HITACHI

SM0757

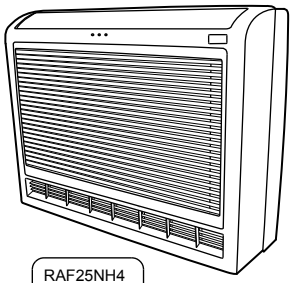
SERVICE MANUAL

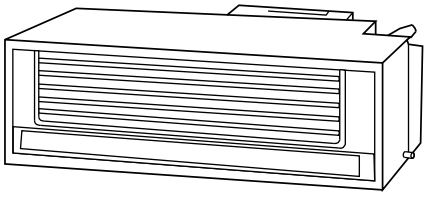
TECHNICAL INFORMATION
INFORMATIONS TECHNIQUES

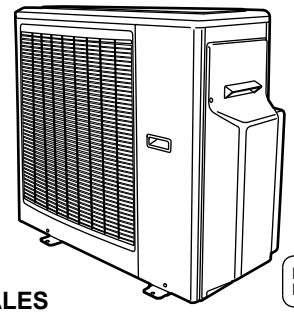
FOR SERVICE PERSONNEL ONLY
RESERVE AU PERSONNEL

RAF25NH4
RAF50NH4
RAD25QH4
RAD40QH4
/
RAM70QH4
(MULTIZONE 70H)
RAM80QH4
(MULTIZONE 80H)

REFER TO THE FOUNDATION MANUAL
REPORTEZ-VOUS AU MANUEL DE BASE


RAF25NH4
RAF50NH4


RAD25QH4
RAD40QH4


RAM70QH4
RAM80QH4

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SPECIFICATIONS
CARACTERISTIQUES GENERALES

TYPE		TYPE		DC INVERTER TRIPLE AND QUADRUPLE SYSTEM MULTI SYSTEME DE TRIPLE ET QUADRUPLE ONDULEUR CC MULTI					
				INDOOR UNIT UNITÉ INTÉRIEURE				OUTDOOR UNIT	UNITÉ EXTÉRIEURE
MODEL		MODÈLE		RAF25NH4	RAF50NH4	RAD25QH4	RAD40QH4	RAM70QH4	RAM80QH4
POWER SOURCE		PHASE/TENSION/FREQUENCE		1Ø, 230V, 50Hz					
COOLING RÉFRIGÉRATION	TOTAL INPUT	PUISSANCE ABSORBEE TOTALE (W)		REFER TO THE SPECIFICATIONS PAGE 10. REPORTEZ-VOUS AUX SPECIFICATIONS DE LA PAGE 11.					
	TOTAL AMPERES	AMPERES TOTAUX (A)							
	CAPACITY	CAPACITE	(kW)						
			(B.T.U./h)						
HEATING CHAUFFAGE	TOTAL INPUT	PUISSANCE ABSORBEE TOTALE (W)							
	TOTAL AMPERES	AMPERES TOTAUX (A)							
	CAPACITY	CAPACITE	(kW)						
			(B.T.U./h)						
DIMENSIONS		DIMENSIONS	W, L (mm)	750		750		850 (+90)*	
			H, H (mm)	600		235		830	
			D, P (mm)	215		400		340 (+50)*	
NET WEIGHT		POIDS NET	(kg)	15.0		14.0		77	79

*After installation Après installation

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT
LES SPECIFICATIONS ET PIECES DETACHEES PEUVENT CHANGER POUR ETRE AMELIOREES.

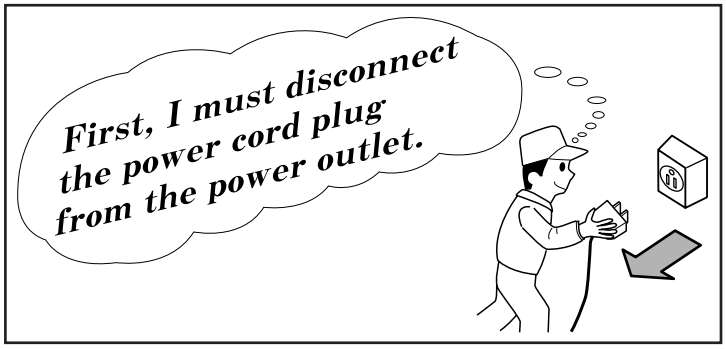
ROOM AIR CONDITIONER

INDOOR UNIT + OUTDOOR UNIT

APRIL 2003 Hitachi Home & Life Solutions, Inc.

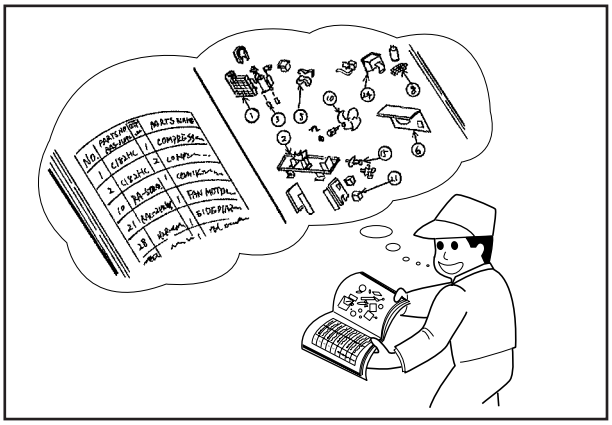
SAFETY DURING REPAIR WORK

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 the 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 occurrence 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 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 after reinforced or at a new location.

10. Any inflammable object must not 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 manufactures 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 (I.C.)

(3) Field effective transistor (F.E.T.)

(4) P.C. boards or the like to 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.

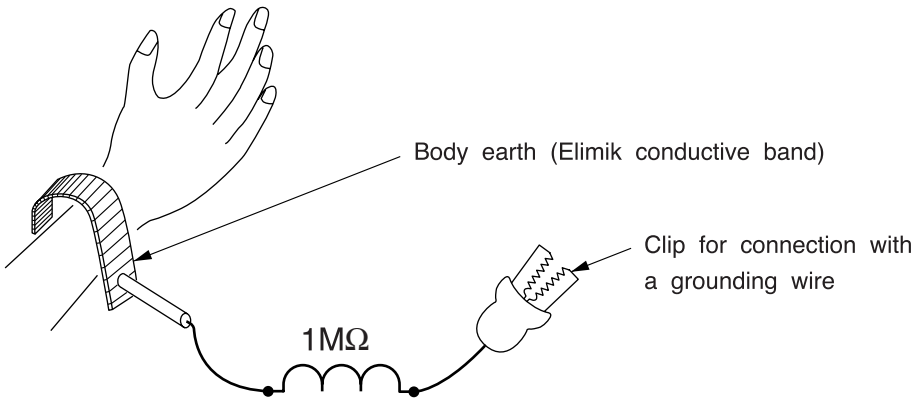


Fig. 2 Body earth

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

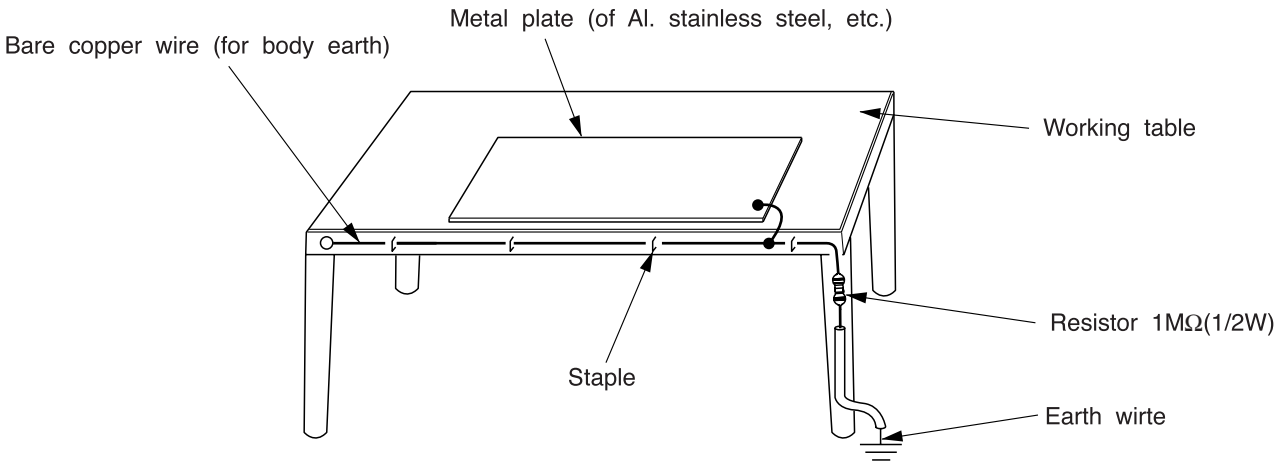


Fig.3 Grounding of the working table

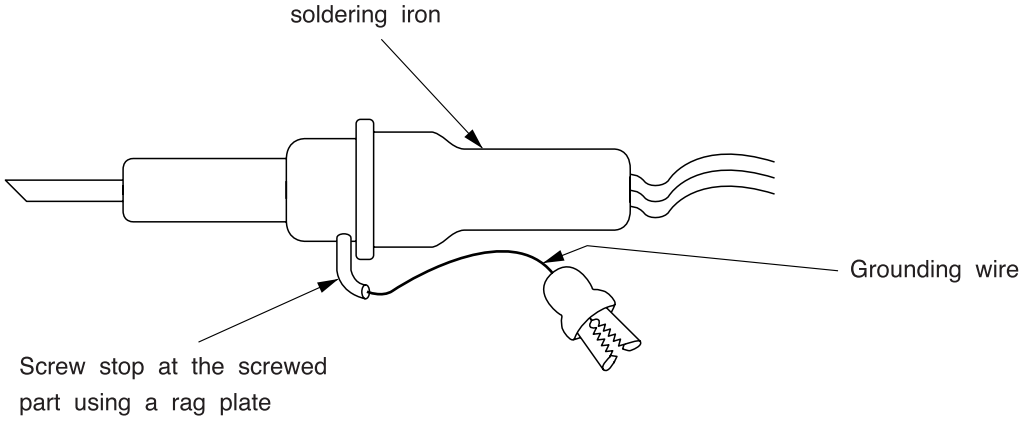


Fig.4 Grounding a solder iron

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, its heard slight flowing noise of refrigerant in the refrigerating cycle 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 dose not start automaticaly 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.

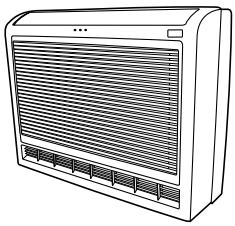
7. When the outside heat exchanger is frosted, the front is melted by operating the hot gas system, it is not trouble that at this time fan stops and the vapour may rise from the outside heat exchanger.

SPECIFICATIONS

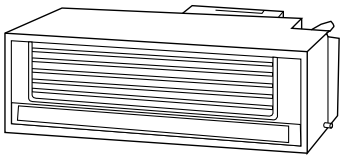
MODEL		RAF-25NH4	RAF-50NH4	RAD-25QH4	RAD-40QH4	RAM-70QH4	RAM-80QH4
FAN MOTOR		20W (DC35V)				50W	
FAN MOTOR CAPACITOR		NO					
FAN MOTOR PROTECTOR		NO					
COMPRESSOR		NO				EU1013DD×2	
OVER HEAT PROTECTOR		NO				YES	
OVERLOAD RELAY		NO				YES	
FUSE (for MICRO COMPUTER)		NO				3.15A	
POWER RELAY, STICK RELAY		NO				G4A	
POWER SWITCH		NO					
TEMPORARY SWITCH		YES				NO	
SERVICE SWITCH		NO				YES	
TRANSFORMER		NO				YES	
VARISTOR		NO				450NR	
NOISE SUPPRESSOR		NO				20132A	
THERMOSTAT		YES (IC)				NO	
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)		YES (RAR-2P2)				NO	
FUSE CAPACITY		30A TIME DELAY FUSE					
REFRIGERANT CHARGING VOLUME (R410A)	UNIT	——				※A: 1450g B: 1450g	
	PIPES	WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.					

※A: COMPRESSOR A
B: COMPRESSOR B

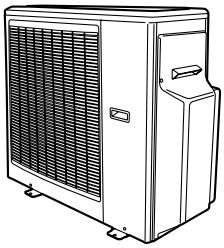
SPECIFICATION OF ROOM AIR CONDITIONER



RAF-25NH4 RAF-50NH4



RAD-25QH4 RAD-40QH4



RAM-70QH4 RAM-80QH4

				STANDARD	CE(EMC&LVD)
TYPE		COOLING/HEATING			
		CONSOLE		FREE DUCT	
MODEL	INDOOR UNIT	RAF-25NH4	RAF-50NH4	RAD-25QH4	RAD-40QH4
	OUTDOOR UNIT	RAM-70QH4		RAM-80QH4	
CLASS		1.0HP	2.0HP	1.0HP	1.5HP
PHESE/VOLTAGE/FREQUENCY		1φ 230V 50Hz			
COOLING	CAPACITY(kW)	2.5(1.0～2.8)	5.0(1.0～5.6)	2.5(1.0～2.8)	4.0(1.0～4.5)
	(BTU/h)	8525(3410～9550)	17050(3410～19100)	8525(3410～9550)	13640(3410～15345)
	TOTAL INPUT(W)	780(360～980)	1910(360～2100)	780(360～980)	1340(360～1480)
(ONE UNIT)	COP	3.21	2.62	3.21	2.99
	TOTAL AMPERES(A)	3.4	8.4	3.4	5.9
	POWER FACTOR(%)	99	99	99	99
	SOUND LEVEL(INDOOR)	35	44	40	43
	AIR FLOW VOLUME(Hi)	7.4 m^3/min	10.3 m^3/min	8.7 m^3/min	9.0 m^3/min
COOLING	CAPACITY(kW)	7.0(3.0～7.9)		8.0(3.0～9.2)	
(3 & 4 UNITS)	(BTU/h)	23870(10230～26260)		27280(10230～30690)	
RAF-25NH4×3	TOTAL INPUT(W)	2180(650～3180)		2650(650～3200)	
…RAM-70QH4	COP	3.21		3.02	
	TOTAL AMPERES(A)	9.6		11.6	
RAF-25NH4×4	POWER FACTOR(%)	99		99	
…RAM-80QH4	SOUND LEVEL(OUTDOOR)	48		49	
HEATING	CAPACITY(kW)	3.9(1.1～4.7)	6.7(1.1～7.6)	3.9(1.1～4.7)	6.0(1.1～6.8)
	(BTU/h)	13300(3750～14660)	22847(3750～25920)	13300(3750～14660)	20460(3750～23190)
	TOTAL INPUT(W)	1100(320～1280)	2070(320～2170)	1100(320～1280)	1770(320～1920)
(ONE UNIT)	COP	3.55	3.24	3.55	3.39
	TOTAL AMPERES(A)	4.8	9.1	4.8	7.8
	POWER FACTOR(%)	99	99	99	99
	SOUND LEVEL(INDOOR)	35	44	41	43
	AIR FLOW VOLUME(Hi)	8.5 m^3/min	12.3 m^3/min	9.0 m^3/min	9.5 m^3/min
HEATING	CAPACITY(kW)	9.6(3.0～10.6)		11.0(3.0～12.4)	
(3 & 4 UNITS)	(BTU/h)	32760(10230～36170)		37530(10230～42310)	
RAF-25NH4×3	TOTAL INPUT(W)	2480(620～3520)		2630(620～3630)	
…RAM-70QH4	COP	3.87		4.18	
	TOTAL AMPERES(A)	10.9		11.6	
RAF-25NH4×4	POWER FACTOR(%)	99		99	
…RAM-80QH4	SOUND LEVEL(OUTDOOR)	51		51	
AUTOMATIC AIR DEFLECTORS		YES	YES	YES	YES
FAN SPEED		3	3	3	3
LINE CORD		NOT PROVIDED(POWER CORD SHOULD BE PREPARED AND CONNECTED TO OUTDOOR UNIT WHEN INSTALLED)			
REMOTE CONTROL SWITCH		YES(WIRELESS)	YES(WIRELESS)	YES(WIRELESS)	YES(WIRE LESS)
MAXIMUM LENGTH OF PIPING		MAX60m(THREE UNITS TOTAL)		MAX70m(FOUR UNITS TOTAL)	
MODEL		RAF-25NH4,50NH4	RAD-25QH4,40QH4	RAM-70QH4	RAM-80QH4
DIMENSIONS inches(mm)	W	29-17/32(750)	29-17/32(750)	33-1/2(850)	
	H	35-5/8(600)	9-1/4(235)	32-11/16(830)	
	D	8-15/32(215)	15-3/4(400)	15-17(390)	
	(INSTALLED)	-	-	-	
NET WEIGHT (kg)		15	14	77	79
PACKING inches(mm)	W	31-3/8(797)	31-23/32(806)	39-1/4(997)	
	H	25-13/16(656)	23-3/8(594)	34-21/32(880)	
	D	10-15/16(278)	12-1/16(306)	16-15/16(430)	
	cu.ft	5.13	5.17	13.31	
GROSS WEIGHT(kg)		17	16	81	83
FLARE NUT SIZE(SMALL/LARGE)		6.35/9.52 6.35/12.7	6.35/9.52	6.35/9.52	

TRIPLE SYSTEM MULTI R.A.C. *MULTIZONE 70H*
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.

MODEL : RAM—70QH4

POSSIBLE COMBINATIONS TO OPERATE		COOLING			HEATING		
		CAPACITY RATING (kW) (RANGE)	POWER CONSUMPTION (W)	AMPERE(A) 230V	CAPACITY RATING (kW) (RANGE)	POWER CONSUMPTION (W)	AMPERE(A) 230V
ONE UNIT	2.5	2.50 (1.00～2.80)	780 (360～980)	3.4	3.90 (1.10～4.70)	1100 (320～1,280)	4.8
	3.5	3.50 (1.00～3.90)	1160 (360～1,280)	5.1	4.80 (1.10～5.80)	1380 (320～1,750)	6.1
	4.0	4.00 (1.00～4.50)	1340 (360～1,480)	5.9	6.00 (1.10～6.80)	1770 (320～1,920)	7.8
	5.0	5.00 (1.00～5.60)	1910 (360～2,100)	8.4	6.70 (1.10～7.60)	2070 (320～2,170)	9.1
◇ TWO UNITS	2.5+2.5	2.50+2.50 (1.50～5.60)	1560 (640～1,720)	6.9	3.90+3.90 (1.50～8.60)	2290 (600～2,520)	10.1
	2.5+3.5	2.50+3.50 (1.50～6.60)	1990 (640～2,190)	8.7	3.90+4.80 (1.50～9.60)	2690 (600～2,960)	11.8
	2.5+4.0	2.50+4.00 (1.50～7.00)	2220 (640～2,440)	9.7	3.50+5.50 (1.50～9.90)	3200 (600～3,520)	14.1
	2.5+5.0	2.50+4.50 (1.50～7.60)	2580 (640～2,840)	11.3	3.00+6.00 (1.50～9.90)	3200 (600～3,520)	14.1
	3.5+3.5	3.50+3.50 (1.50～7.60)	2580 (640～2,840)	11.3	4.70+4.70 (1.50～10.30)	3200 (600～3,520)	14.1
	3.5+4.0	3.30+3.70 (1.50～7.60)	2580 (640～2,840)	11.3	4.50+4.90 (1.50～10.30)	3200 (600～3,520)	14.1
	3.5+5.0	2.90+4.10 (1.50～7.60)	2580 (640～2,840)	11.3	3.90+5.50 (1.50～10.30)	3200 (600～3,520)	14.1
	4.0+4.0	3.50+3.50 (1.50～7.60)	2580 (640～2,840)	11.3	4.70+4.70 (1.50～10.30)	3200 (600～3,520)	14.1
	4.0+5.0	3.10+3.90 (1.50～7.60)	2580 (640～2,840)	11.3	4.20+5.20 (1.50～10.30)	3200 (600～3,520)	14.1
◆ TWO UNITS	2.5+2.5	2.50+2.50 (1.50～5.50)	1660 (640～1830)	7.3	2.90+2.90 (1.50～6.40)	1580 (600～1,740)	6.9
	2.5+3.5	2.30+3.30 (1.50～6.20)	1860 (640～2,050)	8.2	2.60+3.60 (1.50～6.80)	1930 (600～2,120)	8.5
	2.5+4.0	2.20+3.40 (1.50～6.20)	1860 (640～2,050)	8.2	2.40+3.80 (1.50～6.80)	1930 (600～2,120)	8.5
	3.5+3.5	2.80+2.80 (1.50～6.20)	1860 (640～2,050)	8.2	3.10+3.10 (1.50～6.80)	1930 (600～2,120)	8.5

POSSIBLE COMBINATIONS TO OPERATE		COOLING			HEATING		
		CAPACITY RATING (kW) (RANGE)	POWER CONSUMPTION (W)	AMPERE(A) 230V	CAPACITY RATING (kW) (RANGE)	POWER CONSUMPTION (W)	AMPERE(A) 230V
THREE UNITS	2.5+2.5+2.5	2.33+2.33+2.33 (3.00～7.90)	2180 (650～3,180)	9.6	3.20+3.20+3.20 (3.00～10.60)	2480 (620～3,520)	10.9
	2.5+2.5+3.5	2.05+2.05+2.90 (3.00～7.90)	2180 (650～3,180)	9.6	2.80+2.80+4.00 (3.00～10.60)	2480 (620～3,520)	10.9
	2.5+2.5+4.0	1.95+1.95+3.10 (3.00～7.90)	2180 (650～3,180)	9.6	2.60+2.60+4.40 (3.00～10.60)	2480 (620～3,520)	10.9
	2.5+2.5+5.0	1.75+1.75+3.50 (3.00～7.90)	2180 (650～3,180)	9.6	2.35+2.35+4.90 (3.00～10.60)	2480 (620～3,520)	10.9
	2.5+3.5+3.5	1.80+2.60+2.60 (3.00～7.90)	2180 (650～3,180)	9.6	2.53+3.53+3.53 (3.00～10.60)	2480 (620～3,520)	10.9
	2.5+3.5+4.0	1.75+2.45+2.80 (3.00～7.90)	2180 (650～3,180)	9.6	2.40+3.40+3.80 (3.00～10.60)	2480 (620～3,520)	10.9
	2.5+3.5+5.0	1.60+2.20+3.20 (3.00～7.90)	2180 (650～3,180)	9.6	2.10+3.10+4.40 (3.00～10.60)	2480 (620～3,520)	10.9
	2.5+4.0+4.0	1.70+2.65+2.65 (3.00～7.90)	2180 (650～3,180)	9.6	2.20+3.70+3.70 (3.00～10.60)	2480 (620～3,520)	10.9
	3.5+3.5+3.5	2.33+2.33+2.33 (3.00～7.90)	2180 (650～3,180)	9.6	3.20+3.20+3.20 (3.00～10.60)	2480 (620～3,520)	10.9
	3.5+3.5+4.0	2.20+2.20+2.60 (3.00～7.90)	2180 (650～3,180)	9.6	3.10+3.10+3.40 (3.00～10.60)	2480 (620～3,520)	10.9

◇ Two units Each unit is connected to each compressor.
◆ Two units Two unit are connected to one compressor.

RATING CONDITION (DRY BULB / WET BULB)

	INDOOR	OUTDOOR
COOLING	27 / 19 ℃	35 / — ℃
HEATING	20 / — ℃	7 / 6 ℃

TRIPLE SYSTEM MULTI R.A.C *RAM-70QH4*
INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

Two or three indoor units can be installed with one outdoor unit, while htree is desirable.
And total nominal cooloing capacity should not be more than 11.0kW.

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
RAD-25QH4	2.5	1.00～2.80	1.10～4.70	11～17	15～18
RAF-25NH4	2.5	1.00～2.80	1.10～4.70	11～17	15～18
RAD-40QH4	4.0	1.00～4.50	1.10～6.80	18～28	22～27
RAF-50NH4	5.0	1.00～5.60	1.10～7.60	23～34	24～30

POSSIBLE COMBINATIONS TO INSTALL		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	(12～15)+(14～18)	2.5	---	3.5
	2.5+4.0	(11～14)+(16～20)	2.5	---	4.0
	2.5+5.0	(11～14)+(18～22)	2.5	---	☆ 5.0
	3.5+3.5	(14～18)+(14～18)	3.5	---	3.5
	3.5+4.0	(13～17)+(16～20)	3.5	---	4.0
	3.5+5.0	(13～16)+(18～22)	3.5	---	☆ 5.0
	4.0+4.0	(16～20)+(16～20)	---	4.0	4.0
	4.0+5.0	(16～20)+(18～22)	---	4.0	☆ 5.0
	2.5+2.5	(12～15)+(12～15)	2.5	2.5	---
	2.5+3.5	(12～15)+(14～18)	2.5	3.5	---
	2.5+4.0	(11～14)+(16～20)	2.5	4.0	---
	3.5+3.5	(14～18)+(14～18)	3.5	3.5	---

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

POSSIBLE COMBINATIONS TO INSTALL		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
THREE UNITS	2.5+2.5+2.5	(10～13)+(10～13)+(10～13)	2.5	2.5	2.5
	2.5+2.5+3.5	(10～13)+(10～13)+(12～15)	2.5	2.5	3.5
	2.5+2.5+4.0	(9～11)+(9～11)+(16～20)	2.5	2.5	4.0
	2.5+2.5+5.0	(9～11)+(9～11)+(18～22)	2.5	2.5	☆ 5.0
	2.5+3.5+3.5	(10～13)+(13～16)+(13～16)	2.5	3.5	3.5
	2.5+3.5+4.0	(9～11)+(11～14)+(16～20)	2.5	3.5	4.0
	2.5+3.5+5.0	(9～11)+(11～14)+(18～22)	2.5	3.5	☆ 5.0
	2.5+4.0+4.0	(9～11)+(14～17)+(14～17)	2.5	4.0	4.0
	3.5+3.5+3.5	(13～16)+(13～16)+(13～16)	3.5	3.5	3.5
	3.5+3.5+4.0	(12～15)+(12～15)+(13～17)	3.5	3.5	4.0

(1) Marking ☆:needs flare adapter(9.52D→12.7D):Part No.HFD43D-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 construction which means well thermally sealed.

QUADRUPLE SYSTEM MULTI R.A.C. *MULTIZONE 80H*
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.

MODEL : RAM—80QH4

POSSIBLE COMBINATIONS TO OPERATE		COOLING			HEATING		
		CAPACITY RATING (kW) (RANGE)	POWER CONSUMPTION (W)	AMPERE(A) 230V	CAPACITY RATING (kW) (RANGE)	POWER CONSUMPTION (W)	AMPERE(A) 230V
ONE UNIT	2.5	2.50 (1.00～2.80)	780 (360～980)	3.4	3.90 (1.10～4.70)	1100 (320～1,280)	4.8
	3.5	3.50 (1.00～3.90)	1160 (360～1,280)	5.1	4.80 (1.10～5.80)	1380 (320～1,750)	6.1
	4.0	4.00 (1.00～4.50)	1340 (360～1,480)	5.9	6.00 (1.10～6.80)	1770 (320～1,920)	7.8
	5.0	5.00 (1.00～5.60)	1910 (360～2,100)	8.4	6.70 (1.10～7.60)	2070 (320～2,170)	9.1
◇ TWO UNITS	2.5+2.5	2.50+2.50 (1.50～5.60)	1560 (640～1,720)	6.9	3.90+3.90 (1.50～8.60)	2290 (600～2,520)	10.1
	2.5+3.5	2.50+3.50 (1.50～6.60)	1990 (640～2,190)	8.7	3.90+4.80 (1.50～9.60)	2690 (600～2,960)	11.8
	2.5+4.0	2.50+4.00 (1.50～7.00)	2220 (640～2,440)	9.7	3.50+5.50 (1.50～9.90)	3200 (600～3,520)	14.1
	2.5+5.0	2.50+4.50 (1.50～7.60)	2580 (640～2,840)	11.3	3.00+6.00 (1.50～9.90)	3200 (600～3,520)	14.1
	3.5+3.5	3.50+3.50 (1.50～7.60)	2580 (640～2,840)	11.3	4.70+4.70 (1.50～10.30)	3200 (600～3,520)	14.1
	3.5+4.0	3.50+4.00 (1.50～8.00)	2720 (640～2,990)	11.9	4.50+4.90 (1.50～10.30)	3200 (600～3,520)	14.1
	3.5+5.0	3.10+4.40 (1.50～8.00)	2720 (640～2,990)	11.9	4.00+5.60 (1.50～10.60)	3300 (600～3,630)	14.5
	4.0+4.0	4.00+4.00 (1.50～8.20)	2760 (640～3,040)	12.1	4.80+4.80 (1.50～10.60)	3300 (600～3,630)	14.5
	4.0+5.0	3.60+4.40 (1.50～8.20)	2760 (640～3,040)	12.1	4.30+5.30 (1.50～10.60)	3300 (600～3,630)	14.5
	5.0+5.0	4.00+4.00 (1.50～8.20)	2760 (640～3,040)	12.1	4.80+4.80 (1.50～10.60)	3300 (600～3,630)	14.5
◆ TWO UNITS	2.5+2.5	2.50+2.50 (1.50～5.50)	1660 (640～1830)	7.3	2.90+2.90 (1.50～6.40)	1580 (600～1,740)	6.9
	2.5+3.5	2.30+3.30 (1.50～6.20)	1860 (640～2,050)	8.2	2.60+3.60 (1.50～6.80)	1930 (600～2,120)	8.5
	2.5+4.0	2.20+3.40 (1.50～6.20)	1860 (640～2,050)	8.2	2.40+3.80 (1.50～6.80)	1930 (600～2,120)	8.5
	3.5+3.5	2.80+2.80 (1.50～6.20)	1860 (640～2,050)	8.2	3.10+3.10 (1.50～6.80)	1930 (600～2,120)	8.5

POSSIBLE COMBINATIONS TO OPERATE		COOLING			HEATING		
		CAPACITY RATING (kW) (RANGE)	POWER CONSUMPTION (W)	AMPERE(A) 230V	CAPACITY RATING (kW) (RANGE)	POWER CONSUMPTION (W)	AMPERE(A) 230V
THREE UNITS	2.5+2.5+2.5	2.50+2.50+2.50 (3.00~8.20)	2420 (650~3,000)	10.6	3.40+3.40+3.40 (3.00~11.20)	2530 (620~3,630)	11.1
	2.5+2.5+3.5	2.30+2.30+3.40 (3.00~8.50)	2580 (650~3,200)	11.3	3.00+3.00+4.20 (3.00~11.20)	2530 (620~3,630)	11.1
	2.5+2.5+4.0	2.20+2.20+3.60 (3.00~8.50)	2580 (650~3,200)	11.3	2.80+2.80+4.60 (3.00~11.20)	2530 (620~3,630)	11.1
	2.5+2.5+5.0	2.00+2.00+4.00 (3.00~8.50)	2580 (650~3,200)	11.3	2.60+2.60+5.00 (3.00~11.20)	2530 (620~3,630)	11.1
	2.5+3.5+3.5	2.00+3.00+3.00 (3.00~8.50)	2580 (650~3,200)	11.3	2.60+3.80+3.80 (3.00~11.20)	2530 (620~3,630)	11.1
	2.5+3.5+4.0	2.00+2.90+3.10 (3.00~8.50)	2580 (650~3,200)	11.3	2.60+3.60+4.00 (3.00~11.20)	2530 (620~3,630)	11.1
	2.5+3.5+5.0	1.80+2.60+3.60 (3.00~8.50)	2580 (650~3,200)	11.3	2.30+3.30+4.60 (3.00~11.20)	2530 (620~3,630)	11.1
	2.5+4.0+4.0	2.00+3.00+3.00 (3.00~8.50)	2580 (650~3,200)	11.3	2.40+3.90+3.90 (3.00~11.20)	2530 (620~3,630)	11.1
	2.5+4.0+5.0	1.70+2.80+3.50 (3.00~8.50)	2580 (650~3,200)	11.3	2.30+3.50+4.40 (3.00~11.20)	2530 (620~3,630)	11.1
	3.5+3.5+3.5	2.66+2.66++2.66 (3.00~8.50)	2580 (650~3,200)	11.3	3.40+3.40+3.40 (3.00~11.20)	2530 (620~3,630)	11.1
	3.5+3.5+4.0	2.60+2.60+2.80 (3.00~8.50)	2580 (650~3,200)	11.3	3.20+3.20+3.80 (3.00~11.20)	2530 (620~3,630)	11.1
	3.5+3.5+5.0	2.40+2.40+3.20 (3.00~8.50)	2580 (650~3,200)	11.3	3.00+3.00+4.20 (3.00~11.20)	2530 (620~3,630)	11.1
	3.5+4.0+4.0	2.40+2.80+2.80 (3.00~8.50)	2580 (650~3,200)	11.3	3.20+3.50+3.50 (3.00~11.20)	2530 (620~3,630)	11.1
FOUR UNITS	2.5+2.5+2.5+2.5	2.00+2.00+2.00+2.00 (3.00~9.20)	2650 (650~3,200)	11.6	2.75+2.75+2.75+2.75 (3.00~12.40)	2630 (620~3,630)	11.6
	2.5+2.5+2.5+3.5	1.85+1.85+1.85+2.45 (3.00~9.20)	2650 (650~3,200)	11.6	2.50+2.50+2.50+3.50 (3.00~12.40)	2630 (620~3,630)	11.6
	2.5+2.5+2.5+4.0	1.80+1.80+1.80+2.60 (3.00~9.20)	2650 (650~3,200)	11.6	2.40+2.40+2.40+3.80 (3.00~12.40)	2630 (620~3,630)	11.6
	2.5+2.5+3.5+3.5	1.70+1.70+2.30+2.30 (3.00~9.20)	2650 (650~3,200)	11.6	2.30+2.30+3.20+3.20 (3.00~12.40)	2630 (620~3,630)	11.6

◇ Two units — Each unit is connected to each compressor.
◆ Two units — Two unit are connected to one compressor.

RATING CONDITION (DRY BULB / WET BULB)

	INDOOR	OUTDOOR
COOLING	27 / 19 ℃	35 / — ℃
HEATING	20 / — ℃	7 / 6 ℃

QUADRUPLE SYSTEM MULTI R.A.C *RAM-80QH4*
INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

Two,three or four indoor units can be installed with one outdoor unit, while htree or four is desirable.
And total nominal cooloing capacity should not be more than 12.0kW.

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
RAD-25QH4	2.5	1.00～2.80	1.10～4.70	11～17	15～18
RAF-25NH4	2.5	1.00～2.80	1.10～4.70	11～17	15～18
RAD-40QH4	4.0	1.00～4.50	1.10～6.80	18～28	22～27
RAF-50NH4	5.0	1.00～5.60	1.10～7.60	23～34	24～30

POSSIBLE COMBINATIONS TO INSTALL		SUITABLE ROOM SIZE TO INSTALL (m^2)	CONNECTING POSITION ON OUTDOOR UNIT (VALVE DIAMETER) (mm)			
			NO.1	NO.2	NO.3	NO.4
			6.35/9.52D	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	(12～15)+(14～18)	2.5	---	3.5	---
	2.5+4.0	(11～14)+(16～20)	2.5	---	---	4.0
	2.5+5.0	(11～14)+(18～22)	2.5	---	---	☆ 5.0
	3.5+3.5	(14～18)+(14～18)	3.5	---	3.5	---
	3.5+4.0	(13～17)+(16～20)	3.5	---	---	4.0
	3.5+5.0	(13～16)+(18～22)	3.5	---	---	☆ 5.0
	4.0+4.0	(16～20)+(16～20)	---	4.0	---	4.0
	4.0+5.0	(16～20)+(18～22)	---	4.0	---	☆ 5.0
	2.5+2.5	(12～15)+(12～15)	2.5	2.5	---	---
	2.5+3.5	(12～15)+(14～18)	2.5	3.5	---	---
	2.5+4.0	(11～14)+(16～20)	2.5	4.0	---	---
	3.5+3.5	(14～18)+(14～18)	3.5	3.5	---	---

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

POSSIBLE COMBINATIONS TO INSTALL		SUITABLE ROOM SIZE TO INSTALL (m^2)	CONNECTING POSITION ON OUTDOOR UNIT (VALVE DIAMETER) (mm)			
			NO.1	NO.2	NO.3	NO.4
			6.35/9.52D	6.35/9.52D	6.35/9.52D	6.35/9.52D
THREE UNITS	2.5+2.5+2.5	(10～13)+(10～13)+(10～13)	2.5	2.5	2.5	---
	2.5+2.5+3.5	(10～13)+(10～13)+(12～15)	2.5	2.5	3.5	---
	2.5+2.5+4.0	(9～11)+(9～11)+(16～20)	2.5	2.5	---	4.0
	2.5+2.5+5.0	(9～11)+(9～11)+(18～22)	2.5	2.5	---	☆ 5.0
	2.5+3.5+3.5	(10～13)+(13～16)+(13～16)	2.5	3.5	3.5	---
	2.5+3.5+4.0	(9～11)+(11～14)+(16～20)	2.5	3.5	---	4.0
	2.5+3.5+5.0	(9～11)+(11～14)+(18～22)	2.5	3.5	---	☆ 5.0
	2.5+4.0+4.0	(9～11)+(14～17)+(14～17)	2.5	4.0	---	4.0
	2.5+4.0+5.0	(9～11)+(14～17)+(18～22)				
	3.5+3.5+3.5	(13～16)+(13～16)+(13～16)	3.5	3.5	3.5	---
	3.5+3.5+4.0	(12～15)+(12～15)+(13～17)				
	3.5+3.5+5.0	(12～16)+(12～16)+(12～16)				
	3.5+3.5+4.0	(12～15)+(12～15)+(13～17)	3.5	3.5	---	4.0

POSSIBLE COMBINATIONS TO INSTALL		SUITABLE ROOM SIZE TO INSTALL (m^2)	CONNECTING POSITION ON OUTDOOR UNIT (VALVE DIAMETER) (mm)			
			NO.1	NO.2	NO.3	NO.4
			6.35/9.52D	6.35/9.52D	6.35/9.52D	6.35/9.52D
FOUR UNITS	2.5+2.5 +2.5+2.5	(9～11)+(9～11) +(9～11)+(9～11)	2.5	2.5	2.5	2.5
	2.5+2.5 +2.5+3.5	(9～11)+(9～11) +(9～11)+(10～13)	2.5	2.5	2.5	3.5
	2.5+2.5 +2.5+4.0	(9～11)+(9～11) +(9～11)+(11～14)	2.5	2.5	2.5	4.0
	2.5+2.5 +3.5+3.5	(9～11)+(9～11) +(10～13)+(10～13)	2.5	2.5	3.5	3.5

(1) Marking ☆:needs flare adapter(9.52D→12.7D):Part No.HFD43D-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 construction which means well thermally sealed.

FEATURES

1. NEW REFRIGERANT

(1) New refrigerant R410A with no harmful effect on the ozone layer

Refrigerant R410A, which does not damage the ozone layer, was adopted instead of HCFC-22 which is planned to be phased out globally by 2020.

(2) New refrigerating oil

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

NEW TECHNOLOGY

Cautions in relation to HFC (R410A)

1. Safety during Servicing

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

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

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

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

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

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

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

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

2. Refrigerant Piping Materials

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

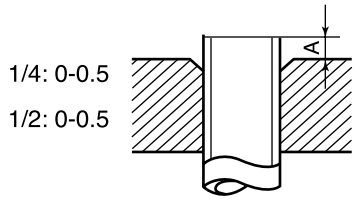
※Do not use thin pipes (thinner than 0.7 mm).

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

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

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

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



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

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

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

3. Servicing Tools

〈Changes in the Product and Components〉

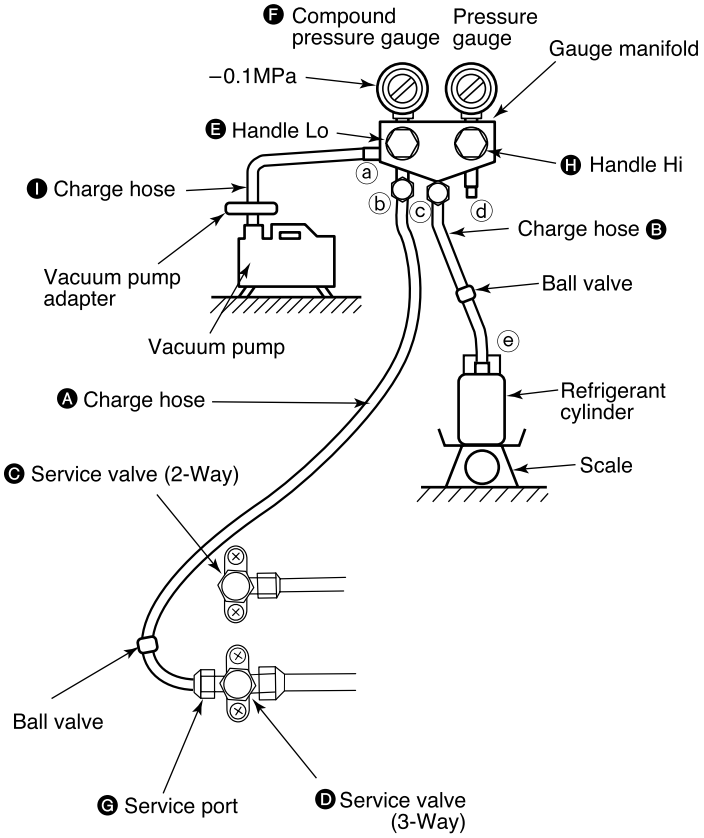
- In order to prevent any other refirigerant from being charged, R410A model is provided with the outdoor unit whose control valve has a different service port diameter (port size: 7/16 UNF 20 threads per inch → 1/2 UNF 20 threads per inch).
- In order to secure larger pressure resisting strength, flare expansion pipe dimensions and flare nut dimensions have been changed.

〈New Tools for R410A〉

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

- Incidentally, the "refrigerant cylinder" comes with the refrigerant designation (R410A) and protector coating in the U.S.'s ARI specified rose color (ARI color code: PMS 507).
- Also, the "charge port and packing for refrigerant cylinder" require 1/2 UNF 20 threads per inch corresponding to the charge hose's port size.

4. Servicing work (Rerfigerant recharging)



⚠ CAUTION

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

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

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

Working steps

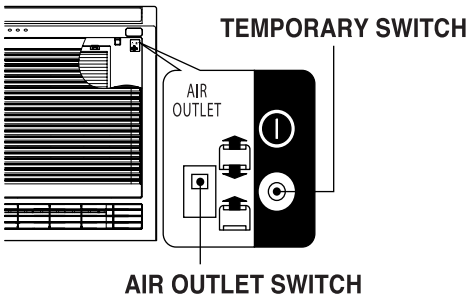
1. Connect the charge hose Ⓐ to outdoor unit.
2. Connect the vacuum pump adapter to the vacuum pump. Connect the 1/2" conversion adapter to the vacuum pump adapter. Connect the charge hose Ⓘ to the conversion adapter.
   Then, service valve Ⓒ & Ⓓ is closed.
3. Connect the charge hose Ⓑ to the refrigerant cylinder.
4. Open the handle Lo Ⓔ.
   Turn ON the power switch of the vacuum pump & adapter.
   ↕ Run the vacuum pump in specified time.
5. When the compound pressure gauge's pointer has indicated -0.1MPa, place the handle Lo Ⓔ in the fully closed position.
   Turn OFF the power switch of the vacuum pump & adapter.
6. Remove the charge hose Ⓘ of vacuum pump at portion ⓐ.
7. Air purge of gauge manifold.
   • Open the refrigerant cylinder's valve and push the valve core at portion ⓐ of gauge manifold. Then the refrigerant is discharge in a moment.
8. Calculation of charged refrigerant amount.
9. Charging of refrigeration.
   • Open the handle Lo Ⓔ in a turn and charge the designated amount.
10. Completion of charging.
11. Be closed the valve of charge hose Ⓐ.
12. Run the compressor at cooling operation.
13. Remove the charge hose Ⓐ & Ⓑ.
    • Remove the charge hose Ⓐ rom portion Ⓖ.
    • Remove the charge hose Ⓑ from portion ⓔ.
14. Attach the caps.
15. Gas leakage check.

MODEL RAF-25NH4, RAF-50NH4

1. Top and Bottom Air Blow System
   During heating, this air conditioner blows warm air from the bottom as well as from the top outlet as in previous models.
   When the fan speed is set to "HI" or "AUTO" for cooling, the air conditioner blows cool air from both top and bottom, which allows rapid cooling. (This top / bottom cool air blow is possible for up to 25 minutes with the fan speed set to AUTO or HI. When the set room temperature is reached, the unit automatically switches to top blow only.)

(1) AIR OUTLET SWITCH

AIR OUTLET SWITCH IS SET TO



COOLING OPERATION

- If cooling is started at an AUTO or HI fan speed setting, and if a considerable difference is present between the room temperature and preset temperature, the damper inside of the bottom air outlet will automatically open to allow cold air to also be directed out of the bottom side air outlet.
  When the room temperature reaches the preset temperature or after approximately 30 minutes have elapsed from starting operation, cold air will automatically be directed only from the top side air outlet.
- When it is desirable to direct cold air from the bottom side air outlet for a longer period of time, set the temperature at 16°C and fan speed at HIGH. When the room temperature is more than 8°C above the preset temperature (16°C), cold air will continuously blow from the bottom side air outlet.

HEATING OPERATION

- As operation starts, warm air is automatically discharged from top and bottom side air outlets.
- When the room temperature reaches the preset temperature, air is directed only from top side air outlet at the LOW fan speed.

DEHUMIDIFYING OPERATION

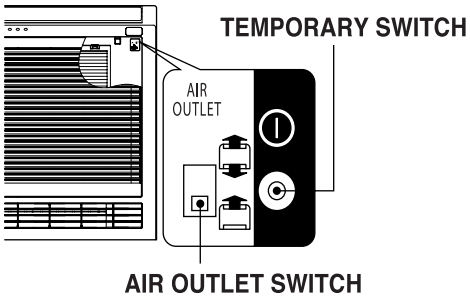
- For more efficient dehumidifying, the bottom side air outlet will remain closed.

FAN OPERATION

- Air blows out only from top side air outlet.

AIR OUTLET SWITCH IS SET TO

- Air blows out only from top side air outlet in both heating and cooling operation.
- Air can be blown only from top side air outlet, to prevent blowing air striking your face during sleep, etc.
- If air blows out only from the top side air outlet, it takes more time to reach the set temperature when compared to air blowing from both top and bottom side air outlets. Also, temperature distribution within the room may be adversely affected. It is therefore recommended to use both top and bottom side air outlets whenever possible.



(2) Damper state in each operation mode

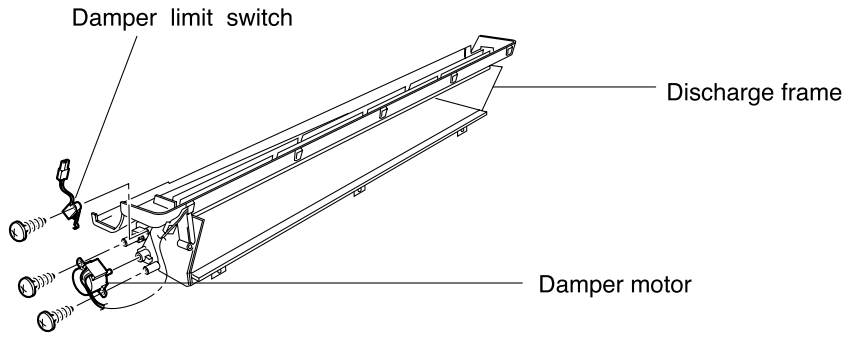
● If the Air outlet switch is set to , the damper at the bottom air outlet and air flow from the bottom will be as follows according to the settings of the operation switch and fan speed select buttons:

Operation	Fan speed	Damper and bottom blow-out states	When the set room temperature is reached
Cooling	AUTO	Damper opens for 25 minutes maximum and air blows from bottom. (But room temperature is more than 10˚C higher than the set temperature.)	Damper closes and no air blows from bottom.
	HI	Damper opens for 25 minutes maximum and air blows from bottom. (But room temperature is more than 9˚C higher than the set temperature.) However, if the temperature and fan speed are set to "16ºC" and "HI" respectively, air continuously blows out from the bottom while the room temperature is more than 8ºC higher than the preset temperature "16ºC".	Damper closes and no air blows from bottom.
	MED or LOW	Damper stays closed and no air blows from bottom.	——
Heating	Each speed including AUTO	Damper opens and air also blows from bottom.	Damper closes and air blows from top in ultra-low fan speed mode.
Sensor dry	Each speed including AUTO	Damper stays closed and no air blows from bottom.	The upper fan also stops.
Fan	Each speed including AUTO	Damper stays closed and no air blows from bottom.	——
Preheating / Defrosting	Each speed including AUTO	When the HOT KEEP lamp is lit, the damper closes and no air blows from bottom.	——

●The ratio of air discharge volume is: Upper: About 60% and Lower: About 40%.

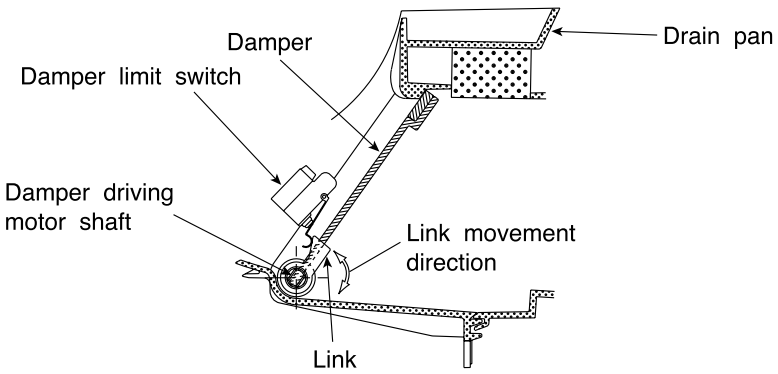
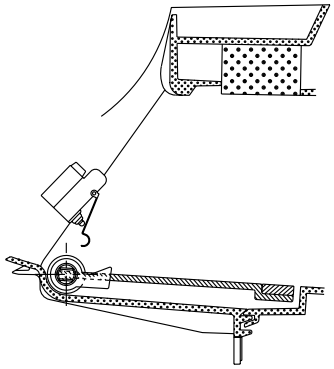
2. Damper Mechanism

(1) Disassembly diagram of damper mechanism



(2) Damper operation theory

The damper and the link connected to the damper moves at the same time by turning the motor.

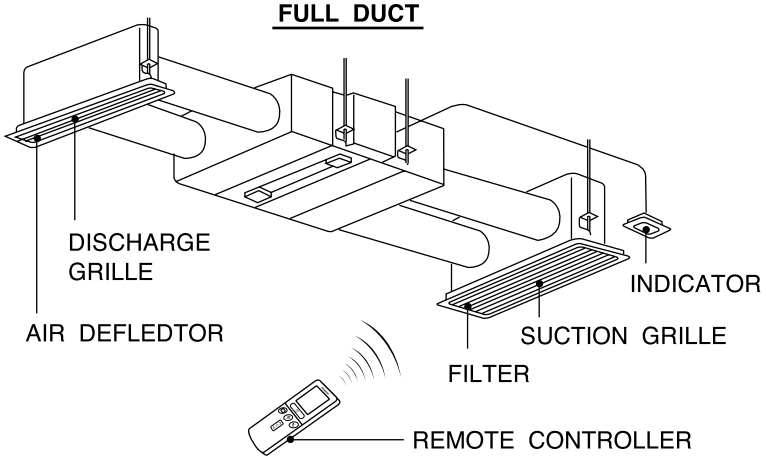
Damper closed state		Damper limit switch is set to ON.
Damper open state		Damper limit switch is set to OFF.

MODEL RAD-25QH4, RAD-40QH4

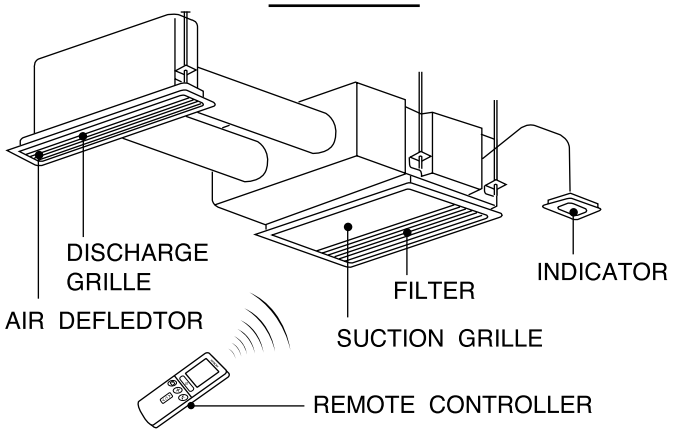
1. The indoor unit includes a built-in drain pump, and draning is performed from the upper part of the indoor unit.

2. Installation can be selected from three thpes of duct conditions.

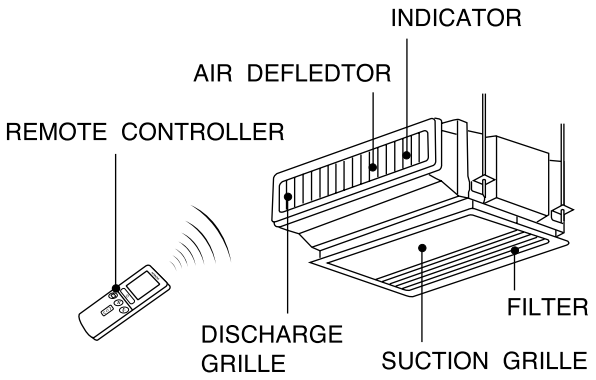
FULL DUCT



SEMI DUCT



NON DUCT



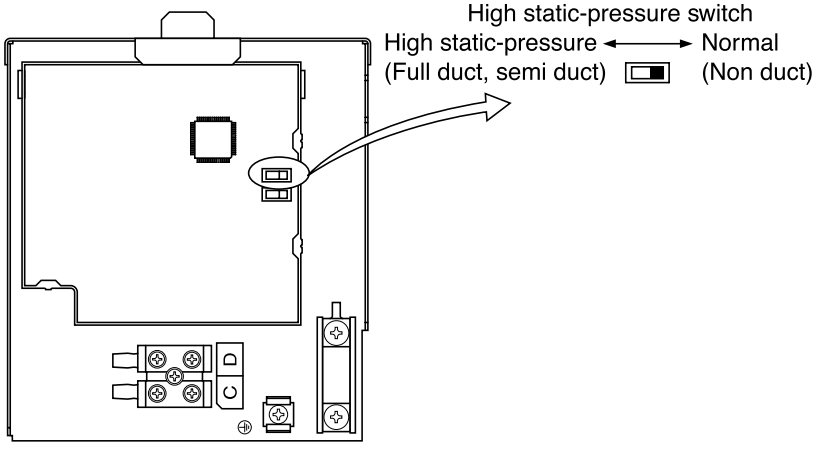
3. Set the switch according to the installation condition.

•Setting of switches

(1) High static-pressure switch

(Full duct type and semi duct type)

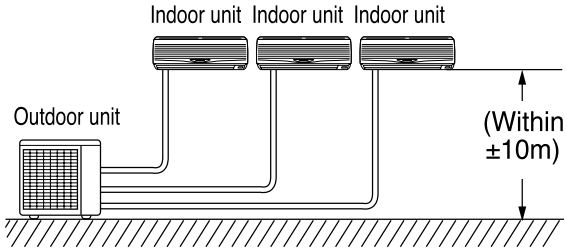
- For full duct type and semi duct type, set the high static-pressure switch to HIGH STATIC-PRESSURE.
- If not set to HIGH STATIC-PRESSURE, there will be reduction of cooling and heating capacities.



Height difference

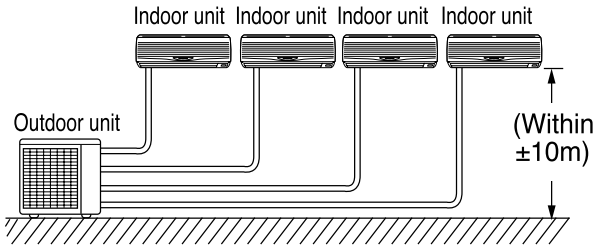
RAM-70QH4

Height difference between indoor units should be not more than 5m.



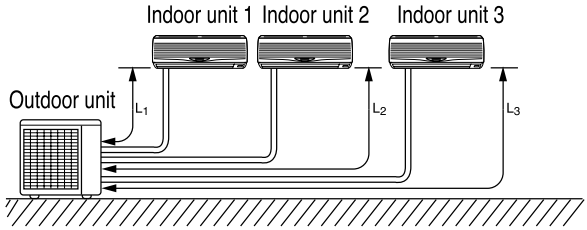
RAM-80QH4

Height difference between indoor units should be not more than 5m.



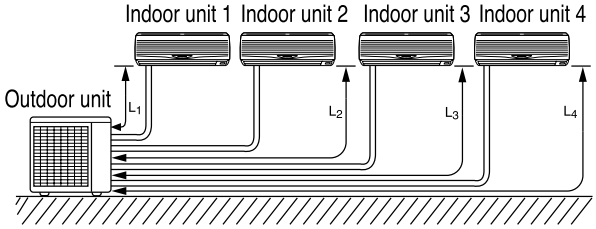
Piping length

RAM-70QH4



$L_1 + L_2 + L_3$ = Maximum 60m
(However, $L_1 + L_2$ = Maximum 35m)
Maximum piping length for one indoor unit is 25m.
* Additional charge of refrigerant is not required.

RAM-80QH4



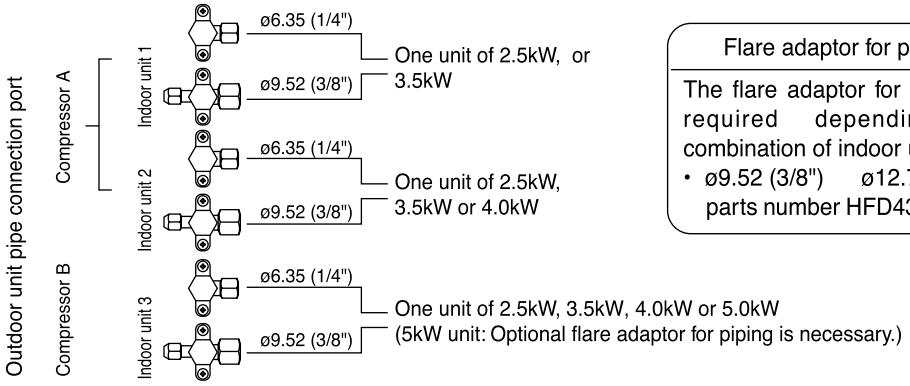
$(L_1 + L_2) = (L_3 + L_4)$ = Maximum 35m
Maximum piping length for one indoor unit is 25m.
* Additional charge of refrigerant is not required.

[Outdoor unit installation]

• The pipe connection ports of the outdoor unit and connectable indoor units are shown below. (Connection of the compressors is as shown below.)

RAM-70QH4

• To the outdoor unit, up to three indoor units can be connected until the total value of each unit's capacity from 5.0kW to 11.0kW.



Flare adaptor for piping

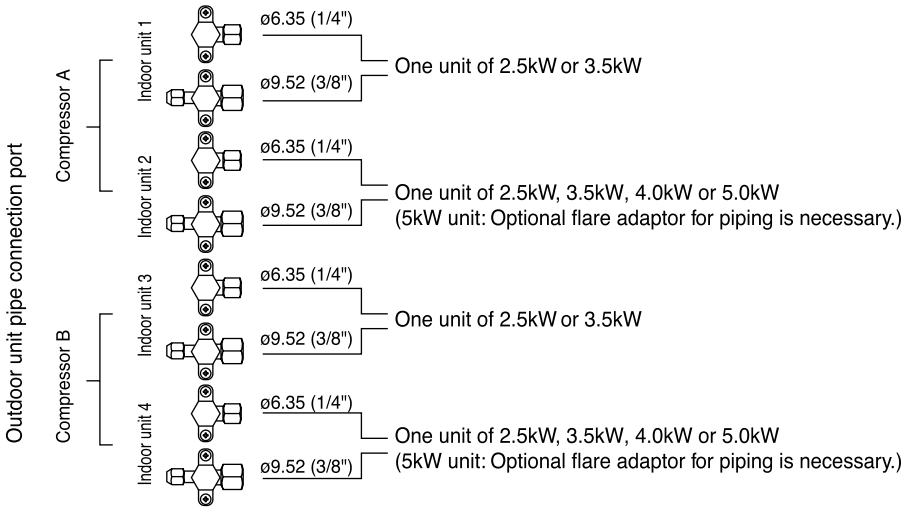
The flare adaptor for piping is required depending on combination of indoor units.

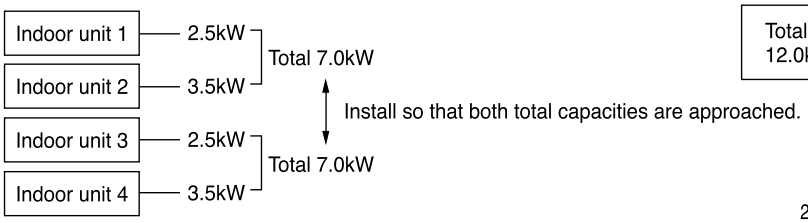
• ø9.52 (3/8") ø12.7 (1/2") parts number HFD43D-4 001

RAM-80QH4

• To the outdoor unit, up to four indoor units can be connected until the total value of each unit's capacity reaches 12.0kW. However, install indoor units so that total capacity of Indoor unit 1 and Indoor unit 2 and total capacity of Indoor unit 3 and Indoor unit 4 are approached. For example, when two 2.5kW units and two 3.5kW units are to be connected, connect as shown below.

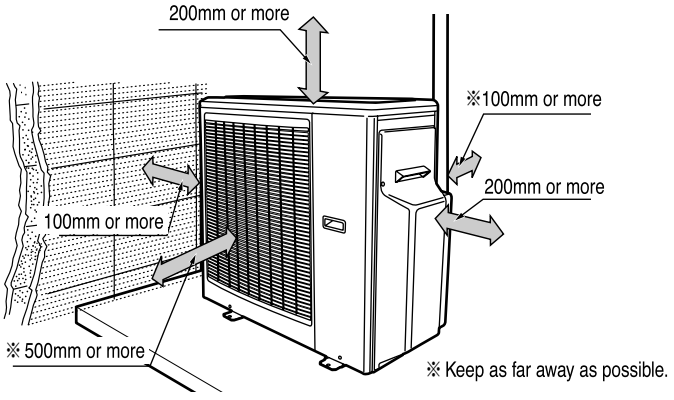
• Connect 3 or more indoor units. If only two units are to be connected, connect them as Indoor unit 1 and Indoor unit 2 or Indoor unit 3 and Indoor unit 4. However, when two 3.5kW units are connected or when one 2.5kW unit and one 4kW unit are connected, capacity may be less than indicated capacity.





Total capacity of 4 units: 12.0kW or less

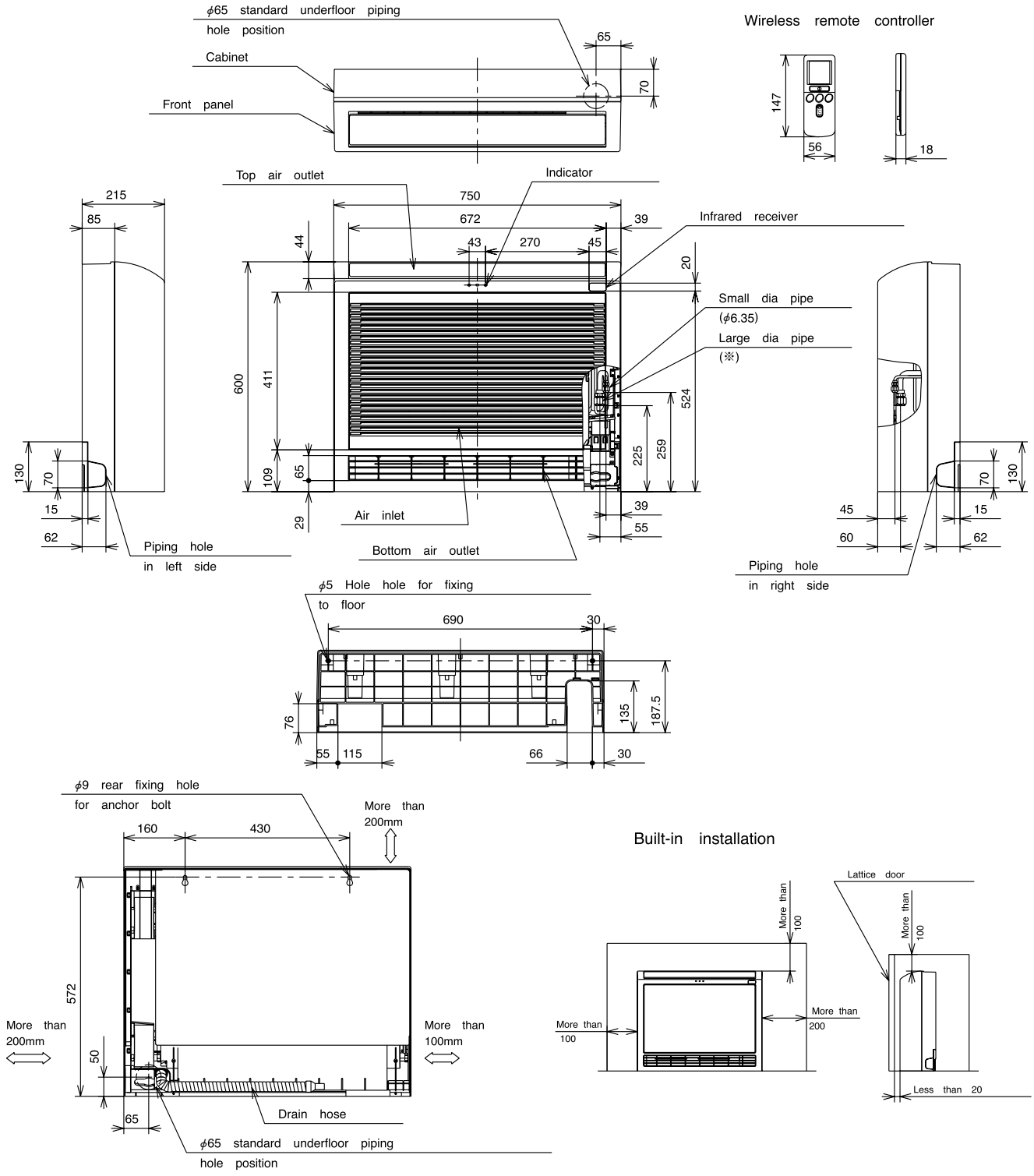
• Remove electric box cover and three cord bands. Then, remove side panel and front panel in sequence. (If side panel cannot be removed at this time, remove top cover.)



CONSTRUCTION AND DIMENSIONAL DIAGRAM

MODEL RAF-25NH4, RAF-50NH4

Unit: mm

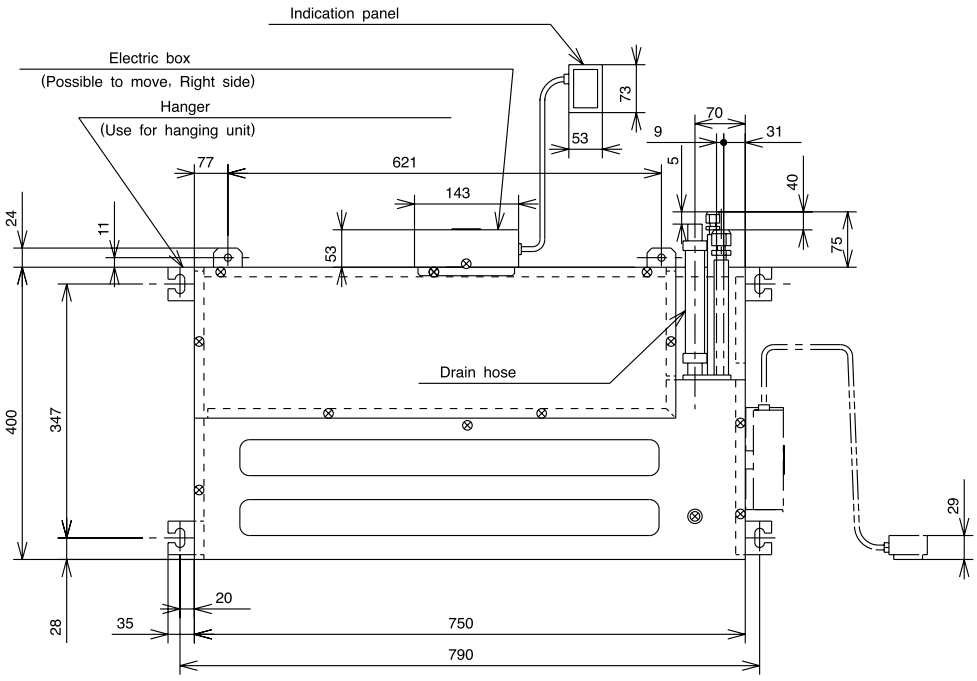


Cautions:

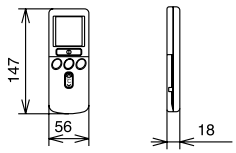
1. Use insulated pipes for both large and small diameters.
2. Make sure the difference in heights between the indoor and outdoor units is 10m.
3. For built-in installation, make sure that the infrared receiver and indicator are not blocked.
4. Pipes can be laid out from the right, bottom or rear, when the unit is viewed from front.
5. Keep the clearance shown by ⟺ for installation.
6. For built-in installation, keep the vertical deflector at the top air outlet as flat as possible.
   If it is inclined too much,heat will be trapped in the unit, which could cause faulty room temperature.
7. An connection cable 1.6mm or 2.0mm dia.×2 (control side) is used for the connection cable.

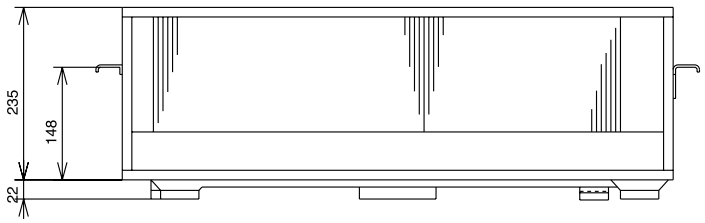
※ RAF-25NH4→φ9.52, RAF-50NH4→φ12.7

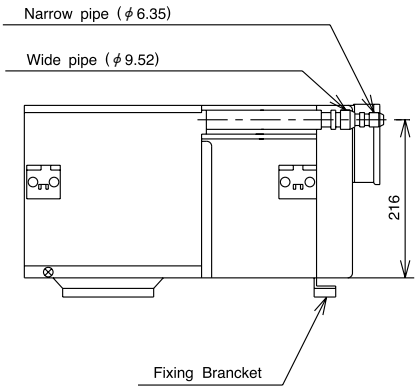
Unit : mm



Wireless remote controller





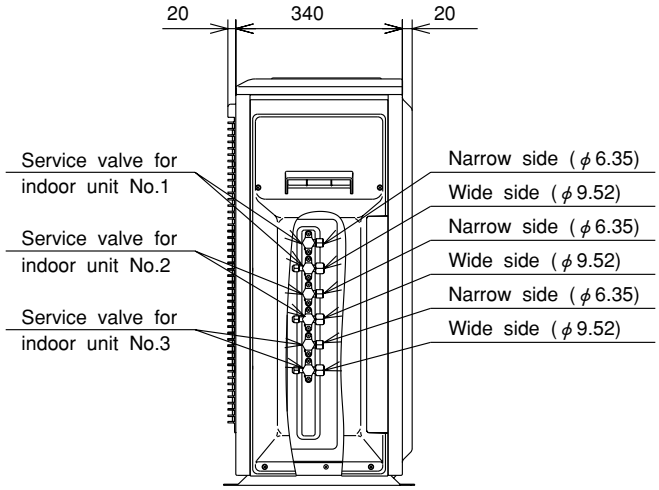


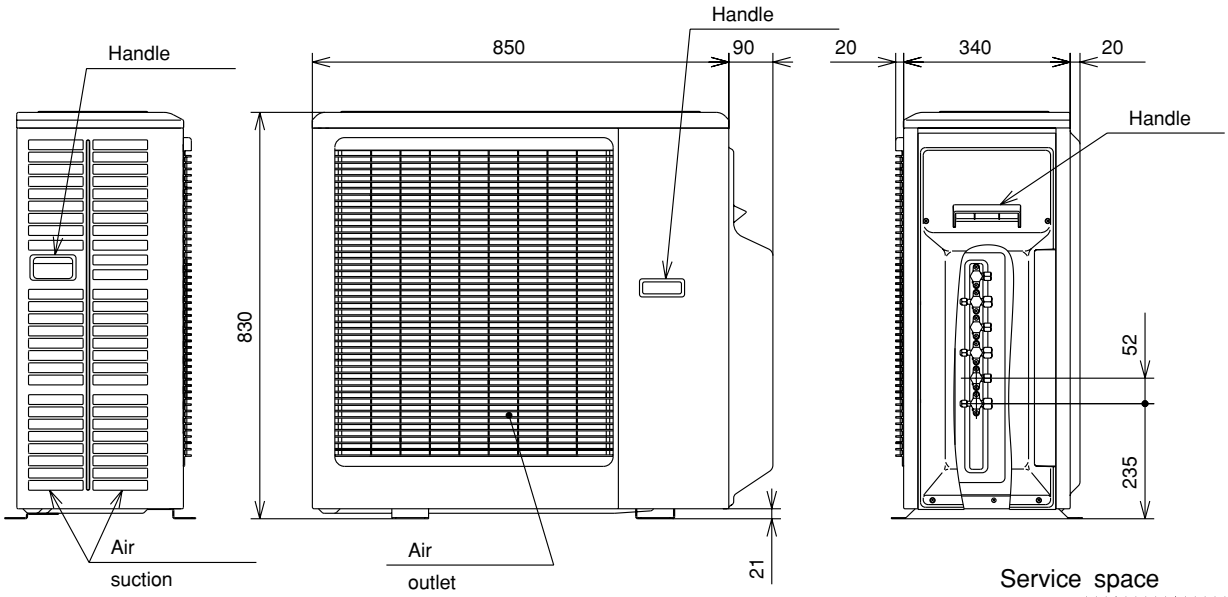
Cautions:

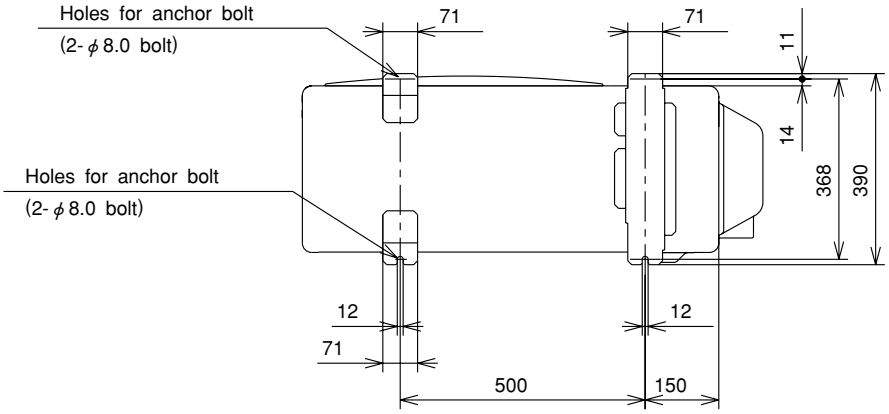
1. Use insulated pipes for both large and small diameters.
2. An connection cable.

MODEL RAM-70QH4

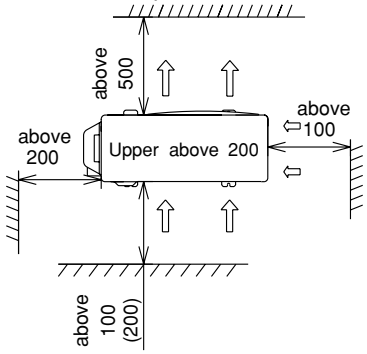
Unit: mm







Service space



In case of instaling enclosed receiver tank, backside space should be above 200.

Note:

1. The way to connect piping sets is flare type coupling.
2. Insulated pipes should be used for both the narrow and wide dia. pipes.

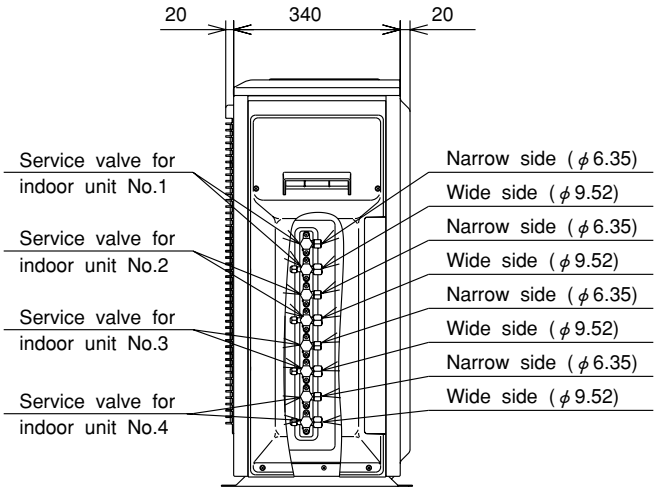
ATTENTION

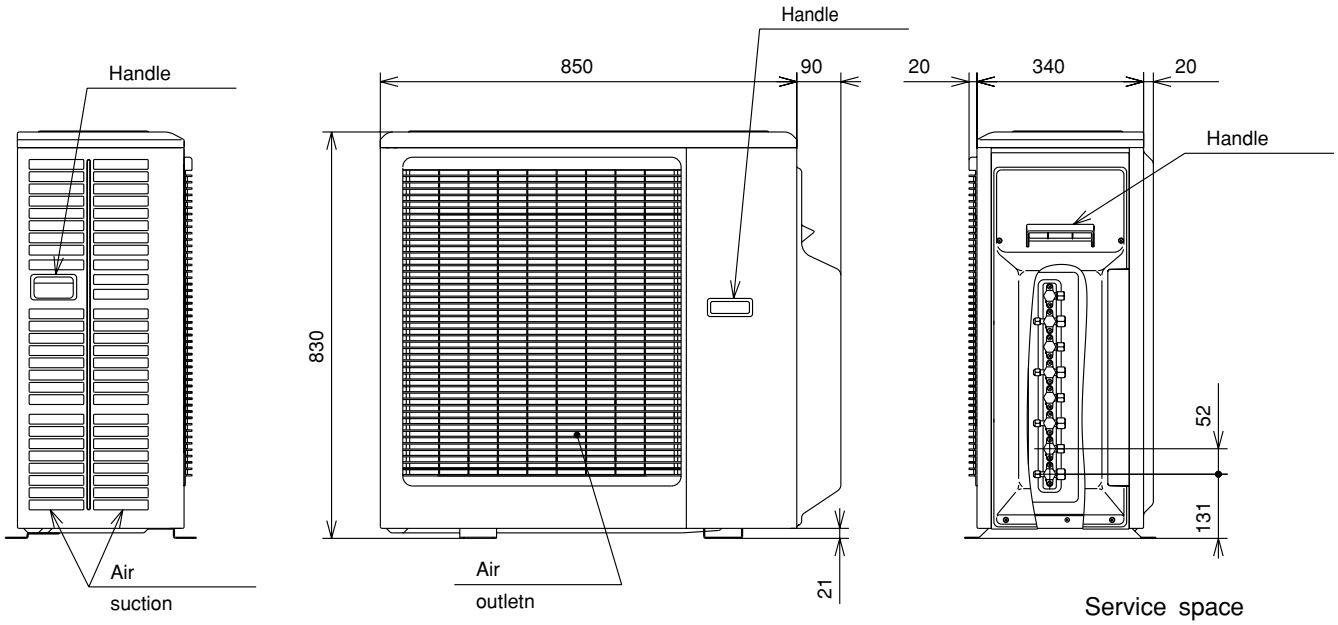
During service, before opening the side panel, please switch off power supply and disconnenct power cord and connecting cord.

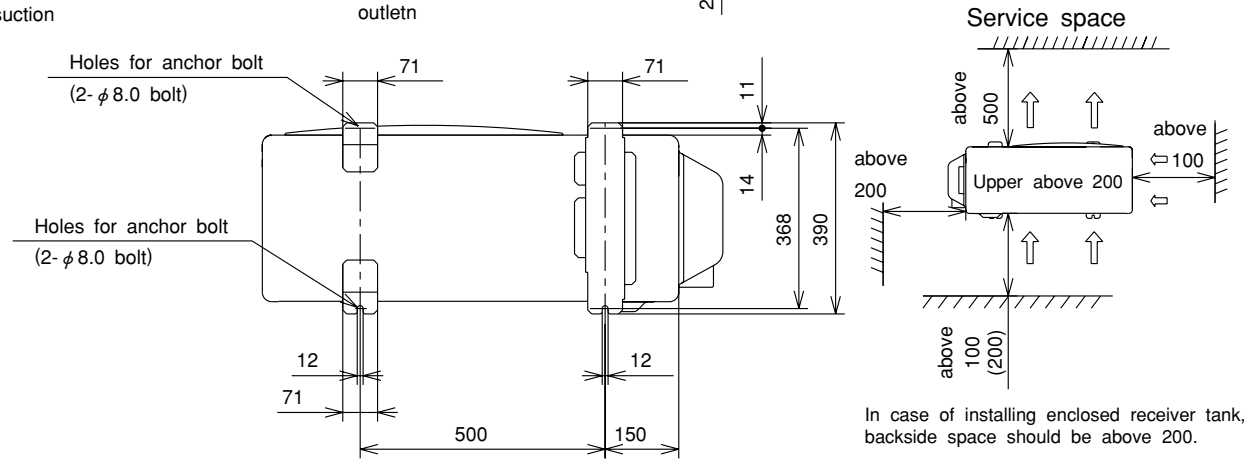
After service has been completed, please replace side panel, reconnect power cord and connecting cord respectively before turning on power.

MODEL RAM-80QH4

Unit: mm







In case of installing enclosed receiver tank, backside space should be above 200.

Note:

1. The way to connect piping sets is flare type coupling.
2. Insulated pipes should be used for both the narrow and wide dia. pipes.

ATTENTION

During service, before opening the side panel, please switch off power supply and disconnenct power cord and connecting cord.

After service has been completed, please replace side panel, reconnect power cord and connecting cord respectively before turning on power.

MAIN PARTS COMPONENT PRINCIPAUX COMPOSANTS

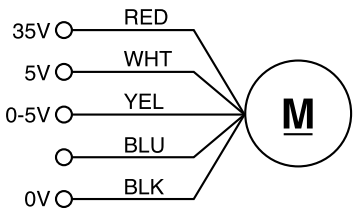
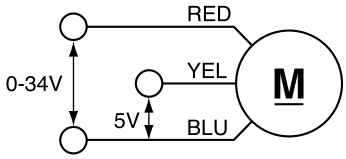
THERMOSTAT THERMOSTAT

Thermostat Specifications Caractéristiques du thermostat

MODEL MODÈLE			RAF-25NH4, RAF-50NH4		RAD-25QH4, RAD-40QH4	
THERMOSTAT MODEL MODÈLE DE THERMOSTAT			IC			
OPERATION MODE MODE DE FONCTIONNEMENT			COOL REFRIGERATION	HEAT CHALEUR	COOL REFRIGERATION	HEAT CHALEUR
TEMPERATURE TEMPERATURE ˚C (˚F)	INDICATION INDICATION 16	ON MARCHE	15.7 (60.3)	19.0 (66.2)	14.9 (59.3)	20.4 (68.8)
		OFF ARRET	15.0 (59.0)	19.7 (67.5)	14.3 (58.3)	21.0 (69.1)
	INDICATION INDICATION 24	ON MARCHE	23.7 (74.7)	27.0 (80.6)	22.9 (43.7)	28.4 (83.1)
		OFF ARRET	23.0 (73.4)	27.7 (81.9)	22.3 (72.7)	29.0 (84.1)
	INDICATION INDICATION 32	ON MARCHE	31.7 (89.1)	35.0 (95.0)	30.9 (88.1)	36.4 (97.7)
		OFF ARRET	31.0 (87.8)	35.7 (96.3)	30.3 (87.1)	37.0 (98.8)

FAN MOTOR MOTEUR DE VENTILATEUR

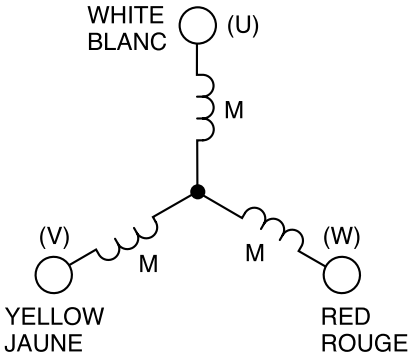
Fan Motor Specifications Caractéristiques du moteur de ventilateur

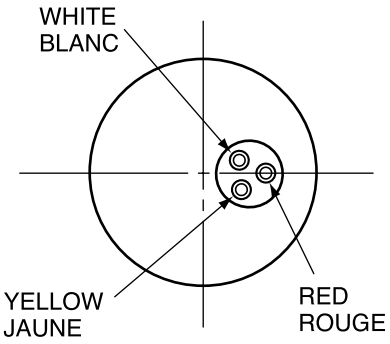
MODEL MODÈLE	RAF-25NH4, RAF-50NH4	RAD-25QH4, RAD-40QH4
POWER SOURCE ALIMENTATION SORTIE	DC : 5V, DC : 0 - 35V	DC : 0 - 300V
OUT PUT MODE DE FONCTIONNEMENT	20W (MAX40)	50W
CONNECTION CONNEXION	 (Control circuit built in)	

BLU : BLUE / BLEU
YEL : YELLOW / JAUNE
BRN : BROWN / BRUN
WHT : WHITE / BLANC
GRY : GRAY / GRIS
ORN : ORANGE / ORANGE
GRN : GREEN / VERT
RED : RED / ROUGE
BLK : BLACK / NOIR
PNK : PINK / ROSE
VIO : VIOLET / VIOLET

COMPRESSOR COMPRESSEUR

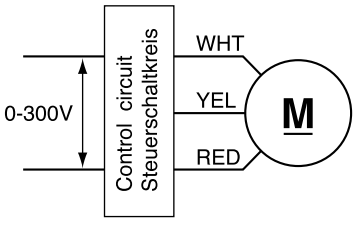
Compressor Motor Specifications Caractéristiques du moteur de compresseur

MODEL	MODÈLE		RAM-70QH4, RAM-80QH4
COMPRESSOR MODEL	MODÈLE DE COMPRESSEUR		EU1013DD x 2
PHASE	PHASE		SINGLE SIMPLE
RATED VOLTAGE	TENSION NOMINALE		230V
RATED FREQUENCY	FREQUENCE NOMINALE		50Hz
POLE NUMBER	NOMBRE DE POLE		4
CONNECTION CONNEXION			
RESISTANCE VALUE VALEUR DE RESISTANCE	(Ω)	20˚C (68˚F)	2M = 0.83
		75˚C (167˚F)	2M = 1.01



FAN MOTOR MOTEUR DE VENTILATEUR

Fan Motor Specifications Caractéristiques du moteur de ventilateur

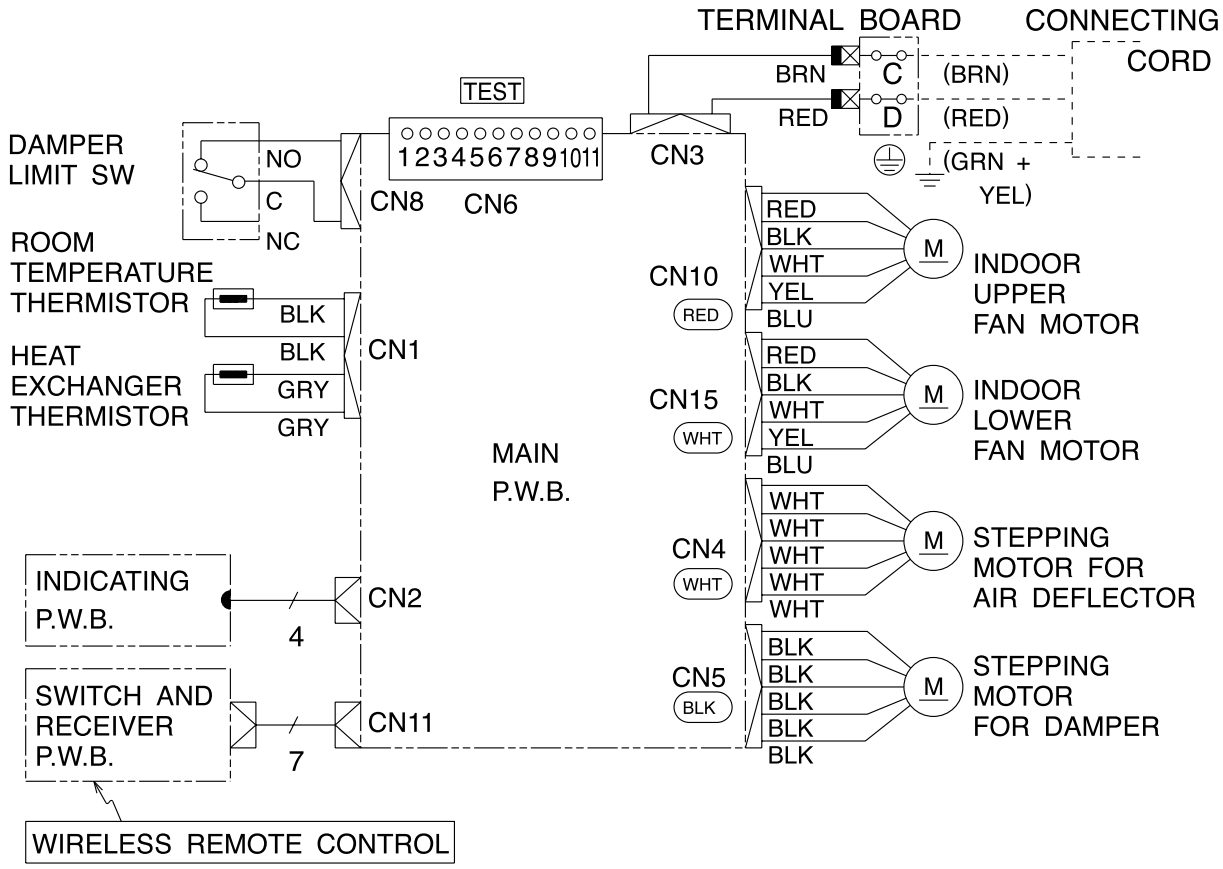
MODEL	MODÈLE	RAM-70QH4, RAM-80QH4
POWER SOURCE	ALIMENTATION SORTIE	DC : 0 - 300V, CC : 0 - 300V
OUT PUT	MODE DE FONCTIONNEMENT	50W
CONNECTION CONNEXION		

WIRING DIAGRAM

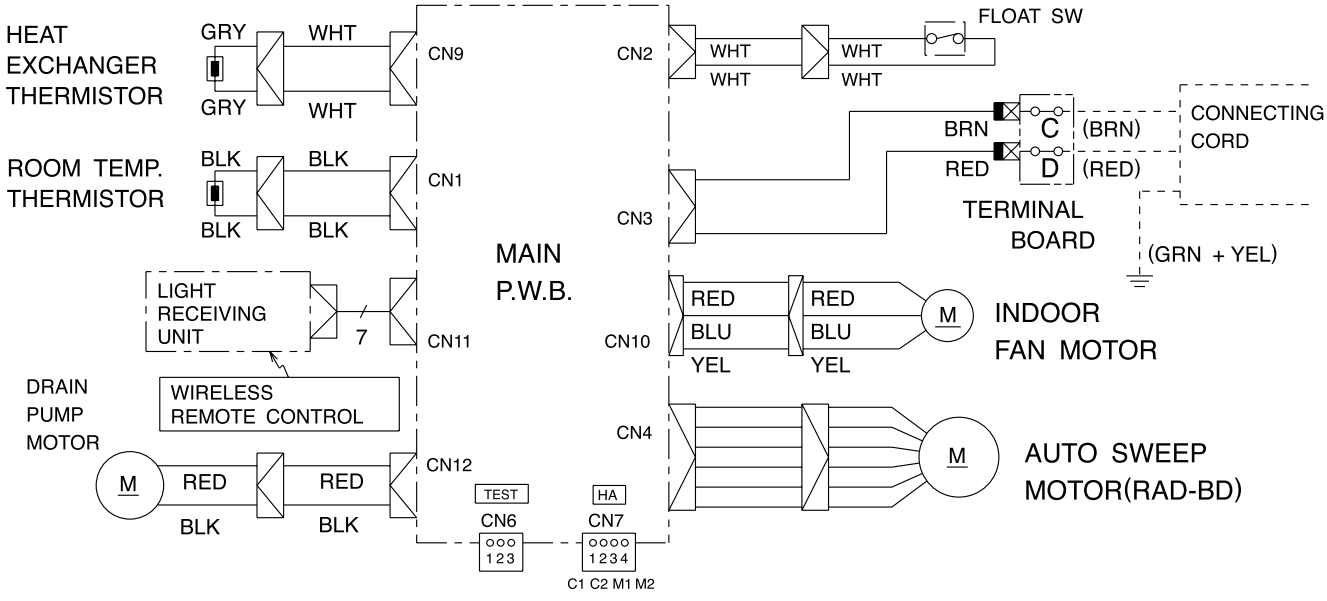
INDOOR UNIT

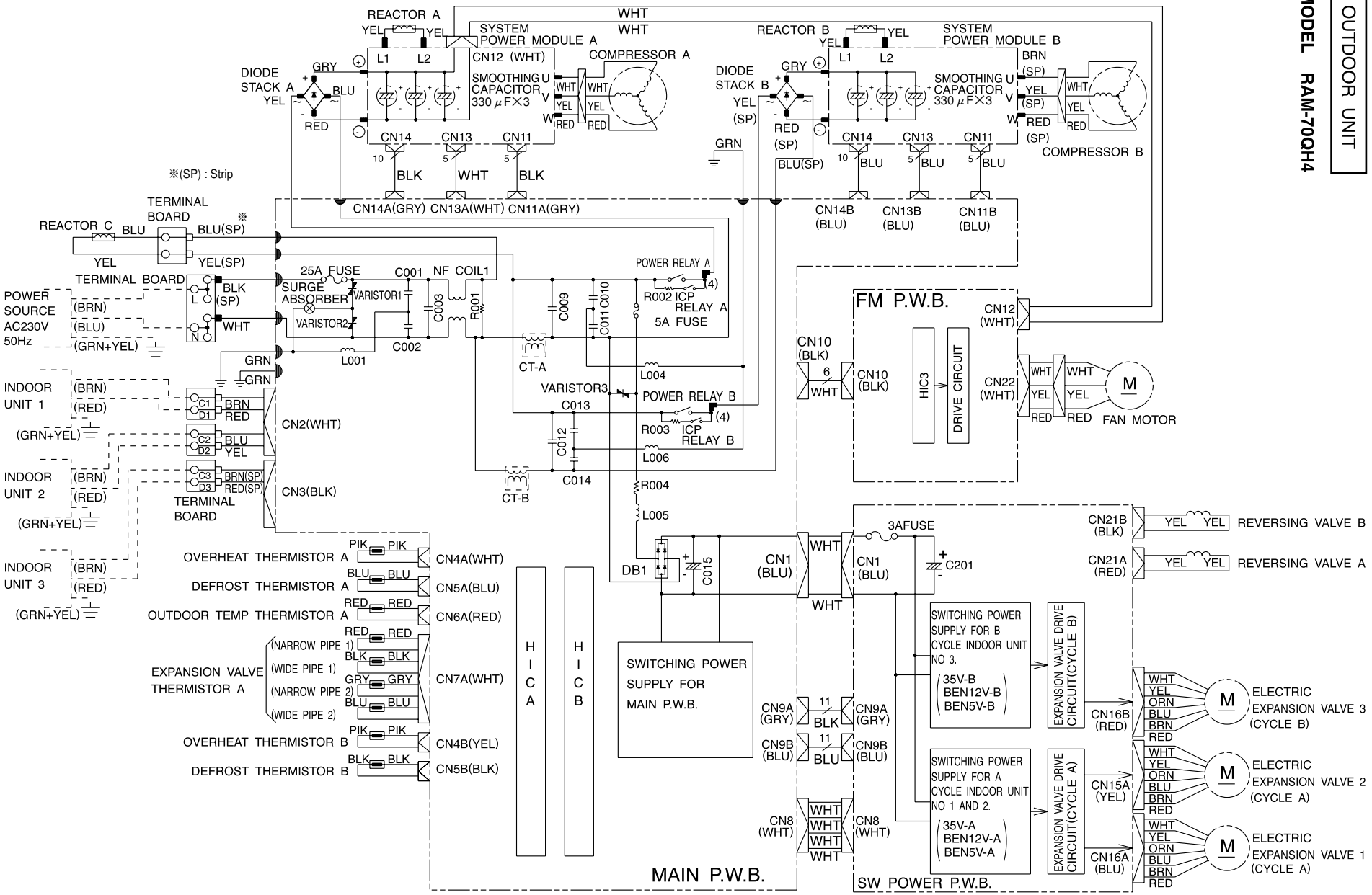
BLU	: BLUE	YEL	: YELLOW	BRN	: BROWN	WHT	: WHITE
GRY	: GRAY	ORN	: ORANGE	GRN	: GREEN	RED	: RED
BLK	: BLACK	PNK	: PINK	VIO	: VIOLET		

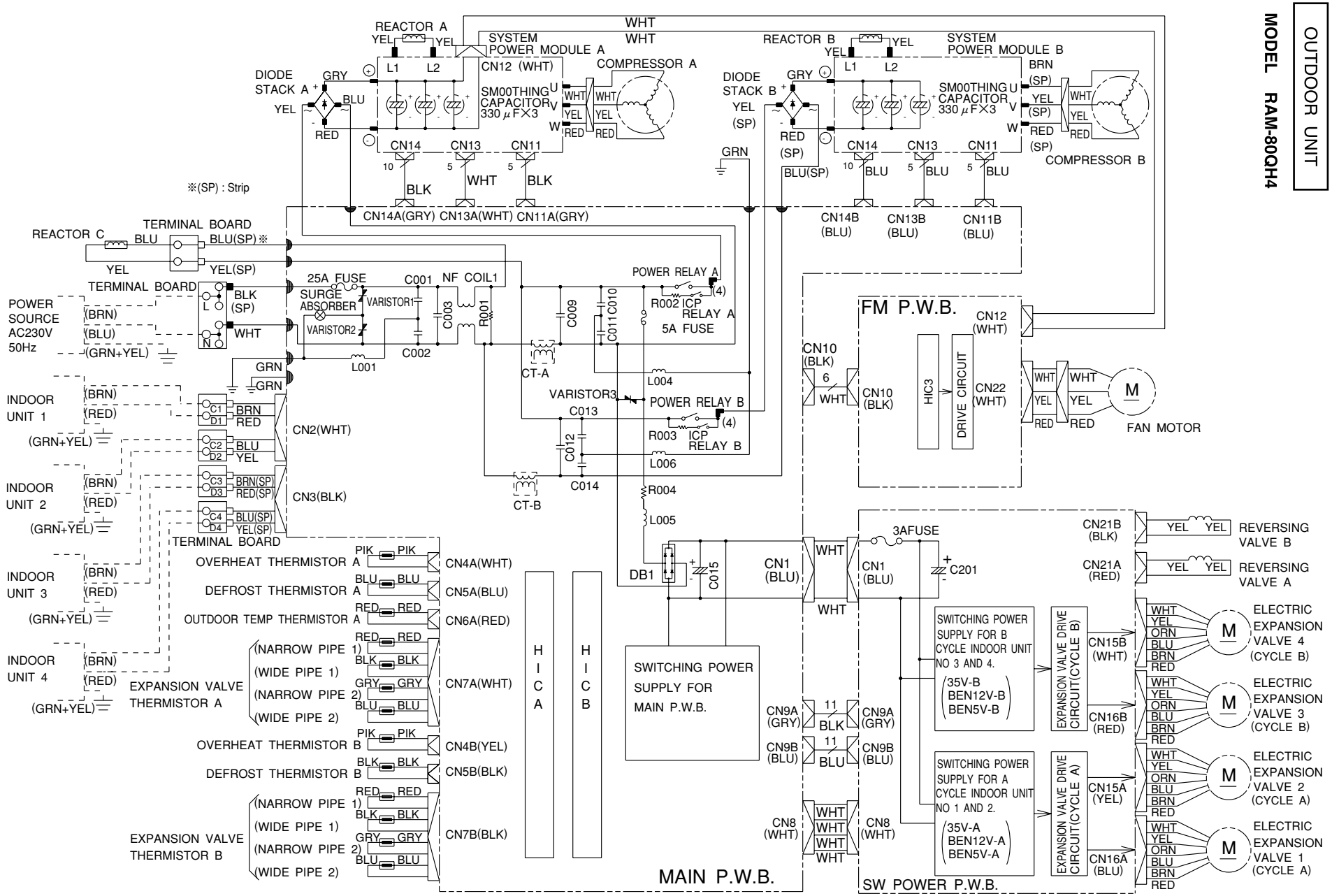
MODEL RAF-25NH4, 50NH4



MODEL RAD-25QH4, 40QH4

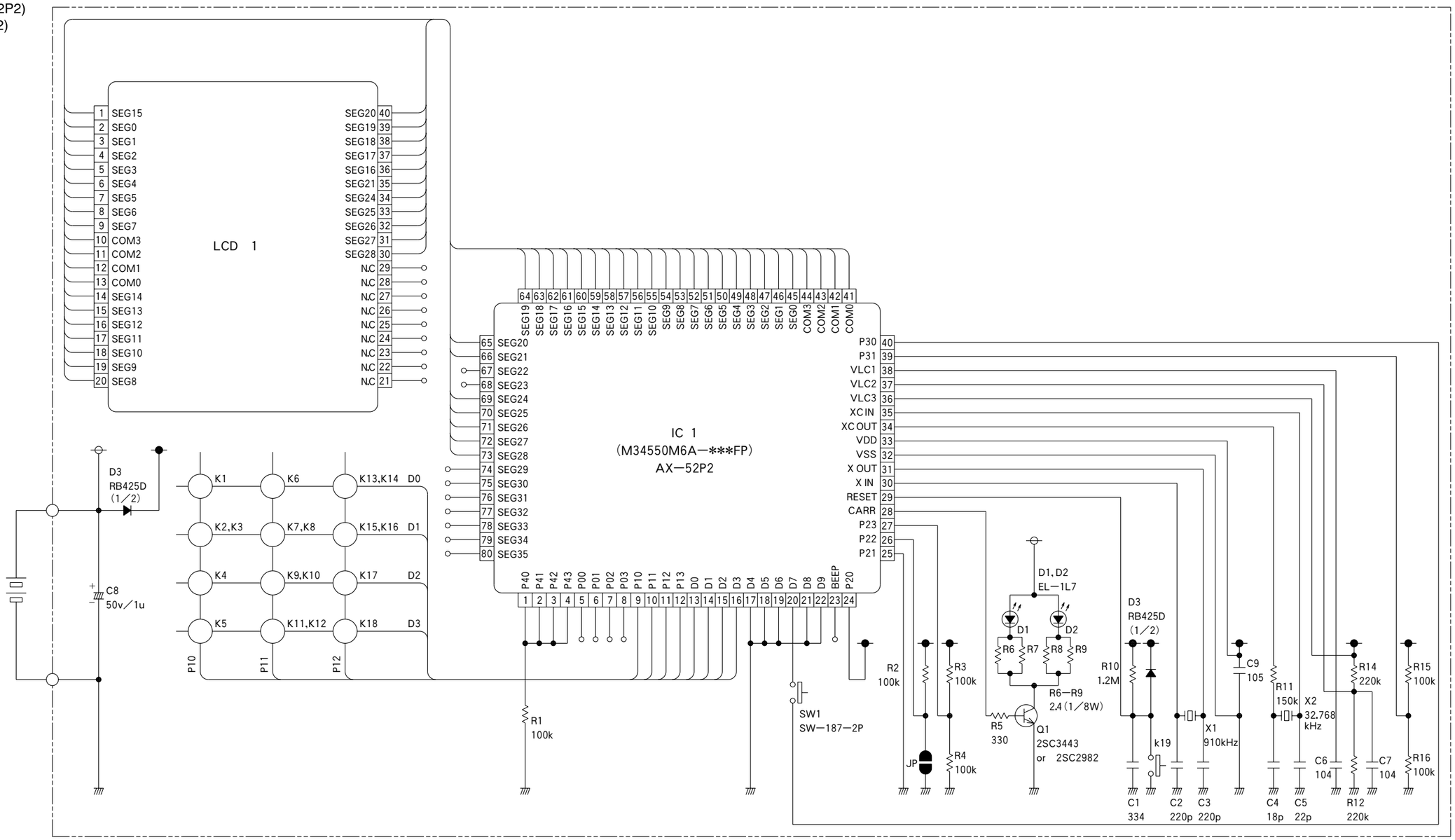



REACTOR A
REACTOR B
REACTOR C
SYSTEM POWER MODULE A
SYSTEM POWER MODULE B
DIODE STACK A
DIODE STACK B
SMOOTHING U CAPACITOR 330 μF×3
COMPRESSOR A
COMPRESSOR B
※(SP) : Strip
TERMINAL BOARD
CN14A(GRY) CN13A(WHT) CN11A(GRY)
CN14B (BLU) CN13B (BLU) CN11B (BLU)
POWER SOURCE AC230V 50Hz
25A FUSE
SURGE ABSORBER
VARISTOR1
VARISTOR2
NF COIL1
POWER RELAY A
R002 ICP RELAY A 5A FUSE
CT-A
CT-B
VARISTOR3
POWER RELAY B
R003 ICP RELAY B
INDOOR UNIT 1
INDOOR UNIT 2
INDOOR UNIT 3
CN2(WHT)
CN3(BLK)
FM P.W.B.
HIC3
DRIVE CIRCUIT
FAN MOTOR
OVERHEAT THERMISTOR A
DEFROST THERMISTOR A
OUTDOOR TEMP THERMISTOR A
EXPANSION VALVE THERMISTOR A
OVERHEAT THERMISTOR B
DEFROST THERMISTOR B
CN4A(WHT)
CN5A(BLU)
CN6A(RED)
CN7A(WHT)
CN4B(YEL)
CN5B(BLK)
HICA
HICB
SWITCHING POWER SUPPLY FOR MAIN P.W.B.
DB1
3AFUSE
C201
SWITCHING POWER SUPPLY FOR B CYCLE INDOOR UNIT NO 3.
35V-B BEN12V-B BEN5V-B
SWITCHING POWER SUPPLY FOR A CYCLE INDOOR UNIT NO 1 AND 2.
35V-A BEN12V-A BEN5V-A
EXPANSION VALVE DRIVE CIRCUIT(CYCLE B)
EXPANSION VALVE DRIVE CIRCUIT(CYCLE A)
REVERSING VALVE B
REVERSING VALVE A
ELECTRIC EXPANSION VALVE 3 (CYCLE B)
ELECTRIC EXPANSION VALVE 2 (CYCLE A)
ELECTRIC EXPANSION VALVE 1 (CYCLE A)
MAIN P.W.B.
SW POWER P.W.B.


REACTOR A
SYSTEM POWER MODULE A
CN12 (WHT)
COMPRESSOR A
DIODE STACK A
SM00THING CAPACITOR 330μF×3
REACTOR B
SYSTEM POWER MODULE B
DIODE STACK B
COMPRESSOR B
※(SP) : Strip
CN14A(GRY) CN13A(WHT) CN11A(GRY)
CN14B (BLU) CN13B (BLU) CN11B (BLU)
REACTOR C
TERMINAL BOARD
TERMINAL BOARD
POWER SOURCE AC230V 50Hz
25A FUSE
SURGE ABSORBER
VARISTOR1
VARISTOR2
NF COIL1
POWER RELAY A
ICP RELAY A 5A FUSE
CT-A
CT-B
VARISTOR3
POWER RELAY B
ICP RELAY B
INDOOR UNIT 1
INDOOR UNIT 2
INDOOR UNIT 3
INDOOR UNIT 4
CN2(WHT)
CN3(BLK)
FM P.W.B.
HIC3
DRIVE CIRCUIT
FAN MOTOR
OVERHEAT THERMISTOR A
DEFROST THERMISTOR A
OUTDOOR TEMP THERMISTOR A
EXPANSION VALVE THERMISTOR A
OVERHEAT THERMISTOR B
DEFROST THERMISTOR B
EXPANSION VALVE THERMISTOR B
CN4A(WHT)
CN5A(BLU)
CN6A(RED)
CN7A(WHT)
CN4B(YEL)
CN5B(BLK)
CN7B(BLK)
HICA
HICB
SWITCHING POWER SUPPLY FOR MAIN P.W.B.
MAIN P.W.B.
3AFUSE
C201
SWITCHING POWER SUPPLY FOR B CYCLE INDOOR UNIT NO 3 AND 4.
35V-B BEN12V-B BEN5V-B
SWITCHING POWER SUPPLY FOR A CYCLE INDOOR UNIT NO 1 AND 2.
35V-A BEN12V-A BEN5V-A
EXPANSION VALVE DRIVE CIRCUIT(CYCLE B)
EXPANSION VALVE DRIVE CIRCUIT(CYCLE A)
REVERSING VALVE B
REVERSING VALVE A
ELECTRIC EXPANSION VALVE 4 (CYCLE B)
ELECTRIC EXPANSION VALVE 3 (CYCLE B)
ELECTRIC EXPANSION VALVE 2 (CYCLE A)
ELECTRIC EXPANSION VALVE 1 (CYCLE A)
SW POWER P.W.B.

WIRING DIAGRAM OF THE PRINTED WIRING BOARD
SCHÉMA ELECTRIQUE DU CIRCUIT IMPRIMÉ

Remote controller (RAR-2P2)
Télécommande (RAR-2P2)

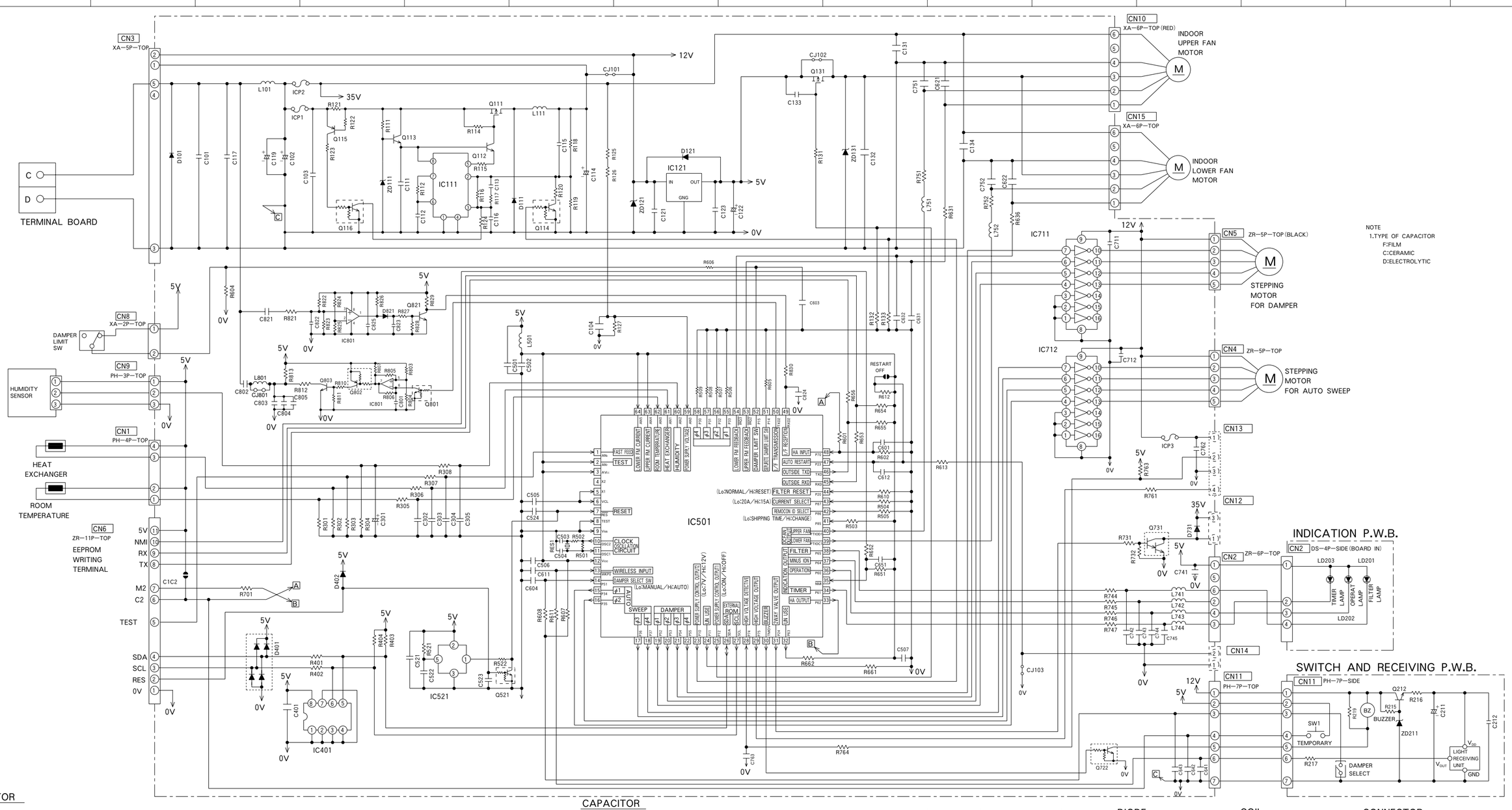


Key matrix table

input \ output		D0	D1	D2	D3
P10	Door open	Start/Stop	Operation selection	Fan speed selection	——
	Door shat	Start/Stop	Dry	——	——
P11	Door open	On timer	Hour up	Hour down	Dry・present time
	Door shat	——	Room temperature up	Room temperature down	——
P12	Door open	Off timer	——	Reservation	Cancel
	Door shat	Sleep	——	——	——
P13	Door open	——	——	——	——
	Door shat	——	——	——	——

Tableau matriciel des touches:

Entée \ Sortie		D0	D1	D2	D3
P10	Volet ouvert	Marche/arrêt	Choix du mode	Sélection de la vitesse de ventilation	——
	Volet fermé	Marche/arrêt	Déshumidification	——	——
P11	Volet ouvert	Programmateur de mise en marche	Heure croissante	Heure décroissante	Jour・heure actuelle
	Volet fermé	——	Température de pièce croissante	Température de pièce décroissante	——
P12	Volet ouvert	Programmateur d'arrêt	——	Attente	Annulation
	Volet fermé	Veille	——	——	——
P13	Volet ouvert	——	——	——	——
	Volet fermé	——	——	——	——



RESISTOR

SYMBOL	RETER Ω	VALUE LIMIT	VALUE W
R111	27K	±5%	1/10W
R112	30K	±5%	1/16W
R114	750	±5%	1/8W
R115	560	±5%	1/8W
R116			1/16W
R117	68K	±5%	1/16W
R118	75K	±2%	1/16W
R119	6.8K	±2%	1/16W
R120			1/16W
R121	0.56	±5%	1/4W
R122	100	±5%	1/16W
R123	33K	±5%	1/16W
R124	100	±5%	1/16W
R125	30K	±5%	1/16W
R126	30K	±5%	1/16W
R127	5.1K	±5%	1/16W
R131	5.1K	±5%	1/16W
R132	10K	±5%	1/16W
R133	10K	±5%	1/16W
R215	2.7K	±5%	1/10W
R216	47	±5%	1/10W
R217	1K	±5%	1/8W
R219	3.3K	±5%	1/16W
R301	12.7K	±1%	1/16W
R302	12.7K	±1%	1/16W
R303	10K	±1%	1/16W
R304	100K	±1%	1/16W

SYMBOL	RETER Ω	VALUE LIMIT	VALUE W
R305	1K	±5%	1/16W
R306	1K	±5%	1/16W
R307	1K	±5%	1/16W
R308	1K	±5%	1/16W
R401	390	±5%	1/16W
R402	390	±5%	1/16W
R403	5.1K	±5%	1/16W
R404	5.1K	±5%	1/16W
R501	1M	±5%	1/16W
R502	0	±5%	1/16W
R503	10K	±5%	1/16W
R504	10K	±5%	1/16W
R505	10K	±5%	1/16W
R506	10K	±5%	1/16W
R507	10K	±5%	1/16W
R508	10K	±5%	1/16W
R509	10K	±5%	1/16W
R521	1M	±5%	1/16W
R522	1K	±5%	1/16W
R601	1K	±5%	1/16W
R602	10K	±5%	1/16W
R631	1K	±5%	1/16W
R636	1K	±5%	1/16W
R651	1K	±5%	1/16W
R652	100	±5%	1/16W
R653	1K	±5%	1/16W
R654	10K	±5%	1/16W
R655	10K	±5%	1/16W
R656	1K	±5%	1/16W
R661	10K	±5%	1/16W
R662	10K	±5%	1/16W
R701	1K	±5%	1/16W
R731	2.7K	±5%	1/16W
R732	10K	±5%	1/16W
R744	300	±5%	1/10W
R745	300	±5%	1/10W

SYMBOL	RETER Ω	VALUE LIMIT	VALUE W
R746	300	±5%	1/10W
R747	300	±5%	1/10W
R751	2.7K	±5%	1/16W
R752	2.7K	±5%	1/16W
R761	100	±5%	1/16W
R763	10K	±5%	1/16W
R764	1K	±5%	1/16W
R803	120K	±5%	1/16W
R804	120K	±5%	1/16W
R805	120K	±5%	1/16W
R806	120K	±5%	1/16W
R807	4.3K	±5%	1/16W
R810	680	±5%	1/10W
R811	2K	±5%	1/16W
R812	39	±5%	1/8W
R813	39	±5%	1/8W
R821	1K	±5%	1/16W
R822	10K	±1%	1/16W
R823	10K	±1%	1/16W
R824	8.25K	±1%	1/16W
R825	10K	±1%	1/16W
R826	1K	±5%	1/16W
R827	3K	±5%	1/16W
R828	10K	±5%	1/16W

SYMBOL	RETER Ω	VALUE LIMIT	VALUE W
R829	5.1K	±5%	1/16W
R830	1K	±5%	1/16W

IC

SYMBOL	MODEL
IC111	NJM2340M
IC121	LF50CDT
IC401	BR24C04FJ—W
IC501	HD64F3687H
IC521	RN5VD42C
IC711	ULN2003ANS
IC712	ULN2003ANS
IC801	NJM2903M

CHIP JUMPER

SYMBOL	MOUNT	NOTE
CJ101	USE	1608
CJ102	USE	1608
CJ103	USE	1608
CJ801	—	1608

OVER CURRENT PROTECTOR

SYMBOL	MODEL	RATING CURRENT
ICP1	CCP2E—20	0.8A
ICP2	CCP2E—50	2.0A
ICP3	ICP—S0.5	0.5A

CAPACITOR

SYMBOL	RETER F	V	TYPE
C101	0.22μ	55V	F
C102	330μ	50V	D
C103	470p	630V	C
C104	0.1μ	25V	C
C111	2.2μ	10V	C
C112	1000P	50V	C
C113	0.047μ	25V	C
C114	220μ	25V	D
C115			
C116		50V	C
C117		55V	F
C119		50V	D
C121	0.1μ	25V	C
C122	100μ	10V	D
C123	0.1μ	25V	C
C131	0.22μ	50V	C
C132	0.1μ	25V	C
C133	0.1μ	25V	C
C134	0.22μ	50V	C
C211	47μ	16V	D
C212	0.1μ	25V	C
C301	22μ	4V	D
C302	0.1μ	25V	C
C303	0.1μ	25V	C

SYMBOL	RETER F	V	TYPE
C304	0.1μ	25V	C
C305	0.1μ	25V	C
C401	0.1μ	25V	C
C501	0.1μ	25V	C
C502	0.1μ	25V	C
C503	12p	50V	C
C504	12p	50V	C
C505	0.1μ	25V	C
C506	0.1μ	25V	C
C507	0.1μ	25V	C
C521	0.1μ	25V	C
C522	0.22μ	10V	C
C523	0.1μ	25V	C
C524	0.1μ	25V	C
C601	0.1μ	25V	C
C603	0.1μ	25V	C
C604	0.1μ	25V	C
C611	1000P	50V	C
C612	0.1μ	25V	C
C621			
C622			

SYMBOL	RETER F	V	TYPE
C631	1000P	50V	C
C632	1000P	50V	C
C641			
C642			
C643			
C651	0.1μ	25V	C
C711	0.1μ	25V	C
C712	0.1μ	25V	C
C741	0.1μ	25V	C
C742			
C743			
C744			
C745			
C751	1μ	16V	C
C752	1μ	16V	C
C762	0.1μ	25V	C
C763	0.1μ	25V	C
C801	150P	50V	C
C802	0.22μ	55V	F
C803	0.1μ	25V	C
C804		25V	C
C805		25V	C

SYMBOL	RETER F	V	TYPE
C821	0.01μ	55V	F
C822	1000P	50V	C
C823	0.047μ	25V	C
C824	0.01μ	50V	C
C825	0.1μ	25V	C

TRANSISTOR

SYMBOL	MODEL
Q111	2SJ518
Q112	2SC5209H
Q113	2SC5209H
Q114	RN1102
Q115	2SA1162Y
Q116	RN1102
Q131	2SJ511
Q212	2SC2462LC
Q521	RN1102
Q722	RN1102
Q731	2SD1834
Q801	RN1102
Q802	RN2102
Q803	2SC3441E
Q821	2SC4738GRY

DIODE

SYMBOL	MODEL
D101	DSM3MA2
D111	D1FS6
D121	1SS355
D401	HN1D03FU
D402	1SS355
D731	1SS355
D821	1SS355

ZENER DIODE

SYMBOL	MODEL
ZD111	RD6.2UJN2
ZD121	PTZ20A
ZD131	RLZ6.8A
ZD211	RD5.6UJN2

BUZZER

SYMBOL	MODEL
BZ	PKM13EPY

LIGHT RECEIVING UNIT

SYMBOL	MODEL
IRR	GP1U281R

OSCILLATOR

SYMBOL	MODEL	FREQUENCY
RES1	MA—405—10M	10MHz

COIL

SYMBOL	RATING (H)	RATING CURRENT
L101	82μ	1.3A
L111	560μ	0.4A
L501	BLM11A601SPT	0.2A
L741	CHIP JUMPER	—
L742	CHIP JUMPER	—
L743	CHIP JUMPER	—
L744	CHIP JUMPER	—
L751	BLM11A601SPT	0.2A
L752	BLM11A601SPT	0.2A
L801	100μ	55mA

LED

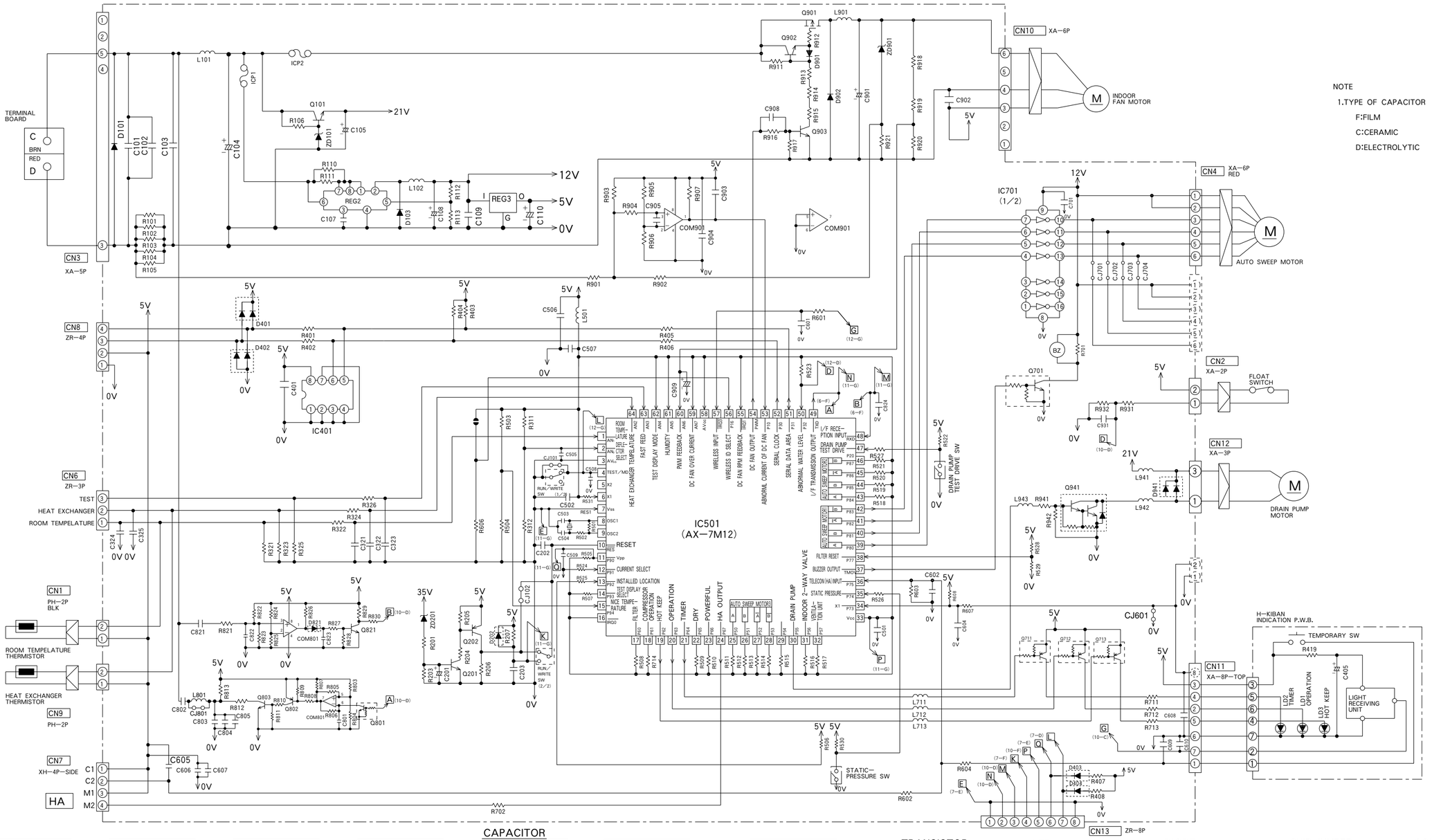
SYMBOL	MODEL	COLOR
LD201	SEL6814A	YELLOW
LD202	SEL6914A	ORANGE
LD203	SEL6414E	GREEN

SWITCH

SYMBOL	MODEL
SW1 (TEMPORARY SW)	EVQ21509K
SW2 (DAMPER SELECT SW)	ESD170206

CONNECTOR

SYMBOL	MODEL
CN1	PH—4P—TOP
CN2	ZR—6P—TOP
CN2	DS—4P—SIDE (BOARD IN)
CN3	XA—5P—TOP
CN4	ZR—5P—TOP
CN5	ZR—5P—TOP (BLACK)
CN6	ZR—11P—TOP
CN8	XA—2P—TOP
CN9	PH—3P—TOP
CN10	XA—6P—TOP (RED)
CN11	PH—7P—TOP
CN11	PH—7P—SIDE
CN12	SMT—2P—TOP
CN13	ZR—4P—TOP
CN14	
CN15	XA—6P—TOP



RESISTOR

SYMBOL	RETER VALUE Ω	LIMIT	W
R101	1.5	±5%	1/4W
R102	1.5	±5%	1/4W
R103	1.5	±5%	1/4W
R104	1.5	±5%	1/4W
R105	1.5	±5%	1/4W
R106	3.9K	±5%	1/4W
R110	1.0	±5%	1/4W
R111	1.0	±5%	1/4W
R112	10K	±2%	1/16W
R113	1.2K	±2%	1/16W
R201	5.1K	±5%	1/10W
R203	2K	±5%	1/16W
R204	5.1K	±5%	1/16W
R205	2.7K	±5%	1/16W
R206	5.1K	±5%	1/16W
R207			1/16W
R311	5.1K	±5%	1/16W
R312	5.1K	±5%	1/16W
R321	12.7K	±1%	1/16W
R322	1K	±5%	1/16W
R323	12.7K	±1%	1/16W
R324	1K	±5%	1/16W

SYMBOL	RETER VALUE Ω	LIMIT	W
R325	10K	±5%	1/16W
R326	1K	±5%	1/16W
R401	390	±5%	1/16W
R402	390	±5%	1/16W
R403	5.1K	±5%	1/16W
R404	5.1K	±5%	1/16W
R405	390	±5%	1/16W
R406	390	±5%	1/16W
R407			1/16W
R408			1/16W
R419	10	±5%	1/6W
R501	1M	±5%	1/16W
R502	220	±5%	1/16W
R503			1/16W
R504	1K	±5%	1/16W
R505			1/16W
R506	10K	±5%	1/16W
R507	10K	±5%	1/16W
R508	10K	±5%	1/16W
R509	10K	±5%	1/16W
R510	10K	±5%	1/16W
R511	10K	±5%	1/16W
R512	10K	±5%	1/16W
R513	10K	±5%	1/16W
R514	10K	±5%	1/16W
R515	10K	±5%	1/16W

SYMBOL	RETER VALUE Ω	LIMIT	W
R516	10K	±5%	1/16W
R517	10K	±5%	1/16W
R518	10K	±5%	1/16W
R519	10K	±5%	1/16W
R520	10K	±5%	1/16W
R521	10K	±5%	1/16W
R522	10K	±5%	1/16W
R523			1/16W
R524	1K	±5%	1/16W
R525	1K	±5%	1/16W
R526	1K	±5%	1/16W
R527	1K	±5%	1/16W
R528			1/16W
R529	10K	±5%	1/16W
R530	10K	±5%	1/16W
R531	100K	±5%	1/16W
R601	1K	±5%	1/16W
R602	1K	±5%	1/16W
R603	10K	±5%	1/16W
R604	1K	±5%	1/16W
R606	10K	±5%	1/16W
R607	1K	±5%	1/16W
R608	10K	±5%	1/16W
R701	3.3K	±5%	1/10W
R702	1K	±5%	1/16W
R711	180	±5%	1/10W

SYMBOL	RETER VALUE Ω	LIMIT	W
R712	180	±5%	1/10W
R713	270	±5%	1/10W
R714	2K	±5%	1/16W
R803	120K	±5%	1/16W
R804	120K	±5%	1/16W
R805	120K	±5%	1/16W
R806	120K	±5%	1/16W
R807	4.3K	±5%	1/16W
R808	4.3K	±5%	1/16W
R809	10K	±5%	1/16W
R810	360	±5%	1/10W
R811	1K	±5%	1/16W
R812	39	±5%	1/4W
R813	39	±5%	1/4W
R821	1K	±5%	1/16W
R822	10K	±1%	1/16W
R823	10K	±1%	1/16W
R824	8.25K	±1%	1/16W
R825	10K	±1%	1/16W
R826	1K	±5%	1/16W
R827	3K	±5%	1/16W
R828	10K	±5%	1/16W
R829	5.1K	±5%	1/16W
R830	5.1K	±5%	1/16W

SYMBOL	RETER VALUE Ω	LIMIT	W
R901	1K	±1%	1/10W
R902	43K	±1%	1/16W
R903	8.25K	±1%	1/16W
R904	27K	±5%	1/16W
R905	12.7K	±1%	1/16W
R906	1K	±1%	1/16W
R907	2.7K	±5%	1/16W
R911	1K	±5%	1/4W
R912	47	±5%	1/10W
R913	1K	±5%	1/4W
R914	1K	±5%	1/4W
R915	1K	±5%	1/4W
R916	3.3K	±5%	1/16W
R917	3.3K	±5%	1/16W
R918	10K	±1%	1/10W
R919	10K	±1%	1/10W
R920	2.21K	±1%	1/16W
R921	12K	±5%	1/16W
R931	1K	±5%	1/16W
R932	10K	±5%	1/16W
R941	1K	±5%	1/16W
R942	10K	±5%	1/16W

CAPACITOR

SYMBOL	RETER VALUE F	V	TYPE
C101		55V	F
C102		55V	F
C103	0.22μ	55V	F
C104	470μ	50V	D
C105	100μ	50V	D
C107	220p	50V	C
C108	150μ	50V	D
C109	0.1μ	25V	C
C110	100μ	10V	D
C201	100μ	4V	D
C202	0.1μ	25V	C
C203		16V	C
C321	0.1μ	25V	C
C322	0.1μ	25V	C
C323	0.1μ	25V	C
C324		25V	C
C325		25V	C
C401	0.1μ	25V	C
C405	100μ	10V	D

SYMBOL	RETER VALUE F	V	TYPE
C501	1μ	16V	C
C502	0.1μ	25V	C
C503	22p	50V	C
C504	27p	50V	C
C505	0.1μ	25V	C
C506	0.1μ	25V	C
C507	0.1μ	25V	C
C508		25V	C
C509		25V	C
C601	1000P	50V	C
C602	0.1μ	25V	C
C604	0.1μ	25V	C
C605		25V	C
C606		25V	C
C607		25V	C
C608		25V	C
C609		25V	C
C610		25V	C
C701		25V	C
C801	150P	50V	C
C802	0.22μ	55V	F
C803	0.1μ	50V	C
C804		50V	C
C805		50V	C

SYMBOL	RETER VALUE F	V	TYPE
C821	0.01μ	55V	F
C822	1000P	50V	C
C823	0.047μ	16V	F
C824	0.01μ	50V	C
C901	330μ	50V	D
C902	0.1μ	25V	C
C903	1000P	50V	C
C904	0.1μ	25V	C
C905	1μ	16V	C
C908		25V	C
C909	10μ	16V	D
C931	0.1μ	25V	C

TRANSISTOR

SYMBOL	MODEL
Q101	2SD1266—P
Q201	2SC2462LC
Q202	2SA1121SC
Q701	2SC4398
Q711	DTA143EK
Q712	DTA143EK
Q713	DTA143EK
Q801	2SC4398
Q802	2SA1121SC
Q803	2SC2618RC
Q821	2SC2462LC
Q901	2SJ245S
Q902	2SC2462LC
Q903	2SC3360
Q941	2SD1800

IC

SYMBOL	MODEL
REG2	MC34063AM
REG3	NJM78M05DLA
IC401	HN58X2402F
IC501	HD6473644H
IC701	ULN2003ANS
COM801	NJM2903M—T
COM901	NJM2903M—T

COIL

SYMBOL	RETER VALUE H	A
L101	82μ	1.14A
L102	560μ	0.4A
L801	100μ	55mA
L901	450μ	1.3A

LED

SYMBOL	MODEL
LD1	SEL2713K
LD2	SEL2413E
LD3	SEL2213C

ZENNER DIODE

SYMBOL	MODEL
ZD101	RD22UJN2
ZD201	RLZ27D
ZD901	UDZ15B

OVER CURRENT PROTECTOR

SYMBOL	MODEL	A
ICP1	CCP2E—20	0.8A
ICP2	CCP2E—50	2.0A

BEES INDUCTOR

SYMBOL	MODEL
L501	BLM11A601S
L711	BLM11A601S
L712	BLM11A601S
L713	BLM11A601S
L941	BLM11A601S
L942	BLM11A601S
L943	BLM11A601S

DIODE

SYMBOL	MODEL
D101	DSA3MA2
D103	D1FS6
D202	
D401	HSM2838C
D402	HSM2836C
D403	
D404	
D821	HSM2838C
D901	LFB01
D902	D1FL20U
D941	HSM2838C

SWITCH

SYMBOL	MODEL
SW2 (STATIC—PRESSURE SW)	SSSS9AE
SW3 (DRAIN PUMP TEST DRIVE SW)	SSSS9AE
SW4 (RUN/WRITE SW)	
TEMPORARY SW	J—M0200

BUZZER

SYMBOL	MODEL
BZ1	PKM13EPY—4002

CHIP JUMPER

SYMBOL	MODEL
CJ101	○
CJ102	○
CJ701	—
CJ702	—
CJ703	—
CJ704	—
CJ601	○
CJ801	—

LIGHT RECEIVING UNIT

SYMBOL	MODEL
IRR	HC377M

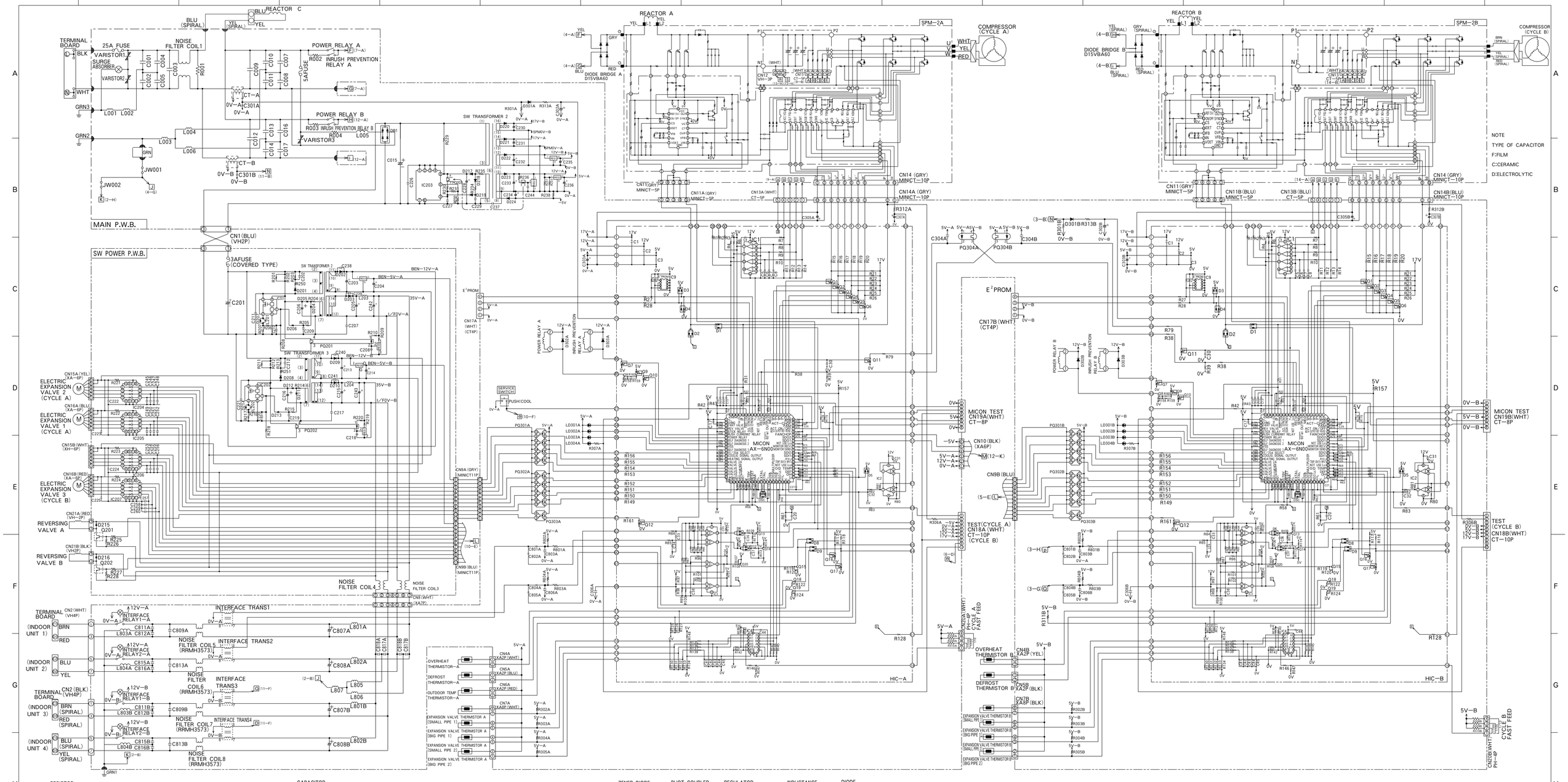
OSCILLATOR

SYMBOL	MODEL	Hz
RES1	HC—49—U03C	10M

CONNECTOR

SYMBOL	MODEL
CN1	PH—2P(TOP ENTRY)
CN2	XA—2P(TOP ENTRY)
CN3	XA—5P(TOP ENTRY)
CN4	XA—6P(TOP ENTRY)
CN5	
CN6	ZR—3P(TOP ENTRY)
CN7	XH—4P(SIDE ENTRY)
CN8	ZR—4P(TOP ENTRY)
CN9	PH—2P(TOP ENTRY)
CN10	XA—6P(TOP ENTRY)
CN11	XA—8P—TOP(TOP ENTRY)
CN11B	EI—7P(TOP ENTRY)
CN12	XA—3P(TOP ENTRY)
CN13	

MODEL RAM-70QH4



RESISTOR

SYMBOL	Ω	W	TOLERANCE	RETER VALUE
R001	1M	5%	1/4	
R002	100	5%	1/4	
R003	100	5%	1/2	
R004	0.56	5%	1/2	
R201	1M	5%	1/2	
R202	1M	5%	1/2	
R203	820K	5%	1/4	
R204	10	2%	1/2	
R205	2K	5%	1/6	
R206	680	5%	1/4	
R207	0.33	5%	1	
R208	3.3K	5%	1/4	
R209	150	5%	1/4	
R210	4.7K	5%	1/4	
R211	1M	5%	1/2	
R212	1M	5%	1/2	
R213	820K	5%	1/4	
R214	10	2%	1/4	
R215	2K	5%	1/6	
R216	680	5%	1/4	
R217	0.33	5%	1	
R218	3.3K	5%	1/4	
R219	150	5%	1/4	
R220	4.7K	5%	1/4	
R250	47	5%	1/2	
R251	47	5%	1/2	
R221	100	5%	1/6	
R222	100	5%	1/6	
R223	100	5%	1/6	
R224	100	5%	1/6	
R225	150	5%	1/6	
R226	10K	5%	1/6	
R227	750	5%	1/6	
R228	10K	5%	1/6	
R901	180K	0.5%	1/2	
R902	180K	0.5%	1/2	
R903	180K	0.5%	1/2	
R904	47K	1%	1/6	
R905	47K	1%	1/6	
R906	47K	1%	1/6	
R907	15K	5%	1/2	
R908	15K	5%	1/2	
R909	15K	5%	1/2	
R910	620	2%	1/6	
R911	10K	5%	1/6	
R912	1.5K	1%	1/6	
R913	68K	5%	1/6	
R914	5.11K	1%	1/6	
R915	3.0K	2%	1/6	
R916	4.7K	5%	1/6	
R917	26.7K	1%	1/6	
R920	10K	5%	1/6	
R921	10K	5%	1/6	
R922	10K	5%	1/6	
R923	4.7K	5%	1/6	
R924	4.7K	5%	1/6	
R925	4.7K	5%	1/6	
R926	100	5%	1/6	
R927	100	5%	1/6	
R928	100	5%	1/6	
R929	1K	5%	1/6	
R930	1K	5%	1/6	
R931	1K	5%	1/6	
R932	10K	5%	1/6	
R933	10K	5%	1/6	
R934	10K	5%	1/6	
R935	15K	5%	1/2	
R936	15K	5%	1/2	
R937	15K	5%	1/2	
R940	3.0	2%	2	
R941	3.0	2%	2	
R942	100	5%	1/6	
R943	100	5%	1/6	
R944	100	5%	1/6	
R948	1K	5%	1/6	
R949	1K	5%	1/6	
R950	1K	5%	1/6	
R301A	1K	1%	1/6	
R302A				
R303A				
R304A				
R305A				
R306A	100	5%	1/6	
R307A	1.6K	5%	1/6	
R308A	4.3K	5%	1/6	
R309A	1.6K	5%	1/6	
R310A	470	5%	1/6	
R312A	5.1k	5%	1/6	
R313A	1.69k	1%	1/6	
R801A	33	5%	1/4	
R802A	33	5%	1/4	
R803A	33	5%	1/4	
R804A	33	5%	1/4	
R301B	1K	1%	1/6	
R302B	2K	5%	1/6	
R303B	2K	5%	1/6	
R304B	2K	5%	1/6	
R305B	2K	5%	1/6	
R306B	100	5%	1/6	
R307B	1.6K	5%	1/6	
R308B	4.3K	5%	1/6	
R309B	1.6K	5%	1/6	
R310B	470	5%	1/6	
R312B	5.1k	5%	1/6	
R313B	1.69k	1%	1/6	
R801B	33	5%	1/4	
R802B	33	5%	1/4	
R803B	33	5%	1/4	
R804B	33	5%	1/4	

CAPACITOR

SYMBOL	μF	V	TYPE
C001	0.0047	AC250	C
C002	0.0047	AC250	C
C003	0.56	630	F
C004		AC250	C
C005		AC250	C
C007		AC250	C
C008		AC250	C
C009	3.3 (4.0)	AC250	F
C010	0.01	AC250	C
C011	0.01	AC250	C
C012	3.3 (4.0)	AC250	F
C013	0.01	AC250	C
C014	0.01	AC250	C
C015	270	450	D
C016		AC250	C
C017		AC250	C
C201	10	450	D
C202	0.01	AC250	C
C203	330	25	D
C204	100	6.3	D
C205	470	50	D
C206	330	25	D
C207	0.0047	AC250	C
C208	0.1	50	C
C209	0.0033	50	F
C210	0.0047	50	C
C211	0.0068	2K	C
C212	0.01	AC250	C
C213	330	25	D
C214	100	6.3	D
C215	470	50	D
C216	330	25	D
C217	0.0047	AC250	C
C218	0.1	50	C
C219	0.0033	50	F
C220	0.0047	50	C
C221	0.0068	2K	C
C222	0.1	50	C
C223	0.1	50	C
C224	0.1	50	C
C225	0.1	50	C
C226	0.0022	2K	C
C227	0.0047	50	C
C228	4.7	25	D
C229	0.001	50	F
C230	22	10	D
C231	22	50	D
C232	220	25	D
C233	220	25	D
C234	47	16	D
C235	100	6.3	D
C236	0.0047	AC250	C
C237	0.0047	AC250	C
C238	0.001	50	C
C239	0.001	AC250	C
C240	0.001	50	C
C241	0.001	AC250	C
C242	470	50	D
C243	470	50	D
C244	0.1	50	C
C245	0.01	50	C
C246	0.01	50	C
C247	0.01	50	C
C248	0.01	50	C
C249	0.01	50	C
C250	0.01	50	C
C251	0.01	50	C
C252	0.01	50	C
C253	0.01	50	C
C254	0.01	50	C
C255	0.01	50	C
C256	0.01	50	C
C257	0.01	50	C
C258	0.01	50	C
C259	0.01	50	C
C260	0.01	50	C
C301A	0.1	50	C
C302A	100	10	D
C303A	100	6.3	D
C304A	0.0047	50	C
C305A	100	25	D
C306A	0.1	50	C
C307A	22	6.3	D
C801A	0.15	50	F
C802A	0.022	50	F
C803A	0.1	50	C
C804A	0.15	50	F
C805A	0.022	50	F
C806A	0.1	50	C
C807A	100	50	D
C808A	100	50	D
C809A	0.15	50	F
C811A	0.01	AC250	C
C812A	0.01	AC250	C
C813A	0.15	50	F
C815A	0.01	AC250	C
C816A	0.01	AC250	C
C817A	0.01	AC250	C
C818A	0.01	AC250	C
C301B	0.1	50	C
C302B	100	10	D
C303B	100	6.3	D
C304B	0.0047	50	C
C305B	100	25	D
C306B	0.1	50	C
C307B	22	6.3	D
C801B	0.15	50	F
C802B	0.022	50	F
C803B	0.1	50	C
C804B	0.15	50	F
C805B	0.022	50	F
C806B	0.1	50	C
C807B	100	50	D
C808B	100	50	D
C809B	0.15	50	F
C811B	0.01	AC250	C
C812B	0.01	AC250	C
C813B	0.15	50	F
C815B	0.01	AC250	C
C816B	0.01	AC250	C
C817B	0.01	AC250	C
C818B	0.01	AC250	C

ZENER DIODE

SYMBOL	MODEL
ZD901	HZ7A1
ZD904	HZ15-2
ZD905	HZ15-2
ZD906	HZ15-2

LED

SYMBOL	MODEL
LD301A	LED-T2-R
LD302A	LED-T2-D
LD303A	LED-T2-G
LD304A	LED-T2-R
LD301B	LED-T2-R
LD302B	LED-T2-D
LD303B	LED-T2-G
LD304B	LED-T2-R

IC

SYMBOL	MODEL
HIC-A	M68975-01
HIC-B	M68975-01
HIC-3	M68298
IC201	STR-F6667B
IC202	STR-F6667B
IC203	STR-L451
IC204	M54532P
IC205	M54532P
IC206	M54532P
IC207	M54532P
SPM2-A	
SPM2-B	

INTERFACE TRANS

SYMBOL	MODEL
INTERFACE TRANS1	RMF3249
INTERFACE TRANS2	RMF3249
INTERFACE TRANS3	RMF3249
INTERFACE TRANS4	RMF3249

PHOT COUPLER

SYMBOL	MODEL
PQ201	PS2501
PQ202	PS2501
PQ203	PS2501
PQ301A	PS2501-4
PQ302A	PS2501-4
PQ303A	PS2501
PQ301B	PS2501-4
PQ302B	PS2501-4
PQ303B	PS2501
PQ304A	PS2501
PQ304B	PS2501

TRANSISTOR

SYMBOL	MODEL
Q201	2SC1214CT
Q202	2SC1214CT
Q901	2SC3632
Q902	2SC3632
Q903	2SC3632
Q904	AA1AAM
Q907	MTP2P50E
Q908	MTP2P50E
Q909	MTP2P50E
Q910	2SA673
Q911	2SA673
Q912	2SA673
Q913	2SA673
Q914	2SA673
Q915	2SA673
Q916	2SC458
Q917	2SC458
Q918	2SC458
Q919	2SK2842
Q920	2SK2842
Q921	2SK2842

REGULATOR

SYMBOL	MODEL
REG1	MC7805CT
REG2	MC7805CT
REG3	SE612N
REG4	μPC78L05J/T
REG5	SE034N
REG6	μPC78L05J/T
REG7	SE034N

SURGE ABSORBER

SYMBOL	MODEL
SURGE ABSORBER	RA-10QM-V1-Y
VARISTOR1	450NR-12D
VARISTOR2	450NR-12D
VARISTOR3	450NR-12D

SWITCH

SYMBOL	MODEL
SERVICE SWITCH	SKHHLQ-SW

JUMPER WIRE

SYMBOL	MODEL
JW001	○
JW002	—
JW901	○
JW902	○
JW903	—

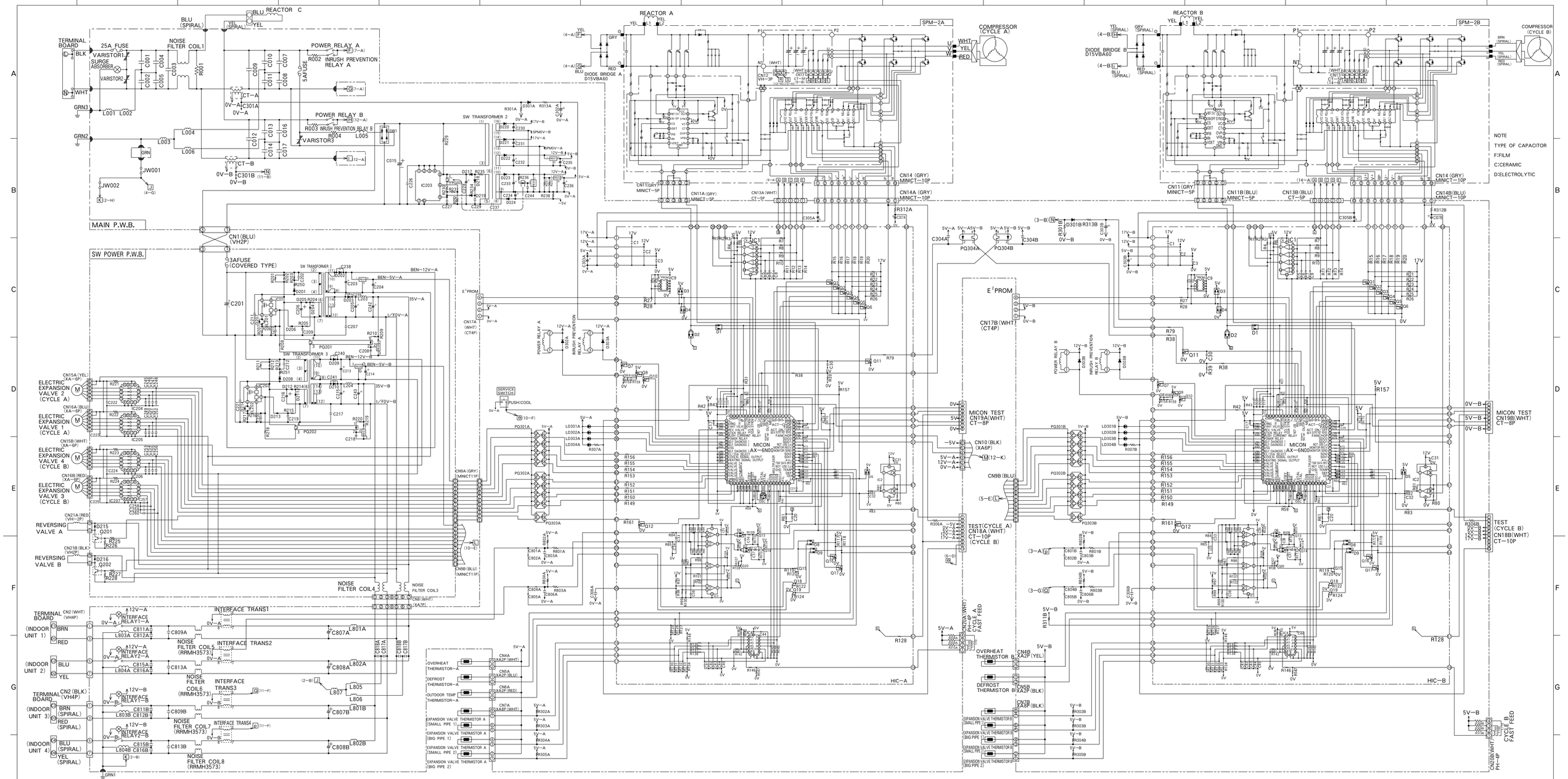
INDUCTANCE

SYMBOL	MODEL
L001	FBA04MA450
L002	EXCELSA35V
L003	WIRE JUMPER
L004	FBA04MA450
L005	
L006	FBA04MA450
L201	WIRE JUMPER
L202	WIRE JUMPER
L203	WIRE JUMPER
L204	WIRE JUMPER
L801A	RCH105-820
L802A	RCH105-820
L803A	RCH105-820
L804A	RCH105-820
L801B	RCH105-820
L802B	RCH105-820
L803A	FBA04MA450
L804A	FBA04MA450
L803B	FBA04MA450
L804B	FBA04MA450
L805	WIRE JUMPER
L806	WIRE JUMPER
L807	WIRE JUMPER
L901	EXCELSA35V
L902	EXCELSA35V
L903	WIRE JUMPER
L904	EXCELSA35V

DIODE

SYMBOL	MODEL
D201	SARS01
D202	RNZ2
D203	FML-G22S
D204	AG01Z
D205	AG01Z
D206	AG01Z
D207	
D208	SARS01
D209	RNZ2
D210	FML-G22S
D211	AG01Z
D212	AG01Z
D213	AG01Z
D214	
D215	1SS120
D216	1SS120
D217	AG01Z
D218	AG01Z
D219	AG01Z
D220	AG01Z
D221	AG01Z
D222	AG01Z
D223	AG01Z
D224	AK06

SYMBOL	MODEL
D301A	1SS120
D302A	1SS120
D303A	1SS120
D301B	1SS120
D302B	1SS120
D303B	1SS120
DB1	D15XB60
D901	S3L60
D902	S3L60
D903	S3L60
D904	S3L60
D905	S3L60
D906	S3L60
D913	1S2076A
D914	1S2076A
D915	1S2076A



RESISTOR

SYMBOL	W	LIMIT	W
R001	1M	5%	1/2
R002	100	5%	1/2
R003	100	5%	1/2
R004	0.56	5%	7
R201	1M	5%	1/2
R202	1M	5%	1/2
R203	820K	5%	1/4
R204	10	2%	1/4
R205	2K	5%	1/6
R206	680	5%	1/4
R207	0.33	5%	1
R208	3.3K	5%	1/6
R209	150	5%	1/4
R210	4.7K	5%	1/4
R211	1M	5%	1/2
R212	1M	5%	1/2
R213	820K	5%	1/4
R214	10	2%	1/4
R215	2K	5%	1/6
R216	680	5%	1/4
R217	0.33	5%	1
R218	3.3K	5%	1/6
R219	150	5%	1/4
R220	4.7K	5%	1/4
R250	47	5%	1/2
R251	47	5%	1/2
R221	100	5%	1/6
R222	100	5%	1/6
R223	100	5%	1/6
R224	100	5%	1/6
R225	750	5%	1/6
R226	10K	5%	1/6
R227	750	5%	1/6
R228	10K	5%	1/6

RESISTOR

SYMBOL	W	LIMIT	W
R229	2.2M	5%	1/4
R230	3.3K	5%	1/4
R231	680	5%	1/2
R232	2	5%	1/2
R233	1K	5%	1/2
R234	2.2K	5%	1/4
R235	22	2%	1/6
R236	1.8K	5%	1/6
R237	1K	5%	1/6
R238	1K	5%	1/6
R901	180K	0.5%	1/2
R902	180K	0.5%	1/2
R903	180K	0.5%	1/2
R904	47K	1%	1/6
R905	47K	1%	1/6
R906	47K	1%	1/6
R907	15K	5%	1/2
R908	15K	5%	1/2
R909	15K	5%	1/6
R910	620	2%	1/6
R911	10K	5%	1/6
R912	10K	5%	1/6
R913	68K	5%	1/6
R914	5.11K	1%	1/6
R915	3.0K	2%	1/6
R916	0		1/6
R917	26.7K	1%	1/6
R920	10K	5%	1/6
R921	10K	5%	1/6
R922	10K	5%	1/6
R923	4.7K	5%	1/6
R924	4.7K	5%	1/6
R925	4.7K	5%	1/6
R926	100	5%	1/6
R927	100	5%	1/6
R928	100	5%	1/6
R929	1K	5%	1/6

RESISTOR

SYMBOL	W	LIMIT	W
R930	1K	5%	1/6
R931	1K	5%	1/6
R932	10K	5%	1/6
R933	10K	5%	1/6
R934	10K	5%	1/6
R935	15K	5%	1/6
R936	15K	5%	1/6
R937	15K	5%	1/6
R940	3.0	2%	2
R941	3.0	2%	2
R942	100	5%	1/6
R943	100	5%	1/6
R944	100	5%	1/6
R948	1K	5%	1/6
R949	1K	5%	1/6
R950	1K	5%	1/6

RESISTOR

SYMBOL	W	LIMIT	W
R301A	1K	1%	1/6
R302A			1/6
R303A			1/6
R304A			1/6
R305A			1/6
R306A	100	5%	1/6
R307A	1.6K	5%	1/6
R308A	4.3K	5%	1/6
R309A	1.6K	5%	1/6
R310A	470	5%	1/6
R312A	5.1k	5%	1/6
R313A	1.69k	1%	1/6
R801A	33	5%	1/4
R802A	33	5%	1/4
R803A	33	5%	1/4
R804A	33	5%	1/4

RESISTOR

SYMBOL	W	LIMIT	W
R301B	1K	1%	1/6
R302B			1/6
R303B			1/6
R304B			1/6
R305B			1/6
R306B	100	5%	1/6
R307B	1.6K	5%	1/6
R308B	4.3K	5%	1/6
R309B	1.6K	5%	1/6
R310B	470	5%	1/6
R311B	0		1/6
R312B	5.1k	5%	1/6
R313B	1.69k	1%	1/6
R801B	33	5%	1/4
R802B	33	5%	1/4
R803B	33	5%	1/4
R804B	33	5%	1/4

CAPACITOR

SYMBOL	μF	V	TYPE
C001	0.0047	AC250	C
C002	0.0047	AC250	C
C003	0.56	630	F
C004		AC250	C
C005		AC250	C
C007		AC250	C
C008		AC250	C
C009	3.3	4.0	CH450
C010	0.01	AC250	C
C011	0.01	AC250	C
C012	3.3	4.0	CH450
C013	0.01	AC250	C
C014	0.01	AC250	C
C015	270	450	D
C016		AC250	C
C017		AC250	C
C201		450	D
C202	0.01	AC250	C
C203	330	25	D
C204	100	6.3	D
C205	470	50	D
C206	330	25	D
C207	0.0047	AC250	C
C208	0.1	50	C
C209	0.0033	50	F
C210	0.0047	50	C
C211	0.0068	2K	C
C212	0.01	AC250	C
C213	330	25	D
C214	100	6.3	D
C215	470	50	D
C216	330	25	D
C217	0.0047	AC250	C
C218	0.1	50	C
C219	0.0033	50	F
C220	0.0047	50	C
C221	0.0068	2K	C
C222	0.1	50	C
C223	0.1	50	C

CAPACITOR

SYMBOL	μF	V	TYPE
C301A	0.1	50	C
C302A	100	10	D
C303A	100	6.3	D
C304A	0.0047	50	C
C305A	100	25	D
C306A	0.1	50	C
C307A	22	6.3	D
C801A	0.15	50	F
C802A	0.022	50	F
C803A	0.1	50	C
C804A	0.15	50	F
C805A	0.022	50	F
C806A	0.1	50	C
C807A	100	50	D
C808A	100	50	D
C809A	0.15	50	F
C811A	0.01	AC250	C
C812A	0.01	AC250	C
C813A	0.15	50	F
C815A	0.01	AC250	C
C816A	0.01	AC250	C
C817A	0.01	AC250	C
C818A	0.01	AC250	C

CAPACITOR

SYMBOL	μF	V	TYPE
C301B	0.1	50	C
C302B	100	10	D
C303B	100	6.3	D
C304B	0.0047	50	C
C305B	100	25	D
C306B	0.1	50	C
C307B	22	6.3	D
C801B	0.15	50	F
C802B	0.022	50	F
C803B	0.1	50	C
C804B	0.15	50	F
C805B	0.022	50	F
C806B	0.1	50	C
C807B	100	50	D
C808B	100	50	D
C809B	0.15	50	F
C811B	0.01	AC250	C
C812B	0.01	AC250	C
C813B	0.15	50	F
C815B	0.01	AC250	C
C816B	0.01	AC250	C
C817B	0.01	AC250	C
C818B	0.01	AC250	C

CAPACITOR

SYMBOL	μF	V	TYPE
C224	0.1	50	C
C225	0.1	50	C
C226	0.0022	2K	C
C227	0.0047	50	C
C228	4.7	25	D
C229	0.001	50	F
C230	22	50	D
C231	22	50	D
C232	220	25	D
C233	220	25	D
C234	47	16	D
C235	100	6.3	D
C236	100	6.3	D
C237	0.0047	AC250	C
C238	0.001	50	C
C239	0.001	AC250	C
C240	0.001	50	C
C241	0.001	AC250	C
C242	470	50	D
C243	470	50	D
C244	0.1	50	C
C245	0.01	50	C
C246	0.01	50	C
C247	0.01	50	C
C248	0.01	50	C
C249	0.01	50	C
C250	0.01	50	C
C251	0.01	50	C
C252	0.01	50	C
C253	0.01	50	C
C254	0.01	50	C
C255	0.01	50	C
C256	0.01	50	C
C257	0.01	50	C
C258	0.01	50	C
C259	0.01	50	C
C260	0.01	50	C

CAPACITOR

SYMBOL	μF	V	TYPE
C901	10	100	D
C902	10	100	D
C903	100	100	D
C904	4.7	100	D
C905	4.7	100	D
C906	4.7	100	D
C907	22	10	D
C908	1	50	D
C909	100	6.3	D
C910	100	16	D
C911	100	10	D
C912	0.047	50	F
C913	0.1	50	F
C914	0.1	50	F
C915	0.1	50	F
C916	0.022	50	F
C917	220	10	D
C918	0.1	50	C
C919	0.1	50	C
C920	0.001	50	C
C921	0.001	50	C
C922	0.001	50	C
C923	0.022	25	C
C924	0.022	25	C
C925	0.1	50	C
C926	0.1	50	C
C927	0.1	50	C
C928	0.1	50	C
C929	0.1	50	C
C930	0.082	630	F
C931	0.1	50	C

INTERFACE TRANS

SYMBOL	MODEL
INTERFACE TRANS1	RMF3249
INTERFACE TRANS2	RMF3249
INTERFACE TRANS3	RMF3249
INTERFACE TRANS4	RMF3249

ZENER DIODE

SYMBOL	MODEL
ZD901	HZ7A1
ZD904	HZ15−2
ZD905	HZ15−2
ZD906	HZ15−2

LED

SYMBOL	MODEL
LD301A	LED−T2−R
LD302A	LED−T2−D
LD303A	LED−T2−G
LD304A	LED−T2−R
LD301B	LED−T2−R
LD302B	LED−T2−D
LD303B	LED−T2−G
LD304B	LED−T2−R

IC

SYMBOL	MODEL
HIC−A	M68978−01
HIC−B	M68978−01
HIC−3	M68298
IC201	STR−F6657B
IC202	STR−F6657B
IC203	STR−L451
IC204	M54532P
IC205	M54532P
IC206	M54532P
IC207	M54532P
SPM2−A	
SPM2−B	

PHOT COUPLER

SYMBOL	MODEL
PQ201	PS2501
PQ202	PS2501
PQ203	PS2501
PQ301A	PS2501−4
PQ302A	PS2501−4
PQ303A	PS2501
PQ301B	PS2501−4
PQ302B	PS2501−4
PQ303B	PS2501
PQ304A	PS2501
PQ304B	PS2501

TRANSISTOR

SYMBOL	MODEL
Q201	2SC1214CT
Q202	2SC1214CT
Q901	2SC3632
Q902	2SC3632
Q903	2SC3632
Q904	AA1A4M
Q907	MTP2P50E
Q908	MTP2P50E
Q909	MTP2P50E
Q910	2SA673
Q911	2SA673
Q912	2SA673
Q913	2SA673
Q914	2SA673
Q915	2SA673
Q916	2SC458
Q917	2SC458
Q918	2SC458
Q919	2SK2842
Q920	2SK2842
Q921	2SK2842

REGULATOR

SYMBOL	MODEL
REG1	MC7805CT
REG2	MC7805CT
REG3	SE012N
REG4	μPC78L05J−T
REG5	SE034N
REG6	μPC78L05J−T
REG7	SE034N

SURGE ABSORBER

SYMBOL	MODEL
SURGE ABSORBER	RA−10NM−V1−T
VARISTOR1	450NR−12D
VARISTOR2	450NR−12D
VARISTOR3	450NR−12D

SWITCH

SYMBOL	MODEL
SERVICE SWITCH	SKHHLQ−SW

JUMPER WIRE

SYMBOL	MODEL
JW001	○
JW002	−
JW901	○
JW902	○
JW903	−

INDUCTANCE

SYMBOL	MODEL
L001	FBA04MA450
L002	EXCELSA35V
L003	WIRE JUMPER
L004	FBA04MA450
L005	
L006	FBA04MA450
L201	WIRE JUMPER
L202	WIRE JUMPER
L203	WIRE JUMPER
L204	WIRE JUMPER
L801A	RCH106−820
L802A	RCH106−820
L801B	RCH106−820
L802B	RCH106−820
L803A	FBA04MA450
L804A	FBA04MA450
L803B	FBA04MA450
L804B	FBA04MA450
L805	WIRE JUMPER
L806	WIRE JUMPER
L807	WIRE JUMPER
L901	EXCELSA35V
L902	EXCELSA35V
L903	WIRE JUMPER
L904	EXCELSA35V

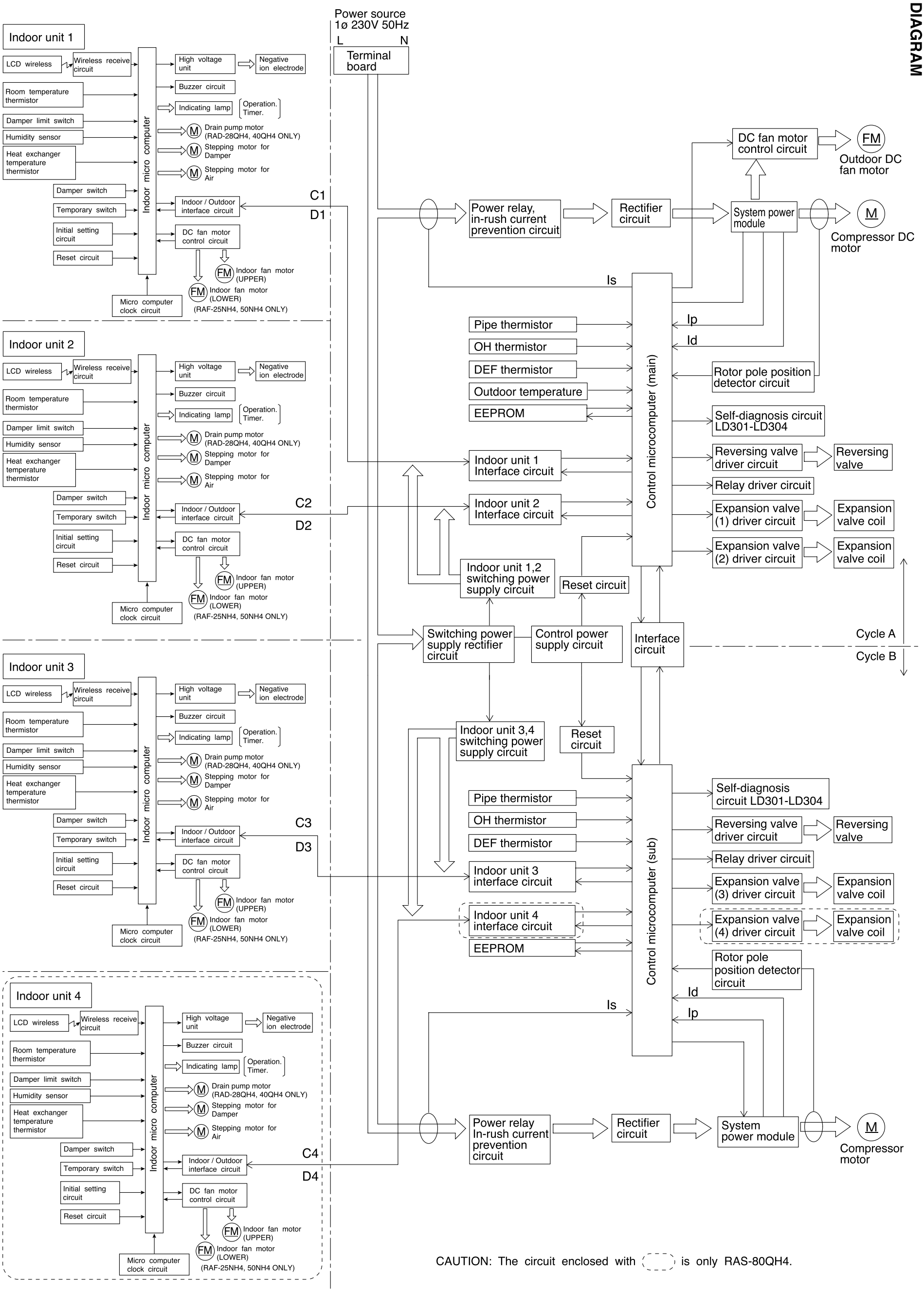
DIODE

SYMBOL	MODEL
D201	SARS01
D202	RN2Z
D203	FML−G22S
D204	AG01Z
D205	AG01Z
D206	AG01Z
D207	
D208	SARS01
D209	RN2Z
D210	FML−G22S
D211	AG01Z
D212	AG01Z
D213	AG01Z
D214	
D215	1SS120
D216	1SS120
D217	AG01Z
D218	AG01Z
D219	AG01Z
D220	AG01Z
D221	AG01Z
D222	AG01Z
D223	AG01Z
D224	AK06

DIODE

SYMBOL	MODEL
D301A	1SS120
D302A	1SS120
D303A	1SS120
D301B	1SS120
D302B	1SS120
D303B	1SS120
DB1	D15XB60
D901	S3L60
D902	S3L60
D903	S3L60
D904	S3L60
D905	S3L60
D906	S3L60
D913	1S2076A
D914	1S2076A
D915	1S2076A

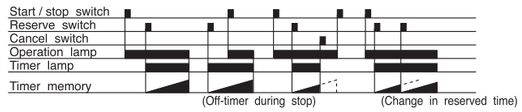
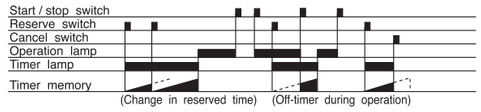
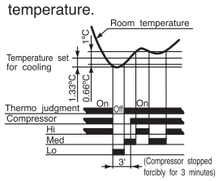
BLOCK DIAGRAM

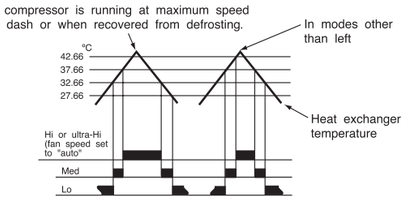
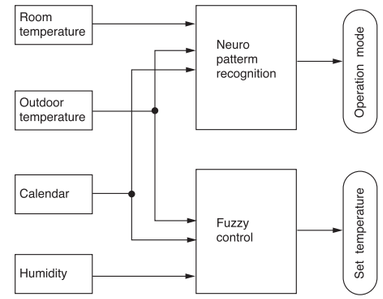


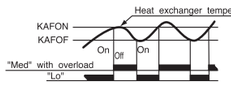
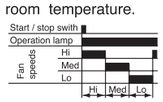
CAUTION: The circuit enclosed with ( ) is only RAS-80QH4.

BASIC MODE

MODEL RAF-25NH4, RAF-50NH4, RAD-25QH4, RAD-40QH4

<table>
<tr><th colspan="2">Operation mode</th><th>Fan</th><th>Cooling</th><th>Dehumidifying</th><th>Heating</th><th>Auto</th><th></th></tr>
<tr><td colspan="2">Basic operation of start / stop switch</td><td colspan="6"> 
</td></tr>
<tr><td rowspan="2">Timer functions</td><td>Off-timer</td><td colspan="6"> 
</td></tr>
<tr><td>On-timer</td><td colspan="6"> 
</td></tr>
<tr><td rowspan="4">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 18ºC in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33ºC).
When the compressor is running at maximum speed during hot dash or when recovered from defrosting.
 
</td><td rowspan="2">The neuro & fuzzy control allows device to determine optimum operation mode and set temperature. However, during auto cooling, the new cool rhythm starts when the room temperature is less than the set temperature plus 0.66ºC, after dash is finished.
 

Notes:
(1)The set temperature can be vaned ±3ºC using the temperature setting buttons ^ and v.
(2)If operation is started by tele-control or by temporary switch in status where remote control has not been used after power was supplied, the operation mode will be as follows (since there is no stored calendar data):
Room temperature at operation start (ºC)
<table>
<tr><td>Cooling</td><td>Set temperature:28ºC
Fan mode: Auto</td></tr>
<tr><td>Dehumiditying</td><td>Set temperature:Room temperature at operation start
Fan mode: Auto</td></tr>
<tr><td>Heating</td><td>Set temperature:22ºC
Fan mode: Auto</td></tr>
</table></td><td rowspan="2">The special auto mode is based on N&F auto, but the following is different:
<table>
<tr><th>Operation mode</th><th>Mode change during operation</th></tr>
<tr><td>N&F auto</td><td>Does not change as long as auto door temparature or calendar data does not change greatly.</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.
Note
(1)Since there is no stored calendar data, N&F control is not determined. See Note (2) of N&F auto.</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 18ºC in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33ºC).
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 18ºC in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33ºC).</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 18ºC in the "Ultra-Lo" mode other than during preheating (cooling is recovered at 18.33ºC).
The fan speed is controlled by the heat exchanger temperature; the overload control is executed as in the following diagram:
 
</td><td></td><td></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 127.</td><td>See page 133.</td><td>See page 137.</td><td></td><td></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 130.</td><td>·Same as at left.
·See page 133.</td><td>·Same as at left.
·See page 140.</td><td>·Same as at left.
·Performs the sleep operation of each operation mode.</td><td></td></tr>
</table>

Notes:
1. The speed set of rotaion for the fan motor in each operation mode are as shown in Table 1.
2. The set room temperatures in the diagram include the shift values in Table 2.
3. See "Damper control theory" for damper control and upper / lower fan operations.

MODEL		RAF-25NH4	RAF-50NH4
NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	REQUIRED VALUE OF UNIT SIDE
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	3.33 ℃	3.33 ℃
13F	SFTSZW	1.66 ℃	1.66 ℃
140	SHIFTC	1.00 ℃	1.00 ℃
141	SHIFTD	1.00 ℃	1.00 ℃
142	CLMXTP_M	30.00 ℃	30.00 ℃
143	YNEOF_M	23.00 ℃	23.00 ℃
148	TEION_M	2.00 ℃	2.00 ℃
149	TEIOF_M	9.00 ℃	9.00 ℃
150	CMNLMT_M	1900 min-1	1900 min-1
16D	FWSS_M	400 min-1	400 min-1
16E	FWSOY_M	710 min-1	820 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	1170 min-1
175	FWHH_M	960 min-1	1250 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	740 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	1100 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
		Sleep		FWSOY
		Lo		FWS
		Overload		FWKAF
		Med		FWL
		Hi	Set fan speed "Hi"	FWH
		Ultra Hi	(When AIR OUTLET SWITCH "ON")	FWHM
		Ultra Hi	(When AIR OUTLET SWITCH "OFF")	FWHH
		Hi	Set fan speed "AUTO"	FWAH
	Lower Fan	Ultra Lo		FWUDSS
		Sleep		FWUDSOY
		Lo		FWUDS
		Overload		FWUDKAF
		Med		FWUDL
		Hi	Set fan speed "Hi"	FWUDH
		Ultra Hi		FWUDHH
		Hi	Set fan speed "AUTO"	FWUDAH
Cooling operation	Upper Fan	Sleep		FCSOY
		Lo		FCS
		Med		FCL
		H	Set fan speed "Hi"	FCH
		Ultra Hi	(When AIR OUTLET SWITCH "ON")	FCHM
		Ultra Hi	(When AIR OUTLET SWITCH "OFF")	FCHH
		H	Set fan speed "AUTO"	FCAH
	Lower Fan	Sleep		FCUDSOY
		Lo		FCUDS
		Med		FCUDL
		H	Set fan speed "Hi"	FCUDH
		Ultra Hi		FCUDHH
		Hi	Set fan speed "AUTO"	FCUDAH
Dehumidifying operation		Sleep		FDOY
		Lo 1		FDS1
		Lo 2		FDS2

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

PROM NO.	LABEL NAME	RAD-25QH4	RAD-40QH4
		REQUIRED VALUE	OF UNIT SIDE
0	WMAX	5300 min-1	4500 min-1
1	WMAX2	5300 min-1	4500 min-1
2	WSTD	4000 min-1	4000 min-1
9	CMAX	3300 min-1	4000 min-1
A	CMAX2	3300 min-1	4000 min-1
B	CSTD	3000 min-1	3000 min-1
1B	SDMAX	2050 min-1	1800 min-1
1C	SDRPM	1800 min-1	1500 min-1
2B	PKOU	500 min-1	500 min-1
41	SHIFTW	5.00 ℃	5.00 ℃
42	SFTSZW	5.00 ℃	5.00 ℃
43	SHIFTC	1.66 ℃	1.66 ℃
44	SHIFTD	1.66 ℃	1.66 ℃
A3	AFWSS	13.0 V	13.0 V
A4	AFWSOY	17.6 V	17.6 V
A5	AFWS	20.3 V	20.3 V
A6	AFWKAF	22.8 V	22.8 V
A7	AFWL	22.8 V	22.8 V
A8	AFWAH	28.0 V	28.0 V
A9	AFWH	28.4 V	28.4 V
AA	AFWHH	28.4 V	28.4 V
AB	AFCSOY	17.9 V	17.9 V
AC	AFCS	20.5 V	20.5 V
AD	AFCL	24.0 V	24.0 V
AE	AFCAH	28.0 V	28.0 V
AF	AFCH	28.0 V	28.0 V
B0	AFCHH	28.0 V	28.0 V
B5	AFDOY	17.9 V	17.9 V
B6	AFDS1	20.5 V	20.5 V
B7	AFDS2	20.5 V	20.5 V

Table 1 Fan speed by mode

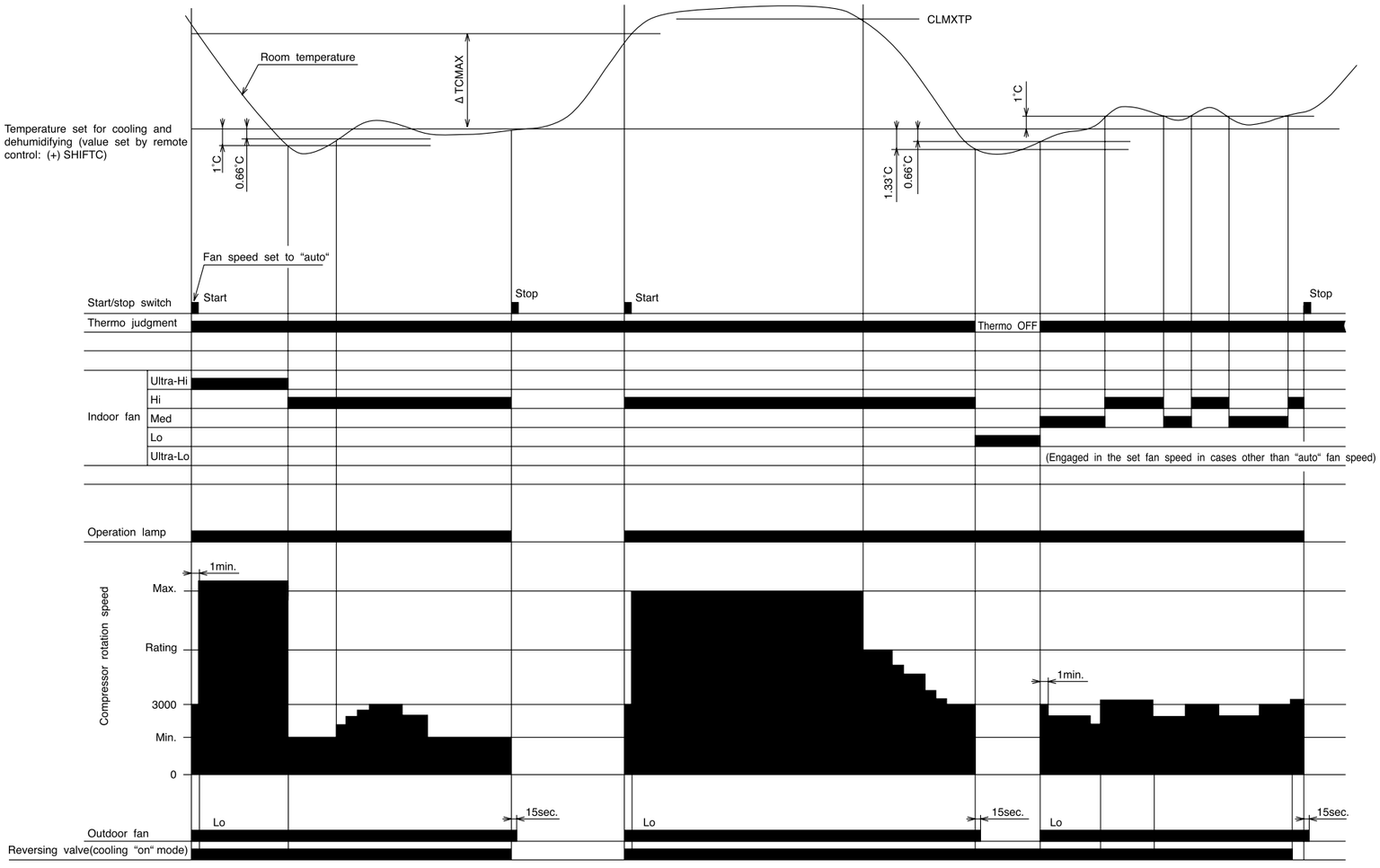
Operation mode	Fan speed mode		Label name
Heating Operation	Ultra Lo		AFWSS
	Sleep		AFWSOY
	Lo		AFWS
	Overload		AFWKAF
	Med		AFWL
	Hi	Set fan speed "AUTO"	AFWAH
		Set fan speed "Hi"	AFWH
	Ultra Hi		AFWHH
Cooling Operation	Sleep		AFCSOY
	Lo		AFCS
	Med		AFCL
	Hi	Set fan speed "AUTO"	AFCAH
		Set fan speed "Hi"	AFCH
	Ultra Hi		AFCHH
Dehumidifying operation	Sleep		AFDOY
	Lo 1		AFDS1
	Lo 2		AFDS2

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

MODE					NO.	LABEL NAME	REQUIRED VALUE OF UNIT SIDE	
ELECTRIC EXPANSION VALVE	The degree of valve difference at the time of starting	COOLING OPERATION	1 unit operation	Outdoor temperature of less than 40℃	080H	PSTARTC1$	250	
				Outdoor temperature of 40℃ or more	081H	PSTARTC1K$	300	
			2 unit operation	Outdoor temperature of less than 40℃	082H	PSTARTC2$	150	
				Outdoor temperature of 40℃ or more	083H	PSTARTC2K$	200	
		HEATING OPERATION	Common	Except the indoor setting wind velocity LOW	084H	PSTARTH$	180	
				Indoor setting wind velocity LOW	085H	PSTARTH2$	100	
	The degree of minimum valve difference				086H	PMIN$	30	
	Reverse cycle period	The digree of initial valve difference	Normal		087H	DFCTPS$	100	
			Step up		089H	DFSPPS$	380	
			The degree of last attainment valve difference		08AH	DFPSMX$	480	
		The digree of valve difference by the stop side refrigerating cycle			08BH	PCLOCH$	30	
		A part for the narrow pipe of the stop cycle side temperature rise			08CH	HOSO_SA	3.00	
	Compensa -tion △	COOLING OPERATION			08DH	dN_e_C	50	
		HEATING OPERATION			08EH	dN_e_H	80	
Compressor rotation speed maximum and minimum value	≪ Cooling ≫ Max Command rotation speed	SINGLE COMPRESSOR OPERATION	One unit operation		0C0H	CMAX_1C1D	5200	min-1
			Two unit operation	(Those with 2kw model connection)	0C1H	CMAX_1C2D1	5200	min-1
			Two unit operation		0C2H	CMAX_1C2D2	5500	min-1
		TWO COMPRESSOR OPERATION	One unit operation		0C3H	CMAX_2C1D	4000	min-1
			Two unit operation	(Those with 2kw model connection)	0C4H	CMAX_2C2D1	4500	min-1
			Two unit operation		0C5H	CMAX_2C2D2	5000	min-1
	≪ HEATING ≫ Max Command rotation speed	SINGLE COMPRESSOR OPERATION	One unit operation		0C6H	WMAX_1C1D	5800	min-1
			Two unit operation	(Those with 2kw model connection)	0C7H	WMAX_1C2D1	6500	min-1
			Two unit operation		0C8H	WMAX_1C2D2	6500	min-1
		TWO COMPRESSOR OPERATION	One unit operation		0C9H	WMAX_2C1D	5000	min-1
			Two unit operation	(Those with 2kw model connection)	0CAH	WMAX_2C2D1	6500	min-1
			Two unit operation		0CBH	WMAX_2C2D2	6500	min-1
	Max at the time of the following of the setting wind velocity is Lo	Normal	Cooling		0CCH	CJKMAX	5000	min-1
			Heating		0CDH	WJKMAX	6500	min-1
	One unit heating operation outdoor temp. ≦ max rotation speed at the5℃		3.6 kw or less		0D0H	GAIMX1	5650	min-1
			4.0 kw or more		0D1H	GAIMX2	5800	min-1
	Minimum rotation speed		Cooling		0D2H	CMIN	1400	min-1
			Heating		0D3H	WMIN	1400	min-1
Rversing valve control	Power ON/OFF at the compressor rotation speed	O N	Normal		120H	BONRPM_S	1500	min-1
		O F F	Velocity		122H	BOFRPM	1600	min-1
			Continuation time		123H	BONTMB	180	sec.
	Power on at the time of a compressor slowdown	Forced ON time			124H	SBNTIM	10	min.
		Compressorcommand rotations spee is down deviation			125H	SIREISA	300	min-1
	Power ON by the outdoor temperature				126H	SBCTGT	34	℃
	Compressor rotation speed at the during Forced cooling operation				128H	KYO_RPM	4000	min-1
Compressor starting sequence	At starting of cooling operation cycle	outdoor temperature judging value			129H	STAROTP_C	25.0	℃
		outdoor temperature ＞ STAROTP_C	initial rotation speed		12AH	SDRCT1_C1	2000	min-1
			initial drive time		12BH	TSKTM1_C1	60	sec.
		outdoor temperature ≦ STAROTP_C	initial rotation speed		12CH	SDRCT1_C2	3000	min-1
			initial drive time		12DH	TSKTM1_C2	60	sec.
	At starting of heating operation cycle	outdoor temperature judging value			12EH	STAROTP_W	4.8	℃
		outdoor temperature ＞ STAROTP_W	initial rotation speed		12FH	SDRCT1_W1	2000	min-1
			initial drive time		130H	TSKTM1_W1	60	sec.
		outdoor temperature ≦ STAROTP_W	initial rotation speed		131H	SDRCT1_W2	3000	min-1
			initial drive time		132H	TSKTM1_W2	120	sec.
	Step-up control	Step-up rotation speed			133H	SDSTEP	1000	min-1
		Step-up cycle			134H	TSKSPT	8	sec.
Defrost control	Slowdown period paramete	Slowdown period 1			135H	TDF411	0	sec.
		Slowdown period 2			136H	TDF412	0	sec.
		Slowdown period 3			137H	TDF413	0	sec.
	Balance time before a reverse cycle start				138H	TDF414	90	sec.
	The parameter in a reverse cycle period	Maximum execution time			139H	DFMXTM	12	min.
		At starting	initial rotation speed		13AH	SDRCT2	2000	min-1
			initial drive time		13BH	TSKTM2	60	sec.
		Step-up	Step-up rotation speed		13CH	DFSTEP	1000	min-1
			Step-up cycle		13DH	TDFSPT	90	sec.
		Maximum rotation speed			13EH	DEFMAX	6000	min-1
	Balance time after a reverse cycle ended				13FH	TDF415	90	sec.
	Defrost prohibition period	0℃ or more of outdoor temperature			140H	DFSTMB	50	min.
		-5℃ or less of outdoor temperature			141H	DFSTMB2	88	min.
	Defrost demand start /release	Start heat exchanger temperature	Maximum		142H	DEFONH	-1.9	℃
			Standard		143H	DEFON	-5.1	℃
			Minimum		144H	DEFONL	-23.9	℃
			Compensation coefficient	-3℃ or more of outdoor temperature	145H	DEF_a1	112	/128
				Less than -3℃ of outdoor temperature	146H	DEF_a2	138	/128
		Defrost release			147H	DEFOFF	15.0	℃
Protection control	Compressor rotation speed at the overheat thermistor high temperature			Down start overheat thermistor temperature	148H	NDWN_ON	97.2	℃
				Down release overheat thermistor temperature	149H	NDWN_OFF	95.0	℃
	Stop by overheat	Start temperature			14AH	OH_ON	118.2	℃
		Release temperature			14BH	OH_OFF	104.7	℃

Basic Cooling Operation



Notes:

(1) The comprassor minimum ON time and minimum OFF time is 3minutes.

(2) See "Damper control theory" for dampar control and upper / lower fan operations.

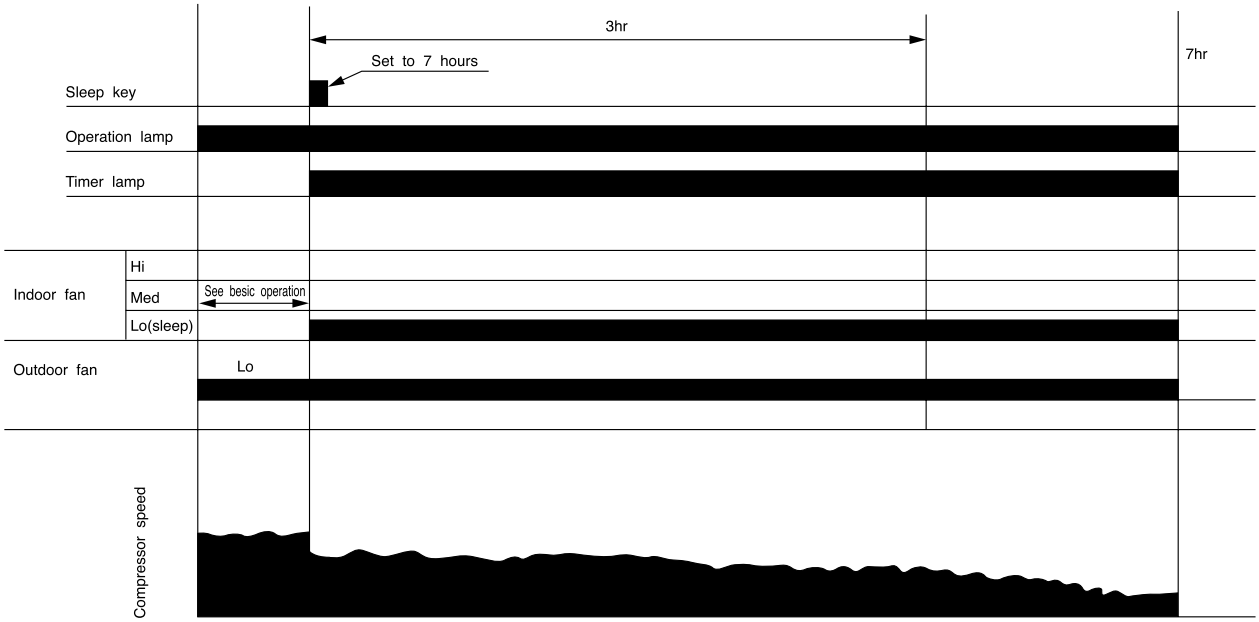
Table 1 Δ TCMAX

Maximum speed -minimum speed	Room temperature-set temperture (including shift)
1400min^{-1}	2.00˚C
1800min^{-1}	2.33˚C
2200min^{-1}	2.66˚C
2600min^{-1}	3.00˚C
3000min^{-1}	3.33˚C
3400min^{-1}	3.66˚C
3800min^{-1}	4.00˚C
4200min^{-1}	4.33˚C
4600min^{-1}	4.66˚C
5000min^{-1}	5.00˚C
5400min^{-1}	5.33˚C
5800min^{-1}	5.66˚C
6200min^{-1}	6.00˚C
6600min^{-1}	6.33˚C
7000min^{-1}	6.66˚C

Note:

1. See the data on page 118, 120, 123 for each constant in capital letters in the diagrams.

Cooling Sleep Operation



Notes:

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

(2) If the operation mode is changed during sleep operation, the set temperature is cleared, and shift starts from the point when switching is made.

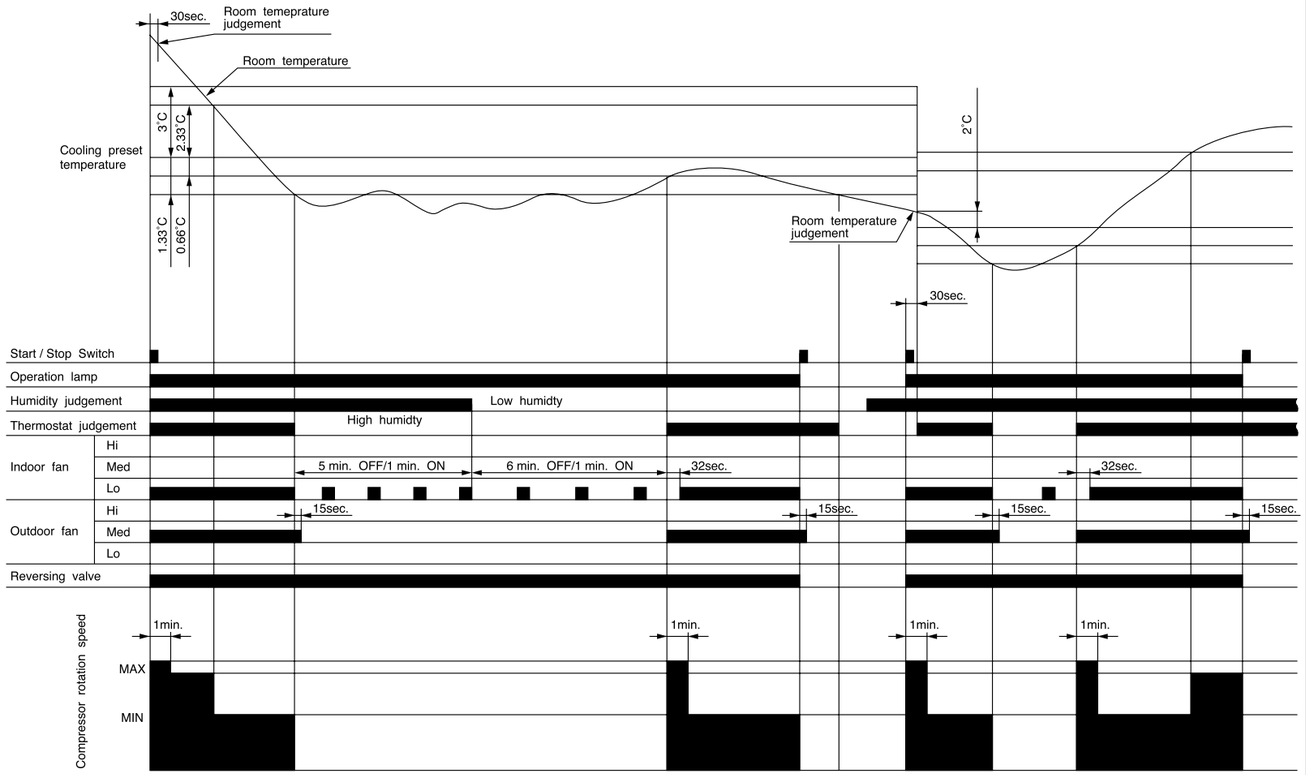
(3) The indoor fan speed does not change even when the fan speed mode is changed.

(4) When operation is stopped during sleep operation, the set temperature when stopped, as well as the time, continue to be counted.

(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.

Dehumidifying



Notes:

(1) 30 seconds after the operation is started, when the room temperature is (cooling preset temperature) - (1.33˚C) or less, the operation is done assuming as the preset temperature = (room temperature at the time) - (2˚C).

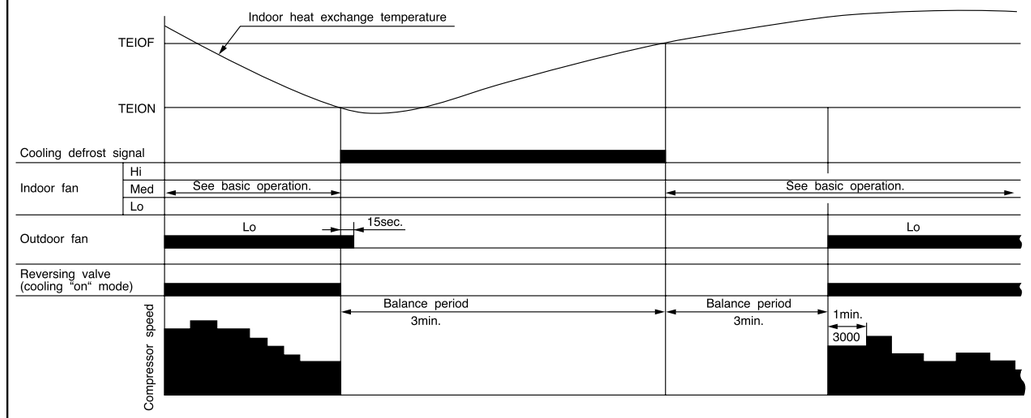
(2) The indoor fan is operated in the "Lo" mode, OFF for 5 minutes and ON for 1 minute (at high humidity) or OFF for 6minutes and ON for 1 minute (at low humidity), repeatedly according to the humidity judgement when the thermostat is turned OFF.

(3) When the operation is started by thee themostat turning ON, the start of the indoor fan is delayed 32 seconds after the start of compressor operation.

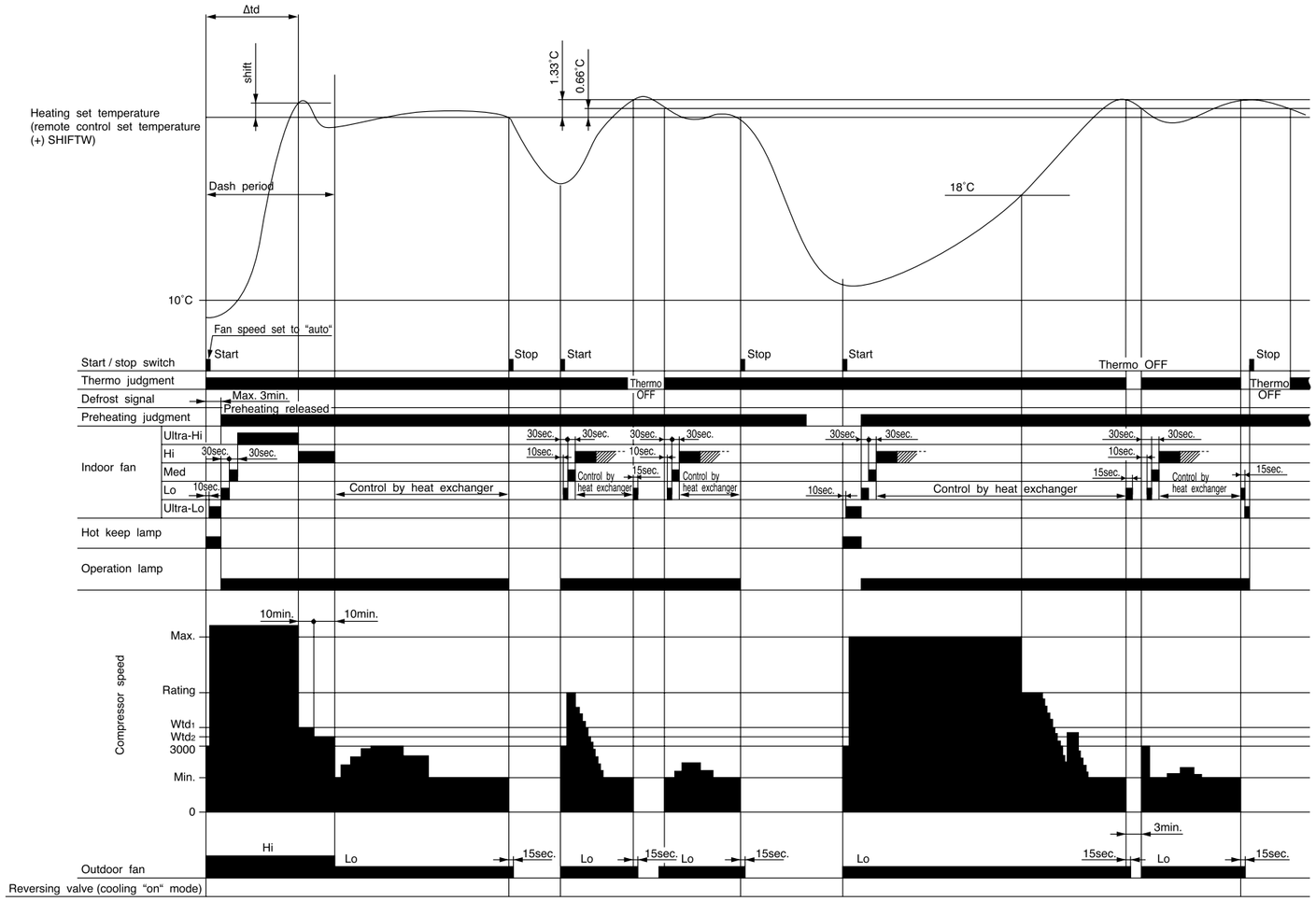
(4) The commpressor is operated forcedly for 3 minutes after operation is started.

(5) The minimum ON time and OFF time of the compressor are 3 minutes.

Cooling Defrost



Basic Heating Operation



Notes:

(1) Hot dash is engaged if the difference between the room temperature and set temperature is equal to that between the room temperature, at which the compressor reaches maximum speed, and set temperature (ΔTWMAX: See Table 7), and the room and outdoor temperatures are less than 10˚C; when the fan speed is "auto", operation is started at "Hi", or the fan speed is changed to "Hi" during heating.

(2) The maximum compressor speed period during hot dash is finished (1) when the room temperature reaches the heating set temperature (including heating shift) when the thermo is off.

(3) The thermo OFF temperature during hot dash is heating set temperature (including heating shift) plus 3˚C. After thermo OFF, hot dash finishes, and PI control starts with item I = 0.

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

(5) The time limit for which the maximum compressor speed during normal heating (except for hot dash) can be maintained is less than 120 minutes when the room temperature is 18˚C or more; it is not provided when the room temperature is less than 18˚C and outdoor temperature is less than 2˚C.

(6) The operation indicator blinks every second during initial cycle operation, preheating, defrosting (including balance time after defrosting is finished), or auto fresh defrosting.

(7) If the room temperature falls to less than 18˚C in the "ultra-Lo" mode, the indoor fan stops. When the room tempereture is 18˚C+0.33˚C 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˚C.

(8) When thermostat is OFF ; after 3 minutes has elapsed operation with FAN set to ON for 15seconds and OFF for 60seconds will be repeated depending on heat exchange temperature.

Table 6 Speed Specifications during Steady Speed Period.

Δtd (Hot dash time)	Wtd_1	Wtd_2
Less than 10 minutes	$2000min^{-1}$	$1600min^{-1}$
10 - 20 minutes	$3000min^{-1}$	$2400min^{-1}$
20 minutes or more	$4000min^{-1}$	$3200min^{-1}$

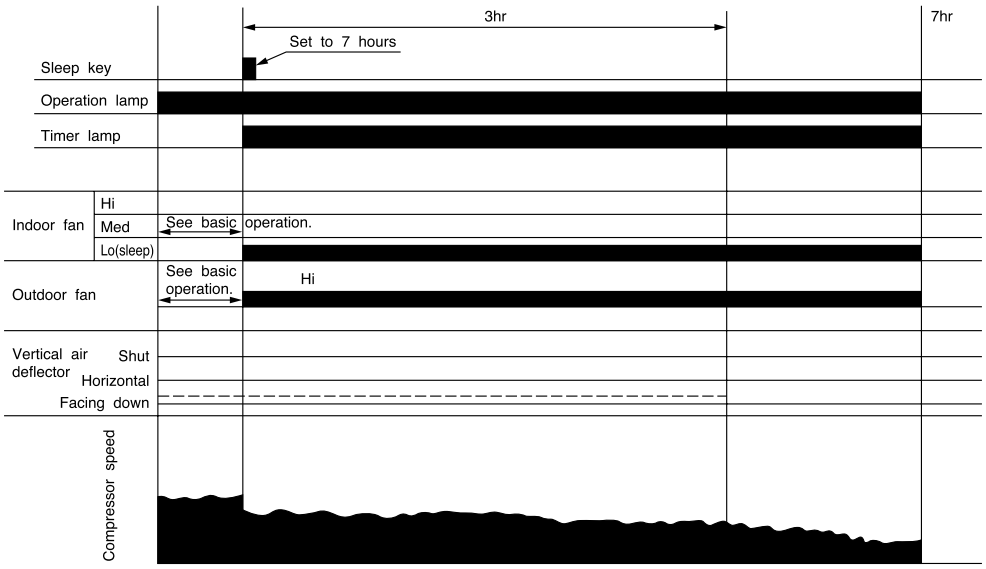
Table 7 ΔTWMAX

Compressor speed - minimum speed	Set temperature (including shift)- room temperature
$1400min^{-1}$	2.00˚C
$1800min^{-1}$	2.33˚C
$2200min^{-1}$	2.66˚C
$2600min^{-1}$	3.00˚C
$3000min^{-1}$	3.33˚C
$3400min^{-1}$	3.66˚C
$3800min^{-1}$	4.00˚C
$4200min^{-1}$	4.33˚C
$4600min^{-1}$	4.66˚C
$5000min^{-1}$	5.00˚C
$5400min^{-1}$	5.33˚C
$5800min^{-1}$	5.66˚C
$6200min^{-1}$	6.00˚C
$6600min^{-1}$	6.33˚C
$7000min^{-1}$	6.66˚C

Note:

1. See the data on page 118, 120, 123 for each constant in capital letters in the diagrams.

Heating Sleep Operation



Notes:

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

(2) If the operation mode is changed during sleep operation, the changed operation mode is set and sleep control starts.

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

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

(5) When operation is stopped during sleep operation, the set temperature when stopped, as well as the time, continue to be counted.

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

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

MODEL RAM-70QH4
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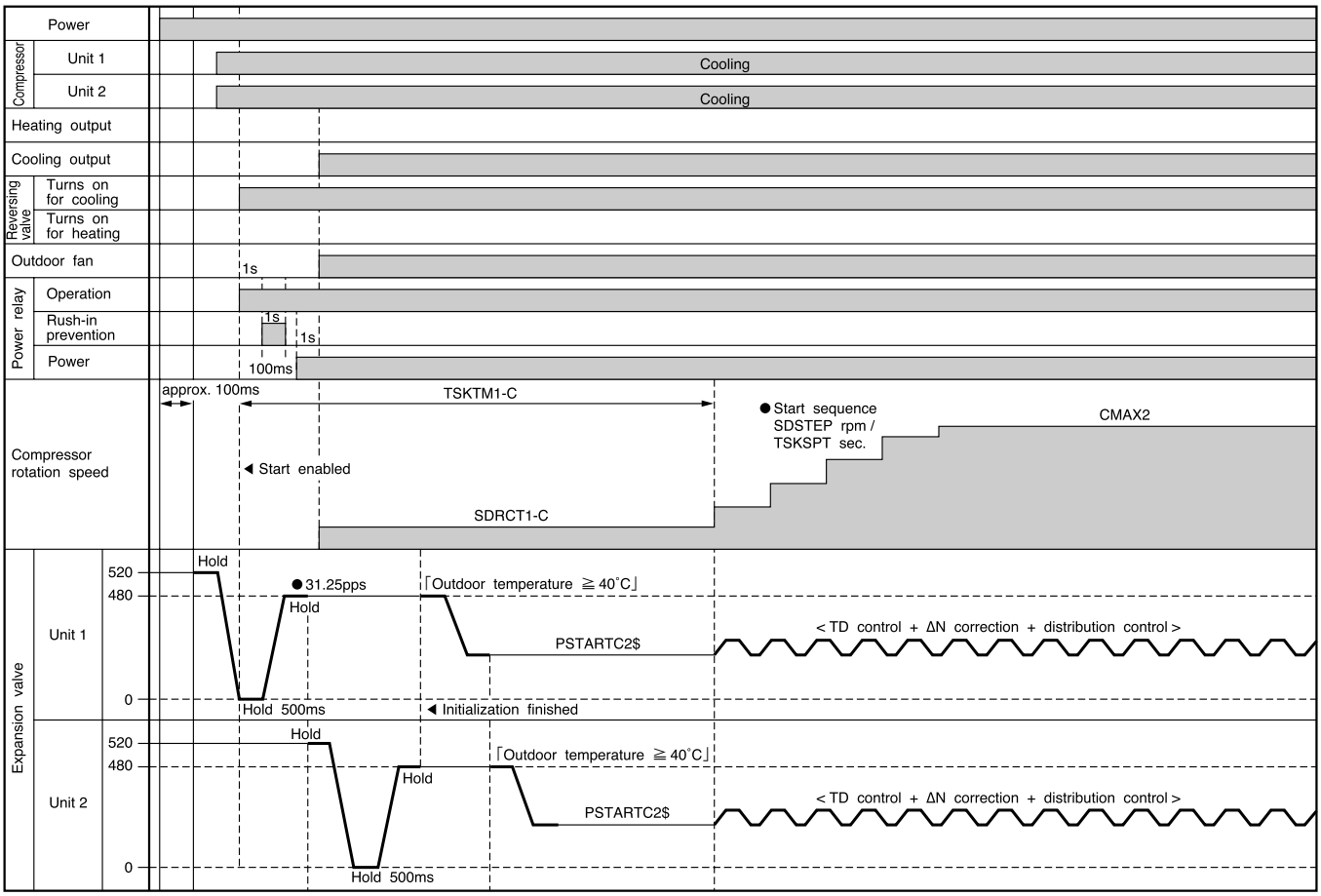
◇ Expansion valves

- 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). When the valve for unit 1 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 reached.

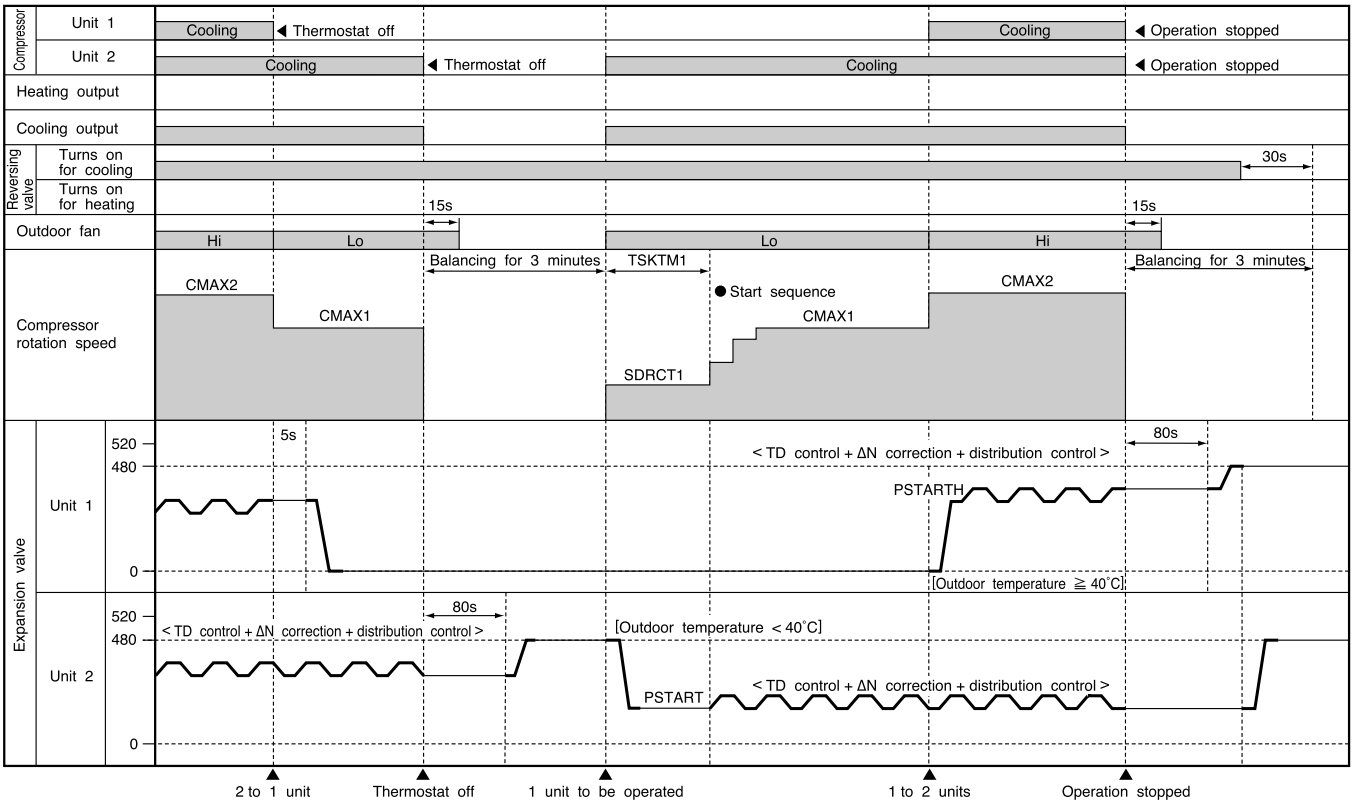


※ • See other sections for details of expansion valve TD control, ΔN correction and distribution control.
- TSKTM1, SDRCT1, SDSTEP, TSKSPT, CMAX2, PSTART and PSTARTH are EEPROM data.
- Unit 3 and 4 operation is the same as unit 1 and 2.
  However, the outdoor unit fan is operated with the type A compressor.
- Wiht RAM-70QH4, type B compressor operates unit 3 only.

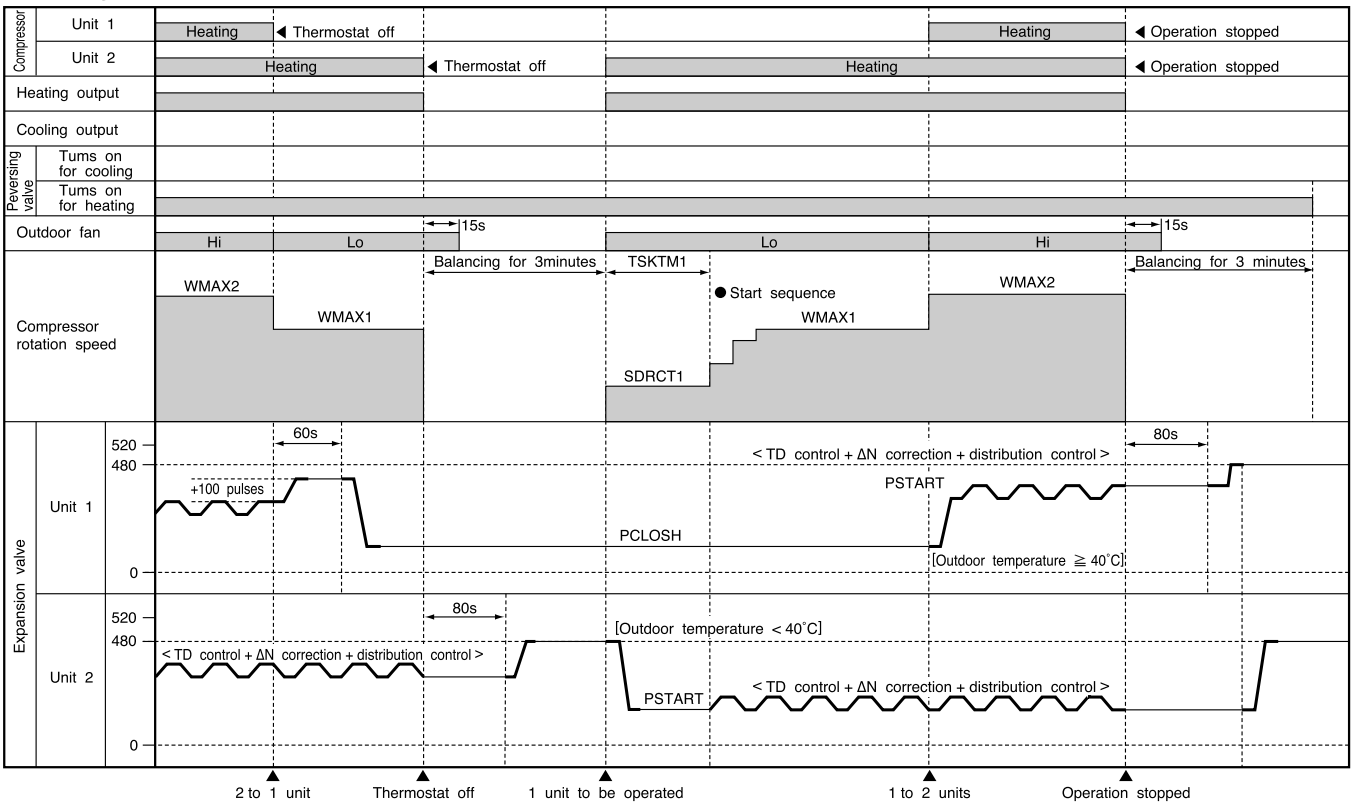
CHANGING THE NUMBER OF UNITS TO BE OPERATED

- The following shows the operation status when the number of units to be operated is changed from 2 to 1, thermostat off, 1, 2 and then operation stop.

[Cooling]



[Heating]



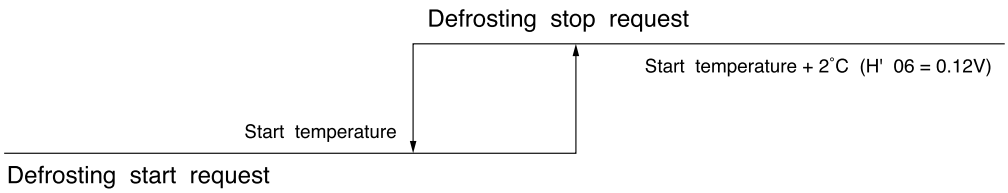
※ • See other sections for details of expansion valve TD control, ΔN correction and distribution control.
• CMAX1, CMAX2, WMAX1, WMAX2, TSKTM1, SDRCT1, PSTART, PSTARTH and PCLOSH are EEPROM data.

<< Defrosting Start / Release Request Judgment >>

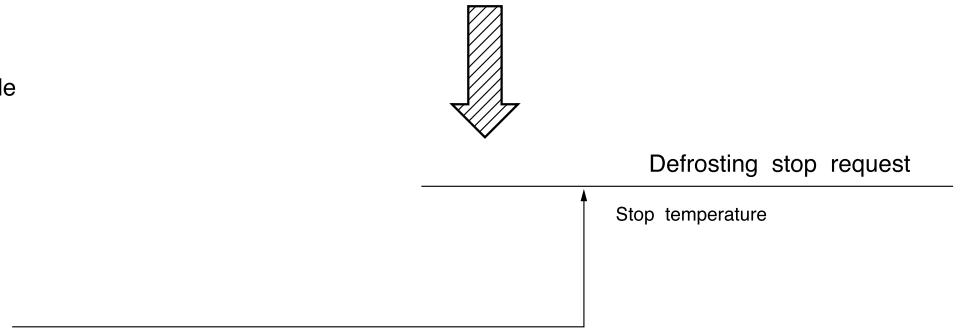
- The microcomputer retrieves temperature data from the heat exchange sensor data; it senses that defrosting starts when the operation mode is heating (other than defrosting), and that defrosting stops when it is still defrosting.

Defrosting start temperature: DEF-ON (EEPROM)
Defrosting stop temperature: DEF-OFF (EEPROM)

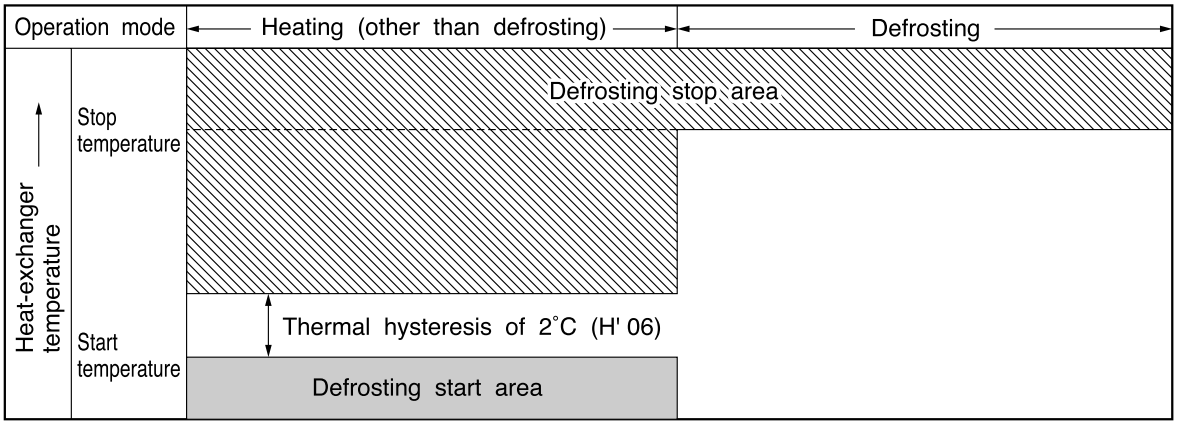
1. Defection process diagram
   - During heating mode (other than defrosting)



   - During defrosting mode



Note : Even if defrosting start request is issued, defrosting will not commence until the defrosting inhibit time (FLGSET : EEPROM) has passed after operation starts.



DEFROSTING

- A reversing valve defrosting format is used, and the defrosting cycle consists of [balancing period of 90 seconds when defrosting starts -> reverse cycle period for 12 minutes maximum -> balancing period of 90 seconds when defrosting stops]. Since this system uses the outdoor heat-exchanger concurrently in two cycles, defrosting is executed for both cycles during 2-cycle heating operation.

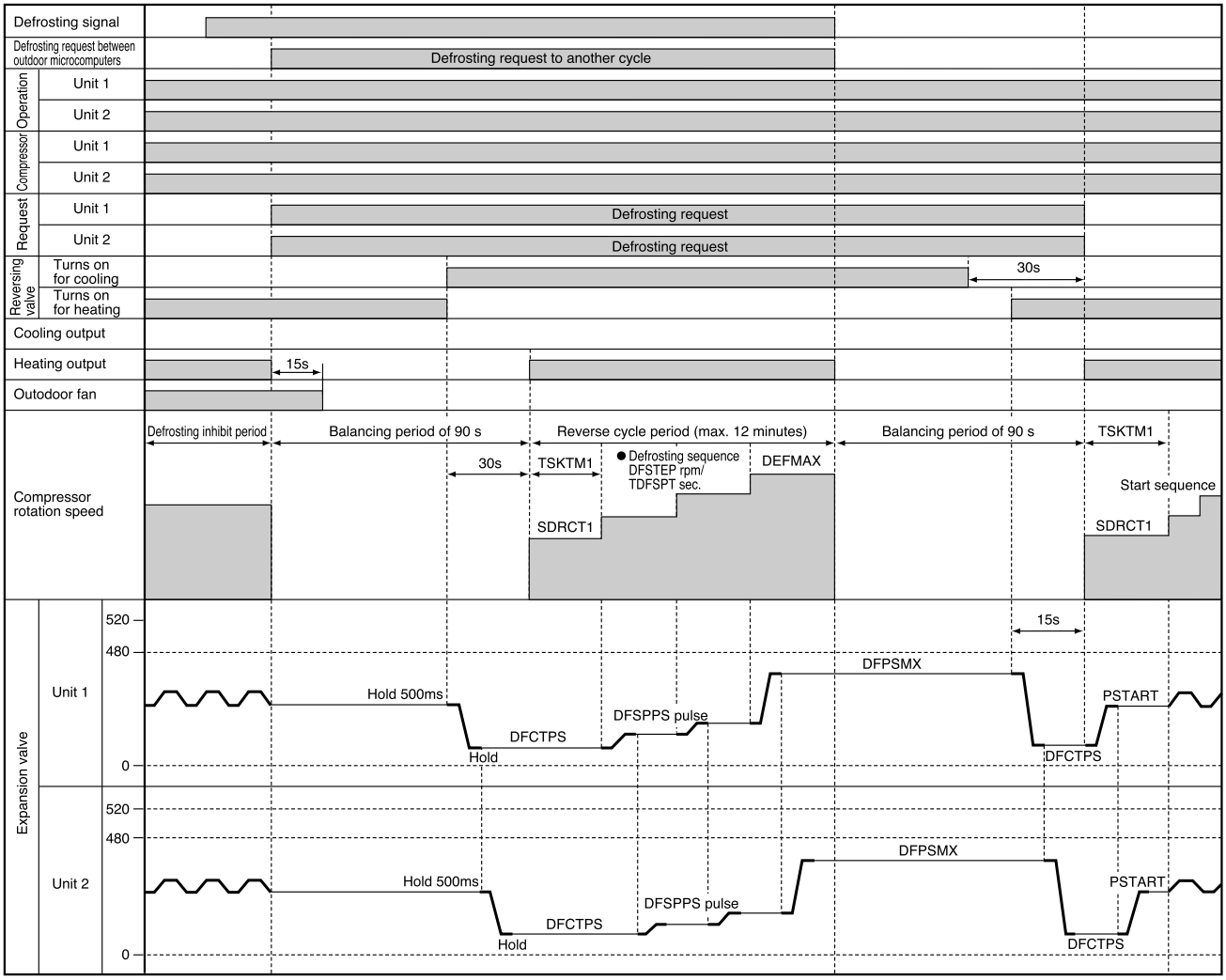
(1) Defrosting start conditions
- Defrosting is performed when all the following conditions are satisfied (however, this does not apply when a defrosting request from another cycle is received.):
  ① For normal operation
  ② Heat-exchanger low temperature (heat-exchanger temperature ≦ DEF. ⇒ ON)
  ③ When defrosting inhibit time is up (instructed by EEPROM [FLGSET (3.2.1)] and set when normal operation is started)

(2) Defrosting stop conditions
- Defrosting is released when either of the following conditions is established (however, defrosting will continue when a defrosting request from another cycle is received.):
  ① Heat-exchanger temperature is recovered (heat-exchanger temperature ≧ DEF. ⇒ OFF)
  ② When maximum defrosting time (12 minutes) is up
  ※ Release during balancing at start: To be returned to normal when remaining balancing time is up.
  Release during reverse cycle period: To be returned to normal when balancing time (90 seconds) is up at the end.

(3) Outputs during defrosting
[Defrosting request between outdoor microcomputers] To be transferred only when heat-exchanger low temperature is detected and defrosting is being executed.
[Indoor defrosting request] To be transferred to all units which are in heating operation.
[Compressor] To increase the speed at the rate of DFSTEP rpm/TDFSPT second and reach the maximum defrosting speed [DEFMAX].
[Expansion valves] Units with compressor off: To be fully closed when defrosting starts and the balancing time (30 seconds) is up.
Units with compressor on: To be opened by [DFSPPS] pulses, synchronized with a step-up of rotation speed, and fully opened [DFPSMX] when the speed reaches [DEFMAX].
※ If there is no compressor on machine in one cycle, the above control can be performed by turning the operation bit on and off.

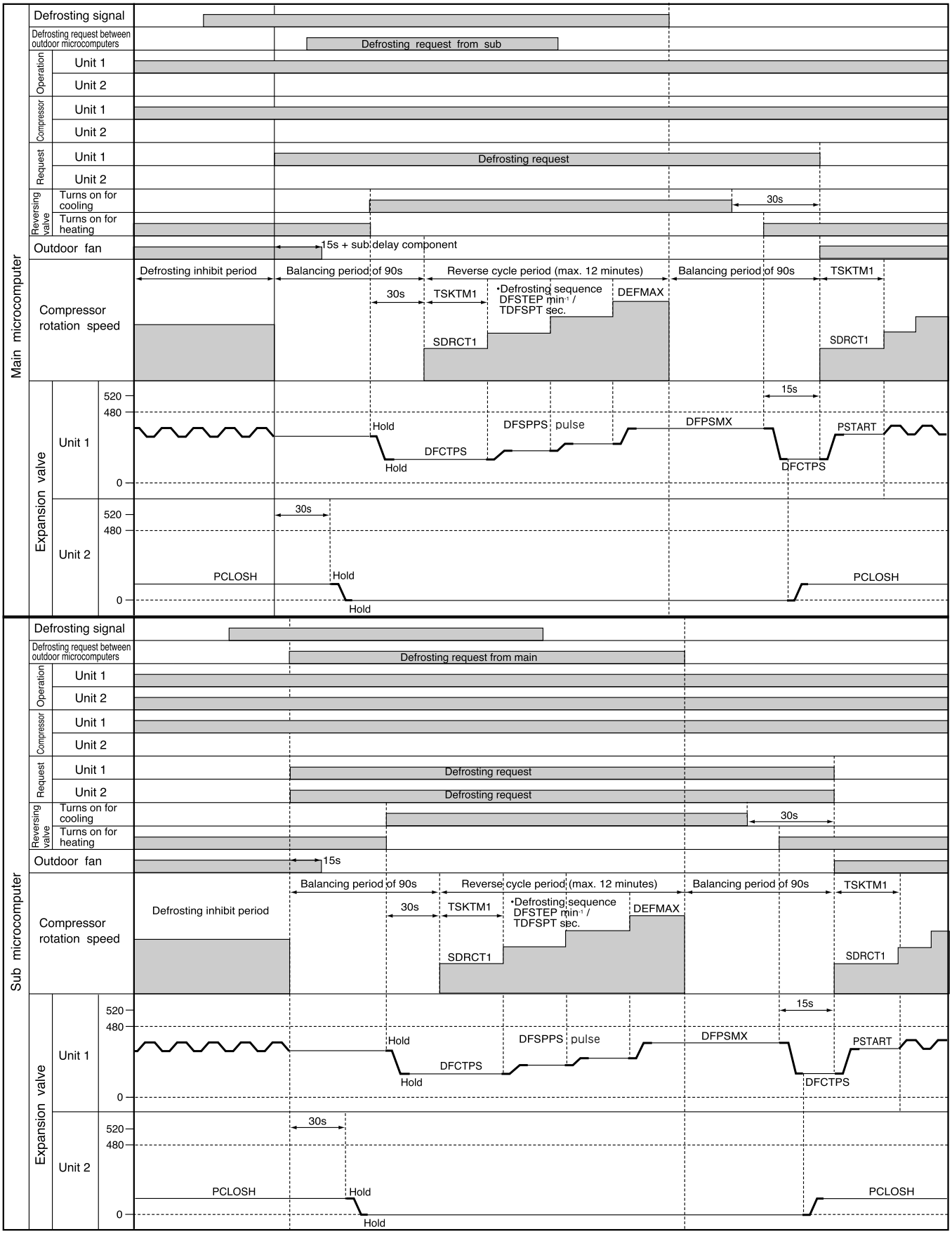
(4) Special remarks
- During one-cycle heating operation, defrosting should be executed with one cycle only. Other cycles should remain in the stop mode.
- During 2-cycle heating operation, defrosting is released and finished for both cycles. Therefore, each period may exceed the specitied time.
- If unit fails and stops while defrosting is being executed by a defrosting request issued from another cycle, defrosting will be executed from start (for balancing 90 seconds) after balancing 3 minutes are up and failure is released.

During one-cycle heating operation



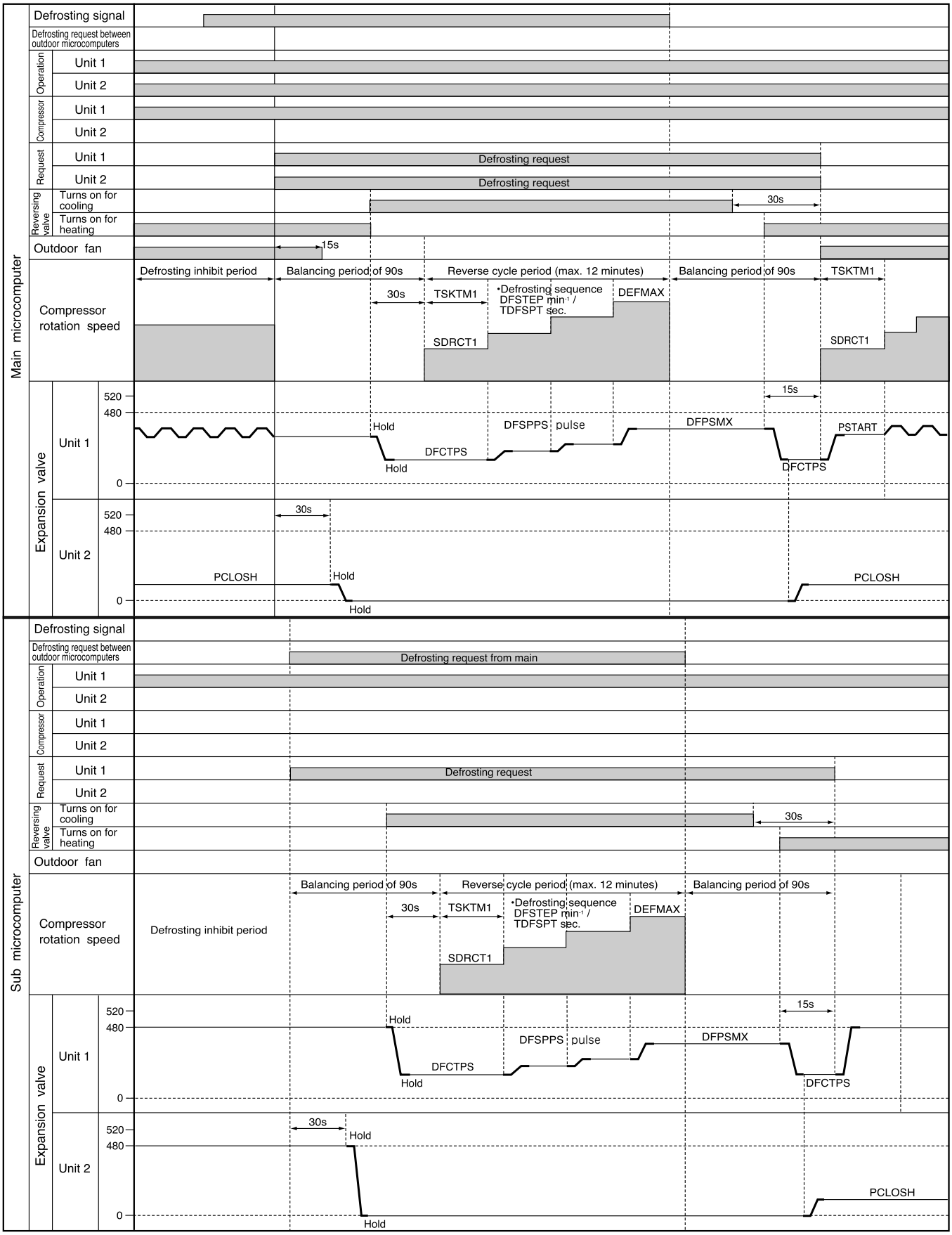
※ • See other sections for details of expansion valve TD control, ΔN correction and distribution control.
• DEF-ON, DEF-OFF, TSKTM1, SDRCT1, TDFSPT, DFSTEP, DEFMAX, PSTART, DFCTPS, DFSPPS and FLGSET are EEPROM data.

During two-cycle heating operation Ⅰ (main unit 1: thermostat on/main unit 2: operation stop/sub unit 1: thermostat on/sub unit 2: thermostat off)



※ • See other sections for datails of expansion valve TD control, Δ N correction and distribution control.
• TSKTM1, SDRCT1, DFSTEP, TDFSPT, DEFMAX, DFCTPS, DFSPPS, DFPSMX, PSTART and PCLOSH are EEPROM data.

During two-cycle heating operation Ⅱ (main unit 1: thermostat on/main unit 2: thermostat off/sub unit 1: thermostat off/sub unit 2: operation stop)



※ • See other sections for datails of expansion valve TD control, Δ N correction and distribution control.
• TSKTM1, SDRCT1, DFSTEP, TDFSPT, DEFMAX, DFCTPS, DFSPPS, DFPSMX, PSTART and PCLOSH are EEPROM data.

AUTO FRESH DEFROSTING

• If auto fresh conditions are established when heating operation stops, defrosting operation can be executed during the stop period.
Auto fresh defrosting consists of [balancing period of 90 seconds when defrosting starts → reverse cycle period for 12 minutes maximum] .

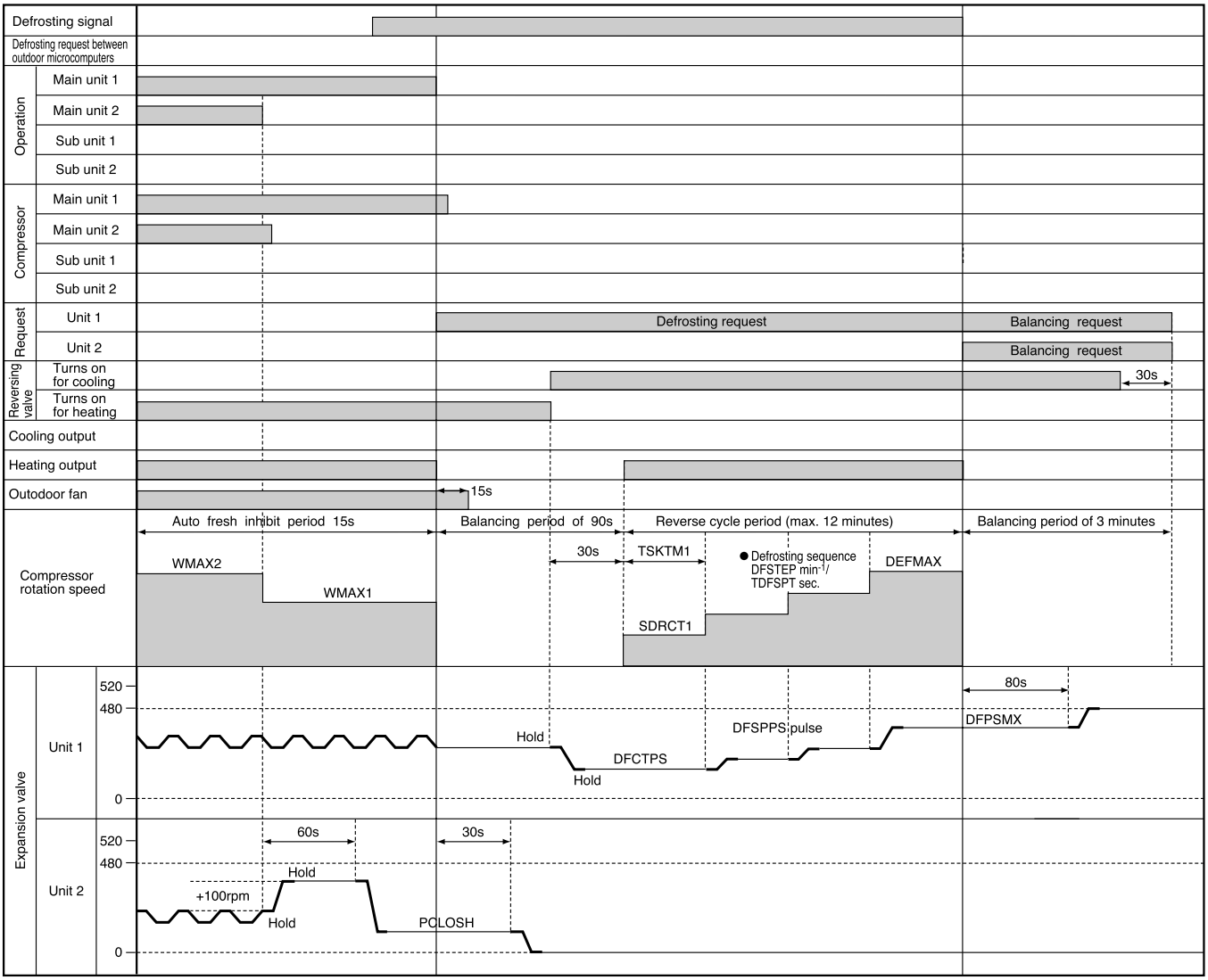
(1) Auto fresh defrosting defrosting start conditions
- Auto fresh defrosting is performed when all the following conditions are satisfied:
  1) Heat-exchanger at low temperature (heat-exchanger temperature ≦ DEF → ON)
  2) Units in all cycles stop
  3) Auto fresh defrosting inhibit time (15 minutes) is up
  4) Compressor is turned on during operation stop
  5) There is a delay of compressor from indoor units during operation stop

(2) Auto fresh defrosting stop conditions
- Auto fresh defrosting is released when any of the following conditions is established:
  1) Heat-exchanger temperature is recovered (heat-exchanger temperature ≧ DEF → OFF)
  2) Maximum defrosting time (12 minutes) is up
  3) A failure occurs
  4) Either indoor unit of all cycles starts operation.

※ Release during balancing at start: To stop or start operation when remaining balancing time is up.
Release during reverse cycle period: To stop or start operation when balancing time (3 minutes) is up.

(3) Outputs during auto fresh defrosting
[Defrosting request between outdoor microcomputers] Not to be transferred.
[Indoor defrosting request] To be transferred only to object unit of auto fresh defrosting (indoor unit which has stopped last).
[Compressor] To increase the speed at the rate of DFSTEP rpm/TDFSPT second and reach the maximum defrosting speed [DEFMAX].
[Expansion valves] Non-object units of auto fresh defrosting: To be fully closed when defrosting starts and the balancing time (30 seconds) is up.
Object units of auto fresh defrosting: To be opened by [DFSPPS] pulses, synchronized whith a step-up of rotation speed, and fully opened [DFPSMX] when the speed reaches [DEFMAX].

(4) Special remarks
- Other cycles should remain in the stop mode.
- When operation stops during defrosting, the unit should directly shift to auto fresh defrosting.
- All indoor units should stop for auto fresh defrosting. Therefore, if two cycles stop operation simultaneously, auto fresh defrosting will not commence because of delay in communications.



※ • See other sections for details of expansion valve TD control, ΔN correction and distribution control.
• TSKTM1, SDRCT1, DFSTEP, TDFSPT, DEFMAX, DFCTPS, DFSPPS, DFPSMX and PCLLOSH are EEPROM data.

PROCESSING AT OVERHEAT THERMISTOR (OH) HIGH TEMPERATURE

◇ Restriction Start Conditions

[Operating two units] in common for cooling and heating

- When either expansion valve counts 480 pulses and the OH temperature ＞ 97℃ ⇒ the compressor speed will decrease at a rate of 100 min^{-1} / 30 second.

[Operating one unit for cooling]

- When the expansion valve of the operated unit counts 480 pulses and the OH temperature ＞ 97℃ ⇒ the compressor speed will decrease at a rate of 100 min^{-1} / 30 second.

[Operating one unit for heating]

- When the expansion valve of the operated unit counts 480 pulses and the OH temperature ≧ 97℃ ⇒ the expansion valve of stopped unit will open until 250 pulses are counted at a rate of 20 pulses / 20 second.
- When the expansion valve of the operated unit counts 480 pulses and the OH temperature ＞ 97℃ ⇒ the compressor speed will decrease at a rate of 100 min^{-1} / 30 second.

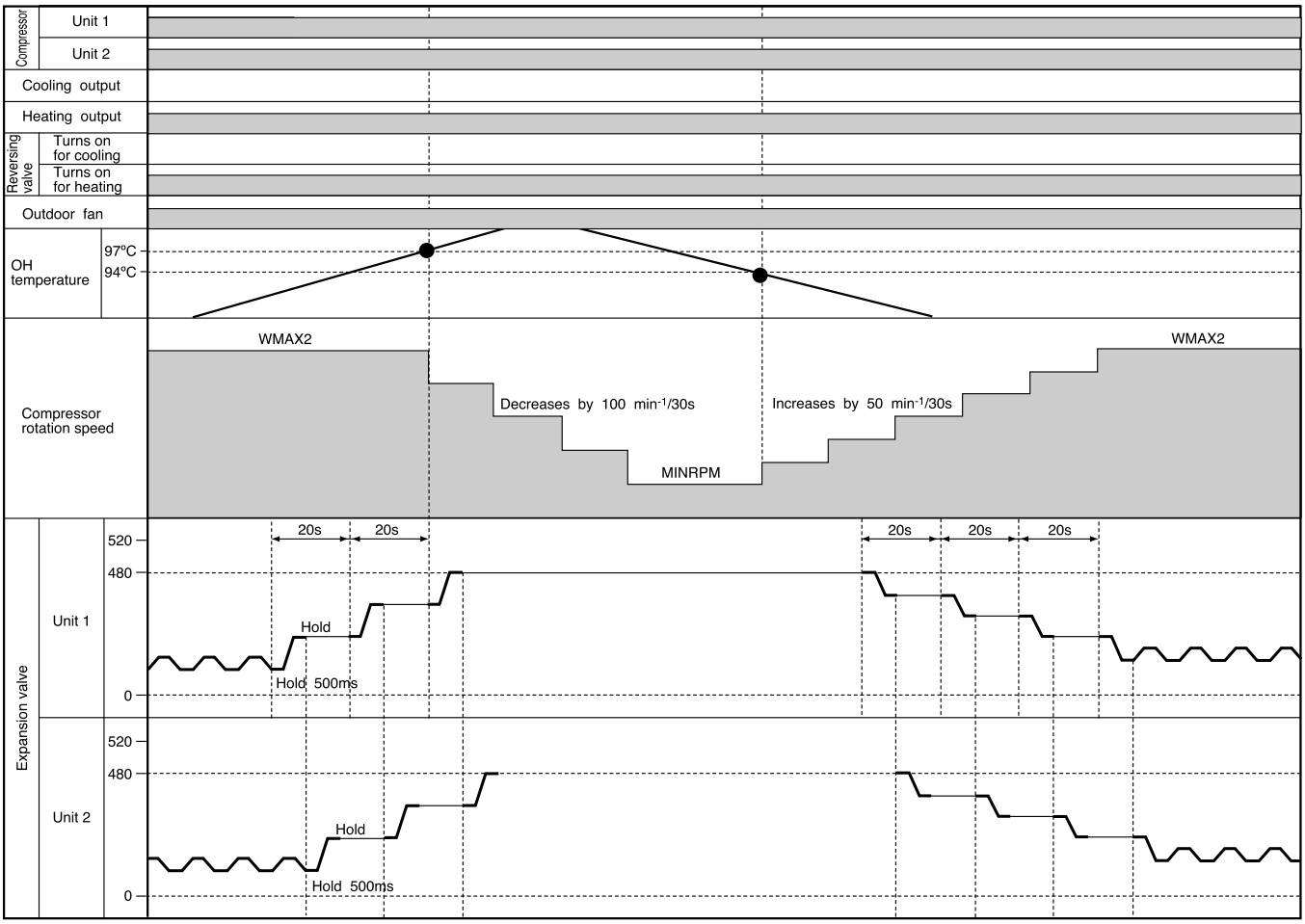
※ • The decreasing rotation speed is based on that when reduction processing is started and will hold until decreasing is finished. However, the reference rotation speed will be replaced only when the target speed is lower than that when reduction processing was started.

- Reduction of compressor speed is inhibited when the OH temperature is between 94℃ and 97℃ and does not rise from 30 seconds before.

◇ Restriction Release Condition (in common for all)

- Restriction is released when the OH temperature ＜ 94℃ and the compressor speed increases at a rate of 50 min^{-1} / 30 second to restore the target speed.

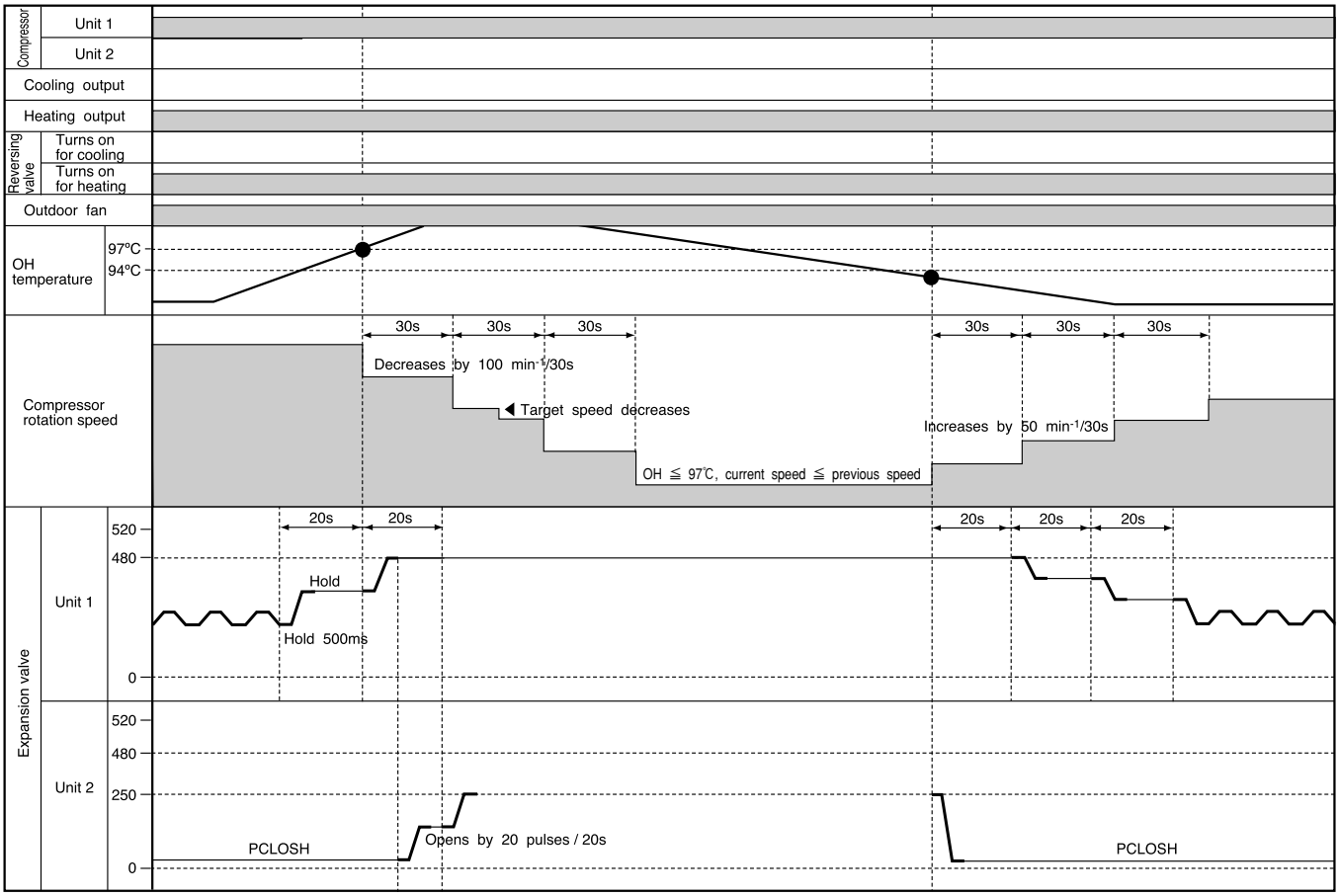
When two units are operated for heating:



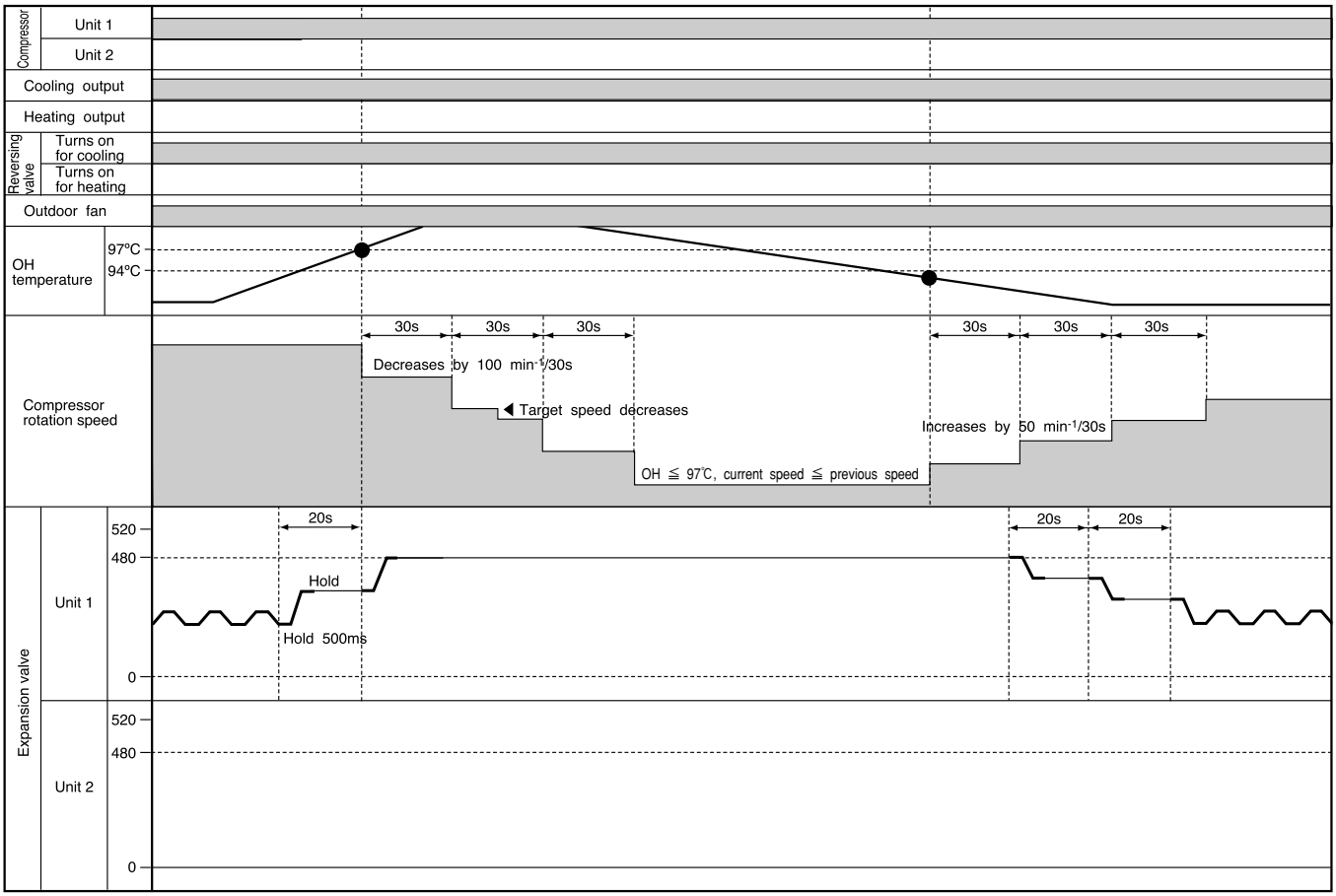
※ • Operation when two units are operated for cooling is similar to that shown above.

- WMAX2 and MINRPM are EEPROM data.
- See other sections for details of expansion valve TD control, ΔN correction and distribution control.

When one unit is operated for heating:



When one unit is operated for cooling:



※・ PCLOSCH is EEPROM data.
・ See other sections for details of expansion valve TD control, ΔN correction and distribution control.

FORCED COOLING

·Units can be operated in a cooling cycle to collect refrigerant.
The conditions for execution and operation status are as follows:

[Conditions for execution]

•Forced cooling operation will be executed when the forced cooling switch is turned ON and there is no record that all indoor units 1-4 have been operated. This system commands the main and sub microcomputers to simultaneously execute forced cooling.
•The main microcomputer monitors operation records of all indoor units 1-4.
The main microcomputer always monitors the operation status of indoor units. When it detects an operated unit, it inhibits forced cooling.
•Since the forced cooling switch is provided on the main microcomputer side, the main microcomputer transfers the forced cooling command to the sub microcomputer via communication line between outdoor microcomputers. When the sub microcomputer receives this request, it executes forced cooling.

[Operation status]

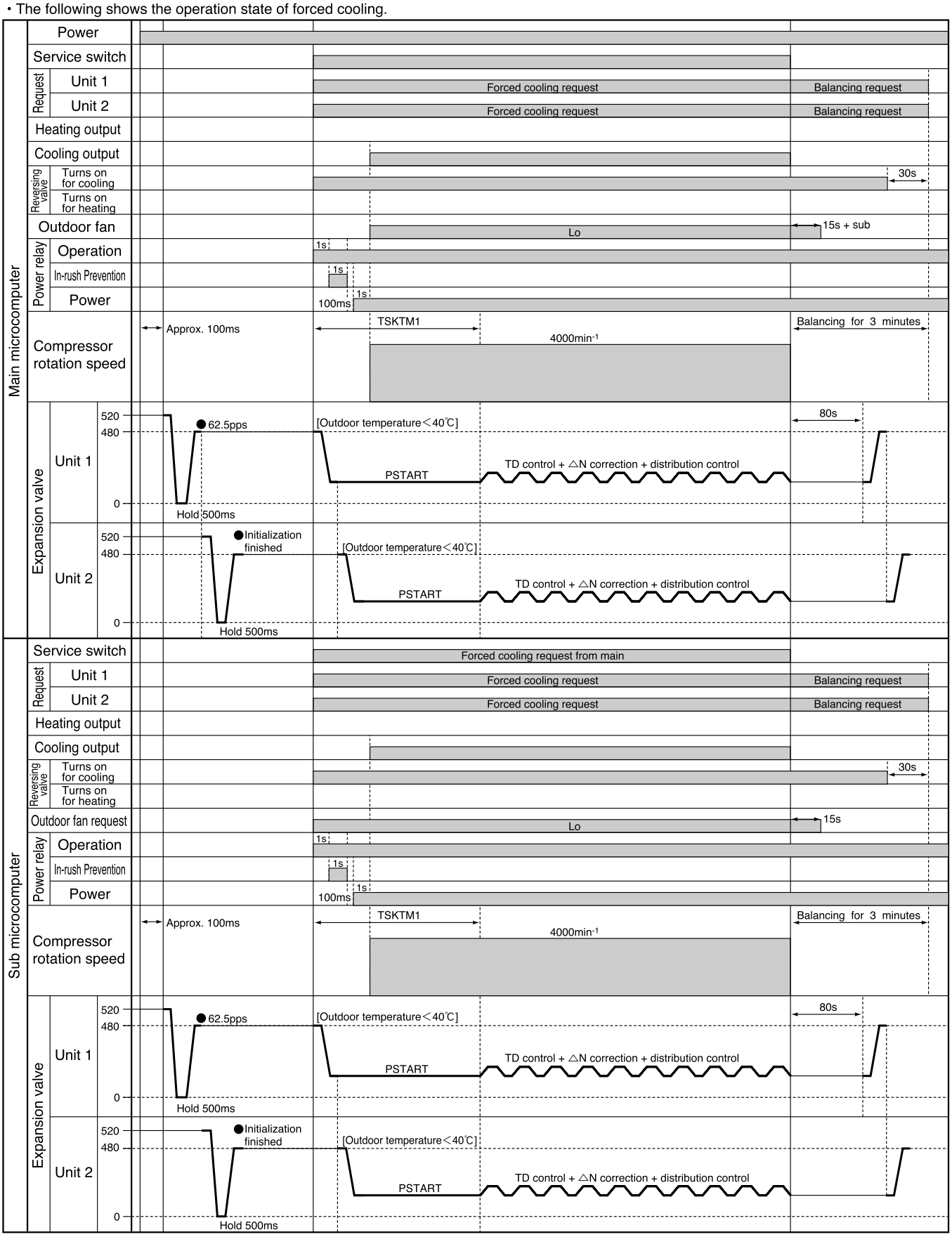
•Outdoor fan: Fixed at B(Lo).
•Compressor rotation speed: Fixed at 4000 min^{-1}.
•Expansion valves, Reversing valve: Same as usual operation.

[Special remarks]

•Thermostat turns OFF when outdoor failure occurs during forced cooling, but this is not counted.
•If it cannot be detected that indoor units for sub microcomputer are being operated because of a delay in communications and the indoor unit for main microcomputer starts forced cooling, the sub microcomputer will continue operation and the main microcomputer will release forced cooling immediately.
•Since the compressor rotation speed is fixed at 4000 min^{-1} during forced cooling, the steady speed control when the compressor starts will not be executed.

FORCED COOLING

• The following shows the operation state of forced cooling.

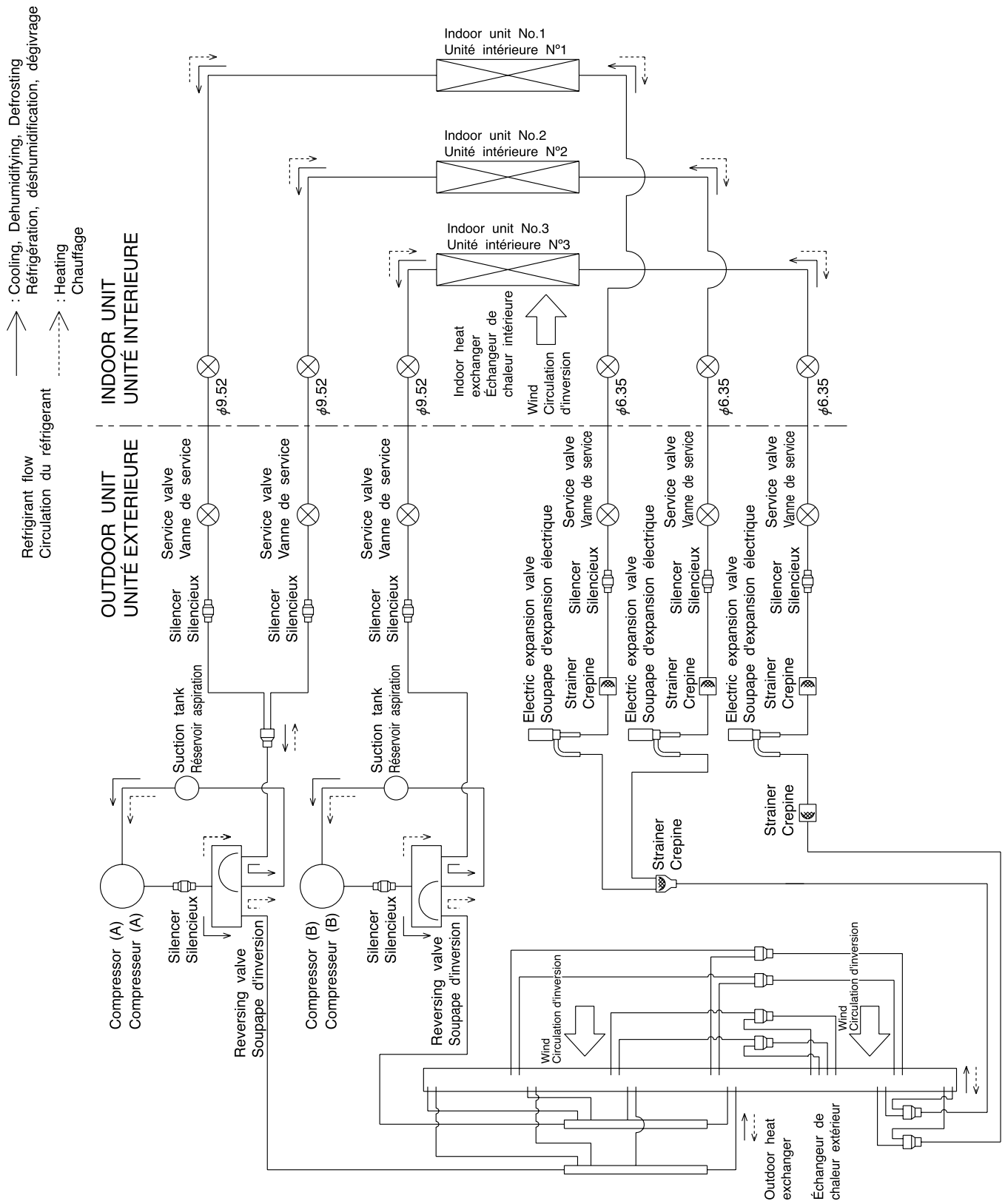


※• TSKTM1 and PSTART are EEPROM data.

• See other sections for details of expansion valve TD control, ΔN correction and distribution control.

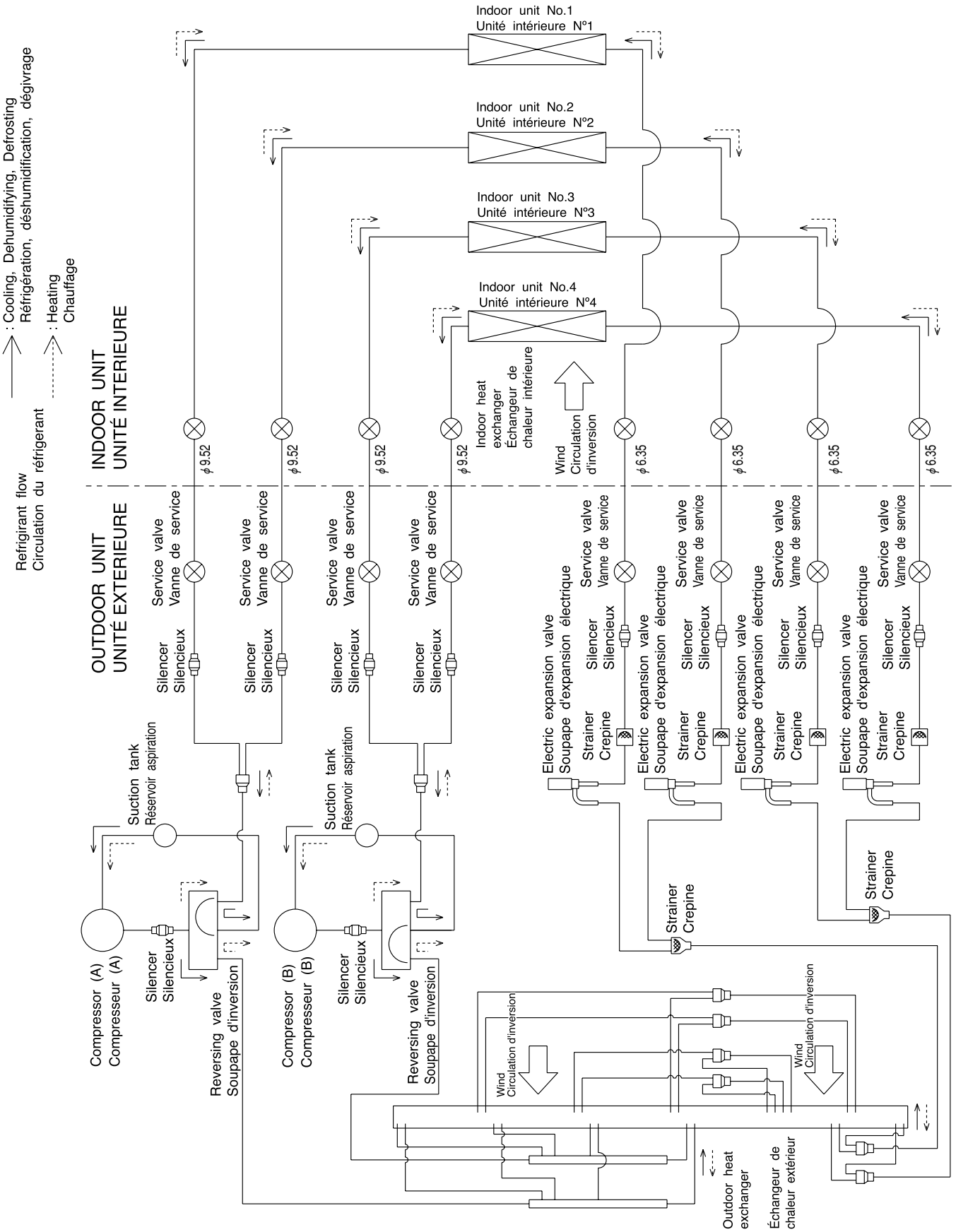
REFRIGERATING CYCLE DIAGRAM
SCHEMA FRIGORIFIQUE

MODEL
MODÈLE RAM-70QH4



REFRIGERATING CYCLE DIAGRAM
SCHEMA FRIGORIFIQUE

MODEL
MODÈLE RAM-80QH4



AUTO SWING FUNCTION

MODEL RAD-25QH4, RAD-40QH4

INPUT SIGNAL	PRESENT CONDITION			OPERATING SPECIFICATION	REFERENCE
	OPERATION	OPERATION MODE	AIR DEFLECTOR		
KEY INPUT	STOP	EACH MODE	STOP	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING ONE SWING	STOP AT THE MOMENT.	
	DURING OPERATION	AUTO COOL COOL FAN AUTO DRY DRY	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
		AUTO HEAT HEAT CIRCULATOR	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
THERMO. ON (INTERNAL FAN ON)	DURING OPERATION	AUTO DRY DRY AUTO HEAT HEAT CIRCULATOR	TEMPORARY STOP	START SWING AGAIN.	
THERMO. OFF (INTERNAL FAN OFF)			DURING SWINGING	STOP SWINGING TEMPORARILY. (SWING MODE IS CLEARED IF SWING COMMAND IS TRANSMITTED DURING TEMPORARY STOP.)	
MAIN SWITCH ON	STOP	COOL FAN DRY	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD ② UPWARD	
		HEAT CIRCULATOR	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD	
MAIN SWITCH OFF	DURING OPERATION	EACH MODE	STOP DURING SWINGING	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING INITIALIZING		
CHANGE OF OPERATION	DURING OPERATION	EACH MODE	STOP	INITIALIZING CONDITION OF EACH MODE.	
			DURING SWINGING	STOP SWINGING AND MODE BECOMES INITIALIZING CONDITION.	

DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAF-25NH4, RAF-50NH4

1. Power circuit

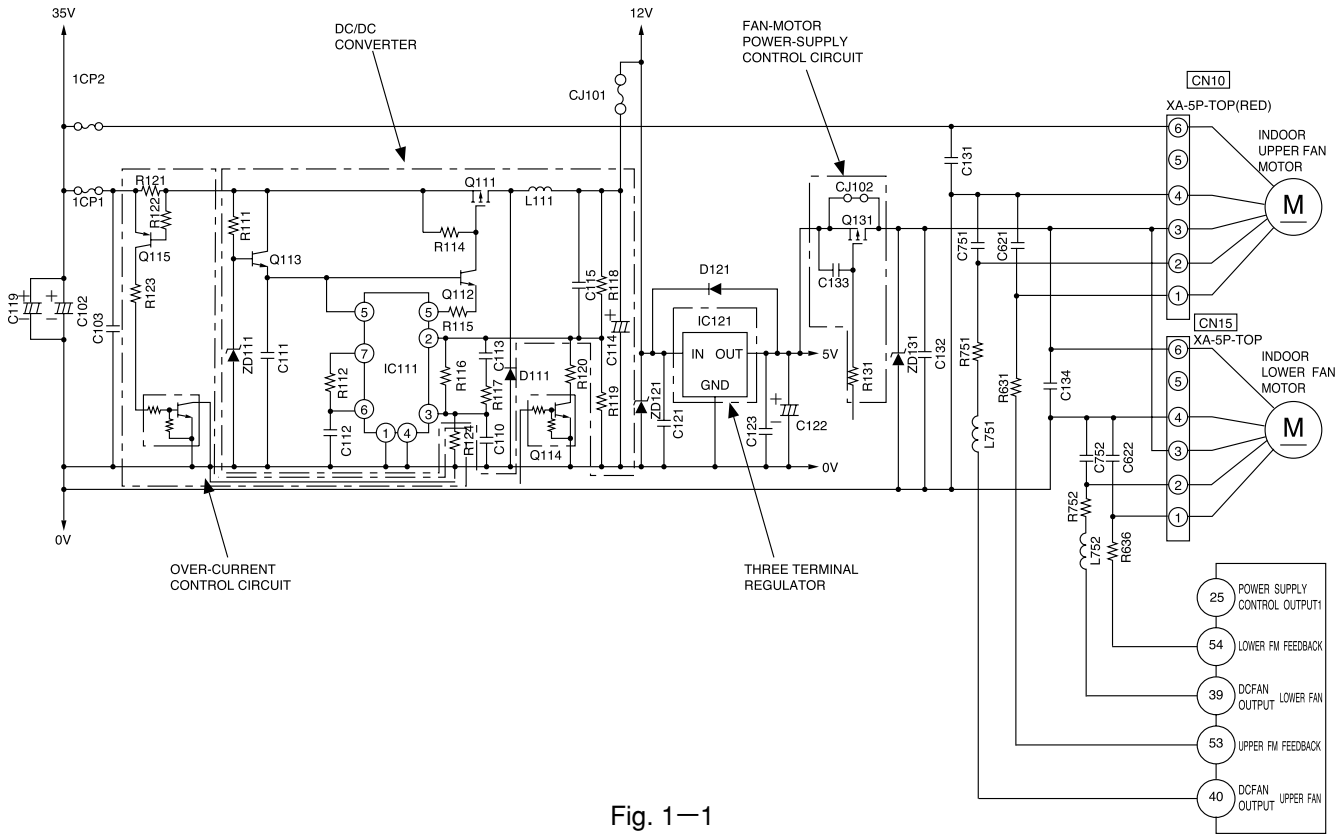


Fig. 1—1

Power to operate indoor unit (DC35V) is generated at the power supply in outdoor unit and it is sent to indoor unit through the connecting cord C and D.
Then, DC 12V (12V line) is generated using DC/DC converter from the voltage sent from outdoor unit, as the control voltage of 12V is required to drive the stepping motor and others.
Furthermore, 5V (5V line), which is necessary to drive the microcomputer and to control the fan motor, is generated using three-terminal regulator IC121.

2. Reset Circuit

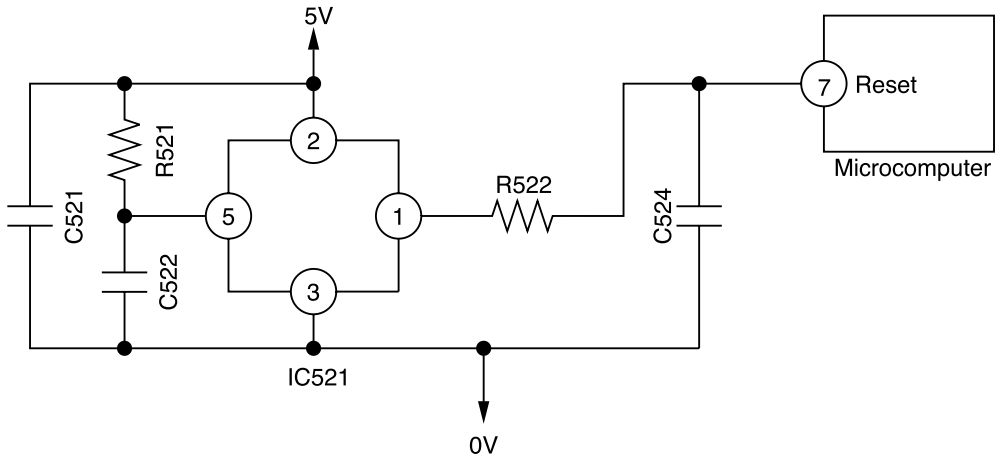


Fig.2-1

Timing chart

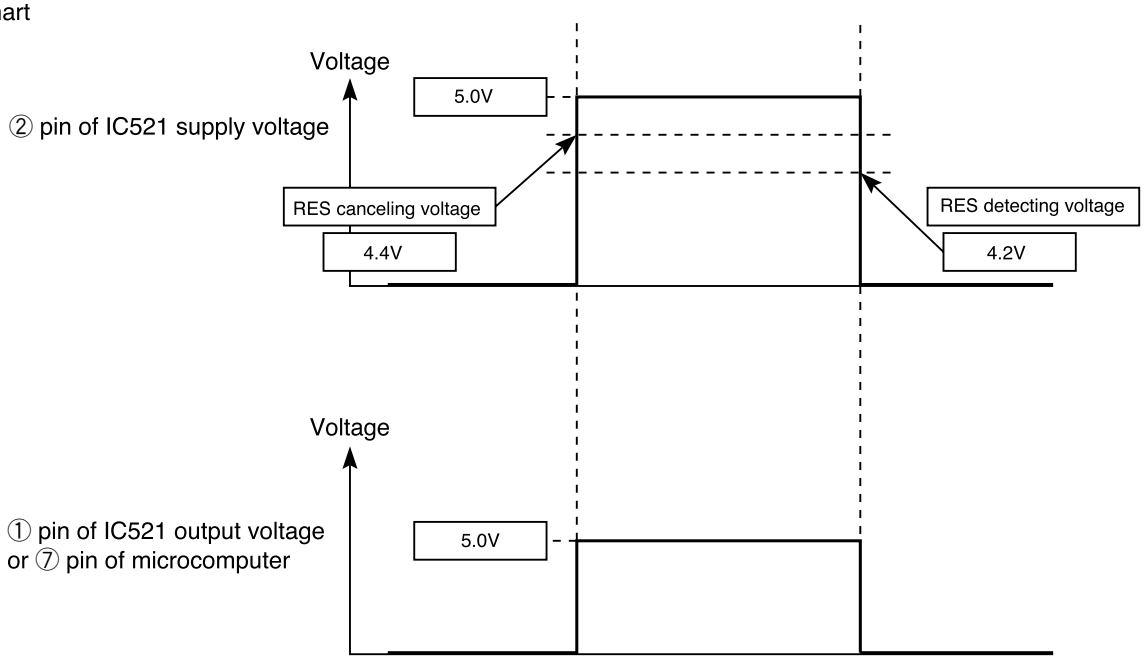


Fig.2-2

- Reset circuit is to initialize the indoor unit microcomputer when switching ON the power or after recovering from power failure.
- Microcomputer operates when ⑦ pin of the indoor unit microcomputer (reset input) is "Lo" for resetting and "Hi" for hitting.
- Waveform of each part when switching ON the power and when shutting down is shown in the Fig. 2-2.
- After switching ON the power, ① pin of IC521 and ⑦ pin of microcomputer becomes Hi when DC5V line rises and reaches approximately 4.4V or higher.
  Then, resetting will be cancelled and microcomputer starts operating.
- After shutting down the power, ① pin of IC521 and ⑦ pin of microcomputer becomes Lo when DC5V line falls and reaches approximately 4.2V or lower.
  Then, the microcomputer will be in reset condition.

3. Room Temperature Thermistor Circuit

A room temperature thermistor circuit is shown in Fig. 3-1.
According to room temperature, the voltage of point Ⓐ becomes as it is shown in Fig.3-2.

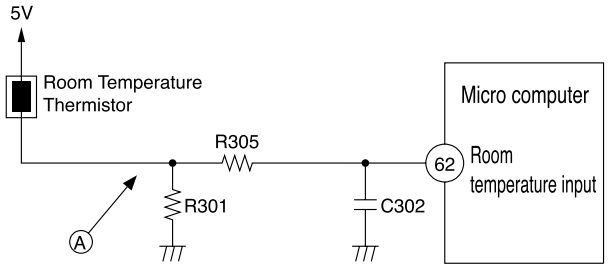


Fig. 3-1

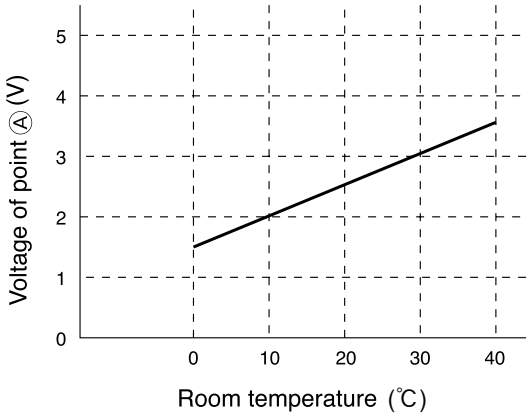


Fig. 3-2

4. Heat Exchanger Thermistor Circuit

Heat exchanger temperature is noticed inside the room
(1) Preheating
(2) Low-temperature defrosts at cooling•dehumidification operation time.
(3) Not working of reversing valve or detection of opening of heat exchange thermistor is controlled.

According to heat exchange temperature, the voltage of point Ⓐ becomes as it is shown in Fig. 4-2.

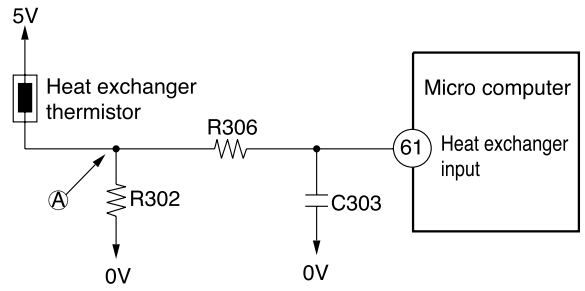


Fig. 4-1

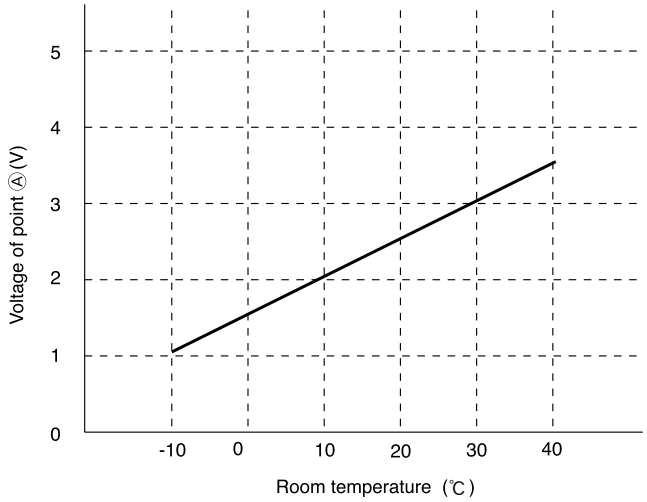


Fig. 4-2

5. Humidity Sensor Circuit

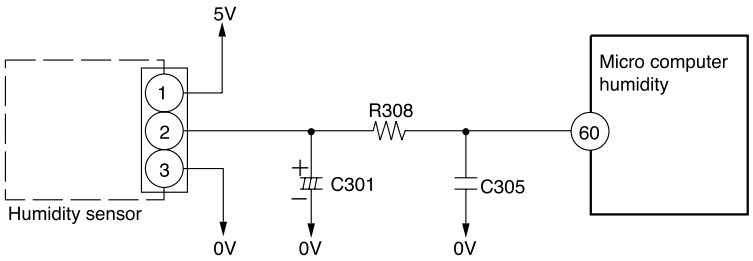


Fig. 5-1

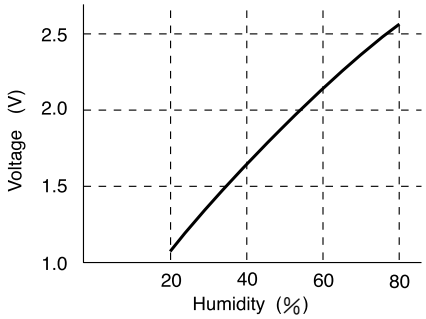


Fig. 5-2

● From the output (② pin) of humidity sensor, the 5V pulse3 of different width is output according to detected humidity. Smooth output pulse is carried out by C301 and it changes into the characteristic of voltage-humidity as shown in Fig.5-2. The micro computer detects and controls humidity by reading this voltage directly.

6. Fan Motor Drive Circuit

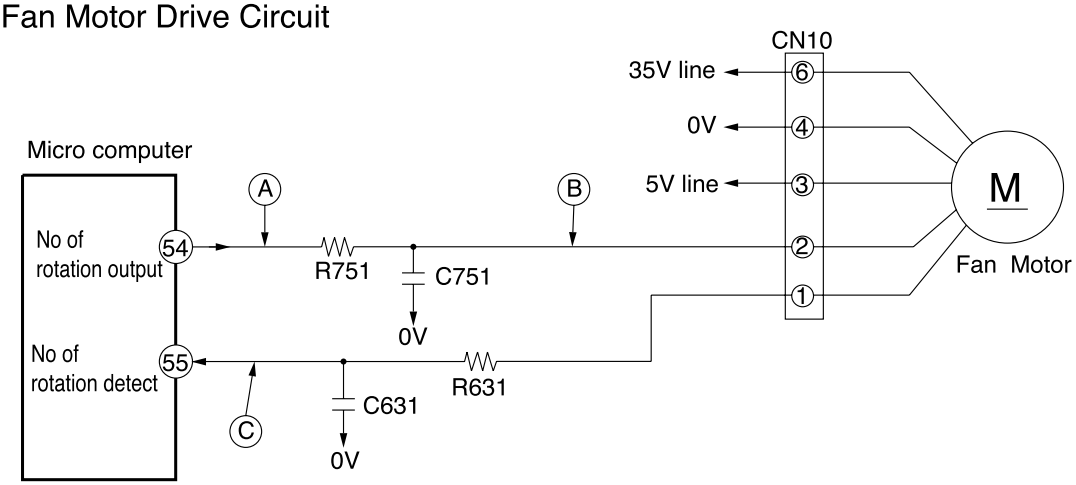


Fig. 6-1

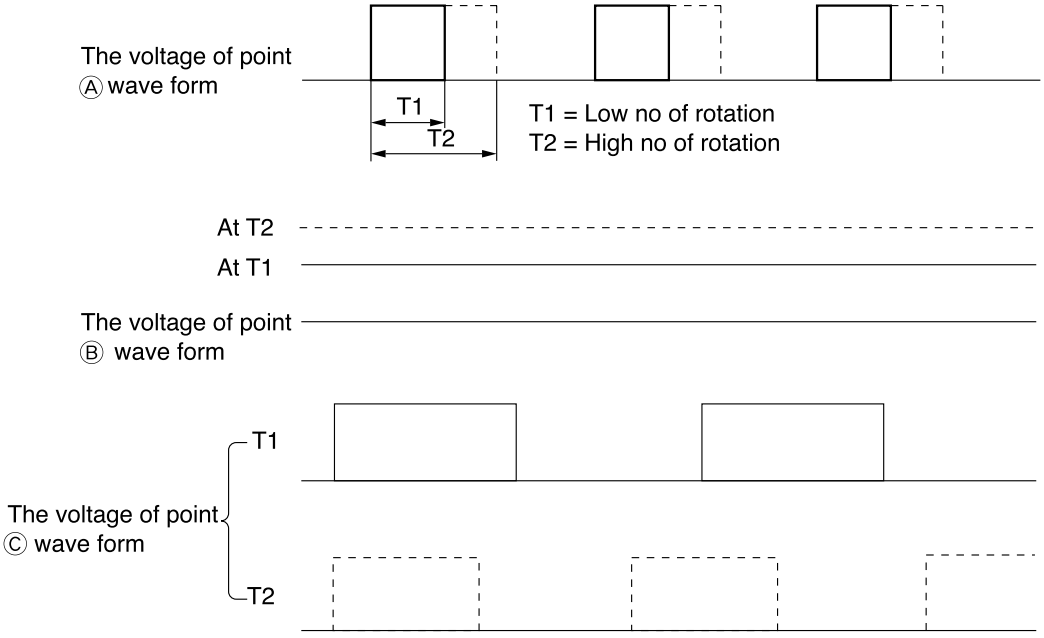


Fig. 6-2

- The 15.7 kHz PWM pulse shown in Fig.6-2 from the micro computer pin ⑭ is output to point Ⓐ. The width of this pulse changes with instruction number of rotations.
- This pulse changes to analog voltage by R751 and C751 and it is applied to the fan motor as instruction voltage number of rotations. The relationship between the voltage of point Ⓑ and number of rotations becomes as shown in Fig.6-3. (The gap may arise depending on the condition of unit.)
- The feedback pulse of number of rotation is outputted from the fan motor and input to micro computer pin ⑮. The frequency of this pulse is 12/60 of the number of rotations. (Ex: 1000min^{-1}X 12/60=200Hz) The micro computer observes this frequency and to make it as the instruction number of rotation all the time, adjusts the output pulse width of pin ⑭.
- If the feedback pulse becomes lower than 100min^{-1} caused by lock or failure of a fan motor, the fan output stops temporary as the fan lock is faulty. The pulse will output again after 10 seconds. If the abnormal in fan lock is detected twice in 10 minutes, the unit is completely stopped and change to the fault mode which the timer lamp blinks 10 times.

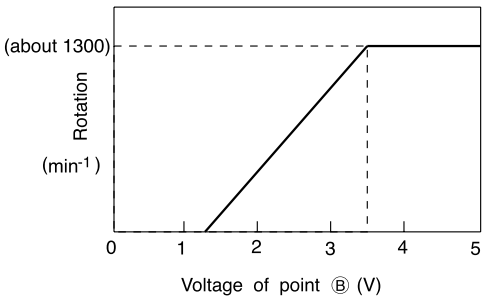


Fig. 6-3

Damper control

1. Precondition

The damper has 2-directional output and realizes OPEN/CLOSE using a stepping motor.
Damper control functions only when the Air outlet SW is set to " ".

2. OPEN/CLOSE Operation

(1) OPEN operation
Start up the damper towards OPEN direction by overall angle width [DNPALD1]. When the start up completes, turn off the output.

(2) CLOSE operation
Start up the damper towards CLOSE direction by overall angle width [DNPALD1] + tightening angle [CNPPLS1]. When start up completes, turn off the output.

3. Initial Operation

Initial operation is performed only once when the main power is switched ON. The damper should be operated as follows due to its structure.
① Damper OPEN (Damper limit SW = OFF signal)
② Damper CLOSE (Damper limit SW = ON signal)
Its travel speed is pulse output speed [DNPPPS].

4. Monitor Function of Damper Limit SW

Monitoring of damper limit SW is inhibited during start up and for 2 seconds after starting up the damper, after which the damper limit SW will be monitored.

(1) Damper limit SW signal at the completion of initial operation is monitored. If the signal is OFF, it is judged as malfunction and the malfunction mode is entered immediately.
(2) Monitoring of damper limit SW signal is inhibited while the unit is stopped.
(3) Damper limit SW is always monitored while the unit is in operation. Right after the unit operation is started, however, malfunction judgment is not made and the damper performs the following operation.
When "ON" signal is detected (Normal signal): Start up towards CLOSE direction by tightening angle.
When "OFF" signal is detected (Abnormal signal): Start up towards CLOSE direction by overall angle width plus tightening angle.
(4) After performing the above operation, malfunction judgment will always be carried out. If abnormality is detected for 4 times consecutively within 30 minutes, the malfunction mode is entered at the moment the 4th abnormality is detected.
In the case where 3 or less abnormality are detected, retry operation is performed.
Abnormal OPEN location
If the signal is "ON", the damper is judged to be at CLOSE location (abnormal). The retry operation, which is the same as OPEN operation by overall angle width, will be performed.
Abnormal CLOSE location
If the signal is "OFF", the damper is judged to be at OPEN location (abnormal). The retry operation, which is the same as CLOSE operation by overall angle width + tightening angle, will be performed.
(5) Self diagnosis mode of the damper is indicated by "Timer lamp blinks for 8 times".

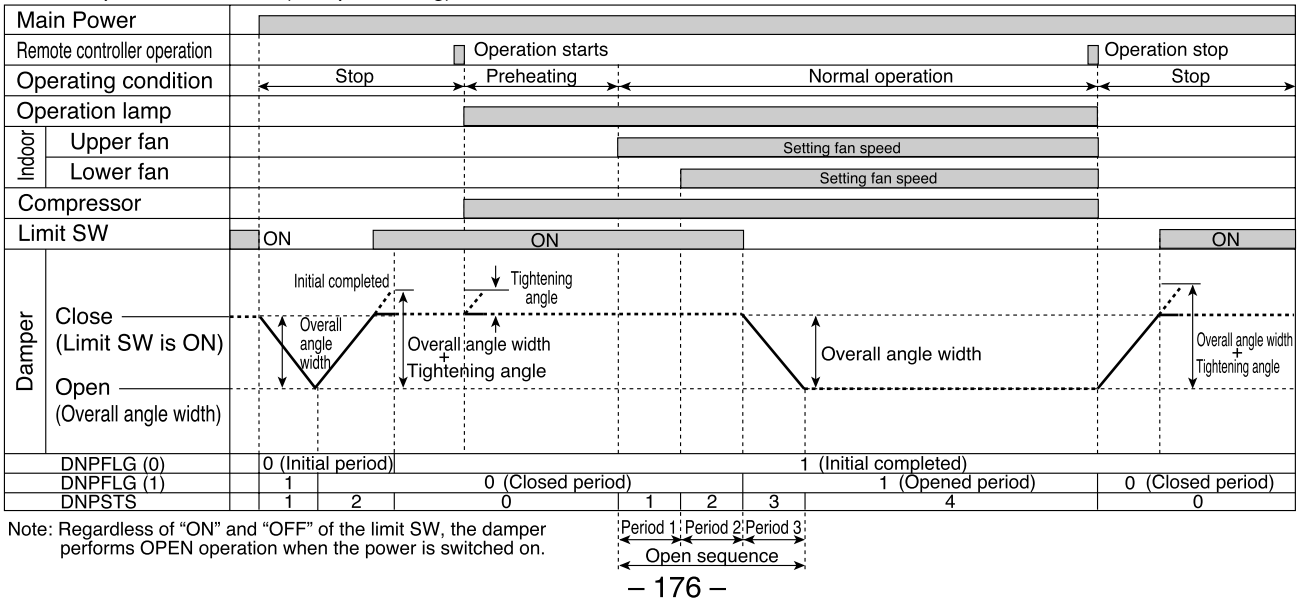
5. Damper operation by operating modes

The damper functions only during heating and cooling operation. It stays closed during other operating modes.

Heating mode

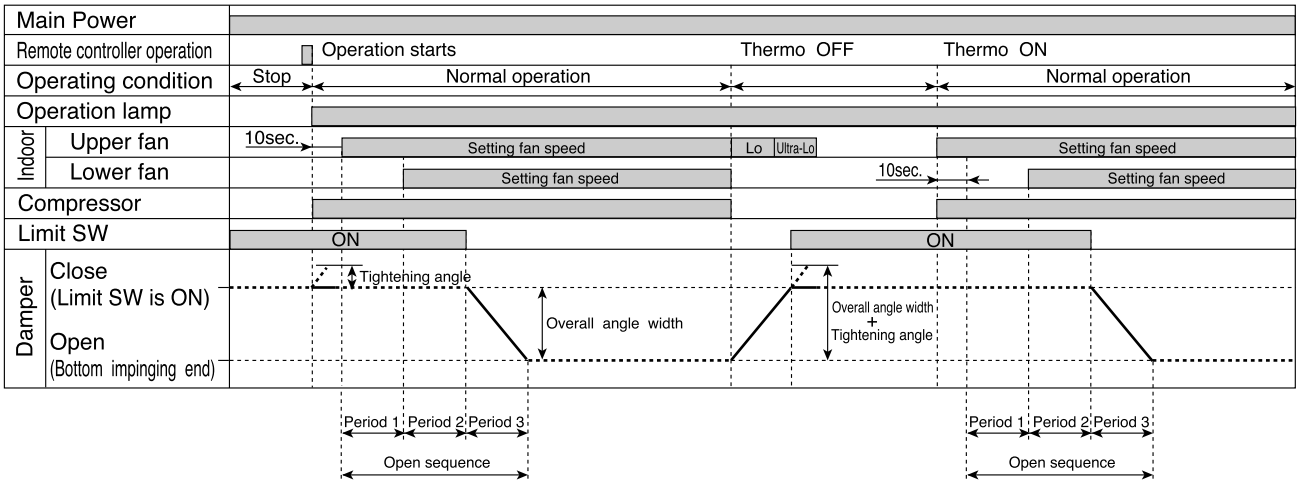
The damper is open during normal heating operation (except for 10 seconds after thermo resumes, during sleep operation and during nice temperature). It is closed during other types of operation.
The damper closes immediately if the damper changeover SW is set to "manual". When the damper is starting up, however, it closes only after open operation completed.

● Main operation ON/OFF (with preheating)

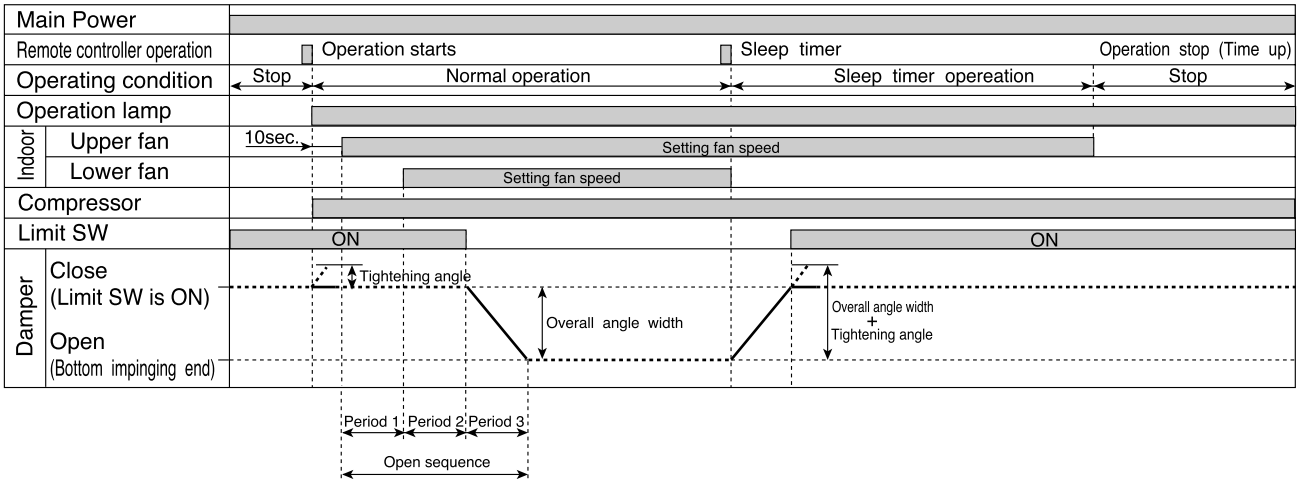


Note: Regardless of "ON" and "OFF" of the limit SW, the damper performs OPEN operation when the power is switched on.

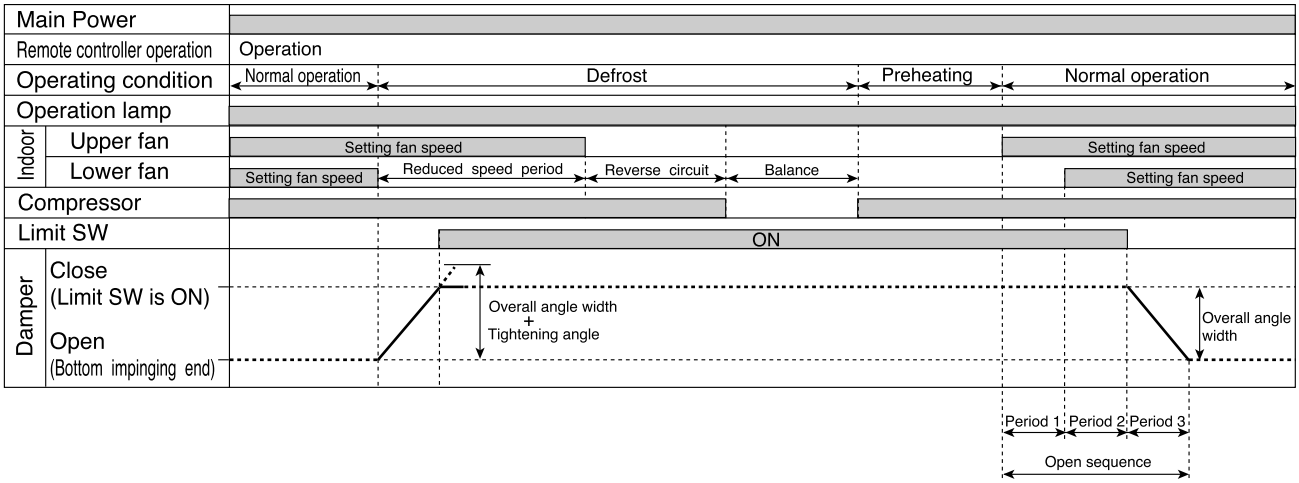
● Thermo intermittence



● Sleep Timer



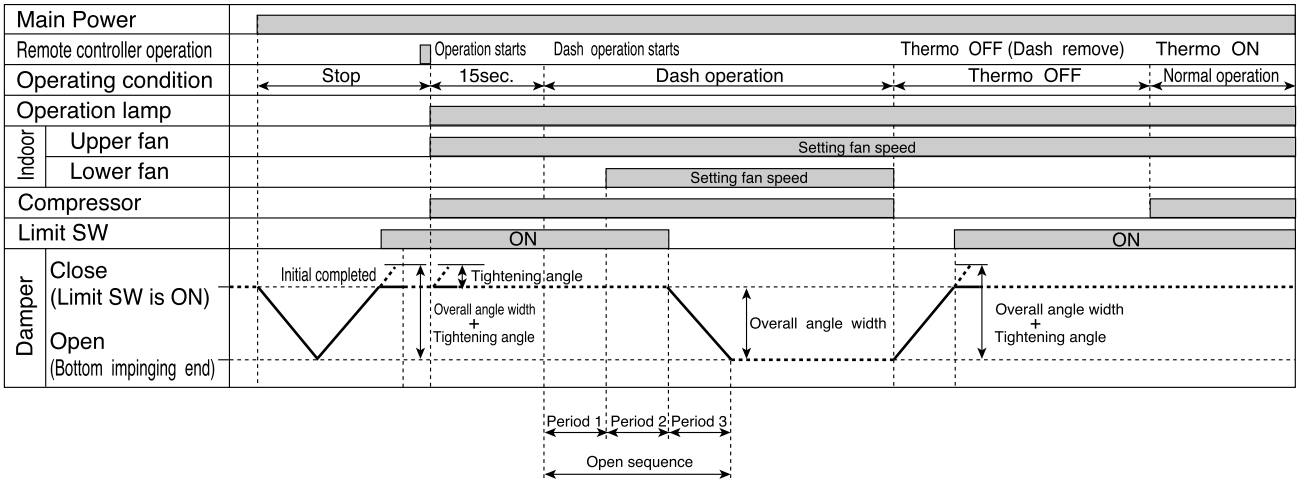
● Reversing valve defrost



Cooling mode

The damper opens at cool dash (excluding smell prevention) and closes at the completion of cool dash.
The damper also closes at the moment the Air outlet SW is set to “ ”.

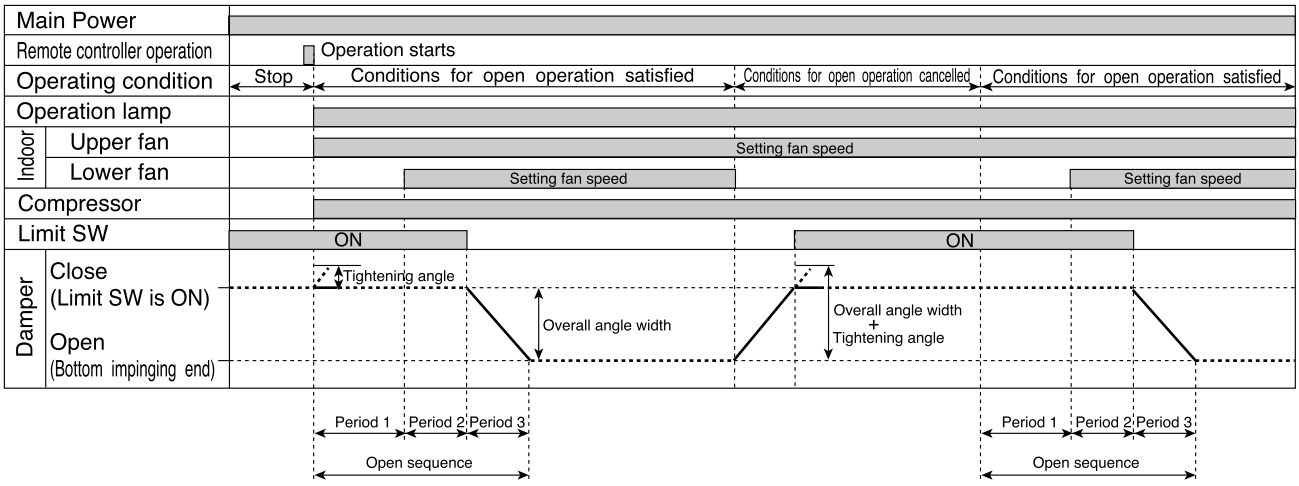
● Dash operation (no smell prevention)



● Damper open operation (except dash)

This function is allowed when the damper open control select flag on EEPROM at cooling operation and fan speed of HI is set to [FLGET8 (3) = 1] and all the following conditions are satisfied. If any of the following conditions is unsatisfied, the damper will be closed.

(a) Operating mode: “Manual cooling”
(b) Preset fan speed: “Hi”
(c) Preset temperature: “16ºC”
(d) [Room temperature (RMTM) – Final preset temperature (THERW2)] ≧ [ONDOSA] However, the condition. (d) will be cancelled when [Room temperature (RMTM) – Final preset temperature (THERW2)] ≦ [ONDOSA].
(e) Thermo ON condition (ASTUS=3)



DESCRIPTION OF MAIN CIRCUIT OPERATION

MODEL RAD-25QH4, RAD-40QH4

1.Reset Circuit

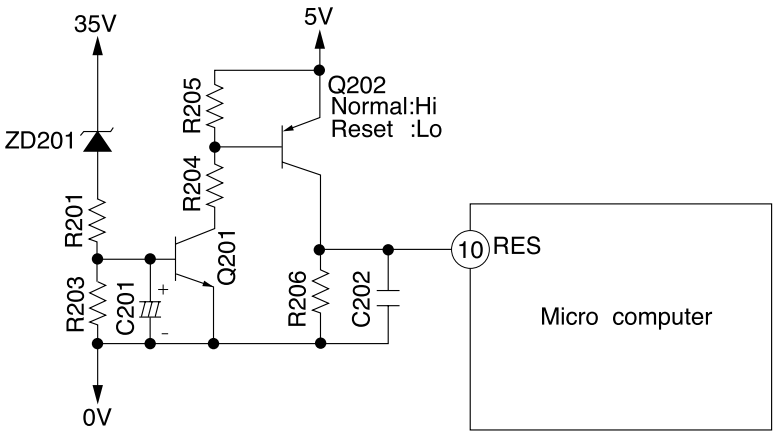


Fig.1-1

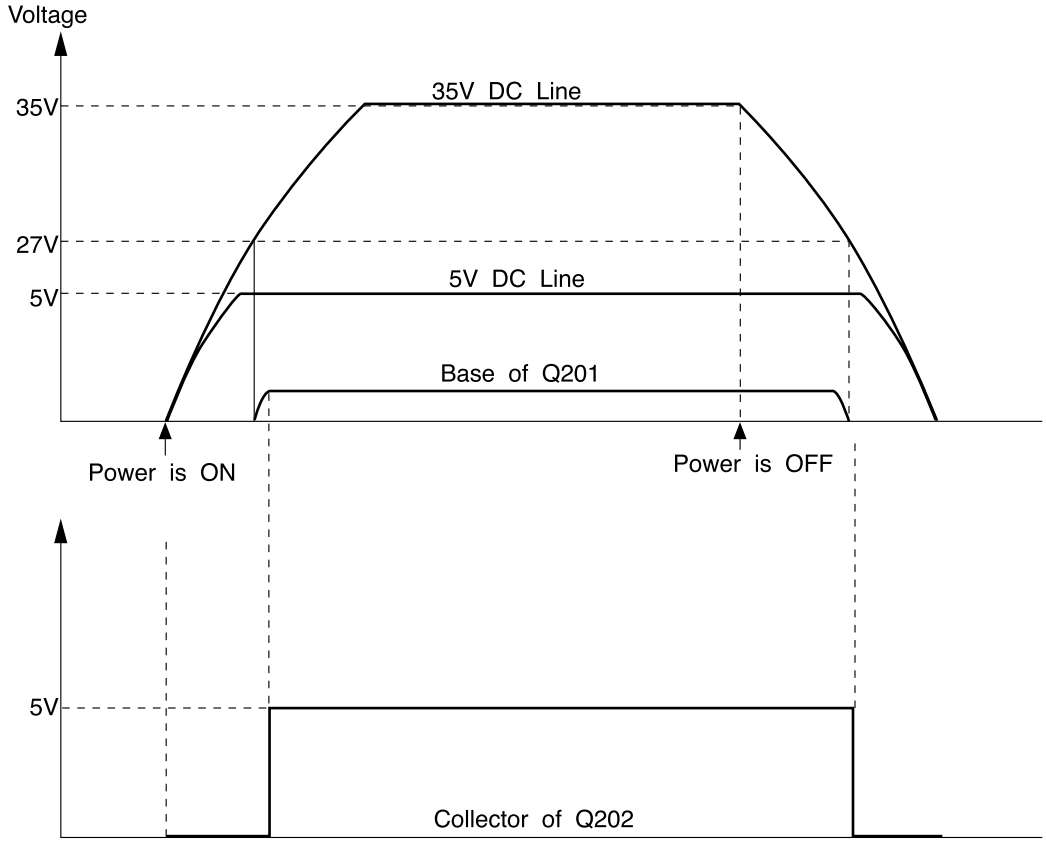
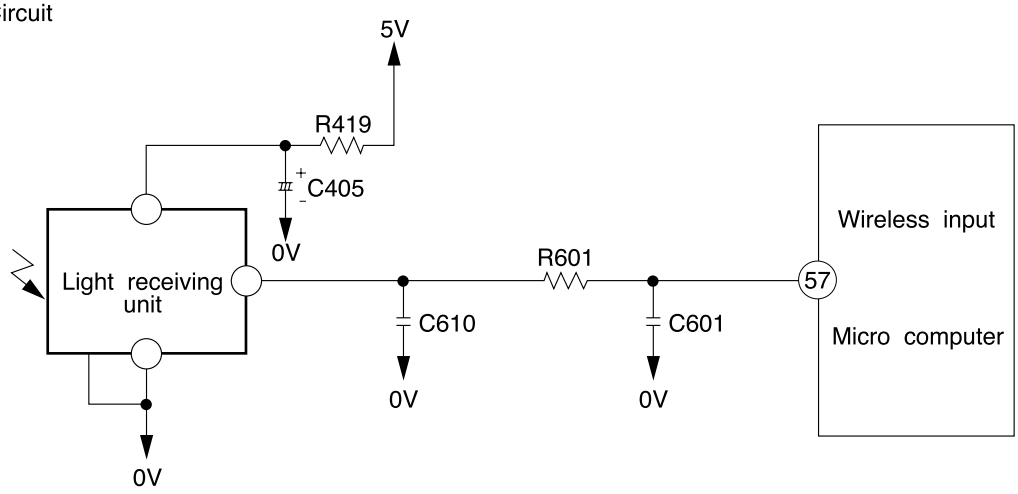


Fig.1-2

- The reset circuit initializes the program when power is supplied or power is restored following a power failure.
- RESET "Lo" or SET "Hi" activates the micro computer.
- Fig.1-2 shows the waveforms in each circuit when poewr is ON and OFF.
- When power is supplied, the voltages on the 35V and 5V DC lines rise, and when the 35V DC line becomes approx. 27V, ZD201 turns on and the voltage at the base of Q201 rises to turn Q201 on. Since the collector of Q201 goes "Lo" at this time, Q202 turns on and the reset input of the micro computer goes "Hi". The 5V DC line has already been 5V at this time and the micro computer starts operation.
- When power is OFF, the voltage on the 35V DC line drops, and when it is approx. 27V, ZD201 turns off, Q201 and Q202 turn off, and the reset input of the micro computer goes "Lo" to reset it.

2.Receive Circuit



• The Light receiving unit receives an infrared signal from the wireless remote control. The receiver amplifies and shapes the signal and outputs it.

3.Buzzer Circuit

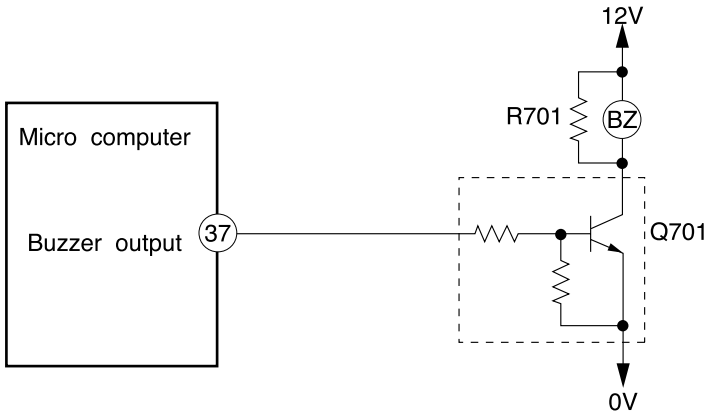


Fig.3-1 Buzzer Circuit

• When the buzzer sounds, an approx. 3.9kHz square signal is output from buzzer output pin ㊲ of the micro computer. After the amplitude of this signal has been set to 12Vp-p by a transistor, it is applied to the buzzer. The piezoelectric element in the buzzer oscillates to generate the buzzer's sound.

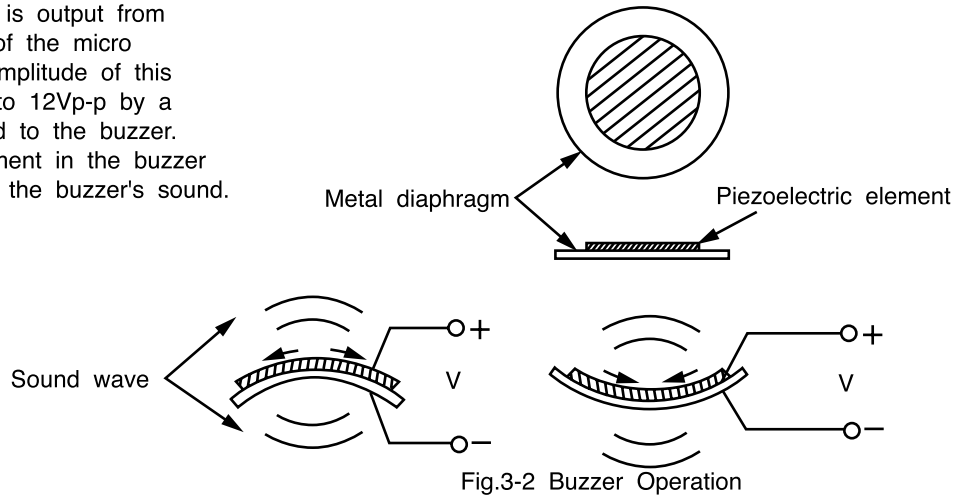


Fig.3-2 Buzzer Operation

4.Auto Sweep Motor Circuit

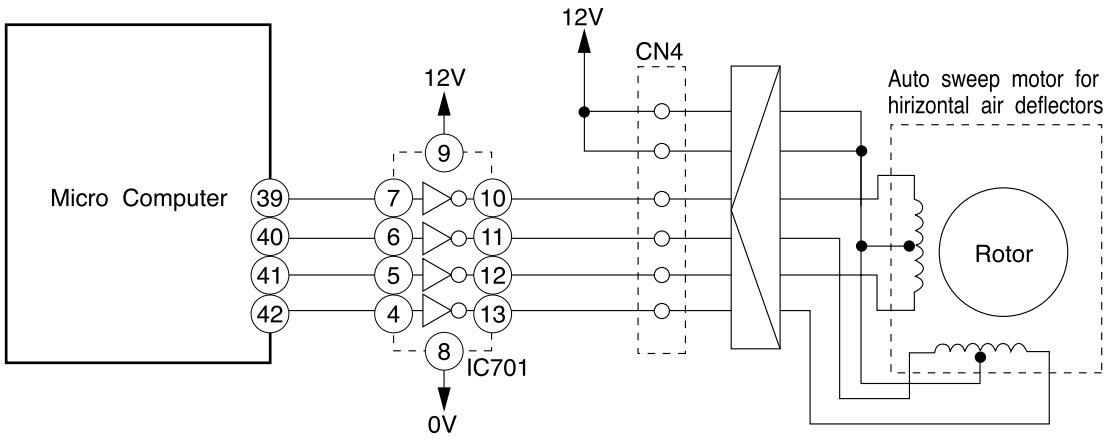


Fig.4-1 Auto Sweep Motor Circuit (Horizontal air deflectors)

• Fig.4-1 shows the Auto sweep Motor drive cicuit; the signals shown in Fig.4-2 are output from pins ㊴-㊷ of the micro computer.

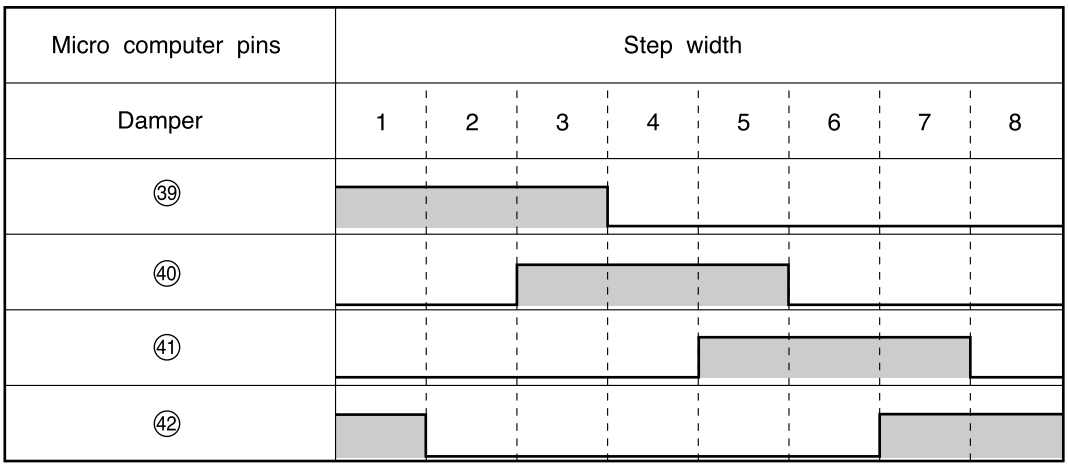


Fig.4-2 Micro computer Output Signals

• As the micro computer's outputs change as shown in Fig.4-2, the core of the stepping motor is excited to turn the rotor. Table 4-1 shows the rotation angle of horizontal air deflectors.

Table 4-1 Auto sweep Motor Rotation

	Rotation angle per step(°)	Time per step(ms.)
Horizontal air deflectors	0.0882	10

• The Auto sweep motor (sub) drive circuit operates in the same way.

5.Room Temperature Thermistor Circuit

Fig. 5-1 shows the room temperature thermistor circuit.

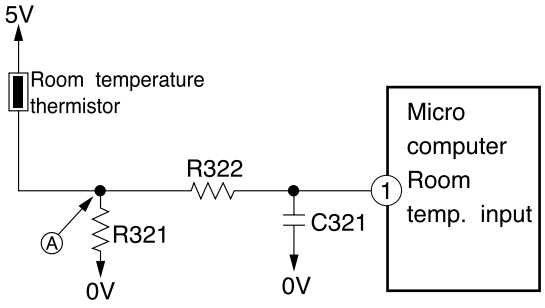


Fig. 5-1

The Voltage at Ⓐ depends on the room temperature as shown in Fig. 5-2

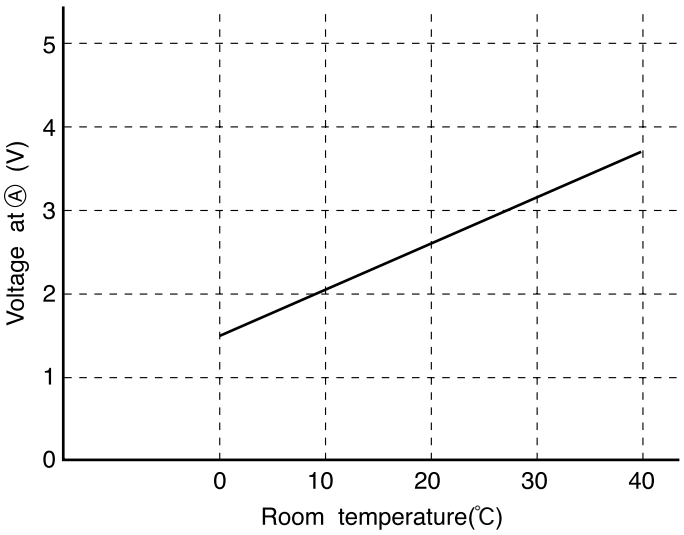


Fig. 5-2

6.Heat exchanger temperature thermistor circuit

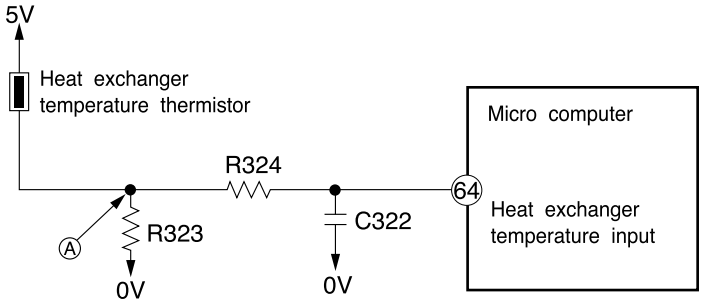


Fig. 6-1

The circuit detects the indoor heat exchanger temperature and controls the following.

(1) Preheation.
(2) Low-temperature defrosting during cooling and dehumidifying operation.
(3) Detection of the reversing valve non-operation or heat exchanger temperature thermistor open.

The voltage at Ⓐ depends on the heat exchanger temperature as shown in Fig. 6-2

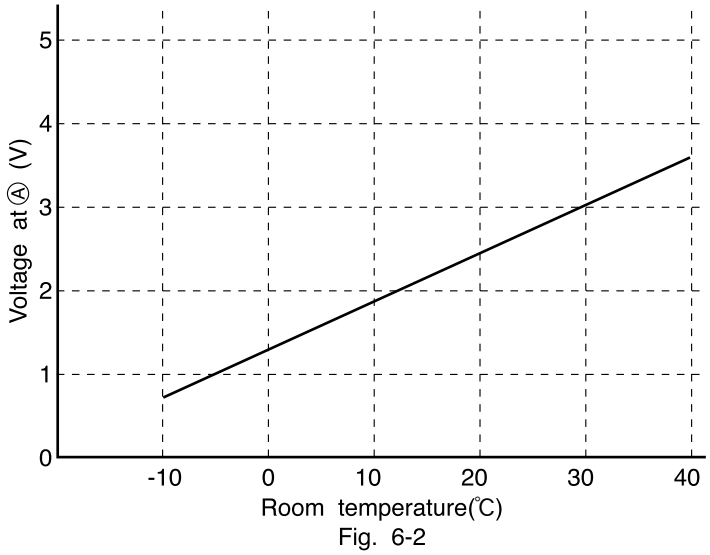


Fig. 6-2

7. Initial Setting Circuit (IC401)

- When power is supplied, the micro computer reads the data in IC401 (E^2PROM) and sets the preheating activation value and the rating and maximum speed of the compressor, etc. to their initial values.

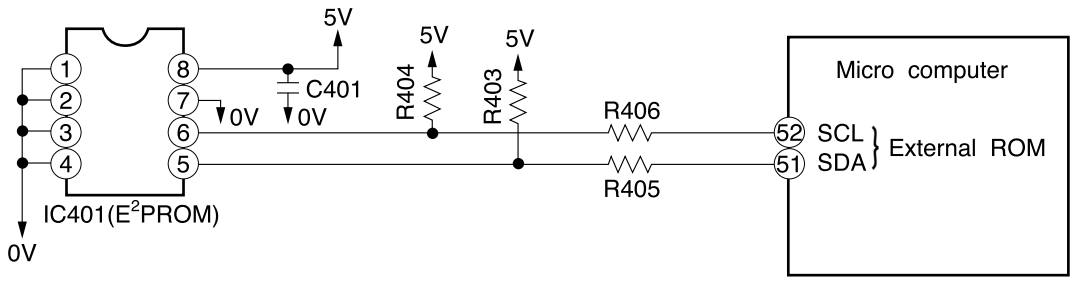


Fig. 7-1

8. Temporary Switch

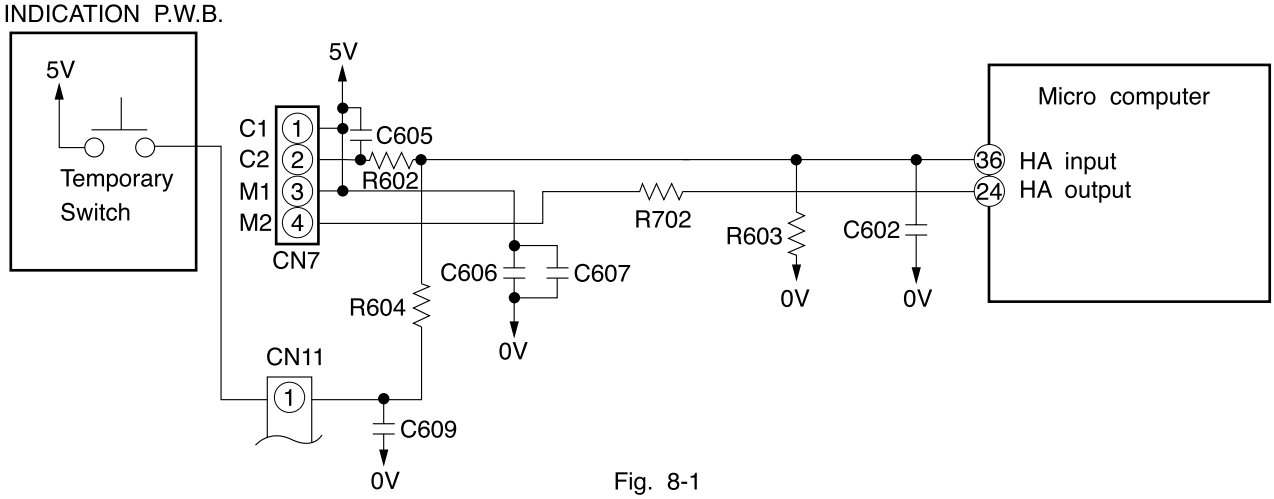


Fig. 8-1

- The temporary switch is used to operate the air conditioner temporarily when the wireless remote control is lost or faulty.
- The air conditioner operates in the previous mode at the previously set temperature. However, when the power switch is set to OFF, it starts automatic operation.

9. Drain pump drive circuit

When cool or dehumidifying operation, pin 30 of the micro computer goes "Hi", Q905 turn on and the drain pump drive.

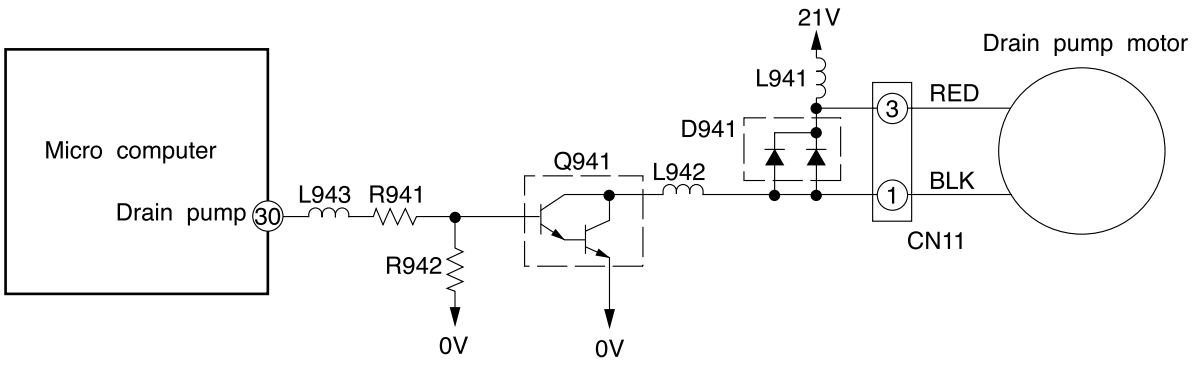
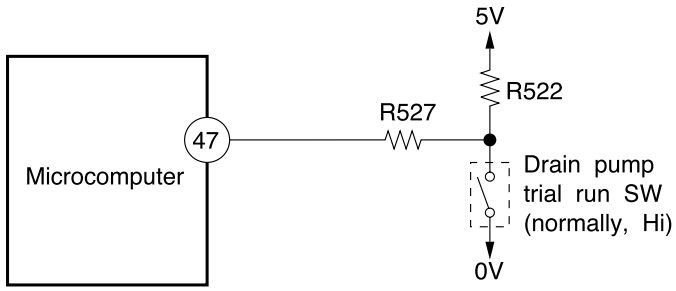


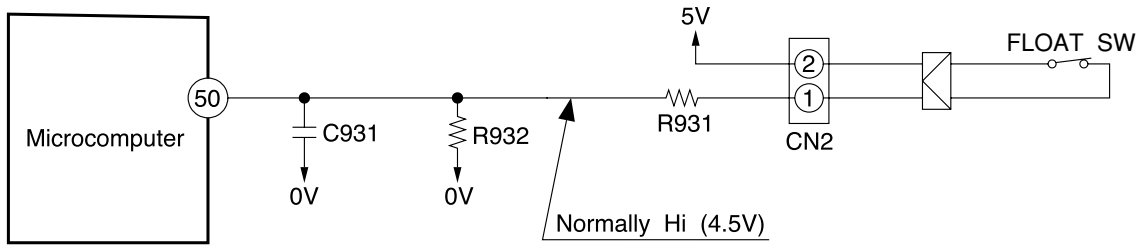
Fig. 9-1

10. Drain pump trial run switch



• This switch forcibly turns the drain pump on. When the drain pump trial run switch is turned on, the timer indicator will blink seven times, and no remote signal will be accepted.

11. Float switch



• This is a float type switch that monitors the drain level of drain pan. The switch will be activated and will stop operation if the drain pump is faulty or drain hose is stopped up, disabling drainage, causing the drain level to rise abnormally.
• When the float switch is activated, the timer indicator will flash six times. Note that the float switch will also be activated, disabling operation if the connector of float switch has defective contact or is connected incompletely.

12. DC Fan Motor Drive Circuit

MODEL RAD-25QH4, RAD-40QH4

• Fig. 12-1 shows the indoor DC fan motor drive circuit.

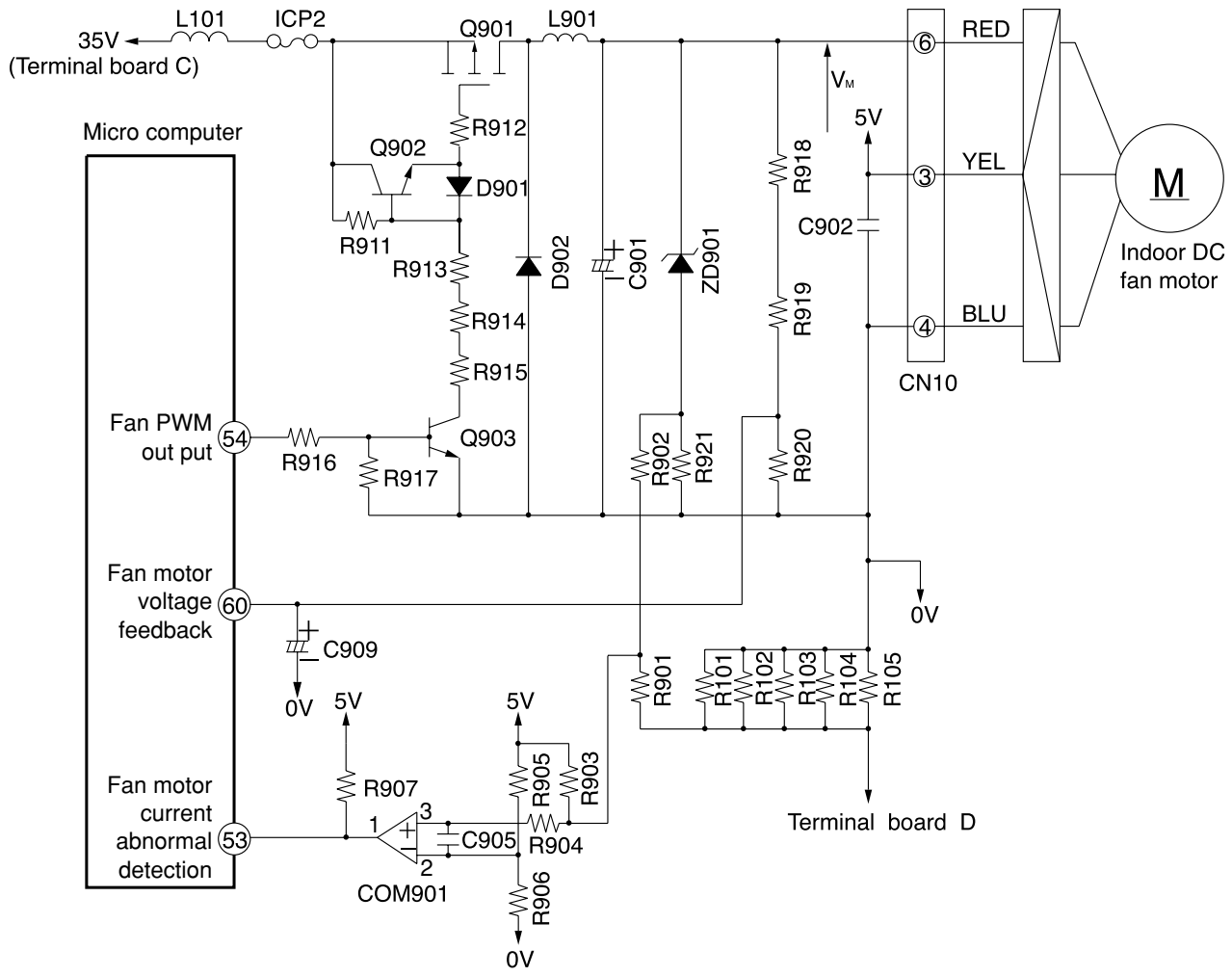


Fig. 12-1

• The circuit produces the fan motor drive voltages, 8-33V, from 35V DC supplied from the outdoor unit and controls the fan motor speed.
• Q901 is switched on and off according to the signal at fan PWM output pin ⑭ to control the voltage which is smoothed by C901, L901 to drive the fan motor.
• The output voltage is divided by R918, R919 and R920 and is input to divided voltage output pin ⑥⓪ ; the micro computer controls the fan PWM output so the output Voltage is set to the specified value. The chopper frequency of the fan PWM output is 15.7kHz.
• The fan current abnormality detector detects the fan motor current using R101-R105 and COM91 determines an overcurrent and outputs it to fan current abnormality pin ⑤③ which is "Hi" during normal operation and "Lo" when overcurrent occrus.
• REG3 supplies 5V DC to the DC fan motor.

13. High static-pressure switch (Full duct type and semi duct type)

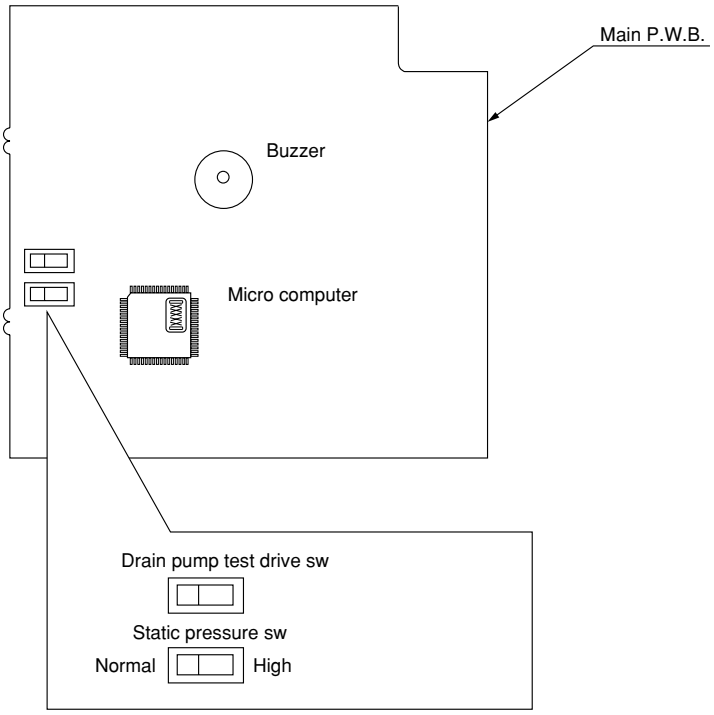


Fig. 13-1

- For full duct type and semi duct type, set the high to HIGH STATIC-PRESSURE.
- If not set to HIGH, there will be reduction of cooling and heating capacities.

■ RAM-70QH4, RAM-80QH4

1. POWER SUPPLY CIRCUIT

The power supply circuit consists of the circuit (A cycle) corresponds to the indoor units 1 and 2, and the circuit (B cycle) corresponds to the indoor units 3 and 4.

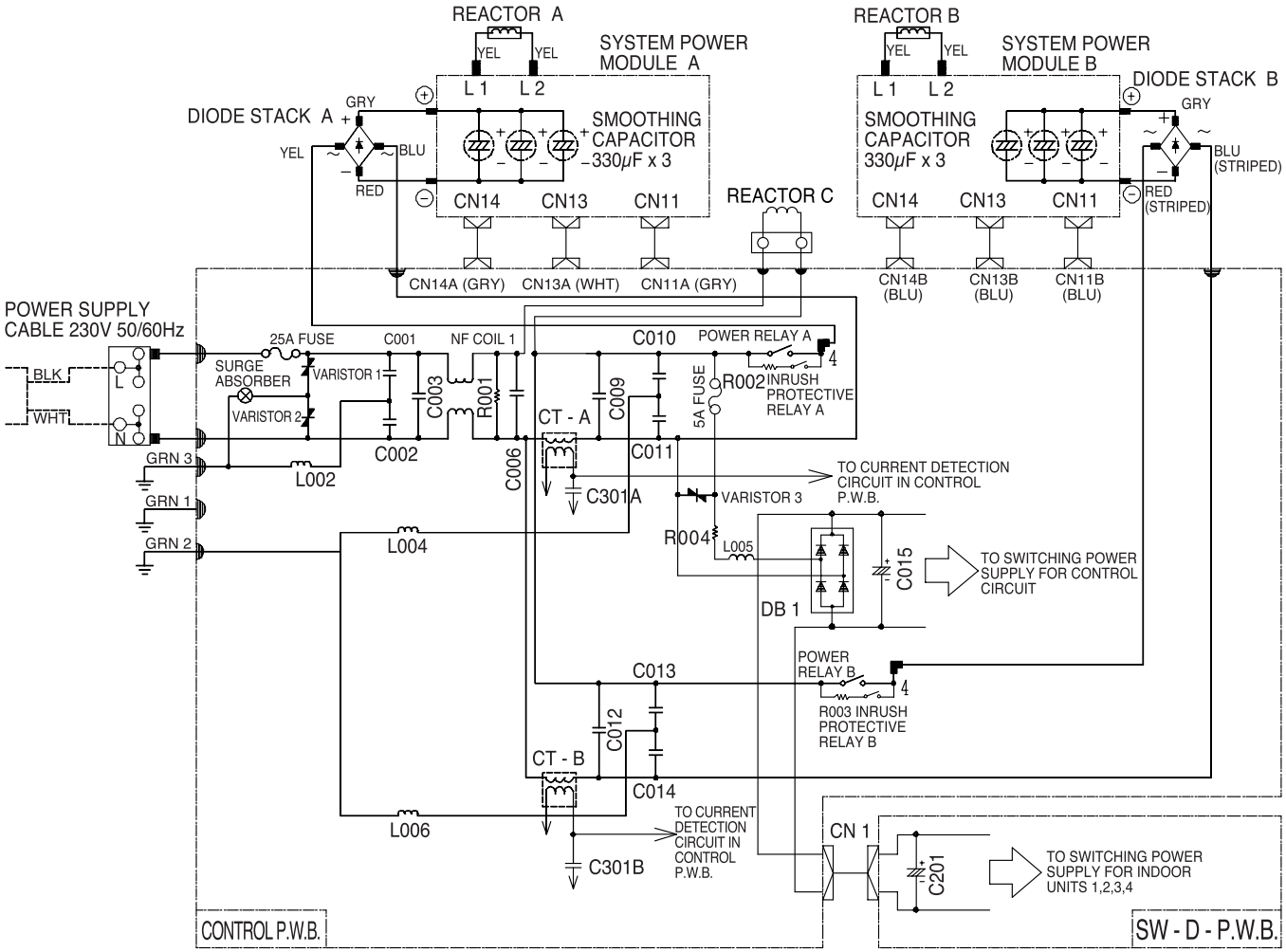


Fig.1-1 Power Supply Circuit

- This circuit works as follows and gets DC voltage: at first, all-wave rectifying 230 x $\sqrt{2}$ = 325[V] from AC 230V supplied L:N terminals, then, boosting proper DC voltage by the chopper circuit.

  But **while the compressor running, the DC voltage turns out approx. 320V-360V.**

• Functions of Main Parts

(1)System Power Module (SPM)

(The module was a new type which joined together old type ACT and POWER modules)

①ACT Module part

The active filter, consists of the reactor and switching element, takes away higher harmonic components contained in the current generated due to the compressor operating, and improves the power factor.

②Power Module

See 3. "Power Module Circuit".

(2)Diode stack A(B) , DB1

The parts rectify the 230V AC supplied terminals L and N to a DC power supply.

< Reference >

• In the case of malfunction or defective connection: Immediately after the compressor starting, it may stop due to "Abnormal low speed" active error etc. And 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.

< Reference >

• In the case of defective diode stack A(B),: Two situations happen, one of them, the compressor stops to cause "IP" "abnormal low speed", etc. immediately after it starts, and another, it does not operate at all because no DC voltage is generated between (+) and (-) terminals.
• If the diode stack A(B) is faulty. Also, be aware that the 30A fuse might have blown.
• If DB1 is faulty, the compressor does not operated at all because no voltage is generated on the parts of the control P.W.B.
• If DB1 is faulty, be aware that the 5A fuse (or R004) might also have blown.

(3)Smoothing capacitor (C501, C502, C503: 330μF 420V)

The condensers boost up the voltage to be rectified by the diode stuck and smoothes it.

(3)Smoothing capacitor (C015: 270μF 450V, C201: 10μF 450V)

The condensers boost up the voltage rectified by the diode stacks and smoothes it.

Be careful to avoid an electric shock as a high voltage is generated on each part. Also, take care of a short circuit accident due to wrong connections of test equipment terminals, or the P.W.B. may be damaged.

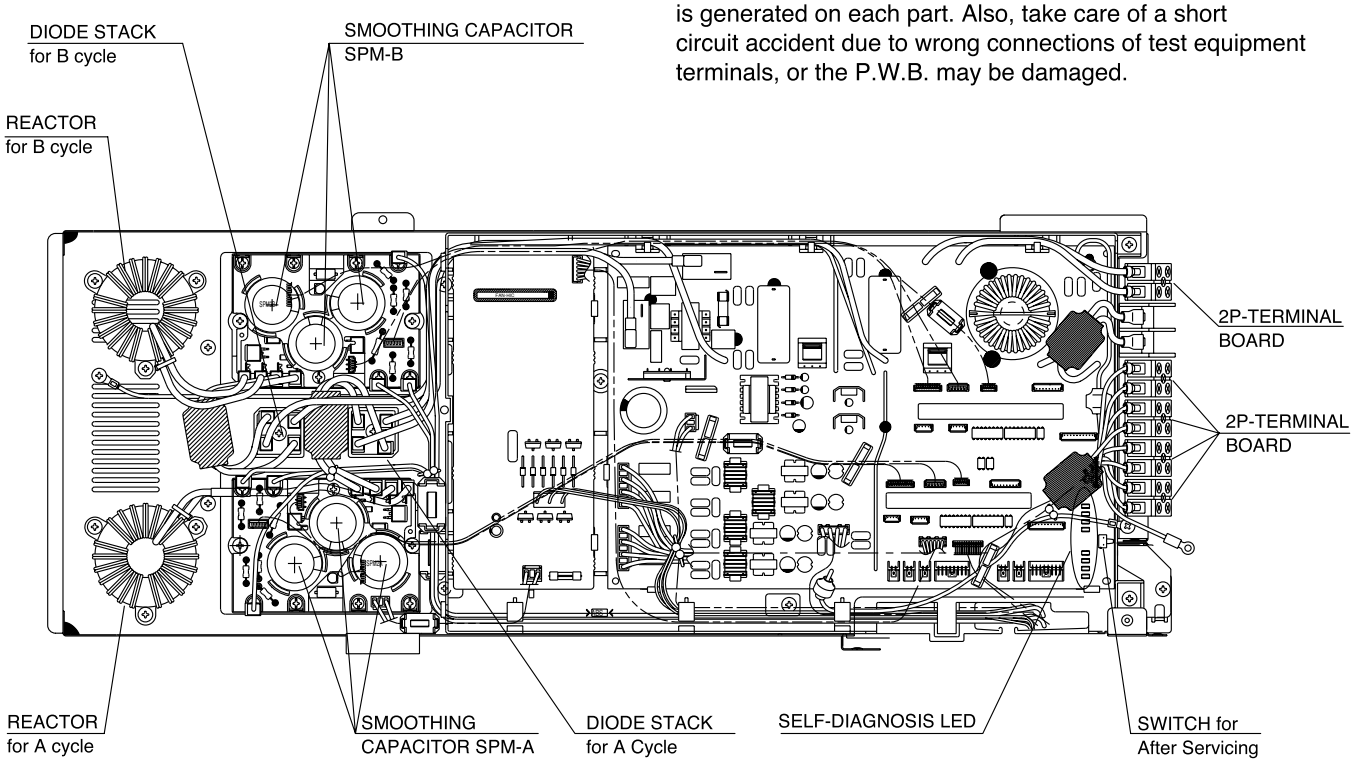


Fig. 1-2

(5) C001-C014, NF COIL 1

These coils absorb electrical noises generated during the compressor is operating and invasive noises entering from L and N terminals, and prevent the electronic parts from them.

(6) SURGE ABSORBER, VARISTOR 1-3

These electronic parts absorb invasive noises like an inductive thunder.

(7) INRUSH PROTECTIVE RESISTOR (R002,R003), INRUSH PROTECTIVE RESISTOR (R004)

The resistors work to limit an over current when power is just turned on.

(8) CT

The part detects an electrical current and limits it to be not in excess at high loading.

※ Be sure to make an earth line for the outdoor unit. If not, the noise filter circuit does not work normally.

※ Be sure to make an earth line for the outdoor unit. If not, the surge absorber and varistor 1-3 can not work.

< Reference >

When the inrush protective resistor is defective, the DB1 may malfunction. As a result, No DC voltage is generated and no operation can be done. In this case, the 5A fuse may blow.

2. Interface Circuit

- The function of the interface circuit is to perform:
  Communications between the indoor and outdoor units by mean of superimposing an A.C. signal (f=38kHz, amplitude 1V) on the 35V D.C. line supplied from the outdoor unit to the indoor unit.
  The circuit consists of three small circuits and one part as below.
  Oscillator circuit that generates the approx. 38kHz transmitting signal.
  Modulation circuit that composes of an interface signal sent from the micro computer and the f=38kHz transmitting signal.
  Demodulation circuit that picks up the interface signal from the communication signal of approx. 38kHz.
  Interface transformer that picks up the interface signal from the 35V D.C. line and superimposes.
- The timing of the interface
  The outdoor unit transmits the REQ signal (request signal to indoor) to the indoor unit one, the indoor unit, after transmitting the REQ signal, transmits the SS signal (the operation order) to the outdoor unit. Then after receiving the order from the indoor unit one, the outdoor unit transmits the REQ signal to the indoor unit two. Similarly, the indoor unit two receives the REQ signal and transmits the SS signal.
- The micro computer in HIC-A (which is for A cycle) controls the indoor unit one and two, the micro computer in HIC-B (which is for B cycle) controls the indoor unit three and four.
- The interface communication between the indoor and outdoor unit in A cycle (one, two) and B cycle (three, four) performs individually. The mutual operation information of A cycle and B cycle is interchanged each other as the inter-micro computer communication.
- The state of the interface communication between the indoor and outdoor unit is under watch. In the case of fault, the self-diagnosis lamp will indicate the state as table 2-1.
- When the interface works normally, measure the voltage (by the indicator style tester with 1V full scale, AC sampling range) between C1D1, C2D2, C3D3, and C4D4 each terminal. The indicator will swing slightly. If the indicator doesn't swing at all, it is likely to have some troubles in the outdoor control P.W.B. interface circuit. However, please accept that the check with the tester is just for a reference value.

Table 2-1

LED 3A0-1A	LED 3A0-2A	LED 3A0-3A	LED 3A0-4A	Self-diagnosis name	Trouble items	Main check point	Example of checking
☐ 1 blink	☐ No blink	☐	☐	In and outdoor unit communication error 1 of A cycle	Communication error of indoor unit 1: No communication between indoor unit 1 and outdoor unit	① Unconnection to indoor unit 1 ② Indoor parts troubled ③ Indoor control P.W.B.	See A
☐ 2 blinks	☐ No blink	☐	☐	In and outdoor unit communication error 2 of A cycle	Communication error of indoor unit 2: No communication between indoor unit 2 and outdoor unit	① Unconnection to indoor unit 2 ② Indoor parts troubled ③ Indoor control P.W.B.	See B
☐ 3 blinks	☐ No blink	☐	☐	In and outdoor unit communication error 3 of A cycle	Communication error of indoor unit 1 and 2: No communication between indoor unit 1 [2] and outdoor	① Unconnection to indoor unit 1 and 2 ② CD reverse connection ③ Indoor parts ④ SW-D-P.W.B. ⑤ Outdoor control P.W.B.	See C
☐ No blink	☐ 1 blink	☐	☐	In and outdoor unit communication error 1 of B cycle	Communication error of indoor unit 3: No communication between indoor unit 3 and outdoor unit	① Unconnection to indoor unit 3 ② Indoor parts troubled ③ Outdoor control P.W.B.	See A
☐ No blink	☐ 2 blinks	☐	☐	In and outdoor unit communication error 2 of B cycle	Communication_error of indoor unit 4: No communication between indoor unit 4 and outdoor unit	① Unconnection to indoor unit 4 ② Indoor electric parts troubled ③ Outdoor control P.W.B.	See B
☐ No blink	☐ 3 blinks	☐	☐	In and outdoor unit communication error 3 of B	Communication error of indoor unit 3 and 4, No communication between indoor unit 3[4] and outdoor unit	① Unconnection to indoor unit 3 and 4 ② CD reverse connection ③ Indoor parts troubled ④ SW-D-P.W.B. ⑤ Outdoor control P. W. B.	See C
☐ No blink	☐ 9 blinks	☐	☐	Communication error of outdoor micro computers	No communication between outdoor A cycle micro computer and B cycle micro computer.	① Outdoor control P. W. B.	———

(Caution)
In A cycle and B cycle, the communication error is checked independently.
As the examples shown in Table 2-2, it is possible that only one cycle is normal, or another trouble in the other cycle is also indicated.

Table 2-2

LED 3A0-1A	LED 3A0-2A	LED 3A0-3A	LED 3A0-4A	Indication example of combined troubles.
☐ 1 blink	☐ No light	☐	■	A cycle: In/outdoor unit communication error 1, B cycle: Normal operation
☐ 2 blink	☐ 2 blink	☐	☐	A cycle: In/outdoor unit communication error 2, B cycle: Stop operating because of peak current cut off
☐ 2 blink	☐ 1 blink	☐	☐	A cycle: In/outdoor unit communication error 2, B cycle: Communication error 1

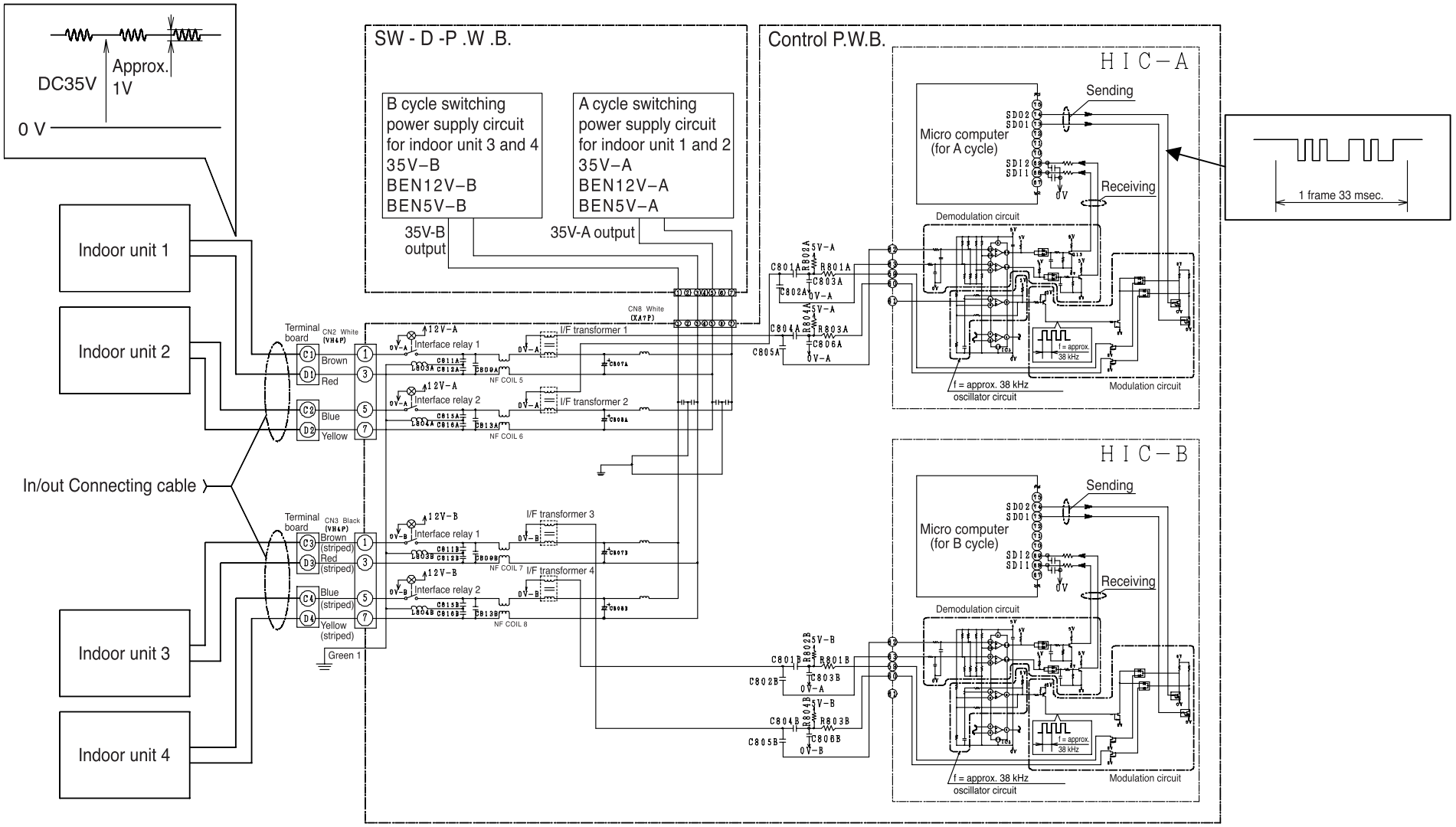


Fig. 2-1 Interface circuit

<Example of checking>

※ Explaining an example of checking for table. 2- 1

(A) : Communication error 1 (LD 303A or LD 303B one time blink)

In the case of the indoor unit 1 (or 3) is in the communication error and the indoor unit 2 (or 4) is normal: At first, check the connections of the in/outdoor connecting cables in the indoor and outdoor units (wrong connection, poor insertion etc).

If being normal state, unplug the power supply (turn off the overcurrent breaker), and remove the in/outdoor connecting cable, then insert the right cable (connected on C2C3 (C4, D4) terminals) into C1D1 (C3, D3) terminals and turn on the power supply (overcurrent breaker). (Connect no cable to C2C3 (C4, D4) terminals.)

If the electric parts of the outdoor unit are normal, "**LD 303A (LD303B) blinks two times**" (because of no connection to C2D2 (C4, D4) terminals), but "LD303A (LD303B) blinks three times," the control P.W.B. of the outdoor unit may malfunction.

※ When replacing C1D1 with C2D2 (C3D3,C4D4), take care of connecting normally, in the case of connecting in reverse, LD303A will blink 3 times and the outlet (35V) fells down to 5V or less (protector operated).

※ When replacing C1D1 with C2D2 (C3D3, C4D4), unplug the power supply (turn off the overcurrent breaker) or the P.W.B. will be damaged.

※ After checking, put back the parts in proper state.

(B) : Communication error 2 (LD303A or LD303B blinks two times)

In the case of the indoor units 2 (or 4) is in the communication error and the indoor unit 1 (or 3) is normal:

As above-mentioned (A), check the connections of the in/outdoor connecting cable in the indoor and outdoor units (wrong connection, poor insertion, etc).

If being normal state, unplug the power supply (turn off the overcurrent breaker) and remove the cables , then insert the cable connected on C1D1 (C3, D3) into C2D2, and turn on the power supply (overcurrent breaker). (Connect no cable to C1D1 (C3, D3).) If the electric parts of the outdoor unit are normal, "LD 303A (LD 303B) may blink one time" (because of no connection to C1D1 (C3, D3) terminals.), but "LD 303A(LD 303B) blinks 3 times", the control P.W.B. of the outdoor unit may malfunction.

※ Measure a voltage of the 35V-outlet, and take care of connecting in proper state.

(C) : Communication error 3 (LD 303A or LD 303B blinks three times)

In the case of that both the indoor unit 1 and 2 (the indoor unit 3 and 4) are in the communication error: At first, check the connections of "CD reverse" in the indoor and outdoor units, oK or not. If one line of either C1D1 or C2D2 terminals is connected wrongly in CD reverse, "LD 303A blinks three times". Similarly, If one line of either C3D3 or C4D4 is connected wrongly in CD reverse, "LD 303B blinks three times".

※ If CD is connected in reverse , the outlet (35V) fells down to 5V or less (protector operated).

In the case of connecting CD in no reverse, check the voltage between C1D1 and C2D2 (C3D3, C4D4) terminals by the tester. If the voltage is in abnormal , turn off the power supply for a moment, and check the voltage again after removing C1D1 and C2D2 (C3D3, C4D4). but the checked voltage is normal at this time, the indoor unit 1 or 2, or both (unit 3 or 4, or both) malfunction.

For the purpose of determining the units malfunctioned, connect the units one by one and check them at each time. If the 35V outlet is abnormal after removing C1D1 and C2D2 (C3D3, C4D4), "SW-D-P.W.B" is defective. If the 35V outlet is normal, measure the voltages between C1 D1, C2 D2, (C3 D3, C4 D4) each terminal by the indicated tester (with 1V full scale and AC sampling range).

In this just case of indicating the communication error of LD 303A or LD 303B, when the indicator is moving slightly , the HIC of the outdoor unit control P.W.B may be malfunction. (The electric parts of indoor unit are probably not defective because the indoor unit has not short circuit and two of the indoors interface circuit may be not malfunction at same time)

If the indicator does not move at all, the outdoors interface circuit is malfunction.

※ **Remove and insert the connectors, cables and others, after disconnecting the power cord plug from the power supply outlet.**

※ Be aware that the outdoors electric parts, the switching power supply in particular may be defective at leaving CD connection in reverse.

- Fig. 3-1 shows the power module and its peripheral circuit.
  The three transistors on the positive ⊕ side are called the upper arm, and the three transistors on the negative ⊖ side, the lower arm.

- RAM-70QH4 and RAM-80QH4 have two power module circuits as shown in Fig. 3-1 because of providing for two cycles and two compressors style.

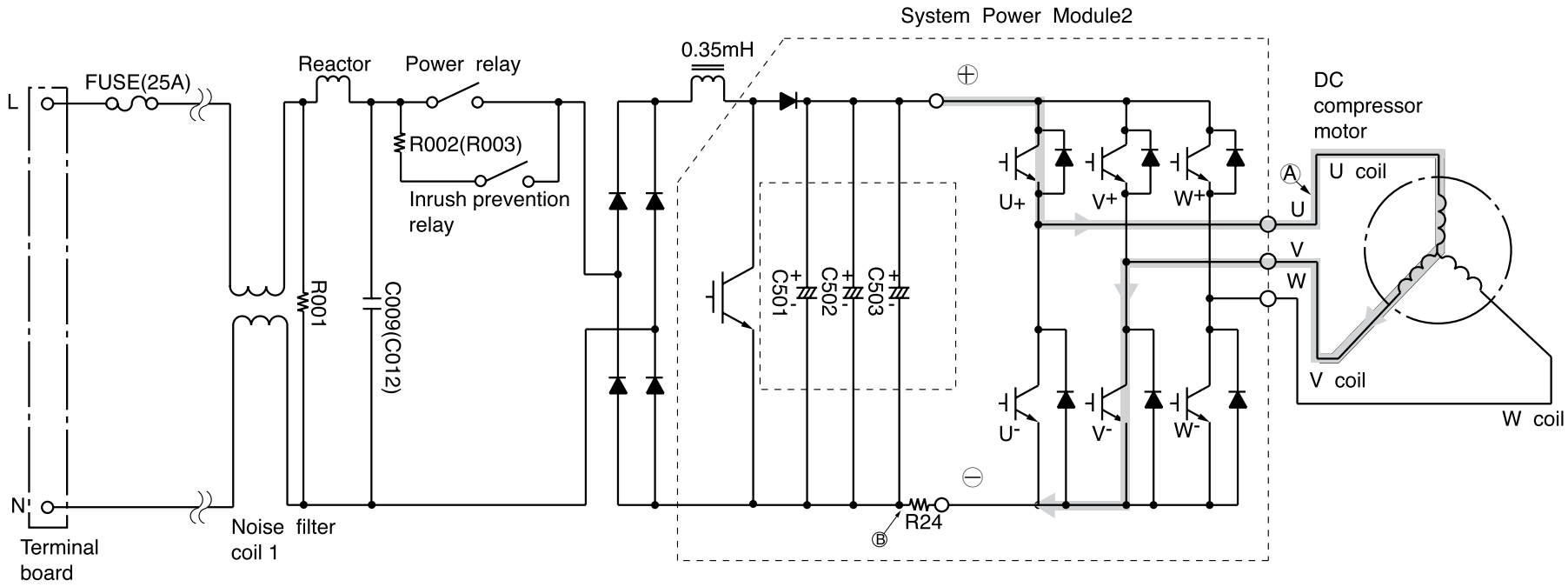


Fig. 3-1 Power module circuit (U^+ is ON, V^- is ON)

- 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)]

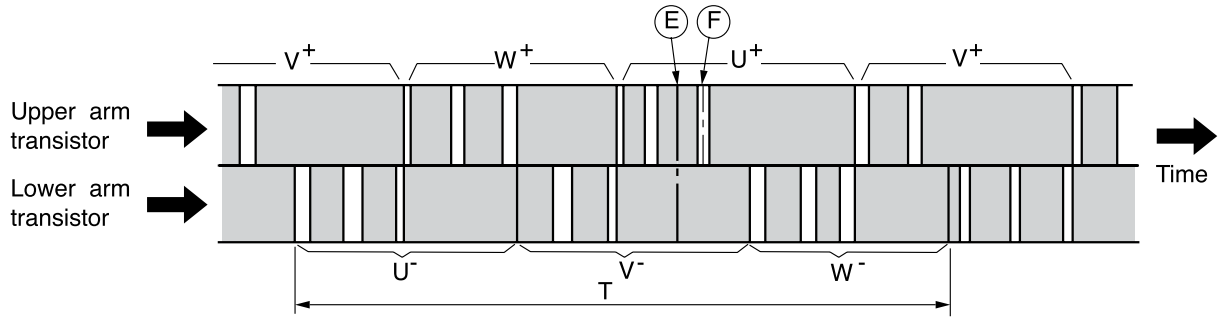


Fig. 3-2 Switching order of power module

- 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 waveform at each point shown in Fig. 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.

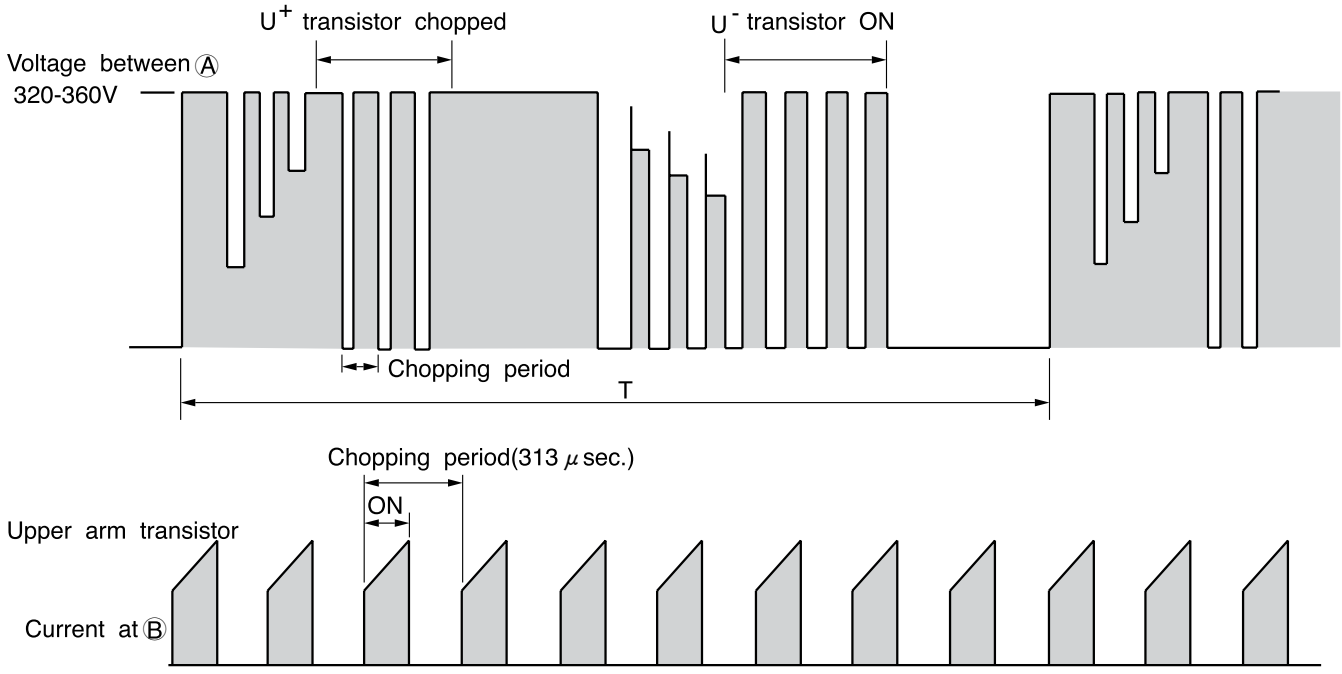


Fig. 3-3 Voltage waveform at each point

- 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 → Returm diode → Point Ⓐ (Fig. 3-4)

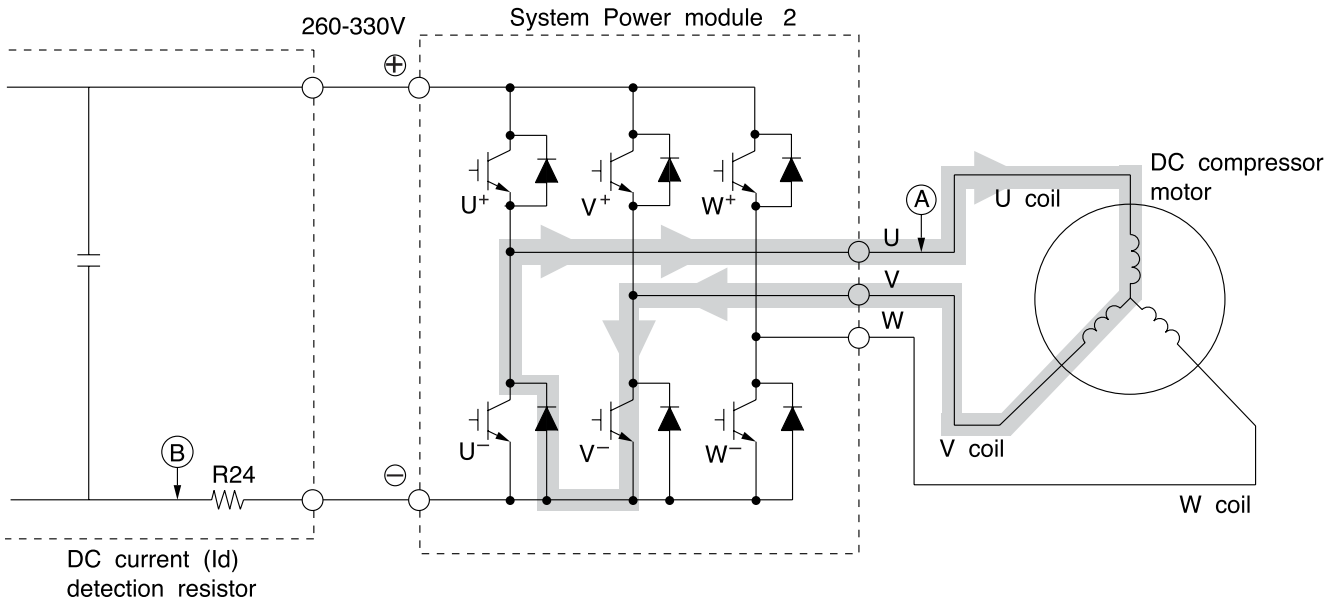


Fig. 3-4 Power module circuit (U^+ is ON, V^- is ON)

- Since current flows at point Ⓑ only when U^+ 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 main P.W.B. may indicate as shown below:

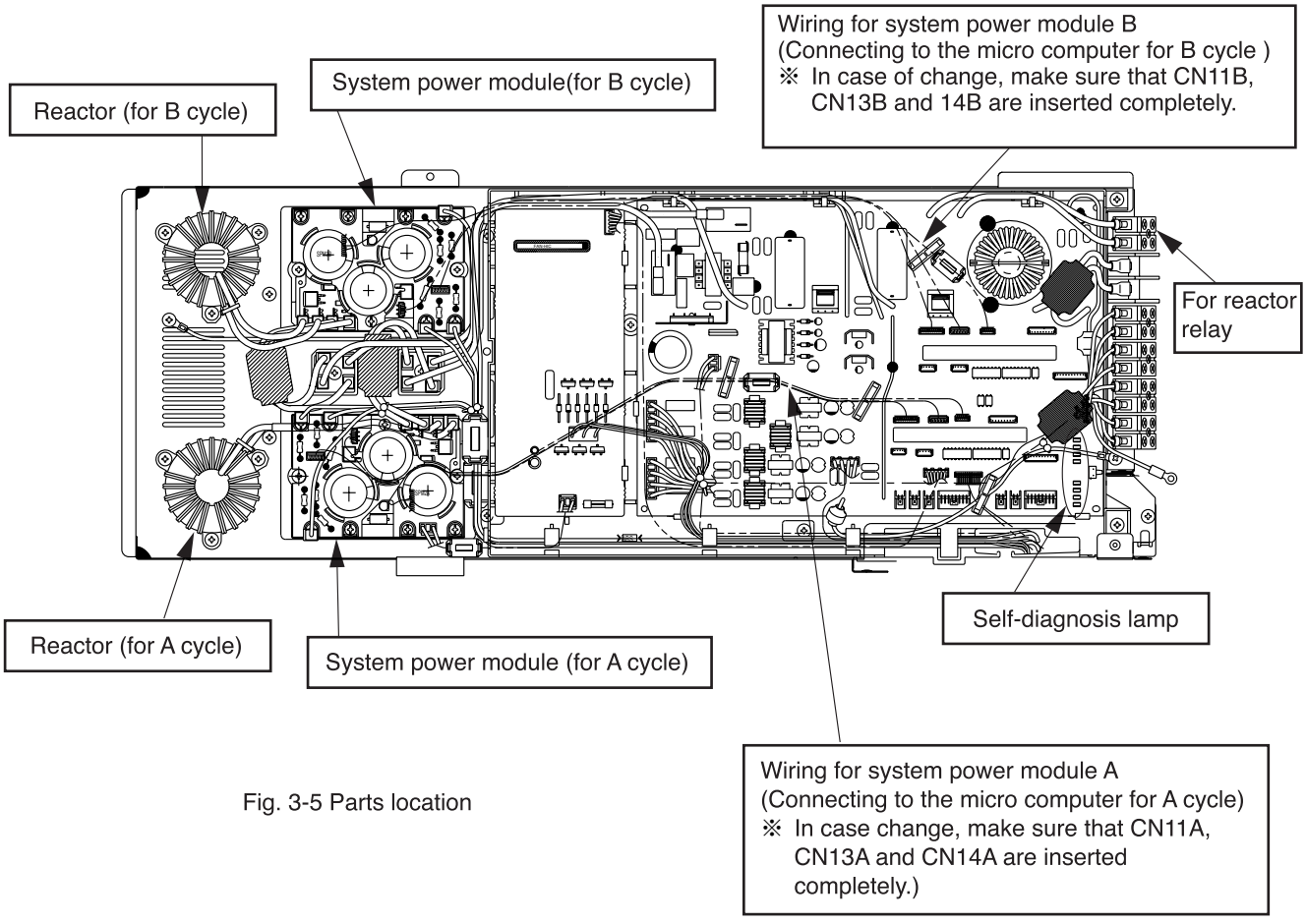


Fig. 3-5 Parts location

4. P.W.B Power Supply Circuit (Switching Power Circuit)

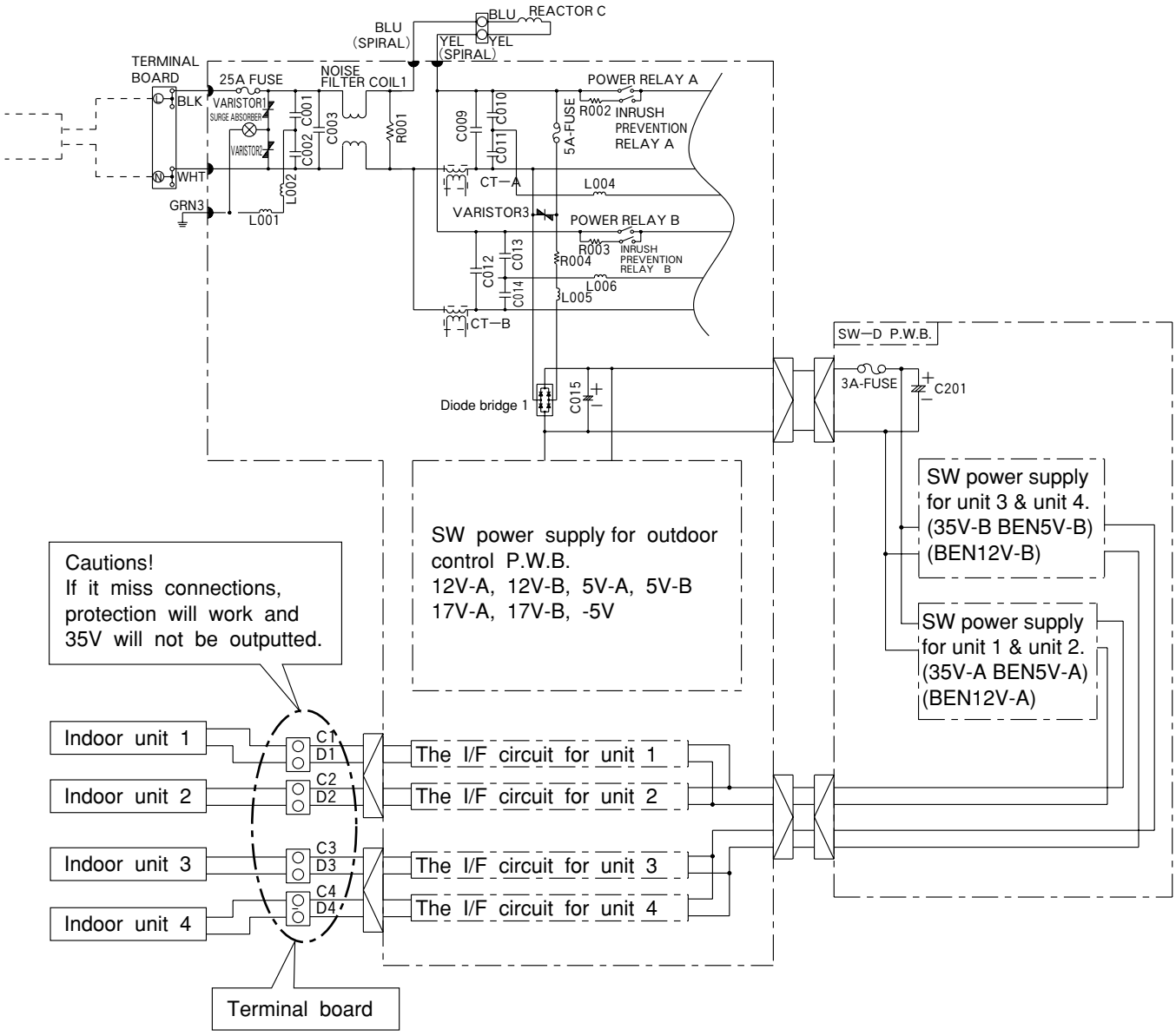


Fig. 4-1 Function of P.W.B. Power Supply Circuit

RAM-70QH4 and RAM-80QH4 have [**SWITCHING POWER SUPPLY CIRCUIT FOR OUTDOOR CONTROL P.W.B.**] (the circuit is in charge of outdoor control power supply entirely) on their control P.W.B. RAM-70QH4 and RAM-80QH4 have [SWITCHING POWER SUPPLY CIRCUIT FOR INDOOR UNIT] (the circuit generates 35V power supply for the indoor units of 4 rooms (3 rooms in case of 3 rooms multi) and 12V, 5V, for electric expansion valve control on their SW-D- P.W.B. with 2-circuit.)

The functions of switching power circuit, input DC approx. 325V, which was rectificated by the diode bridge DB1, into the primary. Switch the control IC on and off at high speed to generate the voltage in the switching transformer primary winding. Transmit the voltage to the secondary winding through the transformer core. The voltage is generated at each secondary output corresponding to each winding.

(1) Switching power supply circuit for outdoor control P.W.B.

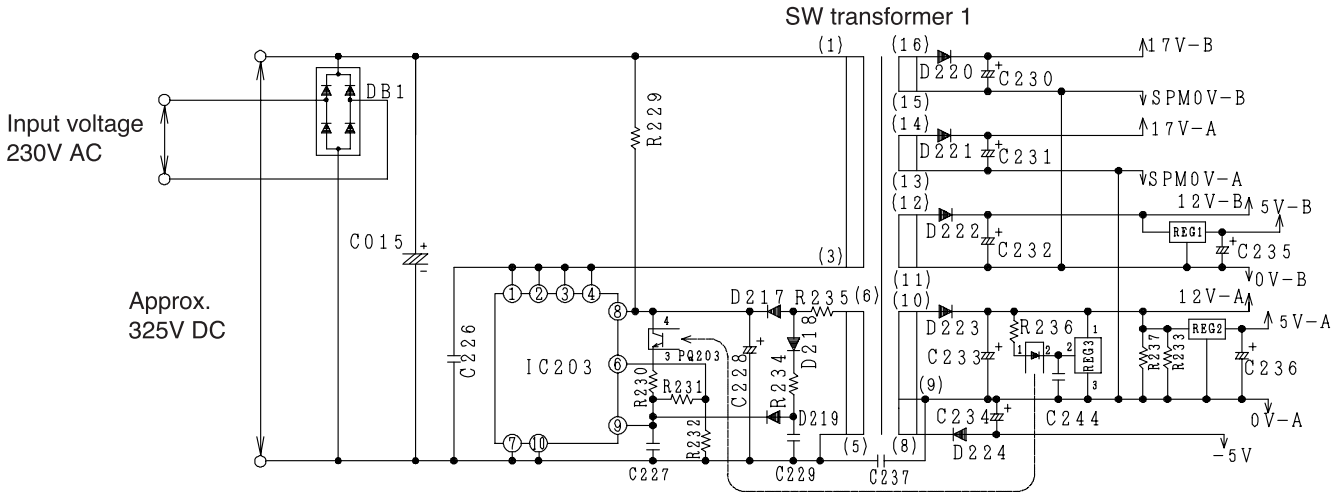


Fig. 4-2 Switching power supply circuit for outdoor control P.W.B.

Fig. 4-2 shows the switching power supply for the outdoor control P.W.B.

The switching power supply for the outdoor control P.W.B. generates the voltage of power supply to control circuits of the outdoor parts.
The following table 4-1 shows the specification of each output voltage.

Table 4-1 Voltage specification

Output name	Output specification	Main load circuit
12 V– A	12 (+2.0/–1.5)V	A cycle control system, (Each IC, Relay, Fan HIC)
12 V– B	12 (+2.0/–1.5)V	B cycle control system, (Each IC, Relay)
5 V– A	5 (±0.5)V	A cycle control system, (Micro computer, Control circuits)
5 V– B	5 (±0.5)V	B cycle control system, (Micro computer, Control circuits)
– 5V	–4.5 (+2.2/–1.0)V	Fan HIC (HIC3)
17 V– A	17 (+2.0/–1.0)V	System power module A
17 V– B	17 (+2.0/–1.0)V	System power module B

In order to check the voltage shown in Table 4-1, measure at output-indicating point with the P.W.B. by tester.
A cycle and B cycle are isolated electrically, so the potentials of 0V are different between A and B.
When you measure the voltage in A cycle <B cycle>, connect the control terminal (usually black) of a tester to V-A <OV-B>.
Take care NOT to get an electric shock in measuring voltage of the circuit. The electric potential (from the earth) of the OV-point is more than 200V. So measuring it is attended by danger.

(2) Switching power supply for indoor unit

Fig. 4-3 shows the switching power supply circuit for the indoor units.

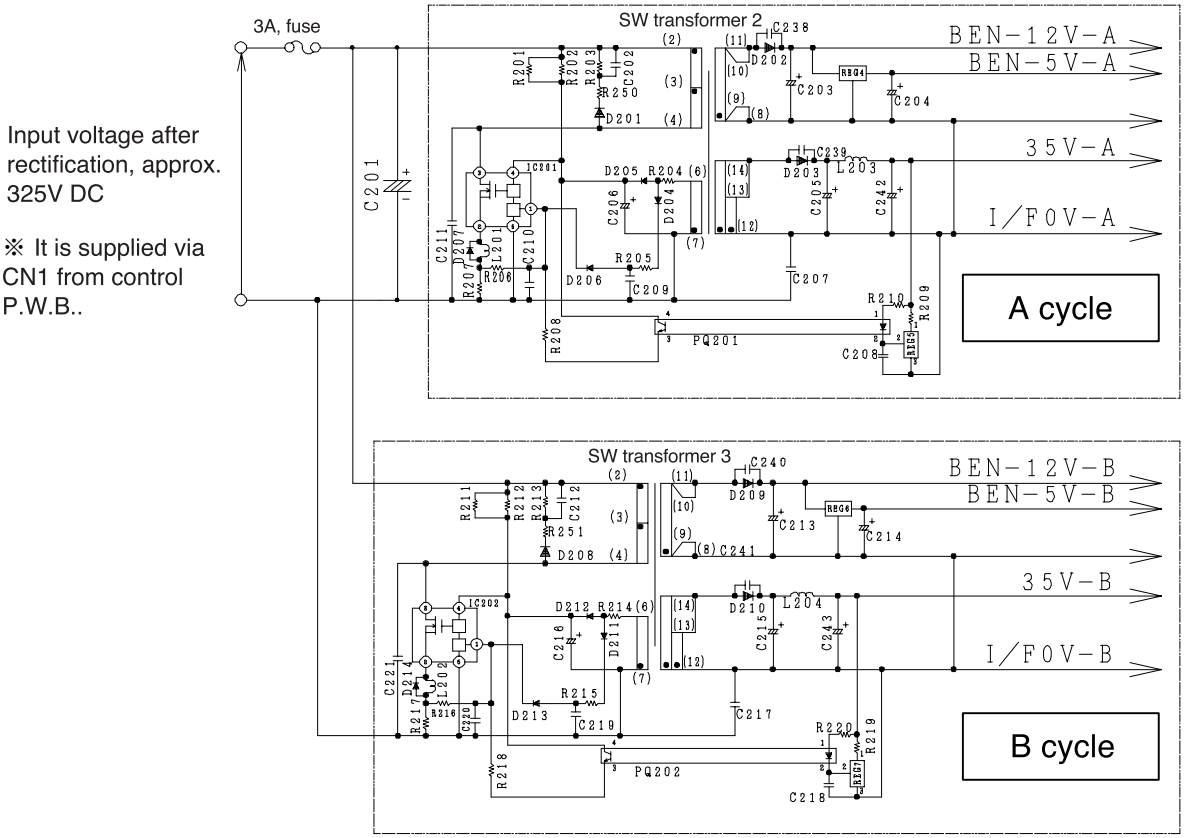


Fig. 4-3 Switching power supply circuit for indoor unit

The switching power supply circuit consists 2 circuits , and is carried on the SW-D-P.W.B.

The circuit for A cycle generates 35V of the power supply voltage for the indoor unit 1• 2, and 12V and 5V for the drive of electric expansion valve. Similarly . the circuit for B cycle generates 35V of the power supply voltage for the indoor unit 3 • 4, and 12V and 5V for the drive of B cycle electric expansion valve. The voltage specification of each output is in fig . 4-2 below.

Fig . 4-2 Voltage specification.

Output name	Output specification	Main load circuit
35 V – A	35 (± 2.5) V	Indoor unit 1 • 2, Reversing valve for A cycle
BEN 12V – A	12 (± 2.0) V	Electric expansion valve 1 • 2 for A cycle
BEN 5V – A	5 (± 0.5) V	Control circuit for electric expansion valve of A cycle
35V – B	35 (± 2.5) V	Indoor unit 3 • 4 (only unit 3 operates for 3 rooms)
BEN 12V – B	12 (± 2.0) V	Electric expansion valve 1 • 2 for B cycle
BEN 5V – B	5 (± 0.5) V	Control circuit for electric expansion valve of B cycle

<Reference>

- If the 3A fuse has broken , the switching power circuit is defective. Replace the SW-D-P.W.B..
- In the case of that the 5A fuse in the control P.W.B has broken.

(1) If the varistor 3 has broken, the terminal board L/N was supplied a excessive voltage.
Although the switching power circuit is normal , but have to check the DC voltage that leads to the terminal board L/N terminal, and replace the varistor 3 and 5A fuse.

(2) If the varistor 3 has not broken , replace the control P.W.B. because the switching power circuit for control P.W.B. is defective.

- In the case of that the indoor unit of A or B cycle does not operate at all:

(1) If the voltage on the C-D terminals of the in/outdoors connecting cable (check it at the indoor side as near as possible), is normal, Be aware that the electric parts may also be defective.

(2) If the voltage is abnormal , check C and D of the terminal board in the in and outdoor unit both whether C and D are connected in reverse.
If they are connected in reverse , the 35V output of the switching power circuit is cut off by a protector . At this time, LD303A (green) or LD303B (green) blinks three times, the cable that has a blinking LED is in reverse connection. (LD303A 3 blinks, C1D1 or C2D2, or both be in reverse connection and LD303B 3 blinks.C3D3 or C4D4, or both be in reverse connection)

(3) If you have checked that C and D are connect normally, unplug the power supply (turn off the overcurrent breaker) for a moment and remove the in/outdoor connecting cable, then turn on the power supply and check the voltages on C1 and D1, C2 and D2, C3 and D3, C4 and D4 each terminal of the outdoor unit terminal boards.
If being abnormal, replace the SW-D-P.W.B., but being normal, repair the electric parts because they are defective.

- In the case of the indoor unit 1 and 4 (three rooms multi-type is unit 1-3) does not operate at all:
  (1) Check the connection of the in/outdoor connecting cable whether being in reverse or not)
  (2) If the connections is not reverse,
    ① check the voltage (230V is supplied) on the L and N terminals.
    ② Replace the SW-D-P.W.B., if the connectors "CN1" and "CN8" leads the SW-D-P.W.B. with the control P.W.B. is connected normally and the self-diagnosis lamp for the outdoor unit lights.
    ③ Replace the control P.W.B., if the self-diagnosis lamp does not light.

(Caution)

※The outdoor unit does not operate at all (above mentioned) means the cases of that the indoor unit indicator, the operation indicator and the louver initializing, at the power supply turning on, can not turn on , equivalent to that the indoor unit is not supplied with the power supply.

※When removing the connectors and the in/outdoor connecting cable, unplug the power supply (turn off overcurrent breaker) or the P.W.B. may be damaged.

5. Overload control ciricuit (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 judgement by comparing the DC current level and set value.
- Fig. 5-1 shows the overload control system configuration and Fig. 5-2 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.

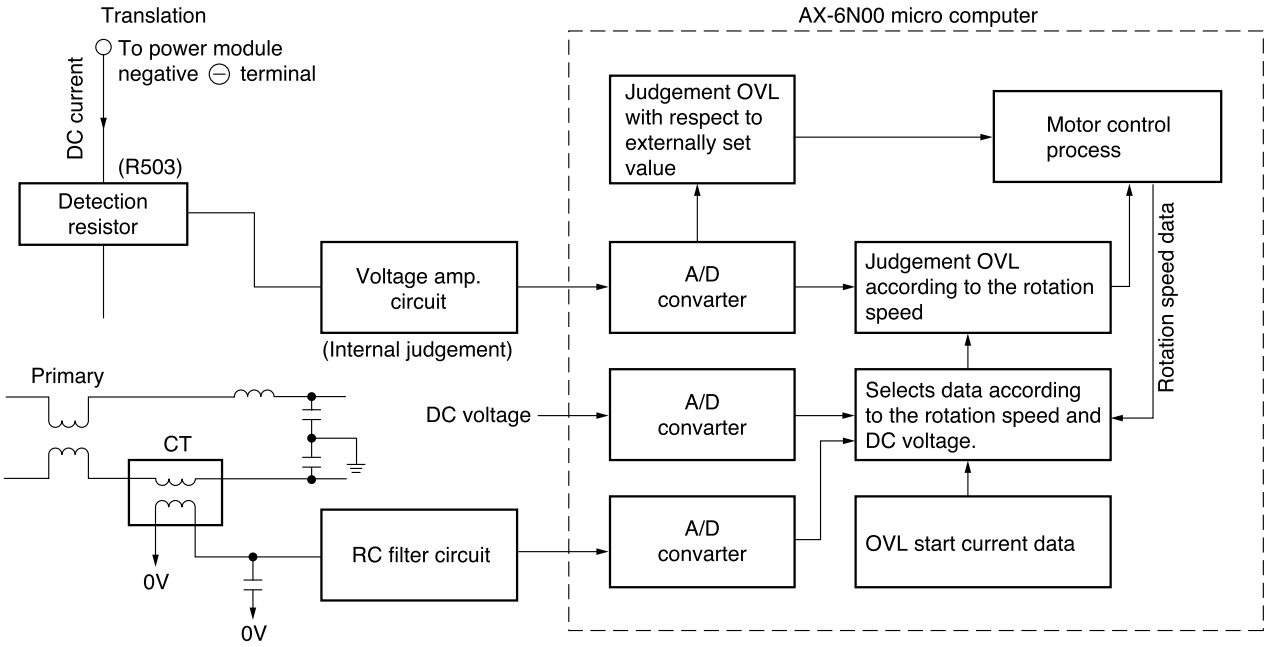


Fig. 5-1 Overload Control System Configuration

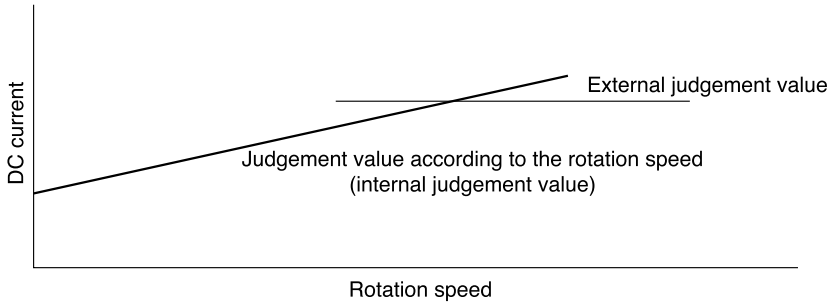


Fig. 5-2

6. Temperature Detection Circuit

- The outdoor unit (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. 6-1, and their roles and temperature measuring points are shown as Table 6-1. The DEF thermistor, OH thermistor and electric expansion valve are for A cycle and B cycle respectively. The outdoor temperature thermistor is common to A cycle and B cycle.

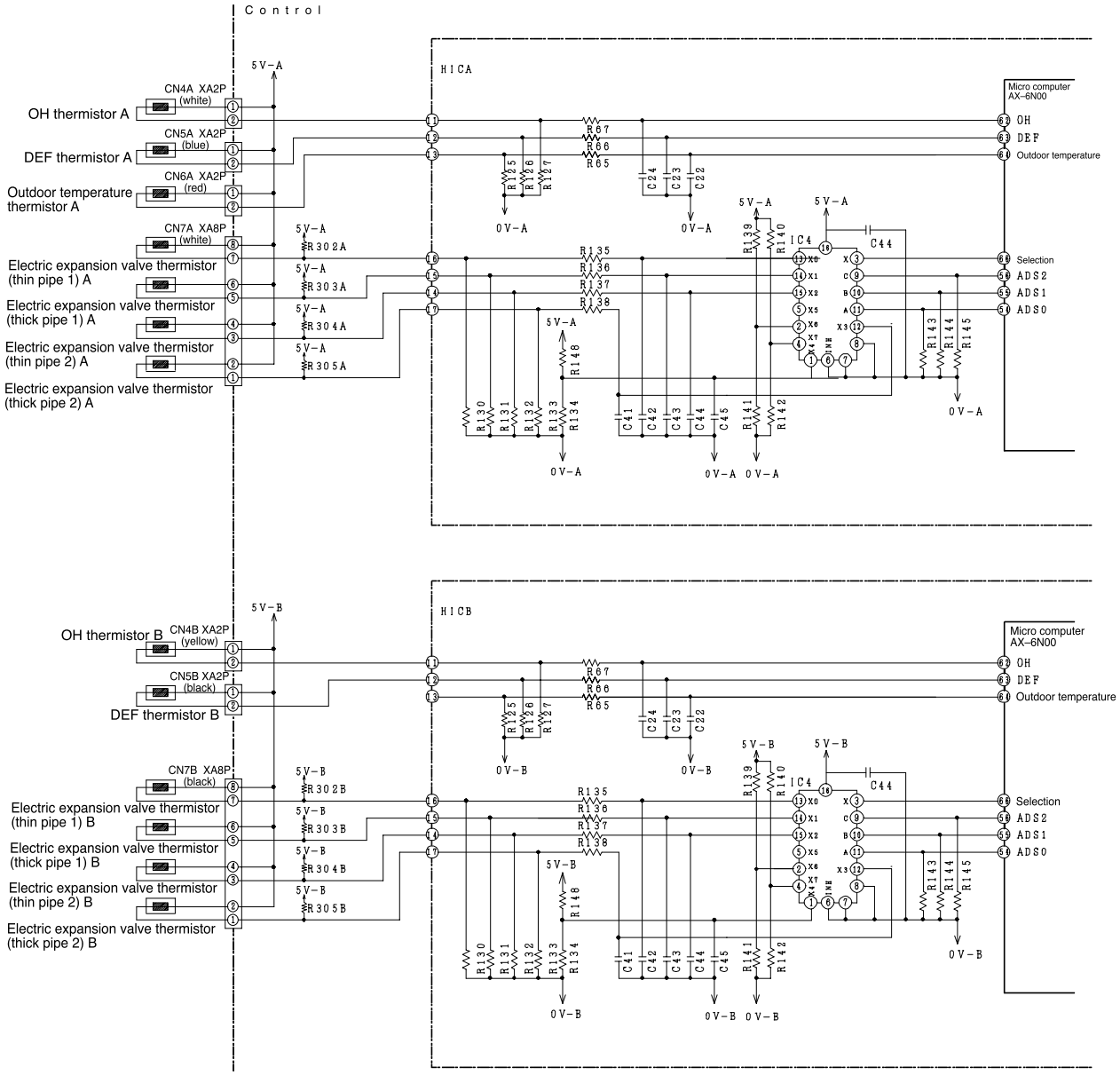


Fig. 6-1 Temperature Detection Circuit

Table 6-1 Name and Role of each thermistor

Name	Connector No	Measuring Point	Role
OH thermistor A	CN4A	A cycle 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.
OH thermistor B	CN4B	B cycle compressor head	
DEF thermistor A	CN5A	A cycle heat exchanger	The thermistors decide the defrost operation during heating combined the data of the outside temperature and its data.
DEF thermistor B	CN5B	B cycle heat exchanger	
Outdoor temperature thermistor A	CN6A	Outside temperature	Outdoor temperature is used to decide the various operations of the air conditioner.
Electric expansion valve thermistor (thin pipe 1) A	CN7A	Indoor unit 1 (thin 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 (thick pipe 1) A		Indoor unit 1 (thick pipe)	
Electric expansion valve thermistor (thin pipe 2) A		Indoor unit 2 (thin pipe)	
Electric expansion valve thermistor (thick pipe 2) A		Indoor unit 2 (thick pipe)	
Electric expansion valve thermistor (thin pipe 1) B※1	CN7B	Indoor unit 3 (thin pipe)	
Electric expansion valve thermistor (thick pipe 1) B※1		Indoor unit 3 (thick pipe)	
Electric expansion valve thermistor (thin pipe 2) B※1		Indoor unit 4 (thin pipe)	
Electric expansion valve thermistor (thick pipe 2) B※1		Indoor unit 4 (thick pipe)	

※1 Not carried in RAM-70QH4

- Table 6-2 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.
- Avoid measuring the voltage at the HIC pins. However if you must measure it, be aware that the basic voltage potentials at HIC pins should be 0V-A in A cycle and 0V-B in B cycle. The voltage may be measured incorrectly when the basic voltage potential is wrong.

Table 6-2 Correspondence between each thermistor's resistance and temperature (reference value)

Electric expansion valve thermistor DEF thermistor	Temperature	Resistance	HIC 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, LD301A (red) lights and LD302A (orange) blinks so that they indicate troubled parts. Combinations of LD301A and LD302A, LD301B and LD302B are set up for indicating troubled thermistors of A cycle and B cycle each. The correspondences between the number of blink time and troubled parts are shown as Table 6-3. 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 in one cycle by the table, a small number of blink takes precedence of others. (When the thermistors of A and B cycle are troubled at the same time, LD301A and LD301B light, and LD302A and LD302B blink.)
- The electric expansion valve thermistor is put together with 4 pieces, when replacing the thermistor, replace one set of 4 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 aware 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.

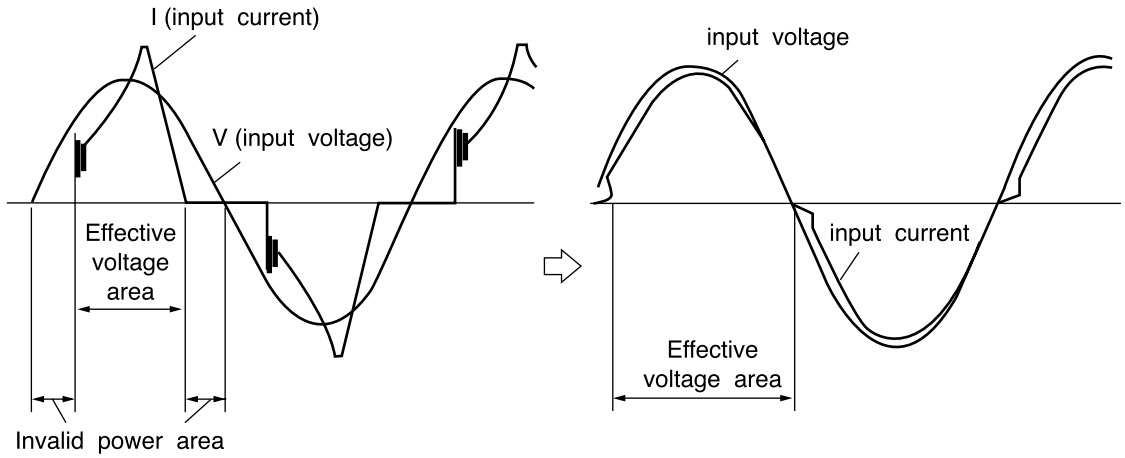
Table 6-3 LED lighting mode at the thermistors troubled

LED lighting mode		Troubled thermistor	Judgement	
LD301A	LD302A		Open	Short
Lights	1 blink	OH thermistor A	0.04V or less	4.96V or more
Lights	2 blinks	DEF thermistor A	0.04V or less	4.94V or more
Lights	3 blinks	Outdoor temperature thermistor		
Lights	4 blinks	Electric expansion value thermistor (thin pipe1) A		
Lights	5 blinks	Electric expansion value thermistor (thick pipe1) A		
Lights	6 blinks	Electric expansion value thermistor (thin pipe 2) A		
Lights	7 blinks	Electric expansion value thermistor (thick pipe 2) A		
LD301B	LD302B			
Lights	1 blink	OH thermistor A	0.04V or less	4.96V or more
Lights	2 blinks	DEF thermistor A	0.04V or less	4.94V or more
Lights	4 blinks	Electric expansion value thermistor (thin pipe1) B		
Lights	5 blinks	Electric expansion value thermistor (thick pipe1) B		
Lights	6 blinks	Electric expansion value thermistor (thin pipe 2) B		
Lights	7 blinks	Electric expansion value thermistor (thick pipe 2) B		

- 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.

7. 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.

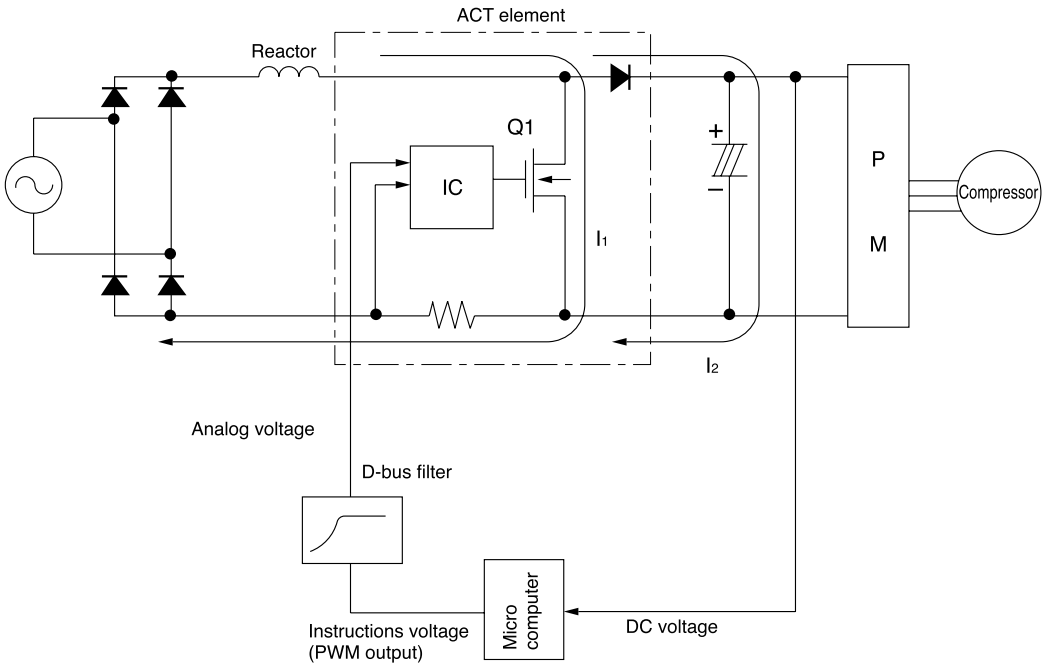


*Assuming the same current capacity (20A), power can be used about 10% effective, comparing with curent use (power factor of 90%), and maximum capacity is thereby improved.

(1) Boosting and varying DC voltage Vd

It boosts the DC voltage to the valve corresponds to the rotation speed with a detected DC voltage by the micro computer.

Its component is basically made of a boosting chopper circuit.



The current I_1 is absorbed into the reactor for On time and discharged to the capacitor for Off time with high frequency chopping. (I_2)

It controls a chopper duty of Q1 so that a current be absorbed into the reactor and a current be consumed by the inverter are balanced. At high loading, DC voltage is boosted as many duties (absorbing current much).

COOLING MODE

Q1 The compressor has stopped suddenly during cooling operation.

A1 Check if indoor heat exchanger is frosted.
Wait for 3-4 minutes until it is defrosted.

If the air conditioner operates in cooling mode when it is cold, the evaporator may get frosted.

DEHUMIDIFYING MODE

Q1 Sound of running water is heard from indoor unit during dehumidifying.

A1 Normal sound when refrigerant flows in pipe.

Q2 Compressor occasionally does not operate during dehumidifying.

A2 Compressor may not operate when room temperature is 10℃ or less. It also stops when the humidity is preset humidity or less.

Q3 Cold air comes out during a dehumidifying operation.

A3 To improve the dehumidification efficiency performs quiet fan operation. Therefore the air is cold and it is not a malfunction.

Q4 The operation does not stop even by setting the temperature higher than room temperature on the remote controller.

A4 It sets to perform dehumidifying operation by setting the temperature slightly lower than remote controller setting.

HEATING MODE

Q1 The circulation stops occasionally during Heating mode.

A1 It occurs during defrosting
Wait for 5 -10 minutes until the condenser is defrosted.

Q2 When the fan speed is set at HIGH or MED, the flow is actually Weak.

A2 At the beginning of heating, the fan speed remains LOW for 30 seconds. If HIGH is selected, it switches to LOW and again to MED after additional 30 seconds.

Q3 Heating operation stops while the temperature is preset at "30".

A3 If temperature is high in the outdoor, heating operation may stop to protect internal devices.

AUTO FRESH DEFROSTING

Q1 After the ON/OFF button is pressed to stop heating, the outdoor unit is still working with the OPERATION lamp lighting.

A1 Auto Fresh Defrosting is carried out : the system checks the outdoor heat exchanger and defrosts it as necessary before stopping operation.

AUTO OPERATION

Q1 Fan speed does not change when fan speed selector is changed duning auto operation.

A1 At this point fan speed is automatic.

Q2 How is the automatic operation mode determined?

A2 According to the room temperature and outside temperature, heating or cooling or dehumidifying operation is automatically selected. Refer to the basic operation section.

Q3 The room temperature cannot be controlled at an automatic operation.

A3 It is automatically set as follows.
At cooling: Set at 27°C
At dehumidifying: Set slightly lower than room temperature
At heating: Set at 23°C
The room temperature setting can be raised 3°C by "_" or lowered 3°C by "∨".

AT STARTING OPERATION

Q1 When only the power switch is turned on, the damper at the bottom air outlet moves even if the START/STOP button is not pressed. (RAF-25NH4, 50NH4)

A1 To ensere correct opening and closing of the damper, the damper will move when power is turned on or the unit is to be operated in order to check its fully opened and closed positions.

Q2 When the heating operation is started, the indoor fan does not start immediately and the damper at the bottom air outlet occasionally does not open.

A2 This is because the preheating device is working. It will not start to drive the fan until the refrigerating cycle warms up and warm air blows. Wait for a while. The damper does not open either during preheating or for one minute after preheating is finished.

Q3 When the unit built behind the gallery (lattice door) is to be started immediately after it has stopped, the unit occasionally will not start.

A3 Such a phenomenon may occur with built-in installation where heat is likely to be stuffy. Install the unit as near to the lattice door as possible so that air is not short-circuited, or provide a partition between the unit and lattice door.

OTHERS

Q1 The indoor fan varies among high air flow, low air flow and breeze in the auto fan speed mode.(Heating operation)

A1 This is because the cool wind prevention function is operating, and does not indicate a fault.

The heat exchanger temperature is sensed in the auto fan speed mode. When the temperature is low, the fan speed varies among high air flow, low air flow and breeze.

Q2 Loud noise from the outdoor unit is heard when operation is started.

A2 When operation is started, the compressor rotation speed goes to maximum to increase the heating or cooling capability, so noise becomes slightly louder. This does not indicate a fault.

Q3 Noise from the outdoor unit occasionally changes.

A3 The compressor rotation speed changes according to the difference between the thermostat set temperature and room temperature.
This does not indicate a fault.

Q4 There is a difference between the set temperature and room temperature.

A4 There may be a difference between the set temperature and room temperature because of construction of room, air current, etc. Set the temperature at a comfortable level for the space.

Q5 Air does not flow immediately after operation is started.

A5 Preliminary operation is performed for one minute when the power switch is turned on and heating or dehumidifying is set. The operation lamp blinks during this time for heating. This does not indicate a fault.

Q6 Mold in the room cannot be inhibited even after performing the air conditioner drying operation.

A6 Air conditioner drying operation is to dry the interior of the indoor unit to inhibit the growth of mold. It is not to inhibit the mold growth in the room.

Q7 The interior of the indoor unit seems to be still damp even after performing the air conditioner drying operation.

A7 Condition of the interior of the indoor unit varies depending on usage of the unit and condition of the indoor unit. If it is not dried after the first try, perform the drying more than one time for better effect.

Q8 Even if the air conditioner drying is performed using the remote controller during the unit operation or timer programming, the air conditioner drying operation does not start.

A8 To perform the air conditioner drying, stop the unit operation or programming beforehand.

Q9 The unit is operated after built-in installation (behind the lattice door). It turns off for a long time and the room is not warmed(cooled).

A9 Check to see if warm (cool) air is being short-circuited behind the lattice door. A short-circuit is likely to occur when the deflector position is not appropriate, the lattice does not have a big enough opening, and/or the unit is installed in the inner part. Install the unit as near the lattice door as possible.

Q10 Strange sound is occasionally heard from the bottom air outlet.

A10 When the damper is switched, scrambing of air will occur brtween the top and bottom outlets due to the set fan speed during switching and filter clogged state, which, may generate some sound.

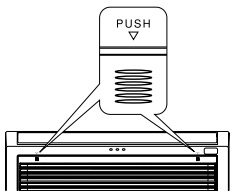
DISASSEMBLY AND REASSEMBLY

MODEL RAF-25NH4, RAF-50NH4

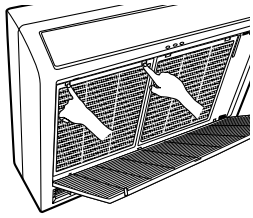
1. AIR FILTER

Clean the air filter, as it removes dust inside the room.
Be sure to clean the filter once every two weeks so as not to consume electricity unnecessarily.

PROCEDURE



1 **Open the front panel.**
- To open the front panel, use the remote controller to stop unit operation. Then press the two "▒" sections below PUSH at the top left and right corners of the front panel.
- Grasp the left and right sides of the front panel and open it toward you.

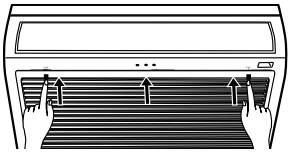


2 **Remove the filters.**

3 **Remove dust of the filters using a vacuum cleaner.**
- After using neutral detergent, wash with clean water and dry in shade.

4 **Attach the filters.**
- Attaching the filters which are placed the surface written "FRONT" up.

5 **Close the front panel.**
- To close the front panel, press the two "▒" sections below PUSH at the top left and right corners of the front panel.
- Press the upper center part of the front panel to close properly.

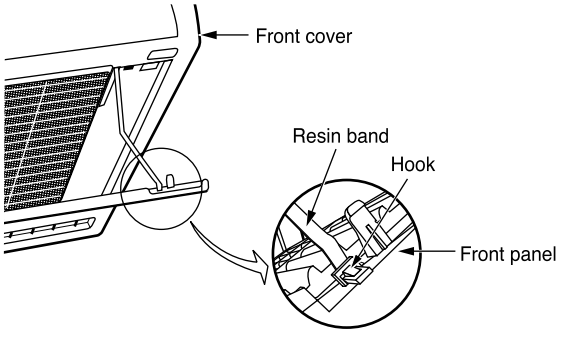


2. FRONT PANEL

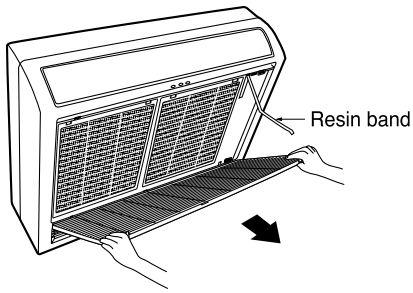
- Be sure to use both hands to grasp the front panel when removing it or attaching it.
- The front panel may be installed up or down to suit user preference.

Removing

① Press the hook found at the tip of the resin band installed inside the front panel's right section to remove the resin band.



② Pull the front panel down toward you and once fully open, pull it to remove.



Attaching

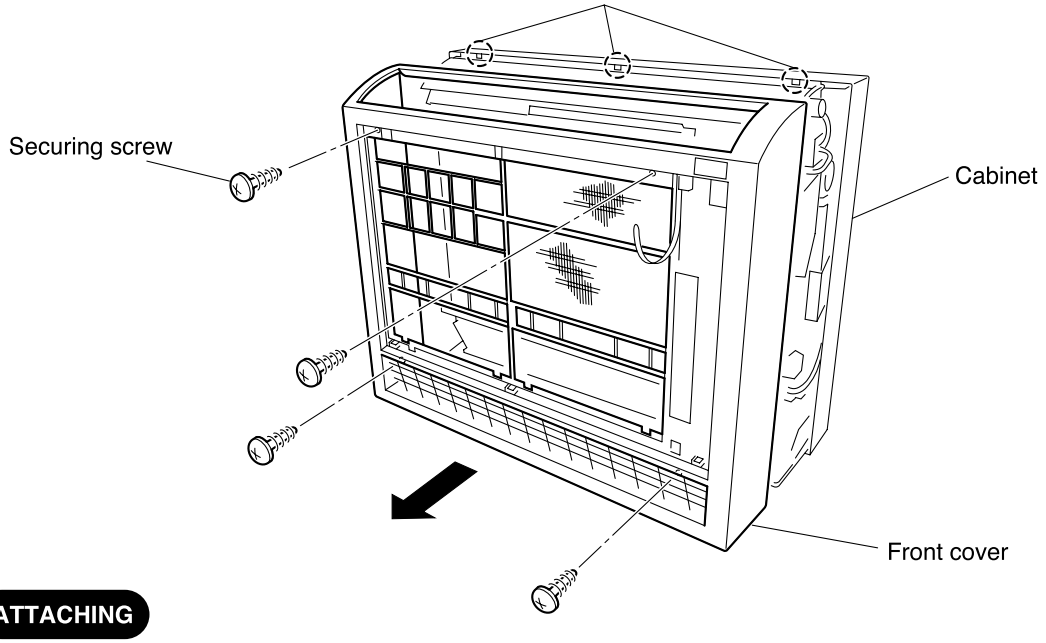
① Attach three front panel bearings to the axis of the front cover.

② Insert the tip of the resin band into the hole of the protrusion inside the right section of the front panel.

3. FRONT COVER

Remove the four securing screws of the front cover, and then pull the front cover towards you.

When attaching the front cover, insert the front cover tabs into these openings.

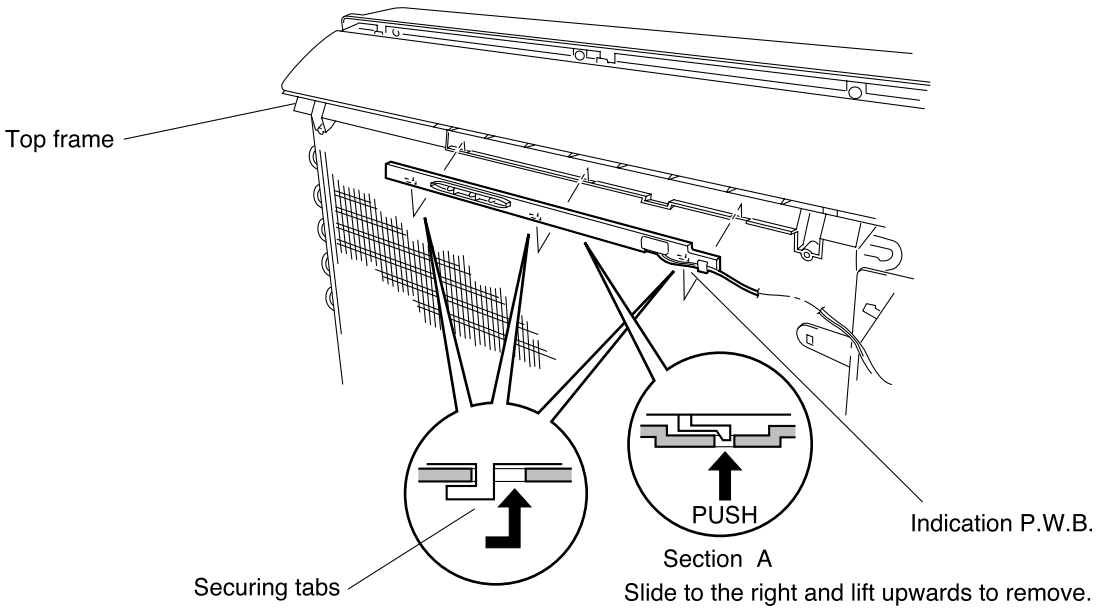


ATTACHING

When attaching the front cover, fit the three tabs on the top of the front cover so that they enter the openings on the top frame (insert from a slightly raised position). Be sure that the tabs are inserted correctly.

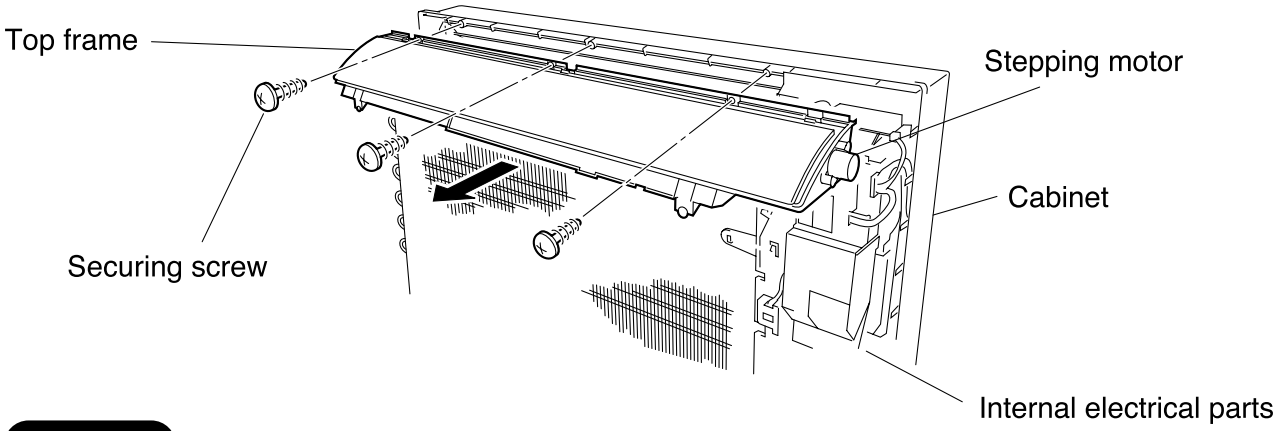
4. INDICATION P.W.B.

(1) Use a screwdriver or other such tool to push up the tabs of the section A from below, and remove.
(2) As shown in the following diagram, slide the L-shaped tab on the indication P.W.B. to the right so that it enters the hole in the top frame. You can then remove the indication P.W.B. by pulling upwards.



5. TOP FRAME

(1) Remove the front panel, and then remove the front cover.
(2) Remove the indication P.W.B..
(3) Remove the cord from the stepping motor of the air deflecfor.
(4) Remove the three securing screws of the top frame, and pull the frame towards you.

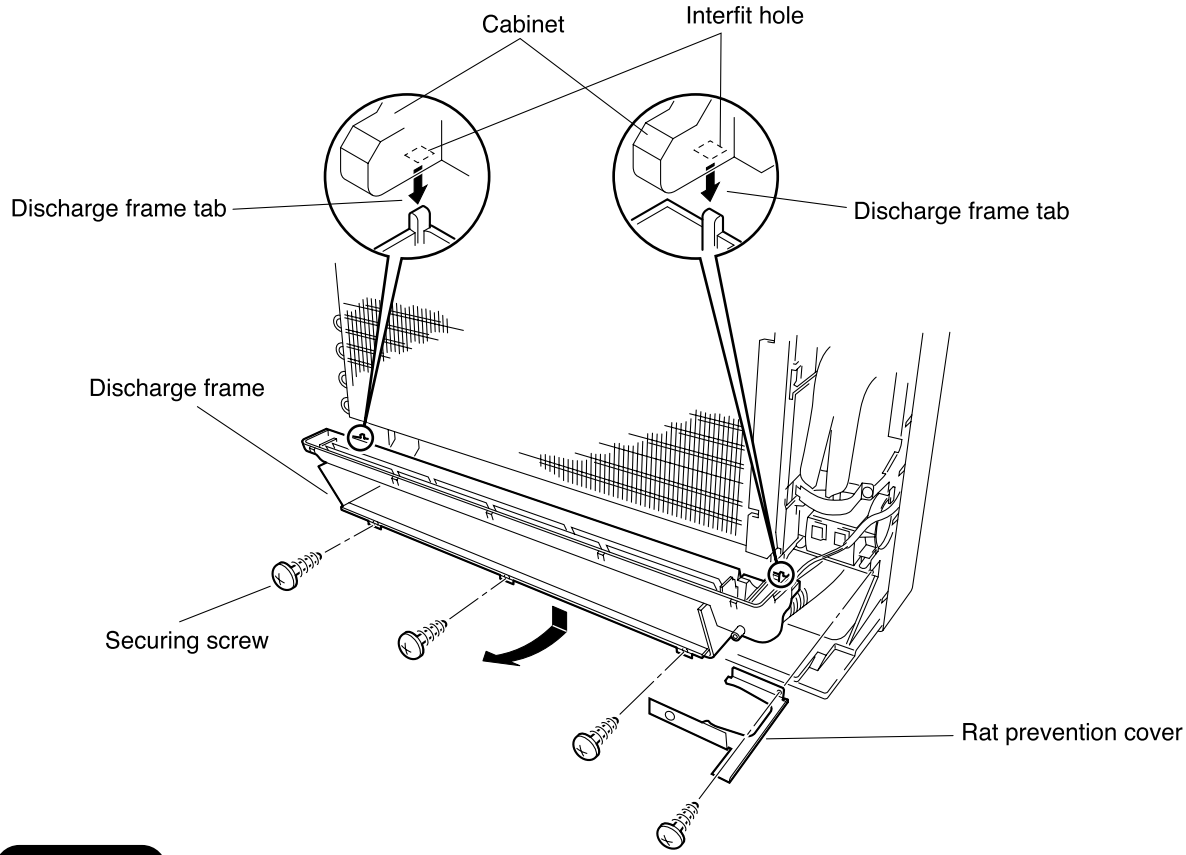


ATTACHING

(1) When attaching the top frame, align the left and right of the top frame with the inside of the guides on the cabinet, and then push the top frame straight to the back.
Note: Check to see that there is no space between the top frame and the cabinet.
(2) Fasten the three securing screws, and then check to see that the top frame does not slip to the side.

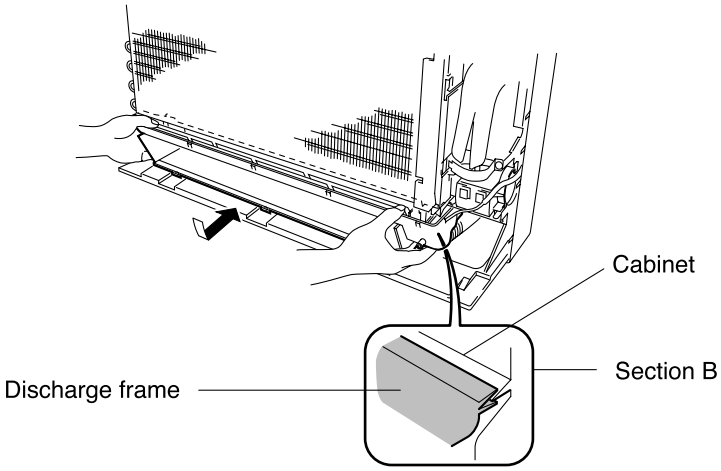
6. DISCHARGE FRAME

(1) Remove the three securing screws of the discharge frame.
(2) Remove the screw on the rat prevention cover.
(3) Lower the rear side of the discharge frame, remove the tab on the interfit section, and then pull out the discharge frame towards you.



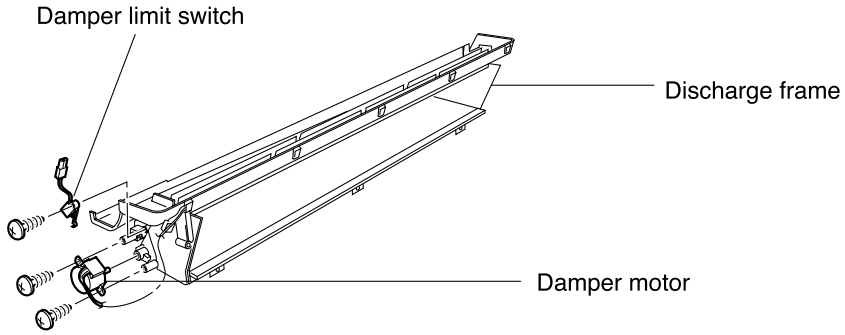
ATTACHING

(1) Align the tabs to the left and the right of the discharge frame with the holes in the cabinet, lift up the discharge frame while pushing it to the rear, and keep pushing until it clicks into place.
Note: After installing, check to see that the cabinet and the discharge frame are correctly fitted together, as shown in section B.



7. DAMPER MOTOR-DAMPER LIMIT SWITCH

(1) Remove the securing screw of the damper limit switch.
(2) Remove the two securing screws of the damper motor (stepping motor).
(3) Pull out the damper motor and the damper limit switch, and then remove them.

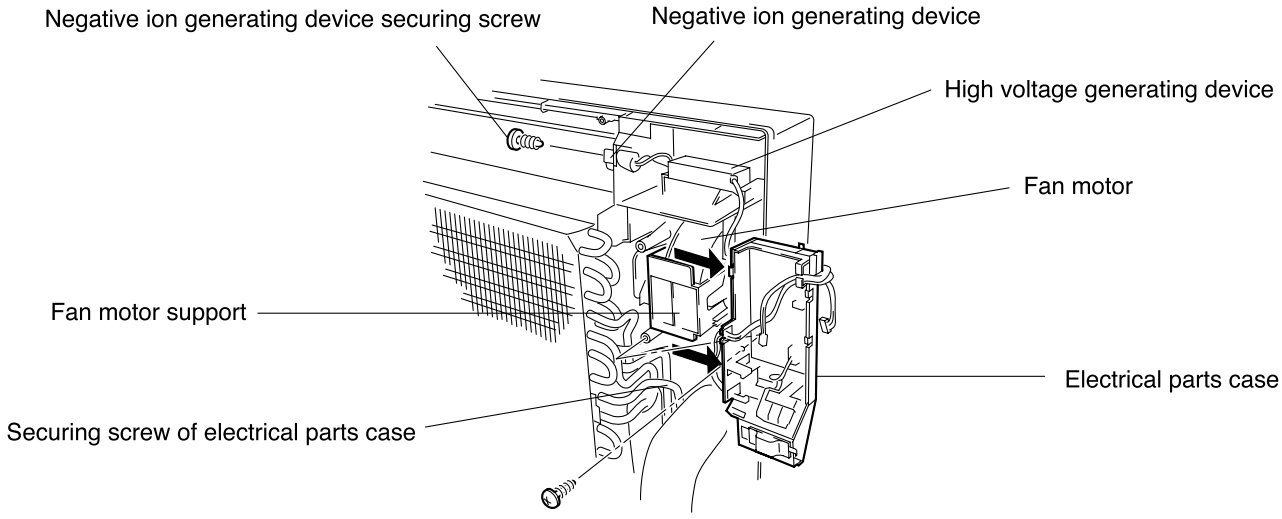


ATTACHING

Note: After removing the damper limit switch, check to see that the switch operates when the damper goes upwards.

8. NEGATIVE ION GENERATING DEVICE

(1) Remove the front panel, and then remove the front cover.
(2) Remove the display P.W.B..
(3) Remove the cord from the stepping motor of the air deflector.
(4) Remove the top frame.
(5) Use a flat-blade screwdriver to slightly lift the high voltage generating device, and then pull it towards you.
(6) Remove the securing screw, and remove the negative ion generating device.

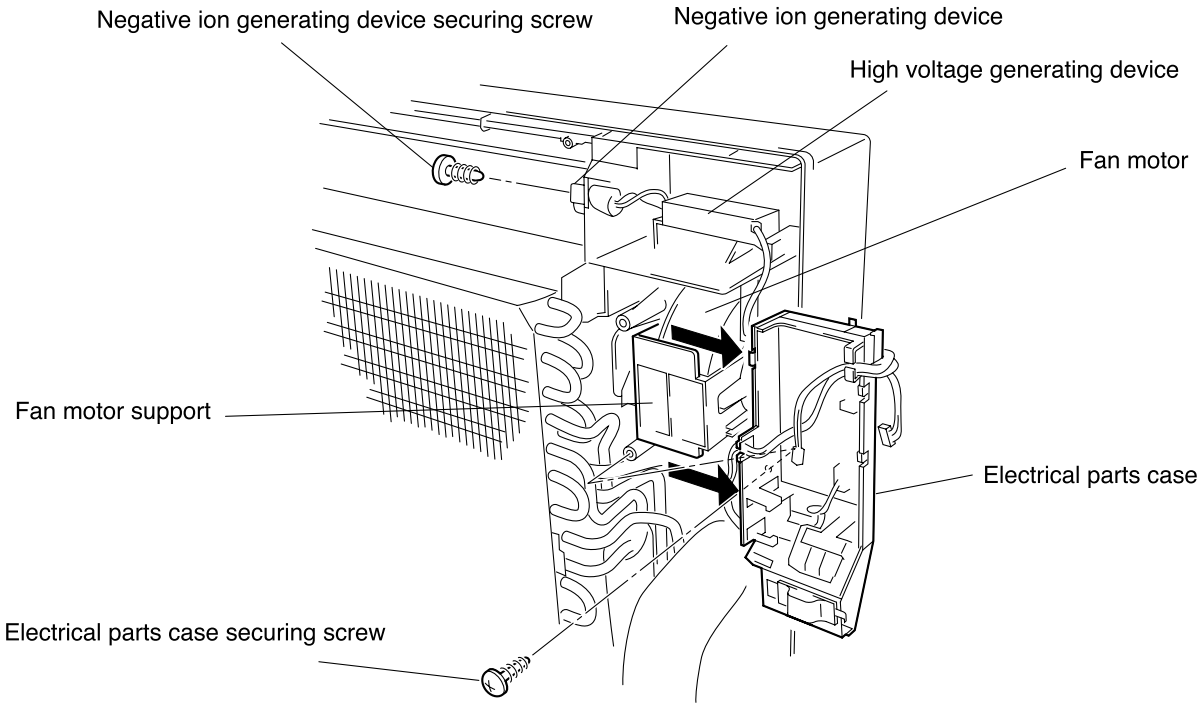


ATTACHING

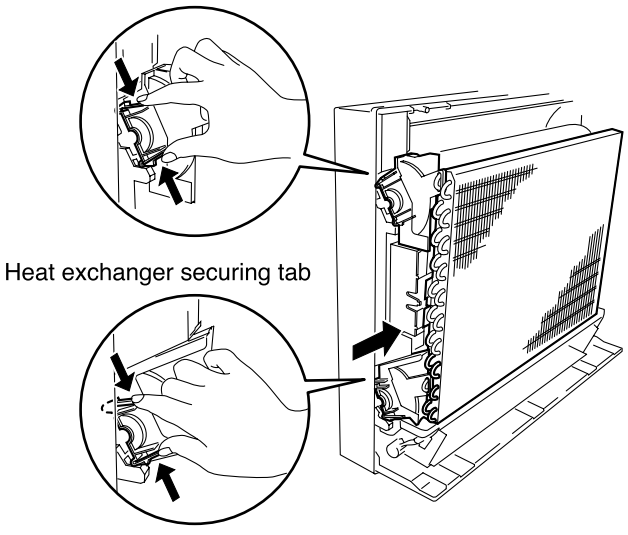
Note - Don't touch the ion generating tip when replacing the electrode.
- The ion generating tip must be replaced if it is bent.
- Clean the electrode with a toothbrush if dust gathers on the electrode.
  Even if this happens, be sure not to touch the ion generating tip.

9. FAN MOTOR – TANGENTIAL AIR FLOW FAN

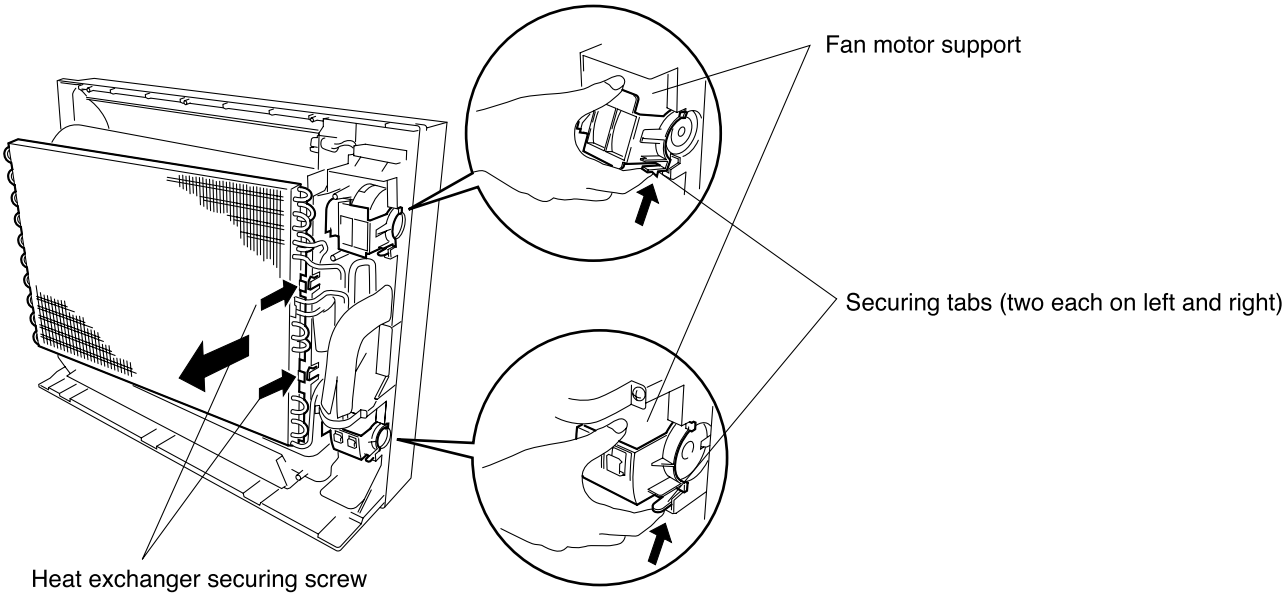
(1) Remove the front panel, and then remove the front cover.
(2) Remove the display P.W.B..
(3) Remove the cord from the stepping motor of the air deflector.
(4) Remove the top frame.
(5) Remove the electrical parts cover, the fan motor cord, the negative ion generating device cord, and the heat exchanger thermostat cord.
(6) Remove the pipe cover from the heat exchanger.
(7) Remove the securing screw of the electrical parts case, then slide the electrical parts case to the right while removing it from the fan motor support.



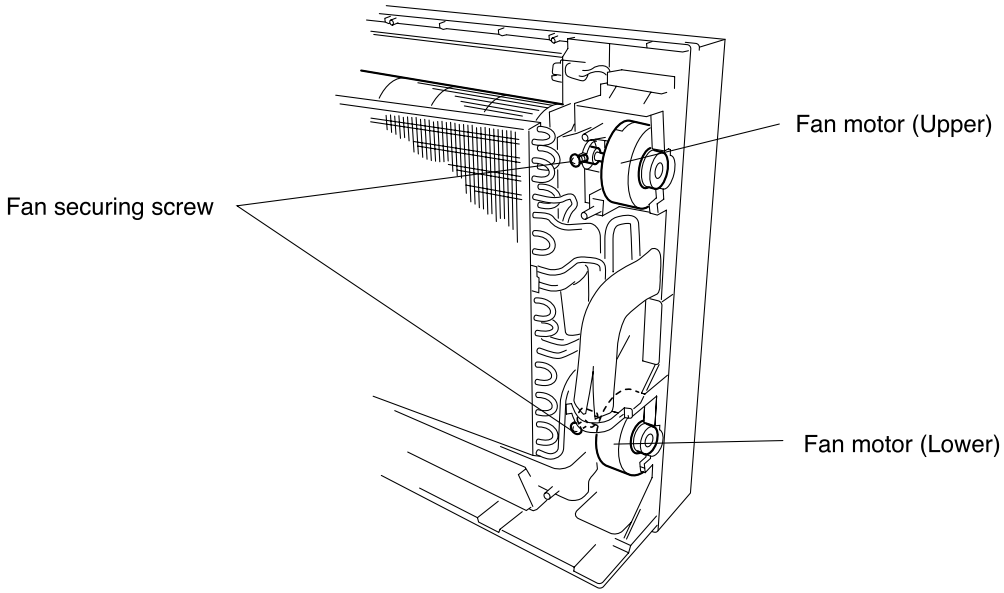
(8) Use a flat-blade screwdriver or other such tool to lift up the central securing tab and the left side of the heat exchanger.
(9) Remove the upper and lower fan covers.
- As shown in the diagram below, bend the lever (tab) securing the fan cover inwards while pulling out the heat exchanger towards you.
- Bend the lever (tab) of the lower fan cover inwards while pulling out the lower fan cover slightly upwards and towards you.



(10) Use a minus screwdriver or other such tool to raise the two tabs (see arrows in diagram below) securing the right side of the heat exchanger, then pull out the heat exchanger towards you.
(11) Pull the lower section of the fan motor support towards you while raising the two levers (tabs) on the left and right of the upper and lower sides of the fan motor support securing the fan motor, and then remove the fan motor support.



(12) Loosen the screws securing the tangential air flow fan and the fan motor, and then remove the tangential air flow fan and the fan motor.



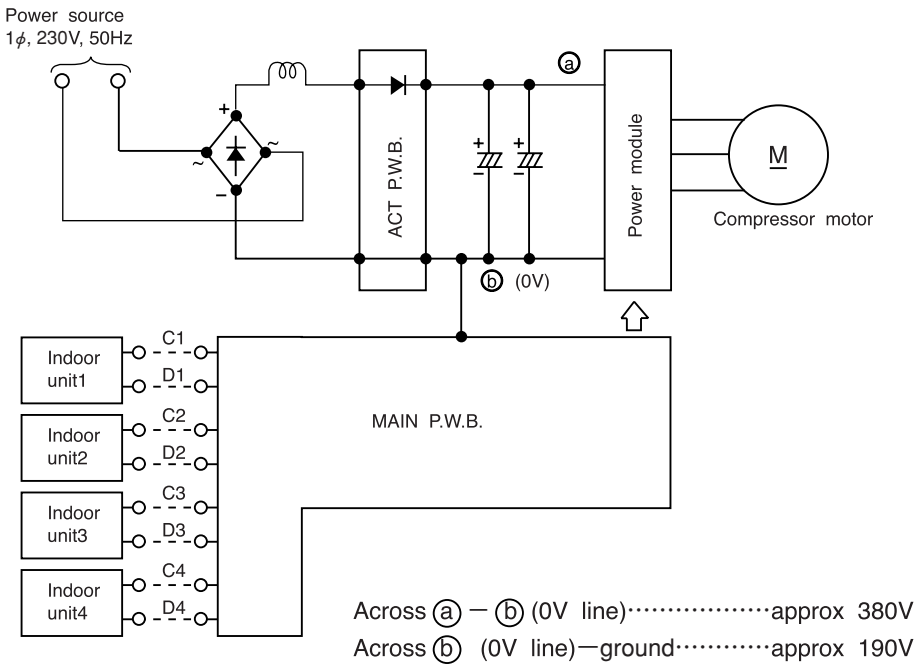
ATTACHING

(1) When attaching the tangential air flow fan and the fan motor, insert the axis of the fan motor into the boss of the tangential air flow fan. Insert the fan support into the boss on the right side of the tangential air flow fan, and then insert into the fan support securing groove on the cabinet.
(2) Fasten the securing screws of the fan.
Note: Rotate the fan by hand, and check to see that it does not strike the inside section.

PRECAUTIONS FOR CHECKING

DANGER

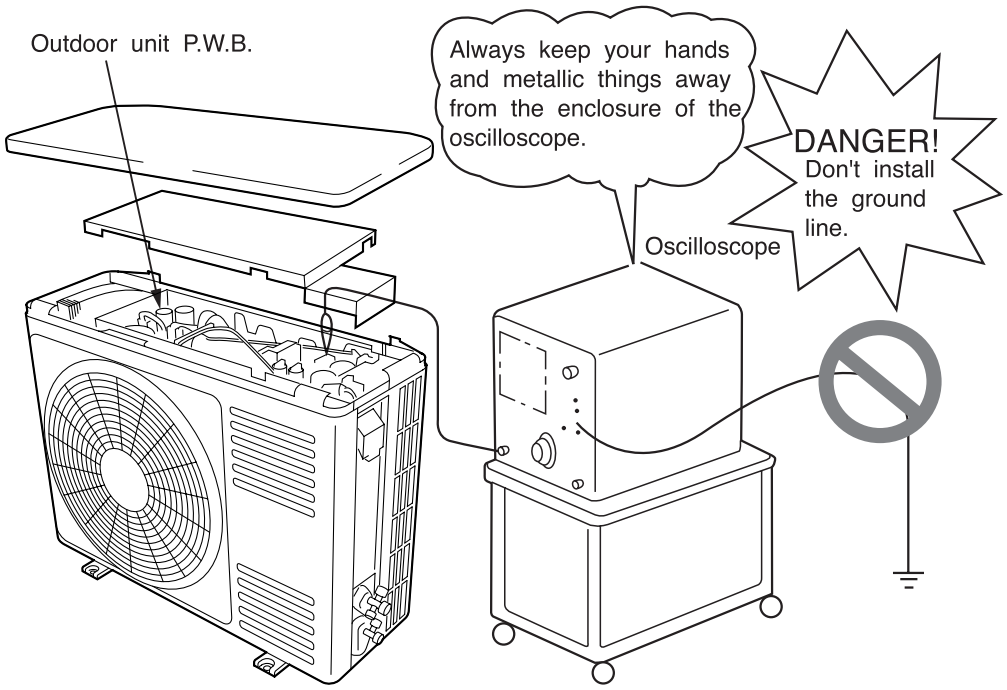
1. Remember that the 0V line is biased to 190V in reference to the ground level.
2. Also note that it takes about 10 minutes until the voltages fall after the power switch is turned off.



Across ⓐ — ⓑ (0V line)·····approx 380V
Across ⓑ (0V line)—ground·····approx 190V

DANGER

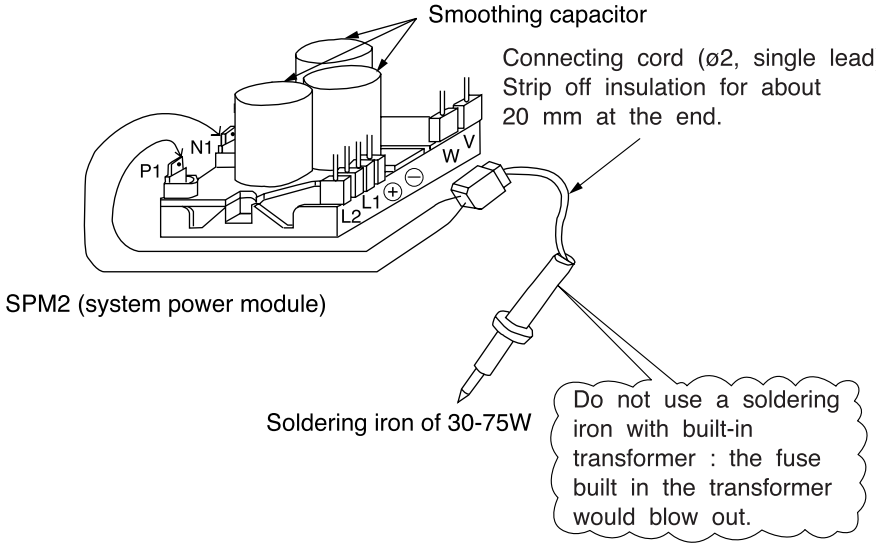
When using an oscilloscope, never ground it. Don't forget that high voltages as noted above may apply to the oscilloscope.



DISCHARGING CAPACITORS

1. Turn off the indoor unit's power switch or unplug the power cord, and wait for a minute or so.
2. Open the cover of the electric parts compartment. Discharge electricity from smoothing capacitors (330μF x 3pcs.) by connecting the leads of a soldering iron of 30-75W to the terminals provided for this purpose. Continue discharging for more than 15 seconds.

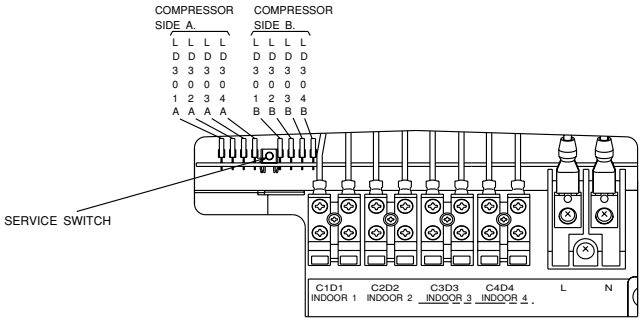
The smoothing capacitors (330μF x 3pcs.) are charged to about 380V. Don't forget to discharge them before attempting access to electric parts.



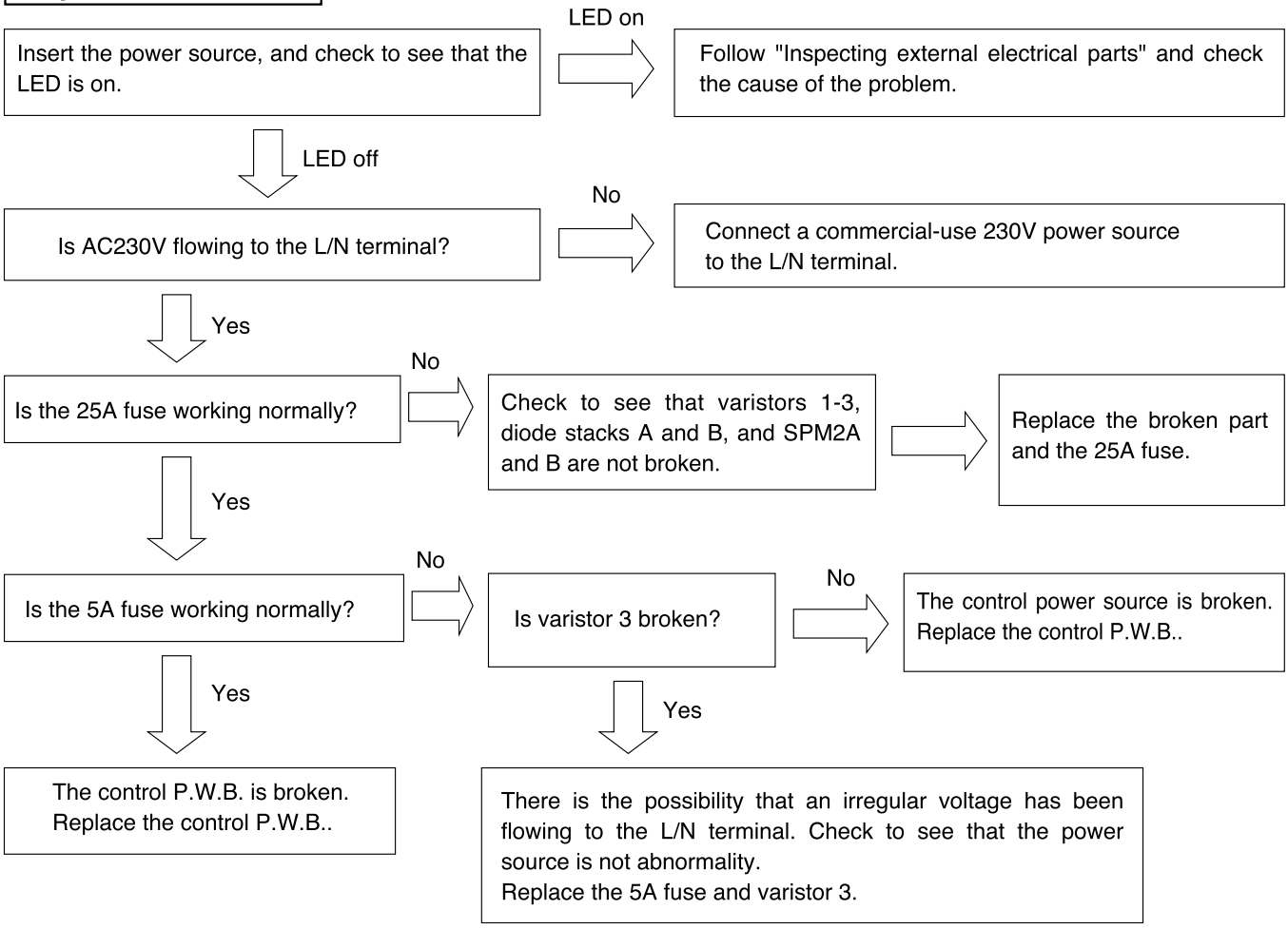
INSPECTING EXTERNAL ELECTRICAL PARTS

- Check to see that the LED is either on or blinking.
- LEDs are divided between those for A cycle and those for B cycle. This is determined by either an A or a B appearing in the circuit code, for example LD301A or LD301B.
- 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)	It 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

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.

LD301: Blinks twice
Peak current cut

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 control 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.

Takes several minutes to restart.

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

LD301: Blinks three times
Low speed

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.

Is 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 control 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.

LD301: Blinks four times
Switch failure

Check to see that the control P.W.B. has 17V.
* The A cycle and the B cycle are different brands. Be sure to check the correct points for measuring.

No (16 -19V)

Is 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

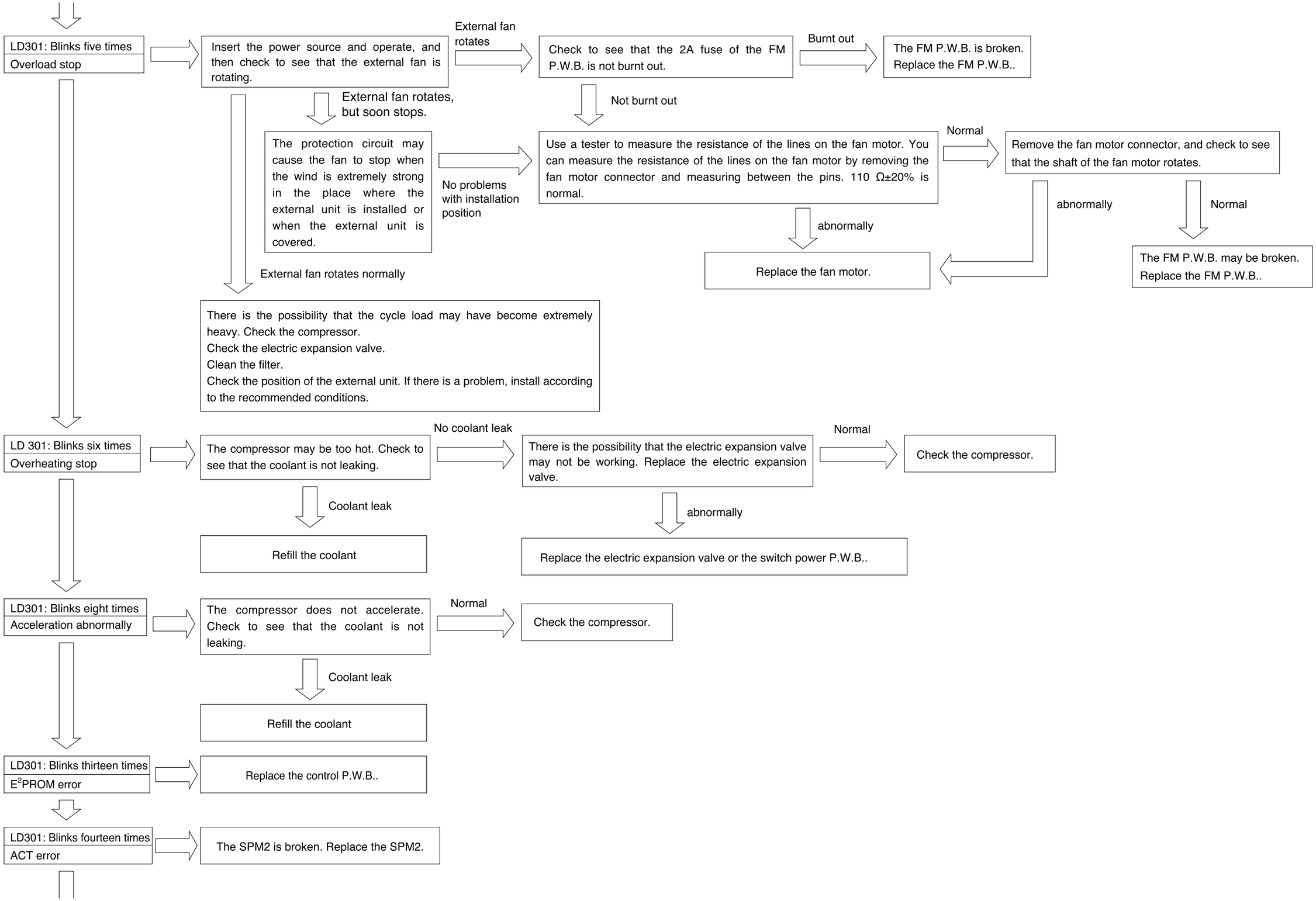
The SPM2 may be broken.
Replace the SPM2.

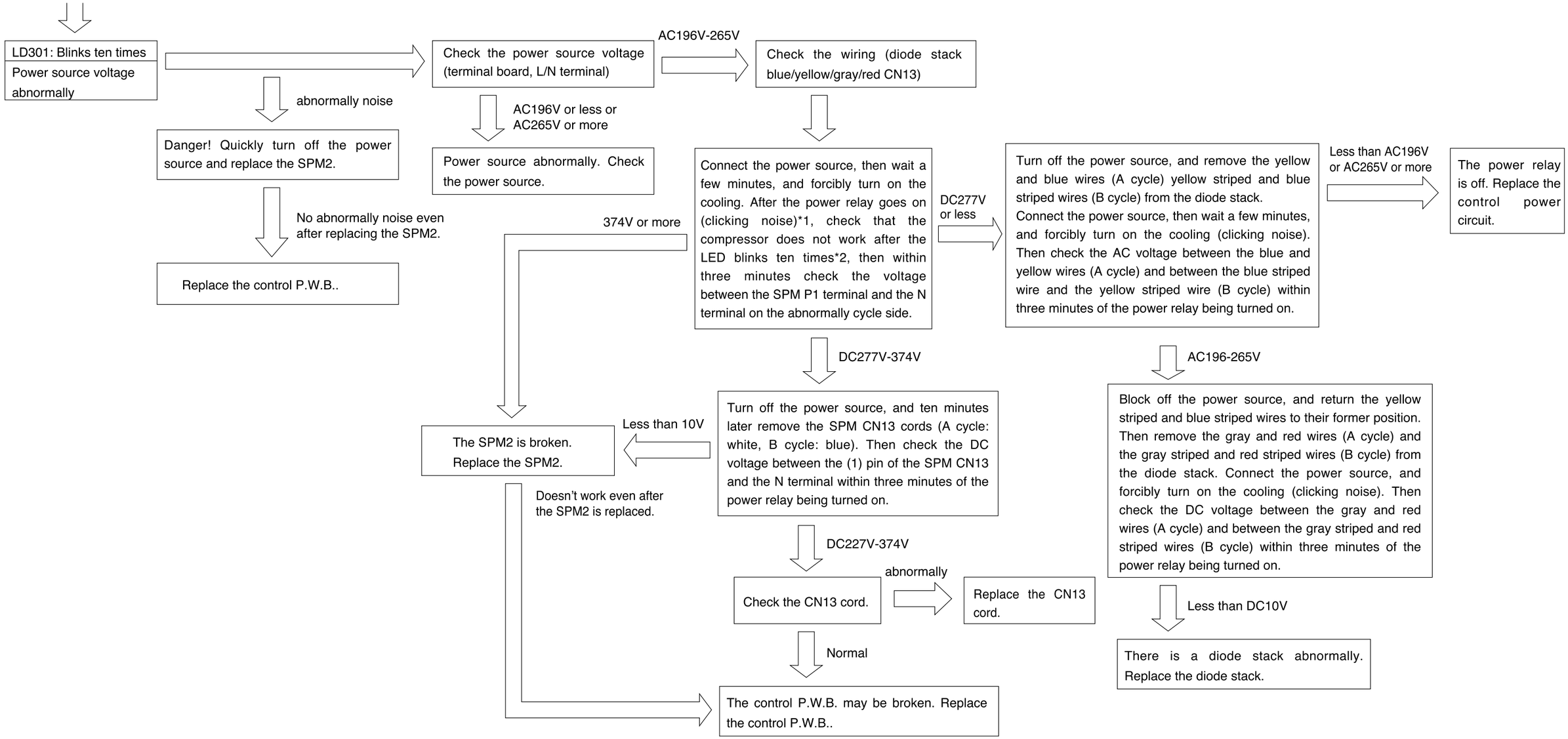
Doesn't work even after the SPM2 is replaced.

If the unit doesn't work even after replacing the SPM2, the position detection circuit may be broken. Replace the control P.W.B..

abnormally

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

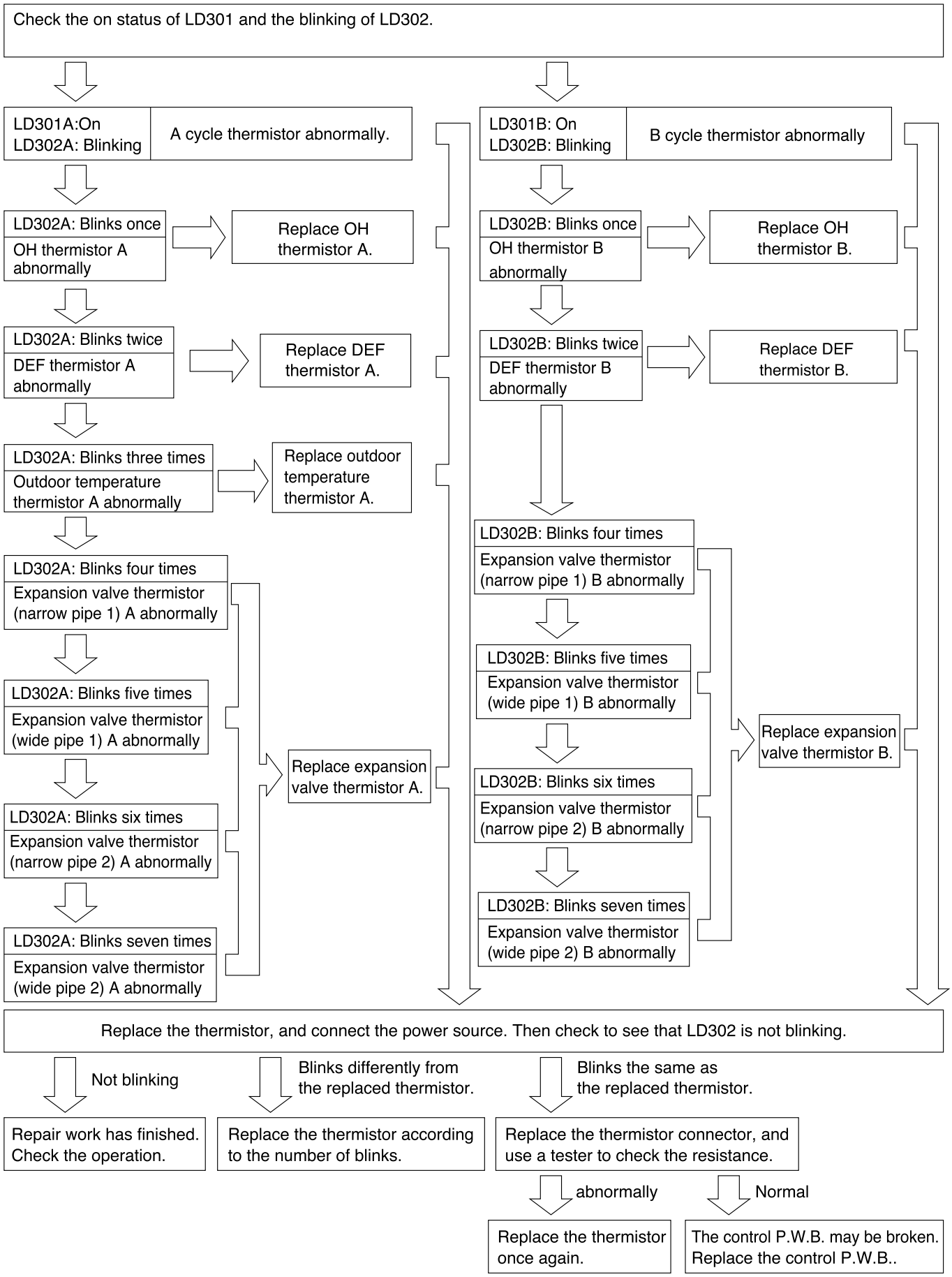

LD301: Blinks five times
Overload stop
Insert the power source and operate, and then check to see that the external fan is rotating.
External fan rotates
Check to see that the 2A fuse of the FM P.W.B. is not burnt out.
Burnt out
The FM P.W.B. is broken. Replace the FM P.W.B..
Not burnt out
External fan rotates, but soon stops.
The protection circuit may cause the fan to stop when the wind is extremely strong in the place where the external unit is installed or when the external unit is covered.
No problems with installation position
Use a tester to measure the resistance of the lines on the fan motor. You can measure the resistance of the lines on the fan motor by removing the fan motor connector and measuring between the pins. 110 Ω±20% is normal.
Normal
Remove the fan motor connector, and check to see that the shaft of the fan motor rotates.
abnormally
Normal
The FM P.W.B. may be broken. Replace the FM P.W.B..
abnormally
Replace the fan motor.
External 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 external unit. If there is a problem, install according to the recommended conditions.
LD 301: Blinks six times
Overheating stop
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. Replace the electric expansion valve.
Normal
Check the compressor.
Coolant leak
Refill the coolant
abnormally
Replace the electric expansion valve or the switch power P.W.B..
LD301: Blinks eight times
Acceleration abnormally
The compressor does not accelerate. Check to see that the coolant is not leaking.
Normal
Check the compressor.
Coolant leak
Refill the coolant
LD301: Blinks thirteen times
E2PROM error
Replace the control P.W.B..
LD301: Blinks fourteen times
ACT error
The SPM2 is broken. Replace the SPM2.



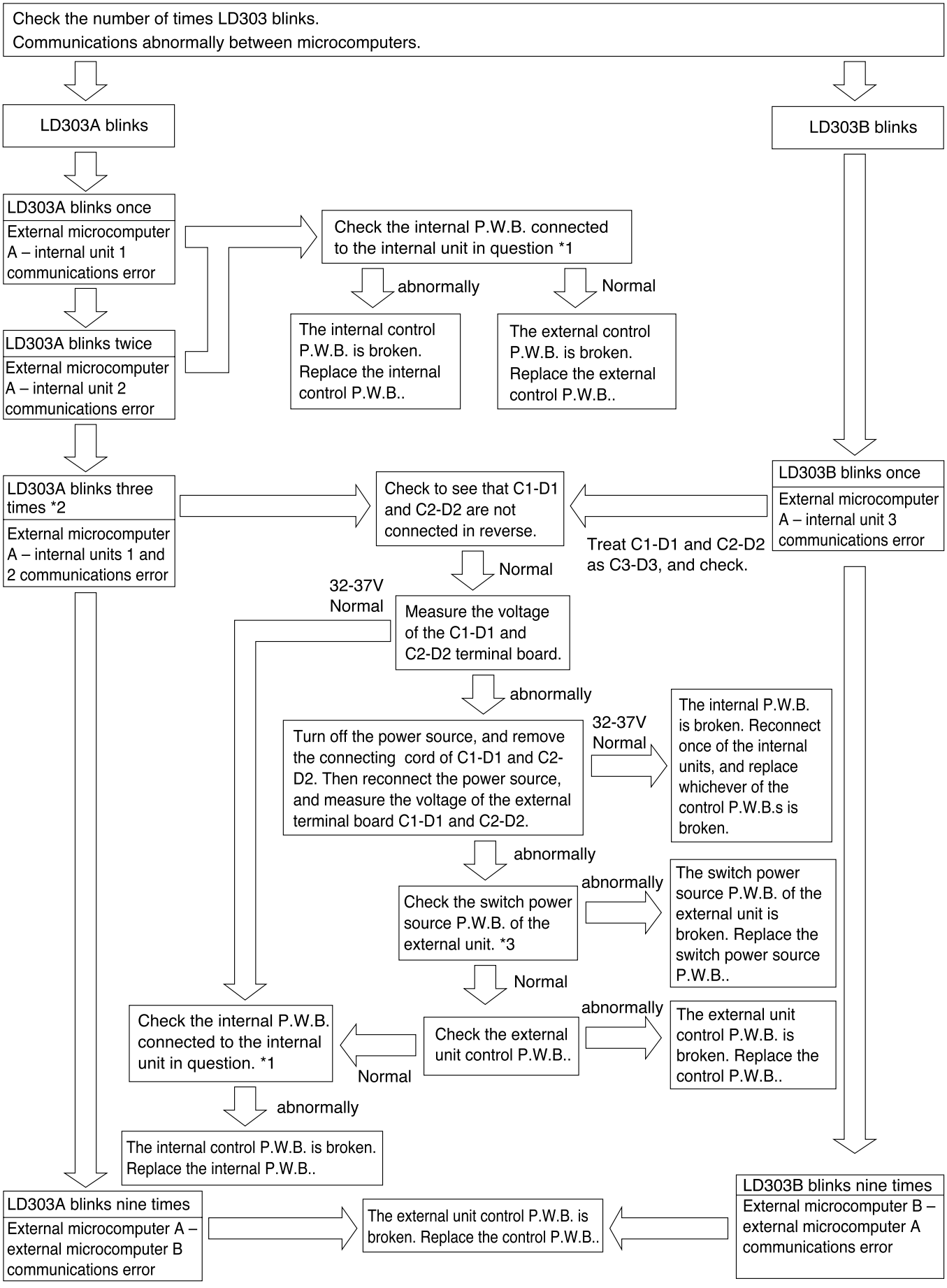
* 1 The power relay does not turn on without an operation order. In the case of a abnormally stop, the power relay turns off after approximately three minutes.

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

Inspection method 3



Inspection method 4



* 1 Example of indoor P.W.B. checking method (when indoor unit 1 is displayed as broken)

Reinsert the connecting cord of indoor unit 1 (the indoor unit with a communications error) and indoor unit 2 (the indoor unit where communications are possible) (turn off the power source before disconnecting and reinserting the connecting cord)

indoor unit 2 communications error
LD303 blinks twice

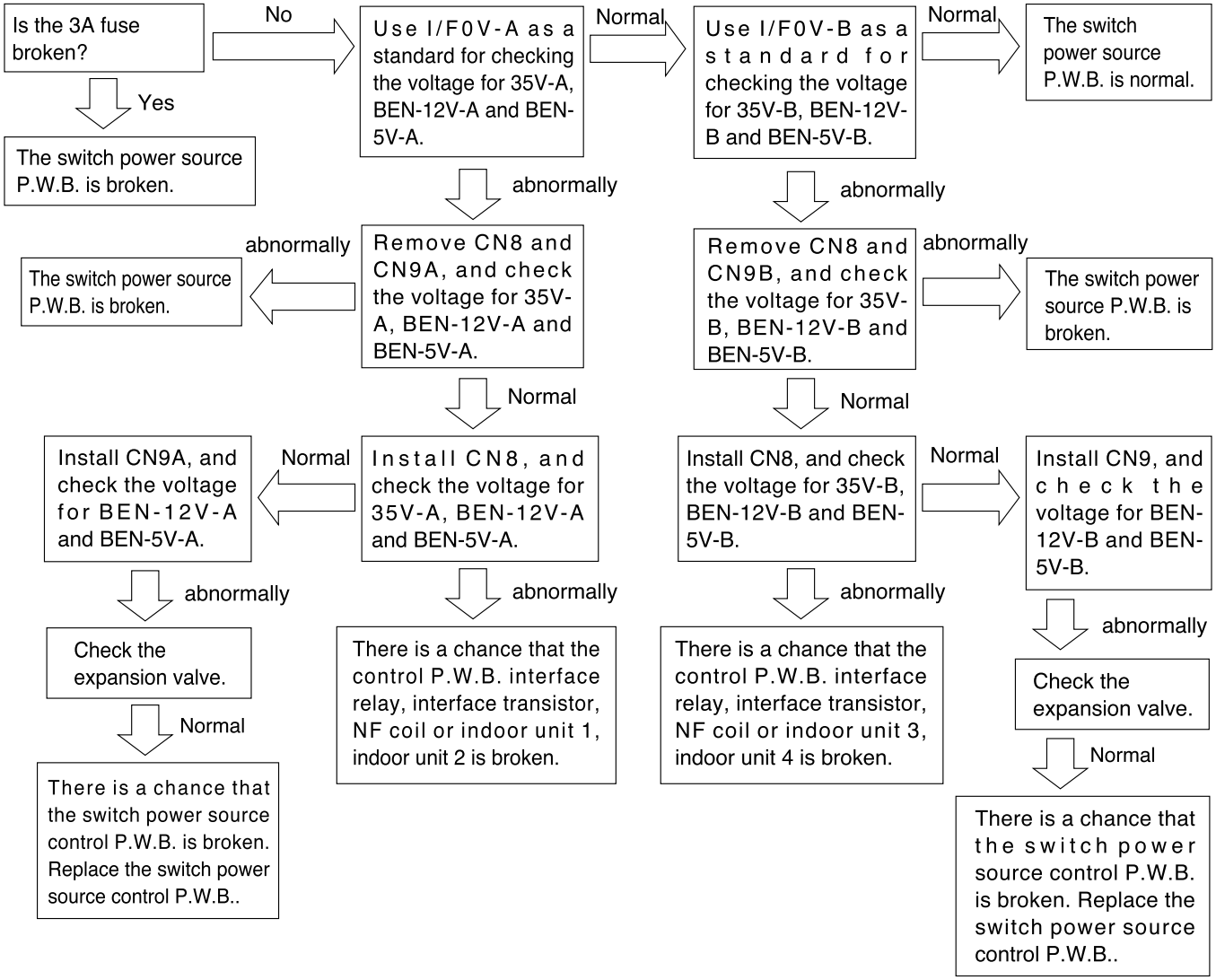
The indoor unit control P.W.B. is broken.

indoor unit 1 communications error
LD303 blinks once

The indoor unit control P.W.B. is not broken.
Check the outdoor unit control P.W.B..

* 2 This breakdown check assumes an indoor unit is connected to all four rooms (or all three rooms). If an indoor unit is not connected to all four rooms (or all three rooms), note that there will be either blinking to indicate a communications error for the unconnected indoor unit or three blinks when there is a communications error for the connected indoor units.

* 3 Indoor unit switch power source P.W.B. check method



HOW TO OPERATE USING THE SERVICE SWITCH THE OUTDOOR UNIT

MODEL RAM-70QH4, RAM-80QH4

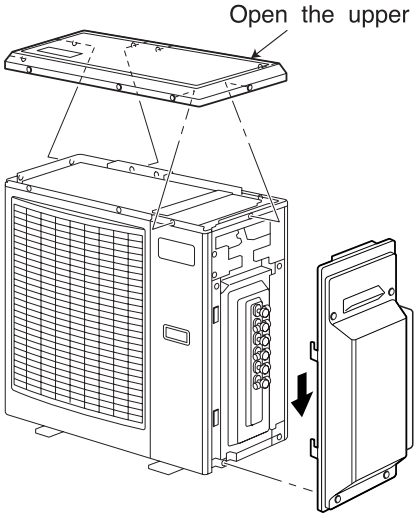
1. Turn the Power switch off and then turn on again.
2. Remove the electrical parts cover.
3. Press the service switch for one second or more (wait for at least 20 seconds after turning the power source switch on).

LD304 (red) will light and the unit will operate in the forced cooling mode at this time

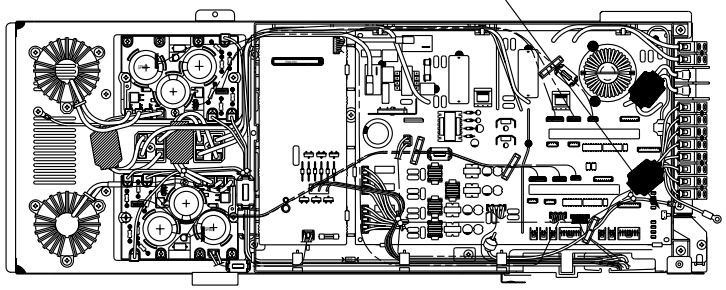
※Check for each cycle.

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 defect indicator (LD303) will blink 9 times after operation 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.

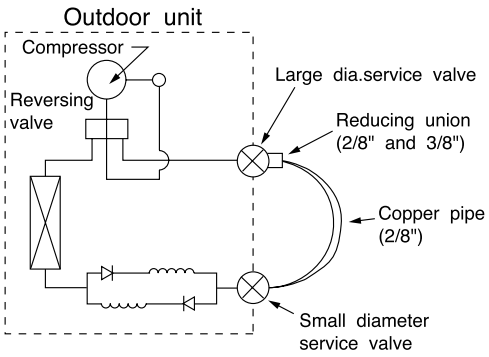
Be sure to return the service switch to "normal" after checking with service operation is completed.

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"

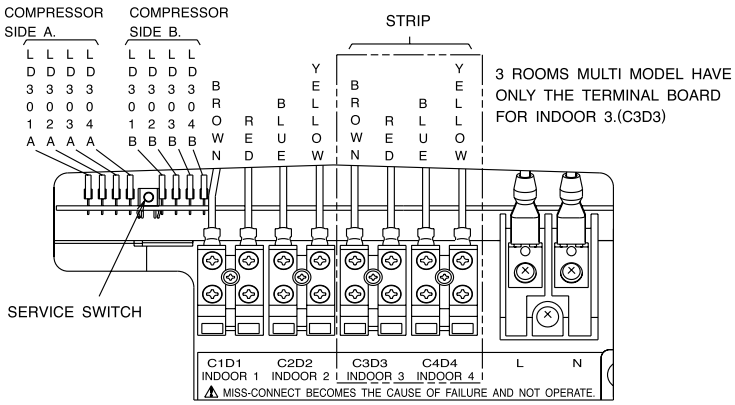
※1 The charging amount of 300g is equivalent to the load in normal operation.

LIGHTING MODE OF THE SELF-DIAGNOSIS LAMP

MODEL RAM-70QH4, RAM-80QH4

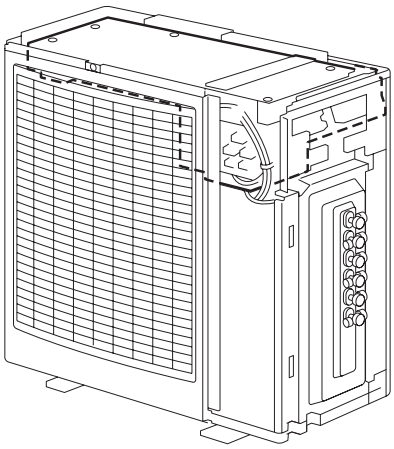
1 INSTALLATION POSITION OF SELF-DIAGNOSIS LAMP

Positions of self-diagnosis lamps (LEDs)



Be sure to turn off the power source when connecting and removing the cable.

Be careful of electrocution when operating the service switch.



2 LIGHTING MODE OF THE SELF-DIAGNOSIS LAMP

MODEL RAM-70QH4, RAM-80QH4

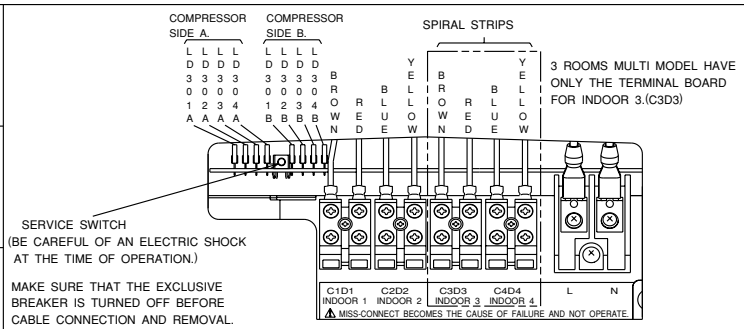
⚠⚠DANGER(DC360V)

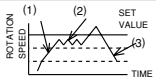
- WAIT FOR FIFTEEN-MINUTES (MIN.) EVER AFTER TURNING OFF THE POWER SWITCH WHEN SERVICE WORK IS DONE.

⚠⚠DANGER (COURANT CONTINU DE 360V)

- ATTENDRE QUINZE MINUTES (MIN.) ÀPRES AVOIR COMMUTÉ L'INTERRUPTEUR D'ALIMENTATION SUR ARRET LÔRSQUE LES OPÉRATIONS DE SERVICE SONT TERMINEÉS.

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



LD3013A	LD3023A	LD3033A	LD3043A	LD3013B	LD3023B	LD3033B	LD3043B	SELF-DIA-GNOSIS NAME	DETAILS	MAIN CHECK POINT
				RED	ORANGE	GREEN	RED			
□	□	□	■					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)		
□	□	□	□					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.)	NOT MALFUNCTION.
▨	□	□	□					PEAK CURRENT CUT 2TIMES	OVERCURRENT IS DETECTED.	①SYSTEM POWER MODULE ②COMPRESSOR ③P.W.B.s
▨	□	□	□					ABNORMAL LOW SPEED ROTATION 3TIMES	POSITION DETECTION SIGNAL IS NOT INPUT DURING OPERATION.	①SYSTEM POWER MODULE ②COMPRESSOR ③P.W.B.s ④INSERT FAILURE OF CN14A.B
▨	□	□	□					SWITCHING FAILURE 4TIMES	SWITCHING FROM LOW FREQUENCY SYNC START TO POSITION DETECTION OPERATION FAILURE.	①SYSTEM POWER MODULE ②COMPRESSOR ③P.W.B.s ④INSERT FAILURE OF CN14A
▨	□	□	□					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
▨	□	□	□					OH THERMISTOR TEMP. RISE 6TIMES	OH THERMISTOR OPERATED.	①LEAK OF REFRIGERANT ②COMPRESSOR
▨	□	□	□					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.	① CONNECTION FAILURE OF POWER CABLE ②DIODE STUCK ③REACTOR ④POWER VOLTAGE ⑤INSERT FAILURE OF CN14B
▨	□	□	□					EEPROM READ ERROR 13TIMES	MICROCOMPUTER CANNOT READ THE DATA IN EEPROM.	P.W.B.s (POWER CIRCUIT, EEPROM.ETC.)
▨	□	□	□					ACTIVE CONVERTER DEFECTIVE 14TIMES	OVERVOLTAGE IS DETECTED BY SYSTEM POWER MODULE.	SYSTEM POWER MODULE
▨	▨	□	□					SYSTEM POWER MODULE ERROR 2TIMES	OVERVOLTAGE IS DETECTED BY SYSTEM POWER MODULE.	SYSTEM POWER MODULE
■	▨	□	□					THERMISTOR ABNORMAL LIT 1～7 TIMES	THERMISTOR IS OPEN OR SHORTED. ※REFER TO THE FOLLOWING "CORRESPONDENCE TABLE FOR ABNORMAL THERMISTOR"	①THERMISTOR ②CONNECTION OF THERMISTOR DEFECTIVE ③THERMISTOR CIRCUIT
□	□	▨	□					COMMUNICATIONS ERROR 1 BETWEEN INDOOR UNIT AND OUTDOOR UNIT 1TIME	COMPRESSOR SIDE A. COMMUNICATION ERROR OF INDOOR 1 / COMPRESSOR SIDE B. COMMUNICATION ERROR OF INDOOR 3 / EVEN WHEN THE INDOOR UNIT IS NOT CONNECTED, IT BLINKS SIMILARLY. (NOT MALFUNCTION.)	①INDOOR ELEC-AS ②P.W.B.s
□	□	▨	□					COMMUNICATIONS ERROR 2 BETWEEN INDOOR UNIT AND OUTDOOR UNIT 2TIMES	COMPRESSOR SIDE A. COMMUNICATION ERROR OF INDOOR 2 / COMPRESSOR SIDE B. COMMUNICATION ERROR OF INDOOR 4	①INDOOR ELEC-AS ②P.W.B.s
□	□	▨	□					COMMUNICATIONS ERROR 3 BETWEEN INDOOR UNIT AND OUTDOOR UNIT 3TIMES	COMPRESSOR SIDE A. COMMUNICATION ERROR OF INDOOR 1 AND 2 / COMPRESSOR SIDE B. COMMUNICATION ERROR OF INDOOR 3 AND 4	①CONNECTION FAILURE OF F CABLE ②ELECTRICAL ASSEMBLY INDOOR UNIT ③SW-D-BOARD ④P.W.B.s
□	□	▨	□					COMMUNICATIONS ERROR BETWEEN OUTDOOR UNIT 9TIMES	COMMUNICATIONS BETWEEN MICROCOMPUTERS OF COMPRESSOR SIDE A & COMPRESSOR SIDE B ARE INTERRUPTED. (EEPROM READ ERROR ALSO 9 TIMES BLINKING)	P.W.B.s (POWER CIRCUIT, EEPROM.ETC.)

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

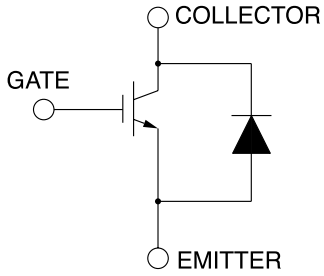
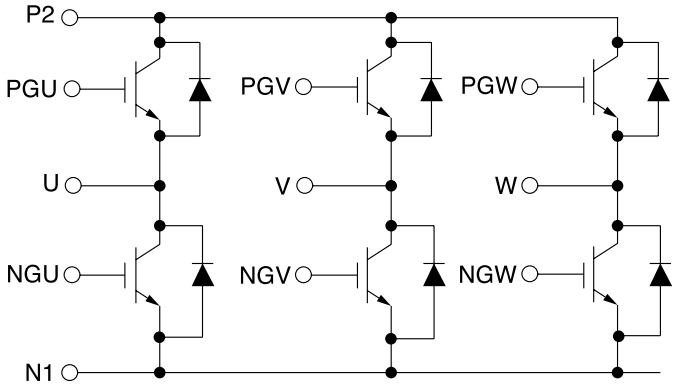
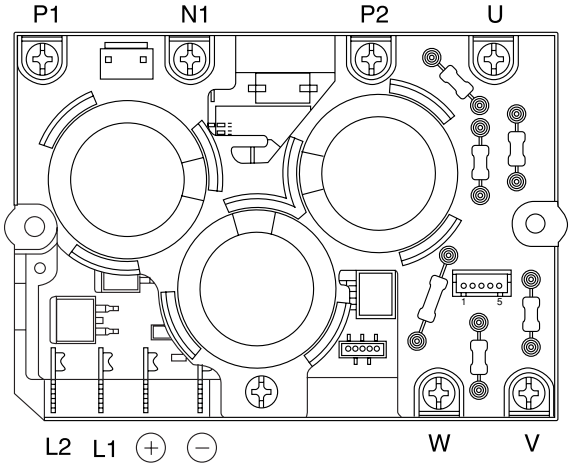
CORRESPONDENCE TABLE FOR ABNORMAL THERMISTOR

BLINKING TIMES	ABNORMAL THERMISTOR	
	LD302A(ORANGE) BLINKING	LD302B(ORANGE) BLINKING
1TIME	COMPRESSOR SIDE A.OH THERMISTOR	COMPRESSOR SIDE B.OH THERMISTOR
2TIMES	COMPRESSOR SIDE A.DEFROST THERMISTOR	COMPRESSOR SIDE B.DEFROST THERMISTOR
3TIMES	OUTSIDE TEMPERATURE THERMISTOR	
4TIMES	THERMISTOR FOR INDOOR UNIT 1 NARROW PIPE	THERMISTOR FOR INDOOR UNIT 3 NARROW PIPE
5TIMES	THERMISTOR FOR INDOOR UNIT 1 WIDE PIPE	THERMISTOR FOR INDOOR UNIT 3 WIDE PIPE
6TIMES	THERMISTOR FOR INDOOR UNIT 2 NARROW PIPE	THERMISTOR FOR INDOOR UNIT 4 NARROW PIPE
7TIMES	THERMISTOR FOR INDOOR UNIT 2 WIDE PIPE	THERMISTOR FOR INDOOR UNIT 4 WIDE PIPE

SERVICE OPERATION

BEFORE PROCEEDS THE REFERIGERANT WITHDRAWAL OR SINGLE OPERATION OF THE OUTDOOR UNIT, SWITCH OFF THE EXCLUSIVE BREAKER FIRST AND ON AGAIN AND AFTER WAIT FOR MORE THAN 20 SECONDS PRESS THE SERVICE SWITHC OF THIS UNITS'CIRCUIT BOARD FOR MORE THAN 1 SECOND. (IT OPERATES AS COOLING CYCLE.)
TO PROTECT THE UNIT FROM THE DAMAGE, PLEASE DO NOT OPERATE WHEN THE SPINDLE OF THE SERVICE VALVE IS CLOSED.
TO STOP, PUSH THE SERVICE SWITCH AT LEAST 1 SECOND. IN CASE TO START OPERATION AGAIN, PLEASE SWITCH OFF AND OFF THE BREAKER AGAIN.

TROUBLE SHOOTING OF THE SYSTEM POWER MODULE

MODE	GT15J31ISM
ELEMENT CIRCUIT	
INTERNAL CIRCUIT OF THE MODULE	
TERMINAL SYMBOL OF SYSTEM POWER MODULE SEE NEXT PAGE FOR VALUES MEASURED BY TESTER.	

* Do not disassemble the system power module when performing the diagnosis.

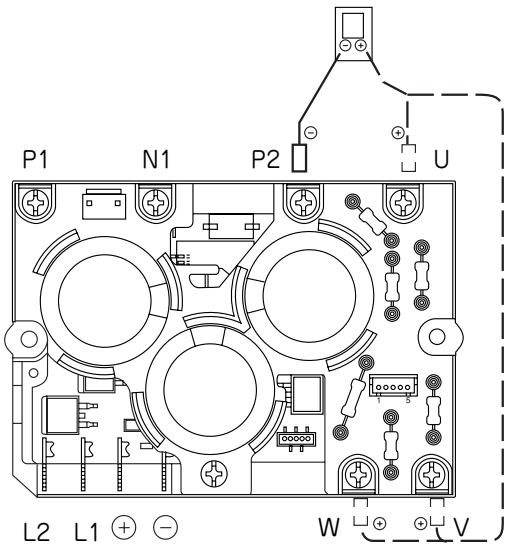
HOW TO CHECK POWER MODULE

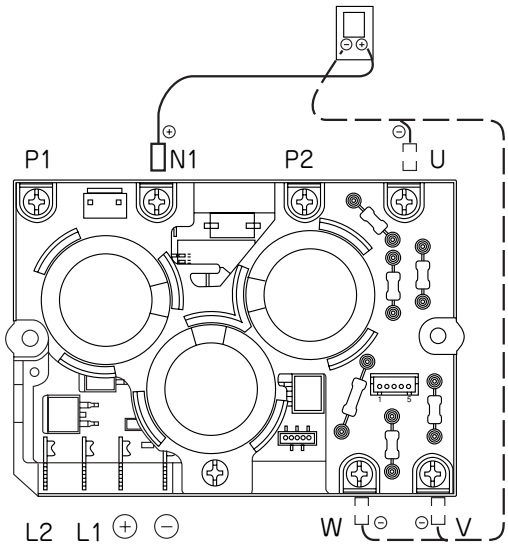
Checking power module using tester

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.





TROUBLESHOOTING WHEN THE TIMER LAMP BLINKS

MODEL RAD-28QH4, RAD-40QH4

Perform troubleshooting according to the number of times the timer lamp on the display of the indoor unit blinks.

Lamp blinking mode	Main defective
2 sec ---------- Once	Reversing valve defective
2 sec 2 Times	Forced operation of outdoor unit
2 sec 3 Times	Indoor / outdoor interface defective
2 sec 4 Times	Outdoor electric assembly defective
2 sec 6 Times	Abnormal water level detection
2 sec 7 Times	During drain pump test drive
2 sec 9 Times	Indoor thermistor abnormal
2 sec 10 Times	Over current in DC fan moter
2 sec 13 Times	IC401 defective

Lamp blinking mode	Main defective
2 sec ---------- Once	Reversing valve defective
2 sec 2 Times	Forced operation of outdoor unit
2 sec 3 Times	Indoor / outdoor interface defective
2 sec 6 Times	Abnormal water level detection
2 sec 7 Times	During drain pump test drive
2 sec 9 Times	Indoor thermistor abnormal
2 sec 10 Times	Over current in DC fan moter
2 sec 13 Times	IC401 defective

(▮ - - - Lights for 0.35 sec at interval of 0.35 sec.)

MODEL RAF-25NH4, RAF-50NH4

Lamp blinking mode	Main defective
2 sec ---------- Once	Reversing valve defective
2 sec 2 Times	Forced operation of outdoor unit
2 sec 3 Times	Indoor/Outdoor interface defective
2 sec 8 Times	Damper defective
2 sec 9 Times	Indoor sensor defective
2 sec 10 Times	Abnormal rotating numbers of DC fan motor
2 sec 13 Times	IC401 defective

(▮ ------ Lights for 0.35 sec at interval of 0.35 sec.)

Lamp blinking mode	Main defective
2 sec 2 Times	Peak current cut
2 sec 3 Times	Abnormal low speed rotation
2 sec 4 Times	Switching failure
2 sec 5 Times	Overload lower limit cut
2 sec 6 Times	OH thermistor temp. rise
2 sec 7 Times	Outdoor thermistor abnormal
2 sec 8 Times	Acceleration defective
2 sec 9 Times	Comunications error
2 sec 12 Times	Fan lock error
2 sec 13 Times	Defective EEPROM of outdoor unit
2 sec 14 Times	Defective active converter
2 sec 15 Times	Discharge error

< Cautions >

(1) If the interface circuit is faulty when power is supplied, self-diagnosis will not be displayed.

(2) If the indoor unit does not operate at all, check to see if the connecting cord is reversely connected or disconnected.

Fan Motor Set Wind Volocity and DC Voltage (between blue and red) characteristics.

MODEL RAF-32QH1

MODE			FAN SPEED	Connector blue - red voltage (V)	Rotation speed (min.$^{-1}$)	LABEL NAME
Indoor fan speed	Upper fan	Heating operation	SUPER LO SS	12.1	650	AFWSS
			SLEEP	19.7	910	AWSOY
			LO S	19.7	910	AFWSSZ
			OVER LOAD	24.3	1100	AFWKAF
			MED LO	24.3	1100	AFWL
			HI (SET FAN SPEED AUTO HI)	27.4	1250	AFWAH
			HI (SET FAN SPEED HI)	27.4	1250	AFWH
			SUPER HI (SET FAN SPEED HI)	27.4	1250	AFWHH
		Cooling operation	SLEEP	18.1	820	AFCSOY
			LO S	20.3	920	AFCSSZ
			COOL rhythm S	20.3	920	AFCRS
			COOL rhythm LO	24.5	1100	AFCRL
			MED LO	24.5	1100	AFCL
			HI	29.6	1220	AFCH
			HIHI	29.6	1220	AFCHH
		Dehumidifying operation	SLEEP LO S	20.3	830	AFDSSZ
			MED LO	20.3	830	AFDL
			HI	20.3	830	AFDH
	Lower fan	Heating operation	LO S	21.6	1080	AFWUDS
			MED LO	22.8	1150	AFWUDL
			HI	25.7	1290	AFWUDH
		Cooling operation	LO S	0	——	AFCUDS
			MED LO	0	——	AFCUDL
			HI	25.7	1100	AFCUDH

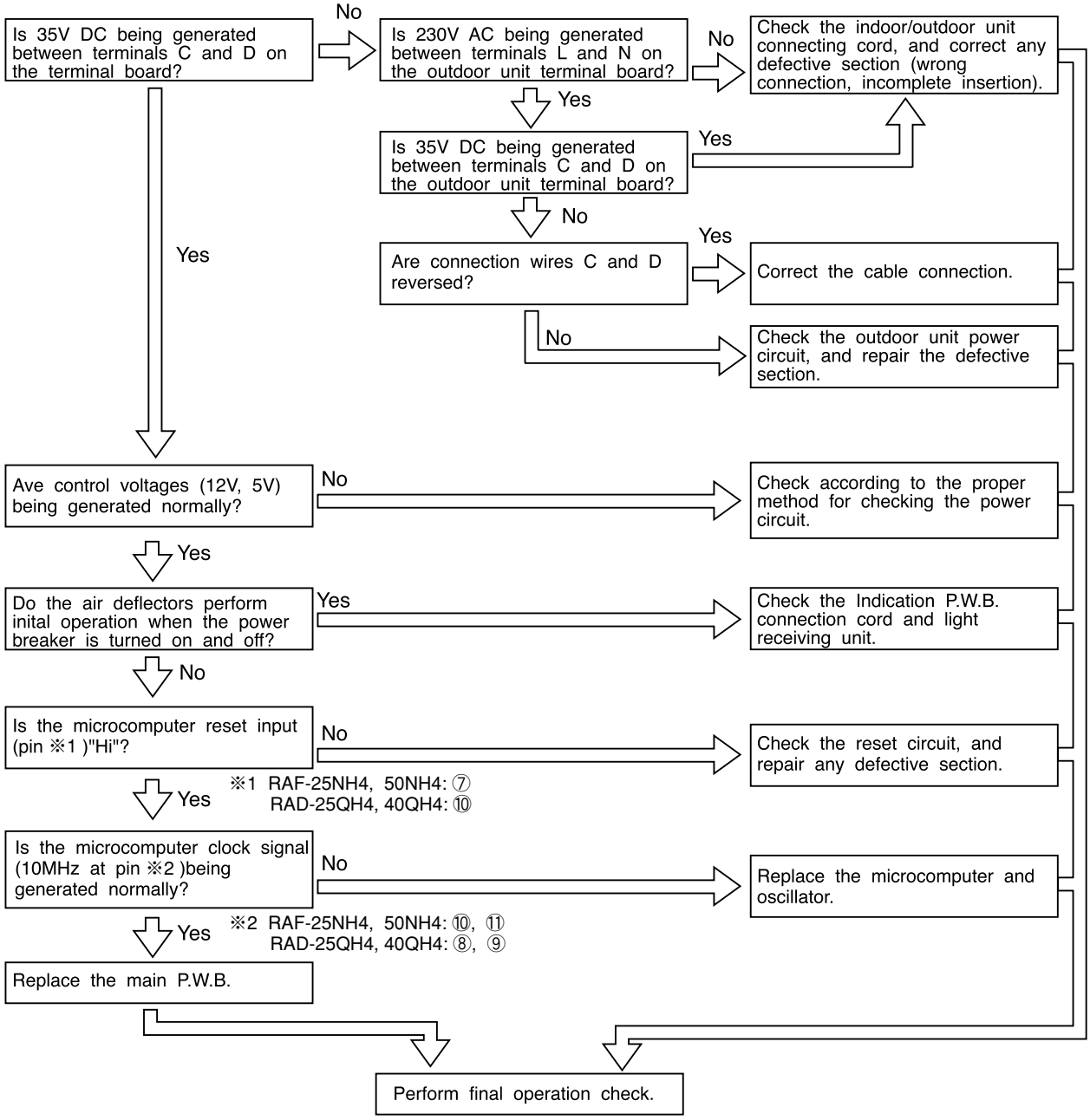
MODEL RAF-40QH1

MODE			FAN SPEED	Connector blue - red voltage (V)	Rotation speed (min.$^{-1}$)	LABEL NAME
Indoor fan speed	Upper fan	Heating operation	SUPER LO SS	12.1	650	AFWSS
			SLEEP	21.5	980	AWSOY
			LO S	21.5	980	AFWSSZ
			OVER LOAD	25.1	1130	AFWKAF
			MED LO	25.1	1130	AFWL
			HI (SET FAN SPEED AUTO HI)	30.8	1300	AFWAH
			HI (SET FAN SPEED HI)	30.8	1300	AFWH
			SUPER HI (SET FAN SPEED HI)	30.8	1300	AFWHH
		Cooling operation	SLEEP	18.1	820	AFCSOY
			LO S	21.4	940	AFCSSZ
			COOL rhythm S	21.4	940	AFCRS
			COOL rhythm LO	26.7	1120	AFCRL
			MED LO	26.7	1120	AFCL
			HI	31.5	1250	AFCH
			HIHI	31.5	1250	AFCHH
		Dehumidifying operation	SLEEP LO S	21.4	950	AFDSSZ
			MED LO	21.4	950	AFDL
			HI	21.4	950	AFDH
	Lower fan	Heating operation	LO S	21.6	1080	AFWUDS
			MED LO	22.8	1150	AFWUDL
			HI	25.7	1290	AFWUDH
		Cooling operation	LO S	0	——	AFCUDS
			MED LO	0	——	AFCUDL
			HI	25.7	1100	AFCUDH

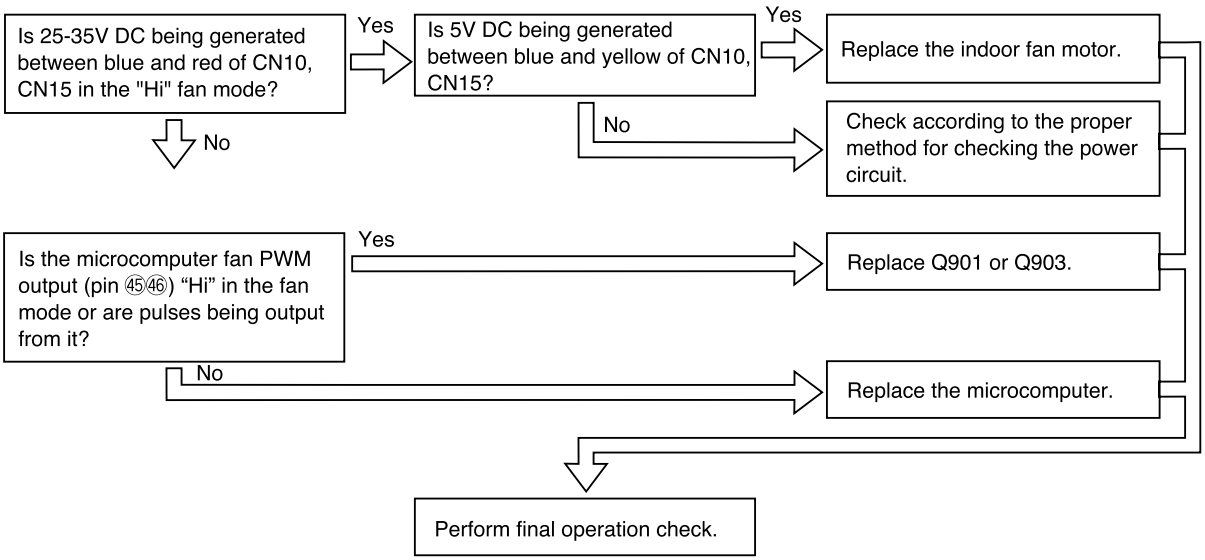
CHECKING THE INDOOR UNIT ELECTRICAL PARTS

[Model : RAF-25NH4, RAF-50NH4, RAD-25QH4, RAD-40QH4]

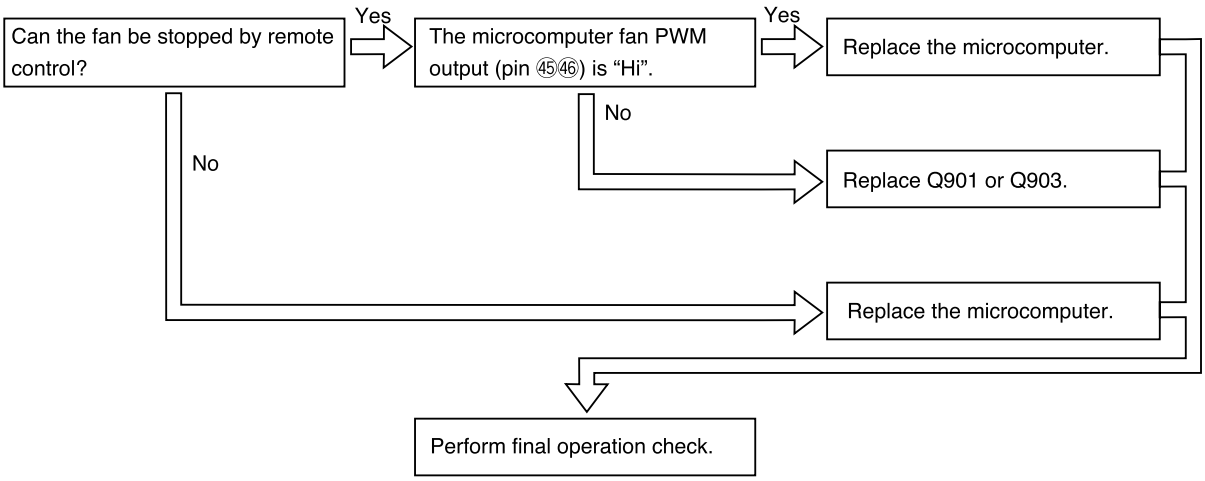
1. Power does not come on (no operation)



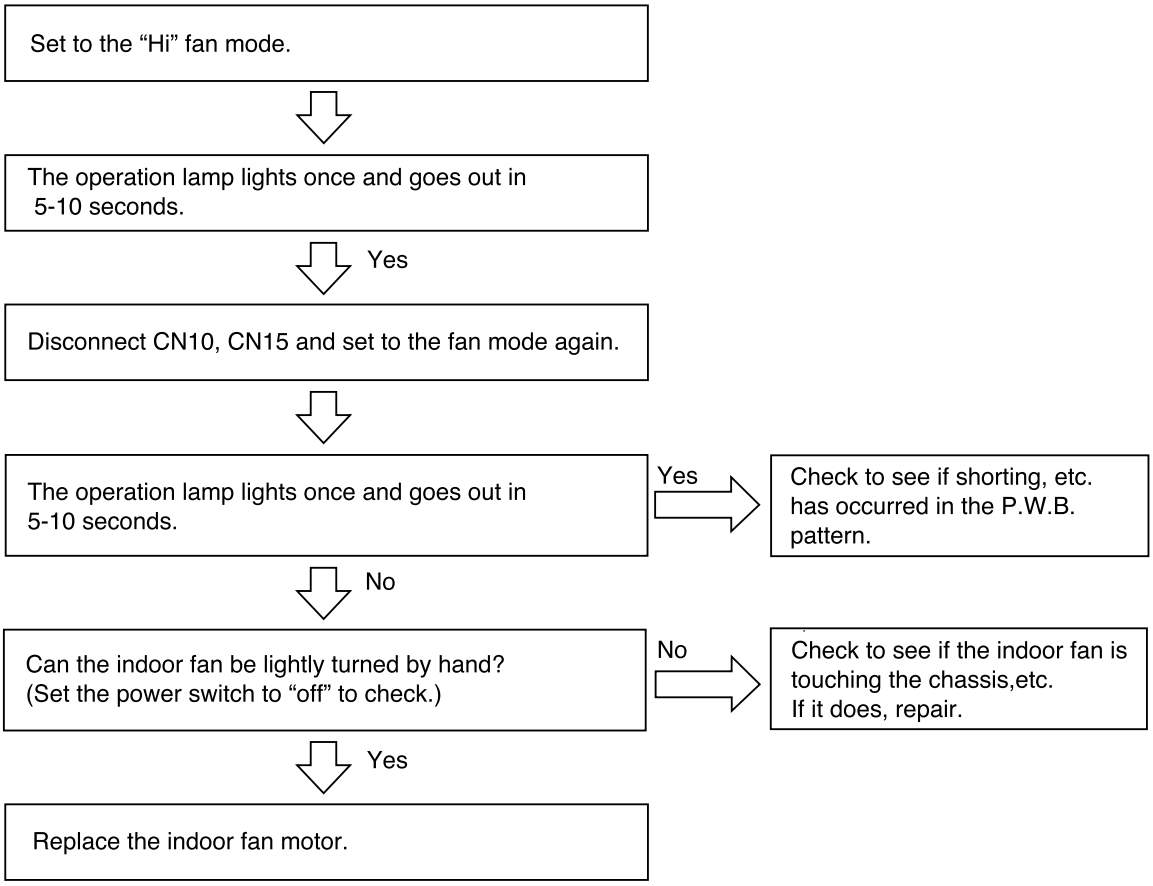
2. Only indoor fan does not operate (others are normal)



3. Indoor fan speed does not change (others are normal)

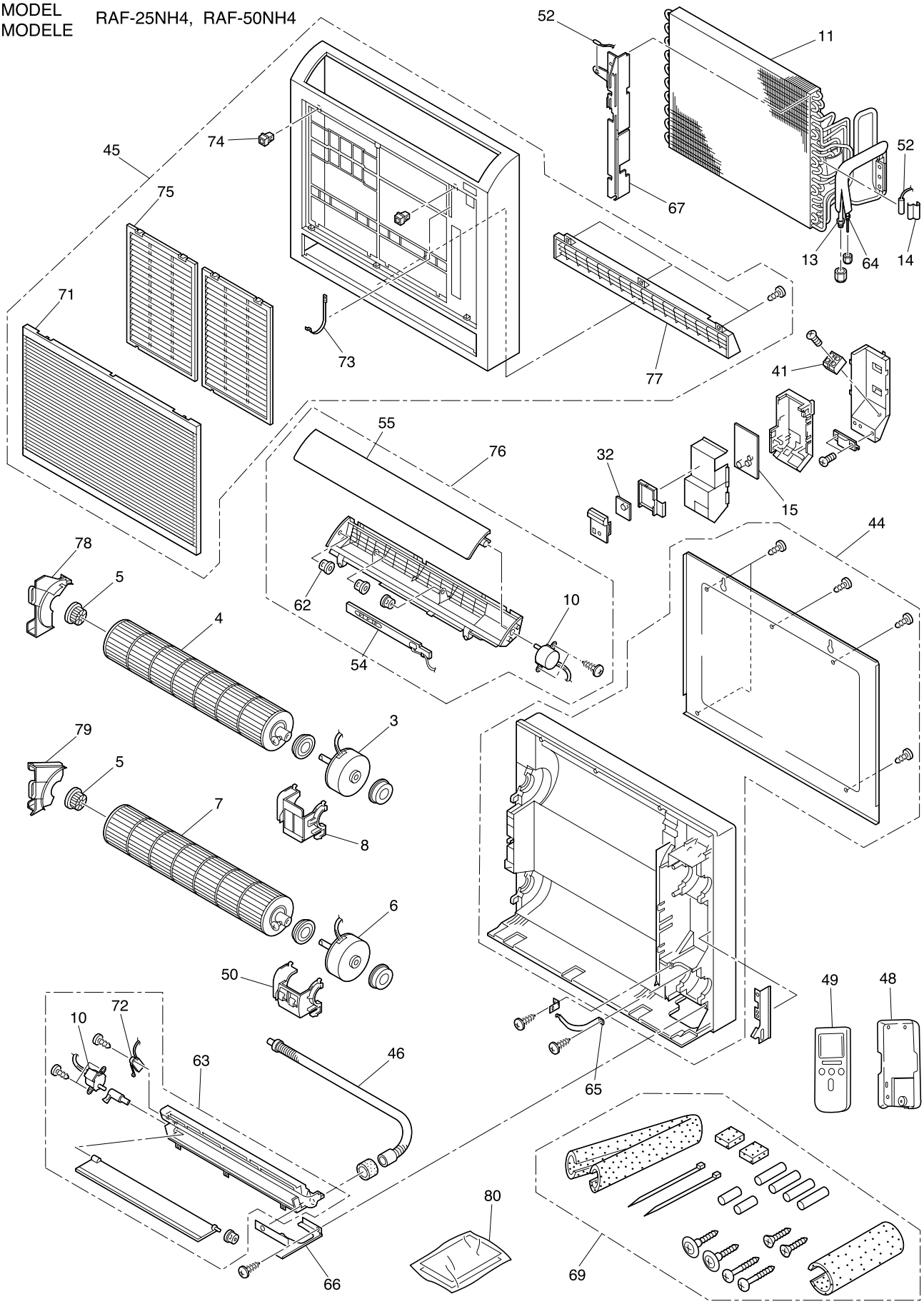


4. All systems stop from several seconds to several minutes after operation is started (all indicators are also off)



PARTS LIST AND DIAGRAM
LISTE DES PIECES DE RECHANGE

MODEL
MODELE RAF-25NH4, RAF-50NH4



MODEL
MODELE RAF-25NH4

NO. Nº	PARTS NO. Nº DE PIÈCE RAF-25NH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
3	ATI-0972B 902	1	FAN MOTOR (UPPER)	MOTEUR DE VENTILATEUR (SUPERIEUR)
4	ATI-0972B 903	1	TANGENTIAL FAN (UPPER)	VENTILATEUR TANGENTIEL (SUPERIEUR)
5	RAS4010LX2 010	2	FAN SUPPORT ASSEMBLY	SUPPORT DE VENTILATEUR
6	ATI-0972B 905	1	FAN MOTOR (LOWER)	MOTEUR DE VENTILATEUR (INFERIEUR)
7	ATI-0972B 906	1	TANGENTIAL FAN (LOWER)	VENTILATEUR TANGENTIEL (INFERIEUR)
8	ATI-0972B 904	1	FAN MOTOR SUPPORT (UPPER)	SUPPORT DE MOTEUR DE VENTILATEUR (SUPERIEUR)
10	RAS-2810NX 045	2	AUTO SWEEP MOTOR	MOTEUR DE BALAYAGE AUTOMOTIQNE
11	RAF-25NH4 902	1	HEAT EXCHANGER ASSEMBLY	ASSEMBLÉE D'THERMISTANCE D'EXCHANGEUR DE CHALEUR
13	RAS-287AX 802	1	UNION (3)	RACCORD UNION (3)
14	ATI-0972B 935	1	BULB SUPPORT	SUPPORT DE BULBE
15	RAF-25NH4 903	1	P.W.B. (MAIN)	CIRCUIT IMPRIME (PRINCIPAL)
32	ATI-0972B 914	1	P.W.B. (SWITCH)	CIRCUIT IMPRIME (INTERRUPTEUR)
41	ATI-0972B 936	1	TERMINAL BORD (2P)	BORNIER DE RACCORDEMENT (2P)
44	RAF-25NH4 901	1	CABINET	COFFRET
45	RAF-25NH4 906	1	FRONT COVER ASSEMBLY	CAPOT AVANT
46	KFR47GBPM 907	1	DRAIN HOSE	FLEXIBLE DE VIDANGE
48	RAS-258JX 004	1	REMOTE CONTROL SUPPORT	SUPPORT DE TELECOMMANDE
49	RAD-25QH4 905	1	REMOTE CONTROL ASSEMBLY	TELECOMMANDE
50	ATI-0972B 912	1	FAN MOTOR SUPPORT (LOWER)	SUPPORT DE MOTEUR DE VENTILATEUR (INFERIEUR)
52	ATI-0972B 915	1	THERMISTOR	THERMISTANCE
54	RAF-25NH4 905	1	P.W.B. (INDICATION)	CIRCUIT IMPRIME (INDICATION)
55	RAF-25NH4 909	1	WIDE DEFLECTOR	DÉFLECTEUR LARGE
62	RAS-3610LX 003	3	DEFLECTOR SUPPORT	APPUI DE DÉFLECTEUR
63	ATI-0972B 917	1	DISCHARGE FRAME	ARMATURÉ DE DISCHARGE
64	RAS-2810KX 009	1	UNION (2)	RACCORD UNION (2)
65	ATI-0972B 925	1	PIPE BAND	BANDE DE PIPE
66	ATI-0972B 926	1	RAT PREVENTION COVER	COUVERTURE DE PREBENTION DE RAT
67	ATI-0972B 927	1	PIPE COVER	COUVERTURE DE PIPE

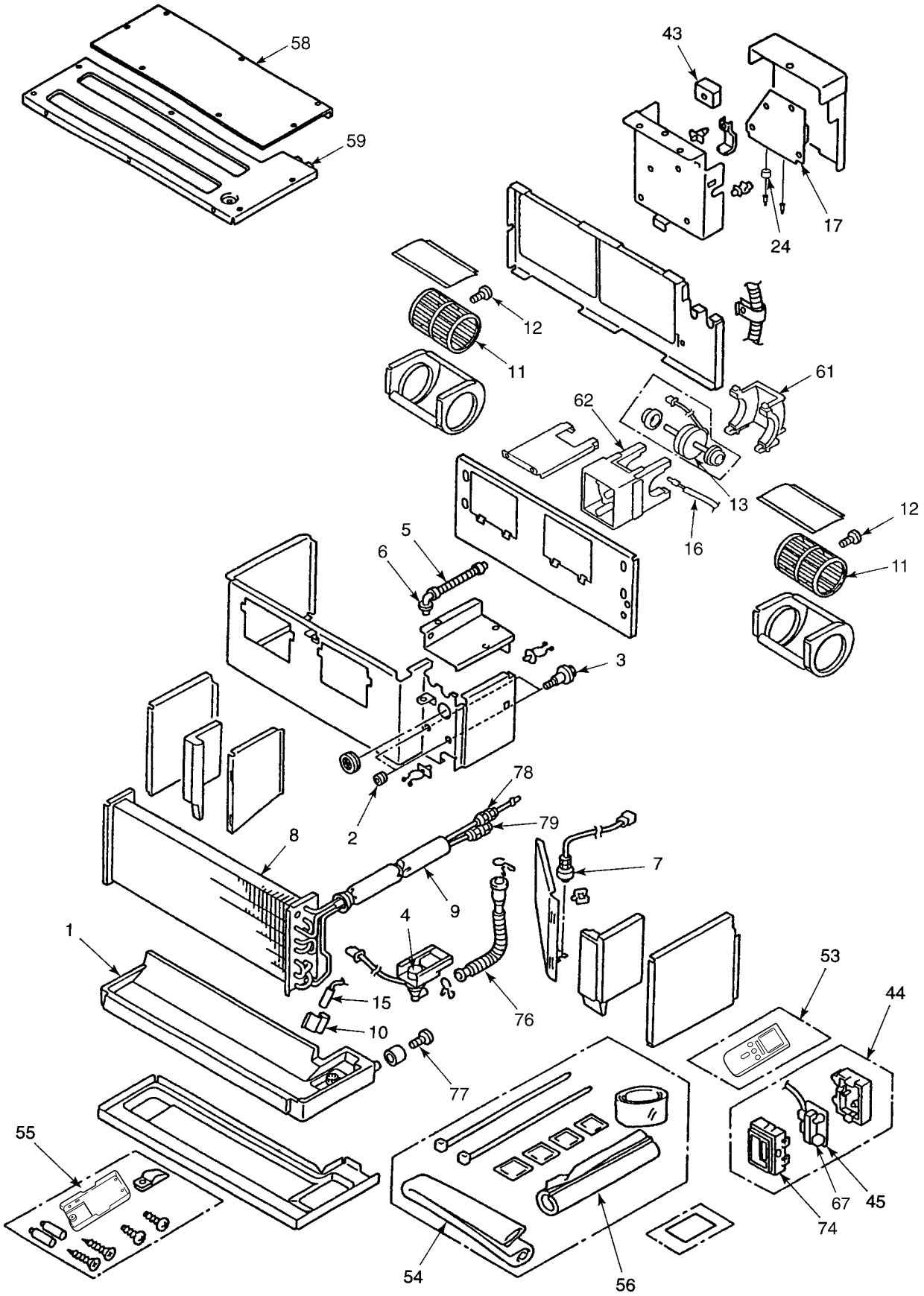
NO. Nº	PARTS NO. Nº DE PIÈCE RAF-25NH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
69	ATI-0972B 929	1	ACCESSARIES ASSEMBLY	ASSEMBLÉE D'ACCESSARIES
71	RAF-25NH4 907	1	FRONT PANEL	PANNEAU FRONTAL
72	ATI-0972B 932	1	DAMPER LIMIT SWITCH	INTERRUPTEUR LIMITEUR DU DÉFLECTEUR
73	ATI-0972B 933	1	BAND (FOR FRONT PANEL)	BAND (POUR LE PANNEAU AVANT)
74	RAP-5CPJ 004	2	LATCH 1 (FRONT COVER)	VERROU 1 (CAPOT AVANT)
75	ATI-0972B 934	2	AIR FILTER	FILTRE A AIR
76	RAF-25NH4 904	1	TOP FRAME	ARMATURE SUPÉRIEURE
77	RAF-25NH4 908	1	DISCHARGE GRILL	GRILLE DE DECHARGE
78	ATI-0972B 922	1	FAN COVER (UPPER)	COUVERTURE DE VENTILATEUR (SUPÉRIEUR)
79	ATI-0972B 923	1	FAN COVER (LOWER)	COUVERTURE DE VENTILATEUR (INFÉRIEUR)

MODEL
MODELE RAF-50NH4

NO. Nº	PARTS NO. Nº DE PIÈCE RAF-50NH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
3	ATI-0972B 902	1	FAN MOTOR (UPPER)	MOTEUR DE VENTILATEUR (SUPERIEUR)
4	ATI-0972B 903	1	TANGENTIAL FAN (UPPER)	VENTILATEUR TANGENTIEL (SUPERIEUR)
5	RAS4010LX2 010	2	FAN SUPPORT ASSEMBLY	SUPPORT DE VENTILATEUR
6	ATI-0972B 905	1	FAN MOTOR (LOWER)	MOTEUR DE VENTILATEUR (INFERIEUR)
7	ATI-0972B 906	1	TANGENTIAL FAN (LOWER)	VENTILATEUR TANGENTIEL (INFERIEUR)
8	ATI-0972B 904	1	FAN MOTOR SUPPORT (UPPER)	SUPPORT DE MOTEUR DE VENTILATEUR (SUPERIEUR)
10	RAS-2810NX 045	2	AUTO SWEEP MOTOR	MOTEUR DE BALAYAGE AUTOMATIQUE
11	ATI-0972B 907	1	HEAT EXCHANGER ASSEMBLY	ASSEMBLÉE D'THERMISTANCE D'EXCHANGEUR DE CHALEUR
13	RAS4010KX2 008	1	UNION (4)	RACCORD UNION (4)
14	ATI-0972B 935	1	BULB SUPPORT	SUPPORT DE BULBE
15	RAF-50NH4 901	1	P.W.B. (MAIN)	CIRCUIT IMPRIME (PRINCIPAL)
32	ATI-0972B 914	1	P.W.B. (SWITCH)	CIRCUIT IMPRIME (INTERRUPTEUR)
41	ATI-0972B 936	1	TERMINAL BORD (2P)	BORNIER DE RACCORDEMENT (2P)
44	RAF-25NH4 901	1	CABINET	COFFRET
45	RAF-25NH4 906	1	FRONT COVER ASSEMBLY	CAPOT AVANT
46	KFR47GBPM 907	1	DRAIN HOSE	FLEXIBLE DE VIDANGE
48	RAS-258JX 004	1	REMOTE CONTROL SUPPORT	SUPPORT DE TELECOMMANDE
49	RAD-25QH4 905	1	REMOTE CONTROL ASSEMBLY	TELECOMMANDE
50	ATI-0972B 912	1	FAN MOTOR SUPPORT (LOWER)	SUPPORT DE MOTEUR DE VENTILATEUR (INFERIEUR)
52	ATI-0972B 915	1	THERMISTOR	THERMISTANCE
54	RAF-25NH4 905	1	P.W.B. (INDICATION)	CIRCUIT IMPRIME (INDICATION)
55	RAF-25NH4 909	1	WIDE DEFLECTOR	DÉFLECTEUR LARGE
62	RAS-3610LX 003	3	DEFLECTOR SUPPORT	APPUL DE DÉFLECTEUR
63	ATI-0972B 917	1	DISCHARGE FRAME	ARMATURÉ DE DISCHARGE
64	RAS-2810KX 009	1	UNION (2)	RACCORD UNION (2)
65	ATI-0972B 925	1	PIPE BAND	BANDE DE PIPE
66	ATI-0972B 926	1	RAT PREVENTION COVER	COUVERTURE DE PREBENTION DE RAT
67	ATI-0972B 927	1	PIPE COVER	COUVERTURE DE PIPE

NO. Nº	PARTS NO. Nº DE PIÈCE RAF-50NH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
69	ATI-0972B 929	1	ACCESSARIES ASSEMBLY	ASSEMBLÉE D'ACCESSARIES
71	RAF-25NH4 907	1	FRONT PANEL	PANNEAU FRONTAL
72	ATI-0972B 932	1	DAMPER LIMIT SWITCH	INTERRUPTEUR LIMITEUR DU DÉFLECTEUR
73	ATI-0972B 933	1	BAND (FOR FRONT PANEL)	BAND (POUR LE PANNEAU AVANT)
74	RAP-5CPJ 004	2	LATCH 1 (FRONT COVER)	VERROU 1 (CAPOT AVANT)
75	ATI-0972B 934	2	AIR FILTER	FILTRE A AIR
76	RAF-25NH4 904	1	TOP FRAME	ARMATURE SUPÉRIEURE
77	RAF-25NH4 908	1	DISCHARGE GRILL	GRILL DE DECHARGE
78	ATI-0972B 922	1	FAN COVER (UPPER)	COUVERTURE DE VENTILATEUR (SUPÉRIEUR)
79	ATI-0972B 923	1	FAN COVER (LOWER)	COUVERTURE DE VENTILATEUR (INFÉRIEUR)

MODEL
MODELE RAD-25QH4, RAD-40QH4



MODEL
MODELE RAD-25QH4

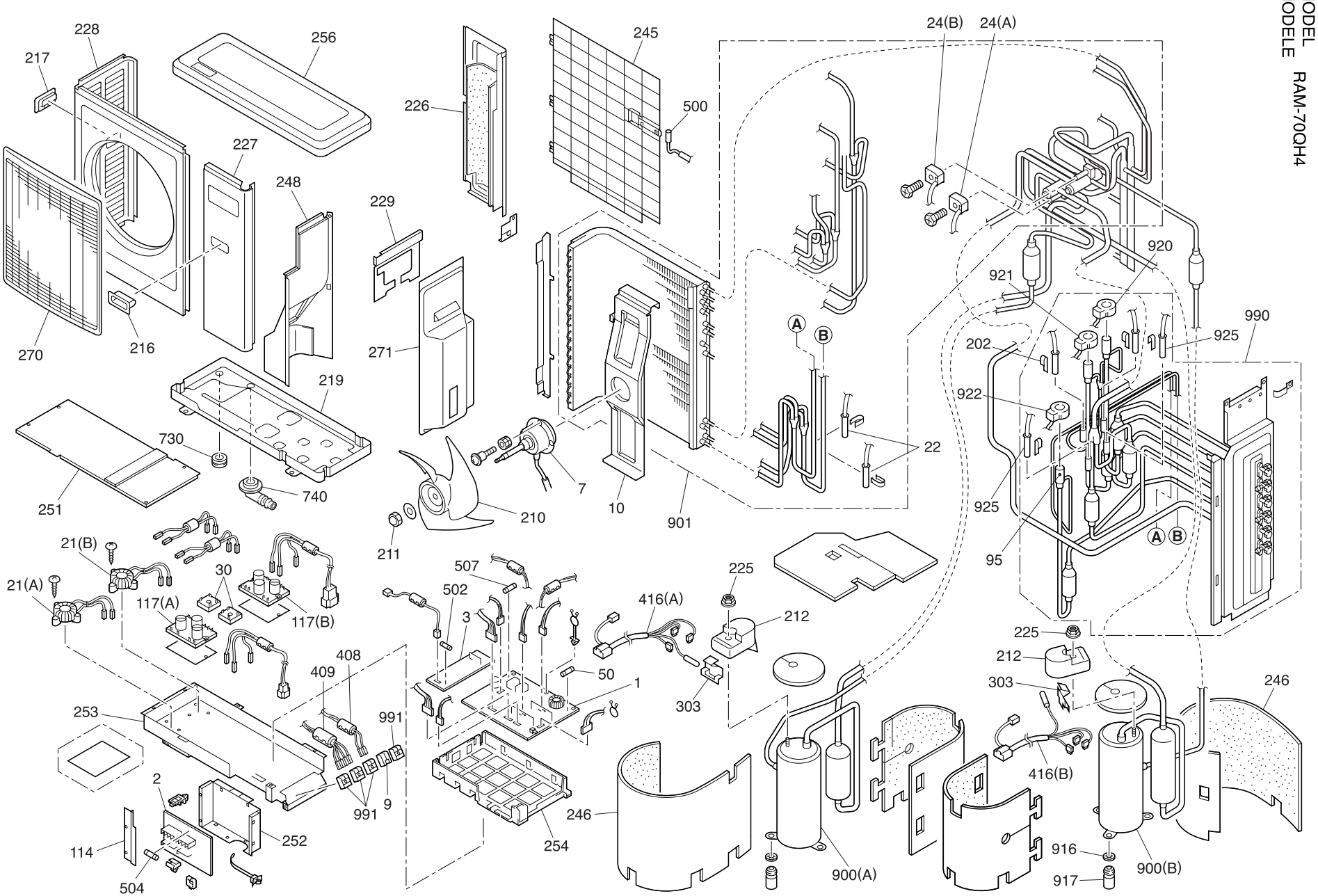
NO. Nº	PARTS NO. Nº DE PIÈCE RAD-25QH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
1	RAD-28MX 001	1	DRAIN PAN	BAC DE CONDENSATS
2	RAMD-350BW 003	2	FAN MOTOR SUPPORT RUBBER	SUPPORT DE MOTEUR DE VENTILATEUR CAOUTCHOUTE
3	RAMD-350BW 004	2	SPECIAL SCREW	VIS SPECIALE
4	RAMD-28GX 002	1	PUMP ASSEMBLY	POMPE
5	RAMD-350BW 010	1	DRAIN HOSE	FLEXIBLE DE VIDANGE
6	RAMD-350BW 009	1	PUMP HOSE	TUYAU DE POMPE
7	RAMD-350BW 011	1	FLOAT SWITCH	INTERRUPTEUR A FLOTTEUR
8	RAD-28MX 801	1	EVAPORATOR ASSEMBLY	EVAPORATEUR
9	RAD-28MX 802	1	PIPE SET	JEU DE TUYAUX
10	RAD-25QH4 906	1	BULB SUPPORT	SUPPORT DE BULBE
11	RAD-32CNH2 906	2	SIROCCO FAN	VENTILATEUR SIROCCO
12	RA-353B 004	2	FAN BOLT	BOULON DE VENTILATEUR
13	RAD-32CNH2 905	1	FAN MOTOR 20W, 1kg	MOTEUR DE VENTILATEUR 20W, 0,9kg
15	RAMD-40GX 002	1	THERMISTOR (HEAT)	THERMISTANCE (CHALEUR)
16	RAD-28MX 005	1	THERMISTOR (TEMPERATURE)	THERMISTANCE (TEMPERATURE)
17	RAD-25QH4 902	1	P.W.B. (MAIN)	CIRCUIT IMPRIME (PRINCIPAL)
24	RAC4010KX2 008	1	FERITE CORE (935)	NOYAU EN FERRITE (935)
31	RAC-228JX 014	2	SLIDE SWITCH	INTERRUPTEUR A COULISSE
34	RAS-2236W 071	1	LED-RED (SEL2213C)	LED-ROUGE (SEL2213C)
43	RAC2843CNH 902	1	TERMINAL BOARD (2P)	BORNIER DE RACCORDEMENT (2P)
44	RAD-25QH4 903	1	INDICATION ASSEMBLY	ASSEMBLEE D'INDICATION
45	DSI25S 901	1	P.W.B. (INDICATION)	CIRCUIT IMPRIME (INDICATION)
53	RAD-25QH4 905	1	REMOTE CONTROL ASSEMBLY	TELECOMMANDE
54	RAMJ-250BW 009	1	INSULATOR PIPE	CANALISATION DE ISOLANT
55	RAS-258JX 004	1	REMOCON SUPPORT	SUPPORT DE TELECOMMANDE
56	RAD-28MX 009	1	INSULATOR PIPE (236L)	CANALISATION DE ISOLANT (236L)
58	RAD-28QH1 904	1	UPPER PLATE (2)	PLAT SUPÉRIEUR (2)
59	RAD-25QH4 904	1	UPPER PLATE (1)	PLAT SUPÉRIEUR (1)

NO. Nº	PARTS NO. Nº DE PIÈCE RAD-25QH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
61	RAD-28QH1 907	1	FAN MOTOR SUPPORT	SUPPORT DE VENTILATEUR
62	RAD-25QH4 901	1	BASE (FAN MOTOR)	BASE (MOTEUR DE VENTILATEUR)
66	RAS-2236W 025	1	LED-YELLOW (SEL2713K)	LED-JAUNE (SEL2713K)
67	RAS-25DXD 002	1	LIGHT RECEIVING UNIT	MODULE DE RECEPTION DE LUMIERE
68	RAS-2553W 020	1	LED-GREEN (SEL2413E)	LED-VERTE (SEL2413E)
69	RAS-2810KX 043	1	CURRENT PROTECTOR (0.8A)	PROTECTEUR COURANT (0,8A)
70	RAS-2810KX 044	1	CURRENT PROTECTOR (2.0A)	PROTECTEUR COURANT (2,0A)
74	RAMJ-250BW 005	1	LED COVER	CAPOT DEL
76	RAD-28MX 003	1	DRAIN PIPE	TUYAU DE VIDANGE
77	RAS5645TWU 008	1	DRAIN CAP	VIDANGEZ LA PAC
78	RAS-287AX 801	1	UNION (2)	RACCORD UNION (2)
79	RAS-287AX 802	1	UNION (3)	RACCORD UNION (3)

MODEL
MODELE RAD-40QH4

NO. Nº	PARTS NO. Nº DE PIÈCE RAD-40QH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
1	RAD-28MX 001	1	DRAIN PAN	BAC DE CONDENSATS
2	RAMD-350BW 003	2	FAN MOTOR SUPPORT RUBBER	SUPPORT DE MOTEUR DE VENTILATEUR CAOUTCHOUTE
3	RAMD-350BW 004	2	SPECIAL SCREW	VIS SPECIALE
4	RAD-28MX 002	1	ASSEMBLY PUMP	POMPE
5	RAMD-350BW 010	1	DRAIN HOSE	FLEXIBLE DE VIDANGE
6	RAMD-350BW 009	1	PUMP HOSE	TUYAU DE POMPE
7	RAMD-350BW 011	1	FLOAT SWITCH	INTERRUPTEUR A FLOTTEUR
8	RAD-28MX 801	1	EVAPORATOR ASSEMBLY	EVAPORATEUR
9	RAD-28MX 802	1	PIPE SET	JEU DE TUYAUX
10	RAD-28QH4 906	1	BULB SUPPORT	SUPPORT DE BULBE
11	RAD-32CNH2 906	2	SIROCCO FAN	VENTILATEUR SIROCCO
12	RA-353B 004	2	FAN BOLT	BOULON DE VENTILATEUR
13	RAD-32CNH2 905	1	FAN MOTOR 20W, 1KG	MOTEUR DE VENTILATEUR 20W, 1KG
15	RAMD-40GX 002	1	THERMISTOR (HEAT)	THERMISTANCE (CHALEUR)
16	RAD-28MX 005	1	THERMISTOR (TEMPERATURE)	THERMISTANCE (TEMPERATURE)
17	RAD-40QH4 901	1	P.W.B. (MAIN)	CIRCUIT IMPRIME (PRINCIPAL)
24	RAC4010KX2 008	1	FERITE CORE (935)	NOYAU EN FERRITE (935)
31	RAC-228JX 014	2	SLIDE SWITCH	INTERRUPTEUR A COULISSE
34	RAS-2236W 071	1	LED-RED (SEL2213C)	DEL-ROUGE (SEL2213C)
43	RAC2843CNH 902	1	TERMINAL BOARD (2P)	BORNIER DE RACCORDEMENT (2P)
44	RAD-28QH4 903	1	INDICATION ASSEMBLY	ASSEMBLEE D'INDICATION
45	DSI25S 901	1	P.W.B. (INDICATION)	CIRCUIT IMPRIME (INDICATION)
53	RAD-28QH4 905	1	REMOTE CONTROL ASSEMBLY	TELECOMMANDE
54	RAMJ-250BW 009	1	INSULATOR PIPE	CANNALISATION DE ISOLANT
55	RAS-258JX 004	1	REMOTE CONTROL SUPPORT	SUPPORT DE TELECOMMANDE
56	RAD-28MX 009	1	INSULATOR PIPE (236L)	CANALISATION DE ISOLANT (236L)
58	RAD-28QH1 904	1	UPPER PLATE (2)	PLAT SUPÉRIEUR (2)
59	RAD-25QH4 904	1	UPPER PLATE (1)	PLAT SUPÉRIEUR (1)

NO. Nº	PARTS NO. Nº DE PIÈCE RAD-40QH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
61	RAD-28QH1 907	1	FAN MOTOR SUPPORT	SUPPORT DE MOTEUR DE VENTILATEUR
62	RAD-25QH4 901	1	BESE (FAN MOTOR)	BASE (MOTEUR DE VENTILATEUR)
66	RAS-2236W 025	1	LED-YELLOW (SEL2713K)	DEL-JAUNE (SEL2713K)
67	RAS-25DXD 002	1	LIGHT RECEIVING UNIT	MODULE DE RECEPTION DE LUMIERE
68	RAS-2553W 020	1	LED-GREEN (SEL2413E)	DEL-VERTE (SEL2413E)
69	RAS-2810KX 043	1	CURRENT PROTECTOR (0.8A)	PROTECTEUR COURANT (0,8A)
70	RAS-2810KX 044	1	CURRENT PROTECTOR (2.0A)	PROTECTEUR COURANT (2,0A)
74	RAMJ-250BW 005	1	LED COVER	CAPOT DEL
76	RAD-28MX 003	1	DRAIN PIPE	TUYAU DE VIDANGE
77	RAS5645TWU 008	1	DRAIN CAP	VIDANGEZ LA PAC
78	RAS-287AX 801	1	UNION (2)	RACCORD UNION (2)
79	RAS-287AX 802	1	UNION (3)	RACCORD UNION (3)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900(B)
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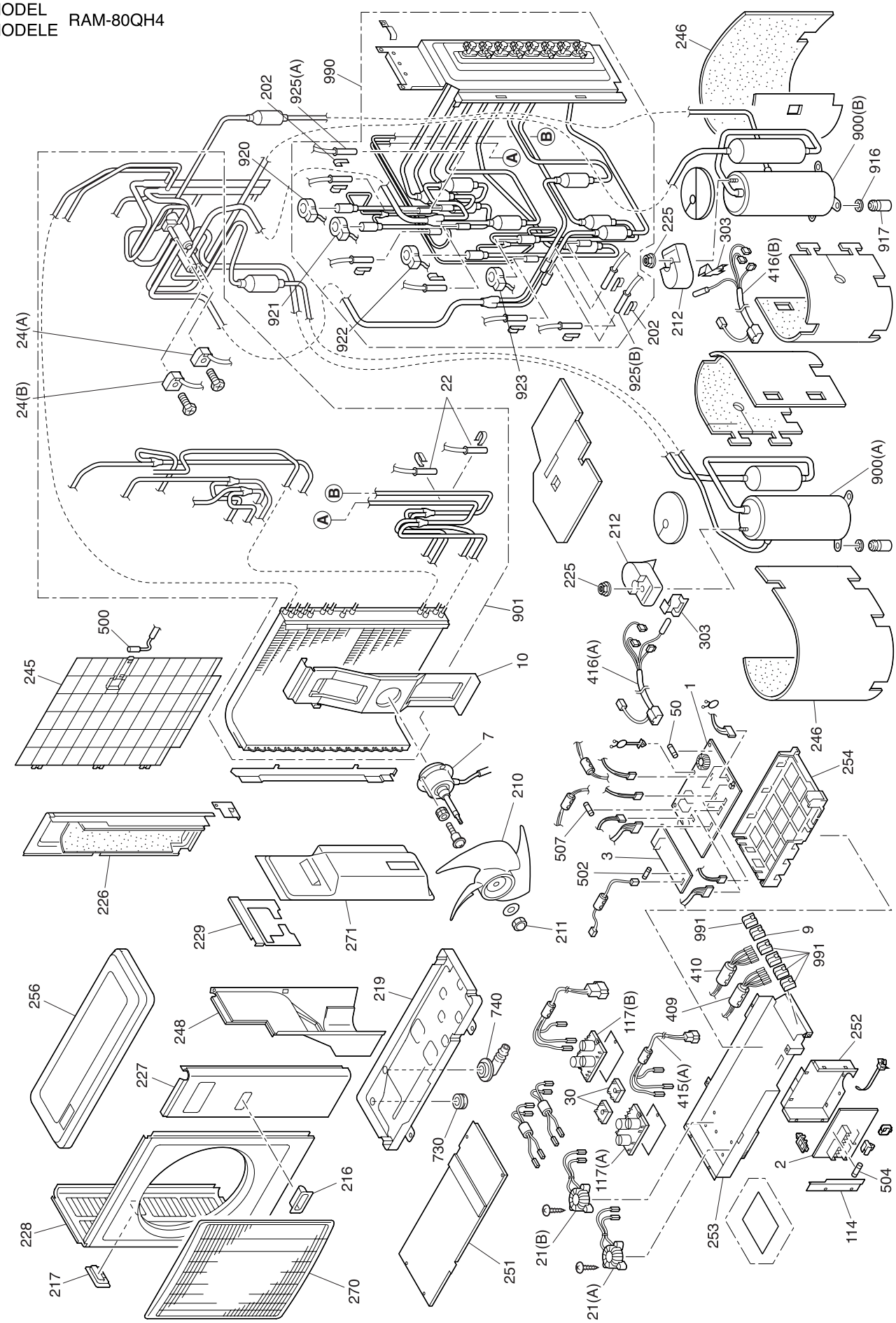
MODEL
MODELE RAM-70QH4

NO. Nº	PARTS NO. Nº DE PIÈCE RAM-70QH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
1	RAM-70QH4 906	1	P.W.B. (MAIN)	CIRCUIT IMPRIME (PRINCIPAL)
2	RAM-70QH4 908	1	P.W.B. (SWITCH)	CIRCUIT IMPRIME (INTERRUPTEUR)
3	RAM-70QH4 907	1	P.W.B. (FAN)	CRICUIT IMPRIME (VENTILATEUR)
7	RAC-80G4X2 007	1	FAN MOTOR 50W, 4kg	MOTEUR DE VENTILATEUR 50W, 4kg
9	RAC-P28KX2 003	1	TERMINAL BOARD (2P)	BORNIER DE RACCORDEMENT
10	RAC68N3X2S 050	1	FAN MOTOR SUPPORT	SUPPORT DE MOTEUR DE VENTILATEUR
21	RAC-2210MX 011	1	REACTOR (B)	REACTANCE (B)
21	RAM-50QH1 902	1	REACTOR (A)	REACTANCE (A)
22	RAC68N3X2S 035	1	THERMISTOR (DEFROST(BLE))	THERMISTANCE (DEGIVRAGE(BLE))
22	RAC68N3X2S 036	1	THERMISTOR (DEFROST(BLK))	THERMISTANCE (DEGIVRAGE(BLK))
24	RAC68N3X2S 032	1	COIL (REVERSING VALVE) (B)	BOBINE (VANNE D'INVERSION) (B)
24	RAC68N3X2S 033	1	COIL (REVERSING VALVE) (A)	BOBINE (VANNE D'INVERSION) (A)
30	RAC-22SHX2 006	2	DIODE STACK	JEU DE DIODES
50	RAC-40FNH1 904	1	FUSE (25A)	FUSIBLE (25A)
95	RAC68N3X2S 029	1	ELECTRIC EXPANSION VALVE (B)	VANNE D'EXPANSION ÉLECTRIQUE (B)
114	RAC68N3X2S 010	1	COVER (RAIN)	COUVETURE (PLUIE)
117	RAC68N3X2S 007	1	P.W.B. (SPM2-A)	CIRCUIT IMPRIME (SPM2-A)
117	RAC68N3X2S 008	1	P.W.B. (SPM2-B)	CIRCUIT IMPRIME (SPM2-B)
202	RAS-408CX2 023	4	BULB SUPPORT	SUPPORT DE BUBLE
210	RAC-68G3X2 012	1	PROPELLER FAN	SOUFFLERIE A HELICE
211	ACPC56L2X2 020	1	NUT (PROPELLER FAN)	ECROU (SOUFFLERIE A HELICE)
212	RAC-2210MX 005	2	O.L.R. COVER	CAPOT O.L.R.
216	RAC-1807V 002	1	HANDLE	POIGNEE
217	RAC-2567HV 006	1	HANDLE (LEFT)	POIGNEE
219	RAM-70QH4 901	1	BASE	BASE
225	RAC-2209LX 007	2	NUT FOR O.L.R. COVER	NUT (O.L.R. COVER)
226	RAC68N3X2S 044	1	PANEL (BACK)	PANNEAU (ARRIÈRE)
227	RAM-70QH4 910	1	PANEL (FRONT)	PANNEAU (AVENT)

NO. Nº	PARTS NO. Nº DE PIÈCE RAM-70QH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
228	RAC-80GW3 005	1	CABINET	COFFRET
229	RAC68N3X2S 045	1	PANEL (SIDE)	PANNEAU (CÔTÉ)
245	RAC68N3X2S 042	1	FILTER	FILTRE
246	RAC68N3X2S 026	1	SOUNDPROOF COVER	COUVERTURE INSONORISÉE
248	RAM-70QH4 903	1	PARTITION	CLOISON
251	RAC68N3X2S 056	1	UPPER PLATE (ELEC. BOX)	PLAQUE SUPÉRIEURE (BOÎTE DE ÉLECTRIQUE)
252	RAC68N3X2S 009	1	ELECTRIC CASE	CAS ÉLECTRIQUE
253	RAM-70QH4 904	1	ELECTRIC BOX	BOÎTE ÉLECTRIQUE
254	RAM-70QH4 905	1	P.W.B. SUPPORT	SUPPORT DE CIRCUIT IMPRIMÉ
256	RAM-80HT 904	1	TOP LID	COUVERCLE SUPÉRIEUR
270	RAC-80GW3 006	1	GRILL	GILLE
271	RAC68N3X2S 047	1	SIDE COVER	COUVERTURE LATÉRALE
303	RAC-2810HX 008	2	SUPPORT (OH-THERMISTOR)	SUPPORT (OH-THERMISTANCE)
408	RAM-70QH4 909	1	CORD (2P) FOR CN3	CORDE (2P) POUR CN3
409	RAM-70QH4 912	1	CORD (4P) FOR CN2	CORDE (4P) POUR CN2
416	RAC68N3X2S 027	1	OVER HEAT THERMISTOR ASSEMBLY (A)	ASSEMBLY (A) DE THERMISTANCE DE SURCHAUFFE
416	RAC68N3X2S 028	1	OVER HEAT THERMISTOR ASSEMBLY (B)	ASSEMBLY (B) DE THERMISTANCE DE SURCHAUFFE
500	RAC68N3X2S 043	1	THERMISTOR (OUT TEMP.)	THERMISTANCE (EXTERIEURE TEMPÉRATURE)
501	HRC-25KX-1 002	5	RELAY (FTR-F3)	RELAIS (FTR-F3)
502	R-S43MVP 050	1	FUSE (2A)	FUSIBLE (2A)
503	R-235TX 044	2	FUSE HOLDER	PORTE-FUSIBLES
504	RAC-206FD 003	1	TUBE FUSE (3A)	FUSIBLE DE TUBE
505	RAC-25EX 010	2	POWER RELAY (G4A)	RELAIS D'ALIMENTATION (G4A)
506	RAC4010KX2 008	2	FERITE CORE (935)	NOYAU EN FERRITE (935)
507	RAC68N3X2S 053	1	FUSE (5A)	FUSIBLE (5A)
508	RAM-103CNH 910	2	REGURATOR (MC7805CT)	REGULATEUR (MC7805CT)
509	RAS-22DWC 006	1	TEMPORARY SWITCH	INTERRUPTEUR AUXILIAIRE
510	RAS-226WI 011	2	FUSE HOLDER	PORTE-FUSIBLES

NO. Nº	PARTS NO. Nº DE PIÈCE RAM-70QH4		Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
511	RAS-258EX	043	3	COIL (RCH106-82K)	BOBINE (RCH106-82K)
512	RA108CHLXA	908	3	VARISTOR (450NR)	VARISTOR (450NR)
730	RAC-2210MX	022	1	BUSH (BASE)	BUSH (BASE)
740	RAC-2810NX	018	1	DRAIN PIPE	TUYAU DE VIDANGE
900	RAC69N3X2S	801	1	COMPRESSOR (A)	COMPRESSEUR (A)
900	RAC69N3X2S	802	1	COMPRESSOR (B)	COMPRESSEUR (B)
901	RAC69N3X2S	803	1	CONDENSER	CONDENSEUR
916	KPNT1	001	6	PUSH NUT	ECROU A POUSSER
917	RAC-2226HV	805	6	COMPRESSOR RUBBER	BAGUE CAOUTCHOUTEE DE COMPRESSEUR
920	RAC68N3X2S	037	1	COIL (BLUE, EXPANSION VALVE)	BOBINE (BLEU, VANNE D'EXPANSION)
921	RAC68N3X2S	038	1	COIL (YELLOW, EXPANSION VALVE)	BOBINE (JAUNE, VANNE D'EXPANSION)
922	RAC68N3X2S	039	1	COIL (RED, EXPANSION VALVE)	BOBINE (ROUGE, VANNE D'EXPANSION)
925	RAC68N3X2S	034	1	THERMISTOR PIPE	THERMISTANCE TUBE
990	RAM-70QH4	902	1	VALVE ASSEMBLY	VANNE
991	ATI-0972B	936	4	TERMINAL BORD (2P)	BORNIER DE RACCORDEMENT (2P)

MODEL
MODELE RAM-80QH4



MODEL
MODELE RAM-80QH4

NO. Nº	PARTS NO. Nº DE PIÈCE RAM-80QH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
1	RAM-80QH4 901	1	P.W.B. (MAIN)	CIRCUIT IMPRIME (PRINCIPAL)
2	RAM-80QH4 902	1	P.W.B. (SWITCH)	CIRCUIT IMPRIME (INTERRUPTEUR)
3	RAM-70QH4 907	1	P.W.B. (FAN)	CIRCUIT IMPRIME (VENTILATEUR)
7	RAC-80G4X2 007	1	FAN MOTOR 50W, 4KG	MOTEUR DE VENTILATEUR 50W, 4KG
9	RAC-P28KX2 003	1	TERMINAL BORD (2P)	BORNIER DE RACCORDEMENT (2P)
10	RAC68N3X2S 050	1	FAN MOTOR SUPPORT	SUPPORT DE MOTEUR DE VENTILATEUR
21	RAC-2210MX 011	1	REACTOR (B)	REACTANCE (B)
21	RAM-50QH1 902	1	REACTOR (A)	REACTANCE (A)
22	RAC68N3X2S 035	1	THERMISTOR (DEFROST(BLE))	THERMISTANCE (DEGIVRAGE(BLE))
22	RAC68N3X2S 036	1	THERMISTOR (DEFROST(BLK))	THERMISTANCE (DEGIBRAGE(BLK))
24	RAC68N3X2S 032	1	COIL (REVERSING VALVE) (B)	BOBINE (VANNE D'INVERSION) (B)
24	RAC68N3X2S 033	1	COIL (REVERSING VALVE) (A)	BOBINE (VANNE D'INVERSION) (A)
30	RAC-22SHX2 006	2	DIODE STACK	JUE DE DIODES
50	RAC-40FNH1 904	1	FUSE (25A)	FUSIBLE (25A)
114	RAC68N3X2S 010	1	COVER (RAW)	COUVETURE (PLUIE)
117	RAC68N3X2S 007	1	P.W.B. (SPM2-A)	CIRCUIT IMPRIME (SPM2-A)
117	RAC68N3X2S 008	1	P.W.B. (SPM2-B)	CIRCUIT IMPRIME (SPM2-B)
202	RAS-408CX2 023	8	BULB SUPPORT	SUPPORT DE BULBE
210	RAC-68G3X2 012	1	PROPELLER FAN	SOUFFLERIE A HELICE
211	ACPC56L2X2 020	1	NUT (PROPELLER FAN)	ECROU (SOUFFLERIE A HELICE)
212	RAC-2210MX 005	2	O.L.R. COVER	CAPAT O.L.R.
216	RAC-1807V 002	1	HANDLE	POIGNEE
217	RAC-2567HV 006	1	HANDLE (LEFT)	POIGNEE
219	RAM-70QH4 901	1	BASE	BASE
225	RAC-2209LX 007	2	NUT FOR O.L.R. COVER	ECROU (CAPAT O.L.R.)
226	RAC68N3X2S 044	1	PANEL (BACK)	PANNEAU (ARRIÈRE)
227	RAM-80QH4 903	1	PANEL (FRONT)	PANNEAU (AVENT)
228	RAC-80GW3 005	1	CABINET	COFFRET

NO. Nº	PARTS NO. Nº DE PIÈCE RAM-80QH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
229	RAC68N3X2S 045	1	PANEL (SIDE)	PANNEAU (CÔTÉ)
245	RAC68N3X2S 042	1	FILTER	FILTRE
246	RAC68N3X2S 026	1	SOUNDPROOF COVER	COUVERTURE INSONORISÉE
248	RAM-70QH4 903	1	PARTITION	CLOISON
251	RAC68N3X2S 056	1	UPPER PLATE (ELECTRIC BOX)	PLAQUE SUPÉRIEURE (BOÎTE DE ÉLECTRIQUE)
252	RAC68N3X2S 009	1	ELECTRIC CASE	CAS ÉLECTRIQUE
253	RAM-70QH4 904	1	ELECTRIC BOX	BOÎTE ÉLECTRIQUE
254	RAM-70QH4 905	1	P.W.B. SUPPORT	SUPPORT DE CIRCUIT IMPRIME
256	RAM-80HT 904	1	TOP LID	COUVERCLE SUPÉRIEUR
270	RAC-80GW3 006	1	GRILL	GRILLE
271	RAC68N3X2S 047	1	SIDE COVER	COUVERTURE LATÉRALE
303	RAC-2810HX 008	2	SUPPORT (OH-THERMISTOR)	SUPPORT (OH-THERMISTANCE)
409	RAM-70QH4 912	1	CORD (4P) FOR CN2	CORDE (4P) POUR CN2
410	RAM-80QH4 904	1	CORD (4P) FOR CN3	CORDE (4P) POUR CN3
416	RAC68N3X2S 027	1	OVERHEAT THERMISTOR ASSEMBLY (A)	ASSEMBLY (A) DE THERMISTANCE DE SURCHAUFFE
416	RAC68N3X2S 028	1	OVERHEAT THERMISTOR ASSEMBLY (B)	ASSEMBLY (B) DE THERMISTANCE DE SURCHAUFFE
500	RAC68N3X2S 043	1	THERMISTOR (OUT TEMPERATURE)	THERMISTANCE (EXTERIEURE TEMPÉRATURE)
501	HRC-25KX-1 002	6	RELAY (FTR-F3)	RELAIS (FTR-F3)
502	R-S43MVP 050	1	FUSE (2A)	FUSIBLE (2A)
503	R-235TX 044	2	FUSE HOLDER	PORTE-FUSIBLE
504	RAC-206FD 003	1	TUBE FUSE (3A)	FUSIBLE DE TUBE
505	RAC-25EX 010	2	POWER RELAY (G4A)	RELAIS D'ALIMENTATION (G4A)
506	RAC4010KX2 008	4	FERITE CORE 935	NOYAU EN FERRITE 935
507	RAC68N3X2S 053	1	FUSE (5A)	FUSIBLE (5A)
508	RAM-103CNH 910	2	REGURATOR (MC7805CT)	REGULATEUR (MC7805CT)
509	RAS-22DWC 006	1	TEMPORARY SWITCH	INTERRUPTEUR AUXILIAIRE
510	RAS-2216WI 011	2	FUSE HOLDER	PORTE-FUSIBLES
511	RAS-258EX 043	4	COIL (RCH106-82K)	BOBINE (RCH106-82K)

NO. Nº	PARTS NO. Nº DE PIÈCE RAM-80QH4	Q'TY/ UNIT QTÉ/ UNITÉ	PARTS NAME	DÉSIGNATION
512	RA108CHLXA 908	3	VARISTOR (450NR)	VARISTOR (450NR)
730	RAC-2210MX 022	1	BUSH (BASE)	BUSH (BASE)
740	RAC-2810NX 018	1	DRAIN PIPE	TUYAU DE VIDANGE
900	RAC68N3X2S 801	1	COMPRESSOR (A)	COMPRESSEUR (A)
900	RAC68N3X2S 802	1	COMPRESSOR (B)	COMPRESSEUR (B)
901	RAC68N3X2S 803	1	CONDENSER	CONDENSEUR
916	KPNT1 001	6	PUSH NUT	ECROU A POUSSER
917	RAC-2226HV 805	6	COMPRESSOR RUBBER	BAGUE CAOUTCHOUTEE DE COMPRESSEUR
920	RAC68N3X2S 037	1	COIL (BULE, EXPANSION VALVE)	BOBINE (BLEU, VANNE D'EXPANSION)
921	RAC68N3X2S 038	1	COIL (YELLOW, EXPANSION VALVE)	BOBINE (JAUNE, VANNE D'EXPANSION)
922	RAC68N3X2S 039	1	COIL (RED, EXPANSION VALVE)	BOBINE (ROUGE, VANNE D'EXPANSION)
923	RAC-2810NX 022	1	COIL (ELECTRIC, EXPANSION VALVE)	BOBINE (ELECTRIQUE, VANNE D'EXPANSION)
925	RAC68N3X2S 034	1	THERMISTOR PIPE	THERMISTANCE TUBE
925	RAC80N4X2S 003	1	THERMISTOR PIPE	THERMISTANCE TUBE
990	RAM-70QH4 902	1	VALVE ASSEMBLY	VANNE
991	ATI-0972B 936	5	TERMINAL BORD (2P)	BORNIER DE RACCORDEMENT (2P)

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