HITACHI

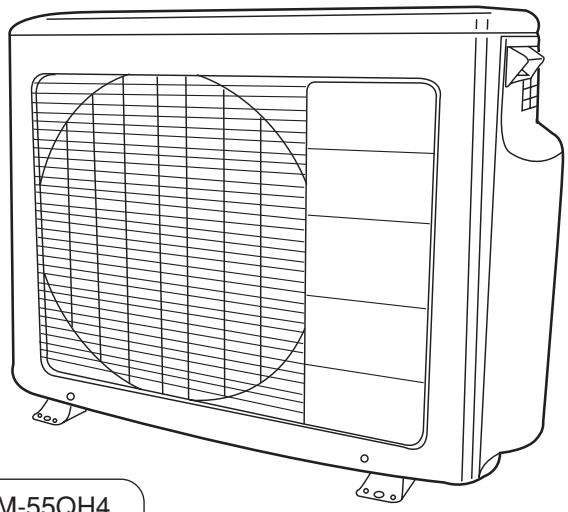
PM | NO. 0217E

RAM-55QH4
RAM-65QH4

SERVICE MANUAL
TECHNICAL INFORMATION

REFER TO THE FOUNDATION MANUAL

FOR SERVICE PERSONNEL ONLY



RAM-55QH4
RAM-65QH4

CONTENTS

NOTE:
This manual describes only points that differ from RAF-25, 50NH4, RAD-25, 40QH4 and RAM-70, 80QH4 (TC No. 0757EF), RAK-25, 35, 50NH4 (TC No. 0761EF), RAD-25, 40NH4, RAI-25, 40NH4 (TC No. 0763EF) for items not described in this manual.

SPECIFICATIONS

TYPE		DC INVERTER DUAL SYSTEM MULTI	
		OUTDOOR UNIT	
MODEL		RAM-55QH4	RAM-65QH4
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	650	
	D	298	
NET WEIGHT	(kg)	50	

※ After installation

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

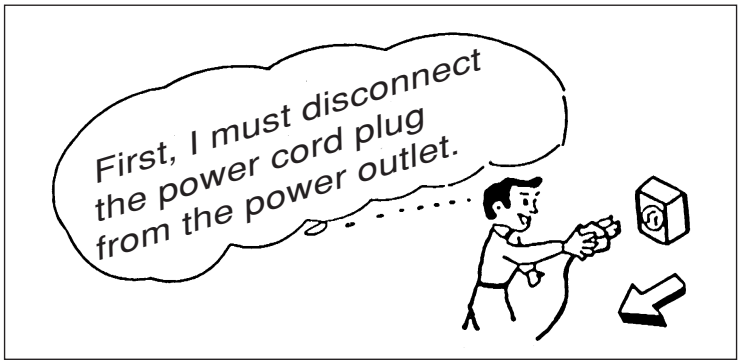
ROOM AIR CONDITIONER

OUTDOOR UNIT

JUNE 2004 **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 1MΩ 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.

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).

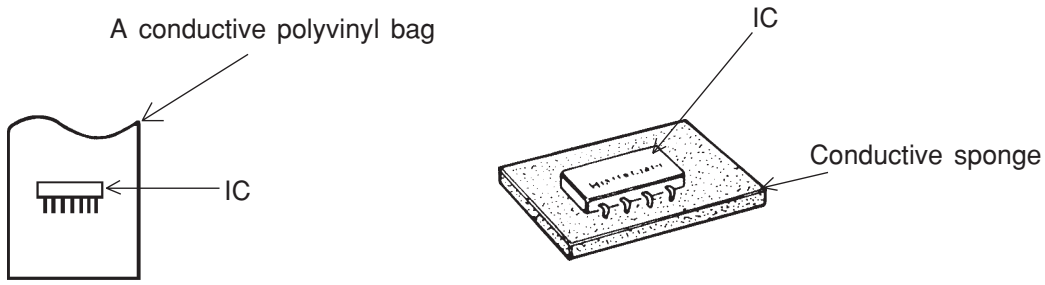


Fig. 1. Conductive Container

   (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.

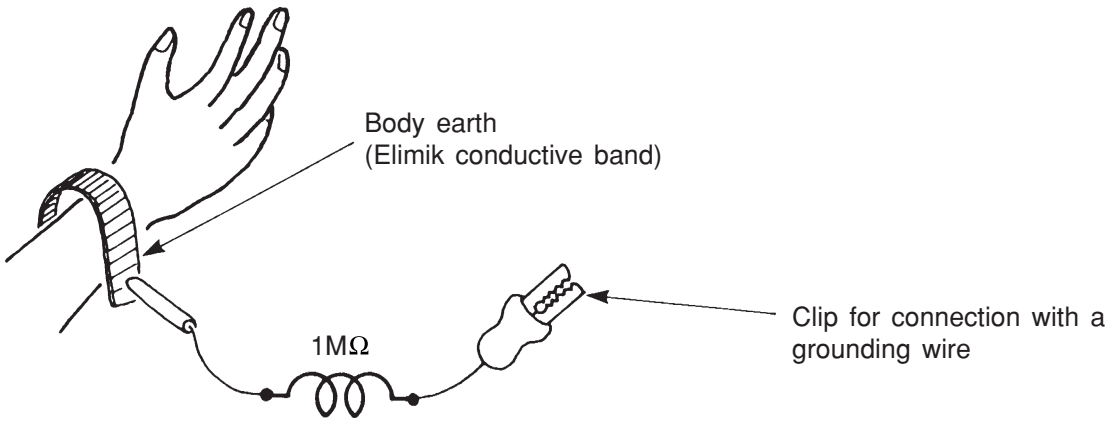


Fig. 2. Body Earth

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

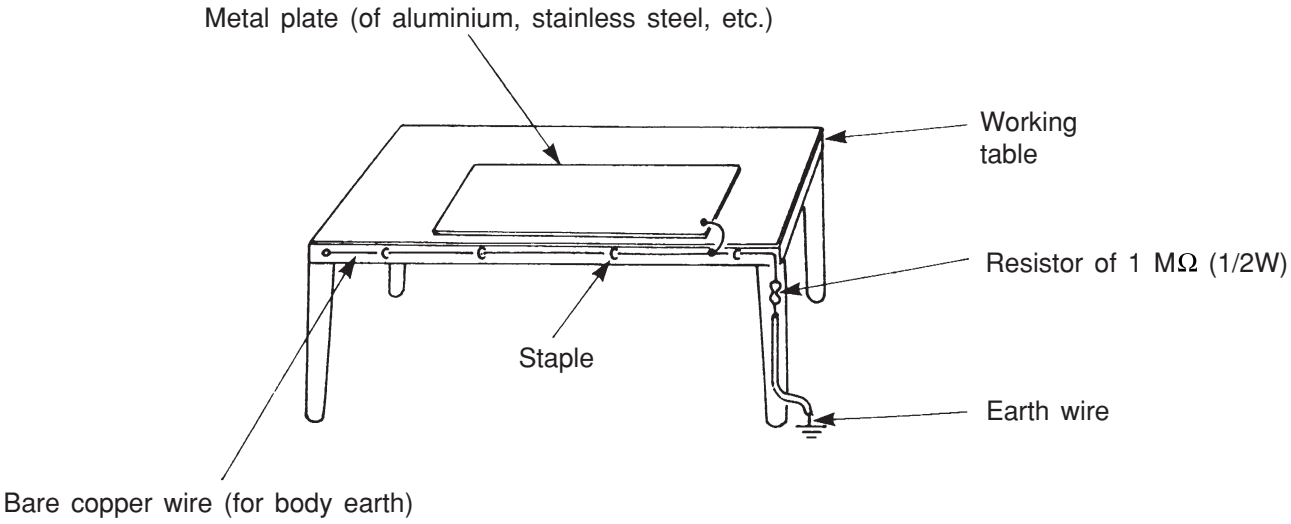


Fig. 3. Grounding of the working table

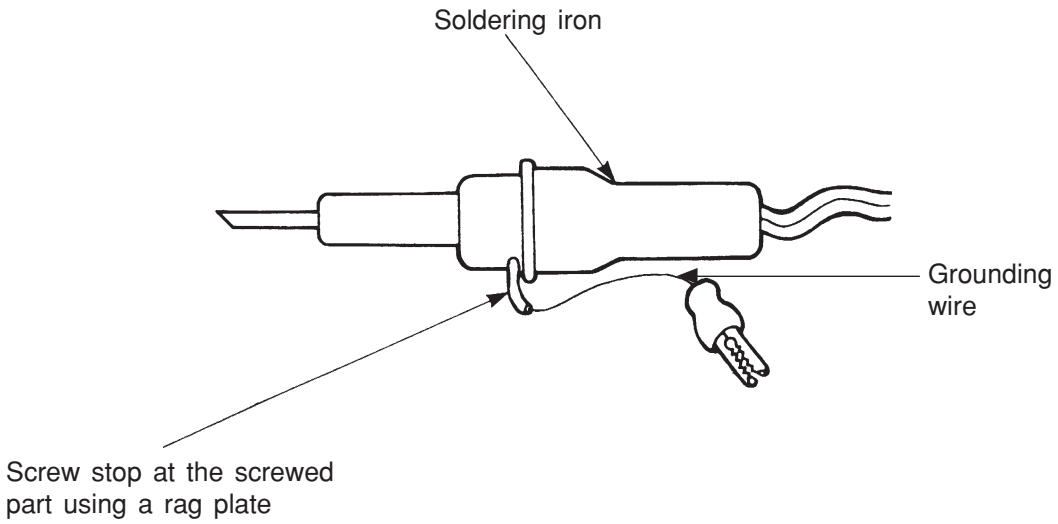


Fig. 4. Grounding a soldering iron

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.

⚠ CAUTION

1. In quiet operation or stopping the running, 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 adjusting thermostat, 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 (50°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 is frosted and 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-55QH4	RAM-65QH4
FAN MOTOR		40 W	
FAN MOTOR CAPACITOR		NO	
FAN MOTOR PROTECTOR		NO	
COMPRESSOR		JU1013D2	
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	1650g	
		WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.	
	PIPES	MAX. 35m	MAX. 45m

※ RAM-65QH4
In case the pipe length is more than 35m, add refrigerant R410 at 20gram per every meter exceeds.

※ RAM-55QH4
Additional charge of refrigerant is not required.

SPECIFICATIONS FOR INDOOR UNITS COMBINATION

TYPE		DC INVERTER DUAL SYSTEM MULTI COOLING AND HEATING
MODEL	OUTDOOR UNIT	RAM-55QH4
PHESE/VOLTAGE/FREQUENCY		1ø, 220 - 240V, 50Hz
CIRCUIT AMPERES TO CONNECT (A)		16
COOLING (TWO UNITS)	CAPACITY (kW) (B.T.U./h)	5.40 (1.50 - 5.90)
		18,430 (5,120 - 20,130)
	TOTAL INPUT (W)	1,795 (200 - 1,980)
	EER (B.T.U./hW)	10.27
	TOTAL AMPERES (A)	8.3 - 7.6
	POWER FACTOR (%)	99
HEATING (TWO UNITS)	CAPACITY (kW) (B.T.U./h)	7.20 (1.50 - 7.20)
		24,560 (5,120 - 24,560)
	TOTAL INPUT (W)	2,100 (200 - 2,100)
	EER (B.T.U./hW)	11.70
	TOTAL AMPERES (A)	9.6 - 8.8
	POWER FACTOR (%)	99
MAXIMUM LENGTH OF PIPING		MAX. 35m (TWO UNIT TOTAL)
STANDARD		CE (EMC&LVD)

MODEL		RAM-55QH4
PACKING (mm)	W	1,008
	H	698
	D	394
	cu.ft.	9.79
GROSS WEIGHT (kg)		53
FLARENUTSIZE (SMALL/LARGE)		6.35D/9.52DX2

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	—

SPECIFICATIONS FOR INDOOR UNITS COMBINATION

TYPE		DC INVERTER TRIPLE SYSTEM MULTI COOLING AND HEATING
MODEL	OUTDOOR UNIT	RAM-65QH4
PHESE/VOLTAGE/FREQUENCY		1ø, 220 - 240V, 50Hz
CIRCUIT AMPERES TO CONNECT (A)		16
COOLING (THREE UNITS)	CAPACITY (kW) (B.T.U./h)	6.30 (1.50 - 6.60)
		21,510 (5,120 - 22,530)
	TOTAL INPUT (W)	2,095 (200 - 2,200)
	EER (B.T.U./hW)	10.26
	TOTAL AMPERES (A)	9.7 - 8.9
	POWER FACTOR (%)	99
HEATING (THREE UNITS)	CAPACITY (kW) (B.T.U./h)	7.20 (1.50 - 7.20)
		24,560 (5,120 - 24,560)
	TOTAL INPUT (W)	1,900 (200 - 2,100)
	EER (B.T.U./hW)	12.93
	TOTAL AMPERES (A)	8.8 - 8.0
	POWER FACTOR (%)	99
MAXIMUM LENGTH OF PIPING		MAX. 45m (THREE UNIT TOTAL)
STANDARD		CE (EMC&LVD)

MODEL		RAM-65QH4
PACKING (mm)	W	1,008
	H	698
	D	394
	cu.ft.	9.79
GROSS WEIGHT (kg)		55
FLARENUTSIZE (SMALL/LARGE)		6.35D/9.52DX3

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	—

DUAL SYSTEM MULTI R.A.C. *RAM-55QH4*
COOL / HEAT CAPACITY SPEC. FOR INDOOR UNITS COMBINATIONS TO BE ABLE TO OPERATE SIMULTANEOUSLY

Whichever indoor units are installed, cooling and heating capacity depends on how many and which indoor units are operating at that time.

POSSIBLE COMBINATIONS TO OPERATE		COOLING			HEATING		
		CAPACITY RATING (kW) (RANGE)	OUTDOOR UNIT		CAPACITY RATING (kW) (RANGE)	OUTDOOR UNIT	
			POWER CONSUMPTION (W)	AMPERE (A) 220-240V		POWER CONSUMPTION (W)	AMPERE (A) 220-240V
ONE UNIT	2.5	2.50 (1.00-2.80)	780 (200-980)	3.6-3.3	3.90 (1.10-4.70)	1145 (200-1380)	5.3-4.8
	3.5	3.50 (1.00-3.90)	1160 (200-1280)	5.3-4.9	4.80 (1.10-5.80)	1550 (200-1870)	7.1-6.5
	4.0	4.00 (1.00-4.50)	1330 (200-1480)	6.1-5.6	6.00 (1.10-6.80)	2150 (200-2440)	9.9-9.0
	5.0	5.00 (1.00-5.60)	1780 (200-1960)	8.2-7.5	6.50 (1.10-7.20)	2400 (200-2660)	11.0-10.1
TWO UNIT	2.5+2.5	2.50+2.50 (1.50-5.60)	1650 (200-1820)	7.6-6.9	3.40+3.40 (1.50-7.20)	2015 (200-2110)	9.3-8.5
	2.5+3.5	2.17+3.03 (1.50-5.70)	1730 (200-1900)	7.9-7.3	3.15+3.85 (1.50-7.20)	2070 (200-2110)	9.5-8.7
	2.5+4.0	2.10+3.30 (1.50-5.90)	1795 (200-1980)	8.2-7.6	2.85+4.35 (1.50-7.20)	2110 (200-2110)	9.7-8.9
	3.5+3.5	2.70+2.70 (1.50-5.90)	1795 (200-1980)	8.2-7.6	3.60+3.60 (1.50-7.20)	2110 (200-2110)	9.7-8.9
	2.5+5.0	1.80+3.60 (1.50-5.90)	1795 (200-1980)	8.2-7.6	2.70+4.50 (1.50-7.20)	2110 (200-2110)	9.7-8.9
	3.5+4.0	2.50+2.90 (1.50-5.90)	1795 (200-1980)	8.2-7.6	3.20+4.00 (1.50-7.20)	2110 (200-2110)	9.7-8.9

ONE UNIT : The values indicated are only for one unit opration when two indoor units are connected.

RATING CONDITON (DRY BLUB / WET BULB)

	INDOOR	OUTDOOR
COOLING	27 / 19 ˚C	35 / –˚C
HEATING	20 / –˚C	7 / 6˚C

TRIPLE SYSTEM MULTI R.A.C. *RAM-65QH4*
COOL / HEAT CAPACITY SPEC. FOR INDOOR UNITS
COMBINATIONS TO BE ABLE TO OPERATE SIMULTANEOUSLY

Whichever indoor units are installed, cooling and heating capacity depends on how many and which indoor units are operating at that time.

POSSIBLE COMBINATIONS TO OPERATE		COOLING			HEATING		
		CAPACITY RATING (kW) (RANGE)	OUTDOOR UNIT		CAPACITY RATING (kW) (RANGE)	OUTDOOR UNIT	
			POWER CONSUMPTION (W)	AMPERE (A) 220-240V		POWER CONSUMPTION (W)	AMPERE (A) 220-240V
ONE UNIT	2.5	2.50 (1.00-2.80)	780 (200-980)	3.6-3.3	3.90 (1.10-4.70)	1145 (200-1380)	5.3-4.8
	3.5	3.50 (1.00-3.90)	1160 (200-1280)	5.3-4.9	4.80 (1.10-5.80)	1550 (200-1870)	7.1-6.5
	4.0	4.00 (1.00-4.50)	1330 (200-1480)	6.1-5.6	6.00 (1.10-6.80)	2150 (200-2440)	9.9-9.0
	5.0	5.00 (1.00-5.60)	1780 (200-1960)	8.2-7.5	6.50 (1.10-7.20)	2400 (200-2660)	11.0-10.1
TWO UNIT	2.5+2.5	2.50+2.50 (1.50-5.60)	1650 (200-1820)	7.6-6.9	3.40+3.40 (1.50-7.20)	2015 (200-2110)	9.3-8.5
	2.5+3.5	2.17+3.03 (1.50-5.70)	1730 (200-1900)	7.9-7.3	3.15+3.85 (1.50-7.20)	2070 (200-2110)	9.5-8.7
	2.5+4.0	2.10+3.30 (1.50-5.90)	1795 (200-1980)	8.2-7.6	2.85+4.35 (1.50-7.20)	2110 (200-2110)	9.7-8.9
	3.5+3.5	2.70+2.70 (1.50-5.90)	1795 (200-1980)	8.2-7.6	3.60+3.60 (1.50-7.20)	2110 (200-2110)	9.7-8.9
	2.5+5.0	1.80+3.60 (1.50-5.90)	1795 (200-1980)	8.2-7.6	2.70+4.50 (1.50-7.20)	2110 (200-2110)	9.7-8.9
	3.5+4.0	2.50+2.90 (1.50-5.90)	1795 (200-1980)	8.2-7.6	3.20+4.00 (1.50-7.20)	2110 (200-2110)	9.7-8.9
	4.0+4.0	3.00+3.00 (1.50-6.60)	1995 (200-2200)	9.2-8.4	3.60+3.60 (1.50-7.20)	2110 (200-2100)	9.7-8.9
	3.5+5.0	2.50+3.50 (1.50-6.60)	1995 (200-2200)	9.2-8.4	3.05+4.15 (1.50-7.20)	2110 (200-2100)	9.7-8.9
	4.0+5.0	2.67+3.33 (1.50-6.60)	1995 (200-2200)	9.2-8.4	3.45+3.75 (1.50-7.20)	2110 (200-2110)	9.7-8.9
THREE UNIT	2.5+2.5+2.5	2.10+2.10+2.10 (1.50-6.60)	2095 (200-2200)	9.6-8.8	2.40+2.40+2.40 (1.50-7.20)	1900 (200-2110)	8.7-8.0
	2.5+2.5+3.5	1.85+1.85+2.60 (1.50-6.60)	2095 (200-2200)	9.6-8.8	2.23+2.23+2.74 (1.50-7.20)	1900 (200-2110)	8.7-8.0

ONE UNIT : The values indicated are only for one unit opration when two indoor units are connected.

RATING CONDITON (DRY BLUB / WET BULB)

	INDOOR	OUTDOOR
COOLING	27 / 19 ˚C	35 / –˚C
HEATING	20 / –˚C	7 / 6˚C

DUAL SYSTEM MULTI R.A.C. *RAM-55QH4*
INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

Two indoor units can be installed with one outdoor unit.
And total nominal cooling capacity should not be more than 7.5kW

INDOOR UNIT MODEL	NOMINAL COOLING CAPACITY (kW)	CAPACITY (kW) at one unit operation		SUITABLE ROOM SIZE (m^2) at one unit operation	
		COOLING	HEATING	COOLING	HEATING
RAK-25NH4	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAF-25NH4	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAD-25NH4	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAI-25NH4	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAK-35NH4	3.5	1.00 - 3.90	1.10 - 5.80	16 - 24	17 - 22
RAD-40NH4	4.0	1.00 - 4.50	1.10 - 6.80	18 - 28	22 - 27
RAI-40NH4	4.0	1.00 - 4.50	1.10 - 6.80	18 - 28	22 - 27
RAK-50NH4	5.0	1.00 - 5.60	1.10 - 7.20	23 - 34	23 - 29
RAF-50NH4	5.0	1.00 - 5.60	1.10 - 7.20	23 - 34	23 - 29

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

TRIPLE SYSTEM MULTI R.A.C. *RAM-65QH4*
INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

Two or three indoor units can be installed with one outdoor unit.
And total nominal cooling capacity should not be more than 9.0kW

INDOOR UNIT MODEL	NOMINAL COOLING CAPACITY (kW)	CAPACITY (kW) at one unit operation		SUITABLE ROOM SIZE (m^2) at one unit operation	
		COOLING	HEATING	COOLING	HEATING
RAK-25NH4	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAF-25NH4	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAD-25NH4	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAI-25NH4	2.5	1.00 - 2.80	1.10 - 4.70	11 - 17	14 - 18
RAK-35NH4	3.5	1.00 - 3.90	1.10 - 5.80	16 - 24	17 - 22
RAD-40NH4	4.0	1.00 - 4.50	1.10 - 6.80	18 - 28	22 - 27
RAI-40NH4	4.0	1.00 - 4.50	1.10 - 6.80	18 - 28	22 - 27
RAK-50NH4	5.0	1.00 - 5.60	1.10 - 7.20	23 - 34	23 - 29
RAF-50NH4	5.0	1.00 - 5.60	1.10 - 7.20	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.

DUAL SYSTEM MULTI R.A.C. *RAM-55QH4*
CONNECTING POSISION TO BE ABLE TO INSTALL

POSSIBLE COMBINATIONS TO INSTALL (kW)		SUITABLE ROOM SIZE TO INSTALL (m^2)	CONNECTING POSITION ON OUTDOOR UNIT (VALVE DIAMETER) (mm)	
			No.1	No.2
			6.35/9.52D	6.35/9.52D
TWO UNITS	2.5+2.5	(12-15) + (12-15)	2.5	2.5
	2.5+3.5	(11-14) + (14-18)	2.5	3.5
	2.5+4.0	(10-13) + (15-19)	2.5	4.0
	3.5+3.5	(13-16) + (13-16)	3.5	3.5
	2.5+5.0	(10-12) + (18-20)	2.5	◎ 5.0
	3.5+4.0	(12-14) + (14-18)	3.5	4.0

2.5, 3.5, 4.0, 5.0 means indoor units cooling capacity class.

(1) Marking
◎: needs flare adapter (9.52 → 12.7D): Part No. TA261D-4 001

(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.

TRIPLE SYSTEM MULTI R.A.C. *RAM-65QH4*
CONNECTING POSISION TO BE ABLE TO INSTALL

POSSIBLE COMBINATIONS TO INSTALL (kW)		SUITABLE ROOM SIZE TO INSTALL (m^2)	CONNECTING POSITION ON OUTDOOR UNIT (VALVE DIAMETER) (mm)		
			No.1	No.2	No.3
			6.35/9.52D	6.35/9.52D	6.35/9.52D
TWO UNITS	2.5+2.5	(12-15) + (12-15)	2.5	2.5	
	2.5+3.5	(11-14) + (14-18)	2.5	3.5	
	2.5+4.0	(10-13) + (15-19)	2.5	4.0	
	3.5+3.5	(13-16) + (13-16)	3.5	3.5	
	2.5+5.0	(10-12) + (18-20)	2.5	◎ 5.0	
	3.5+4.0	(12-14) + (14-18)	3.5	4.0	
	4.0+4.0	(13-16) + (13-16)	4.0	4.0	
	3.5+5.0	(11-14) + (16-18)	3.5	◎ 5.0	
	4.0+5.0	(12-15) + (16-17)	4.0	◎ 5.0	
THREE UNITS	2.5+2.5+2.5	(10-11) + (10-11) + (10-11)	2.5	2.5	2.5
	2.5+2.5+3.5	(8-10) + (8-10) + (12-12)	2.5	2.5	3.5

2.5, 3.5, 4.0, 5.0 means indoor units cooling capacity class.

(1) Marking
◎: needs flare adapter (9.52 → 12.7D): Part No. TA261D-4 001

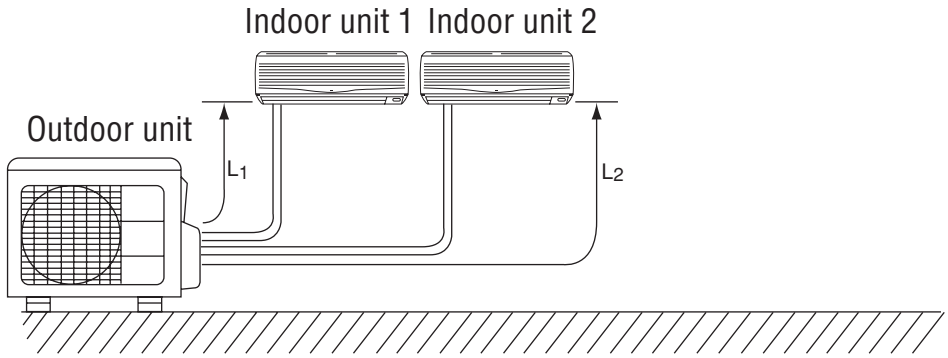
(2) Suitable room size is determined based on the conditions below:
- Climate is in the temperate zone like Tokyo, Japan.
- For usual residential use.
- Smaller figure is for light construction which means light thermally sealed.
- Larger figure is for heavy constructions, which means well thermally sealed.

INSTALLATION

PIPE LENGTH

(1) Total 35m maximum pipe length.

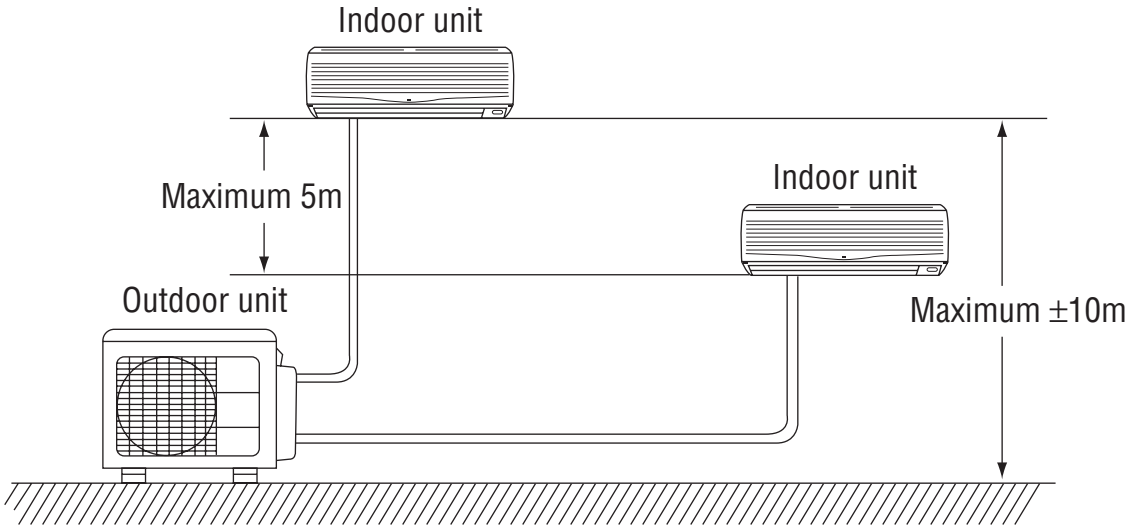
(2) Pipe length for one indoor unit : maximum 25m.



HIGHT DIFFERENCE

(1) Hight : maximum ± 10m

(2) Hight difference between each indoor unit ≤ 5m.



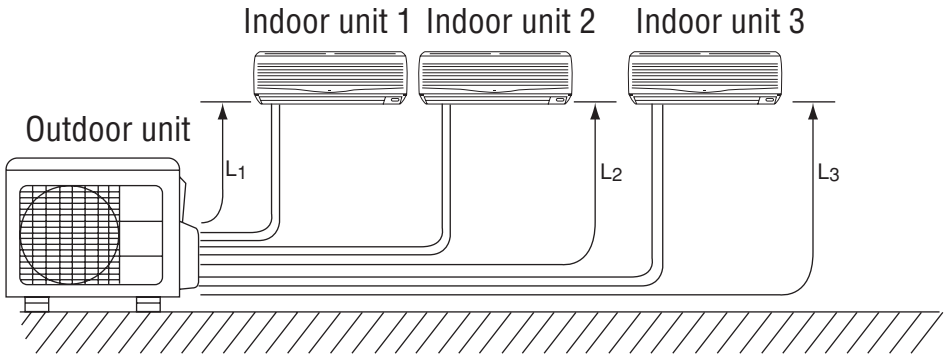
- To the outdoor unit, up to two indoor units can be connected until the total value of capacity from 5.0kW to 7.50kW.
- Make sure to connect to two indoor units.

INSTALLATION

PIPE LENGTH

(1) Total 45m maximum pipe length.

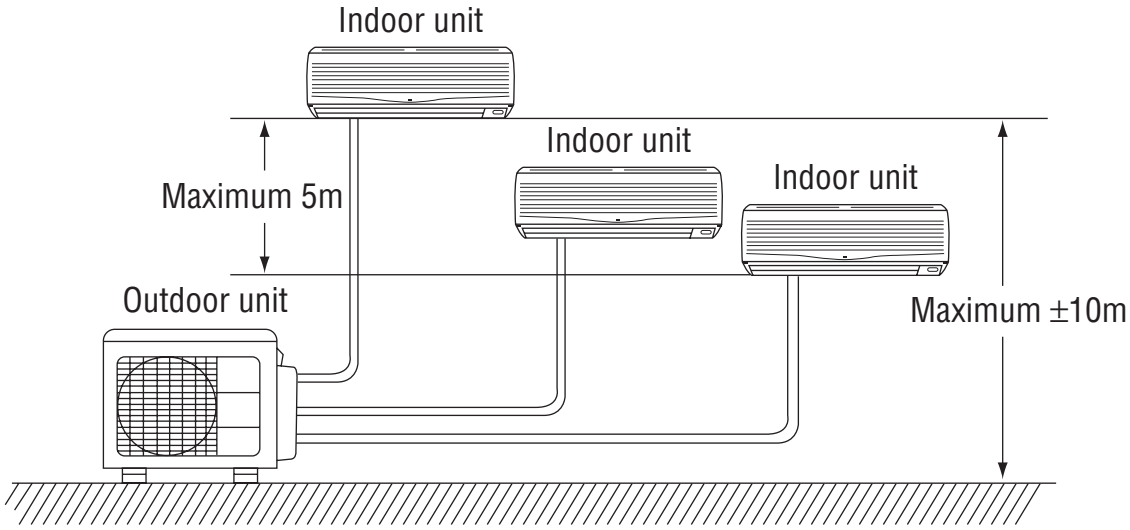
(2) Pipe length for one indoor unit : maximum 25m.



HIGHT DIFFERENCE

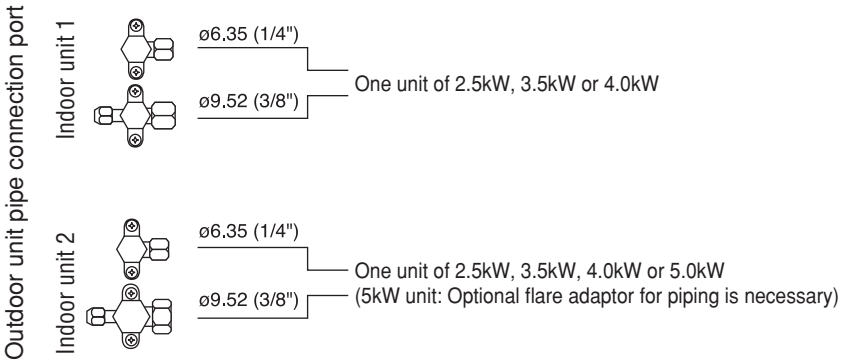
(1) Hight : maximum ± 10m

(2) Hight difference between each indoor unit ≤ 5m.



- To the outdoor unit, up to three indoor units can be connected until the total value of capacity from 5.0kW to 9.0kW.
- Make sure to connect to two or three indoor units.

MODEL: RAM-55QH4

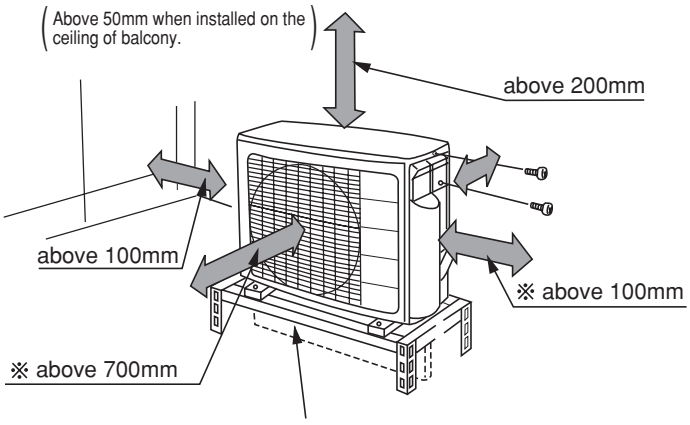


Flare adaptor for piping

The flare adaptor for piping is required depending on combination of indoor units.

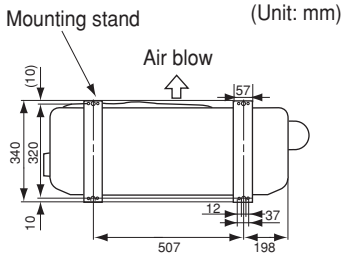
- ø9.52 (3/8") → ø12.7 (1/2") parts number TA261D-4 001

- 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.



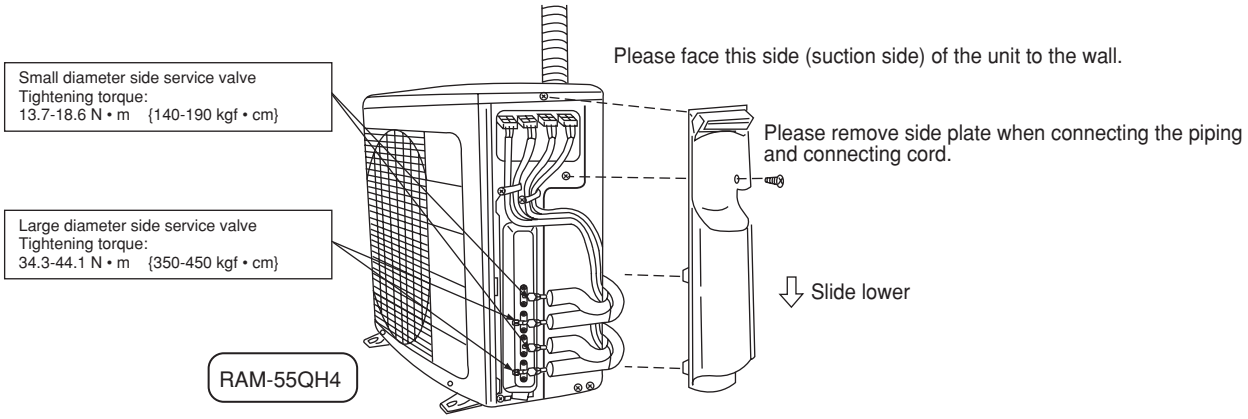
Heating efficiency will be increased if the ventilation below the outdoor unit is minimized.

Dimension of Mounting Stand of the Outdoor Unit



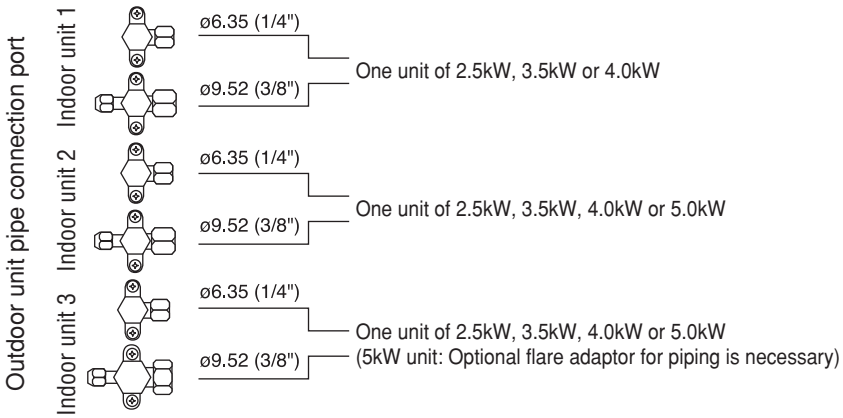
Connecting the pipe

- Install the unit in a stable place to minimize vibrationor noise.
- After arranging the cord and pipes, secure them inplace.



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

MODEL: RAM-65QH4



Flare adaptor for piping

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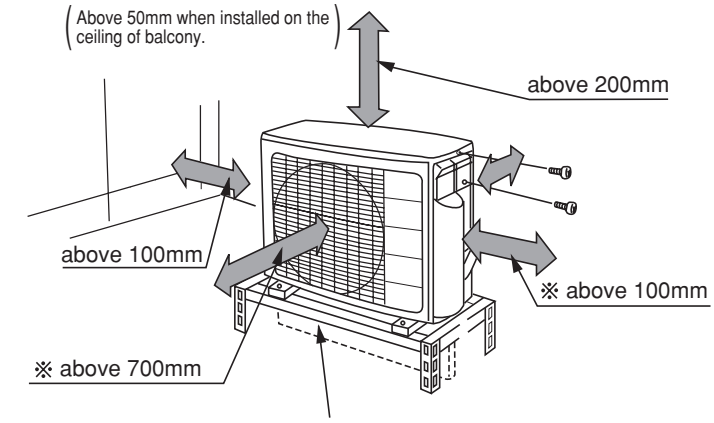
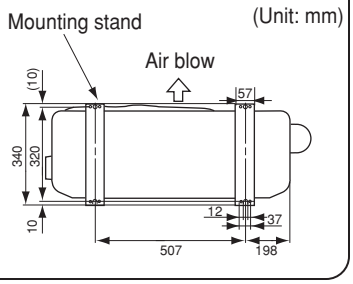
- The space indicated with a ⇔ mark is required to guarantee the air conditioner's performance. Install the airconditioner in a place big enough to provide ample space for servicing and repairs later on.



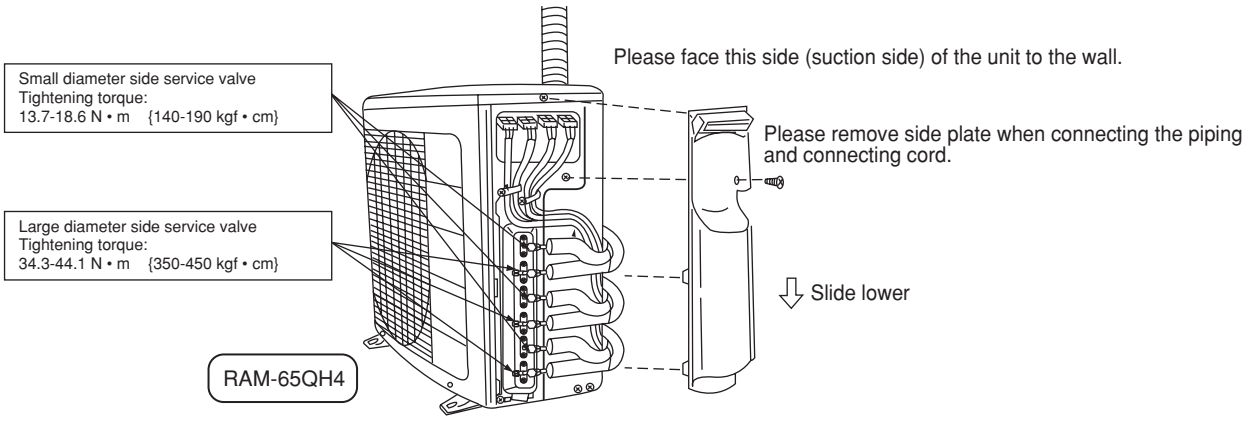
Heating efficiency will be increased if the ventilation below the outdoor unit is minimized.

Dimension of Mounting Stand of the Outdoor Unit



Connecting the pipe

- Install the unit in a stable place to minimize vibrationor noise.
- After arranging the cord and pipes, secure them inplace.



- 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.

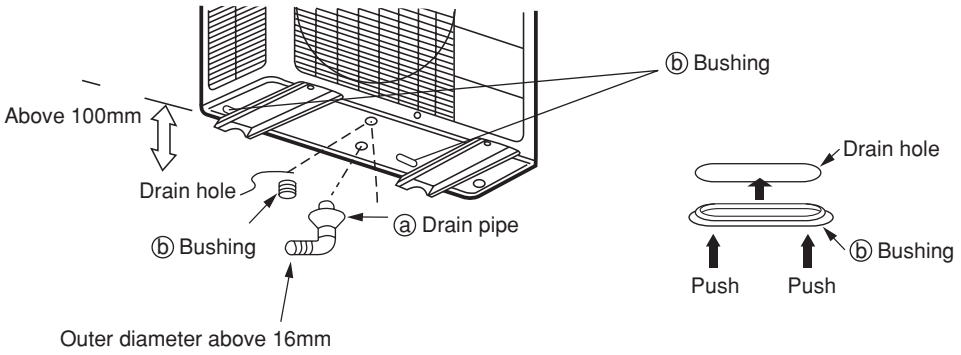
Condensed water disposal of outdoor unit

- 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.

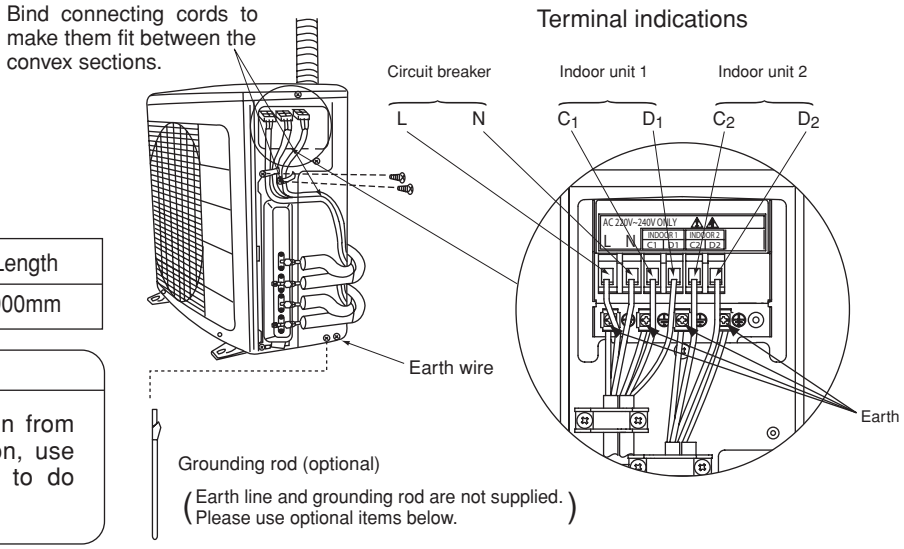
※ For more details, refer to the Installation Manual for Cold Areas.



Connection of the connecting cords and power cord. (Outdoor unit)
RAM-55QH4

⚠ 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.



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

⚠ CAUTION

- If earth line cannot be taken from the power supply connection, use the optional grounding rod to do earthing.

Wiring pattern
Indoor Unit

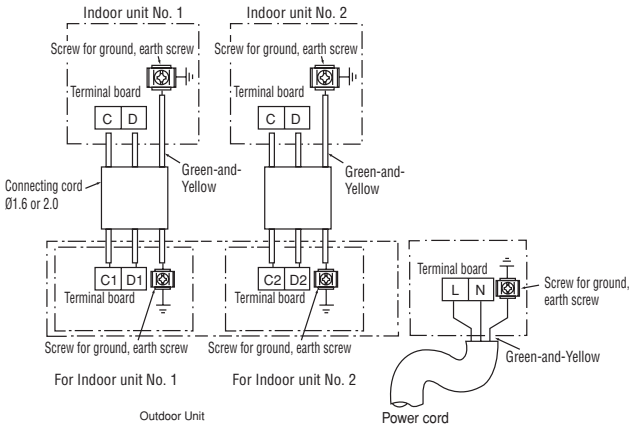
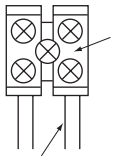


Fig. 1

⚠ WARNING

Connection of the power cord and connecting cord



Power cord and Connecting cord

Securely screw in the power cord and connecting cord so that it will not get loose or disconnect.

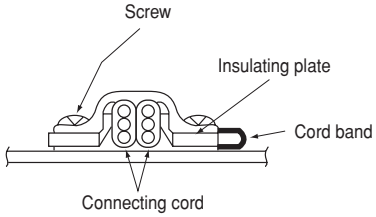
Tightening torque reference value: 1.2 to 1.6 N•m (12 to 16 kgf•cm)

Excessive tightening may damage the interior of the cord requiring replacement.

⚠ CAUTION

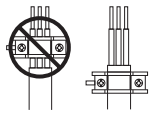
- To prevent a connection error, connecting cords should be bundled and taped to each respective pipe. If connecting cords are mixed with other indoor units, a refrigeration cycle abnormality may occur, causing dripping.

- When putting two connecting cords through the band.



⚠ 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.

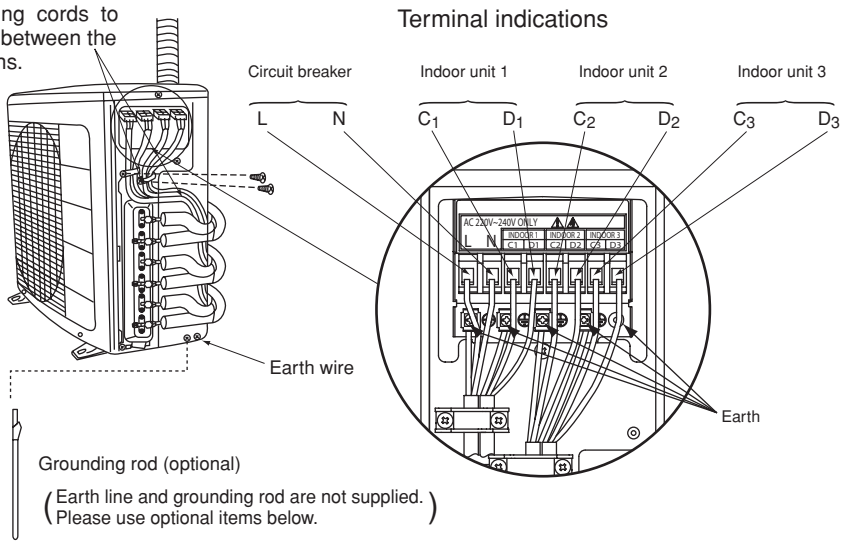


- Hold the handle of the side cover, slide down and take off the corner hook, then pull. Reverse these steps when installing.

Connection of the connecting cords and power cord. (Outdoor unit)
RAM-65QH4

⚠ 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.



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

⚠ CAUTION

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Wiring pattern
Indoor Unit

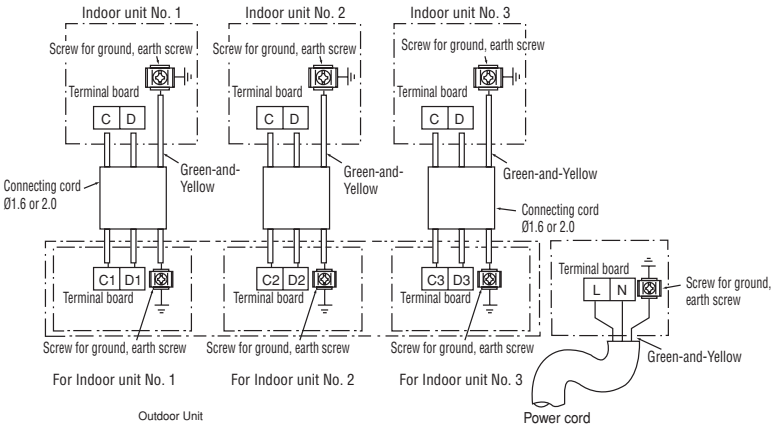
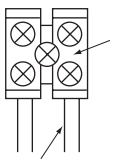


Fig. 1

⚠ WARNING

Connection of the power cord and connecting cord



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)
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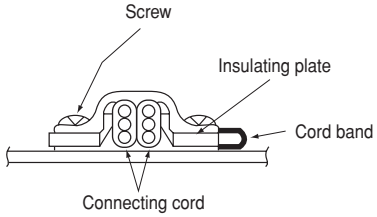

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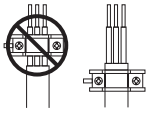
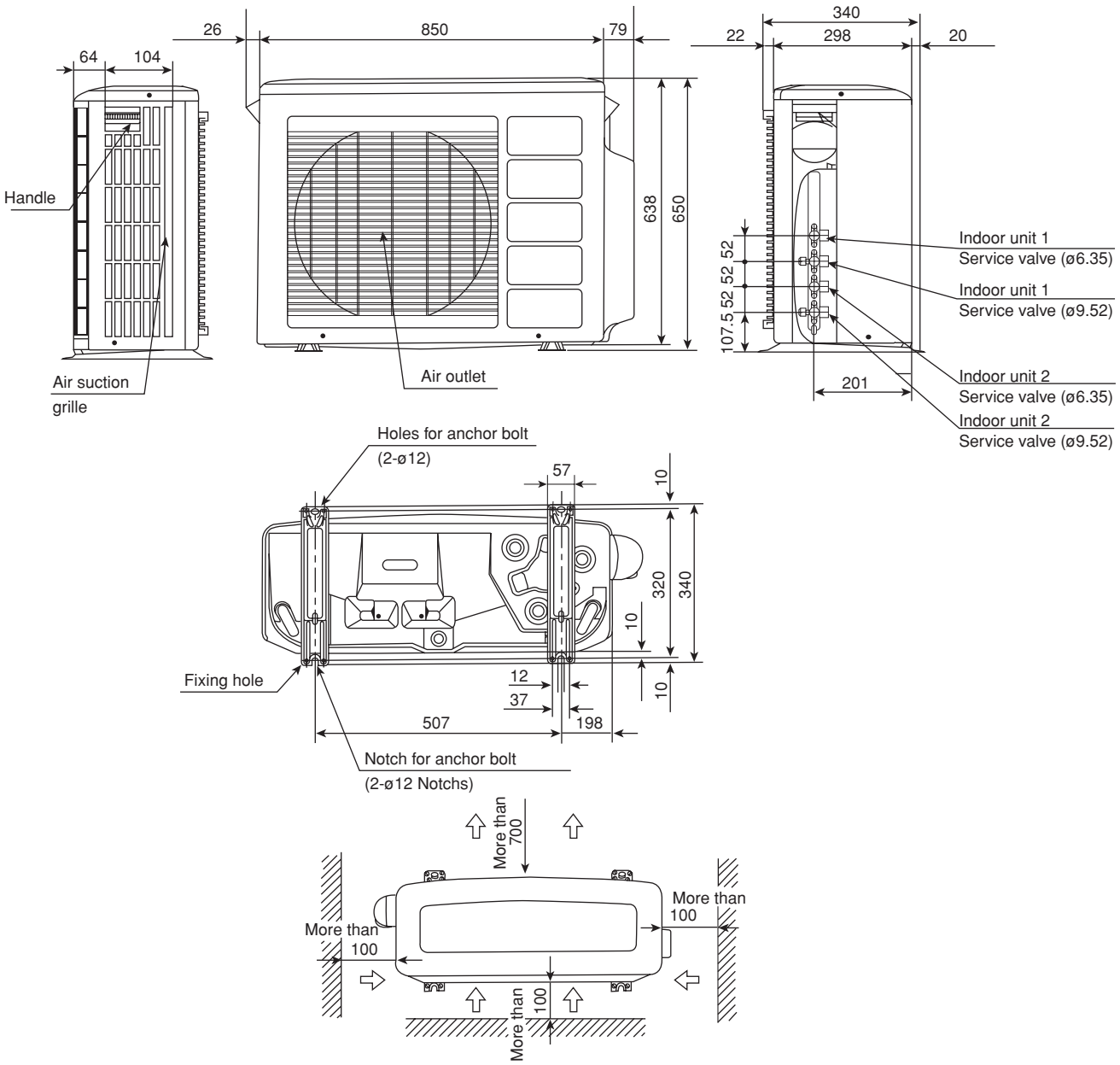


- Hold the handle of the side cover, slide down and take off the corner hook, then pull. Reverse these steps when installing.

CONSTRUCTION AND DIMENSIONAL DIAGRAM

MODEL RAM-55QH4

Unit: mm



Service space

Note:

1. Insulated pipes should be used for both small and large diameter pipes.
2. Piping length should be within 25m for one room and within 35m in total.
3. Height difference of piping between indoor unit and outdoor unit should be within 10m.
4. Overhead clearance of outdoor unit should be 200mm to allow servicing.
5. For electrical connection, please refer to the installation manual.

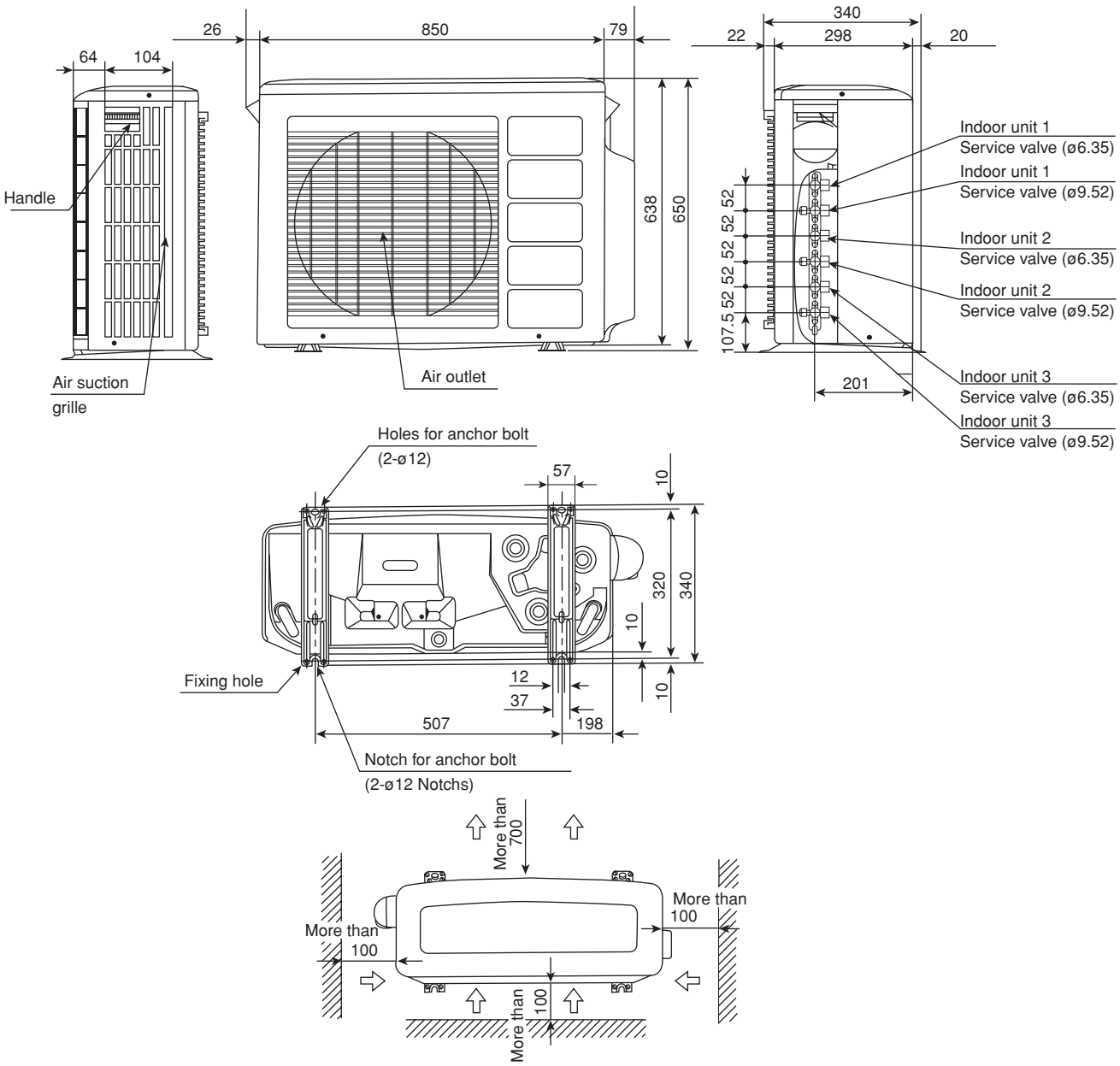
ATTENTION

During service, before opening the side cover, please switch off power supply.

CONSTRUCTION AND DIMENSIONAL DIAGRAM

MODEL RAM-65QH4

Unit: mm



Service space

Note:

1. Insulated pipes should be used for both small and large diameter pipes.
2. Piping length should be within 25m for one room and within 45m in total.
3. Height difference of piping between indoor unit and outdoor unit should be within 10m.
4. Overhead clearance of outdoor unit should be 200mm to allow servicing.
5. For electrical connection, please refer to the installation manual.

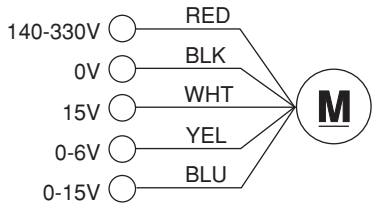
ATTENTION

During service, before opening the side cover, please switch off power supply.

MAIN PARTS COMPONENT

FAN MOTOR

Fan Motor Specifications

MODEL		RAM-55QH4 / RAM-65QH4
POWER SOURCE		DC : 140-330V
OUTPUT		40W
CONNECTION		 (Control circuit built in)
RESISTANCE VALUE (Ω)	20˚C (68˚F)	—
	75˚C (167˚F)	—

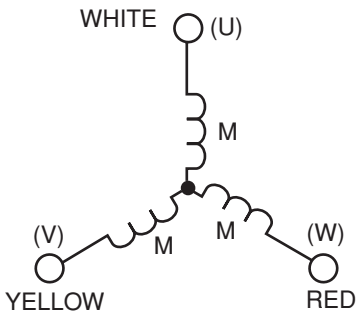
BLU : BLUE YEL : YELLOW BRN : BROWN WHT : WHITE

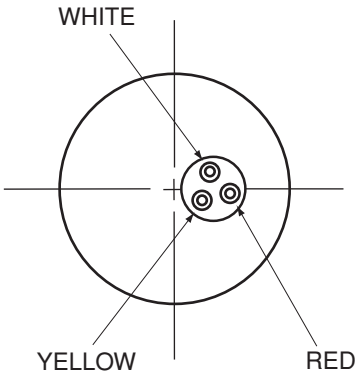
GRY : GRAY ORN : ORANGE GRN : GREEN RED : RED

BLK : BLACK PNK : PINK VIO : VIOLET

COMPRESSOR

Compressor Motor Specifications

MODEL		RAM-55QH4 / RAM-65QH4
COMPRESSOR MODEL		JU1013D2
PHASE		SINGLE
RATED VOLTAGE		DC: 280-330V
RATED FREQUENCY		50Hz
POLE NUMBER		4
CONNECTION		
RESISTANCE VALUE (Ω)	25°C (68°F)	2M = 1.063
	75°C (167°F)	2M = 1.268

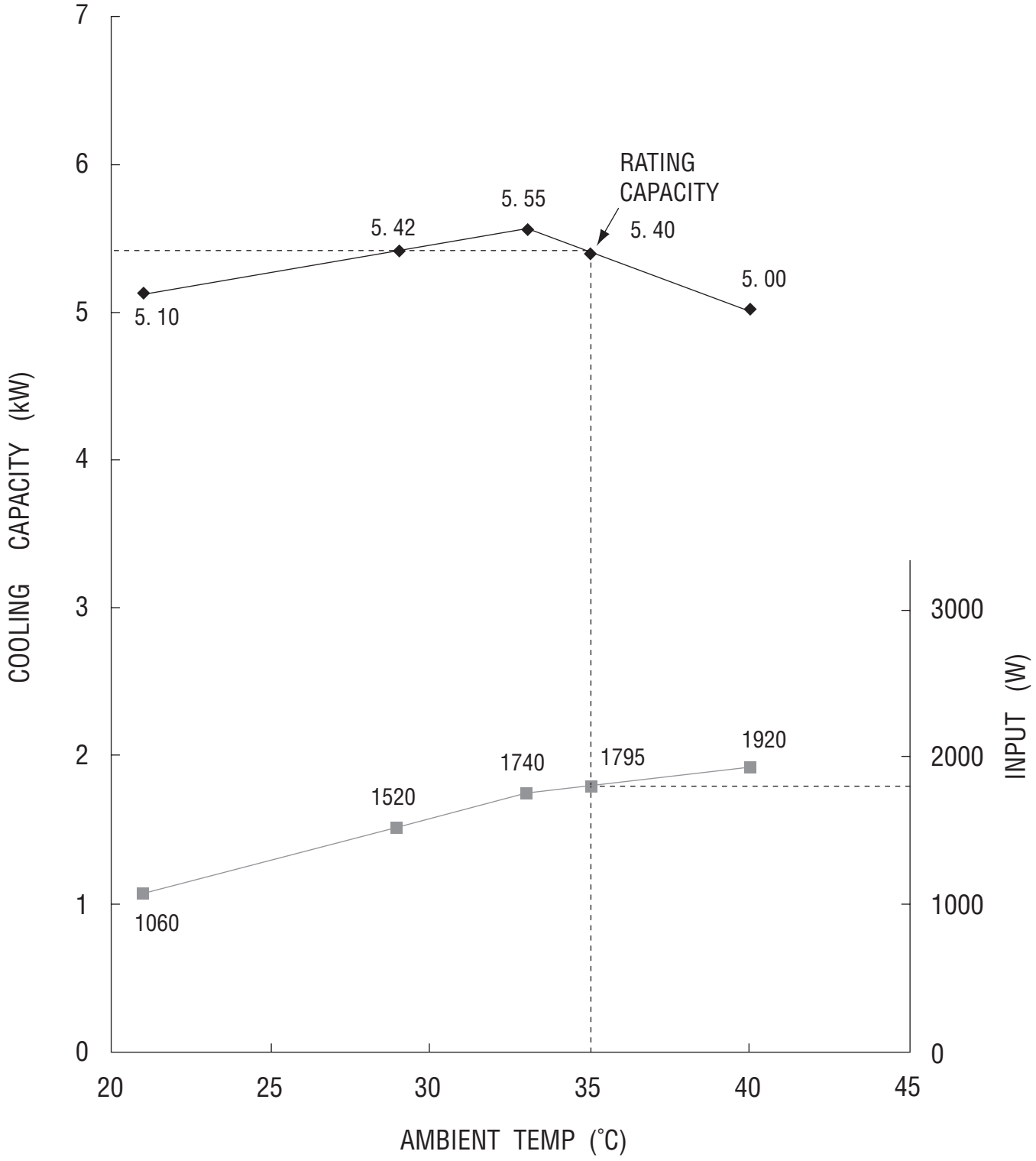


CAPACITY DIAGRAM (RELATED TO THE AMBIENT TEMPERATURE)

MODEL : RAM-55QH4

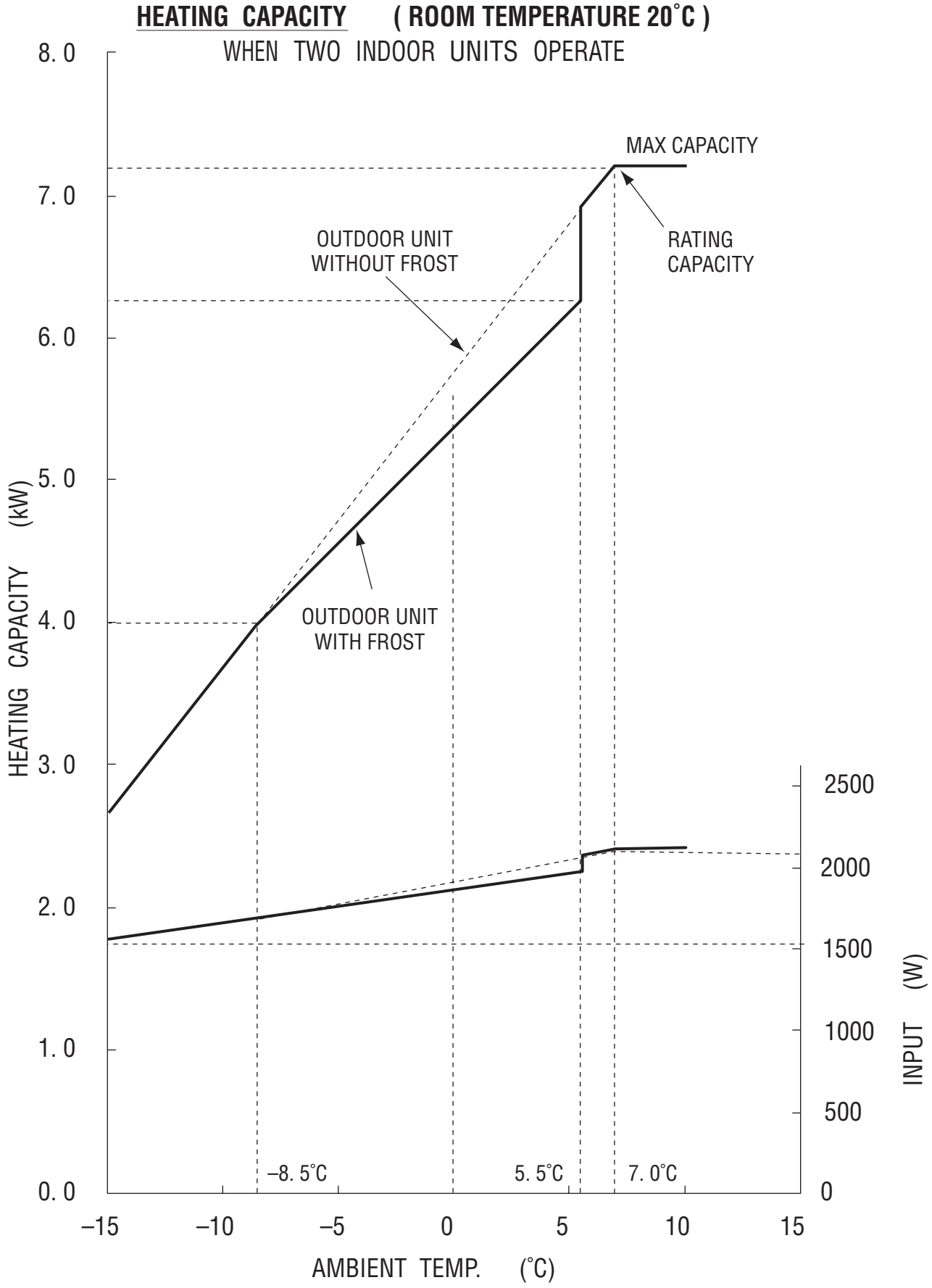
COOLING CAPACITY (ROOM TEMPERATURE 27˚C)

WHEN TWO INDOOR UNITS OPERATE



CAPACITY DIAGRAM (RELATED TO THE AMBIENT TEMPERATURE)

MODEL : RAM-55QH4

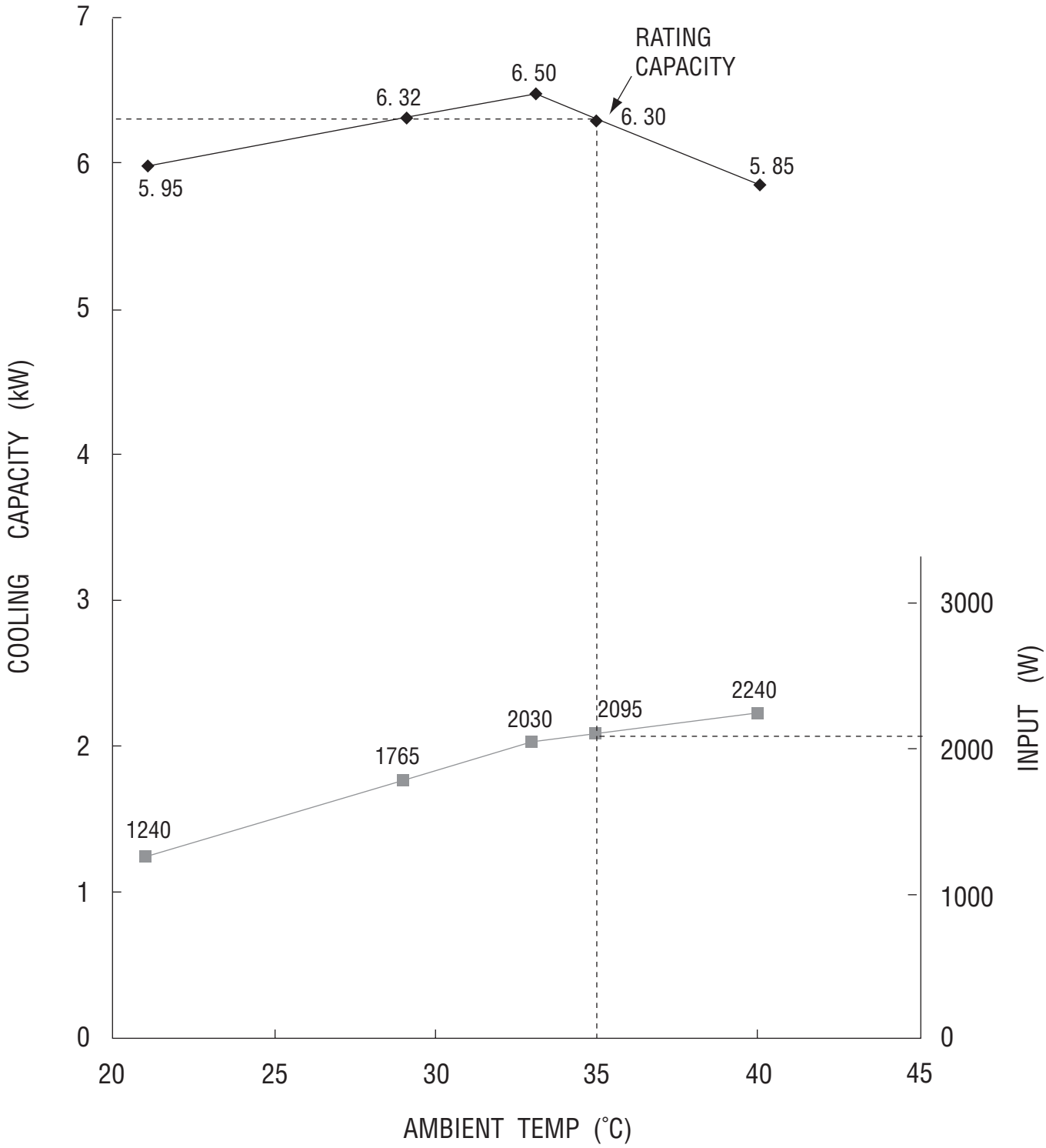


CAPACITY DIAGRAM (RELATED TO THE AMBIENT TEMPERATURE)

MODEL : RAM-65QH4

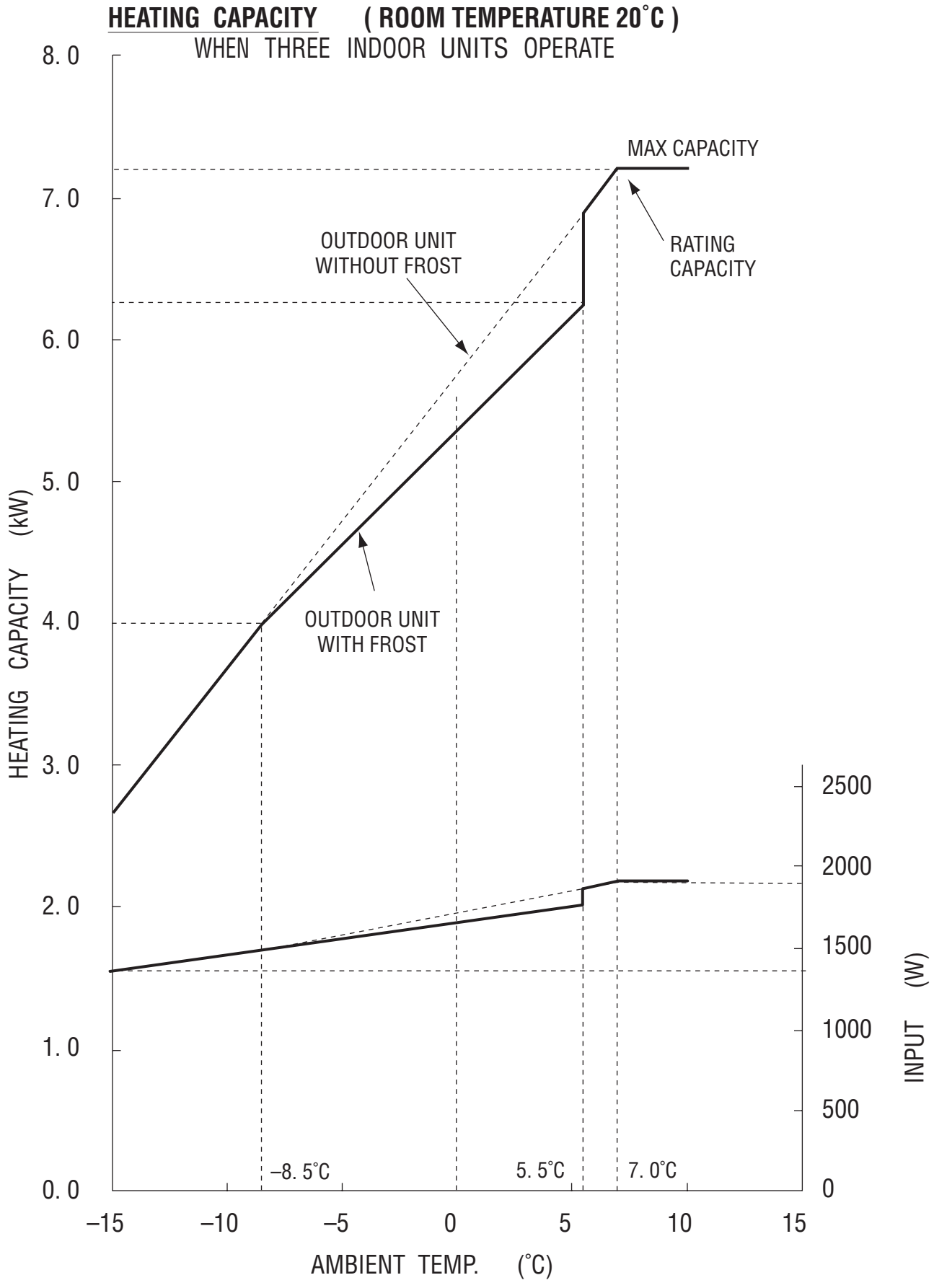
COOLING CAPACITY (ROOM TEMPERATURE 27˚C)

WHEN THREE INDOOR UNITS OPERATE



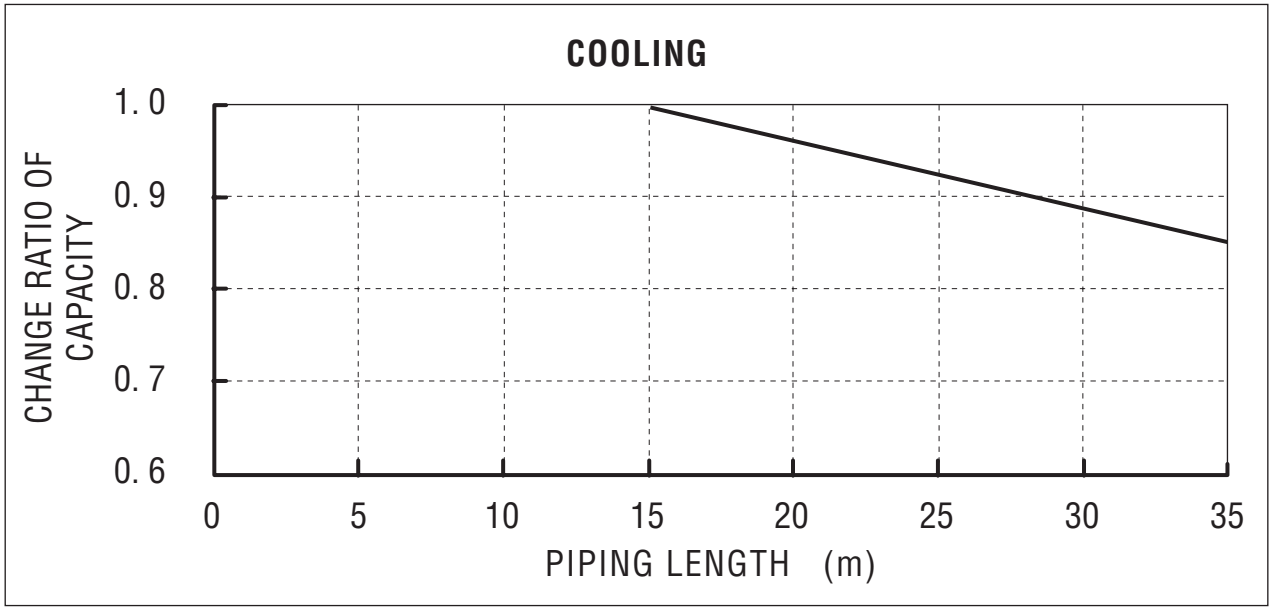
CAPACITY DIAGRAM (RELATED TO THE AMBIENT TEMPERATURE)

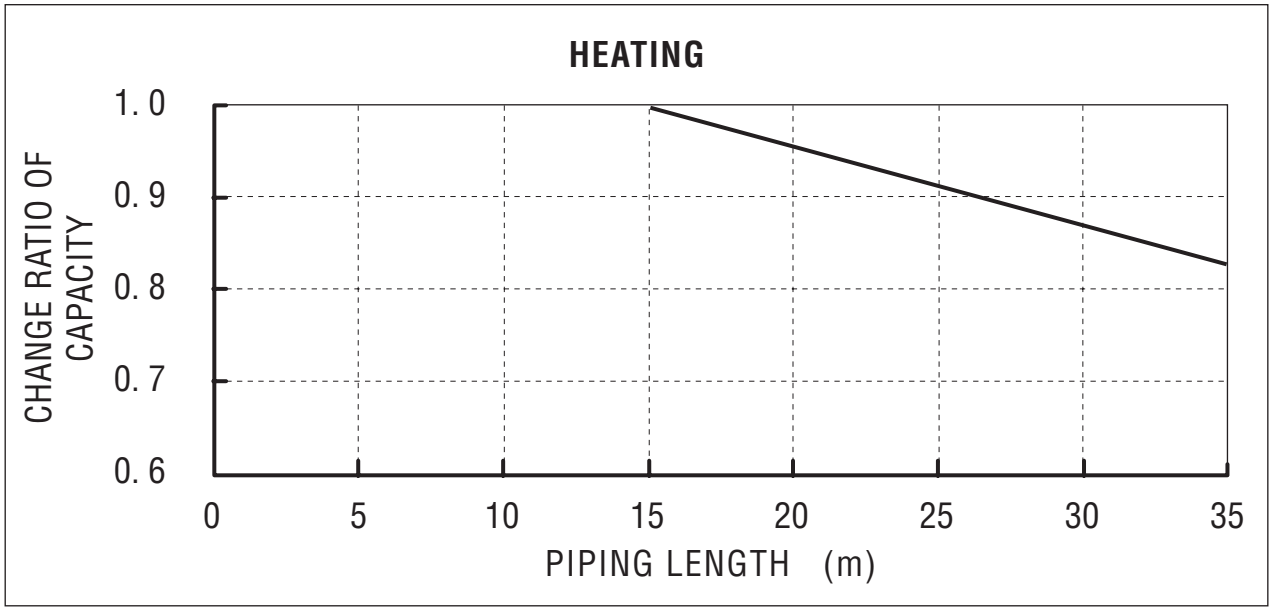
MODEL : RAM-65QH4



CAPACITY DIAGRAM (RELATED TO THE PIPING LENGTH)

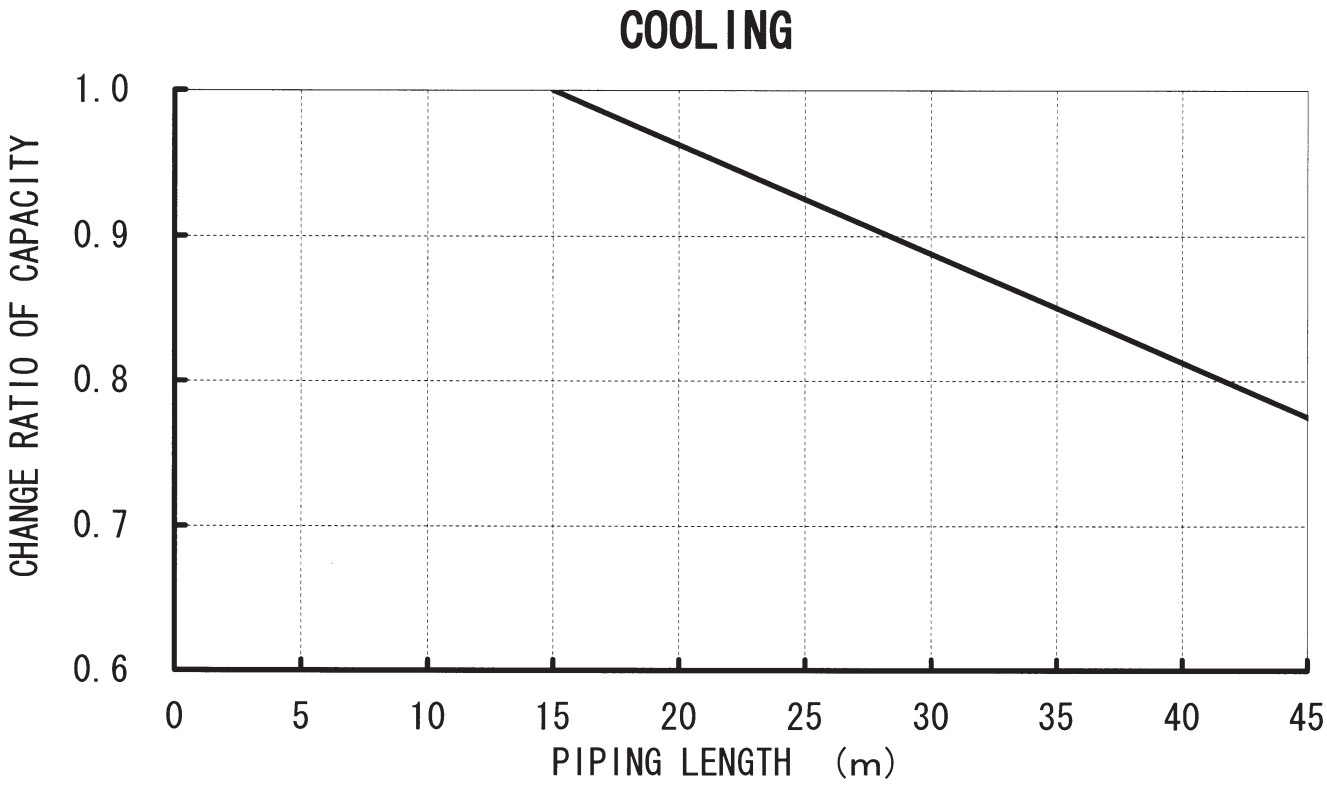
MODEL : RAM-55QH4

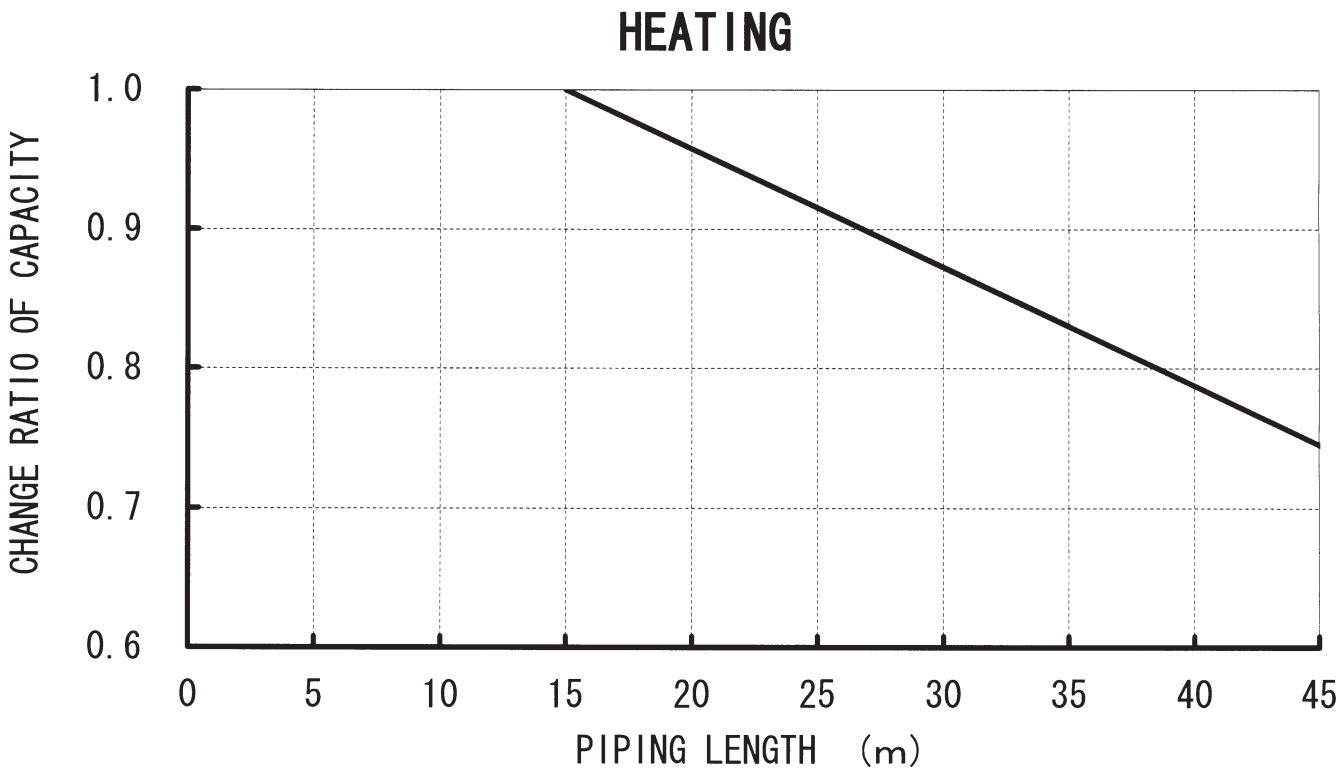




CAPACITY DIAGRAM (RELATED TO THE PIPING LENGTH)

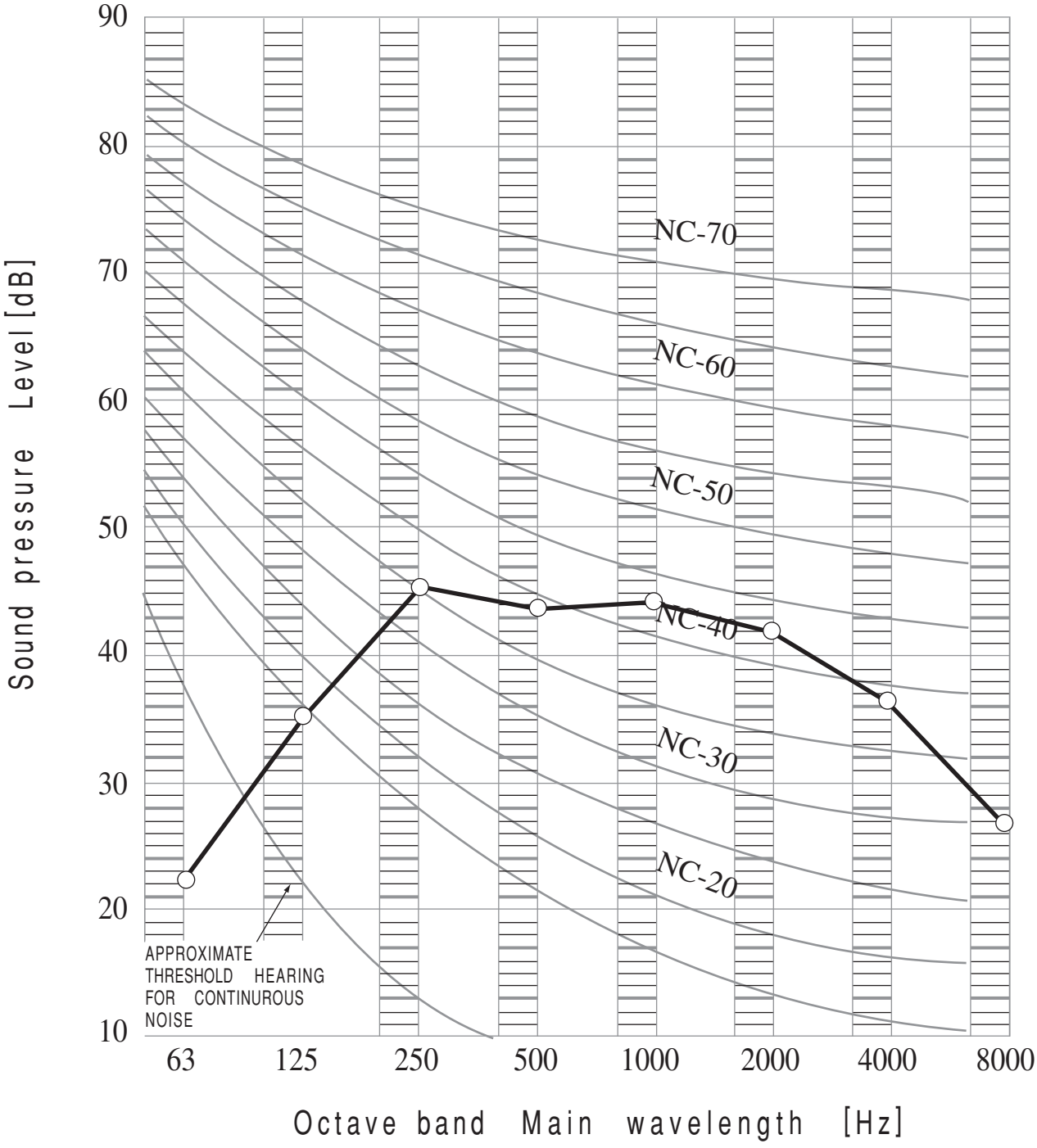
MODEL : RAM-65QH4





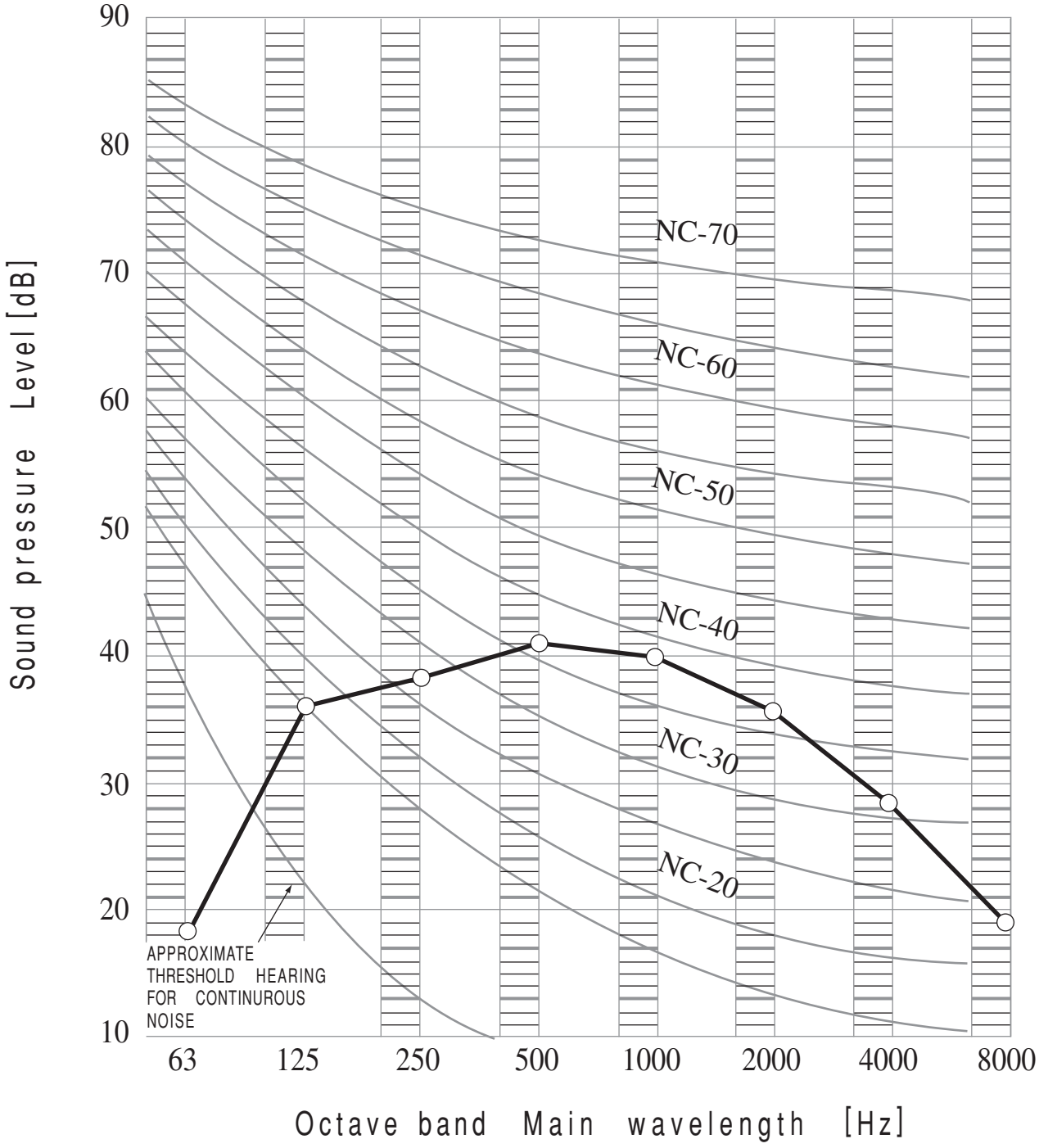
SOUND PRESSURE LEVEL

MODEL : RAM-55QH4 / RAM-65QH4 (Heating)



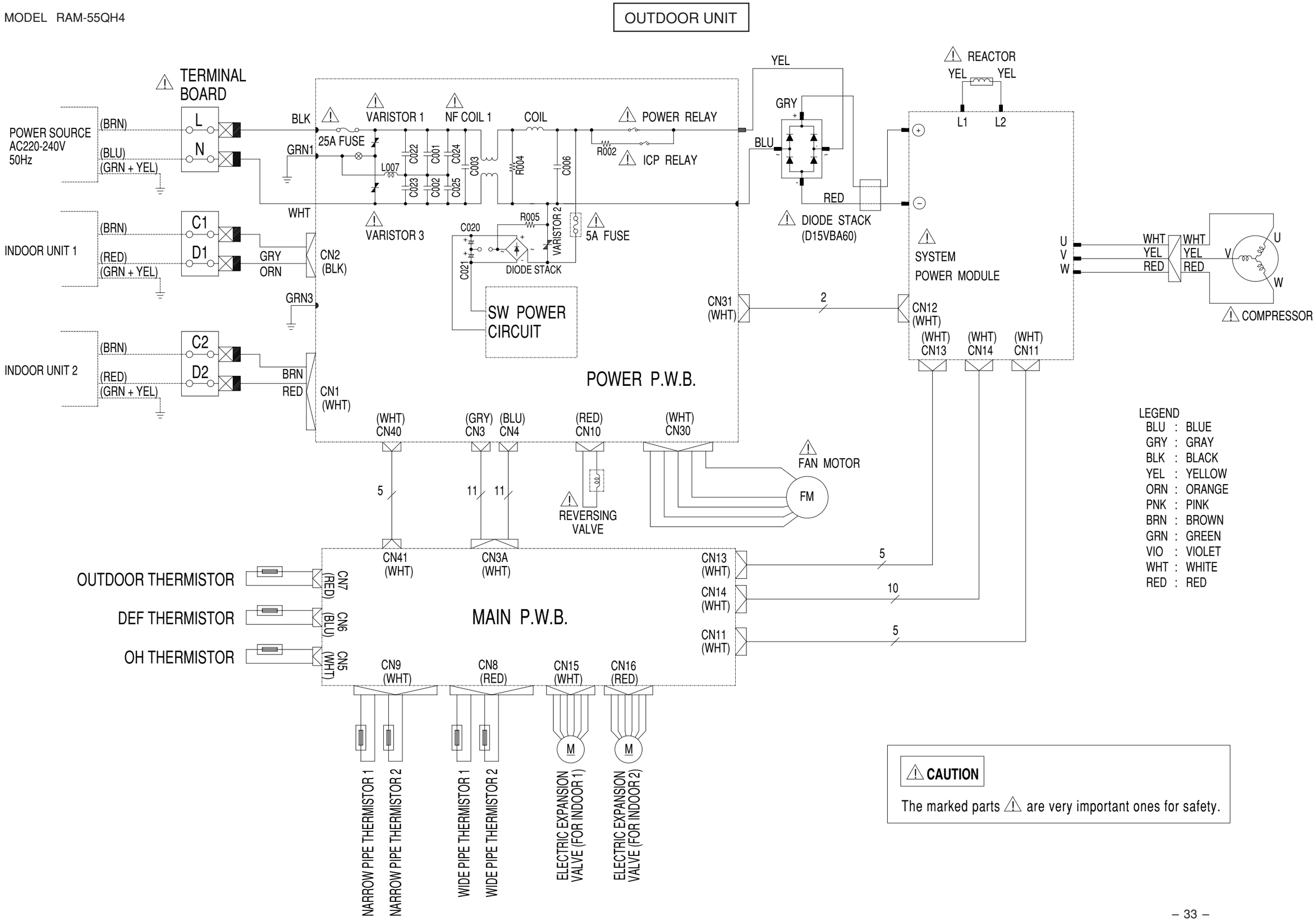
SOUND PRESSURE LEVEL

MODEL : RAM-55QH4 / RAM-65QH4 (Cooling)



WIRING DIAGRAM

MODEL RAM-55QH4



LEGEND

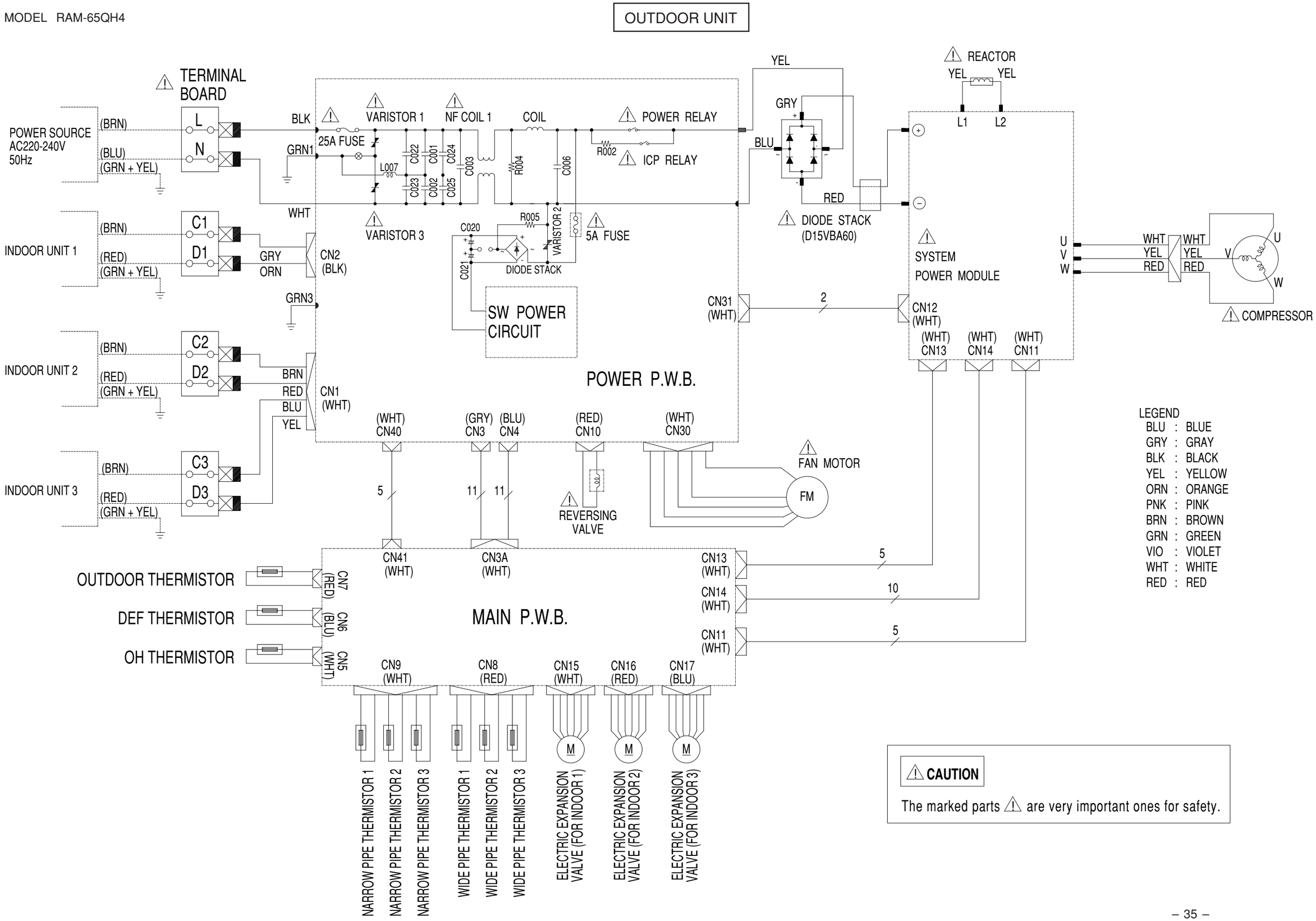
BLU	:	BLUE
GRY	:	GRAY
BLK	:	BLACK
YEL	:	YELLOW
ORN	:	ORANGE
PNK	:	PINK
BRN	:	BROWN
GRN	:	GREEN
VIO	:	VIOLET
WHT	:	WHITE
RED	:	RED

⚠ CAUTION

The marked parts ⚠ are very important ones for safety.

WIRING DIAGRAM

MODEL RAM-65QH4



LEGEND

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

⚠ CAUTION

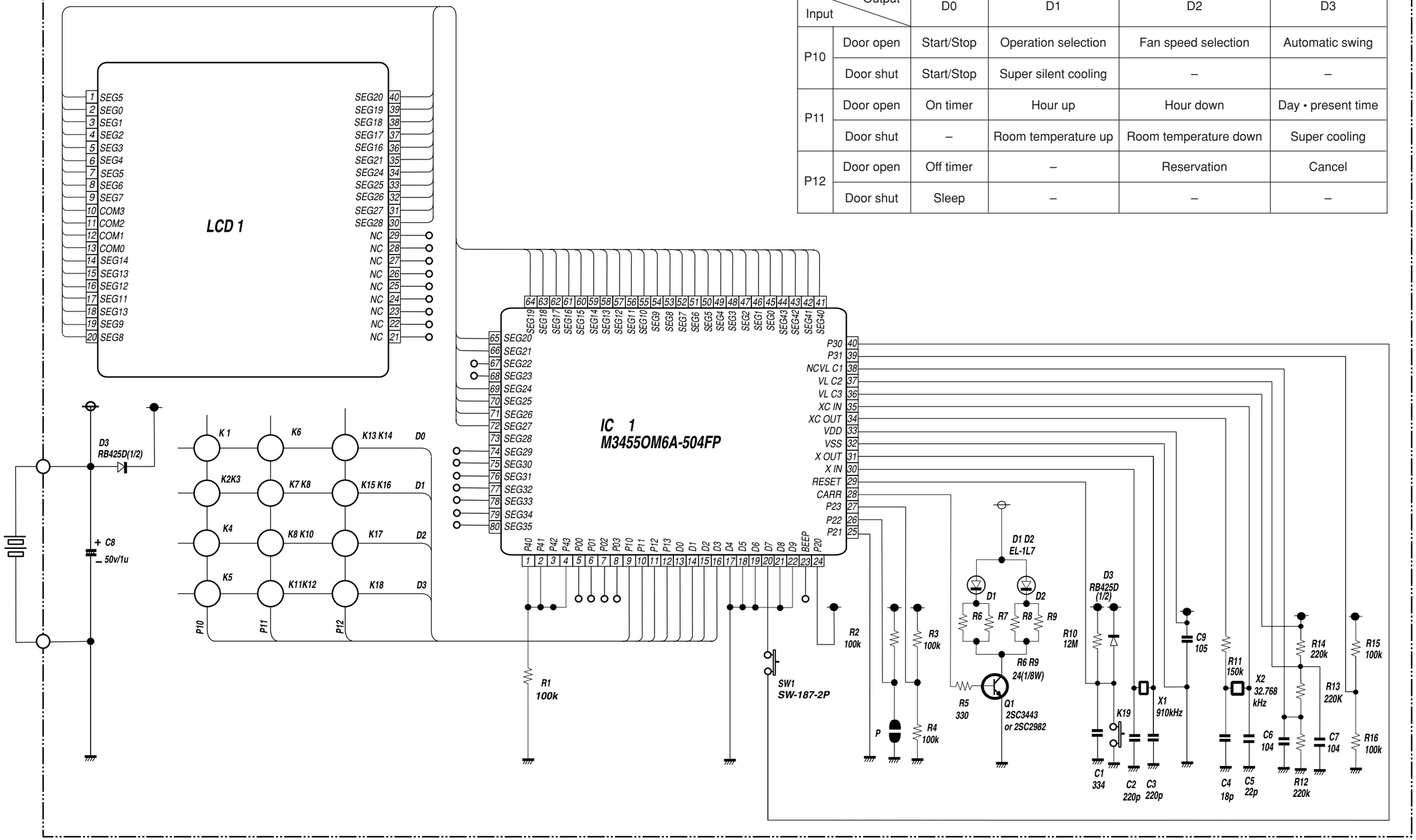
The marked parts ⚠ are very important ones for safety.

CIRCUIT DIAGRAM

Remote Control

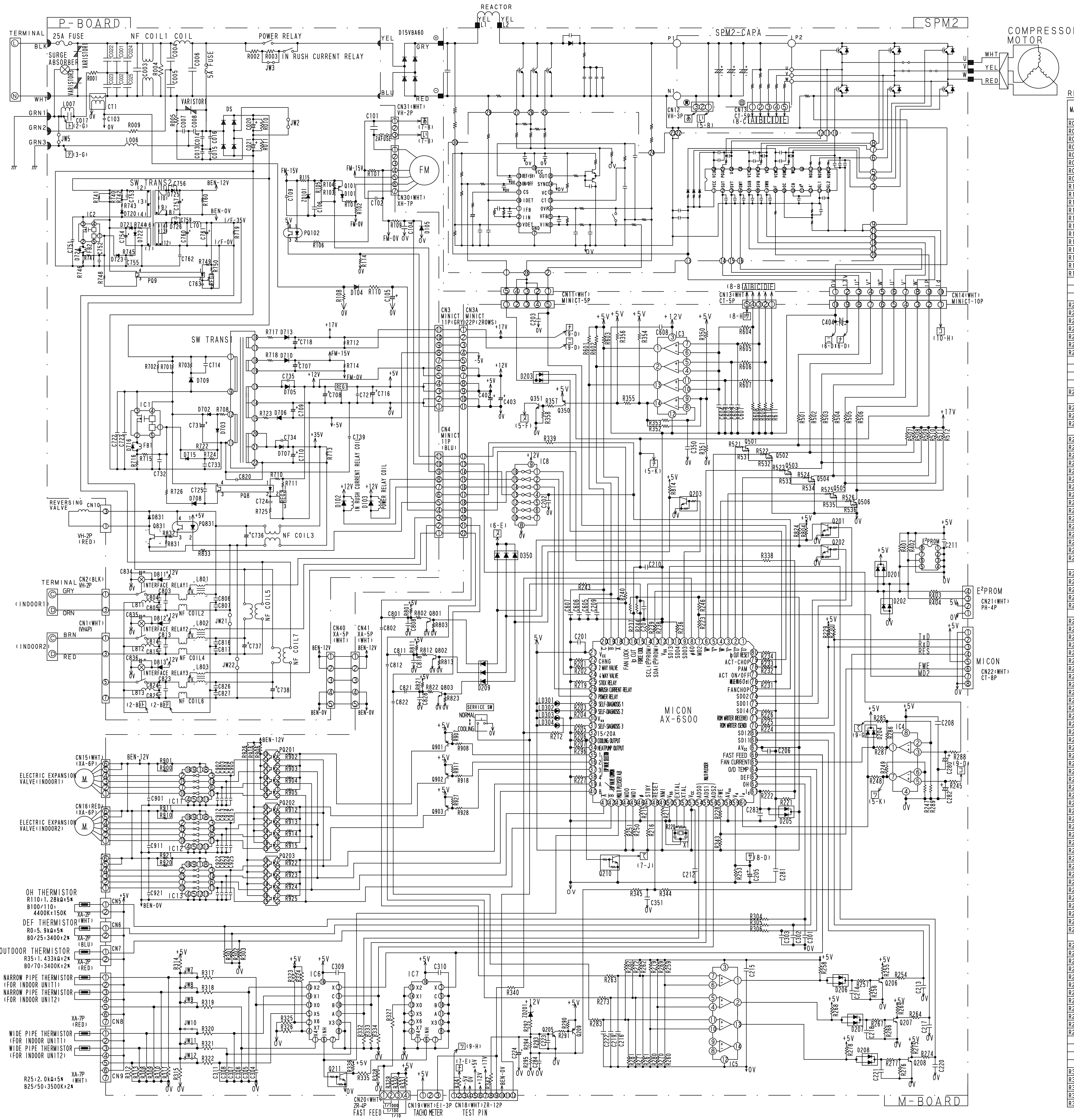
Key matrix table

Input \ Output		D0	D1	D2	D3
P10	Door open	Start/Stop	Operation selection	Fan speed selection	Automatic swing
	Door shut	Start/Stop	Super silent cooling	–	–
P11	Door open	On timer	Hour up	Hour down	Day • present time
	Door shut	–	Room temperature up	Room temperature down	Super cooling
P12	Door open	Off timer	–	Reservation	Cancel
	Door shut	Sleep	–	–	–



CIRCUIT DIAGRAM

MODEL RAM-55QH4



MOUNTING	PCB SET	TYPE
R - RADIAL	NO MARKING···#M-BOARDAS	F - FILM
C - CHIP	P···#P-BOARDAS	C - CERAMIC
A - AXIAL		D - ELECTROLYTIC
H - HAND INSERT		

RESISTOR

MARK	RATING Ω	%	W	MOUNTING	PCB SET	ASSY NO.	REMARK
R001	JUMPER WIRE		1/4	A	P	28	
R002	100	5%	10	H	P	14	
R003			10	H	P		
R004	470K	5%	1/2	A	P	15	
R005	2.2	5%	5	H	P	16	
R009			1/4	A	P		
R010	470K	5%	1/2	A	P	15	
R011	470K	5%	1/2	A	P	15	
R101	3.6K	1%	1/6	A	P	33	
R102	3K	1%	1/6	A	P	34	
R103	30K	5%	1/6	A	P	35	
R104	3.9K	5%	1/6	A	P	36	
R105	7.5K	5%	1/6	A	P	37	
R106	2.4K	5%	1/6	A	P	38	
R107	1	1%	2	R	P	39	
R108	1K	1%	1/6	A	P	40	
R109	510	5%	1/6	A	P	41	
R110	1.69K	1%	1/6	A	P	42	
R114	1K	5%	1/6	A	P	43	
R115	JUMPER WIRE			A	P		
R201	10K	5%	1/16	C		11	1608
R202	10K	5%	1/16	C		11	1608
R203	2K	5%	1/16	C		13	1608
R204	2K	5%	1/16	C		13	1608
R205	2K	5%	1/16	C		13	1608
R206	10K	5%	1/16	C		11	1608
R207	10K	5%	1/16	C		11	1608
R212	2K	5%	1/16	C		13	1608
R215	10K	5%	1/16	C		11	1608
R216	10K	5%	1/16	C		11	1608
R217	10K	5%	1/16	C		11	1608
R219	10K	5%	1/16	C		11	1608
R220	1M	5%	1/16	C		14	1608
R221	10K	1%	1/16	C		12	1608
R222	510	5%	1/16	C		16	1608
R223	100	5%	1/16	C		17	1608
R224	100	5%	1/16	C		17	1608
R225	100	5%	1/16	C		17	1608
R226	10K	5%	1/16	C		11	1608
R227	10K	5%	1/16	C		11	1608
R228	100	5%	1/16	C		17	1608
R229	10K	5%	1/16	C		11	1608
R230	10K	5%	1/16	C		11	1608
R231	10K	5%	1/16	C		11	1608
R232	10K	5%	1/16	C		11	1608
R233	100	5%	1/16	C		17	1608
R234	10K	5%	1/16	C		11	1608
R236	10K	5%	1/16	C		11	1608
R237	5.1K	5%	1/16	C		18	1608
R238	100	5%	1/16	C		17	1608
R239	100	5%	1/16	C		17	1608
R240	1K	5%	1/16	C		20	1608
R243	100	5%	1/16	C		17	1608
R244	2K	5%	1/16	C		13	1608
R245	5.1K	5%	1/16	C		18	1608
R246	10K	5%	1/16	C		11	1608
R247	3.16K	1%	1/16	C		19	1608
R248	1K	5%	1/16	C		20	1608
R249	20K	1%	1/16	C		21	1608
R250	10K	5%	1/16	C		11	1608
R251	10K	5%	1/16	C		11	1608
R253	3.32K	1%	1/16	C		22	1608
R254	100	5%	1/16	C		17	1608
R255	2K	5%	1/16	C		13	1608
R256	10K	5%	1/16	C		11	1608
R257	3K	5%	1/16	C		23	1608
R258	1K	5%	1/16	C		20	1608
R259	8.25K	1%	1/16	C		24	1608
R260	10K	1%	1/16	C		12	1608
R261	10K	1%	1/16	C		12	1608
R262	10K	1%	1/16	C		12	1608
R263	1K	5%	1/16	C		20	1608
R264	100	5%	1/16	C		17	1608
R265	2K	5%	1/16	C		13	1608
R266	10K	5%	1/16	C		11	1608
R267	3K	5%	1/16	C		23	1608
R268	1K	5%	1/16	C		20	1608
R269	8.25K	1%	1/16	C		24	1608
R270	10K	1%	1/16	C		12	1608
R271	10K	1%	1/16	C		12	1608
R272	10K	1%	1/16	C		12	1608
R273	1K	5%	1/16	C		20	1608
R274	100	5%	1/16	C		17	1608
R275	2K	5%	1/16	C		13	1608
R276			1/16	C			1608
R277			1/16	C			1608
R278			1/16	C			1608
R279	8.25K	1%	1/16	C		24	1608
R280	10K	1%	1/16	C		12	1608
R281	10K	1%	1/16	C		12	1608
R282			1/16	C			1608
R283			1/16	C			1608
R285			1/16	C			1608
R286	2K	1%	1/16	C		46	1608
R287	2K	5%	1/16	C		13	1608
R288	1K	5%	1/16	C		20	1608
R289	1K	1%	1/16	C		47	1608
R290	10K	5%	1/16	C		11	1608
R291	4.7K	5%	1/16	C		29	1608
R292	3K	5%	1/16	C		23	1608
R293	1.6K	5%	1/16	C		30	1608
R294	27K	5%	1/16	C		31	1608
R295	5.1K	5%	1/16	C		18	1608
R296	10K	5%	1/16	C		11	1608
R301	3.74K	1%	1/16	C		32	1608
R302	3.01K	1%	1/16	C		33	1608
R303	3.01K	1%	1/16	C		33	1608
R304	100	5%	1/16	C		17	1608
R305	100	5%	1/16	C		17	1608

RESISTOR

MARK	RATING Ω	%	W	MOUNTING	PCB SET	ASSY NO.	REMARK
R306	100	5%	1/16	C		17	1608
R308	2K	2%	1/16	C		34	1608
R309	2K	2%	1/16	C		34	1608
R310	2K	2%	1/16	C		34	1608
R311	2K	2%	1/16	C		34	1608
R312	2K	2%	1/16	C		34	1608
R313	2K	2%	1/16	C		34	1608
R314			1/16	C			1608
R315			1/16	C			1608
R317	1K	5%	1/16	C		20	1608
R318	1K	5%	1/16	C		20	1608
R319	1K	5%	1/16	C		20	1608
R320	1K	5%	1/16	C		20	1608
R321	1K	5%	1/16	C		20	1608
R322	1K	5%	1/16	C		20	1608
R323			1/16	C			1608
R324			1/16	C			1608
R325	10K	5%	1/16	C		11	1608
R326	10K	5%	1/16	C		11	1608
R327	1K	5%	1/16	C		20	1608
R328	2.7K	5%	1/16	C		36	1608
R329	470	5%	1/16	C		37	1608
R330	1.6K	5%	1/16	C		30	1608
R331	4.3K	5%	1/16	C		38	1608
R332	10K	5%	1/16	C		11	1608
R333	10K	5%	1/16	C		11	1608
R334	10K	5%	1/16	C		11	1608
R335	100	5%	1/16	C		17	1608
R336	2K	5%	1/16	C		13	1608
R338	JUMPER	5%	1/16	C		26	1608
R339			1/16	C			1608
R340	100	5%	1/16	C		17	1608
R341	100	5%	1/16	C		17	1608
R342	100	5%	1/16	C		17	1608
R343	10K	5%	1/16	C		11	1608
R344	100	5%	1/16	C		17	1608
R345	5.1K	5%	1/16	C		18	1608
R350	120K	1%	1/16	C		41	1608
R351	120K	1%	1/16	C		41	1608
R352	120K	1%	1/16	C		41	1608
R353	120K	1%	1/16	C		41	1608
R354	4.3K	2%	1/16	C		39	1608
R355	4.3K	5%	1/16	C		38	1608
R356	10K	5%	1/16	C		11	1608
R357	2K	5%	1/16	C		13	1608
R358	3K	5%	1/16	C		23	1608
R401	5.1K	5%	1/16	C		18	1608
R402	5.1K	5%	1/16	C		18	1608
R403	390	5%	1/16	C		25	1608
R404	390	5%	1/16	C		25	1608
R501	1K	5%	1/16	C		20	1608
R502	1K	5%	1/16	C		20	1608
R503	1K	5%	1/16	C		20	1608
R504	1K	5%	1/16	C		20	1608
R505	1K	5%	1/16	C		20	1608
R506	1K	5%	1/16	C		20	1608
R507	5.1K	5%	1/8	C		45	3216
R508	5.1K	5%	1/8	C		45	3216
R509	5.1K	5%	1/8	C		45	3216
R510	5.1K	5%	1/8	C		45	3216
R511	5.1K	5%	1/8	C		45	3216
R512	5.1K	5%	1/8	C		45	3216
R521	10K	5%	1/16	C		11	1608
R522	10K	5%	1/16	C		11	1608
R523	10K	5%	1/16	C		11	1608
R524	10K	5%	1/16	C		11	1608
R525	10K	5%	1/16	C		11	1608
R526	10K	5%	1/16	C		11	1608
R531	5.1K	5%	1/16	C		18	1608
R532	5.1K	5%	1/16	C		18	1608
R533	5.1K	5%	1/16	C		18	1608
R534	5.1K	5%	1/16	C		18	1608
R535	5.1K	5%	1/16	C		18	1608
R536	5.1K	5%	1/16	C		18	1608
R601	2K	5%	1/16	C		13	1608
R602	2K	5%	1/16	C		13	1608
R603	2K	5%	1/16	C		13	1608
R604	100	5%	1/16	C		17	1608
R605	100	5%	1/16	C		17	1608
R606	100	5%	1/16	C		17	1608
R607	100	5%	1/16	C		17	1608
R608	4.02K	1%	1/16	C		44	1608
R609	4.02K	1%	1/16	C		44	1608
R610	4.02K	1%	1/16	C		44	1608
R611	4.02K	1%	1/16	C		44	1608
R701	1M	5%	1/2	A	P	44	
R702	1M	5%	1/2	A	P	44	
R703	100K	5%	2	A	P	29	
R708	10	5%	1/4	A	P	18	
R710	1.8K	5%	1/4	A	P	19	
R711	75	5%	1/6	A	P	20	
R712	3.3K	5%	1/4	A	P	21	
R713	8.2K	5%	1	H	P	22	
R714	3.3K	5%	1/4	A	P	21	
R715	680	5%	1/4	A	P	23	
R716	0.56	5%	1	A	P	24	
R717	JUMPER WIRE		1/4	A	P		
R718	8.2	5%	1/4	A	P	25	
R719	8.2K	5%	1	H	P	22	
R722	2.7K	5%	1/4	A	P	27	
R723	33	5%	1/6	A	P	26	
R724	2.7K	5%	1/4	A	P	27	
R725	JUMPER WIRE		1/4	A	P		
R726	3.3K	5%	1/4	A	P	21	
R740	820K	5%	1/2	A	P	17	
R741	820K	5%	1/2	A	P	17	
R742	820K	5%	1/4	A	P	45	
R743	47	5%	1/2	A	P	46	
R744	10	2%	1/4	A	P	47	
R745	2K	5%	1/6	A	P	48	
R746	0.33	5%	1	A	P	49	
R747	680	5%	1/4	A	P	50	
R748	3.3K	5%	1/4	A	P	21	

RESISTOR

MARK	RATING Ω	%	W	MOUNTING	PCB SET	ASSY NO.	REMARK
R749	4.7K	5%	1/4	A	P	51	
R750	150	5%	1/4	A	P	52	
R760	100K	5%	1/4	A	P	53	
R801	39	5%	1/4	C		43	3225
R802	39	5%	1/4	C		43	3225
R803	3K	5%	1/16	C		23	1608
R804	3K	5%	1/16	C		23	1608
R811	39	5%	1/4	C		43	3225
R812	39	5%	1/4	C		43	3225
R813	3K	5%	1/16	C		23	1608
R814	3K	5%	1/16	C		23	1608
R821			1/4	C			3225
R822			1/4	C			3225
R823			1/16	C			1608
R824	3K	5%	1/16	C		23	1608
R831	10K	5%	1/6	A	P	30	
R832	7.5K	5%	1/2	A	P	31	
R833	620	5%	1/6	A	P	32	
R900	200	5%	1/10	C		15	2125
R901	200	5%	1/10	C		15	2125
R902	510	5%	1/16	C		16	1608
R903	510	5%	1/16	C		16	1608
R904	510	5%	1/16	C		16	1608
R905	510	5%	1/16	C		16	1608
R906	1K	5%	1/10	C		48	2125
R907	10K	5%	1/16	C		11	1608
R908	3K	5%	1/16	C		23	1608
R910	200	5%	1/10	C		15	2125
R911	200	5%	1/10	C		15	2125
R912	510	5%	1/16	C		16	1608
R913	510	5%	1/16	C		16	1608
R914	510	5%	1/16	C		16	1608
R915	510	5%	1/16	C		16	1608
R916	1K	5%	1/10	C		48	2125
R917	10K	5%	1/16	C		11	1608
R918	3K	5%	1/16	C		23	1608
R920			1/10	C			2125
R921			1/10	C			2125
R922			1/16	C			1608
R923			1/16	C			1608
R924			1/16	C			1608
R925			1/16	C			1608
R926			1/10	C			2125
R927	10K	5%	1/16	C		11	1608
R928	3K	5%	1/16	C		23	1608

CAPACITOR

MARK	RATING F	V	TYPE	MOUNTING	PCB SET	ASSY NO.	MODEL	REMARK
C001	0.01μ	AC250	C	R	P	75		
C002	0.01μ	AC250	C	R	P	75		
C003	0.68μ	630	F	H	P	58		
C004			C	R	P			
C005			C	R	P			
C006	3.3μ	AC300	F	H	P	59		
C007	0.01μ	AC250	C	R	P	75		
C008	0.01μ	AC250	C	R	P	75		
C010			D	H	P			
C011			F	H	P			
C013	0.01μ	AC250	C	R	P	75		
C014	0.01μ	AC250	C	R	P	75		
C015			C	R	P			
C016			C	R	P			
C017	0.01μ	AC250	C	R	P	75		
C020	0.01μ	AC250	D	H	P	75	KMX	
C021	0.01μ	AC250	D	H	P	75	KMX	
C101	0.082μ	630	F	H	P	80		
C102		50	C	R	P			
C103	0.1μ	50	C	R	P	56		
C104	1000p	50	C	R	P	69		
C105	100μ	10	D	R	P	57		
C106		50	C	R	P			
C109	0.1μ	50	C	R	P	56		
C201	0.1μ	25	C	C		51		1608
C202	2200p	25	C	C		50		1608
C203	2200p	25	C	C		50		1608
C205	0.1μ	50	D	C		67	WX	φ4
C206	0.1μ	25	C	C		51		1608
C207	0.047μ	50	C	C		53		1608
C208	0.1μ	25	C	C		51		1608
C209	0.1μ	25	C	C		51		1608
C210	0.047μ	50	C	C		53		1608
C211	0.1μ	25	C	C		51		1608
C212	0.1μ	25	C	C		51		1608
C213	0.047μ	50	C	C		53		1608
C214	0.068μ	16	C	C		55	B	1608
C215	0.1μ	25	C	C		51		1608
C216	4700p	50	C	C		56	B	1608
C217	0.047μ	50	C	C		53		1608
C218	0.068μ	16	C	C		55	B	1608
C219	4700p	50	C	C		56	B	1608
C220			C	C				1608
C221			C	C			B	1608
C222			C	C			B	1608
C223	0.1μ	25	C	C		51		1608
C224	10μ	16	D	C		52	WX	φ3
C280	2.2μ	50	D	C		54	WX	φ4
C281	0.01μ	50	C	C		66	R	1608
C282	22μ	6.3	D	C		57	WX	φ4
C283	0.1μ	25	C	C		51		1608
C284	0.1μ	25	C	C		51		1608
C301	0.1μ	25	C	C		51		1608
C302	0.1μ	25	C	C		51		1608
C303	0.1μ	25	C	C		51		1608
C304	1μ	16	C	C		58		2125
C305	1μ	16	C	C		58		2125
C306	1μ	16	C	C		58		2125
C307	1μ	16	C	C		58		2125
C308	1μ	16	C	C		58		2125
C309	0.1μ	25	C	C		51		1608
C310	0.1μ	25	C	C		51		1608
C311	1μ	16	C	C		58		2125

CAPACITOR

MARK	RATING F	V	TYPE	MOUNTING	PCB SET	ASSY NO.	MODEL	REMARK
C350	150p	50	C	C		69	CH	1608
C351	0.047μ	50	C	C		53		1608
C402	100μ	10	D	C		59	WX	φ6.3
C403	100μ	25	D	C		60	WX	φ8
C404	33μ	25	D	C		61	WX	φ6.3
C601	680p	50	C	C		62	CH	2125
C602	680p	50	C	C		62	CH	2125
C603	680p	50	C	C		62	CH	2125
C604	680p	50	C	C		62	CH	2125
C605	1000p	50	C	C		63	B	1608
C606	1000p	50	C	C		63	B	1608
C607	1000p	50	C	C		63	B	1608
C608	0.1μ	25	C	C		51		1608
C707	330μ	25	D	R	P	62	PF	
C708	330μ	25	D	R	P	62	PF	
C709	180μ	10	D	R	P	63	PF	
C710	330μ	50	D	R	P	64	PF	
C714	0.01μ	1KV	C	H	P	73		
C716	330μ	10	D	R	P	65	PF	
C718	220μ	25	D	R	P	66	PF	
C721	0.1μ	50	C	R	P	56		
C722			C	R	P			
C723	470p	2KV	C	R	P	67		
C724	0.1μ	50	C	R	P	56		
C725			C	R	P			
C731	330μ	25	D	R	P	62	PF	
C732	470p	50	C	R	P	68	E	
C733	1000p	50	C	R	P	69	E	
C734	1000p	AC250	C	R	P	70		
C735	1000p	50	C	R	P	69	E	
C736	68μ	50	D	R	P	71	PF	
C737	68μ	50	D	R	P	71	PF	
C738			D	R	P		PF	
C739	470p	AC250	C	H	P	76		
C751	0.00068μ	2K	C	R	P	81		
C752	470p	50	C	R	P	68		
C753	0.01μ	AC250	C	R	P	74		
C754	330μ	25	D	R	P	85		
C755	0.00033μ	50	C	R	P	82		
C756	1000p	50	C	R	P	69		
C757	330μ	25	D	R	P	62	PF	
C759	0.001μ	AC250	C	R	P	83		
C760	470μ	50	D	R	P	84	PF	
C761	470μ	50	D	R	P	84	PF	
C762	470p	AC250	C	R	P	76		
C763	0.1μ	50	C	R	P	56		
C801	0.15μ	50	F	C		64		6041
C802	0.022μ	16	F	C		65		3216
C803	0.15μ	50	F	R	P	72		
C804	0.01μ	AC250	C	H	P	75		
C805	0.01μ	AC250	C	H	P	75		
C806	0.01μ	AC250	C	H	P	74		
C807	0.01μ	AC250	C	H	P	74		
C808	0.1μ	25	C	C		51		1608
C811	0.15μ	50	F	C		64		6041
C812	0.022μ	16	F	C		65		3216
C813	0.15μ	50	F	R	P	72		
C814	0.01μ	AC250	C	H	P	75		
C815	0.01μ	AC250	C	H	P	75		
C816	0.01μ	AC250	C	H	P	74		
C817	0.01μ	AC250	C	H	P	74		
C818	0.1μ	25	C	C		51		1608
C820	470p	AC250	C	H	P	76		
C821			F	C				6041
C822			F	C				3216
C823			F	R	P			
C824			C	H	P			
C825			C	H	P			
C826			C	H	P			
C827			C	H	P			
C828			C	C				1608
C834	100μ	25	D	R	P	86		
C835	100μ	25	D	R	P	86		
C836			D	R	P			
C901	0.1μ	25	C	C		51		1608
C902	0.01μ	50	C	C		68		1608
C903	0.01μ	50	C	C		68		1608
C904	0.01μ	50	C	C		68		1608
C905	0.01μ	50	C	C		68		1608
C911	0.1μ	25	C	C		51		1608
C912	0.01μ	50	C	C		68		1608
C913	0.01μ	50	C	C		68		1608
C914	0.01μ	50	C	C		68		1608
C915	0.01μ	50	C	C		68		1608
C921			C	C				1608
C922			C	C				1608
C923			C	C				1608
C924			C	C				1608
C925			C	C				1608

FUSE

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
2AFUSE	RRPN2038	H	P	124	
5AFUSE	RRPN2586	H	P	125	
25AFUSE	RRPN1220	H	P	127	

DIODE STACK

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
DS	DX15XB60	H	P	103	

RELAY

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
INTERFACE RELAY1	RRRB1319	H	P	142	
INTERFACE RELAY2	RRRB1330	H	P	146	
INTERFACE RELAY3		H	P		
CURRENT RELAY	RRRB1330	H	P	146	
POWER RELAY	RRRB1313	H	P	143	

TRANSISTOR

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
Q101	2SA673	R	P	105	
Q201	RN1402	C		81	SC-59
Q202	RN1402	C		81	SC-59
Q203	RN1402	C		81	SC-59
Q205	2SC2462LC	C		82	MPAK
Q206	2SC2462LC	C		82	MPAK
Q207	2SC2462LC	C		82	MPAK
Q208		C			MPAK
Q209	2SA1121SC	C		83	MPAK
Q210		C			SC-59
Q211	RN1402	C		81	SC-59
Q350	2SA1121SC	C		83	MPAK
Q351	2SC2462LC	C		82	MPAK
Q501	2SC2462LC	C		82	MPAK
Q502	2SC2462LC	C		82	MPAK
Q503	2SC2462LC	C		82	MPAK
Q504	2SC2462LC	C		82	MPAK
Q505	2SC2462LC	C		82	MPAK
Q506	2SC2462LC	C		82	MPAK
Q801	2SC2618RC	C		85	
Q802	2SC2618RC	C		85	
Q803	2SC2618RC	C		85	
Q831	2SC1214CT	R	P	104	
Q901	2SA1121SC	C		83	MPAK
Q902	2SA1121SC	C		83	MPAK
Q903		C			MPAK

ZENER DIODE

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
ZD101		A	P		
ZD201	RLZ6.8A	C		91	LLDS

LED

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
LD301	LT1D67A	C		92	RED
LD302	LT1D67A	C		92	RED
LD303	LT1D67A	C		92	RED
LD304	LT1K67A	C		93	GRN

INDUCTOR

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
L006	EXCELSA35V	A	P	139	
L007		A	P		
L701	JUMPER WIRE	A	P		
L811	FB-HF70BTL	A	P	135	
L812	FB-HF70BTL	A	P	135	
L813		A	P		
FB1	BL01RN1	A	P	134	
FB2	BL01RN1	A	P	134	
CT1	S19-J299CT	H	P	140	

PHOTO COUPLER

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
PQ8	PS2501	H	P	121	
PQ9	PS2501	H	P	121	
PQ102	PS2501	H	P	121	
PQ201	PS2501L-4	C		86	
PQ202	PS2501L-4	C		86	
PQ203		C			
PQ831	PC817X	H	P	120	

JUMPER WIRE

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
JW2	NONE	A	P		
JW3	MOUNTING	A	P		
JW5	NONE	A	P		
JW7	NONE	C			1608
JW8	NONE	C			1608
JW9	NONE	C			1608
JW10	NONE	C			1608
JW11	NONE	C			1608
JW12	NONE	C			1608
JW21	NONE	A	P		
JW22	NONE	A	P		

SWITCH

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
SERVICE SW	SKQMALE010	R		100	

OSCILLATOR

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
X1	CSTCV16.0MXJ03	C		95	

NF COIL

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
NF COIL1	RRMH3681	H	P	137	
NF COIL2	RRMH3573	H	P	136	
NF COIL3	RRMH3573	H	P	136	
NF COIL4	RRMH3573	H	P	136	
NF COIL5	RRMH3573	H	P	136	
NF COIL6		H	P		
NF COIL7		H	P		
COIL	RRMH3442	H	P	138	

IC

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
MICON	AX-6S00	QFP		79	
E²PROM	S24C02BFJ-TB	SOP		72	
IC1	STR-F6523	H	P	109	
IC2	STR-F6667B	H	P	118	
IC3	NJM2901M-TE1	SOP		74	
IC4	NJM2904M-TE3	SOP		75	
IC5	NJM2901M-TE1	SOP		74	
IC6	HD74HC4051FP	SOP		73	
IC7	HD74HC4051FP	SOP		73	
IC8	ULN2003ANS	SOP		76	
IC11	M54532FP	SOP		77	
IC12	M54532FP	SOP		77	
IC13		SOP			
REG1	MC7805CT	H	P	112	
REG2	SE012N	H	P	115	
REG4	SE034N	H	P	119	

DIODE

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
D101	1GH46	A	P	92	
D102	1S2076A	A	P	90	
D103	1S2076A	A	P	90	
D104	1SS120	A	P	91	
D105	1SS120	A	P	91	
D201	DAN202K	C		88	SC-59
D202	DAP202K	C		89	SC-59
D203	DAP202K	C		89	SC-59
D204	DAN202K	C		88	SC-59
D205	DAN202K	C		88	SC-59
D206	DAN202K	C		88	SC-59
D207	DAN202K	C		88	SC-59
D208		C			SC-59
D209	HN2D01FU-TE85L	C		90	
D350	HN2D01FU-TE85L	C		90	
D702	1GH46	A	P	92	
D703	1SS120	A	P	91	
D705	RN2Z	H	P	93	
D706	AK04	A	P	94	
D707	RN3Z	H	P	95	
D708	JUMPER WIRE	A	P		
D709	RU1P	A	P	98	
D710	1GH46	A	P	92	
D713	1GH46	A	P	92	
D715	1SS120	A	P	91	
D716	1S2473	A	P	96	
D720	SARS01	A	P	99	
D721	AG01Z	A	P	100	
D722	AG01Z	A	P	100	
D723	AG01Z	A	P	100	
D724	1S2473	A	P	96	
D725	RN2Z	H	P	93	
D726	FML-G22S	A	P	101	
D811	1SS120	A	P	91	
D812	1SS120	A	P	91	
D813		A	P		
D831	1SS120	A	P	91	

SURGE ARRESTER

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
VARISTOR1	450NR-12D	R	P	131	
VARISTOR2	450NR-12D	R	P	131	
VARISTOR3	450NR-12D	R	P	131	
SURGE ABSORBER	DSA-102MA-05F25	H	P	133	

CONNECTOR

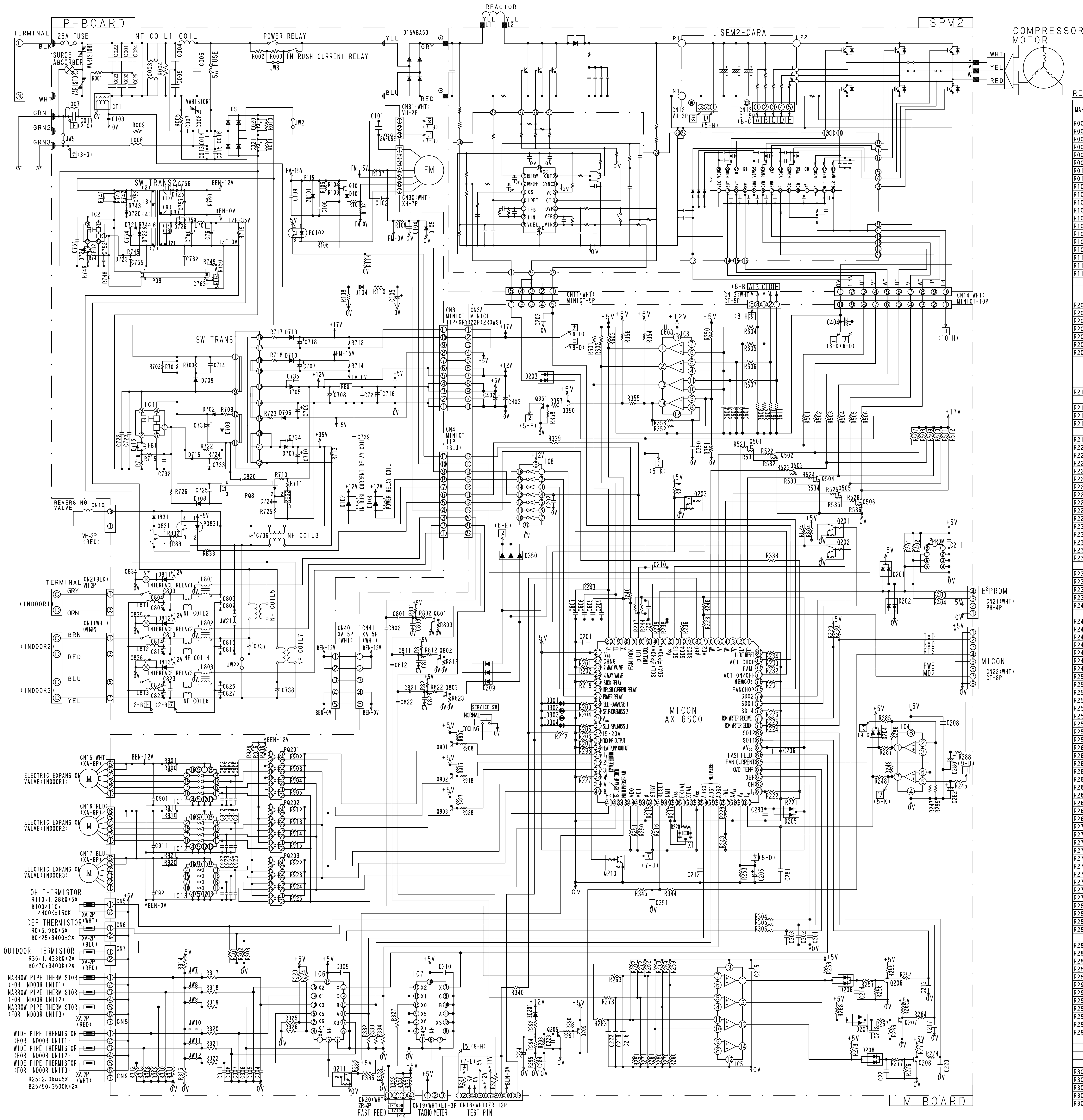
MARK	MODEL	PCB SET	ASSY NO.	REMARK
CN1	VH-4Pハヌケ	P	164	WHITE
CN2	VH-2Pハヌケ	P	170	BLACK
CN3A	MINICT-22P		101	2ROWS
CN3	MINICT-11P	P	168	GRAY
CN4	MINICT-11P	P	167	BLUE
CN5	XA-2Pタテ		102	WHITE
CN6	XA-2Pタテ		103	BLUE
CN7	XA-2Pタテ		104	RED
CN8	XA-7P		122	RED
CN9	XA-7P		123	WHITE
CN10	VH-2Pハヌケ	P	165	RED
CN11	MINICT-5P		107	WHITE
CN13	CT-5P		108	WHITE
CN14	MINICT-10P		109	WHITE
CN15	XA-6P		111	WHITE
CN16	XA-6P		110	RED
CN17				BLUE
CN18	ZR-12Pタテ		113	WHITE
CN19				WHITE
CN20	ZR-4Pタテ		115	WHITE
CN21	PH-4Pタテ		112	WHITE
CN22	CT-8Pタテ		120	WHITE
CN30	XH-5P	P	168	WHITE
CN31	VH-2Pハヌケ	P	169	WHITE
CN40	XA-5P	P	171	WHITE
CN41	XA-5P		117	WHITE

TRANS

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
SW TRANS1	RRMF3529	H	P	144	
SW TRANS2	RRMF3695	H	P	147	
L801	RRMF3636	H	P	145	
L802	RRMF3636	H	P	145	
L803		H	P		

CIRCUIT DIAGRAM

MODEL RAM-65QH4



MOUNTING
R - RADIAL
C - CHIP
A - AXIAL
H - HAND INSERT

PCB SET
NO MARKING···#M-BOARDAS
P···#P-BOARDAS

TYPE
F - FILM
C - CERAMIC
D - ELECTROLYTIC

RESISTOR

MARK	RATING Ω	%	W	MOUNTING	PCB SET	ASSY NO.	REMARK
R001	JUMPER WIRE		1/4	A	P	(28)	
R002	100	5%	10	H	P	(14)	
R003			10	H	P		
R004	470K	5%	1/2	A	P	(15)	
R005	2.2	5%	5	H	P	(16)	
R009			1/4	A	P		
R010	470K	5%	1/2	A	P	(15)	
R011	470K	5%	1/2	A	P	(15)	
R101	3.6K	1%	1/6	A	P	(33)	
R102	3K	1%	1/6	A	P	(34)	
R103	30K	5%	1/6	A	P	(35)	
R104	3.9K	5%	1/6	A	P	(36)	
R105	7.5K	5%	1/6	A	P	(37)	
R106	2.4K	5%	1/6	A	P	(38)	
R107	1	1%	2	R	P	(39)	
R108	1K	1%	1/6	A	P	(40)	
R109	510	5%	1/6	A	P	(41)	
R110	1.69K	1%	1/6	A	P	(42)	
R114	1K	5%	1/6	A	P	(43)	
R115	JUMPER WIRE			A	P		
R201	10K	5%	1/16	C		(11)	1608
R202	10K	5%	1/16	C		(11)	1608
R203	2K	5%	1/16	C		(13)	1608
R204	2K	5%	1/16	C		(13)	1608
R205	2K	5%	1/16	C		(13)	1608
R206	10K	5%	1/16	C		(11)	1608
R207	10K	5%	1/16	C		(11)	1608
R212	2K	5%	1/16	C		(13)	1608
R215	10K	5%	1/16	C		(11)	1608
R216	10K	5%	1/16	C		(11)	1608
R217	10K	5%	1/16	C		(11)	1608
R219	10K	5%	1/16	C		(11)	1608
R220	1M	5%	1/16	C		(14)	1608
R221	10K	1%	1/16	C		(12)	1608
R222	510	5%	1/16	C		(16)	1608
R223	100	5%	1/16	C		(17)	1608
R224	100	5%	1/16	C		(17)	1608
R225	100	5%	1/16	C		(17)	1608
R226	10K	5%	1/16	C		(11)	1608
R227	10K	5%	1/16	C		(11)	1608
R228	100	5%	1/16	C		(17)	1608
R229	10K	5%	1/16	C		(11)	1608
R230	10K	5%	1/16	C		(11)	1608
R231	10K	5%	1/16	C		(11)	1608
R232	10K	5%	1/16	C		(11)	1608
R233	100	5%	1/16	C		(17)	1608
R234	10K	5%	1/16	C		(11)	1608
R236	10K	5%	1/16	C		(11)	1608
R237	5.1K	5%	1/16	C		(18)	1608
R238	100	5%	1/16	C		(17)	1608
R239	100	5%	1/16	C		(17)	1608
R240	1K	5%	1/16	C		(20)	1608
R243	100	5%	1/16	C		(17)	1608
R244	2K	5%	1/16	C		(13)	1608
R245	5.1K	5%	1/16	C		(18)	1608
R246	10K	5%	1/16	C		(11)	1608
R247	3.16K	1%	1/16	C		(19)	1608
R248	1K	5%	1/16	C		(20)	1608
R249	20K	1%	1/16	C		(21)	1608
R250	10K	5%	1/16	C		(11)	1608
R251	10K	5%	1/16	C		(11)	1608
R253	3.32K	1%	1/16	C		(22)	1608
R254	100	5%	1/16	C		(17)	1608
R255	2K	5%	1/16	C		(13)	1608
R256	10K	5%	1/16	C		(11)	1608
R257	3K	5%	1/16	C		(23)	1608
R258	1K	5%	1/16	C		(20)	1608
R259	8.25K	1%	1/16	C		(24)	1608
R260	10K	1%	1/16	C		(12)	1608
R261	10K	1%	1/16	C		(12)	1608
R262	10K	1%	1/16	C		(12)	1608
R263	1K	5%	1/16	C		(20)	1608
R264	100	5%	1/16	C		(17)	1608
R265	2K	5%	1/16	C		(13)	1608
R266	10K	5%	1/16	C		(11)	1608
R267	3K	5%	1/16	C		(23)	1608
R268	1K	5%	1/16	C		(20)	1608
R269	8.25K	1%	1/16	C		(24)	1608
R270	10K	1%	1/16	C		(12)	1608
R271	10K	1%	1/16	C		(12)	1608
R272	10K	1%	1/16	C		(12)	1608
R273	1K	5%	1/16	C		(20)	1608
R274	100	5%	1/16	C		(17)	1608
R275	2K	5%	1/16	C		(13)	1608
R276	10K	5%	1/16	C		(11)	1608
R277	3K	5%	1/16	C		(23)	1608
R278	1K	5%	1/16	C		(20)	1608
R279	8.25K	1%	1/16	C		(24)	1608
R280	10K	1%	1/16	C		(12)	1608
R281	10K	1%	1/16	C		(12)	1608
R282	10K	1%	1/16	C		(12)	1608
R283	1K	5%	1/16	C		(20)	1608
R285			1/16	C			1608
R286	2K	1%	1/16	C		(46)	1608
R287	2K	5%	1/16	C		(13)	1608
R288	1K	5%	1/16	C		(20)	1608
R289	1K	1%	1/16	C		(47)	1608
R290	10K	5%	1/16	C		(11)	1608
R291	4.7K	5%	1/16	C		(29)	1608
R292	3K	5%	1/16	C		(23)	1608
R293	1.6K	5%	1/16	C		(30)	1608
R294	27K	5%	1/16	C		(31)	1608
R295	5.1K	5%	1/16	C		(18)	1608
R296	10K	5%	1/16	C		(11)	1608
R301	3.74K	1%	1/16	C		(32)	1608
R302	3.01K	1%	1/16	C		(33)	1608
R303	3.01K	1%	1/16	C		(33)	1608
R304	100	5%	1/16	C		(17)	1608
R305	100	5%	1/16	C		(17)	1608

RESISTOR

MARK	RATING Ω	%	W	MOUNTING	PCB SET	ASSY NO.	REMARK
R306	100	5%	1/16	C		(17)	1608
R308	2K	2%	1/16	C		(34)	1608
R309	2K	2%	1/16	C		(34)	1608
R310	2K	2%	1/16	C		(34)	1608
R311	2K	2%	1/16	C		(34)	1608
R312	2K	2%	1/16	C		(34)	1608
R313	2K	2%	1/16	C		(34)	1608
R314			1/16	C			1608
R315			1/16	C			1608
R317	1K	5%	1/16	C		(20)	1608
R318	1K	5%	1/16	C		(20)	1608
R319	1K	5%	1/16	C		(20)	1608
R320	1K	5%	1/16	C		(20)	1608
R321	1K	5%	1/16	C		(20)	1608
R322	1K	5%	1/16	C		(20)	1608
R323			1/16	C			1608
R324			1/16	C			1608
R325	10K	5%	1/16	C		(11)	1608
R326	10K	5%	1/16	C		(11)	1608
R327	1K	5%	1/16	C		(20)	1608
R328	2.7K	5%	1/16	C		(36)	1608
R329	470	5%	1/16	C		(37)	1608
R330	1.6K	5%	1/16	C		(30)	1608
R331	4.3K	5%	1/16	C		(38)	1608
R332	10K	5%	1/16	C		(11)	1608
R333	10K	5%	1/16	C		(11)	1608
R334	10K	5%	1/16	C		(11)	1608
R335	100	5%	1/16	C		(17)	1608
R336	2K	5%	1/16	C		(13)	1608
R338	JUMPER	5%	1/16	C		(26)	1608
R339			1/16	C			1608
R340	100	5%	1/16	C		(17)	1608
R341	100	5%	1/16	C		(17)	1608
R342	100	5%	1/16	C		(17)	1608
R343	10K	5%	1/16	C		(11)	1608
R344	100	5%	1/16	C		(17)	1608
R345	5.1K	5%	1/16	C		(18)	1608
R350	120K	1%	1/16	C		(41)	1608
R351	120K	1%	1/16	C		(41)	1608
R352	120K	1%	1/16	C		(41)	1608
R353	120K	1%	1/16	C		(41)	1608
R354	4.3K	2%	1/16	C		(39)	1608
R355	4.3K	5%	1/16	C		(38)	1608
R356	10K	5%	1/16	C		(11)	1608
R357	2K	5%	1/16	C		(13)	1608
R358	3K	5%	1/16	C		(23)	1608
R401	5.1K	5%	1/16	C		(18)	1608
R402	5.1K	5%	1/16	C		(18)	1608
R403	390	5%	1/16	C		(25)	1608
R404	390	5%	1/16	C		(25)	1608
R501	1K	5%	1/16	C		(20)	1608
R502	1K	5%	1/16	C		(20)	1608
R503	1K	5%	1/16	C		(20)	1608
R504	1K	5%	1/16	C		(20)	1608
R505	1K	5%	1/16	C		(20)	1608
R506	1K	5%	1/16	C		(20)	1608
R507	5.1K	5%	1/8	C		(45)	3216
R508	5.1K	5%	1/8	C		(45)	3216
R509	5.1K	5%	1/8	C		(45)	3216
R510	5.1K	5%	1/8	C		(45)	3216
R511	5.1K	5%	1/8	C		(45)	3216
R512	5.1K	5%	1/8	C		(45)	3216
R521	10K	5%	1/16	C		(11)	1608
R522	10K	5%	1/16	C		(11)	1608
R523	10K	5%	1/16	C		(11)	1608
R524	10K	5%	1/16	C		(11)	1608
R525	10K	5%	1/16	C		(11)	1608
R526	10K	5%	1/16	C		(11)	1608
R531	5.1K	5%	1/16	C		(18)	1608
R532	5.1K	5%	1/16	C		(18)	1608
R533	5.1K	5%	1/16	C		(18)	1608
R534	5.1K	5%	1/16	C		(18)	1608
R535	5.1K	5%	1/16	C		(18)	1608
R536	5.1K	5%	1/16	C		(18)	1608
R601	2K	5%	1/16	C		(13)	1608
R602	2K	5%	1/16	C		(13)	1608
R603	2K	5%	1/16	C		(13)	1608
R604	100	5%	1/16	C		(17)	1608
R605	100	5%	1/16	C		(17)	1608
R606	100	5%	1/16	C		(17)	1608
R607	100	5%	1/16	C		(17)	1608
R608	4.02K	1%	1/16	C		(44)	1608
R609	4.02K	1%	1/16	C		(44)	1608
R610	4.02K	1%	1/16	C		(44)	1608
R611	4.02K	1%	1/16	C		(44)	1608
R701	1M	5%	1/2	A	P	(44)	
R702	1M	5%	1/2	A	P	(44)	
R703	100K	5%	2	A	P	(29)	
R708	10	5%	1/4	A	P	(18)	
R710	1.8K	5%	1/4	A	P	(19)	
R711	75	5%	1/6	A	P	(20)	
R712	3.3K	5%	1/4	A	P	(21)	
R713	8.2K	5%	1	H	P	(22)	
R714	3.3K	5%	1/4	A	P	(21)	
R715	680	5%	1/4	A	P	(23)	
R716	0.56	5%	1	A	P	(24)	
R717	JUMPER WIRE		1/4	A	P		
R718	8.2	5%	1/4	A	P	(25)	
R719	8.2K	5%	1	H	P	(22)	
R722	2.7K	5%	1/4	A	P	(27)	
R723	33	5%	1/6	A	P	(26)	
R724	2.7K	5%	1/4	A	P	(27)	
R725	JUMPER WIRE		1/4	A	P		
R726	3.3K	5%	1/4	A	P	(21)	
R740	820K	5%	1/2	A	P	(17)	
R741	820K	5%	1/2	A	P	(17)	
R742	820K	5%	1/4	A	P	(45)	
R743	47	5%	1/2	A	P	(46)	
R744	10	2%	1/4	A	P	(47)	
R745	2K	5%	1/6	A	P	(48)	
R746	0.33	5%	1	A	P	(49)	
R747	680	5%	1/4	A	P	(50)	
R748	3.3K	5%	1/4	A	P	(21)	

RESISTOR

MARK	RATING Ω	%	W	MOUNTING	PCB SET	ASSY NO.	REMARK
R749	4.7K	5%	1/4	A	P	(51)	
R750	150	5%	1/4	A	P	(52)	
R760	100K	5%	1/4	A	P	(53)	
R801	39	5%	1/4	C		(43)	3225
R802	39	5%	1/4	C		(43)	3225
R803	3K	5%	1/16	C		(23)	1608
R804	3K	5%	1/16	C		(23)	1608
R811	39	5%	1/4	C		(43)	3225
R812	39	5%	1/4	C		(43)	3225
R813	3K	5%	1/16	C		(23)	1608
R814	3K	5%	1/16	C		(23)	1608
R821	39	5%	1/4	C		(43)	3225
R822	39	5%	1/4	C		(43)	3225
R823	3K	5%	1/16	C		(23)	1608
R824	3K	5%	1/16	C		(23)	1608
R831	10K	5%	1/6	A	P	(30)	
R832	7.5K	5%	1/2	A	P	(31)	
R833	620	5%	1/6	A	P	(32)	
R900	200	5%	1/10	C		(15)	2125
R901	200	5%	1/10	C		(15)	2125
R902	510	5%	1/16	C		(16)	1608
R903	510	5%	1/16	C		(16)	1608
R904	510	5%	1/16	C		(16)	1608
R905	510	5%	1/16	C		(16)	1608
R906	1K	5%	1/10	C		(48)	2125
R907	10K	5%	1/16	C		(11)	1608
R908	3K	5%	1/16	C		(23)	1608
R910	200	5%	1/10	C		(15)	2125
R911	200	5%	1/10	C		(15)	2125
R912	510	5%	1/16	C		(16)	1608
R913	510	5%	1/16	C		(16)	1608
R914	510	5%	1/16	C		(16)	1608
R915	510	5%	1/16	C		(16)	1608
R916	1K	5%	1/10	C		(48)	2125
R917	10K	5%	1/16	C		(11)	1608
R918	3K	5%	1/16	C		(23)	1608
R920	200	5%	1/10	C		(15)	2125
R921	200	5%	1/10	C		(15)	2125
R922	510	5%	1/16	C		(16)	1608
R923	510	5%	1/16	C		(16)	1608
R924	510	5%	1/16	C		(16)	1608
R925	510	5%	1/16	C		(16)	1608
R926	1K	5%	1/10	C		(48)	2125
R927	10K	5%	1/16	C		(11)	1608
R928	3K	5%	1/16	C		(23)	1608

CAPACITOR

MARK	RATING F	V	TYPE	MOUNTING	PCB SET	ASSY NO.	MODEL	REMARK
C001	0.01μ	AC250	C	R	P	(75)		
C002	0.01μ	AC250	C	R	P	(75)		
C003	0.68μ	630	F	H	P	(58)		
C004			C	R	P			
C005			C	R	P			
C006	3.3μ	AC300	F	H	P	(59)		
C007	0.01μ	AC250	C	R	P	(75)		
C008	0.01μ	AC250	C	R	P	(75)		
C010			D	H	P			
C011			F	H	P			
C013	0.01μ	AC250	C	R	P	(75)		
C014	0.01μ	AC250	C	R	P	(75)		
C015			C	R	P			
C016			C	R	P			
C017	0.01μ	AC250	C	R	P	(75)		
C020	0.01μ	AC250	D	H	P	(75)	KMX	
C021	0.01μ	AC250	D	H	P	(75)	KMX	
C101	0.082μ	630	F	H	P	(80)		
C102		50	C	R	P			
C103	0.1μ	50	C	R	P	(56)		
C104	1000p	50	C	R	P	(69)		
C105	100μ	10	D	R	P	(57)		
C106		50	C	R	P			
C109	0.1μ	50	C	R	P	(56)		
C201	0.1μ	25	C	C		(51)		1608
C202	2200p	25	C	C		(50)		1608
C203	2200p	25	C	C		(50)		1608
C205	0.1μ	50	D	C		(67)	WX	φ4
C206	0.1μ	25	C	C		(51)		1608
C207	0.047μ	50	C	C		(53)		1608
C208	0.1μ	25	C	C		(51)		1608
C209	0.1μ	25	C	C		(51)		1608
C210	0.047μ	50	C	C		(53)		1608
C211	0.1μ	25	C	C		(51)		1608
C212	0.1μ	25	C	C		(51)		1608
C213	0.047μ	50	C	C		(53)		1608
C214	0.068μ	16	C	C		(55)	B	1608
C215	0.1μ	25	C	C		(51)		1608
C216	4700p	50	C	C		(56)	B	1608
C217	0.047μ	50	C	C		(53)		1608
C218	0.068μ	16	C	C		(55)	B	1608
C219	4700p	50	C	C		(56)	B	1608
C220	0.047μ	50	C	C		(53)		1608
C221	0.068μ	16	C	C		(55)	B	1608
C222	4700p	50	C	C		(56)	B	1608
C223	0.1μ	25	C	C		(51)		1608
C224	10μ	16	D	C		(52)	WX	φ3
C280	2.2μ	50	D	C		(54)	WX	φ4
C281	0.01μ	50	C	C		(66)	R	1608
C282	22μ	6.3	D	C		(57)	WX	φ4
C283	0.1μ	25	C	C		(51)		1608
C284	0.1μ	25	C	C		(51)		1608
C301	0.1μ	25	C	C		(51)		1608
C302	0.1μ	25	C	C		(51)		1608
C303	0.1μ	25	C	C		(51)		1608
C304	1μ	16	C	C		(58)		2125
C305	1μ	16	C	C		(58)		2125
C306	1μ	16	C	C		(58)		2125
C307	1μ	16	C	C		(58)		2125
C308	1μ	16	C	C		(58)		2125
C309	0.1μ	25	C	C		(51)		1608
C310	0.1μ	25	C	C		(51)		1608
C311	1μ	16	C	C		(58)		2125

CAPACITOR

MARK	RATING F	V	TYPE	MOUNTING	PCB SET	ASSY NO.	MODEL	REMARK
C350	150p	50	C	C		(69)	CH	1608
C351	0.047μ	50	C	C		(53)		1608
C402	100μ	10	D	C		(59)	WX	φ6.3
C403	100μ	25	D	C		(60)	WX	φ8
C404	33μ	25	D	C		(61)	WX	φ6.3
C601	680p	50	C	C		(62)	CH	2125
C602	680p	50	C	C		(62)	CH	2125
C603	680p	50	C	C		(62)	CH	2125
C604	680p	50	C	C		(62)	CH	2125
C605	1000p	50	C	C		(63)	B	1608
C606	1000p	50	C	C		(63)	B	1608
C607	1000p	50	C	C		(63)	B	1608
C608	0.1μ	25	C	C		(51)		1608
C707	330μ	25	D	R	P	(62)	PF	
C708	330μ	25	D	R	P	(62)	PF	
C709	180μ	10	D	R	P	(63)	PF	
C710	330μ	50	D	R	P	(64)	PF	
C714	0.01μ	1KV	C	H	P	(73)		
C716	330μ	10	D	R	P	(65)	PF	
C718	220μ	25	D	R	P	(66)	PF	
C721	0.1μ	50	C	R	P	(56)		
C722			C	R	P			
C723	470p	2KV	C	R	P	(67)		
C724	0.1μ	50	C	R	P	(56)		
C725			C	R	P			
C731	330μ	25	D	R	P	(62)	PF	
C732	470p	50	C	R	P	(68)	E	
C733	1000p	50	C	R	P	(69)	E	
C734	1000p	AC250	C	R	P	(70)		
C735	1000p	50	C	R	P	(69)	E	
C736	68μ	50	D	R	P	(71)	PF	
C737	68μ	50	D	R	P	(71)	PF	
C738	68μ	50	D	R	P	(71)	PF	
C739	470p	AC250	C	H	P	(76)		
C751	0.00068μ	2K	C	R	P	(81)		
C752	470p	50	C	R	P	(68)		
C753	0.01μ	AC250	C	R	P	(74)		
C754	330μ	25	D	R	P	(85)		
C755	0.00033μ	50	C	R	P	(82)		
C756	1000p	50	C	R	P	(69)		
C757	330μ	25	D	R	P	(62)	PF	
C759	0.001μ	AC250	C	R	P	(83)		
C760	470μ	50	D	R	P	(84)	PF	
C761	470μ	50	D	R	P	(84)	PF	
C762	470p	AC250	C	R	P	(76)		
C763	0.1μ	50	C	R	P	(56)		
C801	0.15μ	50	F	C		(64)		6041
C802	0.022μ	16	F	C		(65)		3216
C803	0.15μ	50	F	R	P	(72)		
C804	0.01μ	AC250	C	H	P	(75)		
C805	0.01μ	AC250	C	H	P	(75)		
C806	0.01μ	AC250	C	H	P	(74)		
C807	0.01μ	AC250	C	H	P	(74)		
C808	0.1μ	25	C	C		(51)		1608
C811	0.15μ	50	F	C		(64)		6041
C812	0.022μ	16	F	C		(65)		3216
C813	0.15μ	50	F	R	P	(72)		
C814	0.01μ	AC250	C	H	P	(75)		
C815	0.01μ	AC250	C	H	P	(75)		
C816	0.01μ	AC250	C	H	P	(74)		
C817	0.01μ	AC250	C	H	P	(74)		
C818	0.1μ	25	C	C		(51)		1608
C820	470p	AC250	C	H	P	(76)		
C821	0.15μ	50	F	C		(64)		6041
C822	0.022μ	16	F	C		(65)		3216
C823	0.15μ	50	F	R	P	(72)		
C824	0.01μ	AC250	C	H	P	(75)		
C825	0.01μ	AC250	C	H	P	(75)		
C826	0.01μ	AC250	C	H	P	(74)		
C827	0.01μ	AC250	C	H	P	(74)		
C828	0.1μ	25	C	C		(51)		1608
C834	100μ	25	D	R	P	(86)		
C835	100μ	25	D	R	P	(86)		
C836	100μ	25	D	R	P	(86)		
C901	0.1μ	25	C	C		(51)		1608
C902	0.01μ	50	C	C		(68)		1608
C903	0.01μ	50	C	C		(68)		1608
C904	0.01μ	50	C	C		(68)		1608
C905	0.01μ	50	C	C		(68)		1608
C911	0.1μ	25	C	C		(51)		1608
C912	0.01μ	50	C	C		(68)		1608
C913	0.01μ	50	C	C		(68)		1608
C914	0.01μ	50	C	C		(68)		1608
C915	0.01μ	50	C	C		(68)		1608
C921	0.1μ	25	C	C		(51)		1608
C922	0.01μ	50	C	C		(68)		1608
C923	0.01μ	50	C	C		(68)		1608
C924	0.01μ	50	C	C		(68)		1608
C925	0.01μ	50	C	C		(68)		1608

FUSE

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
2AFUSE	RRPN2038	H	P	(124)	
5AFUSE	RRPN2586	H	P	(125)	
25AFUSE	RRPN1220	H	P	(127)	

DIODE STACK

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
DS	DX15XB60	H	P	(103)	

RELAY

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
INTERFACE RELAY1	RRRB1319	H	P	(142)	
INTERFACE RELAY2	RRRB1330	H	P	(146)	
INTERFACE RELAY3	RRRB1330	H	P	(146)	
CURRENT RELAY	RRRB1330	H	P	(146)	
POWER RELAY	RRRB1313	H	P	(143)	

TRANSISTOR

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
Q101	2SA673	R	P	(105)	
Q201	RN1402	C		(81)	SC-59
Q202	RN1402	C		(81)	SC-59
Q203	RN1402	C		(81)	SC-59
Q205	2SC2462LC	C		(82)	MPAK
Q206	2SC2462LC	C		(82)	MPAK
Q207	2SC2462LC	C		(82)	MPAK
Q208	2SC2462LC	C		(82)	MPAK
Q209	2SA1121SC	C		(83)	MPAK
Q210		C			SC-59
Q211	RN1402	C		(81)	SC-59
Q350	2SA1121SC	C		(83)	MPAK
Q351	2SC2462LC	C		(82)	MPAK
Q501	2SC2462LC	C		(82)	MPAK
Q502	2SC2462LC	C		(82)	MPAK
Q503	2SC2462LC	C		(82)	MPAK
Q504	2SC2462LC	C		(82)	MPAK
Q505	2SC2462LC	C		(82)	MPAK
Q506	2SC2462LC	C		(82)	MPAK
Q801	2SC2618RC	C		(85)	
Q802	2SC2618RC	C		(85)	
Q803	2SC2618RC	C		(85)	
Q831	2SC1214CT	R	P	(104)	
Q901	2SA1121SC	C		(83)	MPAK
Q902	2SA1121SC	C		(83)	MPAK
Q903	2SA1121SC	C		(83)	MPAK

ZENER DIODE

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
ZD101		A	P		
ZD201	RLZ6.8A	C		(91)	LLDS

LED

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
LD301	LT1D67A	C		(92)	RED
LD302	LT1D67A	C		(92)	RED
LD303	LT1D67A	C		(92)	RED
LD304	LT1K67A	C		(93)	GRN

INDUCTOR

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
L006	EXCELSA35V	A	P	(139)	
L007		A	P		
L701	JUMPER WIRE	A	P		
L811	FB-HF70BTL	A	P	(135)	
L812	FB-HF70BTL	A	P	(135)	
L813	FB-HF70BTL	A	P	(135)	
FB1	BL01RN1	A	P	(134)	
FB2	BL01RN1	A	P	(134)	
CT1	S19-J299CT	H	P	(140)	

PHOTO COUPLER

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
PQ8	PS2501	H	P	(121)	
PQ9	PS2501	H	P	(121)	
PQ102	PS2501	H	P	(121)	
PQ201	PS2501L-4	C		(86)	
PQ202	PS2501L-4	C		(86)	
PQ203	PS2501L-4	C		(86)	
PQ831	PC817X	H	P	(120)	

JUMPER WIRE

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
JW2	NONE	A	P		
JW3	MOUNTING	A	P		
JW5	NONE	A	P		
JW7	NONE	C			1608
JW8	NONE	C			1608
JW9	NONE	C			1608
JW10	NONE	C			1608
JW11	NONE	C			1608
JW12	NONE	C			1608
JW21	NONE	A	P		
JW22	NONE	A	P		

SWITCH

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
SERVICE SW	SKQMALE010	R		(100)	

OSCILLATOR

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
X1	CSTCV16.0MXJ03	C		(95)	

NF COIL

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
NF COIL1	RRMH3681	H	P	(137)	
NF COIL2	RRMH3573	H	P	(136)	
NF COIL3	RRMH3573	H	P	(136)	
NF COIL4	RRMH3573	H	P	(136)	
NF COIL5	RRMH3573	H	P	(136)	
NF COIL6	RRMH3573	H	P	(136)	
NF COIL7	RRMH3573	H	P	(136)	
COIL	RRMH3442	H	P	(138)	

IC

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
MICON	AX-6S00	QFP		(79)	
E²PROM	S24C02BFJ-TB	SOP		(72)	
IC1	STR-F6523	H	P	(109)	
IC2	STR-F6667B	H	P	(116)	
IC3	NJM2901M-TE1	SOP		(74)	
IC4	NJM2904M-TE3	SOP		(75)	
IC5	NJM2901M-TE1	SOP		(74)	
IC6	HD74HC4051FP	SOP		(73)	
IC7	HD74HC4051FP	SOP		(73)	
IC8	ULN2003ANS	SOP		(76)	
IC11	M54532FP	SOP		(77)	
IC12	M54532FP	SOP		(77)	
IC13	M54532FP	SOP		(77)	
REG1	MC7805CT	H	P	(112)	
REG2	SE012N	H	P	(115)	
REG4	SE034N	H	P	(119)	

DIODE

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
D101	1GH46	A	P	(92)	
D102	1S2076A	A	P	(90)	
D103	1S2076A	A	P	(90)	
D104	1SS120	A	P	(91)	
D105	1SS120	A	P	(91)	
D201	DAN202K	C		(88)	SC-59
D202	DAP202K	C		(89)	SC-59
D203	DAP202K	C		(89)	SC-59
D204	DAN202K	C		(88)	SC-59
D205	DAN202K	C		(88)	SC-59
D206	DAN202K	C		(88)	SC-59
D207	DAN202K	C		(88)	SC-59
D208	DAN202K	C		(88)	SC-59
D209	HN2D01FU-TE85L	C		(90)	
D350	HN2D01FU-TE85L	C		(90)	
D702	1GH46	A	P	(92)	
D703	1SS120	A	P	(91)	
D705	RN2Z	H	P	(93)	
D706	AK04	A	P	(94)	
D707	RN3Z	H	P	(95)	
D708	JUMPER WIRE	A	P		
D709	RU1P	A	P	(98)	
D710	1GH46	A	P	(92)	
D713	1GH46	A	P	(92)	
D715	1SS120	A	P	(91)	
D716	1S2473	A	P	(96)	
D720	SARS01	A	P	(99)	
D721	AG01Z	A	P	(100)	
D722	AG01Z	A	P	(100)	
D723	AG01Z	A	P	(100)	
D724	1S2473	A	P	(96)	
D725	RN2Z	H	P	(93)	
D726	FML-G22S	A	P	(101)	
D811	1SS120	A	P	(91)	
D812	1SS120	A	P	(91)	
D813	1SS120	A	P	(91)	
D831	1SS120	A	P	(91)	

SURGE ARRESTER

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
VARISTOR1	450NR-12D	R	P	(131)	
VARISTOR2	450NR-12D	R	P	(131)	
VARISTOR3	450NR-12D	R	P	(131)	
SURGE ABSORBER	DSA-102MA-05F25	H	P	(133)	

CONNECTOR

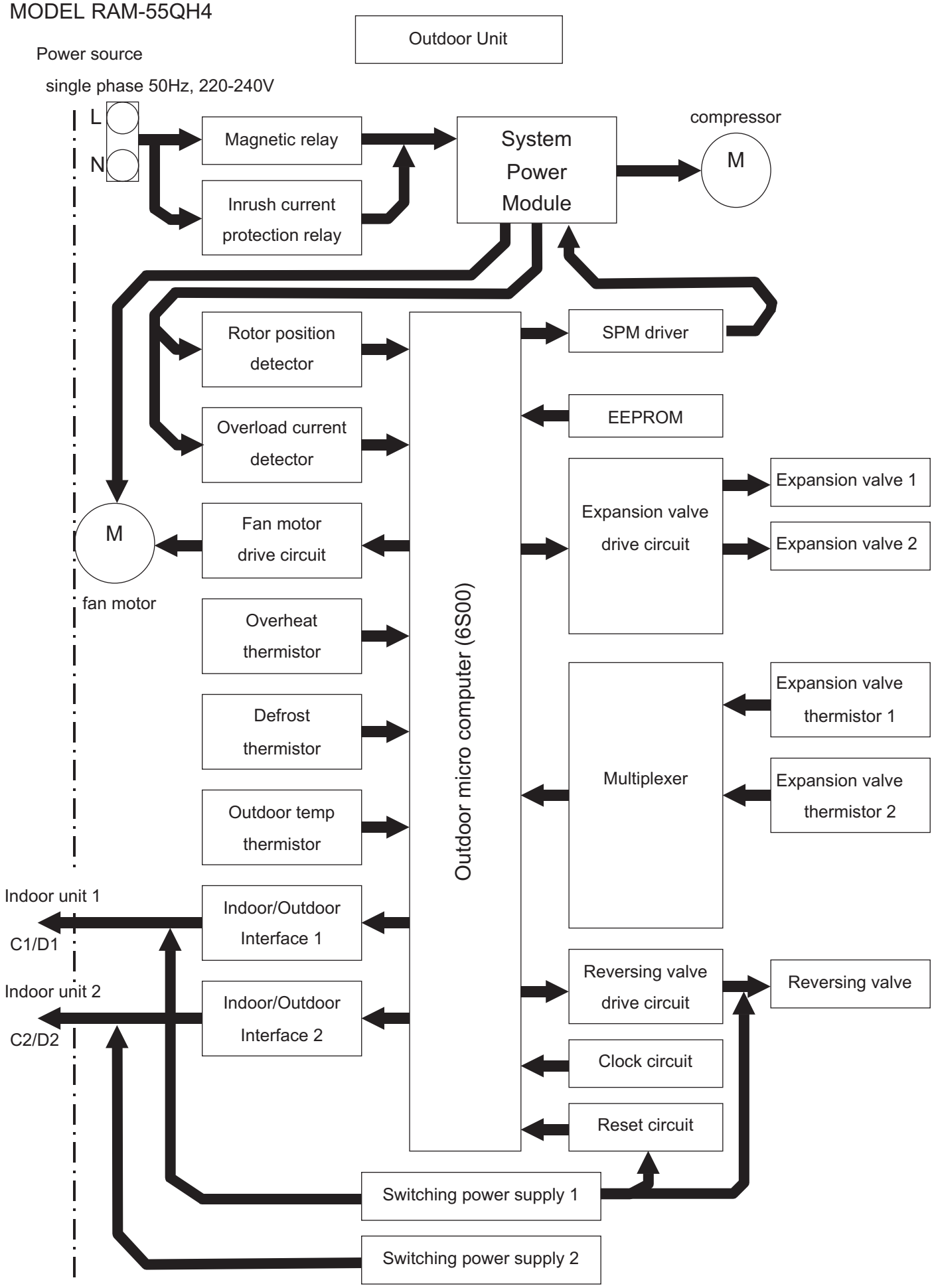
MARK	MODEL	PCB SET	ASSY NO.	REMARK
CN1	VH-4Pハヌケ	P	(164)	WHITE
CN2	VH-2Pハヌケ	P	(170)	BLACK
CN3A	MINICT-22P		(101)	2ROWS
CN3	MINICT-11P	P	(166)	GRAY
CN4	MINICT-11P	P	(167)	BLUE
CN5	XA-2Pタテ		(102)	WHITE
CN6	XA-2Pタテ		(103)	BLUE
CN7	XA-2Pタテ		(104)	RED
CN8	XA-7P		(122)	RED
CN9	XA-7P		(123)	WHITE
CN10	VH-2Pハヌケ	P	(165)	RED
CN11	MINICT-5P		(107)	WHITE
CN13	CT-5P		(108)	WHITE
CN14	MINICT-10P		(109)	WHITE
CN15	XA-6P		(111)	WHITE
CN16	XA-6P		(110)	RED
CN17	XA-6P		(118)	BLUE
CN18	ZR-12Pタテ		(113)	WHITE
CN19	EI-3P			WHITE
CN20	ZR-4Pタテ		(115)	WHITE
CN21	PH-4Pタテ		(112)	WHITE
CN22	CT-8Pタテ		(120)	WHITE
CN30	XH-5P	P	(168)	WHITE
CN31	VH-2Pハヌケ	P	(169)	WHITE
CN40	XA-5P	P	(171)	WHITE
CN41	XA-5P		(117)	WHITE

TRANS

MARK	MODEL	MOUNTING	PCB SET	ASSY NO.	REMARK
SW TRANS1	RRMF3529	H	P	(144)	
SW TRANS2	RRMF3695	H	P	(147)	
L801	RRMF3636	H	P	(145)	
L802	RRMF3636	H	P	(145)	
L803	RRMF3636	H	P	(145)	

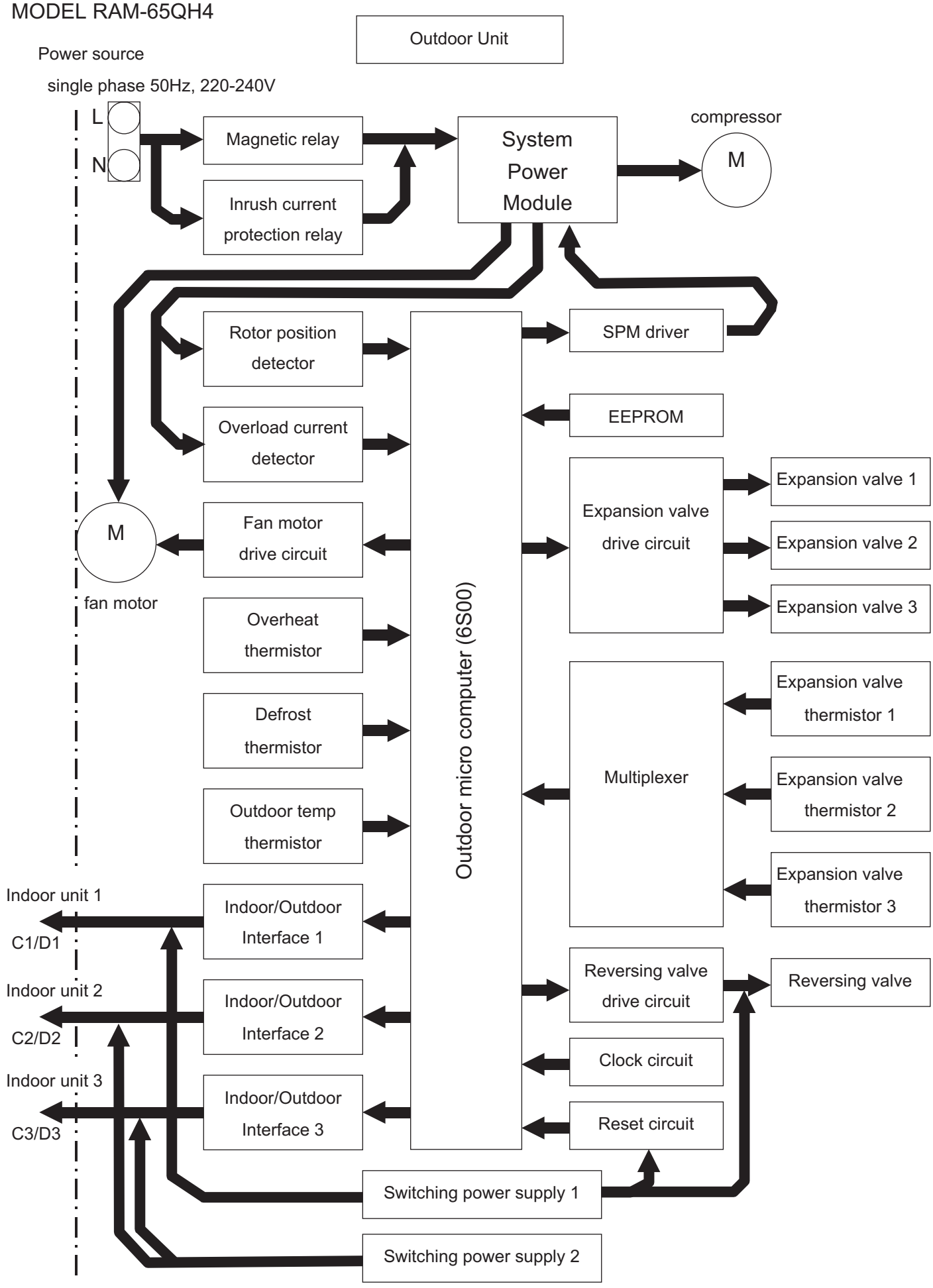
BLOCK DIAGRAM

MODEL RAM-55QH4

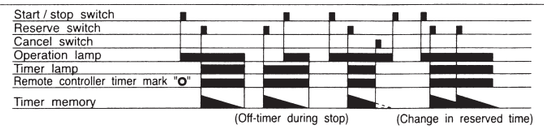
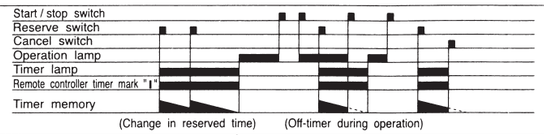
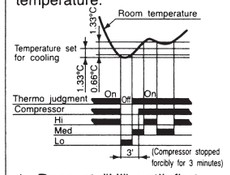


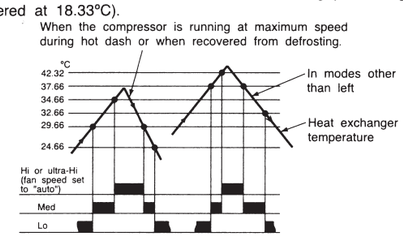
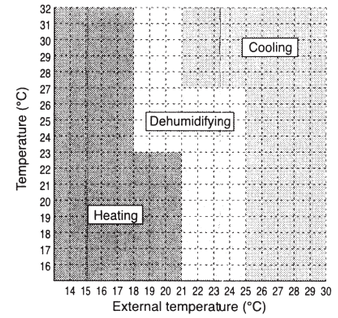
BLOCK DIAGRAM

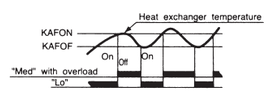
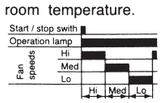
MODEL RAM-65QH4



BASIC MODE

<table>
<tr><th colspan="2">Operation mode</th><th>Fan</th><th>Cooling</th><th>Dehumidifying</th><th>Heating</th><th>Auto</th></tr>
<tr><td colspan="2">Basic operation of start / stop switch</td><td colspan="5"> 
</td></tr>
<tr><td rowspan="2">Timer functions</td><td>Off-timer</td><td colspan="5"> 
</td></tr>
<tr><td>On-timer</td><td colspan="5"> 
</td></tr>
<tr><td rowspan="5">Fan speed mode (indoor fan)</td><td>Auto</td><td></td><td>Changes from "Hi" to "Med" or "Lo" depending on room temperature.
 

1. Runs at "Hi" until first thermo off after operation is started.
2. Runs at "Lo" when thermo is off.</td><td></td><td>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).
When the compressor is running at maximum speed during hot dash or when recovered from defrosting.
 
</td><td rowspan="5">Operation mode
o 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
o 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.
 

※ Operation mode stays uncharged even if the room or ambient temperature changes during operation.
Set room temperature
o 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.</td><td rowspan="5">The special auto mode is based on auto, but the following is different:
<table><tr><th>Operation mode</th><th>Mode change during operation</th></tr><tr><td>auto</td><td>Judging the operation mode from the external temperature and room temperature at the start.</td></tr><tr><td>Special auto</td><td>The operation mode will be judged the same as at operation start every hour.</td></tr></table>
The special auto operation mode is entered when operation is started in the following status:
<Start condition>
Power is supplied while the tele-control signal is being input. (Operation starts automatically.)
<End condition>
The remote control restores the normal operation mode.</td></tr>
<tr><td>Hi</td><td>Operates at "Hi" regardless of the room temperature.</td><td>Set to "Ultra-Hi" when the compressor runs at maximum speed, and to "Hi" in other modes.</td><td></td><td>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.</td></tr>
<tr><td>Med</td><td>Operates at "Med" regardless of the room temperature.</td><td>Same as at left.</td><td></td><td>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).</td></tr>
<tr><td>Lo</td><td>Operates at "Lo" regardless of the room temperature.</td><td>Same as at left.</td><td>Set to "Lo" in modes other than when the compressor stops.</td><td>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:
 
</td></tr>
<tr><td colspan="2">Basic operation of temperature controller</td><td>Performs only fan operation at the set speed regardless of the room temperature.
 
</td><td>See page 53.</td><td>See page 57.</td><td>See page 59.</td></tr>
<tr><td colspan="2">Sleep operation (with sleep button ON)</td><td>Enters sleep operation after set as on the left.
Action during sleep operation silent (sleep) operation</td><td>·Same as at left.
·See page 55.</td><td>·Same as at left.
·See page 57.</td><td>·Same as at left.
·See page 61.</td><td>·Same as at left.
·Performs the sleep operation of each operation mode.</td></tr>
</table>

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.

MODEL		RAK-25NH4	RAK-35NH4	RAK-50NH4
PROM NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE
0A2	RTOTSA	2.00 ˚C	2.00 ˚C	2.00 ˚C
120	WMAX_M	5300 min^{-1}	5000 min^{-1}	4500 min^{-1}
121	WMAX2_M	5300 min^{-1}	5000 min^{-1}	4500 min^{-1}
122	WSTD_M	4000 min^{-1}	4000 min^{-1}	4000 min^{-1}
123	WJKMAX_M	3700 min^{-1}	3700 min^{-1}	4000 min^{-1}
124	WBEMAX_M	3500 min^{-1}	3500 min^{-1}	3700 min^{-1}
127	CMAX_M	3300 min^{-1}	3300 min^{-1}	4000 min^{-1}
128	CMAX2_M	3300 min^{-1}	3300 min^{-1}	4000 min^{-1}
129	CSTD_M	3250 min^{-1}	3150 min^{-1}	3000 min^{-1}
12A	CKYMAX_M	2800 min^{-1}	2800 min^{-1}	2800 min^{-1}
12B	CJKMAX_M	2750 min^{-1}	2750 min^{-1}	2750 min^{-1}
12C	CBEMAX_M	2500 min^{-1}	2500 min^{-1}	2500 min^{-1}
12F	SDMAX_M	2400 min^{-1}	1550 min^{-1}	1800 min^{-1}
130	SDRPM_M	2100 min^{-1}	1400 min^{-1}	1100 min^{-1}
138	WMIN_M	800 min^{-1}	800 min^{-1}	800 min^{-1}
139	CMINHI_M	800 min^{-1}	800 min^{-1}	800 min^{-1}
13A	CMIN_M	1200 min^{-1}	1200 min^{-1}	1200 min^{-1}
13B	DMIN_M	1200 min^{-1}	1200 min^{-1}	1200 min^{-1}
13C	PKOU_M	550 min^{-1}	550 min^{-1}	550 min^{-1}
13D	FZZY_GN_M	1.5	1.5	1.5
13E	FZZYTM_M	4 min.	4 min.	4 min.
144	SHIFTW_M	2.33 ˚C	2.33 ˚C	2.33 ˚C
145	SFTSZW_M	2.33 ˚C	2.33 ˚C	2.33 ˚C
146	SHIFTC_M	1.33 ˚C	1.33 ˚C	0.00 ˚C
147	SHIFTD_M	0.00 ˚C	0.00 ˚C	0.00 ˚C
148	CLMXTP_M	30.00 ˚C	30.00 ˚C	30.00 ˚C
149	YNEOF_M	20.00 ˚C	20.00 ˚C	20.00 ˚C
14E	TEION_M	2.00 ˚C	2.00 ˚C	2.00 ˚C
14F	TEIOF_M	9.00 ˚C	9.00 ˚C	9.00 ˚C
157	CMNLMT_M	1950 min^{-1}	1950 min^{-1}	1950 min^{-1}
178	FWSS_M	500 min^{-1}	500 min^{-1}	500 min^{-1}
179	FWSOY_M	830 min^{-1}	830 min^{-1}	830 min^{-1}
17A	FWS_M	850 min^{-1}	880 min^{-1}	920 min^{-1}
17B	FWKAF_M	1050 min^{-1}	1050 min^{-1}	1000 min^{-1}
17C	FWL_M	990 min^{-1}	1020 min^{-1}	1130 min^{-1}
17D	FWAH_M	1060 min^{-1}	1100 min^{-1}	1250 min^{-1}
17E	FWH_M	1080 min^{-1}	1130 min^{-1}	1270 min^{-1}
17F	FWHH_M	1080 min^{-1}	1130 min^{-1}	1270 min^{-1}
180	FCSOY_M	650 min^{-1}	650 min^{-1}	700 min^{-1}
181	FCS_M	700 min^{-1}	730 min^{-1}	800 min^{-1}
182	FCL_M	820 min^{-1}	900 min^{-1}	1040 min^{-1}
183	FCAH_M	920 min^{-1}	1000 min^{-1}	1240 min^{-1}
184	FCH_M	960 min^{-1}	1050 min^{-1}	1290 min^{-1}
185	FCHH_M	1060 min^{-1}	1100 min^{-1}	1310 min^{-1}
186	FDOY_M	700 min^{-1}	730 min^{-1}	800 min^{-1}
187	FDS1_M	700 min^{-1}	730 min^{-1}	800 min^{-1}
188	FDS2_M	700 min^{-1}	730 min^{-1}	800 min^{-1}

Table 1 Fan speed by mode

Operation mode	Fan speed mode		Label name
Heating operation	Ultra Lo		FWSS_M
	Sleep		FWSOY_M
	Lo		FWS_M
	Overload		FWKAF_M
	Med		FWL_M
	Hi	Set fan speed "AUTO"	FWAH_M
	Hi	Set fan speed "HI"	FWH_M
	Ultra Hi		FWHH_M
Cooling operation	Sleep		FCSOY_M
	Lo		FCS_M
	Med		FCL_M
	Hi	Set fan speed "AUTO"	FCAH_M
	Hi	Set fan speed "HI"	FCH_M
	Ultra Hi		FCHH_M
Dehumidifying operation	Sleep		FDOY_M
	Lo 1		FDS1_M
	Lo 2		FDS2_M

Table 2 Room temperature shift value

Operation mode		Label name
Heating operation	Fan speed "AUTO, Hi, Med"	SHIFTW_M
	Fan speed "Lo, Sleep"	SFTSZW_M
Cooling operation		SHIFTC_M
Dehumidifying operation		SHIFTD_M

MODEL		RAF-25NH4	RAF-50NH4
N O .	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE
09C	RTOTSA	2.00 ˚C	2.00 ˚C
120	WMAX_M	5300 min^{-1}	4500 min^{-1}
121	WMAX2_M	5300 min^{-1}	4500 min^{-1}
122	WSTD_M	4000 min^{-1}	4000 min^{-1}
123	WJKMAX_M	3700 min^{-1}	4000 min^{-1}
124	WBEMAX_M	3500 min^{-1}	3700 min^{-1}
125	CMAX_M	3500 min^{-1}	4000 min^{-1}
126	CMAX2_M	3500 min^{-1}	4000 min^{-1}
127	CSTD_M	3250 min^{-1}	3100 min^{-1}
128	CKYMAX_M	2800 min^{-1}	2800 min^{-1}
129	CJKMAX_M	2750 min^{-1}	2750 min^{-1}
12A	CBEMAX_M	2500 min^{-1}	2500 min^{-1}
12B	SDMAX_M	2400 min^{-1}	1800 min^{-1}
12C	SDRPM_M	2000 min^{-1}	1100 min^{-1}
132	WMIN_M	800 min^{-1}	800 min^{-1}
133	CMINHI_M	800 min^{-1}	800 min^{-1}
134	CMIN_M	1200 min^{-1}	1200 min^{-1}
135	DMIN_M	1200 min^{-1}	1100 min^{-1}
136	PKOU_M	500 min^{-1}	500 min^{-1}
137	FZZY_GN_M	1.0	1.0
138	FZZYTM_M	3 min.	3 min.
13E	SHIFTW_M	2.33 ˚C	2.33 ˚C
13F	SFTSZW_M	0.66 ˚C	0.66 ˚C
140	SHIFTO_M	-0.66 ˚C	-0.66 ˚C
141	SHIFTD_M	-0.66 ˚C	-0.66 ˚C
142	CLMXTP_M	30.00 ˚C	30.00 ˚C
143	YNEOF_M	23.00 ˚C	23.00 ˚C
148	TEION_M	2.00 ˚C	2.00 ˚C
149	TEIOF_M	9.00 ˚C	9.00 ˚C
150	CMNLMT_M	1900 min^{-1}	1900 min^{-1}
16D	FWSS_M	400 min^{-1}	400 min^{-1}
16E	FWSOY_M	710 min^{-1}	740 min^{-1}
16F	FWS_M	710 min^{-1}	820 min^{-1}
170	FWKAF_M	790 min^{-1}	950 min^{-1}
171	FWL_M	790 min^{-1}	950 min^{-1}
172	FWAH_M	830 min^{-1}	1040 min^{-1}
173	FWH_M	870 min^{-1}	1080 min^{-1}
174	FWHM_M	960 min^{-1}	1100 min^{-1}
175	FWHH_M	960 min^{-1}	1100 min^{-1}
176	FCSOY_M	670 min^{-1}	670 min^{-1}
177	FCS_M	670 min^{-1}	730 min^{-1}
178	FCL_M	750 min^{-1}	920 min^{-1}
179	FCAH_M	790 min^{-1}	1000 min^{-1}
17A	FCH_M	830 min^{-1}	1050 min^{-1}
17B	FCHM_M	880 min^{-1}	1090 min^{-1}
17C	FCHH_M	880 min^{-1}	1090 min^{-1}
17D	FDOY_M	670 min^{-1}	730 min^{-1}
17E	FDS1_M	670 min^{-1}	730 min^{-1}
17F	FDS2_M	670 min^{-1}	730 min^{-1}
180	FCLN_M	600 min^{-1}	600 min^{-1}
186	FWOPN_M	1060 min^{-1}	1250 min^{-1}
187	FCOPN_M	1020 min^{-1}	1090 min^{-1}
188	FWCLD_M	1060 min^{-1}	1250 min^{-1}
189	FCCLD_M	1020 min^{-1}	1090 min^{-1}
18A	FWUDSS_M	400 min^{-1}	400 min^{-1}
18B	FWUDSOY_M	640 min^{-1}	660 min^{-1}
18C	FWUDS_M	640 min^{-1}	740 min^{-1}
18D	FWUDKAF_M	710 min^{-1}	860 min^{-1}
18E	FWUDL_M	710 min^{-1}	860 min^{-1}
18F	FWUDAH_M	750 min^{-1}	950 min^{-1}
190	FWUDH_M	780 min^{-1}	970 min^{-1}
191	FWUDHH_M	870 min^{-1}	990 min^{-1}
192	FCUDSOY_M	600 min^{-1}	660 min^{-1}
193	FCUDS_M	600 min^{-1}	660 min^{-1}
194	FCUDL_M	680 min^{-1}	820 min^{-1}
195	FCUDAH_M	710 min^{-1}	900 min^{-1}
196	FCUDH_M	750 min^{-1}	940 min^{-1}
197	FCUDHH_M	790 min^{-1}	980 min^{-1}
19D	FWUDOPN_M	950 min^{-1}	1100 min^{-1}
19E	FCUDOPN_M	900 min^{-1}	980 min^{-1}

Table 1 Fan speed by mode

Operation mode		Fan speed mode		Label name
Heating operation	Upper Fan	Ultra Lo		FWSS_M
		Sleep		FWSOY_M
		Lo		FWS_M
		Overload		FWKAF_M
		Med		FWL_M
		Hi	Set fan speed "HI"	FWH_M
		Ultra Hi	(When AIR OUTLET SWITCH "ON")	FWHM_M
		Ultra Hi	(When AIR OUTLET SWITCH "OFF")	FWHM_M
		Hi	Set fan speed "AUTO"	FWAH_M
	Lower Fan	Ultra Lo		FWUDSS_M
		Sleep		FWUDSOY_M
		Lo		FWUDS_M
		Overload		FWUDKAF_M
		Med		FWUDL_M
		Hi	Set fan speed "HI"	FWUDH_M
		Ultra Hi		FWUDHH_M
		Hi	Set fan speed "AUTO"	FWUDAH_M
Cooling operation	Upper Fan	Sleep		FCSOY_M
		Lo		FCS_M
		Med		FCL_M
		Hi	Set fan speed "HI"	FCH_M
		Ultra Hi	(When AIR OUTLET SWITCH "ON")	FCHM_M
		Ultra Hi	(When AIR OUTLET SWITCH "OFF")	FCHH_M
		Hi	Set fan speed "AUTO"	FCAH_M
	Lower Fan	Sleep		FCUDSOY_M
		Lo		FCUDS_M
		Med		FCUDL_M
		Hi	Set fan speed "HI"	FCUDH_M
		Ultra Hi		FCUDHH_M
		Hi	Set fan speed "AUTO"	FCUDAH_M
Dehumidifying operation		Sleep		FDOY_M
		Lo1		FDS1_M
		Lo2		FDS2_M

Table 2 Room temperature shift value

Operation mode		Shift value
Heating operation	Fan speed "AUTO, Hi, Med"	SHIFTW
	Fan speed "Lo, Sleep"	SFTSZW
Cooling operation		SHIFTC
Dehumidifying operation		SHIFTD

MODEL		RAM-55QH4	RAM-65QH4
PROM NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE
0A2	RTOTSA	5.00 ˚C	5.00 ˚C
120	WMAX_M	5300 min^{-1}	4500 min^{-1}
121	WMAX2_M	5300 min^{-1}	4500 min^{-1}
122	WSTD_M	4000 min^{-1}	3700 min^{-1}
123	WJKMAX_M	3700 min^{-1}	3700 min^{-1}
124	WBEMAX_M	3500 min^{-1}	3500 min^{-1}
127	CMAX_M	3500 min^{-1}	3500 min^{-1}
128	CMAX2_M	3500 min^{-1}	3500 min^{-1}
129	CSTD_M	3250 min^{-1}	3000 min^{-1}
12A	CKYMAX_M	2850 min^{-1}	2850 min^{-1}
12B	CJKMAX_M	2700 min^{-1}	2700 min^{-1}
12C	CBEMAX_M	2000 min^{-1}	2000 min^{-1}
12F	SDMAX_M	2400 min^{-1}	1800 min^{-1}
130	SDRPM_M	2000 min^{-1}	1500 min^{-1}
138	WMIN_M	800 min^{-1}	800 min^{-1}
139	CMINHI_M	800 min^{-1}	800 min^{-1}
13A	CMIN_M	1000 min^{-1}	1000 min^{-1}
13B	DMIN_M	1000 min^{-1}	1000 min^{-1}
13C	PKOU_M	500 min^{-1}	500 min^{-1}
13D	FZZY_GN_M	1.0	1.0
13E	FZZYTM_M	3 min.	3 min.
144	SHIFTW_M	4.00 ˚C	4.00 ˚C
145	SFTSZW_M	5.33 ˚C	5.33 ˚C
146	SHIFTC_M	-1.00 ˚C	-1.00 ˚C
147	SHIFTD_M	-1.00 ˚C	-1.00 ˚C
148	CLMXTP_M	30.00 ˚C	30.00 ˚C
149	YNEOF_M	21.00 ˚C	21.00 ˚C
14E	TEION_M	2.00 ˚C	2.00 ˚C
14F	TEIOF_M	6.00 ˚C	6.00 ˚C
157	CMNLMT_M	1950 min^{-1}	1950 min^{-1}
178	FWSS_M	16.0 V	16.0 V
179	FWSOY_M	18.9 V	21.1 V
17A	FWS_M	19.9 V	22.1 V
17B	FWKAF_M	24.0 V	26.0 V
17C	FWL_M	24.0 V	26.0 V
17D	FWAH_M	26.0 V	30.1 V
17E	FWH_M	27.0 V	32.0 V
17F	FWHH_M	30.1 V	33.0 V
180	FCSOY_M	16.4 V	18.0 V
181	FCS_M	17.0 V	18.9 V
182	FCL_M	19.9 V	24.0 V
183	FCAH_M	22.1 V	27.0 V
184	FCH_M	23.4 V	30.5 V
185	FCHH_M	25.2 V	30.5 V
186	FDOY_M	17.0 V	18.9 V
187	FDS1_M	17.0 V	18.9 V
188	FDS2_M	17.0 V	18.9 V

Table 1 Fan speed by mode

Operation mode	Fan speed mode		Label name
Heating operation	Ultra Lo		FWSS_M
	Sleep		FWSOY_M
	Lo		FWS_M
	Overload		FWKAF_M
	Med		FWL_M
	Hi	Set fan speed "AUTO"	FWAH_M
	Hi	Set fan speed "HI"	FWH_M
	Ultra Hi		FWHH_M
Cooling operation	Sleep		FCSOY_M
	Lo		FCS_M
	Med		FCL_M
	Hi	Set fan speed "AUTO"	FCAH_M
	Hi	Set fan speed "HI"	FCH_M
	Ultra Hi		FCHH_M
Dehumidifying operation	Sleep		FDOY_M
	Lo 1		FDS1_M
	Lo 2		FDS2_M

Table 2 Room temperature shift value

Operation mode		Label name
Heating operation	Fan speed "AUTO, Hi, Med"	SHIFTW_M
	Fan speed "Lo, Sleep"	SFTSZW_M
Cooling operation		SHIFTC_M
Dehumidifying operation		SHIFTD_M

MODEL		RAD-25NH4	RAD-40NH4
PROM NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE
0A2	RTOTSA	2.00 ˚C	2.00 ˚C
120	WMAX_M	5300 min^{-1}	4500 min^{-1}
121	WMAX2_M	5300 min^{-1}	4500 min^{-1}
122	WSTD_M	4000 min^{-1}	4000 min^{-1}
123	WJKMAX_M	3600 min^{-1}	4000 min^{-1}
124	WBEMAX_M	3200 min^{-1}	3500 min^{-1}
127	CMAX_M	3300 min^{-1}	3500 min^{-1}
128	CMAX2_M	3300 min^{-1}	3500 min^{-1}
129	CSTD_M	3000 min^{-1}	3000 min^{-1}
12A	CKYMAX_M	2500 min^{-1}	3000 min^{-1}
12B	CJKMAX_M	2300 min^{-1}	2700 min^{-1}
12C	CBEMAX_M	1900 min^{-1}	2000 min^{-1}
12F	SDMAX_M	2050 min^{-1}	1800 min^{-1}
130	SDRPM_M	1800 min^{-1}	1500 min^{-1}
138	WMIN_M	800 min^{-1}	800 min^{-1}
139	CMINHI_M	800 min^{-1}	800 min^{-1}
13A	CMIN_M	1000 min^{-1}	1000 min^{-1}
13B	DMIN_M	1000 min^{-1}	1000 min^{-1}
13C	PKOU_M	500 min^{-1}	500 min^{-1}
13D	FZZY_GN_M	1.5	1.0
13E	FZZYTM_M	3 min.	3 min.
144	SHIFTW_M	5.00 ˚C	5.00 ˚C
145	SFTSZW_M	5.00 ˚C	5.00 ˚C
146	SHIFTC_M	1.66 ˚C	1.66 ˚C
147	SHIFTD_M	1.66 ˚C	1.66 ˚C
148	CLMXTP_M	30.00 ˚C	30.00 ˚C
149	YNEOF_M	20.00 ˚C	20.00 ˚C
14E	TEION_M	2.00 ˚C	2.00 ˚C
14F	TEIOF_M	9.00 ˚C	9.00 ˚C
157	CMNLMT_M	0 min^{-1}	0 min^{-1}
178	FWSS_M	13.1 V	13.1 V
179	FWSOY_M	17.6 V	17.6 V
17A	FWS_M	20.3 V	20.3 V
17B	FWKAF_M	22.9 V	22.9 V
17C	FWL_M	22.9 V	22.9 V
17D	FWAH_M	27.9 V	27.9 V
17E	FWH_M	28.3 V	28.3 V
17F	FWHH_M	28.3 V	28.3 V
180	FCSOY_M	18.0 V	18.0 V
181	FCS_M	20.5 V	20.5 V
182	FCL_M	24.0 V	24.0 V
183	FCAH_M	27.9 V	27.9 V
184	FCH_M	27.9 V	27.9 V
185	FCHH_M	27.9 V	27.9 V
186	FDOY_M	18.0 V	18.0 V
187	FDS1_M	20.5 V	20.5 V
188	FDS2_M	20.5 V	20.5 V

Table 1 Fan speed by mode

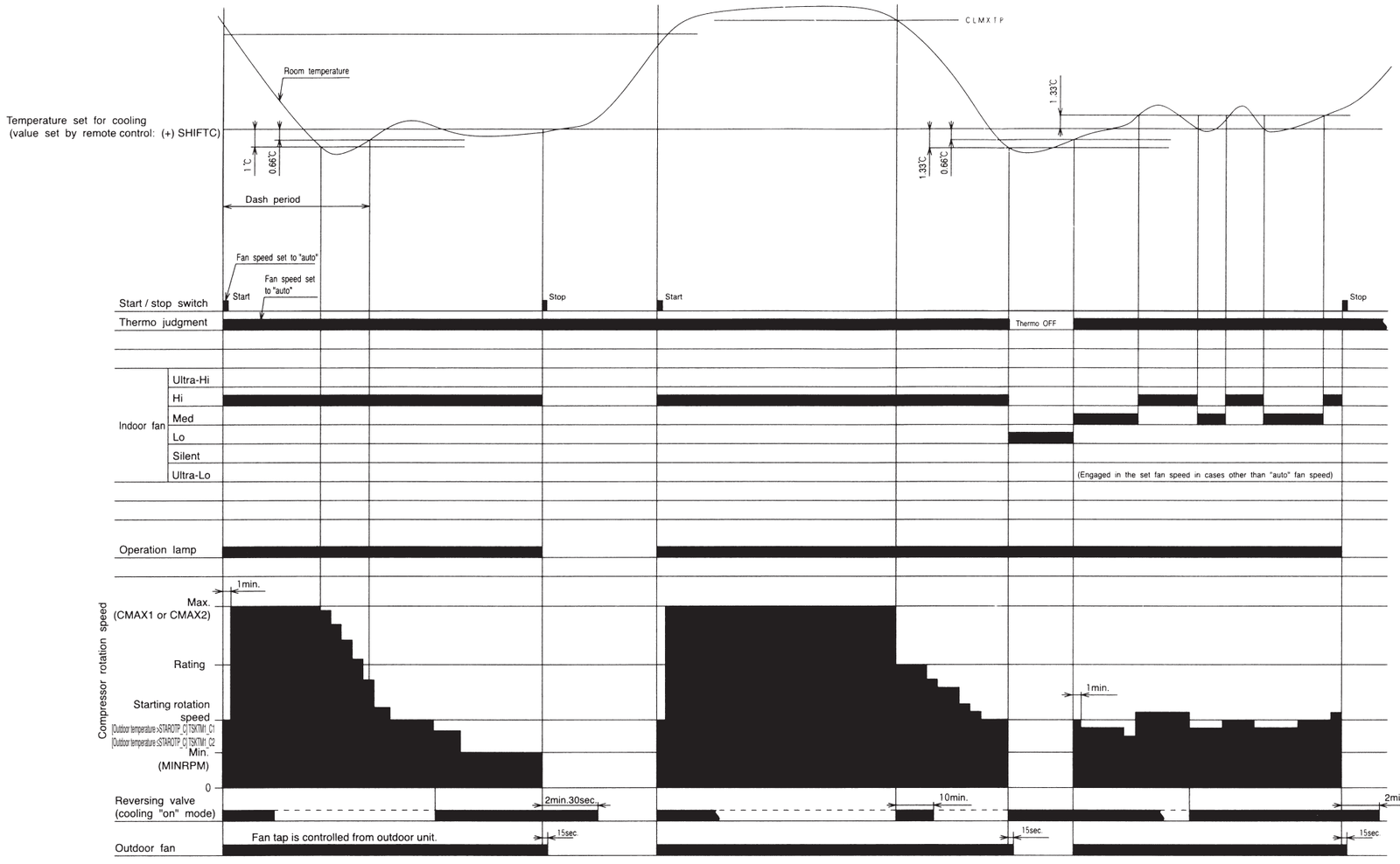
Operation mode	Fan speed mode		Label name
Heating operation	Ultra Lo		FWSS_M
	Sleep		FWSOY_M
	Lo		FWS_M
	Overload		FWKAF_M
	Med		FWL_M
	Hi	Set fan speed "AUTO"	FWAH_M
	Hi	Set fan speed "HI"	FWH_M
	Ultra Hi		FWHH_M
Cooling operation	Sleep		FCSOY_M
	Lo		FCS_M
	Med		FCL_M
	Hi	Set fan speed "AUTO"	FCAH_M
	Hi	Set fan speed "HI"	FCH_M
	Ultra Hi		FCHH_M
Dehumidifying operation	Sleep		FDOY_M
	Lo 1		FDS1_M
	Lo 2		FDS2_M

Table 2 Room temperature shift value

Operation mode		Label name
Heating operation	Fan speed "AUTO, Hi, Med"	SHIFTW_M
	Fan speed "Lo, Sleep"	SFTSZW_M
Cooling operation		SHIFTC_M
Dehumidifying operation		SHIFTD_M

MODEL		RAM-55QH4 / RAM-65QH4	
PROM NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	
040	PSTARTC1$	250	
041	PSTARTC1K$	300	
042	PSTARTC2$	150	
043	PSTARTC2K$	300	
044	PSTARTH$	250	
045	PSTARTH2$	250	
046	PMIN$	30	
047	DFCTPS$	100	
048	DFCTPN$	240	
049	DFSPPS$	380	
04A	DFPSMX$	480	
04B	PCLOSH$	60	
121	CMAX1	5400	min^{-1}
122	CMAX2	6100	min^{-1}
125	CMAX3	6200	min^{-1}
12C	WMAX1	6200	min^{-1}
12D	WMAX2	6200	min^{-1}
130	WMAX3	6200	min^{-1}
142	STAROTP_C	25	˚C
143	SDRCT1_C1	2000	min^{-1}
144	TSKTM1_C1	40	sec
145	SDRCT1_C2	3000	min^{-1}
146	TSKTM_C2	60	sec
147	STAROTP_W	4.8	˚C
148	SDRCT1_W1	2000	min^{-1}
149	TSKTM1_W1	90	sec
14A	SDRCT1_W2	3000	min^{-1}
14B	TSKTM1_W2	90	sec
14C	SDSTEP	1000	min^{-1}
14D	TSKSPT	8	sec
14E	KYO_RPM	3000	min^{-1}
1BB	TDF414	90	sec
1BC	DFMXTM	12	min^{-1}
1BD	SDRCT2	2000	min^{-1}
1BE	TSKTM2	60	sec
1BF	DFSTEP	1000	min^{-1}
1C0	TDFSPT	90	sec
1C1	DEFMAX	6000	min^{-1}
1C2	TDF415	90	sec
1C3	DFSTMB	50	min.
1C4	DFSTMB2	60	min.
1CB	NDWN_ON	97.2	˚C
1CC	NDWN_OFF	95	˚C
1CD	OH_ON	118.2	˚C
1CE	OH_OFF	104.7	˚C

Basic Cooling Operation



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.

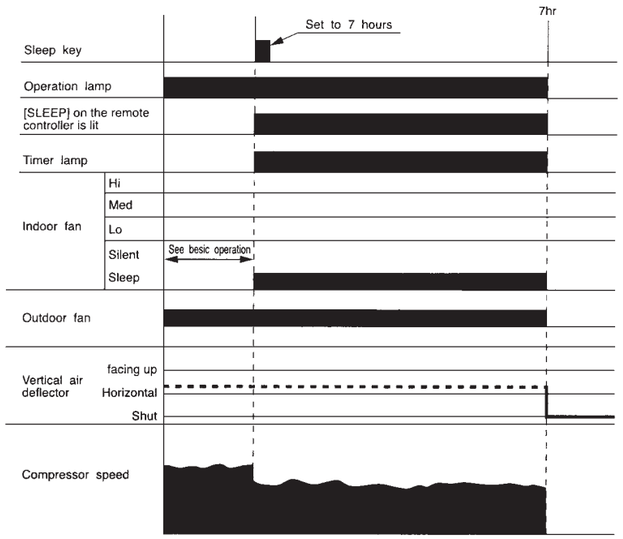
(4) The compressor minimum ON time and minimum OFF time is 3 minutes.

(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.

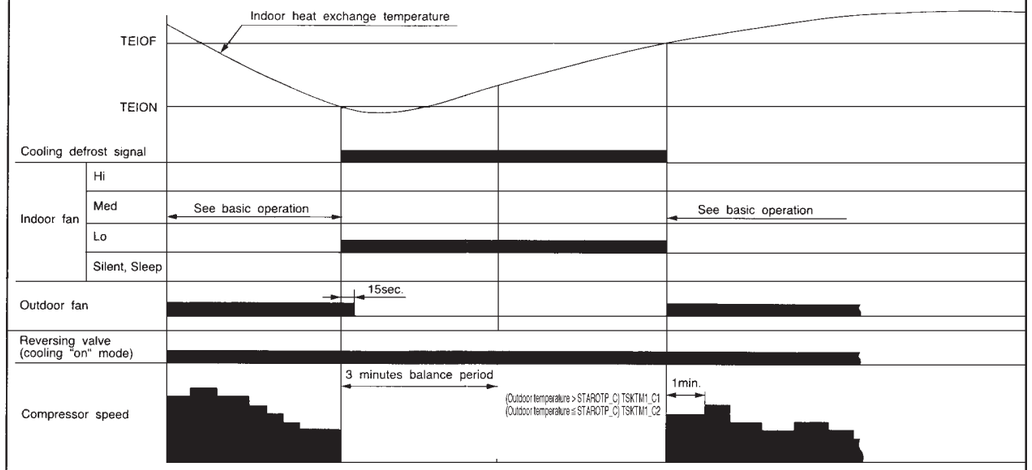
Cooling Sleep Operation



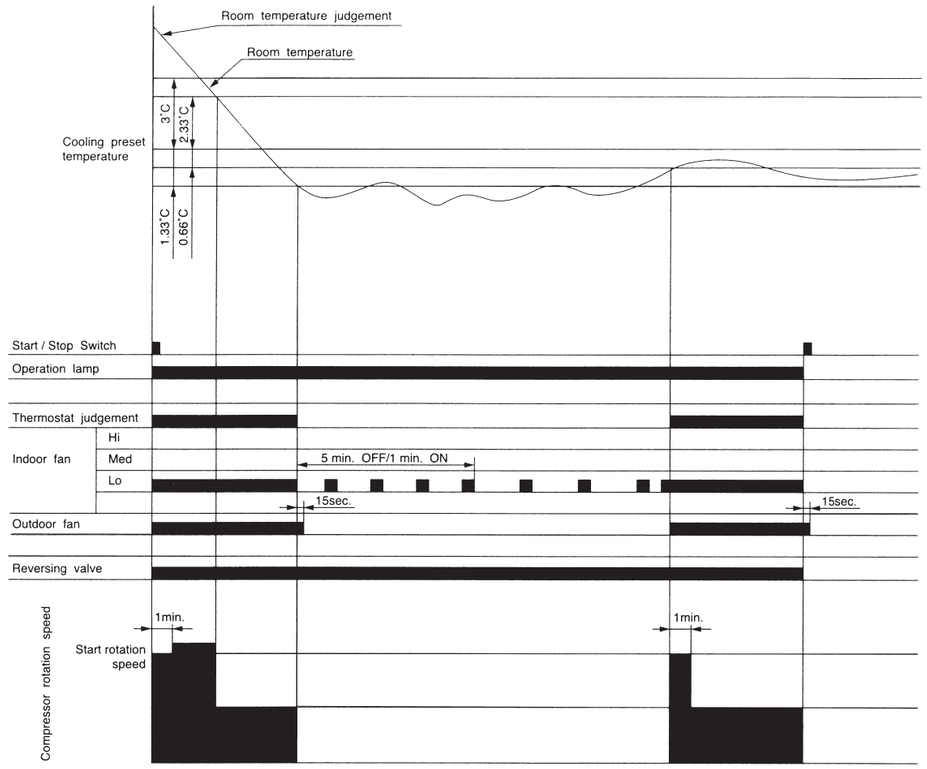
Notes:
(1) The sleep operation starts when the sleep key is pressed.
(2) When the sleep key is set, the indoor fan is set to "sleep silent" (FCSOY_M or AFCSOY).
(3) The indoor fan speed does not change even when the fan speed mode is changed.
(4) If the set time is changed during sleep operation, all 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



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.

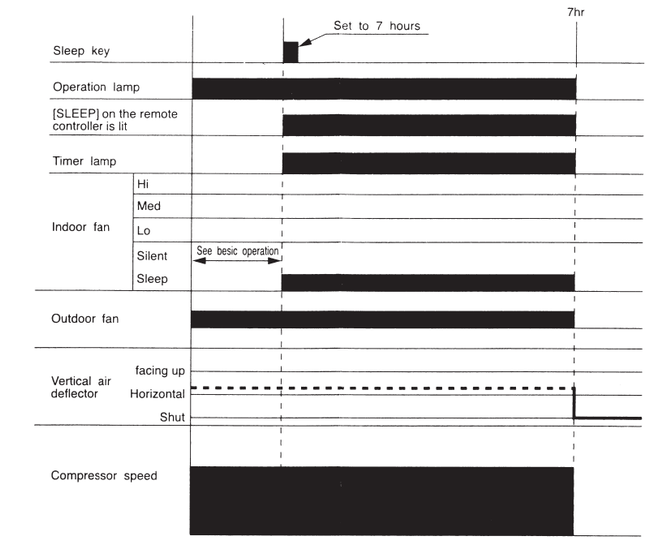
① "THERMO ON continues" when room temperature ≧ setting temperature +1°C: (The THERMO operation value is usually the same as that at "start of operation")

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).

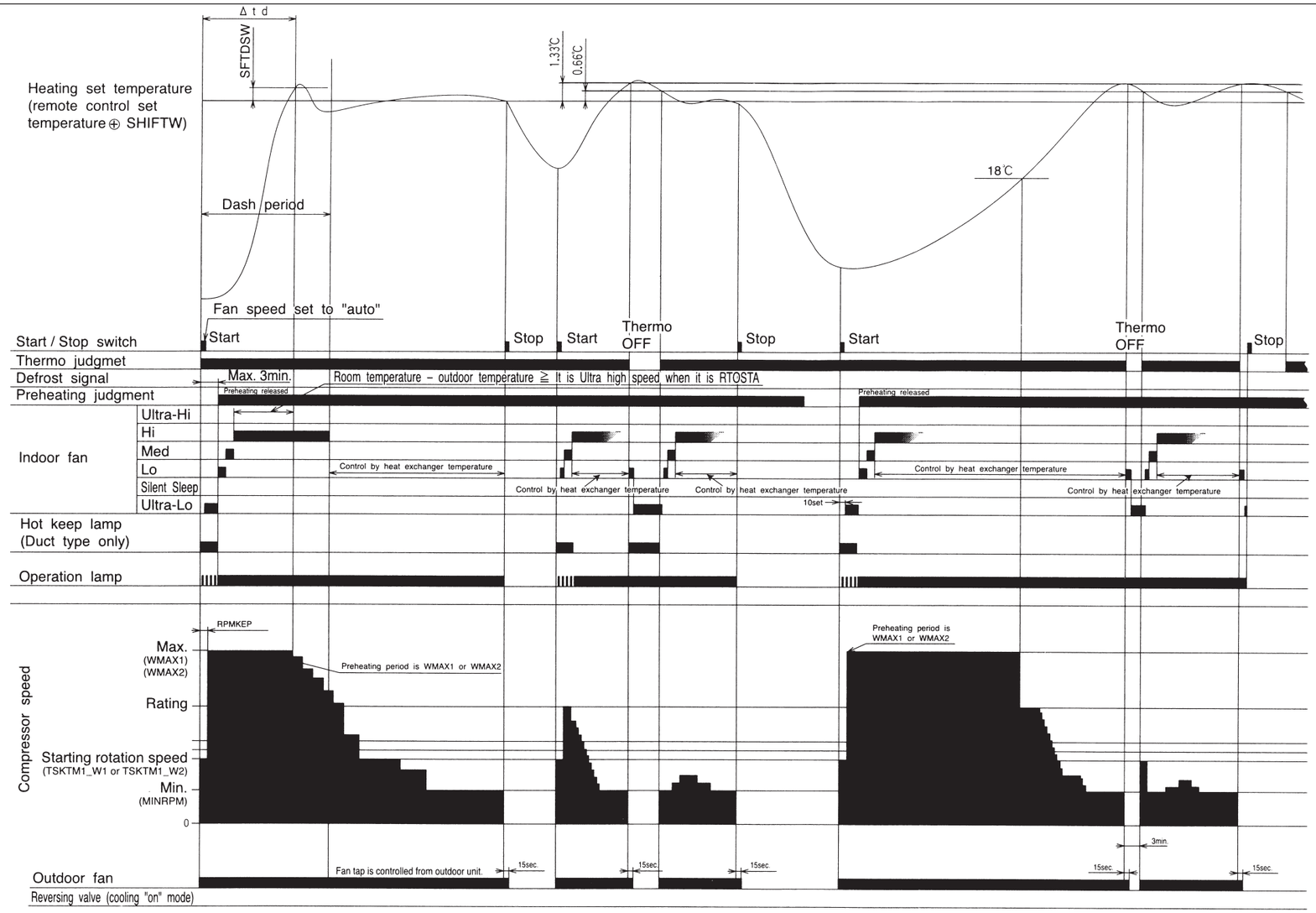
(3) The indoor fan speed does not change even when the fan speed mode is changed.

(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.

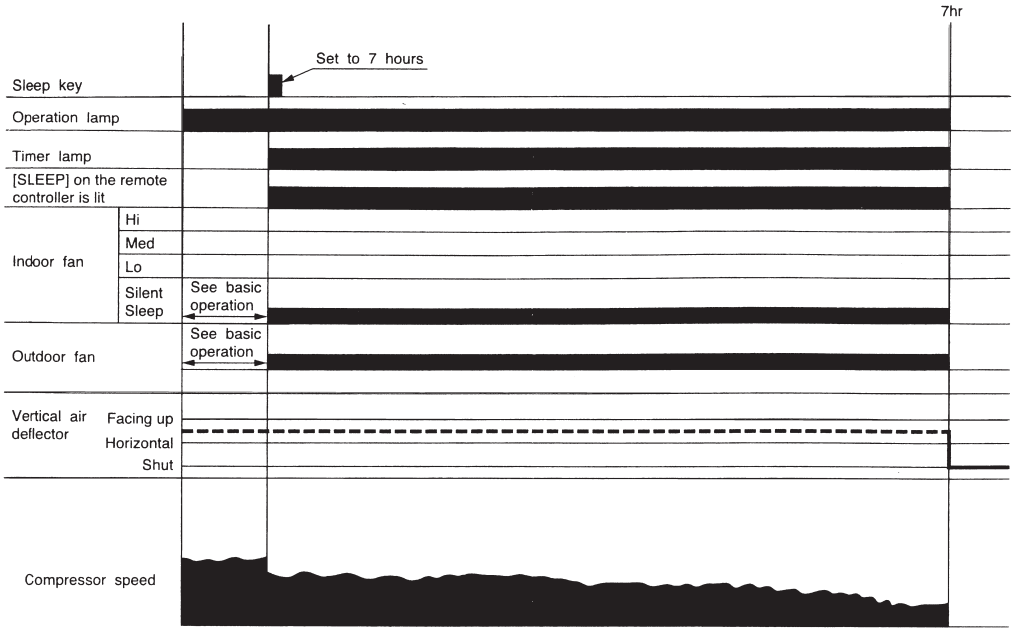
(7) For preheating judgment, preheating starts if the heat exchange temperature is lower than YNEOFC and is cancelled if the heat exchange temperature is YNEOF plus 0.33℃ or higher at the start of operation using the START / STOP button.

(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.

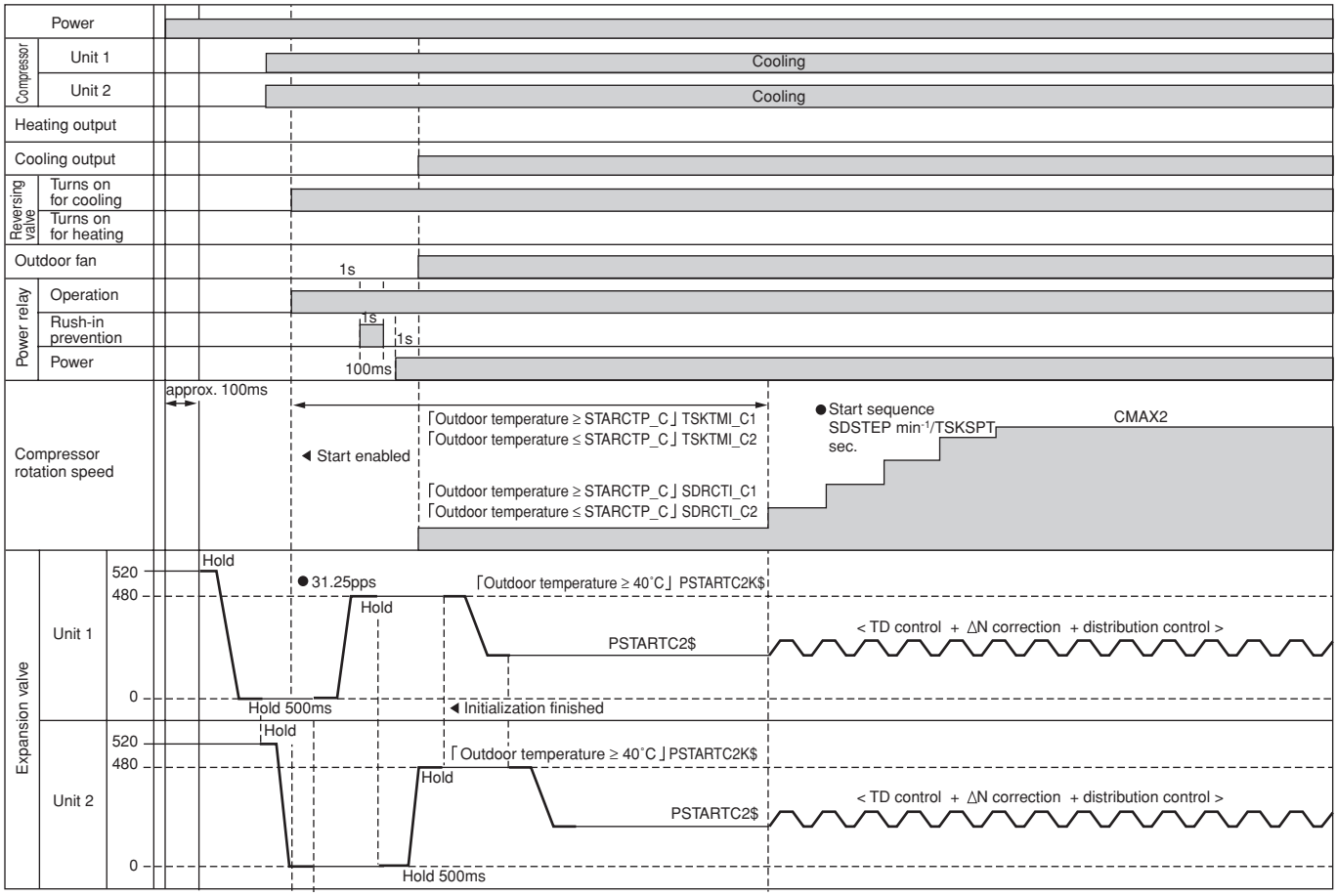
MODEL RAM-55QH4

◇ 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). When the valve for unit 1, 2 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.

◇ Compressor rotation speed

- When the compressor is started, the SDRCT1 speed / TSTKTM1 second is held.
  After the steady speed period is finished, the speed increases at the rate of SDSTEP speed / TSKSPT second until the target speed is resched.



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

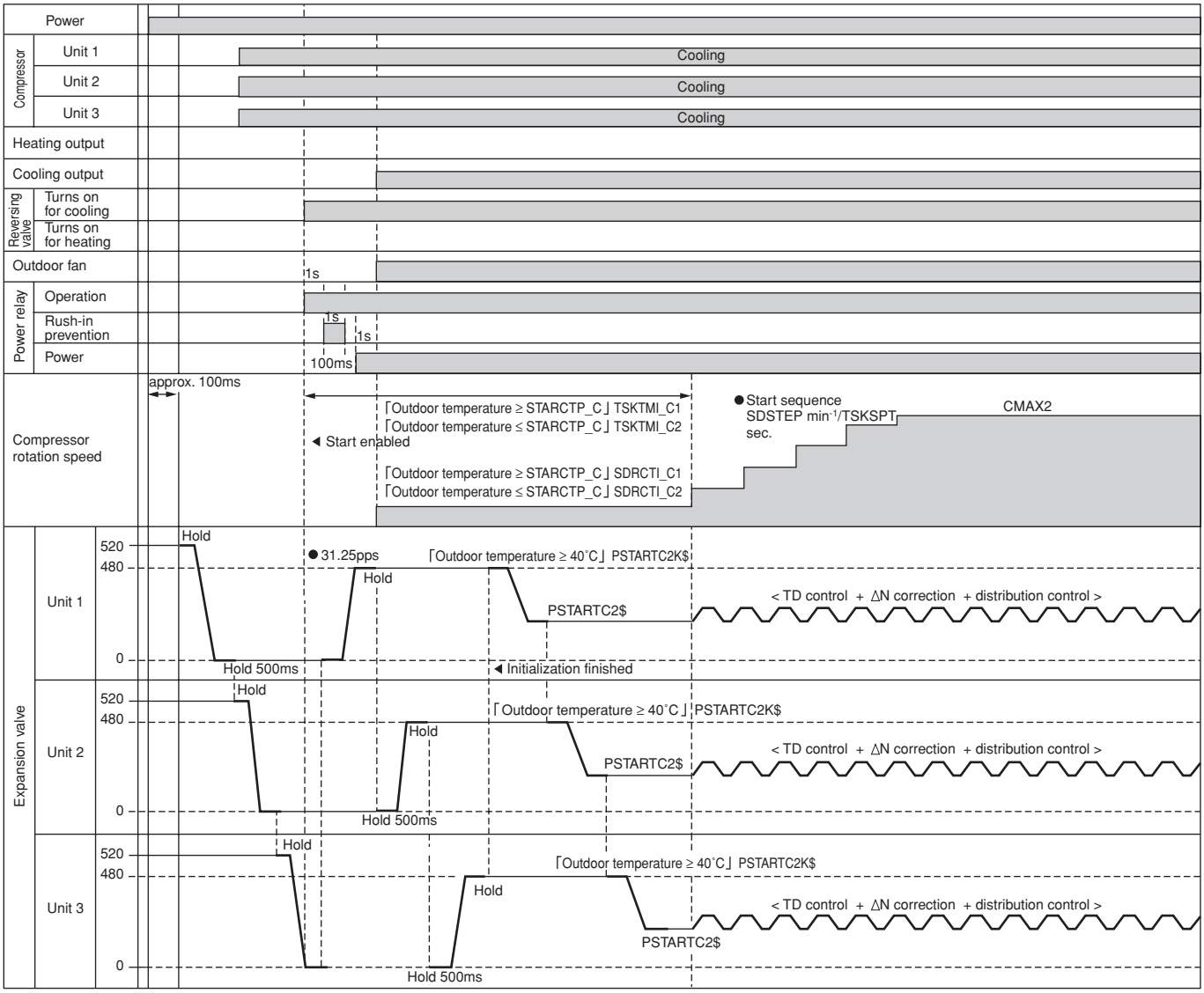
MODEL RAM-65QH4

◇ 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). When the valve for unit 1, 2, 3 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.

◇ Compressor rotation speed

- When the compressor is started, the SDRCT1 speed / TSTKTM1 second is held.
  After the steady speed period is finished, the speed increases at the rate of SDSTEP speed / TSKSPT second until the target speed is resched.



※ 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.
  - 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.

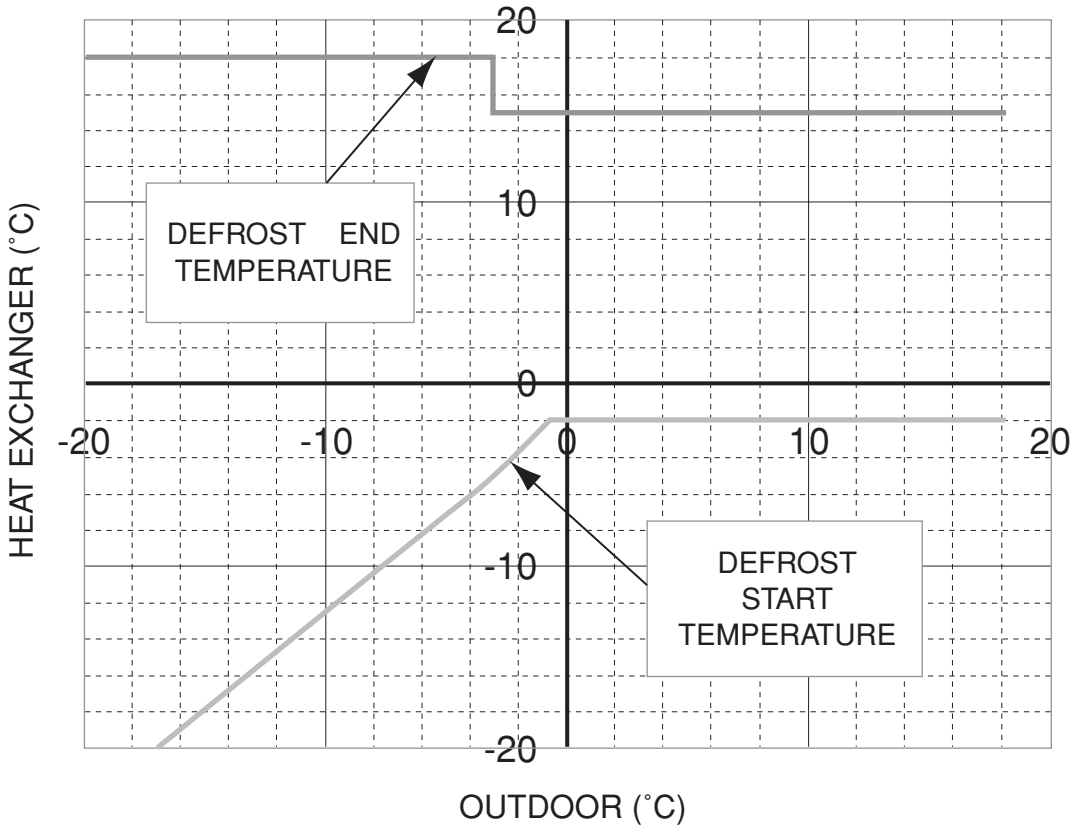
(3) Outputs during defrost

- 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].

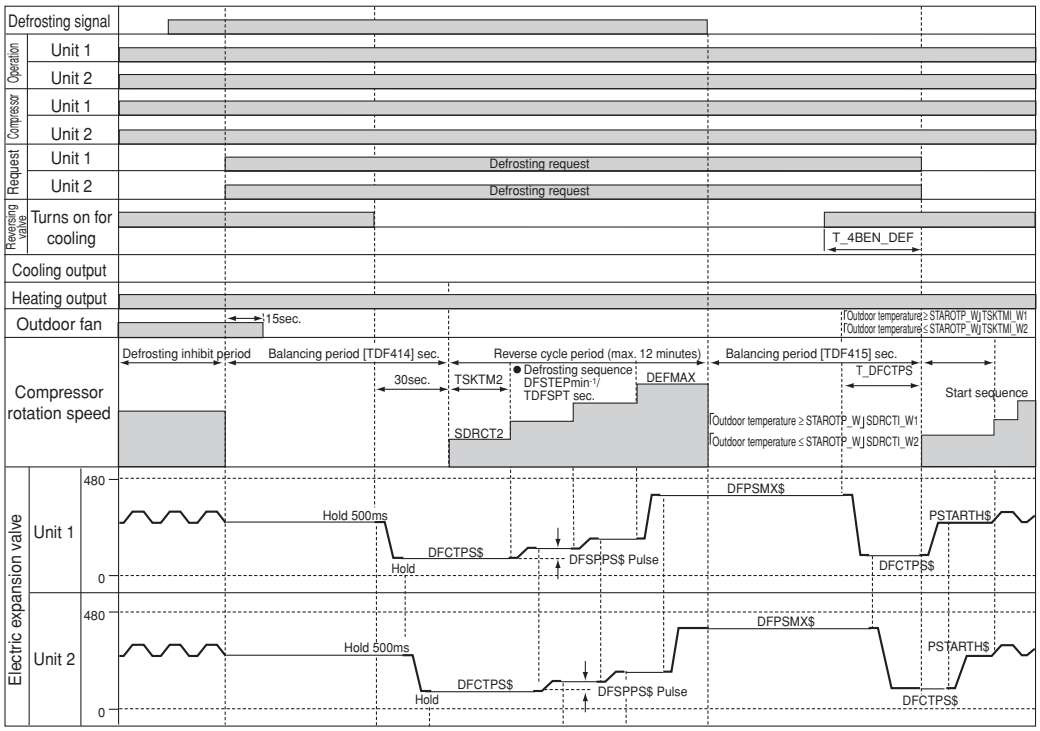
RAM-55QH4, RAM-65QH4 DEFROST TEMPERATURE



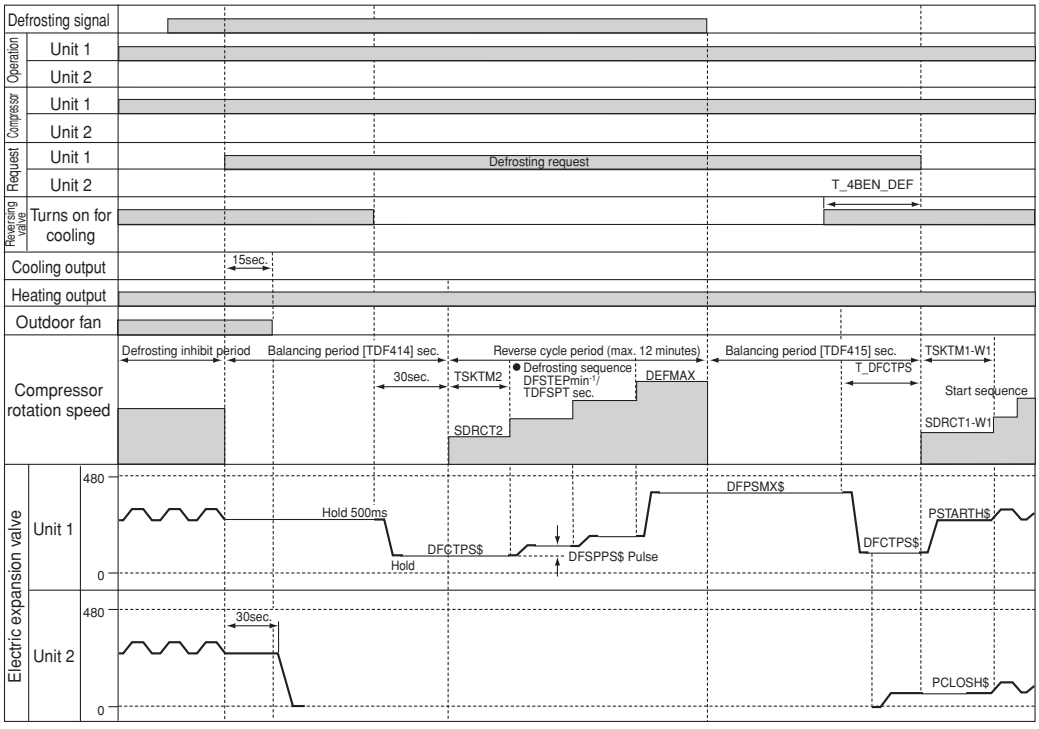
* above graph is showing the ideal value by micon program.
* guaranteed temperature range of this model is –15˚C to +27˚C at heating.

MODEL RAM-55QH4

・Time chart when executing defrost (unit 1 and unit 2 operated)

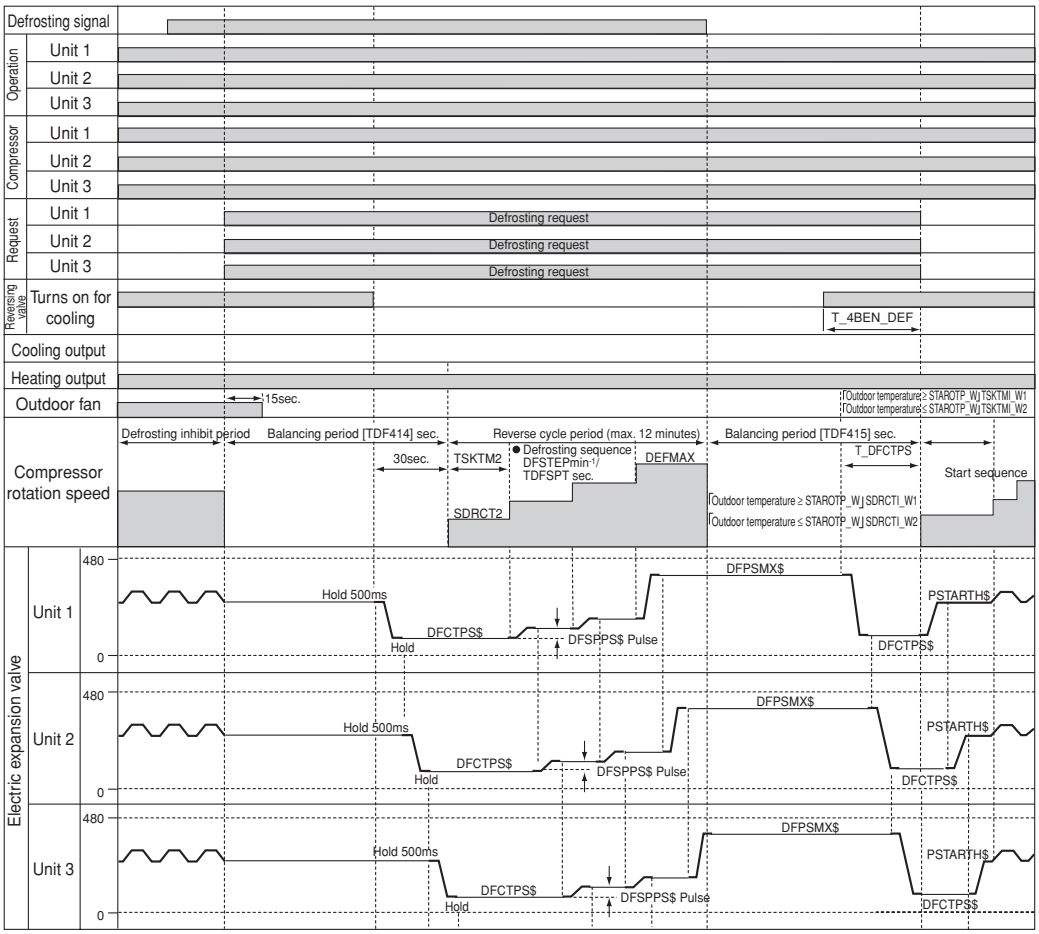


・Time chart when executing defrost (Only unit 1 operated, unit 2 stopped)

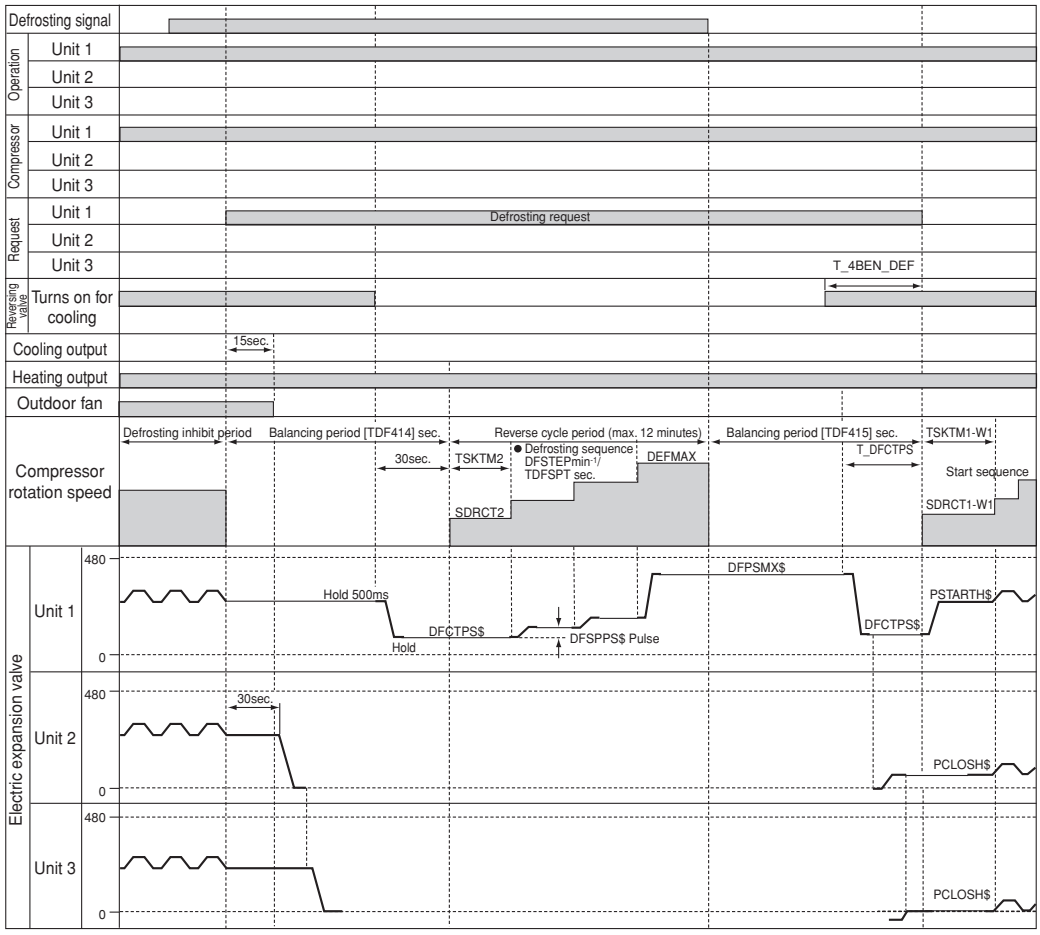


MODEL RAM-65QH4

・Time chart when executing defrost (unit 1, unit 2 and unit 3 operated)



・Time chart when executing defrost (Only unit 1 operated, unit 2 and unit 3 stopped)



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.

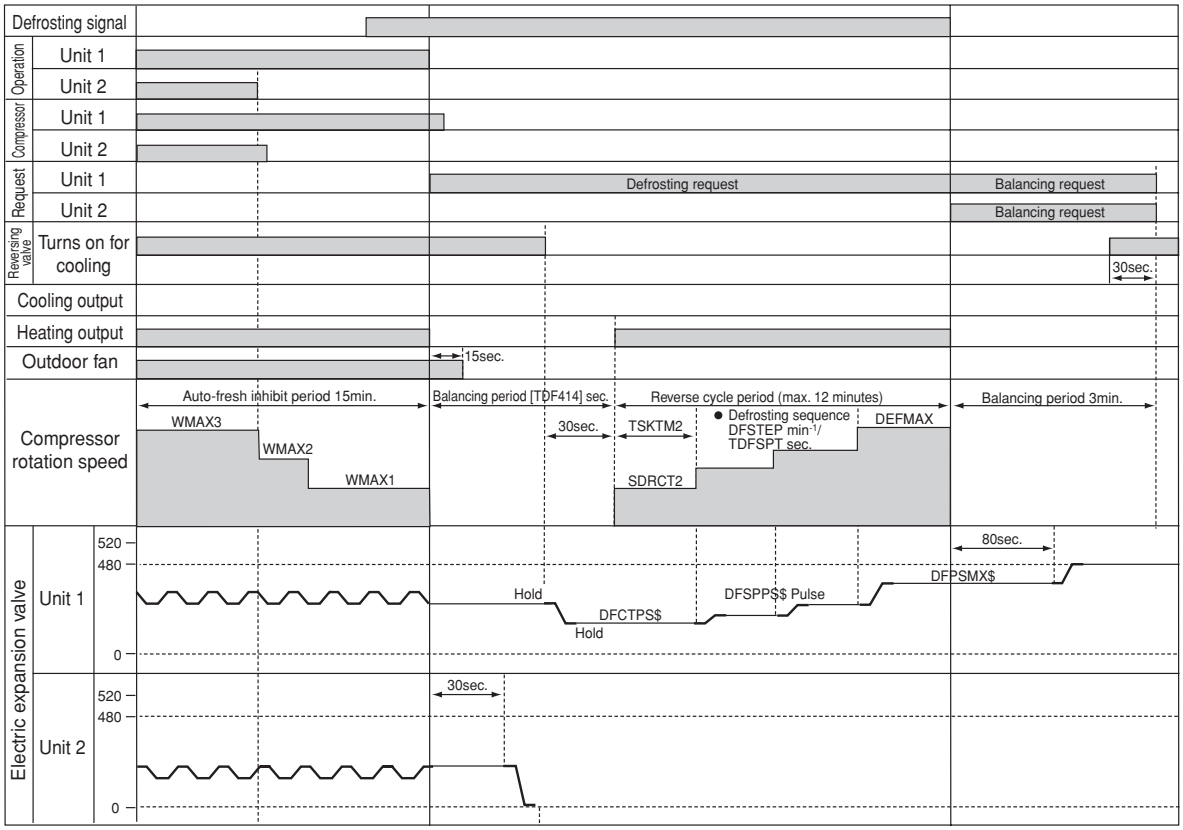
(2) Release condition of auto-fresh
- If any one of following conditions is established, auto-fresh is released:
  ① Heat exchange temperature returns (heat exchange temperature ≥ DEFOFF)
  ② 12 minutes of defrost MAX time has elapsed.
  ③ Failure occurred.
  ④ Either unit 1 or unit 2 or unit 3 started 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-55QH4



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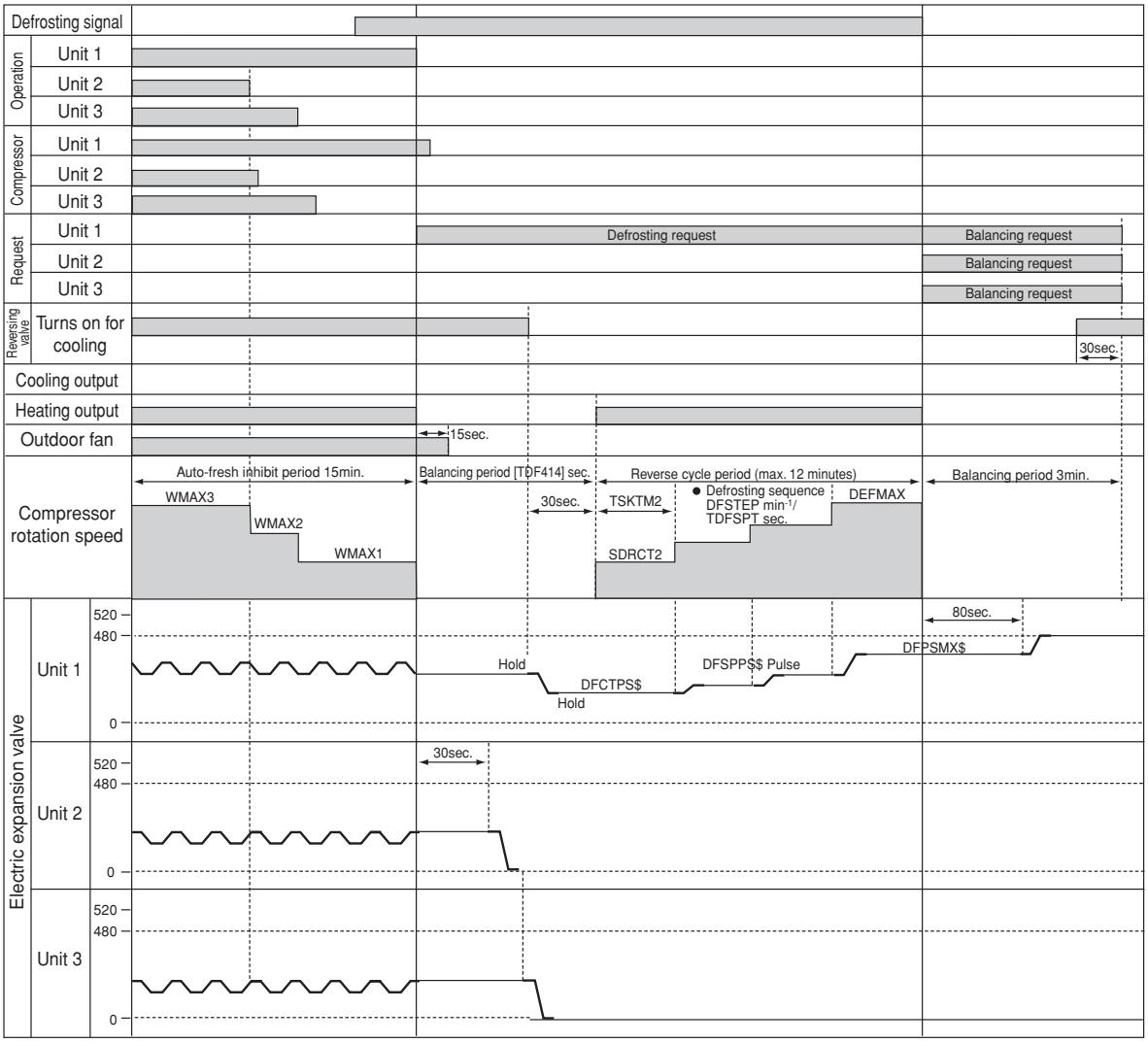
MODEL RAM-65QH4



MODEL RAM-55QH4

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 and 2 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.

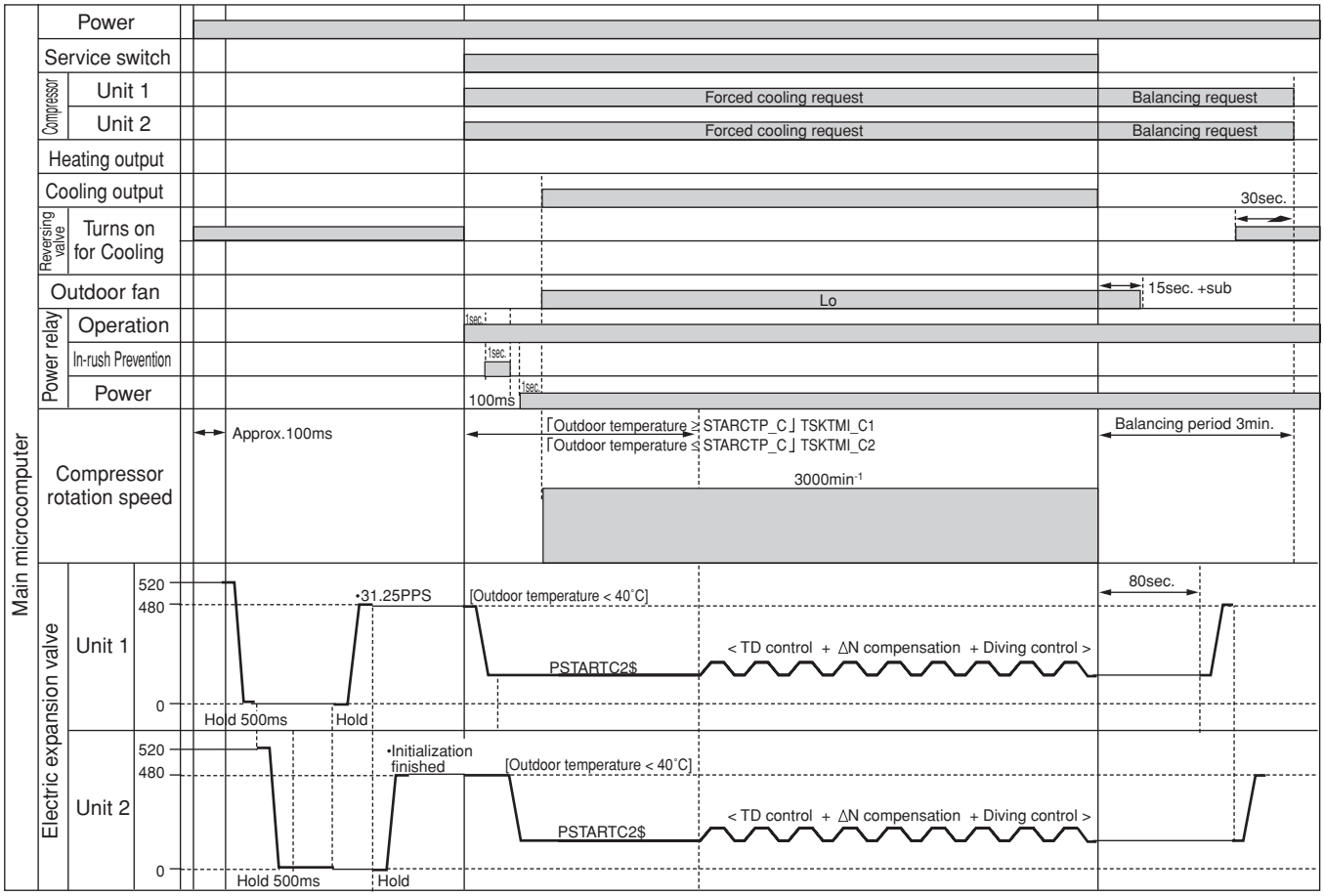
[Operation status]

• 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, compressor fixed speed control at start is not performed.

• The following shows the operation state of forced cooling.



※TSKTM1_C and PSTARTC2$ are EEPROM data.

MODEL RAM-65QH4

FORCED COOLING

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  Execution condition and operation status are shown below.

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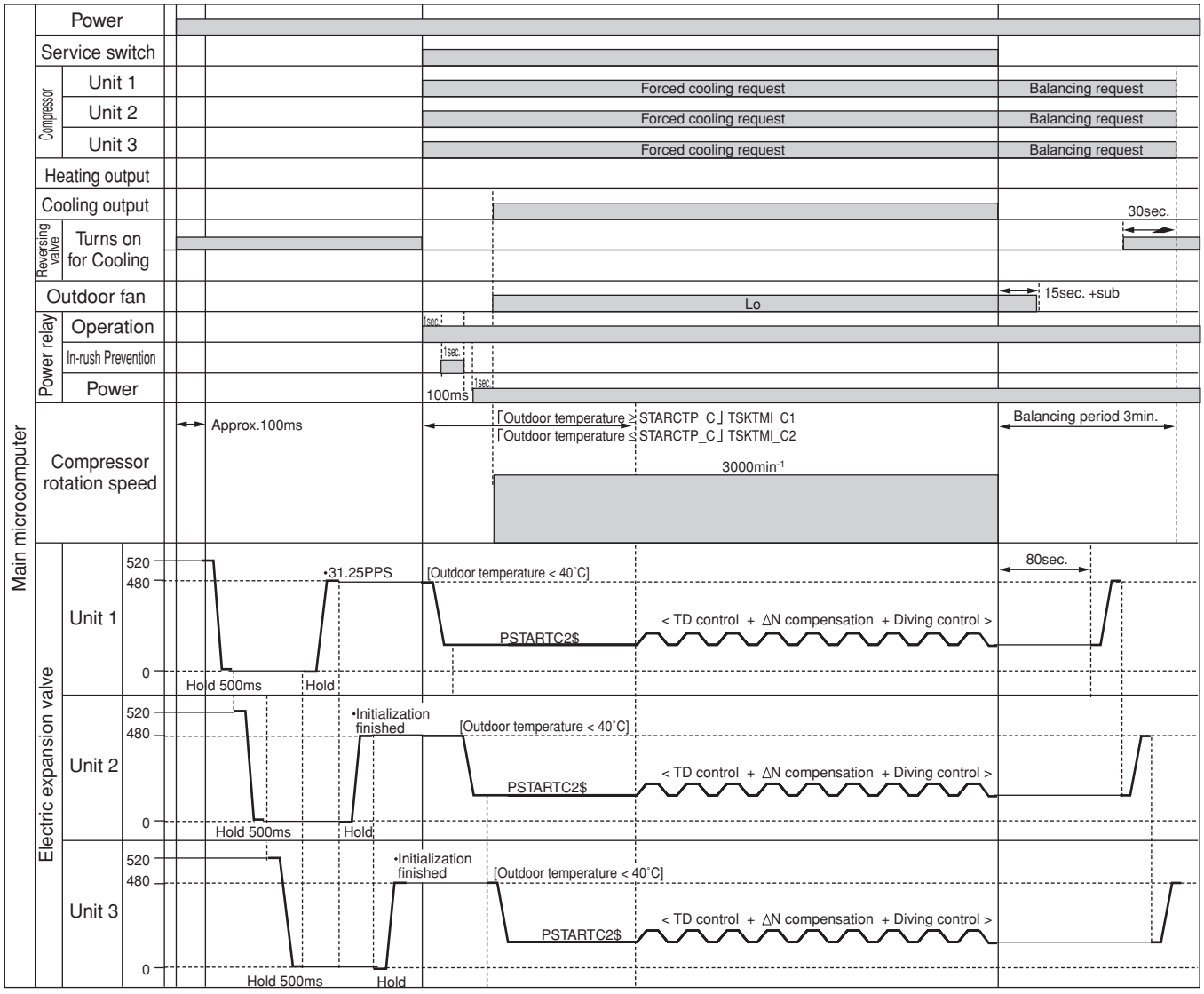


※TSKTM1_C and PSTARTC2$ are EEPROM data.

MODEL RAM-55QH4

PROCESSING AT OVERHEAT THERMISTOR (OH) HIGH TEMPERATURE

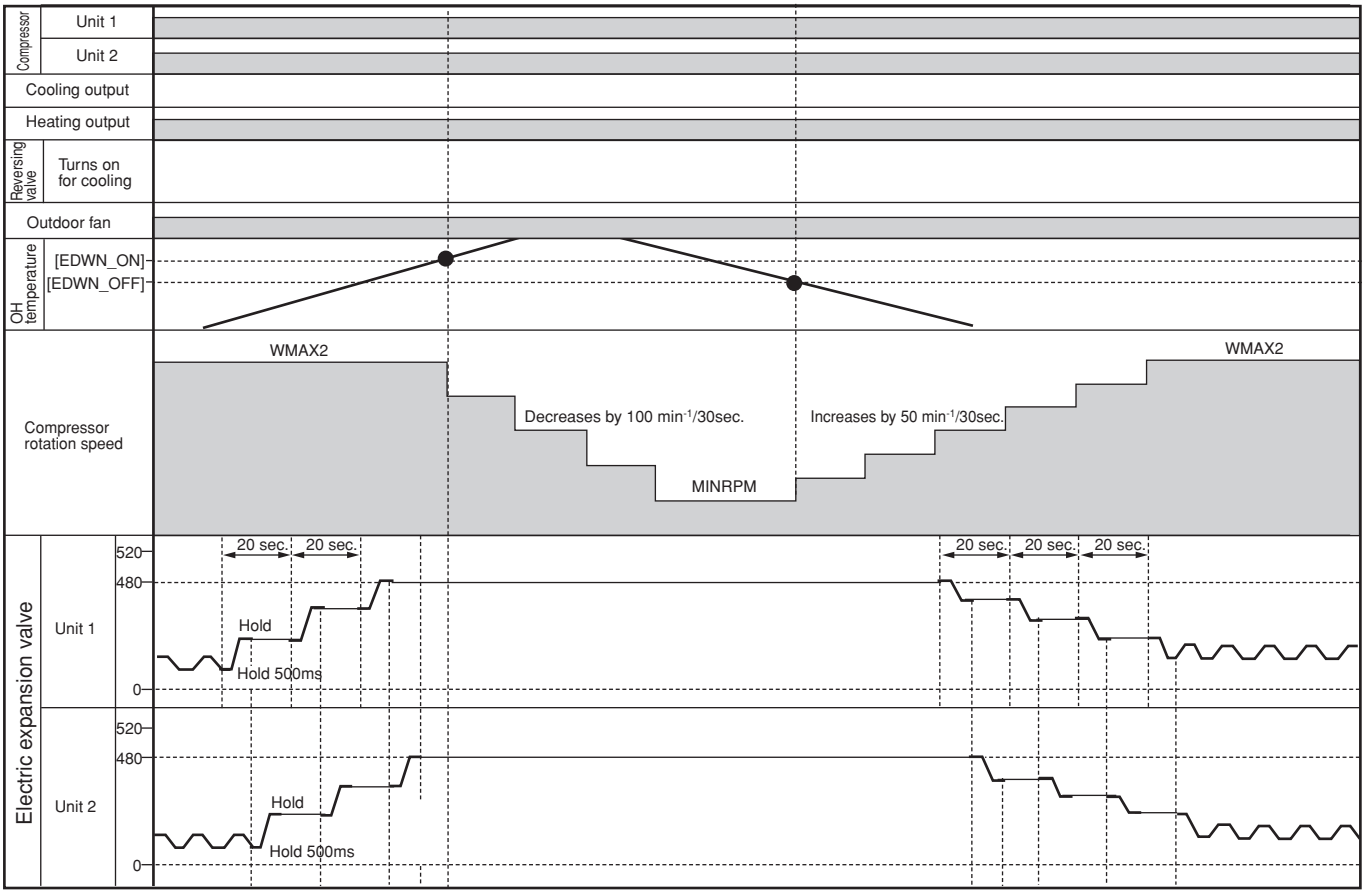
◇ Restriction Start Conditions

- 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 two units are operated for heating:



※• Operation with one unit in heating or cooling mode and with two units in cooling mode is the same as in the above diagram.

• WMAX2 and MINRPM are EEPROM data.

MODEL RAM-65QH4

PROCESSING AT OVERHEAT THERMISTOR (OH) HIGH TEMPERATURE

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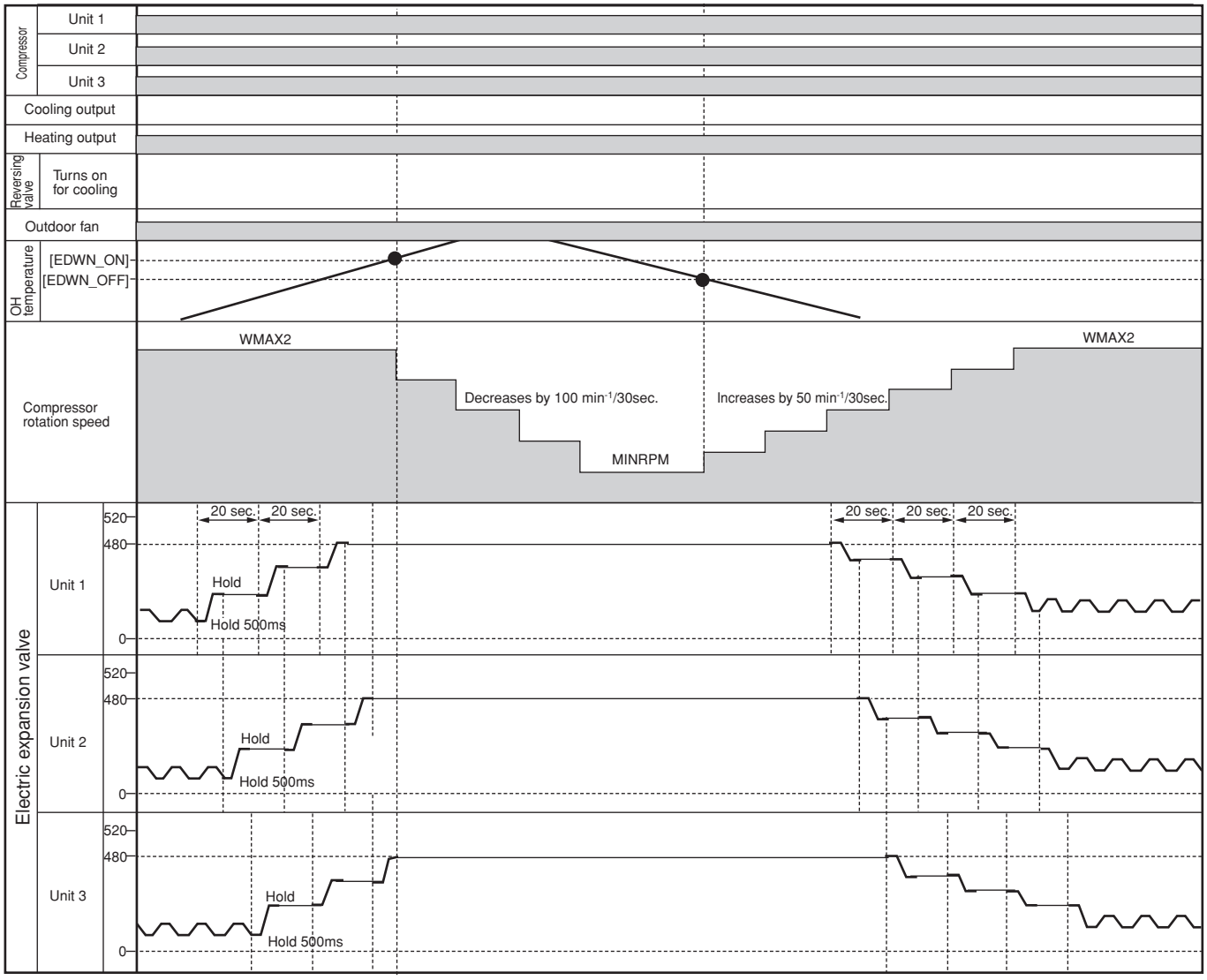
- If [NDOWN_OFF] ≤ OH temperature ≤ [NDOWN_ON] and the OH temperature does not rise from that 20 seconds before, the reduction of compressor speed will not occur.

◇ 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.

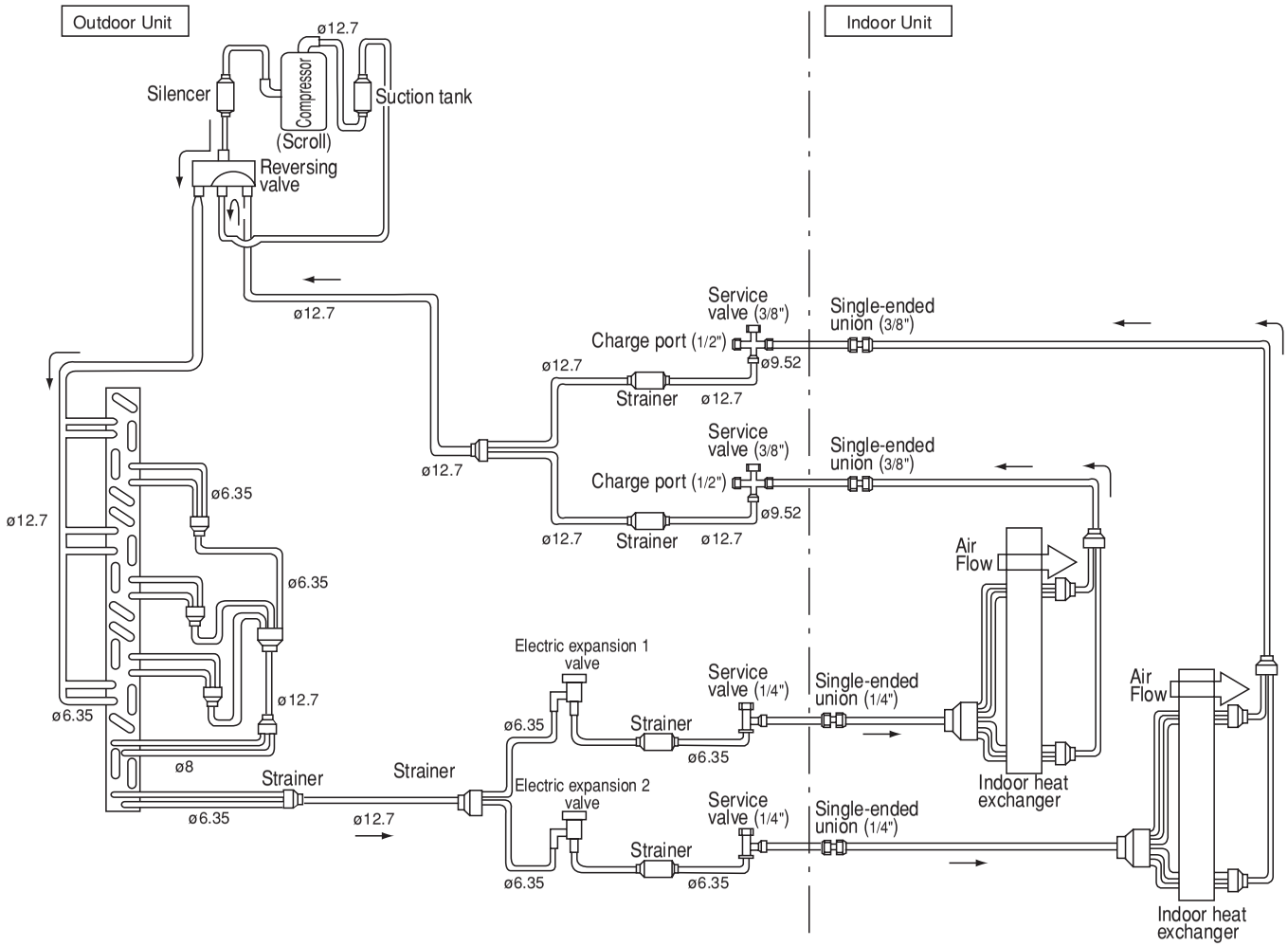
When three units are operated for heating:



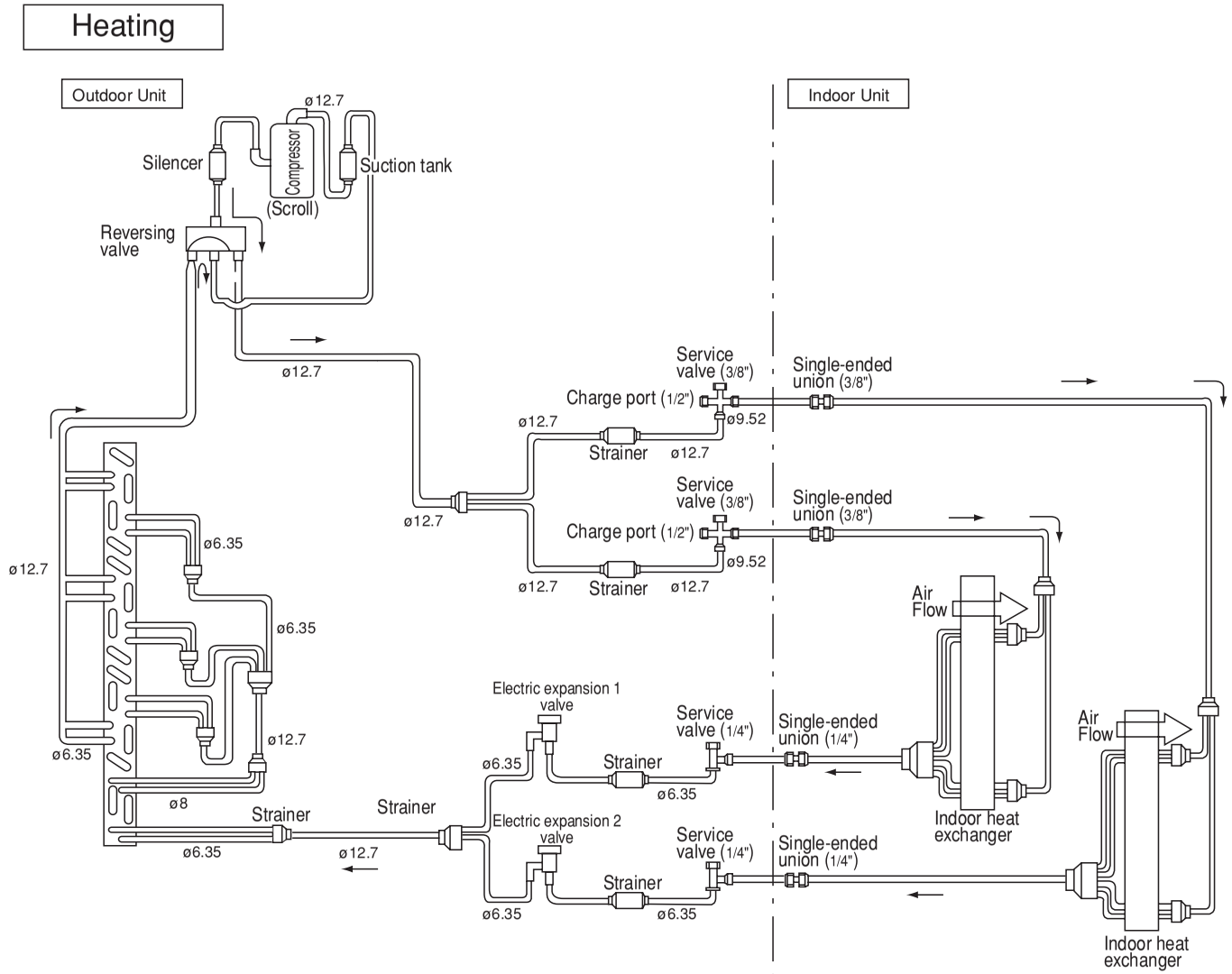
※• Operation with one unit in heating or cooling mode and with two units in cooling mode is the same as in the above diagram.
• WMAX2 and MINRPM are EEPROM data.

REFRIGERATING CYCLE DIAGRAM
RAM-55QH4

Cooling, dehumidifying, defrosting



REFRIGERATING CYCLE DIAGRAM
RAM-55QH4



REFRIGERATING CYCLE DIAGRAM
RAM-65QH4

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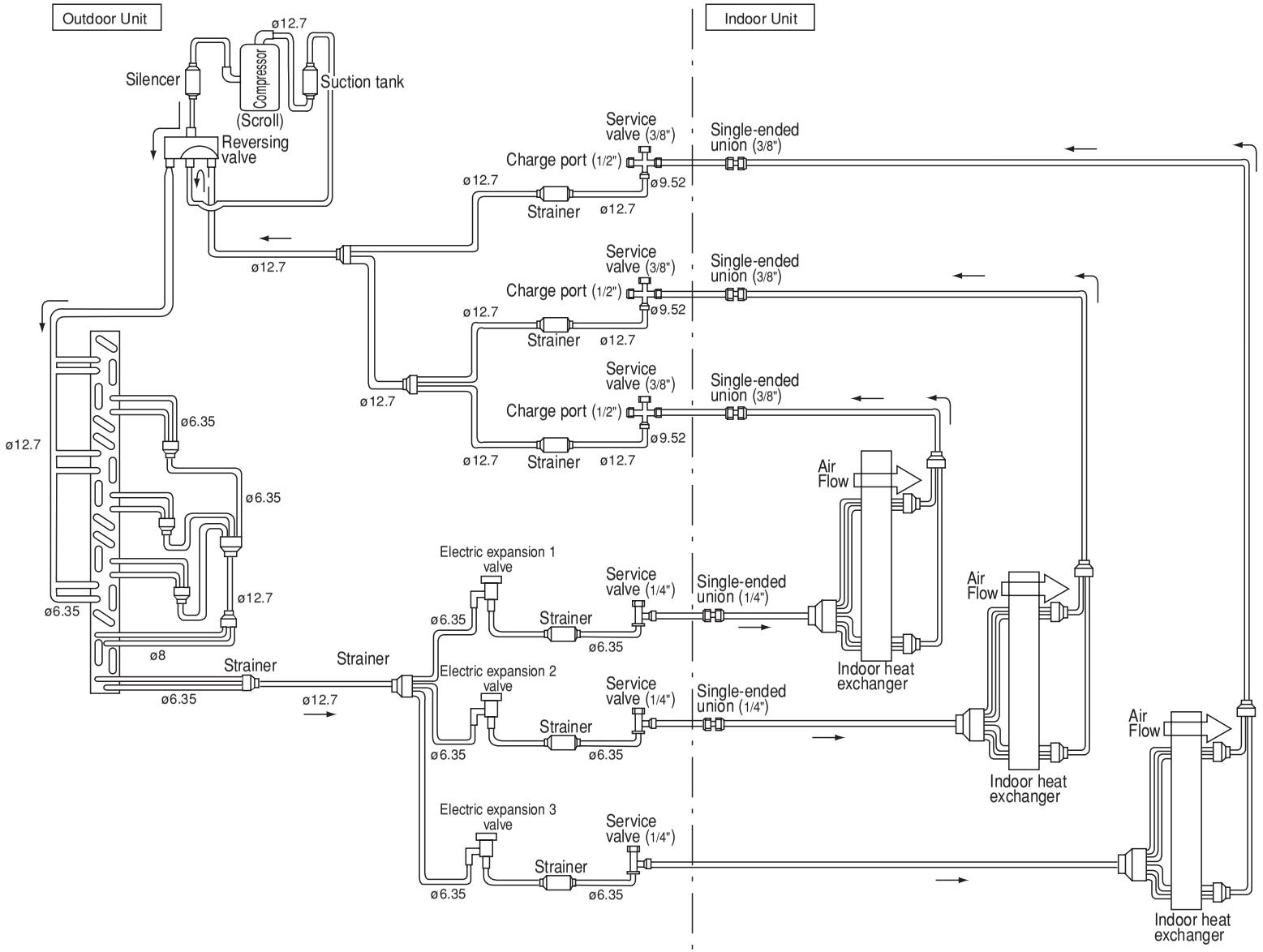
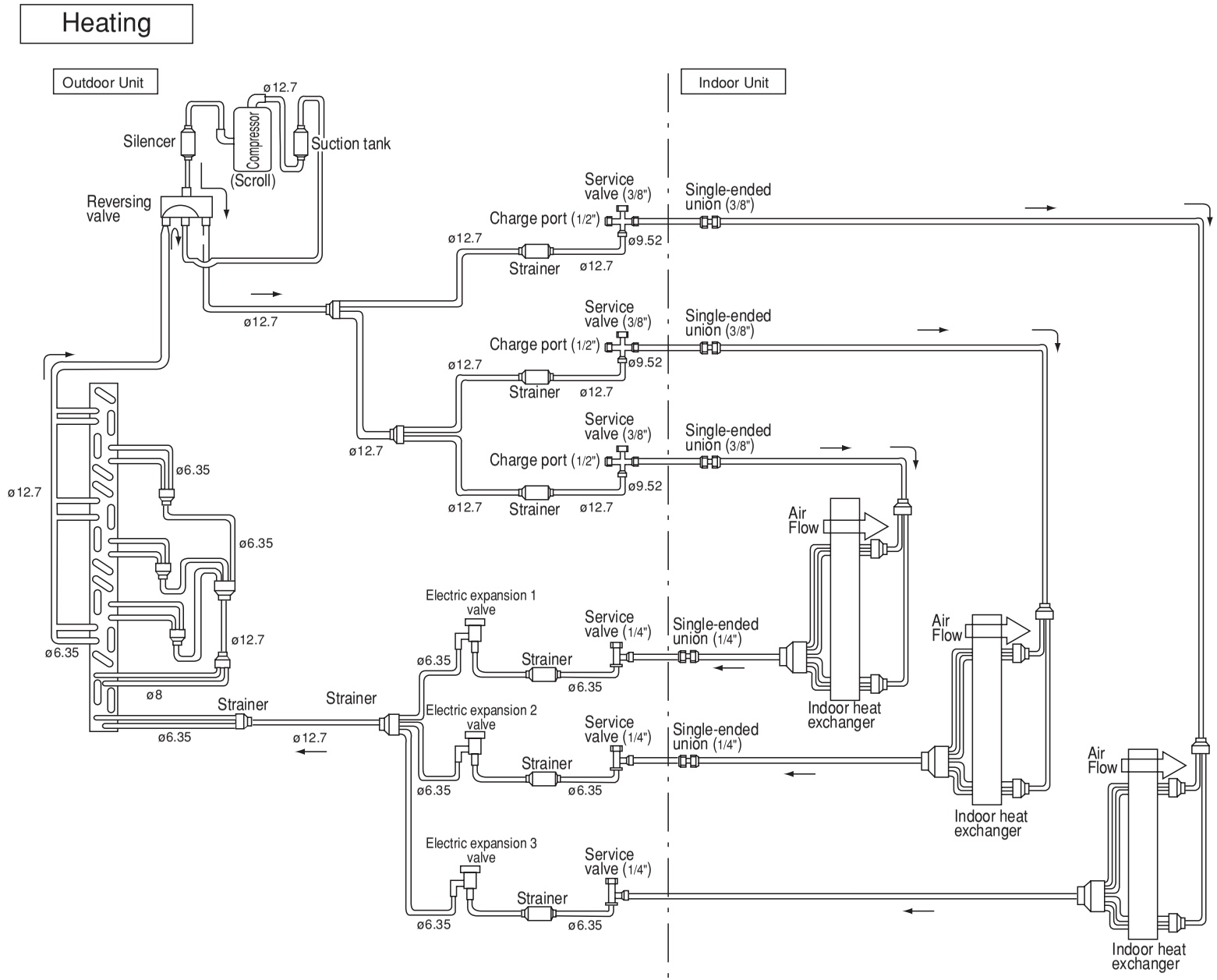


REFRIGERATING CYCLE DIAGRAM
RAM-65QH4



DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAM-55QH4, RAM-65QH4

1. Power Circuit

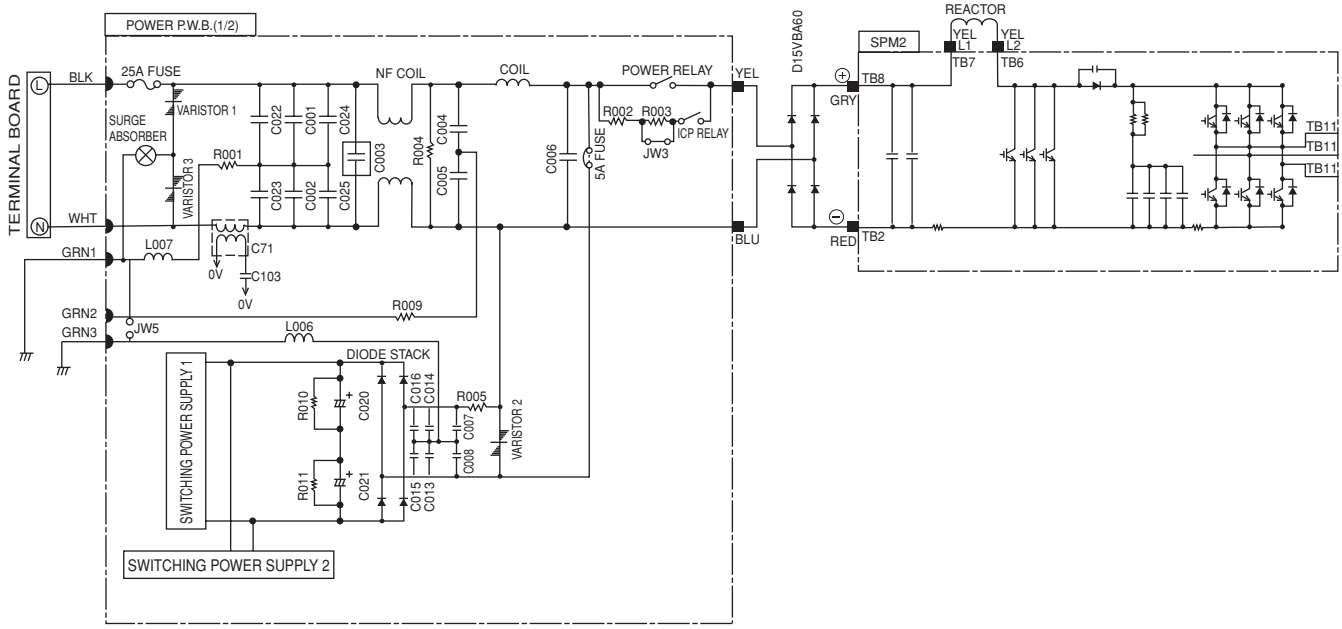


Fig. 1-1

- 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.

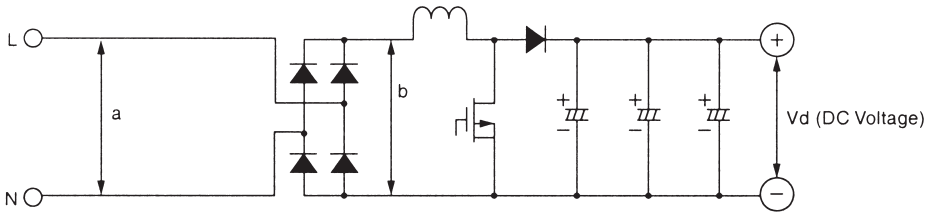


Fig. 1-2

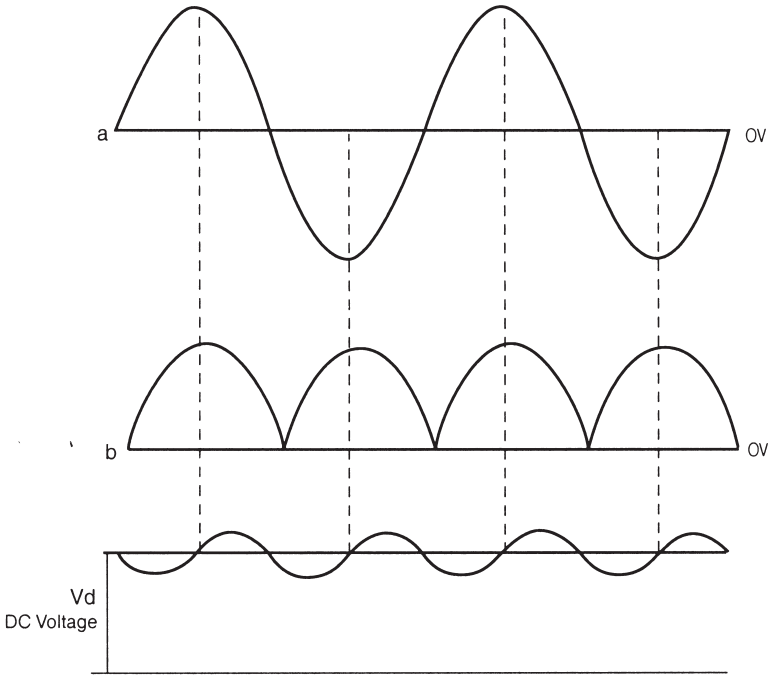


Fig. 1-3

(Approx. 300-330V during operation)

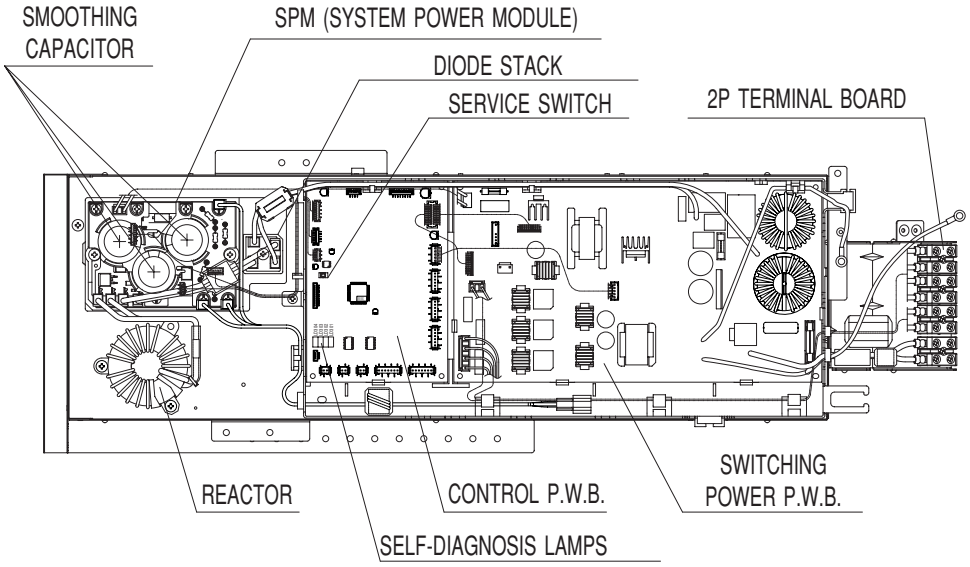


Fig. 1-4

- 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, C021, 220μF, DC 250V)

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 $\oplus$ side and C021 $\ominus$ side is about 330V.

(5) C001 to C016, 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 (R020)
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.

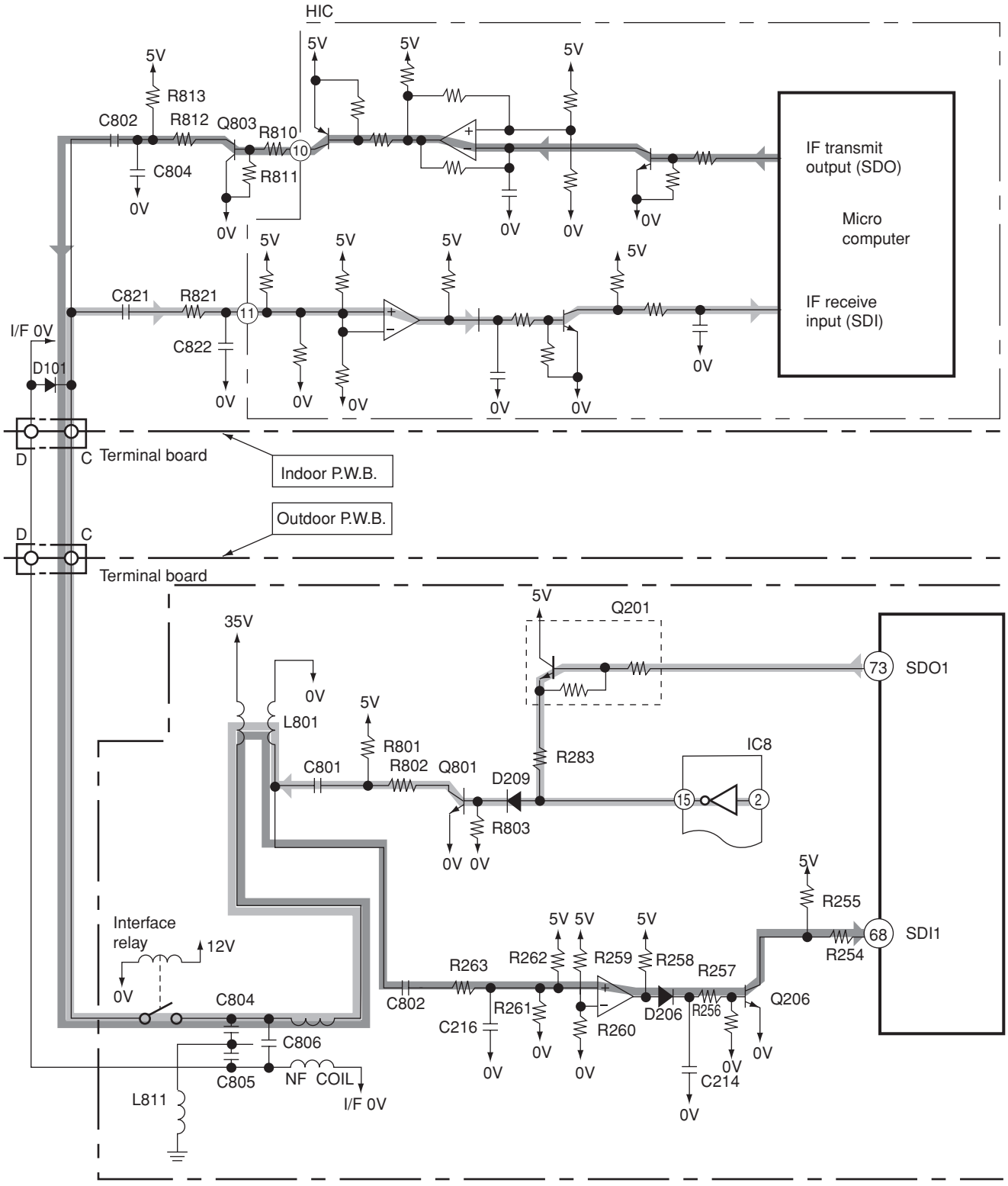
< Reference >

- 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 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) and L801 (or L802, L803), 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.



(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

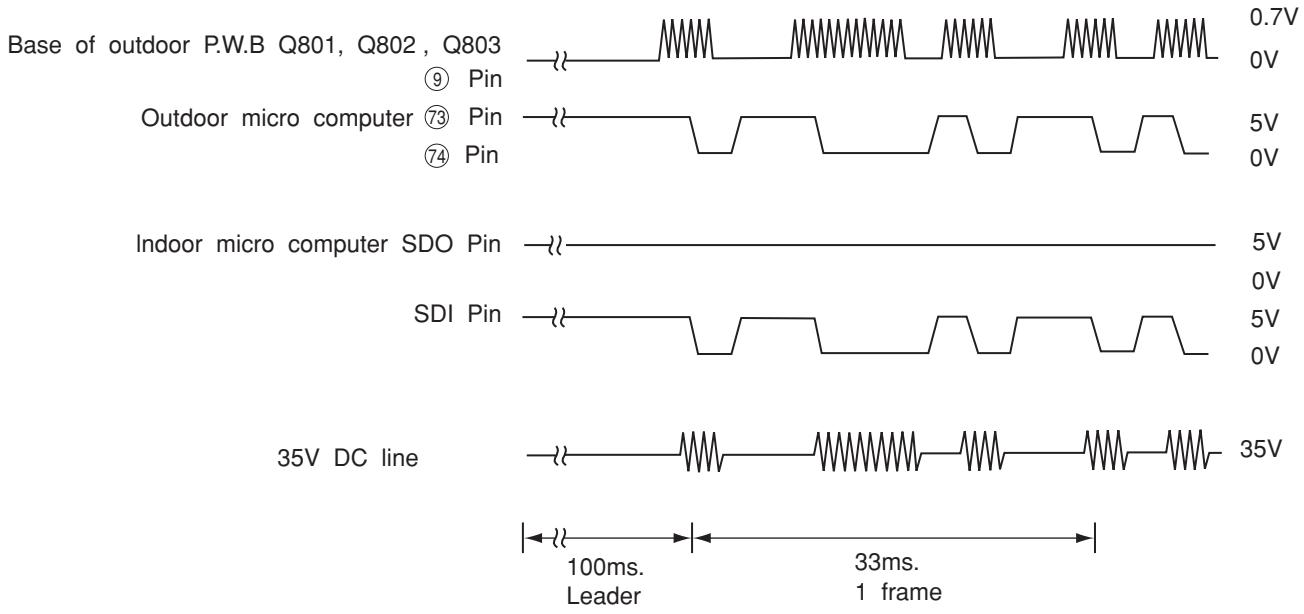


Fig. 2-2 Voltages Waveforms of indoor / Outdoor Micro computers (Outdoor to Indoor Communications)

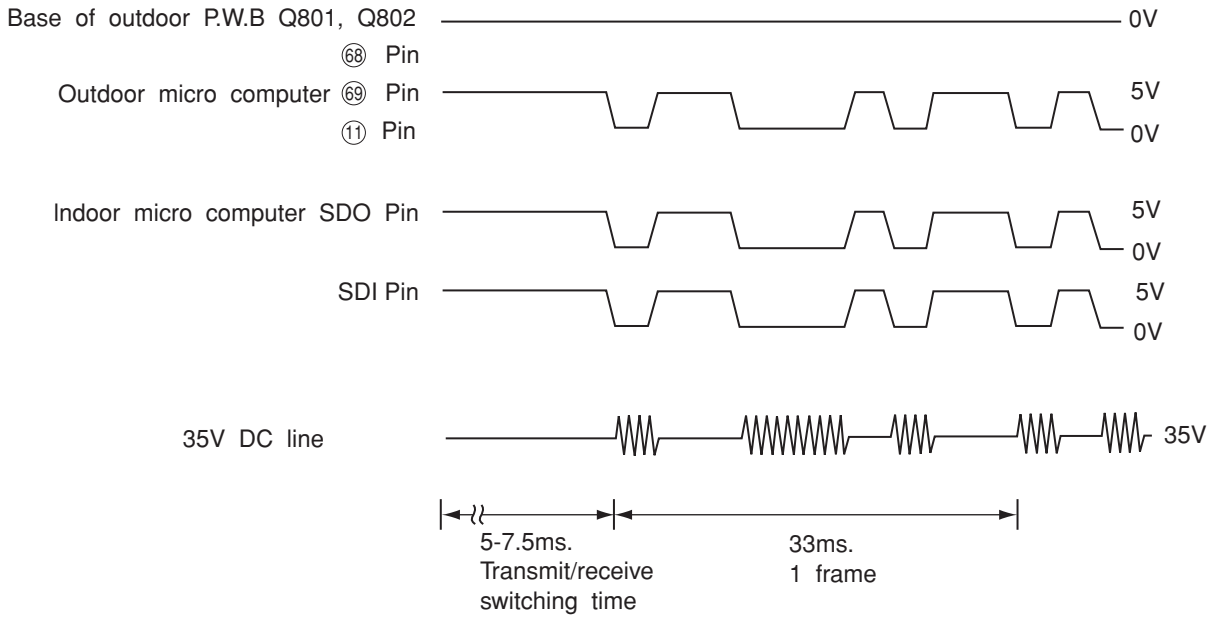


Fig. 2-3 Voltages Waveforms of indoor / Outdoor Micro computers (Indoor to Outdoor Communications)

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.

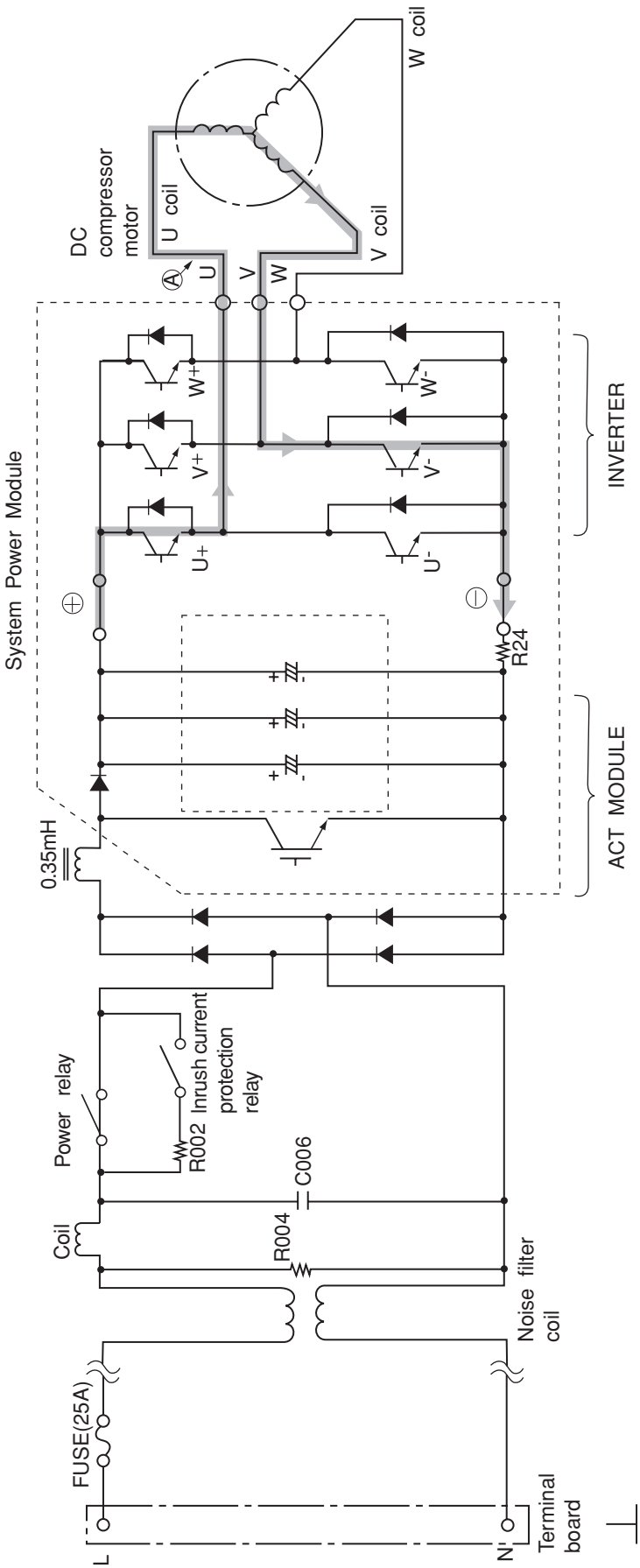


Fig. 3-1 System power module circuit (U^+ is ON, V^- is ON)

- 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.

[※At point E: U^+ is ON, V^- is ON (circuit in Fig. 3-1)
※At point F: U^+ is chopped (OFF), V^- is ON (circuit in Fig. 3-4)]

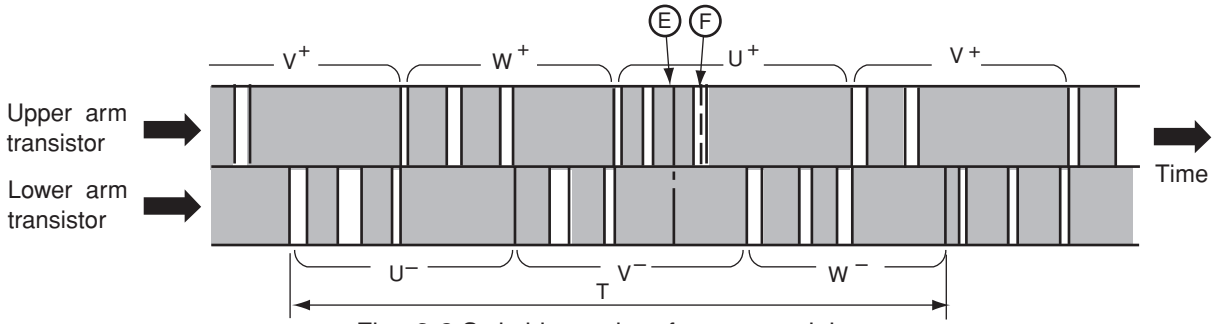


Fig. 3-2 Switching order of power module

- 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.

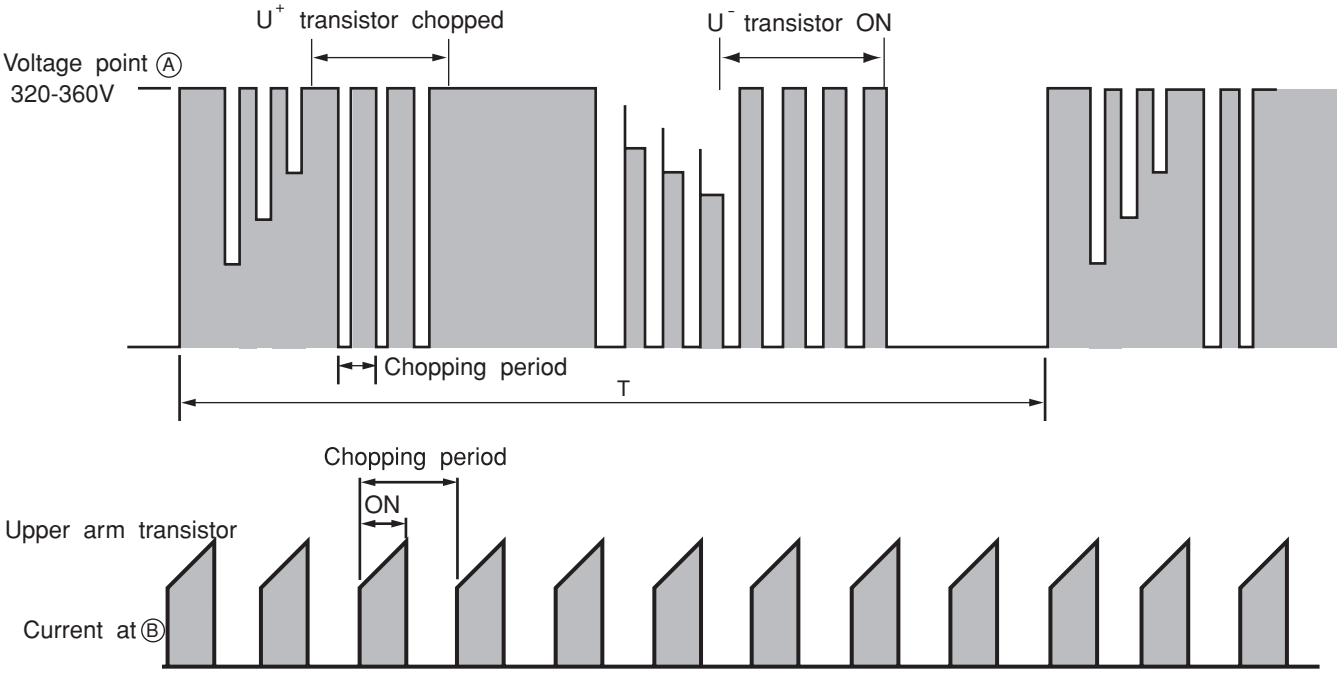


Fig. 3-3 Voltage waveform at each point

- 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)

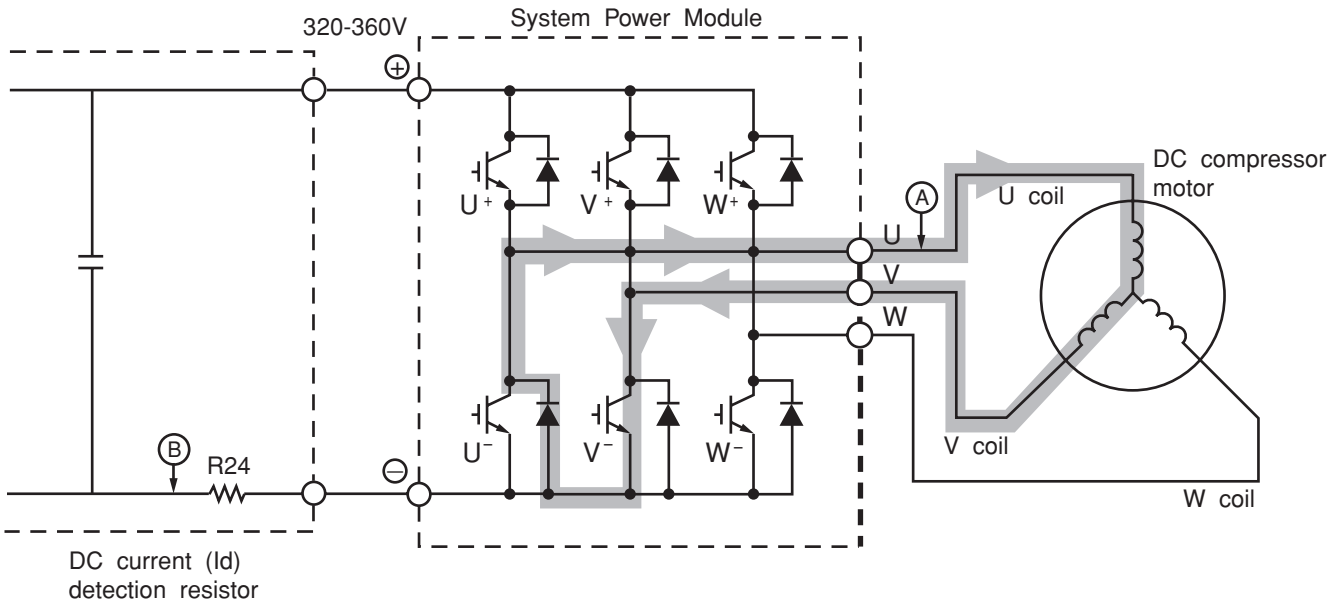


Fig. 3-4 System Power module circuit (U^+ is OFF, V^- is ON)

- Since current flows at point Ⓑ only when U+ transistor and V^- transistor is ON, the current waveform at point Ⓑ becomes intermittent waveform as shown in Fig. 3-3. Since current at point Ⓑ 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:

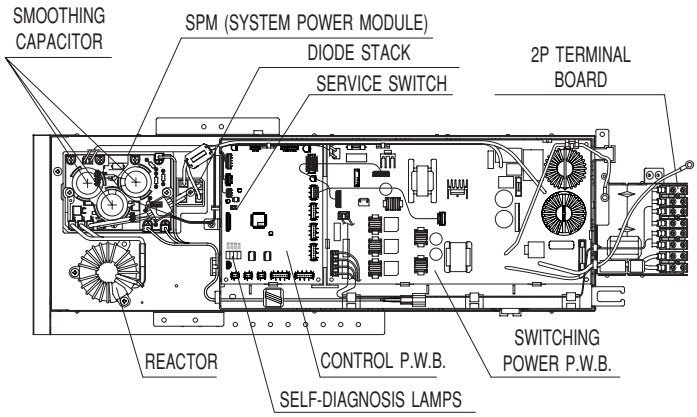


Fig. 3-5

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

※ 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.

4. Power Supply Circuit

- Fig. 4-1 shows the power circuit.

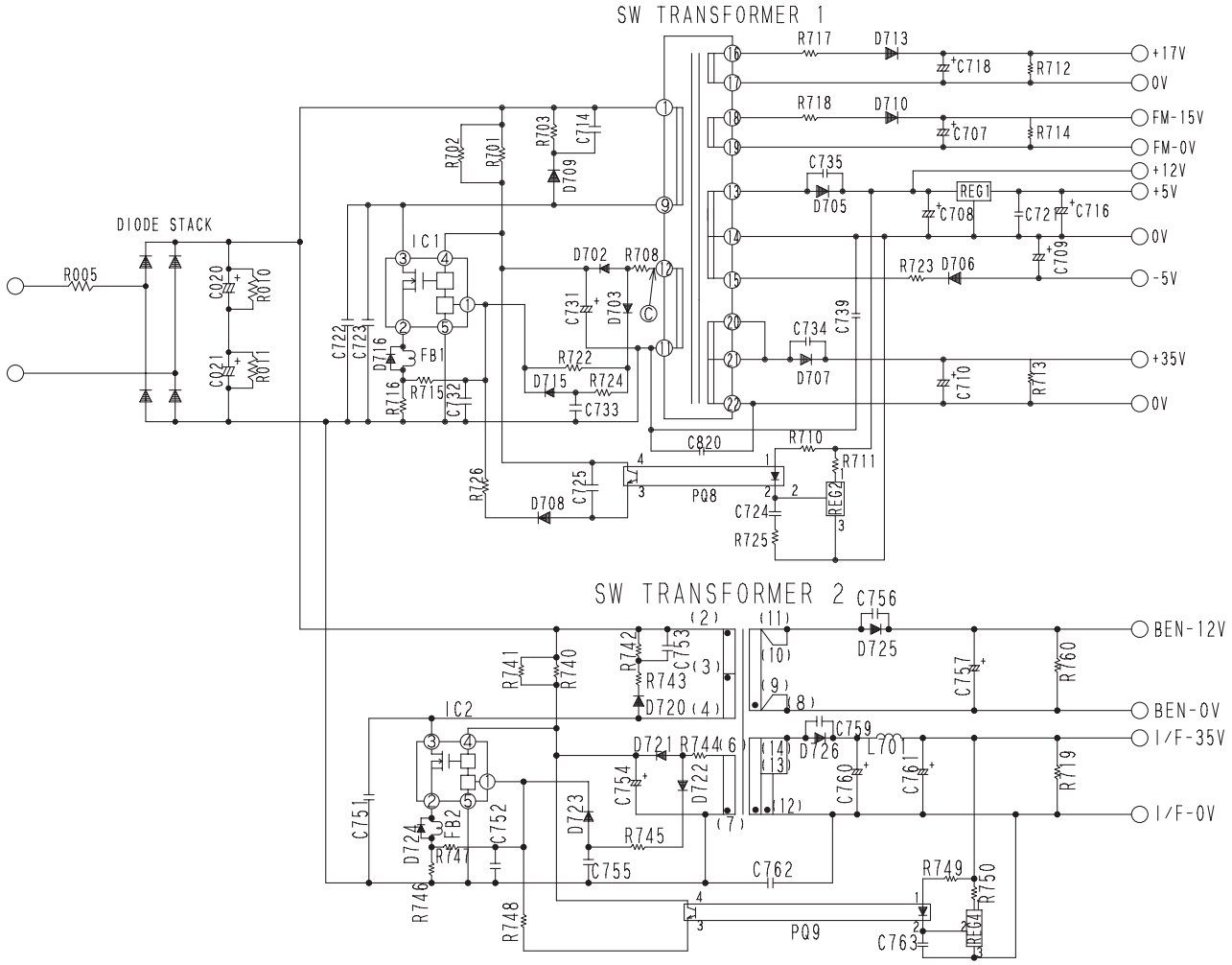


Fig. 4-1 Power circuit for P.W.B.

- There are two switching power supply in Power PWB.
- Switching power supply 1 is generating the secondary power for control circuits and DC35V indoor unit 1.
- Switching power supply 2 is generating the DC12V for expansion valve and DC35V for indoor unit 2 and 3.
- 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 C021 ⊖ in the control power circuit. With this power, current flows to pin ④ of IC1 via R701 and IC1 starts to tum 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.]

5. Reversing valve control circuit

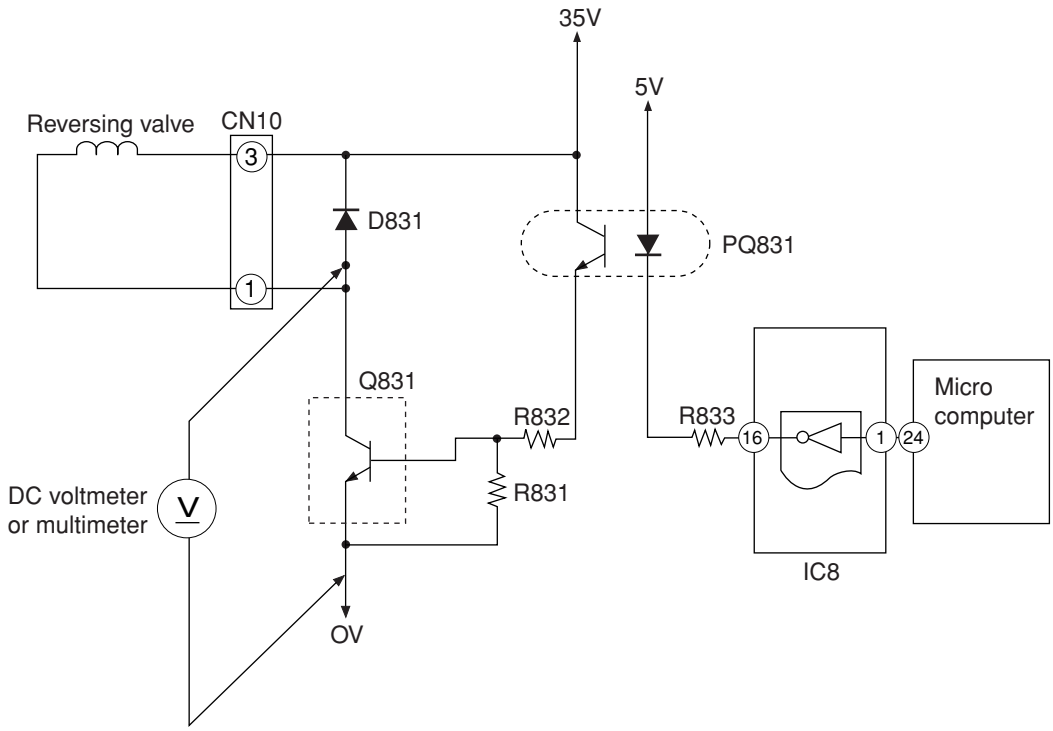


Fig. 5-1

Since the reversing valve is differential pressure system, even when reversing valve is ON (collector of Q831 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 Q831 will be about 35V. This does not indicate trouble. When rotation speed is reduced under 2700min^{-1}, collector voltage of Q831 will fall to about 0.8V again. To measure voltage, connect ⊕ terminal of tester to D831 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 Q831
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

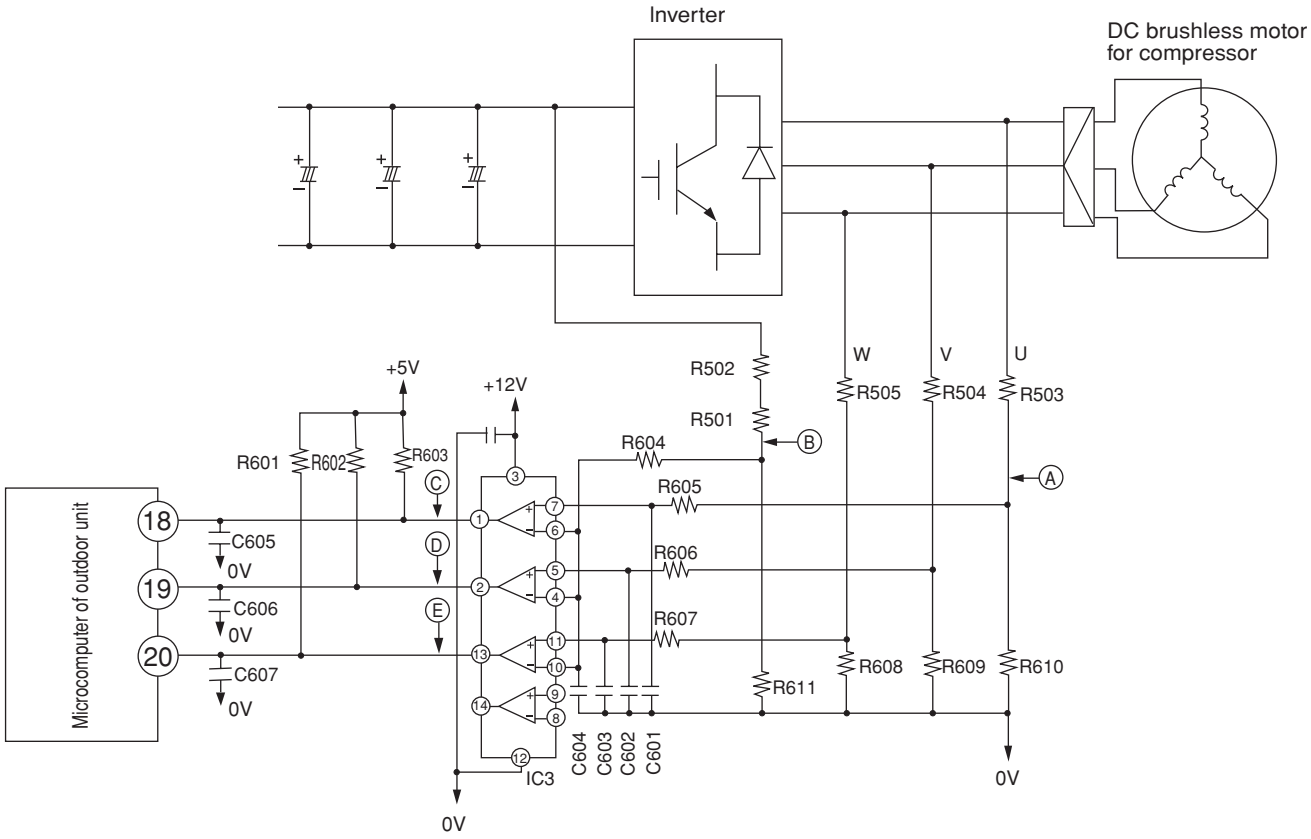


Fig. 6-1 Rotor magnetic pole position detection circuit

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 R608 - R610, 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 R611), 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.

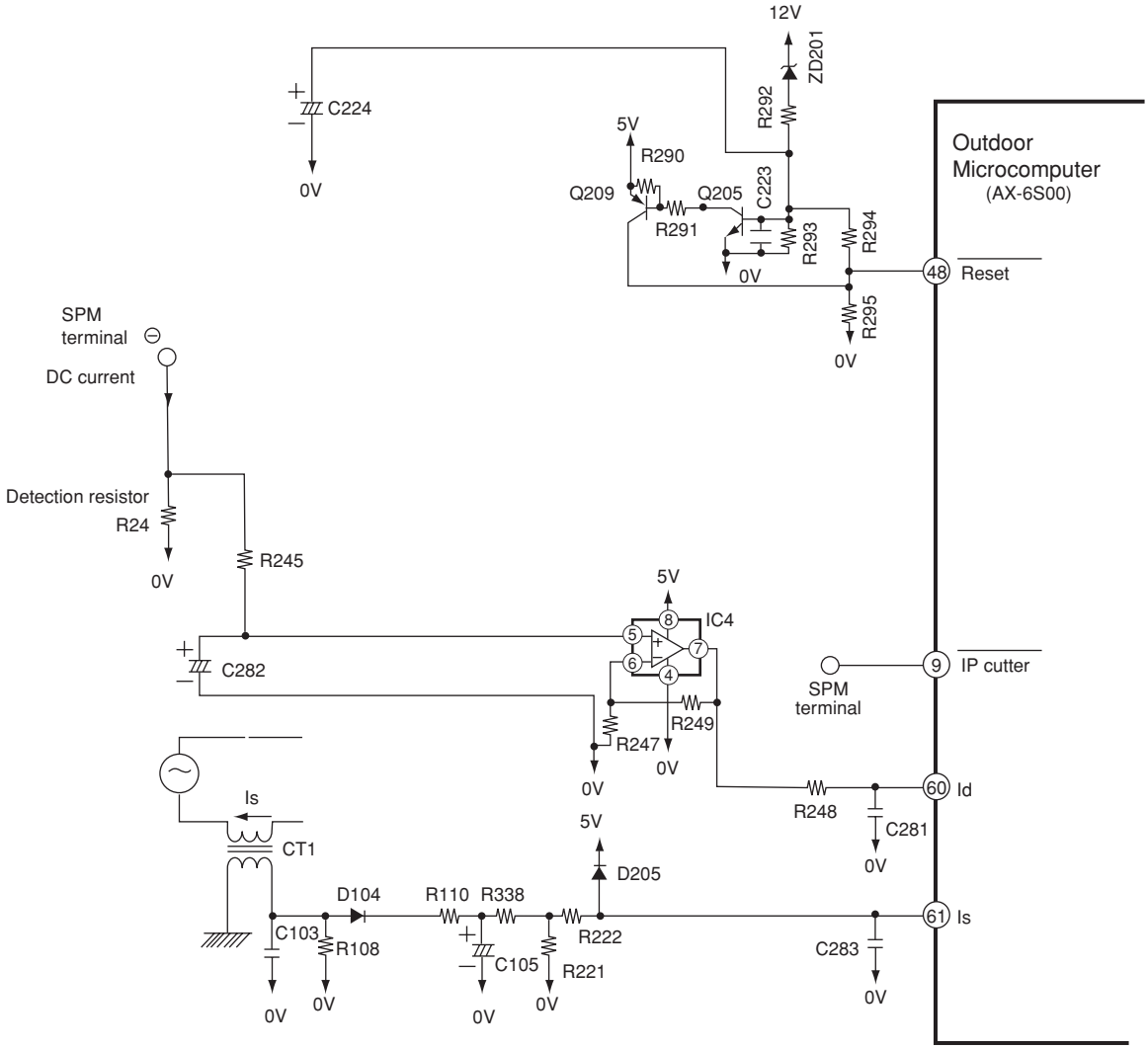


Fig. 7-1 Peripheral circuit of microcomputer (AX-6S00)

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.

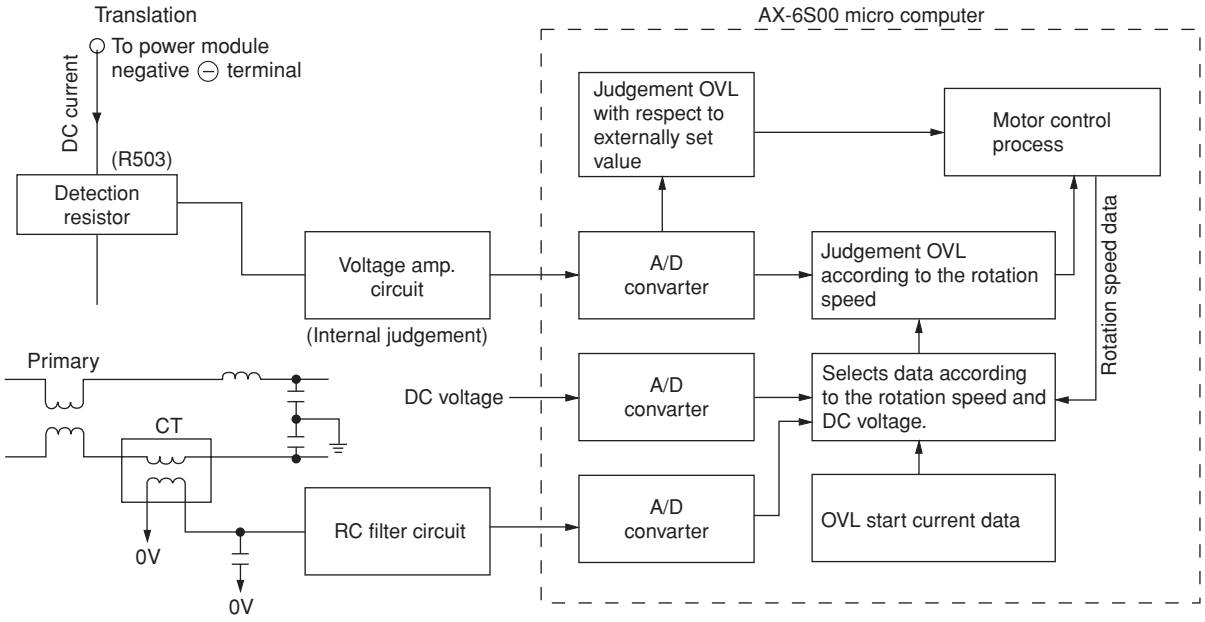


Fig. 8-1 Overload Control System Configuration

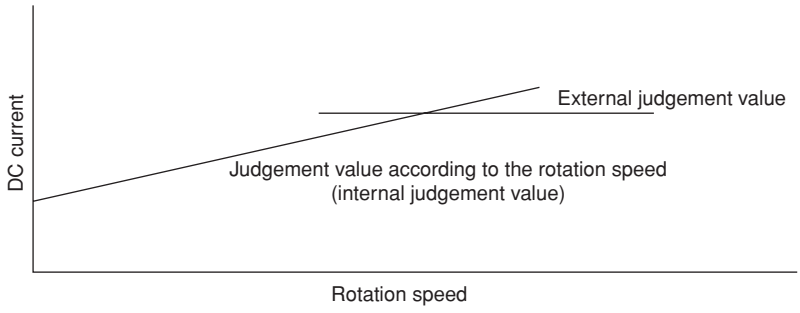


Fig. 8-2

9. Reset circuit

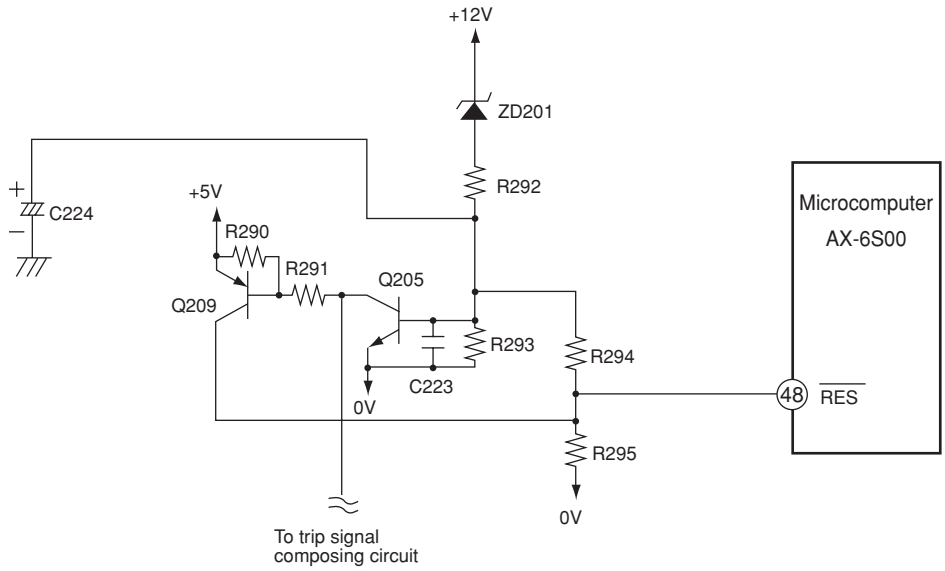


Fig. 9-1

- 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 Q208 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. However, Q208 is left ON since reset voltage is fed back by R294, until 12V line drops to about 7.6V. This prevents chattering of reset voltage due to voltage change in 12V line.

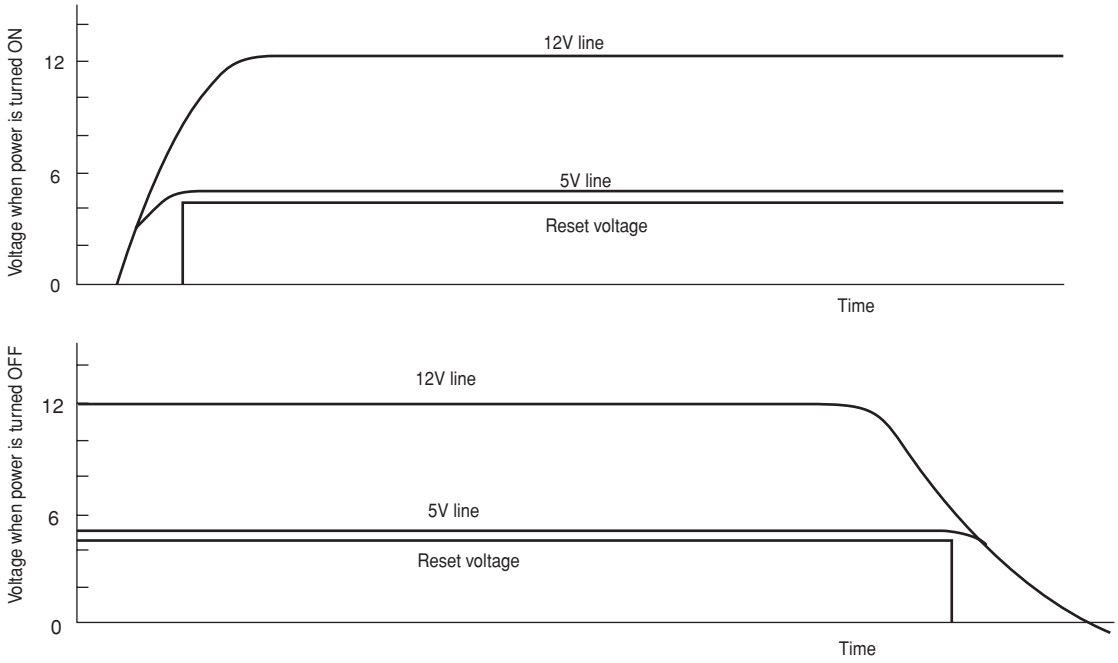


Fig. 9-2

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-55QH4, Fig. 10-2 for model RAM-65QH4, and their roles and temperature measuring points are shown as Table 10-1.

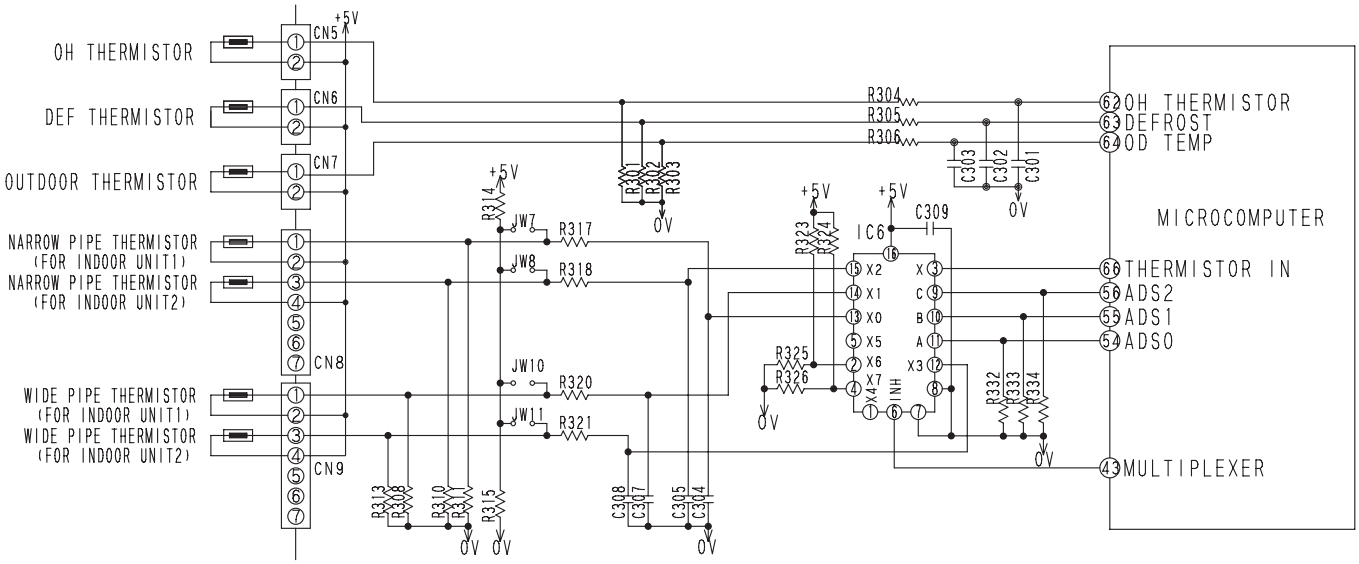


Fig. 10-1 Temperature Detection Circuit

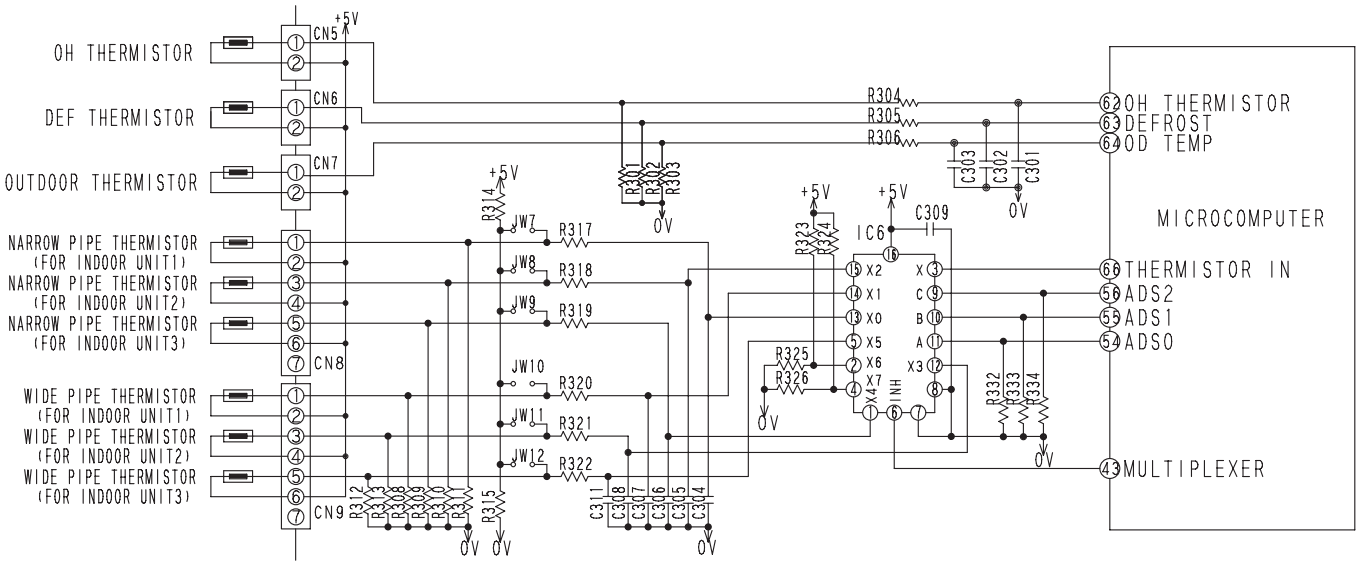


Fig. 10-2 Temperature Detection Circuit

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 (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)	

Remark :
"*" mark is for model RAM-65QH4 only.

- 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
RAM-65QH4	RAM-55QH4	Lights	1 blink	OH thermistor	0.04V or less	4.96V or more
		Lights	2 blinks	DEF thermistor	0.04V or less	4.94V or more
		Lights	3 blinks	Outdoor temperature thermistor		
		Lights	4 blinks	Electric expansion value thermistor (thin pipe 1)		
		Lights	5 blinks	Electric expansion value thermistor (thick pipe 1)		
		Lights	6 blinks	Electric expansion value thermistor (thin pipe 2)		
		Lights	7 blinks	Electric expansion value thermistor (thick pipe 2)		
		Lights	8 blinks	Electric expansion value thermistor (thin pipe 3)	0.04V or less	4.94V or more
		Lights	9 blinks	Electric expansion value thermistor (thick pipe 3)		

- 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

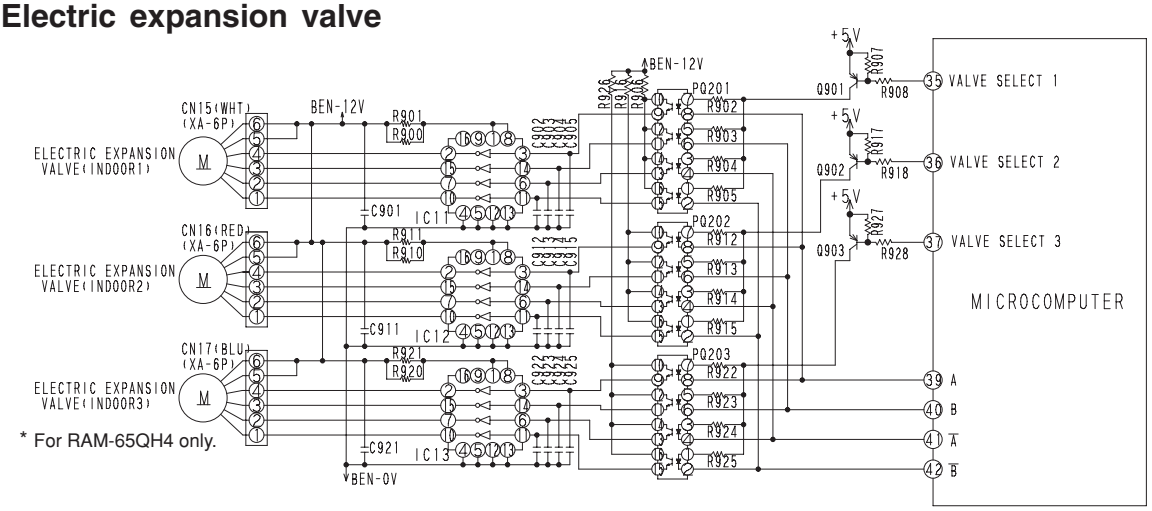


Table 11-1

- 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~CN17 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~CN17 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

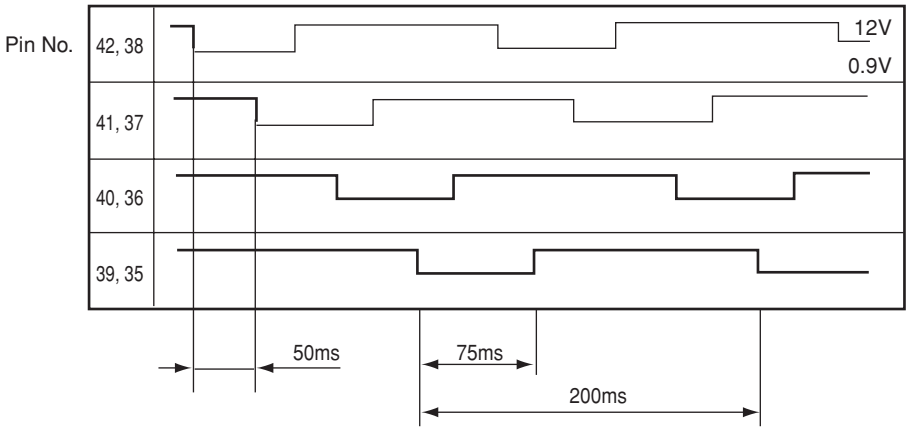


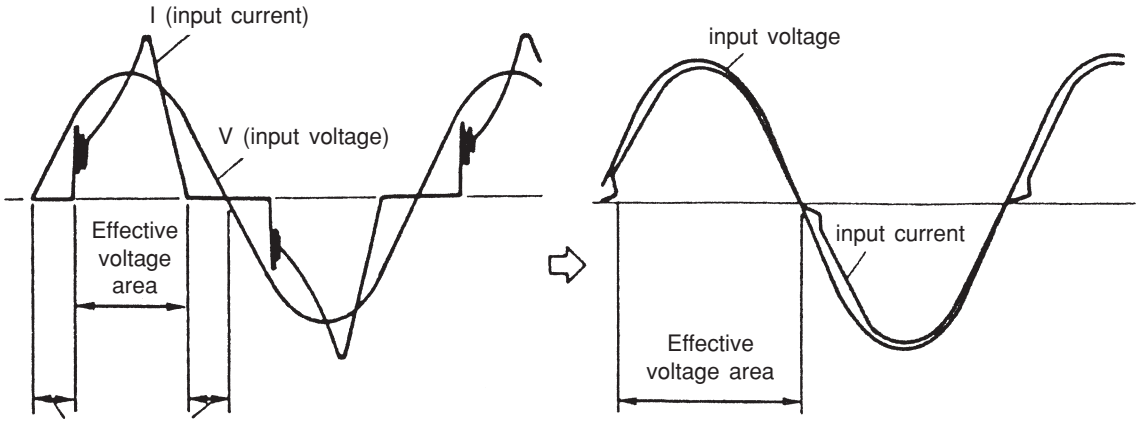
Fig. 11-2

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.

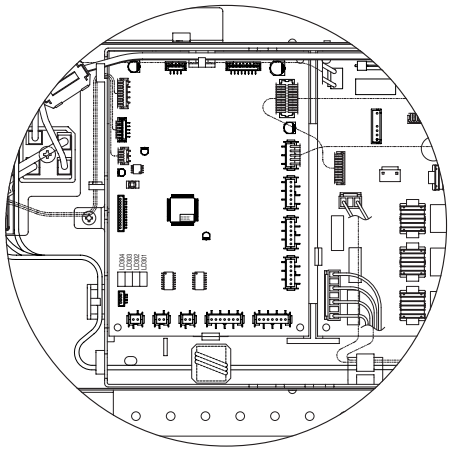


*Assuming the same current capacity (20A), power can be used about 10% effective, comparing with curent use (power factor of 90%), and maximum capacity is thereby improved.

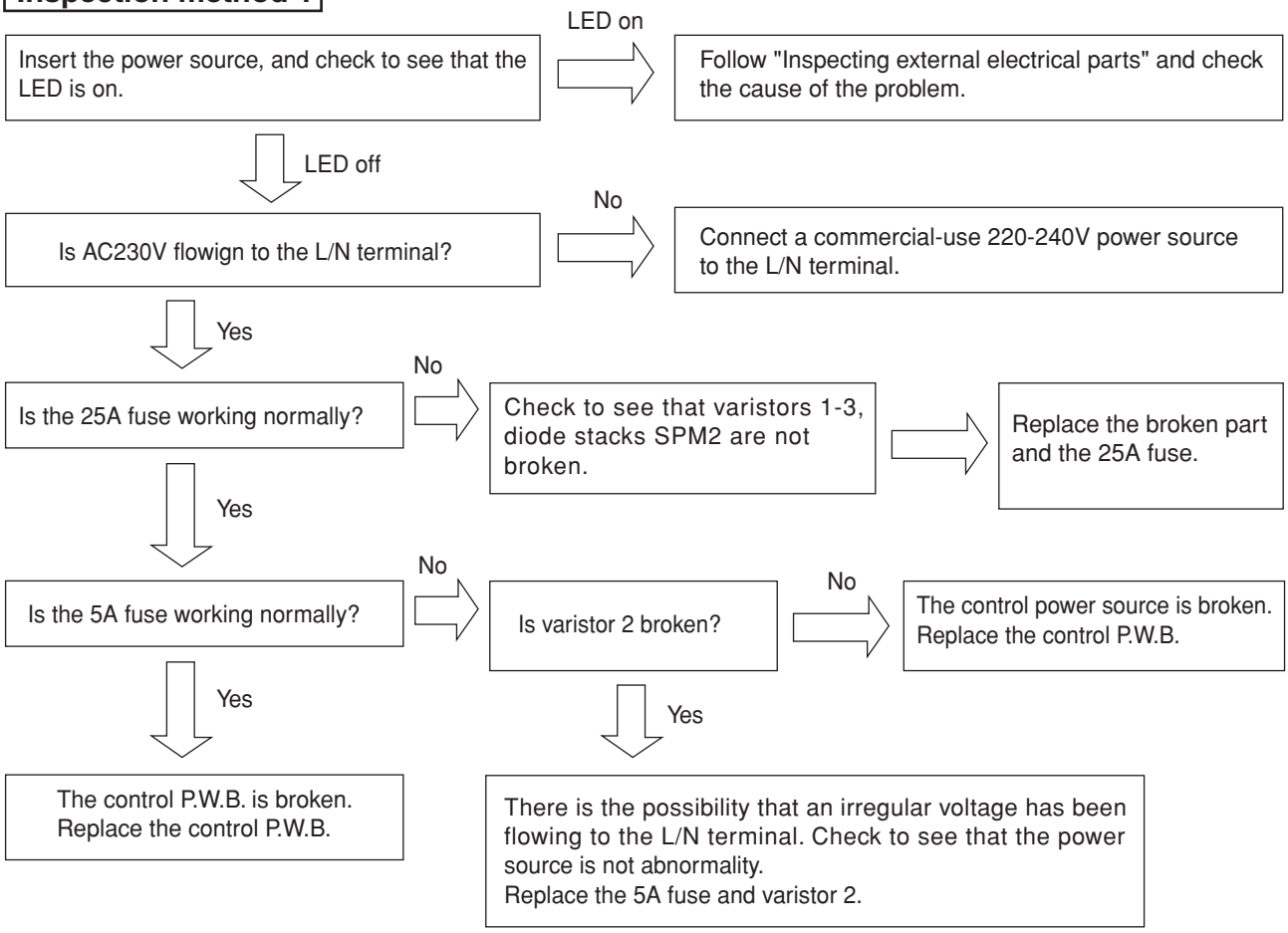
INSPECTING OUTDOOR ELECTRICAL PARTS

• 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 lightening 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	Blinks	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	Off	On	Normal operation	Normal operation
Case 7	On	Off	Off	On	OVL1 operation	Normal operation
Case 8	Off	On	Off	On	OVL2 operation	Normal operation
Case 9	On	On	Off	On	OVL3 operation	Normal operation



Inspection method 1



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.

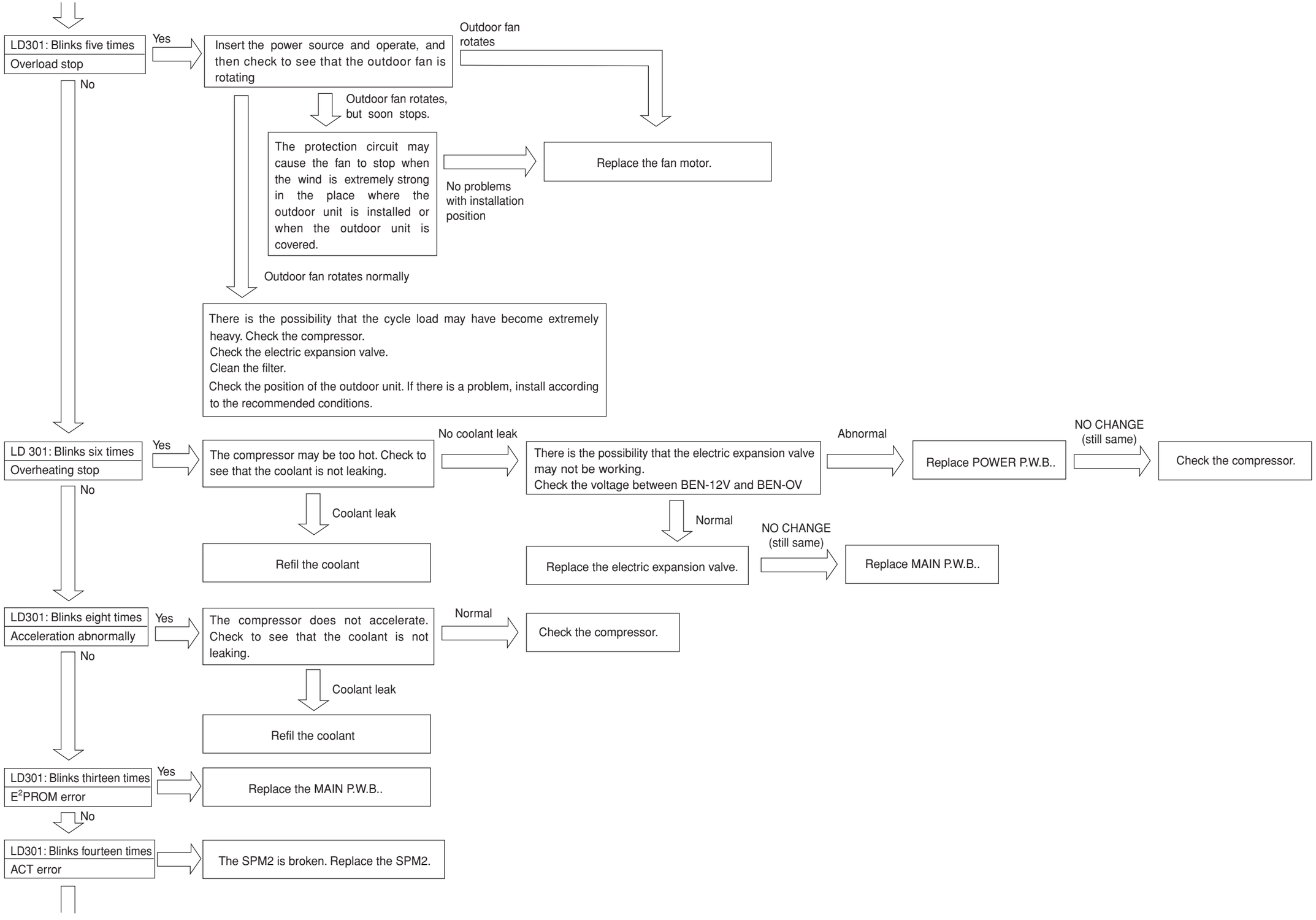
O.K. (16-19V) → Ia the wire from the SPM2 to the compressor loose or broken, or has it been connected improperly?

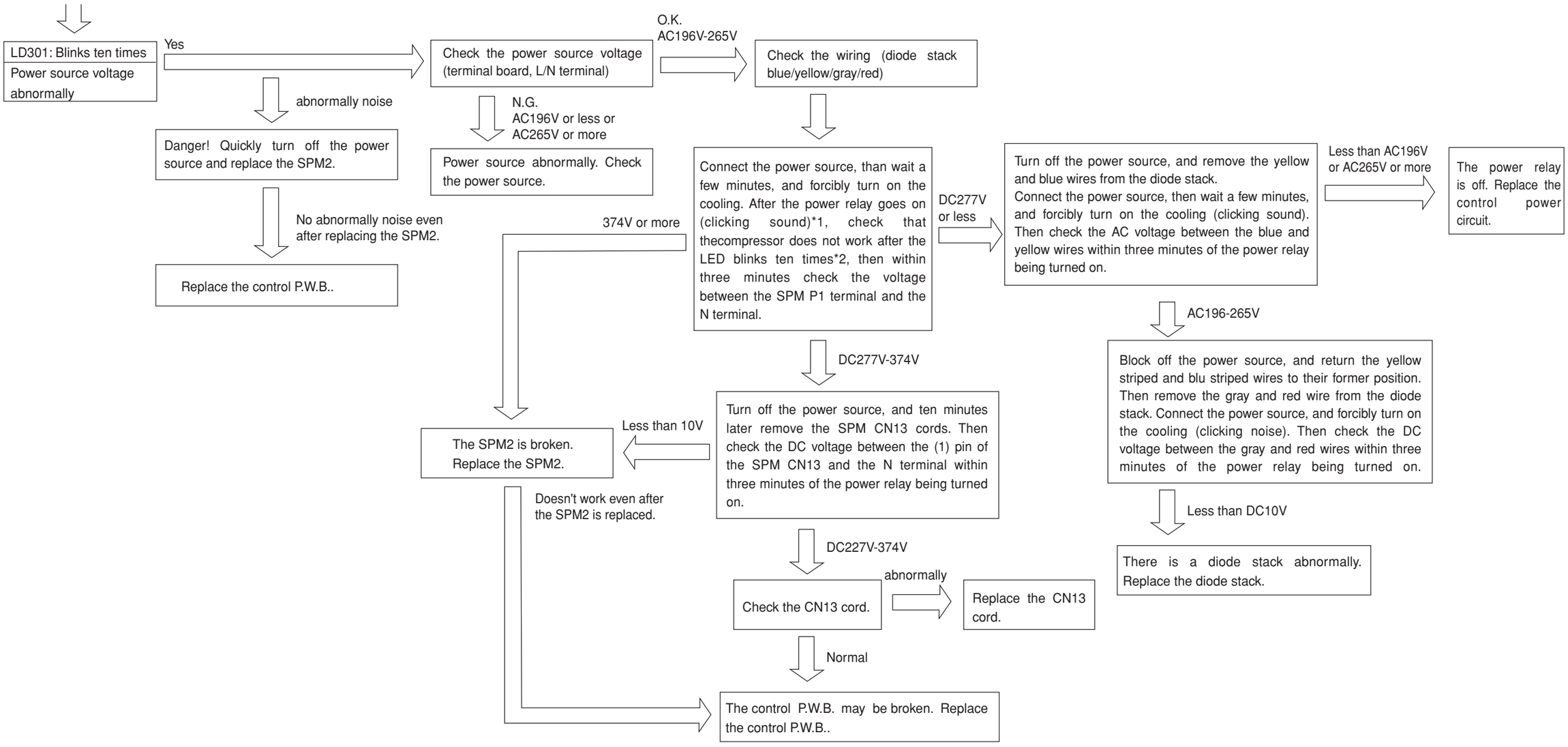
Cable abnormally → The compressor switch fails if two or more compressor cables are loose (or broken).
There is the possibility that the compressor will not operate if the compressor cables have been connected improperly.
Replace the cable or rewire as appropriate.

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..

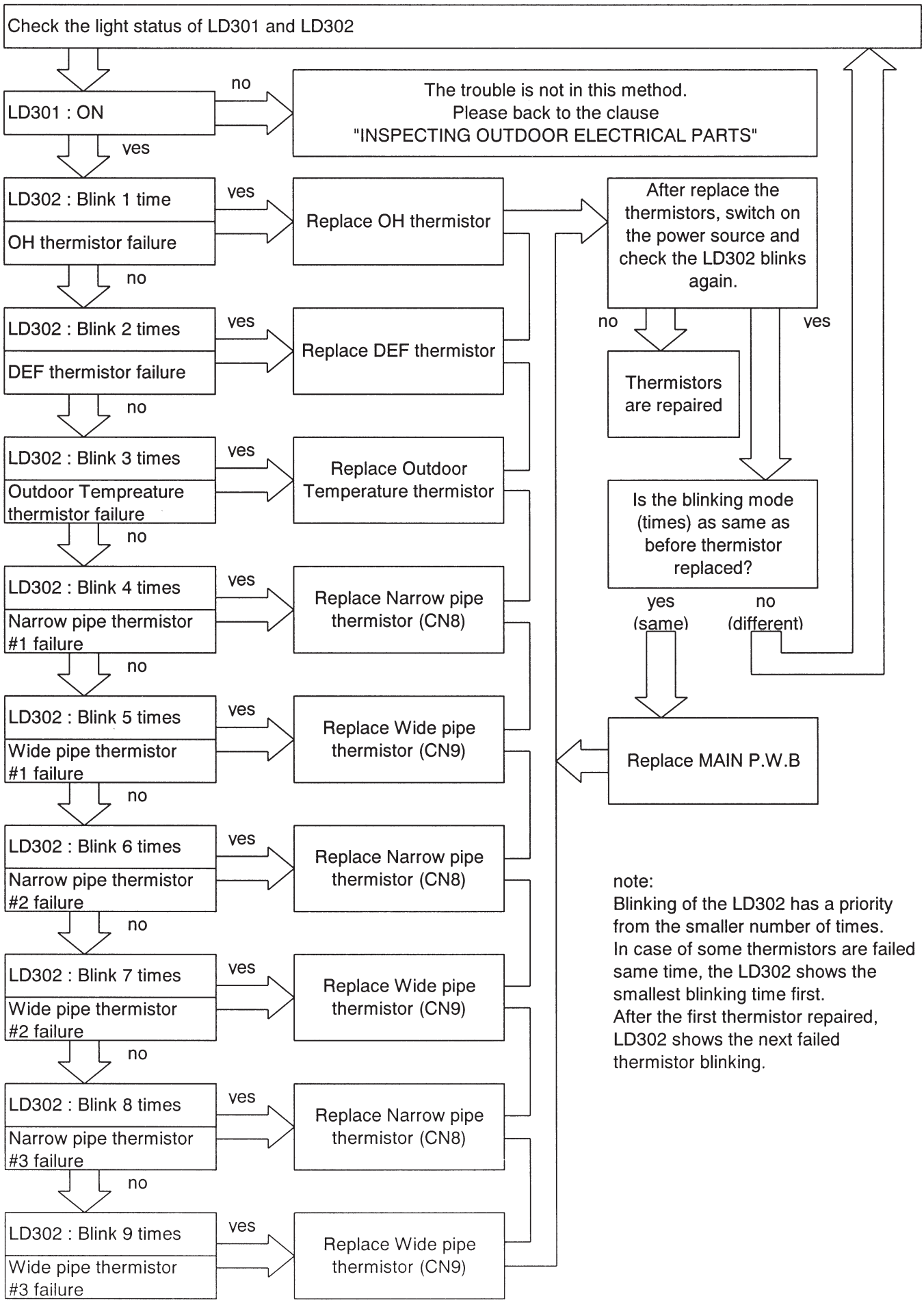

LD301: Blinks five times
Overload stop
Yes
Insert the power source and operate, and then check to see that the outdoor fan is rotating
Outdoor fan rotates
No
Outdoor fan rotates, but soon stops.
The protection circuit may cause the fan to stop when the wind is extremely strong in the place where the 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 coolant leak
There is the possibility that the electric expansion valve may not be working.
Check the voltage between BEN-12V and BEN-OV
Abnormal
Replace POWER P.W.B..
NO CHANGE (still same)
Check the compressor.
No
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
E2PROM error
Yes
Replace the MAIN P.W.B..
No
LD301: Blinks fourteen times
ACT error
The SPM2 is broken. Replace the SPM2.



* 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.

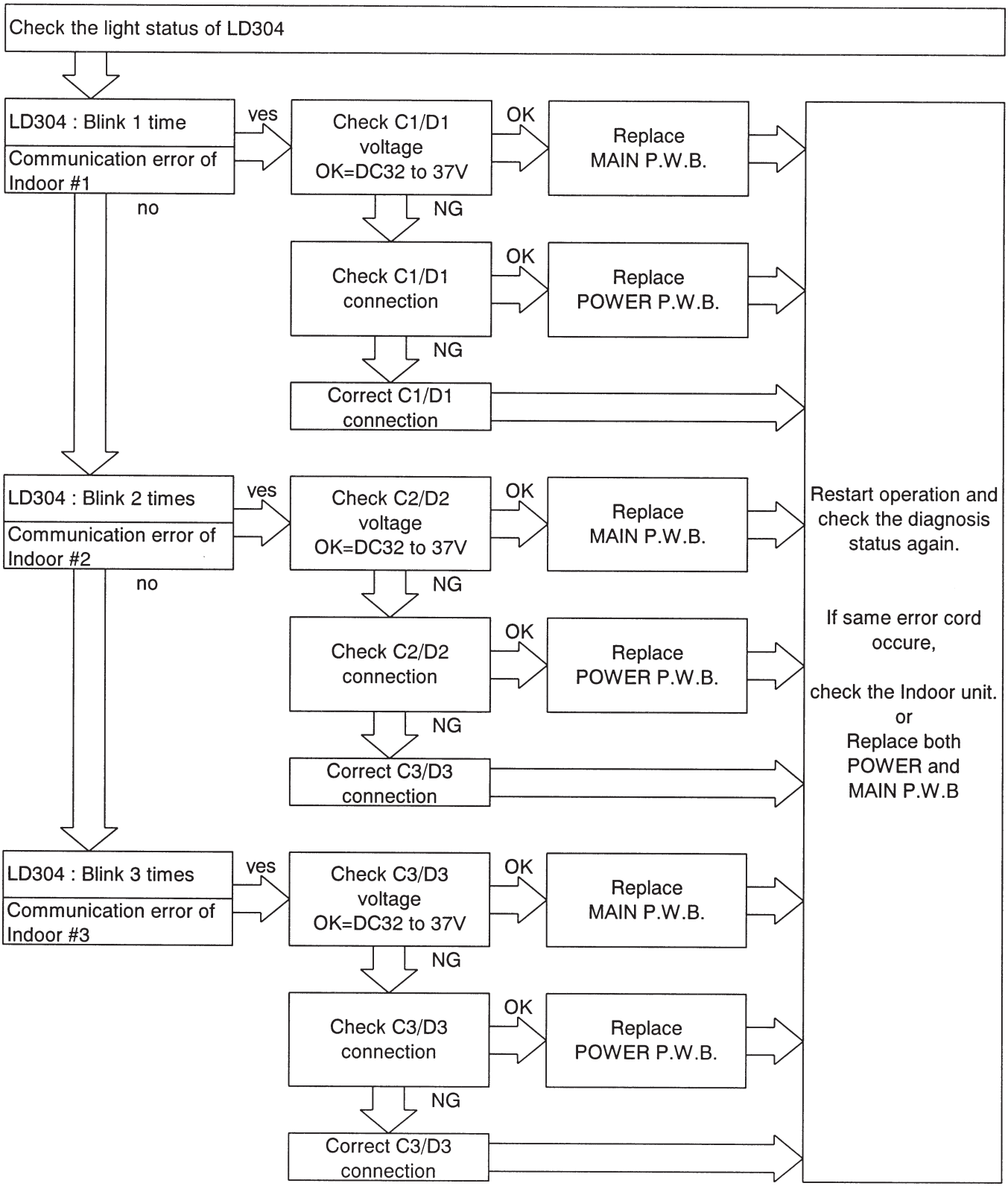
* 2 Carry out each of the voltage checks in the three minutes between the power relay turning on and turning off.

Inspection method 3



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.

Inspection method 4



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.

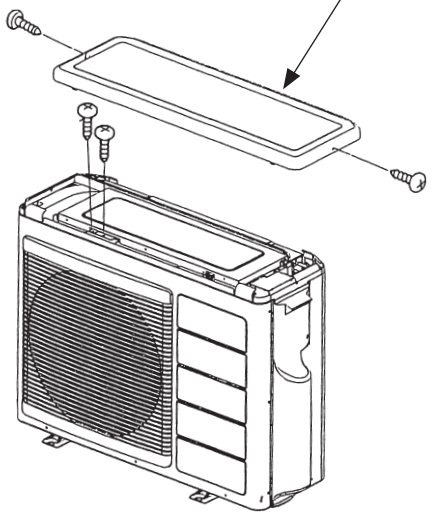
HOW TO OPERATE USING THE SERVICE SWITCH THE OUTDOOR UNIT

MODEL RAM-55QH4, RAM-65QH4

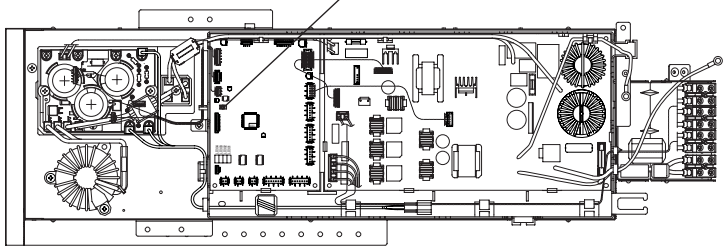
1. Turn the Power switch off and then turn on again.
2. Remove the electrical parts cover.
3. Press the service switch for one second or more (wait for at least 30 seconds after turning the power source switch on).

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.

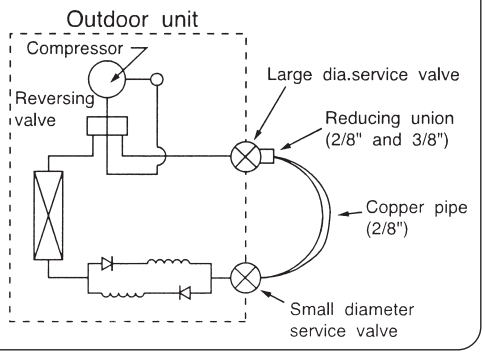
Be sure to return the service switch to "normal" after checking with service operation is completed.

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)



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.

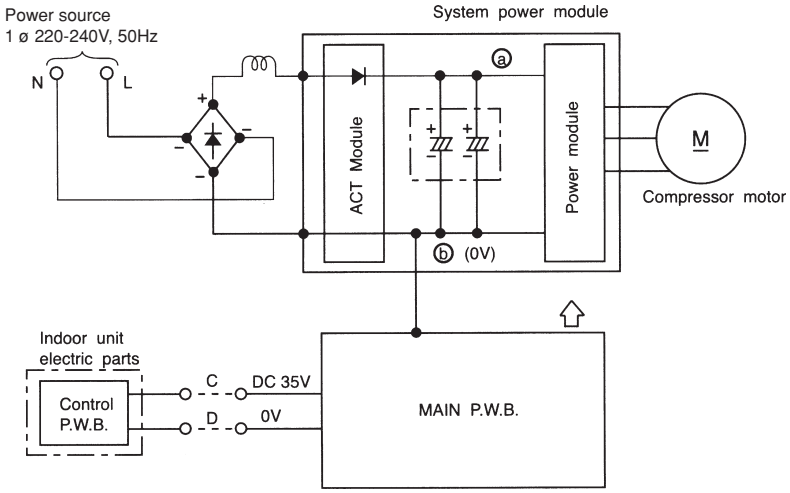
TROUBLE SHOOTING

Model RAM-55QH4
RAM-65QH4

PRECAUTIONS FOR CHECKING

DANGER

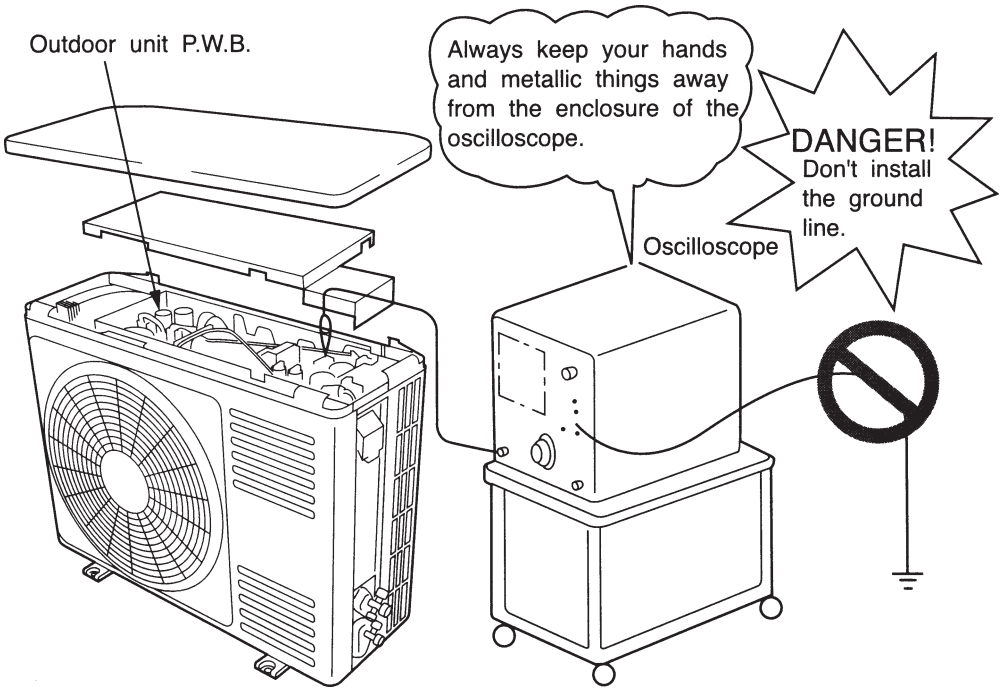
1. Remember that the 0V line is biased to 162V in reference to the ground level.
2. Also note that it takes about 10 minutes until the voltage fall after the power switch is turned off.



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.



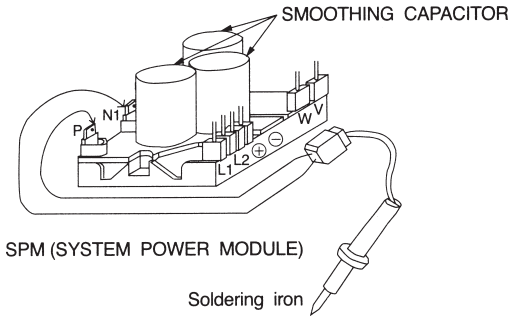
Discharge procedure and how to cut off power to power circuit

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.)

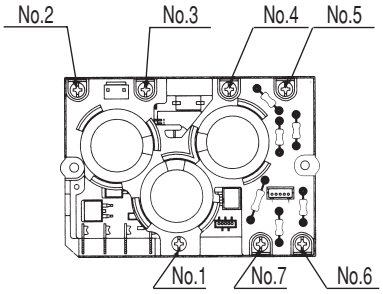
1. Disconnect power plug.
2. Wait for 10 minutes or more after power is turned off and then remove electrical parts box lid. As shown below. Apply soldering iron of 30-75W for 15 seconds or more to P1 and N1 black/white lead receptacles on system power module to discharge voltage from smoothing capacitor.
   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.

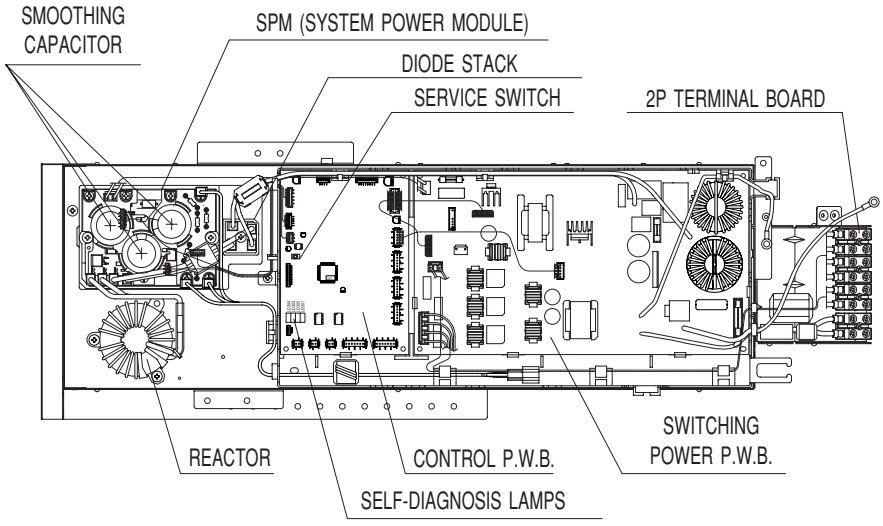


Do not use soldering iron with transformer: Doing so will blow thermal fuse inside transformer.

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.

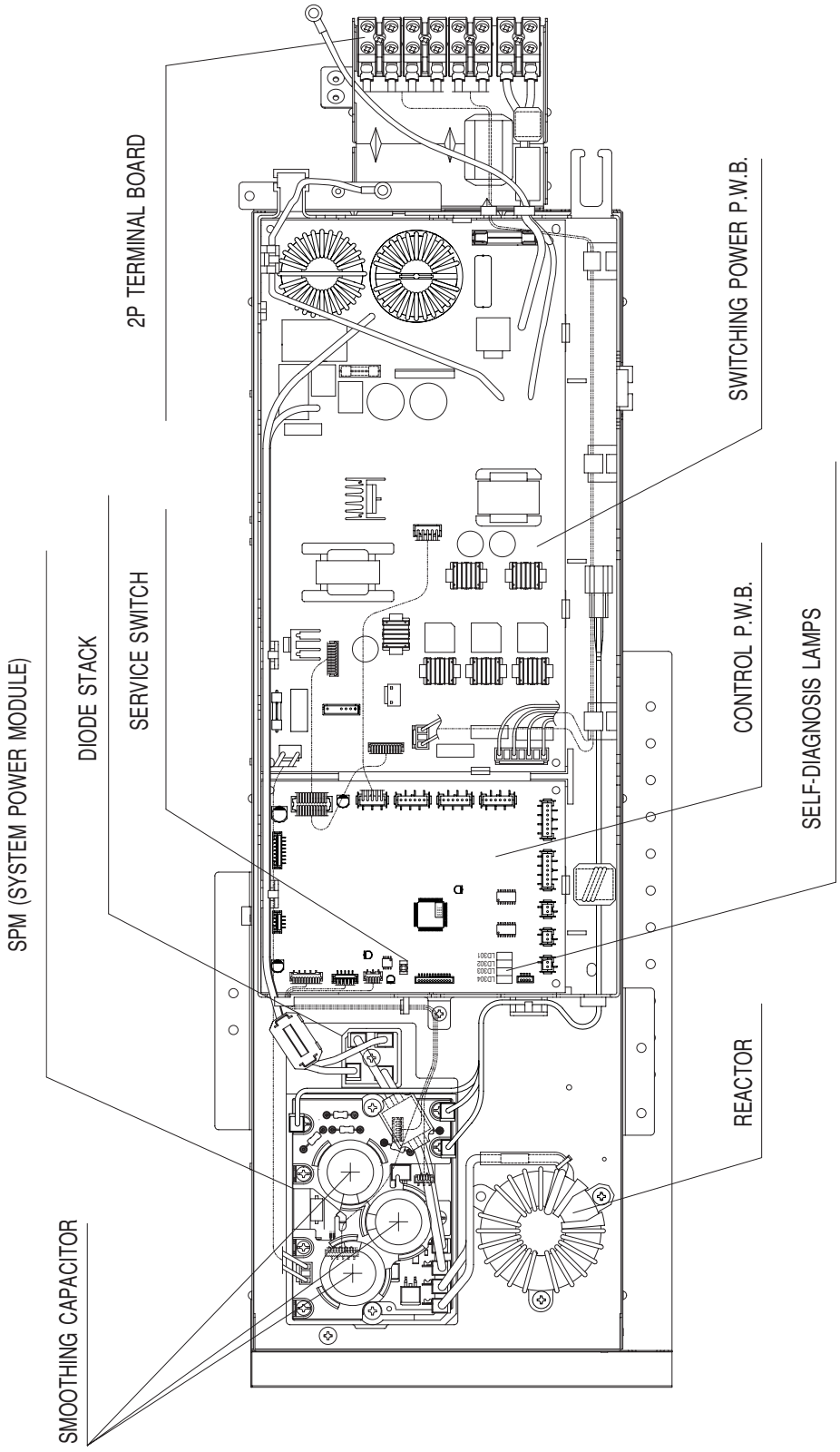




Lighting mode self-diagnosis lamp

RAM-55/65QH4

1 Location of self-diagnosis lamp



2 Lighting mode self-diagnosis lamp

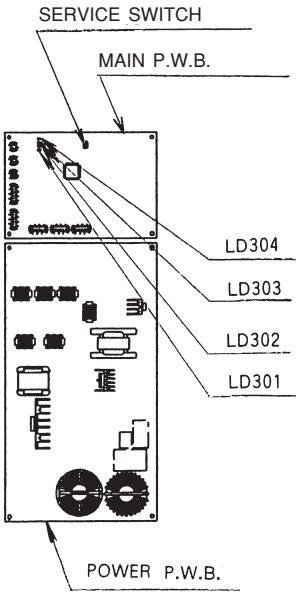
RAM-55/65QH4

DANGER (DC360V)

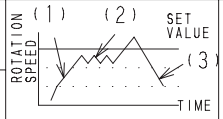
●WAIT FOR TEN-MINUTE(MIN) AFTER TURNING OFF THE POWER SWITCH WHEN SERVICE WORK IS BEING DONE.

SERVICE OPERATION

REFRIGERANT WITHDRAWAL OR SINGLE OPERATION OF THE OUTDOOR UNIT, SHALL SWITCH OFF THE EXCLUSIVE BREAKER FIRST.
PUT THE SWITCH TO ON POSITION BACK AND WAIT AT LEAST 20 SECONDS.
THEN PUSH THE SERVICE SWITCH WHICH IS ON THE CIRCUIT BOARD FOR MORE THAN 1 SECOND.
(THERE WILL BE A COOLING CYCLE)
TO PRESERVE PARTS FROM DAMAGE, MUST NOT OPERATE IT FOR MORE THAN 5 MINUTES.
TO PAUSE, PUSH THE SERVICE SWITCH AT LEAST 1 SECOND IN CASE TO START OPERATING ONCE AGAIN
PLEASE SWITCH OFF THE POWER BACK.



SELF-DIAGNOSIS LIGHTING MODE ■:LIT ▨:BLINKING □:OFF

LD301 RED	LD302 RED	LD303 RED	LD304 GRN	SELF-DIAGNOSIS NAME	DETAILS	MAIN CHECK POINT
				[1] DURING OPERATION		
□	□	■	□	NORMAL OPERATION	COMPRESSOR OPERATION	NOT MALFUNCTION
■	□	■	□	OVERLOAD (1)	 THE ROTATION SPEED IS AUTOMATICALLY CONTROLLED TO PROTECT THE COMPRESSOR IN THE OVERLOAD CONDITION.	THIS SHOWS AN OVERLOAD. NOT MALFUNCTION.
□	■	■	□	OVERLOAD (2)		
■	■	■	□	OVERLOAD (3)		
				[2] DURING STOP		
□	□	□	□	NORMAL STOP	INDOOR THERMOSTAT OFF. MAIN OPERATION OFF.	NOT MALFUNCTION.
▨	□	□	□	RESET STOP 1TIME	WHEN STOPPED WITH POWER RESET. (NORMAL WHEN POWER HAS BEEN TURNED ON.)	P.W.B.s (POWER CIRCUIT, MICROCOMPUTER, ETC.)
▨	□	□	□	PEAK CURRENT CUT 2TIMES	OVERCURRENT IS DETECTED.	①COMPRESSOR ②P.W.B.s
▨	▨	□	□	PEAK CURRENT CUT 2TIMES		①SYSTEM POWER MODULE ②P.W.B.s
▨	□	□	□	ABNORMAL LOW SPEED ROTATION 3TIMES	POSITION DETECTION SIGNAL IS NOT INPUT DURING OPERATION.	①SYSTEM POWER MODULE ②COMPRESSOR ③P.W.B.s
▨	□	□	□	SWITCHING FAILURE 4TIMES	SWITCHING FROM LOW FREQUENCY SYNC START TO POSITION DETECTION OPERATION FAILURE.	①SYSTEM POWER MODULE ②COMPRESSOR ③P.W.B.s
▨	□	□	□	OVERLOAD LOWER LIMIT CUT 5TIMES	UNDER THE LOWER LIMIT OF ROTATION SPEED WITH OVERLOAD CONTROL CIRCUIT OPERATED.	①OUTDOOR UNIT IS EXPOSED TO DIRECT SUNLIGHT OR ITS AIRFLOW BLOCKED. ②FAN MOTOR ③FAN MOTOR CIRCUIT ④THE VOLTAGE IS EXTREMELY LOW.
▨	□	□	□	OH THERMISTOR TEMP. RISE 6TIMES	OH THERMISTOR OPERATED.	①LEAK OF REFRIGERANT ②COMPRESSOR ③OH THERMISTOR CIRCUIT ④FAN MOTOR ⑤FAN MOTOR CIRCUIT
▨	□	□	□	ACCELERATION DEFECTIVE 8TIMES	NO ACCELERATION OVER THE LOWER LIMIT OF THE ROTATION SPEED.	①LEAK OF REFRIGERANT ②COMPRESSOR
▨	□	□	□	ABNORMAL POWER VOLTAGE 10TIMES	POWER VOLTAGE IS ABNORMALLY LOW.	①POWER VOLTAGE ②CONNECTION OF REACTOR
▨	□	□	□	FAN DEFECTIVE 12TIMES	OUTDOOR FAN ROTATION IS ABNORMAL.	①OUTDOOR FAN MOTOR ②P.W.B.s (FUSE)
▨	□	□	□	EEPROM READ ERROR 13TIMES	MICROCOMPUTER CANNOT READ THE DATA IN EEPROM.	MAIN P.W.B.
▨	□	□	□	ACTIVE CONVERTER DEFECTIVE 14TIMES	OVERVOLTAGE IS DETECTED BY SYSTEM POWER MODULE	SYSTEM POWER MODULE
■	▨	□	□	THERMISTOR ABNORMAL LIT 1~9TIMES	THERMISTOR IS OPEN OR SHORTED. *REFER TO THE FOLLOWING "CORRESPONDENCE TABLE FOR ABNORMAL THERMISTOR"	①THERMISTOR ②CONNECTION OF THERMISTOR DEFECTIVE ③THERMISTOR CIRCUIT
□	□	□	▨	COMMUNICATIONS ERROR BETWEEN INDOOR UNIT AND OUTDOOR UNIT 1TIME	COMMUNICATION ERROR OF INDOOR 1	EVEN WHEN THE INDOOR UNIT IS NOT CONNECTED. IT BLINKS SIMILARLY. (NOT MALFUNCTION.) ①CABLE IS WRONG CONNECTED ②CABLE IS OPEN ③INTERFACE CIRCUIT OF BETWEEN INDOOR UNIT AND OUTDOOR UNIT
□	□	□	▨	2TIMES	COMMUNICATION ERROR OF INDOOR 2	
□	□	□	▨	* 3TIMES	COMMUNICATION ERROR OF INDOOR 3	

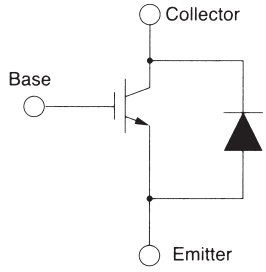
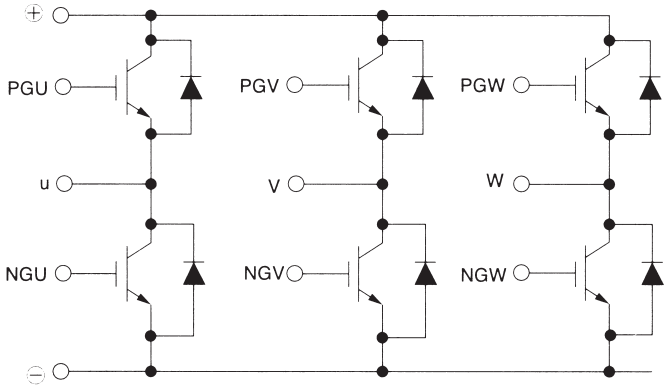
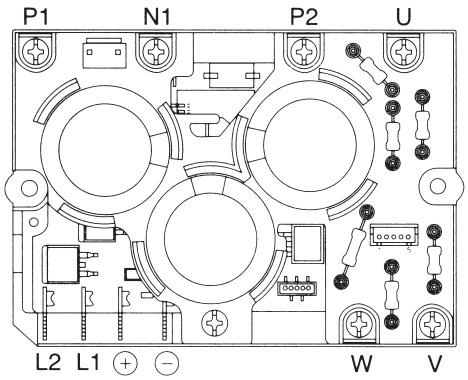
*EXAMPLE OF BLINKING (5 TIMES) ■■■■■ 2SEC ■ ··LIGHTS FOR 0.25 SEC AT INTERVAL OF 0.25 SEC.

CORRESPONDENCE TABLE FOR ABNORMAL THERMISTOR

	BLINKING TIMES	ABNORMAL THERMISTOR
	1TIME	OVER HEAT THERMISTOR
	2TIMES	DEFROST THERMISTOR
	3TIMES	OUTDOOR TEMPERATURE THERMISTOR
	4TIMES	NARROW PIPE THERMISTOR(INDOOR 1)
	5TIMES	WIDE PIPE THERMISTOR(INDOOR 1)
	6TIMES	NARROW PIPE THERMISTOR(INDOOR 2)
	7TIMES	WIDE PIPE THERMISTOR(INDOOR 2)
*	8TIMES	NARROW PIPE THERMISTOR(INDOOR 3)
*	9TIMES	WIDE PIPE THERMISTOR(INDOOR 3)

Remark :
Starmark "*" is only use for RAM-65QH4

TROUBLESHOOTING OF THE SYSTEM POWER MODULE

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.

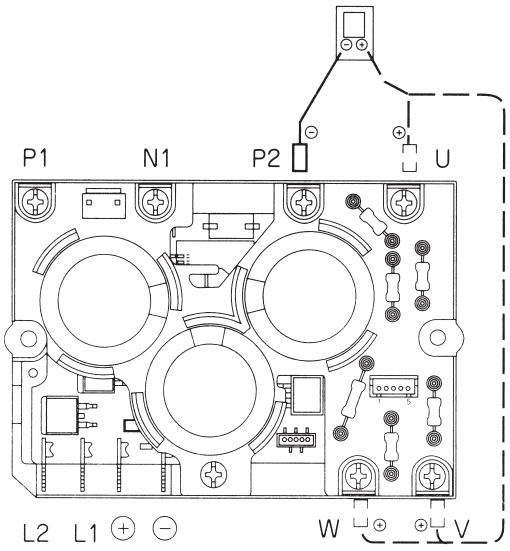
HOW TO CHECK POWER MODULE

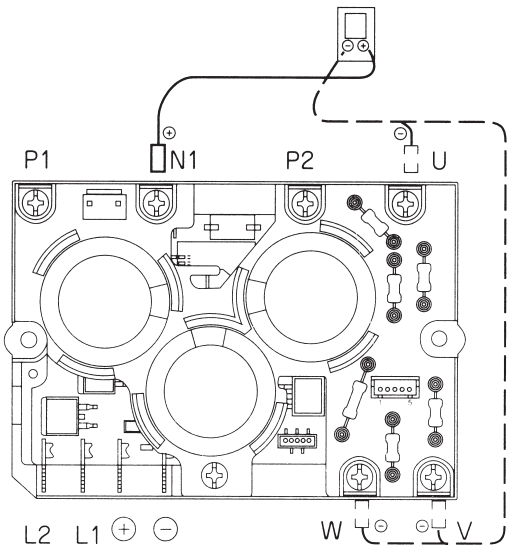
Checking power module using tester

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?

Selfdiagnosis Lamp \ Lighting mode	Blinks 2 times	Blinks 3 times	Blinks 4 times	Blinks 5 times	Blinks 6 times	Blinks 8 times
LD301	▭	▭	▭	▭	▭	▭
LD302	▭	▭	▭	▭	▭	▭
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

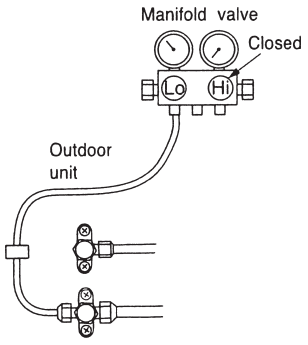
▭ Blinking ▭ Off

YES

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

Outdoor air temperature (℃)	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)



Abnormal
Gas leaking

Gas leaks.
Repair and seal refrigerant.

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.)

Perform a final check of operation.

DISASSEMBLY AND REASSEMBLY

MODEL RAM-65QH4

1. Electric parts

(1) Remove the screw on both sides of upper cover, and then remove the upper cover.

(2) Remove the screws holding the electric part cover, and then remove the cover.

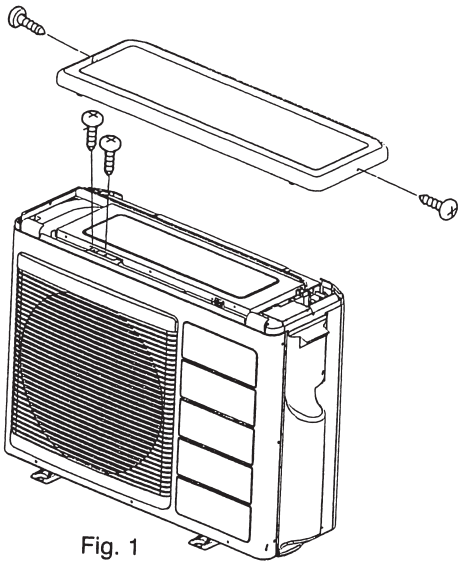


Fig. 1

(3) Slightly widen the electric part cover to the left and right, and then lift the cover to remove it.

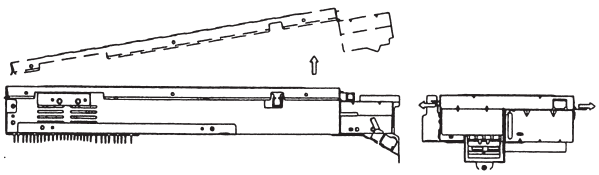


Fig. 2

(4) Unplug the connectors of each lead wire and disconnect the ground wire from the P.W.B.; widen the tabs of supports at the front of P.W.B., and then lift the P.W.B. to remove it.(At this time, also remove 2P terminal board [LN terminal].)

(5) Disconnect each lead wire from the system power module (SPM) assembly, and then remove the screws on left and right.

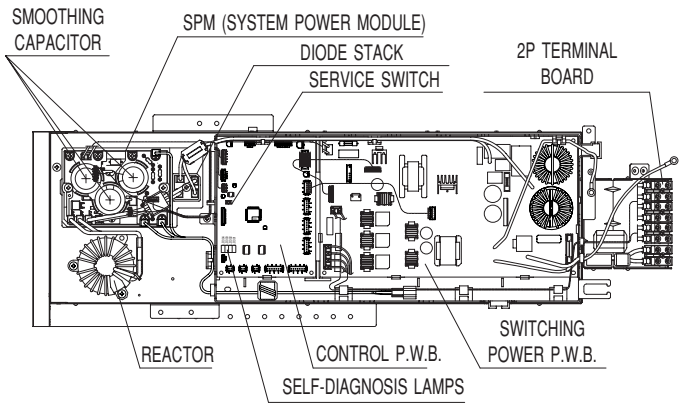


Fig. 3

(6) When installing the electric part cover, fit the cover approximately horizontally so that it does not catch the terminal board or resin sleeve of cord.

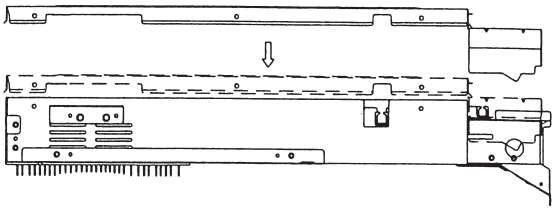


Fig. 4

2. Front cover

(1) Remove the upper cover.

(2) Remove the screw on right side.

(3) Remove the screws from the bottom of front cover.

(4) Remove the screws holding the front cover and electric parts.

(5) Slightly open the right side, and lift the cover up to release it from the hook.

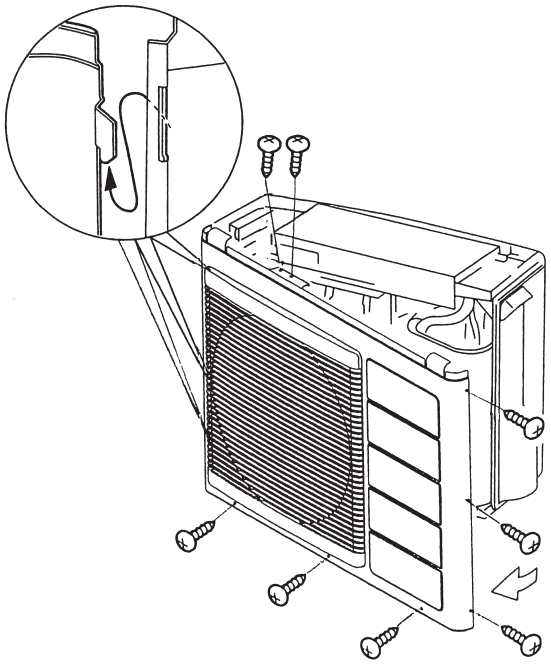


Fig. 5

<Repairing Refrigerating Cycle>

1. Electric expansion valve and Service valve assembly (with valve base)

(1) Remove the upper plate, side plate, front cover, both side covers and electric part box.
(2) Remove the two screws holding the partition (one on base and one on top of condenser).
(3) Remove the support that holds the lead wire, both of which are attached to the partition.
(4) Pull the three Electric expansion valve coils up to remove them.
(5) Use a pipe cutter, etc. to cut off the three pipes at the side of Electric expansion valve and condenser outlet pipe.
(6) Remove the screws holding the valve base.
(7) Lift the valve base to remove it from the base.

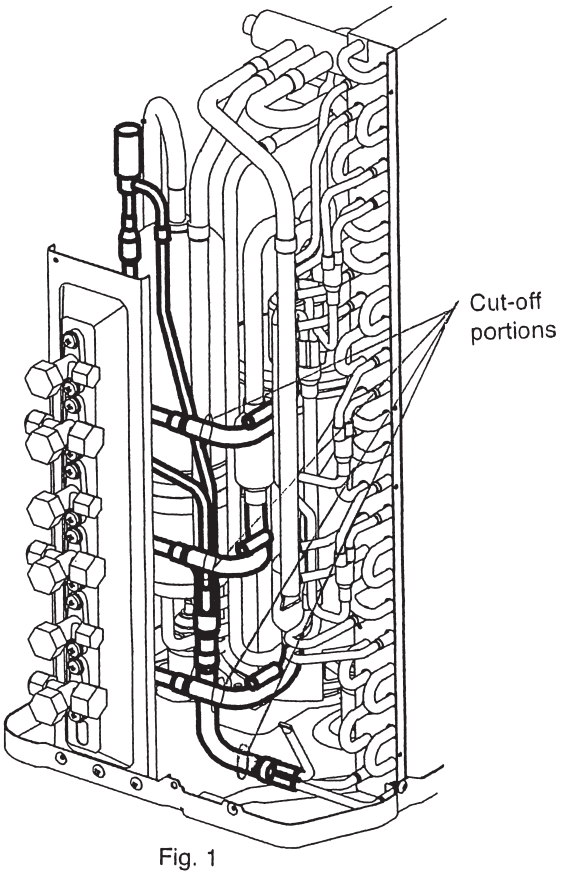


Fig. 1

2. Condenser

(1) Remove the covers, electric part box, partition and supports (see steps (1)-(3) of item 1).
(2) Remove the net at the back.
(3) Cut off the condenser outlet pipe.
(4) Cut off the condenser inlet pipe.
(5) Remove the screws holding the condenser on both sides of base.

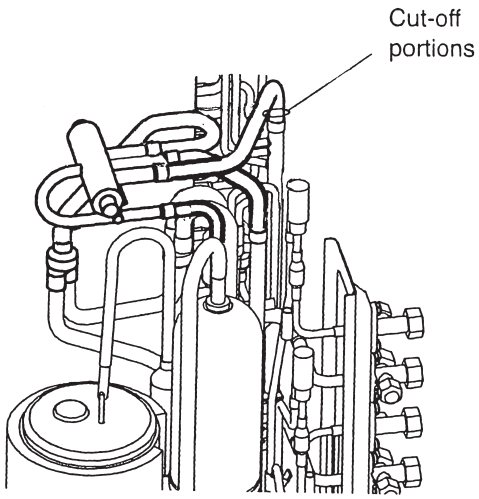


Fig. 2

3. Reversing valve

(1) Remove the covers, electric part box, partition and supports (see steps (1)-(3) of item 1).
(2) Remove the Reversing valve coil.
(3) Cut off the three pipes at the side and bottom of Reversing valve.
(4) Pull out the soldered portion of D-pipe.

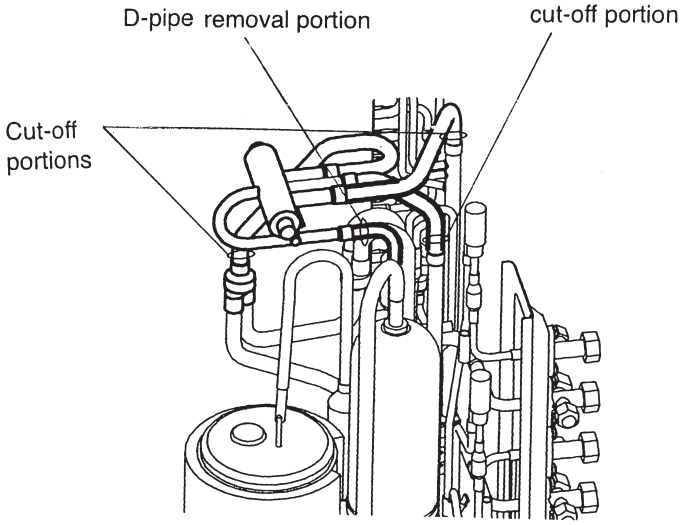
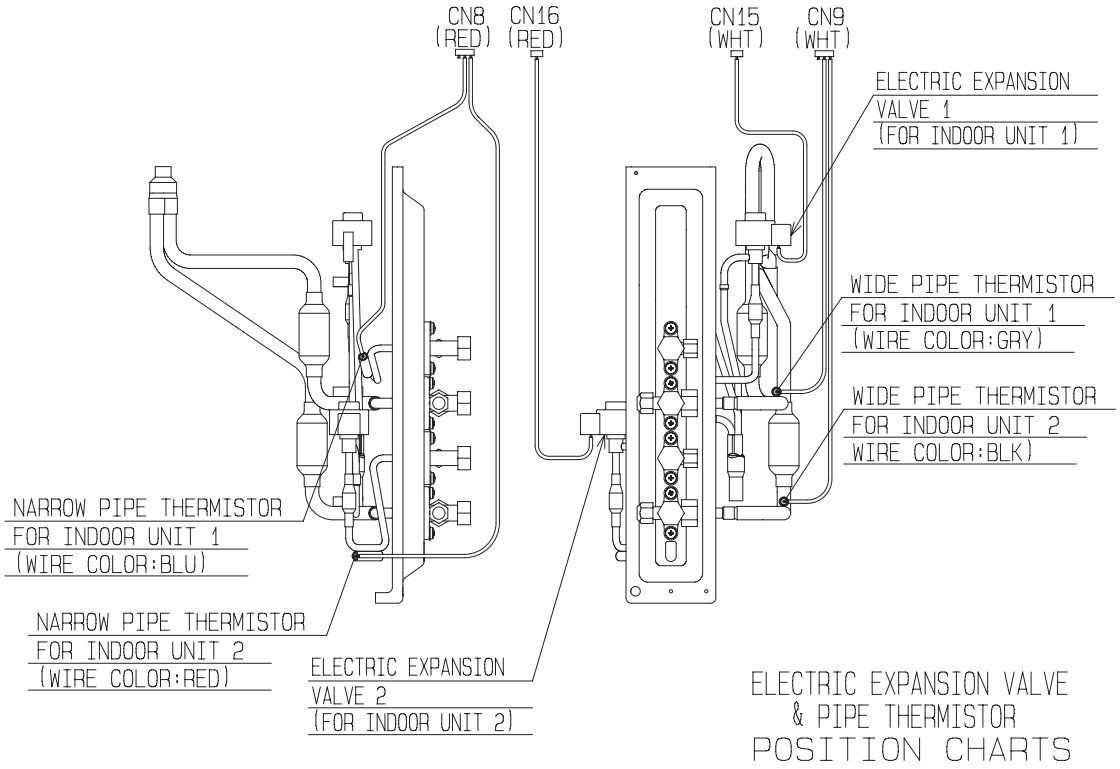


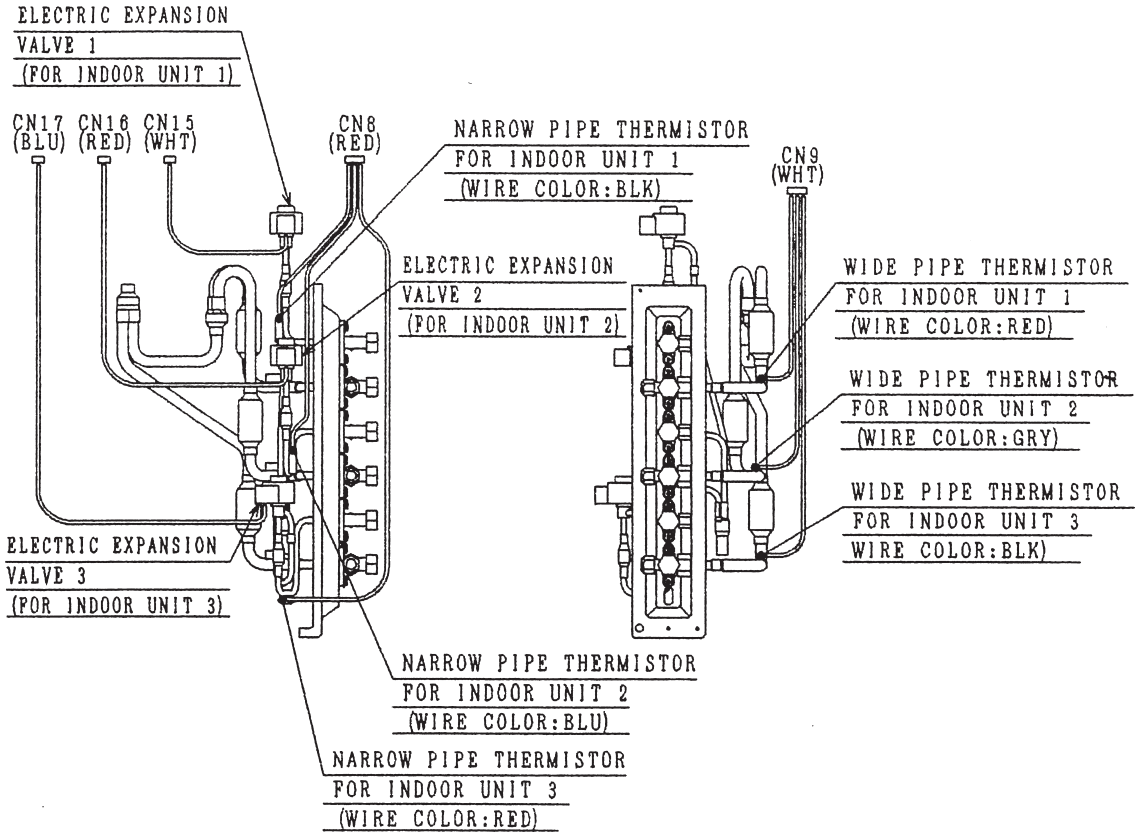
Fig. 3

ELECTRIC EXPANSION VALVE & PIPE THERMISTOR POSITION CHARTS

MODEL RAM-55QH4

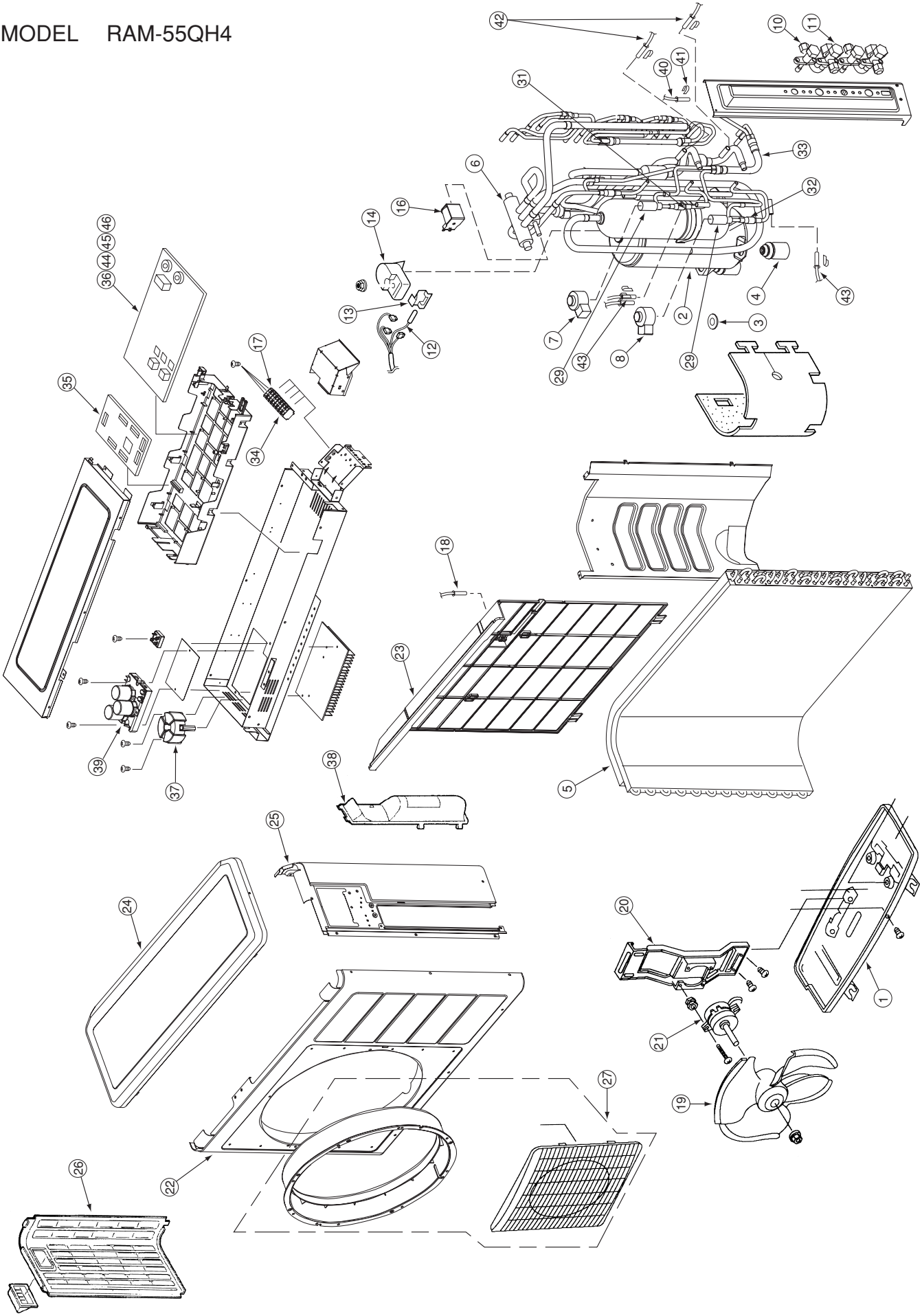


MODEL RAM-65QH4



PARTS LIST AND DIAGRAM

MODEL RAM-55QH4

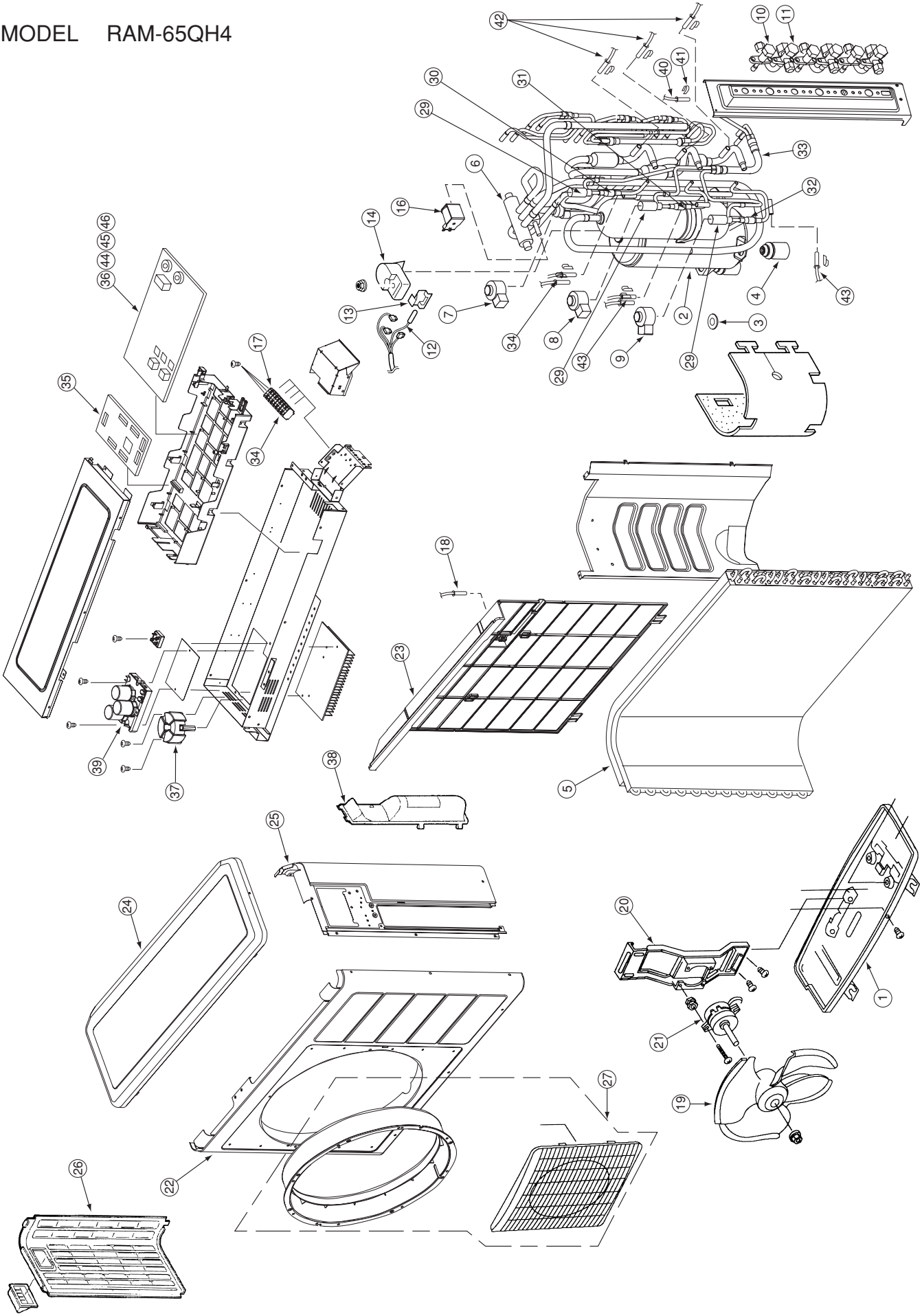


MODEL RAM-55QH4

NO.	PART N0. RAM-55QH4	Q'TY / UNIT	PARTS NAME
1	PMRAM-65QH4 902	1	BASE
2	PMRAM-65QH4 901	1	COMPRESSOR
3	KPNT1 001	3	PUSH NUT
4	RAC-2226HV 805	3	COMPRESSOR RUBBER
5	PMRAC-50NH4 902	1	CONDENSER
6	PMRAC-25NH4 902	1	REVERSING VALVE
7	PMRAM-65QH4 904	1	EXPANSION VALVE COIL (W)
8	PMRAM-65QH4 905	1	EXPANSION VALVE COIL (R)
10	PMRAM-65QH4 915	2	VALVE (2S)
11	PMRAM-65QH4 916	2	VALVE (3S)
12	PMRAC-40CNH2 914	1	THERMISTOR (OH)
13	PMRAC-25NH4 909	1	THERMISTOR SUPPORT (OH)
14	PMRAC-25NH4 910	1	OLR COVER
16	PMRAC-07CHV1 921	1	MG-COIL (REVERSING VALVE)
17	PMRAS-10C6M 002	2	2P TERMINAL FOR C-D LINE
18	PMRAM-65QH4 910	1	THERMISTOR (OUTSIDE TEMPERATURE)
19	PMRAC-40CNH2 917	1	PROPELLER FAN
20	PMRAC-40CNH2 918	1	SUPPORT (FAN MOTOR)
21	PMRAC-40CNH2 919	1	FAN MOTOR
22	PMRAC-40CNH2 904	1	CABINET
23	PMRAC-24CP5 904	1	NET
24	PMRAC-40CNH2 922	1	TOP COVER
25	PMRAM-55QH4 903	1	SIDE PLATE R
26	PMRAC-40CNH2 926	1	SIDE PLATE L
27	PMRAC-51CHA1 907	1	D-GRILL-AS (INCL. MOUTH RING)
29	PMRAM-65QH4 903	2	ELECTRICAL EXPANSION VALVE
31	PMRAM-65QH4 918	1	STRAINER (ST-PIPE-AS 2)
32	PMRAM-65QH4 919	1	STRAINER (ST-PIPE-AS 3)
33	PMRAM-65QH4 920	1	STRAINER (CO-PIPE-AS)
34	PMRAC-07CV1 006	1	2P TERMINAL FOR L-N LINE
35	PMRAM-55QH4 901	1	P.W.B. (MAIN)
36	PMRAM-55QH4 902	1	PWB (POWER)
37	PMRAC-18SH4 901	1	REACTOR
38	PMRAM-55QH4 904	1	SV-COVER
39	PMRAC-40CNH2 901	1	SYSTEM POWER MODULE (SPM2)
40	PMRAM-55QH4 905	1	THERMISTOR (DEFROST)
41	PMRAM-65QH4 907	1	THERMISTOR SUPPORT
42	PMRAM-55QH4 906	1	THERMISTOR-V (W)
43	PMRAM-55QH4 907	1	THERMISTOR-V (R)
44	PMRA-108CHLXA 908	1	VARISTOR (450NR)
45	PMRAC-40CNH2 905	1	FUSE (25A)
46	PMRAM-55QH4 908	1	FUSE (5A)

PARTS LIST AND DIAGRAM

MODEL RAM-65QH4



MODEL RAM-65QH4

NO.	PART N0. RAM-65QH4	Q'TY / UNIT	PARTS NAME
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3	KPNT1 001	3	PUSH NUT
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5	PMRAC-50NH4 902	1	CONDENSER
6	PMRAC-25NH4 902	1	REVERSING VALVE
7	PMRAM-65QH4 904	1	EXPANSION VALVE COIL (W)
8	PMRAM-65QH4 905	1	EXPANSION VALVE COIL (R)
9	PMRAM-65QH4 906	1	EXPANSION VALVE COIL (B)
10	PMRAM-65QH4 915	3	VALVE (2S)
11	PMRAM-65QH4 916	3	VALVE (3S)
12	PMRAC-40CNH2 914	1	THERMISTOR (OH)
13	PMRAC-25NH4 909	1	THERMISTOR SUPPORT (OH)
14	PMRAC-25NH4 910	1	OLR COVER
16	PMRAC-07CHV1 921	1	MG-COIL (REVERSING VALVE)
17	PMRAS-10C6M 002	3	2P TERMINAL FOR C-D LINE
18	PMRAM-65QH4 910	1	THERMISTOR (OUTSIDE TEMPERATURE)
19	PMRAC-40CNH2 917	1	PROPELLER FAN
20	PMRAC-40CNH2 918	1	SUPPORT (FAN MOTOR)
21	PMRAC-40CNH2 919	1	FAN MOTOR
22	PMRAC-40CNH2 904	1	CABINET
23	PMRAC-24CP5 904	1	NET
24	PMRAC-40CNH2 922	1	TOP COVER
25	PMRAM-65QH4 911	1	SIDE PLATE R
26	PMRAC-40CNH2 926	1	SIDE PLATE L
27	PMRAC-51CHA1 907	1	D-GRILL-AS (INCL. MOUTH RING)
29	PMRAM-65QH4 903	3	ELECTRICAL EXPANSION VALVE
30	PMRAM-65QH4 917	1	STRAINER (ST-PIPE-AS 1)
31	PMRAM-65QH4 918	1	STRAINER (ST-PIPE-AS 2)
32	PMRAM-65QH4 919	1	STRAINER (ST-PIPE-AS 3)
33	PMRAM-65QH4 920	1	STRAINER (CO-PIPE-AS 1)
34	PMRAC-07CV1 006	1	2P TERMINAL FOR L-N LINE
35	PMRAM-65QH4 908	1	P.W.B. (MAIN)
36	PMRAM-65QH4 909	1	PWB (POWER)
37	PMRAC-18SH4 901	1	REACTOR
38	PMRAM-65QH4 921	1	SV-COVER
39	PMRAC-40CNH2 901	1	SYSTEM POWER MODULE (SPM2)
40	PMRAM-65QH4 912	1	THERMISTOR (DEFROST)
41	PMRAM-65QH4 907	1	THERMISTOR SUPPORT
42	PMRAM-65QH4 913	1	THERMISTOR-V (W)
43	PMRAM-65QH4 914	1	THERMISTOR-V (R)
44	PMRA-108CHLXA 908	1	VARISTOR (450NR)
45	PMRAC-40CNH2 905	1	FUSE (25A)
46	PMRAM-55QH4 908	1	FUSE (5A)

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