

HITACHI

PM

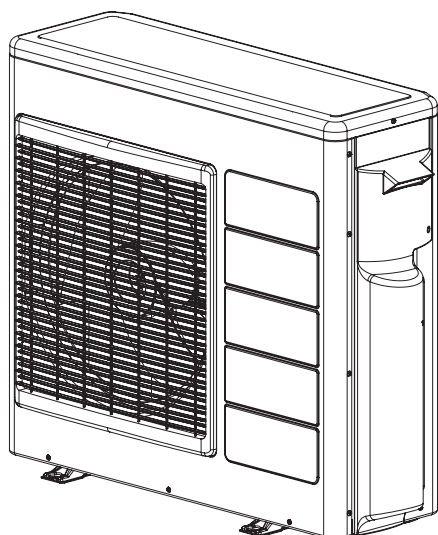
NO. 0583E

RAM-53NP2B
RAM-53NP3B

SERVICE MANUAL TECHNICAL INFORMATION

FOR SERVICE PERSONNEL ONLY

REFER TO THE FOUNDATION MANUAL



RAM-53NP2B
RAM-53NP3B

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SPECIFICATIONS

TYPE	DC INVERTER QUADRUPLE SYSTEM MULTI	
	OUTDOOR UNIT	
MODEL	RAM-53NP2B	RAM-53NP3B
POWER SOURCE	1 ϕ , 220 - 240V, 50/60Hz	
TOTAL INPUT (W)	REFER TO THE SPECIFICATIONS PAGE	
TOTAL AMPERES (A)		
COOLING CAPACITY (kW)		
HEATING CAPACITY (B.T.U.)		
DIMENSIONS (mm)	W	850
	H	750
	D	298
NET WEIGHT (kg)	51 / 54	

※ After installation

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

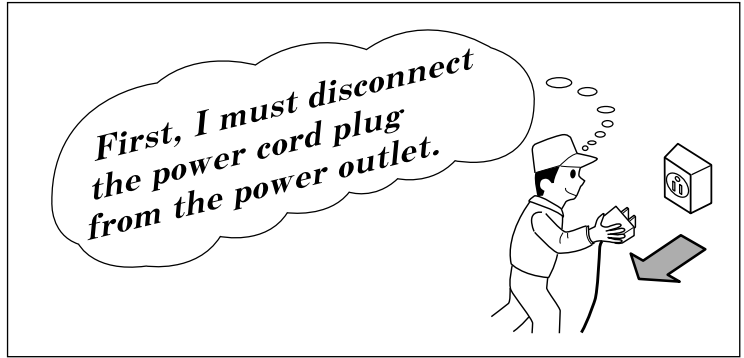
ROOM AIR CONDITIONER OUTDOOR UNIT

JANUARY 2015

Refrigeration & Air-Conditioning Division

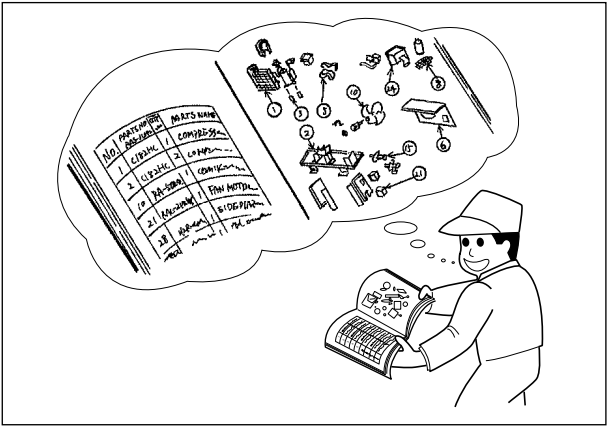
SAFETY DURING REPAIR WORK

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



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

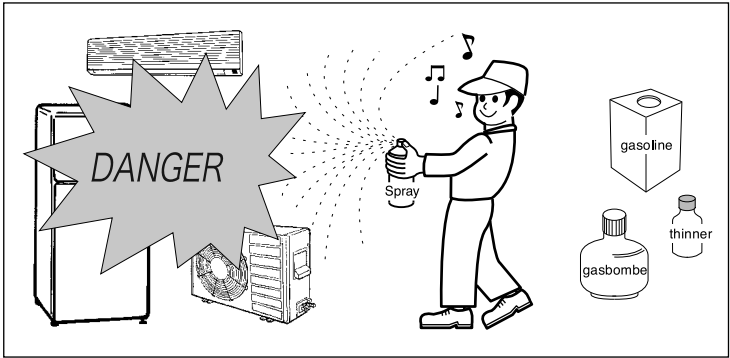
If the contacts of electrical parts are defective, replace the electrical parts without trying to repair them.



3. After completion of repairs, the initial state should be restored.
4. Lead wires should be connected and laid as in the initial state.
5. Modification of the unit by 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 $1M\Omega$ or more as measured by a 500V DC megger.
9. The initial location of installation such as window, floor or the other should be checked for being and safe enough to support the repaired unit again. If it is found not so strong and safe, the unit should be installed at the initial location 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 manufacturers during maintenance and handling thereof. (They apply the same to handling of abnormal goods such as rejected goods being returned).

2. Object parts

- (1) Micro computer
- (2) Integrated circuits (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).

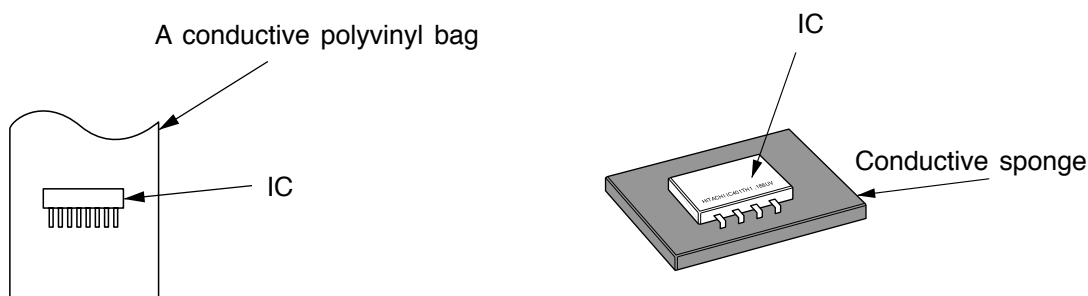


Fig. 1. Conductive container

- (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 $1M\Omega$ 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.

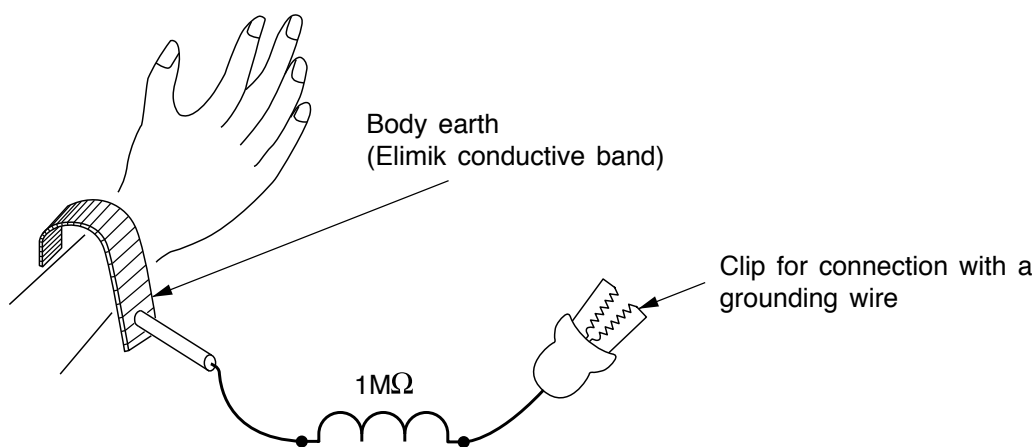


Fig. 2. Body Earth

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

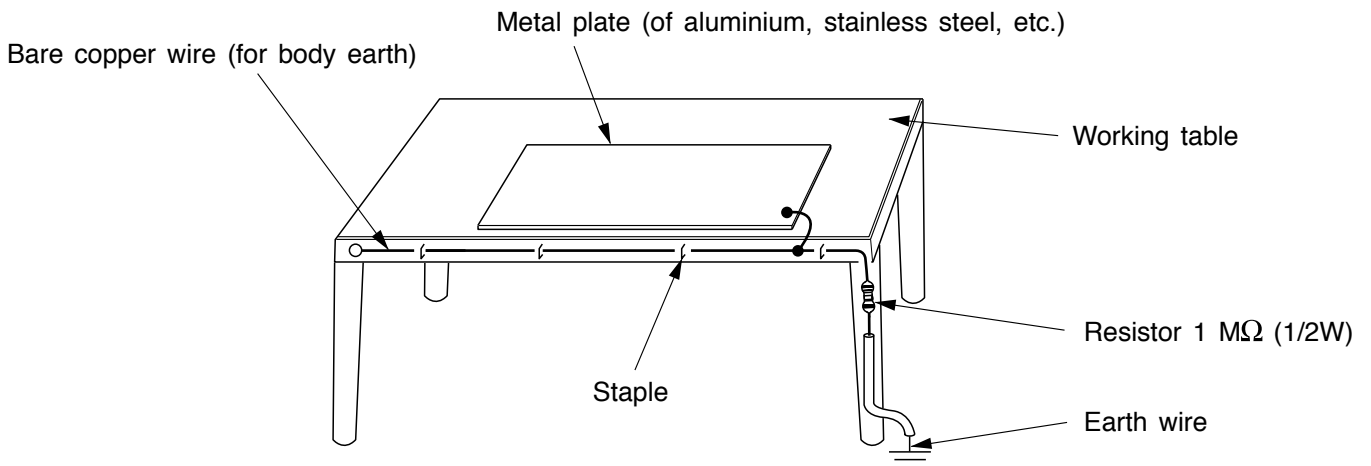


Fig. 3. Grounding of the working table

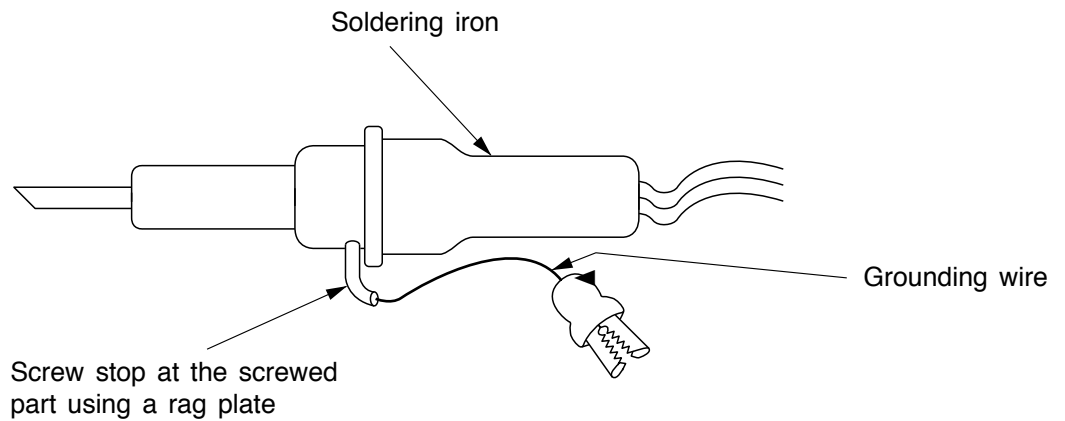


Fig. 4. Grounding a solder iron

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 short circuit a load circuit or the like.

⚠ CAUTION

1. In quiet or stop operation, slight flowing noise of refrigerant in the refrigerating cycle is heard occasionally, but this noise is not abnormal for the operation.
2. When it thunders nearby, it is recommend to stop the operation and to disconnect the power cord plug from the power outlet for safety.
3. In the event of power failure, the air conditioner will restart automatically in the previously selected mode once the power is restored. In the event of power failure during TIMER operation, the air conditioner will not start automatically. Re-press ON/OFF button after 3 minutes from when the unit off or power recovery.
4. If the room air conditioner is stopped by adjusting thermostat, or miss operation, and re-start in a moment, there is occasion that the cooling and heating operation does not start for 3 minutes, it is not abnormal and this is the result of the operation of IC delay circuit. This IC delay circuit ensures that there is no danger of blowing fuse or damaging parts even if operation is restarted accidentally.
5. This room air conditioner should not be used at the cooling operation when the outside temperature is below -10°C (14°F).
6. This room air conditioner (the reverse cycle) should not be used when the outside temperature is below -15°C (5°F).
If the reverse cycle is used under this condition, the outside heat exchanger is frosted and efficiency falls.
7. When the outside heat exchanger is frosted, the frost is melted by operating the hot gas system, it is not trouble that at this time fan stops and the vapour may rise from the outside heat exchanger.

SPECIFICATIONS

MODEL	RAM-53NP2B	RAM-53NP3B
FAN MOTOR	47 W	
FAN MOTOR CAPACITOR	NO	
FAN MOTOR PROTECTOR	NO	
COMPRESSOR	JU1015D9	
COMPRESSOR MOTOR CAPACITOR	NO	
OVERLOAD PROTECTOR	YES	
OVERHEAT PROTECTOR	YES	
FUSE (for MICROPROCESSOR)	5.0A	
POWER RELAY	G4A	
POWER SWITCH	NO	
TEMPORARY SWITCH	NO	
SERVICE SWITCH	YES	
TRANSFORMER	NO	
VARISTOR	450NR	
NOISE SUPPRESSOR	YES	
THERMOSTAT	YES(IC)	
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)	NO	
REFRIGERANT CHARGING VOLUME (Refrigerant R410A)	UNIT	1900g
	WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.	
	PIPES (MAX.)	MAX. 35m

※ RAM-53NP2B
Additional charge of refrigerant is not required

※ Ram-53NP3B
In case the pipe length is more than 35m, add refrigerant R410A at 20gram per every meter exceeds.

SPECIFICATIONS FOR INDOOR UNITS COMBINATION

TYPE		DC INVERTER QUADRUPLE SYSTEM MULTI COOLING AND HEATING
MODEL	OUTDOOR UNIT	RAM-53NP2B
PHASE/VOLTAGE/FREQUENCY		1ø, 220 - 240V, 50/60Hz
CIRCUIT AMPERES TO CONNECT (A)		20A
COOLING (FOUR UNITS)	CAPACITY (kW) (B.T.U./h)	5.30
		18,090
	TOTAL INPUT (W)	1,550
	EER (B.T.U./hW)	11.67
	TOTAL AMPERES (A)	7.10 - 6.50
POWER FACTOR (%)		99
HEATING (FOUR UNITS)	CAPACITY (kW) (B.T.U./h)	6.80
		23,200
	TOTAL INPUT (W)	1,790
	EER (B.T.U./hW)	12.96
	TOTAL AMPERES (A)	8.20 - 7.50
POWER FACTOR (%)		99
MAXIMUM LENGTH OF PIPING		MAX. 35m (TWO UNIT TOTAL)
STANDARD		CE (EMC&LVD)

MODEL		RAM-53NP2B
PACKING (mm)	W	1,008
	H	800
	D	394
	cu.ft.	11.22
GROSS WEIGHT (kg)		53
FLARE NUT SIZE (SMALL/LARGE)		(6.35D/9.52D)X2

OPERATION SCOPE

	INDOOR SUCTION TEMPERATURE (°C)	OUTDOOR SUCTION TEMPERATURE (°C)	INDOOR SUCTION HUMIDITY (%)
COOLING OPERATION SCOPE	16 ~ 32	-10 ~ 43	BELOW 80
HEATING OPERATION SCOPE	BELOW 27	-15 ~ 21	—

SPECIFICATIONS FOR INDOOR UNITS COMBINATION

TYPE		DC INVERTER QUADRUPLE SYSTEM MULTI COOLING AND HEATING
MODEL	OUTDOOR UNIT	RAM-53NP3B
PHASE/VOLTAGE/FREQUENCY		1ø, 220 - 240V, 50/60Hz
CIRCUIT AMPERES TO CONNECT (A)		20A
COOLING (FOUR UNITS)	CAPACITY (kW) (B.T.U./h)	5.30
		18,090
	TOTAL INPUT (W)	1,550
	EER (B.T.U./hW)	11.67
	TOTAL AMPERES (A)	7.12 - 6.52
POWER FACTOR (%)		99
HEATING (FOUR UNITS)	CAPACITY (kW) (B.T.U./h)	6.80
		23,200
	TOTAL INPUT (W)	1,620
	EER (B.T.U./hW)	14.32
	TOTAL AMPERES (A)	7.44 - 6.82
POWER FACTOR (%)		99
MAXIMUM LENGTH OF PIPING		MAX. 45m (THREE UNIT TOTAL)
STANDARD		CE (EMC&LVD)

MODEL		RAM-53NP3B
PACKING (mm)	W	1,008
	H	800
	D	394
	cu.ft.	11.22
GROSS WEIGHT (kg)		56
FLARE NUT SIZE (SMALL/LARGE)		(6.35D/9.52D)X2

OPERATION SCOPE

	INDOOR SUCTION TEMPERATURE (°C)	OUTDOOR SUCTION TEMPERATURE (°C)	INDOOR SUCTION HUMIDITY (%)
COOLING OPERATION SCOPE	16 ~ 32	-10 ~ 43	BELOW 80
HEATING OPERATION SCOPE	BELOW 27	-15 ~ 21	—

**2 ROOM MULTI-SPLIT INVERTER TYPE RAC: RAM-53NP2B
POSSIBLE COMBINATION TO OPERATE (SAME TIME OPERATION)**

POSSIBLE COMBINATIONS TO OPERATE	COOLING					HEATING					ENERGY RANK	
	CAPACITY RATING (kW) (RANGE)	TOTAL	OUTDOOR UNIT		EER	ENERGY RANK	CAPACITY RATING (kW) (RANGE)	TOTAL	OUTDOOR UNIT			COP
			POWER CONSUMPTION (W)	AMPERE (A)					220 - 230	240 V		
ONE UNIT												
1.5	1.50 (1.00-2.20)	1.50	430 (200-480)	2.0 - 1.9 - 1.8	3.49	A	2.00 (1.10-2.20)	2.00	610 (200-650)	2.8 - 2.7 - 2.6	3.28	C
1.8	1.80 (1.00-2.00)	1.80	495 (200-750)	2.3 - 2.2 - 2.1	3.64	A	2.50 (1.10-3.20)	2.50	690 (200-1050)	3.2 - 3.0 - 2.9	3.62	A
2.5	2.50 (1.00-2.80)	2.50	700 (200-980)	3.2 - 3.1 - 2.9	3.57	A	3.90 (1.10-4.70)	3.90	1060 (200-1380)	4.9 - 4.7 - 4.5	3.68	A
3.5	3.50 (1.00-3.90)	3.50	1030 (200-1280)	4.7 - 4.5 - 4.3	3.40	A	4.80 (1.10-5.80)	4.80	1320 (200-1870)	6.1 - 5.8 - 5.6	3.64	A
5.0	5.00 (1.00-5.50)	5.00	1510 (200-1660)	6.9 - 6.6 - 6.4	3.31	A	6.50 (1.10-7.20)	6.50	1800 (200-2010)	8.3 - 7.9 - 7.6	3.61	A
3.0	1.50 + 1.50 (1.50-3.90)	3.00	920 (200-1000)	4.2 - 4.0 - 3.9	3.26	A	2.00 + 2.00 (1.50-4.70)	4.00	1060 (200-1380)	4.9 - 4.7 - 4.5	3.77	A
3.3	1.50 + 1.80 (1.50-3.90)	3.30	1020 (200-1300)	4.7 - 4.5 - 4.3	3.24	A	2.00 + 2.50 (1.50-5.20)	4.50	1250 (200-1870)	5.7 - 5.5 - 5.3	3.60	A
4.0	1.50 + 2.50 (1.50-4.50)	4.00	1180 (200-1250)	5.4 - 5.2 - 5.0	3.39	A	2.00 + 3.90 (1.50-6.50)	5.90	1620 (200-2010)	7.4 - 7.1 - 6.8	3.64	A
5.0	1.50 + 3.50 (1.50-5.90)	5.00	1480 (200-1660)	6.8 - 6.5 - 6.2	3.38	A	2.00 + 4.80 (1.50-7.20)	6.80	1820 (200-2010)	8.4 - 8.0 - 7.7	3.74	A
6.5	1.22 + 4.08 (1.50-5.90)	5.30	1550 (200-1660)	7.1 - 6.8 - 6.5	3.42	A	1.60 + 5.20 (1.50-7.20)	6.80	1820 (200-2010)	8.4 - 8.0 - 7.7	3.74	A
3.6	1.80 + 1.80 (1.50-4.00)	3.60	1080 (200-1300)	5.0 - 4.7 - 4.5	3.33	A	2.50 + 2.50 (1.50-5.20)	5.00	1290 (200-1550)	5.9 - 5.7 - 5.4	3.88	A
4.3	1.80 + 2.50 (1.50-4.60)	4.30	1280 (200-1450)	5.9 - 5.6 - 5.4	3.36	A	2.50 + 3.90 (1.50-6.30)	6.40	1700 (200-1920)	7.8 - 7.5 - 7.2	3.76	A
5.3	1.80 + 3.50 (1.50-5.60)	5.30	1550 (200-1660)	7.1 - 6.8 - 6.5	3.42	A	2.31 + 4.49 (1.50-7.20)	6.80	1850 (200-2010)	8.5 - 8.1 - 7.8	3.68	A
6.8	1.40 + 3.90 (1.50-5.90)	5.30	1550 (200-1660)	7.1 - 6.8 - 6.5	3.42	A	1.80 + 5.00 (1.50-7.20)	6.80	1820 (200-2010)	8.4 - 8.0 - 7.7	3.74	A
5.0	2.50 + 2.50 (1.50-5.60)	5.00	1470 (200-1660)	6.7 - 6.5 - 6.2	3.40	A	3.40 + 3.40 (1.50-7.20)	6.80	1820 (200-2010)	8.4 - 8.0 - 7.7	3.74	A
6.0	2.21 + 3.09 (1.50-5.70)	5.30	1550 (200-1660)	7.1 - 6.8 - 6.5	3.42	A	2.83 + 3.97 (1.50-7.20)	6.80	1820 (200-2010)	8.4 - 8.0 - 7.7	3.74	A
7.0	2.65 + 2.65 (1.50-5.90)	5.30	1550 (200-1660)	7.1 - 6.8 - 6.5	3.42	A	3.40 + 3.40 (1.50-7.20)	6.80	1790 (200-2010)	8.2 - 7.9 - 7.5	3.80	A
7.5	1.77 + 3.53 (1.50-5.90)	5.30	1550 (200-1660)	7.1 - 6.8 - 6.5	3.42	A	2.27 + 4.53 (1.50-7.20)	6.80	1790 (200-2010)	8.2 - 7.9 - 7.5	3.80	A
8.5	2.18 + 3.12 (1.50-6.60)	5.30	1550 (200-1660)	7.1 - 6.8 - 6.5	3.42	A	2.80 + 4.00 (1.50-7.20)	6.80	1790 (200-2010)	8.2 - 7.9 - 7.5	3.80	A
TWO UNITS												

** REMARKS :

- ONE UNIT INDICATED ARE ONLY FOR ONE UNIT OPERATION WHEN TWO INDOOR UNITS ARE CONNECTED.
- TWO UNITS INDICATED ARE ONLY FOR TWO UNIT OPERATION WHEN TWO INDOOR UNITS ARE CONNECTED.
- TOTAL VALUE OF EACH UNITS CAPACITY REACH 8.8kW.

**3 ROOM MULTI-SPLIT INVERTER TYPE RAC: RAM-53NP3B
POSSIBLE COMBINATION TO OPERATE (SAME TIME OPERATION)**

POSSIBLE COMBINATIONS TO OPERATE		COOLING						HEATING										
		CAPACITY RATING (KW) (RANGE)		TOTAL	OUTDOOR UNIT			COP	ENERGY RANK	CAPACITY RATING (KW) (RANGE)		TOTAL		OUTDOOR UNIT			COP	ENERGY RANK
					POWER CONSUMPTION (W)	AMPERE (A)								POWER CONSUMPTION (W)	AMPERE (A)			
						220	230								240	220		
ONE UNIT	1.5	1.5	1.50 (1.00-2.20)	1.50	430 (200-480)	2.0	1.9	1.8	3.49	A	2.00 (1.10-2.20)	2.00	810 (200-650)	2.8	2.7	2.6	3.28	C
	1.8	1.8	1.80 (1.00-2.00)	1.80	495 (200-750)	2.3	2.2	2.1	3.64	A	2.50 (1.10-3.20)	2.50	890 (200-1050)	3.2	3.0	2.9	3.62	A
	2.5	2.5	2.50 (1.00-2.80)	2.50	700 (200-980)	3.2	3.1	2.9	3.57	A	3.90 (1.10-4.70)	3.90	1060 (200-1380)	4.9	4.7	4.5	3.68	A
	3.5	3.5	3.50 (1.00-3.90)	3.50	1030 (200-1280)	4.7	4.5	4.3	3.40	A	4.80 (1.10-5.80)	4.80	1320 (200-1870)	6.1	5.8	5.6	3.64	A
	5.0	5.0	5.00 (1.00-5.50)	5.00	1510 (200-1660)	6.9	6.6	6.4	3.31	A	6.50 (1.10-7.20)	6.50	1870 (200-2010)	8.3	7.9	7.6	3.61	A
TWO UNITS	3.0	1.5 + 1.5	1.50 + 1.50 (1.50-3.90)	3.00	920 (200-1000)	4.2	4.0	3.9	3.26	A	2.00 + 2.00 (1.50-4.70)	4.00	1060 (200-1380)	4.9	4.7	4.5	3.77	A
	3.3	1.5 + 1.8	1.50 + 1.80 (1.50-3.90)	3.30	1020 (200-1300)	4.7	4.5	4.3	3.24	A	2.00 + 2.50 (1.50-5.20)	4.50	1250 (200-1370)	5.7	5.5	5.3	3.60	A
	4.0	1.5 + 2.5	1.50 + 2.50 (1.50-4.50)	4.00	1180 (200-1250)	5.4	5.2	5.0	3.39	A	2.00 + 3.40 (1.50-6.50)	5.90	1620 (200-2010)	7.4	7.1	6.8	3.64	A
	5.0	1.5 + 3.5	1.50 + 3.50 (1.50-5.90)	5.00	1480 (200-1660)	6.8	6.5	6.2	3.38	A	2.00 + 4.80 (1.50-7.20)	6.80	1820 (200-2010)	8.4	8.0	7.7	3.74	A
	6.5	1.5 + 5.0	1.22 + 4.08 (1.50-5.90)	5.30	1550 (200-1660)	7.1	6.8	6.5	3.42	A	1.60 + 5.20 (1.50-7.20)	6.80	1820 (200-2010)	8.4	8.0	7.7	3.74	A
	3.6	1.8 + 1.8	1.80 + 1.80 (1.50-4.00)	3.60	1080 (200-1300)	5.0	4.7	4.5	3.33	A	2.50 + 2.50 (1.50-5.20)	5.00	1290 (200-1550)	5.9	5.7	5.4	3.88	A
	4.3	1.8 + 2.5	1.80 + 2.50 (1.50-4.60)	4.30	1280 (200-1450)	5.9	5.6	5.4	3.36	A	2.50 + 3.90 (1.50-6.30)	6.40	1700 (200-1920)	7.8	7.5	7.2	3.76	A
	5.3	1.8 + 3.5	1.80 + 3.50 (1.50-5.60)	5.30	1550 (200-1660)	7.1	6.8	6.5	3.42	A	2.31 + 4.49 (1.50-7.20)	6.80	1850 (200-2010)	8.5	8.1	7.8	3.68	A
	6.8	1.8 + 5.0	1.40 + 3.90 (1.50-5.90)	5.30	1550 (200-1660)	7.1	6.8	6.5	3.42	A	1.80 + 5.00 (1.50-7.20)	6.80	1820 (200-2010)	8.4	8.0	7.7	3.74	A
	5.0	2.5 + 2.5	2.50 + 2.50 (1.50-6.00)	5.00	1470 (200-1660)	6.7	6.5	6.2	3.40	A	3.40 + 3.40 (1.50-7.20)	6.80	1820 (200-2010)	8.4	8.0	7.7	3.74	A
	6.0	2.5 + 3.5	2.21 + 3.09 (1.50-5.70)	5.30	1550 (200-1660)	7.1	6.8	6.5	3.42	A	2.83 + 3.97 (1.50-7.20)	6.80	1820 (200-2010)	8.4	8.0	7.7	3.74	A
	7.0	3.5 + 3.5	2.65 + 2.65 (1.50-5.90)	5.30	1550 (200-1660)	7.1	6.8	6.5	3.42	A	3.40 + 3.40 (1.50-7.20)	6.80	1790 (200-2010)	8.2	7.9	7.5	3.80	A
	7.5	2.5 + 5.0	1.77 + 3.53 (1.50-5.90)	5.30	1550 (200-1660)	7.1	6.8	6.5	3.42	A	2.27 + 4.53 (1.50-7.20)	6.80	1790 (200-2010)	8.2	7.9	7.5	3.80	A
8.5	3.5 + 5.0	2.18 + 3.12 (1.50-6.00)	5.30	1550 (200-1660)	7.1	6.8	6.5	3.42	A	2.80 + 4.00 (1.50-7.20)	6.80	1790 (200-2010)	8.2	7.9	7.5	3.80	A	
THREE UNITS	4.5	1.5 + 1.5 + 1.5	1.50 + 1.50 + 1.50 (1.50-5.00)	4.50	1320 (200-1680)	6.1	5.8	5.6	3.41	A	2.00 + 2.00 + 2.00 (1.50-6.20)	6.00	1580 (200-1950)	7.3	6.8	6.6	3.80	A
	4.8	1.5 + 1.5 + 1.8	1.50 + 1.50 + 1.80 (1.50-6.00)	4.80	1420 (200-1680)	6.5	6.2	6.0	3.38	A	2.00 + 2.00 + 2.50 (1.50-6.80)	6.50	1620 (200-1760)	7.4	7.0	6.8	4.01	A
	5.5	1.5 + 1.5 + 2.5	1.45 + 1.45 + 2.41 (1.50-6.00)	5.30	1550 (200-1660)	7.1	6.8	6.5	3.42	A	1.72 + 1.72 + 3.36 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	6.5	1.5 + 1.5 + 3.5	1.22 + 1.22 + 2.85 (1.50-6.00)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.55 + 1.55 + 3.71 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	8.0	1.5 + 1.5 + 5.0	0.99 + 0.99 + 3.31 (1.50-6.00)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.30 + 1.30 + 4.21 (1.50-7.20)	6.80	1860 (200-1860)	7.7	7.2	7.1	4.05	A
	5.1	1.5 + 1.8 + 1.8	1.50 + 1.80 + 1.80 (1.50-6.00)	5.10	1500 (200-1660)	6.9	6.6	6.3	3.40	A	1.94 + 2.43 + 2.43 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	5.8	1.5 + 1.8 + 2.5	1.37 + 1.64 + 2.28 (1.50-6.00)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.62 + 2.02 + 3.16 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	6.8	1.5 + 1.8 + 3.5	1.17 + 1.40 + 2.73 (1.50-6.00)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.46 + 1.83 + 3.51 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	8.3	1.5 + 1.8 + 5.0	0.96 + 1.15 + 3.19 (1.50-6.00)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.24 + 1.55 + 4.02 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	6.5	1.5 + 2.5 + 2.5	1.22 + 2.04 + 2.04 (1.50-6.00)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.39 + 2.71 + 2.71 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	7.5	1.5 + 2.5 + 3.5	1.06 + 1.77 + 2.47 (1.50-6.00)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.27 + 2.48 + 3.05 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	8.5	1.5 + 3.5 + 3.5	0.94 + 2.18 + 2.18 (1.50-6.00)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.17 + 2.81 + 2.81 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	5.4	1.8 + 1.8 + 1.8	1.77 + 1.77 + 1.77 (1.50-6.00)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	2.27 + 2.27 + 2.27 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	6.1	1.8 + 1.8 + 2.5	1.56 + 1.56 + 2.17 (1.50-6.40)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	2.01 + 2.01 + 2.79 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	7.1	1.8 + 1.8 + 3.5	1.34 + 1.34 + 2.61 (1.50-6.60)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.72 + 1.72 + 3.35 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	8.6	1.8 + 1.8 + 5.0	1.11 + 1.11 + 3.08 (1.50-6.60)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.42 + 1.42 + 3.95 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	6.8	1.8 + 2.5 + 2.5	1.40 + 1.95 + 1.95 (1.50-6.60)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.80 + 2.50 + 2.50 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	7.8	1.8 + 2.5 + 3.5	1.22 + 1.70 + 2.38 (1.50-6.60)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.57 + 2.18 + 3.05 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
	8.8	1.8 + 3.5 + 3.5	1.08 + 2.11 + 2.11 (1.50-6.60)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	1.40 + 2.70 + 2.70 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A
7.5	2.5 + 2.5 + 2.5	1.77 + 1.77 + 1.77 (1.50-6.60)	5.30	1550 (200-1680)	7.1	6.8	6.5	3.42	A	2.27 + 2.27 + 2.27 (1.50-7.20)	6.80	1880 (200-1860)	7.7	7.2	7.1	4.05	A	
8.5	2.5 + 2.5 + 3.5	1.56 + 1.56 + 2.18 (1.50-6.60)	5.30	1550 (200-1680)	7.12	6.81	6.52	3.42	A	2.00 + 2.00 + 2.80 (1.50-7.20)	6.80	1820 (200-1860)	7.71	7.23	7.07	4.20	A	

**** REMARKS :**

- ONE UNIT INDICATED ARE ONLY FOR ONE UNIT OPERATION WHEN TWO OR THREE INDOOR UNITS ARE CONNECTED.
- TWO UNITS INDICATED ARE ONLY FOR TWO UNIT OPERATION WHEN TWO OR THREE INDOOR UNITS ARE CONNECTED.
- THREE UNITS INDICATED ARE ONLY FOR THREE UNIT OPERATION WHEN THREE UNITS ARE CONNECTED.
- TOTAL VALUE OF EACH UNITS CAPACITY REACH 8.8KW.

DUAL AND TRIPLE SYSTEM MULTI R.A.C. RAM-53NP2B & RAM-53NP3B INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

Two, three or four indoor units can be installed with one outdoor unit.
And total nominal cooling capacity should not be more than 8.8kW

NOMINAL COOLING CAPACITY (kW)	INDOOR UNIT MODEL	CAPACITY (kW) at one unit operation		SUITABLE ROOM SIZE (m ²) at one unit operation	
		COOLING	HEATING	COOLING	HEATING
1.5kW	RAK-15QPB	1.00 ~ 1.60	1.10 ~ 2.20	8 ~ 12	9 ~ 11
1.8kW	RAK-18RPB	1.50 ~ 2.00	1.80 ~ 3.50	8 ~ 12	9 ~ 11
	RAK-18QXB	1.50 ~ 2.00	1.80 ~ 3.50	8 ~ 12	9 ~ 11
	RAD-18QPB	1.50 ~ 2.00	1.80 ~ 3.50	8 ~ 12	9 ~ 11
2.5kW	RAK-25RPB	1.50 ~ 2.80	1.80 ~ 4.70	11 ~ 17	14 ~ 18
	RAK-25RXB	1.50 ~ 2.80	1.80 ~ 4.70	11 ~ 17	14 ~ 18
	RAD-25QPB	1.50 ~ 2.80	1.80 ~ 4.70	11 ~ 17	14 ~ 18
	RAI-25QPB	1.50 ~ 2.80	1.80 ~ 4.70	11 ~ 17	14 ~ 18
	RAF-25RXB	1.50 ~ 2.80	1.80 ~ 4.70	11 ~ 17	14 ~ 18
3.5kW	RAK-35RPB	1.50 ~ 3.90	1.80 ~ 5.80	16 ~ 24	17 ~ 22
	RAK-35RXB	1.50 ~ 3.90	1.80 ~ 5.80	16 ~ 24	17 ~ 22
	RAD-35QPB	1.50 ~ 3.90	1.80 ~ 5.80	16 ~ 24	17 ~ 22
	RAI-35QPB	1.50 ~ 3.90	1.80 ~ 5.80	16 ~ 24	17 ~ 22
	RAF-35RXB	1.50 ~ 3.90	1.80 ~ 5.80	16 ~ 24	17 ~ 22
5.0kW	RAK-50RPB	1.50 ~ 5.60	1.80 ~ 7.20	23 ~ 34	23 ~ 29
	RAK-50RXB	1.50 ~ 5.60	1.80 ~ 7.20	23 ~ 34	23 ~ 29
	RAD-50QPB	1.50 ~ 5.60	1.80 ~ 7.20	23 ~ 34	23 ~ 29
	RAI-50QPB	1.50 ~ 5.60	1.80 ~ 7.20	23 ~ 34	23 ~ 29
	RAF-50RXB	1.50 ~ 5.60	1.80 ~ 7.20	23 ~ 34	23 ~ 29

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

* Up to Three indoor unit is only applicable for RAM-53NP3B

DUAL SYSTEM MULTI R.A.C. *RAM-53NP2B* INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

POSSIBLE COMBINATIONS TO INSTALL (kW)		SUITABLE ROOM SIZE TO INSTALL (m ²)	CONNECTING POSITION ON OUTDOOR UNIT (VALVE DIAMETER)(mm)	
			No.1	No.2
			6.35/9.52D	6.35/9.52D
TWO UNITS	1.5+1.5	(8 ~ 12) + (8 ~ 12)	1.5	1.5
	1.5+1.8	(8 ~ 12) + (8 ~ 12)	1.5	1.8
	1.5+2.5	(8 ~ 12) + (11 ~ 17)	1.5	2.5
	1.5+3.5	(8 ~ 12) + (16 ~ 24)	1.5	3.5
	1.5+5.0	(8 ~ 12) + (23 ~ 34)	1.5	5.0
	1.8+1.8	(8 ~ 12) + (8 ~ 12)	1.8	1.8
	1.8+2.5	(8 ~ 12) + (11 ~ 17)	1.8	2.5
	1.8+3.5	(8 ~ 12) + (16 ~ 24)	1.8	3.5
	1.8+5.0	(8 ~ 12) + (23 ~ 34)	1.8	5.0
	2.5+2.5	(11 ~ 17) + (11 ~ 17)	2.5	2.5
	2.5+3.5	(11 ~ 17) + (16 ~ 24)	2.5	3.5
	2.5+5.0	(9 ~ 15) + (22 ~ 31)	2.5	5.0
	3.5+3.5	(16 ~ 24) + (16 ~ 24)	3.5	3.5
	3.5+5.0	(12 ~ 19) + (19 ~ 27)	3.5	5.0

1.5, 2.5, 3.5 & 5.0 means indoor units cooling capacity class.

(1) Marking

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

(2) Suitable room size is determined based on the conditions below:

- Climate is in the temperate zone like Tokyo, Japan.
- For usual residential use.
- Smaller figure is for light construction which means light thermally sealed.
- Larger figure is for heavy constructions, which means well thermally sealed.

TRIPLE SYSTEM MULTI R.A.C. RAM-53NP3B INDOOR UNITS COMBINATIONS TO BE ABLE TO INSTALL

POSSIBLE COMBINATIONS TO INSTALL (kW)		SUITABLE ROOM SIZE TO INSTALL (m ²)	CONNECTING POSITION ON OUTDOOR UNIT (VALVE DIAMETER)(mm)		
			No.1	No.2	No.3
			6.35/9.52D	6.35/9.52D	6.35/9.52D
TWO UNITS	1.5+1.5	(8 ~ 12) + (8 ~ 12)	1.5	1.5	
	1.5+1.8	(8 ~ 12) + (8 ~ 12)	1.5	1.8	
	1.5+2.5	(8 ~ 12) + (11 ~ 17)	1.5	2.5	
	1.5+3.5	(8 ~ 12) + (16 ~ 24)	1.5	3.5	
	1.5+5.0	(8 ~ 12) + (23 ~ 34)	1.5		⊙ 5.0
	1.8+1.8	(8 ~ 12) + (8 ~ 12)	1.8	1.8	
	1.8+2.5	(8 ~ 12) + (11 ~ 17)	1.8	2.5	
	1.8+3.5	(8 ~ 12) + (16 ~ 24)	1.8	3.5	
	1.8+5.0	(8 ~ 12) + (23 ~ 34)	1.8		⊙ 5.0
	2.5+2.5	(11 ~ 17) + (11 ~ 17)	2.5	2.5	
	2.5+3.5	(11 ~ 17) + (16 ~ 24)	2.5	3.5	
	2.5+5.0	(9 ~ 15) + (22 ~ 31)	2.5		⊙ 5.0
	3.5+3.5	(16 ~ 24) + (16 ~ 24)	3.5	3.5	
	3.5+5.0	(12 ~ 19) + (19 ~ 27)	3.5		⊙ 5.0
THREE UNITS	1.5+1.5+1.5	(8 ~ 12) + (8 ~ 12) + (8 ~ 12)	1.5	1.5	1.5
	1.5+1.5+1.8	(8 ~ 12) + (8 ~ 12) + (8 ~ 12)	1.5	1.5	1.8
	1.5+1.5+2.5	(8 ~ 12) + (8 ~ 12) + (11 ~ 17)	1.5	1.5	2.5
	1.5+1.5+3.5	(8 ~ 12) + (8 ~ 12) + (16 ~ 24)	1.5	1.5	3.5
	1.5+1.5+5.0	(7 ~ 11) + (7 ~ 11) + (20 ~ 29)	1.5	1.5	⊙ 5.0
	1.5+1.8+1.8	(8 ~ 12) + (8 ~ 12) + (8 ~ 12)	1.5	1.8	1.8
	1.5+1.8+2.5	(8 ~ 12) + (8 ~ 12) + (11 ~ 17)	1.5	1.8	2.5
	1.5+1.8+3.5	(8 ~ 12) + (8 ~ 12) + (16 ~ 24)	1.5	1.8	3.5
	1.5+1.8+5.0	(7 ~ 10) + (8 ~ 12) + (19 ~ 28)	1.5	1.8	⊙ 5.0
	1.5+2.5+2.5	(8 ~ 12) + (11 ~ 17) + (11 ~ 17)	1.5	2.5	2.5
	1.5+2.5+3.5	(7 ~ 11) + (11 ~ 16) + (14 ~ 22)	1.5	2.5	3.5
	1.5+3.5+3.5	(6 ~ 10) + (12 ~ 19) + (12 ~ 19)	1.5	3.5	3.5
	1.8+1.8+1.8	(8 ~ 12) + (8 ~ 12) + (8 ~ 12)	1.8	1.8	1.8
	1.8+1.8+2.5	(8 ~ 12) + (8 ~ 12) + (11 ~ 17)	1.8	1.8	2.5
	1.8+1.8+3.5	(8 ~ 12) + (8 ~ 12) + (15 ~ 23)	1.8	1.8	3.5
	1.8+1.8+5.0	(7 ~ 11) + (7 ~ 11) + (18 ~ 27)	1.8	1.8	⊙ 5.0
	1.8+2.5+2.5	(8 ~ 12) + (11 ~ 17) + (11 ~ 17)	1.8	2.5	2.5
	1.8+2.5+3.5	(8 ~ 12) + (9 ~ 15) + (14 ~ 21)	1.8	2.5	3.5
	1.8+3.5+3.5	(7 ~ 11) + (12 ~ 19) + (12 ~ 19)	1.8	3.5	3.5
	2.5+2.5+2.5	(11 ~ 16) + (11 ~ 16) + (11 ~ 16)	2.5	2.5	2.5
2.5+2.5+3.5	(9 ~ 14) + (9 ~ 14) + (12 ~ 19)	2.5	2.5	3.5	

1.5, 2.5, 3.5 & 5.0 means indoor units cooling capacity class.

(1) Marking

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

(2) Suitable room size is determined based on the conditions below:

- Climate is in the temperate zone like Tokyo, Japan.
- For usual residential use.
- Smaller figure is for light construction which means light thermally sealed.
- Larger figure is for heavy constructions, which means well thermally sealed.

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.

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 fan-driven 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.

Nominal diameter	Outside diameter (mm)	Thickness (mm)
1/4	6.35	0.8
3/8	9.52	0.8

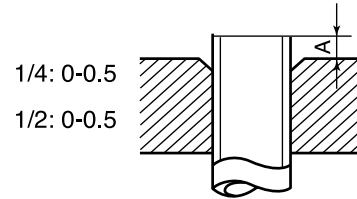
※Do not use thin pipes (thinner than 0.7 mm).

(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.

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

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

3. Servicing Tools

(Changes in the Product and Components)

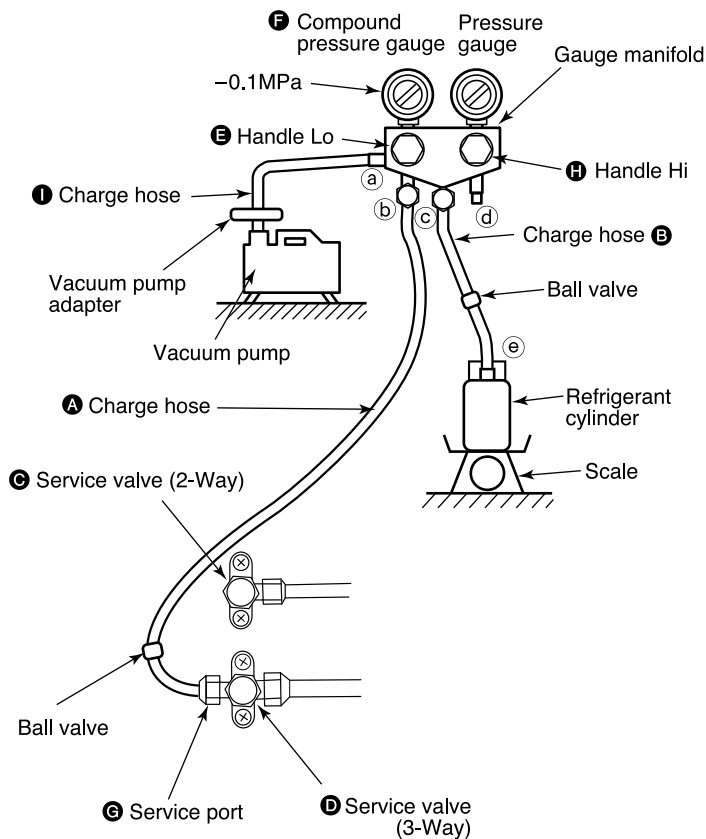
- In order to prevent any other refrigerant from being charged, R410A model is provided with the outdoor unit whose control valve has a different service port diameter (port size: 7/16 UNF 20 threads per inch → 1/2 UNF 20 threads per inch).
- In order to secure larger pressure resisting strength, flare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

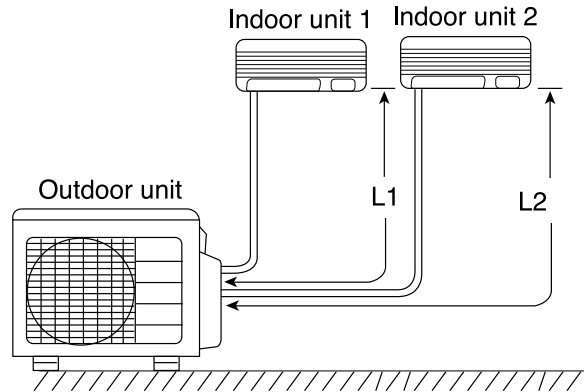
1. Connect the charge hose **A** to outdoor unit.
2. Connect the vacuum pump adapter to the vacuum pump. Connect the 1/2" conversion adapter to the vacuum pump adapter. Connect the charge hose **1** to the conversion adapter.
Then, service valve **C** & **D** is closed.
3. Connect the charge hose **B**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

RAM-53NP2B

INSTALLATION

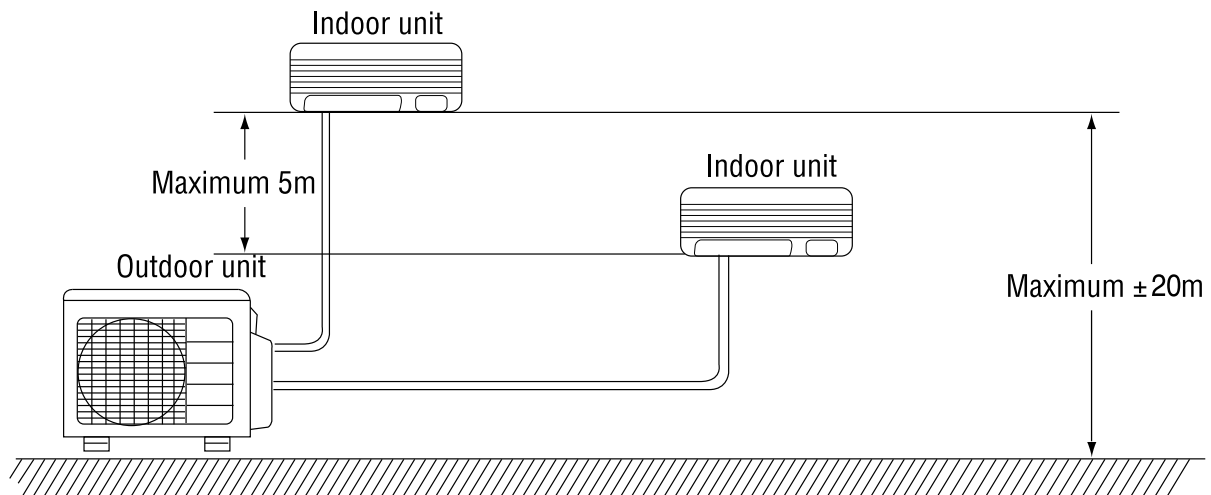
PIPE LENGTH

- (1) Total 35m maximum pipe length.
- (2) Pipe length for one indoor unit : maximum 25m.



HIGHT DIFFERENCE

- (1) Height : maximum $\pm 20\text{m}$
- (2) Height difference between each indoor unit $\leq 5\text{m}$.



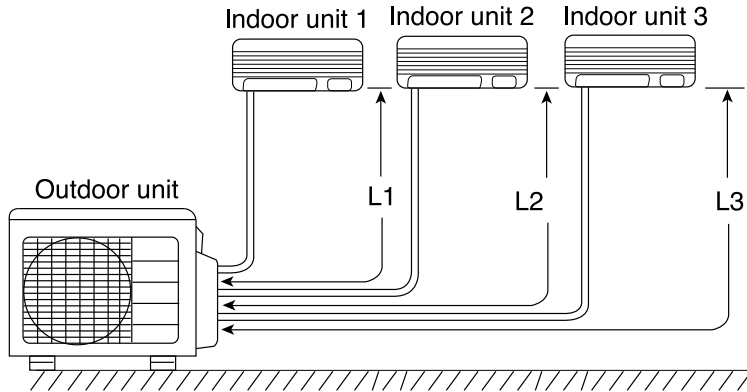
- To the outdoor unit, up to two indoor units can be connected until the total value of capacity to 8.8kW.
- Make sure to connect to two indoor units.

RAM-53NP3B

INSTALLATION

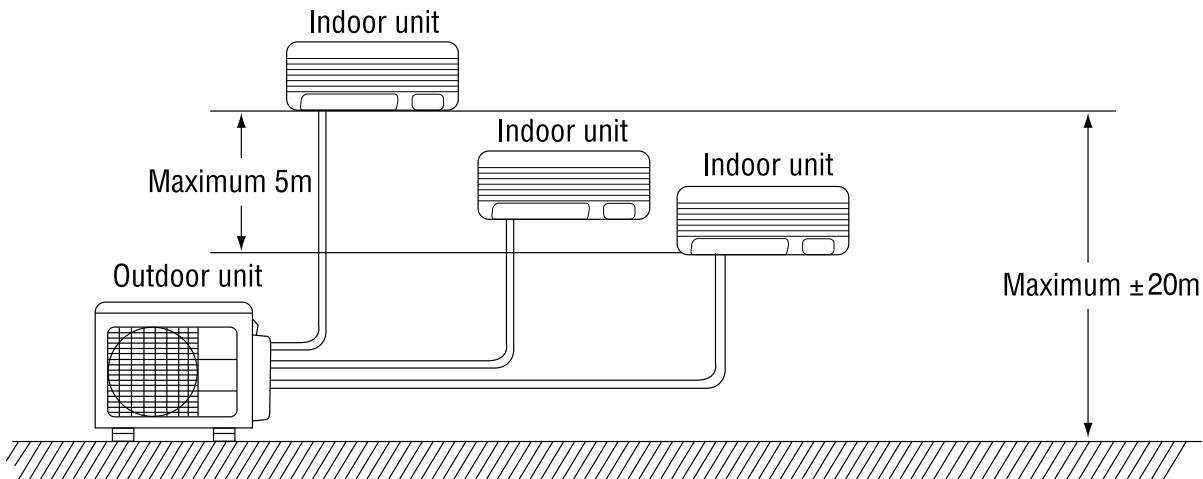
PIPE LENGTH

- (1) Total 45m maximum pipe length.
- (2) Pipe length for one indoor unit : maximum 25m.



HIGHT DIFFERENCE

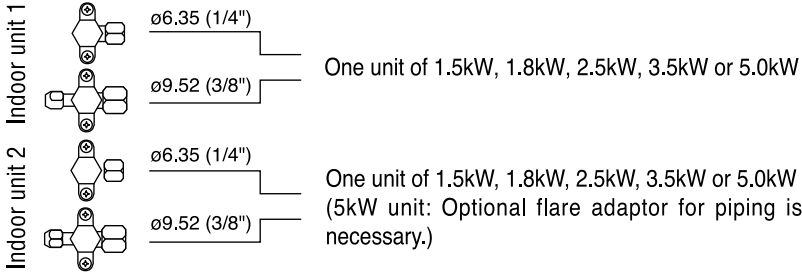
- (1) Height : maximum $\pm 20\text{m}$
- (2) Height difference between each indoor unit $\leq 5\text{m}$.



- To the outdoor unit, up to three indoor units can be connected until the total value of capacity to 8.8kW.
- Make sure to connect to two or three more indoor units.

MODEL RAM-53NP2B

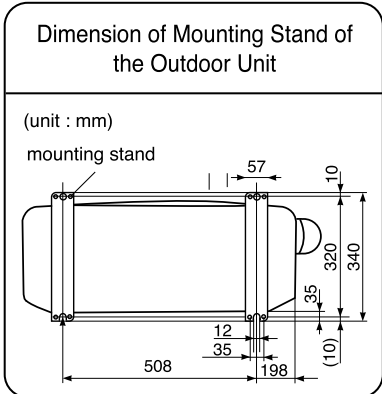
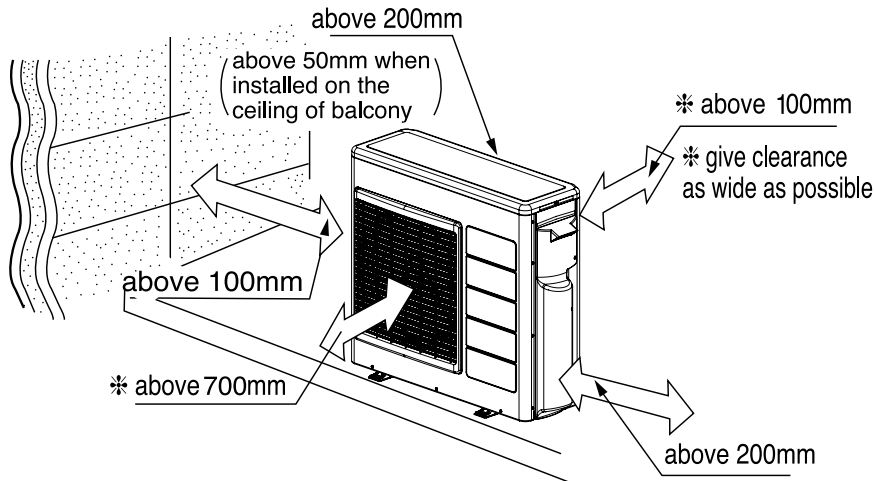
Outdoor unit pipe connection port



Flare adaptor for piping

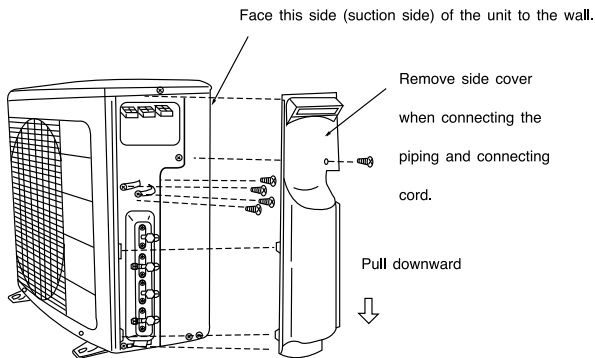
The flare adaptor for piping is required depending on combination of indoor units.
 • $\varnothing 9.52$ (3/8") $\rightarrow \varnothing 12.7$ (1/2")
 Parts number TA261D-4 001

- Remove the side cover.
- For installation, refer as shown below.
- The space indicated with a \Leftrightarrow mark is required to guarantee the air conditioner's performance. Install the air conditioner in a place big enough to provide ample space for servicing and repairs later on.



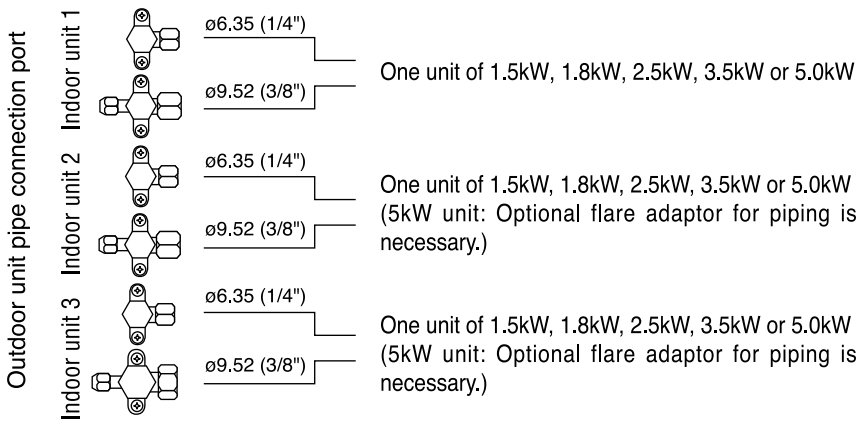
Connecting the pipe

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



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

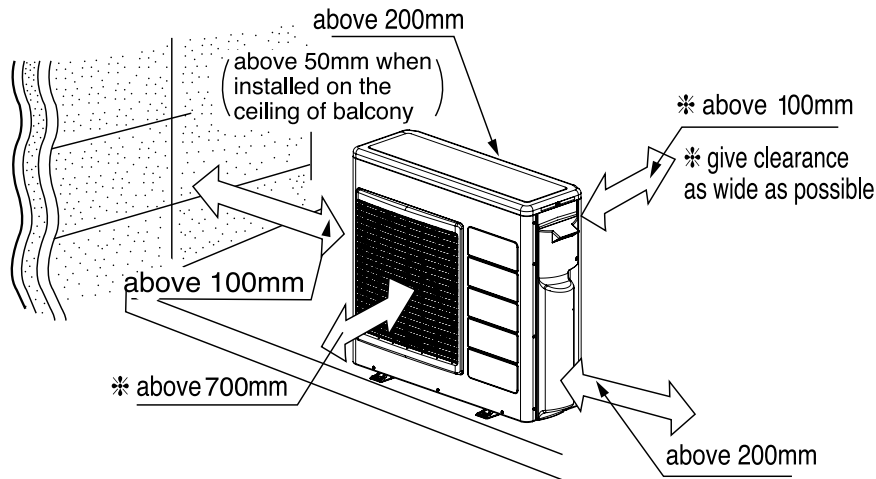
MODEL RAM-53NP3B



Flare adaptor for piping

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

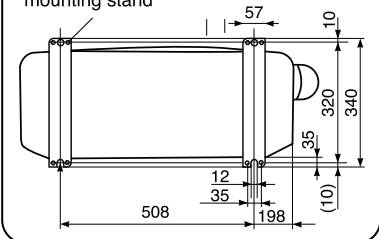
- Remove the side cover.
- For installation, refer as shown below.
- The space indicated with a ⇔ mark is required to guarantee the air conditioner's performance. Install the air conditioner in a place big enough to provide ample space for servicing and repairs later on.



Dimension of Mounting Stand of the Outdoor Unit

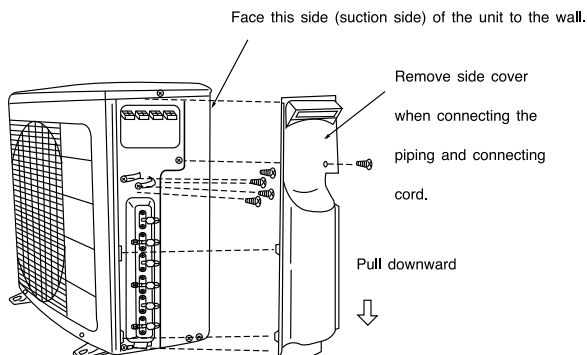
(unit : mm)

mounting stand



Connecting the pipe

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



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

1. Remove flare nut from service valve.
2. Apply refrigerant oil to flare nut sections of service valve and pipings.
3. Match center of piping to large diameter side service valve and tank assembly, and tighten flarenut first by hand, then securely tighten using torque wrench.
4. Perform air purge and gas leak inspection.
5. Wrap the insulating material around side piping using vinyl tape.

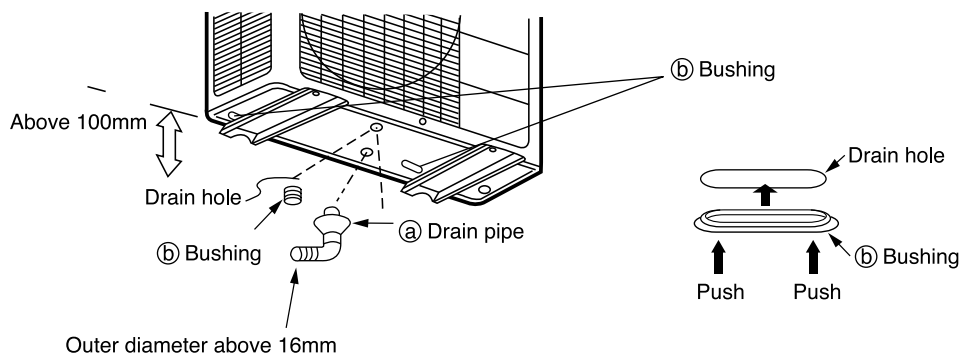
Condensed water disposal of outdoor unit

- There is holes on the base of outdoor unit for condensed water to exhaust.
- To lead condensed water to the drain hole, place the outdoor unit on the mounting stand (optional) or on blocks to raise its level more than 100mm from the ground surface. Connect the drain pipe as shown in the figure. Cover two other water drain holes with the bushings included. (To install a bushing, push in both ends of the bushing so that it aligns with the drain hole.)
- When connecting the drain pipe, make sure that the bushing does not lift off or deviate from the base.
- Install the outdoor unit on a stable, flat surface and check to see that the condensed water drains.

When Using and Installing in Cold Areas

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

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



Connection of the connecting cords and power cord. (Outdoor unit)

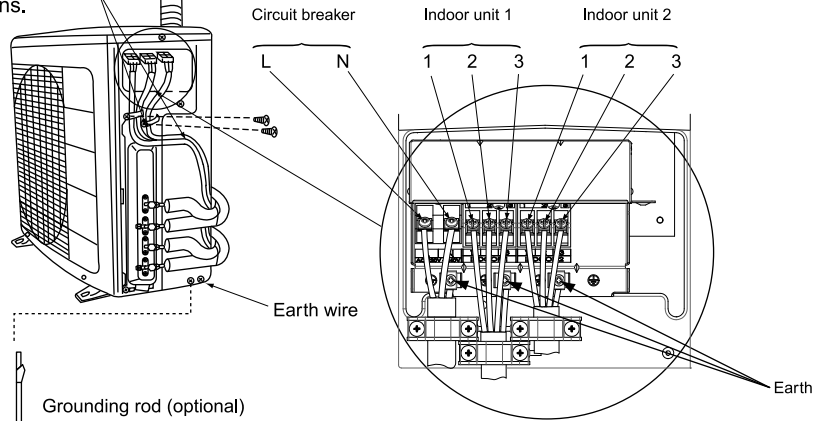
RAM-53NP2B

⚠ WARNING

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

Bind connecting cords to make them fit between the convex sections.

Terminal indications



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

⚠ CAUTION

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

Grounding rod (optional)

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

Wiring pattern
Indoor Unit

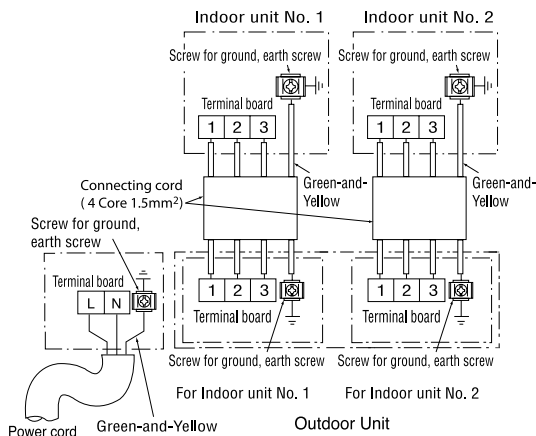
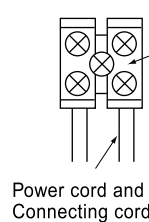


Fig. 1

⚠ WARNING

Connection of the power cord and connecting cord



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

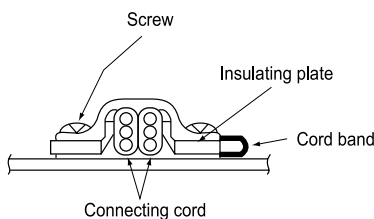
Tightening torque reference value:
1.2 to 1.6 N·m (12 to 16 kgf·cm)

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

⚠ CAUTION

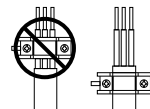
- To prevent a connection error, connecting cords should be bundled and taped to each respective pipe. If connecting cords are mixed with other indoor units, a refrigeration cycle abnormality may occur, causing dripping.

- When putting two connecting cords through the band.



⚠ WARNING

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



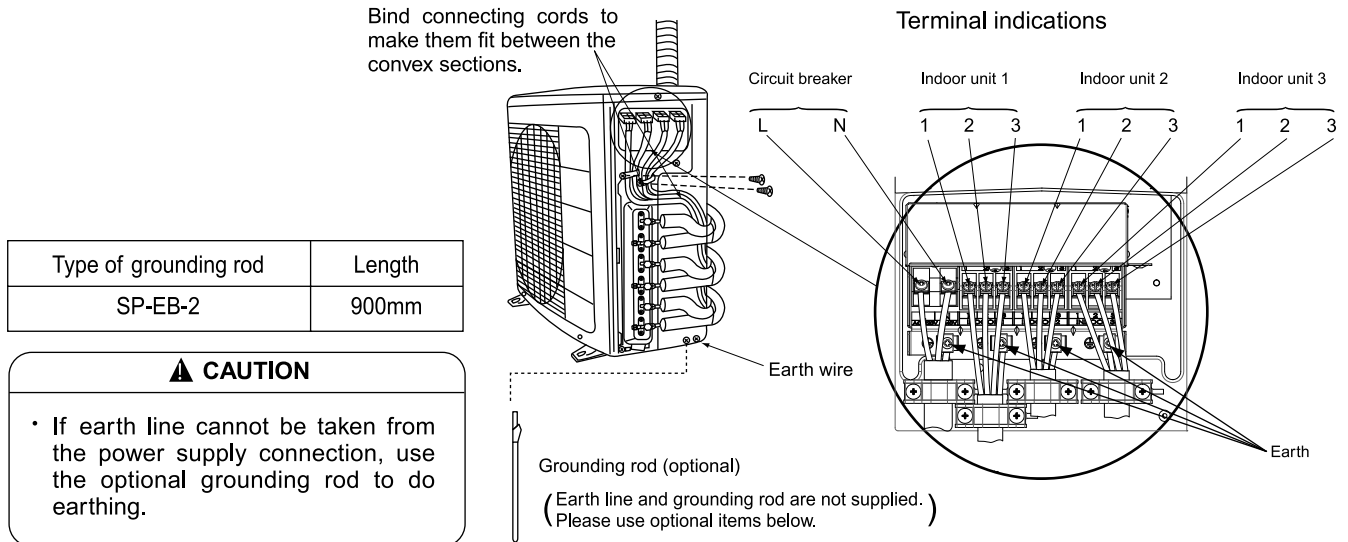
- Hold the handle of the side cover, slide down and take off the corner hook, then pull. Reverse these steps when installing.

Connection of the connecting cords and power cord. (Outdoor unit)

RAM-53NP3B

⚠ WARNING

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



Wiring pattern Indoor Unit

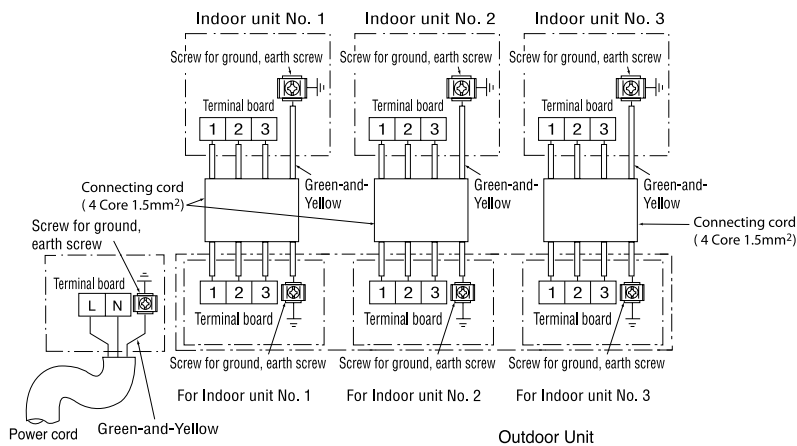
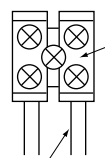


Fig. 1

⚠ WARNING

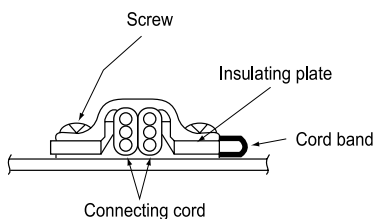
Connection of the power cord and connecting cord

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

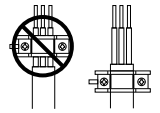
⚠ CAUTION

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

- When putting two connecting cords through the band.



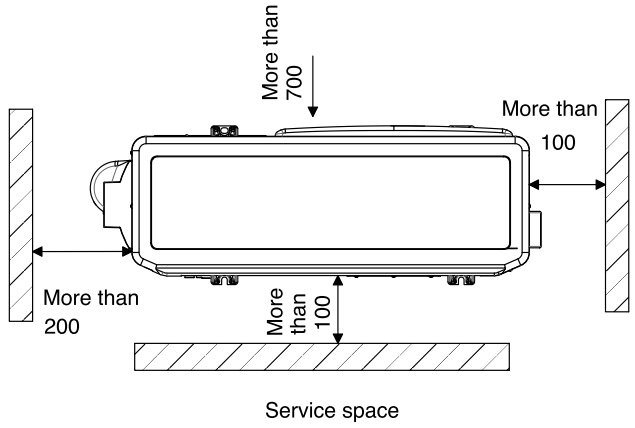
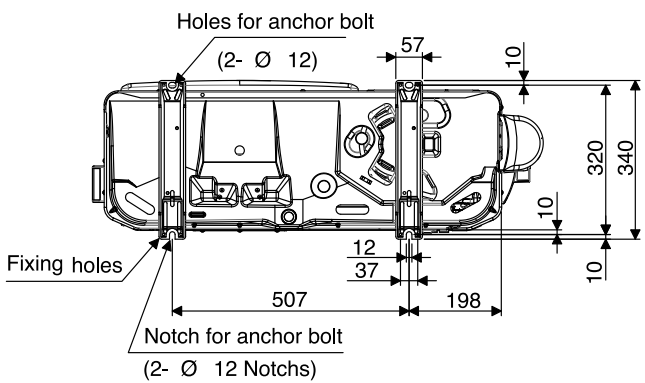
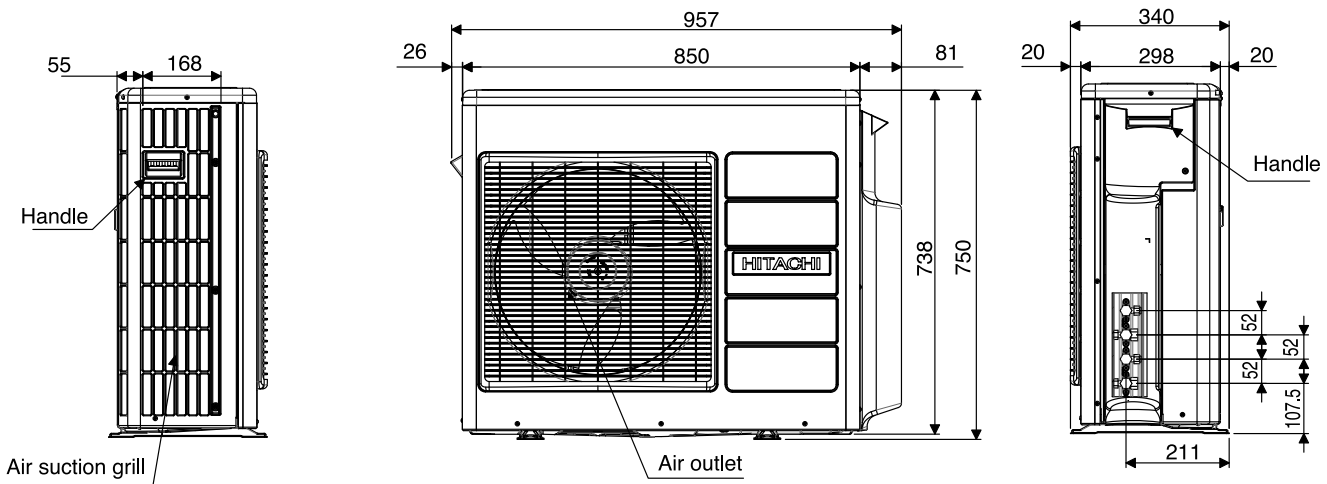
⚠ WARNING

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

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

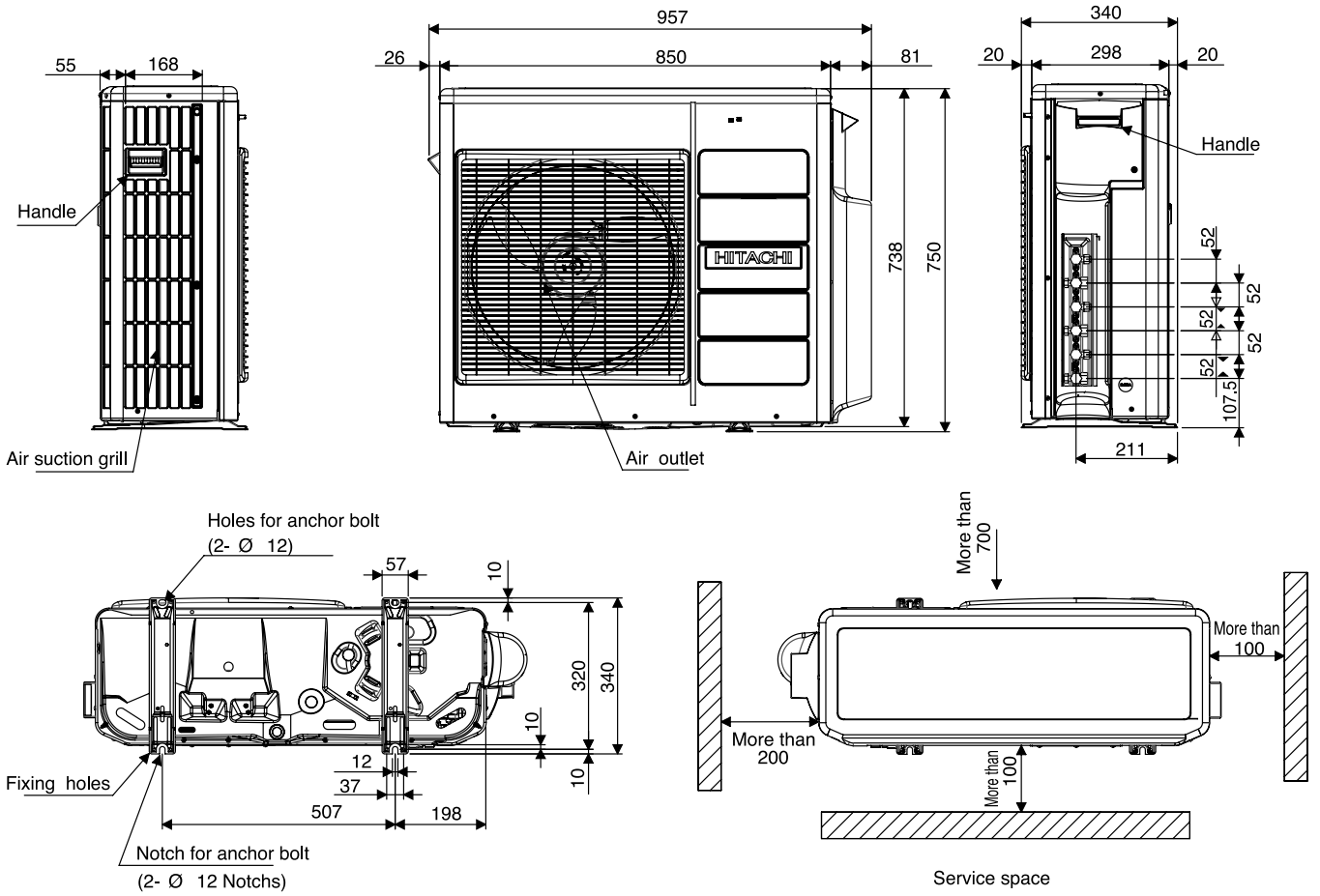
CONSTRUCTION AND DIMENSIONAL DIAGRAM

MODEL RAM-53NP2B



CONSTRUCTION AND DIMENSIONAL DIAGRAM

MODEL RAM-53NP3B



MAIN PARTS COMPONENT

FAN MOTOR

Fan Motor Specifications

MODEL			RAM-53NP2B
POWER SOURCE			DC: 120 ~ 380V
OUTPUT			47W
CONNECTION			
RESISTANCE VALUE (Ω)	20°C (68°F)	2M	38.2 ± 3.9

BLU : BLUE

YEL : YELLOW

BRN : BROWN

WHT : WHITE

GRY : GRAY

ORN : ORANGE

GRN : GREEN

RED : RED

BLK : BLACK

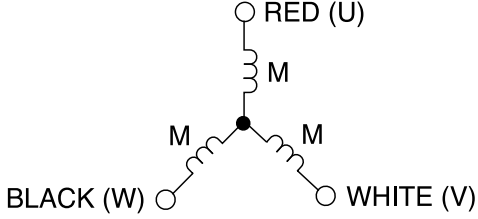
PNK : PINK

VIO : VIOLET

MAIN PARTS COMPONENT

FAN MOTOR

Fan Motor Specifications

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POWER SOURCE			DC: 120 ~ 380V
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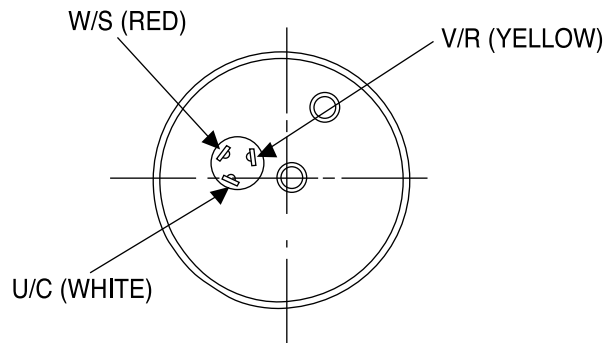
PNK : PINK

VIO : VIOLET

COMPRESSOR MOTOR

Compressor Motor Specifications

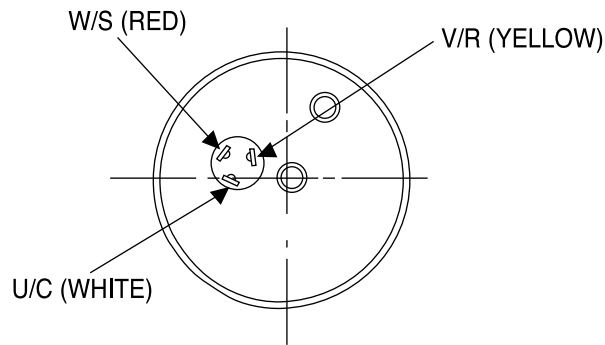
MODEL	RAM-53NP2B		
COMPRESSOR MODEL	JU1015D9		
PHASE	SINGLE		
RATED VOLTAGE	AC 220 ~ 240 V		
RATED FREQUENCY	50/60 Hz		
POLE NUMBER	4		
CONNECTION			
RESISTANCE VALUE (Ω)	20°C (68°F)	2M	1.298 ± 7%
	75°C (167°F)	2M	1.579 ± 7%



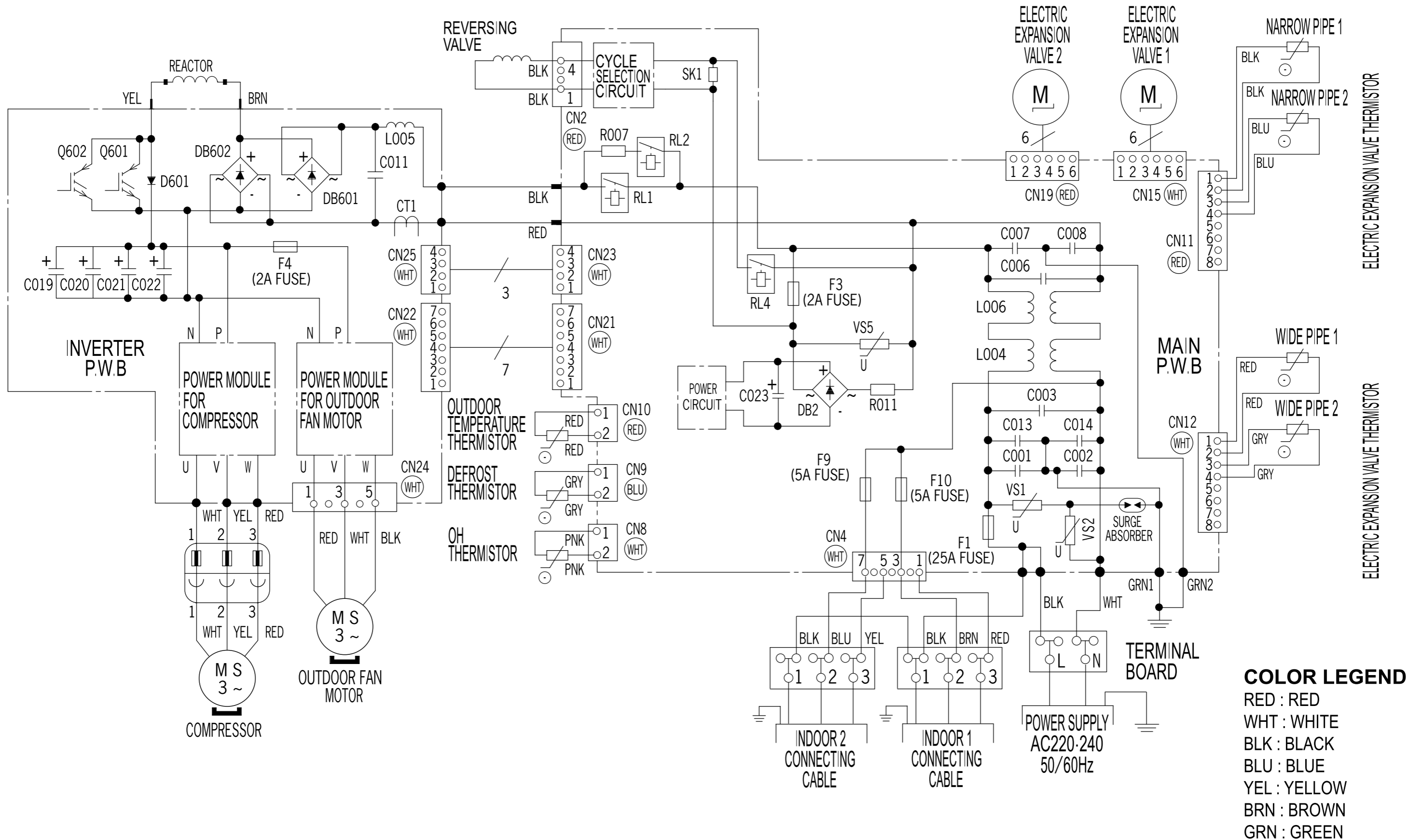
COMPRESSOR MOTOR

Compressor Motor Specifications

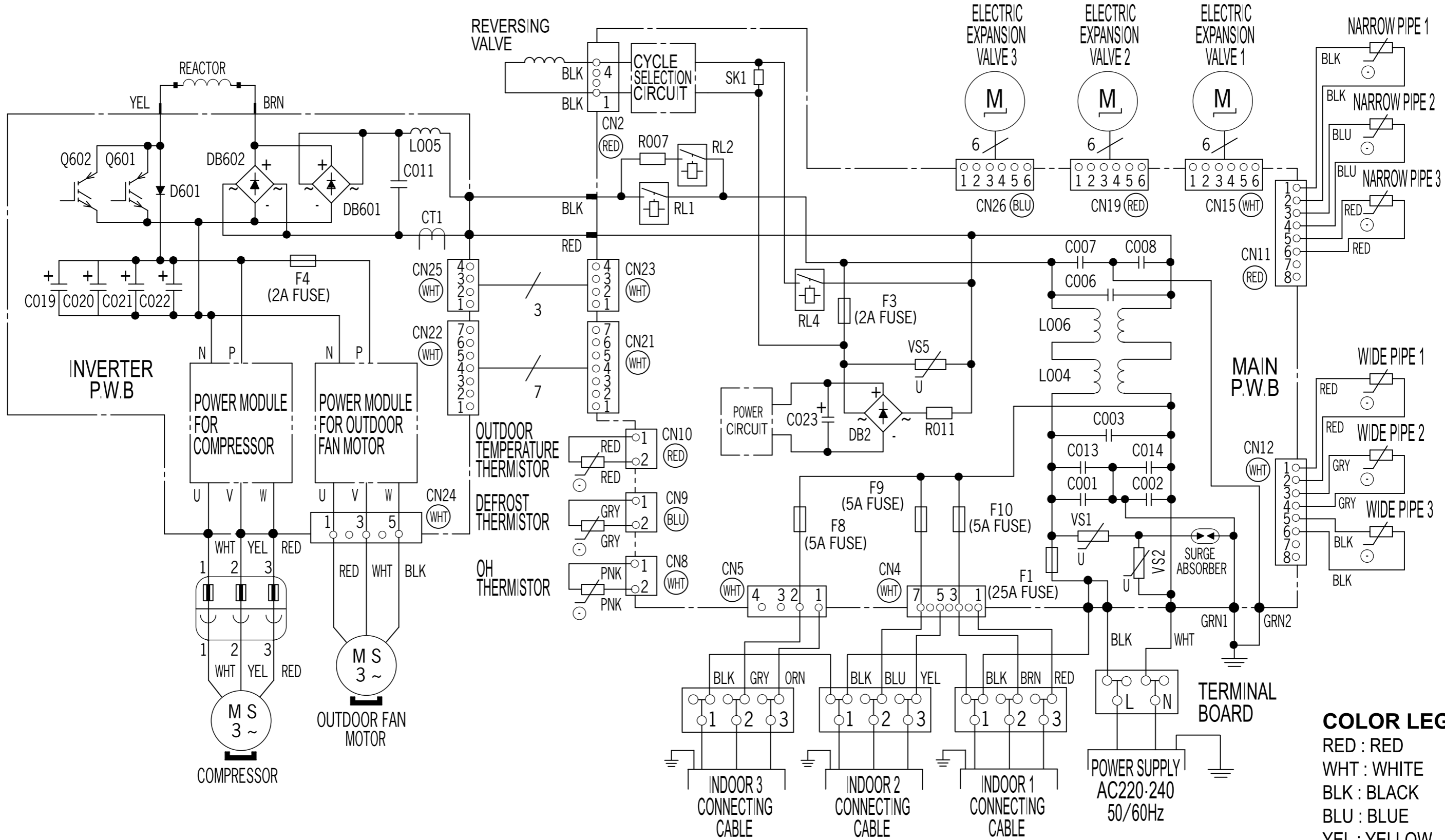
MODEL		RAM-53NP3B	
COMPRESSOR MODEL		JU1015D9	
PHASE		SINGLE	
RATED VOLTAGE		AC 220 ~ 240 V	
RATED FREQUENCY		50/60 Hz	
POLE NUMBER		4	
CONNECTION			
RESISTANCE VALUE (Ω)	20°C (68°F)	2M	1.298 ± 7%
	75°C (167°F)	2M	1.579 ± 7%



WIRING DIAGRAM
MODEL RAM-53NP2B



WIRING DIAGRAM
MODEL RAM-53NP3B

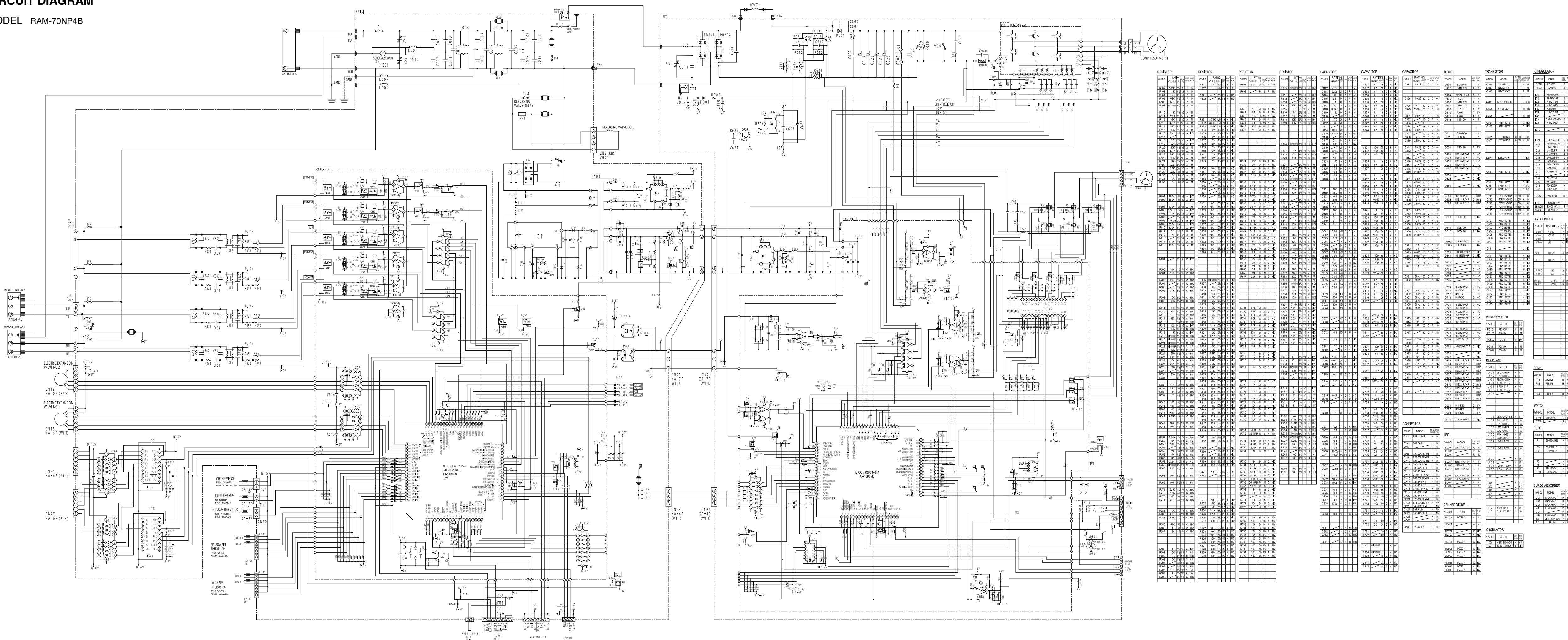


COLOR LEGEND

- RED : RED
- WHT : WHITE
- BLK : BLACK
- BLU : BLUE
- YEL : YELLOW
- BRN : BROWN
- GRN : GREEN

CIRCUIT DIAGRAM

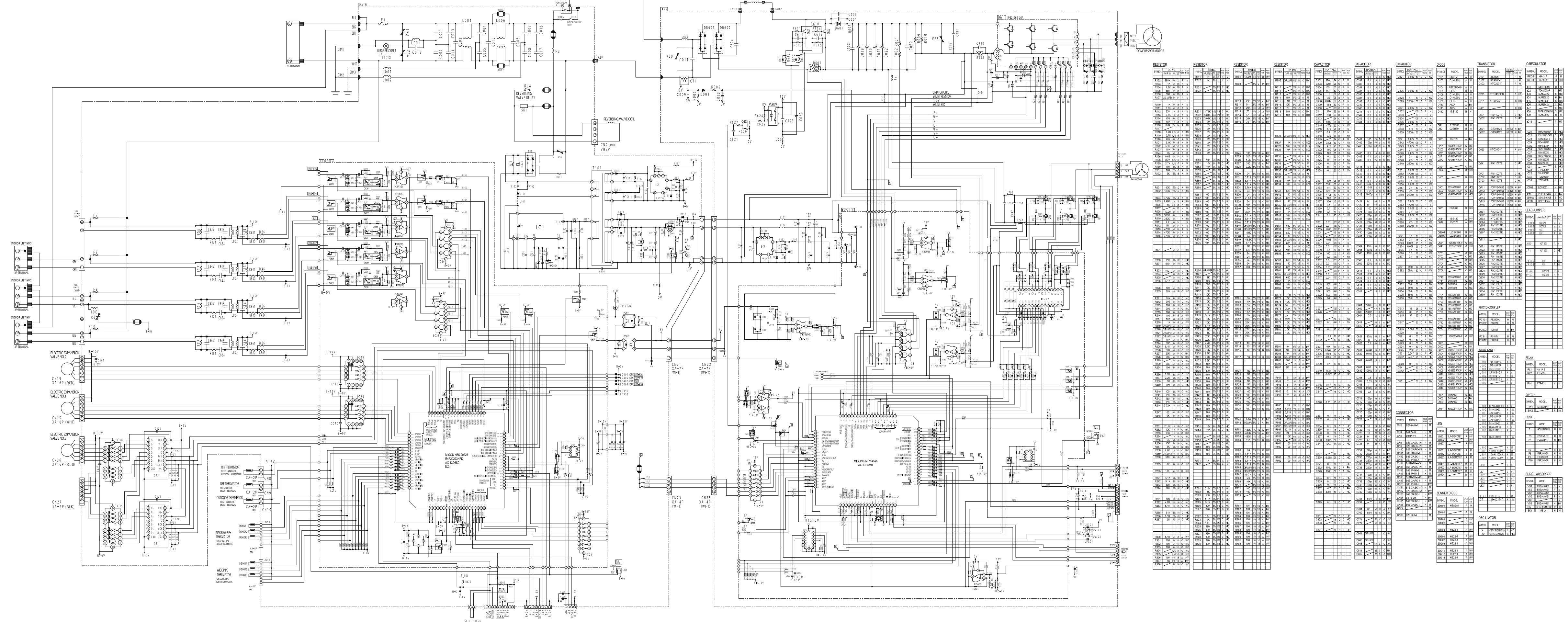
MODEL RAM-70NP4B



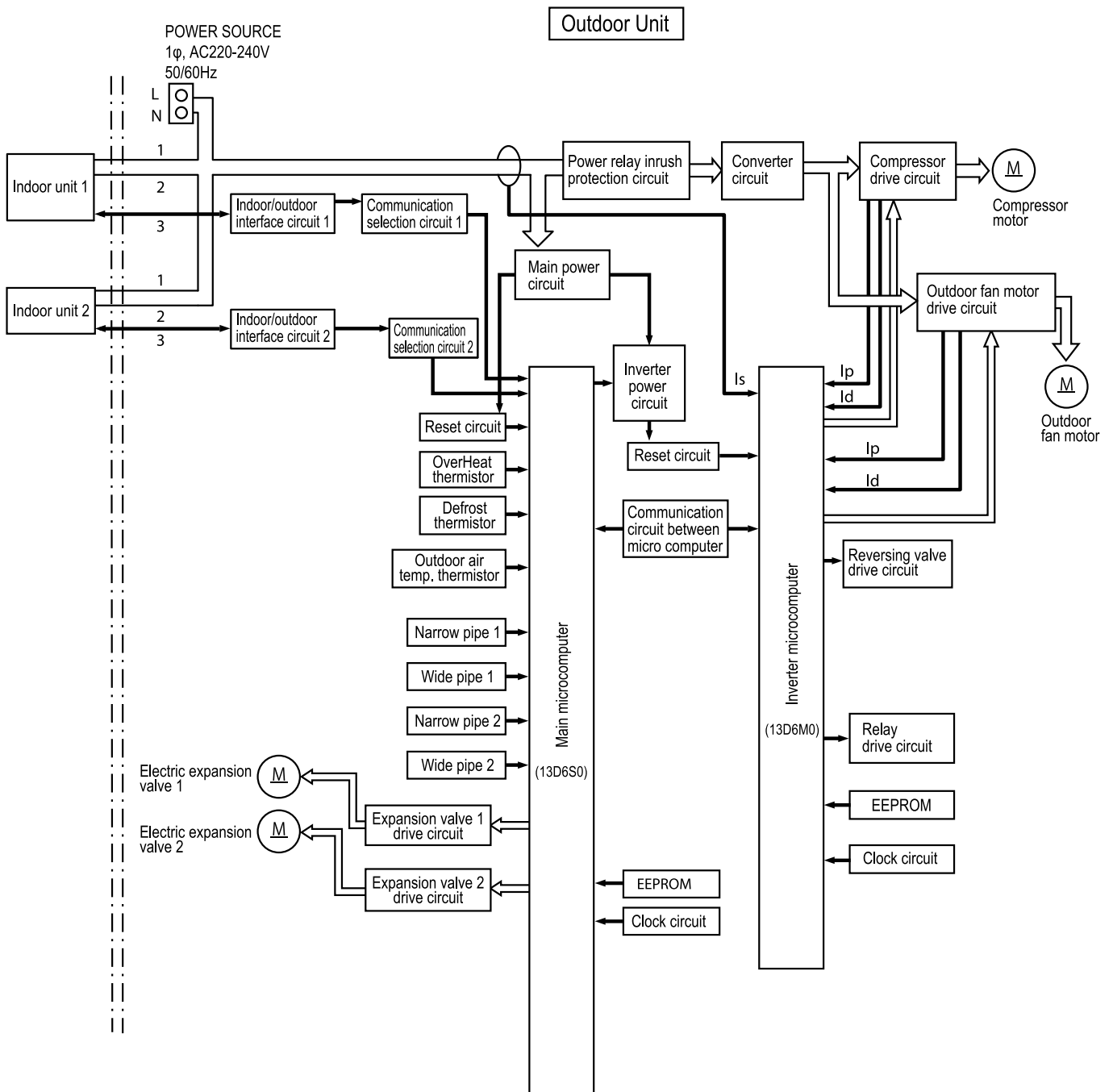
RESISTOR	RESISTOR	RESISTOR	RESISTOR	CAPACITOR	CAPACITOR	CAPACITOR	DIODE	TRANSISTOR	REGULATOR
R001 100 Ω	R002 100 Ω	R003 100 Ω	R004 100 Ω	C001 100 μF	C002 100 μF	C003 100 μF	D001 1N4001	Q001 2N3055	U001 7805
R005 100 Ω	R006 100 Ω	R007 100 Ω	R008 100 Ω	C004 100 μF	C005 100 μF	C006 100 μF	D002 1N4001	Q002 2N3055	U002 7805
R009 100 Ω	R010 100 Ω	R011 100 Ω	R012 100 Ω	C007 100 μF	C008 100 μF	C009 100 μF	D003 1N4001	Q003 2N3055	U003 7805
R013 100 Ω	R014 100 Ω	R015 100 Ω	R016 100 Ω	C010 100 μF	C011 100 μF	C012 100 μF	D004 1N4001	Q004 2N3055	U004 7805
R017 100 Ω	R018 100 Ω	R019 100 Ω	R020 100 Ω	C013 100 μF	C014 100 μF	C015 100 μF	D005 1N4001	Q005 2N3055	U005 7805
R021 100 Ω	R022 100 Ω	R023 100 Ω	R024 100 Ω	C016 100 μF	C017 100 μF	C018 100 μF	D006 1N4001	Q006 2N3055	U006 7805
R025 100 Ω	R026 100 Ω	R027 100 Ω	R028 100 Ω	C019 100 μF	C020 100 μF	C021 100 μF	D007 1N4001	Q007 2N3055	U007 7805
R029 100 Ω	R030 100 Ω	R031 100 Ω	R032 100 Ω	C022 100 μF	C023 100 μF	C024 100 μF	D008 1N4001	Q008 2N3055	U008 7805
R033 100 Ω	R034 100 Ω	R035 100 Ω	R036 100 Ω	C025 100 μF	C026 100 μF	C027 100 μF	D009 1N4001	Q009 2N3055	U009 7805
R037 100 Ω	R038 100 Ω	R039 100 Ω	R040 100 Ω	C028 100 μF	C029 100 μF	C030 100 μF	D010 1N4001	Q010 2N3055	U010 7805
R041 100 Ω	R042 100 Ω	R043 100 Ω	R044 100 Ω	C031 100 μF	C032 100 μF	C033 100 μF	D011 1N4001	Q011 2N3055	U011 7805
R045 100 Ω	R046 100 Ω	R047 100 Ω	R048 100 Ω	C034 100 μF	C035 100 μF	C036 100 μF	D012 1N4001	Q012 2N3055	U012 7805
R049 100 Ω	R050 100 Ω	R051 100 Ω	R052 100 Ω	C037 100 μF	C038 100 μF	C039 100 μF	D013 1N4001	Q013 2N3055	U013 7805
R053 100 Ω	R054 100 Ω	R055 100 Ω	R056 100 Ω	C040 100 μF	C041 100 μF	C042 100 μF	D014 1N4001	Q014 2N3055	U014 7805
R057 100 Ω	R058 100 Ω	R059 100 Ω	R060 100 Ω	C043 100 μF	C044 100 μF	C045 100 μF	D015 1N4001	Q015 2N3055	U015 7805
R061 100 Ω	R062 100 Ω	R063 100 Ω	R064 100 Ω	C046 100 μF	C047 100 μF	C048 100 μF	D016 1N4001	Q016 2N3055	U016 7805
R065 100 Ω	R066 100 Ω	R067 100 Ω	R068 100 Ω	C049 100 μF	C050 100 μF	C051 100 μF	D017 1N4001	Q017 2N3055	U017 7805
R069 100 Ω	R070 100 Ω	R071 100 Ω	R072 100 Ω	C052 100 μF	C053 100 μF	C054 100 μF	D018 1N4001	Q018 2N3055	U018 7805
R073 100 Ω	R074 100 Ω	R075 100 Ω	R076 100 Ω	C055 100 μF	C056 100 μF	C057 100 μF	D019 1N4001	Q019 2N3055	U019 7805
R077 100 Ω	R078 100 Ω	R079 100 Ω	R080 100 Ω	C058 100 μF	C059 100 μF	C060 100 μF	D020 1N4001	Q020 2N3055	U020 7805
R081 100 Ω	R082 100 Ω	R083 100 Ω	R084 100 Ω	C061 100 μF	C062 100 μF	C063 100 μF	D021 1N4001	Q021 2N3055	U021 7805
R085 100 Ω	R086 100 Ω	R087 100 Ω	R088 100 Ω	C064 100 μF	C065 100 μF	C066 100 μF	D022 1N4001	Q022 2N3055	U022 7805
R089 100 Ω	R090 100 Ω	R091 100 Ω	R092 100 Ω	C067 100 μF	C068 100 μF	C069 100 μF	D023 1N4001	Q023 2N3055	U023 7805
R093 100 Ω	R094 100 Ω	R095 100 Ω	R096 100 Ω	C070 100 μF	C071 100 μF	C072 100 μF	D024 1N4001	Q024 2N3055	U024 7805
R097 100 Ω	R098 100 Ω	R099 100 Ω	R100 100 Ω	C073 100 μF	C074 100 μF	C075 100 μF	D025 1N4001	Q025 2N3055	U025 7805
R101 100 Ω	R102 100 Ω	R103 100 Ω	R104 100 Ω	C076 100 μF	C077 100 μF	C078 100 μF	D026 1N4001	Q026 2N3055	U026 7805
R105 100 Ω	R106 100 Ω	R107 100 Ω	R108 100 Ω	C079 100 μF	C080 100 μF	C081 100 μF	D027 1N4001	Q027 2N3055	U027 7805
R109 100 Ω	R110 100 Ω	R111 100 Ω	R112 100 Ω	C082 100 μF	C083 100 μF	C084 100 μF	D028 1N4001	Q028 2N3055	U028 7805
R113 100 Ω	R114 100 Ω	R115 100 Ω	R116 100 Ω	C085 100 μF	C086 100 μF	C087 100 μF	D029 1N4001	Q029 2N3055	U029 7805
R117 100 Ω	R118 100 Ω	R119 100 Ω	R120 100 Ω	C088 100 μF	C089 100 μF	C090 100 μF	D030 1N4001	Q030 2N3055	U030 7805
R121 100 Ω	R122 100 Ω	R123 100 Ω	R124 100 Ω	C091 100 μF	C092 100 μF	C093 100 μF	D031 1N4001	Q031 2N3055	U031 7805
R125 100 Ω	R126 100 Ω	R127 100 Ω	R128 100 Ω	C094 100 μF	C095 100 μF	C096 100 μF	D032 1N4001	Q032 2N3055	U032 7805
R129 100 Ω	R130 100 Ω	R131 100 Ω	R132 100 Ω	C097 100 μF	C098 100 μF	C099 100 μF	D033 1N4001	Q033 2N3055	U033 7805
R133 100 Ω	R134 100 Ω	R135 100 Ω	R136 100 Ω	C100 100 μF	C101 100 μF	C102 100 μF	D034 1N4001	Q034 2N3055	U034 7805
R137 100 Ω	R138 100 Ω	R139 100 Ω	R140 100 Ω	C103 100 μF	C104 100 μF	C105 100 μF	D035 1N4001	Q035 2N3055	U035 7805
R141 100 Ω	R142 100 Ω	R143 100 Ω	R144 100 Ω	C106 100 μF	C107 100 μF	C108 100 μF	D036 1N4001	Q036 2N3055	U036 7805
R145 100 Ω	R146 100 Ω	R147 100 Ω	R148 100 Ω	C109 100 μF	C110 100 μF	C111 100 μF	D037 1N4001	Q037 2N3055	U037 7805
R149 100 Ω	R150 100 Ω	R151 100 Ω	R152 100 Ω	C112 100 μF	C113 100 μF	C114 100 μF	D038 1N4001	Q038 2N3055	U038 7805
R153 100 Ω	R154 100 Ω	R155 100 Ω	R156 100 Ω	C115 100 μF	C116 100 μF	C117 100 μF	D039 1N4001	Q039 2N3055	U039 7805
R157 100 Ω	R158 100 Ω	R159 100 Ω	R160 100 Ω	C118 100 μF	C119 100 μF	C120 100 μF	D040 1N4001	Q040 2N3055	U040 7805
R161 100 Ω	R162 100 Ω	R163 100 Ω	R164 100 Ω	C121 100 μF	C122 100 μF	C123 100 μF	D041 1N4001	Q041 2N3055	U041 7805
R165 100 Ω	R166 100 Ω	R167 100 Ω	R168 100 Ω	C124 100 μF	C125 100 μF	C126 100 μF	D042 1N4001	Q042 2N3055	U042 7805
R169 100 Ω	R170 100 Ω	R171 100 Ω	R172 100 Ω	C127 100 μF	C128 100 μF	C129 100 μF	D043 1N4001	Q043 2N3055	U043 7805
R173 100 Ω	R174 100 Ω	R175 100 Ω	R176 100 Ω	C130 100 μF	C131 100 μF	C132 100 μF	D044 1N4001	Q044 2N3055	U044 7805
R177 100 Ω	R178 100 Ω	R179 100 Ω	R180 100 Ω	C133 100 μF	C134 100 μF	C135 100 μF	D045 1N4001	Q045 2N3055	U045 7805
R181 100 Ω	R182 100 Ω	R183 100 Ω	R184 100 Ω	C136 100 μF	C137 100 μF	C138 100 μF	D046 1N4001	Q046 2N3055	U046 7805
R185 100 Ω	R186 100 Ω	R187 100 Ω	R188 100 Ω	C139 100 μF	C140 100 μF	C141 100 μF	D047 1N4001	Q047 2N3055	U047 7805
R189 100 Ω	R190 100 Ω	R191 100 Ω	R192 100 Ω	C142 100 μF	C143 100 μF	C144 100 μF	D048 1N4001	Q048 2N3055	U048 7805
R193 100 Ω	R194 100 Ω	R195 100 Ω	R196 100 Ω	C145 100 μF	C146 100 μF	C147 100 μF	D049 1N4001	Q049 2N3055	U049 7805
R197 100 Ω	R198 100 Ω	R199 100 Ω	R200 100 Ω	C148 100 μF	C149 100 μF	C150 100 μF	D050 1N4001	Q050 2N3055	U050 7805

CIRCUIT DIAGRAM

MODEL RAM-53NP2B

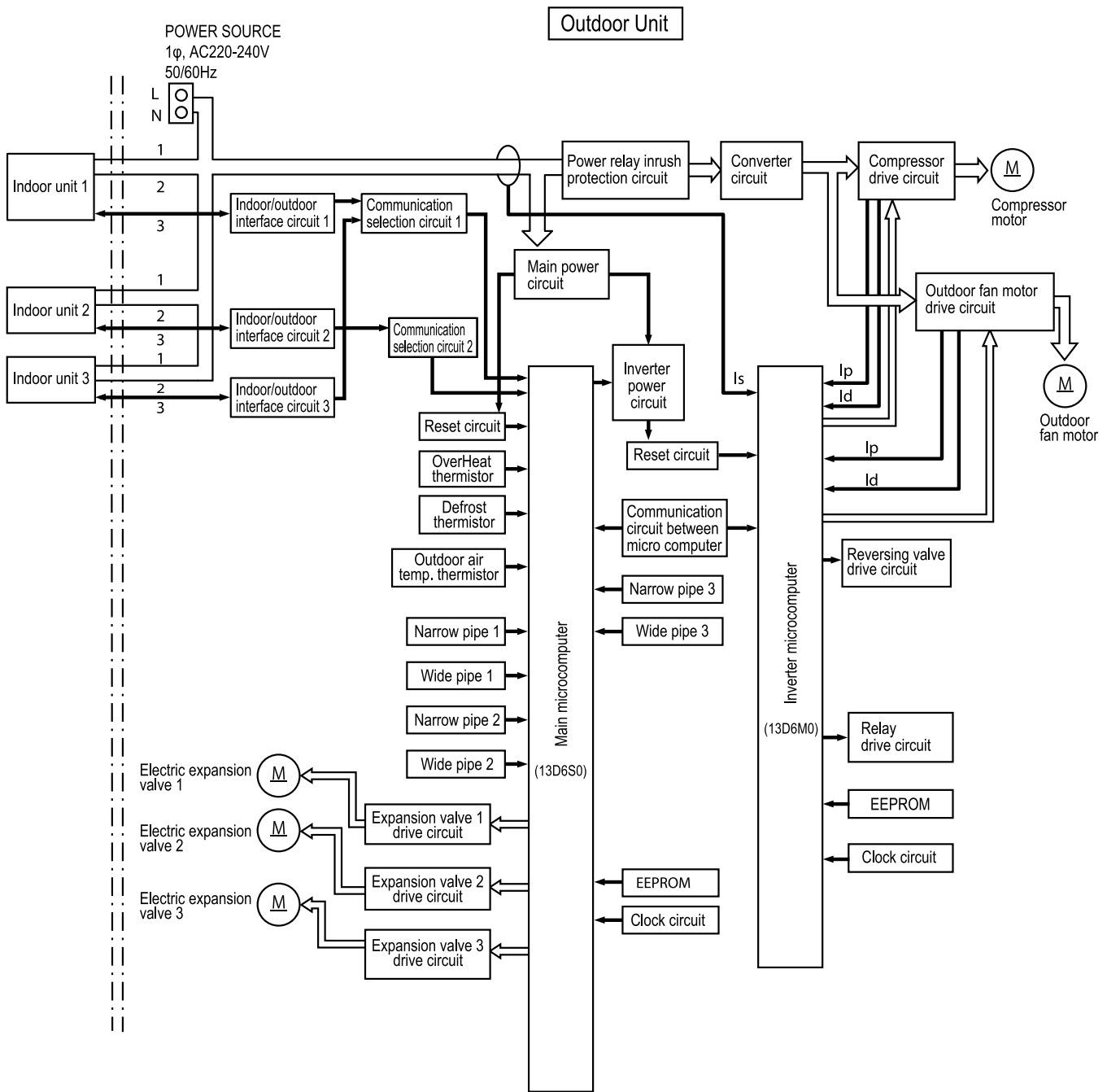


BLOCK DIAGRAM
 MODEL RAM-53NP2B



BLOCK DIAGRAM

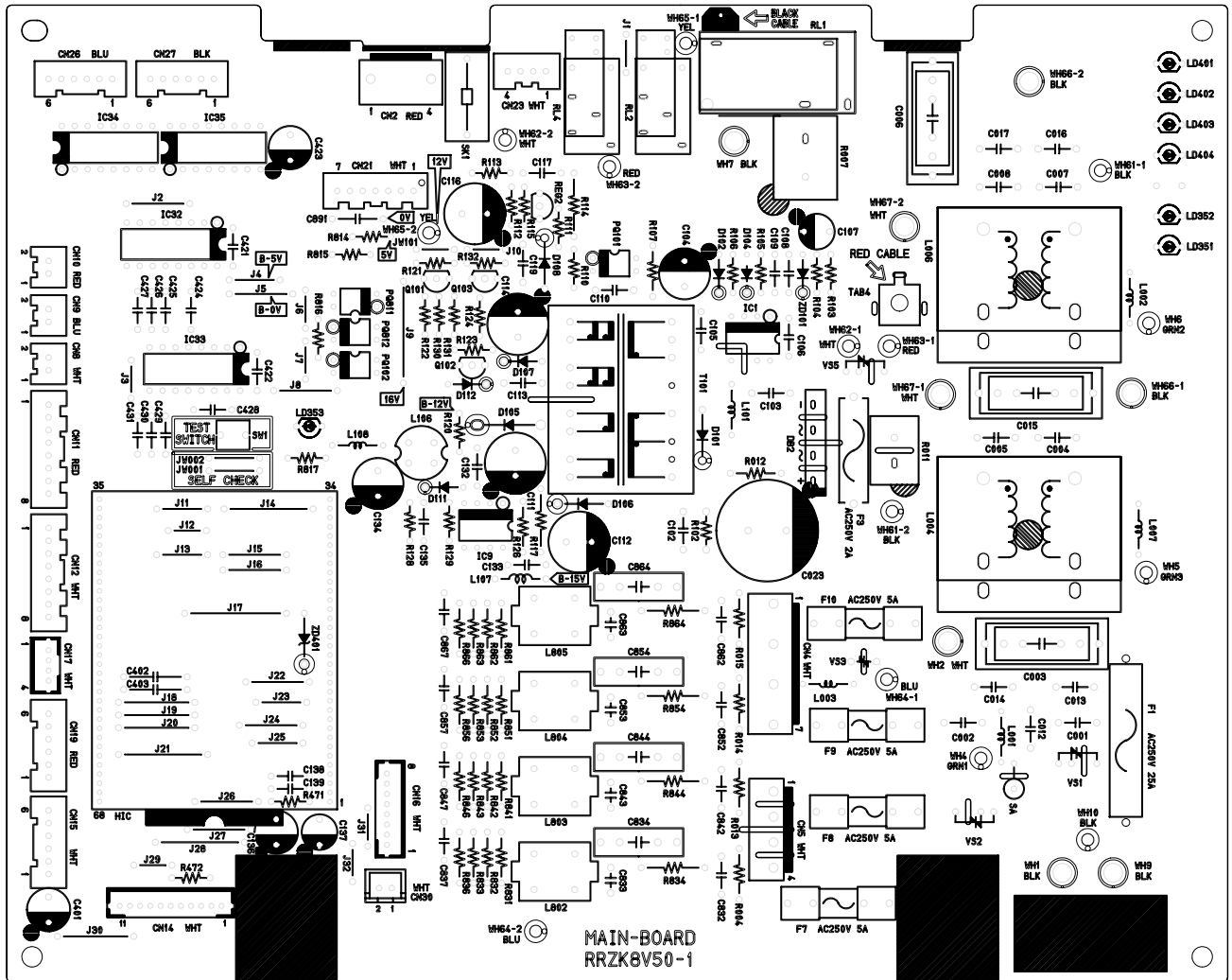
MODEL RAM-53NP3B



PRINTED WIRING BOARD LOCATION DIAGRAM

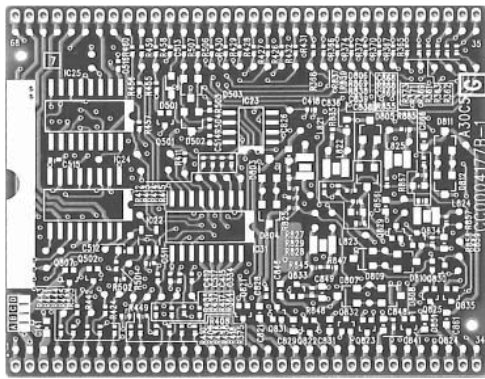
■ RAM-53NP2B

Main board [component side]

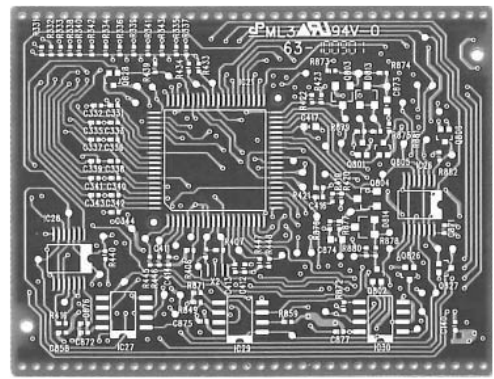


■ RAM-53NP2B

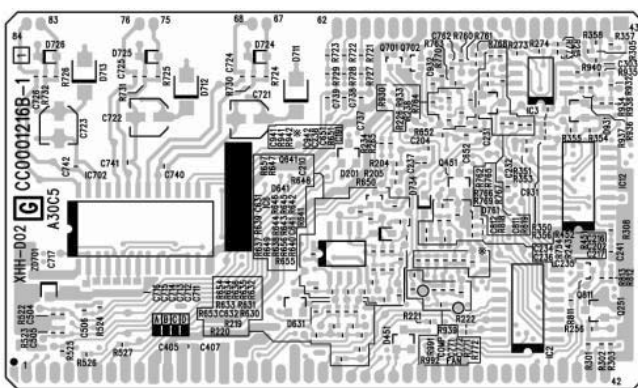
[Main HIC board] top side



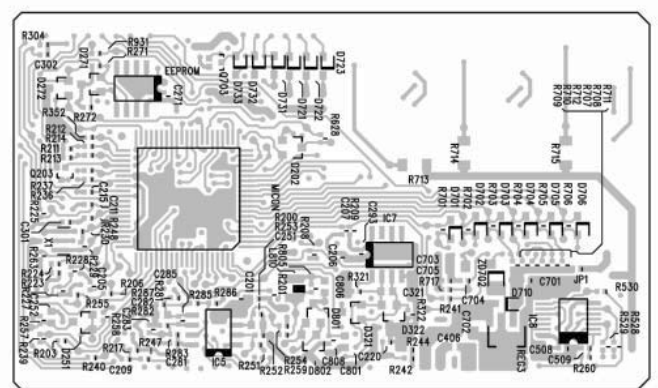
[Main HIC board] bottom side



[Inverter HIC board] top side



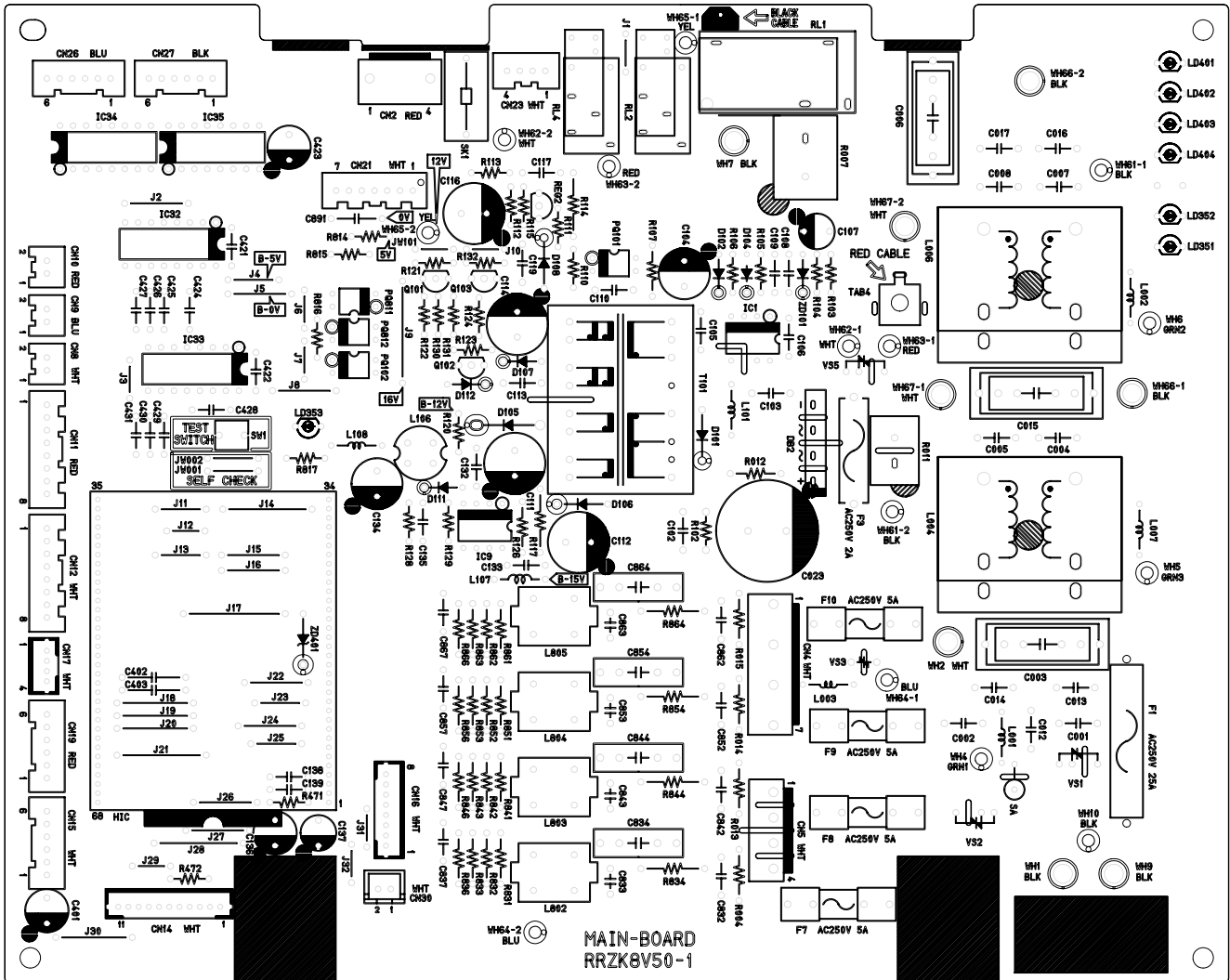
[Inverter HIC board] bottom side



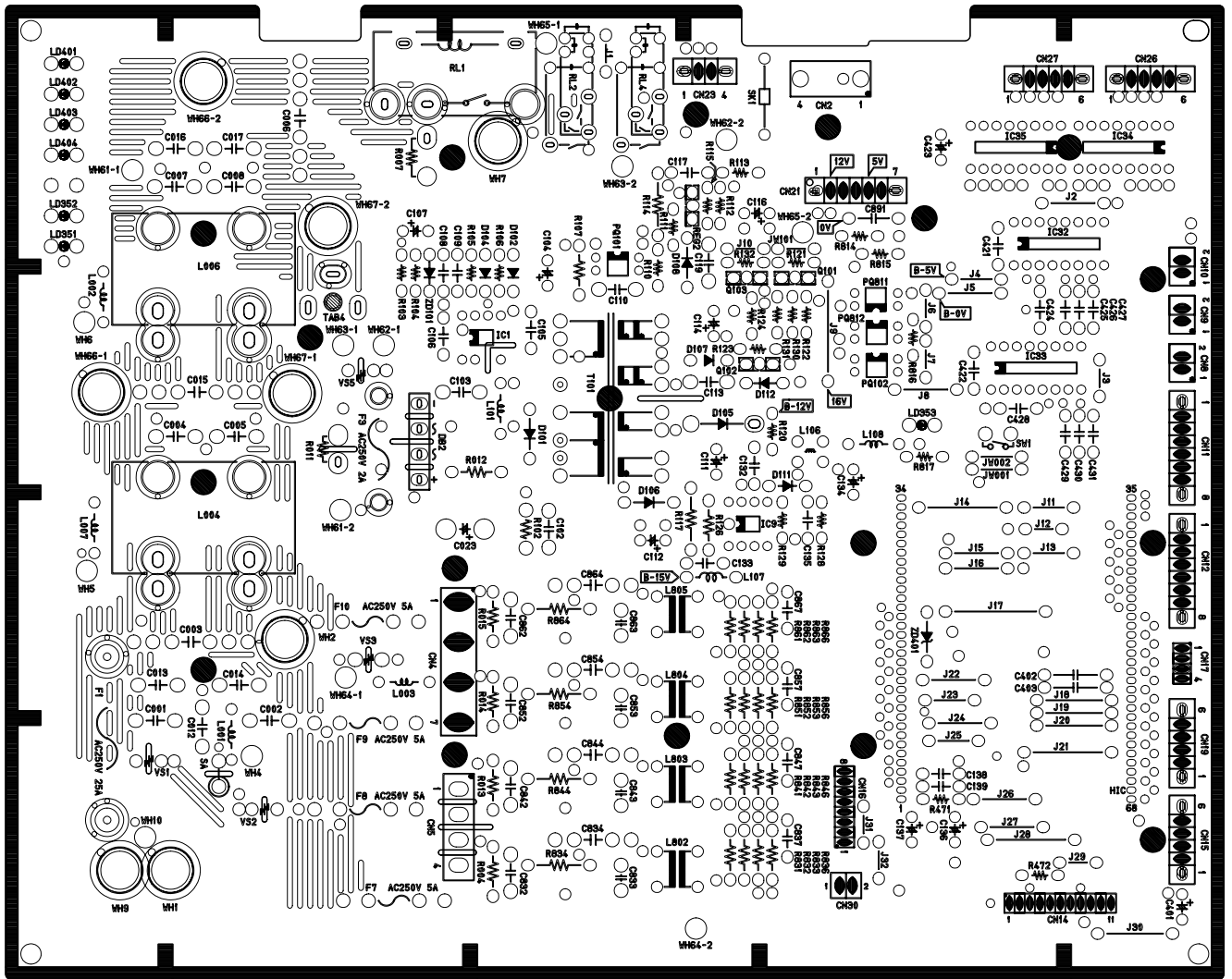
PRINTED WIRING BOARD LOCATION DIAGRAM

■ RAM-53NP3B

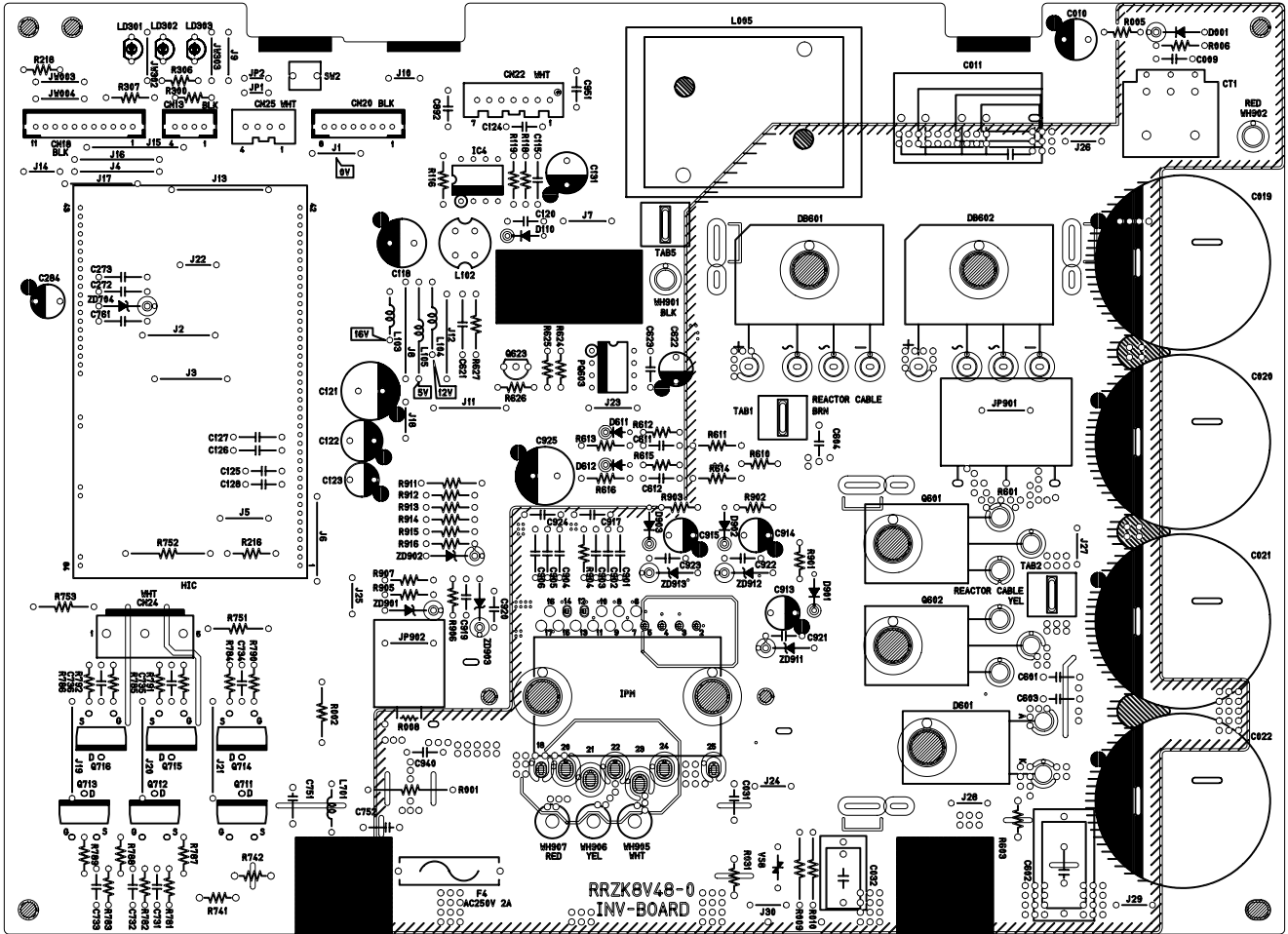
Main board [component side]



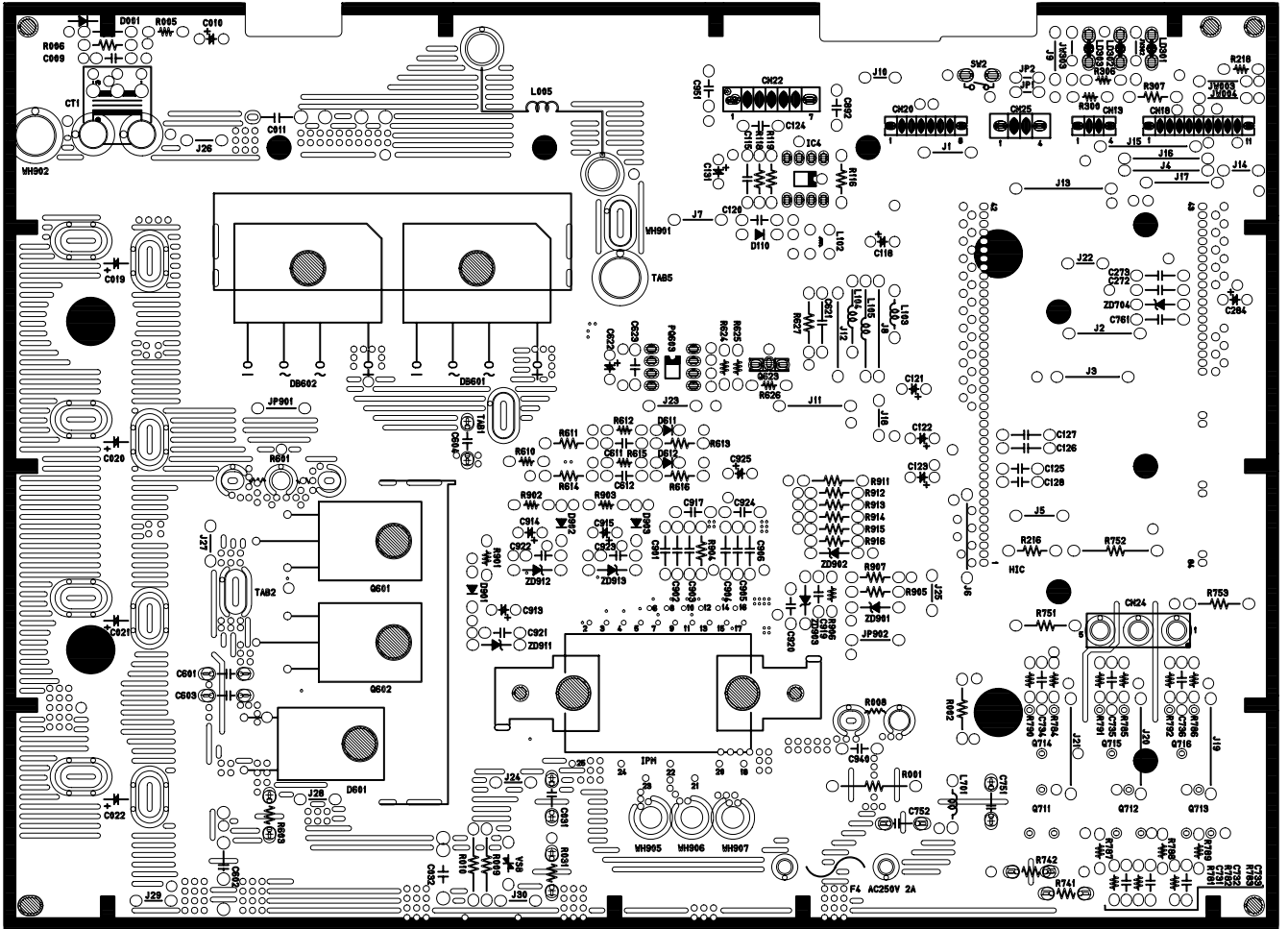
Main board [solder side]



Inverter board [component side]

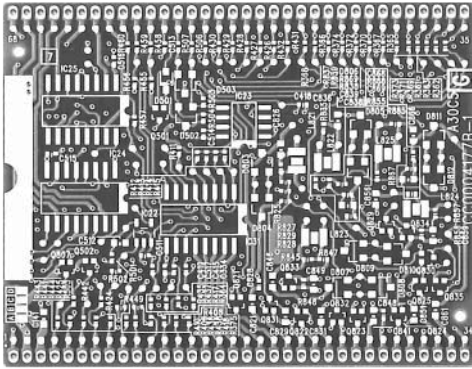


Inverter board [solder side]

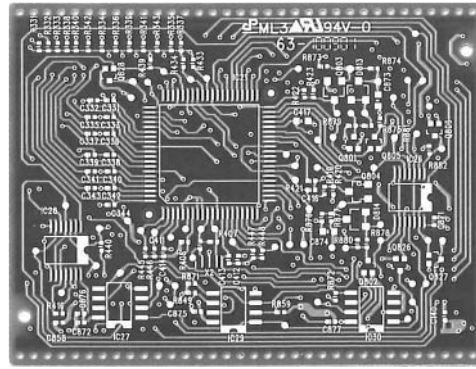


■ RAM-53NP3B

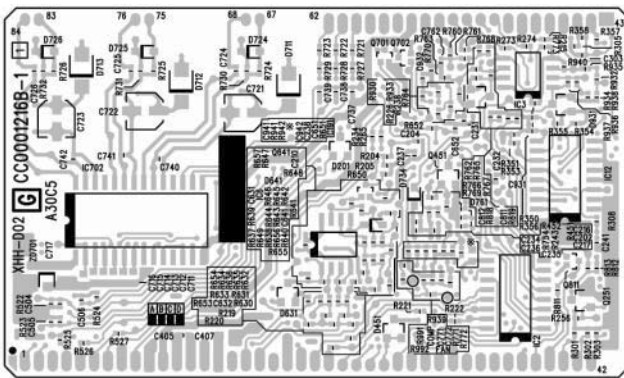
[Main HIC board] top side



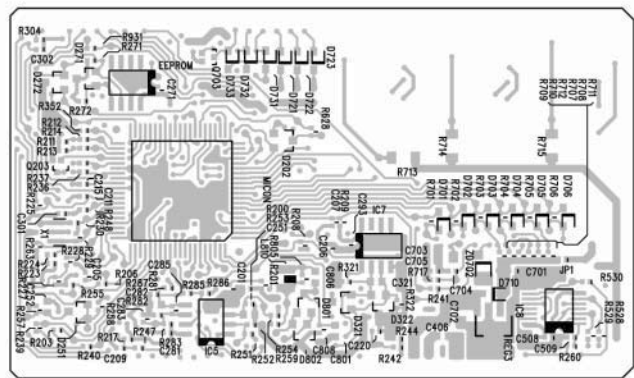
[Main HIC board] bottom side



[Inverter HIC board] top side



[Inverter HIC board] bottom side



BASIC MODE

Operation mode	Fan	Cooling	Dehumidifying	Heating	Auto
Basic operation of start/stop button					
Timer functions	Off-timer				
	On-timer				
	Off -> On On -> Off timer				
Fan speed mode (indoor fan)	Auto	<p>Changes from "Hi" to "Med" or "Lo" depending on room temperature.</p> <p>1. Runs at "Hi" until room temperature reaches to "setting temperature-SFTDSC_M" after operation is started. 2. Runs at "ultra-Lo" when thermo is off.</p>	<p>Set to "ultra-Hi" when the compressor runs at cold dash mode speed, and to "Hi" in other modes. Runs at "ultra-Lo" when thermo is off.</p>	<p>Set to "ultra-Lo", "Silent", "Lo", "Med", "Hi", "ultra-Hi" or "stop" depending on the room temperature, time and heat exchanger temperature. Set to "stop" if the heat exchanger temperature is "DNZKOF_M" during Thermo OFF. (When reach at "DNZKON_M", fan speed set to "ultra-Lo" again.) Set to "ultra-Hi" when the compressor is running at maximum speed during hot-dash or when recovered from defrosting.</p>	<p>Operating mode is judged by room temperature.</p> <p>(1) Judging by room temperature</p> <ul style="list-style-type: none"> Operating mode at start up is judged (initial judgment). <p>(a) Conditions for judgment (any of the followings).</p> <ul style="list-style-type: none"> When auto operation is started after the previous auto mode operation. When auto operation is started after the previous manual mode operation. When the operating mode is switched to auto while operating at manual mode. <p>(b) Judging method</p> <ul style="list-style-type: none"> [Cooling] : Room temperature \geq Remote controller setting [Heating] : Room temperature $<$ Remote controller setting
	Hi	Operates at "Hi" regardless of the room temperature.	Set to "ultra-Hi" when the compressor runs at cold dash mode speed, and to "Hi" in other modes. Runs at "ultra-Lo" when thermo is off.	Set to "ultra-Lo", "Silent", "Lo", "Med", "Hi", "ultra-Hi" or "stop" depending on the room temperature, time and heat exchanger temperature. Set to "stop" if the heat exchanger temperature is "DNZKOF_M" during Thermo OFF. (When reach at "DNZKON_M", fan speed set to "ultra-Lo" again.) Set to "ultra-Hi" when the compressor is running at maximum speed during hot dash or when recovered from defrosting.	Set to "ultra-Lo", "Silent", "Lo", "Med", "Hi", "ultra-Hi" or "stop" depending on the room temperature, time and heat exchanger temperature. Set to "stop" if the heat exchanger temperature is "DNZKOF_M" during Thermo OFF. (When reach at "DNZKON_M", fan speed set to "ultra-Lo" again.)
	Med	Operates at "Med" regardless of the room temperature.	Operates at "Med" regardless of the room temperature. Runs at "ultra-Lo" when thermo is off.	Set to "ultra-Lo", "Silent", "Lo", "Med", "Hi", "ultra-Hi" or "stop" depending on the room temperature, time and heat exchanger temperature. Set to "stop" if the heat exchanger temperature is "DNZKOF_M" during Thermo OFF. (When reach at "DNZKON_M", fan speed set to "ultra-Lo" again.)	Set to "ultra-Lo", "Silent", "Lo", "Med", "Hi", "ultra-Hi" or "stop" depending on the room temperature, time and heat exchanger temperature. Set to "stop" if the heat exchanger temperature is "DNZKOF_M" during Thermo OFF. (When reach at "DNZKON_M", fan speed set to "ultra-Lo" again.)
	Lo	Operates at "Lo" regardless of the room temperature.	Operates at "Lo" regardless of the room temperature. Runs at "ultra-Lo" when thermo is off.	Set to "Lo" in modes other than when the compressor stops.	Set to "ultra-Lo", "Silent", "Lo", "Med", "Hi", "ultra-Hi" or "stop" depending on the room temperature, time and heat exchanger temperature. Set to "stop" if the heat exchanger temperature is "DNZKOF_M" during Thermo OFF. (When reach at "DNZKON_M", fan speed set to "ultra-Lo" again.) The fan speed is controlled by the heat exchanger temperature; the overload control is executed as in the following diagram:
	Silent	Operates at "Silent" regardless of the room temperature.	Operates at "Silent" regardless of the room temperature. Runs at "ultra-Lo" when thermo is off.	Set to "Silent" in modes other than when the compressor stops.	
Basic operation of temperature controller	Performs only fan operation at the set speed regardless of the room temperature.	See page 55.	See page 59.	See page 61.	
Sleep operation (with sleep button ON)	<ul style="list-style-type: none"> Enters sleep operation after set as on the left. Action during sleep operation Lo (sleep) operation 	<ul style="list-style-type: none"> Same as at left See page 57. 	<ul style="list-style-type: none"> Same as at left See page 59. 	<ul style="list-style-type: none"> Same as at left See page 63. 	<ul style="list-style-type: none"> Same as at left. Performs the sleep operation of each operation mode.

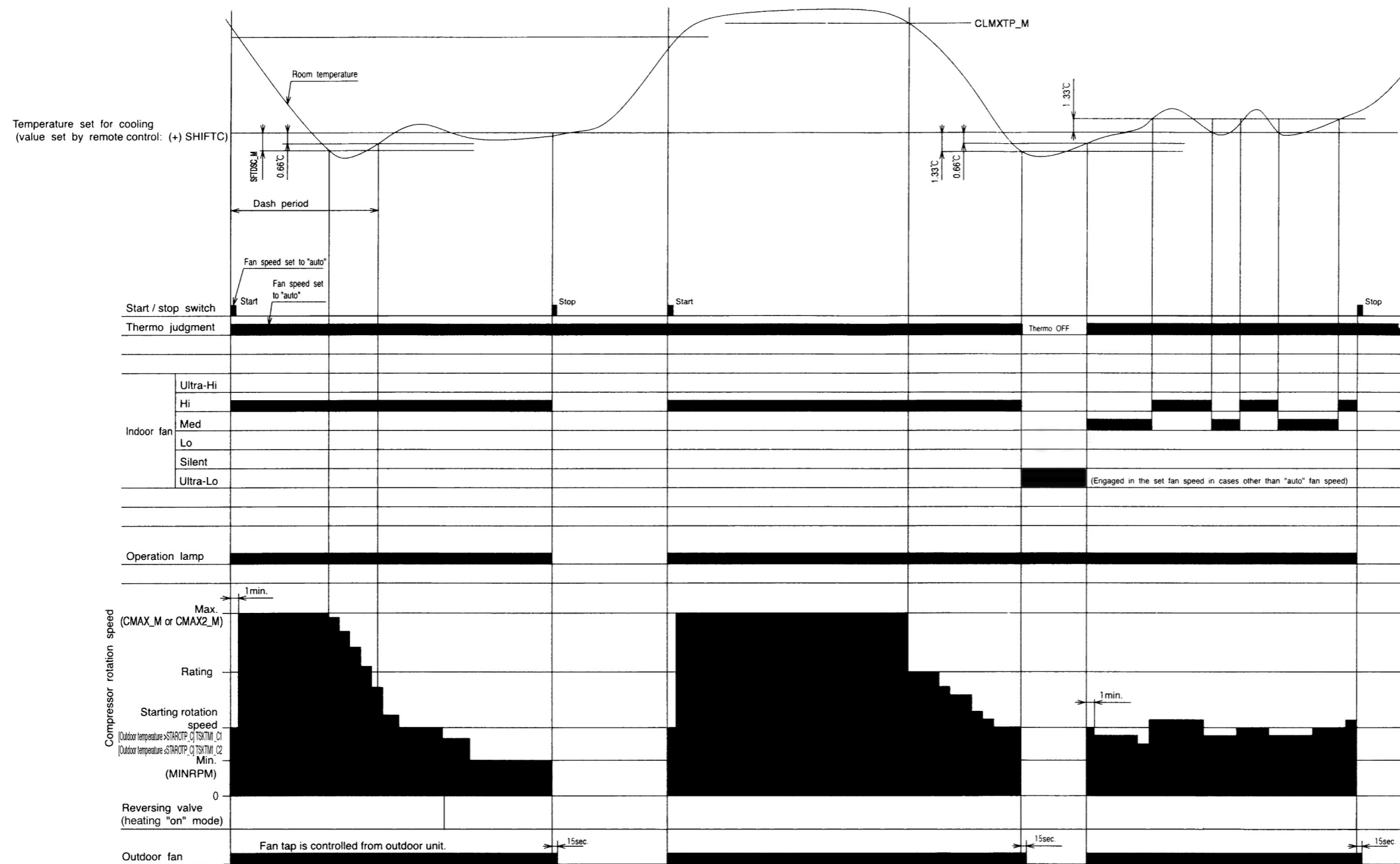
RAM-53NP2B

PROM. ADD.	LABEL NAME	VALUE
000	PSTARTC1_d	250 pulse
001	PSTARTC1k_d	300 pulse
002	PSTARTC2_d	150 pulse
003	PSTARTC2k_d	300 pulse
02E	DFCTPS_d	150 pulse
030	DFSPPS_d	10 pulse
031	BNTDFSPT_8u	10 sec
036	DFPSMX_d	400 pulse
03A	PCLOSH_d	86 pulse
13F	DFCTPS2_d	400 pulse
157	DFCTPS1U_d	230 pulse
159	DFCTPS2U_d	230 pulse
165	STARTOTP_c	25.0°C
166	SDRCT1_C1	2500 min ⁻¹
167	TSKTM1_C1	60 sec
168	SDRCT1_C2	2500 min ⁻¹
169	TSKTM1_C2	60 sec
16F	SDSTEP	500 min ⁻¹
170	TSKSPT	30 sec
184	CMAX2	5000 min ⁻¹
19B	WMAX2S2U	6000 min ⁻¹
7A6	NDWN_ON	97.2°C
7A7	NDWN_OFF	95.0°C
85F	TDF414_1U	60 sec
860	TDF414_2U	70 sec
866	TDF415_1U	80 sec
867	TDF415_2U	70 sec
86D	SDRCT2	2000 min ⁻¹
86E	TSKTM2	70 sec
86F	DFSTEP	500 min ⁻¹
870	TDSPT	60 sec
871	DEFMAX	4000 min ⁻¹
872	SDRCT2_2U	2300 min ⁻¹
873	TSKTM2_2U	45 sec
874	DFSTEP_2U	700min ⁻¹
875	TDFSPT_2U	40 sec
876	DEFMAX_2U	6000 min ⁻¹
88C	T_DFCTPS	50 sec
898	DEFOFF_1U	15.4°C
899	DEFOFF_2U	15.4°C

RAM-53NP3B

PROM. ADD.	LABEL NAME	VALUE
000	PSTARTC1_d	250 pulse
001	PSTARTC1k_d	300 pulse
002	PSTARTC2_d	150 pulse
003	PSTARTC2k_d	300 pulse
004	PSTARTC3_d	150 pulse
005	PSTARTC3k_d	300 pulse
02E	DFCTPS_d	150 pulse
030	DFSPPS_d	10 pulse
031	BNTDFSPT_8u	10 sec
036	DFPSMX_d	400 pulse
03A	PCLOSH_d	86 pulse
13F	DFCTPS2_d	400 pulse
157	DFCTPS1U_d	230 pulse
159	DFCTPS2U_d	230 pulse
165	STARTOTP_c	25.0°C
166	SDRCT1_C1	2500 min-1
167	TSKTM1_C1	60 sec
168	SDRCT1_C2	2500 min-1
169	TSKTM1_C2	60 sec
16F	SDSTEP	500 min-1
170	TSKSPT	30 sec
184	CMAX2	5000 min-1
186	CMAX3	5700 min-1
19B	WMAX2S2U	6000 min-1
1AB	WMAX3S2U	6000 min-1
1AD	WMAX3S3U	6150 min-1
7A6	NDWN_ON	97.2°C
7A7	NDWN_OFF	95.0°C
85F	TDF414_1U	60 sec
860	TDF414_2U	70 sec
861	TDF414_3U	60 sec
866	TDF415_1U	80 sec
867	TDF415_2U	70 sec
868	TDF415_3U	60 sec
86D	SDRCT2	2000 min-1
86E	TSKTM2	70 sec
86F	DFSTEP	500 min-1
870	TDSPT	60 sec
871	DEFMAX	4000 min-1
872	SDRCT2_2U	2300 min-1
873	TSKTM2_2U	45 sec
874	DFSTEP_2U	700min-1
875	TDFSPT_2U	40 sec
876	DEFMAX_2U	6000 min-1
877	SDRCT2_3U	2500 min-1
878	TSKTM2_3U	60 sec
879	DFSTEP_3U	800 min-1
87A	TDFSPT_3U	60 sec
87B	DEFMAX_3U	6000 min-1
88C	T_DFCTPS	50 sec
898	DEFOFF_1U	15.4°C
899	DEFOFF_2U	15.4°C
89A	DEFOFF_3U	15.4°C

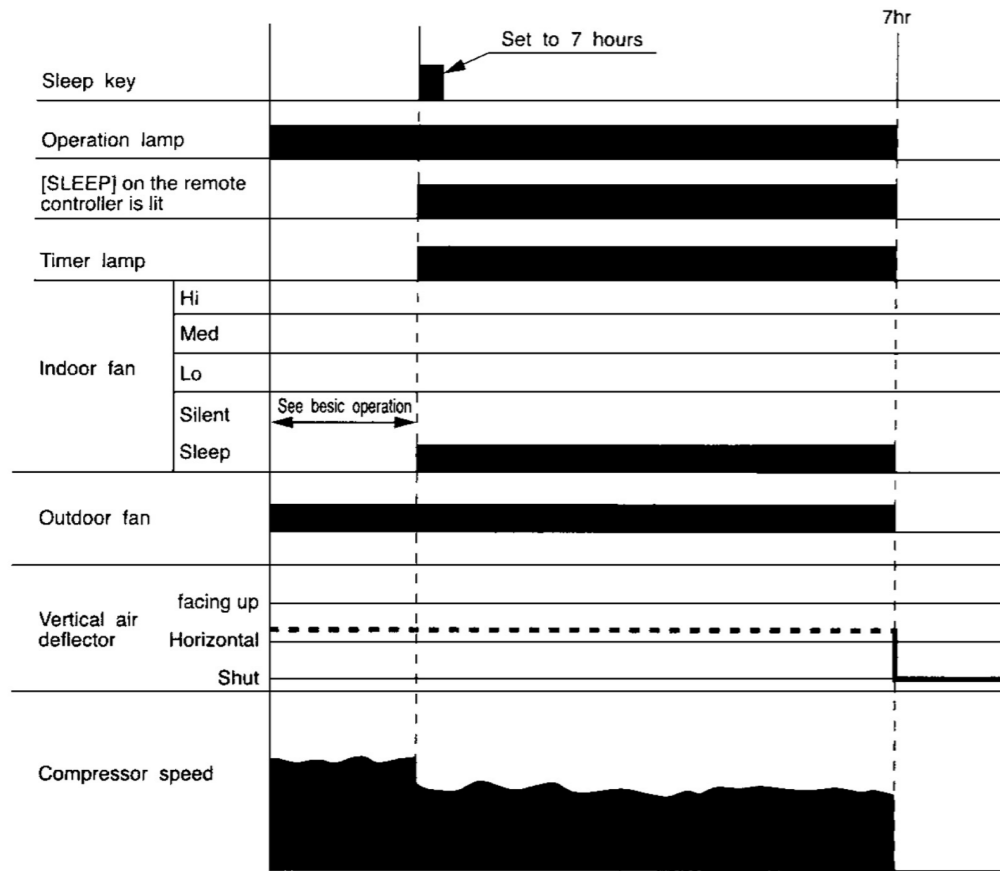
Basic Cooling Operation



Notes:

- (1) Cool dash is started when the operation is started at fan speed "AUTO" or "HI" or when the fan speed is changed to "AUTO" or "HI" during cooling operation, and when the compressor speed (P item) reaches (CMAX_M or CMAX2_M) or higher.
- (2) The maximum compressor speed period during cool dash is finished.
 - 1 When 25 minutes have elapsed after cool dash was started.
 - 2 When the room temperature reaches the cooling set temperature -1°C (including cooling shift) and then becomes lower than the preset temperature by 0.66°C after the steady speed period
 - 3 When thermo is OFF.
(If cool dash finished in the above 1, the compressor does not go through the steady speed period but it starts fuzzy control.)
- (3) The thermo OFF temperature during cool dash is cooling set temperature (including cooling shift) -3°C . After thermo OFF, cool dash is finished and fuzzy control starts.
- (4) The compressor minimum ON time and minimum OFF time is 3 minutes.
- (5) The time limit for which the maximum compressor speed (CMAX_M or CMAX2_M) during normal cooling can be maintained is less than 60 minutes when the room temperature is less than CLMXTP_M : it is not provided when the room temperature is CLMXTP_M or more.
- (6) Compressor speed is determined by instruction sent from indoor unit and corrected by outdoor unit according to such factors as capacity, fan speed, number of units being operated, outdoor temperature, discharge pressure and etc.
- (7) If another indoor unit is doing heating operation, cooling operation cannot be done.

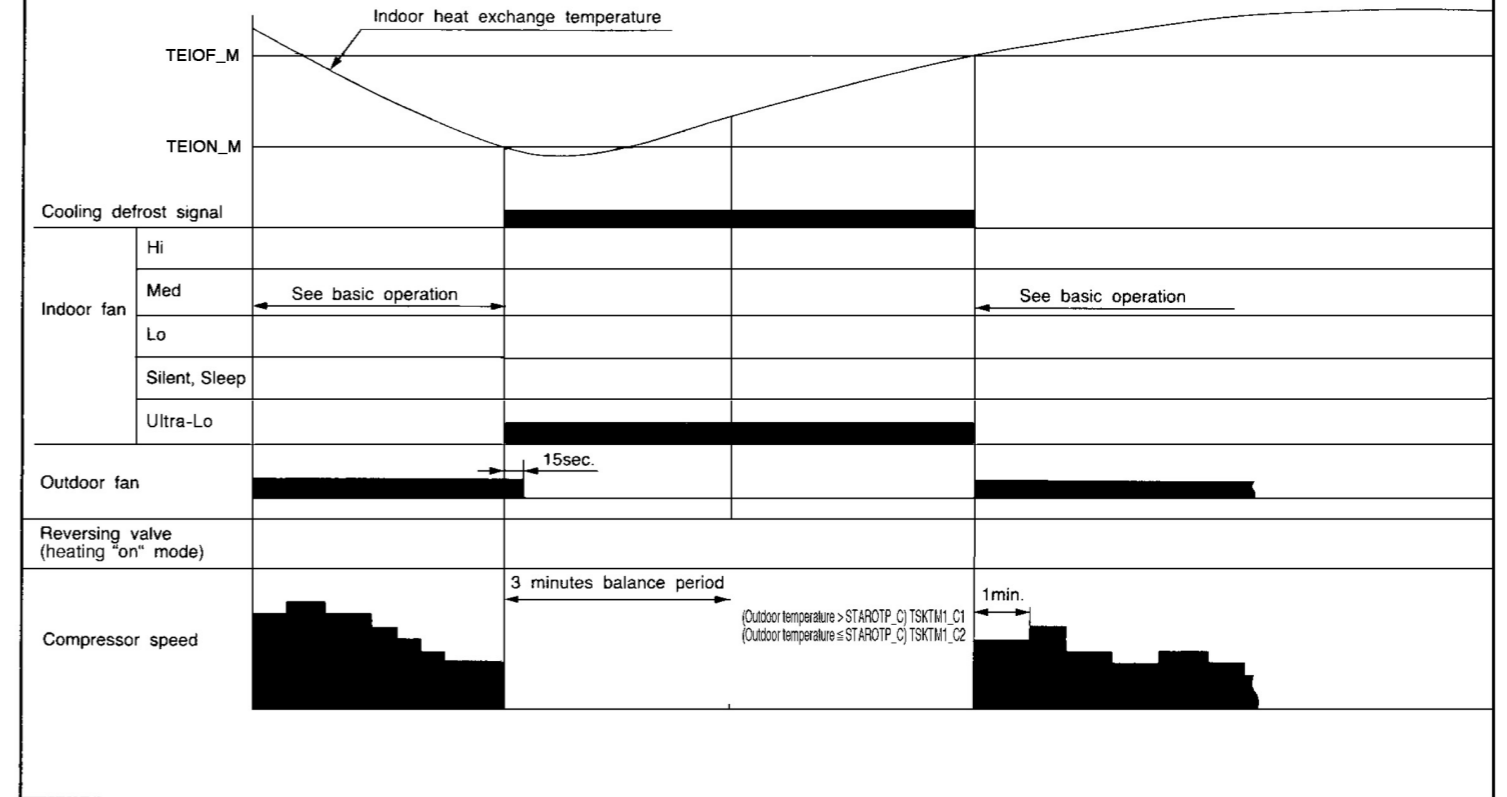
Cooling Sleep Operation



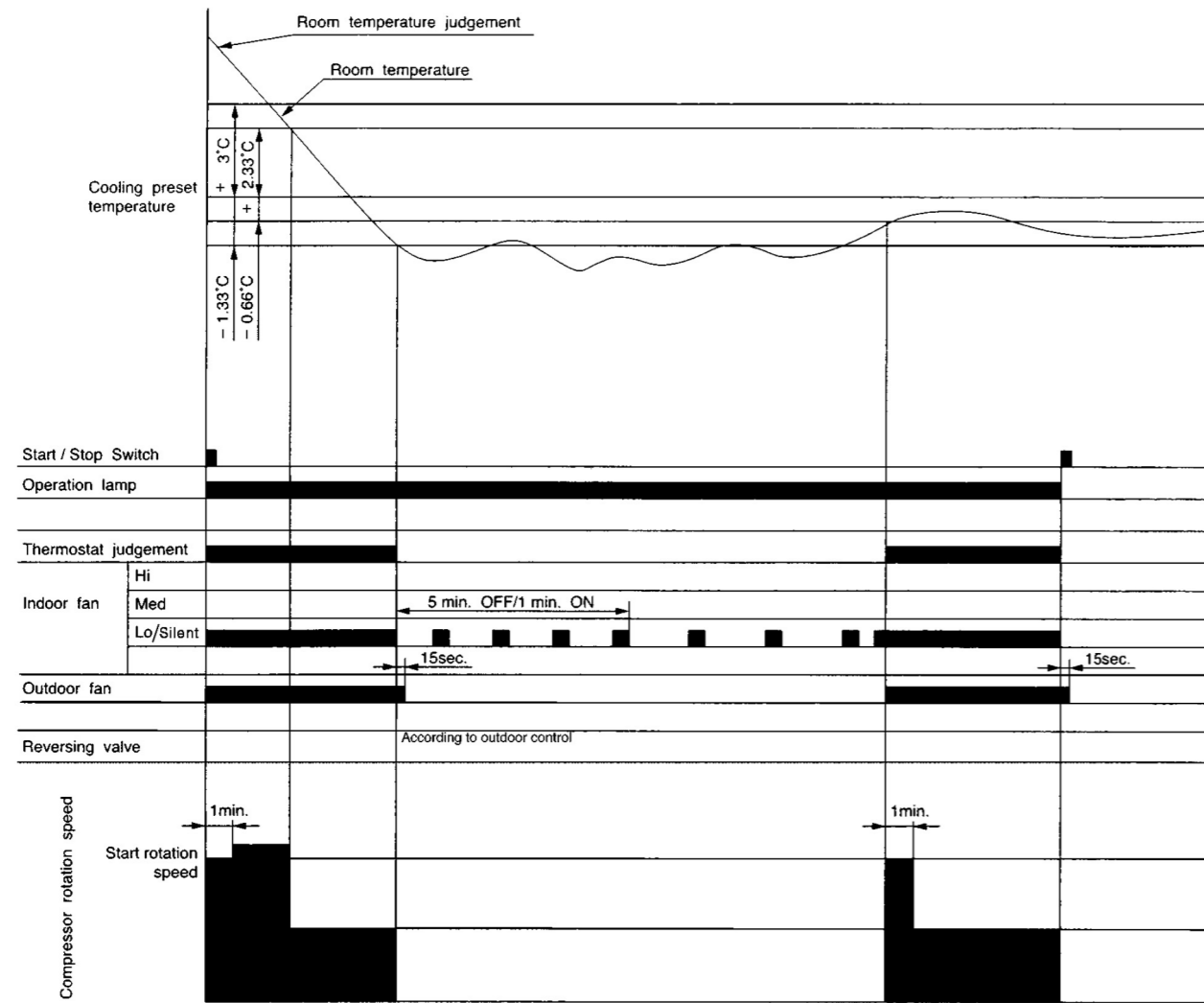
Notes.

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

Cooling Defrost



Dehumidifying

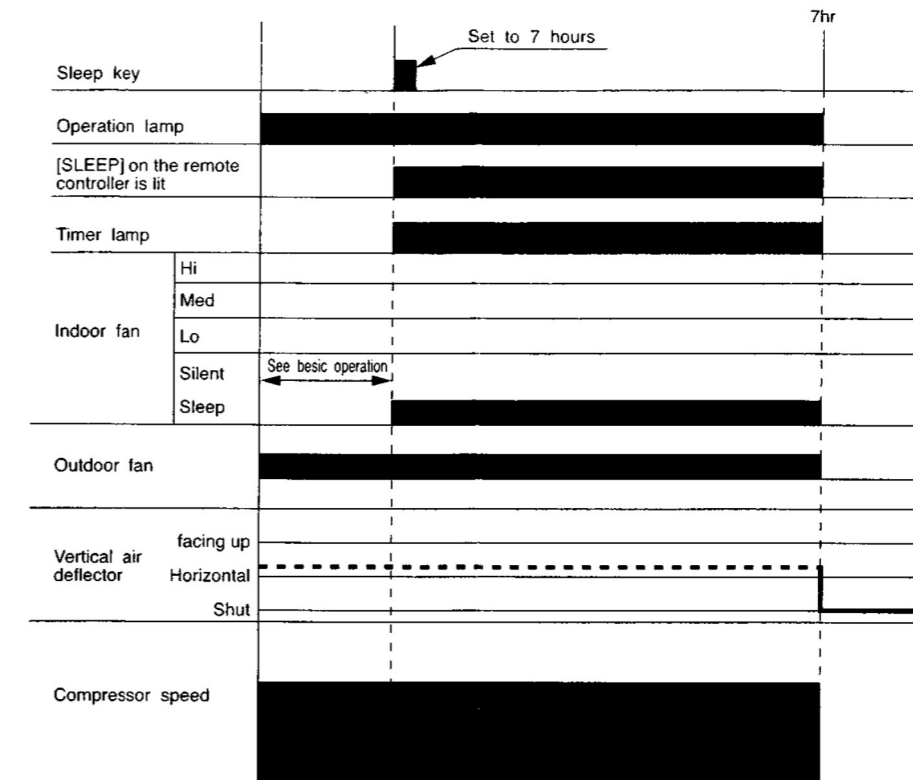


Notes:

- (1) The indoor fan is operated in the "Lo" or "Silent" mode, OFF for 5 minutes and ON for 1 minute, repeatedly according to the humidity judgement when the thermostat is turned OFF.
- (2) The compressor is operated forcedly for 3 minutes after operation is started.
- (3) The minimum ON time and OFF time of the compressor are 3 minutes.
- (4) At the start of operation, the thermostat will be off when room temperature \leq setting temperature -1.33°C ; the thermostat will be on when room temperature \geq setting temperature -0.66°C .
- (5) The following procedure is performed to prevent excessive cooling during operation other than start. However, this procedure applies only when the thermostat is intermittent:
 - Whether THERMO ON is to continue or not depends on the thermal condition when the 3-minute forced operation ceases.
 - ① "THERMO ON continues" when room temperature \geq setting temperature $+1^{\circ}\text{C}$: (The THERMO operation value is usually the same as that at "start of operation")
 - ② "Forced THERMO OFF" when room temperature $<$ setting temperature $+1^{\circ}\text{C}$: (The same THERMO operation value as that at "start of operation" is usually used for recovery)

Therefore, if the air-conditioner is stabilized under this thermal condition, it will enter intermittent operation, which is "3-minute operation/3-minute stop".
- (6) Compressor speed is determined by instruction sent from indoor unit and corrected by outdoor unit according to such factors as capacity, fan speed, number of units being operated, outdoor temperature, etc.

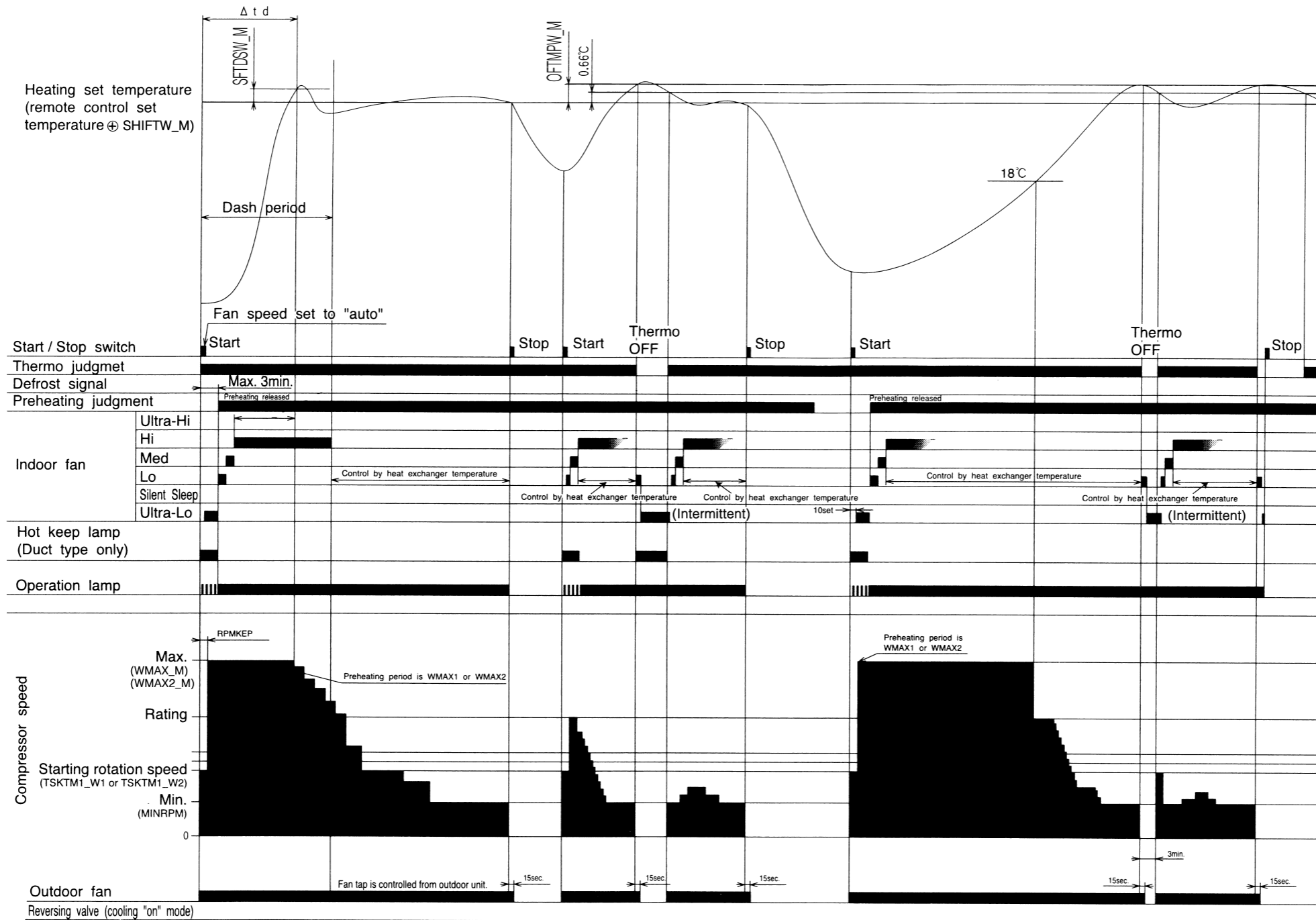
Dehumidifying Sleep Operation



Notes:

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

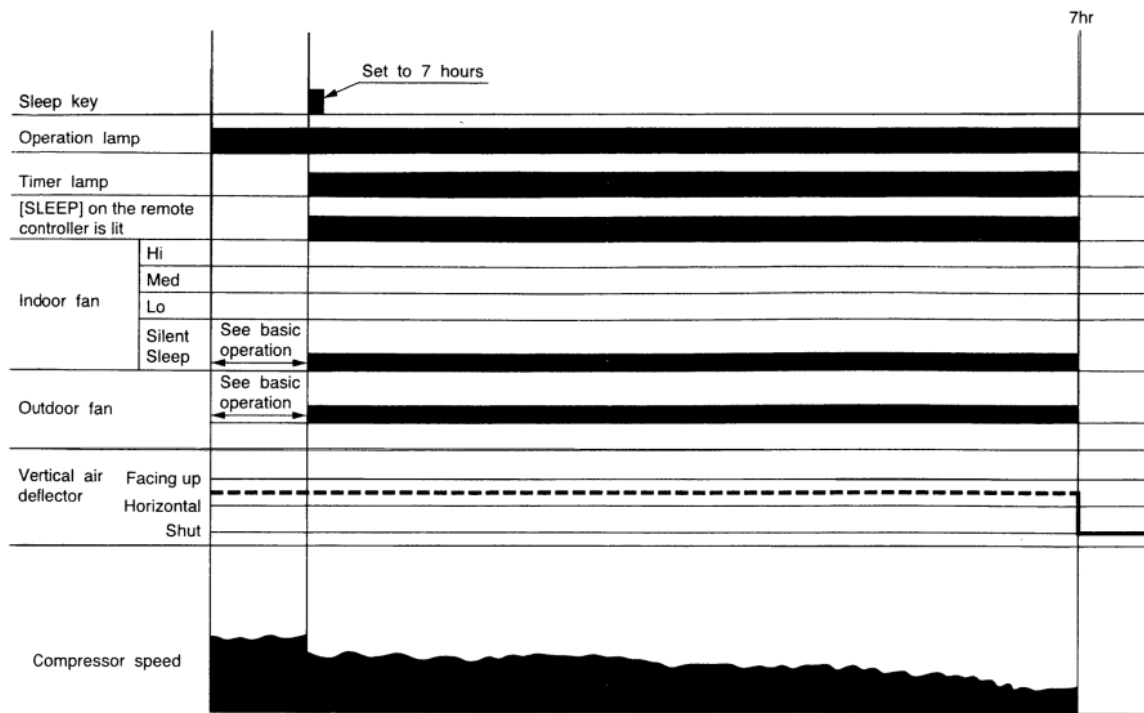
Basic Heating Operation



Notes:

- (1) Hot Dash is started when the operation is started at fan speed "AUTO" or "HI" or when the fan speed is changed to "AUTO" or "HI" during heating operation, and when the compressor speed (P item) reaches (WMAX_M or WMAX2_M) or higher with the room temperature at 8°C or less and outdoor temperature at 10°C or less.
- (2) The maximum compressor speed period during hot dash is finished (1) when the room temperature reaches the heating set temperature (including heating shift) plus SFTDSW_M or (2) 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.
- (4) The compressor minimum ON time and minimum OFF time is 3 minutes.
- (5) The time limit for which the maximum compressor speed (WMAX_M or WMAX2_M) 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 4°C.
- (6) The operation indicator will blink every second during initial cycle operation, preheating, defrosting (including balance time after defrost is finished), or auto fresh defrosting. However, with duct type models, operation indicator does not blink, but Hot Keep indicator will light. And Hot Keep indicator will also light in "Thermo OFF" mode.
- (7) For preheating judgment, preheating starts if the heat exchange temperature is lower than YNEOF_M and is cancelled if the heat exchange temperature is YNEOF_M plus 0.33°C or higher at the start of operation using the START / STOP button.
- (8) If the room temperature falls to less than 18°C in the "Ultra-Lo" mode, the indoor fan stops. When the room temperature 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.
- (9) Compressor speed is determined by instruction sent from indoor unit and corrected by outdoor unit according to such factors as capacity, fan speed, number of units being operated, outdoor temperature, discharge pressure etc.
- (10) If another indoor unit is doing cooling operation, dehumidifying operation or fan operation, heating operation cannot be done.
- (11) Indoor fan will reduce 1 step lower if heat exchanger thermistor sense lower temperature than default setting. Indoor fan resume to initial setting once heat exchanger thermistor sense above than default setting.

Heating Sleep Operation



Notes:

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

NOTE:

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

MODEL RAM-53NP2B

EXPANSION VALVES

The expansion valves are initialized when power is supplied. The valve for unit 1 is fully closed (-520 pulses), and then that for unit 2 is fully opened (480 pulses). The valve for unit 2 is fully closed (-520 pulses), and then that for unit 3 is fully opened (480 pulses). The valve for unit 3 is fully closed (-520 pulses), and then that for unit 4 is fully opened (480 pulses). The valve for unit 4 is fully closed (-520 pulses). When the valve for unit 1, 2, 3, 4 is fully closed (0 pulse), start-up is possible.

The start openings are held during the steady speed period when the compressor is started. After the steady speed period is finished, the TD control is entered. The start openings are set to $PSTARTC * K_d$ when the outdoor temperature at start $40^{\circ}C$ or more, and to $PSTARTC * _d$ when it is less than $40^{\circ}C$.

* Indicate number of operating indoor unit

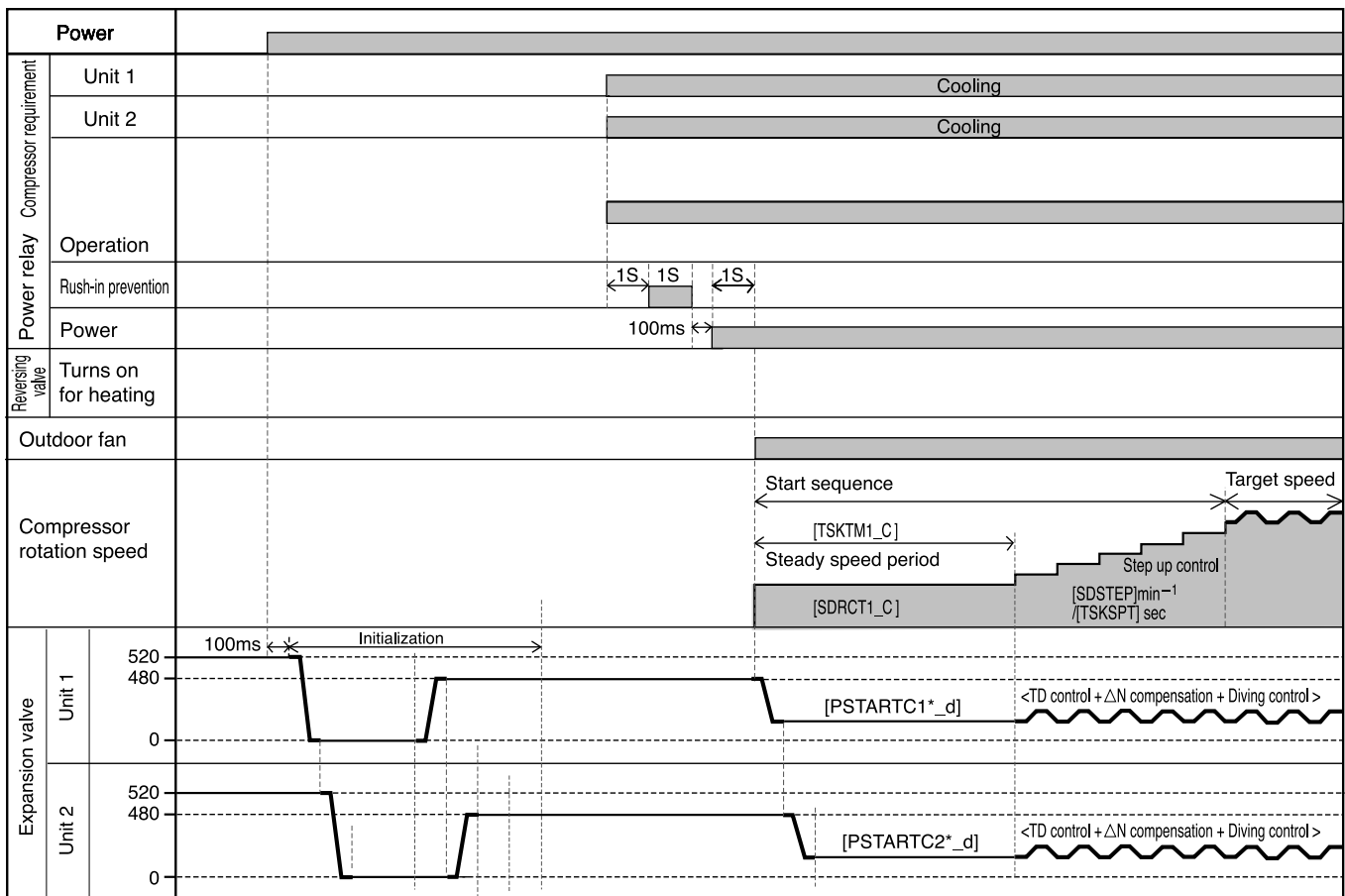
Compressor rotation speed

When the compressor is started, it will be in steady speed period.

The compressor speed and duration during steady speed period is as below:

COMP Speed (min ⁻¹)	Duration (sec)	Outdoor Temperature (°C)
SDRCT1_C1	TSKTM1_C1	> STAROTP_C
SDRCT1_C2	TSKTM1_C2	≤ STAROTP_C

After the steady speed period is finished, the speed increases at the rate of $SDSTEP$ (min-1) within $TSKSPT$ (sec) until the target speed is reached.



MODEL RAM-53NP3B

EXPANSION VALVES

The expansion valves are initialized when power is supplied. The valve for unit 1 is fully closed (-520 pulses), and then that for unit 2 is fully opened (480 pulses). The valve for unit 2 is fully closed (-520 pulses), and then that for unit 3 is fully opened (480 pulses). The valve for unit 3 is fully closed (-520 pulses), and then that for unit 4 is fully opened (480 pulses). The valve for unit 4 is fully closed (-520 pulses). When the valve for unit 1, 2, 3, 4 is fully closed (0 pulse), start-up is possible.

The start openings are held during the steady speed period when the compressor is started. After the steady speed period is finished, the TD control is entered. The start openings are set to $PSTARTC * K_d$ when the outdoor temperature at start 40°C or more, and to $PSTARTC * _d$ when it is less than 40°C.

* Indicate number of operating indoor unit

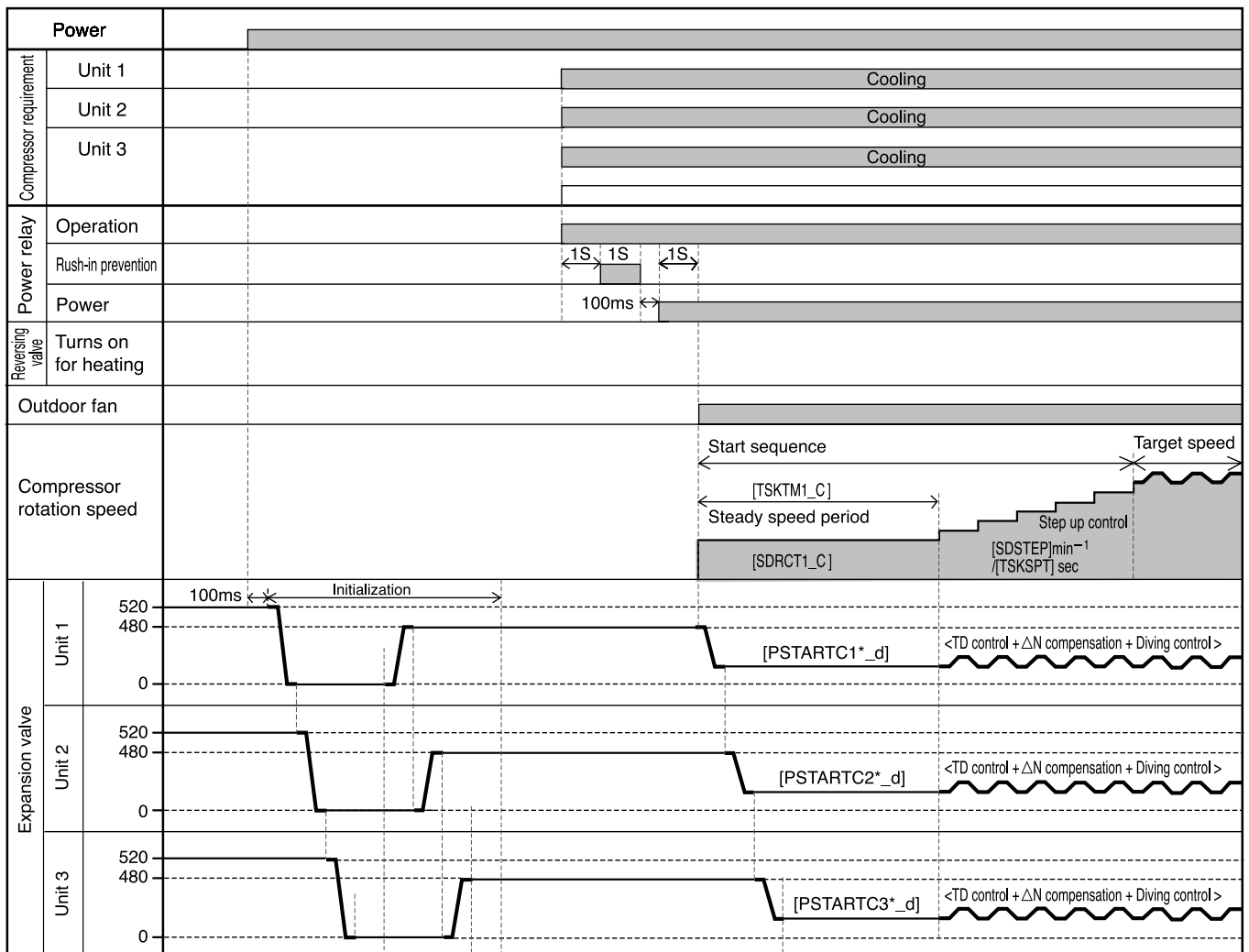
Compressor rotation speed

When the compressor is started, it will be in steady speed period.

The compressor speed and duration during steady speed period is as below:

COMP Speed (min ⁻¹)	Duration (sec)	Outdoor Temperature (°C)
SDRCT1_C1	TSKTM1_C1	> STAROTP_C
SDRCT1_C2	TSKTM1_C2	≤ STAROTP_C

After the steady speed period is finished, the speed increases at the rate of $SDSTEP$ (min⁻¹) within $TSKSPT$ (sec) until the target speed is reached.



DEFROST

Reversing valve defrost system is employed: it consists of balancing period → reversing cycle period → balancing period.

(1) Defrost start condition

- When all the following conditions are established defrost is executed:
 - ① Normal operation
 - ② Heat exchange temperature is within defrost range specified by outdoor temperature and heat exchange temperature. (Defrost signal occurred).
 - ③ Defrost inhibit period linked to outdoor temperature has elapsed.

(2) Defrost release condition

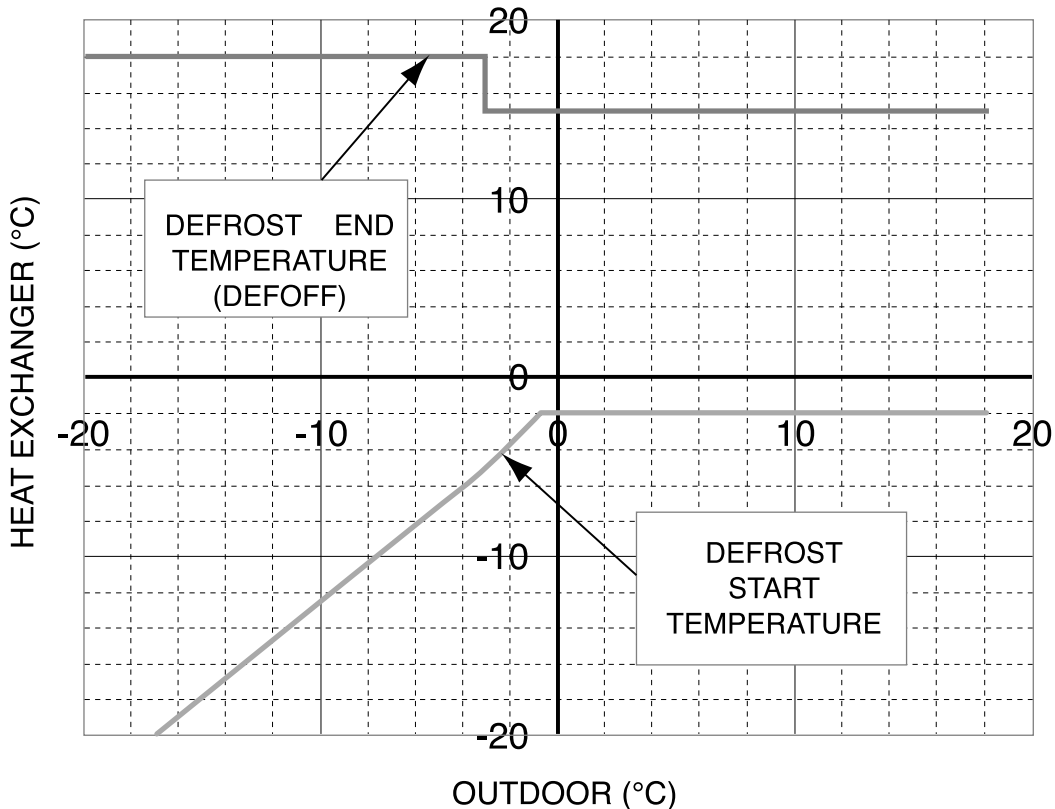
- If any of the following conditions is established, defrost is released:
 - ① Heat exchange temperature returns (heat exchange temperature ≥ DEFOFF).
 - ② Defrost max time of 12 minutes has elapsed.
- Released by condition ① during balancing period: When remaining balancing period has elapsed, returned to initial condition (ASTUS=0).
- Released by condition ① or ② during reverse cycle period: [TDF415_*U] shifted to balancing period.

(3) Output during defrost

- Indoor defrost request: Transmitted to all units being operated in heating mode.
- Compressor : Balancing period for [TDF414_*U] (min-1) → Starting of reverse cycle period by [SDRCT2] min⁻¹ for [TSKTM2] (sec) → Accelerating by [DFSTEP] (min-1) for duration [TDFSPT] (sec) in remaining reverse cycle period until defrost MAX speed [DEFMAX] is reached → Balancing period for [TDF415_*U] (sec).
- Electric expansion valve
 - Unit being stopped : [FULL CLOSE] 30 seconds after balancing period has passed → [FULL CLOSE] during reverse cycle period → [PCLOSH_d] 15 seconds before balancing period is finished
 - Unit being operated : [DFCTPS_d] 30 seconds before balancing period is finish → Synchronized with step-up of rotation speed of compressor, opened by [DFSPPS_d] pulse and reaches MAX opening degree [DFPSMX_d] when rotation speed of compressor reaches [DEFMAX].

* Indicate number of operating indoor unit.

RAM-53NP2B & RAM-53NP3B DEFROST TEMPERATURE

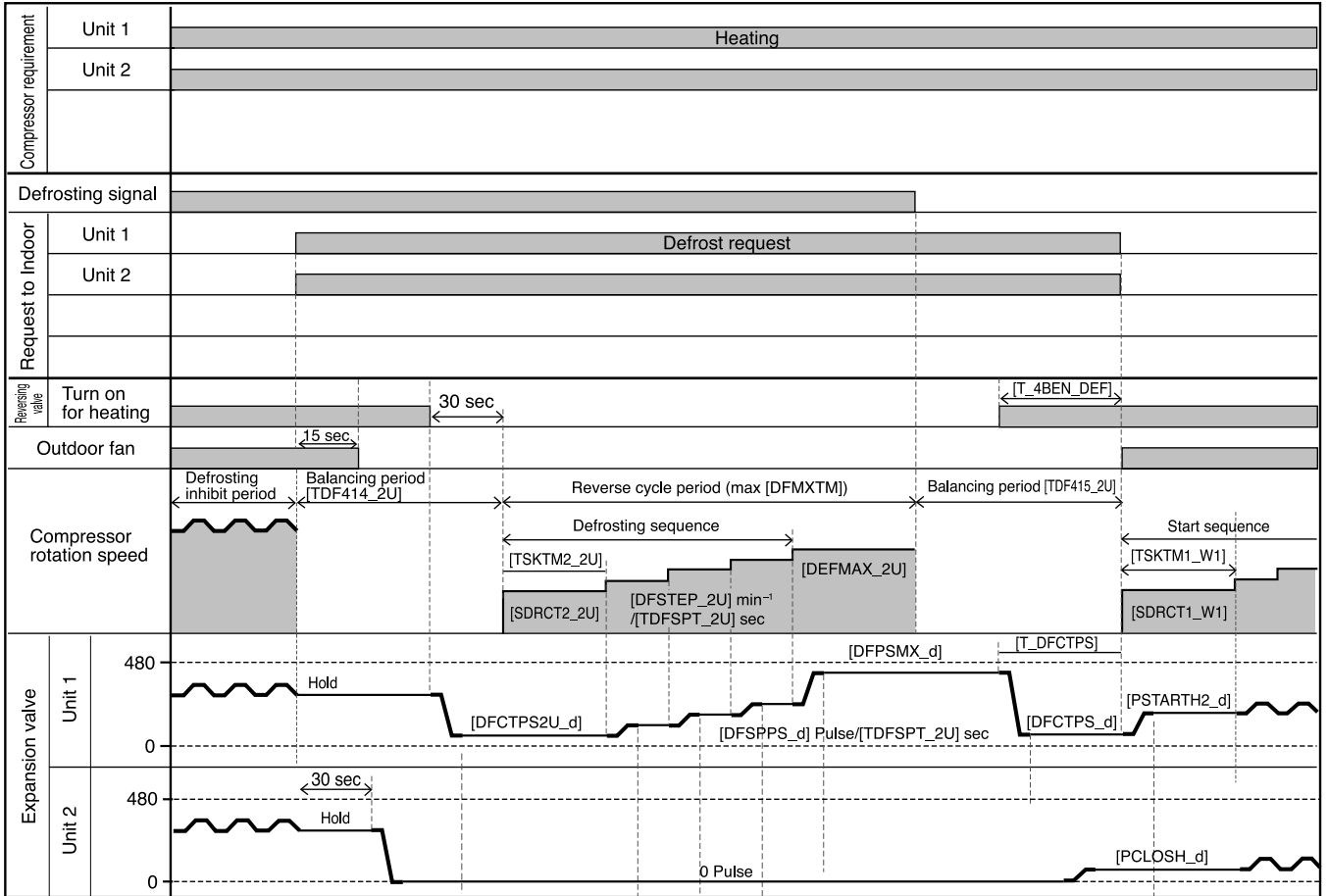


* above graph is showing the ideal value by micon program.

* guaranteed temperature range of this model is -15°C to +21°C at heating.

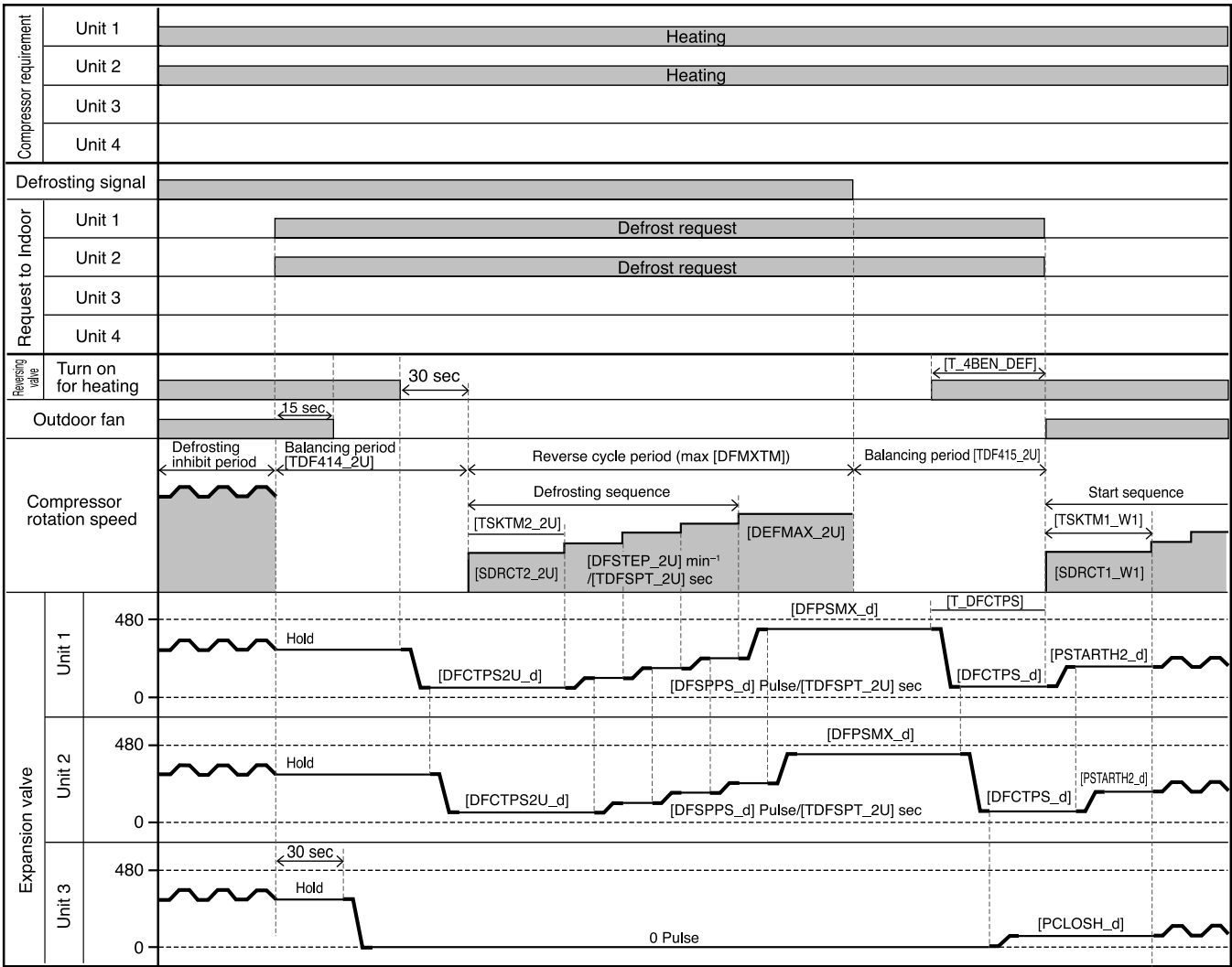
MODEL RAM-53NP2B

- Time chart when executing defrost (Unit 1 operated and Unit 2 stopped)



MODEL RAM-53NP3B

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



AUTO-FRESH DEFROST

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

Auto-fresh consists of balancing period at start of defrost for [TDF414_*U] seconds → Reverse cycle period for MAX 12 minutes.

(1) Start conditions for auto-fresh

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

(2) Release condition of auto-fresh

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

(3) Outputs during auto-fresh

[Indoor unit defrost request]: Transmitted only to unit to which auto-fresh is applied (indoor unit stopped last).

[Compressor]: Accelerated by DFSTEP $\text{min}^{-1}/\text{TDFSPT}$ seconds and reaches defrost MAX speed [DEFMAX].

[Electric expansion valve]:

Unit auto-fresh not applied: FULL CLOSE when balancing for 30 seconds has elapsed at start of defrost.

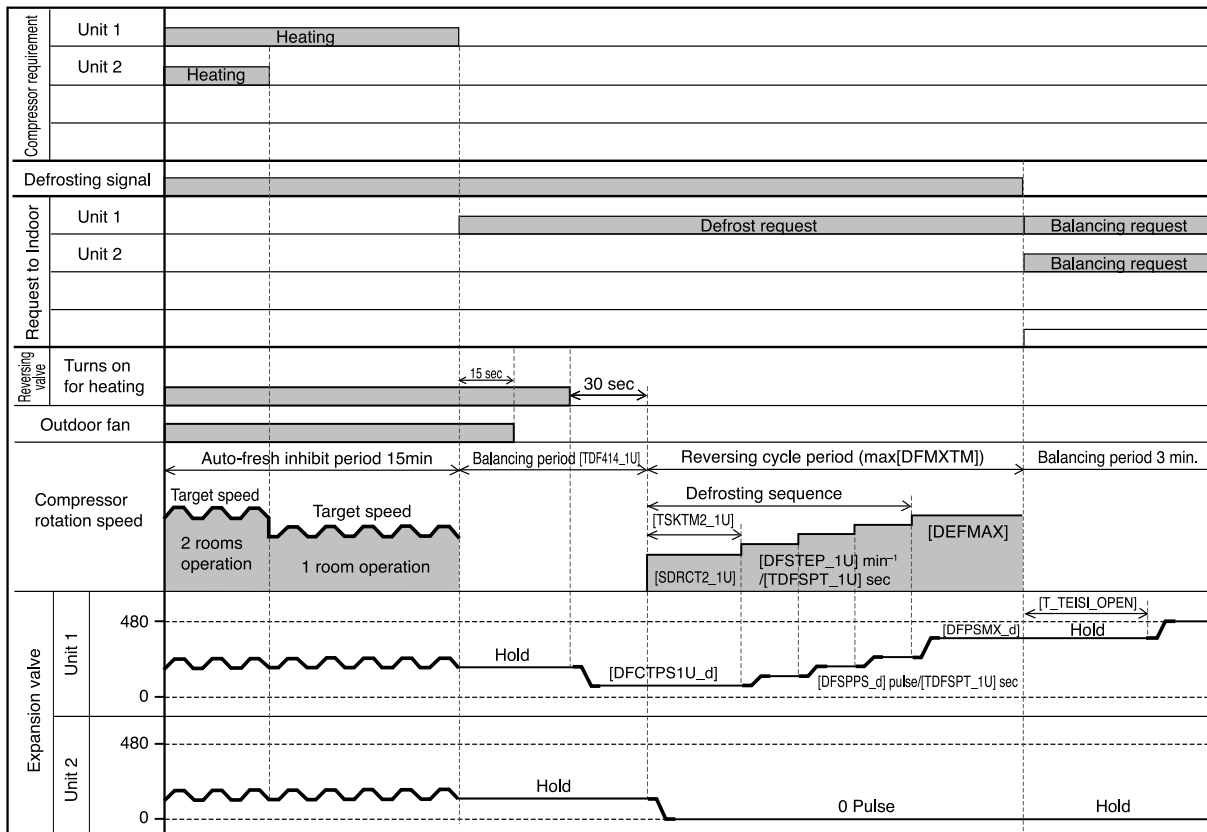
Unit auto-fresh applied : Synchronized with step-up of rotation speed of compressor, opened by [DFSPPS_d] pulses and reaches MAX opening degree [DEFSMX_d] when rotation speed of compressor reaches [DEFMAX].

(4) Note

- Shifted to auto-fresh in defrost mode when operation is stopped.
- All indoor units must be stopped to fulfill condition for auto-fresh.
- If signal is delayed, auto-fresh condition will not be established.

MODEL RAM-53NP2B

* Indicate number of operating unit.



MODEL RAM-53NP2B

FORCED COOLING

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

[Execution condition]

- With indoor unit 1 2 not operated, when forced cooling switch is turned ON, forced cooling will be performed.
- Always operation status of indoor units are monitored and forced cooling is inhibited when operation of any unit is detected.

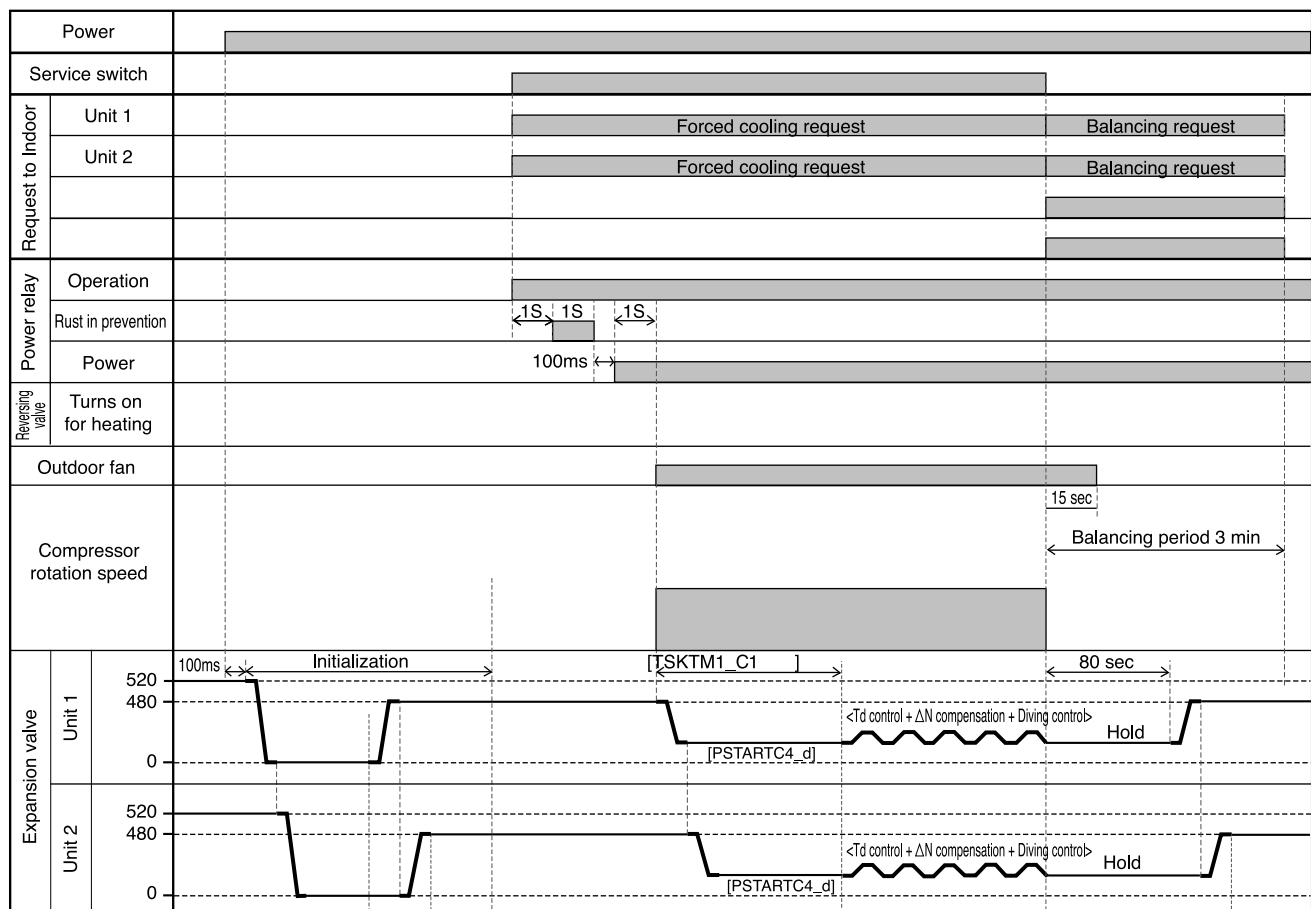
[Operation status]

- Outdoor unit fan: Fixed in LO.
- Compressor rotation speed: Fixed in 3000min⁻¹.
- Expansion valve/reversing valve : Set in normal conditions.

[Note]

- During forced cooling, if failure occurs in outdoor unit, thermostat is turned off. However, it is not counted.
- Since rotation speed of compressor is fixed in 3000min⁻¹ during forced cooling, steady speed period of compressor at start is not performed.

- The following shows the operation state of forced cooling.



※ TSKTM1_C and PSTARTC2\$ are EEPROM data.

MODEL RAM-53NP3B

FORCED COOLING

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

[Execution condition]

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

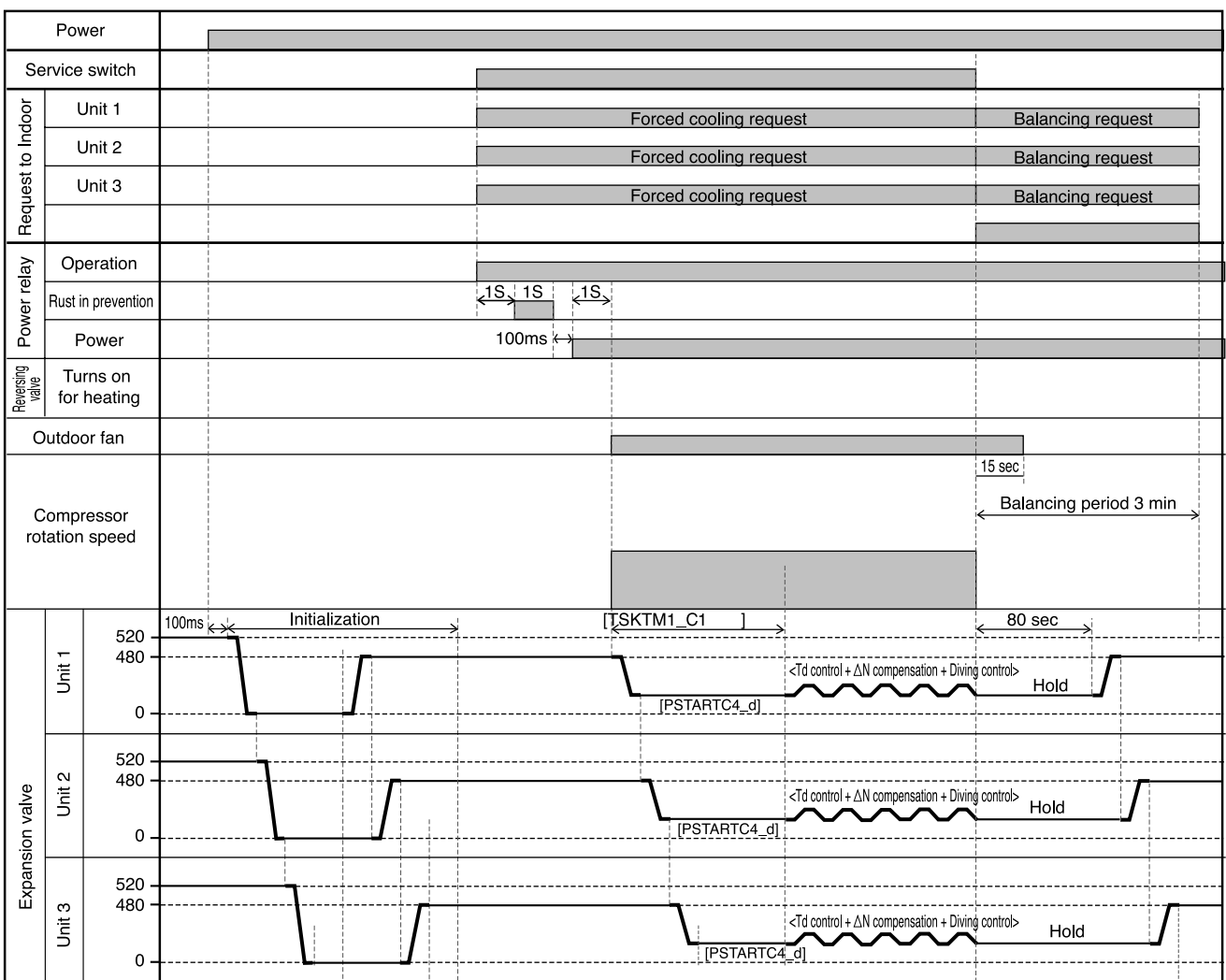
[Operation status]

- Outdoor unit fan: Fixed in LO.
- Compressor rotation speed: Fixed in 3000min⁻¹.
- Expansion valve/reversing valve : Set in normal conditions.

[Note]

- During forced cooling, if failure occurs in outdoor unit, thermostat is turned off. However, it is not counted.
- Since rotation speed of compressor is fixed in 3000min⁻¹ during forced cooling, steady speed period of compressor at start is not performed.

- The following shows the operation state of forced cooling.



※ TSKTM1_C and PSTARTC2\$ are EEPROM data.

MODEL RAM-53NP2B

PROCESSING AT OVERHEAT THERMISTOR (OH) HIGH TEMPERATURE

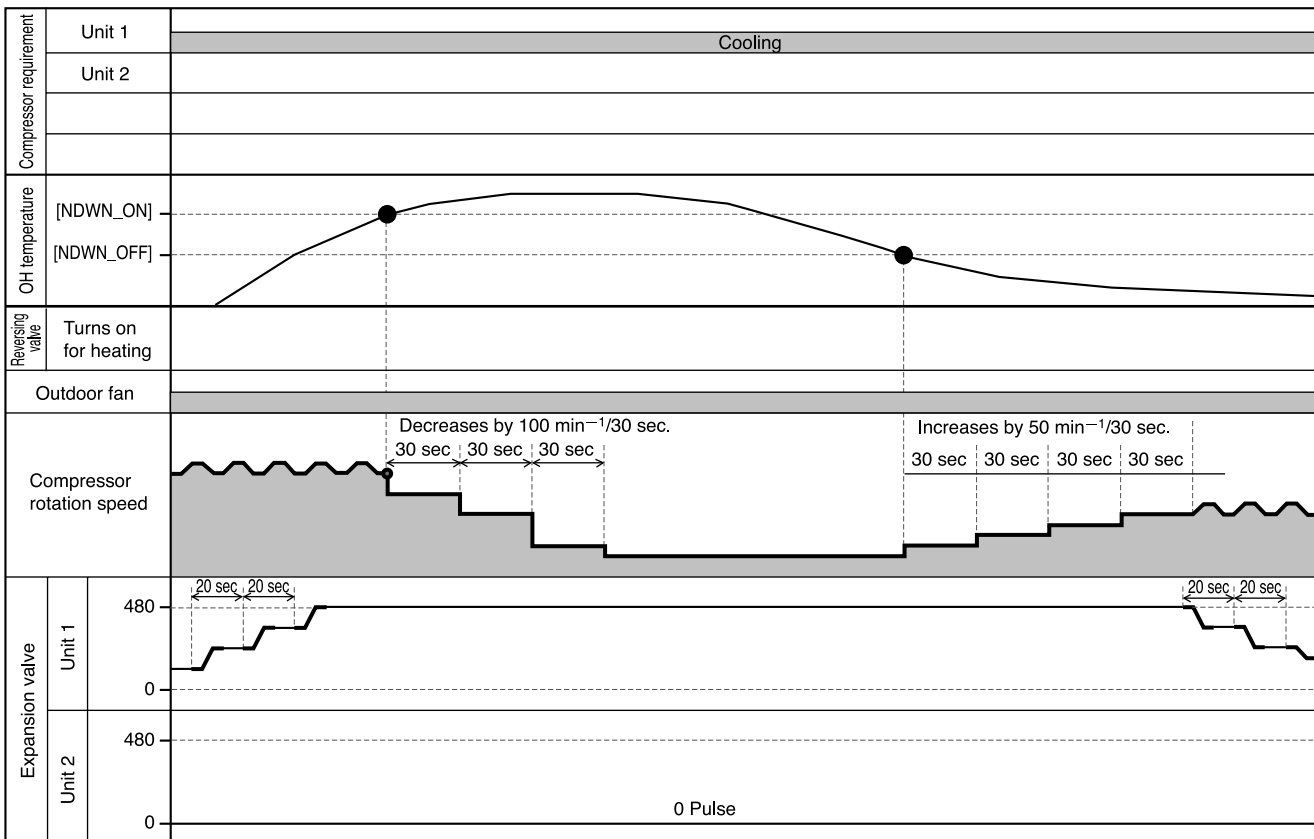
◇ Restriction Start Conditions

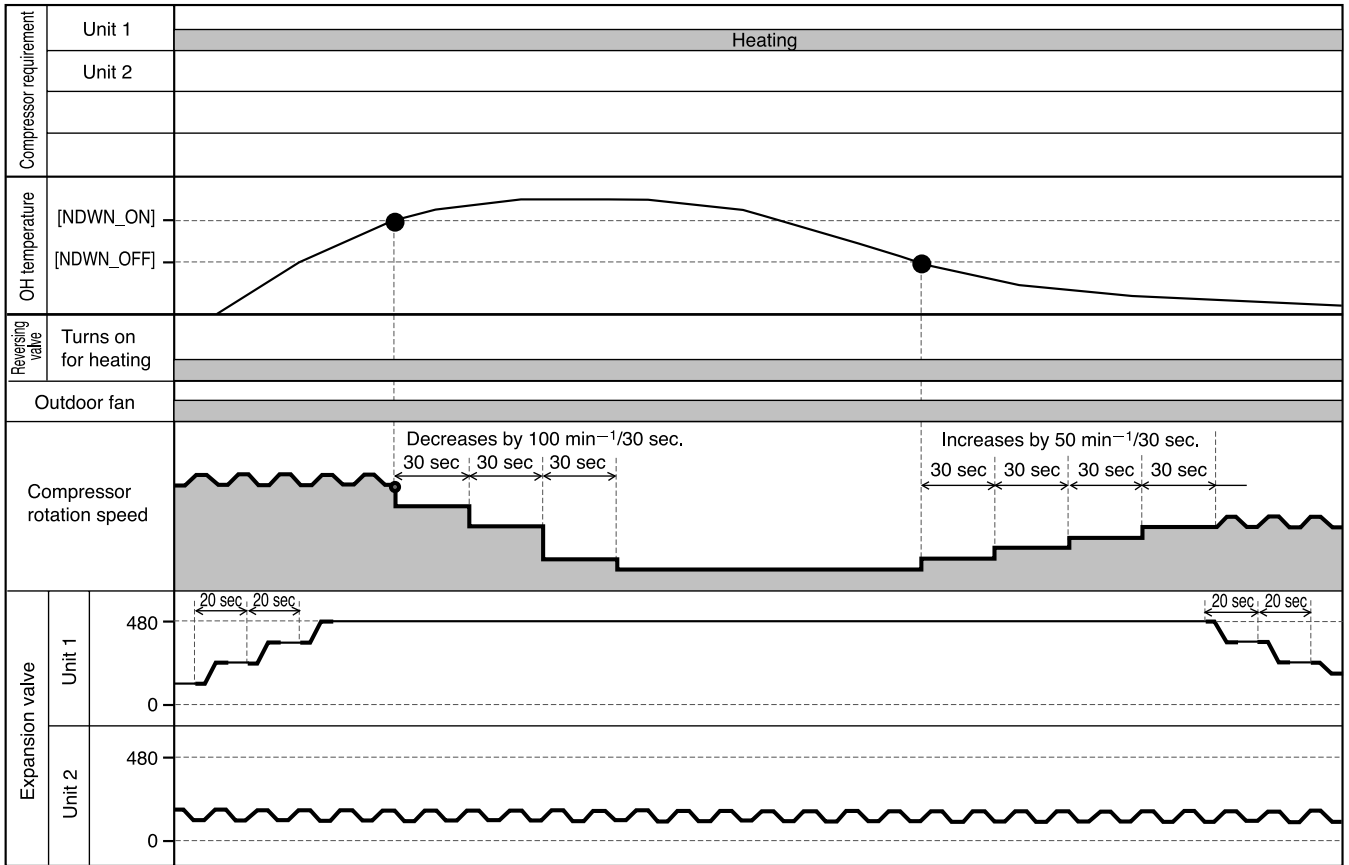
- If any expansion valve is operated at 480 pulses and the OH temperature > [NDOWN_ON], the compressor speed will be reduced at a rate of 100 min⁻¹/30 seconds.
- This reduced rotation speed is based on the speed when the reduction started, and will be maintained until the reduction is finished. However, the reference speed will be exchanged only if the target speed is lower than the speed when the reduction started.
- If [NDOWN_OFF] ≤ OH temperature ≤ [NDOWN_ON] and the OH temperature does not rise from that 20 seconds before, the reduction of compressor speed will not occur.

◇ Restriction Release Condition (in common for all)

- The restriction will be released when OH temperature < [NDOWN_OFF], and the compressor speed will be increased at a rate of 50 min⁻¹/30 seconds to restore the target speed.

When one unit is operated for cooling





MODEL RAM-53NP3B

PROCESSING AT OVERHEAT THERMISTOR (OH) HIGH TEMPERATURE

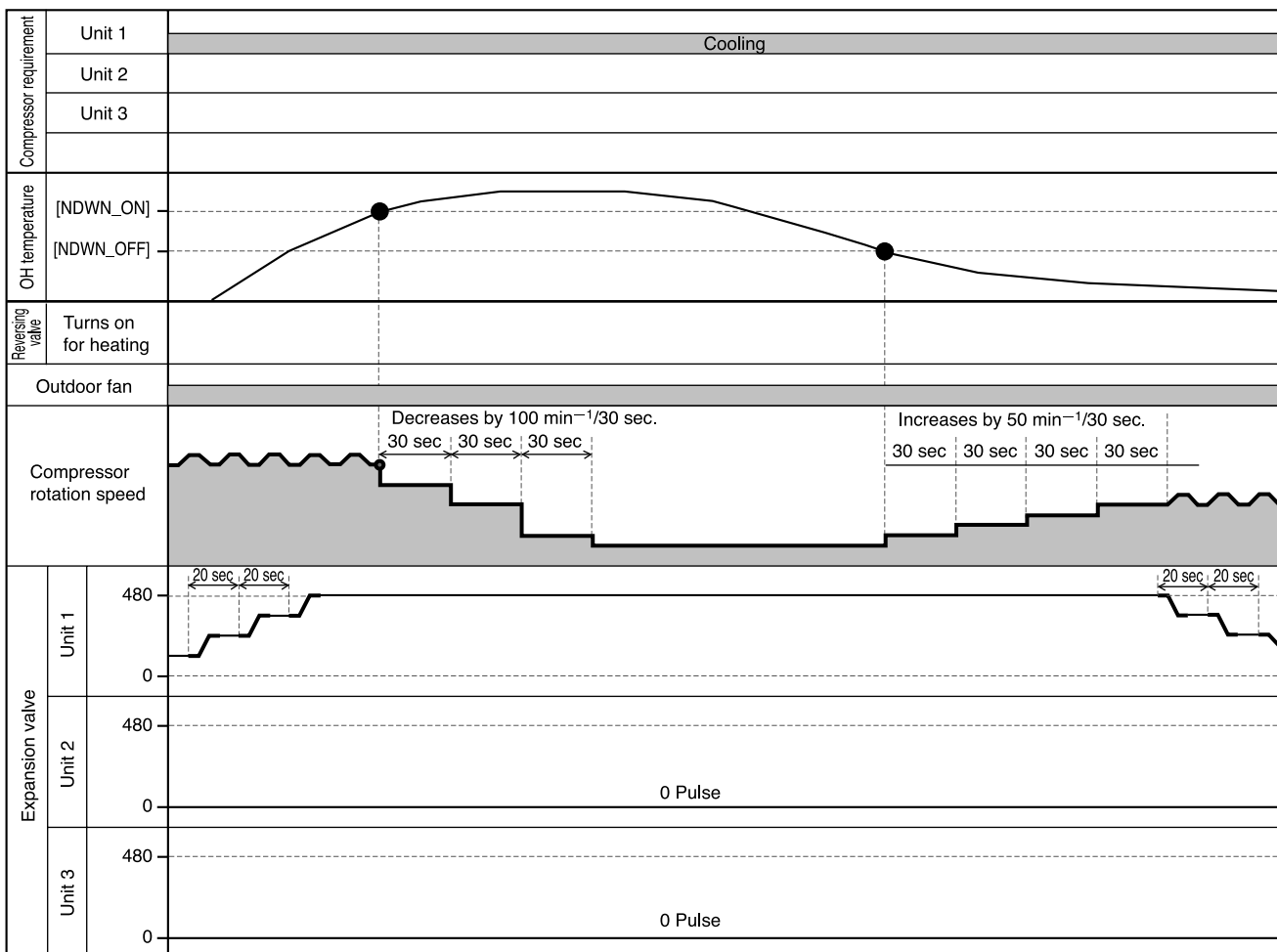
◇ Restriction Start Conditions

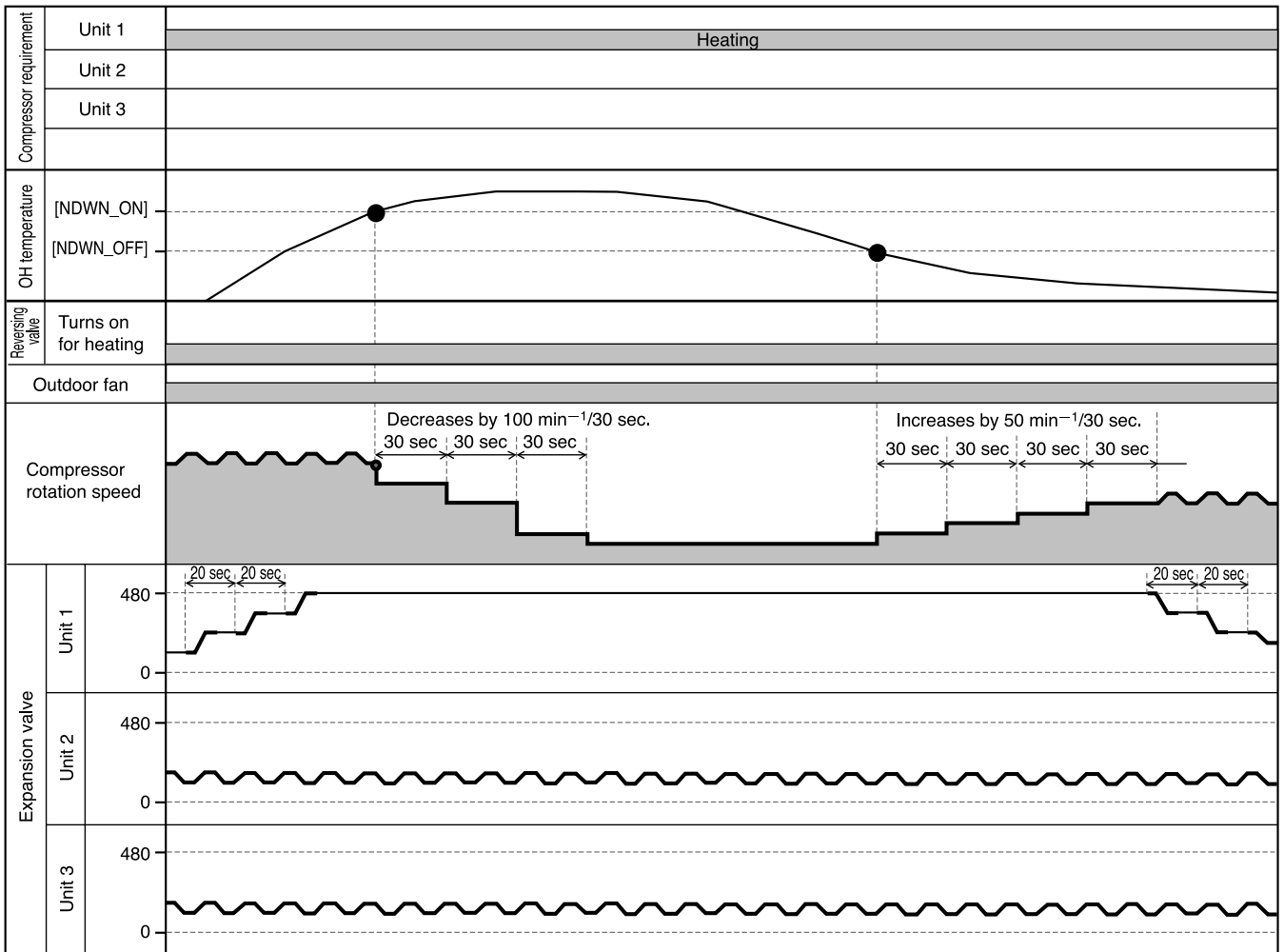
- If any expansion valve is operated at 480 pulses and the OH temperature > [NDWN_ON], the compressor speed will be reduced at a rate of 100 min⁻¹/30 seconds.
- This reduced rotation speed is based on the speed when the reduction started, and will be maintained until the reduction is finished. However, the reference speed will be exchanged only if the target speed is lower than the speed when the reduction started.
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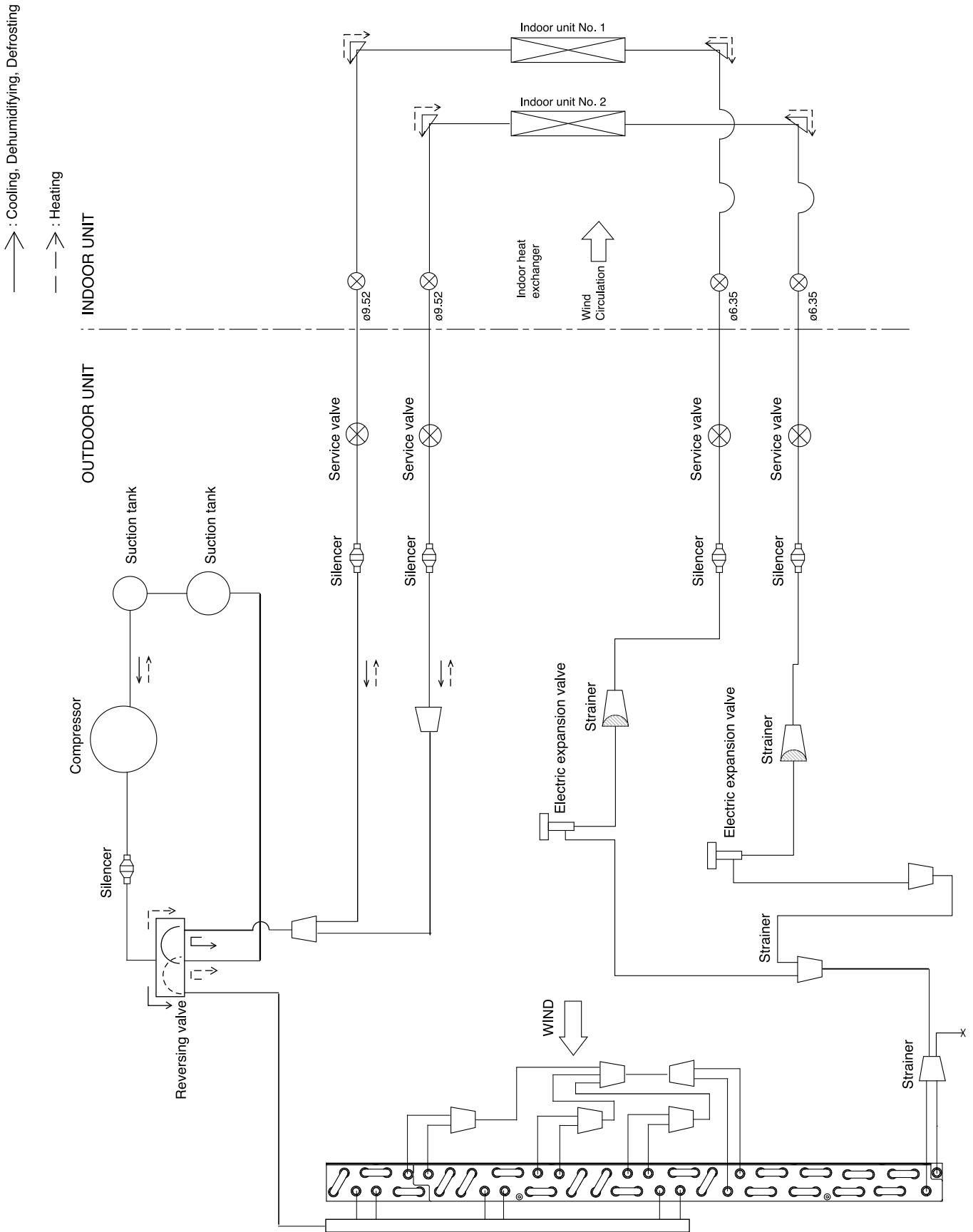
When one unit is operated for cooling





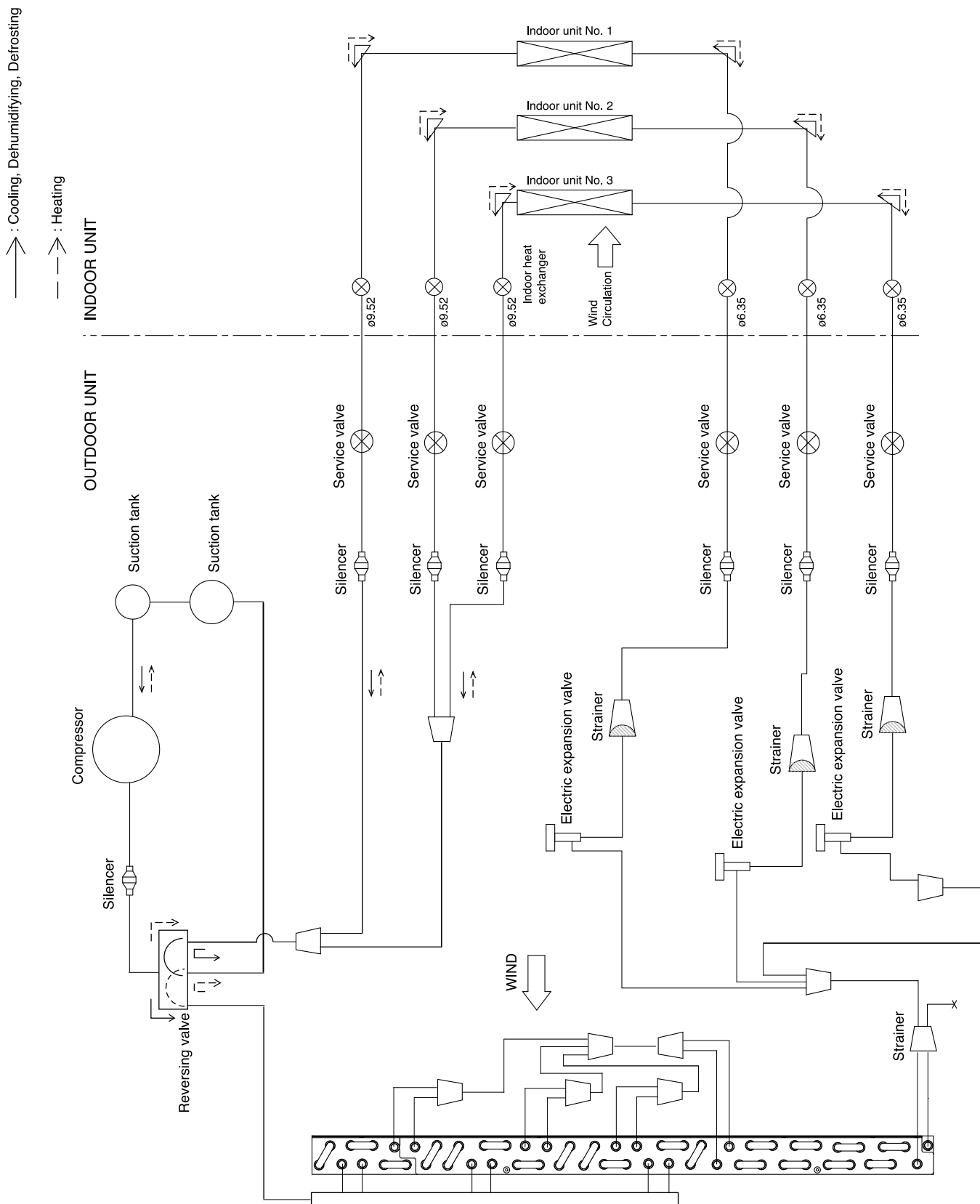
REFRIGERATING CYCLE DIAGRAM

MODEL RAM-53NP2B



REFRIGERATING CYCLE DIAGRAM

MODEL RAM-53NP3B



DESCRIPTION OF MAIN OPERATION CIRCUIT

RAM-53NP2B

1. Main Power Supply Circuit

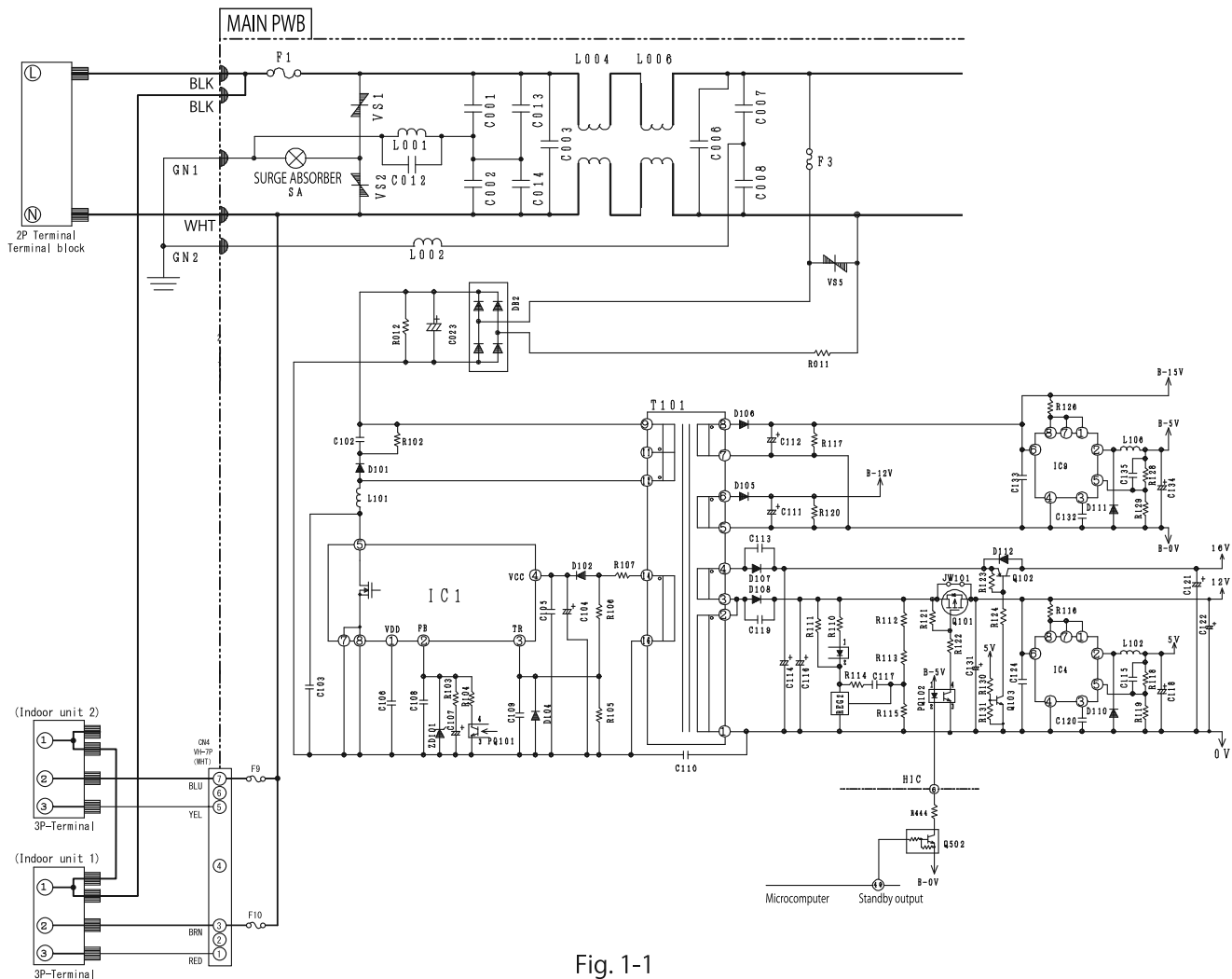


Fig. 1-1

- AC 220~240V power supplied to the 2P terminal block is supplied to DB2 via the noise filter circuit, 2A fuse (F3), and varistor (VS5). High-voltage DC smoothed by DB2 and C023 is used to create DC voltage on the transformer's secondary side by the switch control IC (IC1) and switching transformer.
- Secondary side DC voltage is used in the following six systems:
 - (1) B-15V : Power supply for communication circuits between outdoor and indoor
 - (2) B-5V : Power supply for main microcomputer and peripheral circuits
 - (3) B-12V : Operating power supply for electric expansion valve
 - (4) 16V : Power supply for compressor motor drive IPM and fan motor drive IPM
 - (5) 12V : Power supply for reversing valve relay, power relay, in-rush current relay, and operating amplifier for compressor motor and fan motor current amplification
 - (6) 5V : Power supply for inverter microcomputer and peripheral circuits
- Primary Components
 - (1) C001, C002, C012, C013, C014, C007, C008, L004, L006
Absorb electrical noise generated during operation of the compressor, and reduce noise level emitted to the power line.
 - (2) Surge absorber, varistor 1, 2, 5
Absorb external surges, such as induced lightning.
 - (3) IC1
IC for control of switching power.
 - (4) IC4
DC/DC converter IC for generating 5V from 12V.
 - (5) IC9
DC/DC converter IC for generating B-5V from B-15V.

DESCRIPTION OF MAIN OPERATION CIRCUIT

RAM-53NP3B

1. Main Power Supply Circuit

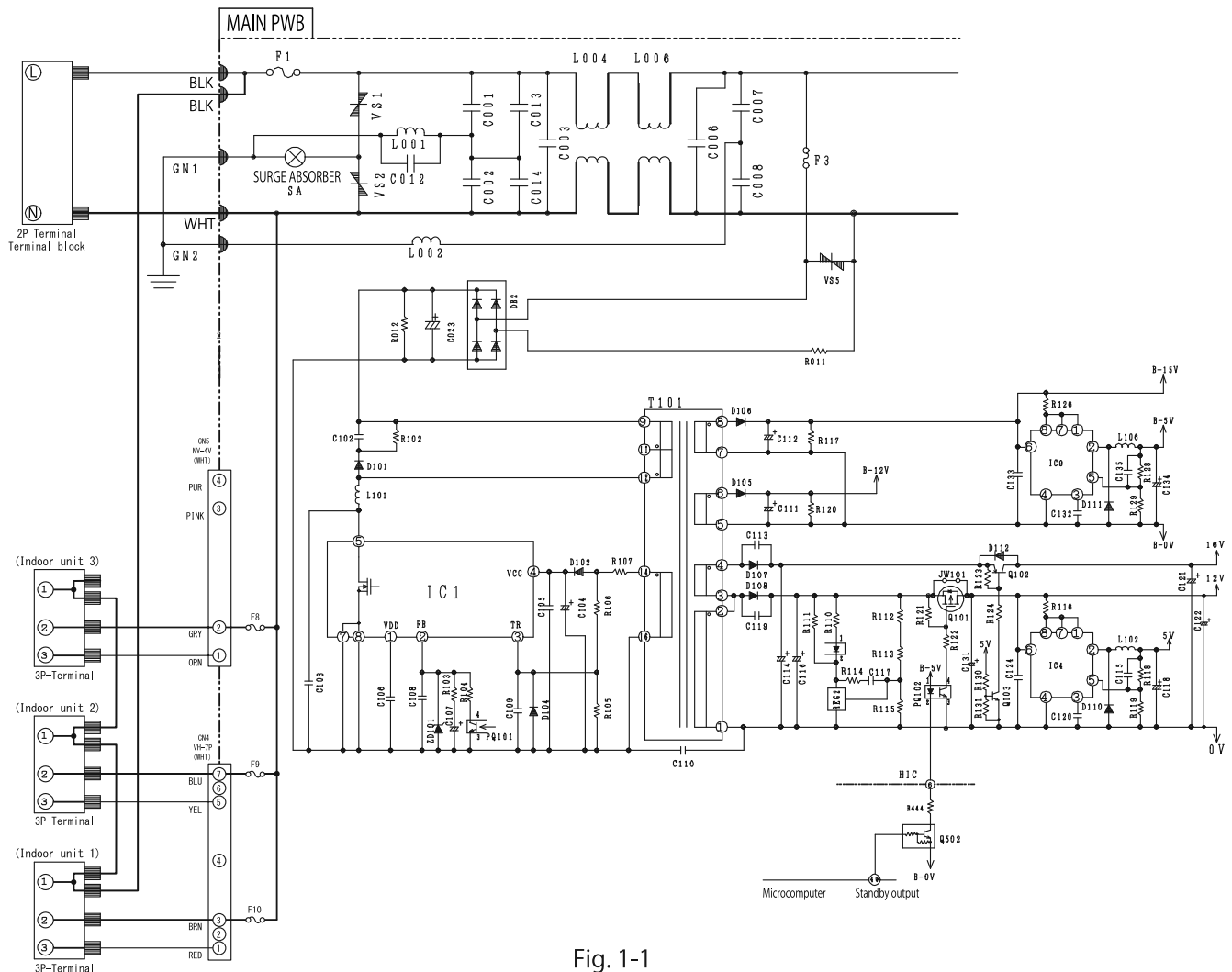


Fig. 1-1

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 - (6) 5V : Power supply for inverter microcomputer and peripheral circuits
- Primary Components
 - (1) C001, C002, C012, C013, C014, C007, C008, L004, L006
Absorb electrical noise generated during operation of the compressor, and reduce noise level emitted to the power line.
 - (2) Surge absorber, varistor 1, 2, 5
Absorb external surges, such as induced lightning.
 - (3) IC1
IC for control of switching power.
 - (4) IC4
DC/DC converter IC for generating 5V from 12V.
 - (5) IC9
DC/DC converter IC for generating B-5V from B-15V.

● Inverter Microcomputer Power Control

The power to the inverter microcomputer is turned ON/OFF by commands from the main microcomputer. Q502, PQ102, Q101, and Q102 are related.

● Specifications and Checkpoints for Main Power Supply Circuits

Output Name	Voltage Specification	Primary Load	± Measurement Location	Examples of Possible Failure Modes for Output Failures (for Reference)
B-15V output	15.5 ±1.5 V	Indoor/outdoor communication	Tester ⊕ terminal: B-15V indicator (L107) Tester ⊖ terminal: B-0V indicator (J5)	LD401 ~ LD402 (green) do not light or blink.
B-12V output	12 +4,-2 V	Expansion valve	Tester ⊕ terminal: B-12V indicator (R120) Tester ⊖ terminal: B-0V indicator (J5)	LD351 (red) blinks 5 or 6 times (related to refrigerant cycle error) and stops.
B-5V output	5 ±0.4 V	Main microcomputer thermistor	Tester ⊕ terminal: B-5V indicator (J4) Tester ⊖ terminal: B-0V indicator (J5)	LD353 (green) does not blink. LD351 (red) does not blink. Outdoor unit does not operate.
5V output	5 ±0.4 V	Inverter microcomputer	Tester ⊕ terminal: 5V indicator (R814) Tester ⊖ terminal: 0V indicator (C891)	LD351 blinks 8 times.
12V output	12 ±1 V	IC2, 3, 4, 5, 6 relay circuits	Tester ⊕ terminal: 12V indicator (WH65-2) Tester ⊖ terminal: 0V indicator (C891)	LD351 blinks 2, 4, 8 or 14 times and then stops..
16V output	15.5 ±1.5 V	Compressor IPM DC fan drive circuit Converter circuit	Tester ⊕ terminal: 16V indicator (J9) Tester ⊖ terminal: 0V indicator (C891)	LD351 blinks 3, 4 or 12 times and then stops.

- Check each voltage. If the above specifications are satisfied, the main power supply circuit can be considered normal.
- Due to high voltage, be particularly careful to avoid electric shock. Further, take care to avoid short-circuit accidents caused by incorrect connection of measuring instruments. Otherwise, the board could be damaged.
- Even after the power is turned off, an electric charge remains in the smoothing capacitor, and a voltage of 260V to 360V is applied between the terminals of the smoothing capacitor.

2. Converter Circuit

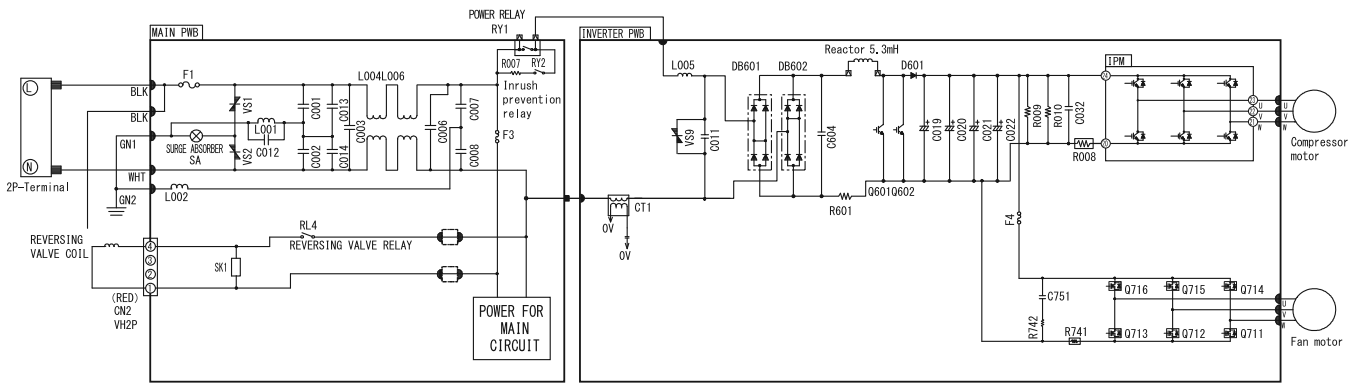


Fig. 2-1

- This circuit rectifies the AC220-240V between L and N on the 2P terminal block, and creates a DC voltage. During operation of the compressor, the rectified circuit voltage is approximately (DC320V - 360V).

● Primary Components

- (1) Intelligent Power Module (IPM)
used for configuration of inverter section.
- (2) Diode bridge (DB601, DB602)
Rectifies AC220-240V from terminal blocks L and N to a DC power supply.

Reference:

- In case of IPM failure or poor connection, immediately after starting the compressor, it might stop due to abnormal speed reduction, switching failure, Ip cut, etc.

Reference:

- If there is a failure in the diode bridge (DB601, DB602), DC voltage is not generated and operation might not occur.

(3) Smoothing Capacitor (C019~022, 500 μ F, 450V)

Boosts and smoothes (averages) voltage rectified by the diode.

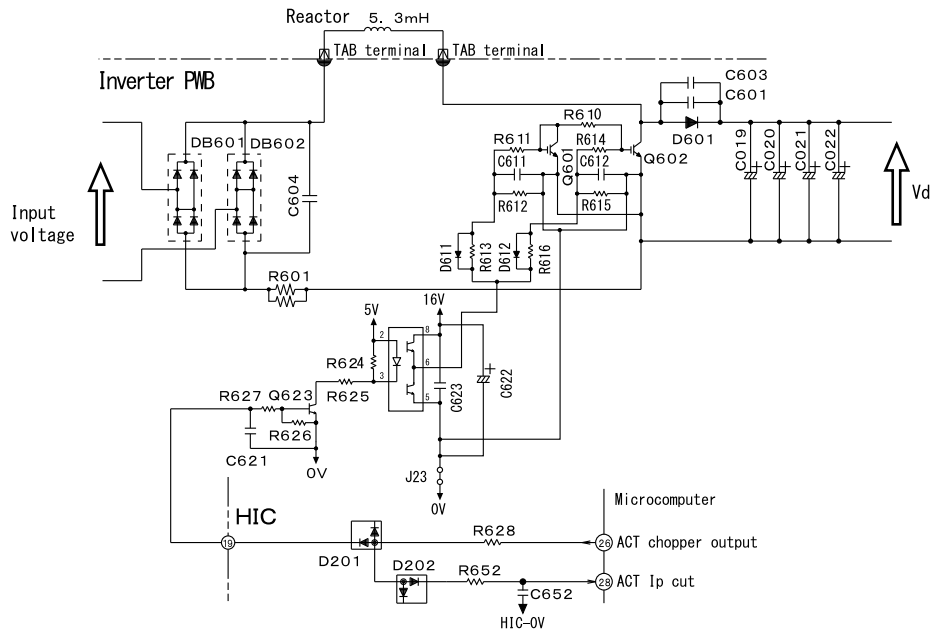


Fig. 2-2

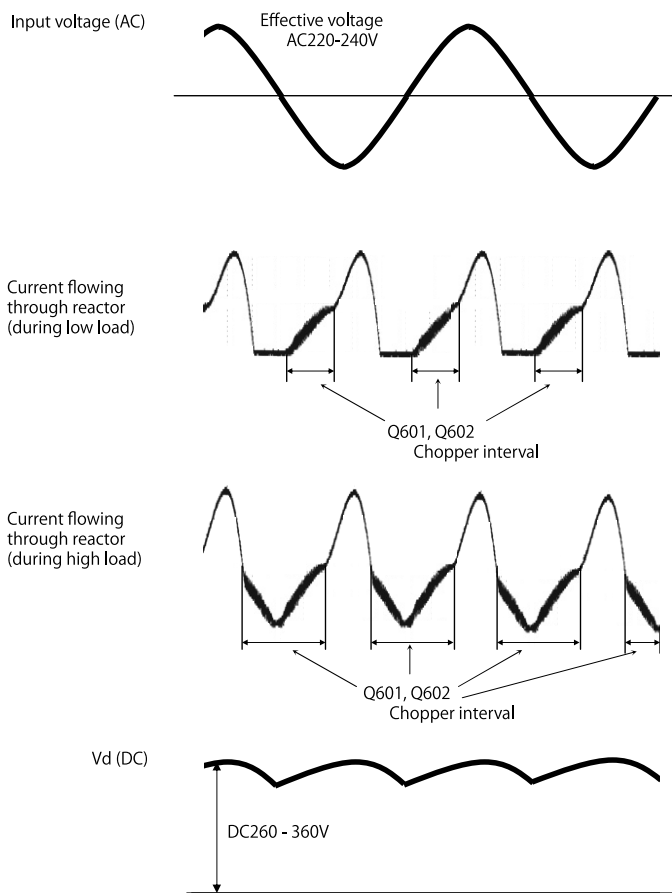


Fig. 2-3

(4) IGBT for improving power factor (Q601, Q602)

When load on the compressor increases, the power factor is improved by applying current to the chopper interval between Q601 and Q602 shown in Fig. 2-3.

3. Reversing Valve Control Circuit

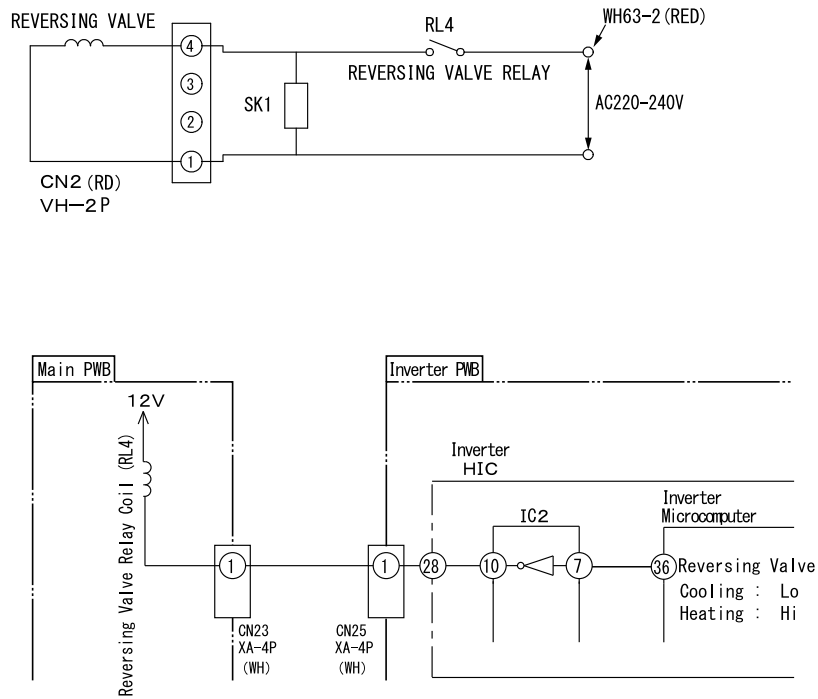


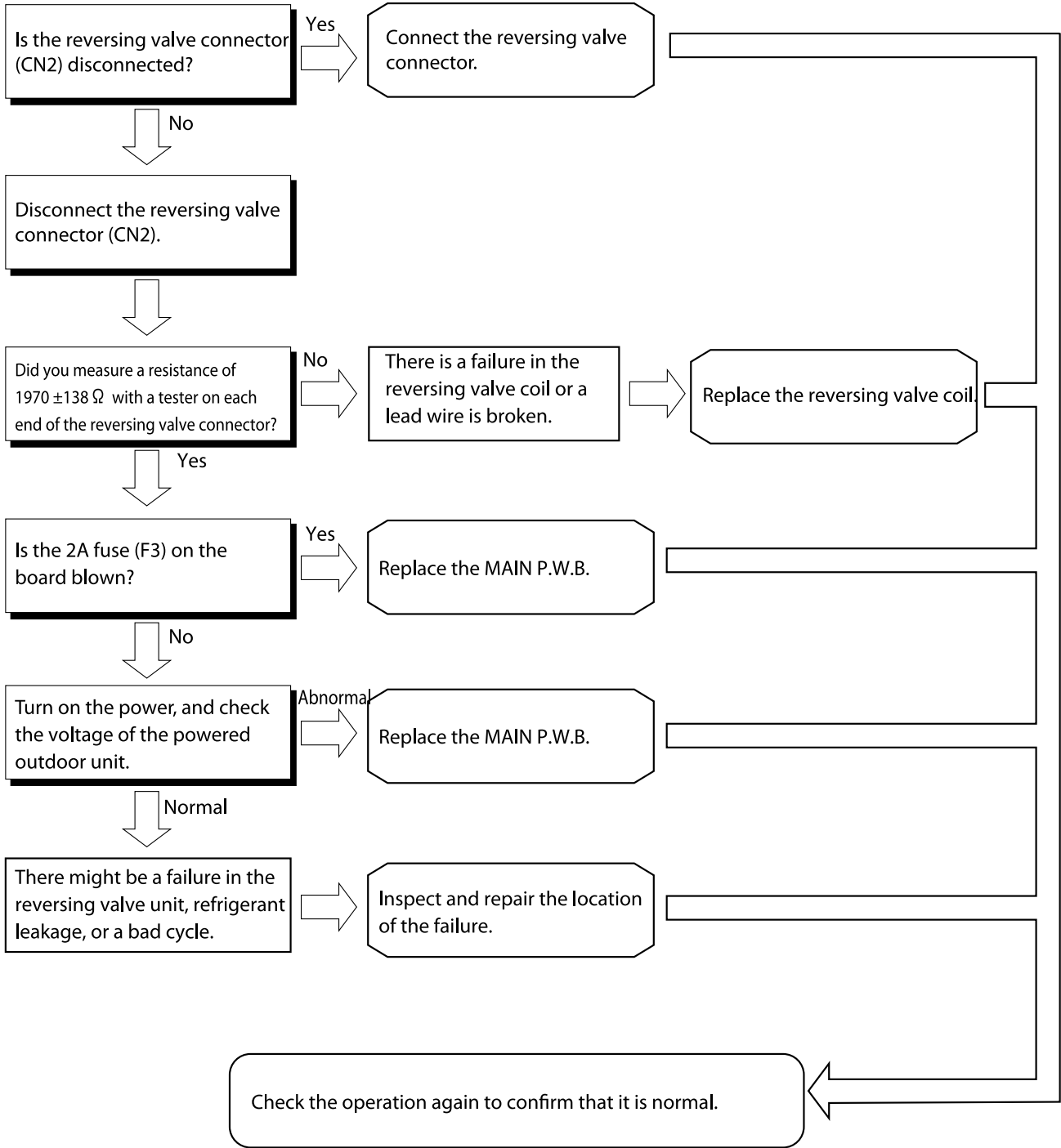
Figure 3-1

- The reversing valve is controlled by operation commands from the indoor microcomputer. Current is applied to the reversing valve coil in the direction designated for each operation mode to slide the valve.
- Before checking the power to the reversing valve, remove the CN2 connector, measure the resistance at both ends of the connector to see if it is $1970 \pm 138 \Omega$. Perform the following power checks only if the result of this check is normal. If this check produces an abnormal result, either a lead wire is broken or there is a failure in the reversing valve.
- Voltage at each point is approximately as shown below table when measure by tester.
(When voltage between pin 1 to pin 4 of CN2 is measured).

Operation Condition		Voltage between pin 1 to pin 4 of CN 2
Cooling	General operation of cooling	About 0V
Heating	In normal heating operation	About AC 220-240V
	MAX. rotation speed instructed by indoor microcomputer after defrost is completed.	About AC 220-240V
	Defrosting	About 0V

Inspection when Timer Lamp on Indoor Unit Flashes Once

Note: Be sure to turn the power off before performing the following inspection.



4. Temperature Detection Circuit

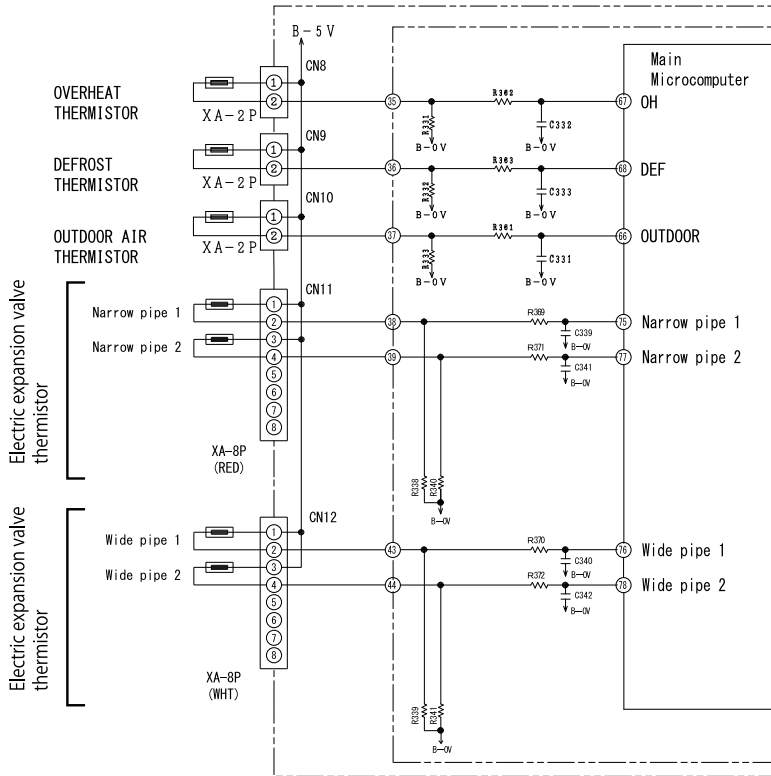


Fig. 4-1

- The OH thermistor circuit detects compressor head surface temperature, the DEF thermistor circuit detects defrost operating temperature, and the outside air temperature thermistor circuit detects the outside air temperature. In addition, the electric expansion valve thermistor (narrow pipe 1) detects the temperature of narrow pipe going to indoor unit 1 and (wide pipe 1) detects the temperature of the wide pipe going to indoor unit 1. (Narrow pipe 2) and (wide pipe 2) are for indoor unit 2.
- Thermistors are negative resistance elements. The resistance value grows smaller as the temperature rises, and grows larger as the temperature falls.
- If the compressor overheats, the resistance value of the OH thermistor grows smaller. B-5V is divided between the OH thermistor and R331, and therefore the voltage of pin ⑦① on the main microcomputer rises.
- The voltage of pin ⑦① on the main microcomputer is compared with the value set and stored internally. If the set value is exceeded it is determined that the compressor has overheated, and operation is stopped.
- If frost accumulates on the outdoor heat exchanger, the temperature of the heat exchanger will fall rapidly. Therefore, the resistance value for DEF thermistor grows large and the voltage of pin ⑦② on the microcomputer falls. If this voltage drops below the value set and stored internally, defrosting of the main microcomputer will start.
- Outdoor temperature is read by the outdoor temperature thermistor (voltage of pin ⑦③ on the microcomputer). Commands from the indoor microcomputer, values read from the outdoor temperature thermistor, and values read from the OH thermistor are taken into account to control the speed of the compressor and the speed of the outdoor fan. Typical values that indicate the relationship between outdoor temperature and voltage are shown below.

Table 4-1

Outdoor temperature (°C)	-10	0	10	20	30	40
Voltage (V) at both ends of R333	1.19	1.69	2.23	2.75	3.22	3.62

- The temperatures at narrow pipe 1 - 2 and wide pipe 1 - 2 are read by thermistors, and the amount that electric expansion valves 1 - 2 are opened is changed to control the distribution of refrigerant.

Reference:

When a thermistor is open and disconnected, pins ⑦⑥ - ⑦⑧ and ⑦⑤ - ⑦⑧ on the main microcomputer are approximately 0V. When there is a short-circuit in a thermistor, these pins are approximately 5V, LD351 will lit and LD352 blinks during standby mode or running. Except for overheat thermistor, if there is a short-circuit in a overheat thermistor the LED indication during standby mode and running will be different as below Table 4-2.

The number of blinks by LD352 indicates the area/portion in unit that thermistor detect have problem.

Table 4-2

Unit condition	LD351 indication	LD352 indication
Standby Mode	Lit	1 time blinking
Running	6 times blinking	Off

4. Temperature Detection Circuit

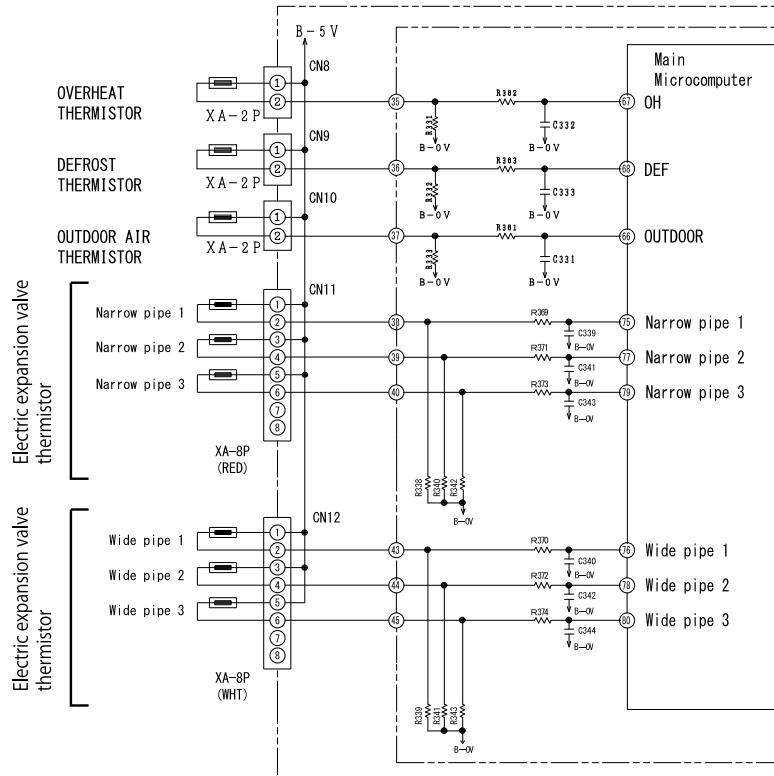


Fig. 4-1

- The OH thermistor circuit detects compressor head surface temperature, the DEF thermistor circuit detects defrost operating temperature, and the outside air temperature thermistor circuit detects the outside air temperature. In addition, the electric expansion valve thermistor (narrow pipe 1) detects the temperature of narrow pipe going to indoor unit 1 and (wide pipe 1) detects the temperature of the wide pipe going to indoor unit 1. (Narrow pipe 2) and (wide pipe 2) are for indoor unit 2. (Narrow pipe 3) and (wide pipe 3) are for indoor unit 3.
- Thermistors are negative resistance elements. The resistance value grows smaller as the temperature rises, and grows larger as the temperature falls.
- If the compressor overheats, the resistance value of the OH thermistor grows smaller. B-5V is divided between the OH thermistor and R331, and therefore the voltage of pin 67 on the main microcomputer rises.
- The voltage of pin 67 on the main microcomputer is compared with the value set and stored internally. If the set value is exceeded it is determined that the compressor has overheated, and operation is stopped.
- If frost accumulates on the outdoor heat exchanger, the temperature of the heat exchanger will fall rapidly. Therefore, the resistance value for DEF thermistor grows large and the voltage of pin 68 on the microcomputer falls. If this voltage drops below the value set and stored internally, defrosting of the main microcomputer will start.
- Outdoor temperature is read by the outdoor temperature thermistor (voltage of pin 69 on the microcomputer). Commands from the indoor microcomputer, values read from the outdoor temperature thermistor, and values read from the OH thermistor are taken into account to control the speed of the compressor and the speed of the outdoor fan. Typical values that indicate the relationship between outdoor temperature and voltage are shown below.

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Outdoor temperature (°C)	-10	0	10	20	30	40
Voltage (V) at both ends of R333	1.19	1.69	2.23	2.75	3.22	3.62

- The temperatures at narrow pipe 1 - 3 and wide pipe 1 - 3 are read by thermistors, and the amount that electric expansion valves 1 - 3 are opened is changed to control the distribution of refrigerant.

Reference:

When a thermistor is open and disconnected, pins 66 - 68 and 75 - 80 on the main microcomputer are approximately 0V. When there is a short-circuit in a thermistor, these pins are approximately 5V, LD351 will lit and LD352 blinks during stanby mode or running. Except for overheat thermistor, if there is a short-circuit in a overheat thermistor the LED indication during stanby mode and running will be different as below Table 4-2.

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Unit condition	LD351 indication	LD352 indication
Stanby Mode	Lit	1 time blinking
Running	6 times blinking	Off

5. Electric Expansion Valve Circuit

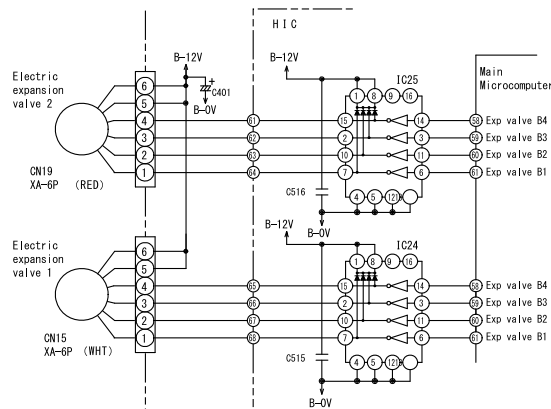


Fig. 5-1

- There are two electric expansion valves for indoor units 1-2.
- The electric expansion valves are powered by B-12V for expansion valves. 1- or 2-phase current is applied to 4-phase wound wires, switching the poles of the wound wires to control valve openings.
- The relationship between the switching direction of the current phase and the open/close direction of the valves is shown in the following table. When current is applied, approximately 0.9V passes through pins ①-④ of CN15 and CN19; when no current is applied, it is approximately 12V. When the power is reset, the expansion valve is initialized for approximately 35 seconds. During initialization, use a tester to measure pins ①-④ on CN15 and CN19. If there is a pin that does not change at approximately 0.9V or 12V, there is an abnormality in that expansion valve or the main microcomputer.
- The logic waveform for when an expansion valve operates is shown in Fig. 5-2.

Table 5-1

CN15, CN19 Pin No.	Lead wire	Power conditions							
		1	2	3	4	5	6	7	8
④	White	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
③	Yellow	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
②	Orange	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
①	Blue	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

Operation mode
 1→2→3→4→5→6→7→8 VALVE CLOSE
 8→7→6→5→4→3→2→1 VALVE OPEN

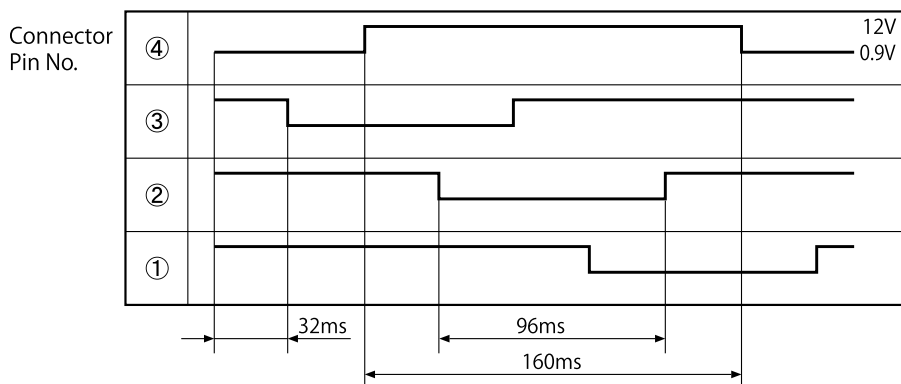


Fig. 5-2

When controlling an expansion valve, the temperature of the compressor head is detected and then the opening is adjusted to stabilize the valve to the target temperature.

This control cycle is performed once every 20 seconds, and a few pulses are output.

5. Electric Expansion Valve Circuit

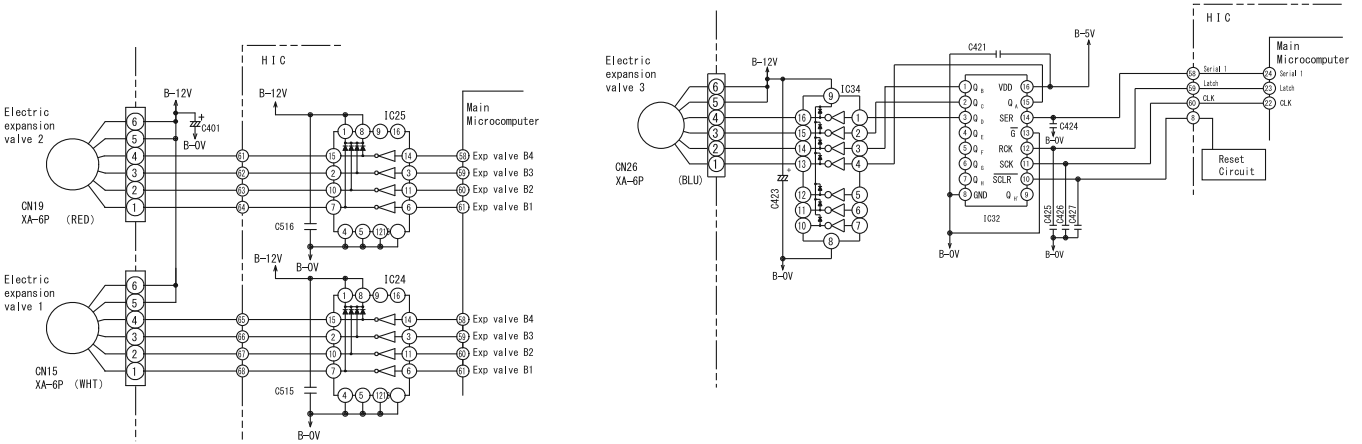


Fig. 5-1

- There are three electric expansion valves for indoor units 1-3.
- The electric expansion valves are powered by B-12V for expansion valves. 1- or 2-phase current is applied to 4-phase wound wires, switching the poles of the wound wires to control valve openings.
- The relationship between the switching direction of the current phase and the open/close direction of the valves is shown in the following table. When current is applied, approximately 0.9V passes through pins ①-④ of CN15, CN19, and CN26 ; when no current is applied, it is approximately 12V. When the power is reset, the expansion valve is initialized for approximately 35 seconds. During initialization, use a tester to measure pins ①-④ on CN15, CN19, and CN26. If there is a pin that does not change at approximately 0.9V or 12V, there is an abnormality in that expansion valve or the main microcomputer.
- The logic waveform for when an expansion valve operates is shown in Fig. 5-2.

Table 5-1

CN15, CN19, CN26 Pin No.	Lead wire	Power conditions							
		1	2	3	4	5	6	7	8
④	White	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
③	Yellow	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
②	Orange	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
①	Blue	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

Operation mode
 1→2→3→4→5→6→7→8 VALVE CLOSE
 8→7→6→5→4→3→2→1 VALVE OPEN

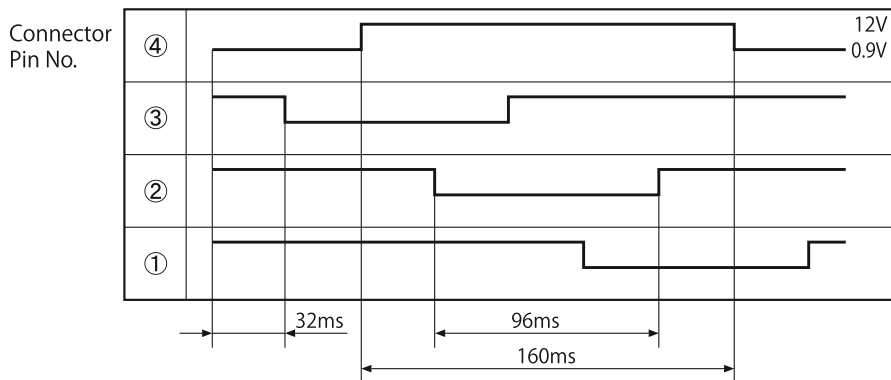


Fig. 5-2

When controlling an expansion valve, the temperature of the compressor head is detected and then the opening is adjusted to stabilize the valve to the target temperature. This control cycle is performed once every 20 seconds, and a few pulses are output.

- One (IC32) 8-bit type shift register ICs that convert serial signal input to parallel and output the parallel signals are used on the circuits of electric expansion valves 3.
- An example of circuit operation when an expansion valve is powered is shown in the time chart in Fig. 5-3.
 - ① A clock signal (16 cycles at 750μs/cycle) is output from pin ② on the microcomputer. (One cycle for the clock signal is 500μs off, 250μs on.)
 - ② A serial signal #1 of the power pattern is synced with the clock signal and output from pin ④ of the microcomputer. #1 The serial signal is the pattern of the current applied to phase 1 or phase 2 of a 4-phase wound wire on an expansion valve, that has then been converted to serial format. A serial signal is output so that the center of the ON serial signal (Hi-level 500μs) aligns with the rising edge of the clock signal.

The content of the shift register in IC is updated by operations① and ② described above.

Next, 250μs after the ON signal is output for the 16th cycle of the clock signal,

- ③ the latch signal from pin ③ on the microcomputer is turned OFF (Lo-level 500μs) and then ON again (Hi-level).
- ④ After the time required to apply current has elapsed, if powering of the expansion valve is required the cycle returns to ① and repeats the operation.

With the operation described above, the opening of expansion valves is controlled while applying current to phase 1 or phase 2 of a 4-phase wound wire on an expansion valve, according to the content of the shift register updated when the current is applied. When the opening of the expansion valve reaches the target amount, the stop pattern described in ② above is applied and then operations① - ④ are performed to complete the control of the expansion valve.

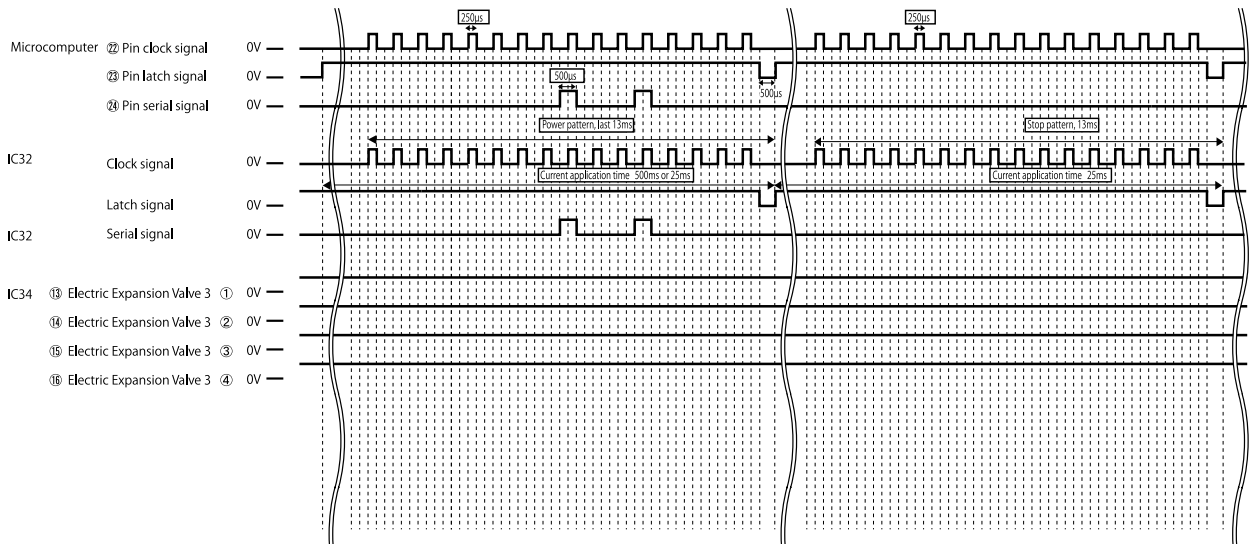


Fig. 5-3 Time Chart

6. Outdoor Fan Motor Control Circuit

- This outdoor unit is equipped with a built-in outdoor fan motor control circuit.

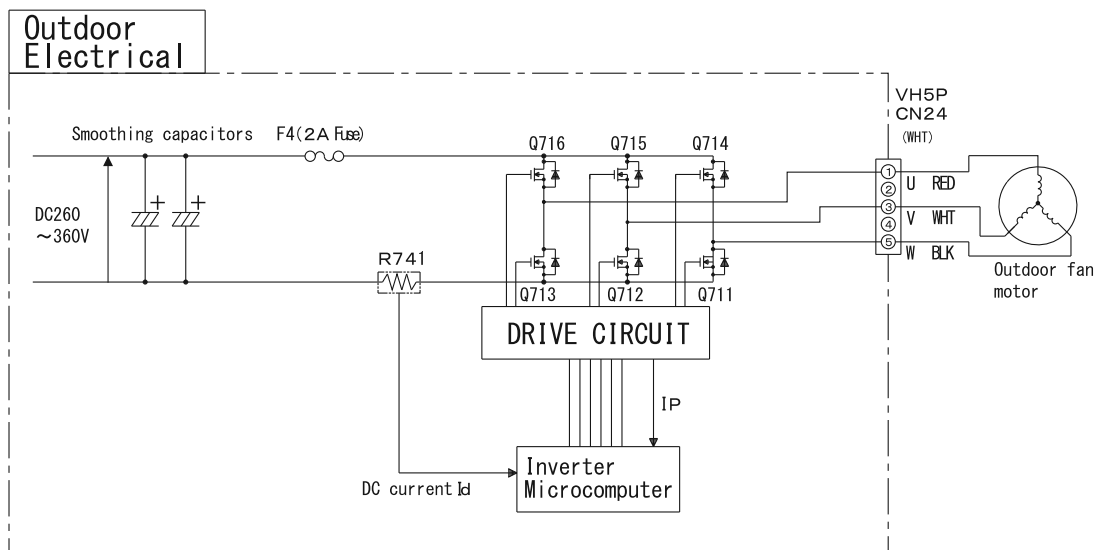


Fig. 6-1

Based on operation commands from the indoor microcomputer, the speed of the outdoor fan motor on this unit is determined by the main microcomputer and controlled by the inverter microcomputer.

Actual speed is estimated based on DC waveforms from R741 to control the speed so that it matches the operational commands.

Overcurrent and other failures in the outdoor fan motor are detected by the magnitude of the direct current.

(1) Control of outdoor fan motor at startup

If the propeller fan is already rotating at the start of operation, due to disturbances such as strong wind, operational behavior will vary according to the direction and speed of such rotation as described below. Favorable wind is defined as wind that blows outward from the mouth ring.

- Strong headwind : Control is not performed, to protect the equipment, and the propeller is blown in the opposite direction by the wind. The unit starts automatically once the wind has weakened.
- Headwind : After the speed reduces gradually and finally stops, the speed is controlled in the normal direction.
- Favorable wind : The speed of the fan is controlled normally.
- Strong favorable wind : Control is not performed, to protect the equipment, and the propeller is blown in the normal direction by the wind. The unit starts automatically once the wind has weakened.

(2) Control of outdoor fan motor during operation

The speed of the propeller fan might drop during operation of the outdoor fan motor due to disturbances such as strong wind.

If such conditions continue for a long period of time, the propeller fan will stop. (Self-diagnosis lamp LD351: Blinks 11 times)

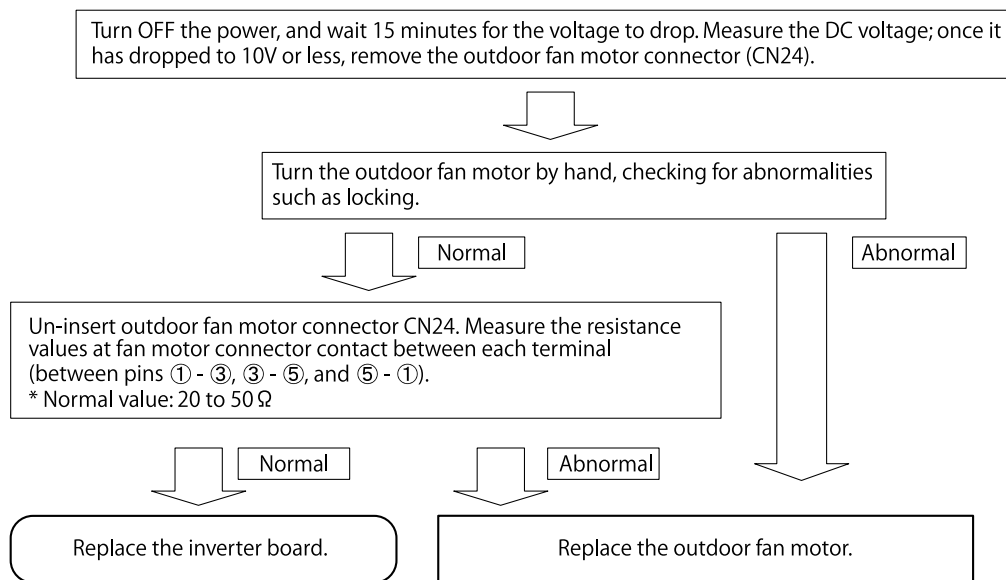
When the fan is restarted, the operation described in (1) above is used.

(3) Confirmation method when self-diagnosis lamp LD351 blinks 12 times

If LD351 on the Main P.W.B. blinks 12 times (fan lock detected) and operation stops, use the following procedure to check the unit.

1. Mechanical locking caused by the insertion of foreign objects such as sticks into the propeller fan or freezing due to the accumulation of snow will cause fan lock to be detected and causing the unit stop its operation.
Remove any foreign objects.
2. Check whether CN24 is securely inserted. A poor connection will cause a fan lock detection and causing the unit stop its operation. If CN24 is loose, insert it securely.
3. Strong wind around the outdoor unit might cause a fan lock detection.
Check if the unit restarts. (Several minutes might be required for the unit to restart.)
If the unit continues to operate after restarting, there is no failure in the outdoor fan motor or electrical components.
4. Perform a check of the outdoor fan motor. The procedure is shown below.

Procedure for Checking the Outdoor Fan Motor



5. Insert the outdoor fan motor connector (CN24).

* Also use the above procedure if F4 (2A fuse) is blown.

Caution

* The power supply for the outdoor fan motor is also used as the power supply for the compressor, and therefore has a high voltage (DC260 to 360V). Use sufficient caution to avoid electric shock when checking operations and performing repairs.

7. Circuits for Communication between Microcomputers

- This unit uses two microcomputers: a main microcomputer and an inverter microcomputer. The two-way communication circuit shown in Fig. 7-1 is used for communication between these two microcomputers.

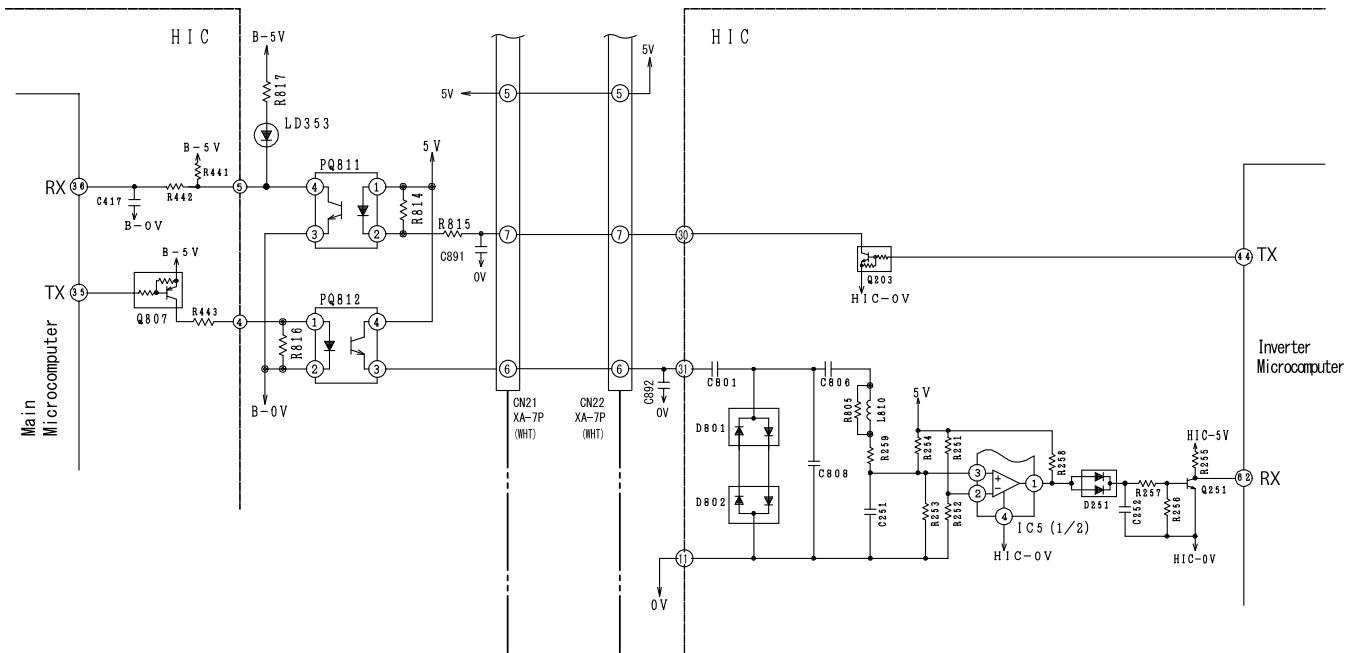


Fig. 7-1

- Signals from the main microcomputer to the inverter microcomputer follow this route: main microcomputer ③⑤ → Q807 → PQ812 → IC5 → Q251 → inverter microcomputer ④②.
- Signals from the inverter microcomputer to the main microcomputer follow this route: inverter microcomputer ④④ → Q203 → PQ811 → main microcomputer ③⑥.

8. Indoor/outdoor communication circuit

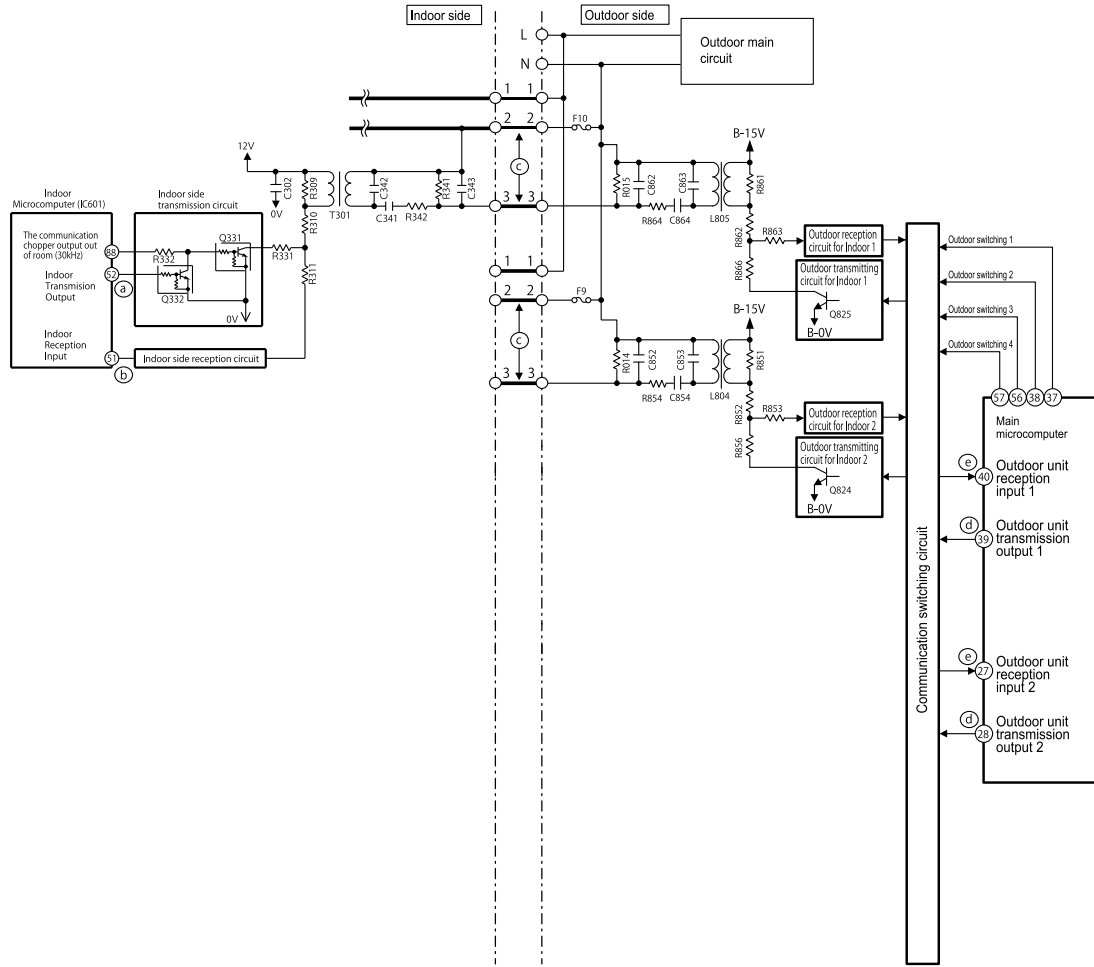


Fig. 5-1

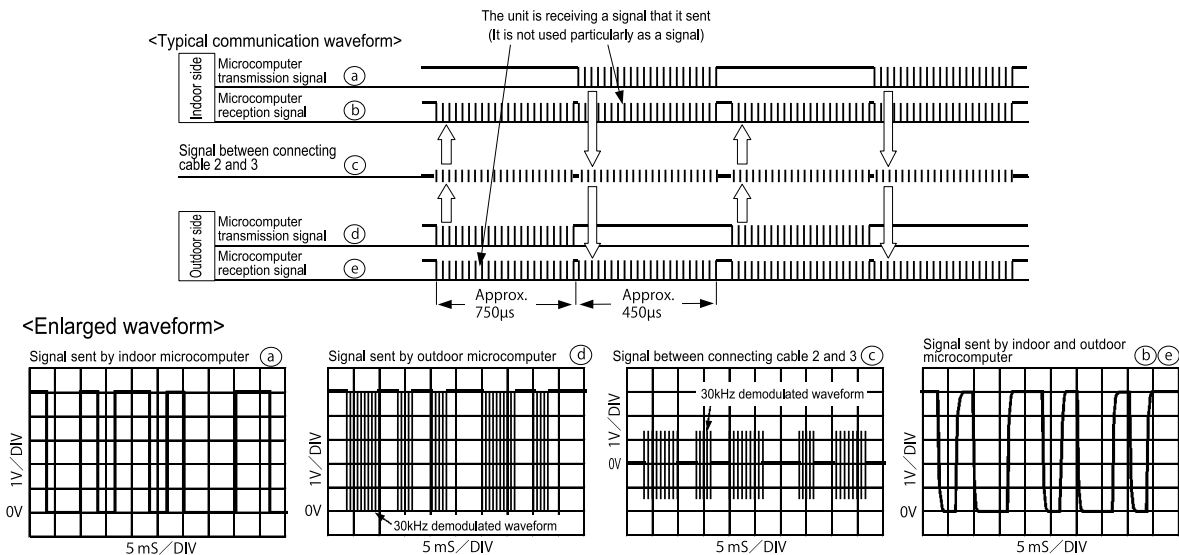


Fig. 5-2

- * Indoor and outdoor communications are conducted by using lines 2 and 3 of connecting cable. Line 2 of connecting cable is share with a transmission channel that powers the indoor unit.
- * Data communicated between the indoor and outdoor units are outputted from the microcomputer as serial signals and are transmitted as demodulated by a 31kHz carrier wave (for indoor) and a 30kHz carrier wave (for outdoor).

Check

If the communication fails between the indoor and outdoor units for some reason, the product will give a self-diagnosis display either by "the timer lamp blinking 3 times (indoor failure)" or "the the timer lamp blinking 12 times (outdoor failure)" depending on the cause.

8. Indoor/outdoor communication circuit

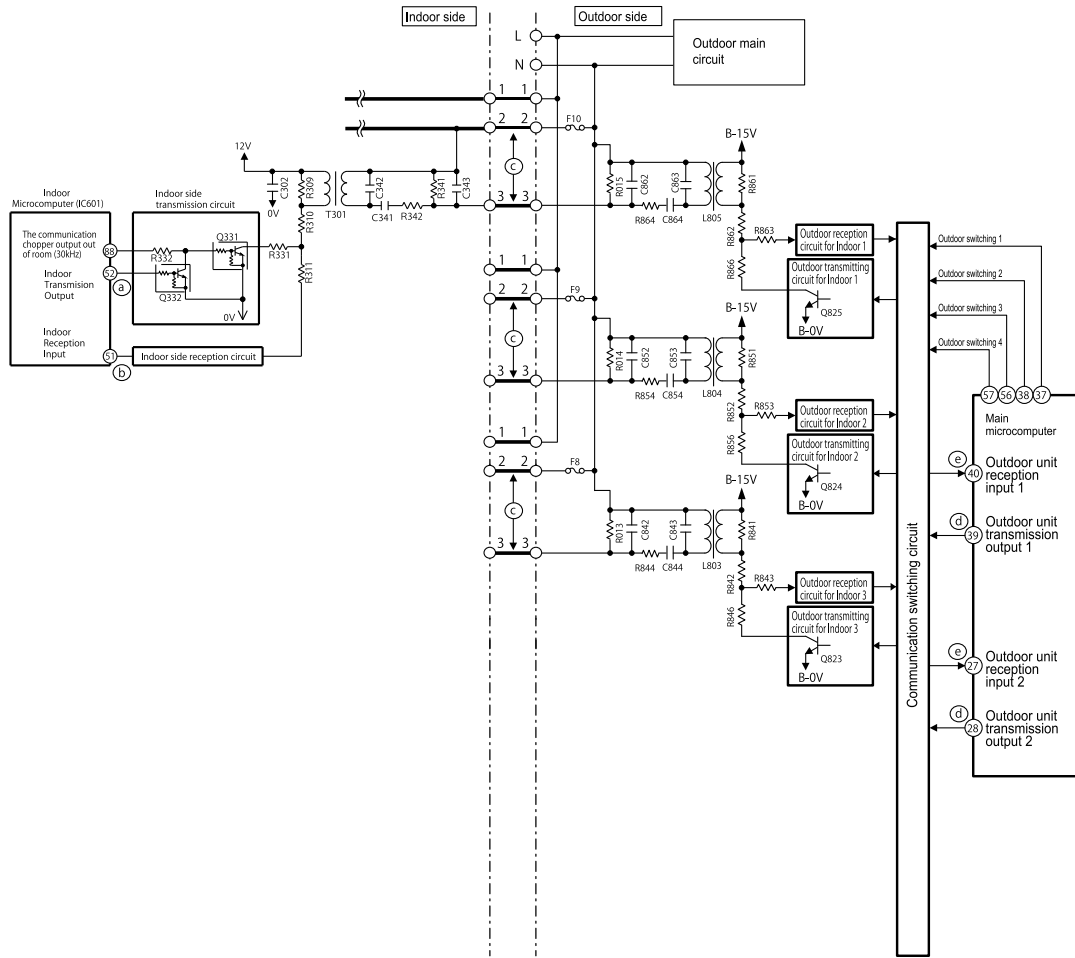


Fig. 5-1

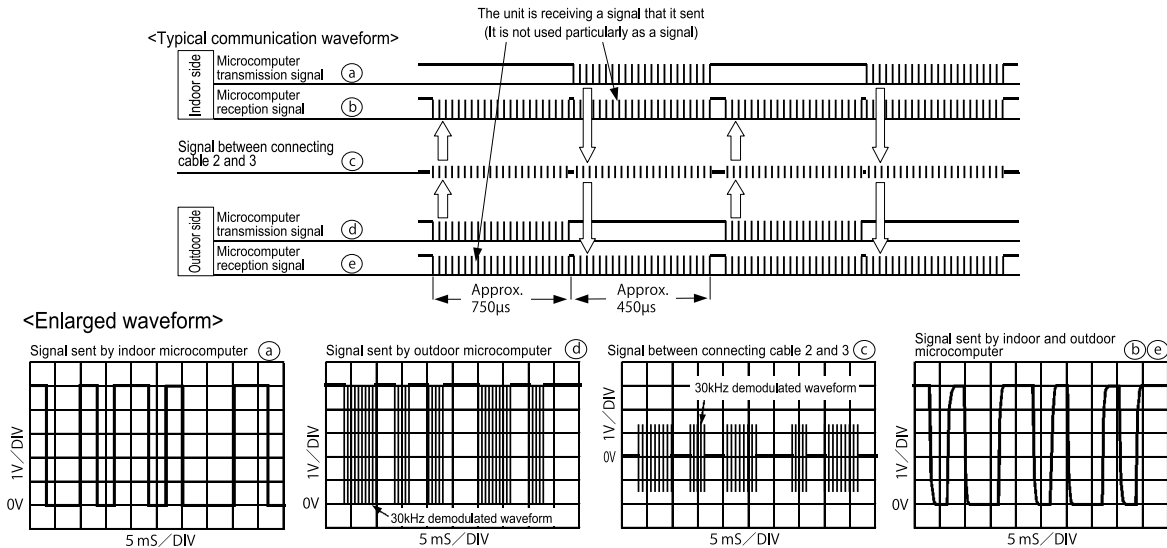


Fig. 5-2

* Indoor and outdoor communications are conducted by using lines 2 and 3 of connecting cable. Line 2 of connecting cable is share with a transmission channel that powers the indoor unit.

* Data communicated between the indoor and outdoor units are outputted from the microcomputer as serial signals and are transmitted as demodulated by a 31kHz carrier wave (for indoor) and a 30kHz carrier wave (for outdoor).

Check

If the communication fails between the indoor and outdoor units for some reason, the product will give a self-diagnosis display either by "the timer lamp blinking 3 times (indoor failure)" or "the the timer lamp blinking 12 times (outdoor failure)" depending on the cause.

8. Hibernation Mode

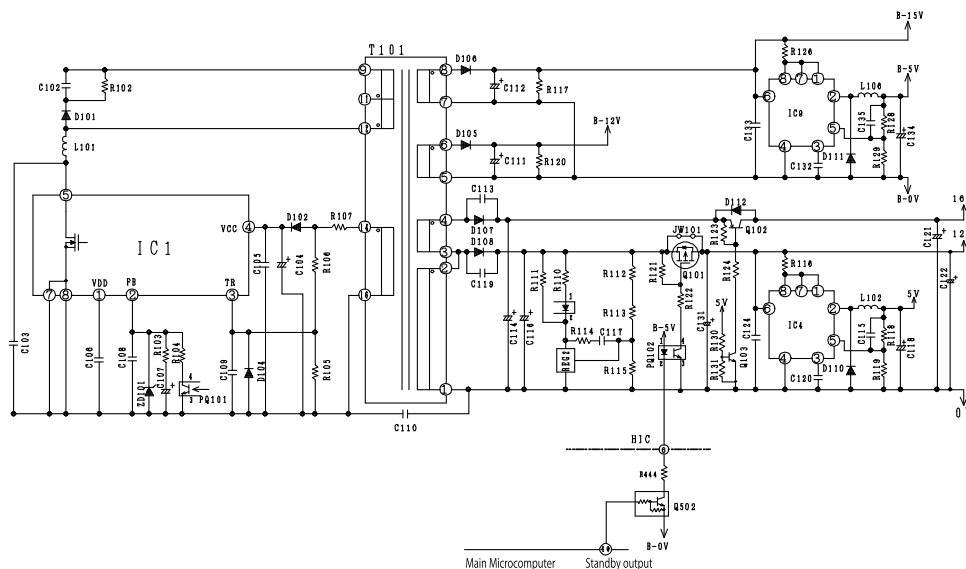


Fig. 8-1

- This model have designed to enter hibernation mode for energy saving and power consumption reduction during stanby.
- Unit will enter hibernation mode during below stanby condition if not received any signal from remote controller and expansion valve already completed initialization .
 - 1) Stanby continuesly
 - 2) Unit in running condition, then off the unit by remote controller and leave the unit in stanby condition.
- During hibernation activation, main microcomputer pin (49) will change to LOW condition. Due to this pin become LOW, Q502, PQ102, and Q101 will be OFF. As Q101 OFF, 12V and 5V will drop to 0V. Due to 5V drop to 0V, Q103 and Q102 will be OFF and causing 16V also drop to 0V.
- During hibernation mode, DC voltage will be as below condition.
 - (1) B-15V : Maintain at 15V
 - (2) B-5V : Maintain at 5V
 - (3) B-12V : Maintain at 12V
 - (4) 16V : Drop to 0V
 - (5) 12V : Drop to 0V
 - (6) 5V : Drop to 0V

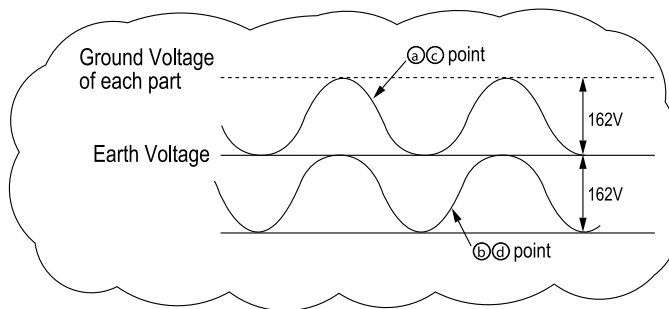
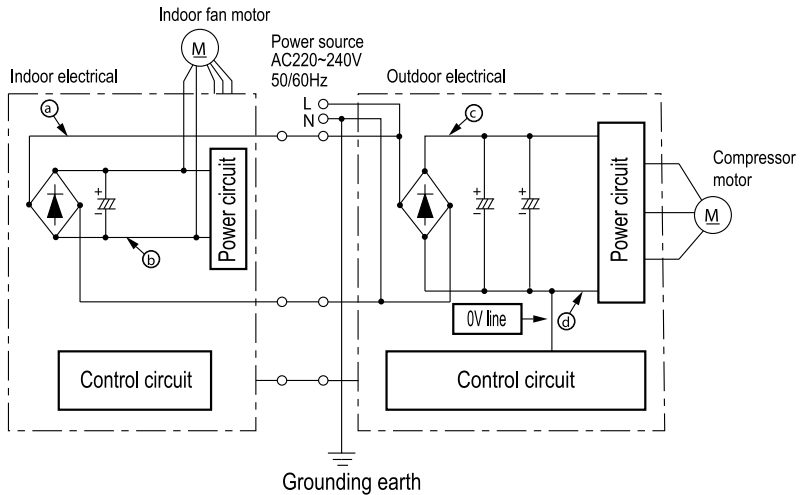
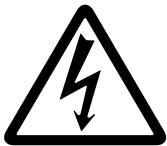
All LED on the Main P.W.B and Inverter P.W.B (LD301, LD351, LD352, LD353, LD401 and LD402) will be OFF during this mode.
- If outdoor unit have failure/error, all indication including error diagnosis LED will be OFF once the smoothing capacitor (C019 ~ C021) voltage reduce to 29V.
- For inspection during hibernation mode, service person can measure DC voltage B-15V, B-12V and B-5V on Main P.W.B. But to measure DC voltage 16V, 12V and 5V on Inverter P.W.B., service person shall on the indoor unit by remote controller first. This will change the unit from hibernation mode to normal.

PRECAUTION FOR CHECKING



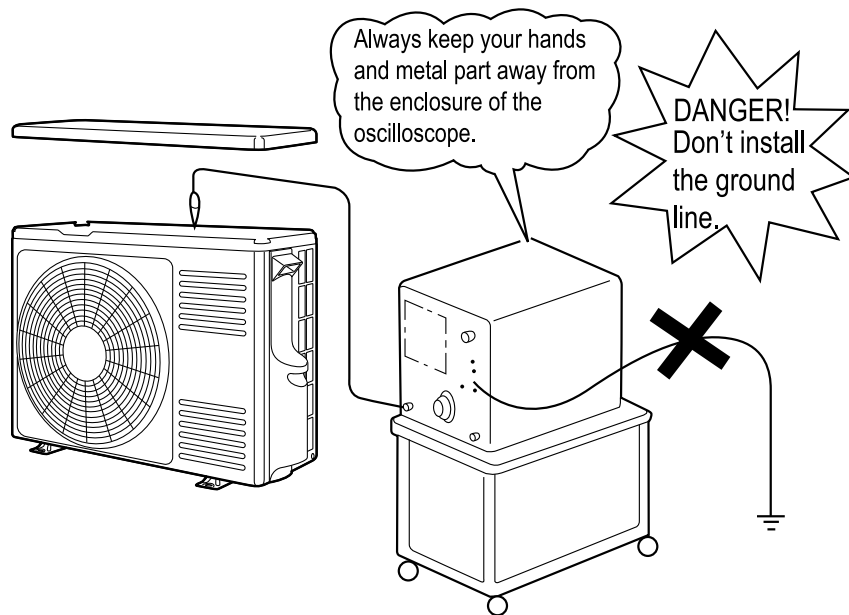
DANGER

1. Remember that the 0V line is biased to 162V in reference to the ground level.
2. Also noted that it takes about 15 minutes until the voltage fall after the power switch is turned OFF.



DANGER

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



SELF CHECK

When it is difficult to judge whether the compressor or the electrical part is faulty resulting self diagnosis lamp LD351 blink 2,3,4 or 5 times, please confirm first the compressor terminal insulation by using mega ohm checker. If the insulation is normal, proceed to below self-check method.

Self-check diagnosis method

1. Switch OFF main power supply. (Wait until DC voltage fully discharged :15 minutes or more)
2. Un-insert jumper wire connector at CN30.
3. Switch ON main power supply. (LD352 will blink 1 time)
4. Press and hold TEST SWITCH for more than 1 second.
 - IPM and the compressor motor will activated and each IGBT inside IPM will be checked internally by inverter microcomputer. Microcomputer will detect short-circuit and open-circuit of the IPM to determine IPM condition either in good condition or already broken.
5. Self-check diagnosis result will appear.
 - The content of diagnosis result shall refer to below table.

Self-check diagnosis result

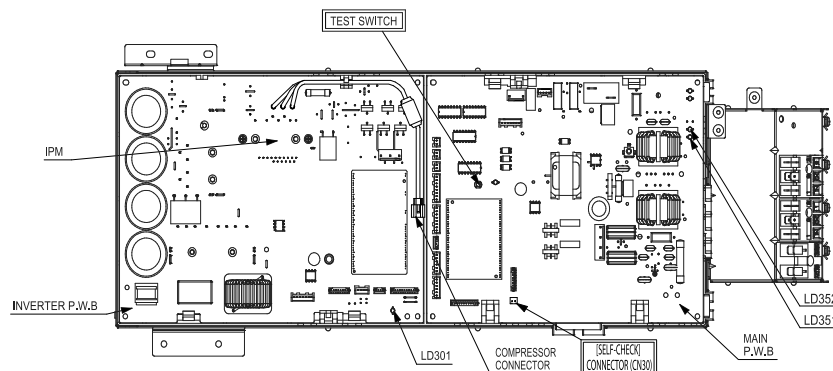
[SELF-CHECK] DIAGNOSIS RESULT		
LD301	DIAGNOSIS CONTENT	REPAIR METHOD
1 TIME BLINK	ELECTRICAL OK.	CHANGE COMPRESSOR.
2 TIMES BLINK	PEAK CURRENT CUT OFF SIGNAL DETECTED.	CHANGE INVERTER P.W.B.
7 TIMES BLINK	COMPRESSOR CURRENT ABNORMAL.	COMPRESSOR CONNECTOR LOOSE => CHECK CONNECTOR. AFTER CHECK COMPRESSOR CHANGE INVERTER P.W.B.
10 TIMES BLINK	DC VOLTAGE ABNORMAL.	AC VOLTAGE ABNORMAL (BEYOND RATED $\pm 10\%$) ↳ CONNECT WITH CORRECT AC VOLTAGE. AC VOLTAGE NORMAL (WITHIN RATED $\pm 10\%$) ↳ CONNECTOR (CN23, CN25) BAD INSERTION => CHECK CONNECTOR OTHER => CHANGE BOTH MAIN & INVERTER P.W.B.
13 TIMES BLINK	EEPROM READING ERROR.	CHANGE INVERTER P.W.B.

In case abnormality found at the checking result, please confirm the connecting cord having problem or not before replace the defect part according to the table of self-check diagnosis result.

In case no abnormality found at electrical part, insert back the jumper wire connector at CN30 as original condition before it can be use.

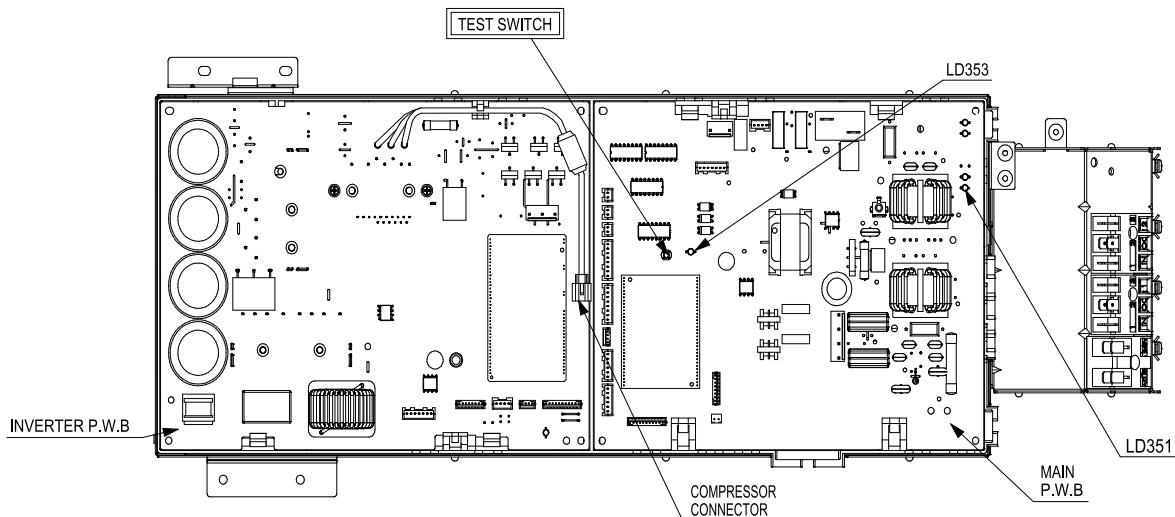
※ If forgot to insert back as per original condition, the system will operate as below table condition after power restored.

Time after power restored	Unit condition
Below than 3 minutes	Indoor timer lamp will 12 times blinking (show error - outdoor communication circuit failure).
3 ~ 6 minutes	Can run as normal.
After 6 minutes	Unit enter hibernation mode. Can run as normal.



Collect refrigerant using test switch operation

1. Turn OFF the breaker and wait for 1 minute or more before turn ON back the breaker.
2. Detach the electrical cover of outdoor unit and ensure LD353 is blinking once.
3. Wait 20 seconds or more before pressing the test switch for 1 second or more to start the forced cooling operation.
4. Pressing the test switch again for 1 second or more will stop the operation.



■ Cautions

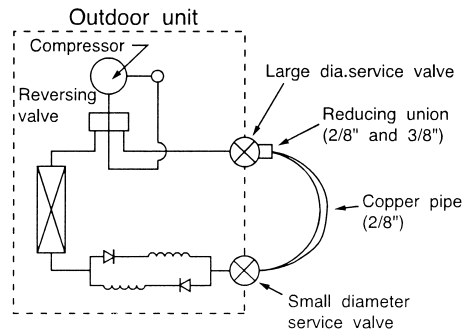
1. Do not in any circumstances operate the outdoor unit for more than 5 minutes.
2. Doing work with the compressor connector removed will cause the LD351 to blink 4 times. It will not start the operation.
3. For another test run, turn OFF the breaker and turn it back ON to reset the power supply. (The test switch is accepted only once after power ON. After operation by remote controller, it is not accepted.)
4. When the operation with the test switch is done, turn OFF the breaker.

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 valve 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")

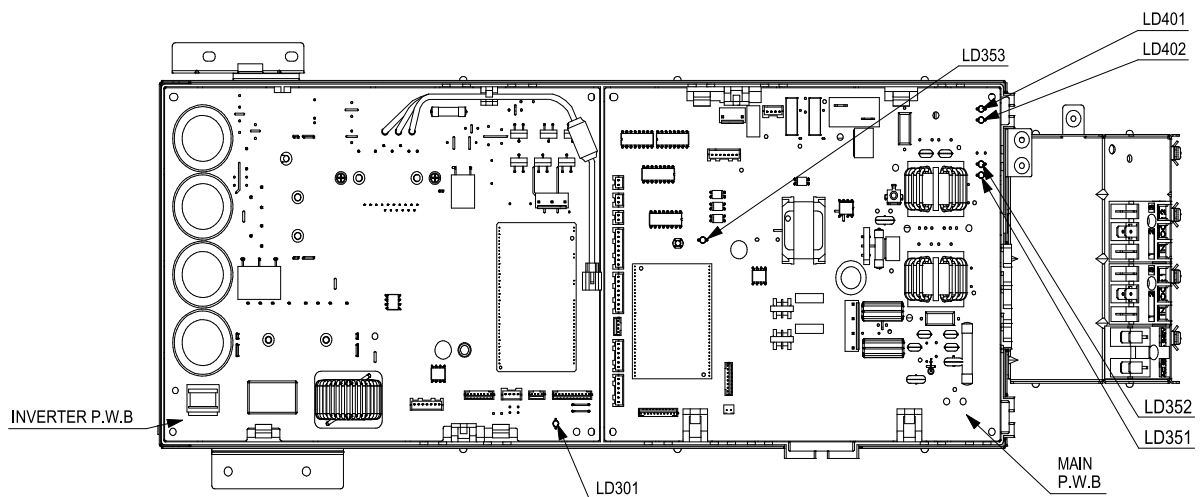
Do not operate more than 5 minutes

The operation method is the same as "Collect refrigerant using test switch".

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

Lighting mode of the self-diagnosis lamp

1 Mounting location of the self-diagnosis lamp



Lighting mode of the self-diagnosis lamp

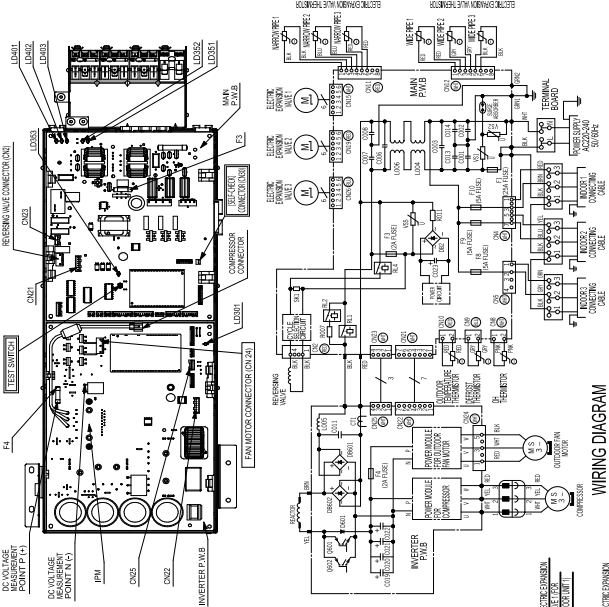
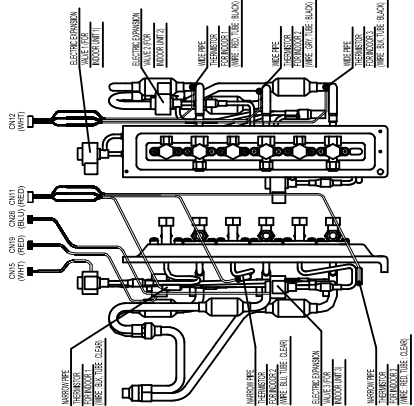
2 Lighting mode of the self-diagnosis lamp

⚠ DANGER
⚡ ELECTRIC SHOCK RISK (DC360V)
 PLEASE WAIT AT LEAST 15 MINUTES FOR THE VOLTAGE TO DROP, MEASURE DC VOLTAGE BETWEEN TERMINAL P & N AND CONFIRMED THAT IT IS BELOW 10V THEN ONLY CAN START THE SERVICING WORK.

FORCED COOL OPERATION

TO COLLECT THE REFRIGERANT OR TO OPERATE THE OUTDOOR UNIT INDEPENDENTLY, PLEASE RESET THE POWER SUPPLY THEN WAIT 20 SECONDS BEFORE PUSH THE TEST SWITCH FOR MORE THAN 1 SECOND, TO STOP OPERATION, PUSH AGAIN THE TEST SWITCH FOR MORE THAN 1 SECOND.

ELECTRIC EXPANSION VALVE AND PIPE THERMISTOR POSITION CHART



LED STATUS	SELF-DIAGNOSIS CONTENT	CHECKING POINT	REPAIR METHOD
BLINK	NORMAL	NORMAL (BLINKING IS NOT TYPICAL FUNCTION)	
BLINK	NORMAL	NORMAL (LED WILL OFF DURING STANDBY MODE)	
BLINK	NORMAL	NO POWER SUPPLY AT TERMINAL "L"	CHECK POWER CABLE
OFF	ABNORMAL	CIRCUIT DEFECT	CHANGE BOTH MAIN & INVERTER PWB
OFF	ABNORMAL	CIRCUIT DEFECT	CHANGE MAIN PWB
LIT	ABNORMAL	CONNECTING CABLE DISCONNECTED	CHANGE CONNECTING CABLE
LIT	ABNORMAL	COMMUNICATION ERROR BETWEEN INDOOR/OUTDOOR UNIT	ADJUST CONNECTING CABLE
1 TIME BLINK	ABNORMAL	INDOOR UNIT IS NOT CONNECTED (INDOOR 1)	CHANGE MAIN PWB
2 TIME BLINK	ABNORMAL	INDOOR UNIT IS NOT CONNECTED (INDOOR 2)	CHANGE MAIN PWB
3 TIME BLINK	ABNORMAL	INDOOR UNIT IS NOT CONNECTED (INDOOR 3)	CHANGE MAIN PWB
OFF	ABNORMAL	INDOOR UNIT IS NOT CONNECTED (INDOOR 4)	CHANGE MAIN PWB

LED INDICATION DURING COMPRESSOR OPERATION	OPERATION STATUS	REPAIR METHOD
LD301	NORMAL	
LIT	OVERLOAD (NORMAL)	
BLINK REPEATEDLY WITH 1 SECOND INTERVAL		

SELF-DIAGNOSIS CONTENT	CHECKING POINT	REPAIR METHOD
NO POWER SUPPLY	NO POWER SUPPLY AT TERMINAL "L"	CHECK POWER CABLE
NO POWER SUPPLY	CONNECTING CABLE MISCONNECTION	CHECK CONNECTING CABLE
NO POWER SUPPLY	F3 (2A FUSE) BLOWN	CHANGE BOTH MAIN & INVERTER PWB
NO POWER SUPPLY	CIRCUIT DEFECT	CHANGE BOTH MAIN & INVERTER PWB
NORMAL STOP	NOT TYPICAL FUNCTION	
BLINK	ABNORMAL LOCATION	ABNORMAL LOCATION
BLINK	4 TIMES THERMISTOR	4 TIMES THERMISTOR
BLINK	5 TIMES THERMISTOR	5 TIMES THERMISTOR
BLINK	6 TIMES THERMISTOR	6 TIMES THERMISTOR
BLINK	7 TIMES THERMISTOR	7 TIMES THERMISTOR
BLINK	8 TIMES THERMISTOR	8 TIMES THERMISTOR
BLINK	9 TIMES THERMISTOR	9 TIMES THERMISTOR
BLINK	10 TIMES THERMISTOR	10 TIMES THERMISTOR
BLINK	11 TIMES THERMISTOR	11 TIMES THERMISTOR
BLINK	12 TIMES THERMISTOR	12 TIMES THERMISTOR
BLINK	13 TIMES THERMISTOR	13 TIMES THERMISTOR
BLINK	14 TIMES THERMISTOR	14 TIMES THERMISTOR
BLINK	15 TIMES THERMISTOR	15 TIMES THERMISTOR

LED INDICATION DURING STOP	SELF-DIAGNOSIS CONTENT	CHECKING POINT	REPAIR METHOD
OFF	NO POWER SUPPLY	NO POWER SUPPLY AT TERMINAL "L"	CHECK POWER CABLE
OFF	NO POWER SUPPLY	CONNECTING CABLE MISCONNECTION	CHECK CONNECTING CABLE
OFF	NO POWER SUPPLY	F3 (2A FUSE) BLOWN	CHANGE BOTH MAIN & INVERTER PWB
OFF	NO POWER SUPPLY	CIRCUIT DEFECT	CHANGE BOTH MAIN & INVERTER PWB
BLINK	ABNORMAL LOCATION	ABNORMAL LOCATION	ABNORMAL LOCATION
BLINK	4 TIMES THERMISTOR	4 TIMES THERMISTOR	4 TIMES THERMISTOR
BLINK	5 TIMES THERMISTOR	5 TIMES THERMISTOR	5 TIMES THERMISTOR
BLINK	6 TIMES THERMISTOR	6 TIMES THERMISTOR	6 TIMES THERMISTOR
BLINK	7 TIMES THERMISTOR	7 TIMES THERMISTOR	7 TIMES THERMISTOR
BLINK	8 TIMES THERMISTOR	8 TIMES THERMISTOR	8 TIMES THERMISTOR
BLINK	9 TIMES THERMISTOR	9 TIMES THERMISTOR	9 TIMES THERMISTOR
BLINK	10 TIMES THERMISTOR	10 TIMES THERMISTOR	10 TIMES THERMISTOR
BLINK	11 TIMES THERMISTOR	11 TIMES THERMISTOR	11 TIMES THERMISTOR
BLINK	12 TIMES THERMISTOR	12 TIMES THERMISTOR	12 TIMES THERMISTOR
BLINK	13 TIMES THERMISTOR	13 TIMES THERMISTOR	13 TIMES THERMISTOR
BLINK	14 TIMES THERMISTOR	14 TIMES THERMISTOR	14 TIMES THERMISTOR
BLINK	15 TIMES THERMISTOR	15 TIMES THERMISTOR	15 TIMES THERMISTOR

LED INDICATION DURING STOP	SELF-DIAGNOSIS CONTENT	CHECKING POINT	REPAIR METHOD
1 TIME BLINK	THERMISTOR CONNECTOR HALF INSERT	INSERT CONNECTOR SECURELY	CHANGE INVERTER PWB
2 TIMES BLINK	THERMISTOR SHORTED OR CUT	IF STILL NOT SOLVE AFTER CHECK THE THERMISTOR	CHANGE INVERTER PWB
3 TIMES BLINK	WAITING COMPRESSOR TO START	NORMAL	
4 TIMES BLINK	SERVICE VALVE NOT OPEN	CHECK SERVICE VALVE	
5 TIMES BLINK	COMPRESSOR CONNECTOR NOT CONNECTED	CHECK COMPRESSOR CONNECTOR	
6 TIMES BLINK	IF NO ISSUE WITH ABOVE CHECKING POINT AND AFTER CHECK THE COMPRESSOR INSULATION, PROCEED TO (SELF-CHECK) DIAGNOSIS	MAKE ADJUSTMENT BASED ON THE RESULT OF (SELF-CHECK) DIAGNOSIS	
7 TIMES BLINK	OUTDOOR UNIT SURROUNDING IS BLOCKED	REMOVE THE CAUSE OF BLOCKING	
8 TIMES BLINK	COMPRESSOR SERVICE VALVE NOT OPEN	CHECK SERVICE VALVE	
9 TIMES BLINK	REFRIGERANT LEAK	CHECK REFRIGERANT LEAK AND RE-CHARGE IT	
10 TIMES BLINK	TEMPERATURE RISE	CHECK COMPRESSOR	
11 TIMES BLINK	COMPRESSOR RISE	CHECK COMPRESSOR	
12 TIMES BLINK	ERROR BETWEEN INDOOR/OUTDOOR UNIT	CHECK CONNECTOR INSERTION	
13 TIMES BLINK	REFER LD401 - LD403	REFER LD401 - LD403	
14 TIMES BLINK	ABNORMAL (BEYOND RATED VOLTAGE ± 10%)	ABNORMAL (BEYOND RATED VOLTAGE ± 10%)	
15 TIMES BLINK	OTHER	OTHER	

⚠ DANGER
 DURING UNIT STOP TO DETERMINE WHETHER THE COMPRESSOR OR THE ELECTRICAL IS FAULTY WHEN SELF-DIAGNOSIS BLINK 2, 3, 4 OR 6 TIMES HAPPEN, CONFIRM THE COMPRESSOR TERMINAL INSULATION BY USING MEGA-OHM CHECKER. IF THE INSULATION IS NORMAL, PROCEED TO BELOW SELF-CHECK METHOD. TAKE NOTE THAT DURING SELF-CHECK, THERE ARE POSSIBILITY LOAD SOUND FROM IPM CAN BE HEARD IN THE CASE OF IPM IS BROKEN.

[SELF-CHECK] DIAGNOSIS METHOD

1. SWITCH OFF MAIN POWER SUPPLY
2. UNINSERT JUMPER WIRE CONNECTOR AT CN10
3. SWITCH ON MAIN POWER SUPPLY (LED3 WILL BLINK)
4. PRESS THE TEST SWITCH FOR MORE THAN 1 SECOND
5. SELF-CHECK DIAGNOSIS RESULT WILL APPEAR REFER BELOW TABLE.
6. SWITCH OFF MAIN POWER SUPPLY AND INSERT BACK JUMPER WIRE

* IF STEP 6 NOT CARRIED OUT, THE SYSTEM WILL NOT OPERATE AND INDOOR TIMER LAMP WILL BLINK 12 TIMES.

[SELF-CHECK] DIAGNOSIS RESULT

LD301 DIAGNOSIS CONTENT	REPAIR METHOD
1 TIME BLINK	ELECTRICAL OK
2 TIMES BLINK	PROCEED TO (SELF-CHECK) DIAGNOSIS
3 TIMES BLINK	COMPRESSOR CURRENT ABNORMAL
4 TIMES BLINK	COMPRESSOR CONNECTOR LOOSE → CHECK CONNECTOR
5 TIMES BLINK	COMPRESSOR CONNECTOR ABNORMAL AFTER CHECK COMPRESSOR CHANGE INVERTER PWB
6 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)
7 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)
8 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)
9 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)
10 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)
11 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)
12 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)
13 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)
14 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)
15 TIMES BLINK	AC VOLTAGE ABNORMAL (BEYOND RATED ± 10%)

[OUTDOOR FAN MOTOR CHECK] DIAGNOSIS METHOD

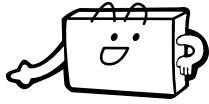
1. SWITCH OFF MAIN POWER SUPPLY
2. UNINSERT OUTDOOR FAN MOTOR CONNECTOR CN24
3. MAKE SURE NO ABNORMALITIES AT THE FAN SHAFT
4. MEASURE RESISTANCE AT FAN MOTOR CONNECTOR CONTACT
5. MEASURE RESISTANCE VALUE BETWEEN CONTACT 20 - 500
6. MOTOR NORMAL - CHANGE INVERTER PWB
7. MOTOR ABNORMAL - CHANGE FAN MOTOR AND INVERTER PWB (IF REQUIRED)

※ OTHERS CHECKING POINT

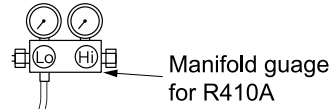
1. REVERSE POLARITY NOT OPERATE AND CHECK THE LEAD WIRE INVERSE AT THE INDOOR UNIT
2. COMMUNICATION ERROR OR OUTDOOR UNIT NO OPERATION ⇒ CHECK CONNECTING CABLE BETWEEN INDOOR AND OUTDOOR UNIT

DD0006143A

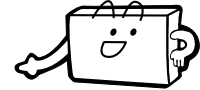
Refrigerant cycle check (gas leak or compressor failure)



Operate the unit after re-connect the connector for compressor.



Manifold gauge for R410A

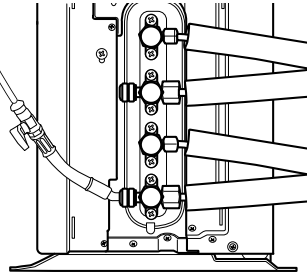


Refer to cycle inspection mode.

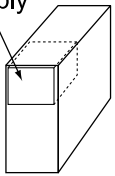


Is the self-diagnosis lamp shown as per this table?

LD351	2 times blink	3 times blink	4 times blink	5 times blink	ON
LD352	OFF	OFF	OFF	OFF	1 time blink
Time to blink	2~3sec			About 10sec	Within 30min
Suspect failure item	Compressor				Gas leak



Outdoor electrical assembly

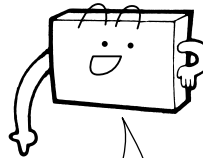


Normal



Outdoor electrical assembly
 ■ Check drive signal using PRD checker

Abnormal (gas leak)



It is a gas leak.
 Please repair and re-charge the gas.

Normal

(When the self-diagnosis lamp is the same to above figure lighting mode)



Compressor is abnormal.
 Please change it and re-charge gas.

Change compressor

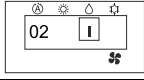
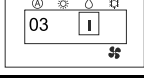
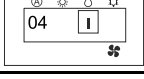
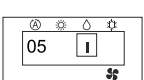

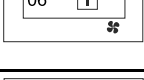
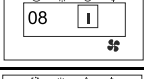


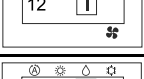
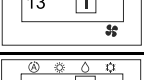
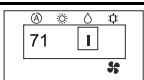
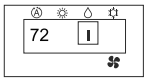
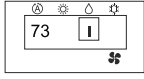

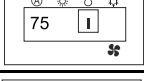
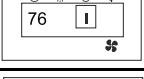
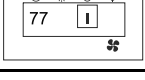
Re-charge gas

Perform final basic operation check

List of error code when using Self-Diagnosis Memory Function

Please refer to the display screen of wireless or wired remote control.
(This error code only for error happen at outdoor side).

RAM-53NP2B




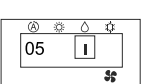

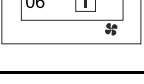


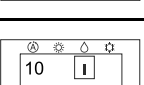


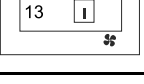
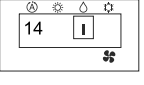

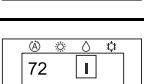
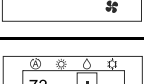
INDOOR OPERATION LAMP BLINKING	WIRELESS REMOTE CONTROL DISPLAY	WIRED REMOTE CONTROL DISPLAY	SELF-DIAGNOSE CONTENT	ERROR DESCRIPTION DETAIL	MAIN CHECK POINT
2 times	002 01		Peak current cut.	Over current is detected.	1. Compressor 2. Inverter P.W.B.
3 times	003 01		Compressor abnormal low speed rotation.	Position detection signal has no input during operation.	1. Compressor 2. Inverter P.W.B.
4 times	004 01		Compressor switching failure.	Fail to switch from initial low frequency sync to position detection sync.	1. Compressor 2. Inverter P.W.B.
5 times	005 01		Overload lower limit cut.	Overload condition still persisting even rotation speed is below the lower rpm limit.	1. Outdoor unit is expose to direct sunlight or its air flow blocked. 2. Fan motor 3. Fan motor circuit 4. The voltage is extremely low
6 times	006 01		OH thermistor temperature rise.	OH thermistor is operating.	1. Leak of refrigerant 2. Compressor 3. OH thermistor circuit 4. Fan motor 5. Fan motor circuit
8 times	008 01		Communication error between microcomputer.	Communication between inverter microcomputer and main microcomputer failed.	1. Connector insertion at CN21 & CN22 2. Main and Inverter P.W.B.
9 times	009 01		Indoor type mismatch.	Single model connected.	1. Main P.W.B. 2. Indoor unit
10 times	010 01		Abnormal power source.	Power supply voltage is incorrect.	1. Power supply voltage 2. Main or Inverter P.W.B. or both P.W.B.
12 times	012 00		Fan motor faulty.	Outdoor fan rpm is not rotate as intended rpm.	1. Fan motor 2. Fan motor circuit
13 times	013 01		EEPROM reading error.	Microcomputer cannot read the data in EEPROM.	1. Inverter P.W.B. If still NG after change Inverter P.W.B, change Main P.W.B.
14 times	014 01		Active converter defect.	Over voltage is detected or compressor load is abnormal.	1. Inverter P.W.B. 2. Compressor
7 times	071 01		Overheat Thermistor	Thermistor's connector not connected or thermistor's wire worn out or shorted.	1. Thermistor 2. Connection of thermistor faulty 3. Thermistor circuit
7 times	072 01		Defrost Thermistor		
7 times	073 01		Outdoor Temperature Thermistor		
7 times	074 01		Narrow pipe thermistor abnormal (Indoor no.1)		
7 times	075 01		Wide pipe thermistor abnormal (Indoor no.1)		
7 times	076 01		Narrow pipe thermistor abnormal (Indoor no.2)		
7 times	077 01		Wide pipe thermistor abnormal (Indoor no.2)		

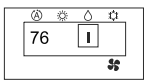

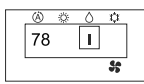
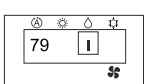
List of error code when using Self-Diagnosis Memory Function

Please refer to the display screen of wireless or wired remote control.

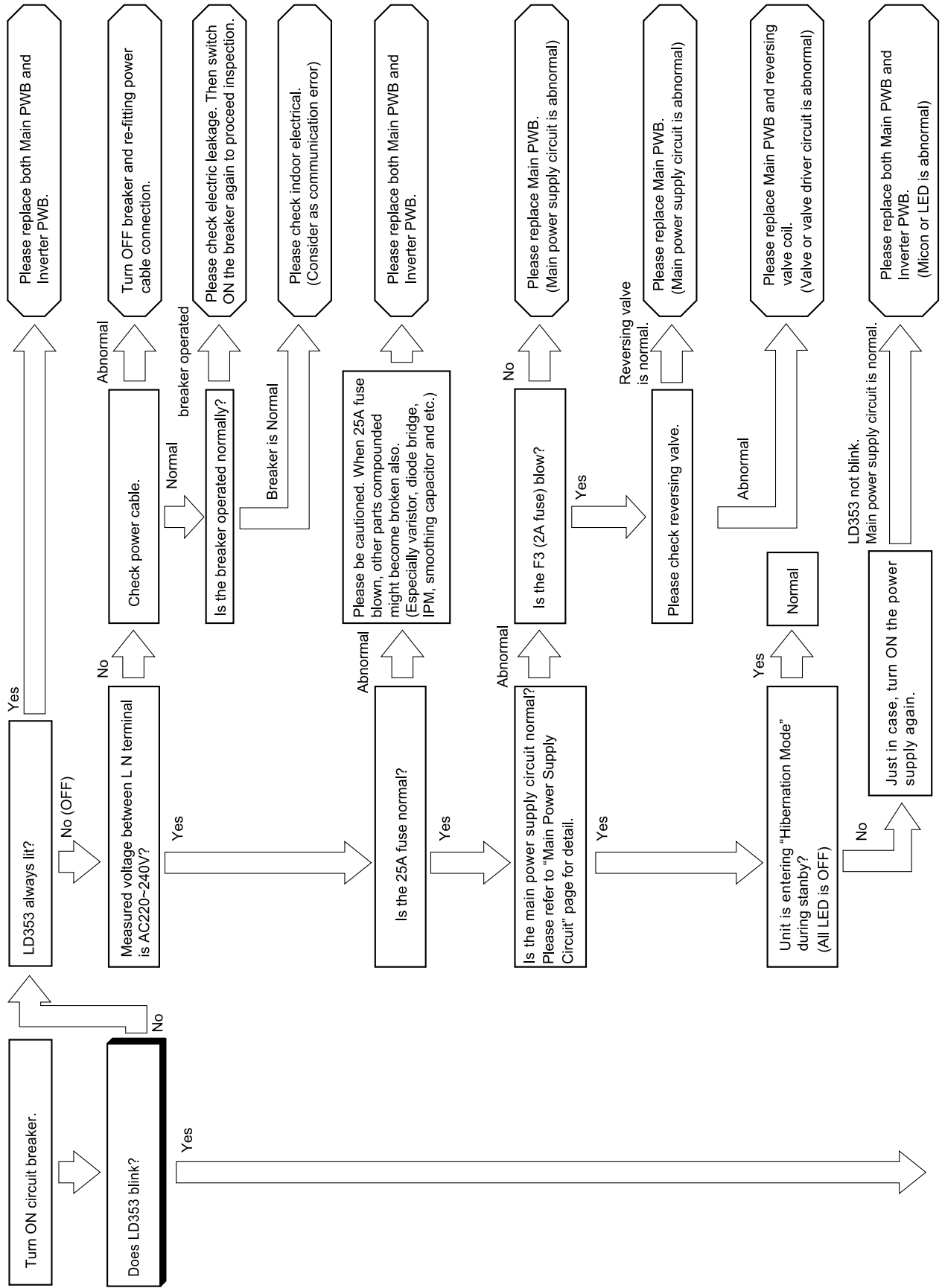
(This error code only for error happen at outdoor side)

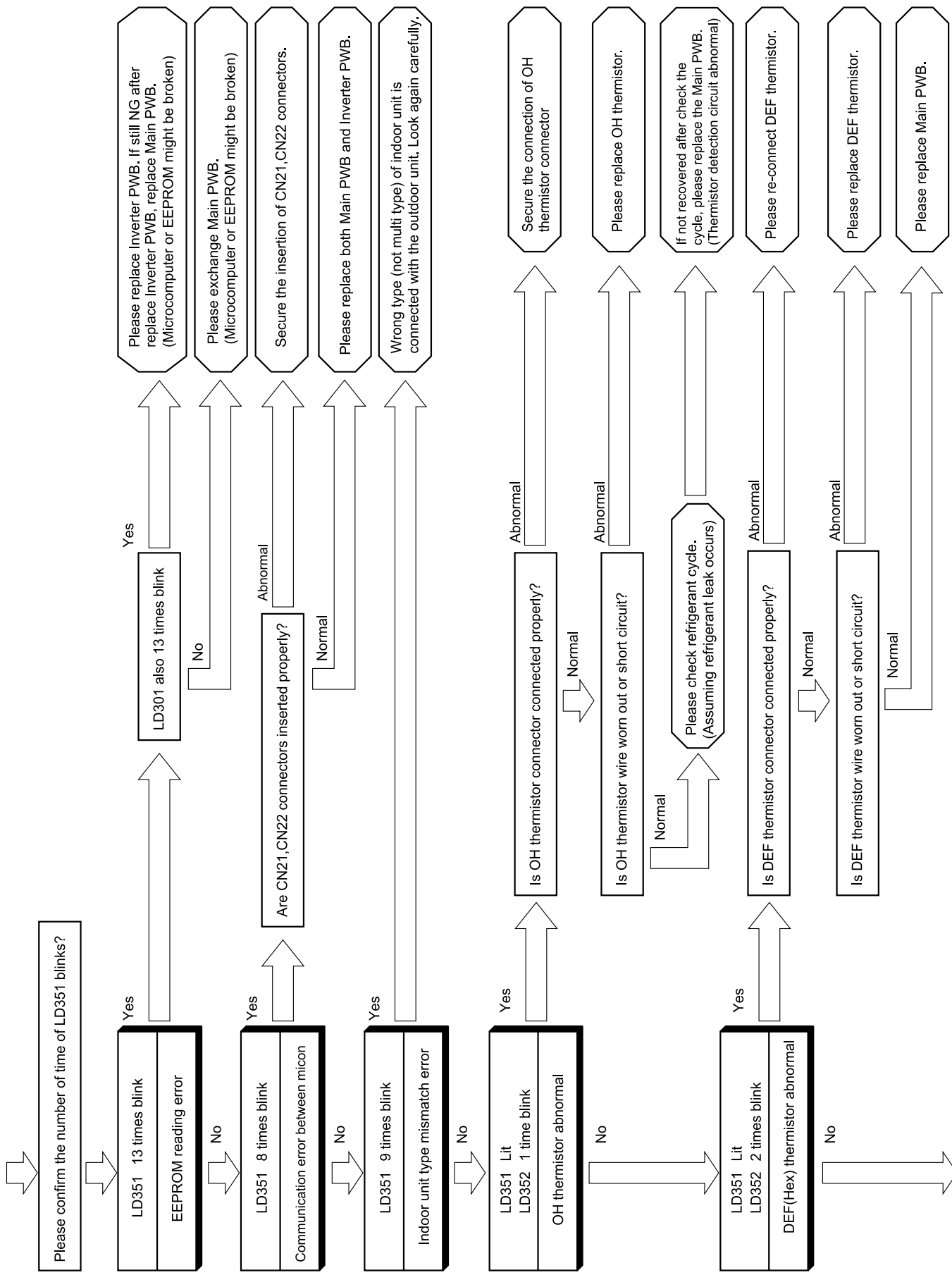
RAM-53NP3B

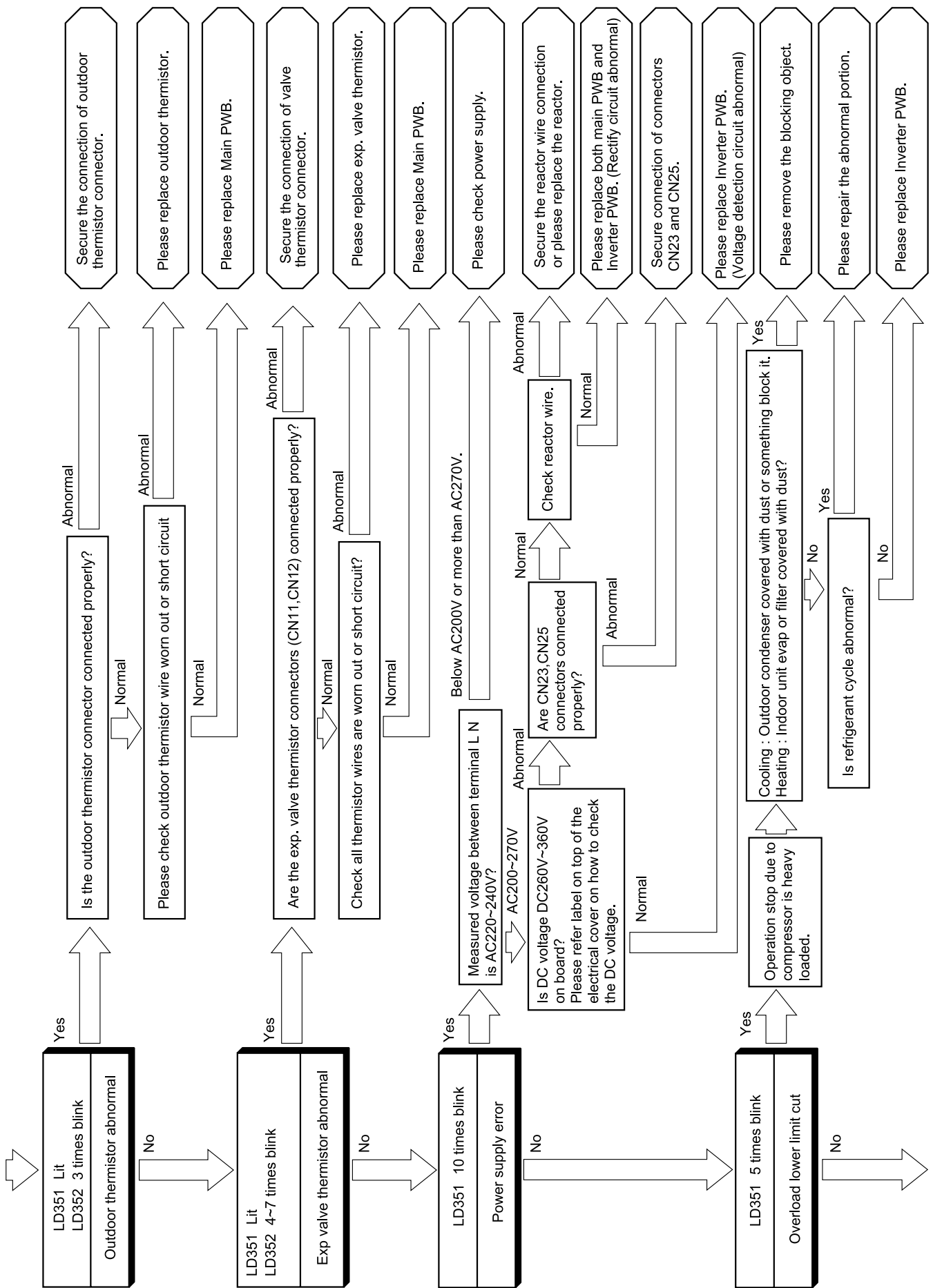
INDOOR OPERATION LAMP BLINKING	WIRELESS REMOTE CONTROL DISPLAY	WIRED REMOTE CONTROL DISPLAY	SELF-DIAGNOSE CONTENT	ERROR DESCRIPTION DETAIL	MAIN CHECK POINT
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3 times	003 01		Compressor abnormal low speed rotation.	Position detection signal has no input during operation.	1. Compressor 2. Inverter P.W.B.
4 times	004 01		Compressor switching failure.	Fail to switch from initial low frequency sync to position detection sync.	1. Compressor 2. Inverter P.W.B.
5 times	005 01		Overload lower limit cut.	Overload condition still persisting even rotation speed is below the lower rpm limit.	1. Outdoor unit is expose to direct sunlight or its air flow blocked. 2. Fan motor 3. Fan motor circuit 4. The voltage is extremely low
6 times	006 01		OH thermistor temperature rise.	OH thermistor is operating.	1. Leak of refrigerant 2. Compressor 3. OH thermistor circuit 4. Fan motor 5. Fan motor circuit
8 times	008 01		Communication error between microcomputer.	Communication between inverter microcomputer and main microcomputer failed.	1. Connector insertion at CN21 & CN22 2. Main and Inverter P.W.B.
9 times	009 01		Indoor type mismatch.	Single model connected.	1. Main P.W.B. 2. Indoor unit
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13 times	013 01		EEPROM reading error.	Microcomputer cannot read the data in EEPROM.	1. Inverter P.W.B. If still NG after change Inverter P.W.B, change Main P.W.B.
14 times	014 01		Active converter defect.	Over voltage is detected or compressor load is abnormal.	1. Inverter P.W.B. 2. Compressor
7 times	071 01		Oveheat Thermistor	Thermistor's connector not connected or thermistor's wire worn out or shorted.	1. Thermistor 2. Connection of thermistor faulty 3. Thermistor circuit
7 times	072 01		Defrost Thermistor		
7 times	073 01		Outdoor Temperature Thermistor		
7 times	074 01		Narrow pipe thermistor abnormal (Indoor no.1)		
7 times	075 01		Wide pipe thermistor abnormal (Indoor no.1)		

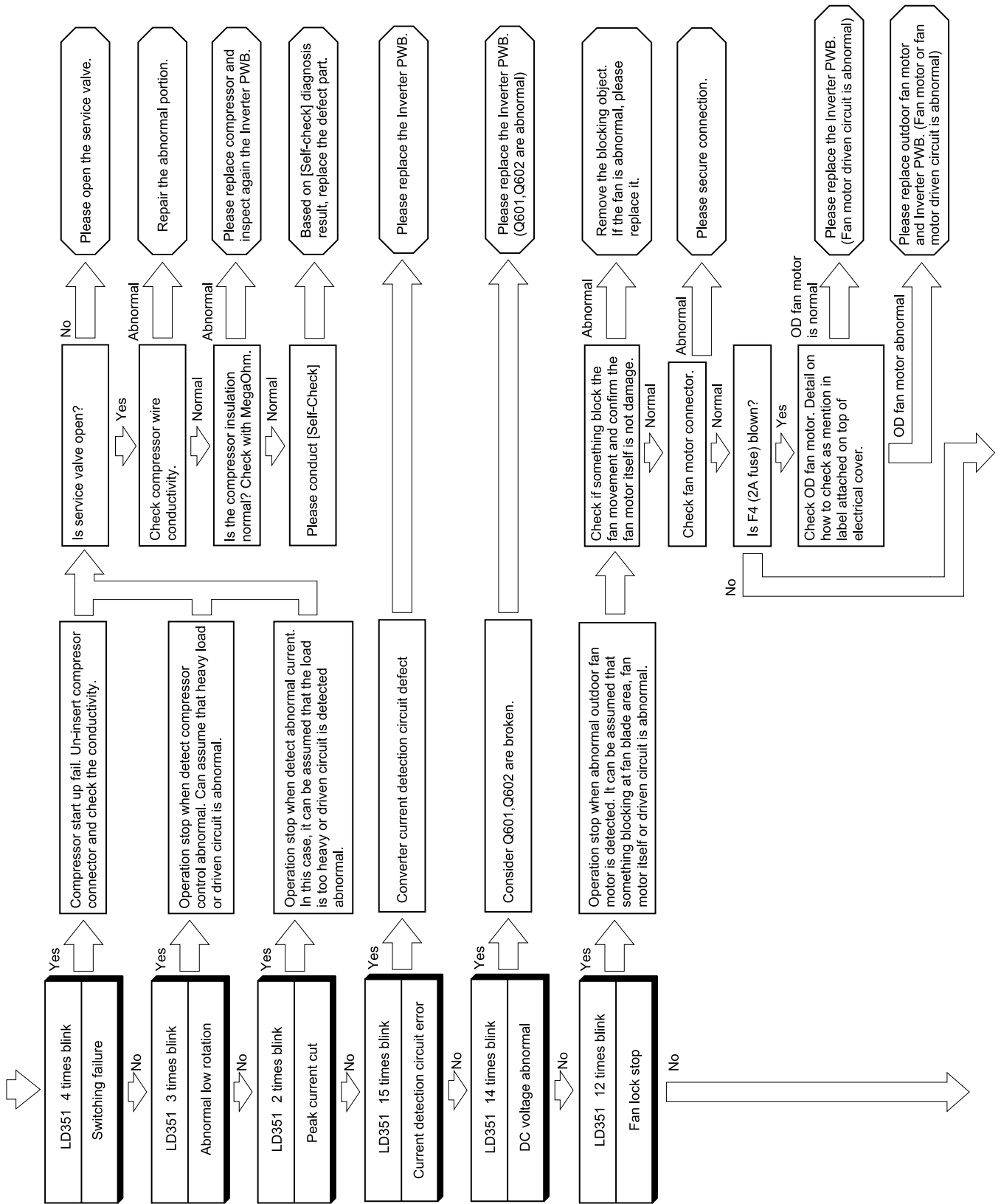
7 times	076 01		Narrow pipe thermistor abnormal (Indoor no.2)	Thermistor's connector not connected or thermistor's wire worn out or shorted.	1. Thermistor 2. Connection of thermistor faulty 3. Thermistor circuit
7 times	077 01		Wide pipe thermistor abnormal (Indoor no.2)		
7 times	078 01		Narrow pipe thermistor abnormal (Indoor no.3)		
7 times	079 01		Wide pipe thermistor abnormal (Indoor no.3)		

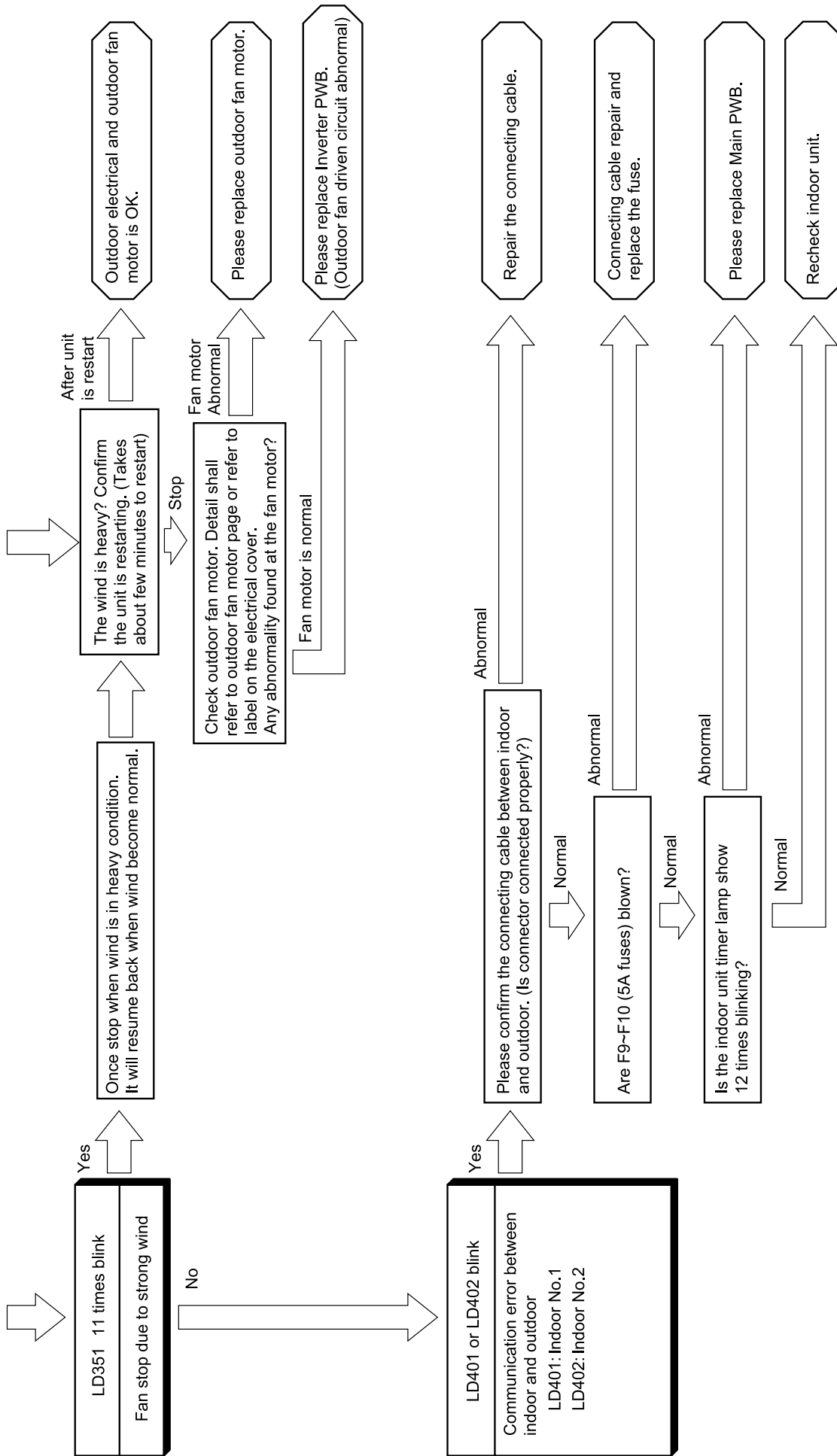
Checking Electrical Parts of Outdoor Unit









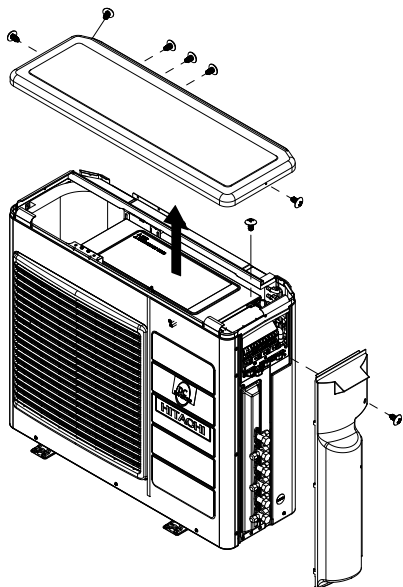


DISMANTLE AND ASSEMBLY PROCEDURE

■ RAM-53NP2B

1. Electrical parts (preparation to remove board)

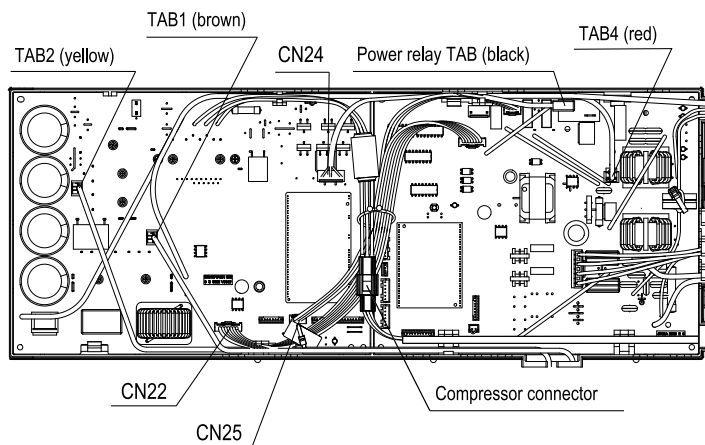
- (1) Remove screw that fix the service valve cover and push it down to take it out.
- (2) Remove the screws on both sides of top cover and then remove the top cover.



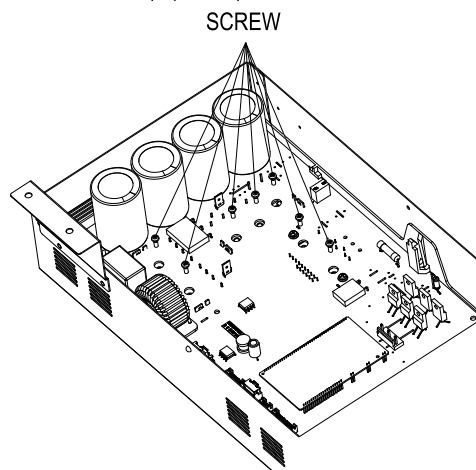
- (3) Remove the screws that holding the electrical cover and then remove the cover.

2. Dismantle procedure of inverter board

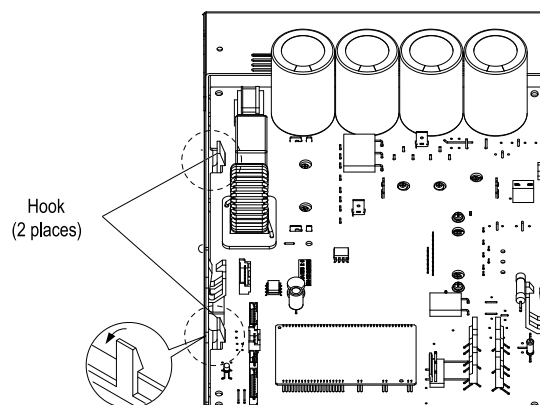
- (1) Un-insert connectors (4 places) and TAB terminal (4 places).



- (2) Remove screw (7 pieces) that fixed the board.

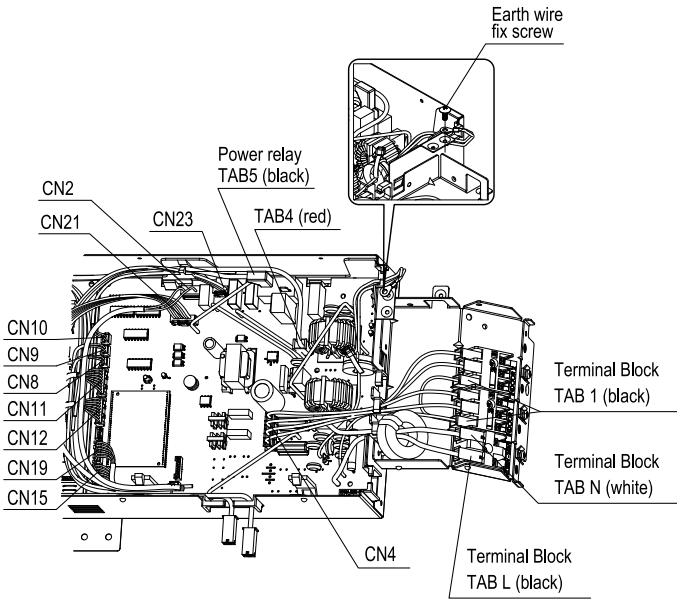


- (3) Take out the board by lift up after release the hook that hold the board in its place.

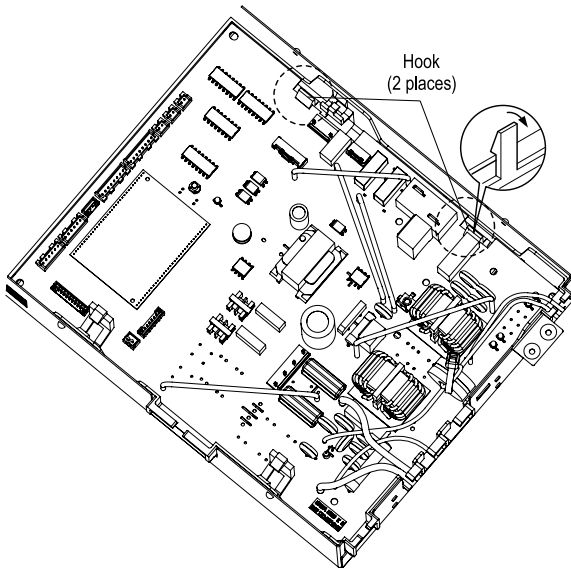


3. Dismantle procedure of main board

- (1) Un-insert connector (11 places), TAB terminal (6 places) and un-screw 1 piece earth screw.



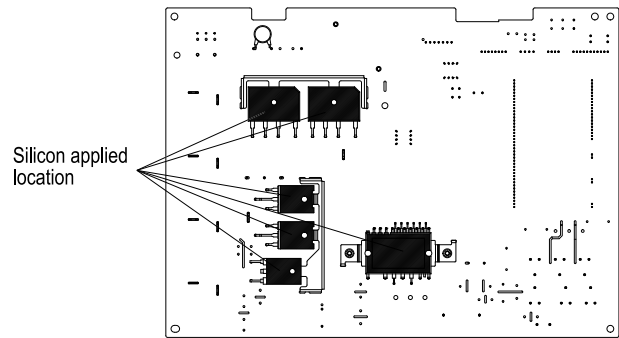
- (2) Release the hooks (2 places) that locking the board and lift up the board to take it out.



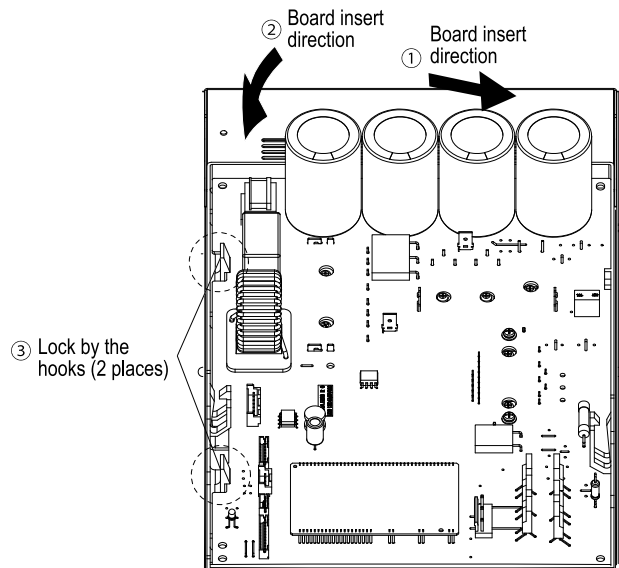
4. Assembly procedure of inverter board

- (1) Preparation before insert back the board.

Applied uniformly with small amount to 6 places of electronic part at back side of board.

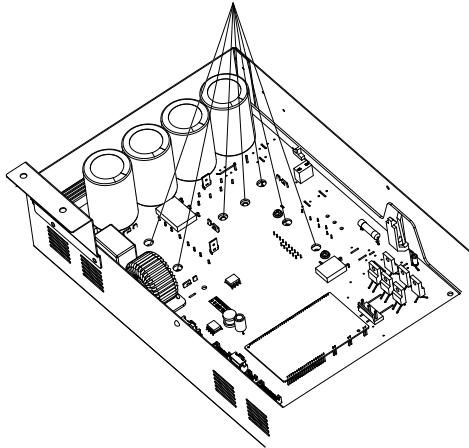


- (2) Insert the board into the pcb support and fix it with hooks (2 places).



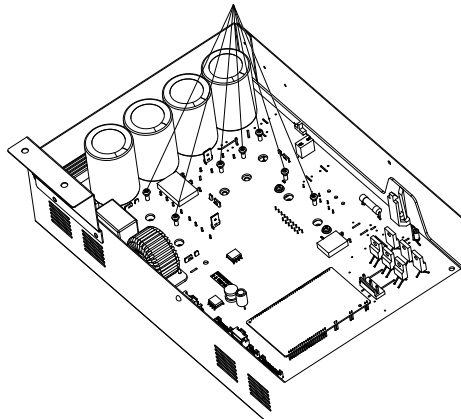
(3) Arrange the board position so that hole for fixing screw and holes at heat sink are concentric.

Arrange hole position (7 places)

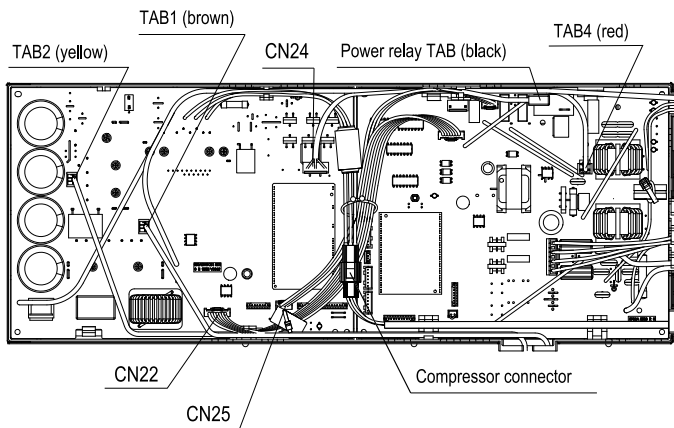


(4) Fix the board with screw (7 places).

Screw

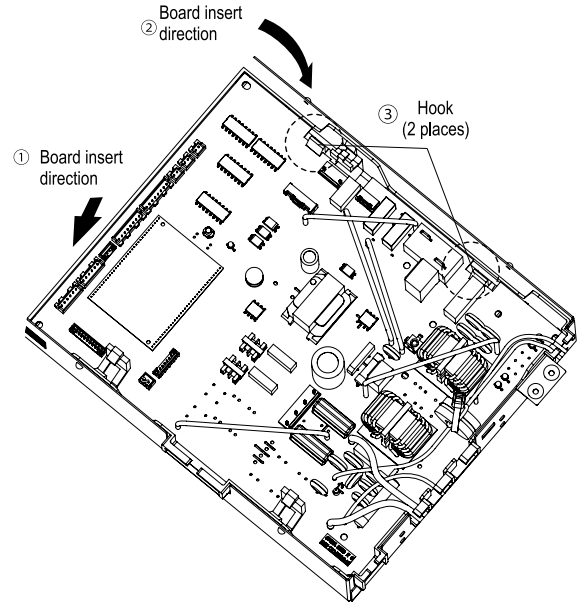


(5) Insert back connector (4 places) and TAB terminal (4 places) at its original location.

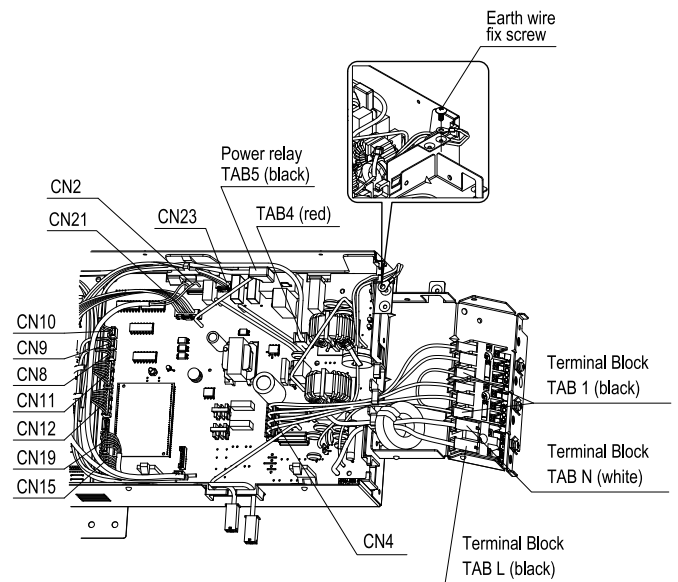


5. Assembly procedure of main board

(1) Insert back the board into pcb support and lock it with hook (2 places).



(2) Insert back the connectors (11 places), TAB terminals (6 places) and 1 piece of earth screw.

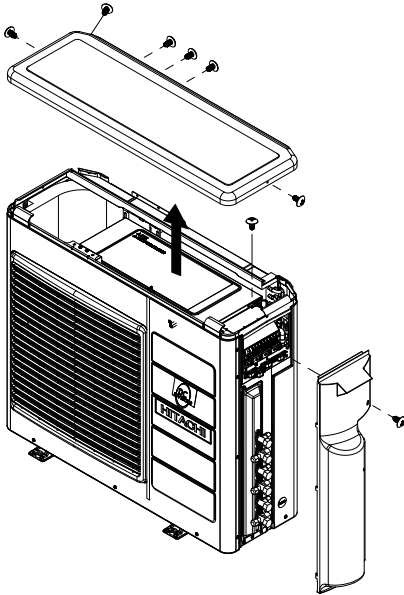


DISMANTLE AND ASSEMBLY PROCEDURE

■ RAM-53NP3B

1. Electrical parts (preparation to remove board)

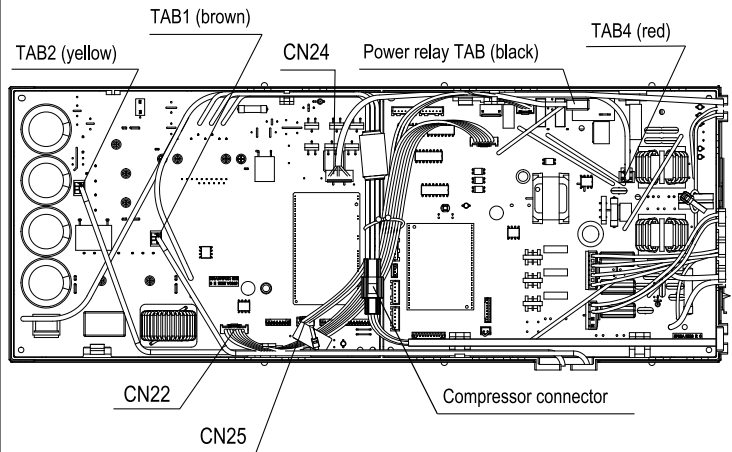
- (1) Remove screw that fix the service valve cover and push it down to take it out.
- (2) Remove the screws on both sides of top cover and then remove the top cover.



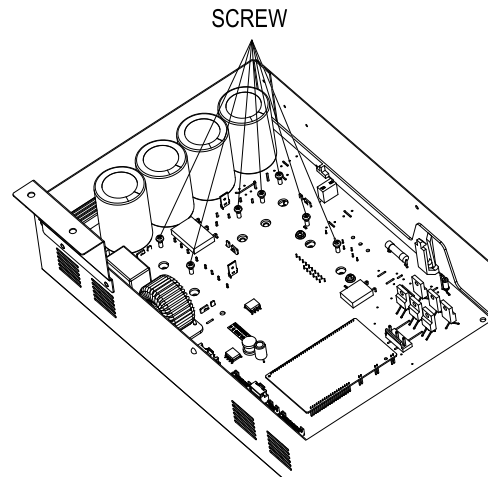
- (3) Remove the screws that holding the electrical cover and then remove the cover.

2. Dismantle procedure of inverter board

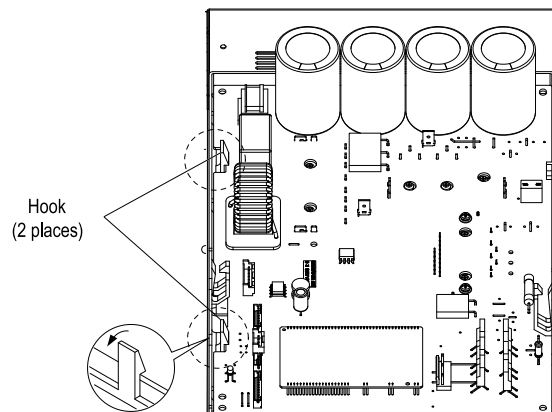
- (1) Un-insert connectors (4 places) and TAB terminal (4 places).



- (2) Remove screw (7 pieces) that fixed the board.

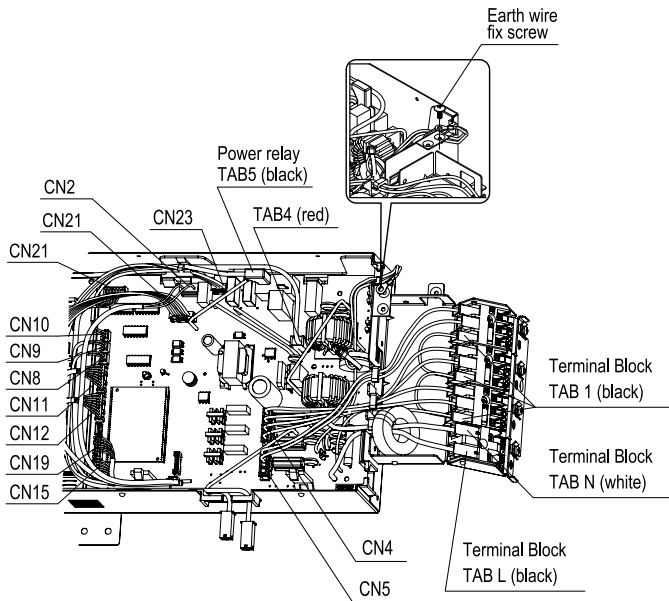


- (3) Take out the board by lift up after release the hook that hold the board in its place.

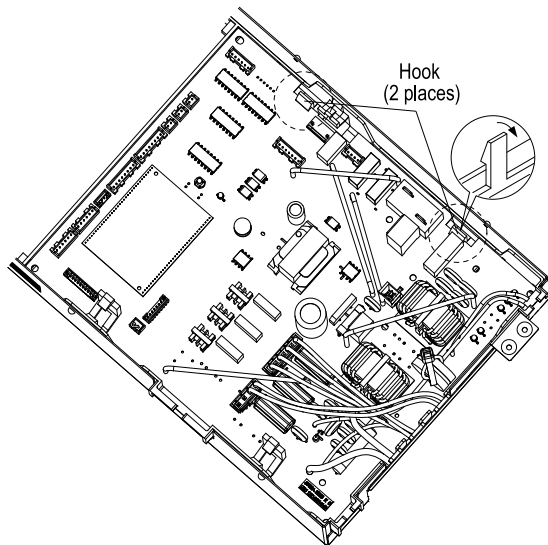


3. Dismantle procedure of main board

- (1) Un-insert connector (13 places), TAB terminal (7 places) and un-screw 1 piece earth screw.



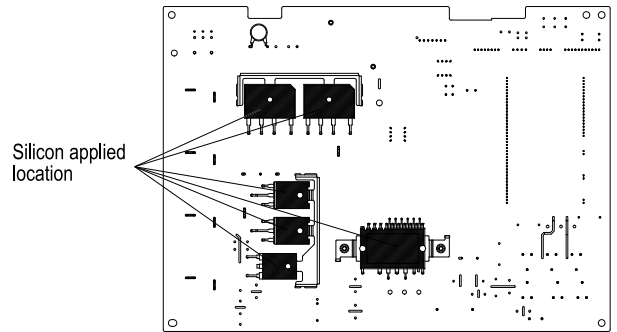
- (2) Release the hooks (2 places) that locking the board and lift up the board to take it out.



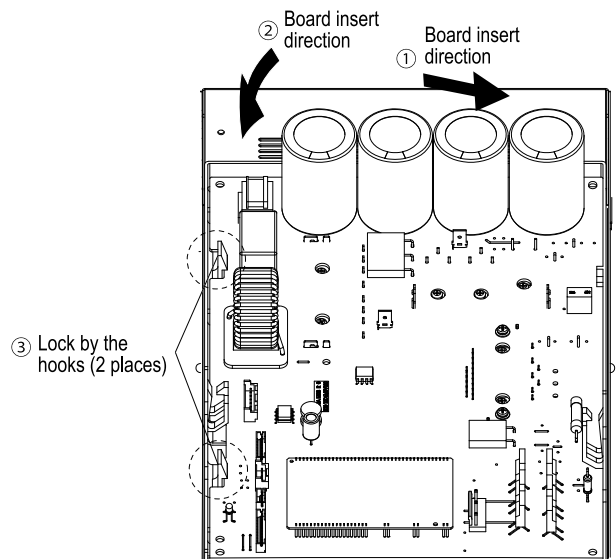
4. Assembly procedure of inverter board

- (1) Preparation before insert back the board.

Applied uniformly with small amount to 6 places of electronic part at back side of board.

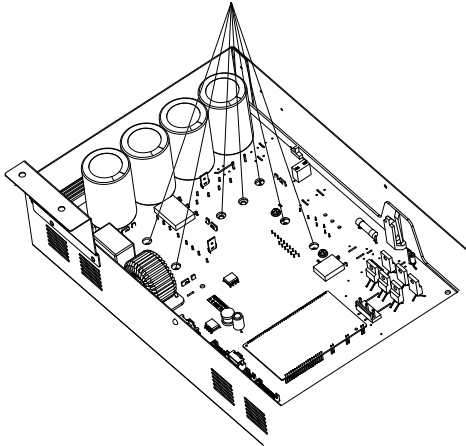


- (2) Insert the board into the pcb support and fix it with hooks (2 places).



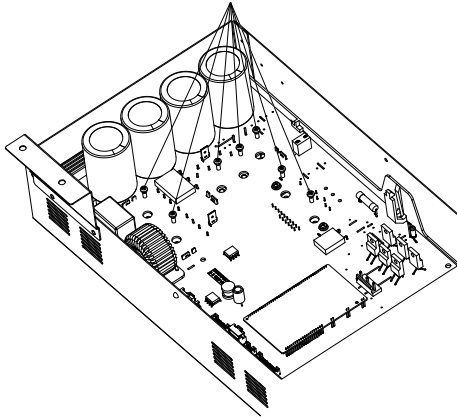
(3) Arrange the board position so that hole for fixing screw and holes at heat sink are concentric.

Arrange hole position (7 places)

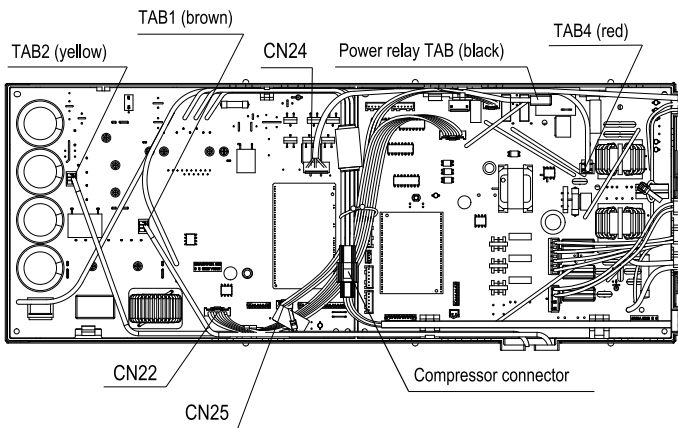


(4) Fix the board with screw (7 places).

Screw

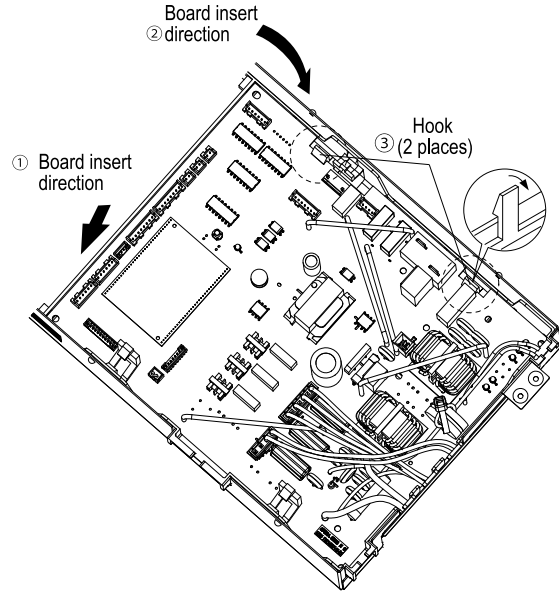


(5) Insert back connector (4 places) and TAB terminal (4 places) at it original location.

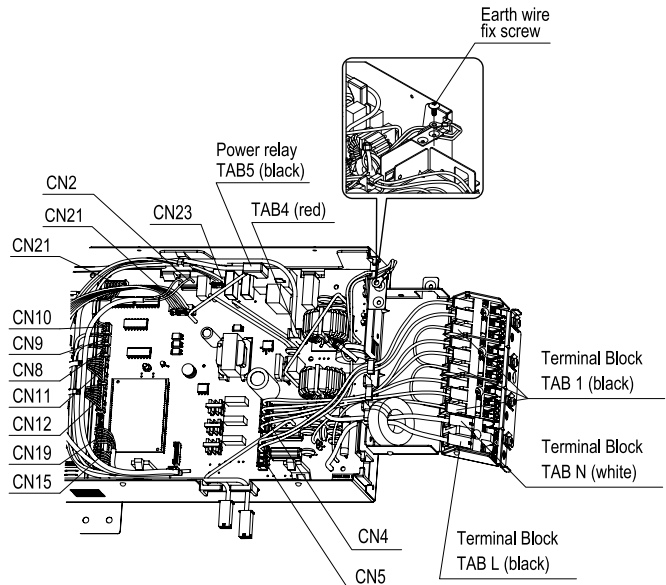


5. Assembly procedure of main board

(1) Insert back the board into pcb support and lock it with hook (2 places).



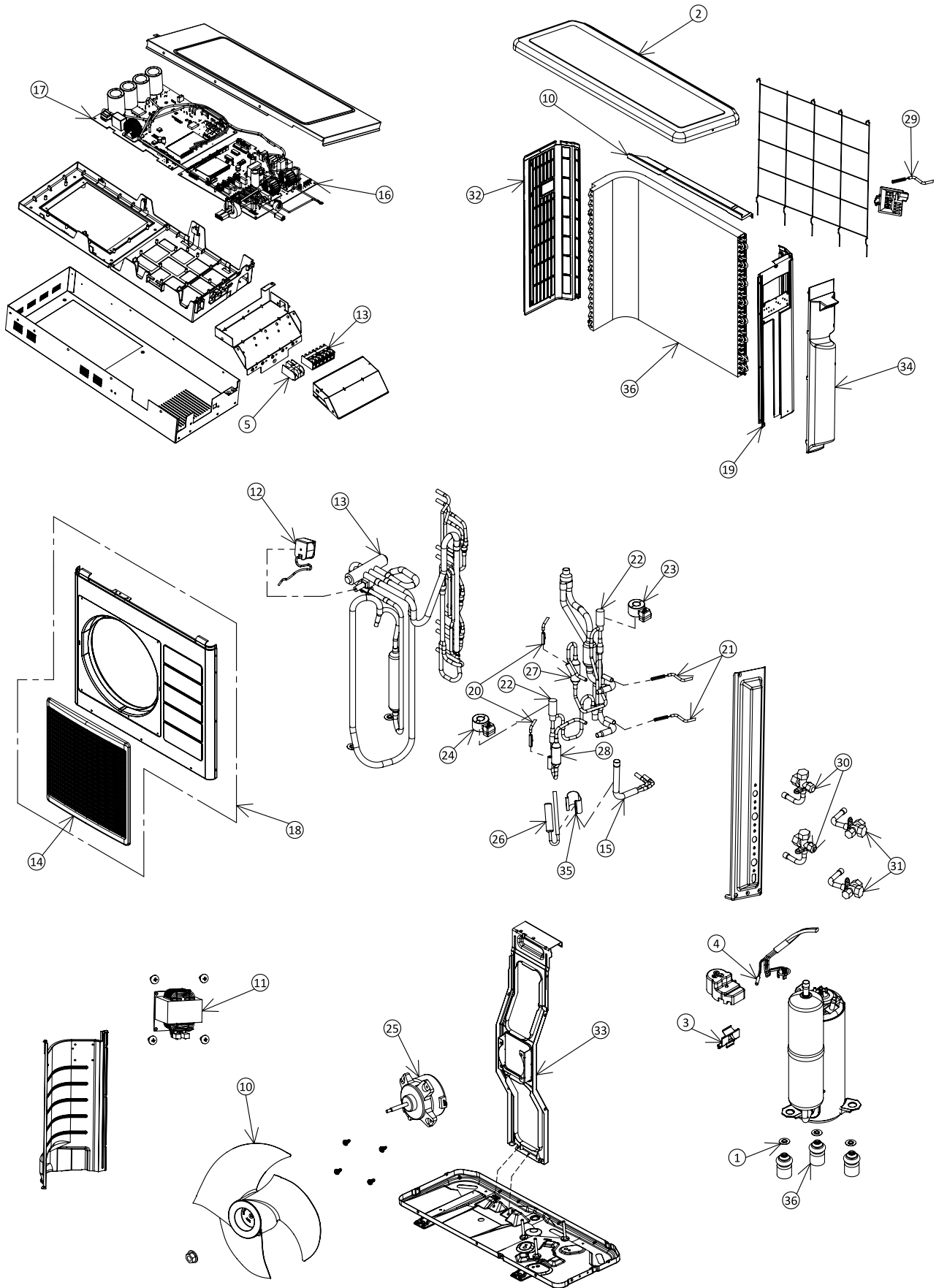
(2) Insert back the connectors (13 places), TAB terminals (7 places) and 1 piece of earth screw.



PARTS LIST AND DIAGRAM

OUTDOOR UNIT

MODEL : RAM-53NP2B



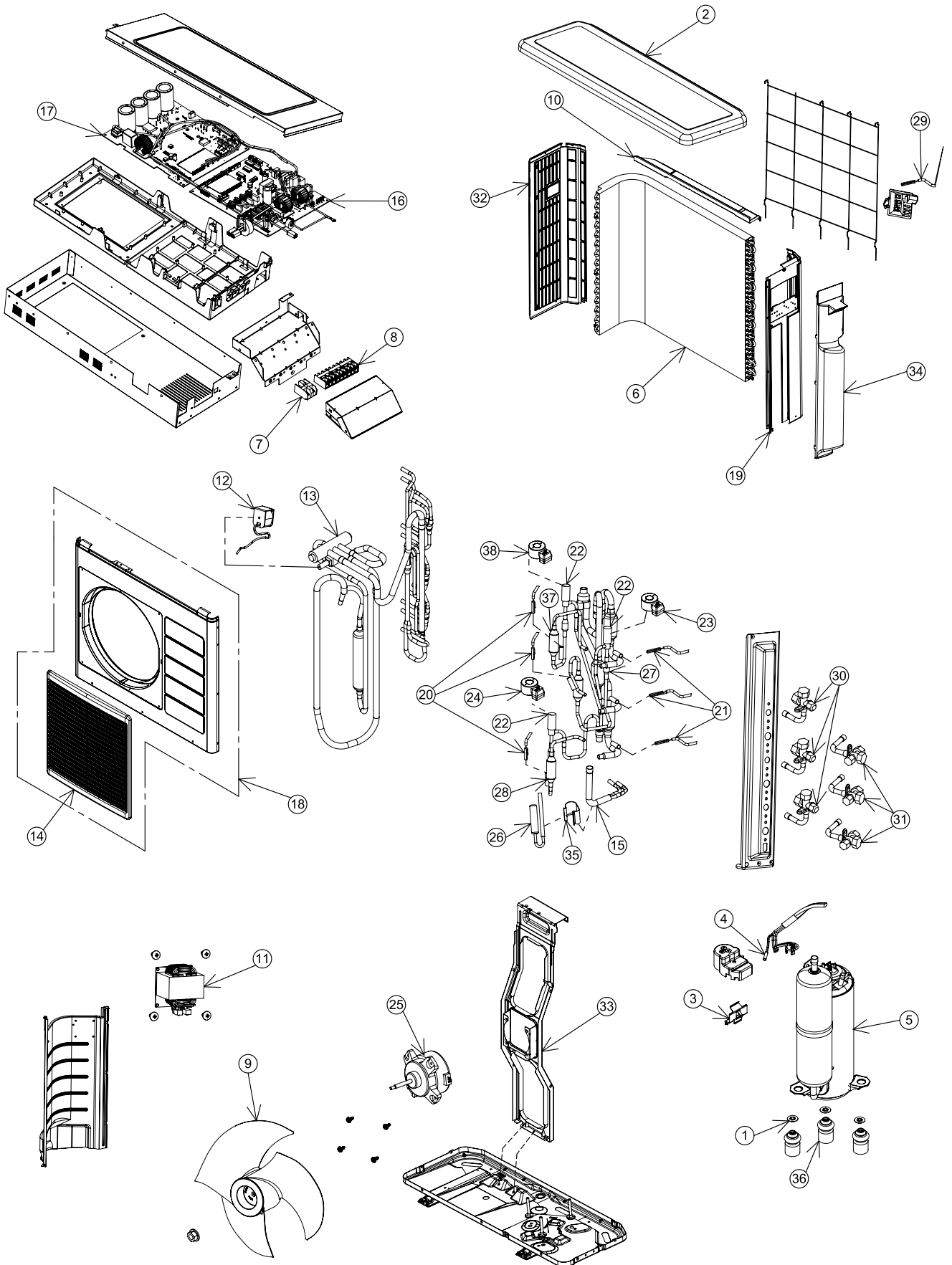
MODEL RAM-53NP2B

NO.	PART NO.		Q'TY / UNIT	PARTS NAME
1	KPNT1	001	6	PUSH NUT
2	PMRAC-24CP5	905	1	TOP COVER
3	PMRAC-25NH4	S09	1	THERMISTOR SUPPORT (OH)
4	PMRAC-40CNH2	S14	1	THERMISTOR (OH)
5	PMRAC-60YH7	S01	1	COMPRESSOR
6	PMRAC-60YHA3	S05	1	CONDENSER
7	PMRAC-63CA1	S02	1	TERMINAL BOARD (2P)
8	PMRAC-VX13CET	S04	1	TERMINAL BOARD (3P)
9	PMRAC-70YHA	907	1	PROPELLER FAN
10	PMRAC-S24HPA	S05	1	NET
11	PMRAC-X18CD	S04	1	REACTOR
12	PMRAM-33NP2B	S06	1	COIL (REVERSING VALVE)
13	PMRAM-33NP2B	S07	1	REVERSING VALVE
14	PMRAM-52QH5	S03	1	D-GRILL-AS
15	PMRAM-53NP2A	S05	1	STRAINER (CO-PIPE-AS)
16	PMRAM-53NP2B	S01	1	P.W.B (MAIN)
17	PMRAM-53NP2B	S02	1	P.W.B (INVERTER)
18	PMRAM-53NP2B	S03	1	CABINET
19	PMRAM-53NP2B	S04	1	SIDE PLATER R
20	PMRAM-53NP2B	S05	1	THERMISTOR-V-R
21	PMRAM-53NP2B	S06	1	THERMISTOR-V-W
22	PMRAM-53NP2B	S07	2	EXPANSION VALVE
23	PMRAM-53NP2B	S08	1	EXPANSION VALVE COIL (W)
24	PMRAM-53NP2B	S09	1	EXPANSION VALVE COIL (R)
25	PMRAM-53NP2B	S10	1	FAN MOTOR
26	PMRAM-55QH4	S05	1	THERMISTOR (DEFROST)
27	PMRAM-65QH4	918	1	STRAINER (ST-PIPE-AS 2)
28	PMRAM-65QH4	919	1	STRAINER (ST-PIPE-AS 3)
29	PMRAM-65QH4	S10	1	THERMISTOR (OUTSIDE TEMPERATURE)
30	PMRAM-65QH4	S15	2	VALVE (2S)
31	PMRAM-65QH4	S16	2	VALVE (3S)
32	PMRAM-72Q9	S05	1	SIDE PLATE L
33	PMRAM-72Q9	S08	1	SUPPORT (FAN MOTOR)
34	PMRAM-72Q9	S09	1	SV-COVER
35	PMRAM-72QH5	S20	1	THERMISTOR SUPPORT
36	RAC-2226HV	805	3	COMPRESSOR RUBBER

PARTS LIST AND DIAGRAM

OUTDOOR UNIT

MODEL : RAM-53NP3B



MODEL RAM-53NP3B

NO.	PART NO.	Q'TY / UNIT	PARTS NAME
1	KPNT1 001	6	PUSH NUT
2	PMRAC-24CP5 905	1	TOP COVER
3	PMRAC-25NH4 S09	1	THERMISTOR SUPPORT (OH)
4	PMRAC-40CNH2 S14	1	THERMISTOR (OH)
5	PMRAC-60YH7 S01	1	COMPRESSOR
6	PMRAC-60YHA3 S05	1	CONDENSER
7	PMRAC-63CA1 S02	1	TERMINAL BOARD (2P)
8	PMRAC-VX13CET S04	1	TERMINAL BOARD (3P)
9	PMRAC-70YHA 907	1	PROPELLER FAN
10	PMRAC-S24HPA S05	1	NET
11	PMRAC-X18CD S04	1	REACTOR
12	PMRAM-33NP2B S06	1	COIL (REVERSING VALVE)
13	PMRAM-33NP2B S07	1	REVERSING VALVE
14	PMRAM-52QH5 S03	1	D-GRILL-AS
15	PMRAM-53NP2A S05	1	STRAINER (CO-PIPE-AS)
16	PMRAM-53NP3B S01	1	P.W.B (MAIN)
17	PMRAM-53NP3B S02	1	P.W.B (INVERTER)
18	PMRAM-53NP2B S03	1	CABINET
19	PMRAM-53NP2B S04	1	SIDE PLATER R
20	PMRAM-53NP3B S03	1	THERMISTOR-V-R
21	PMRAM-53NP3B S04	1	THERMISTOR-V-W
22	PMRAM-53NP2B S07	3	EXPANSION VALVE
23	PMRAM-53NP2B S08	1	EXPANSION VALVE COIL (W)
24	PMRAM-53NP2B S09	1	EXPANSION VALVE COIL (R)
25	PMRAM-53NP2B S10	1	FAN MOTOR
26	PMRAM-55QH4 S05	1	THERMISTOR (DEFROST)
27	PMRAM-65QH4 918	1	STRAINER (ST-PIPE-AS 2)
28	PMRAM-65QH4 919	1	STRAINER (ST-PIPE-AS 3)
29	PMRAM-65QH4 S10	1	THERMISTOR (OUTSIDE TEMPERATURE)
30	PMRAM-65QH4 S15	3	VALVE (2S)
31	PMRAM-65QH4 S16	3	VALVE (3S)
32	PMRAM-72Q9 S05	1	SIDE PLATE L
33	PMRAM-72Q9 S08	1	SUPPORT (FAN MOTOR)
34	PMRAM-72Q9 S09	1	SV-COVER
35	PMRAM-72QH5 S20	1	THERMISTOR SUPPORT
36	RAC-2226HV 805	3	COMPRESSOR RUBBER
37	PMRAM-65QH4 S17	1	STRAINER (ST-PIPE-AS 1)
38	PMRAM-53NP3B S05	1	EXPANSION VALVE COIL (B)

HITACHI

RAM-53NP2B
RAM-53NP3B

PM NO. 0583E

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