HITACHI
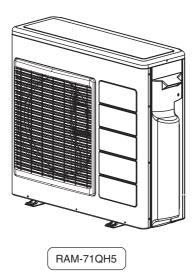## Inspire the Next

SERVICE MANUAL
TECHNICAL INFORMATION

FOR SERVICE PERSONNEL ONLY

REFER TO THE FOUNDATION MANUAL

CONTENTS

RAM-71QH5

SPECIFICATIONS

TYPE		DC INVERTER DUAL SYSTEM MULTI
		OUTDOOR UNIT
MODEL		RAM-71QH5
POWER SOURCE		1ø, 220 - 240V, 50Hz
TOTAL INPUT	(W)	REFER TO THE SPECIFICATIONS PAGE
TOTAL AMPERES	(A)	
COOLING CAPACITY	(kW)	
HEATING CAPACITY	(B.T.U.)	
DIMENSIONS (mm)	W	850
	H	800
	D	298
NET WEIGHT	(kg)	55

※ After installation

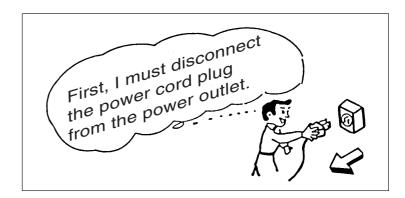## SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

ROOM AIR CONDITIONER
INDOOR UNIT + OUTDOOR UNIT

SEPTEMBER 2009   Refrigeration & Air-Conditioning Division
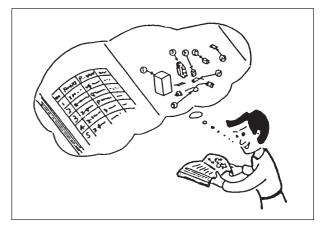
SAFETY DURING REPAIR WORK

1. In order to disassemble and repair the unit in question, be sure to disconnect the power cord plug from the power outlet before starting the work.

2. If it is necessary to replace any parts, they should be replaced with respective genuine parts for the unit, and the replacement must be effected in correct manner according to the instructions in the Service Manual of the unit.

> If the contacts of electrical parts are defective, replace the electrical parts without trying to repair them.

3. After completion of repairs, the initial state should be restored.

4. Lead wires should be connected and laid as in the initial state.

5. Modification of the unit by user himself should absolutely be prohibited.

6. Tools and measuring instruments for use in repairs or inspection should be accurately calibrated in advance.

7. In installing the unit having been repaired, be careful to prevent the occurence of any accident such as electrical shock, leak of current, or bodily injury due to the drop of any part.

8. To check the insulation of the unit, measure the insulation resistance between the power cord plug and grounding terminal of the unit. The insulation resistance should be $1M\Omega$ or more as measured by a 500V DC megger.

9. The initial location of installation such as window, floor or the other should be checked for being and safe enough to support the repaired unit again.
   If it is found not so strong and safe, the unit should be installed at the initial location reinforced or at a new location.

10. Any inflammable thing should never be placed about the location of installation.

11. Check the grounding to see whether it is proper or not, and if it is found improper, connect the grounding terminal to the earth.

DANGER

WORKING STANDARDS FOR PREVENTING BREAKAGE OF SEMICONDUCTORS

1. Scope

   The standards provide for items to be generally observed in carrying and handling semiconductors in relative manufacturers during maintenance and handling thereof. (They apply the same to handling of abnormal goods such as rejected goods being returned).

2. Object parts

   (1) Micro computer
   (2) Integrated circuits (IC)
   (3) Field-effect transistors (FET)
   (4) P.C. boards or the like on which the parts mentioned in (1) and (2) of this paragraph are equipped.

3. Items to be observed in handling

   (1) Use a conductive container for carrying and storing of parts. (Even rejected goods should be handled in the same way).
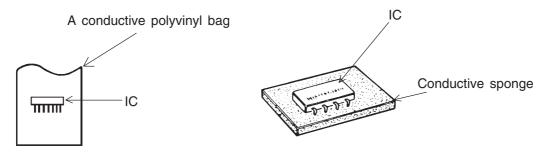
Fig. 1. Conductive Container

   (2) When any part is handled uncovered (in counting, packing and the like), the handling person must always use himself as a body earth. (Make yourself a body earth by passing one M ohm earth resistance through a ring or bracelet).

   (3) Be careful not to touch the parts with your clothing when you hold a part even if a body earth is being taken.

   (4) Be sure to place a part on a metal plate with grounding.

   (5) Be careful not to fail to turn off power when you repair the printed circuit board. At the same time, try to repair the printed circuit board on a grounded metal plate.
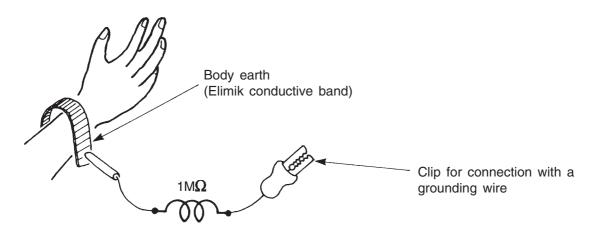
Fig. 2. Body Earth

(6) Use a three wire type soldering iron including a grounding wire.

Metal plate (of aluminium, stainless steel, etc.)

Working table

Resistor of 1 MΩ (1/2W)

Staple

Earth wire

Bare copper wire (for body earth)
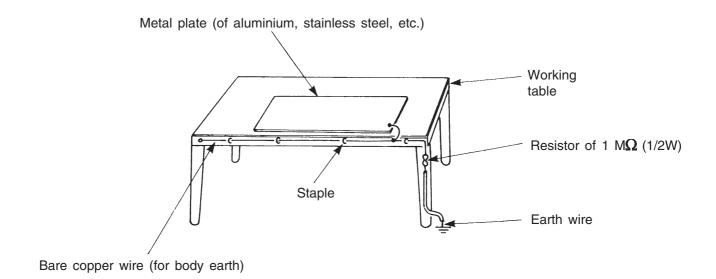
Fig. 3. Grounding of the working table

Soldering iron

Grounding wire

Screw stop at the screwed part using a rag plate

Fig. 4. Grounding a soldering iron

Use a high insulation mode (100V, 10MΩ or higher) when ordinary iron is to be used.

(7) In checking circuits for maintenance, inspection or some others, be careful not to have the test probes of the measuring instrument shortcircuit a load circuit or the like.

– 3 –

⚠ CAUTION

1. In quiet operation or stopping the operation, slight flowing noise of refrigerant in the refrigerating cycle is heard occasionally, but this noise is not abnormal for the operation.

2. When it thunders near by, it is recommend to stop the operation and to disconnect the power cord plug from the power outlet for safety.

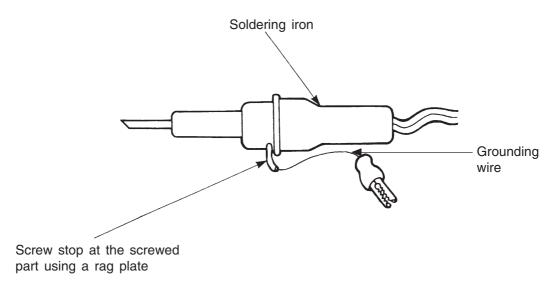3. The room air conditioner does not start automatically after recovery of the electric power failure for preventing fuse blowing. Re-press START/STOP button after 3 minutes from when unit stopped.

4. If the room air conditioner is stopped by setting the temperature, or missoperation, and re-start in a moment, there is occasion that the cooling and heating operation does not start for 3 minutes, it is not abnormal and this is the result of the operation of IC delay circuit. This IC delay circuit ensures that there is no danger of blowing fuse or damaging parts even if operation is restarted accidentally.

5. This room air conditioner should not be used at the cooling operation when the outside temperature is below −10°C (14°F).

6. This room air conditioner (the reverse cycle) should not be used when the outside temperature is below −15°C (5°F).
   If the reverse cycle is used under this condition, the outside heat exchanger will be frosted and its efficiency falls.

7. When the outside heat exchanger is frosted, the frost is melted by operating the hot gas system, it is not trouble that at this time fan stops and the vapour may rise from the outside heat exchanger.

SPECIFICATIONS

MODEL		RAM-71QH5
FAN MOTOR		80 W
FAN MOTOR CAPACITOR		NO
FAN MOTOR PROTECTOR		NO
COMPRESSOR		JU1015D2
COMPRESSOR MOTOR CAPACITOR		NO
OVERLOAD PROTECTOR		YES
OVERHEAT PROTECTOR		YES
FUSE (for MICROPROCESSOR)		5.0A
POWER RELAY		G4A
POWER SWITCH		NO
TEMPORARY SWITCH		NO
SERVICE SWITCH		YES
TRANSFORMER		NO
VARISTOR		450NR
NOISE SUPPRESSOR		YES
THERMOSTAT		YES(IC)
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)		NO
REFRIGERANT CHARGING VOLUME (Refrigerant 410A)	UNIT	2300g
		WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.
	PIPES	MAX. 60m

In case the pipe length is more than 30m, add refrigerant R410 at 20gram per every meter exceeds.

SPECIFICATIONS FOR INDOOR UNITS COMBINATION

TYPE		DC INVERTER QUADRUPLE SYSTEM MULTI COOLING AND HEATING
MODEL	OUTDOOR UNIT	RAM-71QH5
PHESE/VOLTAGE/FREQUENCY		1ø, 220 - 240V, 50Hz
CIRCUIT AMPERES TO CONNECT (A)		30
COOLING (FOUR UNITS)	CAPACITY (kW) (B.T.U./h)	7.10 (2.40 - 8.80)
		24,240 (8,190 - 30,030)
	TOTAL INPUT (W)	2,140 (460 - 3,200)
	EER (B.T.U./hW)	11.33
	TOTAL AMPERES (A)	9.8 - 9.0
	POWER FACTOR (%)	99
HEATING (FOUR UNITS)	CAPACITY (kW) (B.T.U./h)	8.50 (2.80 - 9.50)
		29,000 (9,560 - 32,420)
	TOTAL INPUT (W)	2,110 (480 - 3,120)
	EER (B.T.U./hW)	13.74
	TOTAL AMPERES (A)	9.70 - 8.90
	POWER FACTOR (%)	99
MAXIMUM LENGTH OF PIPING		MAX. 60m (FOUR UNIT TOTAL)
STANDARD		CE (EMC&LVD)

MODEL		RAM-71QH5
PACKING (mm)	W	1,008
	H	848
	D	394
	cu.ft.	11.89
GROSS WEIGHT (kg)		60
FLARENUTSIZE (SMALL/LARGE)		6.35DX4/9.52DX3/12.70X1

OPERATION SCOPE

	INDOOR SUCTION TEMPERATURE (°C)	OUTDOOR SUCTION TEMPERATURE (°C)	INDOOR SUCTION HUMIDITY (%)
COOLING OPERATION SCOPE	16 - 32	22 - 41	BELOW 80
DEHUMIDIFYING OPERATION	16 - 32	22 - 42	BELOW 80
HEATING OPERATION SCOPE	BELOW 27	−15 - 23	—

4 ROOM MULTI-SPLIT INVERTER TYPE RAC: RAM-71QH5
POSSIBLE COMBINATION TO OPERATE (SAME TIME OPERATION)

	POSSIBLE COMBINATIONS TO OPERATE	COOLING CAPACITY RATING (kW) (RANGE)	TOTAL	COOLING POWER CONSUMPTION (W)	AMPERE (A) at 220 - 240	COP	HEATING CAPACITY RATING (kW) (RANGE)	TOTAL	HEATING POWER CONSUMPTION (W)	AMPERE (A) at 220 - 240	COP
ONE UNIT 1.2	1.2	1.20 (1.00-1.60)	1.20	370 (200-480)	1.7 - 1.6	3.24	1.80 (1.10-2.20)	1.80	560 (320-850)	2.6 - 2.4	3.21
1.8	1.8	1.80 (1.50-2.00)	1.80	450 (280-500)	2.1 - 1.9	4.00	2.50 (1.80-3.50)	2.50	850 (320-1130)	3.9 - 3.6	2.94
2.5	2.5	2.50 (1.50-2.80)	2.50	650 (280-720)	3.0 - 2.7	3.85	3.40 (1.80-4.70)	3.40	1130 (320-1480)	5.2 - 4.8	3.01
3.5	3.5	3.50 (1.50-3.90)	3.50	1030 (280-1130)	4.7 - 4.3	3.40	4.30 (1.80-5.80)	4.30	1520 (320-1950)	7.0 - 6.4	2.83
5.0	5.0	5.00 (1.50-5.60)	5.00	1640 (280-1800)	7.5 - 6.9	3.05	6.50 (1.80-7.20)	6.50	2400 (320-2530)	11.0 - 10.1	2.71
6.0	6.0	6.00 (1.50-6.60)	6.00	2080 (280-2290)	9.6 - 8.8	2.88	7.30 (1.80-8.50)	7.30	2590 (320-2860)	11.9 - 10.9	2.82
TWO UNITS 2.4	1.2 + 1.2	1.20 + 1.20 (1.50-2.80)	2.40	690 (380-980)	3.2 - 2.9	3.48	1.80 + 1.80 (2.20-4.70)	3.60	950 (200-1100)	4.4 - 4.0	3.79
3.0	1.2 + 1.8	1.20 + 1.80 (1.50-3.50)	3.00	920 (380-1000)	4.2 - 3.9	3.26	1.80 + 2.50 (2.20-5.20)	4.30	1100 (200-1300)	5.1 - 4.6	3.91
3.7	1.2 + 2.5	1.20 + 2.50 (1.50-4.00)	3.70	1030 (380-1300)	4.7 - 4.3	3.59	1.80 + 3.40 (2.20-6.40)	5.20	1450 (200-1780)	6.7 - 6.1	3.59
4.7	1.2 + 3.5	1.20 + 3.50 (1.50-5.20)	4.70	1390 (380-1450)	6.4 - 5.9	3.38	1.80 + 4.30 (2.20-7.20)	6.10	1660 (200-2010)	7.6 - 7.0	3.67
6.2	1.2 + 5.0	1.20 + 5.00 (1.50-5.90)	6.20	1850 (380-2380)	8.5 - 7.8	3.35	1.80 + 6.50 (2.20-7.20)	8.30	2470 (390-3120)	11.3 - 10.4	3.36
7.2	1.2 + 6.0	1.18 + 5.92 (1.50-6.50)	7.10	2120 (380-2580)	9.7 - 8.9	3.35	1.70 + 6.90 (2.20-8.60)	8.60	2470 (390-3120)	11.3 - 10.4	3.48
3.6	1.8 + 1.8	1.80 + 1.80 (2.00-4.00)	3.60	830 (380-1020)	3.8 - 3.5	4.34	2.50 + 2.50 (2.20-6.40)	5.00	1380 (390-2750)	6.3 - 5.8	3.62
4.3	1.8 + 2.5	1.80 + 2.50 (2.00-4.70)	4.30	1120 (380-1360)	5.1 - 4.7	3.84	2.50 + 3.40 (2.20-7.20)	5.90	1680 (390-3000)	7.7 - 7.1	3.51
5.3	1.8 + 3.5	1.80 + 3.50 (2.00-5.80)	5.30	1600 (380-1950)	7.3 - 6.7	3.31	2.50 + 4.30 (2.20-7.20)	6.80	2030 (390-3120)	9.3 - 8.5	3.35
6.8	1.8 + 5.0	1.80 + 5.00 (2.00-7.10)	6.80	2420 (380-2820)	11.1 - 10.2	2.81	2.30 + 6.30 (2.20-9.50)	8.60	2470 (390-3120)	11.3 - 10.4	3.48
7.8	1.8 + 6.0	1.70 + 5.40 (2.00-7.50)	7.10	2450 (380-2980)	11.2 - 10.3	2.90	2.00 + 6.60 (2.20-9.50)	8.60	2450 (390-3120)	11.2 - 10.3	3.51
5.0	2.5 + 2.5	2.50 + 2.50 (2.00-5.50)	5.00	1410 (380-1720)	6.5 - 5.9	3.55	3.60 + 3.60 (2.20-9.50)	7.20	2070 (390-3120)	9.5 - 8.7	3.48
6.0	2.5 + 3.5	2.50 + 3.50 (2.00-6.60)	6.00	1950 (380-2380)	9.0 - 8.2	3.08	3.60 + 4.30 (2.20-9.50)	7.90	2420 (390-3120)	11.1 - 10.2	3.26
7.5	2.5 + 5.0	2.40 + 4.70 (2.00-7.50)	7.10	2530 (380-2980)	11.6 - 10.6	2.81	2.90 + 5.70 (2.20-9.50)	8.60	2470 (390-3120)	11.3 - 10.4	3.48
8.5	2.5 + 6.0	2.10 + 5.00 (2.00-7.50)	7.10	2450 (380-2980)	11.2 - 10.3	2.90	2.55 + 6.05 (2.20-9.50)	8.60	2450 (390-3120)	11.2 - 10.3	3.51
7.0	3.5 + 3.5	3.50 + 3.50 (2.00-7.40)	7.00	2630 (380-2940)	12.1 - 11.1	2.66	4.30 + 4.30 (2.20-9.50)	8.60	2670 (390-3120)	12.3 - 11.2	3.22
8.5	3.5 + 5.0	2.90 + 4.20 (2.00-7.50)	7.10	2530 (380-2890)	11.6 - 10.6	2.81	3.55 + 5.05 (2.20-9.50)	8.60	2470 (390-3120)	11.3 - 10.4	3.48
9.5	3.5 + 6.0	2.60 + 4.50 (2.00-7.80)	7.10	2450 (380-3100)	11.2 - 10.3	2.90	3.15 + 5.45 (2.20-9.50)	8.60	2450 (390-3120)	11.2 - 10.3	3.51
10.0	5.0 + 5.0	3.55 + 3.55 (2.00-8.00)	7.10	2530 (380-3170)	11.6 - 10.6	2.81	4.30 + 4.30 (2.20-9.50)	8.60	2470 (390-3120)	11.3 - 10.4	3.48
11.0	5.0 + 6.0	3.20 + 3.90 (2.00-8.00)	7.10	2360 (380-3170)	10.8 - 9.9	3.01	3.90 + 4.70 (2.20-9.50)	8.60	2450 (390-3120)	11.2 - 10.3	3.51
THREE UNITS 3.6	1.2 + 1.2 + 1.2	1.20 + 1.20 + 1.20 (2.20-4.00)	3.60	1080 (420-1680)	5.0 - 4.5	3.33	1.80 + 1.80 + 1.80 (2.40-6.20)	5.40	1490 (430-1800)	6.8 - 6.3	3.62
4.2	1.2 + 1.2 + 1.8	1.20 + 1.20 + 1.80 (2.20-4.70)	4.20	1250 (240-1880)	5.7 - 5.3	3.36	1.80 + 1.80 + 2.50 (2.40-6.60)	6.10	1680 (430-2100)	7.7 - 7.1	3.63
4.9	1.2 + 1.2 + 2.5	1.20 + 1.20 + 2.50 (2.20-5.80)	4.90	1450 (420-2280)	6.7 - 6.1	3.38	1.80 + 1.80 + 3.40 (2.20-9.30)	7.00	1910 (430-2200)	8.8 - 8.0	3.66
5.9	1.2 + 1.2 + 3.5	1.20 + 1.20 + 3.50 (2.20-6.60)	5.90	1590 (420-2480)	7.3 - 6.7	3.71	1.80 + 1.80 + 4.30 (2.40-9.50)	7.90	2130 (430-2500)	9.8 - 9.0	3.71
7.4	1.2 + 1.2 + 5.0	1.15 + 1.15 + 4.80 (2.20-7.80)	7.10	2210 (420-2890)	10.1 - 9.3	3.21	1.53 + 1.53 + 5.53 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
8.4	1.2 + 1.2 + 6.0	1.01 + 1.01 + 5.07 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.42 + 1.42 + 5.76 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
4.8	1.2 + 1.8 + 1.8	1.20 + 1.80 + 1.80 (2.20-5.90)	4.80	1450 (420-2280)	6.7 - 6.1	3.31	1.80 + 2.50 + 2.50 (2.20-9.30)	6.80	1860 (430-2400)	8.5 - 7.8	3.66
5.5	1.2 + 1.8 + 2.5	1.20 + 1.80 + 2.50 (2.20-5.90)	5.50	1590 (420-2480)	7.3 - 6.7	3.46	1.80 + 2.50 + 3.40 (2.40-9.50)	7.70	2110 (430-2600)	9.7 - 8.9	3.65
6.5	1.2 + 1.8 + 3.5	1.20 + 1.80 + 3.50 (2.20-6.60)	6.50	1750 (420-2480)	8.0 - 7.4	3.71	1.80 + 2.50 + 4.30 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
8.0	1.2 + 1.8 + 5.0	1.07 + 1.60 + 4.44 (2.20-8.00)	7.10	2210 (420-2890)	10.1 - 9.3	3.21	1.43 + 1.99 + 5.18 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
9.0	1.2 + 1.8 + 6.0	0.95 + 1.42 + 4.73 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.33 + 1.85 + 5.41 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
6.2	1.2 + 2.5 + 2.5	1.20 + 2.50 + 2.50 (1.50-6.60)	6.20	1590 (420-2480)	7.3 - 6.7	3.90	1.80 + 3.40 + 3.40 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
7.2	1.2 + 2.5 + 3.5	1.18 + 2.47 + 3.45 (2.20-7.80)	7.10	2210 (420-2890)	10.1 - 9.3	3.21	1.63 + 3.08 + 3.89 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
8.7	1.2 + 2.5 + 5.0	0.98 + 2.04 + 4.08 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.32 + 2.50 + 4.78 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
9.7	1.2 + 2.5 + 6.0	0.88 + 1.83 + 4.39 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.24 + 2.34 + 5.02 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
8.2	1.2 + 3.5 + 3.5	1.04 + 3.03 + 3.03 (2.20-8.00)	7.10	2210 (420-2890)	10.1 - 9.3	3.21	1.49 + 3.56 + 3.56 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
9.7	1.2 + 3.5 + 5.0	0.88 + 2.56 + 3.66 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.23 + 2.93 + 4.44 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
10.7	1.2 + 3.5 + 6.0	0.80 + 2.32 + 3.98 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.16 + 2.76 + 4.69 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
11.2	1.2 + 5.0 + 5.0	0.76 + 3.17 + 3.17 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.05 + 3.78 + 3.78 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
5.4	1.8 + 1.8 + 1.8	1.80 + 1.80 + 1.80 (2.20-5.90)	5.40	1250 (420-2190)	5.7 - 5.3	4.32	2.86 + 2.86 + 2.86 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
6.1	1.8 + 1.8 + 2.5	1.80 + 1.80 + 2.50 (2.20-6.70)	6.10	1590 (420-2480)	7.3 - 6.7	3.84	2.55 + 2.55 + 3.50 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
7.1	1.8 + 1.8 + 3.5	1.80 + 1.80 + 3.50 (2.20-7.80)	7.10	2210 (420-2890)	10.1 - 9.3	3.21	2.20 + 2.20 + 4.20 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
8.6	1.8 + 1.8 + 5.0	1.50 + 1.50 + 4.10 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.80 + 1.80 + 5.00 (2.40-9.50)	8.60	2280 (430-2600)	10.5 - 9.6	3.77
9.6	1.8 + 1.8 + 6.0	1.35 + 1.35 + 4.40 (2.20-8.00)	7.10	2160 (420-2960)	9.9 - 9.1	3.29	1.60 + 1.60 + 5.40 (2.40-9.50)	8.60	2280 (430-2600)	10.5 - 9.6	3.77
6.8	1.8 + 2.5 + 2.5	1.80 + 2.50 + 2.50 (2.20-7.50)	6.80	2040 (420-2780)	9.4 - 8.6	3.33	2.30 + 3.15 + 3.15 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
7.8	1.8 + 2.5 + 3.5	1.65 + 2.25 + 3.20 (2.20-8.00)	7.10	2210 (420-2960)	10.1 - 9.3	3.21	2.00 + 2.75 + 3.85 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
9.3	1.8 + 2.5 + 5.0	1.40 + 1.90 + 3.80 (2.20-8.00)	7.10	2180 (440-2770)	10.0 - 9.2	3.26	1.70 + 2.30 + 4.60 (2.40-9.50)	8.60	2280 (430-2600)	10.5 - 9.6	3.77
10.3	1.8 + 2.5 + 6.0	1.25 + 1.70 + 4.15 (2.20-8.00)	7.10	2160 (420-2960)	9.9 - 9.1	3.29	1.50 + 2.10 + 5.00 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
8.8	1.8 + 3.5 + 3.5	1.40 + 2.85 + 2.85 (2.20-8.00)	7.10	2210 (420-2960)	10.1 - 9.3	3.21	1.80 + 3.40 + 3.40 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
10.3	1.8 + 3.5 + 5.0	1.25 + 2.40 + 3.45 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.50 + 2.90 + 4.20 (2.40-9.50)	8.60	2280 (430-2600)	10.5 - 9.6	3.77
7.5	2.5 + 2.5 + 2.5	2.36 + 2.36 + 2.36 (2.20-7.80)	7.10	2210 (420-2890)	10.1 - 9.3	3.21	2.86 + 2.86 + 2.86 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
8.5	2.5 + 2.5 + 3.5	2.10 + 2.10 + 2.90 (2.20-8.00)	7.10	2210 (420-2960)	10.1 - 9.3	3.21	2.55 + 2.55 + 3.50 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
10.0	2.5 + 2.5 + 5.0	1.80 + 1.80 + 3.50 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	2.15 + 2.15 + 4.30 (2.40-9.50)	8.60	2280 (430-2600)	10.5 - 9.6	3.77
11.0	2.5 + 2.5 + 6.0	1.60 + 1.60 + 3.90 (2.20-8.00)	7.10	2160 (420-2960)	9.9 - 9.1	3.29	1.95 + 1.95 + 4.70 (2.40-9.50)	8.60	2260 (430-2600)	10.4 - 9.5	3.81
9.5	2.5 + 3.5 + 3.5	1.90 + 2.60 + 2.60 (2.20-8.00)	7.10	2210 (420-2960)	10.1 - 9.3	3.21	2.20 + 3.20 + 3.20 (2.40-9.50)	8.60	2290 (430-2600)	10.5 - 9.6	3.76
11.0	2.5 + 3.5 + 5.0	1.60 + 2.25 + 3.25 (2.20-8.00)	7.10	2180 (420-2960)	10.0 - 9.2	3.26	1.95 + 2.75 + 3.90 (2.40-9.50)	8.60	2280 (430-2600)	10.5 - 9.6	3.77
10.5	3.5 + 3.5 + 3.5	2.36 + 2.36 + 2.36 (2.20-8.00)	7.10	2210 (420-2960)	10.1 - 9.3	3.21	2.86 + 2.86 + 2.86 (2.40-9.50)	8.60	2280 (430-2600)	10.5 - 9.6	3.77

	POSSIBLE COMBINATIONS TO OPERATE	COOLING CAPACITY RATING (kW) (RANGE)	TOTAL	COOLING POWER CONSUMPTION (W)	COOLING AMPERE (A) at 220-240	COP	HEATING CAPACITY RATING (kW) (RANGE)	TOTAL	HEATING POWER CONSUMPTION (W)	HEATING AMPERE (A) at 220-240	COP
4.8	1.2 + 1.2 + 1.2 + 1.2	1.20 + 1.20 + 1.20 + 1.20 (2.20-5.40)	4.80	1420 (200-1660)	6.5 - 6.0	3.38	1.80 + 1.80 + 1.80 + 1.80 (2.60-9.50)	7.20	1950 (460-2420)	9.0 - 8.2	3.69
5.4	1.2 + 1.2 + 1.2 + 1.8	1.20 + 1.20 + 1.20 + 1.80 (2.20-5.90)	5.40	1650 (420-2010)	7.6 - 6.9	3.27	1.80 + 1.80 + 1.80 + 2.50 (2.60-9.50)	7.90	2180 (460-2520)	10.0 - 9.2	3.62
6.1	1.2 + 1.2 + 1.2 + 2.5	1.20 + 1.20 + 1.20 + 2.50 (2.20-6.70)	6.10	1890 (420-2010)	8.7 - 8.0	3.23	1.76 + 1.76 + 1.76 + 3.32 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
7.1	1.2 + 1.2 + 1.2 + 3.5	1.20 + 1.20 + 1.20 + 3.50 (2.40-7.90)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.60 + 1.60 + 1.60 + 3.81 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
8.6	1.2 + 1.2 + 1.2 + 5.0	0.99 + 0.99 + 0.99 + 4.13 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.30 + 1.30 + 1.30 + 4.70 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
9.6	1.2 + 1.2 + 1.2 + 6.0	0.89 + 0.89 + 0.89 + 4.44 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.22 + 1.22 + 1.22 + 4.94 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
6.0	1.2 + 1.2 + 1.8 + 1.8	1.20 + 1.20 + 1.80 + 1.80 (2.20-6.70)	6.00	1850 (420-2010)	8.5 - 7.8	3.24	1.80 + 1.80 + 2.50 + 2.50 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
6.7	1.2 + 1.2 + 1.8 + 2.5	1.20 + 1.20 + 1.80 + 2.50 (2.40-7.50)	6.70	2010 (420-2310)	9.2 - 8.5	3.33	1.63 + 1.63 + 2.26 + 3.08 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
7.7	1.2 + 1.2 + 1.8 + 3.5	1.11 + 1.11 + 1.66 + 3.23 (2.40-8.30)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.49 + 1.49 + 2.07 + 3.56 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
9.2	1.2 + 1.2 + 1.8 + 5.0	0.93 + 0.93 + 1.39 + 3.86 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.23 + 1.23 + 1.71 + 4.44 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
10.2	1.2 + 1.2 + 1.8 + 6.0	0.84 + 0.84 + 1.25 + 4.18 (2.40-8.80)	7.10	2140 (450-3020)	9.8 - 9.0	3.32	1.16 + 1.16 + 1.60 + 4.69 (2.60-9.50)	8.60	2180 (460-2520)	10.0 - 9.2	3.94
7.4	1.2 + 1.2 + 2.5 + 2.5	1.15 + 1.15 + 2.40 + 2.40 (2.40-7.90)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.49 + 1.49 + 2.81 + 2.81 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
8.4	1.2 + 1.2 + 2.5 + 3.5	1.01 + 1.01 + 2.11 + 2.96 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.37 + 1.37 + 2.59 + 3.27 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
9.9	1.2 + 1.2 + 2.5 + 5.0	0.86 + 0.86 + 1.79 + 3.59 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.15 + 1.15 + 2.17 + 4.14 (2.60-9.50)	8.60	2180 (460-2520)	10.0 - 9.2	3.94
10.9	1.2 + 1.2 + 2.5 + 6.0	0.78 + 0.78 + 1.63 + 3.91 (2.40-8.80)	7.10	2140 (450-3020)	9.8 - 9.0	3.32	1.08 + 1.08 + 2.04 + 4.39 (2.60-9.50)	8.60	2180 (460-2520)	10.0 - 9.2	3.94
9.4	1.2 + 1.2 + 3.5 + 3.5	0.91 + 0.91 + 2.64 + 2.64 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.27 + 1.27 + 3.03 + 3.03 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
10.9	1.2 + 1.2 + 3.5 + 5.0	0.78 + 0.78 + 2.28 + 3.26 (2.40-8.80)	7.10	2140 (450-3020)	9.8 - 9.0	3.32	1.08 + 1.08 + 2.57 + 3.88 (2.60-9.50)	8.60	2180 (460-2520)	10.0 - 9.2	3.94
6.6	1.2 + 1.8 + 1.8 + 1.8	1.20 + 1.80 + 1.80 + 1.80 (2.40-7.50)	6.60	2010 (420-2310)	9.2 - 8.5	3.28	1.66 + 2.31 + 2.31 + 2.31 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
7.3	1.2 + 1.8 + 1.8 + 2.5	1.17 + 1.75 + 1.75 + 2.43 (2.40-7.90)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.52 + 2.11 + 2.11 + 2.87 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
8.3	1.2 + 1.8 + 1.8 + 3.5	1.03 + 1.54 + 1.54 + 2.99 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.39 + 1.94 + 1.94 + 3.33 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
9.8	1.2 + 1.8 + 1.8 + 5.0	0.87 + 1.30 + 1.30 + 3.62 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.16 + 1.62 + 1.62 + 4.20 (2.60-9.50)	8.60	2180 (460-2520)	10.0 - 9.2	3.94
10.8	1.2 + 1.8 + 1.8 + 6.0	0.79 + 1.18 + 1.18 + 3.94 (2.40-8.80)	7.10	2140 (450-3020)	9.8 - 9.0	3.32	1.10 + 1.52 + 1.52 + 4.45 (2.60-9.50)	8.60	2180 (460-2520)	10.0 - 9.2	3.94
8.0	1.2 + 1.8 + 2.5 + 2.5	1.07 + 1.60 + 2.22 + 2.22 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.39 + 1.94 + 2.63 + 2.63 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
9.0	1.2 + 1.8 + 2.5 + 3.5	0.95 + 1.42 + 1.97 + 2.76 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.29 + 1.79 + 2.44 + 3.08 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
10.5	1.2 + 1.8 + 2.5 + 5.0	0.81 + 1.22 + 1.69 + 3.38 (2.40-8.80)	7.10	2140 (450-3020)	9.8 - 9.0	3.32	1.09 + 1.51 + 2.06 + 3.94 (2.60-9.50)	8.60	2180 (460-2520)	10.0 - 9.2	3.94
10.0	1.2 + 1.8 + 3.5 + 3.5	0.85 + 1.28 + 2.49 + 2.49 (2.40-8.80)	7.10	2140 (450-3020)	9.8 - 9.0	3.32	1.20 + 1.67 + 2.87 + 2.87 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
8.7	1.2 + 2.5 + 2.5 + 2.5	0.98 + 2.04 + 2.04 + 2.04 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.29 + 2.44 + 2.44 + 2.44 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
9.7	1.2 + 2.5 + 2.5 + 3.5	0.88 + 1.83 + 1.83 + 2.56 (2.40-8.50)	7.10	2140 (450-2650)	9.8 - 9.0	3.32	1.20 + 2.27 + 2.27 + 2.87 (2.60-9.50)	8.60	2200 (480-2580)	10.1 - 9.3	3.91
10.7	1.2 + 2.5 + 3.5 + 3.5	0.80 + 1.66 + 2.32 + 2.32 (2.40-8.80)	7.10	2140 (450-3020)	9.8 - 9.0	3.32	1.12 + 2.12 + 2.68 + 2.68 (2.60-9.50)	8.60	2180 (460-2520)	10.0 - 9.2	3.94
7.2	1.8 + 1.8 + 1.8 + 1.8	1.77 + 1.77 + 1.77 + 1.77 (2.40-7.90)	7.10	2140 (450-2870)	9.8 - 9.0	3.32	2.13 + 2.13 + 2.13 + 2.13 (2.60-9.50)	8.50	2120 (480-2580)	9.7 - 8.9	4.01
7.9	1.8 + 1.8 + 1.8 + 2.5	1.60 + 1.60 + 1.60 + 2.30 (2.40-8.30)	7.10	2140 (450-3090)	9.8 - 9.0	3.32	1.95 + 1.95 + 1.95 + 2.65 (2.60-9.50)	8.50	2120 (480-2580)	9.7 - 8.9	4.01
8.9	1.8 + 1.8 + 1.8 + 3.5	1.45 + 1.45 + 1.45 + 2.75 (2.40-8.50)	7.10	2140 (450-3090)	9.8 - 9.0	3.32	1.80 + 1.80 + 1.80 + 3.10 (2.60-9.50)	8.50	2120 (460-2520)	9.7 - 8.9	4.01
10.4	1.8 + 1.8 + 1.8 + 5.0	1.25 + 1.25 + 1.25 + 3.35 (2.40-8.80)	7.10	2140 (450-3200)	9.8 - 9.0	3.32	1.52 + 1.52 + 1.52 + 3.95 (2.60-9.50)	8.50	2110 (460-2520)	9.7 - 8.9	4.03
8.6	1.8 + 1.8 + 2.5 + 2.5	1.50 + 1.50 + 2.05 + 2.05 (2.40-8.50)	7.10	2140 (450-3090)	9.8 - 9.0	3.32	1.80 + 1.80 + 2.45 + 2.45 (2.60-9.50)	8.50	2120 (460-2520)	9.7 - 8.9	4.01
9.6	1.8 + 1.8 + 2.5 + 3.5	1.35 + 1.35 + 1.80 + 2.60 (2.40-8.50)	7.10	2140 (450-3090)	9.8 - 9.0	3.32	1.67 + 1.67 + 2.28 + 2.88 (2.60-9.50)	8.50	2120 (460-2520)	9.7 - 8.9	4.01
10.6	1.8 + 1.8 + 3.5 + 3.5	1.20 + 1.20 + 2.35 + 2.35 (2.40-8.80)	7.10	2140 (450-3200)	9.8 - 9.0	3.32	1.56 + 1.56 + 2.69 + 2.69 (2.60-9.50)	8.50	2110 (460-2520)	9.7 - 8.9	4.03
9.3	1.8 + 2.5 + 2.5 + 2.5	1.40 + 1.90 + 1.90 + 1.90 (2.40-8.50)	7.10	2140 (450-3090)	9.8 - 9.0	3.32	1.67 + 2.28 + 2.28 + 2.28 (2.60-9.50)	8.50	2120 (460-2520)	9.7 - 8.9	4.01
10.3	1.8 + 2.5 + 2.5 + 3.5	1.25 + 1.75 + 1.75 + 2.35 (2.40-8.80)	7.10	2140 (450-3200)	9.8 - 9.0	3.32	1.56 + 2.13 + 2.13 + 2.69 (2.60-9.50)	8.50	2110 (460-2520)	9.7 - 8.9	4.03
10.0	2.5 + 2.5 + 2.5 + 2.5	1.77 + 1.77 + 1.77 + 1.77 (2.40-8.80)	7.10	2140 (450-3200)	9.8 - 9.0	3.32	2.13 + 2.13 + 2.13 + 2.13 (2.60-9.50)	8.50	2110 (460-2520)	9.7 - 8.9	4.03
11.0	2.5 + 2.5 + 2.5 + 3.5	1.60 + 1.60 + 1.60 + 2.30 (2.40-8.80)	7.10	2140 (450-3200)	9.8 - 9.0	3.32	1.99 + 1.99 + 1.99 + 2.52 (2.60-9.50)	8.50	2110 (460-2520)	9.7 - 8.9	4.03

(FORE UNITS)

<REMARKS>
* ONE UNIT INDICATED ARE ONLY FOR ONE UNIT OPERATION WHEN TWO OR THREE OR FOUR INDOOR UNITS ARE CONNECTED.
* TWO UNITS INDICATED ARE ONLY FOR TWO UNIT OPERATION WHEN TWO OR THREE OR FOUR INDOOR UNITS ARE CONNECTED.
* THREE UNITS INDICATED ARE ONLY FOR THREE UNIT OPERATION WHEN THREE OR FOUR INDOOR UNITS ARE CONNECTED.
* COMBINATIONS WITH 7.0kW INDOOR AND 4.0kW INDOOR : DATA SHALL BE INFORMED LATER
∗　　Total nominal cooling capacity should not be more than 11kW.

QUADRUPLE SYSTEM MULTI R.A.C. *RAM-71QH5*
INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

Two, three or four indoor units can be installed with one outdoor unit.
And total nominal cooling capacity should not be more than 11.0kW

NOMINAL COOLING CAPACITY (kW)	INDOOR UNIT MODEL NAME	CAPACITY (kW) at one unit operation		SUITABLE ROOM SIZE (m^2) at one unit operation	
		COOLING	HEATING	COOLING	HEATING
1.8kW	RAK−18NH5	1.00 − 1.80	1.00 − 1.80	8 − 12	9 − 11
	RAK−18NH6	1.00 − 1.80	1.00 − 1.80	8 − 12	9 − 11
	RAK−18NH6A	1.00 − 1.80	1.00 − 1.80	8 − 12	9 − 11
	RAK−18QH8	1.00 − 1.80	1.00 − 1.80	8 − 12	9 − 11
2.5kW	RAK−25NH5	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAK−25NH6	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAK−18NH6A	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAK−25QH8	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAI−25NH5	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAI−25NH5A	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAF−25NH5	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAF−25QH8	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAD−25NH5	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAD−25NH7	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
	RAD−25NH7A	1.00 − 2.50	1.00 − 2.50	11 − 17	14 − 18
3.5kW	RAK−35NH5	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAK−35NH6	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAK−35NH6A	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAK−35QH8	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAI−35NH5	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAI−35NH5A	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAF−35NH5	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAF−35QH8	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAD−35NH5	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAD−35NH7	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
	RAD−35NH7A	1.00 − 3.50	1.00 − 3.50	16 − 24	17 − 22
5.0kW	RAK−50NH5	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29
	RAK−50NH6	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29
	RAK−50NH6A	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29
	RAK−50QH8	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29
	RAI−50NH5	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29
	RAI−50NH5A	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29
	RAF−50NH5	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29
	RAF−50QH8	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29
	RAD−50NH7	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29
	RAD−50NH7A	1.00 − 5.00	1.00 − 5.00	23 − 34	23 − 29

Be sure to connect two or three indoor units to this outdoor unit. If not, condensed water may drop, resulting in trouble.

QUADRUPLE SYSTEM MULTI R.A.C. *RAM-71QH5* INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

POSSIBLE COMBINATIONS TO INSTALL (kW)		SUITABLE ROOM SIZE TO INSTALL (m²)	CONNECTING POSITION ON OUTDOOR UNIT (VALVE DIAMETER) (mm)			
			No.1 6.35/9.52D	No.2 6.35/9.52D	No.3 6.35/9.52D	No.4 6.35/12.7D
TWO UNITS	1.8+1.8	(8 ~ 12) + (8 ~ 12)	1.8	1.8		
	1.8+2.5	(8 ~ 12) + (11 ~ 17)	1.8	2.5		
	1.8+3.5	(8 ~ 12) + (16 ~ 24)	1.8	3.5		
	1.8+5.0	(8 ~ 12) + (23 ~ 34)	1.8			5.0
	1.8+6.0	(8 ~ 12) + (25 ~ 37)	1.8			6.0
	2.5+2.5	(11 ~ 17) + (11 ~ 17)	2.5	2.5		
	2.5+3.5	(11 ~ 17) + (16 ~ 24)	2.5	3.5		
	2.5+5.0	(11 ~ 17) + (21 ~ 32)	2.5			5.0
	2.5+6.0	(10 ~ 14) + (23 ~ 34)	2.5			6.0
	3.5+3.5	(16 ~ 24) + (16 ~ 24)	3.5	3.5		
	3.5+5.0	(13 ~ 20) + (19 ~ 29)	3.5			5.0
	3.5+6.0	(12 ~ 18) + (20 ~ 31)	3.5			6.0
	5.0+5.0	(16 ~ 24) + (16 ~ 24)	5.0			5.0
	5.0+6.0	(15 ~ 22) + (18 ~ 27)	5.0			6.0
THREE UNITS	1.8+1.8+1.8	(8 ~ 12) + (8 ~ 12) + (8 ~ 12)	1.8	1.8	1.8	
	1.8+1.8+2.5	(8 ~ 12) + (8 ~ 12) + (11 ~ 17)	1.8	1.8	2.5	
	1.8+1.8+3.5	(8 ~ 12) + (8 ~ 12) + (16 ~ 24)	1.8	1.8	3.5	
	1.8+1.8+5.0	(7 ~ 10) + (7 ~ 10) + (19 ~ 28)	1.8	1.8		5.0
	1.8+1.8+6.0	(6 ~ 9) + (6 ~ 9) + (20 ~ 30)	1.8	1.8		6.0
	1.8+2.5+2.5	(8 ~ 12) + (11 ~ 17) + (11 ~ 17)	1.8	2.5	2.5	
	1.8+2.5+3.5	(8 ~ 11) + (10 ~ 16) + (15 ~ 22)	1.8	2.5	3.5	
	1.8+2.5+5.0	(6 ~ 10) + (9 ~ 13) + (17 ~ 26)	1.8	2.5		5.0
	1.8+2.5+6.0	(6 ~ 9) + (8 ~ 12) + (19 ~ 29)	1.8	2.5		6.0
	1.8+3.5+3.5	(6 ~ 10) + (13 ~ 20) + (13 ~ 20)	1.8	3.5	3.5	
	1.8+3.5+5.0	(6 ~ 9) + (11 ~ 17) + (16 ~ 24)	1.8	3.5		5.0
	2.5+2.5+2.5	(11 ~ 16) + (11 ~ 16) + (11 ~ 16)	2.5	2.5	2.5	
	2.5+2.5+3.5	(10 ~ 14) + (10 ~ 14) + (13 ~ 20)	2.5	2.5	3.5	
	2.5+2.5+5.0	(8 ~ 12) + (8 ~ 12) + (16 ~ 24)	2.5	2.5		5.0
	2.5+2.5+6.0	(7 ~ 11) + (7 ~ 11) + (18 ~ 27)	2.5	2.5		6.0
	2.5+3.5+3.5	(9 ~ 13) + (12 ~ 18) + (12 ~ 18)	2.5	3.5	3.5	
	2.5+3.5+5.0	(7 ~ 11) + (10 ~ 16) + (15 ~ 22)	2.5	3.5		5.0
	3.5+3.5+3.5	(11 ~ 16) + (11 ~ 16) + (11 ~ 16)	3.5	3.5	3.5	
FOUR UNITS	1.8+1.8+1.8+1.8	(8 ~ 12) + (8 ~ 12) + (8 ~ 12) + (8 ~ 12)	1.8	1.8	1.8	◎ 1.8
	1.8+1.8+1.8+2.5	(7 ~ 11) + (7 ~ 11) + (7 ~ 11) + (10 ~ 16)	1.8	1.8	1.8	◎ 2.5
	1.8+1.8+1.8+3.5	(7 ~ 10) + (7 ~ 10) + (7 ~ 10) + (13 ~ 19)	1.8	1.8	1.8	◎ 3.5
	1.8+1.8+1.8+5.0	(6 ~ 9) + (6 ~ 9) + (6 ~ 9) + (15 ~ 23)	1.8	1.8	1.8	5.0
	1.8+1.8+2.5+2.5	(7 ~ 10) + (7 ~ 10) + (9 ~ 14) + (9 ~ 14)	1.8	1.8	2.5	◎ 2.5
	1.8+1.8+2.5+3.5	(6 ~ 9) + (6 ~ 9) + (8 ~ 12) + (12 ~ 18)	1.8	1.8	2.5	◎ 3.5
	1.8+1.8+3.5+3.5	(5 ~ 8) + (5 ~ 8) + (11 ~ 16) + (11 ~ 16)	1.8	1.8	3.5	◎ 3.5
	1.8+2.5+2.5+2.5	(6 ~ 10) + (9 ~ 13) + (9 ~ 13) + (9 ~ 13)	1.8	2.5	2.5	◎ 2.5
	1.8+2.5+2.5+3.5	(6 ~ 9) + (8 ~ 12) + (8 ~ 12) + (11 ~ 16)	1.8	2.5	2.5	◎ 3.5
	2.5+2.5+2.5+2.5	(8 ~ 12) + (8 ~ 12) + (8 ~ 12) + (8 ~ 12)	2.5	2.5	2.5	◎ 2.5
	2.5+2.5+2.5+3.5	(7 ~ 11) + (7 ~ 11) + (7 ~ 11) + (10 ~ 16)	2.5	2.5	2.5	◎ 3.5

2.5, 3.5, 4.0, 5.0 & 6.0 means indoor units cooling capacity class.
(1) Marking
  ⊙: needs flare adapter (9.52 → 12.7D): Part No. TA261D-4 001
  ◎: needs flare adapter (12.7 → 9.52D): Part No. TA261D-6 002
(2) Suitable room size is determined based on the conditions below:
  • Climate is in the temperate zone like Tokyo, Japan.
  • For usual residential use.
  • Smaller figure is for light construction which means light thermally sealed.
  • Larger figure is for heavy constructions, which means well thermally sealed.

FEATURES

(1) New refrigerant R410A with no harmful effect on the ozone layer
Refrigerant R410A, which does not damage the ozone layer, was adopted instead of HCFC-22 which is planned to be phased out globally by 2020.

(2) New refrigerating oil
The new refrigerant HFC-R410A is not compatible with conventional mineral oils and no lubrication can be expected with those oils. To solve this, the artificial synthetic ester oil is newly adopted.

NEW TECHNOLOGY

Cautions in relation to HFC (R410A)

1. Safety during Servicing
This air conditioner uses the new refrigerant HFC (R410A) for protecting the ozone layer. R410A has several different characteristic features from HCFC-22. Therefore keep the following care items during servicing for safety.

(1) Since the working pressure of R410A model is about 1.6 times higher than that of HCFC-22 models, it becomes necessary to use part of piping materials and servicing tools exclusive for R410A model.

(2) It is necessary to exercise more care to prevent the foreign matters (oil, moisture, etc.) from mixing into the piping than in the case of HCFC-22 model. Also, when storing the piping, securely seal its openings with pinching and taping, etc..

(3) Be sure to charge the refrigerant from the liquid-phase side, as the liquid-phase/gas-phase-composition changes a little in the case of R410A model.

(4) Never use refrigerant other than R410A in an air conditioner which is designed to operate with R410A.

(5) If a refrigeration gas leakage occurs during servicing, be sure to ventilate fully.
If the refrigerant gas comes into contact with fire, a poisonous gas may occur.

(6) When installing or removing an air conditioner, do not allow air or moisture to remain in the refrigeration cycle. Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused.

(7) After completion of service work, check to make sure that there is no refrigeration gas leakage.
If the refrigerant gas leaks into the room, coming into contact with fire in the fandriven heater, space heater, etc., a poisonous gas may occur.
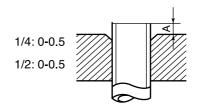
2. Refrigerant Piping Materials

(1) Thickness of Refrigerant Piping
Although the thickness is same as that for HCFC-22 model, as R410A model features higher pressure, be sure to confirm the thickness prior to use.

※Do not use thin pipes (thinner than 0.7 mm).

Nominal diameter	Outside diameter (mm)	Thickness (mm)
1/4	6.35	0.8
1/2	12.70	0.8

(2) Flare's Expansion Pipe
The projection when the new flare tool is used, is as follows. When using the conventional flare tool, be sure to secure the following projection by using a gauge for projection adjustment.

※When using the conventional flare tool, use a gauge for projection adjustment.

Projection "A"(mm) for Flare Tool for R410A (Clutch Type)

1/4: 0-0.5
1/2: 0-0.5

(3) Flare Nut Dimensions
Along with changes in the expansion pipe dimensions, the opposite side dimensions of flare nuts whose nominal diameter is 1/2 change so that different torque wrenches must be used.

※Figures in ( ) denote those for HCFC-22.

Nominal diameter	Opposite Side Dimensions (mm) of Flare Nuts for R410A
1/4	17 (17)
3/8	22 (22)
1/2	26 (24)

3. Servicing Tools

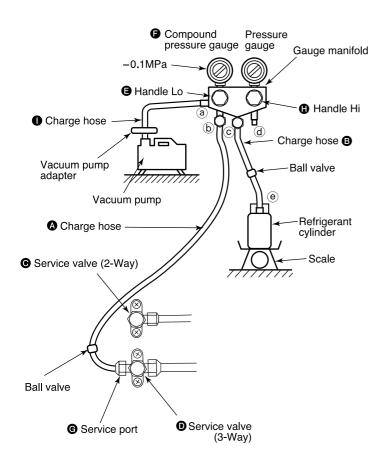(Changes in the Product and Components)

- In order to prevent any other refirigerant from being charged, R410A model is provided with the outdoor unit whose control valve has a different service port diameter (port size: 7/16 UNF 20 threads per inch → 1/2 UNF 20 threads per inch).

- In order to secure larger pressure resisting strength, flare expansion pipe dimensions and flare nut dimensions have been changed.

(New Tools for R410A)

New tools for R410A	Applicable to HCFC-22 Model	Changes
Gauge manifold	×	As pressure is high, it is impossible to measure by means of conventional gauge. In order to prevent any other refrigerant from being charged, each port diameter has been changed.
Charge hose	×	In order to increase pressure resistance, hose materials and port size have been changed (to 1/2 UNF 20 threads per inch). When purchasing a charge hose, be sure to confirm the port size.
Electronic balance for refrigerant charging	○	As pressure is high and gasification speed is fast, it is difficult to read the indicated value by means of charging cylinder, as air bubbles occur.
Torque wrench	× (nominal diam. 1/2, 5/8)	The opposite side dimensions of flare nuts increase. Incidentally, a common wrench is used for nominal diameters 1/4 and 3/8.
Flare tool (clutch type)	○	By increasing the clamp bar's receiving hole, strengh of spring in the tool has been improved.
Gauge for projection adjustment	–	Used when performing flare processing by means of conventional flare tool.
Vacuum pump adapter	○	Connected to conventional vacuum pump.
Gas leakage detector	×	Exclusive for HFC refrigerant.

- Incidentally, the "refrigerant cylinder" comes with the refrigerant designation (R410A) and protector coating in the U.S.'s ARI specified rose color (ARI color code: PMS 507).

- Also, the "charge port and packing for refrigerant cylinder" require 1/2 UNF 20 threads per inch corresponding to the charge hose's port size.
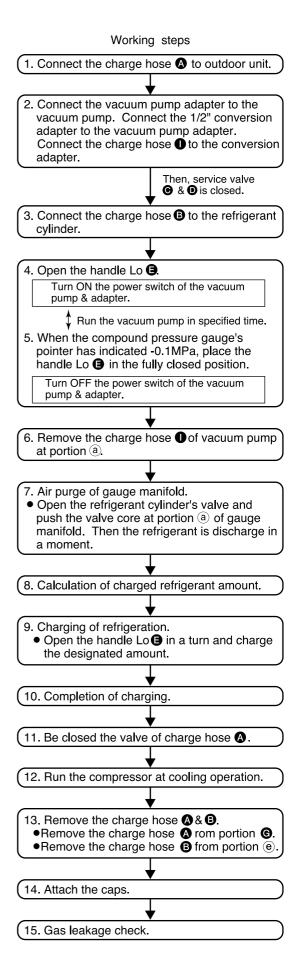
4. Servicing work (Rerfigerant recharging)

F Compound pressure gauge
Pressure gauge
Gauge manifold
−0.1MPa
E Handle Lo
H Handle Hi
I Charge hose
Charge hose **B**
Vacuum pump adapter
Ball valve
Vacuum pump
A Charge hose
Refrigerant cylinder
C Service valve (2-Way)
Scale
Ball valve
G Service port
D Service valve (3-Way)

⚠ CAUTION

1. Be sure to use the vacuum pump, vacuum pump adapter and gauge manifold to refer to their instruction manuals beforehand.

2. Ascertain that the vacuum pump is filled with oil to the level designated on the oil gauge.

3. After closed the ball valve of charge hose, it should be disconnected at service port side and refrigerant cylinder side at first.
Next, after discharging the remained gas in the charge hose by opening the ball valve a little, disconnect it at gauge manifold side. You can prevent from being released the refrigerant suddenly by connecting the ball valve to service port. And you can work with more safety.
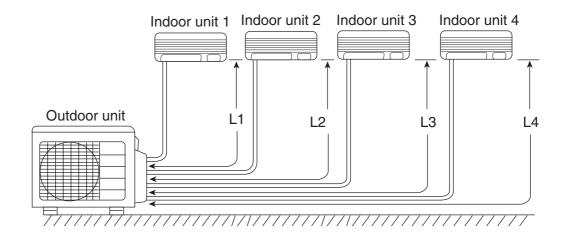
Working steps

1. Connect the charge hose **A** to outdoor unit.

2. Connect the vacuum pump adapter to the vacuum pump. Connect the 1/2" conversion adapter to the vacuum pump adapter. Connect the charge hose **I** to the conversion adapter.

Then, service valve **C** & **D** is closed.

3. Connect the charge hose **B** to the refrigerant cylinder.

4. Open the handle Lo **E**.
   Turn ON the power switch of the vacuum pump & adapter.
   ↕ Run the vacuum pump in specified time.
5. When the compound pressure gauge's pointer has indicated -0.1MPa, place the handle Lo **E** in the fully closed position.
   Turn OFF the power switch of the vacuum pump & adapter.

6. Remove the charge hose **I** of vacuum pump at portion ⓐ.

7. Air purge of gauge manifold.
   ● Open the refrigerant cylinder's valve and push the valve core at portion ⓐ of gauge manifold. Then the refrigerant is discharge in a moment.

8. Calculation of charged refrigerant amount.

9. Charging of refrigeration.
   ● Open the handle Lo **E** in a turn and charge the designated amount.

10. Completion of charging.

11. Be closed the valve of charge hose **A**.

12. Run the compressor at cooling operation.

13. Remove the charge hose **A** & **B**.
    ● Remove the charge hose **A** rom portion **G**.
    ● Remove the charge hose **B** from portion ⓔ.

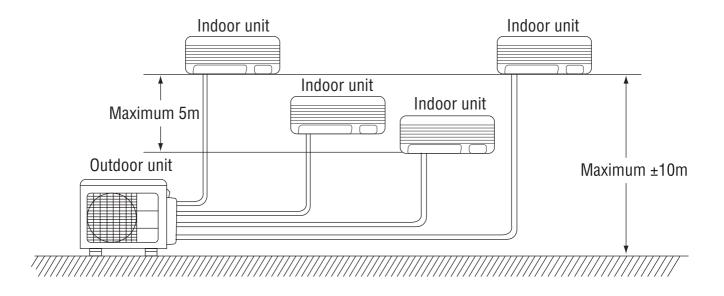14. Attach the caps.

15. Gas leakage check.

INSTALLATION

PIPE LENGTH
(1) Total 60m maximum pipe length.
(2) Pipe length for one indoor unit : maximum 25m.
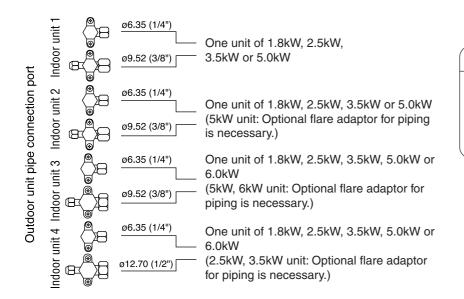

HIGHT DIFFERENCE
(1) Height : maximum ± 10m
(2) Height difference between each indoor unit ≤ 5m.

● To the outdoor unit, up to four indoor units can be connected until the total value of capacity to 11.0kW.
● Make sure to connect to two or more indoor units.
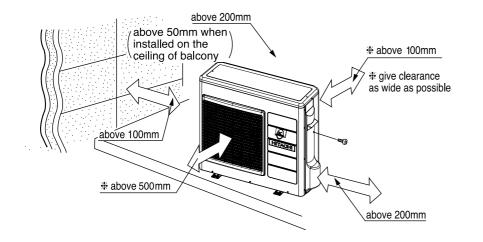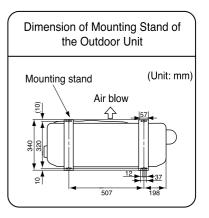
MODEL: RAM-71QH5

Outdoor unit pipe connection port

Indoor unit 1
ø6.35 (1/4")
ø9.52 (3/8")
One unit of 1.8kW, 2.5kW, 3.5kW or 5.0kW

Indoor unit 2
ø6.35 (1/4")
ø9.52 (3/8")
One unit of 1.8kW, 2.5kW, 3.5kW or 5.0kW
(5kW unit: Optional flare adaptor for piping is necessary.)

Indoor unit 3
ø6.35 (1/4")
ø9.52 (3/8")
One unit of 1.8kW, 2.5kW, 3.5kW, 5.0kW or 6.0kW
(5kW, 6kW unit: Optional flare adaptor for piping is necessary.)

Indoor unit 4
ø6.35 (1/4")
ø12.70 (1/2")
One unit of 1.8kW, 2.5kW, 3.5kW, 5.0kW or 6.0kW
(2.5kW, 3.5kW unit: Optional flare adaptor for piping is necessary.)

Flare adaptor for piping

The flare adaptor for piping is required depending on combination of indoor units.
• ø9.52 (3/8") → ø 12.7 (1/2")
  Parts number TA261D-4 001
• ø12.7(1/2") → ø 9.52 (3/8")
  Parts number TA261D-6 002

• Remove the side cover.

• For installation, refer as shown below.

• The space indicated with a ⇔ mark is required to guarantee the air conditioner's performance. Install the airconditioner in a place big enough to provide ample space for servicing and repairs later on.

above 200mm
above 50mm when installed on the ceiling of balcony
✳ above 100mm
✳ give clearance as wide as possible
above 100mm
✳ above 500mm
above 200mm

Dimension of Mounting Stand of the Outdoor Unit

Mounting stand
(Unit: mm)
Air blow
(10)
340
320
57
10
12
37
507
198
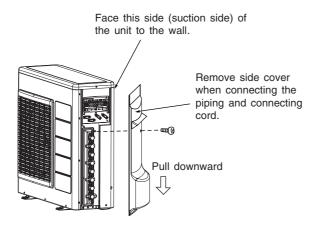
Connecting the pipe

• Install the unit in a stable place to minimize vibrationor noise.

• After arranging the cord and pipes, secure them inplace.

Face this side (suction side) of the unit to the wall.

Remove side cover when connecting the piping and connecting cord.

Pull downward

• Hold the handle of the side cover. Slide down and takeoff the corner hook, then pull. Reverse these stepswhen installing.

1. Remove flare nut from service valve.

2. Apply refrigerant oil to flare nut sections of servicevalve and pipings.

3. Match center of piping to large diameter side service valve and tank assembly, and tighten flarenut first by hand, then securely tighten using torque wrench.

4. Perform air purge and gas leak inspection.

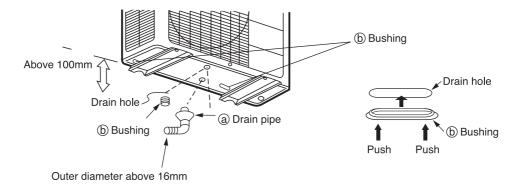5. Wrap the provided insulating material around sidepiping using vinyl tape.

Condensed water disposal of outdoor unit

・ There is holes on the base of outdoor unit for condensed water to exhaust.

・ To lead condensed water to the drain hole, place the outdoor unit on the mounting stand (optional) or on blocks to raise its level more than 100mm from the ground surface. Connect the drain pipe as shown in the figure. Cover two other water drain holes with the bushings included. (To insall a bushing, push in both ends of the bushing so that it aligns with the drain hole.)

・ When connecting the drain pipe, make sure that the bushing does not lift off or deviate from the base.

・ Install the outdoor unit on a stable, flat surface and check to see that the condensed water drains.
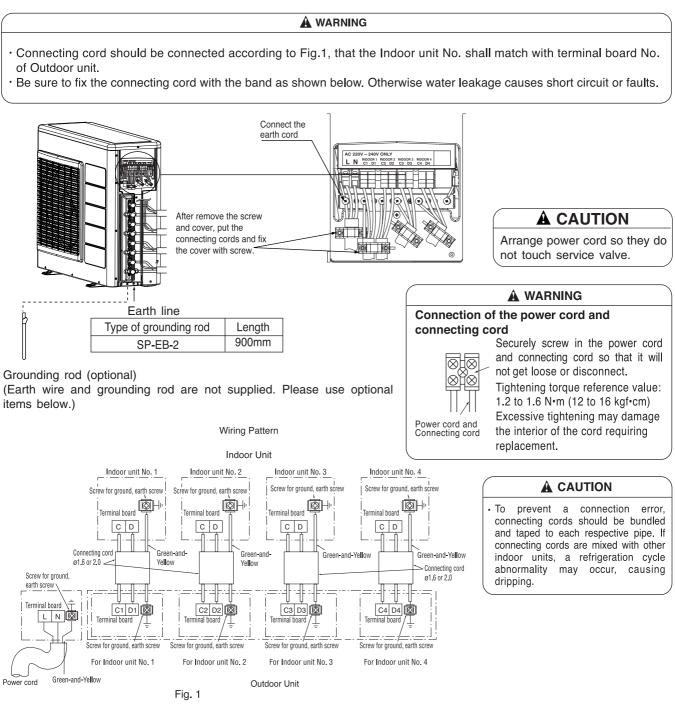
When Using and Installing in Cold Areas

When the air conditioner is used in low temperature and in snowy conditions, water from the heat exchanger may freeze on the base surface to cause poor drainage. When using the air conditioner in such areas, do not install the bushings. Keep a minimum of 250mm between the drain hole and the ground. When using the drain pipe, consult your sales agent.

※For more details, refer to the Installation Manual for Cold Areas.

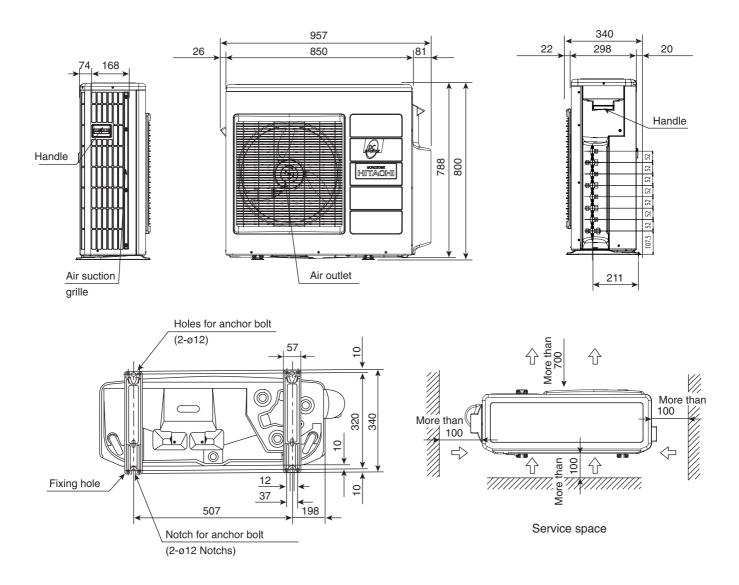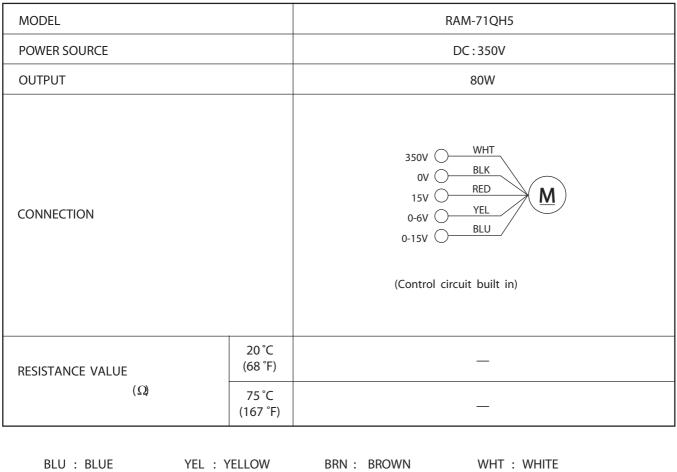# Connection of the connecting cords and power cord. (Outdoor unit)
RAM-71QH5

⚠ WARNING

· Connecting cord should be connected according to Fig.1, that the Indoor unit No. shall match with terminal board No. of Outdoor unit.
· Be sure to fix the connecting cord with the band as shown below. Otherwise water leakage causes short circuit or faults.

Connect the earth cord

AC 220V – 240V ONLY
L N INDOOR 1 INDOOR 2 INDOOR 3 INDOOR 4
   C1 D1 C2 D2 C3 D3 C4 D4

After remove the screw and cover, put the connecting cords and fix the cover with screw.

Earth line

Type of grounding rod	Length
SP-EB-2	900mm

Grounding rod (optional)
(Earth wire and grounding rod are not supplied. Please use optional items below.)

⚠ CAUTION

Arrange power cord so they do not touch service valve.

⚠ WARNING

Connection of the power cord and connecting cord

Securely screw in the power cord and connecting cord so that it will not get loose or disconnect.
Tightening torque reference value: 1.2 to 1.6 N•m (12 to 16 kgf•cm)
Excessive tightening may damage the interior of the cord requiring replacement.

Power cord and Connecting cord

⚠ CAUTION

· To prevent a connection error, connecting cords should be bundled and taped to each respective pipe. If connecting cords are mixed with other indoor units, a refrigeration cycle abnormality may occur, causing dripping.

Wiring Pattern

Indoor Unit

Indoor unit No. 1   Indoor unit No. 2   Indoor unit No. 3   Indoor unit No. 4

Screw for ground, earth screw

Terminal board

C D   C D   C D   C D

Connecting cord ø1.6 or 2.0   Green-and-Yellow   Green-and-Yellow   Green-and-Yellow   Green-and-Yellow   Connecting cord ø1.6 or 2.0

Screw for ground, earth screw

Terminal board
L N

C1 D1   C2 D2   C3 D3   C4 D4
Terminal board   Terminal board   Terminal board   Terminal board

Screw for ground, earth screw

For Indoor unit No. 1   For Indoor unit No. 2   For Indoor unit No. 3   For Indoor unit No. 4

Power cord   Green-and-Yellow   Outdoor Unit

Fig. 1

· When putting two connecting cords through the band.

Screw

Insulating plate

Cord band

Connecting cord

⚠ WARNING

· Leave some space in the connecting cord for maintenance purpose and be sure to secure it with the cord band.
· Secure the connecting cord along the coated part of the wire using the cord band. Do not exert pressure on the wire as this may cause overheating or fire.

· Hold the handle of the side cover, slide down and take off the corner hook, then pull. Reverse these steps when installing.

CONSTRUCTION AND DIMENSIONAL DIAGRAM

MODEL RAM-71QH5

74 168

Handle

Air suction
grille

957
850
26 81
788 800

Air outlet

340
22 298 20

Handle

52 52 52 52 52 52 52 52 52 52 107.5

211

Holes for anchor bolt
(2-ø12)

57
10
320 340
10
10

Fixing hole

12
37
507 198

Notch for anchor bolt
(2-ø12 Notchs)

More than
700

More than
100

More than
100

More than
100

Service space

MAIN PARTS COMPONENT

FAN MOTOR

Fan Motor Specifications

MODEL	RAM-71QH5
POWER SOURCE	DC : 350V
OUTPUT	80W
CONNECTION	 (Control circuit built in)

RESISTANCE VALUE (Ω)	20 ℃ (68 ℉)	—
	75 ℃ (167 ℉)	—

BLU : BLUE	YEL : YELLOW	BRN : BROWN	WHT : WHITE
GRY : GRAY	ORN : ORANGE	GRN : GREEN	RED : RED
BLK : BLACK	PNK : PINK	VIO : VIOLET	

COMPRESSOR MOTOR

Compressor Motor Specifications

MODEL		RAM-71QH5
COMPRESSOR MODEL		JU1015D2
PHASE		SINGLE
RATED VOLTAGE		AC 220 ~ 240 V
RATED FREQUENCY		50 Hz
POLE NUMBER		4
CONNECTION		
RESISTANCE VALUE (Ω)	20°C (68°F)	2M = 1.05
	75°C (167°F)	2M = 1.268
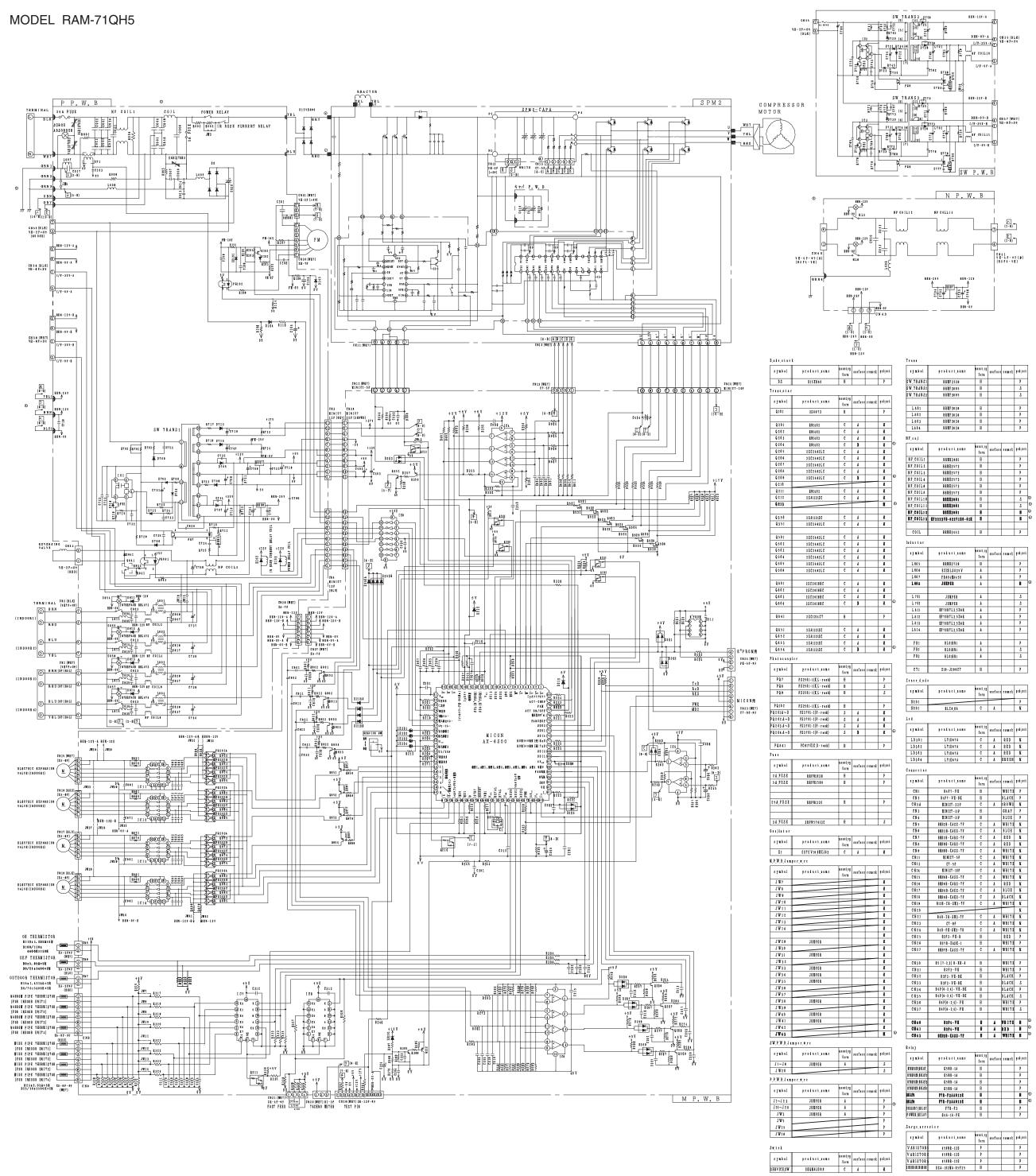
WIRING DIAGRAM

MODEL RAM-71QH5

POWER SOURCE
AC220 - 240V
50Hz

TERMINAL BOARD

(BRN) L
(BLU) N
(GRN & YEL)

BLK
25A FUSE
VARISTOR1
NF COIL1
COIL
POWER RELAY

GRN1
SURGE ABSORBER
WHT
NF P.W.B

VARISTOR3
CT1

REACTOR
YEL YEL
L1 L2

GRY
BLU YEL
RED
DIODE STACK

SYSTEM POWER MODULE

U WHT
V YEL
W RED

INDOOR 1
(BRN) C1 BRN
(RED) D1 RED
(GRN & YEL)

INDOOR 2
(BRN) C2 BLU
(RED) D2 YEL
(GRN & YEL)

CN41 (RED)
ORN
CN40 (WHT)
GRY

(BLK) CN2

DIODE STACK
VARISTOR2

P.W.B. POWER

GRN2
R009
L006
(WHT) CN1

GRN3

N1
CN31 (WHT)
BLK
2
CN12 (WHT)

P.W.B CAPA

BLU

P1 (WHT)
CN13 CN14 CN11

CN32 (BLK) 2 CN33 (BLK)
CN34 (BLK) 4 CN35 (BLK)
CN36 (WHT) 4 CN37 (WHT)

P.W.B SWITCHING POWER

W V U
RED YEL WHT

COMPRESSOR

INDOOR 3
(BRN) C3 GRY
(RED) D3 ORN

INDOOR 4
(BRN) C4 PUR
(RED) D4 PNK
(GRN & YEL)

TERMINAL BOARD

(GRN & YEL)

(RED) (WHT) (GRY)(BLU) (WHT)
CN25 CN26 CN3 CN4 CN30

YEL YEL
REVERSING VALUE

WHT
BLK
RED
YEL
BLU
M
FAN MOTOR

5 10 5

CN13 (WHT) CN14 (WHT) CN11 (WHT)

GRY
WHT
RED
YEL
BLK
ORN
CN18 (BLK)

ELECTRIC EXPANSION VALVE FOR INDOOR UNIT 4

BLK : BLACK
BLU : BLUE
BRN : BROWN
GRN : GREEN
ORN : ORANGE
GRY : GRAY
RED : RED
WHT : WHITE
YEL : YELLOW
PUR : PURPLE
PNK : PINK

OVERHEAT THERMISTOR
RED RED
CN5 (WHT)

DEFROST THERMISTOR
BLU BLU
CN6 (BLU)

OUTDOOR TEMPERATURE THERMISTOR
RED RED
CN7 (RED)

NARROW PIPE THERMISTOR (FOR INDOOR UNIT 1)
NARROW PIPE THERMISTOR (FOR INDOOR UNIT 2)
NARROW PIPE THERMISTOR (FOR INDOOR UNIT 3)
NARROW PIPE THERMISTOR (FOR INDOOR UNIT 4)
CN8 (RED)

WIDE PIPE THERMISTOR (FOR INDOOR UNIT 1)
WIDE PIPE THERMISTOR (FOR INDOOR UNIT 2)
WIDE PIPE THERMISTOR (FOR INDOOR UNIT 3)
WIDE PIPE THERMISTOR (FOR INDOOR UNIT 4)
CN9 (WHT)

P.W.B. MAIN

CN17 (BLU)

GRY
WHT
RED
YEL
BLK
ORN

ELECTRIC EXPANSION VALVE FOR INDOOR UNIT 3

CN15 (WHT)
CN16 (RED)

GRY WHT RED YEL BLK ORN

ELECTRIC EXPANSION VALVE FOR INDOOR UNIT 1

ELECTRIC EXPANSION VALVE FOR INDOOR UNIT 2

USE 30A TIME DELAY FUSE

CIRCUIT DIAGRAM

MODEL RAM-71QH5

BLOCK DIAGRAM

MODEL RAM-71QH5

Outdoor Unit

Power source

single phase 50Hz, 220-240V

L

N

Magnetic relay

Inrush current protection relay

System Power Module

compressor

M

Rotor position detector

Overload current detector

Fan motor drive circuit

M

fan motor

Overheat thermistor

Defrost thermistor

Outdoor temp thermistor

Outdoor micro computer (AX-6V)

SPM driver

EEPROM

Expansion valve drive circuit

Expansion valve 1

Expansion valve 2

Expansion valve 3

Expansion valve 4

Multiplexer

Expansion valve thermistor 1

Expansion valve thermistor 2

Expansion valve thermistor 3

Expansion valve thermistor 4

Indoor unit 1

C1/D1

Indoor/Outdoor Interface 1

Indoor unit 2

C2/D2

Indoor/Outdoor Interface 2

Indoor unit 3

C3/D3

Indoor/Outdoor Interface 3

Indoor unit 4

C4/D4

Indoor/Outdoor Interface 4

Reversing valve drive circuit

Reversing valve

Clock circuit

Reset circuit

Switching power supply 2

Switching power supply 3

BASIC MODE

Operation mode		Fan	Cooling	Dehumidifying	Heating	Auto
Basic operation of start / stop switch						
Timer functions	Off-timer					
	On-timer					

Start / stop switch / Operation lamp (Start Stop Start Stop)

Off-timer timing chart: Start / stop switch, Reserve switch, Cancel switch, Operation lamp, Timer lamp, Remote controller timer mark "O", Timer memory — (Off-timer during stop) (Change in reserved time)

On-timer timing chart: Start / stop switch, Reserve switch, Cancel switch, Operation lamp, Timer lamp, Remote controller timer mark "I", Timer memory — (Change in reserved time) (Off-timer during operation)

| Fan speed mode (indoor fan) | Auto | | Changes from "Hi" to "Med" or "Lo" depending on room temperature. | | Set to "Ultra-Lo", "Lo", "Med", "Hi", "Ultra-Hi" or "stop" depending on the room temperature, time and heat exchange temperature. Set to "stop" if the room temperature is 18°C in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33°C). | **Operation mode** — Judgment based on the room temperature and external temperature: Cooling: external temperature ≥ 25°C, or 21°C ≤ external temperature < 25°C and room temperature > 27°C Heating: external temperature < 18°C, or 18°C ≤ external temperature < 21°C and room temperature ≤ 23°C Dehumidifying: 21°C ≤ external temperature < 25°C and room temperature ≤ 27°C, or 18°C ≤ external temperature < 21°C and room temperature > 23°C |

| | | | 1. Runs at "Hi" until first thermo off after operation is started. 2. Runs at "Lo" when thermo is off. | | | — Set to the mode of the indoor unit that has previously been operating. If, when one indoor unit is heating, the other unit is set to auto, the other unit will also enter the heating operation. If, when one indoor unit is cooling or dehumidifying, the other unit is set to auto, the other unit will enter the cooling or dehumidifying operation. |

| | Hi | Operates at "Hi" regardless of the room temperature. | Set to "Ultra-Hi" when the compressor runs at maximum speed, and to "Hi" in other modes. | | Set to "Ultra-Lo", "Lo", "Med", "Hi", "Ultra-Hi" or "Stop" depending on the room temperature and time. Set to "Stop" if the room temperature is 18°C in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33°C). Set to "Ultra-Hi" when the compressor is running at maximum speed during hot dash or when recovered from defrosting. | |

| | Med | Operates at "Med" regardless of the room temperature. | Same as at left. | | Set to "Ultra-Lo", "Lo", "Med" or "Stop" depending on the room temperature and time. Set to "Stop" if the room temperature is 18°C in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33°C). | |

| | Lo | Operates at "Lo" regardless of the room temperature. | Same as at left. | Set to "Lo" in modes other than when the compressor stops. | Set to "Ultra-Lo", "Lo", or "Stop" depending on the room temperature and time. Set to "Stop" if the room temperature is 18°C in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33°C). The fan speed is controlled by the heat exchanger temperature; the overload control is executed as in the following diagram: | ※ Operation mode stays unchanged even if the room or ambient temperature changes during operation. |

| | Basic operation of temperature controller | Performs only fan operation at the set speed regardless of the room temperature. | See page 53. | See page 95. | See page 99. | **Set room temperature** — All the following temperatures can be compensated for ±3°C using the remote control: Cooling: 27°C Heating: 23°C Dehumidifying: Current room temperature (upper limit: 27°C, lower limit: 23°C) ※ Operates at a target of set temperature minus 2°C. |

| | Sleep operation (with sleep button ON) | Enters sleep operation after set as on the left. Action during sleep operation silent (sleep) operation | ·Same as at left. ·See page 55. | ·Same as at left. ·See page 97. | ·Same as at left. ·See page 99. | ·Same as at left. ·Performs the sleep operation of each operation mode. |

Combination of operations:

When operation mode is selected:

·You cannot operate the indoor units in the following combinations.
·The indoor unit which is switched on first continues to operate, but other indoor units which is switched on later, does not operate while the lamp lights.
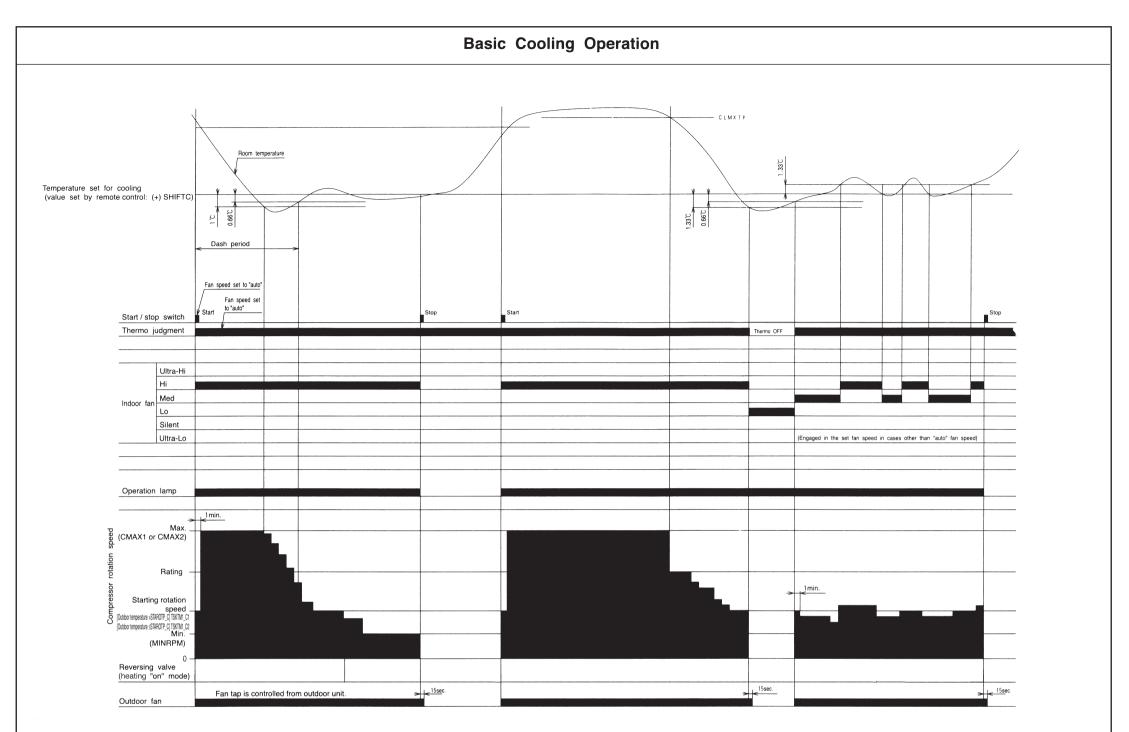
One unit	Other unit
Heating	Cooling
	Dehumidifying
	Circulating (fan)

During automatic operation:

·When heating operation is automatically selected for the first indoor unit, the next indoor unit will then start to heat. Also, if cooling or dehumidifying is automatically selected for the first indoor unit, the next indoor unit will also start to cool or dehumidify.

Notes:
1. Refer to the PWRITE-ZU data for the constants expressed by capital alphabet letters in the drawing.
2. The speed set of rotaion for the fan motor in each operation mode are as shown in Table 1.
3. The set room temperatures in the diagram include the shift values in Table 2.
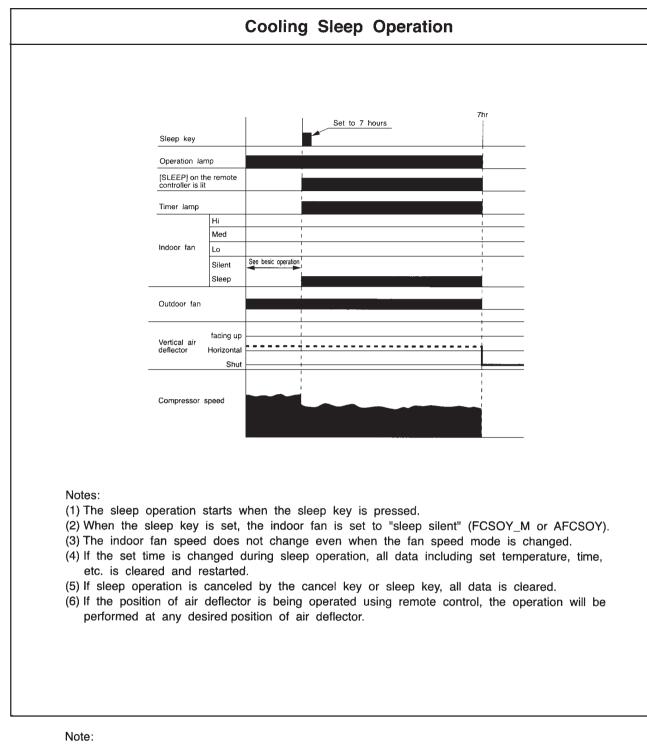
PROM NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	
	MODEL	RAM-71QH5	
040	PSTARTC1$	200	
041	PSTARTC1K$	250	
042	PSTARTC2$	130	
043	PSTARTC2K$	200	
044	PSTARTH$	200	
045	PSTARTH2$	250	
046	PMIN$	86	
047	DFCTPS$	100	
048	DFCTPN$	240	
049	DFSPPS$	44	
04A	DFPSMX$	480	
04B	PCLOSH$	86	
OFD	CMAX1	5800	min^{-1}
OFE	CMAX2	5000	min^{-1}
101	CMAX3	5100	min^{-1}
108	WMAX1	6000	min^{-1}
109	WMAX2	6500	min^{-1}
10C	WMAX3	6500	min^{-1}
11E	STAROTP_C	25	°C
11F	SDRCT1_C1	2500	min^{-1}
120	TSKTM1_C1	60	sec
121	SDRCT1_C2	2500	min^{-1}
122	TSKTM_C2	60	sec
123	STAROTP_W	4.8	°C
124	SDRCT1_W1	2500	min^{-1}
125	TSKTM1_W1	60	sec
126	SDRCT1_W2	2500	min^{-1}
127	TSKTM1_W2	60	sec
128	SDSTEP	500	min^{-1}
129	TSKSPT	30	sec
12A	KYO_RPM	3000	min^{-1}
198	TDF414	90	sec
199	DFMXTM	12	min^{-1}
19A	SDRCT2	2000	min^{-1}
19B	TSKTM2	60	sec
19C	DFSTEP	1000	min^{-1}
19D	TDFSPT	90	sec
19E	DEFMAX	6000	min^{-1}
19F	TDF415	90	sec
1A0	DFSTMB	50	min.
1A1	DFSTMB2	60	min.
01F	NDWN_ON	97.2	°C
020	NDWN_OFF	95	°C
021	OH_ON	118.2	°C
022	OH_OFF	104.7	°C

Basic Cooling Operation

Room temperature

CLMXTP

1.33℃

Temperature set for cooling
(value set by remote control: (+) SHIFTC)

1℃ 0.66℃

1.33℃ 0.66℃

Dash period

Fan speed set to "auto"

Fan speed set
to "auto"

Start / stop switch Start Fan speed set to "auto" Stop Start Stop

Thermo judgment Thermo OFF

Indoor fan	
	Ultra-Hi
	Hi
	Med
	Lo
	Silent
	Ultra-Lo

(Engaged in the set fan speed in cases other than "auto" fan speed)

Operation lamp

Compressor rotation speed

1min.

Max.
(CMAX1 or CMAX2)

Rating

Starting rotation
speed
[Outdoor temperature >STAROTP_C] TSKTM1_C1
[Outdoor temperature ≤STAROTP_C] TSKTM1_C2
Min.
(MINRPM)

0

1min.

Reversing valve
(heating "on" mode)

Outdoor fan Fan tap is controlled from outdoor unit. 15sec. 15sec. 15sec.

Notes:
(1) Cool dash is started when the operation is started at fan speed "AUTO" or "HI" or when the fan speed is changed to "AUTO" or "HI" during cooling operation, and when the compressor speed (P item) reaches (CMAX1 or CMAX2) or higher.
(2) The maximum compressor speed period during cool dash is finished ① when 25 minutes have elapsed after cool dash was started ② when the room temperature reaches the cooling set temperature -1℃ (including cooling shift) and then becomes lower than the preset temperature by 0.66℃ after the steady speed period, ③ when thermo is OFF.
   (If cool dash finished in the above ①, the compressor does not go through the steady speed period but it starts fuzzy control.)
(3) The thermo OFF temperature during cool dash is cooling set temperature (including cooling shift) -3℃. After thermo OFF, cool dash is finished and fuzzy control starts.
(4) The compressor minimum ON time and minimum OFF time is 3 minutes.
(5) The time limit for which the maximum compressor speed (CMAX1 or CMAX2) during normal cooling can be maintained is less than 60 minutes when the room temperature is less than CLMXTP: it is not provided when the room temperature is CLMXTP or more.
(6) Compressor speed is determined by instruction sent from indoor unit and corrected by outdoor unit according to such factors as capacity, fan speed, number of units being operated, outdoor temperature, etc.
(7) If another indoor unit is doing heating operation, cooling operation cannot be done.

Cooling Sleep Operation

Sleep key — Set to 7 hours — 7hr

Operation lamp
[SLEEP] on the remote controller is lit
Timer lamp
Indoor fan — Hi / Med / Lo / Silent / Sleep — See basic operation
Outdoor fan
Vertical air deflector — facing up / Horizontal / Shut
Compressor speed

Notes:
(1) The sleep operation starts when the sleep key is pressed.
(2) When the sleep key is set, the indoor fan is set to "sleep silent" (FCSOY_M or AFCSOY).
(3) The indoor fan speed does not change even when the fan speed mode is changed.
(4) If the set time is changed during sleep operation, all data including set temperature, time, etc. is cleared and restarted.
(5) If sleep operation is canceled by the cancel key or sleep key, all data is cleared.
(6) If the position of air deflector is being operated using remote control, the operation will be performed at any desired position of air deflector.

Note:
1. Refer to the PWRITE-ZU data for the constants expressed by capital alphabet letters in the drawing.

Cooling Defrost

Indoor heat exchange temperature
TEIOF
TEION
Cooling defrost signal
Indoor fan — Hi / Med / Lo / Silent, Sleep — See basic operation / See basic operation
Outdoor fan — 15sec.
Reversing valve (heating "on" mode)
Compressor speed — 3 minutes balance period — (Outdoor temperature > STARDTIP_C) TSKTM1_C1 / (Outdoor temperature ≤ STARDTIP_C) TSKTM1_C2 — 1min.

Dehumidifying

Notes:
(1) The indoor fan is operated in the "Lo" mode, OFF for 5 minutes and ON for 1 minute, repeatedly according to the humidity judgement when the thermostat is turned OFF.
(2) The commpressor is operated forcedly for 3 minutes after operation is started.
(3) The minimum ON time and OFF time of the compressor are 3 minutes.
(4) At the start of operation, the thermostat will be off when room temperature ≦ setting temperature −1.33°C; the thermostat will be on when room temperature ≧ setting temperature −0.66°C.
(5) The following procedure is performed to prevent excessive cooling during operation other than start. However, this procedure applies only when the thermostat is intermittent:
· Whether THERMO ON is to continue or not depends on the thermal condition when the 3-minute forced operation ceases.
① "THERMO ON continues" when room temperature ≧ setting temperature +1°C: (The THERMO operation value is usually the same as that at "start of operation")
② "Forced THERMO OFF" when room temperature < setting temperature +1°C: (The same THERMO operation value as that at "start of operation" is usually used for recovery)
Therefore, if the air-conditioner is stabilized under this thermal condition, it will enter intermittent operation, which is "3-minute operation/3-minute stop".
(6) Compressor speed is determined by instruction sent from indoor unit and corrected by outdoor unit according to such factors as capacity, fan speed, number of units being operated, outdoor temperature, etc.

Dehumidifying Sleep Operation
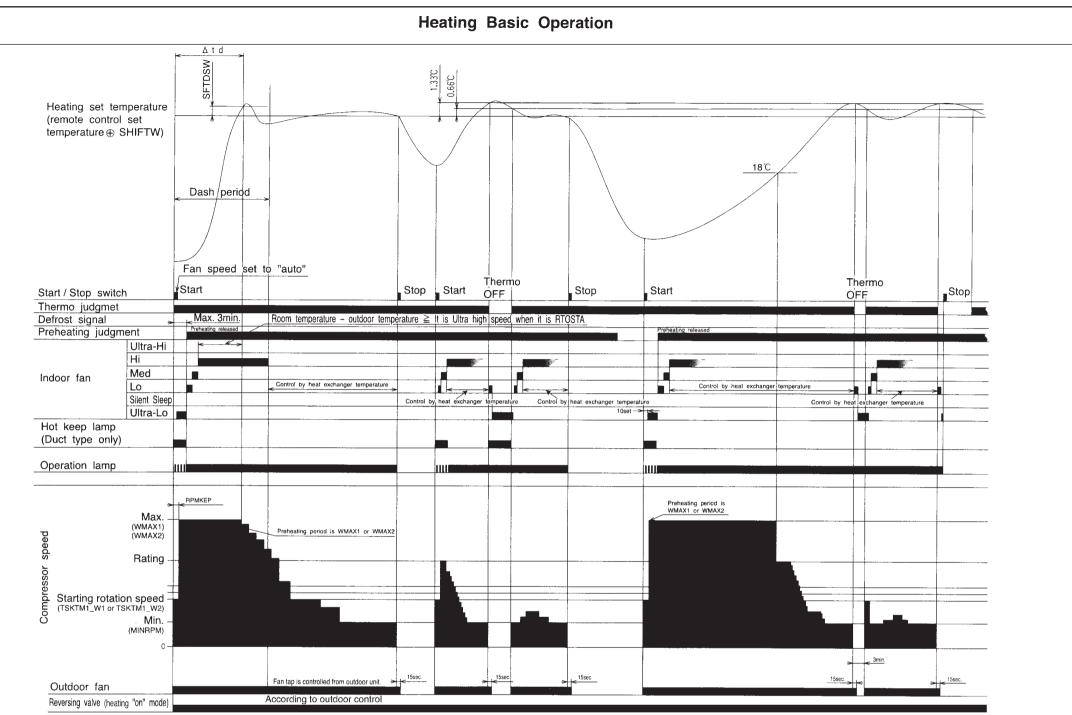
Notes:
(1) The sleep operation starts when the sleep key is pressed.
(2) When the sleep key is set, the indoor fan is set to "sleep silent" (FDOY_M or AFDOY).
(3) The indoor fan speed does not change even when the fan speed mode is changed.
(4) If the set time is changed during sleep operation, all data including set temperature, time, etc. is cleared and restarted.
(5) If sleep operation is canceled by the cancel key or sleep key, all data is cleared.
(6) If the position of air deflector is being operated using remote control, the operation will be performed at any desired position of air deflector.

Heating Basic Operation
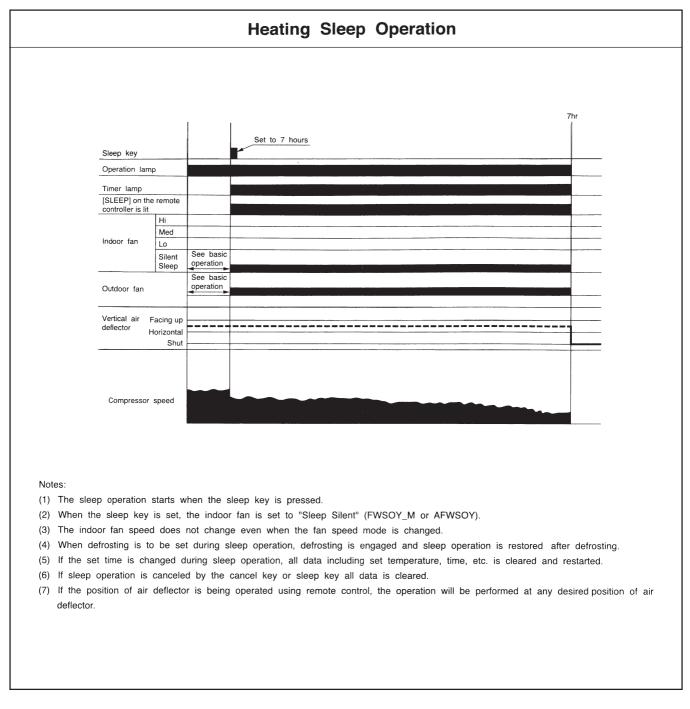
Notes:
(1) Hot Dash is started when the operation is started at fan speed "AUTO" or "HI" or when the fan speed is changed to "AUTO" or "HI" during heating operation, and when the compressor speed (P item) reaches (WMAX1 or WMAX2) or higher with the room temperature at 8℃ or less and outdoor temperature at 10℃ or less.
(2) The maximum compressor speed period during hot dash is finished (1) when the room temperature reaches the heating set temperature (including heating shift) plus SFTDSW or (2) when the thermo is off.
(3) The thermo OFF temperature during hot dash is heating set temperature (including heating shift) plus 3℃. After thermo OFF, hot dash finishes, and PI control starts.
(4) The compressor minimum ON time and minimum OFF time is 3 minutes.
(5) The time limit for which the maximum compressor speed (WMAX1 or WMAX2) during normal heating (except for hot dash) can be maintained is less than 120 minutes when the room temperature is 18℃ or more; it is not provided when the room temperature is less than 18℃ and outdoor temperature is less than 4℃.
(6) The operation indicator will blink every second during initial cycle operation, preheating, defrosting (including balance time after defrost is finished), or auto fresh defrosting. However, with duct type models, operation indicator does not blink, but Hot Keep indicator will light. And Hot Keep indicator will also light in "Thermo OFF" mode.
(7) For preheating judgment, preheating starts if the heat exchange temperature is lower than YNEOFC and is cancelled if the heat exchange temperature is YNEOF plus 0.33℃ or higher at the start of operation using the START / STOP button.
(8) If the room temperature falls to less than 18℃ in the "Ultra-Lo" mode, the indoor fan stops. When the room temperature is 18℃+0.33℃ or more, the ultra-Lo operation restarts. However, the ultra-Lo operation during preheating or preheating after defrosting does not stop if the room temperature is less than 18℃.
(9) Compressor speed is determined by instruction sent from indoor unit and corrected by outdoor unit according to such factors as capacity, fan speed, number of units being operated, outdoor temperature, etc.
(10) If another indoor unit is doing cooling operation, dehumidifying operation or fan operation, heating operation cannot be done.

Heating Sleep Operation

Notes:

(1) The sleep operation starts when the sleep key is pressed.

(2) When the sleep key is set, the indoor fan is set to "Sleep Silent" (FWSOY_M or AFWSOY).

(3) The indoor fan speed does not change even when the fan speed mode is changed.

(4) When defrosting is to be set during sleep operation, defrosting is engaged and sleep operation is restored after defrosting.

(5) If the set time is changed during sleep operation, all data including set temperature, time, etc. is cleared and restarted.

(6) If sleep operation is canceled by the cancel key or sleep key all data is cleared.

(7) If the position of air deflector is being operated using remote control, the operation will be performed at any desired position of air deflector.

NOTE:

1. Refer to the PWRITE-ZU data for the constats expressed by capital alphabet letters in the drawing.

MODEL RAM-71QH5

◇ Expansion valves
 • The expansion valves are initialized when power is supplied. The valve for unit 1 is fully closed (−520 pulses), and then that for unit 2 is fully opened (480 pulses). The valve for unit 2 is fully closed (−520 pulses), and then that for unit 3 is fully opened (480 pulses). The valve for unit 3 is fully closed (-520 pulses), and then that for unit 4 is fully opened (480 pulses). When the valve for unit 1, 2, 3, 4 is fully closed (0 pulse), start-up is possible.
 • The start openings are held during the steady speed period when the compressor is started. After the steady speed period is finished, the TD control is entered. The start openings are set to PSTARTH when the outdoor temperature at start 40°C or more, and to PSTART when it is less than 40°C.
 PSTART C3 is used for 3 rooms and 4 rooms operation.
◇ Compressor rotation speed
 • When the compressor is started, the SDRCT1 speed / TSTKTM1 second is held. (Steady speed period) After the steady speed period is finished, the speed increases at the rate of SDSTEP speed / TSKSPT second until the target speed is reached.

※ TSKTM1, SDRCT1, SDSTEP, TSKSPT, CMAX2, PSTART and PSTARTH are EEPROM data.

DEFROST
・Reversing valve defrost system is employed: it consists of balancing period→ reversing cycle period→ balancing period.
(1) Defrost start condition
　　・ When all the following conditions are established defrost is executed:
　　① Normal operation
　　② Heat exchange temperature is within defrost range specified by outdoor temperature and heat exchange temperature.
　　　(Defrost signal occured).
　　③ Defrost inhibit period linked to outdoor temperature has passed.
(2) Defrost release condition
　　・ If any one of the following conditions is established, defrost is released:
　　① Heat exchange temperature returns (heat exchange temperarure ≥ DEFOFF).
　　② Defrost max time of 12 minutes has elapsed.
　　・ Released by condition ① during balancing period: When remaining balancing period has elapsed, returned to initial
　　　condition (ASTUS=0).
　　・ Released by condition ① or ② during reversing cycle period: [TDF415] Shifted to balancing period.
(3) Outputs during defrost
　　・ Indoor defrost request: Transmitted to all units being operated in heating mode.
　　・ Compressor : Balancing period for [TDF414] seconds→ Starting of reversing cycle period by [SDRCT2] min⁻¹ for
　　　　　　　　　[TSKTM2] seconds → Accelerating by [DFSTEP]min⁻¹/[TDFSPT] seconds in remaining reversing cycle
　　　　　　　　　period until defrost MAX speed [DEFMAX] is reached→ Balancing period for [TDF415] seconds
　　・ Electric expansion valve
　　　　Unit being stopped : [FULL CLOSE] 30 seconds after balancing period has passed →[FULL CLOSE] during
　　　　　　　　　　　　　reversing cycle period→ [PCLOSH$] 15 seconds before balancing period is finished
　　　　Unit being operated : [DFCTPS] 30 seconds before balancing period is finished→ Synchronized with step-up
　　　　　　　　　　　　　of rotation speed of compressor, opened by [DFSPPS] pulses and reaches MAX opening
　　　　　　　　　　　　　degree [DEFSMX] when rotation speed of compressor reaches [DEFMAX].

RAM-71QH5 DEFROST TEMPERATURE

* above graph is showing the ideal value by micon program.
* guaranteed temperature range of this model is −15˚C to +27˚C at heating.

MODEL RAM-71QH5

• Time chart when executing defrost (Unit 1 and Unit 2 operated, Unit 3 and Unit 4 stopped)

Compressor requirement	Unit 1	Heating
	Unit 2	Heating
	Unit 3	
	Unit 4	

Defrosting signal

Request to Indoor	Unit 1	Defrost request
	Unit 2	Defrost request
	Unit 3	
	Unit 4	

| Reversing valve | Turn on for heating | 30 sec [T_4BEN_DEF] |

Outdoor fan — 15 sec

Compressor rotation speed

Defrosting inhibit period | Balancing period [TDF414] | Reverse cycle period (max [DFMXTM]) | Balancing period [TDF415]

Defrosting sequence

[TSKTM2] [DEFMAX] Start sequence [TSKTM1_W∗]

[SDRCT2] [DFSTEP]min^{-1}/[TDFSPT] sec [SDRCT1_W∗]

Expansion valve

Unit 1 (480 / 0)
Hold — [DFCTPS$] — [DFSPPS$] Pulse/[TDFSPT] sec — [DFPSMX$] — [T_DFCTPS] — [DFCTPS$] — [PSTARTH2∗]

Unit 2 (480 / 0)
Hold — [DFCTPS$] — [DFSPPS$] Pulse/[TDFSPT] sec — [DFPSMX$] — [DFCTPS$] — [PSTARTH2∗]

Unit 3 (480 / 0)
30 sec — Hold — 0 Pulse — [PCLOSH$]

Unit 4 (480 / 0)
Hold — 0 Pulse — [PCLOSH$]

AUTO-FRESH DEFROST

• During heating operation is stopped, and when auto-fresh condition is established, defrost operation will be performed while operation is stopped.

Auto-fresh consists of balancing period at start of defrost for [TDF414] seconds → Reverse cycle period for MAX 12 minutes.

(1) Start conditions for auto-fresh
  • When all the following conditions are established, auto-fresh is executed:
    ① Defrost request signal is present.
    ② All indoor units are stopped.
    ③ 15 minutes of auto-fresh inhibit period has elapsed.
    ④ Compressor is ON when operation is stopped.
    ⑤ Compressor delay command is sent from indoor unit when operation is stopped.

(2) Release condition of auto-fresh
  • If any one of following conditions is established, auto-fresh is released:
    ① Heat exchange temperature returns (heat exchange temperature ≥ DEFOFF)
    ② 12 minutes of defrost MAX time has elapsed.
    ③ Failure occurred.
    ④ Either unit 1 or unit 2 or unit 3 or unit 4 started operation.
    ※ Released during start of balancing period : Stopped or started after remaining balancing period has elapsed.
       Released during reverse cycle period : Stopped or started after balancing for 3 minutes.

(3) Outputs during auto-fresh
  [Indoor unit defrost request]: Transmitted only to unit to which auto-fresh is applied (indoor unit stopped last).
  [Compressor]: Accelerated by DFSTEP min^{-1}/TDFSPT seconds and reaches defrost MAX speed [DEFMAX].
  [Electric expansion valve]:
    Unit auto-fresh not applied: FULL CLOSE when balancing for 30 seconds has elapsed at start of defrost.
    Unit auto-fresh applied : Synchronized with step-up of rotation speed of compressor, opened by [DFSPPS] pulses and
                              reaches MAX opening degree [DEFSMX] when rotation speed of compressor reaches [DEFMAX].

(4) Note
  • Shifted to auto-fresh in defrost mode when operation is stopped.
  • All indoor units must be stopped to fulfill condition for auto-fresh.
    If signal is delayed, auto-fresh condition will not be established.   MODEL RAM-71QH5

MODEL RAM-71QH5

FORCED COOLING

・In order to accumulate refrigerant, units operate in cooling cycle.
 Execution condition and operation status are shown below.

[Execution condition]

・With neither indoor unit 1, 2, 3 and 4 not operated, when forced cooling switch is turned ON, forced cooling will be performed.
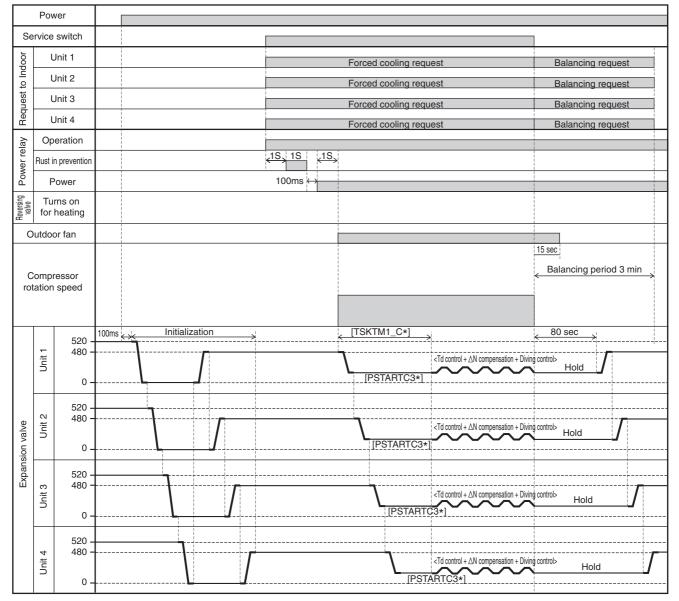
・Always operation status of indoor units are monitored and forced cooling is inhibited when operation of any unit is detected.

[Operation status]

・Outdoor unit fan: Fixed in LO.

・Compressor rotation speed: Fixed in $3000min^{-1}$.

・Expansion valve/reversing valve : Set in normal conditions.

[Note]

・During forced cooling, if failure occurs in outdoor unit, thermostat is turned off.   However, it is not counted.

・Since rotation speed of compressor is fixed in $3000min^{-1}$ during forced cooling, steady speed period of compressor at start is not performed.
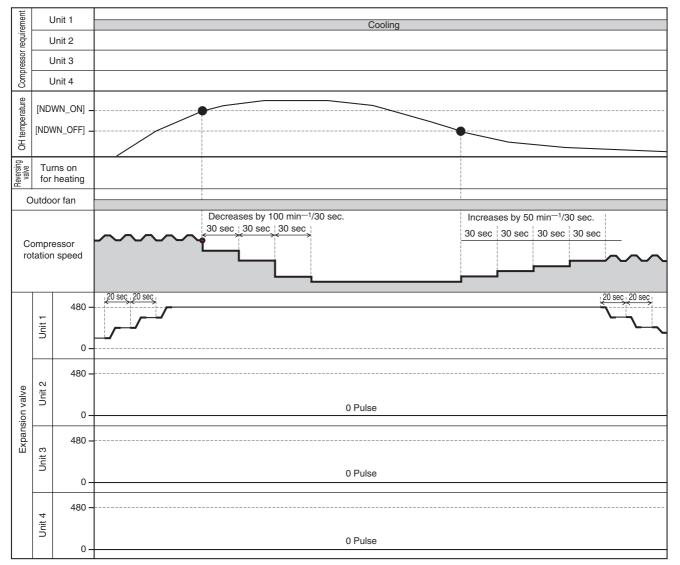
・The following shows the operation state of forced cooling.
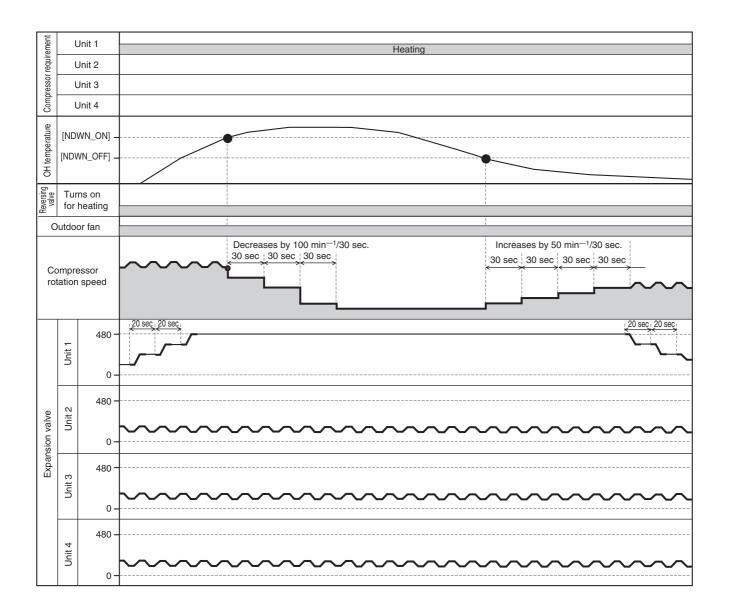
※ TSKTM1_C and PSTARTC2$ are EEPROM data.

MODEL RAM-71QH5
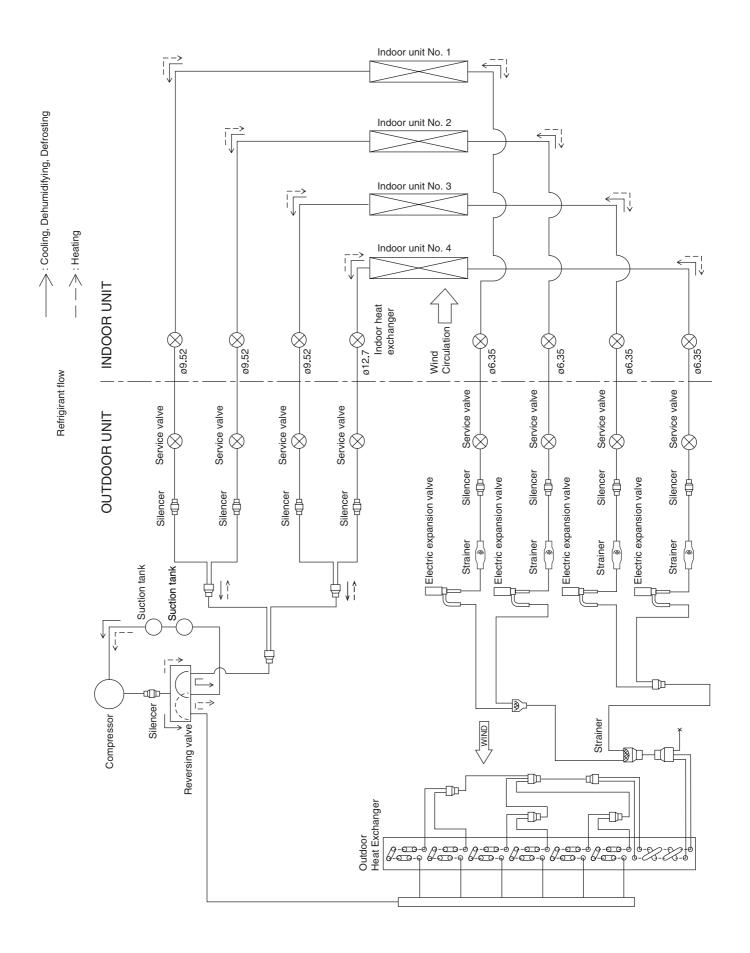
PROCESSING AT OVERHEAT THERMISTOR (OH) HIGH TEMPERATURE

◇ Restriction Start Conditions
  ・ If any expansion valve is operated at 480 pulses and the OH temperature > [NDOWN_ON], the compressor speed will be reduced at a rate of 100 min^{-1}/30 seconds.
  ・ This reduced rotation speed is based on the speed when the reduction started, and will be maintained until the reduction is finished. However, the reference speed will be exchanged only if the target speed is lower than the speed when the reduction started.
  ・ If [NDOWN_OFF] ≤ OH temperature ≤ [NDOWN_ON] and the OH temperature does not rise from that 20 seconds before, the reduction of compressor speed will not occur.
◇ Restriction Release Condition (in common for all)
  ・ The restriction will be released when OH temperature < [NDOWN_OFF], and the compressor speed will be increased at a rate of 50 min^{-1}/30 seconds to restore the target speed.

When one unit is operated for cooling

REFRIGERATING CYCLE DIAGRAM

MODEL RAM-71QH5

DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAM-71QH5

1. Power Circuit
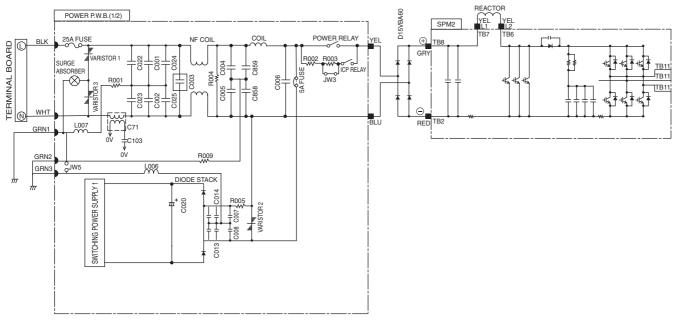
Fig. 1-1

● This circuit full-wave rectifies 220-240 AC applied between terminals L and N, and boosts it to a required voltage with the active module, to create a DC voltage.

The voltage becomes 320-360V when the compressor is operated.

(1) System power module (SPM)
(Current ACT module, smoothing capacitors and power module are combined into one unit)

① Active module

The active filter, consisting of a reactor and switching element, eliminates higher harmonic components contained in the current generated when the compressor is operated, and improves the power-factor. Smoothing capacitor smoothes voltage, which has been rectified by diode stack and boosted at ACT section.

② Power module section
Refer to Item 3 System Power Module Circuit.

(2) Diode stacks

These rectify the 220-240V AC from terminals L and N to a DC power supply.

< Reference >

● In case of malfunction or defective connection:
Immediately after the compressor starts, it may stop due to "abnormally low speed" active error, etc.

The compressor may continue to operate normally, but the power-factor will decrease, the operation current will increase, and the overcurrent breaker of the household power board will probably activate.

● In case of active module faulty or defective connection:

Although the compressor continues to operate normally, the power-factor will decrease, the operation current will increase, and the overcurrent breaker of the household power board will probably activate.
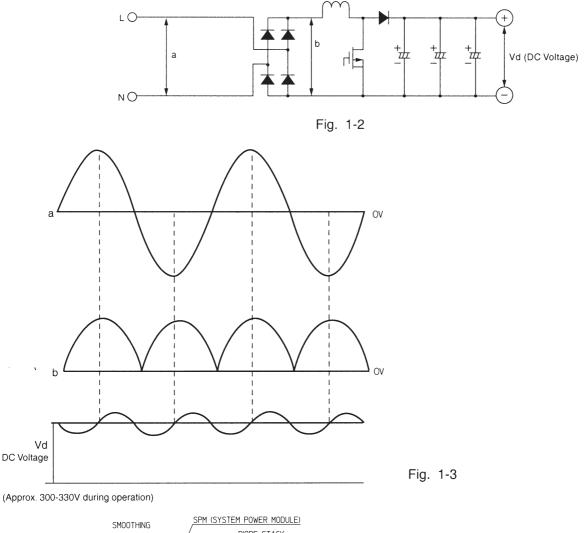
< Reference >

● If D15VBA60 is faulty, the compressor may stop due to "lp", "anbormally low speed", etc. immediately after it starts, or it may not operate at all because no DC voltage is generated between the positive e and negative d terminals.
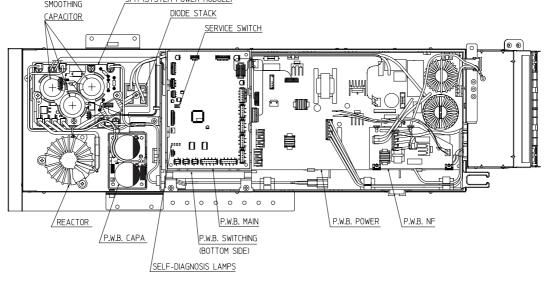
If diode bridge 1 is faulty, be aware that the 25A fuse might also have blown.

● If diode stack is faulty, DC voltage may be not generated and the compressor may not operate at all. Also, be aware that the 5A fuse might have blown.

(3) Smoothing capacitor (C501, C502, C503, 400μF, 450V)

This smoothes (averages) the voltage rectified by the diode stacks.

Fig. 1-2

Fig. 1-3

(Approx. 300-330V during operation)

Fig. 1-4

● Be careful to avoid an electric shock as a high voltage is generated. Also take care not to cause a short-circuit through incorrect connection of test equipment terminals. The circuit board could be damaged.

(4) Smoothing capacitor (C020, 270μF, DC 450V)

This smoothes (averages) the voltage rectified by the diode stacks.

A DC voltage is generated in the same way as in Fig. 1-3. Voltage between C020 ⊕ side and ⊖ side is about 330V.

(5) C001 to C008, C013, C014, C022 to C5, C888, C89, NF COIL1
These absorb electrical noise generated during operation of compressor, and also absorb external noise entering from power line to protect electronic parts.

(6) Surge absorber, Varistor 1, 2, 3,
These absorbs external power surge.

(7) Inrush protective resistor (R002)
This works to protect from overcurrent when power is turned on.

※ Be sure to ground outdoor unit.
If not grounded, noise filter circuit does not operate correctly.

※ If outdoor unit is not grounded, "surge absorber", "varistors 1 and 3" do not operate.
Be sure to perform grounding.

< Reference >

● When inrush protective resistor is defective, D15VBA60 may malfunction. As a result, DC voltage is not generated and no operation can be done. In this case, 5A fuse may have been blown. Take care.
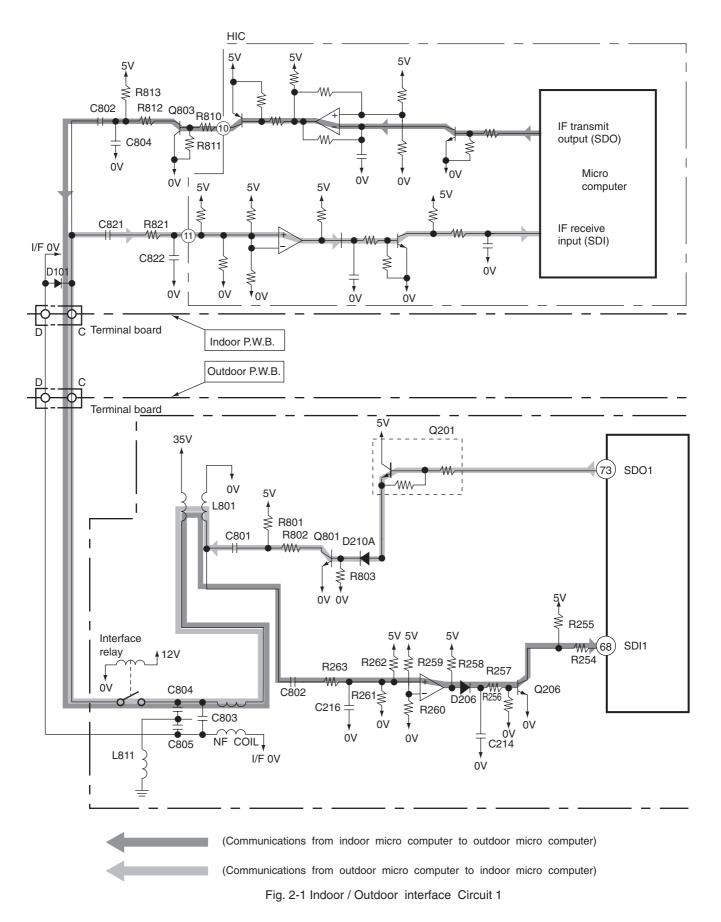
2. Indoor/Outdoor Interface Circuit

● The interface circuit superimposes an interface signal on the 35V DC line supplied from the outdoor unit to perform communications between indoor and outdoor units. This circuit consists of a transmiting circuit which superimposes an interface signal transmit from the microcomputer on the 35V DC line and a transmiting circuit which detects the interface signal on the 35V DC line and outputs it to the microcomputer.

● Communications are performed by mutually transmiting and receiving the 4-frame outdoor request signal one frame of which consists of a leader of approx. 100 ms., start bit, 8-bit data and stop bit and the command signal with the same format transmit from the indoor unit.

● From outdoor microcomputer to indoor microcomputer.
The request signal output from microcomputer pin ⑦③, ⑦④, ⑨, ⑩ is input to the transmitting circuit. The transmitting circuit modulates this signal by approx. 38kHz high-frequency. This high-frequency signal is amplified by a transistor, superimposed on the DC 35V line via C801 (or C811, C821, C831) and L801 (or L802, L803, L804) and supplied to the indoor unit.
To prevent erroneous reception, the outdoor microcomputer is designed so that it cannot receive a signal while it is outputting a request signal.
The receiving circuit in the indoor unit consists of a comparator and transistor. The interface signal from the outdoor unit on the DC 35V line is supplied to C821, where DC components are eliminated, and is then shaped by the comparator. The shaped signal is detected by diode, amplified by amp, and supplied to receiving input of the indoor microcomputer.
Fig. 2-2 shows the voltages at each component when data is transferred from the outdoor microcomputer to the indoor microcomputer.

● Indoor microcomputer to outdoor microcomputer.
The communications from the indoor microcomputer to the outdoor micro computer are the same. Fig. 2-3 shows the voltages and waveforms at each circuit.

- Fig. 2-1 shows the interface circuit used for the indoor and outdoor microcomputers to communicate with each other.

HIC

IF transmit output (SDO)

Micro computer

IF receive input (SDI)

Indoor P.W.B.

Outdoor P.W.B.

Terminal board

73 SDO1

68 SDI1

Interface relay

(Communications from indoor micro computer to outdoor micro computer)

(Communications from outdoor micro computer to indoor micro computer)

Fig. 2-1 Indoor / Outdoor interface Circuit 1

- Fig. 2-1 shows the interface circuit used for the indoor and outdoor microcomputers to communicate with each other.

HIC

IF transmit output (SDO)

Micro computer

IF receive input (SDI)

C802 R812 Q803 R810 R813
C804 ⑩
R811
C821 R821 ⑪
C822

I/F 0V
D101

D C Terminal board

Indoor P.W.B.

Outdoor P.W.B.

D2 C2 Terminal board

35V
0V
L802
C811 R811 R812 Q802 D210B
R813
0V 0V

5V Q202
⑦④ SDO2

Interface relay
12V
0V
C814
C813
L812 C815 NF COIL
I/F 0V

R273 R272 R269 R268 R267
C812 R271 R270 D207 R266 Q207
C219 C218
0V 0V 0V 0V 0V

5V R265
⑥⑨ SDI2
R264

(Communications from indoor micro computer to outdoor micro computer)

(Communications from outdoor micro computer to indoor micro computer)

Fig. 2-1 Indoor / Outdoor interface Circuit 2

- Fig. 2-1 shows the interface circuit used for the indoor and outdoor microcomputers to communicate with each other.

(Communications from indoor micro computer to outdoor micro computer)

(Communications from outdoor micro computer to indoor micro computer)

Fig. 2-1 Indoor / Outdoor interface Circuit 3

● Fig. 2-1 shows the interface circuit used for the indoor and outdoor microcomputers to communicate with each other.

(Communications from indoor micro computer to outdoor micro computer)

(Communications from outdoor micro computer to indoor micro computer)

Fig. 2-1 Indoor / Outdoor interface Circuit 4

3. System power Module Circuit

● Fig. 3-1 shows the system power module and its peripheral circuits. (Current ACT module and power module are combined into one unit.) The three transistors on the positive ⊕ side are called the upper arm, and the three transistors on the negative ⊝ side, the lower arm.

Fig. 3-1 System power module circuit (U⁺ is ON, V⁻ is ON)

Base of outdoor P.W.B Q801, Q802 , Q803 , Q804
⑨ Pin   0.7V
                                                          0V
Outdoor micro computer �73 Pin   5V
                    ㊇74 Pin   0V
                    ⑨ Pin
                    ⑩ Pin
Indoor micro computer SDO Pin   5V
                                                          0V
SDI Pin   5V
                                                          0V

35V DC line   35V

100ms.   33ms.
Leader   1 frame

Fig. 2-2 Voltages Waveforms of indoor / Outdoor Micro computers (Outdoor to Indoor Communications)

Base of outdoor P.W.B Q801, Q802, Q803, Q804   0V
                    ㊇73 Pin
Outdoor micro computer ㊇74 Pin   5V
                    ⑨ Pin   0V
                    ⑩ Pin
Indoor micro computer SDO Pin   5V
                                                          0V
SDI Pin   5V
                                                          0V

35V DC line   35V

5-7.5ms.   33ms.
Transmit/receive 1 frame
switching time

Fig. 2-3 Voltages Waveforms of indoor / Outdoor Micro computers (Indoor to Outdoor Communications)

- DC 320-360V is input to power module and power module switches power supply current according to rotation position of magnet rotor. The switching order is as shown in Fig. 3-2.

$$\left[\begin{array}{l} \text{※At point E: } U^+ \text{ is ON, } V^- \text{ is ON (circuit in Fig. 3-1)} \\ \text{※At point F: } U^+ \text{ is chopped (OFF), } V^- \text{ is ON (circuit in Fig. 3-4)} \end{array}\right]$$

Fig. 3-2 Switching order of power module

- Upper arm transistor is controlled to ON/OFF by 3.2kHz chopper signal. Rotation speed of the compress is proportional to duty ratio (ON time/ ON time + OFF time) of this chopper signal.

- Time T in Fig. 3-2 shows the switching period, and relation with rotation speed (N) of the compressor is shown by formula below;

$$N = 60/2 \times 1/T$$

- Fig. 3-3 shows voltage / current waveform at each point shown in Figs. 3-1 and 3-4. First half of upper arm is chopper, second half is ON, and first half of lower arm is chopper, second half is ON.
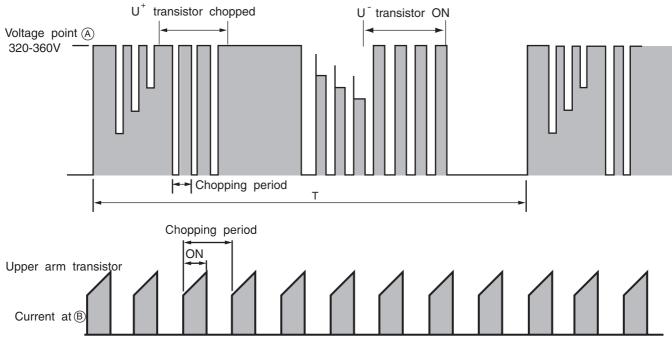
Fig. 3-3 Voltage waveform at each point

- When power is supplied $U^+ \rightarrow U^-$, because of that U^+ is chopped, current flows as shown below; Ⓑ

  (1) When U^+ transistor is ON: U^+ transistor → U coil → V coil → V^- transistor → DC current detection resistor → Point Ⓑ (Fig. 3-1)

  (2) When U^+ transistor is OFF: (by inductance of motor coil) U coil → V coil → V^- transistor → Return diode → Point Ⓐ (Fig. 3-4)

4. Power Supply Circuit

● Fig. 4-1 shows the power circuit.
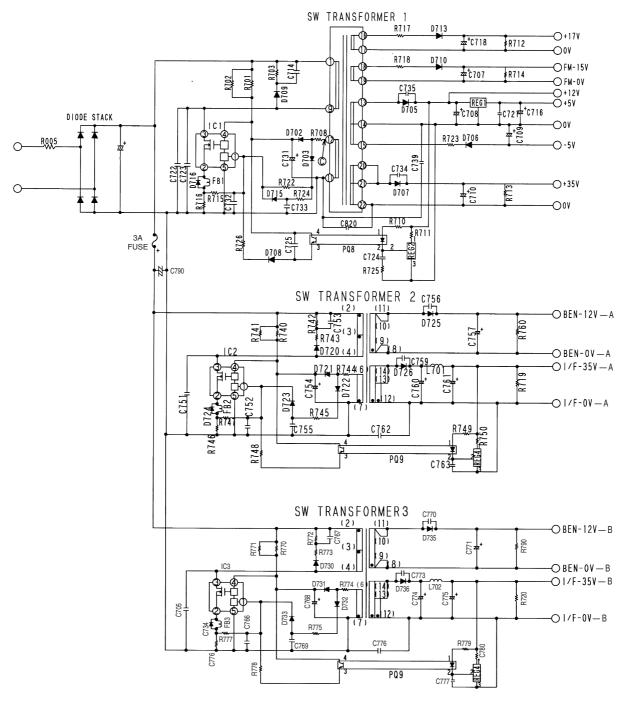
Fig. 4-1 Power circuit for P.W.B.

● There are two switching power supply in Power PWB.

● Switching power supply 1 is generating the secondary power for control circuits.

● Switching power supply 2 is generating the DC12V for expansion valve and DC35V for indoor unit 1 and 2.

● Switching power supply 3 is generating the DC12V for expansion valve and DC35V for indoor unit 3 and 4.

● Switching power supply performs voltage conversion effectively by switching transistor IC1 to convert DC330V to high frequency of approximately 20kHz to 200kHz.

● Transistor IC1 operates as follows:

(1) Shifting from OFF to ON

● DC about 330V is applied from smoothing capacitors C020 ⊕ and ⊖ in the control power circuit. With this power, current flows to pin ④ of IC1 via R701 and IC1 starts to turn ON. Since voltage in the direction of arrow generates at point ⓒ at the same time, current passing through R708 and D702 is positive-fed back to IC1.

(2) During ON

● The drain current at IC1 increases linearly. During this period, the gate voltage and current become constant because of the saturation characteristics of the transformer.

(3) Shifting from ON to OFF

● This circuit applies a negative feedback signal from the 12V output. When the voltage across C708 reaches the specified value, REG2 turns on and current flows to PQ8 ①-②. This turns the secondary circuits on, sets IC1 pin ① to "Hi", and turns IC1 off.

(4) During OFF

● While IC1 is on, the following energy charges the primary windings of the transformer:

$$Energy = LI^2/2.$$

Here, L : Primary inductance

I : Current when IC1 is off

This energy discharges to the secondary windings during power off. That is, C707-C710, C718 is charged according to the turn ratio of each winding.

● At the start, an overcurrent flows to IC1 because of the charged current at C707-C710, C718.

● The drain current at IC1 generates a voltage across R716. If it exceeds the IC1 base voltage, it sets the IC gate voltage to "HI".

● R716 limits the gate voltage to prevent excessive collector current from flowing to IC1.

● This SW power circuit uses a frequency as low as 20kHz, especially at a low load (when both the indoor and outdoor units stop): This reduces power loss in standby status.

<Reference>

● If the power circuit for P.W.B. seems to be faulty:

(1) Make sure that 5V, 12V, 15V, 17V and -5V on the control P.W.B. power voltage are the specified values.

(2) When only the 5V output is low:
REG 1 (regulator) faulty, 5V-0V shorted, output is too high, or REG 1 is abnormal.

(3) When 12V and 5V are abnormal:
The following defects can be considered:
① Fan, operation, power, rush prevention relay (shorting in relay, etc.)
② REG 1 (regulator is abnormal), etc.
Shorting on primary circuits.
When shorting occurs in the secondary circuits, there is no abnormality in the primary circuits because of overcurrent protection.
The voltage rises when an opening occurs in the primary circuits, or the feedback system is abnormal.

(4) When 15V and 17V power supply is abnormal:
D710, D713 or Drive circuit is abnormal.

(5) When all voltage are abnormal:
IC1, R716, may possibly be defective. Also D cable may possibly be reverse connected.
If IC1 is abnormal, be aware that other components, such as the power module, REG (regulator), etc. are possibly defective.

[When the switching power supply seems to be abnormal, the voltage between IC1 pin ④ (to be measured at the leads of R9701and R702) and IC1 pin ⑤ (to be measured at R216 lead) may be between 11 and 16V. This is because the protection circuit of IC1 is operating.]
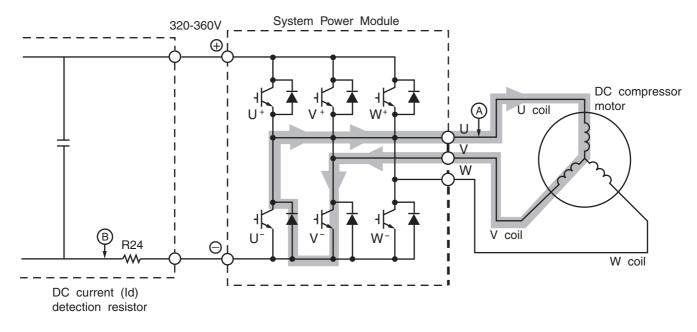
Fig. 3-4 System Power module circuit (U^+ is OFF, V^- is ON)

● Since current flows at point ⑧ only when U+ transistor and V^- transistor is ON, the current waveform at point ⑧ becomes intermittent waveform as shown in Fig. 3-3. Since current at point ⑧ is approximately proportional to the input current of the air conditioner, input current is controlled by using DC current (Id) detection resistor.

<Reference>
If power module is detective, self diagnosis lamps on the control P.W.B. may indicate as shown below:

Table 3-1

Self-diagnosis	Self-diagnosis lamp and mode	
Ip (peak current cut)	LD301	Blinks 2 times
Abnormal low speed rotation	LD301	Blinks 3 times
Switching incomplete	LD301	Blinks 4 times
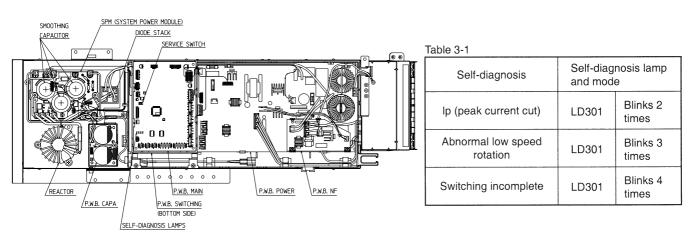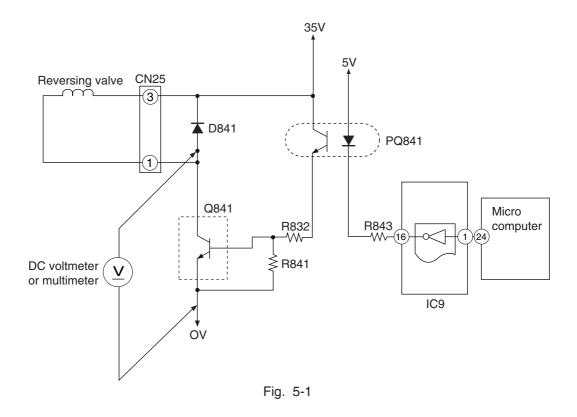
Fig. 3-5

※ From results of power module simple inspection (inspection mode when operated with compressor lead disconnected), LD310 blinks four times about 2 seconds later: Unit has not entered the normal operation.

5. Reversing valve control circuit

Fig. 5-1

Since the reversing valve is differential pressure system, even when reversing valve is ON (collector of Q841 is about 0.8V normally), compressor rotation speed instructed by indoor microcomputer exceeds 3300min⁻¹, signal at pin of ㉔ microcomputer changes, and collector voltage of Q841 will be about 35V.

This does not indicate trouble. When rotation speed is reduced under 2700min⁻¹, collector voltage of Q841 will fall to about 0.8V again. To measure voltage, connect ⊕ terminal of tester to D841 anode and ⊖ terminal to D line on the terminal board.

- By reversing valve control circuit you can switch reversing valve ON/OFF (cooling ON) according to instruction from indoor microcomputer and depending on operation condition.

    Voltage at each point in each operation condition is approximately as shown below when measured by tester. (When collector voltage of Q831 is measured)

Table 5-1

Operation condition		Collector voltage of Q841
Cooling	General operation of cooling	About 0.8V
Heating	In normal heating operation	About 35V
	MAX. rotation speed instructed by indoor microcomputer after defrost is completed	About 35V
	Defrosting	About 0.8V
Dehumidifying	Sensor dry	About 0.8V

6. Rotor magnetic pole position detection circuit
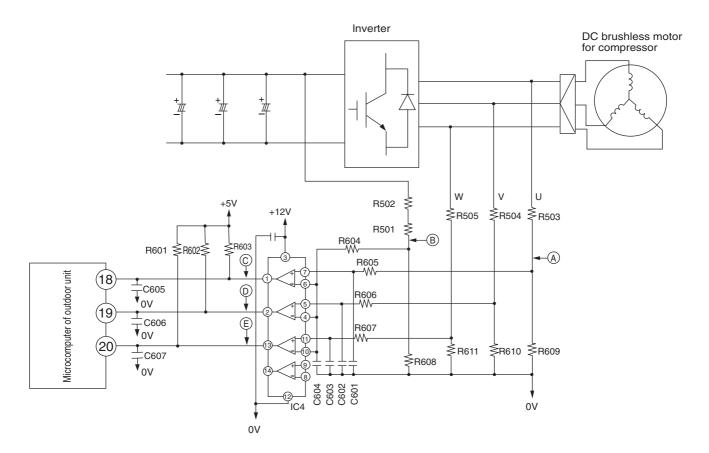
Fig. 6-1 Rotor magnetic pole position detection circuit

When the DC brushless motor is rotated, it also operates as power generator, generating reverse electromotive force according to number of rotations. This reverse electromotive force is voltage-divided by R503 - R505 and R609 - R611, and appears as point Ⓐ voltage. IC3 compares and digitalizes point Ⓐ voltage with point Ⓑ voltage (in which DC voltage (Vd) is voltage-divided by R501, R502 and R608), and inputs this to microcomputer as position detection signals for points Ⓒ, Ⓓ and Ⓔ . Microcomputer switches inverter using optimum timing based on position detection signals, in order to control the rotation of the brushless motor.

7. Peripheral circuit of microcomputer

● Fig. 7-1 shows the microcomputer and its peripheral circuits.

Table 7-1, the basic operations of each circuit block, and Fig. 7-2, the system configuration.
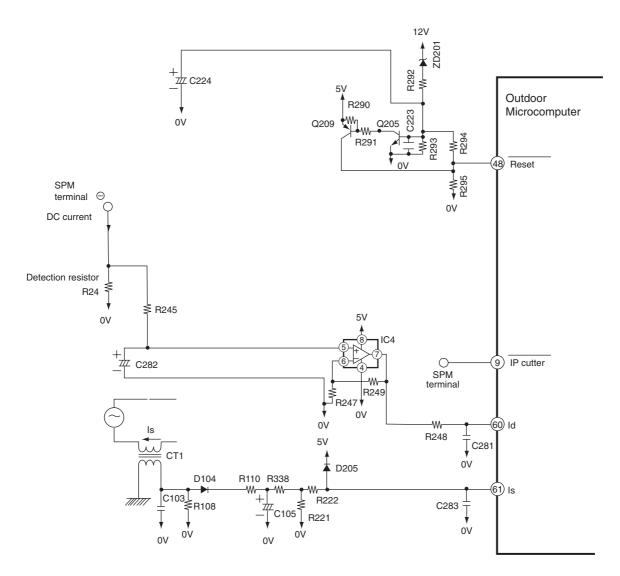
Fig. 7-1 Peripheral circuit of microcomputer

Table 7-1

Circuit block	Basic operation
Peak current cut off circuit	This circuit detects DC current flowing power module: When over-current (instantaneous value) flows, it stops upper and lower arm drive circuit and also produces Ip signal to stop microcomputer.
Overload external judgment circuit	This circuit detects DC current flowing to power module and produces signal to notify microcomputer of overload status.
Voltage amplifier circuit	This circuit voltage-amplifies DC current level detected by detection resistor and sends it to microcomputer. In addition, setting of internal/external overload judgment is performed.
Reset circuit	This circuit produces reset voltage.

8. Overload control circuit (OVL control circuit)

- Overload control is to decrease the speed of the compressor and reduce the load when the load on the air conditioner increases to an overload state, in order to protect the compressor, electronic components and power breaker.

- Overloads are judged by comparing the DC current level and set value.

- Fig. 8-1 shows the overload control system configuration and Fig. 8-2 is a characteristic diagram of overload judgement values. There are two judgement methods-external judgement which mompares the externally set value with the DC current value regardless of the rotation speed and internal judgement which compares the set value that according to the rotation speed programmed in the micro computer software with the DC current value.
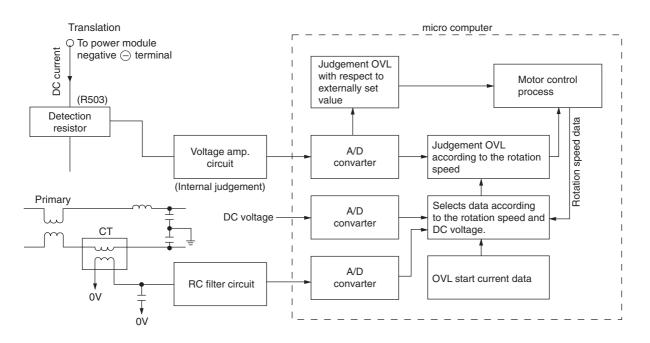
Fig. 8-1 Overload Control System Configuration
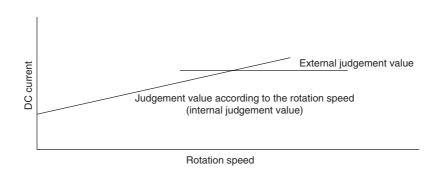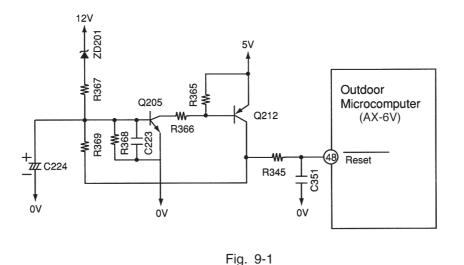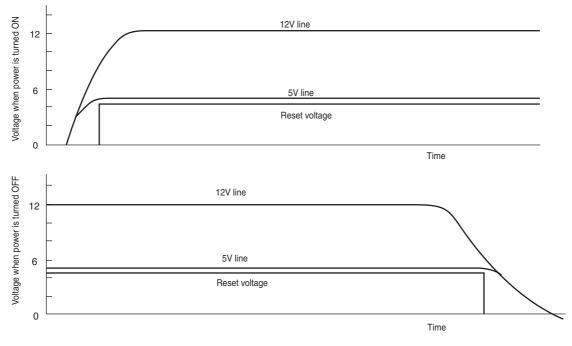
Fig. 8-2

9. Reset circuit

Fig. 9-1

- Reset circuit performs initial setting of microcomputer program when power is turned on.
- Microcomputer resets program with reset voltage set to Lo, to enable operation at Hi level.
- Fig. 9-1 shows reset circuit, and Fig. 9-2 shows waveforms at each point when power is turned on and off.
- After power is turned on, 12V line and 5V line voltages rise: When 12V line voltage reaches 7.2V (Zener voltage of ZD201) ZD201 turns ON and Q212 and Q205 turn on, and reset voltage becomes Hi. Reset voltage is not set to Hi until VDD of microcomputer rises to 5V, enabling operation, due to ZD201.
- After power turns off, when 12V line voltage drops, ZD201 also turns OFF.

Fig. 9-2

10. Temperature Detection Circuit

- The outdoor units (this model) provides with the outdoor temperature thermistor, DEF (defrost) thermistor, OH (overheat) thermistor and electric expansion valve thermistor so that they detect the temperatures of the unit and control the system.

- The circuit of the thermistors is shown as Fig. 10-1 for model RAM-71QH5 and their roles and temperature measuring points are shown as Table 10-1.
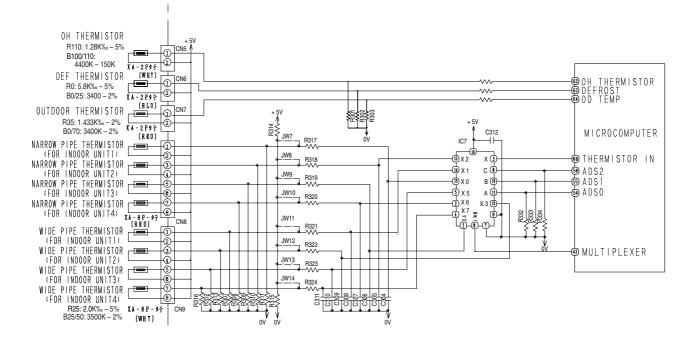
Fig. 10-1 Temperature Detection Circuit

Table 10-1 Name and Role of each thermistor

Name	Connector No	Measuring Point	Role
OH thermistor	CN5	Compressor head	If the temperature of the compressor rises abnormally (118°C), the compressor will be stopped. The temperature is used to decide the operation of the valve.
DEF thermistor	CN6	Heat exchanger	The thermistors decide the defrost operation during heating combined the data of the outside temperature and its data.
Outdoor temperature thermistor	CN7	Outside temperature	Outdoor temperature is used to decide the various operations of the air conditioner.
Electric expansion valve thermistor (NARROW PIPE 1)	CN8	Indoor unit 1 (NARROW PIPE)	The thermistors detect the temperatures of the piping to the indoor units. The temperatures are used to decide how much the expansion valve is opened.
Electric expansion valve thermistor (NARROW PIPE 2)		Indoor unit 2 (NARROW PIPE)	
Electric expansion valve thermistor (NARROW PIPE 3)		Indoor unit 3 (NARROW PIPE)	
Electric expansion valve thermistor (NARROW PIPE 4)		Indoor unit 4 (NARROW PIPE)	
Electric expansion valve thermistor (WIDE PIPE 1)	CN9	Indoor unit 1 (WIDE PIPE)	
Electric expansion valve thermistor (WIDE PIPE 2)		Indoor unit 2 (WIDE PIPE)	
Electric expansion valve thermistor (WIDE PIPE 3)		Indoor unit 3 (WIDE PIPE)	
Electric expansion valve thermistor (WIDE PIPE 4)		Indoor unit 4 (WIDE PIPE)	

- Table 10-2 shows the correspondence between the thermistor's resistance and the temperature. They should be used as reference values. The value, which you measure, may be slightly difference from that in the table. It depends on the instrument.

- When you measure the resistance, pull out the connector after turning off the power supply. Pulling out the connector while the power supply is turned on will cause troubles.

Table 10-2 Correspondence between each thermistor's resistance and temperature (reference value)

Electric expansion valve thermistor DEF thermistor	Temperature	Resistance	Microcomputer pin potential
	-15°C	12.6kΩ	1.0V
	0°C	6.1kΩ	1.7V
	25°C	2.2kΩ	3.0V
	50°C	860Ω	3.9V
	75°C	400Ω	4.4V
Outdoor temperature thermistor	Temperature	Resistance	Potential
	-15°C	12.6kΩ	1.0V
	0°C	6.1kΩ	1.7V
	15°C	3.2kΩ	2.4V
	30°C	2kΩ	3.1V
OH thermistor	Temperature	Resistance	Potential
	25°C	33.9kΩ	0.5V
	50°C	10.8kΩ	1.3V
	75°C	4.1kΩ	2.4V
	100°C	1.7kΩ	3.4V
	105°C	1.5kΩ	3.6V
	118°C	1kΩ	3.9V

- When the connectors of the thermistors are disconnected or the thermistors is open or short, LD301 (red) lights and LD302 (red) blinks so that they indicate troubled parts. Combinations of LD301 and LD302 are set up for indicating troubled thermistors. The correspondences between the number of blink time and troubled parts are shown as Table 10-3. Look in the table (LD301 and LD302 blink) for troubled parts, and if the disconnections of them are checked out, they are replaced.

- If you can see two or more troubled thermistors, a small number of blink takes precedence of others.

- The electric expansions valve thermistor is put togrther with 3 pieces, when replacing the thermistor, replace one set of 3 pieces as taking care of positioning. If you don't do so, the unit may not operate normally and its cooling and heating performance may drop.

- Be ware that only an open-circuit for OH thermistor has to be checked in 5 minutes after the compressor starts.

- If the unit operates abnormally after replacing the thermistor, replace the control P.W.B. because it malfunctions.

Table 10-3 LED lighting mode at the thermistors troubled

LED lighting mode		Troubled thermistor	Judgement	
LD301	LD302		Open	Short
Lights	1 blink	OH thermistor	0.04V or less	4.96V or more
Lights	2 blinks	DEF thermistor		
Lights	3 blinks	Outdoor temperature thermistor		
Lights	4 blinks	Electric expansion value thermistor (narrow pipe 1)		
Lights	5 blinks	Electric expansion value thermistor (wide pipe 1)		
Lights	6 blinks	Electric expansion value thermistor (narrow pipe 2)		
Lights	7 blinks	Electric expansion value thermistor (wide pipe 2)		
Lights	8 blinks	Electric expansion value thermistor (narrow pipe 3)		
Lights	9 blinks	Electric expansion value thermistor (wide pipe 3)		
Lights	10 blinks	Electric expansion value thermistor (narrow pipe 4)		
Lights	11 blinks	Electric expansion value thermistor (narrow pipe 4)		

- The OH thermistors are detecting the compressor head temperatures. If the temperature rises over 118°C, the compressor in the cycle will be stopped to protect itself and LD301 will blink 6 times (OH STOP). When the compressor temperature fells under 105°C, the compressor will restart. During OH STOP, the fan continues to spin. The other cycles without a trouble operates normally.

- If OH STOP often occurs, the refrigerant may be leaking.

11. Electric expansion valve
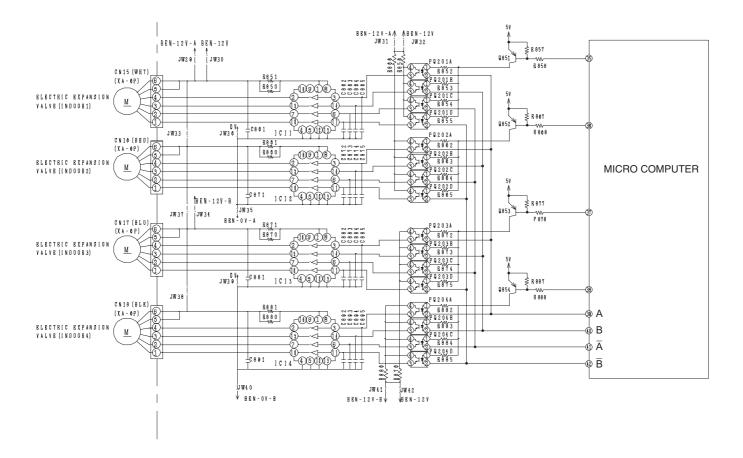
Table 11-1

- The electric expansion valve is driven by DC 12V. Power is supplied to 1 or 2 phases of 4-phase winding to switch magnetic pole of winding in order to control opening degree.
- Relationship between power switching direction of phase and open/close direction is shown below.
  When power is supplied, voltages at pins 4 to 1 of CN15~CN18 are about 0.9V; they are about 12V when no power is supplied. When power is reset, initialization is performed for 10 or 20 seconds.
  During initialization, measure all voltages at pins 4 to 1 of CN15~CN18 using mutimeter. If there is any pin with voltage that has not changed from around 0.9V or 12V, expansion valve or microcomputer is defective.
- Fig. 11-2 shows logic waveform when expansion valve is operating.

Table 11-2

Pin phase No.	Lear wire	Drive status							
		1	2	3	4	5	6	7	8
④	White	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
③	Yellow	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
②	Orange	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
①	Blue	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

Operation mode
1→2→3→4→5→6→7→8 VALVE CLOSE
8→7→6→5→4→3→2→1 VALVE OPEN
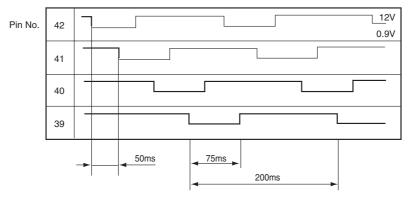
Fig. 11-2
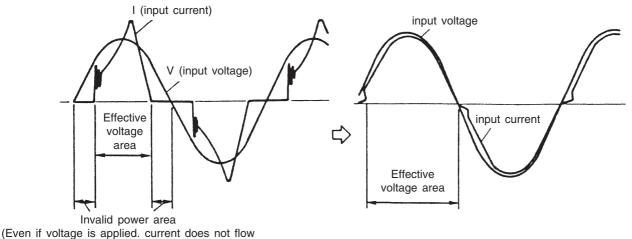
With expansion valve control, opening degree is adjusted to stabilize target temperature, by detecting temperature of compressor head.

The period of control is about once per 20 seconds, and output a few pulses.

12. Power Factor Control Circuit

Power factor is controlled by almost 100%. (Effective use of power)
With IC in ACT module, control is performed so that input current waveform will be similar to waveform of input voltage.

*Assuming the same current capacity (20A), power can be used about 10% effective, comparing with curent use (power factor of 90%), and maximum capacity is thereby improved.
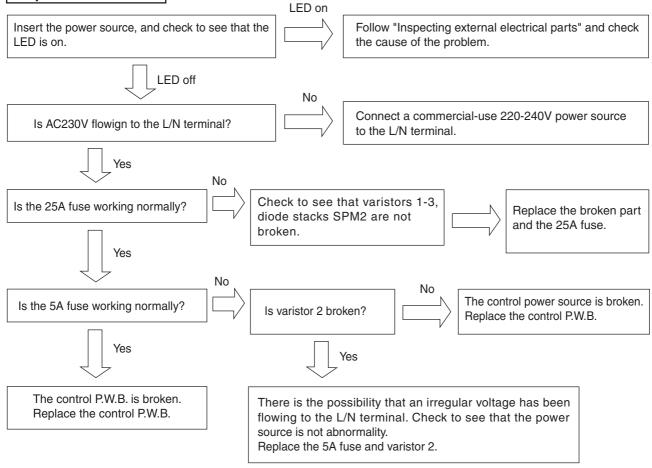
INSPECTING OUTDOOR ELECTRICAL PARTS
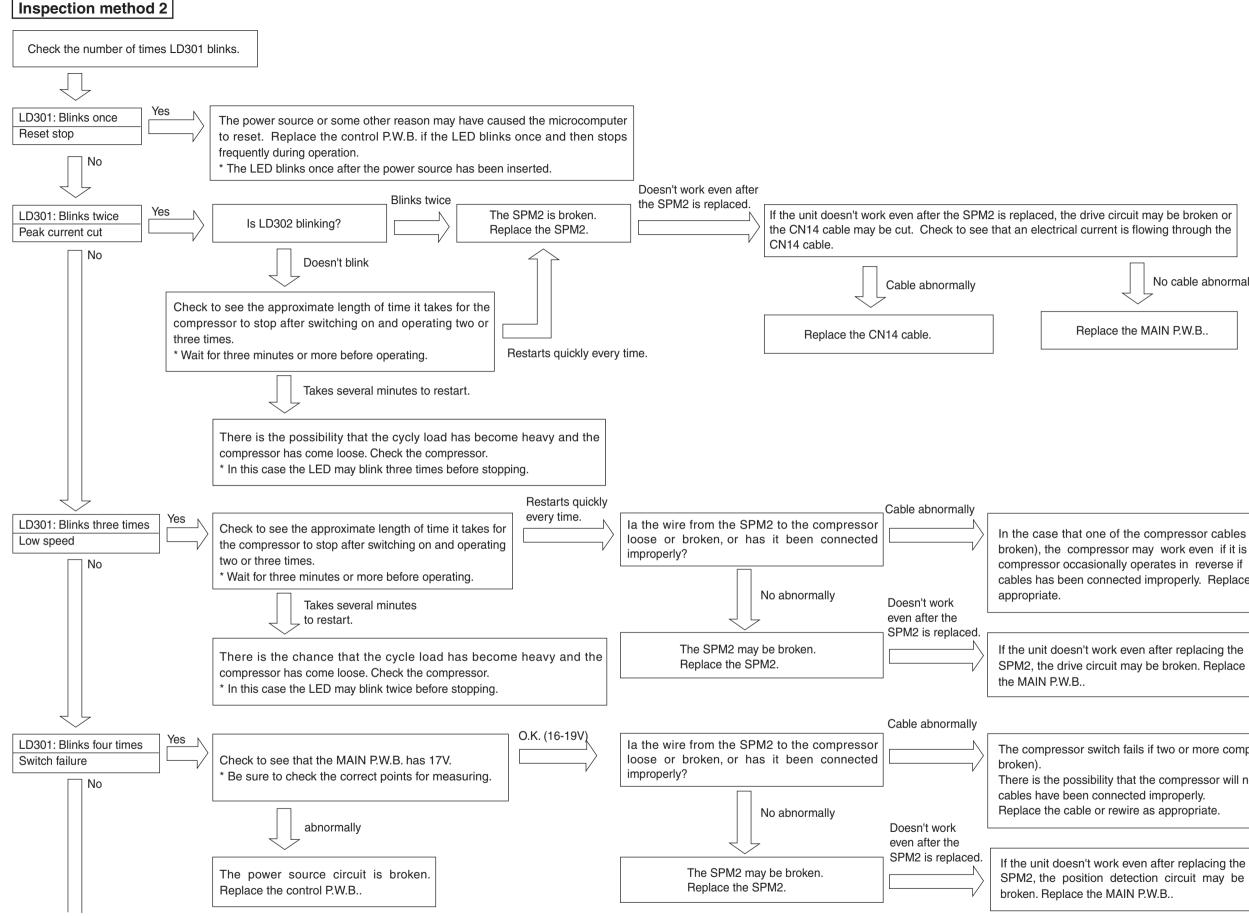
• Check to see that the LED is either on or blinking.
• Carry out inspections by examining the on/blinking status of LEDs 301-304.

LED number	LD301	LD302	LD303	LD304	Status	Checkpoints
Name	Diagnosis lamp 1	Diagnosis lamp 2	Communications lamp	Operation lamp		
Case 1	Off	Off	Off	Off	Normal off status or unconnected microcomputer power source	If the LED is not on even when the power source is connected the microcomputer power source is unconnected. → Inspection method 1
Case 2	Blinks once	Off	Off	Off	Microcomputer reset status (immediately after inserting power source or immediately after power source abnormally)	If is normal for LD301 to blink once after the power source has been inserted. If the unit stops when it is in operation and LD301 blinks once, it is possible that the power source has been temporarily interrupted by lightning or for some other reason. Replace the control PCB if this occurs frequently.
Case 3	Blinks	Off	Off	Off	Abnormally stop	Abnormally stop is shown by the number of times the LED blinks. → Inspection method 2
Case 4	On	Blinks	Off	Off	Thermistor abnormally	Thermistor abnormally is shown by the number of times the LED blinks. → Inspection method 3
Case 5	Off (blinks once)	Off	Off	Blinks	Communications error	Communications error is shown by the number of times the LED blinks. → Inspection method 4 *In the case that an internal unit is not connected, the number of connected internal units is shown by the number of times the LED blinks. This is not a abnormally. The internal unit has no communications error and is able to operate normally.
Case 6	Off	Off	On	Off	Normal operation	Normal operation
Case 7	On	Off	On	Off	OVL1 operation	Normal operation
Case 8	Off	On	On	Off	OVL2 operation	Normal operation
Case 9	On	On	On	Off	OVL3 operation	Normal operation

Inspection method 1

Insert the power source, and check to see that the LED is on.

→ **LED on** → Follow "Inspecting external electrical parts" and check the cause of the problem.

↓ **LED off**

Is AC230V flowign to the L/N terminal?

→ **No** → Connect a commercial-use 220-240V power source to the L/N terminal.

↓ **Yes**

Is the 25A fuse working normally?

→ **No** → Check to see that varistors 1-3, diode stacks SPM2 are not broken. → Replace the broken part and the 25A fuse.

↓ **Yes**

Is the 5A fuse working normally?

→ **No** → Is varistor 2 broken? → **No** → The control power source is broken. Replace the control P.W.B.

↓ **Yes**

The control P.W.B. is broken. Replace the control P.W.B.

Is varistor 2 broken? ↓ **Yes**

There is the possibility that an irregular voltage has been flowing to the L/N terminal. Check to see that the power source is not abnormality.
Replace the 5A fuse and varistor 2.

Inspection method 2

Check the number of times LD301 blinks.

↓

LD301: Blinks once / Reset stop —Yes→ The power source or some other reason may have caused the microcomputer to reset. Replace the control P.W.B. if the LED blinks once and then stops frequently during operation.
* The LED blinks once after the power source has been inserted.

↓ No

LD301: Blinks twice / Peak current cut —Yes→ Is LD302 blinking? —Blinks twice→ The SPM2 is broken. Replace the SPM2. —Doesn't work even after the SPM2 is replaced.→ If the unit doesn't work even after the SPM2 is replaced, the drive circuit may be broken or the CN14 cable may be cut. Check to see that an electrical current is flowing through the CN14 cable.

—Cable abnormally→ Replace the CN14 cable.

—No cable abnormally→ Replace the MAIN P.W.B..

↓ Doesn't blink

Check to see the approximate length of time it takes for the compressor to stop after switching on and operating two or three times.
* Wait for three minutes or more before operating.

—Restarts quickly every time.→ (back to "The SPM2 is broken. Replace the SPM2.")

↓ Takes several minutes to restart.

There is the possibility that the cycly load has become heavy and the compressor has come loose. Check the compressor.
* In this case the LED may blink three times before stopping.

↓ No

LD301: Blinks three times / Low speed —Yes→ Check to see the approximate length of time it takes for the compressor to stop after switching on and operating two or three times.
* Wait for three minutes or more before operating.

—Restarts quickly every time.→ Ia the wire from the SPM2 to the compressor loose or broken, or has it been connected improperly? —Cable abnormally→ In the case that one of the compressor cables has become loose (or broken), the compressor may work even if it is missing a phase. The compressor occasionally operates in reverse if one of the compressor cables has been connected improperly. Replace the cable or rewire as appropriate.

↓ No abnormally

The SPM2 may be broken. Replace the SPM2. —Doesn't work even after the SPM2 is replaced.→ If the unit doesn't work even after replacing the SPM2, the drive circuit may be broken. Replace the MAIN P.W.B..

↓ Takes several minutes to restart.

There is the chance that the cycle load has become heavy and the compressor has come loose. Check the compressor.
* In this case the LED may blink twice before stopping.

↓ No

LD301: Blinks four times / Switch failure —Yes→ Check to see that the MAIN P.W.B. has 17V.
* Be sure to check the correct points for measuring. —O.K. (16-19V)→ Ia the wire from the SPM2 to the compressor loose or broken, or has it been connected improperly? —Cable abnormally→ The compressor switch fails if two or more compressor cables are loose (or broken).
There is the possibility that the compressor will not operate if the compressor cables have been connected improperly. Replace the cable or rewire as appropriate.

↓ No abnormally

The SPM2 may be broken. Replace the SPM2. —Doesn't work even after the SPM2 is replaced.→ If the unit doesn't work even after replacing the SPM2, the position detection circuit may be broken. Replace the MAIN P.W.B..

↓ abnormally

The power source circuit is broken. Replace the control P.W.B..

LD301: Blinks five times / Overload stop

Yes → Insert the power source and operate, and then check to see that the outdoor fan is rotating

No ↓

Outdoor fan rotates → ↓

Outdoor fan rotates, but soon stops. → The protection circuit may cause the fan to stop when the wind is extremely strong in the place where the outdoor unit is installed or when the outdoor unit is covered.

No problems with installation position → Replace the fan motor.

Outdoor fan rotates normally ↓

There is the possibility that the cycle load may have become extremely heavy. Check the compressor.
Check the electric expansion valve.
Clean the filter.
Check the position of the outdoor unit. If there is a problem, install according to the recommended conditions.

LD 301: Blinks six times / Overheating stop

Yes → The compressor may be too hot. Check to see that the coolant is not leaking.

No ↓

No coolant leak → There is the possibility that the electric expansion valve may not be working.
Check the voltage between BEN-12V and BEN-0V

Abnormal → Replace POWER P.W.B.. **NO CHANGE (still same)** → Check the compressor.

Coolant leak ↓ Refil the coolant

Normal ↓ Replace the electric expansion valve. **NO CHANGE (still same)** → Replace MAIN P.W.B..

LD301: Blinks eight times / Acceleration abnormally

Yes → The compressor does not accelerate. Check to see that the coolant is not leaking.

Normal → Check the compressor.

No ↓

Coolant leak ↓ Refil the coolant

LD301: Blinks thirteen times / E^{2}PROM error

Yes → Replace the MAIN P.W.B..

No ↓

LD301: Blinks fourteen times / ACT error

→ The SPM2 is broken. Replace the SPM2.

↓

LD301: Blinks ten times
Power source voltage abnormally

Yes →

abnormally noise ↓

Danger! Quickly turn off the power source and replace the SPM2.

↓ No abnormally noise even after replacing the SPM2.

Replace the control P.W.B..

Check the power source voltage (terminal board, L/N terminal)

N.G.
AC196V or less or AC265V or more ↓

Power source abnormally. Check the power source.

O.K.
AC196V-265V →

Check the wiring (diode stack blue/yellow/gray/red)

↓

Connect the power source, than wait a few minutes, and forcibly turn on the cooling. After the power relay goes on (clicking sound)*1, check that thecompressor does not work after the LED blinks ten times*2, then within three minutes check the voltage between the SPM P1 terminal and the N terminal.

DC277V or less →

Turn off the power source, and remove the yellow and blue wires from the diode stack.
Connect the power source, then wait a few minutes, and forcibly turn on the cooling (clicking sound). Then check the AC voltage between the blue and yellow wires within three minutes of the power relay being turned on.

Less than AC196V or AC265V or more →

The power relay is off. Replace the control power circuit.

↓ **AC196-265V**

Block off the power source, and return the yellow striped and blu striped wires to their former position. Then remove the gray and red wire from the diode stack. Connect the power source, and forcibly turn on the cooling (clicking noise). Then check the DC voltage between the gray and red wires within three minutes of the power relay being turned on.
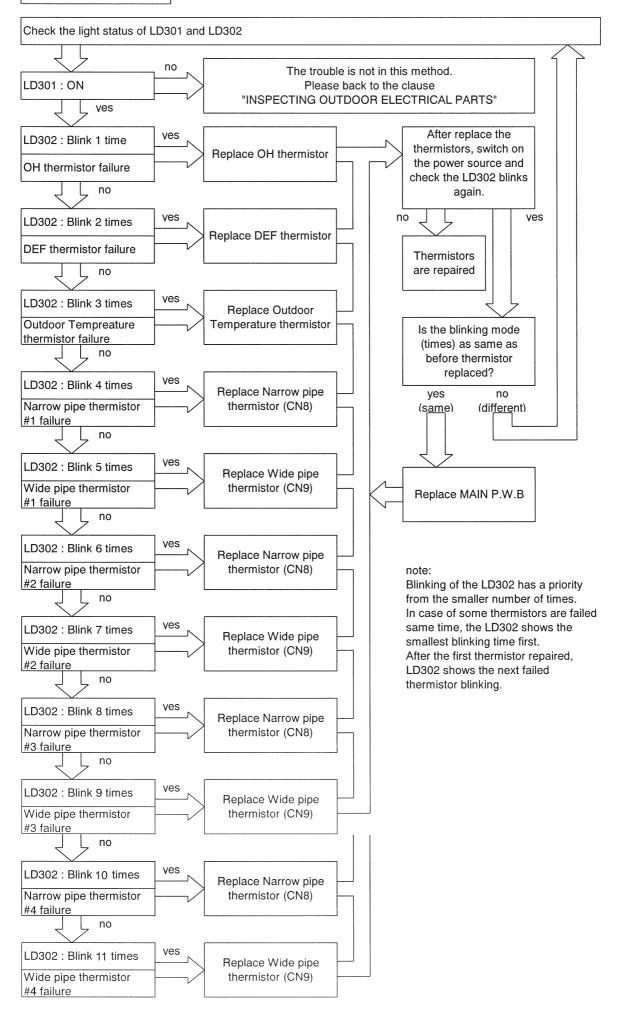
↓ **Less than DC10V**

There is a diode stack abnormally. Replace the diode stack.

374V or more ↓

DC277V-374V ↓

Turn off the power source, and ten minutes later remove the SPM CN13 cords. Then check the DC voltage between the (1) pin of the SPM CN13 and the N terminal within three minutes of the power relay being turned on.

Less than 10V →

The SPM2 is broken. Replace the SPM2.

↓ Doesn't work even after the SPM2 is replaced.

↓ **DC227V-374V**

Check the CN13 cord.

abnormally →

Replace the CN13 cord.

↓ **Normal**

The control P.W.B. may be broken. Replace the control P.W.B..

* 1 The power relay does not turn on without an operation order. In the case of a abnormally stop, the power relay turns off after approximately three minutes.

* 2 Carry out each of the voltage checks in the three minutes between the power relay turning on and turning off.

Inspection method 3

Check the light status of LD301 and LD302

LD301 : ON ──no──▶ The trouble is not in this method.
Please back to the clause
"INSPECTING OUTDOOR ELECTRICAL PARTS"

│ yes

LD302 : Blink 1 time

OH thermistor failure ──yes──▶ Replace OH thermistor ──▶ After replace the thermistors, switch on the power source and check the LD302 blinks again.

│ no

LD302 : Blink 2 times

DEF thermistor failure ──yes──▶ Replace DEF thermistor

no ◀── │ ──▶ yes

│ no

Thermistors are repaired

LD302 : Blink 3 times

Outdoor Tempreature thermistor failure ──yes──▶ Replace Outdoor Temperature thermistor

Is the blinking mode (times) as same as before thermistor replaced?

│ no

LD302 : Blink 4 times

Narrow pipe thermistor #1 failure ──yes──▶ Replace Narrow pipe thermistor (CN8)

yes (same)   no (different)

│ no

LD302 : Blink 5 times

Wide pipe thermistor #1 failure ──yes──▶ Replace Wide pipe thermistor (CN9)

Replace MAIN P.W.B

│ no

LD302 : Blink 6 times

Narrow pipe thermistor #2 failure ──yes──▶ Replace Narrow pipe thermistor (CN8)

note:
Blinking of the LD302 has a priority from the smaller number of times.
In case of some thermistors are failed same time, the LD302 shows the smallest blinking time first.
After the first thermistor repaired, LD302 shows the next failed thermistor blinking.

│ no

LD302 : Blink 7 times

Wide pipe thermistor #2 failure ──yes──▶ Replace Wide pipe thermistor (CN9)

│ no

LD302 : Blink 8 times

Narrow pipe thermistor #3 failure ──yes──▶ Replace Narrow pipe thermistor (CN8)

│ no

LD302 : Blink 9 times

Wide pipe thermistor #3 failure ──yes──▶ Replace Wide pipe thermistor (CN9)

│ no

LD302 : Blink 10 times

Narrow pipe thermistor #4 failure ──yes──▶ Replace Narrow pipe thermistor (CN8)

│ no

LD302 : Blink 11 times

Wide pipe thermistor #4 failure ──yes──▶ Replace Wide pipe thermistor (CN9)

Inspection method 4

Check the light status of LD304

LD304 : Blink 1 time	yes→	Check C1/D1 voltage OK=DC32 to 37V	OK→	Replace MAIN P.W.B.

Communication error of Indoor #1 — no

↓ NG

Check C1/D1 connection — OK→ Replace POWER P.W.B.

↓ NG

Correct C1/D1 connection

LD304 : Blink 2 times	yes→	Check C2/D2 voltage OK=DC32 to 37V	OK→	Replace MAIN P.W.B.

Communication error of Indoor #2 — no

↓ NG

Check C2/D2 connection — OK→ Replace POWER P.W.B.

↓ NG

Correct C3/D3 connection

LD304 : Blink 3 times	yes→	Check C3/D3 voltage OK=DC32 to 37V	OK→	Replace MAIN P.W.B.

Communication error of Indoor #3

↓ NG

Check C3/D3 connection — OK→ Replace POWER P.W.B.

↓ NG

Correct C3/D3 connection

LD304 : Blink 4 times	yes→	Check C4/D4 voltage OK=DC32 to 37V	OK→	Replace MAIN P.W.B.

Communication error of Indoor #4

↓ NG

Check C4/D4 connection — OK→ Replace POWER P.W.B.

↓ NG

Correct C4/D4 connection

Restart operation and check the diagnosis status again.

If same error cord occure,

check the Indoor unit.
or
Replace both
POWER and
MAIN P.W.B

note:
If Indoor unit is not installed, the correspond error cord will be generated.
Blinking of the LD304 has a priority from the smaller number of times.
In case of some indoors are failed at same time, the LD304 shows the smallest blinking time first.
After the first failure repaired, LD304 shows the next fail.

HOW TO OPERATE USING THE SERVICE SWITCH THE OUTDOOR UNIT

MODEL RAM-71QH5

1. Turn the Power switch off and then turn on again.
2. Remove the electrical parts cover.
3. Press the service switch for one second or more (wait for at least 30 seconds after turning the power source switch on).

Never operate the unit in this state for more than 5 minutes.

Open the upper cover

Service switch
(forced-cooling mode is set by pressing for 1 second or more, and stopped by pressing again.)

(Cautions)
(1) If interface signal (35V DC) terminals C and D are not connected when the outdoor unit service switch is used for checking, the outdoor unit defects indicator (LD304) will blink to indicate communication error.
(2) If you do this with the compressor connector in a removed state, LD301 will blink four times, and the unit will not work.

HOW TO OPERATE THE OUTDOOR UNIT INDEPENDENTLY

1. Connect the large dia. pipe side and small dia. pipe side service valves using a pipe.

Connect the small diameter service value and the large diameter service valve using the reducing union and copper pipe as shown on the right.

Charge refrigerant of 300g after vacuuming (※1)

Outdoor unit

Compressor

Reversing valve

Large dia.service valve

Reducing union (2/8" and 3/8")

Copper pipe (2/8")

Small diameter service valve

Parts to be prepared

(1) Reducing union
2/8" (6.35mm)
3/8" (9.52mm)
(2) Copper pipe (2/8" and 3/8")

Do not operate for 5 minutes or more

The operation method is the same as "How to operate using the connector to servicing the outdoor unit"
※ 1 The charging amount of 300g is equivalent to the load in normal operation.

TROUBLE SHOOTING

Model   RAM-71QH5

DANGER

1. Remember that the 0V line is biased to 162V in reference to the ground level.

2. Also note that it takes about 10 minutes until the voltage fall after the power switch is turned off.

Power source
1 ø 220-240V, 50Hz

System power module

N   L

ACT Module

Power module

M

Compressor motor

ⓐ

ⓑ (0V)

Indoor unit electric parts

Control P.W.B.

C   DC 35V

D   0V

MAIN P.W.B.

Across ⓐ – ⓑ (0V line)................... approx 360V

Across ⓐ – ground......................... approx 155-170V

Across ⓑ (0V line)– ground............ approx 155-170V

DANGER

When using an oscilloscope, never ground it. Don't forget that high voltages as noted above may apply to the oscilloscope.

Outdoor unit P.W.B.

Always keep your hands and metallic things away from the enclosure of the oscilloscope.

DANGER!
Don't install the ground line.

Oscilloscope

Discharge procedure and how to cut off power to power circuit

WARNING

Caution

- Voltage of about 360V is charged at both ends of smoothing capacitor 330μF x 3.

- High voltage (DC 360V) is also charged at screw and terminal sections of system power module.

- During continuity check of each circuit of electrical parts in outdoor unit is performed, to prevent secondary trouble, disconnect red/gray wire connected to system power module (SPM) from diode stack. (Also be sure to perform discharging of smoothing capacitor.)

1. Disconnect power plug.

2. Wait for 10 minutes or more after power is turned off and then remove electrical parts box lid. As shown below. Apply soldering iron of 30-75W for 15 seconds or more to P1 and N1 black/white lead receptacles on system power module to discharge voltage from smoothing capacitor.
   Do not loosen or remove screws of system power module: If screw is loose, voltage will not be discharged.

3. Before operation check of each part of circuit, remove receptacle of red/gray lead connected to system power modelu from diodde stack.

SMOOTHING CAPACITOR

SPM (SYSTEM POWER MODULE)

Soldering iron

Do not use soldering iron with transformer: Doing so will blow thermal fuse inside transformer.

As shown left, apply soldering iron to metal parts (receptacles) in sleeve corresponding to P and N1 terminals of system power module.

Screws of system power module are live parts: Do not touch them. Screw tightening torque and method are strictly specified. When the screw is loosened or removed once, be sure to tighten according to the procedure shown on the right, with tightening torque of 0.8±0.2N•m.

No.2   No.3   No.4   No.5

No.1   No.7   No.6

SMOOTHING CAPACITOR

SPM (SYSTEM POWER MODULE)

DIODE STACK

SERVICE SWITCH

REACTOR

P.W.B. CAPA

P.W.B. SWITCHING (BOTTOM SIDE)

SELF-DIAGNOSIS LAMPS

P.W.B. MAIN

P.W.B. POWER

P.W.B. NF

RAM-71QH5

1 Location of self-diagnosis lamp

RAM-71QH5

⚠ DANGER (DC360V)

SWITCH OFF MAIN POWER SUPPLY TO THE OUTDOOR UNIT AT LEAST 10 MINUTES BEFORE START THE SERVICING WORK.

SELF-DIAGNOSIS LIGHTING MODE ■ LIT ▨ BLINKING □ OFF

SERVICE OPERATION

COLLECT REFRIGERANT FROM INDOOR UNIT AND STORE AT OUTDOOR UNIT.

1. SWITCH OFF THE MAIN POWER SUPPLY AND THEN SWITCH IT ON AGAIN. WAIT FOR 1 MINUTE.
2. PRESS AND HOLD THE SERVICE SWITCH FOR 1 SECOND TO START OUTDOOR UNIT IN COOLING OPERATION. IN ORDER TO PREVENT PARTS FROM DAMAGE, DO NOT OPERATE THE OUTDOOR UNIT FOR MORE THAN 5 MINUTES.
3. PRESS AND HOLD THE SERVICE SWITCH FOR 1 SECOND TO STOP THE SERVICE OPERATION.
4. REPEAT STEP 1 TO 3 IF SERVICE OPERATION NEED TO BE REPEATED.

SERVICE SWITCH

P.W.B. MAIN — LD304 LD303 LD302 LD301

P.W.B. NF / P.W.B. POWER

[1] DURING OPERATION

SELF-DIAGNOSIS NAME	DETAILS	MAIN CHECK POINT
NORMAL OPERATION		NOT MALFUNCTION
OVERLOAD (1)	THIS SHOWS AN OVERLOAD, NOT MALFUNCTION.	
OVERLOAD (2)	UNDER OVERLOAD CONDITION, THE ROTATION SPEED IS CONTROLLED AUTOMATICALLY IN ORDER TO PROTECT THE COMPRESSOR.	
OVERLOAD (3)		

(graph: ROTATION SPEED vs TIME — SET VALUE, (1)(2)(3))

※ EXAMPLE OF BLINKING (5 TIMES) — LIGHTS FOR 0.25 SEC. AT INTERVAL OF 0.25 SEC.

[2] DURING STOP

SELF-DIAGNOSIS NAME (BLINKING)	DETAILS	MAIN CHECK POINT
ABNORMAL THERMISTOR — LIT 1-11 TIMES	THERMISTOR IS OPENED OR SHORTED. REFER TO BELOW TABLE FOR "CORRESPONDENCE TABLE FOR ABNORMAL THERMISTOR"	① THERMISTOR ② CONNECTION OF THERMISTOR IS FAULTY ③ THERMISTOR CIRCUIT

CORRESPONDENCE TABLE FOR ABNORMAL THERMISTOR

BLINKING TIME	
1 TIME	OVERHEAT THERMISTOR
2 TIMES	DEFROST THERMISTOR
3 TIMES	OUTDOOR TEMPERATURE THERMISTOR
4 TIMES	NARROW PIPE THERMISTOR (INDOOR 1)
5 TIMES	WIDE PIPE THERMISTOR (INDOOR 1)
6 TIMES	NARROW PIPE THERMISTOR (INDOOR 2)
7 TIMES	WIDE PIPE THERMISTOR (INDOOR 2)
8 TIMES	NARROW PIPE THERMISTOR (INDOOR 3)
9 TIMES	WIDE PIPE THERMISTOR (INDOOR 3)
10 TIMES	NARROW PIPE THERMISTOR (INDOOR 4)
11 TIMES	WIDE PIPE THERMISTOR (INDOOR 4)

[2] DURING STOP

SELF-DIAGNOSIS NAME (BLINKING)	DETAILS	MAIN CHECK POINT
NORMAL STOP	INDOOR THERMOSTAT OFF. MAIN OPERATION OFF.	NOT MALFUNCTION.
RESET STOP (1 TIME)	WHEN STOPPED WITH POWER RESET. (NORMAL WHEN POWER HAS BEEN TURNED ON.)	① P.W.B.s (POWER CIRCUIT, HIC, ETC.)
PEAK CURRENT CUT (2 TIMES)	OVER CURRENT IS DETECTED.	① COMPRESSOR ② P.W.B.s / ① SYSTEM POWER MODULE ② P.W.B.s
ABNORMAL LOW SPEED ROTATION (3 TIMES)	POSITION DETECTION SIGNAL IS NOT INPUT DURING OPERATION.	① SYSTEM POWER MODULE ② COMPRESSOR ③ P.W.B.s
SWITCHING FAILURE (4 TIMES)	FAIL TO SWITCH FROM INITIAL LOW FREQUENCY SYNC. TO POSITION DETECTION SYNC.	① SYSTEM POWER MODULE ② COMPRESSOR ③ P.W.B.s
OVERLOAD LOWER LIMIT CUT (5 TIMES)	OVERLOAD CONDITION STILL PERSISTING EVEN WHEN ROTATION SPEED IS BELOW THE LOWER RPM LIMIT.	① OUTDOOR UNIT IS EXPOSED TO DIRECT SUNLIGHT OR ITS AIRFLOW BLOCKED. ② FAN MOTOR ③ FAN MOTOR CIRCUIT ④ THE VOLTAGE IS EXTREMELY LOW.
OH THERMISTOR TEMP. RISE (6 TIMES)	OH THERMISTOR IS OPERATING.	① LEAK OF REFRIGERANT ② COMPRESSOR ③ OH THERMISTOR CIRCUIT ④ FAN MOTOR ⑤ FAN MOTOR CIRCUIT
ACCELERATION DEFECTIVE (8 TIMES)	NO ACCELERATION ABOVE THE LOWER LIMIT OF THE ROTATION SPEED.	① LEAK OF REFRIGERANT ② COMPRESSOR
POWER SUPPLY VOLTAGE ERROR (10 TIMES)	POWER SUPPLY VOLTAGE IS INCORRECT.	① POWER SUPPLY VOLTAGE ② RECEPTACLE OF WIRE AT SYSTEM POWER MODULE IS NOT PROPERLY INSERTED
FAN LOCK ERROR (12 TIMES)	OUTDOOR FAN RPM IS NOT ROTATE AS INTENDED RPM.	① FAN MOTOR ② FAN MOTOR CIRCUIT
EEPROM READING ERROR (13 TIMES)	MICROCOMPUTER CANNOT READ THE DATA IN EEPROM.	① MAIN P.W.B.
ACTIVE CONVERTER DEFECTIVE (14 TIMES)	OVER VOLTAGE IS DETECTED BY SYSTEM POWER MODULE.	① SYSTEM POWER MODULE
COMMUNICATION ERROR OF INDOOR 1 (1 TIME)	COMMUNICATION ERROR BETWEEN INDOOR AND OUTDOOR UNIT. WHEN INDOOR UNIT IS NOT CONNECTED, IT BLINKS SIMILARLY. NOT MALFUNCTION.	① CABLE IS WRONG CONNECTED ② CABLE IS OPEN ③ INTERFACE CIRCUIT BETWEEN INDOOR AND OUTDOOR UNIT.
COMMUNICATION ERROR OF INDOOR 2 (2 TIMES)		
COMMUNICATION ERROR OF INDOOR 3 (3 TIMES)		
COMMUNICATION ERROR OF INDOOR 4 (4 TIMES)		

(Lamp legend: LD301 LD302 LD303 LD304 — RED RED RED GRN)

Type	GT15V31ISM
Element circuit	
Internal circuit of the module	
Terminal symbol of system module ※See next page for values measured by tester	 ※ Do not disassemble the system power module when troubleshooting is performed.

HOW TO CHECK POWER MODULE

Checking power module using tester

Set tester to resistance range (×100)
If indicator does not swing in the following conductivity check, the power module is normal.
(In case of digital tester, since built-in battery is set in reverse direction, ⊕ and ⊖ terminals are reversed.)

⚠ CAUTION
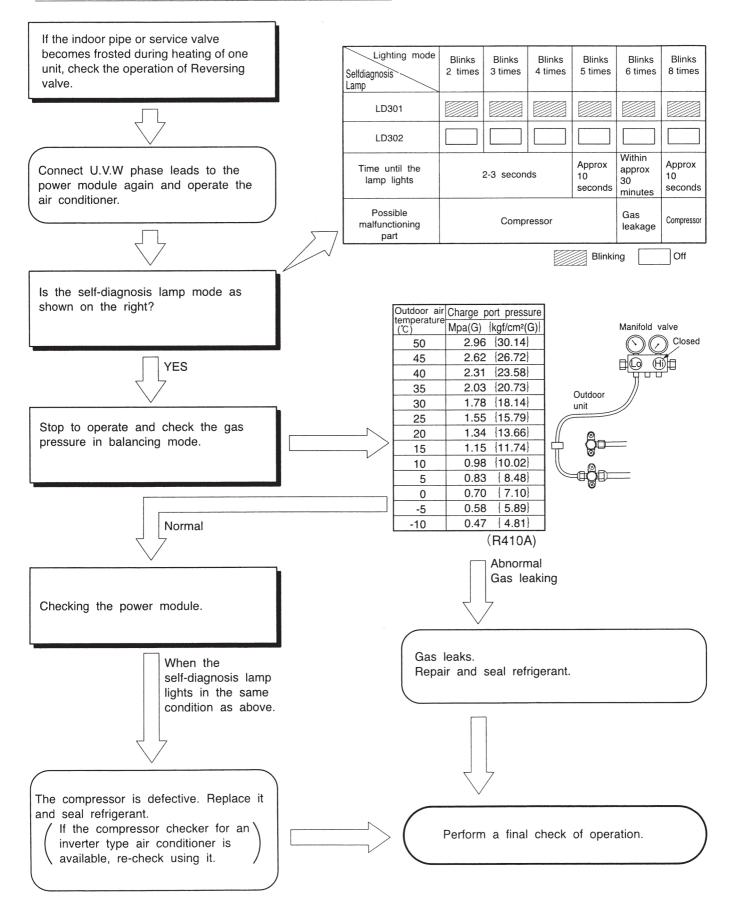
If inner circuit of power module is disconnected (open), the indicator of tester will not swing and this may assumed as normal. In this case, if indicator swings when ⊕ and ⊖ terminals are connected in reverse of diagram below, it is normal. Furthemore, compare how indicator swings at U, V and W phases. If indicator swings the same way at each point, it is normal.

CHECKING THE REFRIGERATING CYCLE

(JUDGING BETWEEN GAS LEAKAGE AND COMPRESSOR DEFECTIVE)

Troubleshooting procedure (No operaton, No heating, No cooling)

If the indoor pipe or service valve becomes frosted during heating of one unit, check the operation of Reversing valve.

↓

Connect U.V.W phase leads to the power module again and operate the air conditioner.

↓

Is the self-diagnosis lamp mode as shown on the right?

Lighting mode / Selfdiagnosis Lamp	Blinks 2 times	Blinks 3 times	Blinks 4 times	Blinks 5 times	Blinks 6 times	Blinks 8 times
LD301	Blinking	Blinking	Blinking	Blinking	Blinking	Blinking
LD302	Off	Off	Off	Off	Off	Off
Time until the lamp lights	2-3 seconds			Approx 10 seconds	Within approx 30 minutes	Approx 10 seconds
Possible malfunctioning part	Compressor				Gas leakage	Compressor

Blinking   Off

YES

↓

Stop to operate and check the gas pressure in balancing mode.

Outdoor air temperature (°C)	Charge port pressure Mpa(G)	{kgf/cm²(G)}
50	2.96	{30.14}
45	2.62	{26.72}
40	2.31	{23.58}
35	2.03	{20.73}
30	1.78	{18.14}
25	1.55	{15.79}
20	1.34	{13.66}
15	1.15	{11.74}
10	0.98	{10.02}
5	0.83	{ 8.48}
0	0.70	{ 7.10}
-5	0.58	{ 5.89}
-10	0.47	{ 4.81}

(R410A)

Manifold valve   Closed
Lo Hi
Outdoor unit

Normal

↓

Checking the power module.

When the self-diagnosis lamp lights in the same condition as above.

↓

The compressor is defective. Replace it and seal refrigerant.
(If the compressor checker for an inverter type air conditioner is available, re-check using it.)

Abnormal Gas leaking

↓

Gas leaks. Repair and seal refrigerant.

↓

Perform a final check of operation.

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ELECTRIC EXPANSION VALVE & PIPE THERMISTOR POSITION CHARTS

MODEL RAM-71QH5

ELECTRICAL EXPANSION VALVE 1
(FOR INDOOR UNIT 1)

ELECTRICAL EXPANSION VALVE 2
(FOR INDOOR UNIT 2)

CN18
(BLK)

CN15
(WHT)

CN16
(RED)

CN8
(RED)

CN17
(BLU)

CN9
(WHT)

NARROW PIPE
THERMISTOR FOR
INDOOR UNIT 1
(WIRE COLOR:BLACK)

NARROW PIPE
THERMISTOR FOR
INDOOR UNIT 2
(WIRE COLOR:BLUE)

NARROW PIPE
THERMISTOR FOR
INDOOR UNIT 3
(WIRE COLOR:RED)

NARROW PIPE
THERMISTOR FOR
INDOOR UNIT 4
(WIRE COLOR:GRAY)

WIDE PIPE
THERMISTOR FOR
INDOOR UNIT 1
(WIRE COLOR:RED)

WIDE PIPE
THERMISTOR FOR
INDOOR UNIT 2
(WIRE COLOR:GRAY)

WIDE PIPE
THERMISTOR FOR
INDOOR UNIT 3
(WIRE COLOR:BLACK)

WIDE PIPE
THERMISTOR FOR
INDOOR UNIT 4
(WIRE COLOR:BLUE)

ELECTRICAL EXPANSION VALVE 4
(FOR INDOOR UNIT 4)

ELECTRICAL EXPANSION VALVE 3
(FOR INDOOR UNIT 3)

PARTS LIST AND DIAGRAM

OUTDOOR UNIT
MODEL : RAM-71QH5

MODEL   RAM-71QH5

NO.	PART N0.		Q'TY / UNIT	PARTS NAME
1	PMRAC-07CV1	R06	2	2P TERMINAL FOR C-D LINE
2	PMRAC-51CHA1	S03	2	4P TERMINAL
3	PMRAC-70YHA	S01	1	CABINET
4	RAC-2226HV	805	3	COMPRESSOR RUBBER
5	PMRAM-72QH5	903	1	COMPRESSOR
6	PMRAM-72QH5	S04	1	CONDENSER
7	PMRAC-70YHA	S05	1	D-GRILL-AS (INCL. MOUTH RING)
8	PMRAM-72QH5	S05	1	EXPANSION VALVE COIL (B)
9	PMRAM-72QH5	S06	1	EXPANSION VALVE COIL (R)
10	PMRAM-72QH5	S07	1	EXPANSION VALVE COIL (W)
11	PMRAM-72QH5	S08	1	EXPANSION VALVE COIL (BLK)
12	PMRAC-80YHA2	902	1	FAN MOTOR (80W)
13	PMRAC-70YHA1	998	1	MG-COIL (REVERSING VALVE)
14	PMRAC-70YHA	S06	1	NET
15	PMRAC-25NH4	910	1	OLR COVER
16	PMRAM-71QH5	S01	1	P.W.B (MAIN)
17	PMRAC-70YHA	907	1	PROPELLER FAN
18	KPNT1	001	3	PUSH NUT
19	PMRAM-72QH5	S02	1	PWB (POWER)
20	PMRAC-18SH4	S01	1	REACTOR
21	PMRAM-22NHZ4	S01	1	REVERSING VALVE
22	PMRAC-70YHA	908	1	SIDE PLATE L
23	PMRAM-72QH5	S14	1	SIDE PLATE R
24	PMRAM-65QH4	920	1	STRAINER (CO-PIPE-AS 1)
25	PMRAM-72QH5	909	1	STRAINER (ST-PIPE-AS 1)
26	PMRAM-72QH5	910	1	STRAINER (ST-PIPE-AS 2)
27	PMRAM-72QH5	911	1	STRAINER (ST-PIPE-AS 3)
28	PMRAM-72QH5	912	1	STRAINER (ST-PIPE-AS 4)
29	PMRAC-70YHA	S12	1	SUPPORT (FAN MOTOR)
30	PMRAM-72QH5	913	1	SV-COVER
31	PMRAC-80YHA	S10	1	SYSTEM POWER MODULE
32	PMRAC-70YHA	S13	1	THERMISTOR (DEFROST)

NO.	PART N0. RAM-71QH5		Q'TY / UNIT	PARTS NAME
33	PMRAM-72Q8	S03	1	THERMISTOR (OH)
34	PMRAM-65QH4	S10	1	THERMISTOR (OUTSIDE TEMPERATURE)
35	PMRAM-72QH5	S15	1	THERMISTOR-PIPE (W)
36	PMRAM-72QH5	S16	1	THERMISTOR-PIPE (R)
37	PMRAC-24CP5	905	1	TOP COVER
38	PMSMARTY235M	901	4	VALVE (2S)
39	PMSMARTY235M	902	3	VALVE (3S)
40	PMRAC-70YHA	916	1	NET COVER
41	PMRAM-72QH5	917	4	EXPANSION VALVE
42	PMRAM-72QH5	918	1	VALVE (4S)
43	PMRAM-72QH5	920	1	SUPPORT (DEF-THERMISTOR)
44	PMRAC-25NH4	909	1	SUPPORT (OH-THERMISTOR)
45	PMRAC-70YHA	918	1	PWB (NF)
46	PMRAC-X18CXT	908	1	PWB (CAPA)
47	PMRAM-72QH5	919	1	PWB (SWITCHING)

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