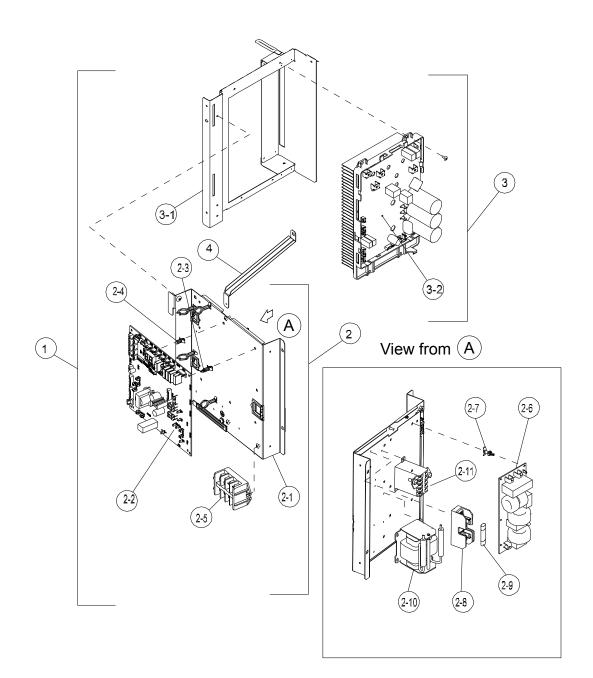


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9.5.2 Electrical parts

LOCATION OF SPARE PART IN THE UNIT ELECTRICAL PARTS

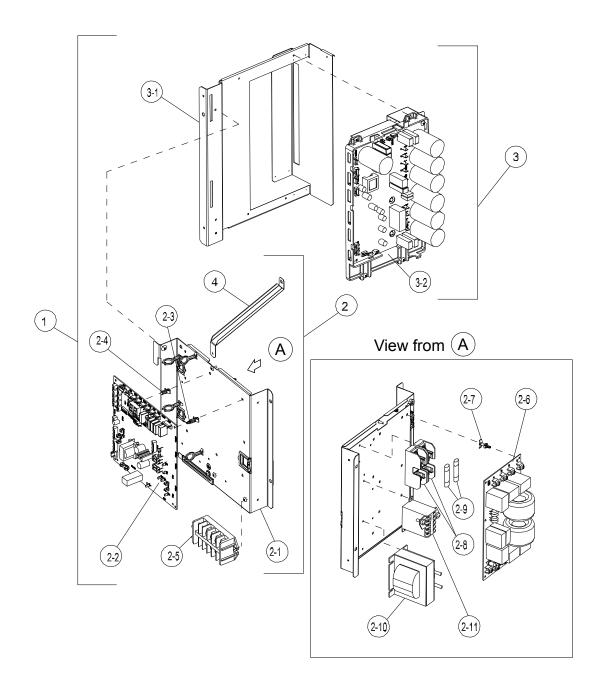
RAS-(4/5/6)HVNCE



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LOCATION OF SPARE PART IN THE UNIT ELECTRICAL PARTS

RAS-(4/5/6)HNCE



Spare Parts Document: EPN-201211A

9.5.3 Parts name

٠ **Cycle and structural parts**

Cycle	and structural pa	rts			
No.	Part name	Remarks	No.	Part name	Remarks
1	Rear Cover Assy	Assembly	21-1-1-2	Strainer	
1-1	Handle		21-2	Header G Unit	Assembly
1-2	H Cover		22	EXPV Coil	Coil for Expansion Valve
1-3	Pipe Cover B		23	Stay	
2	Upper Cover Assy	Assembly	24	End P Unit	
3	Service Cover S Assy	Assembly	25	Partition S Assy	
4	S Cover B	Lower Service Cover	26	Accumulator Assy	
5	Protector Net S Assy		27	Strainer	
6	Shroud S Assy	Assembly	28	Coil 20	Coil for Solenoid Valve
6-1	Shroud S	Shroud	29	Coil	Coil for 4 Way Valve
6-2	Front Protector Net	Air Outlet	30	4-Way Valve Assy	Assembly
7	Clamp S Assy		30-1	D Pipe Unit	
8	Fan Motor	MOF, DC190W, 8P	30-1-1	Pressure SW	PSH (High)
9	Propeller Fan	Ø544	30-1-2	Pressure SW	PSC (Control)
10	B-Base Assy	Assembly	30-1-3	Check Valve	
		Comp 2YC63FXD	30-1-4	Silencer	
		(RAS-4HVNCE)	30-2	SVA Assy	
		Comp E401HHD-36A2	30-2-1	Solenoid valve	SVA
11	Compressor	(RAS-(5-6)HVNCE)	30-3	4 Way Valve	RVR
		Comp 2YC63RXD (RAS-4HNCE)	30-4	Check JA	
		Comp E401HHD-36D2	30-5	Stop Valve	For liquid line 3/8
		(RAS-(5-6)HNCE)	30-6	Stop Valve	For gas line 5/8
		240V-30W	30-7	Valve Stay	
12	C Heater	(RAS-4H(V)NCE)	31	V-Stay	
		240V-52W (RAS-(5-6)H(V)NCE)	32	Thermistor	for Outdoor Temp., THM7
13	Acoustical Cover		33	Thermistor	for Pipe Temp., THM8
14	Acoustical Cover	Upper Cover	34	Thermistor	for Discharge Gas Temp., THM9
15	Acoustical Cover	Lower Cover	05	-	for Condenser Temp.,
16	Vibration Absorber		35	Thermistor	THM10
17	Vibration Absorber		36	TH-Plate	
18	Special Nut		37	Stay	
19	THM Support D		31-8	Valve Stay	
20	Rubber Cap		32	V-Stay	
21	Condenser	Assembly (Heat exchanger	33	Thermistor	for Outdoor Temp., THM7
		+ 21-1+21-2)	34	Thermistor	for Pipe Temp., THM8
21-1	Header L Unit	Assembly	35	Thermistor	for Discharge Gas Temp.
21-1-1	EVO Assy	Assembly			THM9
21-1-1-1	Expansion Valve	EVO	36	TH-Plate	

• Electrical parts

RAS-(4-6)HVNCE

N.L.	Dentwork	Demender
No.	Part name	Remarks
1	Electrical Wiring Diagram	Assembly (2+3+Harness)
2	P Plate Unit	Assembly (2-1~2-11)
2-1	P Plate Assy	Assembly
2-2	Printed Circuit Board	PCB1, PO101D Assy
2-3	Spacer	for PCB1
2-4	Push Spacer	for PCB1
2-5	Terminal Board	ТВ
2-6	Noise Filter	NF
2-7	Spacer	for Noise Filter
2-8	Fuse Holder	
	Fuse	50A (RAS-4HVNCE)
2-9	ruse	40A (RAS-(5-6)HVNCE)
2-10	Reactor Unit	
2-11	MG SW	CMC1
3	Power Unit Assy	Assembly (3-1~3-2)
3-1	Power Stay Assy	Assembly
3-2	Inv. Fin Assy	
4	Upper Support	

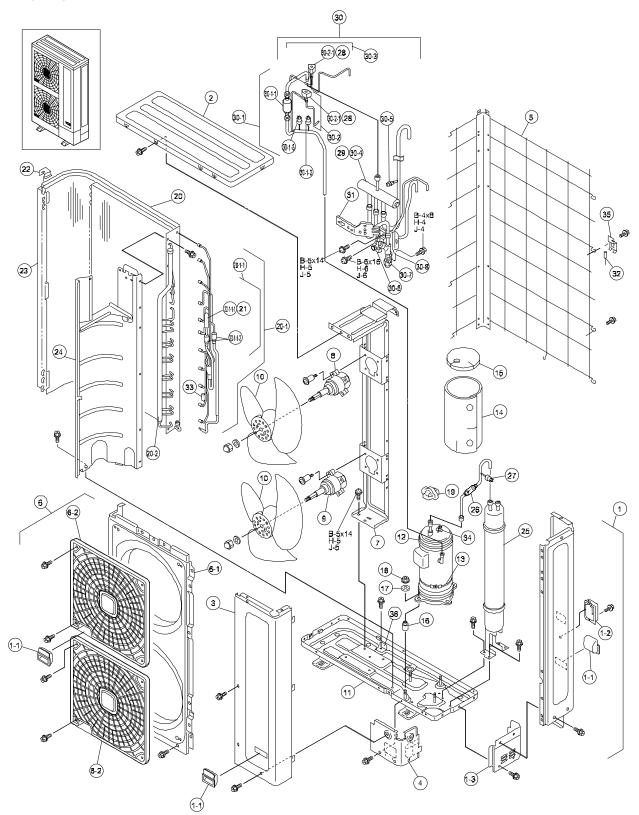
RAS-(4-6)HNCE

No.	Part name	Remarks
1	Electrical Wiring Diagram	Assembly (2+3+Harness)
2	P Plate Unit	Assembly (2-1~2-11)
2-1	P Plate Assy	Assembly
2-2	Printed Circuit Board	PCB1, PO101E Assy
2-3	Spacer	for PCB1
2-4	Push Spacer	for PCB1
2-5	Terminal Board	ТВ
2-6	Noise Filter	NF
2-7	Spacer	for Noise Filter
2-8	Fuse Holder	
2-9	Fuse	20A
2-10	Reactor Unit	
2-11	MG SW	CMC1
3	Power Unit Assy	Assembly (3-1~3-2)
3-1	Power Stay Assy	Assembly
3-2	Inv. Fin Assy	
4	Upper Support	

9.6 RAS-(8-10)HN(P/C)E

9.6.1 Cycle and structural parts

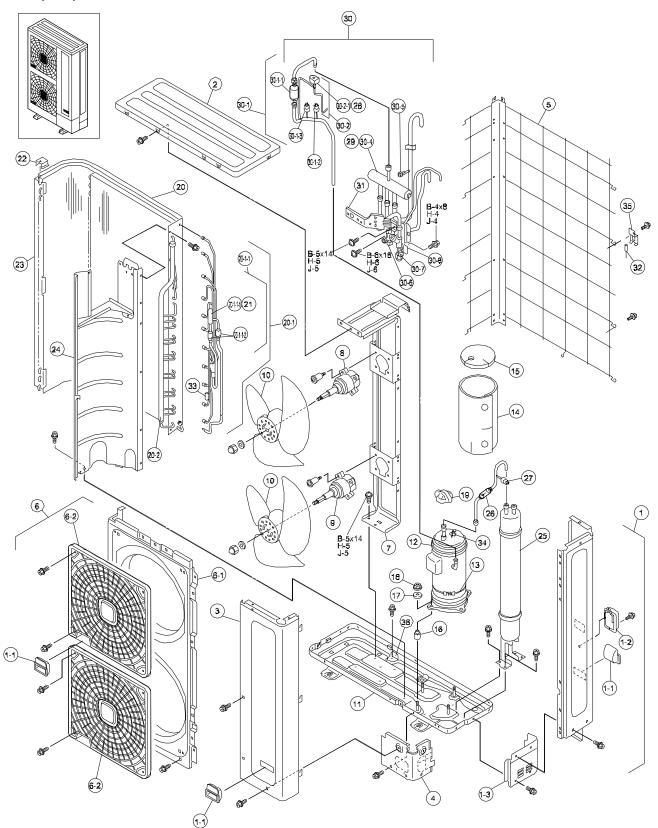
RAS-(8-10)HNPE



Spare Parts Document: EPN-201211B

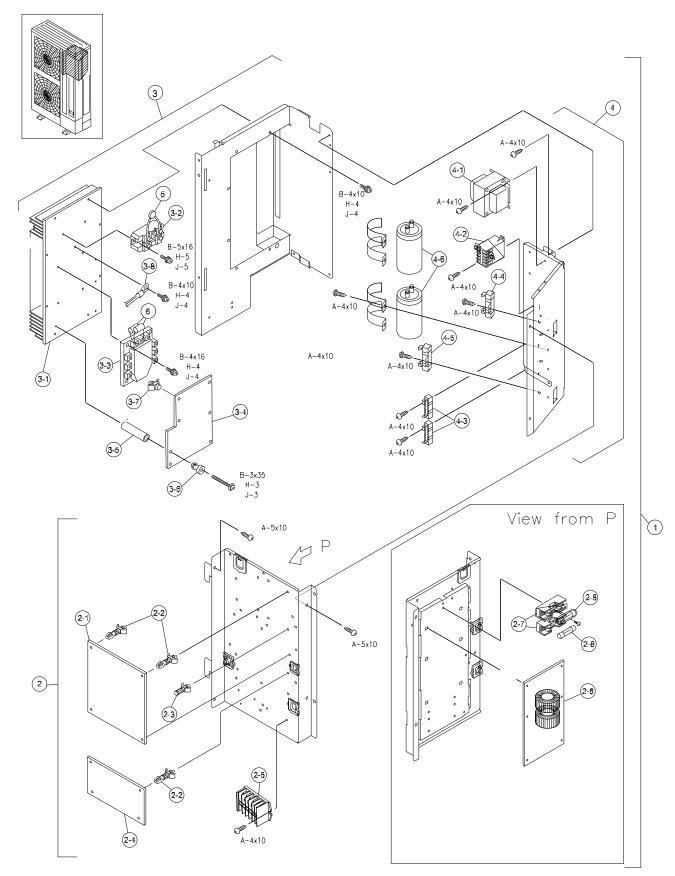
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RAS-(8-10)HNCE



Spare Parts Document: EPN-201211B

9.6.2 Electrical parts



Spare Parts Document: EPN-201211B

310

9

9.6.3 Parts name

Cycle and structural parts

RAS-(8-10)HNPE

KA2-(8-1	IU)HNPE				
No.	Part name	Remarks	No.	Part name	Remarks
1	Rear Cover L Assy	Assembly	26	Strainer	
1-1	Handle		27	Pressure SW	
1-2	H Cover		28	Coil 20	Coil for Solenoid Valve
1-3	Pipe Cover B		29	Coil	Coil for 4 Way Valve
2	Upper Cover Assy	Assembly	30	4-Way Valve Assy	Assembly
3	Service Cover L Assy	Assembly	30	4-Way Valve Assy	Assembly
4	S Cover B	Lower Service Cover	30-1	D Pipe Unit	
5	Protector Net L Assy		30-1-1	Check Valve	
6	Shroud L Unit	Assembly	30-1-2	Pressure SW	PSH (High)
6-1	Shroud L	Shroud	30-1-3	P-Sensor	PSC (Control)
6-2	Front Protector Net	Air Outlet	30-2	SVC Assy	
7	Clamp L Assy		30-2-1	Solenoid Valve	SVA
8	Fan Motor	DC138W, 8P	30-3	SVA Assy	
9	Fan Motor	DC138W, 8P	30-4	4 Way Valve	RVR
10	Propeller Fan	Ø544	30-5	Check JA	
11	B-Base Assy	Assembly			For liquid line 3/8
12	Compressor	Comp DA50PHD-D1SE2 (RAS-8HNPE) Comp DA65PHD-D1SE2	30-6	Stop Valve	(RAS-8HNPE) For liquid line 1/2 (RAS-10HNPE)
		(RAS-10HNPE)	30-7	B Valve	For gas line 3/4
13	C Heater	240V-40.8W	30-8	Valve Stay	
14	Acoustical Cover		31	V-Stay	
15	Acoustical Cover	Upper Cap	32	Thermistor	for Outdoor Temp., THM7
16	Vibration Absorber		33	Thermistor	for Pipe Temp., THM8
17	Vibration Absorber		34	Thermistor	for Condenser Temp.,
18	Special Nut		05		THM9
19	Rubber Cap		35	TH-Plate	
20	Condenser	Assembly (Heat exchanger + 21-1 + 21-2)	36	Condenser Support	
20-1	Header L Unit	Assembly			
20-1-1	EVO Assy	Assembly			
20-1-1-1	Expansion Valve				
20-1-1-2	Strainer				
20-2	Header G Unit	Assembly			
21	EXPV Coil	Coil for Expansion Valve			
22	Stay				
23	End P Unit				
24	Partition Assy				
25	Accumulator Assy	Assembly			

RAS-(8-10)HNCE

No.	Part name	Remarks
	Rear Cover L Assy	Assembly
1-1	Handle	
1-2	H Cover	
1-3	Pipe Cover B	
2	Upper Cover Assy	Assembly
3	Service Cover L Assy	Assembly
4	S Cover B	Lower Service Cover
5	Protector Net L Assy	
6	Shroud L Unit	Assembly
6-1	Shroud L	Shroud
6-2	Front Protector Net	Air Outlet
7	Clamp L Assy	
8	Fan Motor	DC138W, 8P
9	Fan Motor	DC138W, 8P
10	Propeller Fan	Ø544
11	B-Base Assy	Assembly
12	Compressor	Comp DA50PHD-D1SE2 (RAS-8HNPE) Comp DA65PHD-D1SE2 (RAS-10HNPE)
13	C Heater	240V-40.8W
14	Acoustical Cover	
15	Acoustical Cover	Upper Cap
16	Vibration Absorber	
17	Vibration Absorber	
18	Special Nut	
19	Rubber Cap	
20	Condenser	Assembly (Heat exchanger + 21-1 + 21-2)
20-1	Header L Unit	Assembly
20-1-1	EVO Assy	Assembly
20-1-1-1	Expansion Valve	
20-1-1-2	Strainer	
20-2	Header G Unit	Assembly
21	EXPV Coil	Coil for Expansion Valve
22	Stay	
23	End P Unit	
24	Partition Assy	
25	Accumulator Assy	Assembly

No.	Part name	Remarks
26	Strainer	
27	Pressure SW	
28	Coil 20	Coil for Solenoid Valve
29	Coil	Coil for 4 Way Valve
30	4-Way Valve Assy	Assembly
30-1	D Pipe Unit	
30-1-1	Check Valve	
30-1-2	Pressure SW	PSH (High)
30-1-3	P-Sensor	PSC (Control)
30-2	SVA Assy	
30-2-1	Solenoid Valve	SVA
30-4	4 Way Valve	
30-5	Check JA	
30-6	Stop Valve	For liquid line 3/8 (RAS-8HNPE) For liquid line 1/2 (RAS-10HNPE)
30-7	B Valve	For gas line 3/4
30-8	Valve Stay	
31	V-Stay	
32	Thermistor	for Outdoor Temp., THM7
33	Thermistor	for Pipe Temp., THM8
34	Thermistor	for Condenser Temp., THM9
35	TH-Plate	
36	Condenser Support	

HITACHI Inspire the Next

Electrical parts

No.	Part name	Remarks
1	Electrical Box	Assembly (2+3+4+Harness)
2	P Plate Assy	Assembly
2-1	Printed Circuit Board	PCB1, PO101B Assy
2-2	Spacer	For PCB1, PCB3, Noise Filter,
2-3	Push Spacer	For PCB1
2-4	Printed Circuit Board	PCB3, PO121A Assy
2-5	Terminal Board	ТВ
2-6	Noise Filter	NF
2-7	Fuse Holder	
2-8	Fuse	40A
3	Power Unit	Assembly
3-1	Inverter Fin	
3-2	Diode M	DM
3-3	Transistor M	
3-4	Printed Circuit Board	PCB2, PV093 Assy
3-5	Collar	Plastic Material
3-6	Bush	Plastic Material
3-7	Push Spacer	For PCB2
3-8	Thermistor	Fin thermistor
4	CB Stay Assy	Assembly
4-1	Reactor Unit	DCL
4-2	MG SW	CMC
4-3	Resister	RS1, RS2
4-4	Resistor	R1
4-5	Resistor	R2
4-6	Capacitor	CB1, CB2 (450V, 4700µF)
5	Noise Suppressor	ZNR Assy
6	Capacitor Assy	HRN PC301

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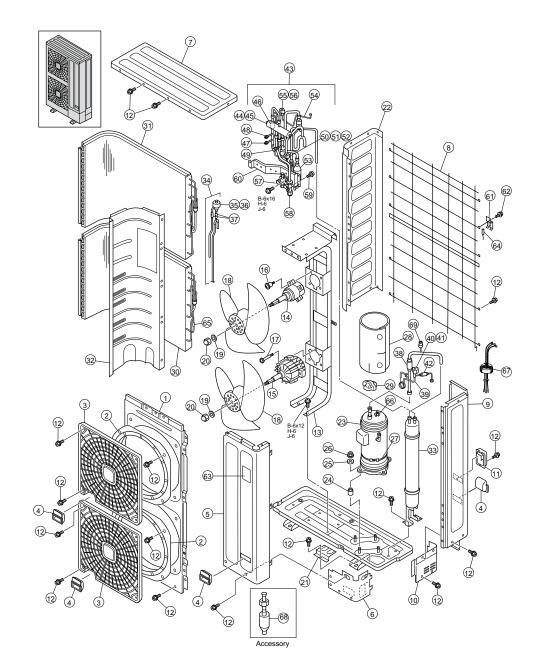
9.7 RAS-12HN(P/C)

9.7.1 Cycle and structural parts

LOCATION OF SERVICE PARTS IN THE UNIT

<Cabinet and Fan>

MODEL: RAS-12HNP RAS-12HNC



A	Truss Head Tapping Screw	(<i>juun</i> >	F	Stud Bolt	
в	Round Head Screw		G	Nut	8
С	Flat Head Screw		н	Washer	0
D	Pan Head Tapping Screw	(jannar)	J	Spring Lock Washer	Q
Е	Hexagon Head Bolt		к	Toothed Lock Washer	٢
10					

NOTE: The unicromated coating is applied to iron and steel material for the unspecified materials of the bolt and screw.

<u>NOTE:</u> The parts without order number are the custom-ordered, and these are not mentioned in the price list. When ordering them, the part name and the drawing number are required. Contact your HITACHI distributor for the delivery date and price about them.

Spare Parts Document: SPN-201302

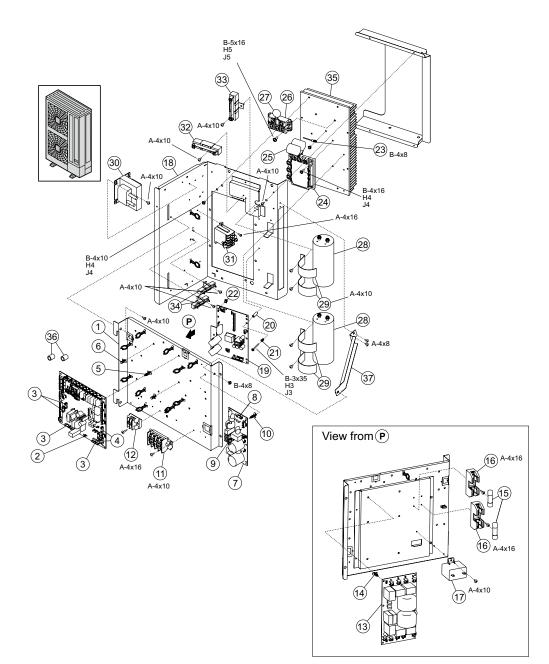
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9.7.2 Electrical parts

LOCATION OF SERVICE PARTS IN THE UNIT

<Electrical Parts> (3\u00e9 400V/50Hz)

MODEL: RAS-12HNP RAS-12HNC



A	Truss Head Tapping Screw	(<i>prese</i>	F	Stud Bolt	
в	Round Head Screw		G	Nut	0
С	Flat Head Screw		н	Washer	0
D	Pan Head Tapping Screw	(Januar)	J	Spring Lock Washer	0
Е	Hexagon Head Bolt		к	Toothed Lock Washer	٩

NOTE: The unicromated coating is applied to iron and steel material for the unspecified materials of the bolt and screw.

NOTE:

The parts without order number are the custom-ordered, and these are not mentioned in the price list. When ordering them, the part name and the drawing number are required. Contact your HITACHI distributor for the delivery date and price about them.

Spare Parts Document: SPN-201302

9.7.3 Parts name

• Cycle and structural parts

Part name	Remarks	No.	Part name	Remarks
Cabinet Panel	Shroud	39	Solenoid Valve Assy	SVF
Cabinet Panel	Bell-mouth	40	Solenoid Valve	Nichiden Industry, SR10D
Air Grille		41	Coil	Nichiden Industry, SR10D
Handle		42	Strainer	
Cabinet Panel	Service Cover	43	Piping Assy	
Cabinet Panel	Lower Service Cover	44	Reversing Valve	SAGINOMIYA, STF-0712G
Cabinet Panel	Upper Cover Assy	45	Coil	SAGINOMIYA, VHV- 01AP552B1
Protection Net		46	Check Valve	
Cabinet Panel	Rear Cover Assy	-10		for High Pressure Protec-
Piping Cover H-Cover		47	Pressure Switch	tion, SAGINOMIYA, ACB- DB157
-	M5			for Pd Control, SAGINOMI-
	wio -	48	Pressure Sensor	YA, NSK-BD050D-282
	DC138W 8P	49	Check Joint	
		50	Solenoid Valve Assy	SVA
	,	51	Solenoid Valve	Nichiden Industry, SR10D
		52	Coil	Nichiden Industry, SR10D
		53	Oil Separator	
		54	Solenoid Valve Assy	SVC (RAS-12HNP)
Closing Nut		55	Solenoid Valve	Nichiden Industry, SR10D (RAS-12HNP)
Piping Cover				Nichiden Industry, SR10D
Cabinet Panel	Side Cover	56	Coil	(RAS-12HNP)
Compressor	DA65PHD-D1SE2	57	Stop Valve	
Vibration Absorber		58	Stop Valve	
Vibration Absorber		59	Screw	
Nut		60	Valve Stay	
Crankcase Heater	240V-40W	61	Thermo Attaching Plate	
		62	Screw	M5
•	Lower Side	63	HITACHI Label	
		64	Thermistor	for Outdoor Temp.
Ũ	Opper Side	65	Thermistor	for Pipe Temp.
		66	Thermistor	for Discharge Gas Temp.
				for Compressor
, ,			Ū	P
				for Low Pressure, SAGINO-
	SAGINOWITA, UKV-UU29E	69	Pressure Switch	MIYA, LCB-DB20
Strainer				
	Cabinet Panel Cabinet Panel Air Grille Handle Cabinet Panel Cabinet Panel Cabinet Panel Protection Net Cabinet Panel Protection Net Cabinet Panel Piping Cover H-Cover Screw Motor Clamp Fan Motor Fan Motor Fan Motor Screw Screw Propeller Fan Washer Closing Nut Piping Cover Cabinet Panel Compressor Vibration Absorber Vibration Absorber	Cabinet PanelShroudCabinet PanelBell-mouthAir Grille-Handle-Cabinet PanelService CoverCabinet PanelLower Service CoverCabinet PanelUpper Cover AssyProtection Net-Cabinet PanelRear Cover AssyPiping Cover-ScrewM5Motor Clamp-Fan MotorDC138W, 8PFan MotorSUS, M6ScrewSUS, M6ScrewSUS, M8Propeller Fanf544Washer-Closing Nut-Piping Cover-Cobinet PanelSide CoverClosing Nut-Piping Cover-Choren FanSide CoverCompressorDA65PHD-D1SE2Vibration Absorber-Nut-Rubber CapLower SideHeat ExchangerLower SideHeat ExchangerUpper SidePartition Plate-Accumulator-Expansion Valve Assy-CoilSAGINOMIYA, UKV-32D28	Cabinet PanelShroud39Cabinet PanelBell-mouth40Air Grille41Handle42Cabinet PanelService Cover43Cabinet PanelLower Service Cover44Cabinet PanelUpper Cover Assy45Protection Net46Cabinet PanelRear Cover Assy47Cabinet PanelRear Cover Assy47Protection Net48Motor Clamp49Fan MotorDC138W, 8P50ScrewSUS, M652ScrewSUS, M652ScrewSUS, M852ScrewSUS, M852Propeller Fanf54453Vasher5657Cabinet PanelSide CoverCabinet PanelSide CoverScrewDA65PHD-D1SE257Vibration Absorber58Vibration Absorber58Vibration Absorber60Crankcase Heater240V-40WSoundproof Cover61Rubber CapLower SideHeat ExchangerUpper SideHeat ExchangerUpper SideAccumulator63Accumulator64Expansion Valve Assy67CoilSAGINOMIYA, UKV-32D28GoilSAGINOMIYA, UKV-029EGoilSAGINOMIYA, UKV-029EGoilSAGINOMIYA, UKV-029EGoilSAGINOMIYA, UKV-029EGoilSAGINOMIYA, UKV-029EGoilSAGINOMIYA, UKV-029E	Cabinet PanelShroud39Solenoid Valve AssyCabinet PanelBell-mouth40Solenoid ValveAir Grille41CoilHandle42StrainerCabinet PanelService Cover43Piping AssyCabinet PanelUpper Cover Assy45CoilProtection Net46Check ValveCabinet PanelRear Cover Assy46Check ValveCabinet PanelRear Cover Assy46Check ValvePiping Cover47Pressure SwitchH-Cover5Solenoid Valve AssyScrewM548Pressure SensorMotor Clamp49Check JointFan MotorDC138W, 8P50Solenoid Valve AssyScrewSUS, M652CoilScrewSUS, M653Oil SeparatorScrewSUS, M654Solenoid Valve AssyVibration Absorber55Solenoid Valve AssyClosing Nut55Solenoid ValvePiping Cover56CoilVibration Absorber59ScrewNut60Valve StayCrankcase Heater240V-40WHeat ExchangerLower SideHeat ExchangerUpper SideHeat ExchangerUpper SideHeat ExchangerUpper SideHeat ExchangerUpper SideHeat ExchangerSAGINOMIYA, UKV-32D28CoilSAGINOMIYA, UKV-32D28GoilSAGINOMIYA, UKV-32D28GoilSAGINOMIYA, UK

• Electrical parts

1Metal Platefor Control (PO101-S)2Fuseon Control PCB, 250V 5A3Fuseon Control PCB, 250V 10A5Plastic Material-6Plastic Materialon DC Fan Control (PO121-S)8Fuseon DC Fan Control PCB, 250V 1A9Fuseon DC Fan Control PCB, 250V 1A10Plastic Material-11Terminal Blockfor Power Source12Terminal Blockfor Power Source13Noise Filter-14Plastic Material-15Fuse40A16Fuse40A17Capacitor440V 10µF18Metal Plate-19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material-21Plastic Material-22Plastic Material-23ThermistorInverter Fin24Transistor Module-25Capacitor Assyfor Noise Suppressor26Diode Module-27Varistor-28Capacitor Assyfor Noise Suppressor29Attaching Plate-30Reactor1.0mH31Mag. Contactor-32Resistor6.3kQ33Resistor500Q34Resistor500Q35Radiation Fin-36Ferrite Core-37Stay- <th>No.</th> <th>Part name</th> <th>Remarks</th>	No.	Part name	Remarks
3Fuseon Control PCB, 250V 5A3Fuseon Control PCB, 250V 10A5Plastic Material-6Plastic Materialfor DC Fan Control (PO121-S)8Fuseon DC Fan Control PCB, 250V 5A9Fuseon DC Fan Control PCB, 250V 5A9Fuseon DC Fan Control PCB, 250V 1A10Plastic Material-11Terminal Blockfor Power Source12Terminal Blockfor Transmission13Noise Filter40A14Plastic Material-15Fuse40A16Fuse Holder-17Capacitor440V 10µF18Metal Plate19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material-21Plastic Material-22Plastic Material-23ThermistorInverter Fin24Transistor Module-25Capacitor Assyfor Noise Suppressor26Diode Module-27Varistor-28Capacitor Assyfor Noise Suppressor29Attaching Plate-30Reactor1.0mH31Mag. Contactor-32Resistor6.3kQ33Resistor500Q34Resistor500Q35Radiation Fin36Ferrite Core	1	Metal Plate	
4Fuseon Control PCB, 250V 10A5Plastic Material6Plastic Material7Printed Circuit Boardfor DC Fan Control (PO121-S)8Fuseon DC Fan Control PCB, 250V 5A9Fuseon DC Fan Control PCB, 250V 1A10Plastic Material11Terminal Blockfor Power Source12Terminal Blockfor Transmission13Noise Filter14Plastic Material15Fuse40A16Fuse Holder17Capacitor440V 10µF18Metal Plate19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material21Plastic Material22Plastic Material23ThermistorInverter Fin24Transistor Module25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor Assyfor Noise Suppressor29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kQ33Resistor500Q34Resistor500Q35Radiation Fin36Ferrite Core	2	Printed Circuit Board	for Control (PO101-S)
5Plastic Material6Plastic Material7Printed Circuit Boardfor DC Fan Control (PO121-S)8Fuseon DC Fan Control PCB, 250V 5A9Fuseon DC Fan Control PCB, 250V 1A10Plastic Materialfor Power Source11Terminal Blockfor Transmission12Terminal Blockfor Transmission13Noise Filter40A14Plastic Materialfor Inverter Control (PV093-S)15Fuse40A16Fuse Holderfor Inverter Control (PV093-S)17Capacitorfor Inverter Control (PV093-S)18Metal Platefor Inverter Control (PV093-S)19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Materialfor Inverter Fin21Plastic Materialfor Noise Suppressor22Plastic Materialfor Noise Suppressor23Thermistorfor Noise Suppressor24Transistor Modulefor Noise Suppressor25Capacitor Assyfor Noise Suppressor26Diode Modulefor Noise Suppressor27Varistorfor Noise Suppressor28Capacitor Assyfor Noise Suppressor29Attaching Platefor Noise Suppressor20Reactor1.0mH21Mag. Contactorfor SiQ22Resistor6.3kQ33Resistorfor SiQ34Resistorfor SiQ35Radiation	3	Fuse	on Control PCB, 250V 5A
6Plastic Material7Printed Circuit Boardfor DC Fan Control (PO121-S)8Fuseon DC Fan Control PCB, 250V 5A9Fuseon DC Fan Control PCB, 250V 1A10Plastic Material11Terminal Blockfor Power Source12Terminal Blockfor Transmission13Noise Filter14Plastic Material15Fuse40A16Fuse Holder17Capacitor440V 10μF18Metal Plate19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material21Plastic Material22Plastic Material23ThermistorInverter Fin24Transistor Module25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor Assyfor Noise Suppressor29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kQ33Resistor10.5kQ34Resistor500Q35Radiatin Fin36Ferrite Core	4	Fuse	on Control PCB, 250V 10A
7Printed Circuit Boardfor DC Fan Control (PO121-S)8Fuseon DC Fan Control PCB, 250V 5A9Fuseon DC Fan Control PCB, 250V 1A10Plastic Material	5	Plastic Material	
8Fuseon DC Fan Control PCB, 250V 5A9Fuseon DC Fan Control PCB, 250V 1A10Plastic Material11Terminal Blockfor Power Source12Terminal Blockfor Transmission13Noise Filter14Plastic Material15Fuse40A16Fuse Holder17Capacitor440V 10μF18Metal Plate19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material21Plastic Material22Plastic Material23ThermistorInverter Fin24Transistor Module25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor Assyfor Noise Suppressor29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kΩ33Resistor500Ω34Resistor500Ω35Radiation Fin36Ferrite Core	6	Plastic Material	
9Fuseon DC Fan Control PCB, 250V 1A10Plastic Material11Terminal Blockfor Power Source12Terminal Blockfor Transmission13Noise Filter14Plastic Material15Fuse40A16Fuse Holder17Capacitor440V 10μF18Metal Plate19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material21Plastic Material22Plastic Material23ThermistorInverter Fin24Transistor Module25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor450V 4700μF29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kΩ33Resistor500Ω34Resistor500Ω35Radiation Fin36Ferrite Core	7	Printed Circuit Board	for DC Fan Control (PO121-S)
10Plastic Material11Terminal Blockfor Power Source12Terminal Blockfor Transmission13Noise Filterfor Transmission14Plastic Materialfor Transmission15Fuse40A16Fuse Holderfor Inverter Control (PV093-S)17Capacitor440V 10µF18Metal Plate19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material21Plastic Material22Plastic Material23Thermistor24Transistor Module25Capacitor Assy26Diode Module27Varistor28Capacitor29Attaching Plate30Reactor31Mag. Contactor32Resistor33Resistor34Resistor35Radiation Fin36Ferrite Core	8	Fuse	on DC Fan Control PCB, 250V 5A
11Terminal Blockfor Power Source12Terminal Blockfor Transmission13Noise Filterfor Transmission14Plastic Material-15Fuse40A16Fuse Holder440V 10μF18Metal Plate-19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material-21Plastic Material-22Plastic Material-23ThermistorInverter Fin24Transistor Module-25Capacitor Assyfor Noise Suppressor26Diode Module-27Varistor-28Capacitor450V 4700μF29Attaching Plate-30Reactor1.0mH31Mag. Contactor-32Resistor6.3kΩ33Resistor500Ω34Resistor Fin35Radiation Fin-36Ferrite Core-	9	Fuse	on DC Fan Control PCB, 250V 1A
12Terminal Blockfor Transmission12Terminal Blockfor Transmission13Noise Filter14Plastic Material15Fuse40A16Fuse Holder440V 10μF17Capacitor440V 10μF18Metal Plate19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material21Plastic Material22Plastic Material23ThermistorInverter Fin24Transistor Module25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor450V 4700μF29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor500Ω33Resistor500Ω34Resistor500Ω35Radiation Fin36Ferrite Core	10	Plastic Material	
13Noise FilterImage: Addition of the section o	11	Terminal Block	for Power Source
14Plastic Material14Plastic Material15Fuse40A16Fuse Holder17Capacitor440V 10μF18Metal Plate19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material21Plastic Material22Plastic Material23ThermistorInverter Fin24Transistor Modulefor Noise Suppressor25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor450V 4700μF29Attaching Plate30Reactor1.0mH31Mag. Contactor6.3kΩ33Resistor500Ω34Resistor500Ω35Radiation Fin36Ferrite Core	12	Terminal Block	for Transmission
15Fuse40A15Fuse Holder440V 10μF16Fuse Holder440V 10μF17Capacitor440V 10μF18Metal Platefor Inverter Control (PV093-S)19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material-21Plastic Material-22Plastic Material-23ThermistorInverter Fin24Transistor Module-25Capacitor Assyfor Noise Suppressor26Diode Module-27Varistor-28Capacitor450V 4700μF29Attaching Plate-30Reactor1.0mH31Mag. Contactor6.3kΩ32Resistor6.00Ω33Resistor500Ω34Resistor500Ω35Radiation Fin-36Ferrite Core-	13	Noise Filter	
16Fuse HolderHor16Fuse Holder440V 10μF17Capacitor440V 10μF18Metal Platefor Inverter Control (PV093-S)19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material-21Plastic Material-22Plastic Material-23ThermistorInverter Fin24Transistor Module-25Capacitor Assyfor Noise Suppressor26Diode Module-27Varistor-28Capacitor450V 4700μF29Attaching Plate-30Reactor1.0mH31Mag. Contactor-32Resistor6.3kΩ33Resistor500Ω34Resistor500Ω35Radiation Fin-36Ferrite Core-	14	Plastic Material	
17Capacitor440V 10μF18Metal Plate440V 10μF18Metal Platefor Inverter Control (PV093-S)19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material-21Plastic Material-22Plastic Material-23ThermistorInverter Fin24Transistor Modulefor Noise Suppressor25Capacitor Assyfor Noise Suppressor26Diode Module-27Varistor450V 4700μF29Attaching Plate-30Reactor1.0mH31Mag. Contactor6.3kΩ33Resistor500Ω34Resistor500Ω35Radiation Fin-36Ferrite Core-	15	Fuse	40A
18Metal PlateFinited Circuit Boardfor Inverter Control (PV093-S)19Printed Circuit Boardfor Inverter Control (PV093-S)20Plastic Material-21Plastic Material-22Plastic MaterialInverter Fin23ThermistorInverter Fin24Transistor Module-25Capacitor Assyfor Noise Suppressor26Diode Module-27Varistor-28Capacitor450V 4700μF29Attaching Plate-30Reactor1.0mH31Mag. Contactor6.3kΩ33Resistor500Ω34Resistor Fin35Radiation Fin-36Ferrite Core-	16	Fuse Holder	
19Printed Circuit Board Plastic Materialfor Inverter Control (PV093-S)20Plastic Material-21Plastic Material-22Plastic Material-23ThermistorInverter Fin24Transistor Modulefor Noise Suppressor25Capacitor Assyfor Noise Suppressor26Diode Module-27Varistor-28Capacitor450V 4700μF29Attaching Plate-30Reactor1.0mH31Mag. Contactor6.3kΩ32Resistor500Ω34Resistor500Ω35Radiation Fin-36Ferrite Core-	17	Capacitor	440V 10µF
20Plastic Material21Plastic Material22Plastic Material23ThermistorInverter Fin24Transistor Module25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor A29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kΩ33Resistor34Resistor35Radiation Fin36Ferrite Core	18	Metal Plate	
21Plastic Material22Plastic Material23ThermistorInverter Fin24Transistor Module25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor A29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kΩ33Resistor500Ω34Resistor Fin36Ferrite Core	19	Printed Circuit Board	for Inverter Control (PV093-S)
Plastic Material22Plastic Material23ThermistorInverter Fin24Transistor Module25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor450V 4700µF29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kΩ33Resistor500Ω34Resistor35Radiation Fin36Ferrite Core	20	Plastic Material	
23ThermistorInverter Fin24Transistor Module125Capacitor Assyfor Noise Suppressor26Diode Module127Varistor450V 4700μF28Capacitor450V 4700μF29Attaching Plate130Reactor1.0mH31Mag. Contactor6.3kΩ33Resistor500Ω34Resistor500Ω35Radiation Fin136Ferrite Core1	21	Plastic Material	
24Transistor Module25Capacitor Assyfor Noise Suppressor26Diode Module27Varistor28Capacitor450V 4700μF29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kΩ33Resistor500Ω34Resistor35Radiation Fin36Ferrite Core	22	Plastic Material	
25Capacitor Assyfor Noise Suppressor26Diode Module-27Varistor-28Capacitor450V 4700μF29Attaching Plate-30Reactor1.0mH31Mag. Contactor-32Resistor6.3kΩ33Resistor500Ω34Resistor500Ω35Radiation Fin36Ferrite Core	23	Thermistor	Inverter Fin
26Diode Module27Varistor28Capacitor450V 4700μF29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kΩ33Resistor10.5kΩ34Resistor500Ω35Radiation Fin36Ferrite Core	24	Transistor Module	
27Varistor28Capacitor450V 4700μF29Attaching Plate	25	Capacitor Assy	for Noise Suppressor
28Capacitor450V 4700μF29Attaching Plate-30Reactor1.0mH31Mag. Contactor-32Resistor6.3kΩ33Resistor500Ω34Resistor500Ω35Radiation Fin36Ferrite Core	26	Diode Module	
29Attaching Plate30Reactor1.0mH31Mag. Contactor32Resistor6.3kΩ33Resistor10.5kΩ34Resistor500Ω35Radiation Fin36Ferrite Core	27	Varistor	
30Reactor1.0mH31Mag. Contactor32Resistor6.3kΩ33Resistor10.5kΩ34Resistor500Ω35Radiation Fin36Ferrite Core	28	Capacitor	450V 4700µF
31Mag. Contactor32Resistor6.3kΩ33Resistor10.5kΩ34Resistor500Ω35Radiation Fin36Ferrite Core	29	Attaching Plate	
32Resistor6.3kΩ33Resistor10.5kΩ34Resistor500Ω35Radiation Fin36Ferrite Core	30	Reactor	1.0mH
33Resistor10.5kΩ34Resistor500Ω35Radiation Fin36Ferrite Core	31	Mag. Contactor	
34Resistor500Ω35Radiation Fin36Ferrite Core	32	Resistor	6.3kΩ
35 Radiation Fin 36 Ferrite Core	33	Resistor	10.5kΩ
36 Ferrite Core	34	Resistor	500Ω
	35	Radiation Fin	
37 Stay	36	Ferrite Core	
	37	Stay	

10

10. Servicing

Índice

10.1.	Introdu	iction		
10.2.	Servici	ng for Out	door Units RAS-(2-2.5)HVNP and RAS-3HVNC	
	10.2.1.	Removing	pipe cover	
	10.2.2.	Removing	front cover	
	10.2.3.	Removing	outdoor fan	
	10.2.4.	Removing	the compressor	
	10.2.5.	Removing	high pressure switch and pressure switch for control	
	10.2.6.	Removing	four-way valve coil	
	10.2.7.	Removing	electronic expansion valve coil	
	10.2.8.	Removing	electrical components	
10.3.	Servici	ng for Prei	mium series	
	10.3.1.	Outdoor u	nit RAS-3HVNPE	
		10.3.1.1.	Removing service cover	
		10.3.1.2.	Remove outlet grille	
		10.3.1.3.	Removing upper cover	
		10.3.1.4.	Removing bottom service cover and rear cover	
		10.3.1.5.	Removing outdoor fan motor	
		10.3.1.6.	Removing electrical box	
		10.3.1.7.	Removing the compressor	
		10.3.1.8.	Removing the High pressure switch and Pressure switch for control	
		10.3.1.9.	Opening electrical box (P plate)	
		10.3.1.10.	Removing Reversing valve coil	
		10.3.1.11.	Removing electronic expansion valve coil	
		10.3.1.12.	Removing solenoid valve coil (SVC)	
		10.3.1.13.	Removing reversing valve	
		10.3.1.14.	Removing Electronic expansion Valve and Solenoid Valve	
		10.3.1.15.	Removing electrical components	
		10.3.1.16.	Removing other electrical components	
	10.3.2.	Outdoor u	nits RAS-(4-6)H(V)NPE	
		10.3.2.1.	Removing service cover	
		10.3.2.2.	Removing air outlet grille	
		10.3.2.3.	Removing upper cover	
		10.3.2.4.	Removing the bottom service cover and rear cover	
		10.3.2.5.	Removing outdoor fan motor	
		10.3.2.6.	Removing electrical box	

	10.3.2.7.	Removing the compressor	350
	10.3.2.8.	Removing the High pressure switch and Pressure switch for control	353
	10.3.2.9.	Opening electrical box (P plate)	354
	10.3.2.10.	Removing Reversing valve coil	354
	10.3.2.11.	Removing electronic expansion valve coil	355
	10.3.2.12.	Removing solenoid valve coil (SVA and SVC)	355
	10.3.2.13.	Removing reversing valve	356
	10.3.2.14.	Removing Electronic expansion Valve and Solenoid Valve	357
	10.3.2.15.	Removing electrical components	358
	10.3.2.16.	Removing other electrical components	359
10.3.3.	Oudoor un	its RAS-(8-10)HNPE	360
	10.3.3.1.	Removing service cover	360
	10.3.3.2.	Removing air outlet grille	360
	10.3.3.3.	Removing upper cover	361
	10.3.3.4.	Removing the bottom service cover and rear cover	361
	10.3.3.5.	Removing outdoor fan motor	362
	10.3.3.6.	Removing electrical box	363
	10.3.3.7.	Removing the compressor	364
	10.3.3.8.	Removing High pressure switch and pressure switch for control	367
	10.3.3.9.	Opening electrical box (P-Mounting Plate)	367
	10.3.3.10.	Removing reversing valve coil	368
	10.3.3.11.	Removing electronic expansion valve coil	369
	10.3.3.12.	Removing solenoid valve coil (SVA and SVC)	369
	10.3.3.13.	Removing reversing valve	370
	10.3.3.14.	Removing Electronic expansion Valve and Solenoid Valve	371
	10.3.3.15.	Removing electrical components	372
	10.3.3.16.	Removing other electrical components	374
10.3.4.	Outdoor U	nits RAS-12HNP	375
	10.3.4.1.	Removing service cover	375
	10.3.4.2.	Removing air outlet grille	375
	10.3.4.3.	Removing upper cover	376
	10.3.4.4.	Removing the bottom service cover and rear cover	376
	10.3.4.5.	Removing outdoor fan motor	377
	10.3.4.6.	Removing electrical box	378
	10.3.4.7.	Removing the compressor	379
	10.3.4.8.	Removing High pressure switch and pressure switch for control	382
	10.3.4.9.	Removing reversing and solenoid valves coils	383
	10.3.4.10.	Removing electronic expansion valve coil	384
		Removing reversing valve	
		Removing Electronic expansion Valve and Solenoid Valve	
		Removing electrical components	
		Removing other electrical components	

10.4.	Servici	ng for Star	ndard Series	
	10.4.1.	Outdoor U	Inits RAS-(4-6)H(V)NCE	
		10.4.1.1.	Removing service cover	
		10.4.1.2.	Remove outlet grille	
		10.4.1.3.	Removing upper cover	
		10.4.1.4.	Removing bottom service cover and rear cover	
		10.4.1.5.	Removing outdoor fan motor	
		10.4.1.6.	Removing electrical box	
		10.4.1.7.	Removing the compressor	
		10.4.1.8.	Removing the High pressure switch and Pressure switch for control	401
		10.4.1.9.	Opening electrical box (P plate)	
		10.4.1.10.	Removing Reversing valve coil	
		10.4.1.11.	Removing electronic expansion valve coil	
		10.4.1.12.	Removing solenoid valve coil (SVA)	
		10.4.1.13.	Removing reversing valve	
		10.4.1.14.	Removing Electronic expansion valve and Solenoid valve	405
		10.4.1.15.	Removing electrical components	
		10.4.1.16.	Removing other electrical components	
	10.4.2.	Outdoor U	Inits RAS-(8-10)HNCE	
		10.4.2.1.	Removing service cover	
		10.4.2.2.	Removing air outlet grille	
		10.4.2.3.	Removing upper cover	
		10.4.2.4.	Removing the bottom service cover and rear cover	409
		10.4.2.5.	Removing outdoor fan motor	
		10.4.2.6.	Removing electrical box	411
		10.4.2.7.	Removing the compressor	
		10.4.2.8.	Removing High pressure switch and pressure switch for control	415
		10.4.2.9.	Opening electrical box (P-Mounting Plate)	
		10.4.2.10.	Removing reversing valve coil	
		10.4.2.11.	Removing electronic expansion valve coil	
		10.4.2.12.	Removing solenoid valve coil (SVA)	
		10.4.2.13.	Removing reversing valve	
		10.4.2.14.	Removing Electronic expansion Valve and Solenoid Valve	
		10.4.2.15.	Removing electrical components	
		10.4.2.16.	Removing other electrical components	
	10.4.3.	Outdoor U	nits RAS-12HNC	
		10.4.3.1.	Removing service cover	
		10.4.3.2.	Removing air outlet grille	
		10.4.3.3.	Removing upper cover	
		10.4.3.4.	Removing the bottom service cover and rear cover	
		10.4.3.5.	Removing outdoor fan motor	
		10.4.3.6.	Removing electrical box	

10.4.3.7.	Removing High pressure switch and pressure switch for control	430
10.4.3.8.	Opening electrical box (P-Mounting Plate)	430
10.4.3.9.	Removing reversing and solenoid valves coils	431
10.4.3.10.	Removing electronic expansion valve coil	
10.4.3.11.	Removing reversing valve	
10.4.3.12.	Removing Electronic expansion Valve and Solenoid Valve	
10.4.3.13.	Removing electrical components	
10.4.3.14.	Removing other electrical components	

10.1 Introduction



- Before performing any of the service operations described in this chapter turn all the main switches off and the place security lockers or convenient warning indicators in order to prevent them from turning on accidentally.
- In case of blocked or stucked parts use appropiated tools and eventually lubricants to release them.
- In case of sharped edged parts as covers use security gloves to avoid getting injured.
- When performing brazing work besides security gloves it is must to wear convenient eye protection.
- Check and be sure that the LED201 (Red) on the inverter PCB is OFF for all electrical maintenance.
- Do NOT touch the electrical components when the LED201 (Red) on the inverter PCB is ON to avoid electrical shock.

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- All compressors are connected by brazing. Check to ensure whether there are flammable things around or not when using a burner for pipe connections if not oil existing pipe inside may ignite.
- Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid mixing the water and foreign particles into the refrigerant cycle. After removing compressor replace it quickly. If exposed for a long period seal the suction pipe and discharge pipe.
- Remove the cap for the compressor just before replacing the compressor. Before mounting the compressor seal the suction pipe and discharge pipe with a tape to protect the compressor from foreign particles. Remove the tape at pipe connection.

10.2 Servicing for Outdoor Units RAS-(2-2.5)HVNP and RAS-3HVNC

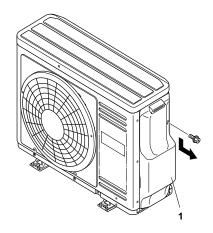
10.2.1 Removing pipe cover

Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.

Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.

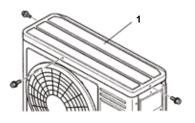
1 Remove pipe cover downward after removing 1 screw.

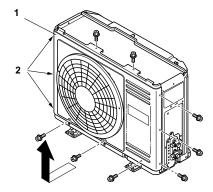
1. Pipe cover.



10.2.2 Removing front cover

- 1 Remove the pipe cover following *Removing pipe cover*.
- 2 Remove 3 fixing screws and remove the upper cover.
- 3 To remove the front cover remove 8 fixing screws and 3 left nails.





1. Upper cover.

Front cover. Nails.

10.2.3 Removing outdoor fan

- 1 Remove the pipe cover following *Removing pipe cover*.
- 2 Remove 3 fixing screws and remove the upper cover.
- 3 Remove the front cover following *Removing front cover*.
- 4 To remove the propeller fan remove the cap nut which fixes the propeller fan onto the motor shaft.

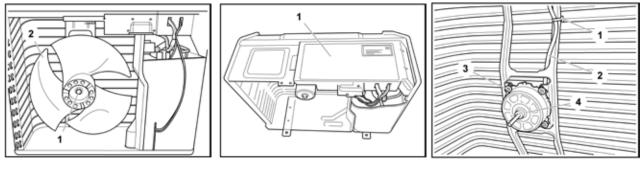
i_{NOTE}

- Use a puller when the propeller fan and motor shaft are fixed too tightly.
- The cap nut is left thread. For removal turn to the reverse direction to the propeller fan.



- 5 Remove the electrical box cover.
- 6 Remove the fan motor connector (CN24) inserted into the PCB in the electrical box. Remove the fan motor lead wire fixed onto the motor clamp using a cord band.

Remove 4 screws which fixes the motor.



1. Cap nut.

1. Electrical box cover.

- 1. Cord band.
- 2. Fan motor lead wire.

2. Propeller fan.

3. Four (4) screws. 4. Fan motor.

i)_{note}

- To mount the motor be sure to place the lead wire outlet downward.
- Fix the motor lead wire onto the motor clamp using a cord band as before to avoid obstructing the propeller fan.
- Mounting the propeller fan:
- Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 3.0 Nm).
- Connect the motor lead wire to the electrical box PCB. (To connect insert into the connector (CN24) on the PCB).

10.2.4 Removing the compressor

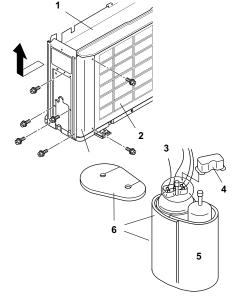


- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal to the suction and discharge pipes when the refrigerant cycle is left unattached for a prolonged time.
- Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape at pipe connection.
- To connect wiring at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage the compressor.
- Remove the pipe cover following *Removing pipe cover*. 1

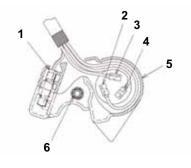
When the outdoor unit is installed close to a wall move the unit from the wall removing the refrigerant piping.

- 2 Collect the refrigerant from the check joint.
- 3 Remove the front cover following *Removing front cover*.

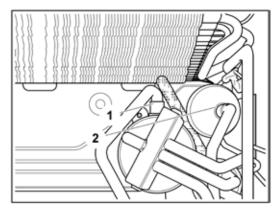
- 4 Remove 7 fixing screws and remove the side cover.
 - 1. Electrical box.
 - 2. Heat exchanger.
 - 3. Compressor-top thermistor.
 - 4. Compressor wiring.
 - 5. Terminal cover.
 - 6. Side cover Soundproof cover.



- **5** Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and remove the thermistor on top of the compressor.
- Check the wiring color and layout when disconnecting. Connecting wires in wrong order at reassembling may result in compressor damage.
 - 1. Compressor-Top Thermistor Mount onto Terminal Cover with Metal
 - Fitting. 2. Yellow. 3. White. 4. Red.
 - 5. Terminal cover.
 - 6. M5 nut.



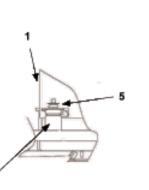
- 6 Remove the suction and discharge pipes from the compressor.
- Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.
 - 1. Blazing Discharge pipe.
 - 2. Blazing Suction pipe.

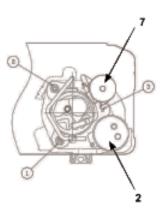




- 7 Remove push nuts A and B which fixes the compressor. Lift the compressor and remove from the unit body. (C in the figure does not have a push nut).
 - **a.** Check if the Faston terminal has any abnormality when replacing the compressor. (Ensure the pull out force greater than 20 N)If the Faston terminal is identified faulty replace to a new one.
 - **b.** Ensure the fixture of the lead wires.

- 1. Compressor.
- 2. Accumulator.
- 3. Push nut.
- 4. Vibration-proof rubber.
- 5. Two push nuts.
- 6. Three vibration-proof rubber.
- 7. Accumulator.





10.2.5 Removing high pressure switch and pressure switch for control

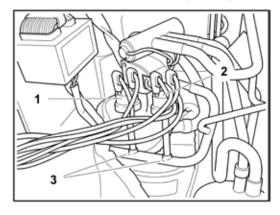
- 1 Remove the pipe cover following *Removing pipe cover*.
- 2 Remove 3 fixing screws and remove the upper cover.
- 3 Remove the front cover following *Removing front cover*.
- 4 Collect the refrigerant from the check joint.
- **5** Disconnect the Faston Terminals.
- 6 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.

1. High pressure switch.

2. Pressure switch for control.

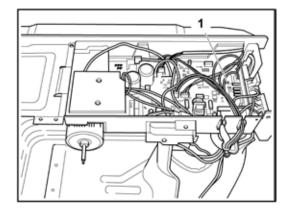
3. Brazing.

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10.2.6 Removing four-way valve coil

- 1 Remove the pipe cover following *Removing pipe cover*.
- 2 Remove 3 fixing screws and remove the upper cover.
- 3 Remove the front cover following *Removing front cover*.
- 4 Remove the electrical box cover.
- 5 Disconnect the PCN6 connector on the control PCB of the electrical box.
 - 1: PCN6 Connector (Green)



6 Remove 1 fixing screw to remove the 4-way valve coil.

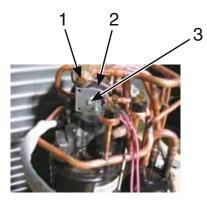
1. 4-way valve.

2. 4-way valve coil.

3. Screw.

NOTE

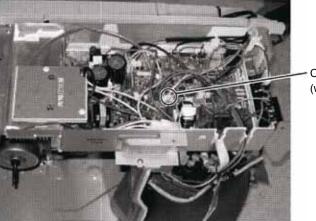
DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.



10.2.7 Removing electronic expansion valve coil

- 1 Remove the pipe cover following *Removing pipe cover*.
- 2 Remove 3 fixing screws and remove the upper cover.
- 3 Remove the front cover following *Removing front cover*.
- 4 Remove the electrical box cover.
- 5 Remove 7 fixing screws and remove the side cover.
- 6 Remove the CN5A connector on the control PCB of the electrical box.

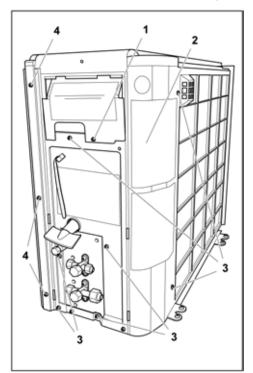
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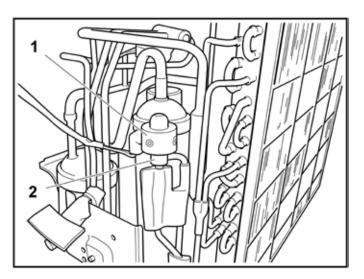


CN5A connector (white)



7 Hold and disconnect the coil of the expansion valve. The expansion valve coil is equipped with a lock mechanism. Ensure that the coil is locked when replacing.





- 1. One terminal cover screw.
- 2. Side cover.
- 3. Seven side cover screws.
- 4. Three front cover screws.



DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

1. Expansion valve coil.

2. Expansion valve body.

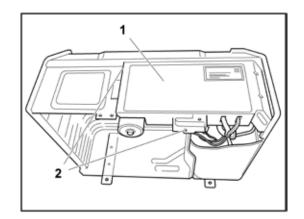
10.2.8 Removing electrical components

Removing Electrical Box

- 1 Remove the pipe cover following *Removing pipe cover*.
- 2 Remove 3 fixing screws and remove the upper cover.
- 3 Remove the electrical box cover.
- 4 Remove 1 fixing screw and remove the terminal cover.
- 5 Disconnect all the wiring connected to the control PCB.
- 6 Remove 2 screws which fix the electrical box.



- 7 Pull up and remove the electrical box.
 - 1. Electrical box cover.
 - 2. Two screws.



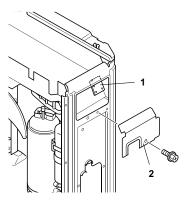
- Removing Display PCB
- 1 Remove the pipe cover following *Removing pipe cover*.
- 2 Remove 1 fixing screw and remove the terminal cover.
- 3 Disconnect all the wiring connected to the display PCB.
- 4 Hold the upper part of 4 holders with long nose pliers and remove the display PCB.

1. Display PCB (PWB2).

2. Terminal cover.

- 3. Long nose pliers.
 - 4. Display PCB.

5. Holder.





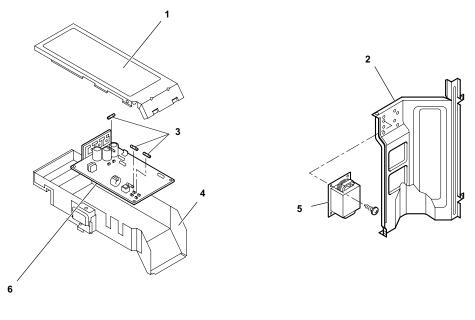
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DO NOT touch electrical components on the PCB. Pay attention not to bend or apply much force onto PCB in order to avoid PCB failure.



- 1 To connect wiring at reassembling ensure that the terminal numbers and wiring mark band codes are matched. Incorrect wiring may result in malfunction or damage of electrical components.
- 2 Different dip switch setting shall be applied for each model when the electrical box is replaced; See chapter 8 "Troubleshooting".
- 3 Pay attention not to clamp any wiring between plates or electrical components when closing electrical box cover or front cover at reassembling.

- Removing other electrical components
- 1 Remove the pipe cover following *Removing pipe cover*.
- 2 Remove 3 fixing screws and remove the upper cover.
- 3 Remove the electrical box cover.
- 4 Removing Electrical Components.
- Remove the fixing screw and remove the reactor.
- To mount components be sure to match the wiring connection with the mark band codes.



- 1. Electrical box cover.
 - 2. Partition plate.
 - 3. Fuse.
 - 4. Electrical box.
 - 5. Reactor.
 - 6. See the note.

i_{note}

- The PCB cannot be removed from the electrical box. To replace PCB the entire electrical box must be replaced.
- DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

10.3 Servicing for Premium series

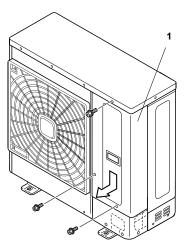
10.3.1 Outdoor unit RAS-3HVNPE

10.3.1.1 Removing service cover



- Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.
- 1 Pull downward and remove the service cover after removing 3 upper and lower fixing screws.
 - Pay attention not to drop the service cover.

1. Service cover.

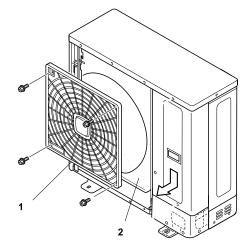


10.3.1.2 Remove outlet grille

1 Remove 4 screws which fix the outlet grille.

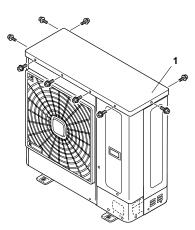
1. Air outlet grille.

2. Shroud.



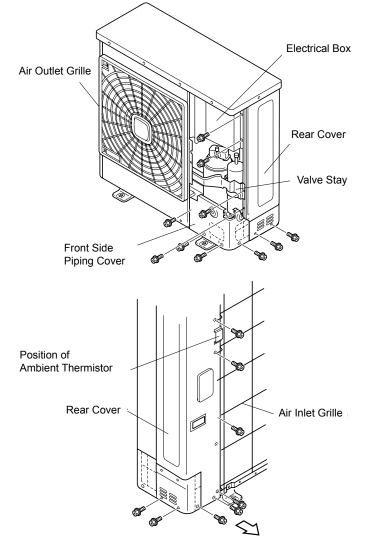
10.3.1.3 Removing upper cover

- 1 Remove the upper cover upward after removing 9 fixing screws.
 - 1. Upper cover.



10.3.1.4 Removing bottom service cover and rear cover

- 1 Remove 5 screws which fix the bottom service cover. Pull and remove the bottom service cover.
- 2 Remove the upper cover following *Removing upper cover*.
- 3 Remove 9 screws which fix the rear cover. Pull backward and remove the rear cover.

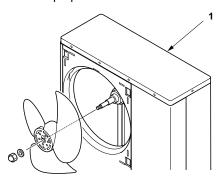


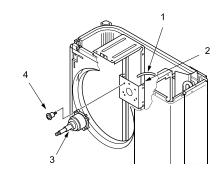
iNOTE Pay attention that the screw length for the ambient thermistor differs from other fixing screws.

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10.3.1.5 Removing outdoor fan motor

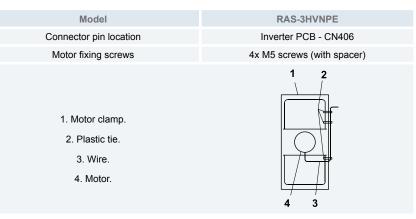
- 1 Remove the service cover following Removing service cover.
- 2 Remove the outlet grille following *Remove outlet grille*.
- 3 Remove the upper cover following *Removing upper cover*.
- 4 To remove the propeller fan remove the cap nut and washer which fix the propeller fan onto the motor shaft. (Use a puller when the propeller fan and motor shaft are fixed too tightly).





- 1. Fan motor lead wire.
- 2. Motor clamp.
 - 3. Motor.
- 4. Screw with spacer.
- 5 Remove the fan motor connector from PCB in the electrical box.

Cut the plastic tie with nippers which fixes the fan motor lead wire onto the motor clamp. Remove 4 screws which fix the motor.



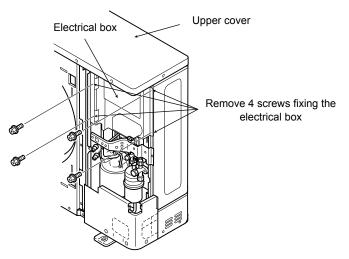
inote

1. Upper cover.

- 1 To mount the motor be sure to place the lead wire outlet downward. (Adjust the propeller fan and shroud not to contact with each other).
- 2 Fix the motor lead wire onto the motor clamp using a plastic tie as shown in the table on the previous page to avoid obstructing the propeller fan.
- 3 Mounting propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 20 Nm)
- 4 Connect the motor lead wire to PCB1 of the electrical box. (Be sure to match colors of the PCB connectors and motor lead wire connectors).
- 5 Be sure to attach the outlet grill onto the shroud after replacing the fan motor.

10.3.1.6 Removing electrical box

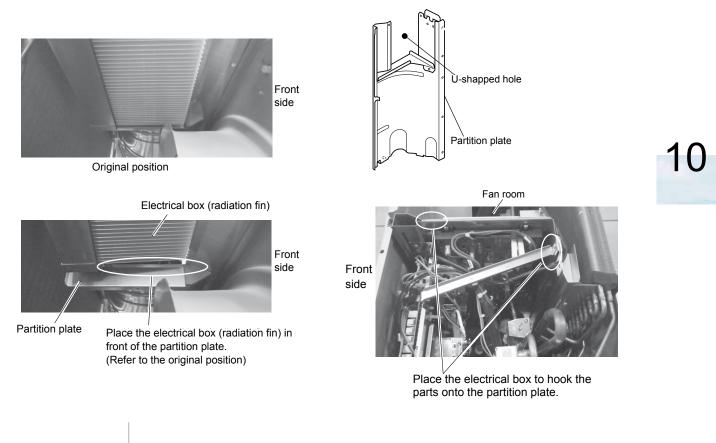
- 1 Remove the service cover following *Removing service cover*.
- 2 Remove the upper cover following *Removing upper cover*.
- 3 Remove 4 screws which fix the electrical box.
- 4 Pull up and remove the electrical box.



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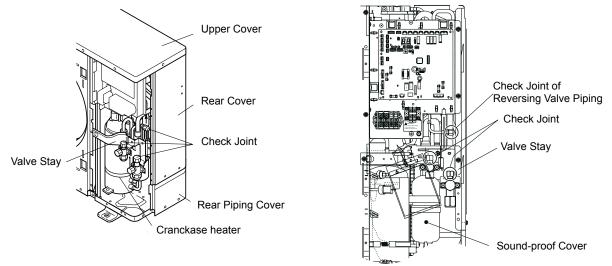
The following wiring must be removed to dismount the electrical box.

- 1. Remove the reversing valve coil from the reversing valve. : Removing reversing valve coil.
- 2. Remove the expansion valve coil from the expansion valve. : Removing electronic expansion valve coil.
- 3. Remove the solenoid valve coil from the solenoid valve. : Removing solenoid valve coil.
- 4. Remove the Faston terminals of high/low pressure switch and the pressure switch for control from the switch body : Removing the high pressure switch, low pressure switch and pressure switch for control.
- 5. Remove all connectors on the control PCB.
- 6. Remove the compressor wires in the terminal box of the compressor.
- 7. To remount the electrical box attach the electrical box fitting with the partition plate. (Insert the radiation fin into the U-notch on the partition plate and place the fin on the fan box side. Then attach the electrical box hooking onto the partition plate).



10.3.1.7 Removing the compressor

- 1 Remove the service cover upper cover bottom service cover and rear cover following *Removing service cover, Removing upper cover,* and *Removing bottom service cover and rear cover.* When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall.
- 2 Remove the electrical box following Removing electrical box.
- **3** Collect the refrigerant from the check joint.
- 4 Remove the valve stay.



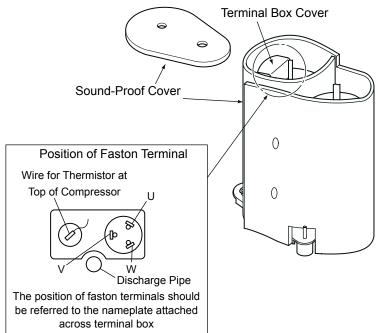
inote

Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.

5 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and remove the thermistor on top of the compressor. Remove the soundproof cover.



Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order at reassembling may result in compressor damage.

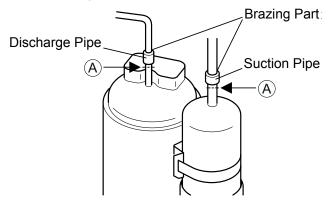




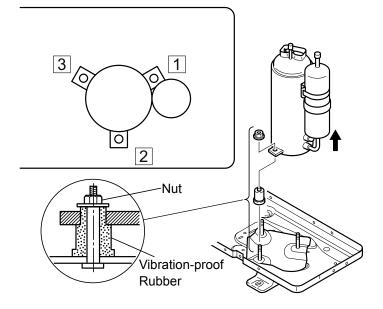
- 6 Remove the crankcase heater.
- 7 Remove the suction pipe and discharge pipe from the compressor. Remove the brazed part after cutting the pipes at "A" by a pipe cutter.

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Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.



8 Remove 1 nut which fix the compressor and remove it by lifting up.



Compressor Position	1	2	3
Vibration-Proof Rubber	0	0	0
Nut	-	0	-

○ : with a nut

: without a nut

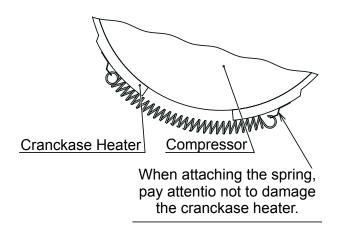
9 When brazing the replaced compressor braze quickly cooling the pipes on the compressor side with wet cloth to avoid the filler metal entering into the compressor.



PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage.



- **10** Perform in the reverse procedure of removing after replacing the compressor.
 - **a.** Check if the Faston terminal has any abnormality. (Ensure the pull out force greater than 20 Nm) If the Faston terminal is identified faulty replace with a new one.
 - **b.** Ensure the fixture of the lead wires.
 - c. Attach the cranckase heater to the compressor without torsion and gap as shown in the figure below.
 - Detail of Spring for Cranckase Heater



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- To prevent contamination of the refrigerant by water or foreign materials, do not expose the refrigerant parts open to atmosphere for long periods. If necessary, seal pipe ends using caps or tape.
- Remove the cap for compressor right before replacing the compressor. When replacing the compressor, seal the tape at the suction and the discharge pipes to prevent foreign materials. Remove it when brazing pipes.
- Securely check terminal numbers and mark bands before disconnecting lead wires. When reassembling the lead wires, connect them to match surely the terminal numbers and the mark bands. If the lead wires are connected incorrectly to the terminal, the compressor will be damaged due to reverse rotation.



10.3.1.8 Removing the High pressure switch and Pressure switch for control

- 1 Remove the service cover following Removing service cover.
- 2 Collect the refrigerant from the check joint according to *Removing the compressor*, in this chapter.

High pressure switch and pressure switch for control

- 1 Remove the soundproof cover on the compressor.
- 2 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.
- 3 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.



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The procedure (2) is not required when removing the pressure sensor for PD control. However, check to ensure that the connector (CN100) on O.U. PCB1 is disconnected.

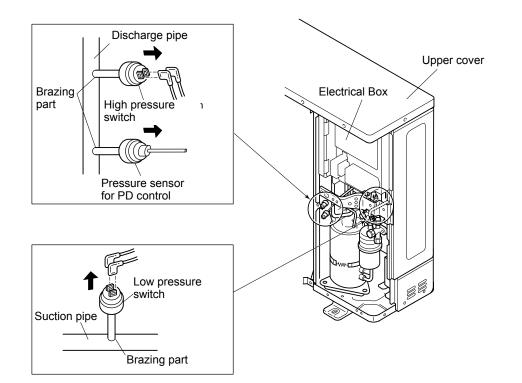
Low pressure switch

- 1 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

MDANGER

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

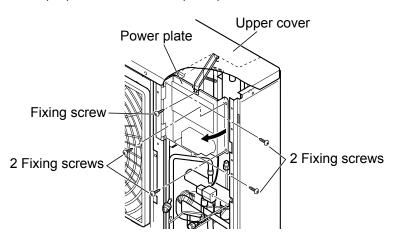
- 2 Disconnect the Faston Terminals of Low Pressure Switch.
- 3 Remove the low pressure switch from the brazed part of suction piping.





10.3.1.9 Opening electrical box (P plate)

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Unplug all the connectors of the electrical box.
- 3 Remove 5 screws which fix the electrical box and open the P plate turning counter clockwise approximately 90°.
 - Check that the LED201 (red) on the inverter PCB (PCB2) is OFF.



• DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

10.3.1.10 Removing Reversing valve coil

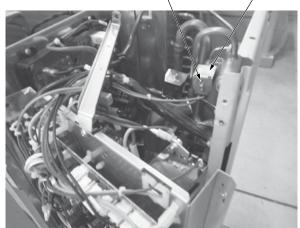
- 1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following *Removing service* cover, *Removing bottom service cover and rear cover* and *Removing upper cover*.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) and LED1 (Red) are ON to avoid electrical shock. Wait until the LED turn off.

- Disconnect the PCN100 connector on the control PCB of the electrical box.
- 4 Remove 1 fixing screw to remove the reversing valve coil.

Fixing screw for Reversing valve

Reversing valve



5 When reassembling, perform the procedure in the reverse way of removing.



Fix the wires by plastic bands to the original position.

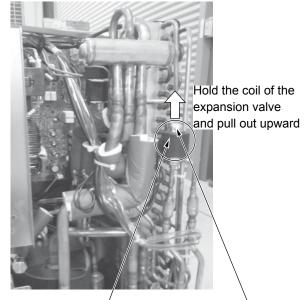
10.3.1.11 Removing electronic expansion valve coil

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) and LED1 (Red) are ON to avoid electrical shock. Wait until the LED turn off.

- **3** Disconnect the CN5A connector on the control PCB of the electrical box.
- 4 Hold the coil of the expansion valve and pull out upward.

It is easier to remove the expansion valve coil if it is rotated while pulling it upward.



Expansion valve coil Release lock

5 When reassembling after replacing the expansion valve coil, perform the procedure in the reverse way of removing. The expansion valve coil is equipped with a lock mechanism. After attaching the expansion valve coil, rotate it until the sound of locking is heard.



Fix the wires by plastic bands to the original position.

10.3.1.12 Removing solenoid valve coil (SVC)

- 1 Remove the service cover and the upper cover following *Removing service cover* and *Removing upper cover*.
- 2 Unplug the connector PCN14 (SVC) on O.U. PCB1.
- Remove the fixing screw, and remove the solenoid valve coil (SVC) upward.
- 4 When reassembling after replacing the solenoid valve coil, perform the procedure in the reverse way of removing.



Fix the wires by plastic bands to the original position.



DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.



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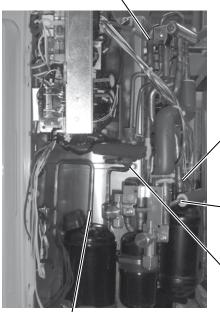
Solenoid valve



10.3.1.13 Removing reversing valve

- 1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following *Removing service cover*, *Removing bottom service cover and rear cover* and *Removing upper cover*.
- 2 Remove the reversing valve coil according to Removing Reversing Valve Coil.
- 3 Remove the electrical box according to *Removing Electrical Box*.
- 4 Recover the refrigerant from check joints according to *Removing Compressor*.
- 5 Remove the valve stay.
- 6 Remove the reversing valve assemblies from the fixed positions (4 brazing parts).
 - **a.** Remove the reversing valve and the stop valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
- 7 Remove reversing valve from the assemblies. (4 brazing parts) At this time, perform the brazing work with cooling the reversing valve body by wet cloth.
- 8 When reassembling after replacing the reversing valves, perform in the reverse procedure of removing.a. Run the lead wires to be located to the original position, and fix them by the plastic band.
 - b. Attach the crankcase heater according to Removing Compressor.

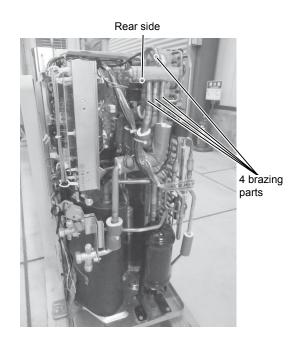
Brazing part (to heat exchanger)



Brazing part (to accumulator)

Brazing part (Gas stop valve)

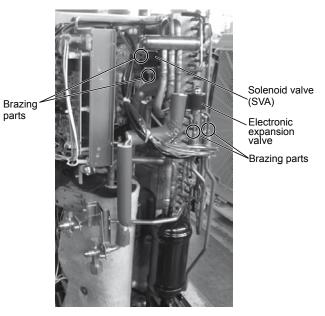
Check joint



Brazing part (discharge pipe)

10.3.1.14 Removing Electronic expansion Valve and Solenoid Valve

- 1 Remove the service cover, the bottom service cover and the rear cover following Removing service cover and Removing bottom service cover and rear cover.
- 2 Recover the refrigerant from check joints according to Removing Compressor.
- 3 Remove the coils according to Removing Electronic Expansion Valve Coil and Removing Solenoid Valve Coil.
- Remove the brazed parts as shown in the figures. 4
 - Electronic Expansion Valve (EVO) Brazed Parts: 2
 - Solenoid Valve (SVC) Brazed Parts: 2 -
 - a. Remove the electronic expansion valve and the solenoid valve with cooling the valve bodies by wet cloth.
 - b. Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.



5 When reassembling after replacing the valves, perform in the reverse procedure of removing.

ΝΟΤΕ

Run the lead wires to be located to the original position, and fix them by the plastic band

10.3.1.15 Removing electrical components

- Removing control PCB (PCB1)
- Remove the service cover following Removing service cover. 1
- 2 Remove all the wiring connected to the control PCB.

DANGER

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

3 Remove the 6 holders. Clamp the middle part of the holders with long-nose pliers and remove it toward front side.

DANGER

in order to avoid PCB failure.

Holde DO NOT touch the electrical components on the PCB. Pay attention not to bend or apply much force onto PCB Printed Circuit Board (PCB1)

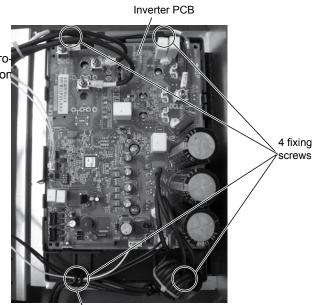
Removing Inverter module

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

MDANGER

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

- 3 Remove all the wiring connected on the Inverter.
- 4 Remove 4 screws which fix the Inverter. Hold the wires placed at the left side.
- 5 Pull the Inverter toward right side from the front of the product. (Remove along with the plastic case and the radiation fin).



Fixed with cord clamps

10.3.1.16 Removing other electrical components

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Open the P plate turning counter clockwise approximately 90° following *Opening electrical box (P plate)*.
 Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

СМС

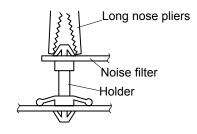
- 1 Remove all the wiring connected to CMC.
- **2** Remove 2 screws fixing the CMC.

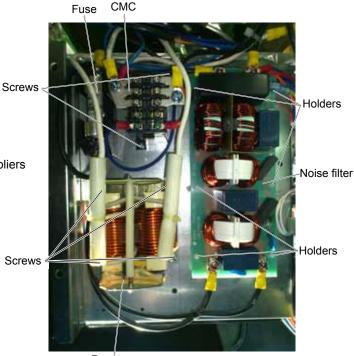
Reactor

1 Remove 4 screws fixing the reactor.

Noise filter

- 1 Remove all the wiring connected to the noise filter.
- **2** Hold the upper part of the 6 holders with the long nose pliers and remove the noise filter.





Reactor

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- To connect wiring at reassembling, ensure that the terminal numbers and wiring mark band codes are matched. If connections are wrong, there is the possibility of wrong operation and to cause damage to electrical parts.
- When attaching the PCB, or when attaching the parts attached to the PCB, pay attention not to clamp any wiring between plates or electrical components.

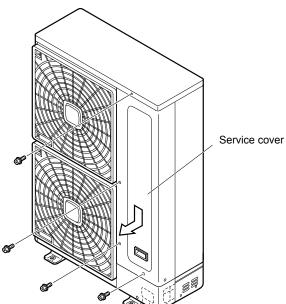
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10.3.2 Outdoor units RAS-(4-6)H(V)NPE

10.3.2.1 Removing service cover

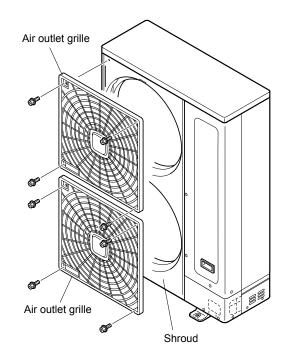


- Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.
- 1 Remove the 4 fixing screws, slide the service cover downward and remove it.
 - Pay attention not to fall off the service cover.



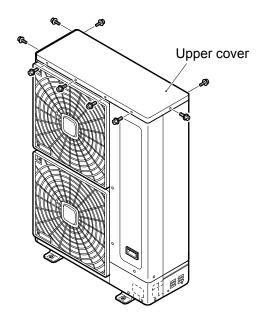
10.3.2.2 Removing air outlet grille

1 Remove the 8 fixing screws of the shroud.



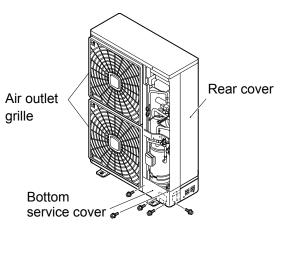
10.3.2.3 Removing upper cover

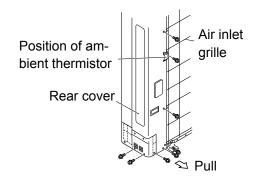
1 Remove 11 screws fixing the upper cover and remove the upper cover upward.



10.3.2.4 Removing the bottom service cover and rear cover

- 1 Remove 5 screws fixing the lower part of service cover and remove the lower part of service cover by pulling towards front side.
- 2 Remove the upper cover according to the item *Removing* upper cover.
- **3** Remove 10 screws fixing panel and remove the rear panel by pulling in the arrow direction.



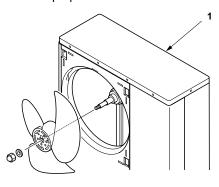


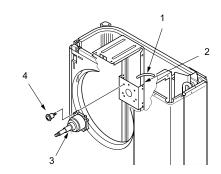
i_{NOTE}

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

10.3.2.5 Removing outdoor fan motor

- 1 Remove the service cover following *Removing service cover*.
- 2 Remove the outlet grille following *Remove outlet grille*.
- 3 Remove the upper cover following *Removing upper cover*.
- 4 To remove the propeller fan remove the cap nut and washer which fix the propeller fan onto the motor shaft. (Use a puller when the propeller fan and motor shaft are fixed too tightly).





- 1. Fan motor lead wire.
- 2. Motor clamp.
- 3. Motor.
- 4. Screw with spacer.

5 Remove the fan motor connector from PCB in the electrical box.

Cut the plastic tie with nippers which fixes the fan motor lead wire onto the motor clamp.

Remove 4 screws which fix the motor.

Model		RAS-(4-6)H(V)NPE		
Fan Motor Comp. №	DC Fan Motor	Inverter PCB		
		CN202 (Red)		
	AC Fan Motor	inverter PCB		
		CN201 (White)		
Screws for motor	DC Fan Motor	4 x M4 screw (with spacer)		
fixing.	AC Fan Motor	4x M4 screws		
1. Motor clamp. 2. Fan motor lead wire. 3. Plastic tie. 4. DC Fan Motor. 5. AC Fan Motor.				

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1. Upper cover.

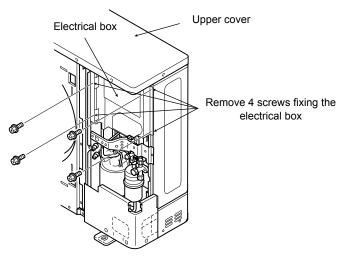
- 1 To mount the motor be sure to place the lead wire outlet downward. (Adjust the propeller fan and shroud not to contact with each other).
- 2 Fix the motor lead wire onto the motor clamp using a plastic tie as shown in the table on the previous page to avoid obstructing the propeller fan.

3 Mounting propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 20 Nm)

- 4 Connect the motor lead wire to PCB1 of the electrical box. (Be sure to match colors of the PCB connectors and motor lead wire connectors).
- 5 Be sure to attach the outlet grill onto the shroud after replacing the fan motor.

10.3.2.6 Removing electrical box

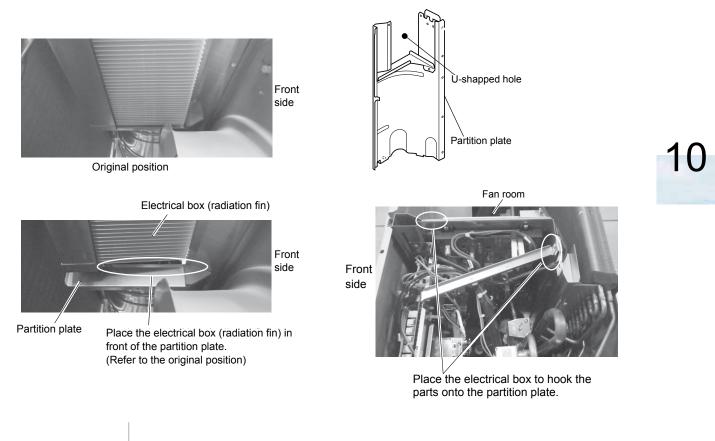
- 1 Remove the service cover following *Removing service cover*.
- 2 Remove the upper cover following *Removing upper cover*.
- **3** Remove 4 screws which fix the electrical box.
- 4 Pull up and remove the electrical box.



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The following wiring must be removed to dismount the electrical box.

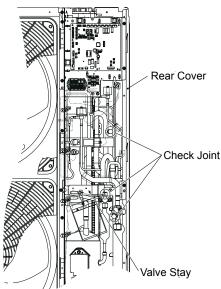
- 1. Remove the reversing valve coil from the reversing valve. : Removing reversing valve coil.
- 2. Remove the expansion valve coil from the expansion valve. : Removing electronic expansion valve coil.
- 3. Remove the solenoid valve coil from the solenoid valve. : Removing solenoid valve coil.
- 4. Remove the Faston terminals of high/low pressure switch and the pressure switch for control from the switch body : Removing the high pressure switch, low pressure switch and pressure switch for control.
- 5. Remove all connectors on the control PCB.
- 6. Remove the compressor wires in the terminal box of the compressor.
- 7. To remount the electrical box attach the electrical box fitting with the partition plate. (Insert the radiation fin into the U-notch on the partition plate and place the fin on the fan box side. Then attach the electrical box hooking onto the partition plate).



10.3.2.7 Removing the compressor

- 1 Remove the service cover, bottom service cover and rear cover following Removing service cover and Removing bottom service cover and rear cover. When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall.
- 2 Collect the refrigerant from the check joint.
- 3 Remove the valve stay.

Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.



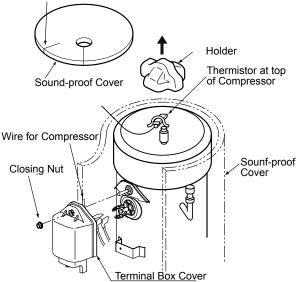
Position of taking out Thermistor

- 4 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and disconnect the thermistor on top of the compressor. Remove the soundproof cover. Sound-proof Cover Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order at
- 5 Remove the rubber cap and the thermistor attached on top of the compressor.

reassembling may result in compressor damage.

Remove the crankcase heater. 6

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- Compressor piping must be connected by brazing. MAKE SURE that any flammable material is not around before heating with burner for the oil inside the piping may flame up.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal the suction and discharge pipes when the refrigerant cycle is left unattached for a long period.
- Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape when blazing the pipe.
- For piping at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage of the compressor.

350

7 Remove the suction pipe and discharge pipe from the compressor.

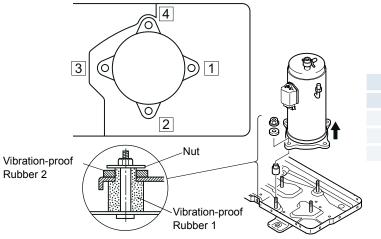
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Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.

8 Remove 2 nuts which fix the compressor and remove it by lifting it up with inclining forward.

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To remove the compressor the liquid stop valve pipe should be moved (bent) to the right side hand. PAY CLO-SE ATTENTION not to crush to break the pipe.



Fixation of the compressor to the bottom plate						
Compressor position	1	2	3	4		
Vibration-proof rubber 1	х	х	х	х		
Vibration-proof rubber 2	х	х	—	_		
Nut	х	x	—	—		

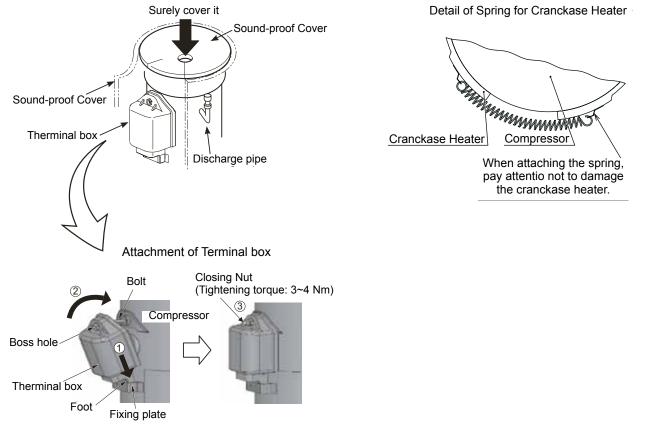
9 When brazing the replaced compressor quickly perform the brazing while the compressor side piping is cooled with wet cloth in order to avoid the brazing material from entering the compressor.

i note

PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage. Cool the pipe by wet cloth

10 Perform in the reverse procedure of removing after replacing the compressor.

- **a.** Check if the Faston terminal has any abnormality. (Ensure the pull out force greater than 20 Nm). If the Faston terminal is identified faulty replace with a new one.
- **b.** Ensure the fixture of the lead wires.
- c. Surely fix the terminal box by tightening the closing nut (Tightening Torque: 3.0 Nm).
- d. Attach the top of sound-proof cover to cover surely the compressor.
- e. Wrap the sound-proof cover to cover the terminal box and the discharge pipe.
- f. Attach the crankcase heater without torsion and gap to the compressor as following figure.



10.3.2.8 Removing the High pressure switch and Pressure switch for control

- 1 Remove the service cover and the bottom service cover following *Removing service cover*, and *Removing bottom* service cover and rear cover.
- 2 Collect the refrigerant from the check joint according to Removing the compressor, in this chapter.

High pressure switch and pressure switch for control

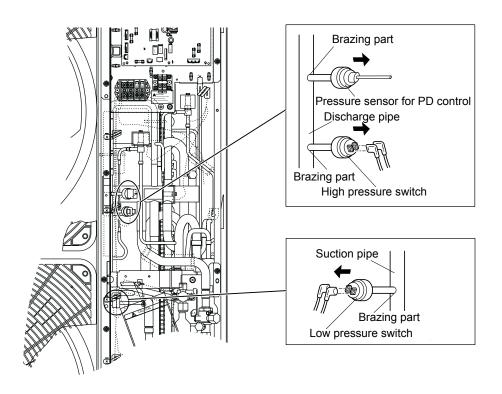
- 1 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.
- 2 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.



The procedure (1) is not required when removing the pressure sensor for PD control. However, check to ensure that the connector (CN100) on O.U. PCB1 is disconnected.

Low pressure switch

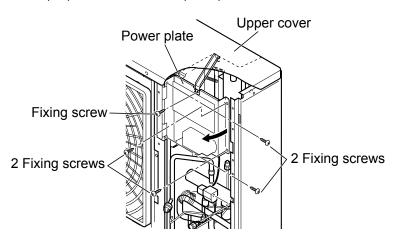
- 1 Disconnect the Faston Terminals of Low Pressure Switch.
- 2 Remove the low pressure switch from the brazed part of suction piping.





10.3.2.9 Opening electrical box (P plate)

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Unplug all the connectors of the electrical box.
- 3 Remove 5 screws which fix the electrical box and open the P plate turning counter clockwise approximately 90°.
 - Check that the LED201 (red) on the inverter PCB (PCB2) is OFF.



• DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

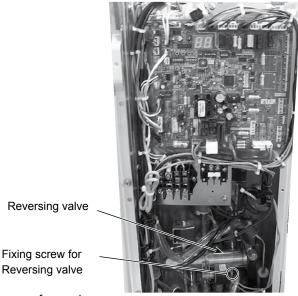
10.3.2.10 Removing Reversing valve coil

1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following *Removing service cover*, *Removing bottom service cover and rear cover* and *Removing upper cover*.



DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

- 2 Disconnect the PCN100 connector on the control PCB of the electrical box.
- **3** Remove 1 fixing screw to remove the reversing valve coil.



4 When reassembling, perform the procedure in the reverse way of removing.



Fix the wires by plastic bands to the original position.

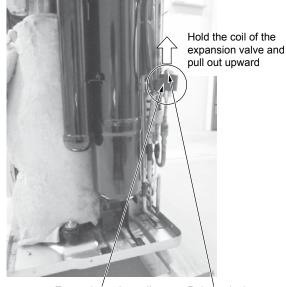
10.3.2.11 Removing electronic expansion valve coil

1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

- 2 Disconnect the CN5A connector on the control PCB of the electrical box.
- **3** Hold the coil of the expansion valve and pull out upward.

It is easier to remove the expansion valve coil if it is rotated while pulling it upward.



Expansion valve coil

Release lock

4 When reassembling after replacing the expansion valve coil, perform the procedure in the reverse way of removing. The expansion valve coil is equipped with a lock mechanism. After attaching the expansion valve coil, rotate it until the sound of locking is heard.



Fix the wires by plastic bands to the original position.

10.3.2.12 Removing solenoid valve coil (SVA and SVC)

- 1 Remove the service cover and the upper cover following *Removing service cover* and *Removing upper cover*.
- 2 Unplug the connector PCN7 (SVA) and PCN14 (SVC) on O.U. PCB1.
- 3 Remove the fixing screw, and remove the solenoid valve coils (SVA and SVC) upward.
- 4 When reassembling after replacing the solenoid valve coil, perform the procedure in the reverse way of removing.

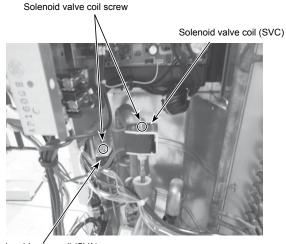


Fix the wires by plastic bands to the original position.



DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

SMGB0079 rev.0 - 01/2013

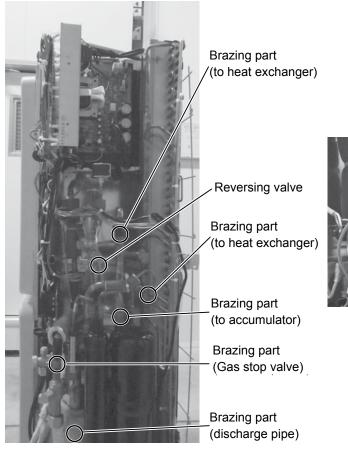


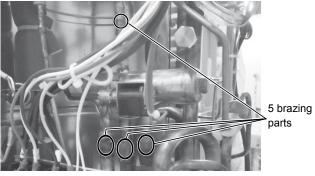
Solenoid valve coil (SVA)



10.3.2.13 Removing reversing valve

- 1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following *Removing service cover*, *Removing bottom service cover and rear cover* and *Removing upper cover*.
- 2 Recover the refrigerant from check joints according to Removing Compressor.
- 3 Remove the reversing valve coil according to Removing Reversing Valve Coil.
- 4 Remove the reversing valve assemblies from the fixed positions (5 brazing parts).
 - a. Remove the reversing valve and the stop valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
- **5** Remove reversing valve from the assemblies. (5 brazing parts) At this time, perform the brazing work with cooling the reversing valve body by wet cloth.
- 6 When reassembling after replacing the reversing valves, perform in the reverse procedure of removing.
 - **a.** Run the lead wires to be located to the original position, and fix them by the plastic band.
 - b. Attach the crankcase heater according to Removing Compressor.

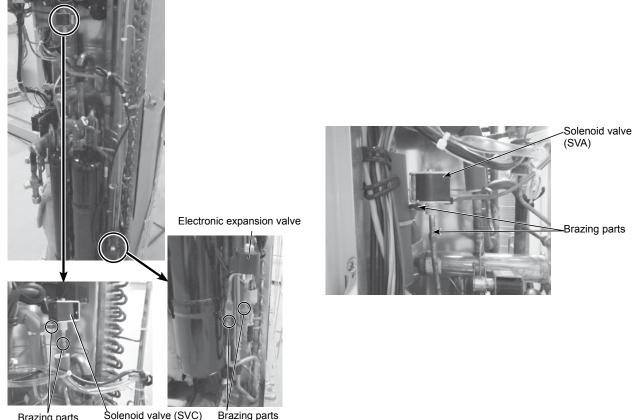






10.3.2.14 Removing Electronic expansion Valve and Solenoid Valve

- 1 Remove the service cover, the bottom service cover and the rear cover following Removing service cover and Removing bottom service cover and rear cover.
- 2 Recover the refrigerant from check joints according to Removing Compressor.
- 3 Remove the coils according to Removing Electronic Expansion Valve Coil and Removing Solenoid Valve Coil.
- 4 Remove the brazed parts as shown in the figures.
 - Electronic Expansion Valve (EVO) Brazed Parts: 2 -
 - Solenoid Valve (SVA) Brazed Parts: 2 -
 - Solenoid Valve (SVC) Brazed Parts: 2 -
 - a. Remove the electronic expansion valve and the solenoid valve with cooling the valve bodies by wet cloth.
 - b. Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.



Brazing parts Solenoid valve (SVC)

5 When reassembling after replacing the valves, perform in the reverse procedure of removing.



Run the lead wires to be located to the original position, and fix them by the plastic band

Holder

10.3.2.15 Removing electrical components

- Removing control PCB (PCB1)
- 1 Remove the service cover following Removing service cover.
- 2 Remove all the wiring connected to the control PCB.

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

3 Remove the 6 holders. Clamp the middle part of the holders with long-nose pliers and remove it toward front side.

Mdanger

DO NOT touch the electrical components on the PCB. Pay attention not to bend or apply much force onto PCB Printed Circuit Board (PCB1) in order to avoid PCB failure.

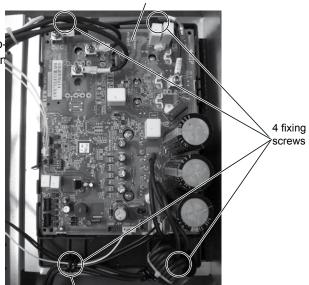


- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

- 3 Remove all the wiring connected on the Inverter.
- 4 Remove 4 screws which fix the Inverter. Hold the wires placed at the bottom side.
- 5 Pull the Inverter toward right side from the front of the product. (Remove along with the plastic case and the radiation fin).

Inverter PCB



Fixed with cord clamps

10.3.2.16 Removing other electrical components

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Open the P plate turning counter clockwise approximately 90° following *Opening electrical box (P plate)*.
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

СМС

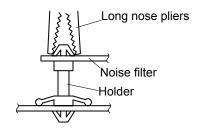
- 1 Remove all the wiring connected to CMC.
- **2** Remove 2 screws fixing the CMC.

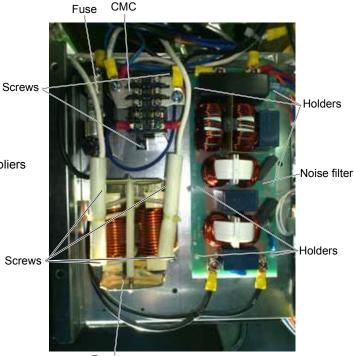
Reactor

1 Remove 4 screws fixing the reactor.

Noise filter

- 1 Remove all the wiring connected to the noise filter.
- 2 Hold the upper part of the 6 holders with the long nose pliers and remove the noise filter.





Reactor

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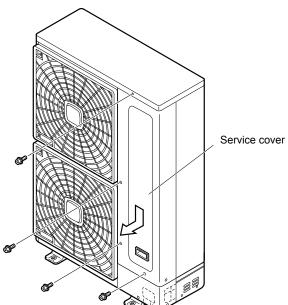
- To connect wiring at reassembling, ensure that the terminal numbers and wiring mark band codes are matched. If connections are wrong, there is the possibility of wrong operation and to cause damage to electrical parts.
- When attaching the PCB, or when attaching the parts attached to the PCB, pay attention not to clamp any wiring between plates or electrical components.

10.3.3 Oudoor units RAS-(8-10)HNPE

10.3.3.1 Removing service cover

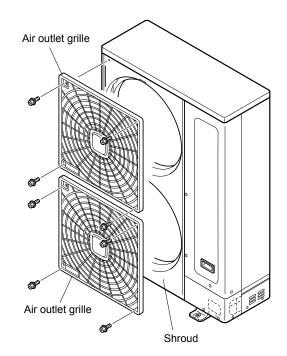


- Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.
- 1 Remove the 4 fixing screws, slide the service cover downward and remove it.
 - Pay attention not to fall off the service cover.



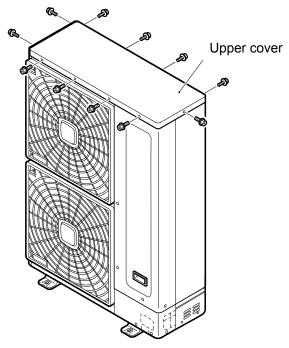
10.3.3.2 Removing air outlet grille

1 Remove the 8 fixing screws of the shroud.



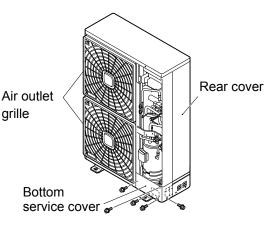
10.3.3.3 Removing upper cover

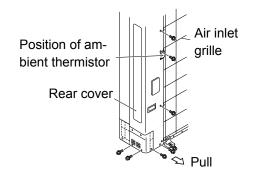
1 Remove 11 screws fixing the upper cover and remove the upper cover upward.



10.3.3.4 Removing the bottom service cover and rear cover

- 1 Remove 5 screws fixing the lower part of service cover and remove the lower part of service cover by pulling towards front side.
- 2 Remove the upper cover according to the item *Removing* upper cover.
- **3** Remove 10 screws fixing panel and remove the rear panel by pulling in the arrow direction.





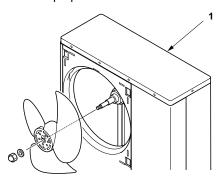


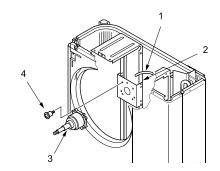
DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

361

10.3.3.5 Removing outdoor fan motor

- 1 Remove the service cover following Removing service cover.
- 2 Remove the outlet grille following *Remove outlet grille*.
- 3 Remove the upper cover following *Removing upper cover*.
- 4 To remove the propeller fan remove the cap nut and washer which fix the propeller fan onto the motor shaft. (Use a puller when the propeller fan and motor shaft are fixed too tightly).





- 1. Fan motor lead wire.
- 2. Motor clamp.
- 3. Motor.
- 4. Screw with spacer.
- 5 Remove the fan motor connector from PCB in the electrical box.

Cut the plastic tie with nippers which fixes the fan motor lead wire onto the motor clamp. Remove 4 screws which fix the motor.

Model		RAS-(8-10)HNCE
Fan Motor Comp. №	DC Fan Motor	Inverter PCB
		CN406 (Red)
	AC Fan Motor	inverter PCB
		CN405 (White)
Screws for motor	DC Fan Motor	4 x M6 screw (with spacer)
fixing.	AC Fan Motor	4x M6 screws
 Motor clamp. Fan motor lead wire. Plastic tie. DC Fan Motor. AC Fan Motor. 		

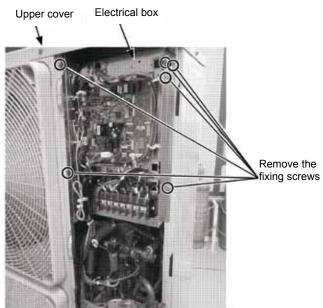
inote

1. Upper cover.

- 1 To mount the motor be sure to place the lead wire outlet downward. (Adjust the propeller fan and shroud not to contact with each other).
- 2 Fix the motor lead wire onto the motor clamp using a plastic tie as shown in the table on the previous page to avoid obstructing the propeller fan.
- 3 Mounting propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 20 Nm)
- 4 Connect the motor lead wire to PCB1 of the electrical box. (Be sure to match colors of the PCB connectors and motor lead wire connectors).
- 5 Be sure to attach the outlet grill onto the shroud after replacing the fan motor.

10.3.3.6 Removing electrical box

- 1 Remove the service cover following *Removing service cover*.
- 2 Remove the upper cover following *Removing upper cover*.
- 3 Remove 6 screws which fix the electrical box.
- 4 Pull up and remove the electrical box.



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The following wiring must be removed to dismount the electrical box.

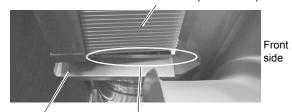
- 1. Remove the reversing valve coil from the reversing valve. : Removing reversing valve coil.
- 2. Remove the expansion valve coil from the expansion valve. : Removing electronic expansion valve coil.
- 3. Remove the solenoid valve coil from the solenoid valve. : Removing solenoid valve coil.
- 4. Remove the Faston terminals of high/low pressure switch and the pressure switch for control from the switch body : Removing the high pressure switch, the low pressure switch and pressure switch for control.
- 5. Remove all connectors on the control PCB.
- 6. Remove the compressor wires in the terminal box of the compressor.
- 7. To remount the electrical box attach the electrical box fitting with the partition plate. (Insert the radiation fin into the U-notch on the partition plate and place the fin on the fan box side. Then attach the electrical box hooking onto the partition plate).

Front

side

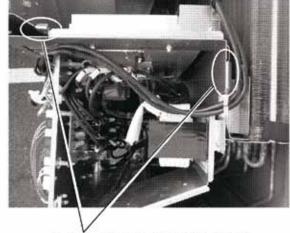


Electrical box (radiation fin)



Partition plate

Place the electrical box (radiation fin) in front of the partition plate. (Refer to the original position)



Place the electrical box to hook the parts onto the partition plate.

363

10.3.3.7 Removing the compressor

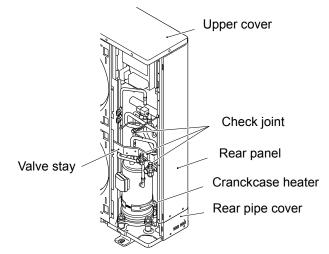
1 Remove the service cover and the bottom service cover following *Removing service cover*, and *Removing bottom* service cover and rear cover.

When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall.

2 Collect the refrigerant from the check joint.

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Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.



3 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and disconnect the thermistor on top of the compressor. Remove the soundproof cover.

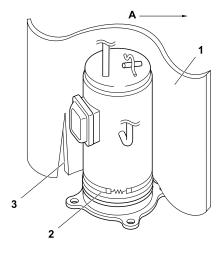


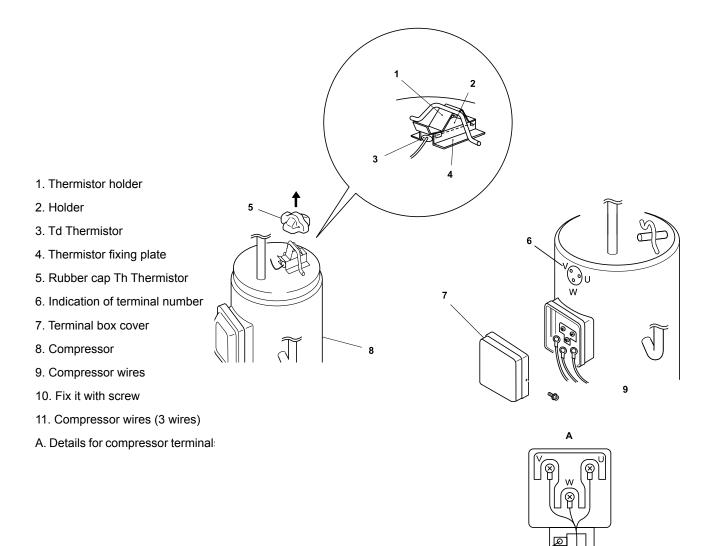
Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order at reassembling may result in compressor damage.

- 4 Remove the rubber cap, the upeer cover and the thermistor attached on top of the compressor.
- **5** Remove the crankcase heater.

1. Sound-proof cover.

- 2. Oil heater.
- 3. Cut part.
- A. Direction to remove the cover.





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• Compressor piping must be connected by brazing. MAKE SURE that any flammable material is not around before heating with burner for the oil inside the piping may flame up.

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- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal the suction and discharge pipes when the refrigerant cycle is left unattached for a long period.
- Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape when blazing the pipe.
- For piping at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage of the compressor.
- 6 Remove the suction pipe and discharge pipe from the compressor.

SMGB0079 rev.0 - 01/2013

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Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.

7 Remove 2 nuts which fix the compressor and remove it by lifting it up with inclining forward.

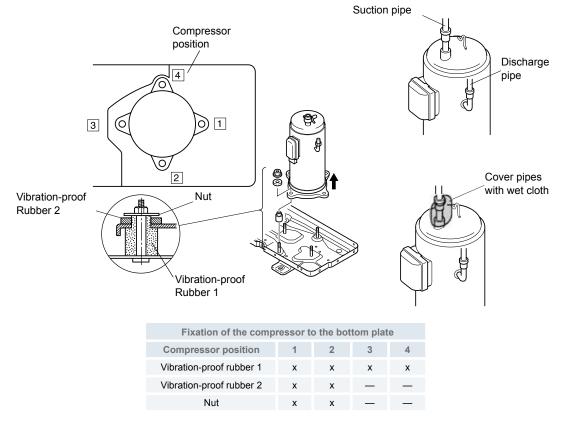
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To remove the compressor the liquid stop valve pipe should be moved (bent) to the right side hand. PAY CLO-SE ATTENTION not to crush to break the pipe.

8 When brazing the replaced compressor quickly perform the brazing while the compressor side piping is cooled with wet cloth in order to avoid the brazing material from entering the compressor.

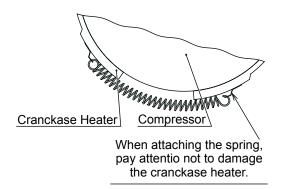


PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage.



- 9 Reassemble the parts in the reverse order of removing procedures.
 - **a.** Tighten the screws (U V and W) for compressor wires with 2.5 Nm.
 - b. Fix the wires firmly.
 - c. Attach the crankcase heater without torsion and gap to the compressor as following figure.

Detail of Spring for Cranckase Heater



10.3.3.8 Removing High pressure switch and pressure switch for control

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Collect the refrigerant from the check joint according to *Removing the compressor*, in this chapter.

High pressure switch and pressure switch for control

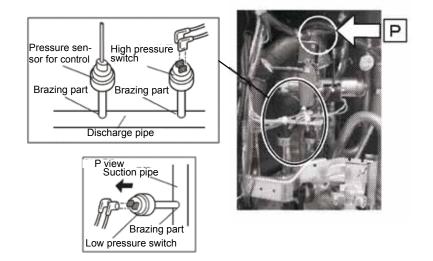
- 1 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.
- 2 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.



The procedure (1) is not required when removing the pressure sensor for PD control. However, check to ensure that the connector (CN100) on O.U. PCB1 is disconnected.

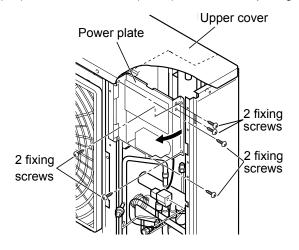
Low pressure switch

- 1 Disconnect the Faston Terminals of Low Pressure Switch.
- 2 Remove the low pressure switch from the brazed part of suction piping.



10.3.3.9 Opening electrical box (P-Mounting Plate)

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Remove 6 screws which fix the electrical box and open the P plate turning counter clockwise approximately 90°.
 - Check that the LED201 (red) on the inverter PCB (PCB2) is OFF when opening P-mounting plate.



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367

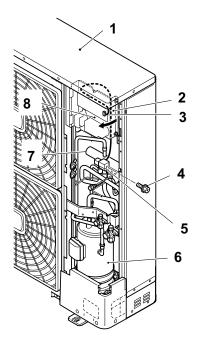
DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

10.3.3.10 Removing reversing valve coil

1 Remove the service cover following *Removing service cover* in this chapter.

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

- 2 Remove the connector (PCN100) on the control PCB (PCB1) of the electrical box.
- 3 Remove the reversing valve coil by removing 1 screw fixing the coil.
 - 1. Upper cover.
 - 2. Power Plate.
 - 3. PCN6.
 - 4. Fixing screw for reversing valve coil.
 - 5. Reversing valve coil.
 - 6. Compressor.
 - 7. Reversing valve.
 - 8. Electrical Box.



4 When reassembling, perform the procedure in the reverse way of removing.



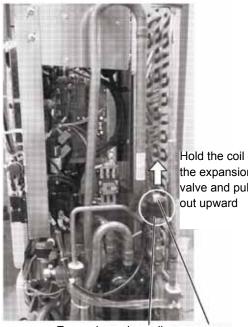
Fix the wires by plastic bands to the original position.

10.3.3.11 Removing electronic expansion valve coil

- 1 Remove the service cover, the bottom service cover and the rear cover following Removing service cover and Removing bottom service cover and rear cover.
- 2 Disconnect the CN5A connector on the control PCB1 of the electrical box.
- 3 Hold the coil of the expansion valve and pull out upward. It is easier to remove the expansion valve coil if it is rotated while pulling it upward.
- 4 When reassembling after replacing the expansion valve coil, perform the procedure in the reverse way of removing. The expansion valve coil is equipped with a lock mechanism. After attaching the expansion valve coil, rotate it until the sound of locking is heard.

i]_{NOTE}

Fix the wires by plastic bands to the original position.



Hold the coil of the expansion valve and pull

Expansion valve coil Release lock



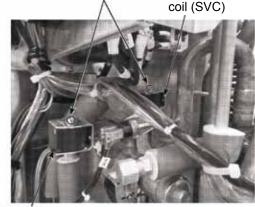
DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

10.3.3.12 Removing solenoid valve coil (SVA and SVC)

- 1 Remove the service cover following *Removing service cover*.
- 2 Open the P-mounting plate. Check to ensure the LED201 (Red) of the inverter PCB (PCB2) is OFF.
- 3 Unplug the connector PCN7 (SVA) and PCN14 (SVC) on O.U. PCB1.
- 4 Remove the fixing screw, and remove the solenoid valve coil (SVA and SVC) upward.
- 5 When reassembling after replacing the solenoid valve coil, perform the procedure in the reverse way of removing.

NOTE

Fix the wires by plastic bands to the original position.



Solenoid valve coil screw Solenoid valve

Solenoid valve coil (SVA)

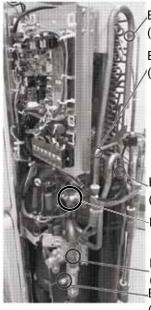


DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.



10.3.3.13 Removing reversing valve

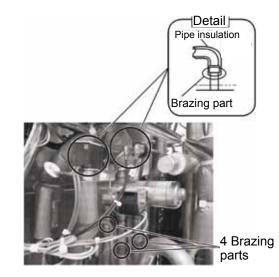
- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Remove the reversing valve coil according to Removing Reversing Valve Coil.
- 3 Recover the refrigerant from check joints according to Removing Compressor.
- 4 Remove the reversing valve assemblies from the fixed positions (5 brazing parts).
 - a. Remove the reversing valve and the stop valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
- **5** Remove reversing valve from the assemblies. (5 brazing parts) At this time, perform the brazing work with cooling the reversing valve body by wet cloth.
- 6 When reassembling after replacing the reversing valves, perform in the reverse procedure of removing.
 - **a.** Run the lead wires to be located to the original position, and fix them by the plastic band.
- **b.** Attach the crankcase heater according to *Removing Compressor*.
- 7 Reassemble the parts in the reverse order of removing procedures.



Brazing part (to heat exchanger) Brazing part (to heat exchanger)

Brazing part (to accumulator) Reversing valve

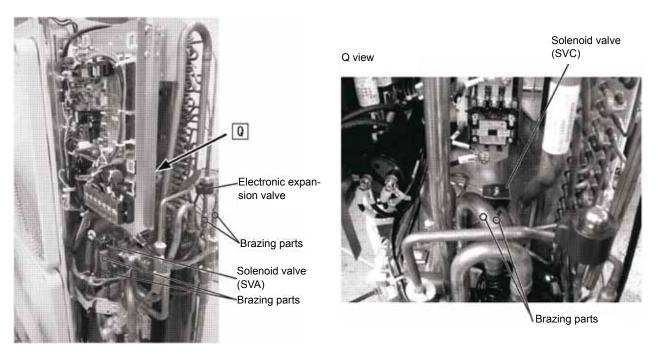
Brazing part (Gas stop valve) Brazing part (discharge pipe)





10.3.3.14 Removing Electronic expansion Valve and Solenoid Valve

- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Recover the refrigerant from check joints according to *Removing Compressor*.
- 3 Remove the coils according to Removing Electronic Expansion Valve Coil and Removing Solenoid Valve Coil.
- 4 Remove the brazed parts as shown in the figures.
 - Electronic Expansion Valve (EVO) Brazed Parts: 2
 - Solenoid Valve (SVA) Brazed Parts: 2
 - Solenoid Valve (SVC) Brazed Parts: 2
 - a. Remove the electronic expansion valve and the solenoid valve with cooling the valve bodies by wet cloth.
 - b. Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.



5 When reassembling after replacing the valves, perform in the reverse procedure of removing.

NOTE Run the lead wires to be located to the original position, and fix them by the plastic band

10.3.3.15 Removing electrical components

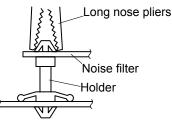
- **Removing control PCB (PCB1) and relay PCB (PCB3)**
- 1 Remove the service cover following *Removing service cover*.
- 2 Remove all the wiring connected to the control PCB and the relay PCB.

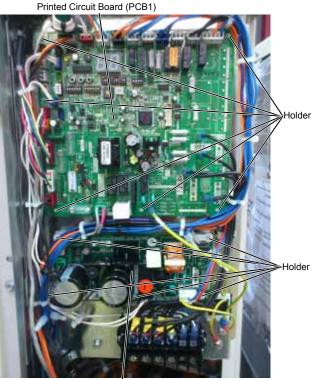
DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

3 Remove the 6 holders for each PCB. Clamp the middle part of the holders with long-nose pliers and remove it toward front side.



DO NOT touch the electrical components on the PCB. Pay attention not to bend or apply much force onto PCB in order to avoid PCB failure.





Printed Circuit Board (PCB3)

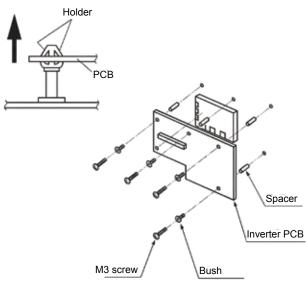
- Removing Inverter module
- 1 Remove the service cover following *Removing service cover*.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

Mdanger

DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

3 Remove 4 screws M3, remove the bushes and remove the spacers fixing the inverter.

When mounting again be sure to place the bushes and spacers.



Removing Diode Module (DM)

- 1 Disconnect the wirings of terminal + U V W on the diode module.
- 2 Remove 2 M5 fixing screws on the diode module.
- 3 Remove the diode module from the electrical box.

1: 5 Screws (M5)

2: Fixing screw (M5)



Removing Transistor Module (IPM)

- 1 Disconnect all the wirings connected to the transistor module.
- 2 Remove the connectors CN2, CN3, CN206, PCN301 and PCN302 from the transistor module.
- 3 Disconnect the wirings of P N U V W on the transistor module.
- 4 Remove 4 M4 fixing screws on the transistor module.
- **5** Remove the transistor module from the electrical box.

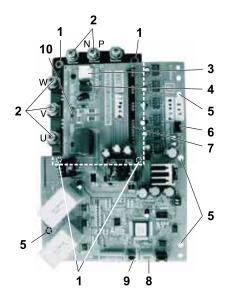
1. Screws for transistor module (M4)

2. Screw (M5) 3. PCN301 4. PCN302 5. Screws for PCB (M3) 6. CN3

7. Inverter PCB

8. CN206 9. CN2

10. LED201



6 Reassemble the parts in the reverse order of removing order.

inote

- To connect wiring at reassembling, ensure that the terminal numbers and wiring mark band codes are matched. If connections are wrong, there is the possibility of wrong operation and to cause damage to electrical parts.
- When attaching the PCB, or when attaching the parts attached to the PCB, pay attention not to clamp any wiring between plates or electrical components.

10.3.3.16 Removing other electrical components

- 1 Remove the service cover following *Removing service cover* in this chapter.
- Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate). 2
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DANGER

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

Capacitors

1 Remove all the wiring connected to the capacitors.



The wires have polar characters. Identify the wire mark band and the indication on the capacitor when connecting wires.

2 Remove 3 screws fixing each capacitor.

CMC

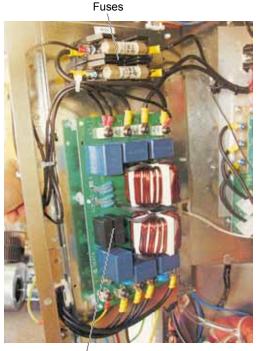
- Remove all the wiring connected to CMC. 1
- 2 Remove 2 screws fixing the CMC.

Reactor

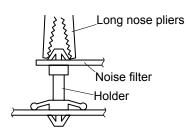
1 Remove 4 screws fixing the reactor.

Noise filter

- 1 Remove all the wiring connected to the noise filter.
- 2 Hold the upper part of the 6 holders with the long nose pliers and remove the noise filter.



Noise filter

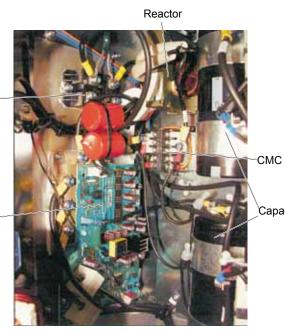


Diode module



Inverter

When mounting components, be sure to match the wiring connections with the mark band codes.



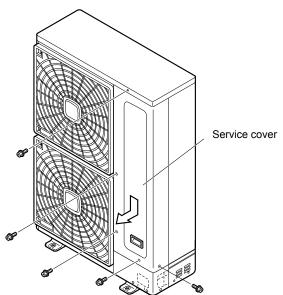
Capacitors

10.3.4 Outdoor Units RAS-12HNP

10.3.4.1 Removing service cover

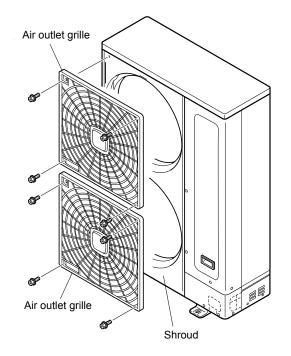


- Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.
- 1 Remove the 5 fixing screws, slide the service cover downward and remove it.
 - Pay attention not to fall off the service cover.



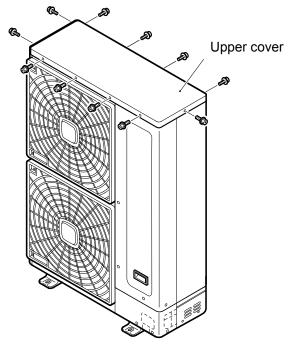
10.3.4.2 Removing air outlet grille

1 Remove the 8 fixing screws of the shroud.



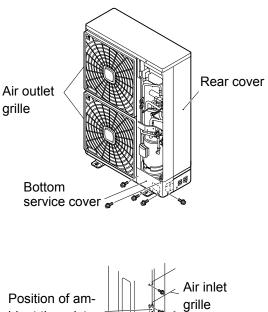
10.3.4.3 Removing upper cover

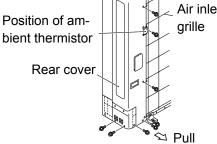
1 Remove 11 screws fixing the upper cover and remove the upper cover upward.



10.3.4.4 Removing the bottom service cover and rear cover

- 1 Remove 5 screws fixing the lower part of service cover and remove the lower part of service cover by pulling towards front side.
- 2 Remove the upper cover according to the item *Removing* upper cover.
- **3** Remove 10 screws fixing panel and remove the rear panel by pulling in the arrow direction.





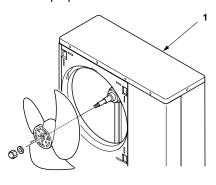
i Note

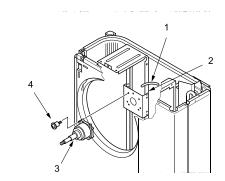
DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

376

10.3.4.5 Removing outdoor fan motor

- 1 Remove the service cover following Removing service cover.
- 2 Remove the outlet grille following Remove outlet grille.
- 3 If necessary, remove the upper cover following *Removing upper cover*.
- **4** To remove the propeller fan remove the cap nut and washer which fix the propeller fan onto the motor shaft. (Use a puller when the propeller fan and motor shaft are fixed too tightly).





Cord clamp

Plastic tie

- 1. Fan motor lead wire.
- 2. Motor clamp.
- 3. Motor.
- 4. Screw with spacer.

1. Upper cover.

5 Remove the fan motor connector from PCB in the electrical box.

Cut the plastic tie with nippers which fixes the fan motor lead wire onto the motor clamp. Remove 4 screws which fix the motor.

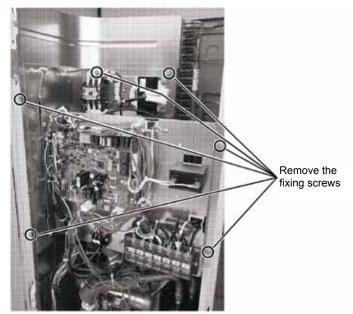
Model		RAS-12HNP	
Fan Motor Comp. №	DC Fan Motor	Inverter PCB	
		CN406 (Red)	
	AC Fan Motor	inverter PCB	
		PCN404 (White)	
Screws for motor fixing.	DC Fan Motor	4 x M6 screw (with spacer)	
	AC Fan Motor	4x M8 screws	
		Motor clamp Fan motor lead wire Plastic tie	

inote

- 1 To mount the motor be sure to place the lead wire outlet downward. (Adjust the propeller fan and shroud not to contact with each other).
- 2 Fix the motor lead wire onto the motor clamp using a plastic tie as shown in the table on the previous page to avoid obstructing the propeller fan.
- 3 Mounting propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 20 Nm)
- 4 Connect the motor lead wire to PCB1 of the electrical box. (Be sure to match colors of the PCB connectors and motor lead wire connectors).
- 5 Be sure to attach the outlet grill onto the shroud after replacing the fan motor.

10.3.4.6 Removing electrical box

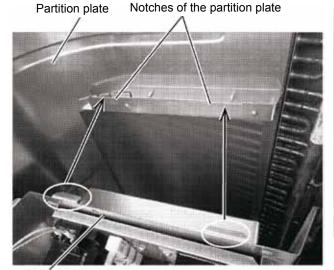
- 1 Remove the service cover following *Removing service cover*.
- 2 Remove the upper cover following *Removing upper cover*.
- 3 Remove 6 screws which fix the electrical box.
- 4 Pull up and remove the electrical box.



inote

The following wiring must be removed to dismount the electrical box.

- 1. Remove the reversing valve coil from the reversing valve. : Removing reversing valve coil.
- 2. Remove the expansion valve coil from the expansion valve. : Removing electronic expansion valve coil.
- 3. Remove the solenoid valve coil from the solenoid valve. : Removing solenoid valve coil.
- 4. Remove the Faston terminals of high/low pressure switch and the pressure switch for control from the switch body : Removing the high pressure switch, the low pressure switch and pressure switch for control.
- 5. Remove all connectors on the control PCB.
- 6. Remove the compressor wires in the terminal box of the compressor.
- 7. To remount the electrical box attach the electrical box fitting with the partition plate. (Insert the radiation fin into the U-notch on the partition plate and place the fin on the fan box side. Then attach the electrical box hooking onto the partition plate).

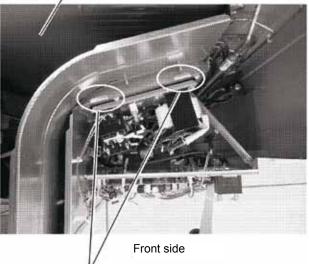


Electrical box

Front side

378

Fan box



Place the electrical box to hook the parts onto the partition plate.



10.3.4.7 Removing the compressor

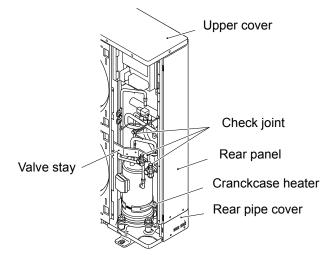
1 Remove the service cover and the bottom service cover following *Removing service cover*, and *Removing bottom* service cover and rear cover.

When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall.

2 Collect the refrigerant from the check joint.

i ΝΟΤΕ

Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.



3 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and disconnect the thermistor on top of the compressor. Remove the soundproof cover.



Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order at reassembling may result in compressor damage.

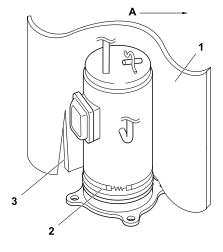
- 4 Remove the rubber cap and the thermistor attached on top of the compressor.
- **5** Remove the crankcase heater.

1. Sound-proof cover.

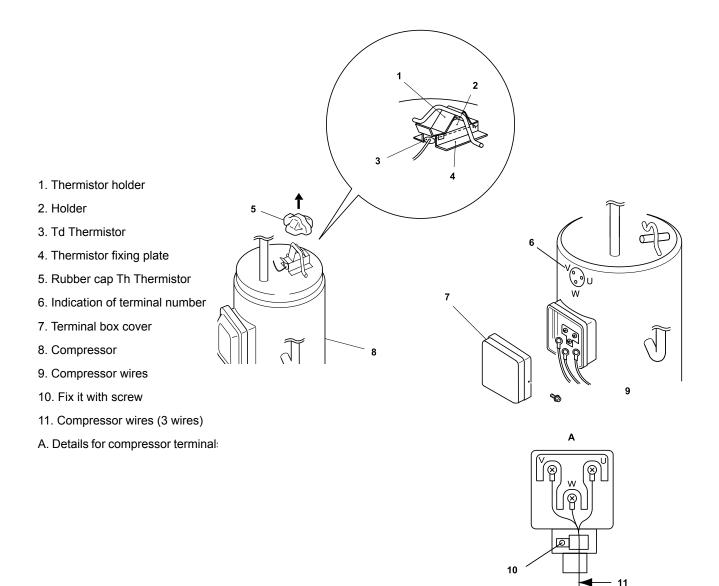
2. Oil heater.

3. Cut part.

A. Direction to remove the cover.



10



inote

- Compressor piping must be connected by brazing. MAKE SURE that any flammable material is not around before heating with burner for the oil inside the piping may flame up.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal the suction and discharge pipes when the refrigerant cycle is left unattached for a long period.
- Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape when blazing the pipe.
- For piping at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage of the compressor.
- 6 Remove the suction pipe and discharge pipe from the compressor.

inote

Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.

7 Remove 2 nuts which fix the compressor and remove it by lifting it up with inclining forward.

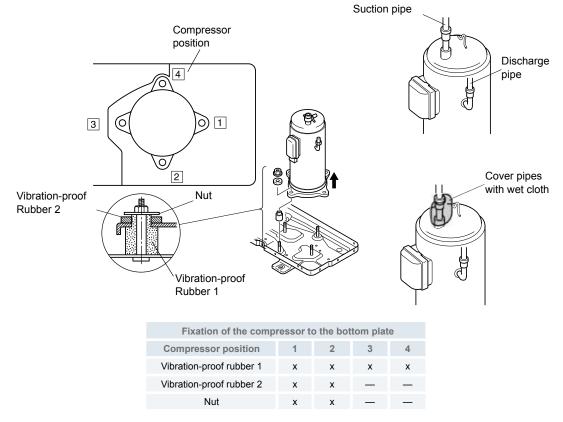
inote

To remove the compressor the liquid stop valve pipe should be moved (bent) to the right side hand. PAY CLO-SE ATTENTION not to crush to break the pipe.

8 When brazing the replaced compressor quickly perform the brazing while the compressor side piping is cooled with wet cloth in order to avoid the brazing material from entering the compressor.

i Note

PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage.

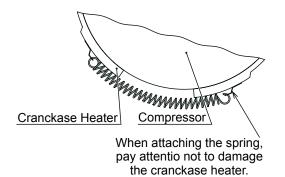


- 9 Reassemble the parts in the reverse order of removing procedures.
 - a. Tighten the screws (U V and W) for compressor wires with 2.5 Nm.

SMGB0079 rev.0 - 01/2013

- **b.** Fix the wires firmly.
- c. Attach the crankcase heater without torsion and gap to the compressor as following figure.

Detail of Spring for Cranckase Heater



10.3.4.8 Removing High pressure switch and pressure switch for control

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Collect the refrigerant from the check joint according to *Removing the compressor*, in this chapter.

High pressure switch and pressure switch for control

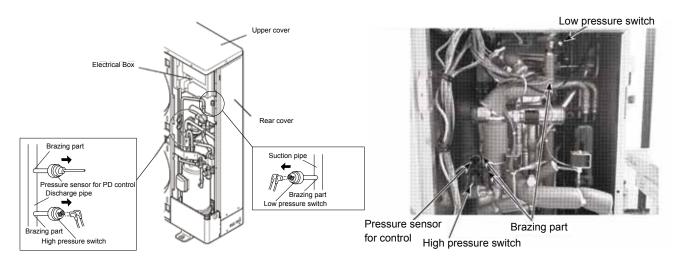
- 1 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.
- 2 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.



The procedure (1) is not required when removing the pressure sensor for PD control. However, check to ensure that the connector (CN100) on O.U. PCB1 is disconnected.

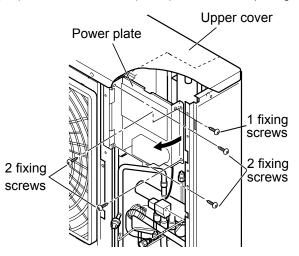
Low pressure switch

- 1 Disconnect the Faston Terminals of Low Pressure Switch.
- 2 Remove the low pressure switch from the brazed part of suction piping.



Opening electrical box (P-Mounting Plate)

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Remove 5 screws which fix the electrical box and open the P plate turning counter clockwise approximately 90°.
 - Check that the LED201 (red) on the inverter PCB (PCB2) is OFF when opening P-mounting plate.



382

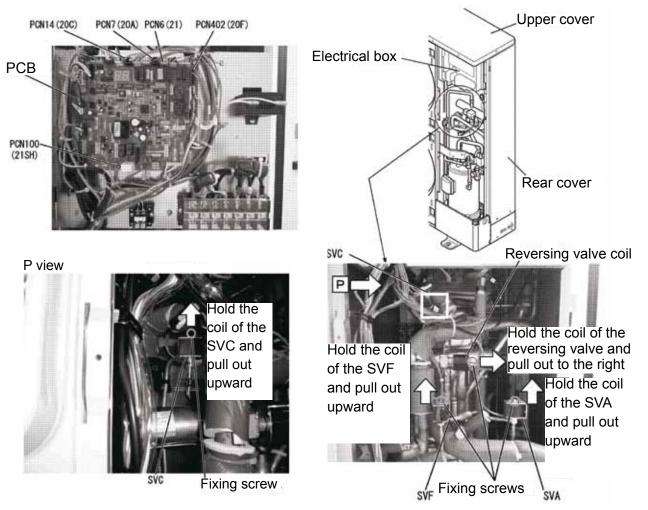
DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

10.3.4.9 Removing reversing and solenoid valves coils

1 Remove the service cover following *Removing service cover* in this chapter.

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

- 2 Remove the connectors on the control PCB (PCB1) of the electrical box according to the following picture.
- 3 Remove the valve coils by removing 1 fixing screw for each coil.



4 When reassembling, perform the procedure in the reverse way of removing.

inote

Fix the wires by plastic bands to the original position.

10.3.4.10 Removing electronic expansion valve coil

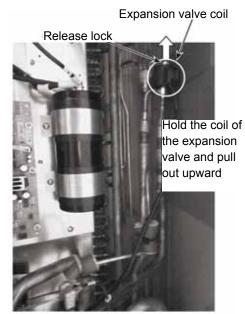
- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - · Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

- 3 Disconnect the CN5A connector on the control PCB1 of the electrical box.
- 4 Hold the coil of the expansion valve and pull out upward. It is easier to remove the expansion valve coil if it is rotated while pulling it upward.
- **5** When reassembling after replacing the expansion valve coil, perform the procedure in the reverse way of removing. The expansion valve coil is equipped with a lock mechanism. After attaching the expansion valve coil, rotate it until the sound of locking is heard.

ΝΟΤΕ

Fix the wires by plastic bands to the original position.



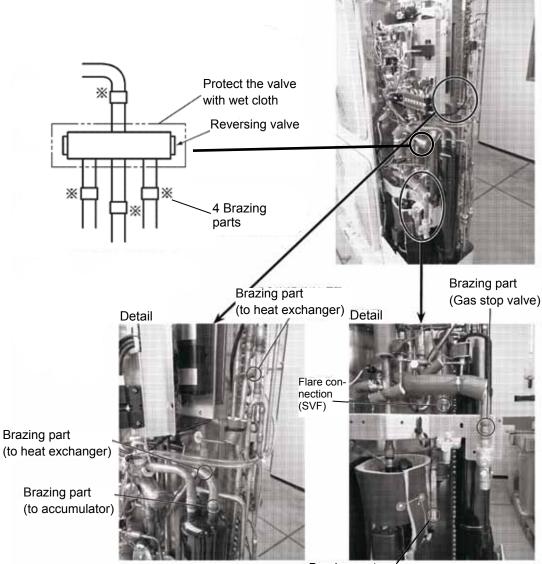
MDANGER

DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.



10.3.4.11 Removing reversing valve

- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Remove the reversing valve coil according to Removing Reversing Valve Coil.
- 3 Recover the refrigerant from check joints according to Removing Compressor.
- 4 Remove the reversing valve assemblies from the fixed positions (5 brazing parts and 1 flare connection).a. Remove the reversing valve and the stop valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
- 5 Remove reversing valve from the assemblies. (5 brazing parts and 1 flare connection) At this time, perform the brazing work with cooling the reversing valve body by wet cloth.
- 6 When reassembling after replacing the reversing valve, perform in the reverse procedure of removing.
 - a. Run the lead wires to be located to the original position, and fix them by the plastic band.b. Attach the crankcase heater according to *Removing Compressor*.
- 7 Reassemble the parts in the reverse order of removing procedures.



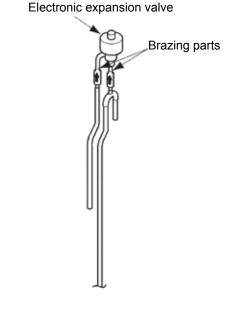
Brazing part / (discharge pipe)

10.3.4.12 Removing Electronic expansion Valve and Solenoid Valve

- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Recover the refrigerant from check joints according to Removing Compressor.
- 3 Remove the coils according to *Removing Electronic Expansion Valve Coil* and *Removing Reversing and Solenoid Valves Coils*.

Removing electronic expansion valve

- 1 Remove the brazed parts as shown in the figure.
 - Electronic Expansion Valve (EVO) Brazed Parts: 2
 - **a.** Remove the electronic expansion valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.



2 When reassembling after replacing the valves, perform in the reverse procedure of removing.



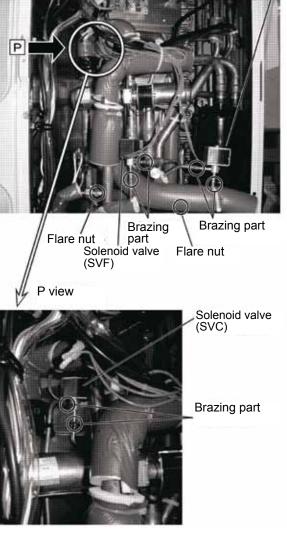
Run the lead wires to be located to the original position, and fix them by the plastic band.

Solenoid valve

(SVA)

Removing solenoid valves

- 1 Remove the brazed parts and the flare connections as shown in the figures.
 - Solenoid Valve (SVA) Brazed Parts: 2
 - Solenoid Valve (SVC) Brazed Parts: 2
 - Solenoid Valve (SVF) Flare connections: 2
 - **a.** Remove the solenoid valves with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
 - **c.** Perform the flare connection work using two spanners to avoid twisting pipes.



2 When reassembling after replacing the valves, perform in the reverse procedure of removing.

i Note

Run the lead wires to be located to the original position, and fix them by the plastic band

10

10.3.4.13 Removing electrical components

- Removing control PCB (PCB1)
- 1 Remove the service cover following Removing service cover.
- 2 Remove all the wiring connected to the control PCB.

DANGER

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

3 Remove the 6 holders. Clamp the middle part of the holders with long-nose pliers and remove it toward front side.

DANGER DO NOT touch the electrical components on the PCB.

Holder Pay attention not to bend or apply much force onto PCB Printed Circuit Board (PCB1)

Removing Inverter module •

in order to avoid PCB failure.

- 1 Remove the service cover following *Removing service cover*.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

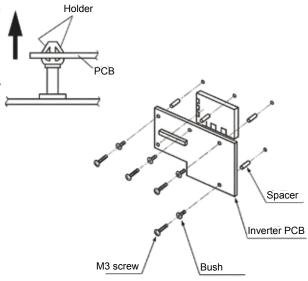
DANGER

DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

3 Remove 4 screws M3, remove the bushes and remove the spacers fixing the inverter.

ΝΟΤΕ

When mounting again be sure to place the bushes and spacers.



Removing Diode Module (DM)

- 1 Disconnect the wirings of terminal + U V W on the diode module.
- 2 Remove 2 M5 fixing screws on the diode module.
- 3 Remove the diode module from the electrical box.

1: 5 Screws (M5)

2: Fixing screw (M5)



Removing Transistor Module (IPM)

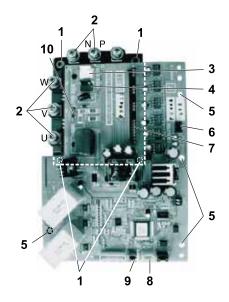
- 1 Disconnect all the wirings connected to the transistor module.
- 2 Remove the connectors CN2, CN3, CN206, PCN301 and PCN302 from the transistor module.
- 3 Disconnect the wirings of P N U V W on the transistor module.
- 4 Remove 4 M4 fixing screws on the transistor module.
- **5** Remove the transistor module from the electrical box.

1. Screws for transistor module (M4)

Screw (M5)
 PCN301
 PCN302
 Screws for PCB (M3)

6. CN3

- 7. Inverter PCB
- 8. CN206
- 9. CN2
- 10. LED201



6 Reassemble the parts in the reverse order of removing order.

i_{NOTE}

Identify terminal with the mark band when reassembling to avoid incorrect wiring.

10.3.4.14 Removing other electrical components

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Open the P plate turning counter clockwise approximately 90° following *Opening electrical box (P plate)*.
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

Capacitors

1 Remove all the wiring connected to the capacitors.



The wires have polar characters. Identify the wire mark band and the indication on the capacitor when connecting wires.

2 Remove 2 screws fixing the capacitors.

СМС

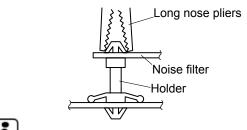
- 1 Remove all the wiring connected to CMC.
- 2 Remove 3 screws fixing the CMC.

Reactor

1 Remove 4 screws fixing the reactor.

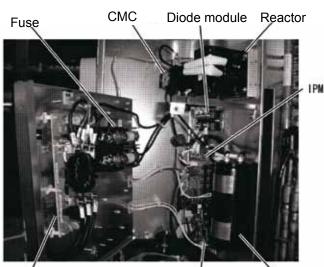
Noise filter

- 1 Remove all the wiring connected to the noise filter.
- 2 Hold the upper part of the 6 holders with the long nose pliers and remove the noise filter.



υνοτέ

- To connect wiring at reassembling, ensure that the terminal numbers and wiring mark band codes are matched. If connections are wrong, there is the possibility of wrong operation and to cause damage to electrical parts.
- From the Power Wires (U Phase, V Phase, W Phase) of Inverter Compressor (MC1), please make sure that the 2 wires of U Phase and V Phase pass through the current sensors (CTU • CTV) of Inverter PCB (PWB3). Also make sure that the Power Wire of U Phase is connected to the U Phase side of current sensor (CTU), and that V Phase is connected to the V Phase side of current sensor (CTV). If the combination is wrong, it could be a cause of wrong operation and damage.
- hen attaching the PCB, or when attaching the parts attached to the PCB, pay attention not to clamp any wiring between plates or electrical components.
- Screws, Bushes and Collars are used to fix the Inverter PCB. Please use Bushes and Collars without fault when attaching the Inverter PCB. Failure to do so may cause wrong operation.
- When replacing the Control PCB, please set the Dip Switches with the same configuration as the PCB before replacement. Wrong settings may cause wrong operation. Also, please confirm the replacement instructions supplied with the PCB sold as a service part.
- Do not apply too much force to the electrical parts mounted on the PCB or to the PCB itself. It may cause failure of the PCB.



Noise filter

Inverter PCB Capacitor

10.4 Servicing for Standard Series

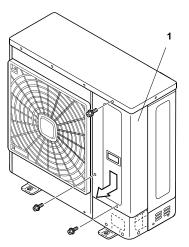
10.4.1 Outdoor Units RAS-(4-6)H(V)NCE

10.4.1.1 Removing service cover



- Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.
- 1 Pull downward and remove the service cover after removing 3 upper and lower fixing screws.
 - Pay attention not to drop the service cover.

1. Service cover.

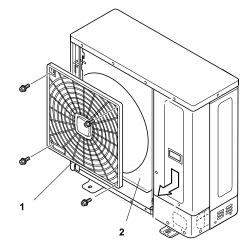


10.4.1.2 Remove outlet grille

1 Remove 4 screws which fix the outlet grille.

1. Air outlet grille.

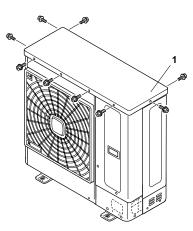
2. Shroud.



10

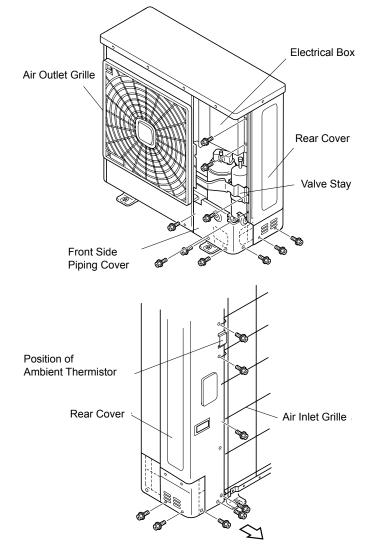
10.4.1.3 Removing upper cover

- 1 Remove the upper cover upward after removing 9 fixing screws.
 - 1. Upper cover.



10.4.1.4 Removing bottom service cover and rear cover

- 1 Remove 5 screws which fix the bottom service cover. Pull and remove the bottom service cover.
- 2 Remove the upper cover following *Removing upper cover*.
- 3 Remove 9 screws which fix the rear cover. Pull backward and remove the rear cover.

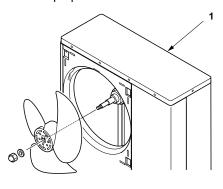


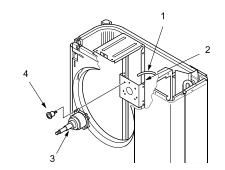
INOTE Pay attention that the screw length for the ambient thermistor differs from other fixing screws.

SMGB0079 rev.0 - 01/2013

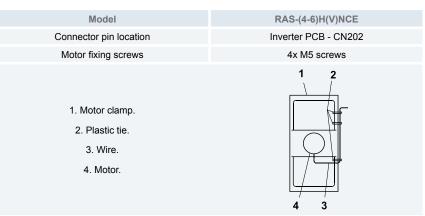
10.4.1.5 Removing outdoor fan motor

- 1 Remove the service cover following *Removing service cover*.
- 2 Remove the outlet grille following *Remove outlet grille*.
- 3 Remove the upper cover following *Removing upper cover*.
- 4 To remove the propeller fan remove the cap nut and washer which fix the propeller fan onto the motor shaft. (Use a puller when the propeller fan and motor shaft are fixed too tightly).





- 1. Fan motor lead wire.
- 2. Motor clamp.
- 3. Motor.
- 4. Screw with spacer.
- **5** Remove the fan motor connector from PCB in the electrical box.
 - Cut the plastic tie with nippers which fixes the fan motor lead wire onto the motor clamp. Remove 4 screws which fix the motor.



i_{note}

1. Upper cover.

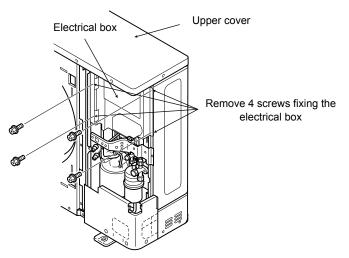
- 1 To mount the motor be sure to place the lead wire outlet downward. (Adjust the propeller fan and shroud not to contact with each other).
- 2 Fix the motor lead wire onto the motor clamp using a plastic tie as shown in the table on the previous page to avoid obstructing the propeller fan.
- 3 Mounting propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 20 Nm)
- 4 Connect the motor lead wire to PCB1 of the electrical box. (Be sure to match colors of the PCB connectors and motor lead wire connectors).
- 5 Be sure to attach the outlet grill onto the shroud after replacing the fan motor.

SMGB0079 rev.0 - 01/2013



10.4.1.6 Removing electrical box

- 1 Remove the service cover following *Removing service cover*.
- 2 Remove the upper cover following *Removing upper cover*.
- 3 Remove 4 screws which fix the electrical box.
- 4 Pull up and remove the electrical box.



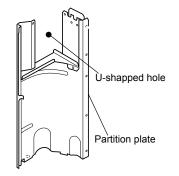
inote

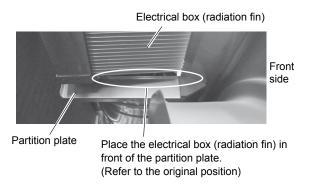
The following wiring must be removed to dismount the electrical box.

- 1. Remove the reversing valve coil from the reversing valve. : Removing reversing valve coil.
- 2. Remove the expansion valve coil from the expansion valve. : Removing electronic expansion valve coil.
- 3. Remove the solenoid valve coil from the solenoid valve. : Removing solenoid valve coil.
- 4. Remove the Faston terminals of high/low pressure switch and the pressure switch for control from the switch body : Removing the high pressure switch, low pressure switch and pressure switch for control.
- 5. Remove all connectors on the control PCB.
- 6. Remove the compressor wires in the terminal box of the compressor.
- 7. To remount the electrical box attach the electrical box fitting with the partition plate. (Insert the radiation fin into the U-notch on the partition plate and place the fin on the fan box side. Then attach the electrical box hooking onto the partition plate).



Original position





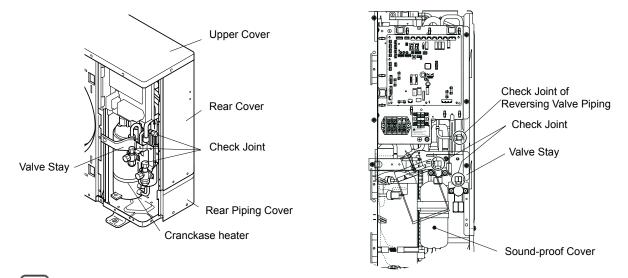
Front side

Place the electrical box to hook the parts onto the partition plate.

10.4.1.7 Removing the compressor

RAS-4H(V)NCE

- 1 Remove the service cover upper cover bottom service cover and rear cover following *Removing service cover, Removing upper cover,* and *Removing bottom service cover and rear cover.* When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall.
- 2 Remove the electrical box following *Removing electrical box*.
- 3 Collect the refrigerant from the check joint.
- 4 Remove the valve stay.



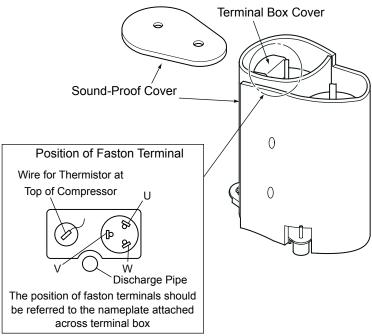
i Note

Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.

5 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and remove the thermistor on top of the compressor. Remove the soundproof cover.



Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order at reassembling may result in compressor damage.

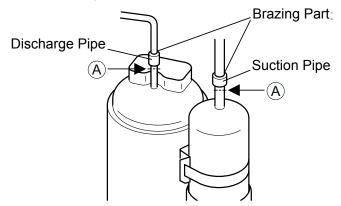


10

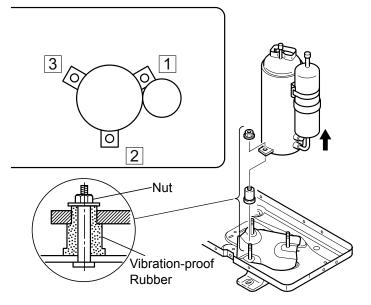
- 6 Remove the crankcase heater.
- 7 Remove the suction pipe and discharge pipe from the compressor. Remove the brazed part after cutting the pipes at "A" by a pipe cutter.

inote

Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.



8 Remove 1 nut which fix the compressor and remove it by lifting up.



Compressor Position	1	2	3
Vibration-Proof Rubber	0	0	0
Nut	-	0	-

○ : with a nut

- : without a nut
- **9** When brazing the replaced compressor braze quickly cooling the pipes on the compressor side with wet cloth to avoid the filler metal entering into the compressor.

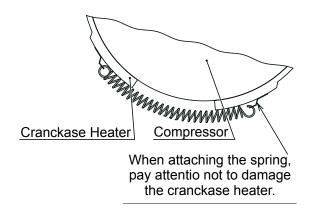
inote

PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage.

10 Perform in the reverse procedure of removing after replacing the compressor.

- **a.** Check if the Faston terminal has any abnormality. (Ensure the pull out force greater than 20 Nm) If the Faston terminal is identified faulty replace with a new one.
- **b.** Ensure the fixture of the lead wires.
- c. Attach the cranckase heater to the compressor without torsion and gap as shown in the figure below.

Detail of Spring for Cranckase Heater



inote

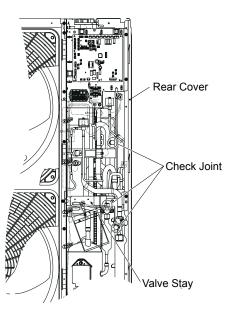
- To prevent contamination of the refrigerant by water or foreign materials, do not expose the refrigerant parts open to atmosphere for long periods. If necessary, seal pipe ends using caps or tape.
- Remove the cap for compressor right before replacing the compressor. When replacing the compressor, seal the tape at the suction and the discharge pipes to prevent foreign materials. Remove it when brazing pipes.
- Securely check terminal numbers and mark bands before disconnecting lead wires. When reassembling the lead wires, connect them to match surely the terminal numbers and the mark bands. If the lead wires are connected incorrectly to the terminal, the compressor will be damaged due to reverse rotation.

RAS-(5-6)H(V)NCE

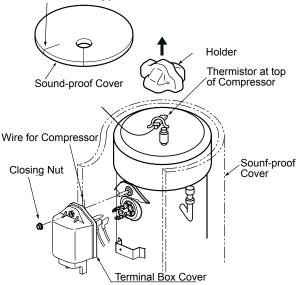
- 1 Remove the service cover, upper cover, bottom service cover and rear cover following *Removing service cover, Removing upper cover, and Removing bottom service cover and rear cover.* When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall.
- 2 Remove the electrical box following *Removing electrical box*.
- 3 Collect the refrigerant from the check joint.
- 4 Remove the valve stay.

NOTE

Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.



Position of taking out Thermistor



5 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and disconnect the thermistor on top of the compressor. Remove the soundproof cover.

i note

Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order at reassembling may result in compressor damage.

- 6 Remove the rubber cap and the thermistor attached on top of the compressor.
- 7 Remove the crankcase heater.

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- Compressor piping must be connected by brazing. MAKE SURE that any flammable material is not around before heating with burner for the oil inside the piping may flame up.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal the suction and discharge pipes when the refrigerant cycle is left unattached for a long period.
- Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape when blazing the pipe.
- For piping at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage of the compressor.

398

8 Remove the suction pipe and discharge pipe from the compressor.

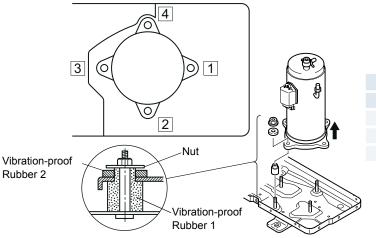
i Note

Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.

9 Remove 2 nuts which fix the compressor and remove it by lifting it up with inclining forward.

inote

To remove the compressor the liquid stop valve pipe should be moved (bent) to the right side hand. PAY CLO-SE ATTENTION not to crush to break the pipe.



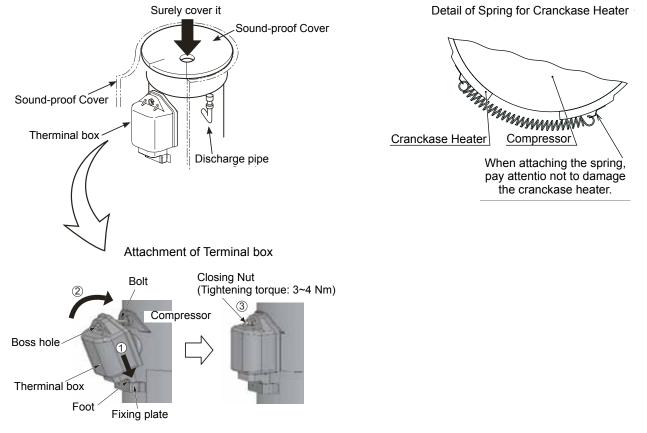
Fixation of the compressor to the bottom plate					
Compressor position	1	2	3	4	
Vibration-proof rubber 1	х	х	х	х	
Vibration-proof rubber 2	bber 2 x x — —				
Nut	х	х	—	—	

10 When brazing the replaced compressor quickly perform the brazing while the compressor side piping is cooled with wet cloth in order to avoid the brazing material from entering the compressor.

inote

PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage. Cool the pipe by wet cloth

- 11 Perform in the reverse procedure of removing after replacing the compressor.
 - **a.** Check if the Faston terminal has any abnormality. (Ensure the pull out force greater than 20 Nm). If the Faston terminal is identified faulty replace with a new one.
 - **b.** Ensure the fixture of the lead wires.
 - c. Surely fix the terminal box by tightening the closing nut (Tightening Torque: 3.0 Nm).
 - d. Attach the top of sound-proof cover to cover surely the compressor.
 - $\boldsymbol{e}.$ Wrap the sound-proof cover to cover the terminal box and the discharge pipe.
 - f. Attach the crankcase heater without torsion and gap to the compressor as following figure.

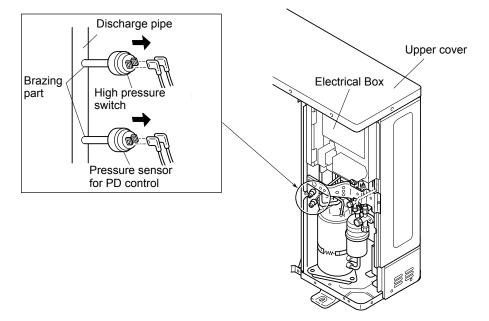




10.4.1.8 Removing the High pressure switch and Pressure switch for control

RAS-4H(V)NCE

- 1 Remove the service cover and the bottom service cover following *Removing service cover*, and *Removing bottom* service cover and rear cover.
- 2 Collect the refrigerant from the check joint according to *Removing the compressor*, in this chapter.
- 3 Remove the soundproof cover on the compressor.
- 4 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.
- 5 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.

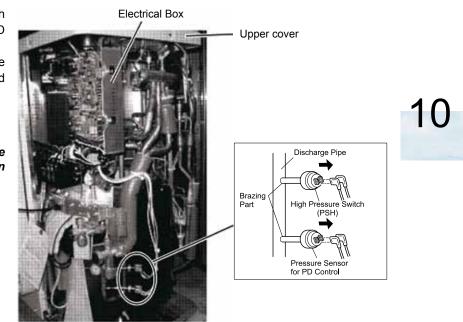


RAS-(5-6)H(V)NCE

- 1 Remove the service cover, the bottom service cover and rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Collect the refrigerant from the check joint according to Removing the compressor, in this chapter.
- **3** Remove the soundproof cover on the compressor.
- 4 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.
- **5** Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.



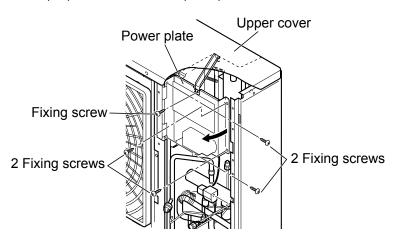
Beware the cover screws do not damage the wirings when performing the procedure in reverse way.





10.4.1.9 Opening electrical box (P plate)

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Unplug all the connectors of the electrical box.
- 3 Remove 5 screws which fix the electrical box and open the P plate turning counter clockwise approximately 90°.
 - Check that the LED201 (red) on the inverter PCB (PCB2) is OFF.

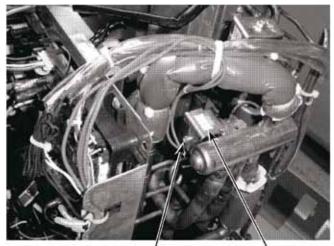




• DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

10.4.1.10 Removing Reversing valve coil

- 1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following *Removing service* cover, *Removing bottom service cover and rear cover* and *Removing upper cover*.
- 2 Disconnect the PCN6 connector on the control PCB of the electrical box.
- Remove 1 fixing screw to remove the reversing valve coil.



Fixing screw for Reversing valve

Reversing valve

4 When reassembling, perform the procedure in the reverse way of removing.

SMGB0079 rev.0 - 01/2013

inote

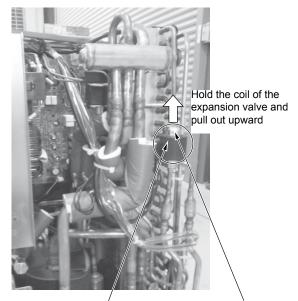
Fix the wires by plastic bands to the original position.

10.4.1.11 Removing electronic expansion valve coil

- 1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following Removing service cover, Removing bottom service cover and rear cover and Removing upper cover.
- 2 Disconnect the CN5A connector on the control PCB of the electrical box.
- 3 Hold the coil of the expansion valve and pull out upward.
- It is easier to remove the expansion valve coil if it is rotated while pulling it upward.
- 4 When reassembling after replacing the expansion valve coil, perform the procedure in the reverse way of removing. The expansion valve coil is equipped with a lock mechanism. After attaching the expansion valve coil, rotate it until the sound of locking is heard.

NOTE

Fix the wires by plastic bands to the original position.



Expansion valve coil

Release lock

DANGER

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

10.4.1.12 Removing solenoid valve coil (SVA)

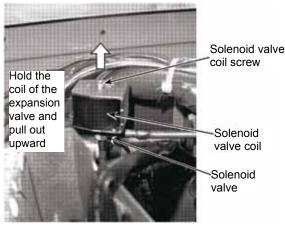
- 1 Remove the service cover and the upper cover following Removing service cover and Removing upper cover.
- 2 Unplug the connector PCN7 (SVA) on O.U. PCB1.
- 3 Remove the fixing screw, and remove the solenoid valve coil (SVA) upward.
- 4 When reassembling after replacing the solenoid valve coil, perform the procedure in the reverse way of removing.



Fix the wires by plastic bands to the original position.

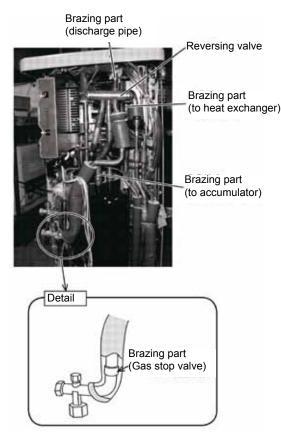


DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.



10.4.1.13 Removing reversing valve

- 1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following *Removing service cover*, *Removing bottom service cover and rear cover* and *Removing upper cover*.
- 2 Remove the reversing valve coil according to *Removing Reversing Valve Coil*.
- 3 Remove the electrical box according to *Removing Electrical Box*.
- 4 Remove the electronic expansion valve coil according to Removing Electronic Expansion Valve Coil.
- 5 Recover the refrigerant from check joints according to *Removing Compressor*.
- **6** Remove the high pressure switch wiring.
- 7 Remove the valve stay.
- 8 Remove the reversing valve assemblies from the fixed positions (4 brazing parts).
 - a. Remove the reversing valve and the stop valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
- **9** Remove reversing valve from the assemblies. (4 brazing parts) At this time, perform the brazing work with cooling the reversing valve body by wet cloth.
- 10 When reassembling after replacing the reversing valves, perform in the reverse procedure of removing.
 - a. Run the lead wires to be located to the original position, and fix them by the plastic band.
 - b. Attach the crankcase heater according to Removing Compressor.





4 brazing parts



10.4.1.14 Removing Electronic expansion valve and Solenoid valve

- 1 Remove the service cover, the bottom service cover, the rear cover and the upper cover following *Removing service* cover, *Removing bottom service cover and rear cover* and *Removing upper cover*.
- 2 Recover the refrigerant from check joints according to Removing Compressor.
- 3 Remove the coils according to Removing Electronic Expansion Valve Coil and Removing Solenoid Valve Coil.
- 4 Remove the brazed parts as shown in the figures.
 - Electronic Expansion Valve (EVO) Brazed Parts: 2
 - Solenoid Valve (SVA) Brazed Parts: 2
 - a. Remove the electronic expansion valve and the solenoid valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
- 5 When reassembling after replacing the valves, perform in the reverse procedure of removing.



Run the lead wires to be located to the original position, and fix them by the plastic band

10.4.1.15 Removing electrical components

- Removing control PCB (PCB1)
- 1 Remove the service cover following Removing service cover.
- 2 Remove all the wiring connected to the control PCB.

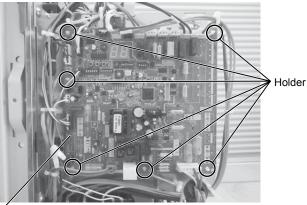
MDANGER

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

3 Remove the 6 holders. Clamp the middle part of the holders with long-nose pliers and remove it toward front side.



DO NOT touch the electrical components on the PCB. Pay attention not to bend or apply much force onto PCB Printed Circuit Board (PCB1) in order to avoid PCB failure.

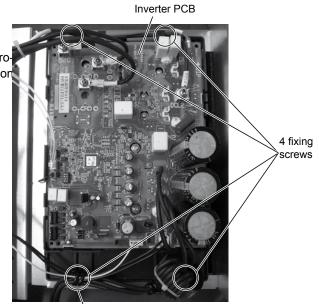


Removing Inverter module

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Open the P plate turning counter clockwise approximately 90° following *Opening electrical box (P plate)*.
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

- 3 Remove all the wiring connected on the Inverter.
- 4 Remove 4 screws which fix the Inverter. Hold the wires placed at the bottom side.
- 5 Pull the Inverter toward right side from the front of the product. (Remove along with the plastic case and the radiation fin).



Fixed with cord clamps

10.4.1.16 Removing other electrical components

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Open the P plate turning counter clockwise approximately 90° following *Opening electrical box (P plate)*.
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

СМС

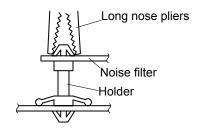
- 1 Remove all the wiring connected to CMC.
- **2** Remove 2 screws fixing the CMC.

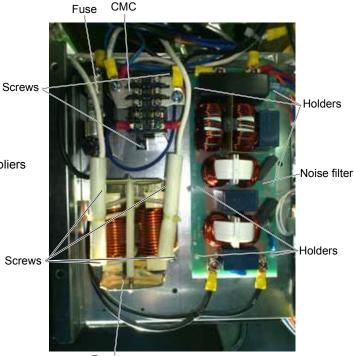
Reactor

1 Remove 4 screws fixing the reactor.

Noise filter

- 1 Remove all the wiring connected to the noise filter.
- **2** Hold the upper part of the 6 holders with the long nose pliers and remove the noise filter.





Reactor

inote

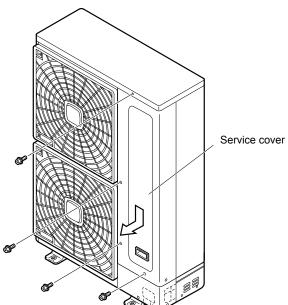
- To connect wiring at reassembling, ensure that the terminal numbers and wiring mark band codes are matched. If connections are wrong, there is the possibility of wrong operation and to cause damage to electrical parts.
- When attaching the PCB, or when attaching the parts attached to the PCB, pay attention not to clamp any wiring between plates or electrical components.

10.4.2 Outdoor Units RAS-(8-10)HNCE

10.4.2.1 Removing service cover

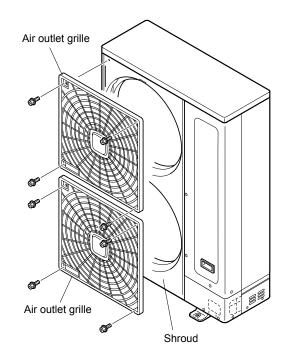


- Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.
- 1 Remove the 4 fixing screws, slide the service cover downward and remove it.
 - Pay attention not to fall off the service cover.



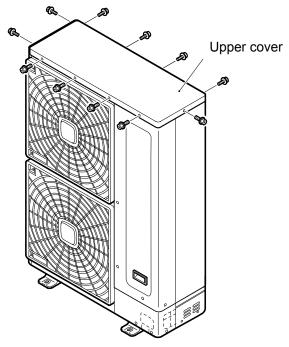
10.4.2.2 Removing air outlet grille

1 Remove the 8 fixing screws of the shroud.



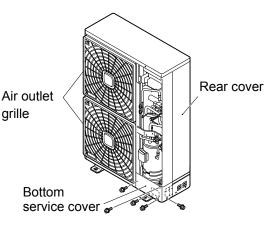
10.4.2.3 Removing upper cover

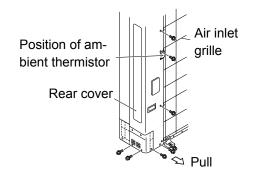
1 Remove 11 screws fixing the upper cover and remove the upper cover upward.



10.4.2.4 Removing the bottom service cover and rear cover

- 1 Remove 5 screws fixing the lower part of service cover and remove the lower part of service cover by pulling towards front side.
- 2 Remove the upper cover according to the item *Removing* upper cover.
- **3** Remove 10 screws fixing panel and remove the rear panel by pulling in the arrow direction.





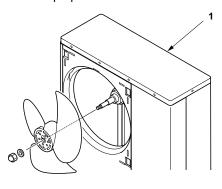


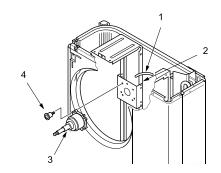
DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

409

10.4.2.5 Removing outdoor fan motor

- 1 Remove the service cover following Removing service cover.
- 2 Remove the outlet grille following *Remove outlet grille*.
- 3 Remove the upper cover following *Removing upper cover*.
- 4 To remove the propeller fan remove the cap nut and washer which fix the propeller fan onto the motor shaft. (Use a puller when the propeller fan and motor shaft are fixed too tightly).





- 1. Fan motor lead wire.
- 2. Motor clamp.
 - 3. Motor.
- 4. Screw with spacer.

5 Remove the fan motor connector from PCB in the electrical box.

Cut the plastic tie with nippers which fixes the fan motor lead wire onto the motor clamp. Remove 4 screws which fix the motor.

Model		RAS-(8-10)HNCE		
Fan Motor Comp. №	DC Fan Motor	Inverter PCB		
		CN406 (Red)		
	AC Fan Motor	inverter PCB		
		CN405 (White)		
Screws for motor DC Fan Motor		4 x M6 screw (with spacer)		
fixing.	AC Fan Motor	4x M6 screws		
1. Motor 2. Fan moto 3. Plas 4. DC Fa 5. AC Fa	or lead wire. stic tie. In Motor.			

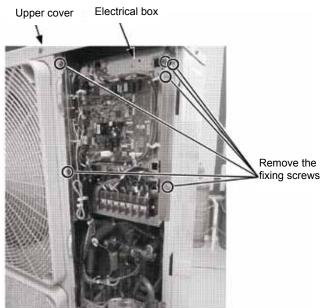
inote

1. Upper cover.

- 1 To mount the motor be sure to place the lead wire outlet downward. (Adjust the propeller fan and shroud not to contact with each other).
- 2 Fix the motor lead wire onto the motor clamp using a plastic tie as shown in the table on the previous page to avoid obstructing the propeller fan.
- 3 Mounting propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 20 Nm)
- 4 Connect the motor lead wire to PCB1 of the electrical box. (Be sure to match colors of the PCB connectors and motor lead wire connectors).
- 5 Be sure to attach the outlet grill onto the shroud after replacing the fan motor.

10.4.2.6 Removing electrical box

- 1 Remove the service cover following *Removing service cover*.
- 2 Remove the upper cover following *Removing upper cover*.
- 3 Remove 6 screws which fix the electrical box.
- 4 Pull up and remove the electrical box.



inote

The following wiring must be removed to dismount the electrical box.

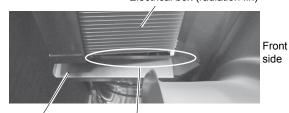
- 1. Remove the reversing valve coil from the reversing valve. : Removing reversing valve coil.
- 2. Remove the expansion valve coil from the expansion valve. : Removing electronic expansion valve coil.
- 3. Remove the solenoid valve coil from the solenoid valve. : Removing solenoid valve coil.
- 4. Remove the Faston terminals of high pressure switch and the pressure switch for control from the switch body : Removing the high pressure switch and pressure switch for control.
- 5. Remove all connectors on the control PCB.
- 6. Remove the compressor wires in the terminal box of the compressor.
- 7. To remount the electrical box attach the electrical box fitting with the partition plate. (Insert the radiation fin into the U-notch on the partition plate and place the fin on the fan box side. Then attach the electrical box hooking onto the partition plate).

Front

side



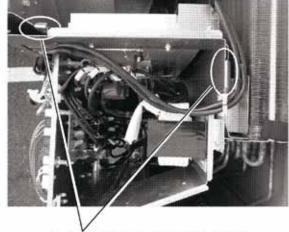
Electrical box (radiation fin)



Partition plate

Place the electrical box (radiation fin) in front of the partition plate. (Refer to the original position)

SMGB0079 rev.0 - 01/2013



Place the electrical box to hook the parts onto the partition plate.



10.4.2.7 Removing the compressor

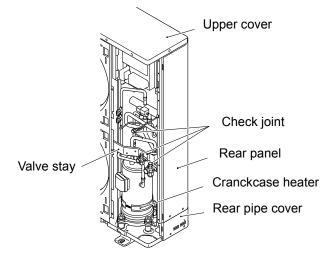
1 Remove the service cover and the bottom service cover following *Removing service cover*, and *Removing bottom* service cover and rear cover.

When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall.

2 Collect the refrigerant from the check joint.

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Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.



3 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and disconnect the thermistor on top of the compressor. Remove the soundproof cover.

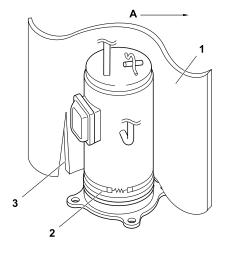


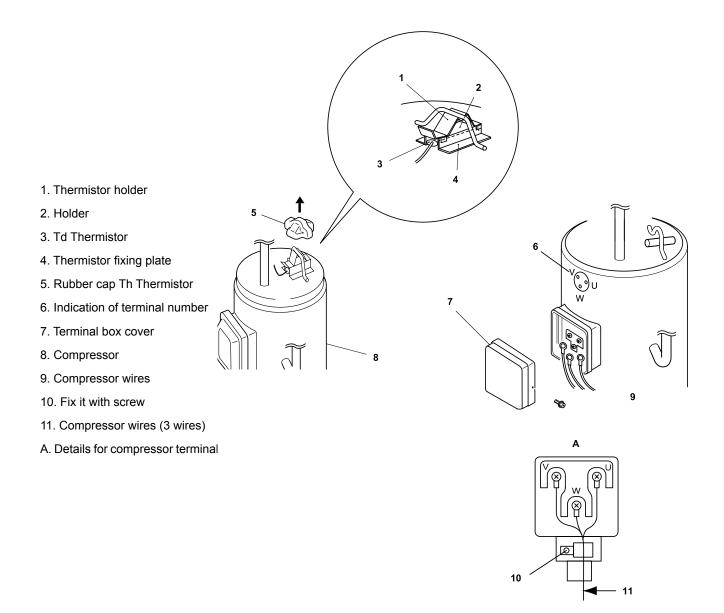
Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order at reassembling may result in compressor damage.

- 4 Remove the rubber cap and the thermistor attached on top of the compressor.
- **5** Remove the crankcase heater.

1. Sound-proof cover.

- 2. Oil heater.
- 3. Cut part.
- A. Direction to remove the cover.





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- Compressor piping must be connected by brazing. MAKE SURE that any flammable material is not around before heating with burner for the oil inside the piping may flame up.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal the suction and discharge pipes when the refrigerant cycle is left unattached for a long period.
- Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape when blazing the pipe.
- For piping at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage of the compressor.
- 6 Remove the suction pipe and discharge pipe from the compressor.

SMGB0079 rev.0 - 01/2013

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Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.

7 Remove 2 nuts which fix the compressor and remove it by lifting it up with inclining forward.

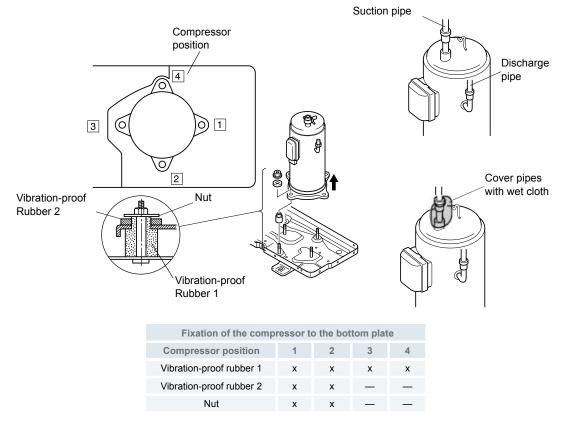
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To remove the compressor the liquid stop valve pipe should be moved (bent) to the right side hand. PAY CLO-SE ATTENTION not to crush to break the pipe.

8 When brazing the replaced compressor quickly perform the brazing while the compressor side piping is cooled with wet cloth in order to avoid the brazing material from entering the compressor.

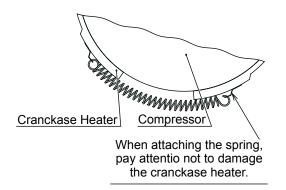


PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage.



- 9 Reassemble the parts in the reverse order of removing procedures.
 - **a.** Tighten the screws (U V and W) for compressor wires with 2.5 Nm.
 - b. Fix the wires firmly.
 - c. Attach the crankcase heater without torsion and gap to the compressor as following figure.

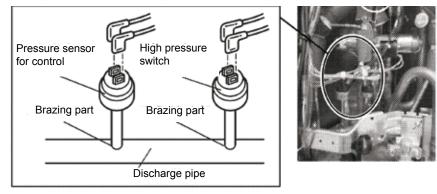
Detail of Spring for Cranckase Heater





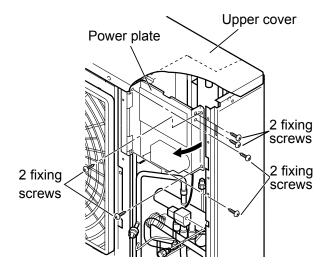
10.4.2.8 Removing High pressure switch and pressure switch for control

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Collect the refrigerant from the check joint according to *Removing the compressor*, in this chapter.
- 3 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.
- 4 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.



10.4.2.9 Opening electrical box (P-Mounting Plate)

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Remove 6 screws which fix the electrical box and open the P plate turning counter clockwise approximately 90°.
 - Check that the LED201 (red) on the inverter PCB (PCB2) is OFF when opening P-mounting plate.





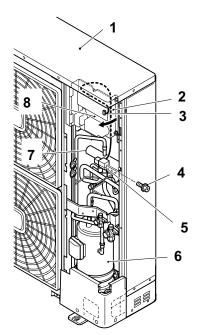
DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

10.4.2.10 Removing reversing valve coil

1 Remove the service cover following *Removing service cover* in this chapter.

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

- 2 Remove the connector (PCN6) on the control PCB (PCB1) of the electrical box.
- 3 Remove the reversing valve coil by removing 1 screw fixing the coil.
 - 1. Upper cover.
 - 2. Power Plate.
 - 3. PCN6.
 - 4. Fixing screw for reversing valve coil.
 - 5. Reversing valve coil.
 - 6. Compressor.
 - 7. Reversing valve.
 - 8. Electrical Box.



4 When reassembling, perform the procedure in the reverse way of removing.



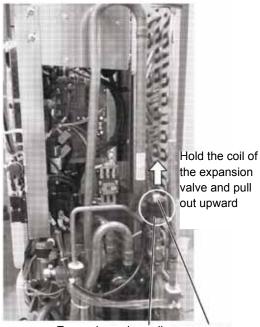
Fix the wires by plastic bands to the original position.

10.4.2.11 Removing electronic expansion valve coil

- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Disconnect the CN5A connector on the control PCB1 of the electrical box.
- 3 Hold the coil of the expansion valve and pull out upward. It is easier to remove the expansion valve coil if it is rotated while pulling it upward.
- 4 When reassembling after replacing the expansion valve coil, perform the procedure in the reverse way of removing. The expansion valve coil is equipped with a lock mechanism. After attaching the expansion valve coil, rotate it until the sound of locking is heard.

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Fix the wires by plastic bands to the original position.



Expansion valve coil Release lock



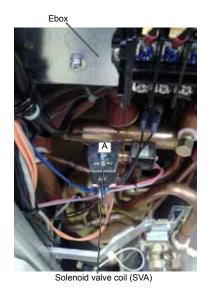
DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

10.4.2.12 Removing solenoid valve coil (SVA)

- 1 Remove the service cover following *Removing service cover*.
- 2 Open the P-mounting plate. Check to ensure the LED201 (Red) of the inverter PCB (PCB2) is OFF.
- 3 Unplug the connector PCN7 (SVA) on O.U. PCB1.
- 4 Remove the fixing screw, and remove the solenoid valve coil (SVA) upward.
- **5** When reassembling after replacing the solenoid valve coil, perform the procedure in the reverse way of removing.

NOTE

Fix the wires by plastic bands to the original position.



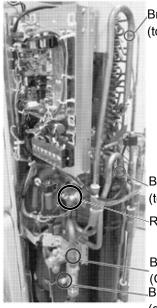


DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.



10.4.2.13 Removing reversing valve

- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Remove the reversing valve coil according to Removing Reversing Valve Coil.
- 3 Recover the refrigerant from check joints according to Removing Compressor.
- 4 Remove the reversing valve assemblies from the fixed positions (4 brazing parts).
 - a. Remove the reversing valve and the stop valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
- **5** Remove reversing valve from the assemblies. (4 brazing parts) At this time, perform the brazing work with cooling the reversing valve body by wet cloth.
- 6 When reassembling after replacing the reversing valves, perform in the reverse procedure of removing.
 - **a.** Run the lead wires to be located to the original position, and fix them by the plastic band.
- **b.** Attach the crankcase heater according to *Removing Compressor*.
- 7 Reassemble the parts in the reverse order of removing procedures.

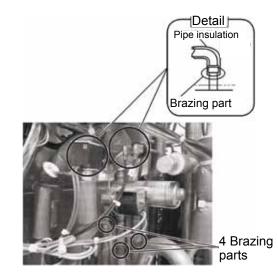


Brazing part (to heat exchanger)

Brazing part (to accumulator)

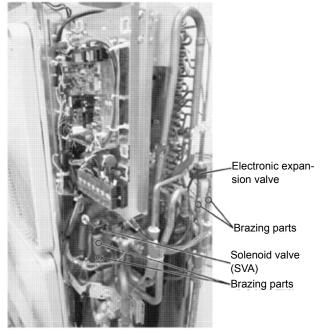
Reversing valve

Brazing part (Gas stop valve) Brazing part (discharge pipe)



10.4.2.14 Removing Electronic expansion Valve and Solenoid Valve

- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Recover the refrigerant from check joints according to Removing Compressor.
- 3 Remove the coils according to Removing Electronic Expansion Valve Coil and Removing Solenoid Valve Coil.
- 4 Remove the brazed parts as shown in the figures.
 - Electronic Expansion Valve (EVO) Brazed Parts: 2
 - Solenoid Valve (SVA) Brazed Parts: 2
 - **a.** Remove the electronic expansion valve and the solenoid valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.



5 When reassembling after replacing the valves, perform in the reverse procedure of removing.



Run the lead wires to be located to the original position, and fix them by the plastic band

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10.4.2.15 Removing electrical components

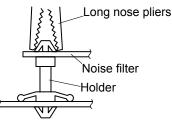
- Removing control PCB (PCB1) and relay PCB (PCB3)
- 1 Remove the service cover following *Removing service cover*.
- 2 Remove all the wiring connected to the control PCB and the relay PCB.

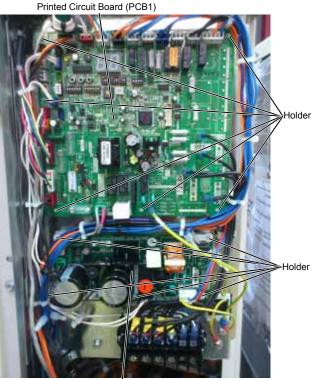
DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

3 Remove the 6 holders for each PCB. Clamp the middle part of the holders with long-nose pliers and remove it toward front side.



DO NOT touch the electrical components on the PCB. Pay attention not to bend or apply much force onto PCB in order to avoid PCB failure.





Printed Circuit Board (PCB3)

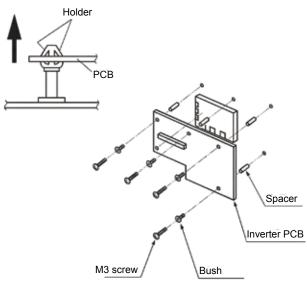
- Removing Inverter module
- 1 Remove the service cover following *Removing service cover*.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

Mdanger

DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

3 Remove 4 screws M3, remove the bushes and remove the spacers fixing the inverter.

When mounting again be sure to place the bushes and spacers.



Removing Diode Module (DM)

- 1 Disconnect the wirings of terminal + U V W on the diode module.
- 2 Remove 2 M5 fixing screws on the diode module.
- 3 Remove the diode module from the electrical box.

1: 5 Screws (M5)

2: Fixing screw (M5)



Removing Transistor Module (IPM)

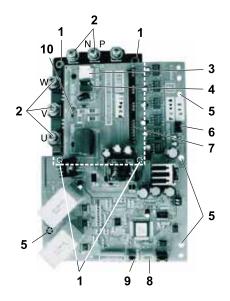
- **1** Disconnect all the wirings connected to the transistor module.
- 2 Remove the connectors CN2, CN3, CN206, PCN301 and PCN302 from the transistor module.
- 3 Disconnect the wirings of P N U V W on the transistor module.
- 4 Remove 4 M4 fixing screws on the transistor module.
- **5** Remove the transistor module from the electrical box.

1. Screws for transistor module (M4)

Screw (M5)
 PCN301
 PCN302
 Screws for PCB (M3)

6. CN3

- 7. Inverter PCB
- 8. CN206 9. CN2
- 10. LED201



6 Reassemble the parts in the reverse order of removing order.

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- To connect wiring at reassembling, ensure that the terminal numbers and wiring mark band codes are matched. If connections are wrong, there is the possibility of wrong operation and to cause damage to electrical parts.
- When attaching the PCB, or when attaching the parts attached to the PCB, pay attention not to clamp any wiring between plates or electrical components.

10.4.2.16 Removing other electrical components

- 1 Remove the service cover following *Removing service cover* in this chapter.
- Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate). 2
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DANGER

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

Capacitors

1 Remove all the wiring connected to the capacitors.



The wires have polar characters. Identify the wire mark band and the indication on the capacitor when connecting wires.

2 Remove 3 screws fixing each capacitor.

CMC

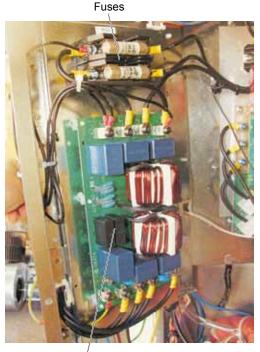
- Remove all the wiring connected to CMC. 1
- 2 Remove 2 screws fixing the CMC.

Reactor

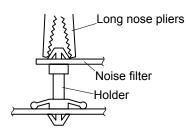
1 Remove 4 screws fixing the reactor.

Noise filter

- 1 Remove all the wiring connected to the noise filter.
- 2 Hold the upper part of the 6 holders with the long nose pliers and remove the noise filter.



Noise filter

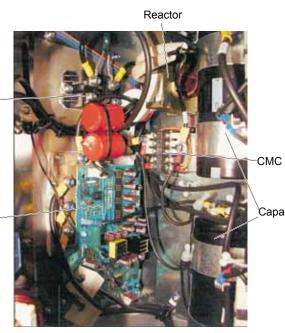


Diode module



Inverter

When mounting components, be sure to match the wiring connections with the mark band codes.



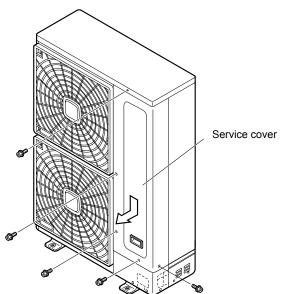
Capacitors

10.4.3 Outdoor Units RAS-12HNC

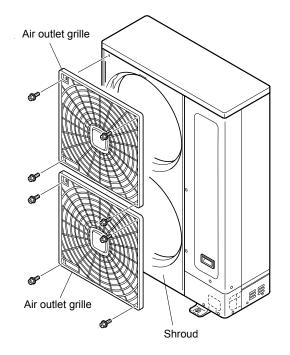
10.4.3.1 Removing service cover



- Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.
- 1 Remove the 5 fixing screws, slide the service cover downward and remove it.
 - Pay attention not to fall off the service cover.

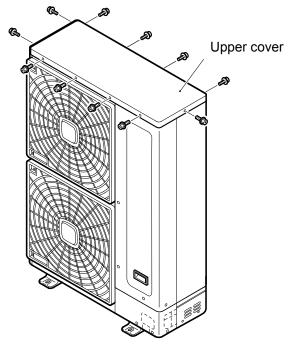


- 10.4.3.2 Removing air outlet grille
- 1 Remove the 8 fixing screws of the shroud.



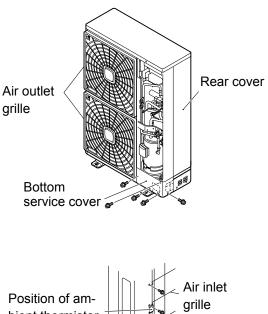
10.4.3.3 Removing upper cover

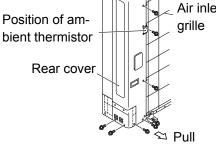
1 Remove 11 screws fixing the upper cover and remove the upper cover upward.



10.4.3.4 Removing the bottom service cover and rear cover

- 1 Remove 5 screws fixing the lower part of service cover and remove the lower part of service cover by pulling towards front side.
- 2 Remove the upper cover according to the item *Removing* upper cover.
- **3** Remove 10 screws fixing panel and remove the rear panel by pulling in the arrow direction.





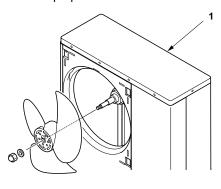
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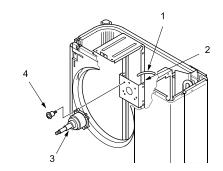
DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

424

10.4.3.5 Removing outdoor fan motor

- 1 Remove the service cover following Removing service cover.
- 2 Remove the outlet grille following Remove outlet grille.
- 3 If necessary, remove the upper cover following *Removing upper cover*.
- 4 To remove the propeller fan remove the cap nut and washer which fix the propeller fan onto the motor shaft. (Use a puller when the propeller fan and motor shaft are fixed too tightly).





Plastic tie

- 1. Fan motor lead wire.
- 2. Motor clamp.
- 3. Motor.
- 4. Screw with spacer.
- 5 Remove the fan motor connector from PCB in the electrical box.

Cut the plastic tie with nippers which fixes the fan motor lead wire onto the motor clamp. Remove 4 screws which fix the motor.

Model		RAS-12HNC		
	DC Fan Motor	Inverter PCB		
		CN406 (Red)		
Fan Motor Comp. Nº		inverter PCB		
	AC Fan Motor	PCN404 (White)		
Screws for motor	DC Fan Motor	4 x M6 screw (with spacer)		
fixing.	AC Fan Motor	4x M8 screws		
		Motor clamp Fan motor lead wire Plastic tie Cord clamp		

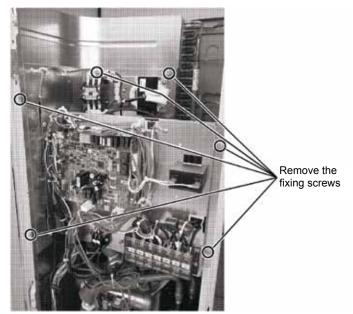
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1. Upper cover.

- 1 To mount the motor be sure to place the lead wire outlet downward. (Adjust the propeller fan and shroud not to contact with each other).
- 2 Fix the motor lead wire onto the motor clamp using a plastic tie as shown in the table on the previous page to avoid obstructing the propeller fan.
- 3 Mounting propeller fan: Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 20 Nm)
- 4 Connect the motor lead wire to PCB1 of the electrical box. (Be sure to match colors of the PCB connectors and motor lead wire connectors).
- 5 Be sure to attach the outlet grill onto the shroud after replacing the fan motor.

10.4.3.6 Removing electrical box

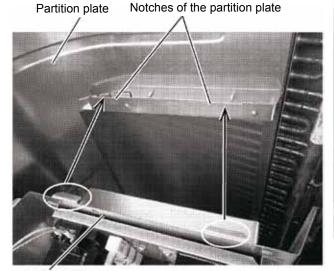
- 1 Remove the service cover following *Removing service cover*.
- 2 Remove the upper cover following *Removing upper cover*.
- 3 Remove 6 screws which fix the electrical box.
- 4 Pull up and remove the electrical box.



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The following wiring must be removed to dismount the electrical box.

- 1. Remove the reversing valve coil from the reversing valve. : Removing reversing valve coil.
- 2. Remove the expansion valve coil from the expansion valve. : Removing electronic expansion valve coil.
- 3. Remove the solenoid valve coil from the solenoid valve. : Removing solenoid valve coil.
- 4. Remove the Faston terminals of high pressure switch and the pressure switch for control from the switch body : Removing the high pressure switch and pressure switch for control.
- 5. Remove all connectors on the control PCB.
- 6. Remove the compressor wires in the terminal box of the compressor.
- 7. To remount the electrical box attach the electrical box fitting with the partition plate. (Insert the radiation fin into the U-notch on the partition plate and place the fin on the fan box side. Then attach the electrical box hooking onto the partition plate).

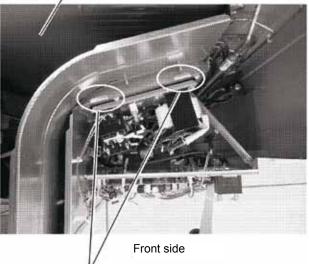


Electrical box

Front side

426

Fan box



Place the electrical box to hook the parts onto the partition plate.



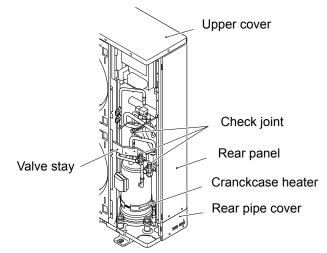
- Removing the compressor
- 1 Remove the service cover and the bottom service cover following *Removing service cover*, and *Removing bottom* service cover and rear cover.

When the outdoor unit is installed close to a wall remove the refrigerant piping and move the unit from the wall.

2 Collect the refrigerant from the check joint.

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Check Perform the recovery work at the check joint of piping. If not, the refrigerant remains inside.



3 Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and disconnect the thermistor on top of the compressor. Remove the soundproof cover.

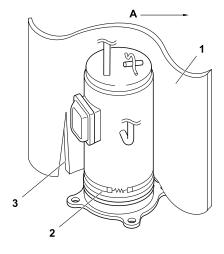


Check the terminal codes and mark bands when disconnecting the wires. Connecting wires in wrong order at reassembling may result in compressor damage.

- 4 Remove the rubber cap and the thermistor attached on top of the compressor.
- **5** Remove the crankcase heater.

1. Sound-proof cover.

- 2. Oil heater.
- 3. Cut part.
- A. Direction to remove the cover.

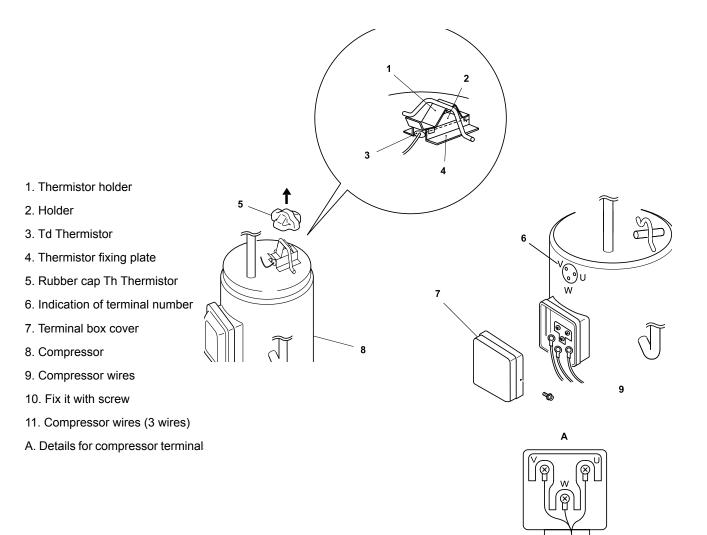


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- Compressor piping must be connected by brazing. MAKE SURE that any flammable material is not around before heating with burner for the oil inside the piping may flame up.
- Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal the suction and discharge pipes when the refrigerant cycle is left unattached for a long period.
- Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape when blazing the pipe.
- For piping at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage of the compressor.
- 6 Remove the suction pipe and discharge pipe from the compressor.

SMGB0079 rev.0 - 01/2013

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Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.

7 Remove 2 nuts which fix the compressor and remove it by lifting it up with inclining forward.

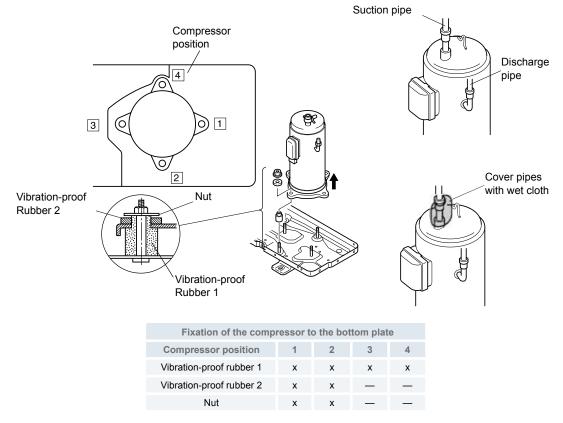
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To remove the compressor the liquid stop valve pipe should be moved (bent) to the right side hand. PAY CLO-SE ATTENTION not to crush to break the pipe.

8 When brazing the replaced compressor quickly perform the brazing while the compressor side piping is cooled with wet cloth in order to avoid the brazing material from entering the compressor.



PAY CLOSE ATTENTION not to let the filler metal enter into the compressor which may result in compressor damage.

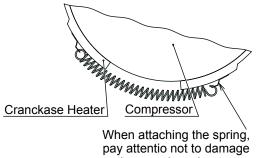


- 9 Reassemble the parts in the reverse order of removing procedures.
 - a. Tighten the screws (U V and W) for compressor wires with 2.5 Nm.

SMGB0079 rev.0 - 01/2013

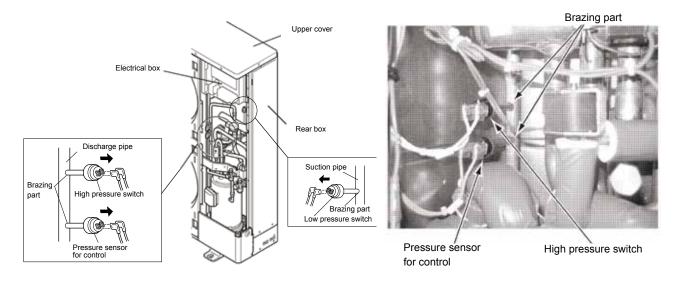
- b. Fix the wires firmly.
- c. Attach the crankcase heater without torsion and gap to the compressor as following figure.

Detail of Spring for Cranckase Heater



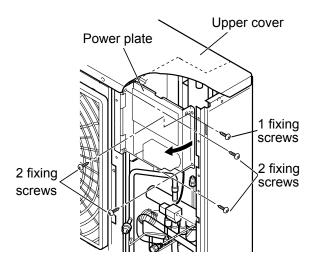
10.4.3.7 Removing High pressure switch and pressure switch for control

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Collect the refrigerant from the check joint according to *Removing the compressor*, in this chapter.
- 3 Disconnect the Faston Terminals of High Pressure Switch and Pressure sensor for PD control.
- 4 Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.



10.4.3.8 Opening electrical box (P-Mounting Plate)

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Remove 5 screws which fix the electrical box and open the P plate turning counter clockwise approximately 90°.
 - Check that the LED201 (red) on the inverter PCB (PCB2) is OFF when opening P-mounting plate.





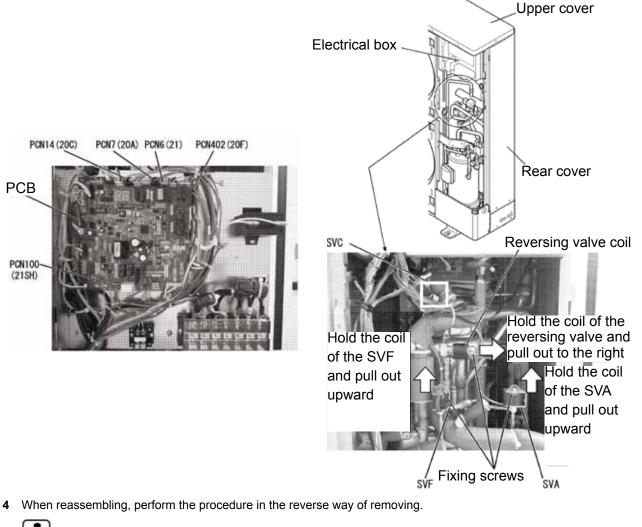
DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

10.4.3.9 Removing reversing and solenoid valves coils

1 Remove the service cover following *Removing service cover* in this chapter.

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

- 2 Remove the connectors on the control PCB (PCB1) of the electrical box according to the following picture.
- 3 Remove the valve coils by removing 1 fixing screw for each coil.



i note

Fix the wires by plastic bands to the original position.

431

10.4.3.10 Removing electronic expansion valve coil

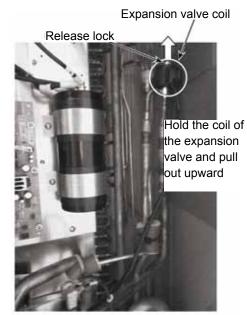
- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - · Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

- 3 Disconnect the CN5A connector on the control PCB1 of the electrical box.
- 4 Hold the coil of the expansion valve and pull out upward. It is easier to remove the expansion valve coil if it is rotated while pulling it upward.
- **5** When reassembling after replacing the expansion valve coil, perform the procedure in the reverse way of removing. The expansion valve coil is equipped with a lock mechanism. After attaching the expansion valve coil, rotate it until the sound of locking is heard.

ΝΟΤΕ

Fix the wires by plastic bands to the original position.



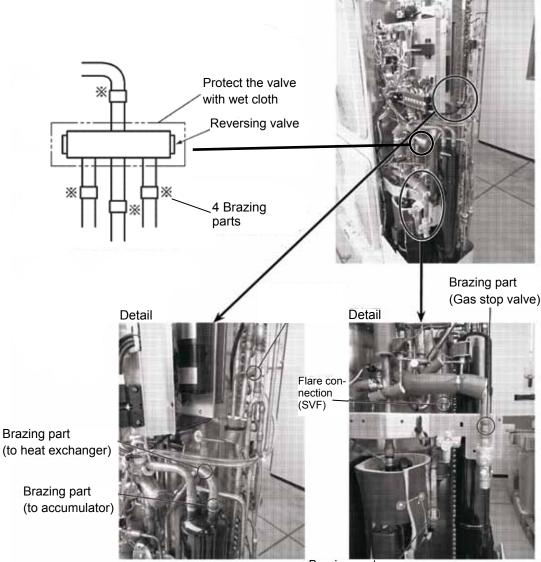
Mdanger

DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.



10.4.3.11 Removing reversing valve

- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Remove the reversing valve coil according to Removing Reversing Valve Coil.
- 3 Recover the refrigerant from check joints according to Removing Compressor.
- 4 Remove the reversing valve assemblies from the fixed positions (4 brazing parts and 1 flare connection).a. Remove the reversing valve and the stop valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
- 5 Remove reversing valve from the assemblies. (4 brazing parts and 1 flare connection) At this time, perform the brazing work with cooling the reversing valve body by wet cloth.
- 6 When reassembling after replacing the reversing valve, perform in the reverse procedure of removing.
 - **a.** Run the lead wires to be located to the original position, and fix them by the plastic band.
- b. Attach the crankcase heater according to *Removing Compressor*.
 7 Reassemble the parts in the reverse order of removing procedures.



Brazing part (discharge pipe)

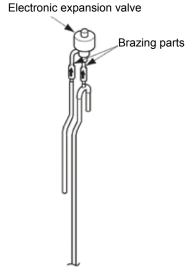


10.4.3.12 Removing Electronic expansion Valve and Solenoid Valve

- 1 Remove the service cover, the bottom service cover and the rear cover following *Removing service cover* and *Removing bottom service cover and rear cover*.
- 2 Recover the refrigerant from check joints according to Removing Compressor.
- 3 Remove the coils according to Removing Electronic Expansion Valve Coil and Removing Reversing and Solenoid Valves Coils.

Removing electronic expansion valve

- 1 Remove the brazed parts as shown in the figure.
 - Electronic Expansion Valve (EVO) Brazed Parts: 2
 - **a.** Remove the electronic expansion valve with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.



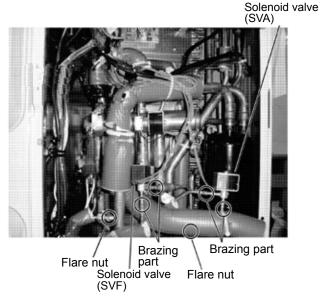
2 When reassembling after replacing the valves, perform in the reverse procedure of removing.



Run the lead wires to be located to the original position, and fix them by the plastic band.

Removing solenoid valves

- 1 Remove the brazed parts and the flare connections as shown in the figures.
 - Solenoid Valve (SVA) Brazed Parts: 2
 - Solenoid Valve (SVC) Brazed Parts: 2
 - Solenoid Valve (SVF) Flare connections: 2
 - **a.** Remove the solenoid valves with cooling the valve bodies by wet cloth.
 - **b.** Perform the brazing work with attention not to burn the electrical wirings and the piping insulations.
 - **c.** Perform the flare connection work using two spanners to avoid twisting pipes.



2 When reassembling after replacing the valves, perform in the reverse procedure of removing.



Run the lead wires to be located to the original position, and fix them by the plastic band

10.4.3.13 Removing electrical components

- Removing control PCB (PCB1)
- 1 Remove the service cover following Removing service cover.
- 2 Remove all the wiring connected to the control PCB.

DANGER

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

3 Remove the 6 holders. Clamp the middle part of the holders with long-nose pliers and remove it toward front side.

DANGER DO NOT touch the electrical components on the PCB.

Holder Pay attention not to bend or apply much force onto PCB Printed Circuit Board (PCB1)

Removing Inverter module •

in order to avoid PCB failure.

- 1 Remove the service cover following *Removing service cover*.
- 2 Open the P plate turning counter clockwise approximately 90° following Opening electrical box (P plate).
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

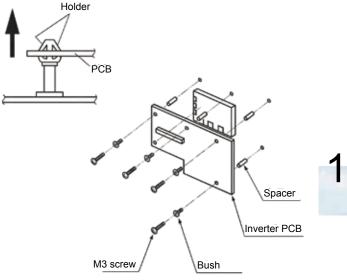
DANGER

DO NOT touch electrical components while the LED201 (Red) or LED1 (Red) are ON to avoid electrical shock. Wait until the LEDs turn off.

3 Remove 4 screws M3, remove the bushes and remove the spacers fixing the inverter.

NOTE

When mounting again be sure to place the bushes and spacers.



Removing Diode Module (DM)

- 1 Disconnect the wirings of terminal + U V W on the diode module.
- 2 Remove 2 M5 fixing screws on the diode module.
- 3 Remove the diode module from the electrical box.

1: 5 Screws (M5)

2: Fixing screw (M5)



Removing Transistor Module (IPM)

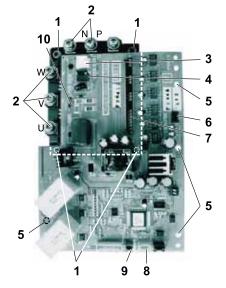
- **1** Disconnect all the wirings connected to the transistor module.
- 2 Remove the connectors CN2, CN3, CN206, PCN301 and PCN302 from the transistor module.
- 3 Disconnect the wirings of P N U V W on the transistor module.
- 4 Remove 4 M4 fixing screws on the transistor module.
- **5** Remove the transistor module from the electrical box.
 - 1. Screws for transistor module (M4)

Screw (M5)
 PCN301
 PCN302

5. Screws for PCB (M3)

6. CN3

- 7. Inverter PCB
- 8. CN206 9. CN2
- 10. LED201



6 Reassemble the parts in the reverse order of removing order.

Identify terminal with the mark band when reassembling to avoid incorrect wiring.

10.4.3.14 Removing other electrical components

- 1 Remove the service cover following *Removing service cover* in this chapter.
- 2 Open the P plate turning counter clockwise approximately 90° following *Opening electrical box (P plate)*.
 - Check that the LED201 (red) on Inverter is OFF when the P plate is opened.

DO NOT touch electrical components while the LED201 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

Capacitors

1 Remove all the wiring connected to the capacitors.



The wires have polar characters. Identify the wire mark band and the indication on the capacitor when connecting wires.

2 Remove 2 screws fixing the capacitors.

СМС

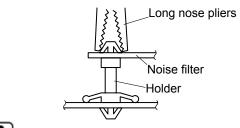
- 1 Remove all the wiring connected to CMC.
- 2 Remove 3 screws fixing the CMC.

Reactor

1 Remove 4 screws fixing the reactor.

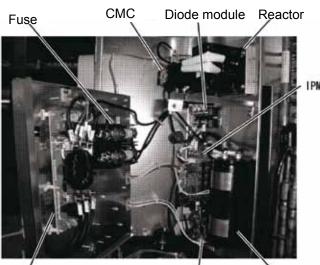
Noise filter

- 1 Remove all the wiring connected to the noise filter.
- 2 Hold the upper part of the 6 holders with the long nose pliers and remove the noise filter.



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- To connect wiring at reassembling, ensure that the terminal numbers and wiring mark band codes are matched. If connections are wrong, there is the possibility of wrong operation and to cause damage to electrical parts.
- From the Power Wires (U Phase, V Phase, W Phase) of Inverter Compressor (MC1), please make sure that the 2 wires of U Phase and V Phase pass through the current sensors (CTU • CTV) of Inverter PCB (PWB3). Also make sure that the Power Wire of U Phase is connected to the U Phase side of current sensor (CTU), and that V Phase is connected to the V Phase side of current sensor (CTV). If the combination is wrong, it could be a cause of wrong operation and damage.
- hen attaching the PCB, or when attaching the parts attached to the PCB, pay attention not to clamp any wiring between plates or electrical components.
- Screws, Bushes and Collars are used to fix the Inverter PCB. Please use Bushes and Collars without fault when attaching the Inverter PCB. Failure to do so may cause wrong operation.
- When replacing the Control PCB, please set the Dip Switches with the same configuration as the PCB before replacement. Wrong settings may cause wrong operation. Also, please confirm the replacement instructions supplied with the PCB sold as a service part.
- Do not apply too much force to the electrical parts mounted on the PCB or to the PCB itself. It may cause failure of the PCB.



Inverter PCB

Noise filter

Capacitor

11. Electrial checks of main parts

Index

11.1.	Inverter	.440
	11.1.1. Specifications of inverter	440
	11.1.2. Inverter time chart	442
	11.1.3. Protective function	443
	11.1.4. Overload control	444
11.2.	Thermistor	.445
11.3.	Electronic expansion valve	.447
11.4.	High pressure protection device	.448
11.5.	Noise filter (NF)	.450
	11.5.1. Noise filter for 3N~ (400V/50Hz)	450
	11.5.2. Noise filter for 1~ (230V/50Hz)	451
11.6.	Capacitor (CB1 CB2)	.452
11.7.	Reactor (DCL)	.453
	11.7.1. Reactor (DCL) for 3N~ (400V/50Hz)	453
	11.7.2. Reactor (DCL) for 1~ (230V/50Hz)	453
11.8.	Scroll compressor	.454
	11.8.1. Reliable mechanism for low vibrating and low sound	454
	11.8.2. Principle of compression	454

11.1 Inverter

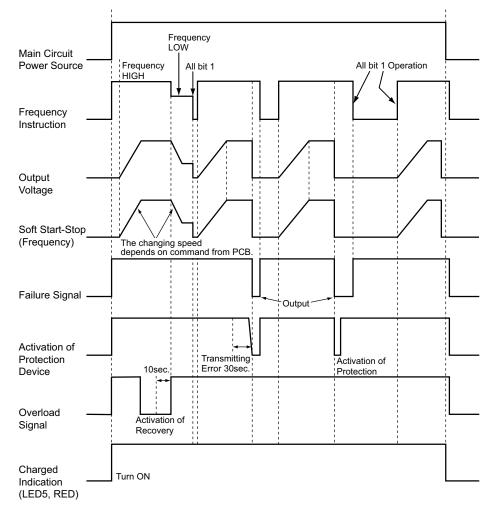
11.1.1 Specifications of inverter

Applicable model	RAS-(4-6)HNPE	RAS-(4-6)HNCE	RAS-(8-12) HN(P/C)(E)	RAS-(2-2.5)HVNP RAS-3HVNC	RAS-3HVNPE	RAS-(4-6)HVNPE	RAS-(4-6)HVNCE		
Applicable power source	3 F	hase 400V 50 Hz		1 Phase. 230V 50 Hz					
Output current	24.0A	16.0A	45.0A	10.5A	16.0A	24.0A	16.0A		
Control Method				Vector control	Vector control				
Range output frequency		20-115HZ		31-115HZ	20-1	15HZ	15-115HZ		
Accuracy of frequency			0.01Hz	z at applicable frequ	ency range				
Output / characteristics	Conditions: 1 Power source voltage AC380/415V 2 Non-loading (free output) 3 Ammeter type volt-meter (X1.1) (V) 400 300 200 100 0 50 75 100 115		2 Non-loading (e volt-meter (X1.1		115 Hz			
Soft start stop	0.125–3.00 Hz/s								



Protection function						
Applicable model	RAS-(4-6)HNPE RAS-(4-6)HNCE RAS-(8-12) HN(P/C)(E)		RAS-(2-2.5)HVNP RAS-3HVNC	RAS-3HVNPE	RAS-(4-6)HVNPE	RAS-(4-6)HVNCE
Excessive high or low voltage for inverter	Excessive low voltage at a voltage is lower than 350 V DC Excessive high voltage at a voltage is higher than 750 V DC		Excessive low voltage at a voltage is lower than 194 V DC Excessive high voltage at a voltage is higher than 400 V DC			
Abnormality of current sensor (0A detection)	Stoppage at a current of corr than 1.5A. When the frequency is 15 to ting. Cause of abnormality: Failure of current sensor Failure of IPM/DIP-IPM/ ISPI Failure of compressor / fan n Disconnected wiring	_				
Overcurrent protection for inverter	Rated current x 150% Rated current x 105% Solution Rated current x 105% Rated current x 105% </td					
Protection of transistor mo- dule	 IPM has four protection function for self-protection. Some of the output terminals between "U" and "V" "V" and "W" "W" and "U" has a short-circuit. Running current reaches the maximum rated current. Abnormal temperature is measured by internal thermistor (for 8 to 12HP). Control voltage decreases abnormally. 					
Overload control	Overload control as a current greater than (rated current X105%). Overload control release at a current smaller than (rated current X 88%).					
Fin temperature increase	The unit is stopped when the fin temperature is higher than 80°C (for 3HP), 90°C (for 4 to 6HP Premium), 92°C (for 4 to 6HP Standard) or 100°C (for 8 to 12HP).					
Earth detection	The unit is stopped when the compressor is earthing.					

11.1.2 Inverter time chart



11.1.3 Protective function

- **1** Excessive high or low voltage for inverter
 - a. Level of detection
 - When the voltage of direct current is greater than (A) V abnormalities are detected.
 - When the voltage of direct current is smaller than (B) V abnormalities are detected.

Power supply	400V 50Hz	230V 50Hz
(A)	750	440
(B)	350	194

b. Function

When abnormalities are detected the inverter compressor is stopped and transmit the signal code of stoppage cause to PCB1.

c. Cancellation of protection function.

Transmission for signal code of stoppage cause is cancelled when a stopping order is given or main power source is cut off.

- 2 Abnormality of current sensor
 - a. Level of detection

When current of the inverter compressor decreases lower than 1.5A during the inverter compressor frequency between 15Hz and 18Hz an abnormality is detected.

b. Function

When abnormalities are detected the inverter compressor is stopped and transmit the signal code of stoppage cause to PCB1.

c. Cancellation of Protection Function

Transmission for signal code of stoppage cause is cancelled when a stopping order is issued or main power source is cut off.

- **3** Overcurrent protection for inverter
 - a. Level of detection

When the current detected by current sensor reaches 150% of the rated current overcurrent is detected. (Instantaneous overcurrent).When the current detected by current sensor exceeds 105% of the rated current continuously for 30 seconds or for 3.5 minutes in total during a 10 minutes period overcurrent is detected. (Electric thermal relay).

b. Function

When abnormalities are detected the inverter compressor is stopped and transmit the signal code of stoppage cause to PCB1.

 $\boldsymbol{c}.$ Cancellation of protection function

Transmission for signal code of stoppage cause is cancelled by stopping order is issued or main power source is cut off.

4 Protection of IPM/DIP-IPM/ISPM

a. Level of detection

When some of the output terminals between "U" and "V" "V" and "W" "W" and "U" of IPM/DIP-IPM/ISPM are shortcircuited an abnormality is detected. When the running current of IPM/DIP-IPM/ISPM reaches (maximum rated current x 105%) an abnormality is detected. When an internal temperature is measured by internal thermistor of IPM an abnormality is detected. When the control voltage of IPM/DIP-IPM/ISPM decreases an abnormality is detected.

b. Function

When abnormalities are detected the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1.

c. Cancellation of protection function

Transmission for signal code of stoppage cause is cancelled when a stopping order is issued or main power source is cut off.

5 Fin temperature increase

a. Level of detection

When the temperature of internal thermistor exceeds more than 80°C (for 3HP), 90°C (for 4 to 6HP Premium), 92°C (for 4 to 6HP Standard) or 100°C (for 8 to 12HP) an abnormality is detected.

b. Function

When abnormalities are detected the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1.

c. Cancellation of protection function

Transmission for signal code of stoppage cause is cancelled when a stopping order is issued or main power source is cut off

- 6 Earth detection
 - a. Level of detection

When the starting current of the compressor reaches 80% of the overcurrent protection value an abnormality is detected.

b. Function

When abnormalities are detected the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1.

c. Cancellation of protection function Transmission for signal code of stoppage cause is cancelled when a stopping order is issued or main power source is cut off.

11.1.4 Overload control

1 Level of detection

When the output current exceeds 105% of the maximum output current an abnormality is detected.

2 Function

An overload signal is issued 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 operation is performed with the compressor frequency limited to the upper level frequency when the output current decreases lower than 88% of the rated one.

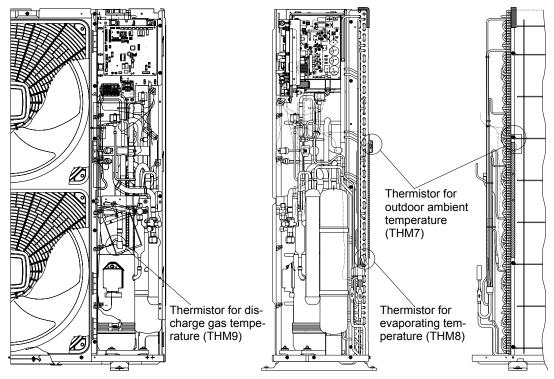
However if the frequency order is smaller than the maximum value the operation is performed according to the order.

3 Cancellation of protection function

After the operation described in the above item 2. is performed for 10 seconds this control is cancelled.

11.2 Thermistor

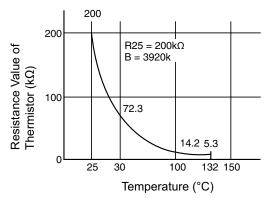
Thermistors for the outdoor unit



Thermistor for upper part temperature of compressor

(For prevention of discharge gas overheating)

- 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.
- 2 If discharge gas temperature increases excessively compressor temperature increases. At the worst compressor motor winding will be burnt out.
- **3** When the upper part temperature of compressor increases during heating operation the unit is controlled according to the following method.
 - 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 upper part temperature increases exceeding 132 °C even if an electronic expansion valve opens the compressor is stopped in order to protect the compressor. In cooling operation the above function is also available.



Resistance Characteristics of Thermistor for discharge Gas Overheating Protection

4 If compressor upper part temperature increases excessively the protection control is activated and the compressor is stopped according to the following method.

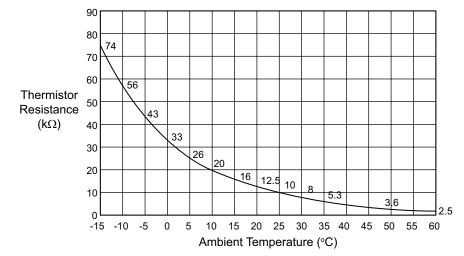
Operation	Upper part temperature of compressor	Defecting period
Cooling	Over 132 °C	10 minutes (continuously)
Cooling	Over 140 °C	5 seconds (continuously)
Hasting	Over 132 °C	10 minutes (continuously)
Heating	Over 140 °C	5 seconds (continuously)
Defrosting	Over 132 °C	5 seconds (continuously)

Thermistor for outdoor ambient temperature

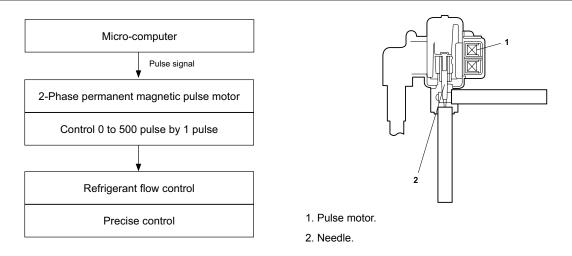
The thermistor resistance characteristics are shown in the figure below.

Thermistor for evaporating temperature of outdoor unit in heating operation (for defrosting)

The characteristics for the thermistor is the same with the value of outdoor ambient temperature thermistor as shown in the figure below.



11.3 Electronic expansion valve



Items	Specifications		
Туре	UKV series		
Refrigerant	R410A		
Working temperature range	-30 °C 70 °C (operation time of the coil: less than 50%)		
Mounting direction	Drive shaft in vertical direction within an angle of 45 °C as maximum		
Flow direction	Reversible		
Drive method	4-Phase canned motor method		
Rated voltage DC12V±1.8 V			
Drive condition	63PPS 1.2 phase excitation		
Coil resistance (each phase)	46Ω ± 10 (at 20 °C)		
	1. Drive circuit.		
	2. Wiring diagram.		
Wiring diagram drive circuit and activation	3. Valve.		
mode	4 . Close.		
	5 . Open.		
	6 . Activation.		

Brazing part

High pressure switch

Brazing part

Low pressure switch

Suction pipe

11.4 High pressure protection device

If the discharge pressure is excessively high the compressor and the component parts of the refrigeration cycle can be damaged.

• High Pressure Switch:

In case that the discharge pressure is higher than 4.15 MPa (R410A) the protection control is activated and the compressor is stopped.

• Pressure Switch for Control:

Pressure sensor for PD control

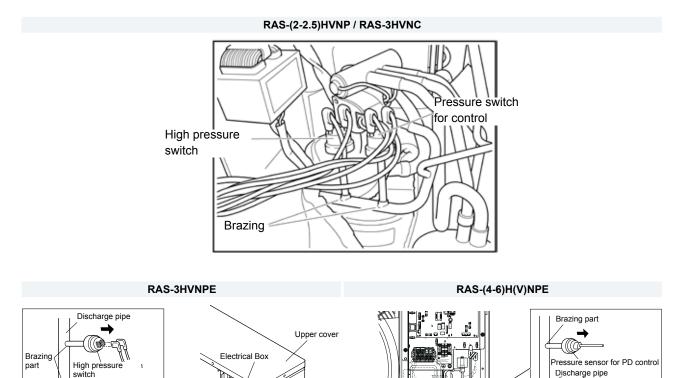
> Low pressure switch

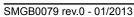
Brazing part

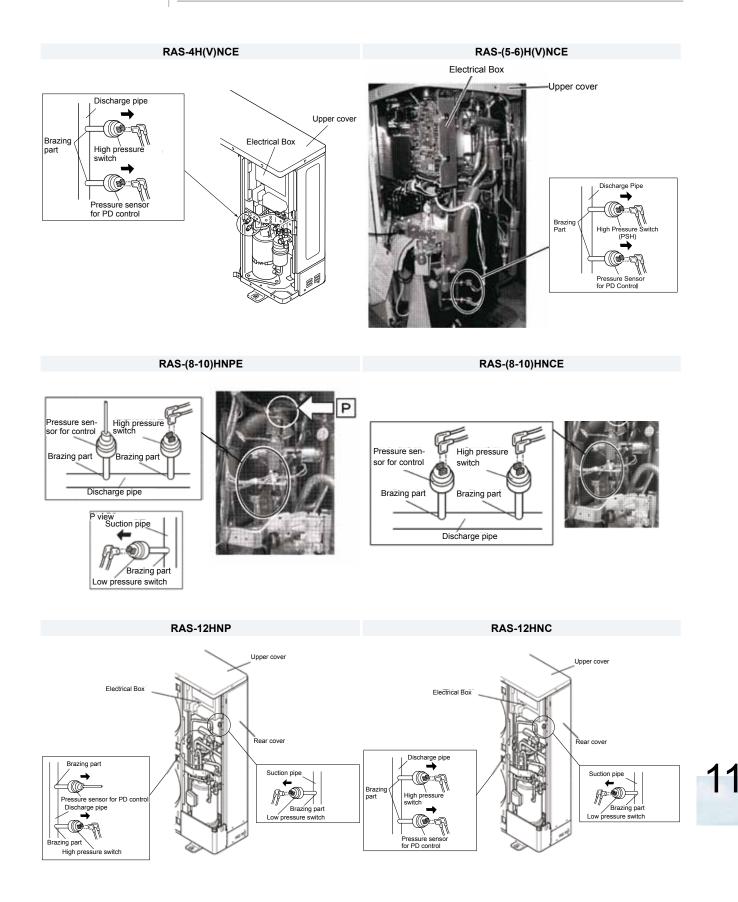
ſ

Suction pipe

In case that the discharge pressure is higher than 3.6 MPa (R410A) the protection control might be performed.





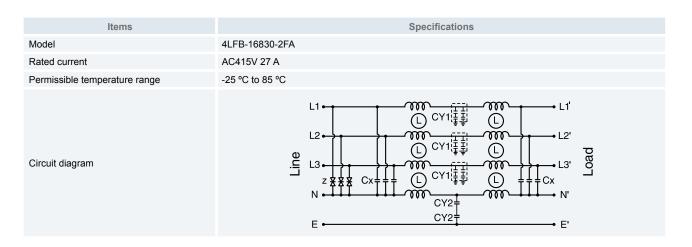


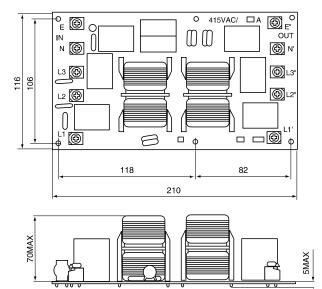
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11.5 Noise filter (NF)

11.5.1 Noise filter for 3N~ (400V/50Hz)

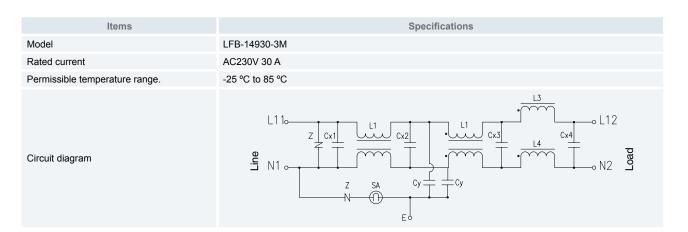
The noise filter decreases the leakage of noise made by the inverter to the power supply side. Terminals indicated with "LOAD" are connected to the inverter side and terminals indicated with "LINE" to the power supply side.

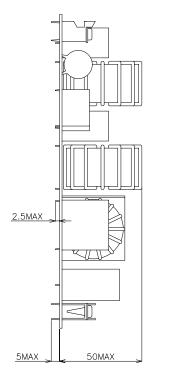


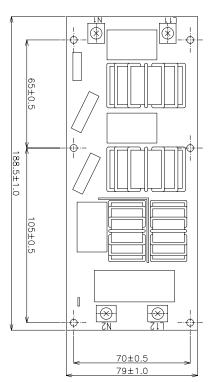


11.5.2 Noise filter for 1~ (230V/50Hz)

The noise filter decreases the leakage of noise made by the inverter to the power supply side. Terminals indicated with "LOAD" are connected to the inverter side and terminals indicated with "LINE" to the power supply side.



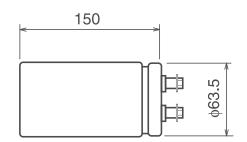




11.6 Capacitor (CB1 CB2)

This part is used for changing the alternative current to the direct current for the inverter. Connect two capacitor in line and used.

Items	Specifications		
Models	LNX2G472MSEAHE		
Capacity of static electricity	4700 µF		
Rated voltage	400 VDC		
Permissible temperature range	-25 °C to 95 °C		





11.7 Reactor (DCL)

11.7.1 Reactor (DCL) for 3N~ (400V/50Hz)

This part is used for changing the alternative current to the direct current for the inverter.

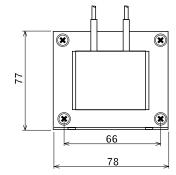
	Items		Specifications
Character		1.0 mH+10 (at 1 kHz)	
Rated current		30 A	
Direct resistance		22.8 mΩ+20 (at 20 °C)	
Permissible temperature range		-20 °C to 60 °C	
	66 ¹²	A MAX. 70	

11.7.2 Reactor (DCL) for 1~ (230V/50Hz)

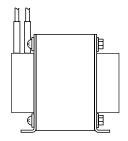
This part is used for changing the alternative current to the direct current for the inverter.

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Items	Specifications
Character	0.5 mH±15 (at 1 kHz)
Rated current	30 A
DC Resistance	26 mΩ (at 20 °C)
Permissible temperature range	-20°C to 60°C

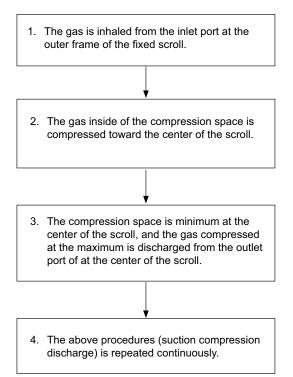


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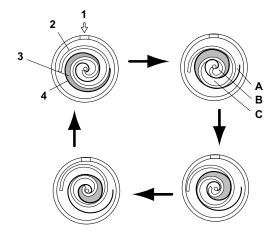


11.8 Scroll compressor

- 11.8.1 Reliable mechanism for low vibrating and low sound
- **1** The rotating direction is definite.
- 2 The pressure inside of the chamber is high pressure and the surface temperature of the chamber is 60 °C to 110 °C.
- **11.8.2 Principle of compression**



- 1. Gas.
- 2. Rotating scroll.
- 3. Compression space.
- 4. Fixed scroll
- A. Suction procedure.
- B. Discharge process.
- C. Compression process.



12. Maintenance notes

Index

12.1.	General notes	456
	12.1.1. Checking the power source and the wiring connection	456
	12.1.2. Burnt-out compressor due to an insufficient refrigerant charge	456
	12.1.3. Insufficient cooling performance when a long piping is applied	457
	12.1.4. Abnormally high operation sound (in the ceiling type indoor unit).	457
	12.1.5. Alarm code "31"	458
	12.1.6. Not cooling well due to insufficient installation space for the outdoor unit	458
12.2.	Maintenance work	459
12.3.	Service and maintenance record	460
12.4.	Service and maintenance record using the 7-segment display	461
12.5.	Service and maintenance record by remote control switch	463
12.6.	Pump-down method for replacing the compressor	464

12

SMGB0079 rev.0 - 01/2013

12.1 General notes

12.1.1 Checking the power source and the wiring connection

Check the following items in the case of abnormal operation:

No.	Check item	Procedure		
1	Is the breaker of the fuse cut out?	Check the secondary voltage of the breaker and the fuse by means of a tester.		
2	Is the secondary power source on the transformer correct?	Disconnect the secondary side of the transformer and check the voltage by means of a tester.		
3	Is the wiring loosened or inco- rrectly connected?	 Check the wiring connection on the PCB. Thermistor connectors Connector of the remote control cable Connector of the transformer Each connector in a high-voltage circuitCheck the connectors according to the electrical wiring diagram. 		

12.1.2 Burnt-out compressor due to an insufficient refrigerant charge

Question and answer for the field work

	Example 1: Burnt-out compressor due to an insufficient refrigerant charge
Phenomenon	After commissioning the alarm code "08" sometimes occurred and the compressors were burnt out after operating for two months.
Cause	The refrigerant piping work was performed during the summer season. The additional refrigerant was not sufficiently charged from the discharge gas side. This insufficient refrigerant charge resulted in the overheating of the discharge gas and the oil deterioration which was finally due to the separated operation despite the alarm code "08".
Countermeasure	 The compressor was replaced with a new compressor. The correct refrigerant amount was charged according to the refrigerant piping length and the connected indoor units.
Remarks	Additional refrigerant charge: Open the liquid stop valves slightly when you charge the additional refrigerant from the check joint of the liquid stop valves (the discharge gas side) during the cooling process. If the liquid stop valve is fully open it is difficult to charge the additional refrigerant. Do not charge the refrigerant from the gas stop valve.

1

12.1.3 Insufficient cooling performance when a long piping is applied

Question and answer for the field work

Question and answer for the field work

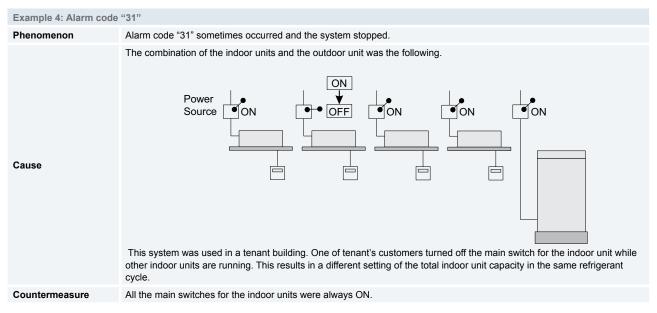
Example 2: Insufficient cooling performance when a long piping is applied							
Phenomenon	Sufficient cooling was not available for an indoor unit that was located at the farthest position.						
Cause	If the location of an outdoor unit is 20 meters lower than the location of the indoor units resetting of the DIP switch DSW3 is required. However no setting was performed. Therefore the largest discharge pressure was not increased. This resulted in an insufficient cooling performance for the indoor units						
Countermeasure	The setting of the DSW2 was changed.						
Remarks	Pay special attention to the size of liquid pipe. Refer to Piping work and refrigerant charge chapter for details.						

12.1.4 Abnormally high operation sound (in the ceiling type indoor unit).

Example 3: Abnormally high operation sound (in-the-ceiling type indoor unit) Phenomenon The operation sound at the "HIGH" speed was abnormally high. The indoor units were installed without the ducts. Since there scarcely was any external static pressure an abnormally big air volume was supplied. This resulted in a higher air speed through the heat exchanger. Damper Indoor unit $\left(\right)$ 🗲 A. Filter Cause 4 Countermeasure In order to reduce the airflow rate a plate that is used as a damper at the discharge gas side was added. Note that the running current is increased when no external pressure is given to the indoor unit. This results in an over-Remarks heating.

12.1.5 Alarm code "31"

Question and answer for the field work



12.1.6 Not cooling well due to insufficient installation space for the outdoor unit

Question and answer for the field work

Example 5: Not cooling well due to insufficient installation space for outdoor unit							
Phenomenon	Cooling operation was well performed through the intermediate season. However the cooling operation was not well available when the outdoor temperature was higher than 35 °C.						
Cause	As the outdoor units were installed without a sufficient installation space the hot discharge air from other outdoor units circulated. In this case though the outdoor temperature was 35 °C the actual suction air temperature was nearly 50 °C and protect system from excessively high suction pressure was activated the frequency of the compressor was decreased and the cooling capacity was also decreased accordingly.						
	As the outdoor units in-line were installed back to back with a distance of 600 mm between each outdoor unit's back the hot discharged air from other outdoor units was circulated.						
Countermeasure	Ensure that sufficient space should be secured for multi-row and multiple-installation.						
Example		Keep a distance of more than 15 mm between other units and do not put obstacles on the right and left sides. Dimen- sion B is as shown below. For detailed information please refer to <i>Unit Installation</i> chapter.					
Example		L	А	В			
		0 < L < 1/2H	600 or more	300 or more			
	× A	1/2H < L < H	1400 or more	350 or more			

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- If L is larger than H mount the units on a base so that H is greater or equal to L.
- In this situation ensure that the base is closed and does not allow the airflow to short circuit.
- When the mark * dimension is secured be sure to mount the airflow guide.

12.2 Maintenance work

For the indoor unit and the outdoor unit

- 1 Fan and fan motor
 - Lubrication: All the fan motors are pre-lubricated and sealed at the factory. Therefore no lubrication maintenance is required.
 - Sound and vibration: Check for abnormal sounds and vibrations.
 - Rotation: Check the clockwise rotation and the rotating speed.
 - Insulation: Check the electrical insulation resistance.
- 2 Heat exchanger
 - Clog: Inspect the heat exchanger at regular intervals and remove any accumulated dirt and any accumulated dust from the heat exchanger. You should also remove from the outdoor units other obstacles such as the growing grass and the pieces of paper which might restrict the airflow.
- 3 Piping connection
 - Leakage: Check for the refrigerant leakage at the piping connection.
- 4 Cabinet
 - Stain and lubrication: Check for any stain and any lubrication. Remove the stain and the lubrication.
 - Fixing screw: Check for any loosened screw or any lost screw. Fix the loosened screws and the lost screws. Insulation material: Check for any peeled thermal insulator on the cabinet. Repair the thermal insulator.
- 5 Electrical equipment
 - Activation: Check for an abnormal activation of the magnetic contactor the auxiliary relay the PCB and others.
 - Line condition: Pay attention to the working voltage the working amperage and the working phase balance. Check
 for any faulty contact that is caused by the loosened terminal connections the oxidized contacts the foreign matter
 and other items. Check the electrical insulation resistance.
- 6 Control device and protection device
 - Setting: Do not readjust the setting in the field unless the setting is maintained at a point that is different from the point listed in the section

For the outdoor unit

- 1 Compressor
 - Sound and vibration: Check for abnormal sounds and vibrations.
 - Activation: Check that the voltage drop of the power supply line is within 15 at the start and within 2 during the operation.
- 2 Reverse valve
 - · Activation: Check for any abnormal activation sound.
- 3 Strainer
 - Clog: Check that there is no temperature difference between both ends.
- 4 Ground wire
 - Ground line: Check for the continuity to earth.
- 5 Oil heater
 - Activation: You should activate the oil heater at least twelve hours before the start-up by turning ON the main switch.

12.3 Service and maintenance record

1 Is the service area sufficient?	No.	Check item	Action	Judg	ement
3 Any heat influence? — Yes No 4 is the ground wire connected? — Yes No 5 Refignent ping. — Good Not Good 6 Fixing the units. — Good Not Good 7 Is interea ny damage on the outer surface or — Yes No 8 Checking the screw and the bots. Tighten if losence. Tighten all the terminal screws with a Philips Tighten of Not Tightened Not Cood	1	Is the service area sufficient?	-	Yes	No
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5 Refrigrant piping. — Good Not Good 6 Fining the units. — Good Not Cood 7 Is free any damage on the outer surface or the internal surface? Tighten if loosends. Tighten if loosends. Tighten if loosends. Tighten if loosends. Not Tightened 9 Tightening the terminal screws. Tighten all the terminals screws with a Phillips Tightened Not Tightened Not Tightened 10 Are the compressor terminals lightly lixe? Patal the terminals. Palad the Not Paladed Not Good 11 Insulation resistance with an outodo resistance with an insulation resistance wi	3	Any heat influence?	_	Yes	No
6 Fixing the units. — — Good Not Good 7 the inter any dimage on the outer surface or the internal surface or surface or the internal surface or the internal surf	4	Is the ground wire connected?	_	Yes	No
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25Activation of each operation mode.switch the STOP switch and the TEMP switch.GoodNot Good26High-pressure cut-out switch.Check the actual activation value.GoodNot Good27Check the activation of the drain-up mechanism.Check the activation during the cooling process.GoodNot Good28Air inlet temperature of the indoor unit DB/WB.—(°C)DB(°C)WB29Air outlet temperature of the outdoor unit DB/ WB.—(°C)DB(°C)WB30Air inlet temperature of the outdoor unit DB/ WB.—(°C)DB(°C)WB31Air outlet temperature of the outdoor unit DB/ WB.—(°C)DB(°C)WB32High-pressure switch.——(°C)DB(°C)WB33Low-pressure switch.——34Operating voltage.—— </td <td>24</td> <td>Vibration and sound.</td> <td></td> <td>Good</td> <td>Not Good</td>	24	Vibration and sound.		Good	Not Good
27Check the activation of the drain-up mechanism.Check the activation during the cooling process.GoodNot Good28Air inlet temperature of the indoor unit DB/WB.–(°C)DB(°C)WB29Air outlet temperature of the indoor unit DB/ WB.–(°C)DB(°C)WB30Air inlet temperature of the outdoor unit DB/ WB.–(°C)DB(°C)WB31Air outlet temperature of the outdoor unit DB/ WB.–(°C)DB(°C)WB31Air outlet temperature of the outdoor unit DB/ WB.–(°C)DB(°C)WB32High-pressure switch.––Kg/~33Low-pressure switch.––Kg/~34Operating voltage.––35Operating current.––Not get36Instructions to the client for cleaning the air fifter.–DoneNot get37Instructions to the client about the cleaning method.–DoneNot get	25	Activation of each operation mode.		Good	Not Good
27nism.Check the activation during the cooling process.GoodNot Good28Air inlet temperature of the indoor unit DB/WB.–(°C)DB(°C)WB29Air outlet temperature of the indoor unit DB/ WB.–(°C)DB(°C)WB30Air inlet temperature of the outdoor unit DB/ WB.–(°C)DB(°C)WB31Air outlet temperature of the outdoor unit DB/ WB.–(°C)DB(°C)WB32High-pressure switch.––kg/cr33Low-pressure switch.––kg/cr34Operating voltage.––A35Operating current.–DoneNot yet36Instructions to the client for cleaning the air filter.–DoneNot yet37Instructions to the client about the cleaning method.–DoneNot yet	26	High-pressure cut-out switch.	Check the actual activation value.	Good	Not Good
29Air outlet temperature of the indoor unit DB/ WB.—(°C)DB(°C)WB30Air inlet temperature of the outdoor unit DB/ WB.—(°C)DB(°C)WB31Air outlet temperature of the outdoor unit DB/ WB.—(°C)DB(°C)WB32High-pressure switch.—(°C)DB(°C)WB33Low-pressure switch.—kg/?G34Operating voltage.—35Operating current.—Not yet36Instructions to the client for cleaning the air filter.—DoneNot yet37Instructions to the client about the cleaning method.—DoneNot yet	27		Check the activation during the cooling process.	Good	Not Good
29WB.—(°C)DB(°C)WB30Air inlet temperature of the outdoor unit DB/ WB.—(°C)DB(°C)WB31Air outlet temperature of the outdoor unit DB/ WB.—(°C)DB(°C)WB32High-pressure switch.—(°C)DB(°C)WB33Low-pressure switch.—Kg/G34Operating voltage.—Kg/G35Operating current.—M36Instructions to the client for cleaning the air filter.—DoneNot yet37Instructions to the client about the cleaning method.—DoneNot yet	28	Air inlet temperature of the indoor unit DB/WB.	-	(°C)DB	(°C)WB
30WB.—(*C)DB(*C)WB31Air outlet temperature of the outdoor unit DB/ WB.—(*C)WB(*C)WB32High-pressure switch.—kg/cm2G33Low-pressure switch.—kg/cm2G34Operating voltage.—V35Operating current.—M36Instructions to the client for cleaning the air rifter.—DoneNot yet37Instructions to the client about the cleaning method.—DoneNot yet	29		-	(°C)DB	(°C)WB
31WB.—(*C)/DB(*C)/WB32High-pressure switch.—kg/cm²G33Low-pressure switch.—kg/cm²G34Operating voltage.—V35Operating current.—A36Instructions to the client for cleaning the air filter.—DoneNot yet37Instructions to the client about the cleaning method.—DoneNot yet	30		-	(°C)DB	(°C)WB
33Low-pressure switch.—kg/cm ² G34Operating voltage.—V35Operating current.—A36Instructions to the client for cleaning the air filter.—DoneNot yet37Instructions to the client about the cleaning method.—DoneNot yet	31	•	-	(°C)DB	(°C)WB
34Operating voltage.—V35Operating current.—A36Instructions to the client for cleaning the air filter.—DoneNot yet37Instructions to the client about the cleaning method.—DoneNot yet	32	High-pressure switch.	_	kg/c	cm²G
35Operating current.—A36Instructions to the client for cleaning the air filter.—DoneNot yet37Instructions to the client about the cleaning method.—DoneNot yet	33	Low-pressure switch.	_	kg/c	cm²G
36Instructions to the client for cleaning the air filter.—DoneNot yet37Instructions to the client about the cleaning method.—DoneNot yet	34	Operating voltage.	-		V
30 filter. Done Not yet 37 Instructions to the client about the cleaning method. — Done Not yet	35	Operating current.	-		A
method.	36	-	_	Done	Not yet
38 Instructions to the client about the operation. — Done Not yet	37	-	-	Done	Not yet
	38	Instructions to the client about the operation.	_	Done	Not yet

12.4 Service and maintenance record using the 7-segment display

Customer's name:						Date:			
Outdoor unit model (serial No.)		RAS- (Serial No.)			RAS- (Serial No.)				
1. Operation mode			(Serial NO.)				(00110	,	
2. Test run start time									
3. Data collect start time									
4. Read out data from 7-segment in outdoor unit									
4.1 Protection control code									
4.2 Total capacity of I.U connected	CP								
		52C	FAN1	FAN2	20A	52C	FAN1	FAN2	20A
4.3 Input/output state of outdoor micro-computer	SC	20F	21	СН	PSH	20F	21	СН	PSH
4.4 Alarm code for abnormal stoppage of compressor	AC								
4.5 Inverter order frequency to compressor	H1								
4.6 Indoor order frequency to compressor	H2								
4.7 Air flow ratio	Fo								
4.8 O.U. expansion valve opening	Eo								
4.9 Temp. at the top of compressor	Td								
4.10 Evaporating temp. at heating	TE								
4.11 Ambient air temp.	То								
4.12 Cause of stoppage at inverter	iT								
4.13 Inverter secondary current	A2								
4.14 Inverter fin temperature	TF								
4.15 O.U. address	nA								
5. Indoor unit (unit No. 1)									
5.1 I.U. expansion valve opening	EA								
5.2 Liquid pipe temp. of I.U. (Free- ze protection)	LA								
5.3 I.U. intake air temp.	iA								
5.4 I.U. discharge air temp.	oA								
5.5 Cause of I.U. stoppage	dA								
6. Indoor unit (unit No. 2)									
6.1 I.U. expansion valve opening	EA								
6.2 Liquid pipe temp of I.U. (Free- ze protection)	LA								
6.3 I.U. intake air temp.	iA								
6.4 I.U. discharge air temp.	oA								
6.5 Cause of I.U. stoppage	dA								
7. Indoor unit (unit No. 3)									
7.1 I.U. expansion valve opening	EA								
7.2 Liquid pipe temp. of I.U. (Free- ze protection)	LA								
7.3 I.U. intake air temp.	iA								
7.4 I.U. discharge air temp.	oA								
7.5 Cause of I.U. stoppage	dA								
8. Indoor unit (unit No. 4)									
8.1 I.U. expansion valve opening	EA								

12

SMGB0079 rev.0 - 01/2013

Customer's name:	Date:			
Outdoor unit model (serial No.)		RAS- (Serial No.)	RAS- (Serial No.)	
8.2 Liquid pipe temp. of I.U. (Free- ze protection)				
8.3 I.U. intake air temp.	iA			
8.4 I.U. discharge air temp.	οA			
8.5 Cause of I.U. stoppage dA				

inote

- O.U.: Outdoor Unit.
- I.U.: Indoor unit.
- FAN1 FAN2: Constant speed fan.
- 52C: CMC.
- PSH: High pressure switch.
- 20A: Solenoid valve (SVA).
- 20F: Solenoid valve (SFV).
- 21: Reversing valve (RVR).
- CH: Oil heater.
- *: Multiply 1/8 by the code on the 7-segment.

12.5 Service and maintenance record by remote control switch

Data sheet for checking by remote control switch

Time			:	:	:	:	:
I.U. modelo							
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	91					
Discharge air temp.	b3	92					
Liquid pipe temp.	b4	93					
Remote thermistor temp.	b5						
Outdoor air temp.	b6	94					
Gas pipe temp.	b7	95					
Evaporating temp. at heating	b8	96					
Control information	b9	97					
Comp. top temp.	bA	98					
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 transmitting	E3						
Times of inverter tripping	E4						
F Automatic louver state							
Louver sensor state	F1						
H Pressure frequency state indication							
Discharge pressure	H1	99					
Suction pressure	H2	9A					
Control information	H3	9b					
Operating frequency	H4	9C					
J I.U. capacity Indication							
I.U. capacity (1/8HP)	J1						
O.U. code	J2						
Refrigerant cycle number	J3						
Refrigerant cycle number	J4						
L Opening of ex. valve	04						
I.U. ex. valve	L1	9d					
O.U. ex. valve 1	L1 L2	90 9E					
O.U. ex. valve 1 O.U. ex. valve 2	L2 L3						
O.U. ex. valve 2 O.U. ex. valve B	L3 L4						
	L4						
P Running current indication (reference)	Dí	05					
Comp. current	P1	9F					

12

463

12.6 Pump-down method for replacing the compressor

No.	Procedure	Remarks
1	Turn off the main switch of the outdoor unit.	
2	Remove the covers the thermistor the crankcase heater the power wirings and other items according to the chapter 10.	Make sure that the terminal part of the detached power supply wires is not exposed by the winding insulation tape and other items.
3	Attach the manifold to the check joint of the high pressure side and the low-pressure side of the outdoor unit.	_
4	Turn on the main switch of the outdoor unit.	-
5	Set the exclusion of the compressor by setting the DSW so that a broken compressor will not work. You can set the exclusion of the compressor by setting the DSW1-4 in ON position.	_
6	The compressor replacing mode is performed: • The DSW1-4 on the outdoor unit PCB \rightarrow ON (The cooling is run).	 This operation is performed for up to a maximum of ten minutes. If the inverter compressor is excluded the operation starts after three minutes.
7	 The operation finishes when one of the following conditions occurs: 1 Ten minutes have passed and STP is displayed in seven segments. 2 "08" is displayed in seven segments. 3 When Ps< 0.1 MPa is continued for one minute in ten minutes STP is displayed in seven seconds and the operation finishes. 	 The operation may finished when any of the conditions 1) to 3) occurs.
8	Close the liquid stop valve completely.	To avoid the spillage of all the refrigerant if the check valve is broken.
9	 Check for a leakage of the check valve on the discharge gas side: DSW4-4 (enforced stoppage of the compressor) → ON so that the compressor will not run although the running command is sent from the remote control switch. Check that variation of Ps on the outdoor unit PCB is 17 seconds. Make sure that the Ps increase is within 0.03 Mpa in two minutes after the Ps increase at the stoppage (during approximately five minutes). Also make sure that Pd > Ps. 	 When you stop the compressor for replacing: You can check the leakage of the check valve by means of the Ps variation because the SVA opens so that the discharge gas side of the inverter compressor can connect to the low-pressure side. 0.03 MPa/2 minutes is within the permissible limits for the check valve on the discharge gas side. The leakage of the check valve may cause an incorrect brazing due to the gas pressure at the brazing of the discharge piping. If the compressor-replacing mode is performed again set the DSW4-4 to OFF and keep the DSW4-4 at the OFF side during ten minutes. Then start according to the procedure No. 6.
10	 Collect the refrigerant by means of the refrigerant collection: Perform either A or B depending on the process 10. The leak rate at the process 10 is within the specification →Collect the refrigerant only at the low-pressure side. The leak rate at the process 10 is greater than the specification → Collect all the refrigerant of the outdoor unit side by means of the machine. 	 The discharge of the refrigerant in the atmosphere is strictly forbidden. Make sure that the refrigerant is collected by the collector. Keep a note of the quantity of the collected refrigerant.
11	After collecting the refrigerant remove the change hose (collector side) of the low-pressure side so that the low-pressure side of the refrigerant cycle will be the atmosphere pressure.	 Make sure that there is no pressure increase of the low-pressure sides after collecting the refrigerant. Make sure that the refrigerant cycle is the atmosphere pressure. Otherwise problems such as the blowing of gas and the suction of the cutting material) may occur when you are removing the compressors.
12	Turn OFF the main switch of the outdoor unit.	-
13	Perform the replacement of the compressor and the change of the refrigerant oil according to the section "replacing the compressor".	Make sure that you follow the instructions.
14	Perform the vacuum from the check joint of the low-pressure side.	If you collect the refrigerant only on the low-pressure side (A in 11). You cannot perform the vacuum of the refrigerant from the check joint of the high-pressure side.
15	Open the liquid stop valve and the gas stop valve completely when you finish the vacuum.	-
16	Make sure that the power is turned OFF and attach the following items: the power supply wire the thermistor the crankcase heater the 63H wiring the panel and the nut).	_
17	Set the DSW back to the original setting. Make sure that all the wirings to the compressor are connected correctly.	-
18	Recharge the refrigerant that is collected in the process by the stop valve of the liquid side during the cooling at the TEST RUN mode.	If the replacement of the compressor takes more than two hours an additional change of the refrigerant is necessary. Additional change = (replacing time $- 2$ hours) x 0.5 kg.

464



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