TOSHIBA

FILE NO. A05-001

SERVICE MANUAL

AIR-CONDITIONER
SPLIT TYPE

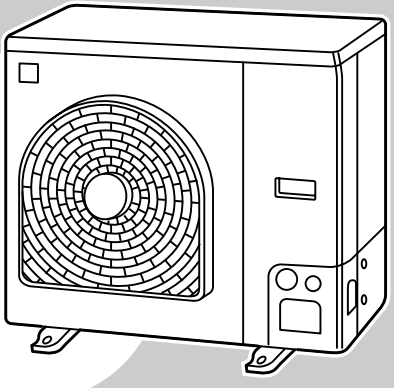
<NEW DIGITAL INVERTER>

OUTDOOR UNIT

RAV-SM561AT-E
RAV-SM801AT-E
RAV-SM1101AT-E
RAV-SM1401AT-E

INDOOR UNIT

This Service Manual describes contents of the new outdoor unit.
For the indoor unit, refer to the Service Manual with **FILE NO. A03-003F**.



HFC
R410A

PRINTED IN JAPAN, Apr.,2005 ToMo

ADOPTION OF NEW REFRIGERANT

This Air Conditioner is a new type which adopts a new refrigerant HFC (R410A) instead of the conventional refrigerant R22 in order to prevent destruction of the ozone layer.

WARNING

Cleaning of the air filter and other parts of the air filter involves dangerous work in high places, so be sure to have a service person do it. Do not attempt it yourself. The cleaning diagram for the air filter is there for the service person, and not for the customer.

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1. SPECIFICATIONS

RAV-SM561AT-E, RAV-SM801AT-E

Model name			RAV-SM561AT-E	RAV-SM801AT-E
Appearance			Silky shade (Muncel 1Y8.5/0.5)	
Power supply			1 phase 230 V (220 – 240 V) 50 Hz (Power exclusive to outdoor is required.)	
Compressor	Type		Hermetic compressor	
	Motor (kW)		1.1	1.6
	Pole		4 poles	
Refrigerant charged (kg)			R410A 1.0	R410A 1.7
Refrigerant control			Pulse motor valve	
Pipe	Standard length		20 (without additional charge)	
	Max. total length (m)		30	
	Over 20m		Add 20 g/m (Max. 200 g)	Add 40 g/m (Max. 400 g)
	Height difference	Outdoor lower (m)	30	
		Outdoor higher (m)	30	
Outer dimension	Height (mm)		550	
	Width (mm)		780	
	Depth (mm)		290	
Total weight (kg)			38	42
Heat exchanger			Finned tube	
Fan unit	Fan		Propeller fan	
	Standard air flow High (m³/h)		2400	2700
	Motor (W)		43	
Connecting pipe	Gas side (mm)		Ø12.7 (1/2”)	Ø15.9 (5/8”)
	Liquid side (mm)		Ø6.4 (1/4”)	Ø9.5 (3/8”)
Protection device			Discharge temp. sensor Over-current sensor Compressor thermo.	
Sound level (Note 2)	High (Mid./Low) (Cooling/Heating) (dB•A)		46 / 48	48 / 50

Note 1 : The cooling capacities and electrical characteristics are measured under the conditions speciied by JIS B 8616 based on the reference piping 7.5m.

Note 2 : The sound level is measured in an anechoic chamber in accordance with JIS B8616. Normally, the values measured in the actual operating environment become larger than the indicated values due to the effects of external sound.

Note : Rated conditions Cooling : Indoor air temperature 27°C DB/19°C WB, Outdoor air temperature 35°C DB
Heating : Indoor air temperature 20°C DB, Outdoor air temperature 7°C DB/6°C WB

RAV-SM1101AT-E, RAV-SM1401AT-E

Model name			RAV-SM1101AT-E	RAV-SM1401AT-E
Appearance			Silky shade (Muncel 1Y8.5/0.5)	
Power supply			1 phase 230 V (220 – 240 V) 50 Hz (Power exclusive to outdoor is required.)	
Compressor	Type		Hermetic compressor	
	Motor (kW)		2.5	3.0
	Pole		4 poles	
Refrigerant charged (kg)			R410A 2.8	
Refrigerant control			Pulse motor valve	
Pipe	Standard length		30 (without additional charge)	
	Max. total length (m)		50	
	Over 20m		Add 40 g/m (Max. 800 g)	
	Height difference	Outdoor lower (m)	30	
		Outdoor higher (m)	30	
Outer dimension	Height (mm)		795	
	Width (mm)		780	
	Depth (mm)		320	
Total weight (kg)			77	
Heat exchanger			Finned tube	
Fan unit	Fan		Propeller fan	
	Standard air flow High (m³/h)		4500	
	Motor (W)		100	
Connecting pipe	Gas side (mm)		Ø15.9 (5/8”)	
	Liquid side (mm)		Ø9.5 (3/8”)	
Protection device			Discharge temp. sensor Over-current sensor Compressor thermo.	
Sound level (Note 2)	High (Mid./Low) (Cooling/Heating) (dB•A)		53 / 54	

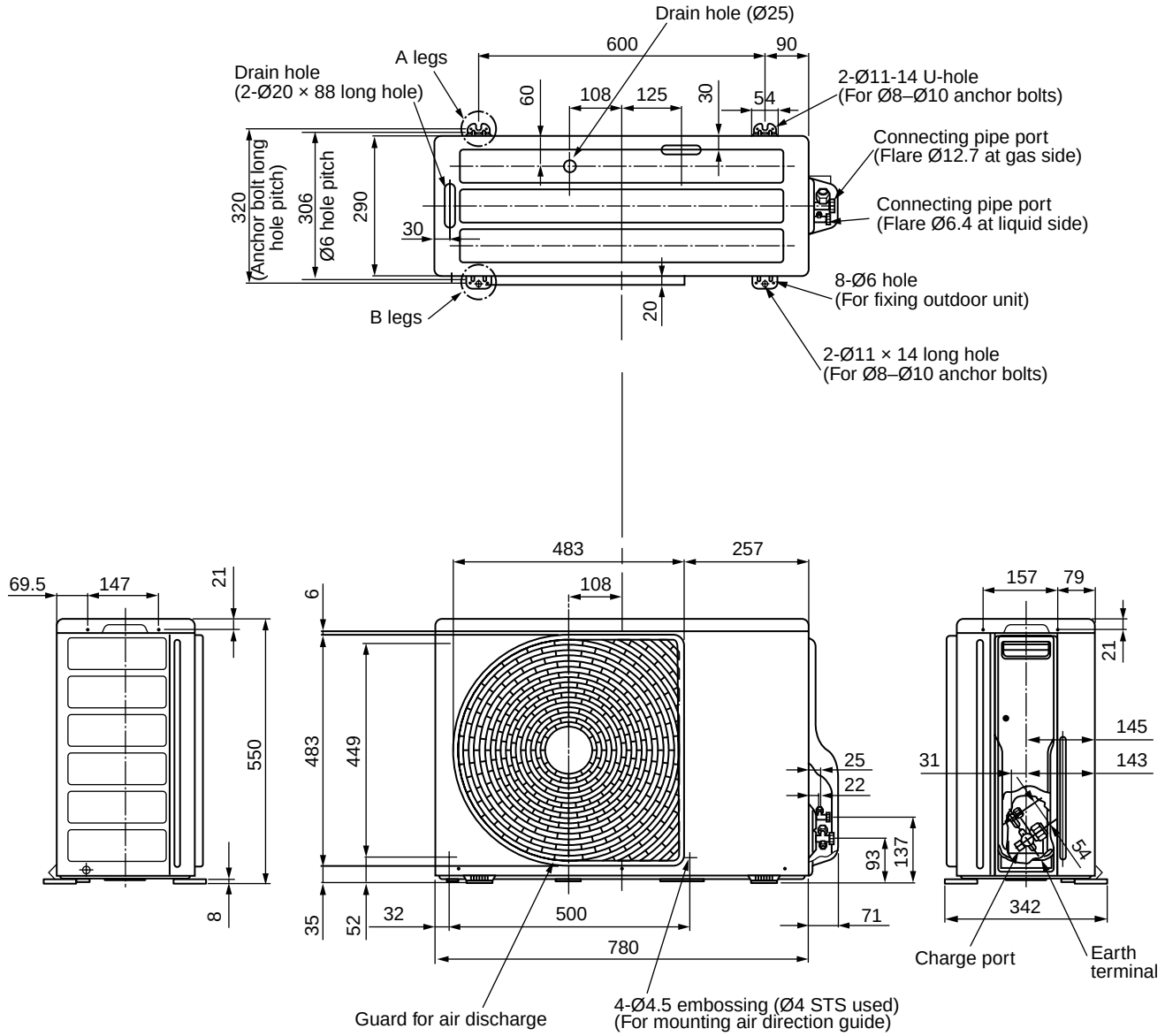
Note 1 : The cooling capacities and electrical characteristics are measured under the conditions speciied by JIS B 8616 based on the reference piping 7.5m.

Note 2 : The sound level is measured in an anechoic chamber in accordance with JIS B8616. Normally, the values measured in the actual operating environment become larger than the indicated values due to the effects of external sound.

Note : Rated conditions Cooling : Indoor air temperature 27°C DB/19°C WB, Outdoor air temperature 35°C DB
Heating : Indoor air temperature 20°C DB, Outdoor air temperature 7°C DB/6°C WB

2. CONSTRUCTION VIEWS (EXTERNAL VIEWS)

RAV-SM561AT-E



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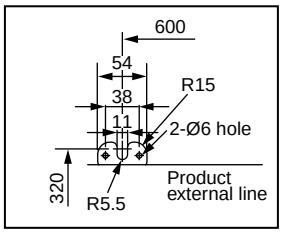

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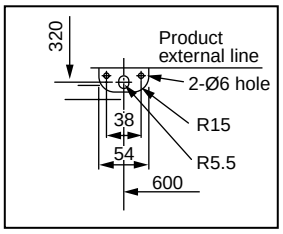

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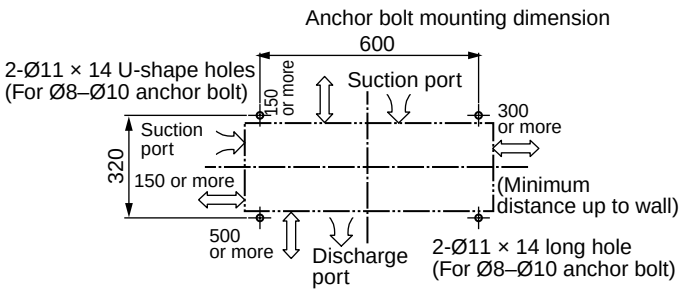
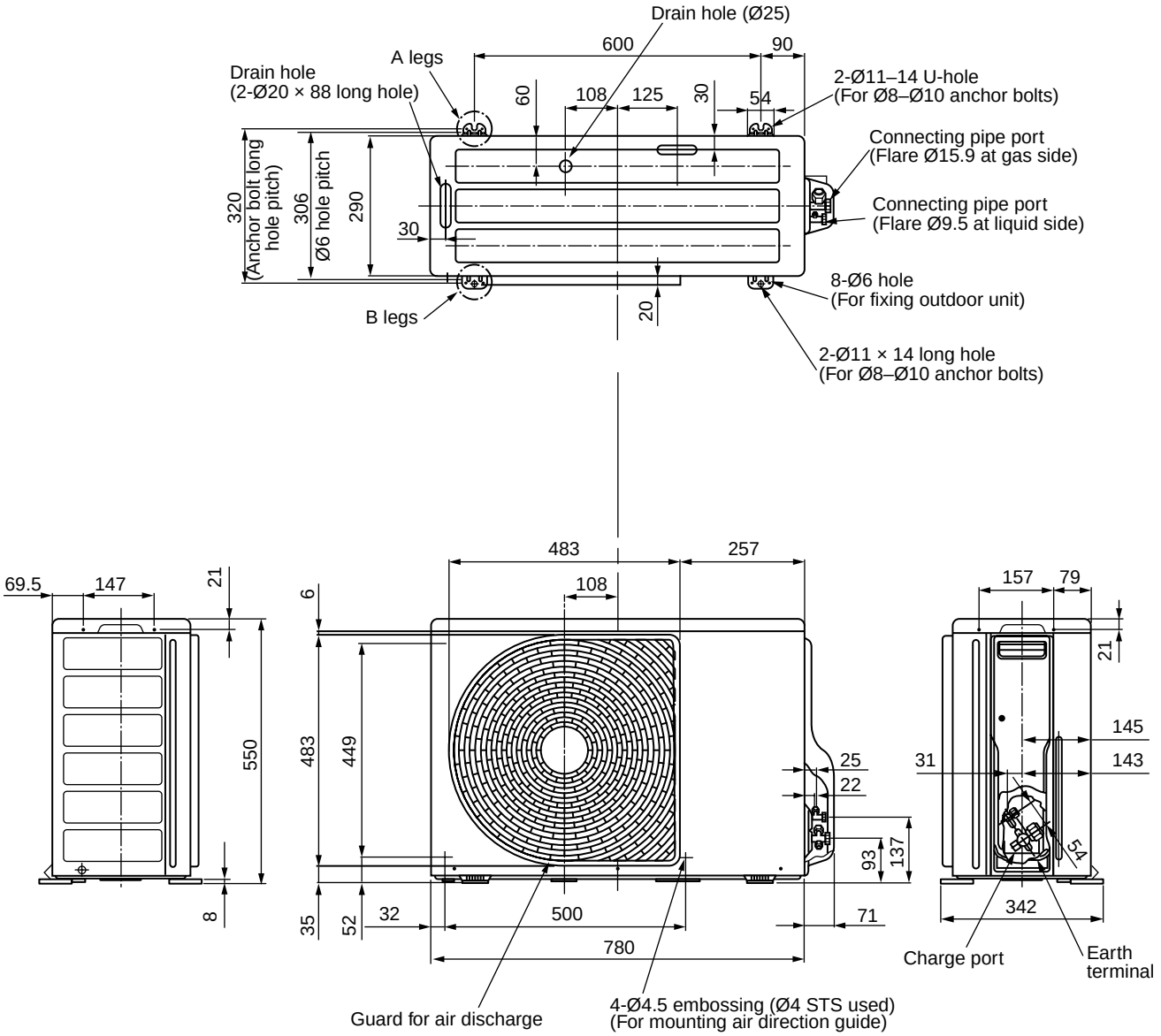


RAV-SM801AT-E



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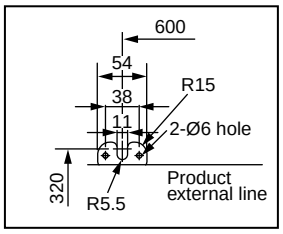
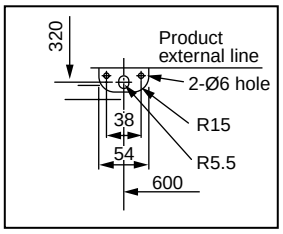
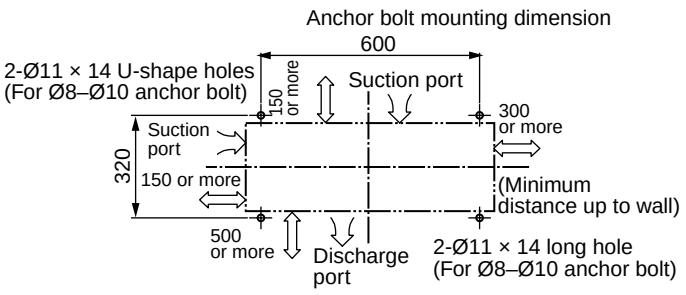


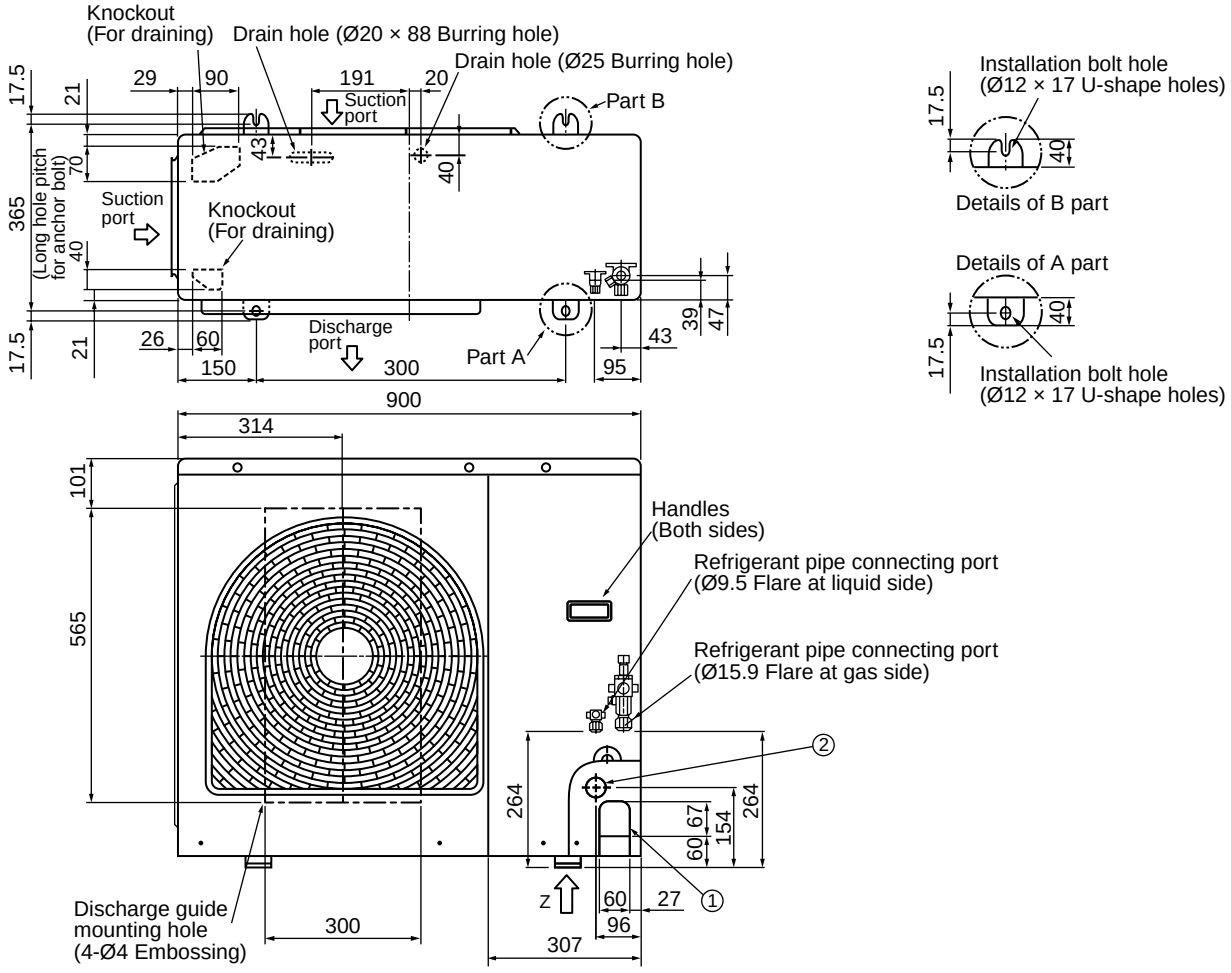
Details of A legs

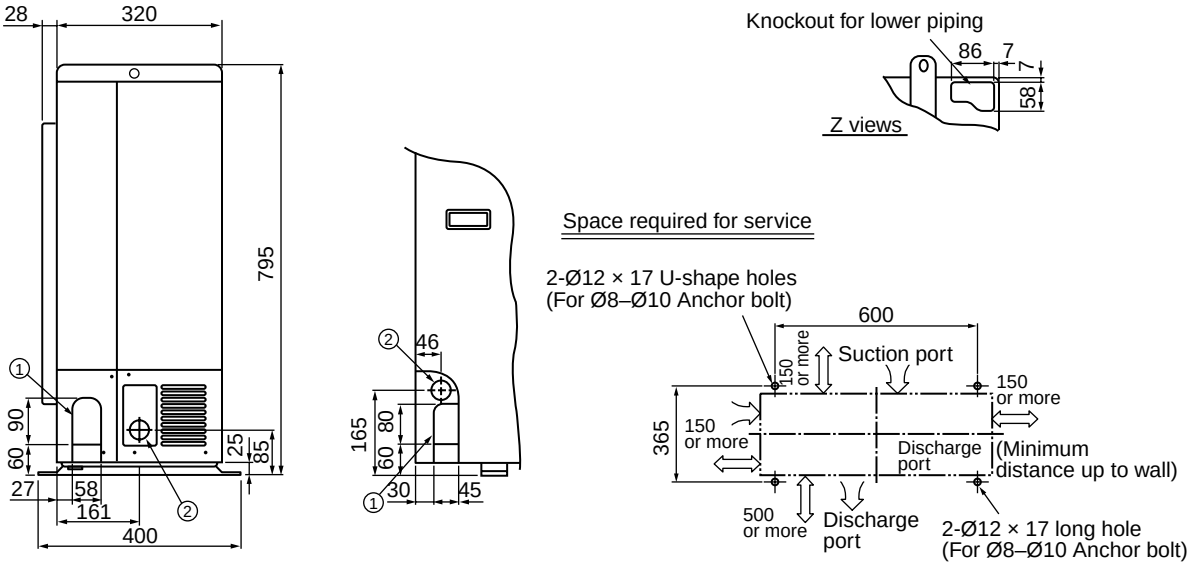


Details of B legs



RAV-SM1101AT-E, RAV-SM1401AT-E

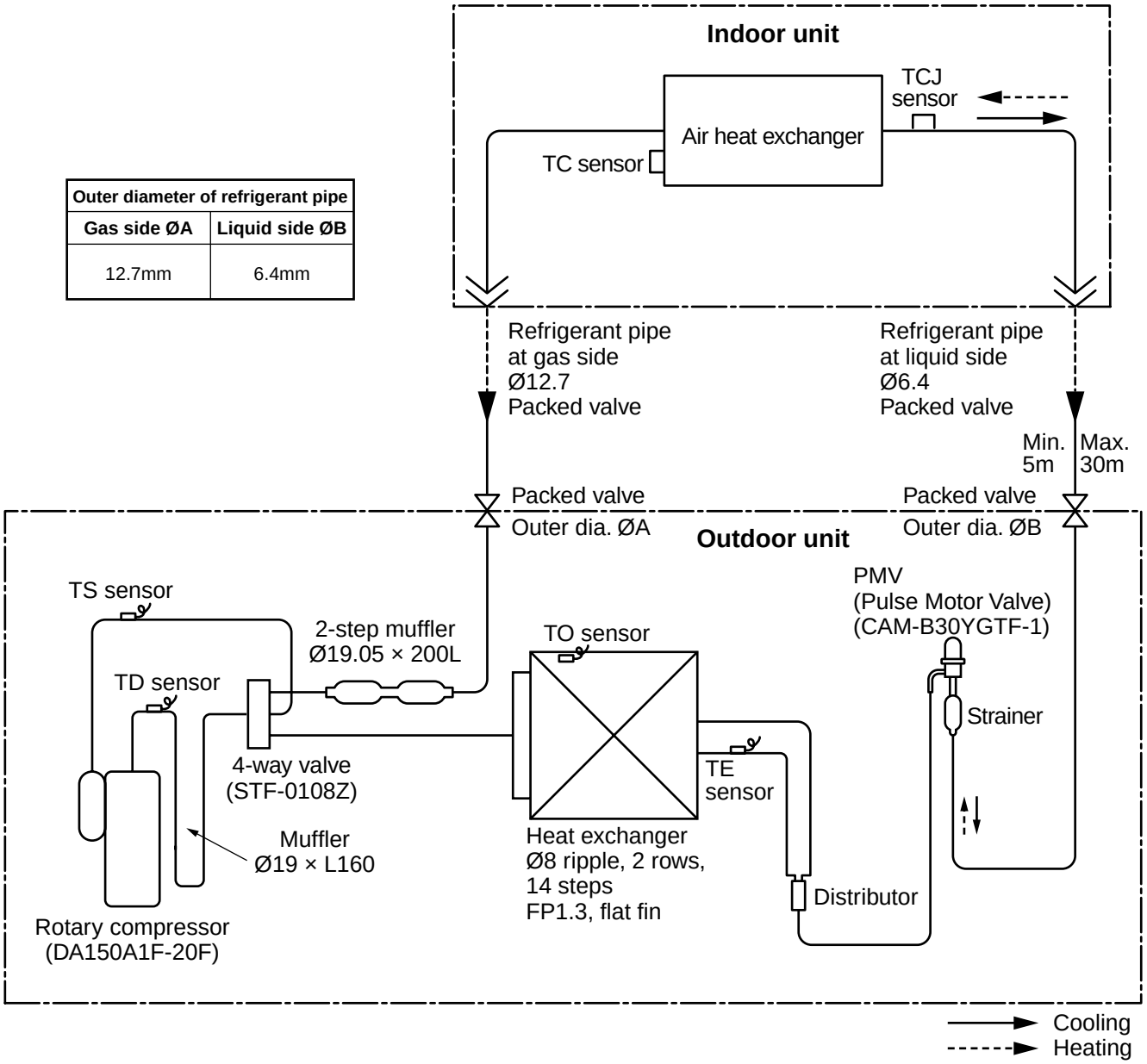




3. REFRIGERATING CYCLE DIAGRAM

RAV-SM561AT-E

Outer diameter of refrigerant pipe	
Gas side ØA	**Liquid side ØB**
12.7mm	6.4mm

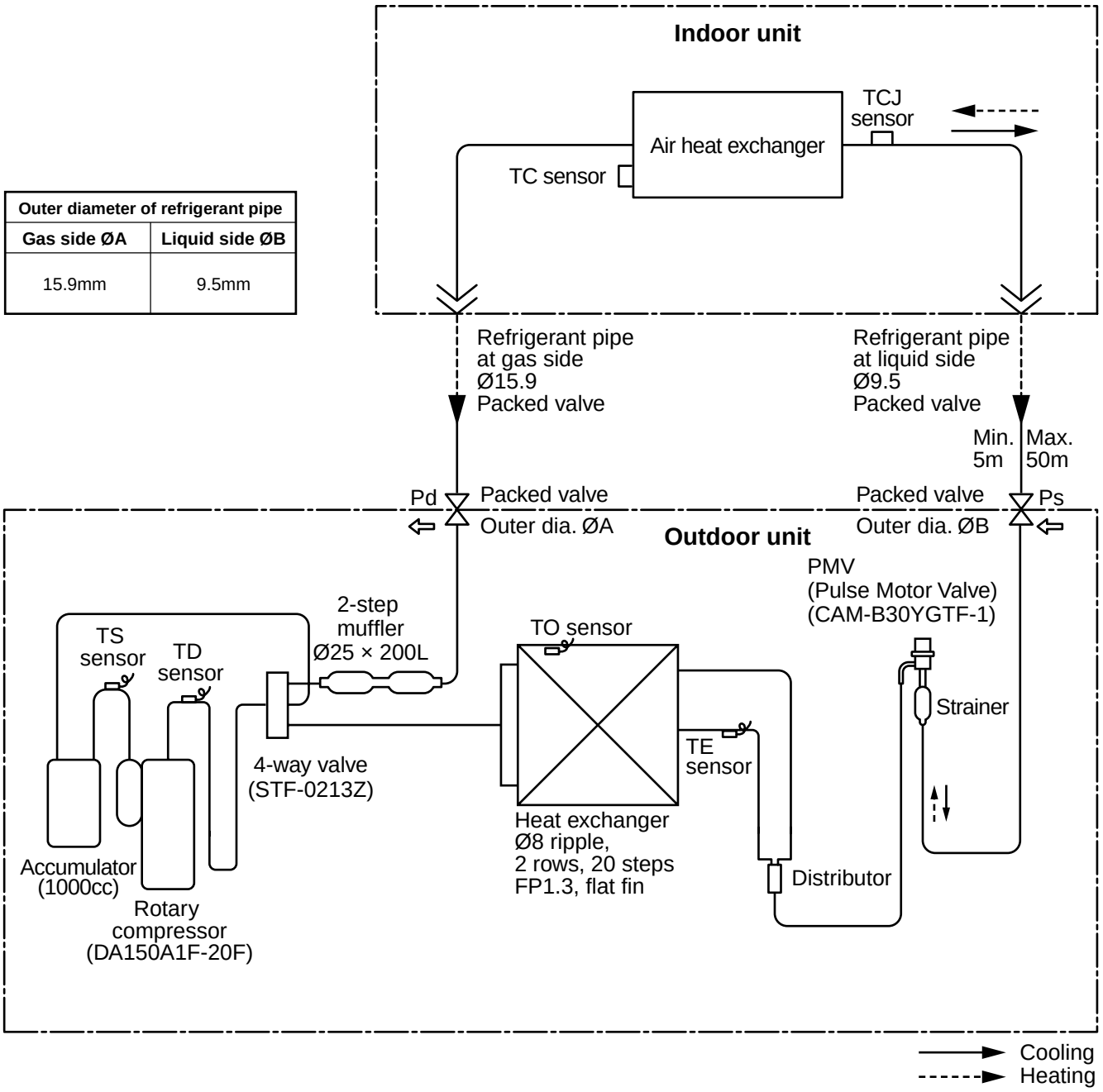


		Pressure				Pipe surface temperature (°C)				Compressor revolutions per second (rps) *	Indoor fan	Indoor/Outdoor temp. conditions (DB/WB) (°C)	
		(MPa)		(kg/cm²G)		Discharge	Suction	Indoor heat exchanger	Outdoor heat exchanger				
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TC)	(TE)			Indoor	Outdoor
Cooling	Standard	3.50	0.97	35.7	9.9	85	14	12	48	70	HIGH	27/19	35/–
	Overload	3.90	1.08	39.8	11.0	93	26	17	54	70	HIGH	32/24	43/–
	Low load	1.90	0.70	19.4	7.1	48	7	5	30	50	LOW	18/15.5	–5/–
Heating	Standard	2.31	0.61	13.6	6.2	87	5	40	1	97	HIGH	20/–	7/6
	Overload	2.86	0.89	29.2	9.1	86	17	47	11	95	HIGH	28/–	24/18
	Low load	1.86	0.25	19.0	2.6	69	–14	31	–15	98	HIGH	15/–	–10/(70%)

* 4 poles are provided to this compressor.
The compressor frequency (Hz) measured with a clamp meter is 2 times of revolutions (rps) of the compressor.

RAV-SM801AT-E

Outer diameter of refrigerant pipe	
Gas side ØA	Liquid side ØB
15.9mm	9.5mm

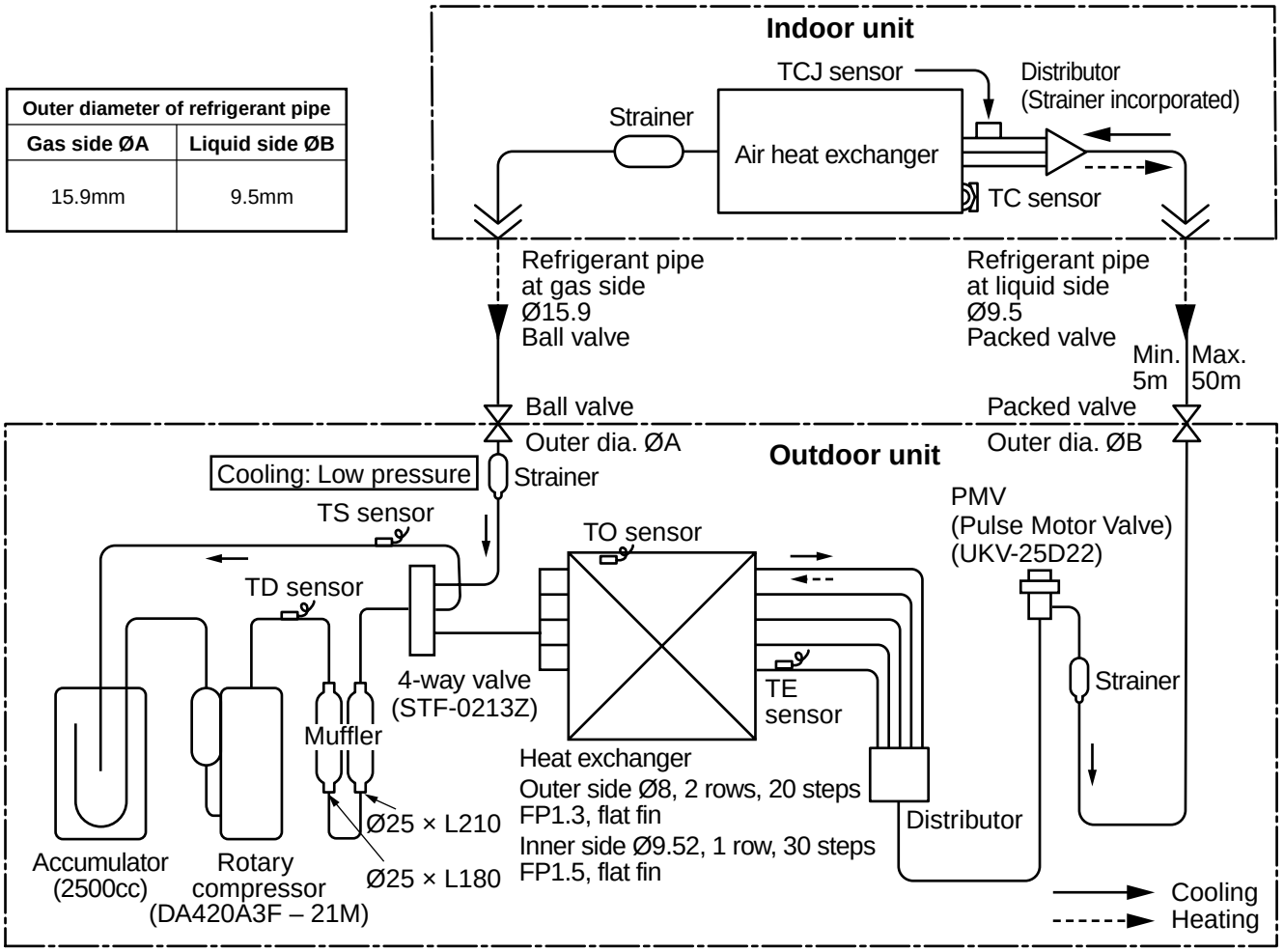


		Pressure				Pipe surface temperature (°C)				Compressor revolutions per second (rps) *	Indoor fan	Indoor/Outdoor temp. conditions (DB/WB) (°C)	
		(MPa)		(kg/cm²G)		Discharge	Suction	Indoor heat exchanger	Outdoor heat exchanger				
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TC)	(TE)			Indoor	Outdoor
Cooling	Standard	3.28	0.86	33.4	8.8	84	11	10	45	83	HIGH	27/19	35/–
	Overload	3.59	1.00	33.6	10.2	82	17	16	51	76	HIGH	32/24	43/–
	Low load	1.85	0.83	18.9	8.5	42	8	6	23	35	LOW	18/15.5	–5/–
Heating	Standard	2.53	0.62	25.8	6.3	75	3	42	2	95	HIGH	20/–	7/6
	Overload	3.42	1.07	34.9	10.9	80	20	54	17	50	LOW	28/–	24/18
	Low load	1.99	0.23	20.3	2.3	89	–19	34	–18	120	HIGH	15/–	–10/(70%)

* 4 poles are provided to this compressor.
The compressor frequency (Hz) measured with a clamp meter is 2 times of revolutions (rps) of the compressor.

RAV-SM1101AT-E, RAV-SM1401AT-E

Outer diameter of refrigerant pipe	
Gas side ØA	Liquid side ØB
15.9mm	9.5mm



RAV-SM1101AT-E

		Pressure				Pipe surface temperature (°C)				Compressor revolutions per second (rps) *	Indoor fan	Indoor/Outdoor temp. conditions (DB/WB) (°C)	
		(MPa)		(kg/cm²G)		Discharge	Suction	Indoor heat exchanger	Outdoor heat exchanger				
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TC)	(TE)			Indoor	Outdoor
Cooling	Standard	3.44	0.92	35.1	9.4	82	8	10	39	47	HIGH	27/19	35/–
	Overload	3.73	1.18	38.1	12.0	82	15	17	48	42	HIGH	32/24	43/–
	Low load	1.49	0.70	15.2	7.1	39	8	3	22	30	LOW	18/15.5	–5/–
Heating	Standard	2.80	0.61	28.6	6.2	80	0	46	1	48	HIGH	20/–	7/6
	Overload	3.43	1.08	35.0	11.0	82	14	55	13	24	LOW	30/–	24/18
	Low load	2.20	0.25	22.4	2.6	76	–19	36	–16	55	HIGH	15/–	–10/(70%)

RAV-SM1401AT-E

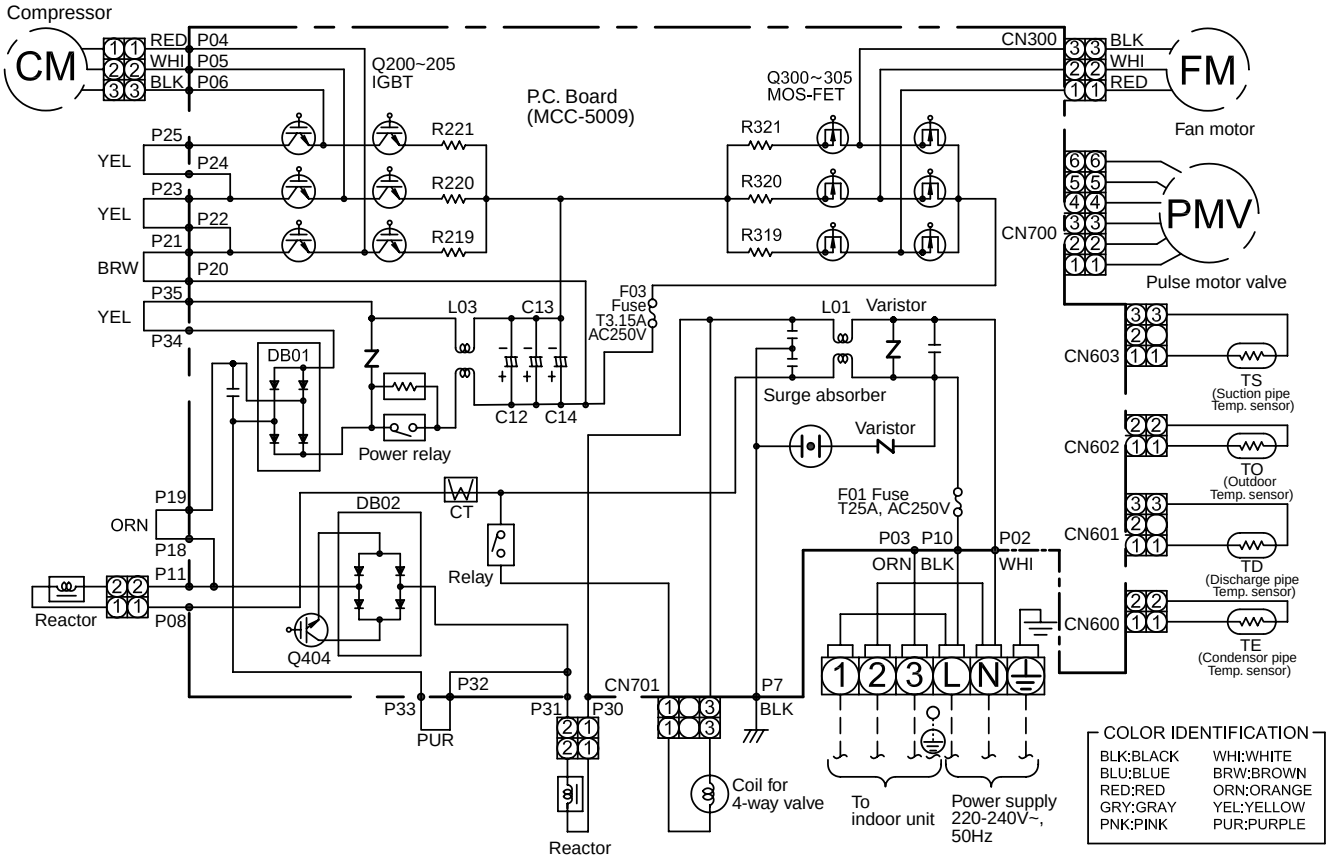
		Pressure				Pipe surface temperature (°C)				Compressor revolutions per second (rps) *	Indoor fan	Indoor/Outdoor temp. conditions (DB/WB) (°C)	
		(MPa)		(kg/cm²G)		Discharge	Suction	Indoor heat exchanger	Outdoor heat exchanger				
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TC)	(TE)			Indoor	Outdoor
Cooling	Standard	3.52	0.85	35.9	8.7	87	8	9	39	54	HIGH	27/19	35/–
	Overload	3.78	1.12	38.6	11.4	84	15	17	47	45	HIGH	32/24	43/–
	Low load	1.51	0.71	15.4	7.2	40	7	3	23	30	LOW	18/15.5	–5/–
Heating	Standard	2.88	0.60	29.4	6.1	85	1	47	1	61	HIGH	20/–	7/6
	Overload	3.41	1.08	34.8	11.0	81	14	54	13	24	LOW	30/–	24/18
	Low load	2.35	0.24	24.0	2.4	80	–19	40	–16	73	HIGH	15/–	–10/(70%)

* 4 poles are provided to this compressor.

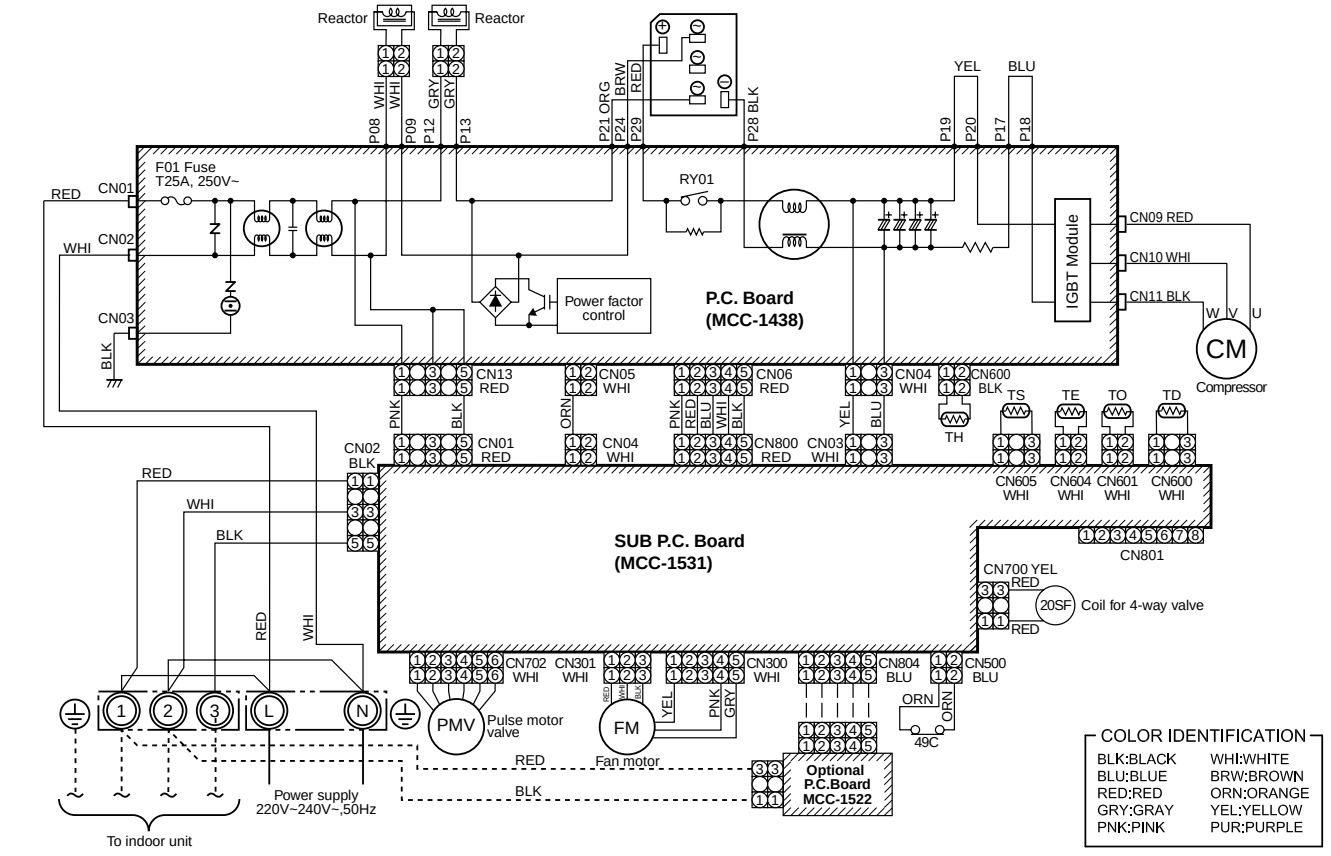
The compressor frequency (Hz) measured with a clamp meter is 2 times of revolutions (rps) of the compressor.

4. WIRING DIAGRAM

RAV-SM561AT-E, RAV-SM801AT-E



RAV-SM1101AT-E, RAV-SM1401AT-E



5. SPECIFICATIONS OF ELECTRICAL PARTS

RAV-SM561AT-E, RAV-SM801AT-E

No.	Parts name	Type	Specifications
1	Fan motor	ICF-140-43-4	Output (Rated) 43 W
2	Compressor	DA150A1F-20F	3 phase, 4P, 1100 W
3	Reactor	CH-57	10 mH, 16A
4	Outdoor temp. sensor (To-sensor)	—	10 kΩ at 25°C
5	Heat exchanger sensor (Te-sensor)	—	10 kΩ at 25°C
6	Suction temp. sensor (Ts-sensor)	—	10 kΩ at 25°C
7	Discharge temp. sensor (Td-sensor)	—	50 kΩ at 25°C
8	Fuse (Switching power (Protect))		T3.15 A, AC 250 V
9	Fuse (Inverter, input (Current protect)		25 A, AC 250 V
10	4-way valve solenoid coil	VHV-01AJ503C1	
11	Compressor thermo. (Protection)	US-622	ON : 90 ± 5°C, OFF : 125 ± 4°C

RAV-SM1101AT-E, RAV-SM1401AT-E

No.	Parts name	Type	Specifications
1	Fan motor	ICF-280-100-1	Output (Rated) 100 W
2	Compressor	DA420A3F-21M	3 phase, 4P, 3750 W
3	Reactor	CH-56-2Z-T	6 mH, 18.5 A
4	Outdoor temp. sensor (To-sensor)	—	10 kΩ at 25°C
5	Heat exchanger sensor (Te-sensor)	—	10 kΩ at 25°C
6	Suction temp. sensor (Ts-sensor)	—	10 kΩ at 25°C
7	Discharge temp. sensor (Td-sensor)	—	50 kΩ at 25°C
8	Fuse (Switching power (Protect))		T3.15 A, AC 250 V
9	Fuse (Inverter, input (Current protect))		25 A, AC 250 V
10	4-way valve solenoid coil	VHV-01AJ503C1	
11	Compressor thermo. (Protection)	US-622	ON : 90 ± 5°C, OFF : 125 ± 4°C

6. REFRIGERANT R410A

This air conditioner adopts the new refrigerant HFC (R410A) which does not damage the ozone layer.

The working pressure of the new refrigerant R410A is 1.6 times higher than conventional refrigerant (R22). The refrigerating oil is also changed in accordance with change of refrigerant, so be careful that water, dust, and existing refrigerant or refrigerating oil are not entered in the refrigerant cycle of the air conditioner using the new refrigerant during installation work or servicing time.

The next section describes the precautions for air conditioner using the new refrigerant. Conforming to contents of the next section together with the general cautions included in this manual, perform the correct and safe work.

6-1. Safety During Installation/Servicing

As R410A's pressure is about 1.6 times higher than that of R22, improper installation/servicing may cause a serious trouble. By using tools and materials exclusive for R410A, it is necessary to carry out installation/servicing safely while taking the following precautions into consideration.

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

If other refrigerant than R410A is mixed, pressure in the refrigeration cycle becomes abnormally high, and it may cause personal injury, etc. by a rupture.

(2) Confirm the used refrigerant name, and use tools and materials exclusive for the refrigerant R410A.

The refrigerant name R410A is indicated on the visible place of the outdoor unit of the air conditioner using R410A as refrigerant. To prevent mischarging, the diameter of the service port differs from that of R22.

(3) If a refrigeration gas leakage occurs during installation/servicing, be sure to ventilate fully.

If the refrigerant gas comes into contact with fire, a poisonous gas may occur.

(4) 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.

(5) After completion of installation 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.

(6) When an air conditioning system charged with a large volume of refrigerant is installed in a small room, it is necessary to exercise care so that, even when refrigerant leaks, its concentration does not exceed the marginal level.

If the refrigerant gas leakage occurs and its concentration exceeds the marginal level, an oxygen starvation accident may result.

(7) Be sure to carry out installation or removal according to the installation manual.

Improper installation may cause refrigeration trouble, water leakage, electric shock, fire, etc.

(8) Unauthorized modifications to the air conditioner may be dangerous. If a breakdown occurs please call a qualified air conditioner technician or electrician.

Improper repair's may result in water leakage, electric shock and fire, etc.

6-2. Refrigerant Piping Installation

6-2-1. Piping Materials and Joints Used

For the refrigerant piping installation, copper pipes and joints are mainly used. Copper pipes and joints suitable for the refrigerant must be chosen and installed. Furthermore, it is necessary to use clean copper pipes and joints whose interior surfaces are less affected by contaminants.

(1) Copper Pipes

It is necessary to use seamless copper pipes which are made of either copper or copper alloy and it is desirable that the amount of residual oil is less than 40 mg/10 m. Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface). Otherwise, the expansion valve or capillary tube may become blocked with contaminants.

As an air conditioner using R410A incurs pressure higher than when using R22, it is necessary to choose adequate materials.

Thicknesses of copper pipes used with R410A are as shown in Table 6-2-1. Never use copper pipes thinner than 0.8 mm even when it is available on the market.

Table 6-2-1 Thicknesses of annealed copper pipes

		Thickness (mm)	
Nominal diameter	**Outer diameter (mm)**	**R410A**	**R22**
1/4	6.35	0.80	0.80
3/8	9.52	0.80	0.80
1/2	12.70	0.80	0.80
5/8	15.88	1.00	1.00

(2) Joints

For copper pipes, flare joints or socket joints are used. Prior to use, be sure to remove all contaminants.

a) Flare Joints

Flare joints used to connect the copper pipes cannot be used for pipings whose outer diameter exceeds 20 mm. In such a case, socket joints can be used.

Sizes of flare pipe ends, flare joint ends and flare nuts are as shown in Tables 6-2-3 to 6-2-6 below.

b) Socket Joints

Socket joints are such that they are brazed for connections, and used mainly for thick pipings whose diameter is larger than 20 mm. Thicknesses of socket joints are as shown in Table 6-2-2.

Table 6-2-2 Minimum thicknesses of socket joints

Nominal diameter	**Reference outer diameter of copper pipe jointed (mm)**	**Minimum joint thickness (mm)**
1/4	6.35	0.50
3/8	9.52	0.60
1/2	12.70	0.70
5/8	15.88	0.80

6-2-2. Processing of Piping Materials

When performing the refrigerant piping installation, care should be taken to ensure that water or dust does not enter the pipe interior, that no other oil other than lubricating oils used in the installed air conditioner is used, and that refrigerant does not leak. When using lubricating oils in the piping processing, use such lubricating oils whose water content has been removed. When stored, be sure to seal the container with an airtight cap or any other cover.

(1) Flare Processing Procedures and Precautions

a) Cutting the Pipe

By means of a pipe cutter, slowly cut the pipe so that it is not deformed.

b) Removing Burrs and Chips

If the flared section has chips or burrs, refrigerant leakage may occur. Carefully remove all burrs and clean the cut surface before installation.

c) Insertion of Flare Nut

d) Flare Processing

Make certain that a clamp bar and copper pipe have been cleaned.

By means of the clamp bar, perform the flare processing correctly.

Use either a flare tool for R410A or conventional flare tool.

Flare processing dimensions differ according to the type of flare tool. When using a conventional flare tool, be sure to secure “dimension A” by using a gauge for size adjustment.

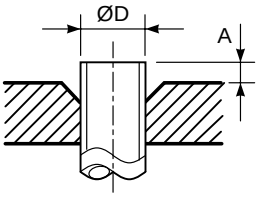


Fig. 6-2-1 Flare processing dimensions

Table 6-2-3 Dimensions related to flare processing for R410A

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R410A clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0
3/8	9.52	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0
1/2	12.70	0.8	0 to 0.5	1.0 to 1.5	2.0 to 2.5
5/8	15.88	1.0	0 to 0.5	1.0 to 1.5	2.0 to 2.5

Table 6-2-4 Dimensions related to flare processing for R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R22 clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0 to 0.5	0.5 to 1.0	1.0 to 1.5
3/8	9.52	0.8	0 to 0.5	0.5 to 1.0	1.0 to 1.5
1/2	12.70	0.8	0 to 0.5	0.5 to 1.0	1.5 to 2.0
5/8	15.88	1.0	0 to 0.5	0.5 to 1.0	1.5 to 2.0

Table 6-2-5 Flare and flare nut dimensions for R410A

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.35	0.8	9.1	9.2	6.5	13	17
3/8	9.52	0.8	13.2	13.5	9.7	20	22
1/2	12.70	0.8	16.6	16.0	12.9	23	26
5/8	15.88	1.0	19.7	19.0	16.0	25	29

Table 6-2-6 Flare and flare nut dimensions for R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.35	0.8	9.0	9.2	6.5	13	17
3/8	9.52	0.8	13.0	13.5	9.7	20	22
1/2	12.70	0.8	16.2	16.0	12.9	20	24
5/8	15.88	1.0	19.4	19.0	16.0	23	27
3/4	19.05	1.0	23.3	24.0	19.2	34	36

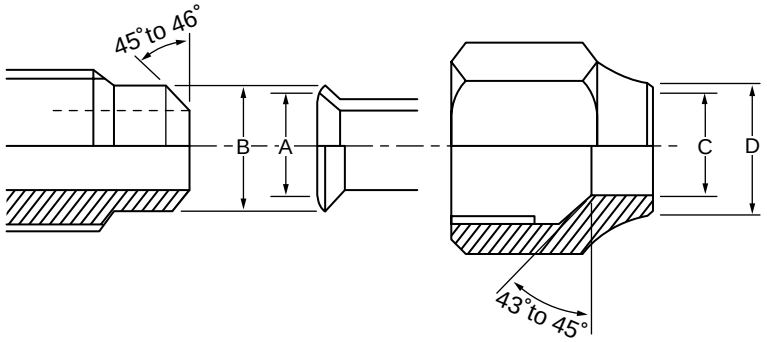


Fig. 6-2-2 Relations between flare nut and flare seal surface

(2) Flare Connecting Procedures and Precautions

a) Make sure that the flare and union portions do not have any scar or dust, etc.

b) Correctly align the processed flare surface with the union axis.

c) Tighten the flare with designated torque by means of a torque wrench. The tightening torque for R410A is the same as that for conventional R22. Incidentally, when the torque is weak, the gas leakage may occur. When it is strong, the flare nut may crack and may be made non-removable. When choosing the tightening torque, comply with values designated by manufacturers. Table 6-2-7 shows reference values.

NOTE:

When applying oil to the flare surface, be sure to use oil designated by the manufacturer. If any other oil is used, the lubricating oils may deteriorate and cause the compressor to burn out.

Table 6-2-7 Tightening torque of flare for R410A [Reference values]

Nominal diameter	Outer diameter (mm)	Tightening torque N•m (kgf•cm)	Tightening torque of torque wrenches available on the market N•m (kgf•cm)
1/4	6.35	14 to 18 (140 to 180)	16 (160), 18 (180)
3/8	9.52	33 to 42 (330 to 420)	42 (420)
1/2	12.70	50 to 62 (500 to 620)	55 (550)
5/8	15.88	63 to 77 (630 to 770)	65 (650)

6-3. Tools

6-3-1. Required Tools

The service port diameter of packed valve of the outdoor unit in the air conditioner using R410A is changed to prevent mixing of other refrigerant. To reinforce the pressure-resisting strength, flare processing dimensions and opposite side dimension of flare nut (For Ø12.7 copper pipe) of the refrigerant piping are lengthened.

The used refrigerating oil is changed, and mixing of oil may cause a trouble such as generation of sludge, clogging of capillary, etc. Accordingly, the tools to be used are classified into the following three types.

(1) Tools exclusive for R410A (Those which cannot be used for conventional refrigerant (R22))

(2) Tools exclusive for R410A, but can be also used for conventional refrigerant (R22)

(3) Tools commonly used for R410A and for conventional refrigerant (R22)

The table below shows the tools exclusive for R410A and their interchangeability.

Tools exclusive for R410A (The following tools for R410A are required.)

Tools whose specifications are changed for R410A and their interchangeability

No.	Used tool	Usage	R410A air conditioner installation		Conventional air conditioner installation
			Existence of new equipment for R410A	Whether conventional equipment can be used	Whether new equipment can be used with conventional refrigerant
①	Flare tool	Pipe flaring	Yes	*(Note 1)	OK
②	Copper pipe gauge for adjusting projection margin	Flaring by conventional flare tool	Yes	*(Note 1)	*(Note 1)
③	Torque wrench	Connection of flare nut	Yes	NO GOOD	NO GOOD
④	Gauge manifold	Evacuating, refrigerant charge, run check, etc.	Yes	NO GOOD	NO GOOD
⑤	Charge hose				
⑥	Vacuum pump adapter	Vacuum evacuating	Yes	NO GOOD	OK
⑦	Electronic balance for refrigerant charging	Refrigerant charge	Yes	NO GOOD	OK
⑧	Refrigerant cylinder	Refrigerant charge	Yes	NO GOOD	NO GOOD
⑨	Leakage detector	Gas leakage check	Yes	NO GOOD	OK
⑩	Charging cylinder	Refrigerant charge	(Note 2)	NO GOOD	NO GOOD

(Note 1) When flaring is carried out for R410A using the conventional flare tools, adjustment of projection margin is necessary. For this adjustment, a copper pipe gauge, etc. are necessary.

(Note 2) Charging cylinder for R410A is being currently developed.

General tools (Conventional tools can be used.)

In addition to the above exclusive tools, the following equipments which serve also for R22 are necessary as the general tools.

(1) Vacuum pump
Use vacuum pump by attaching vacuum pump adapter.
(2) Torque wrench
(3) Pipe cutter
(4) Reamer
(5) Pipe bender
(6) Level vial
(7) Screwdriver (+, –)
(8) Spanner or Monkey wrench
(9) Hole core drill (Ø65)
(10) Hexagon wrench (Opposite side 4mm)
(11) Tape measure
(12) Metal saw

Also prepare the following equipments for other installation method and run check.

(1) Clamp meter
(2) Thermometer
(3) Insulation resistance tester
(4) Electroscope

6-4. Recharging of Refrigerant

When it is necessary to recharge refrigerant, charge the specified amount of new refrigerant according to the following steps.

Recover the refrigerant, and check no refrigerant remains in the equipment.

↓

Connect the charge hose to packed valve service port at the outdoor unit's gas side.

↓

Connect the charge hose of the vacuum pump adapter.

↓

Open fully both packed valves at liquid and gas sides.

↓

Place the handle of the gauge manifold Low in the fully opened position, and turn on the vacuum pump's power switch. Then, evacuating the refrigerant in the cycle.

↓

When the compound gauge's pointer has indicated –0.1 Mpa (–76 cmHg), place the handle Low in the fully closed position, and turn off the vacuum pump's power switch.

↓

Keep the status as it is for 1 to 2 minutes, and ensure that the compound gauge's pointer does not return.

↓

Set the refrigerant cylinder to the electronic balance, connect the connecting hose to the cylinder and the connecting port of the electronic balance, and charge **liquid refrigerant.**

(For refrigerant charging, see the figure below.)

① Never charge refrigerant exceeding the specified amount.

② If the specified amount of refrigerant cannot be charged, charge refrigerant **bit by bit** in COOL mode.

③ Do not carry out additional charging.

When additional charging is carried out if refrigerant leaks, the refrigerant composition changes in the refrigeration cycle, that is characteristics of the air conditioner changes, refrigerant exceeding the specified amount is charged, and working pressure in the refrigeration cycle becomes abnormally high pressure, and may cause a rupture or personal injury.

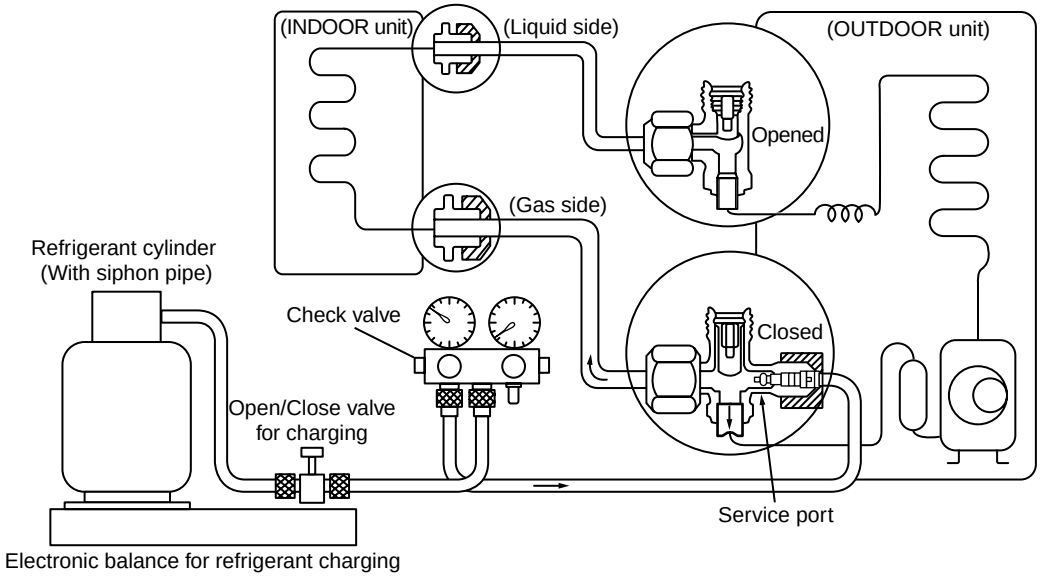
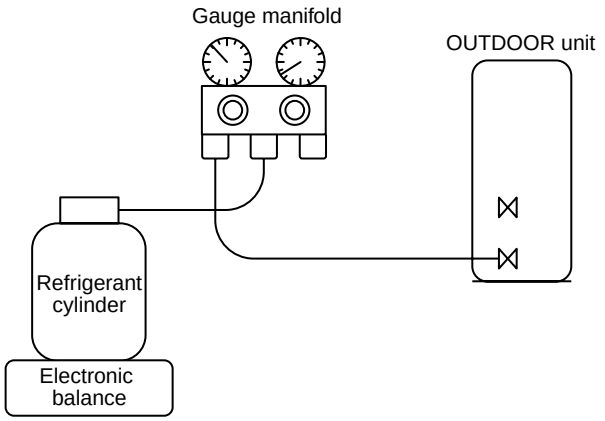


Fig. 6-4-1 Configuration of refrigerant charging

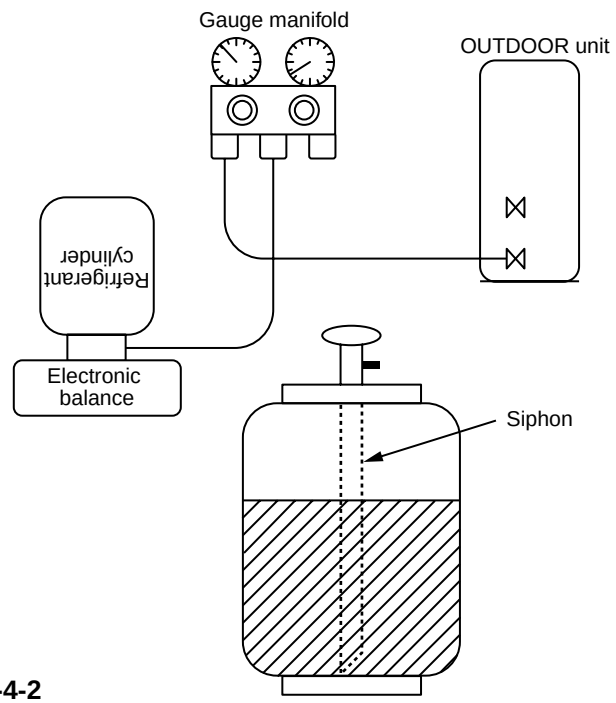
① Be sure to make setting so that **liquid** can be charged.
② When using a cylinder equipped with a siphon, liquid can be charged without turning it upside down.

It is necessary for charging refrigerant under condition of liquid because R410A is mixed type of refrigerant. Accordingly, when charging refrigerant from the refrigerant cylinder to the equipment, charge it turning the cylinder upside down if cylinder is not equipped with siphon.

[Cylinder with siphon]



[Cylinder without siphon]



R410A refrigerant is HFC mixed refrigerant. Therefore, if it is charged with gas, the composition of the charged refrigerant changes and the characteristics of the equipment varies.

Fig. 6-4-2

6-5. Brazing of Pipes

6-5-1. Materials for Brazing

(1) Silver brazing filler

Silver brazing filler is an alloy mainly composed of silver and copper. It is used to join iron, copper or copper alloy, and is relatively expensive though it excels in solderability.

(2) Phosphor bronze brazing filler

Phosphor bronze brazing filler is generally used to join copper or copper alloy.

(3) Low temperature brazing filler

Low temperature brazing filler is generally called solder, and is an alloy of tin and lead. Since it is weak in adhesive strength, do not use it for refrigerant pipes.

① Phosphor bronze brazing filler tends to react with sulfur and produce a fragile compound water solution, which may cause a gas leakage. Therefore, use any other type of brazing filler at a hot spring resort, etc., and coat the surface with a paint.
② When performing brazing again at time of servicing, use the same type of brazing filler.

6-5-2. Flux

(1) Reason why flux is necessary

- By removing the oxide film and any foreign matter on the metal surface, it assists the flow of brazing filler.
- In the brazing process, it prevents the metal surface from being oxidized.
- By reducing the brazing filler's surface tension, the brazing filler adheres better to the treated metal.

(2) Characteristics required for flux

- Activated temperature of flux coincides with the brazing temperature.
- Due to a wide effective temperature range, flux is hard to carbonize.
- It is easy to remove slag after brazing.
- The corrosive action to the treated metal and brazing filler is minimum.
- It excels in coating performance and is harmless to the human body.

As the flux works in a complicated manner as described above, it is necessary to select an adequate type of flux according to the type and shape of treated metal, type of brazing filler and brazing method, etc.

(3) Types of flux

- **Noncorrosive flux**

  Generally, it is a compound of borax and boric acid.

  It is effective in case where the brazing temperature is higher than 800°C.

- **Activated flux**

  Most of fluxes generally used for silver brazing are this type.

  It features an increased oxide film removing capability due to the addition of compounds such as potassium fluoride, potassium chloride and sodium fluoride to the borax-boric acid compound.

(4) Piping materials for brazing and used brazing filler/flux

Piping material	Used brazing filler	Used flux
Copper - Copper	Phosphor copper	Do not use
Copper - Iron	Silver	Paste flux
Iron - Iron	Silver	Vapor flux

① Do not enter flux into the refrigeration cycle.
② When chlorine contained in the flux remains within the pipe, the lubricating oil deteriorates. Therefore, use a flux which does not contain chlorine.
③ When adding water to the flux, use water which does not contain chlorine (e.g. distilled water or ion-exchange water).
④ Remove the flux after brazing.

6-5-3. Brazing

As brazing work requires sophisticated techniques, experiences based upon a theoretical knowledge, it must be performed by a person qualified.

In order to prevent the oxide film from occurring in the pipe interior during brazing, it is effective to proceed with brazing while letting dry Nitrogen gas (N2) flow.

Never use gas other than Nitrogen gas.

(1) Brazing method to prevent oxidation

① Attach a reducing valve and a flow-meter to the Nitrogen gas cylinder.
② Use a copper pipe to direct the piping material, and attach a flow-meter to the cylinder.
③ Apply a seal onto the clearance between the piping material and inserted copper pipe for Nitrogen in order to prevent backflow of the Nitrogen gas.
④ When the Nitrogen gas is flowing, be sure to keep the piping end open.
⑤ Adjust the flow rate of Nitrogen gas so that it is lower than 0.05 m³/Hr or 0.02 MPa (0.2kgf/cm²) by means of the reducing valve.
⑥ After performing the steps above, keep the Nitrogen gas flowing until the pipe cools down to a certain extent (temperature at which pipes are touchable with hands).
⑦ Remove the flux completely after brazing.

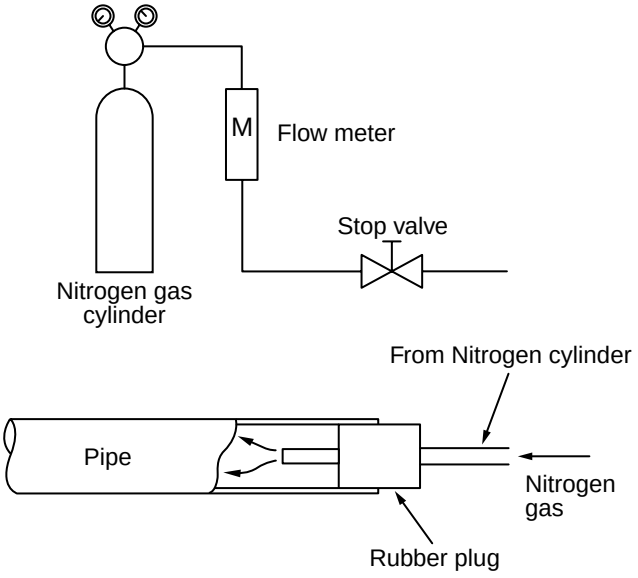


Fig. 6-5-1.
Circuit Configuration and Control Specifications

7. CONTROL SPECIFICATIONS

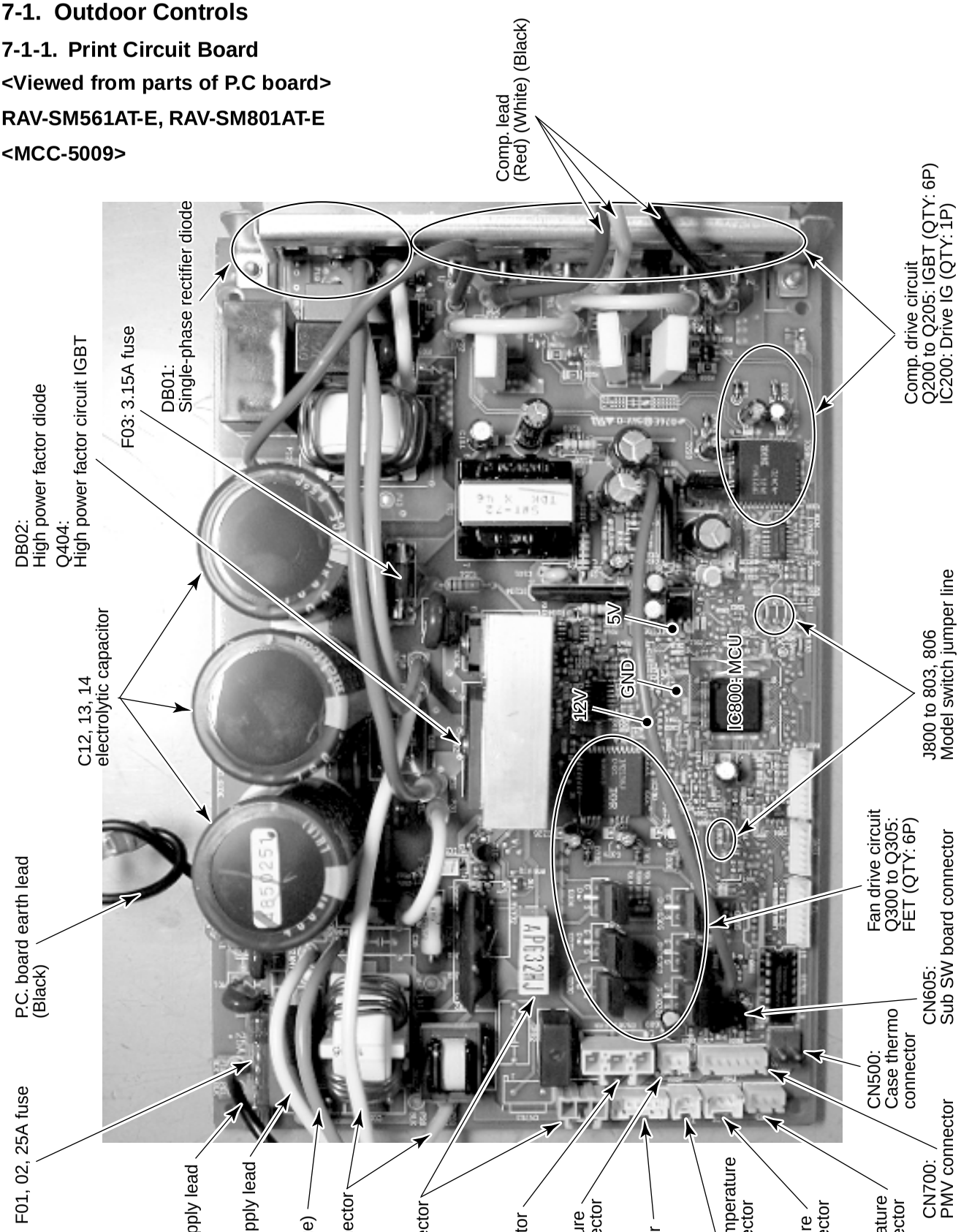
7-1. Outdoor Controls

7-1-1. Print Circuit Board

<Viewed from parts of P.C board>

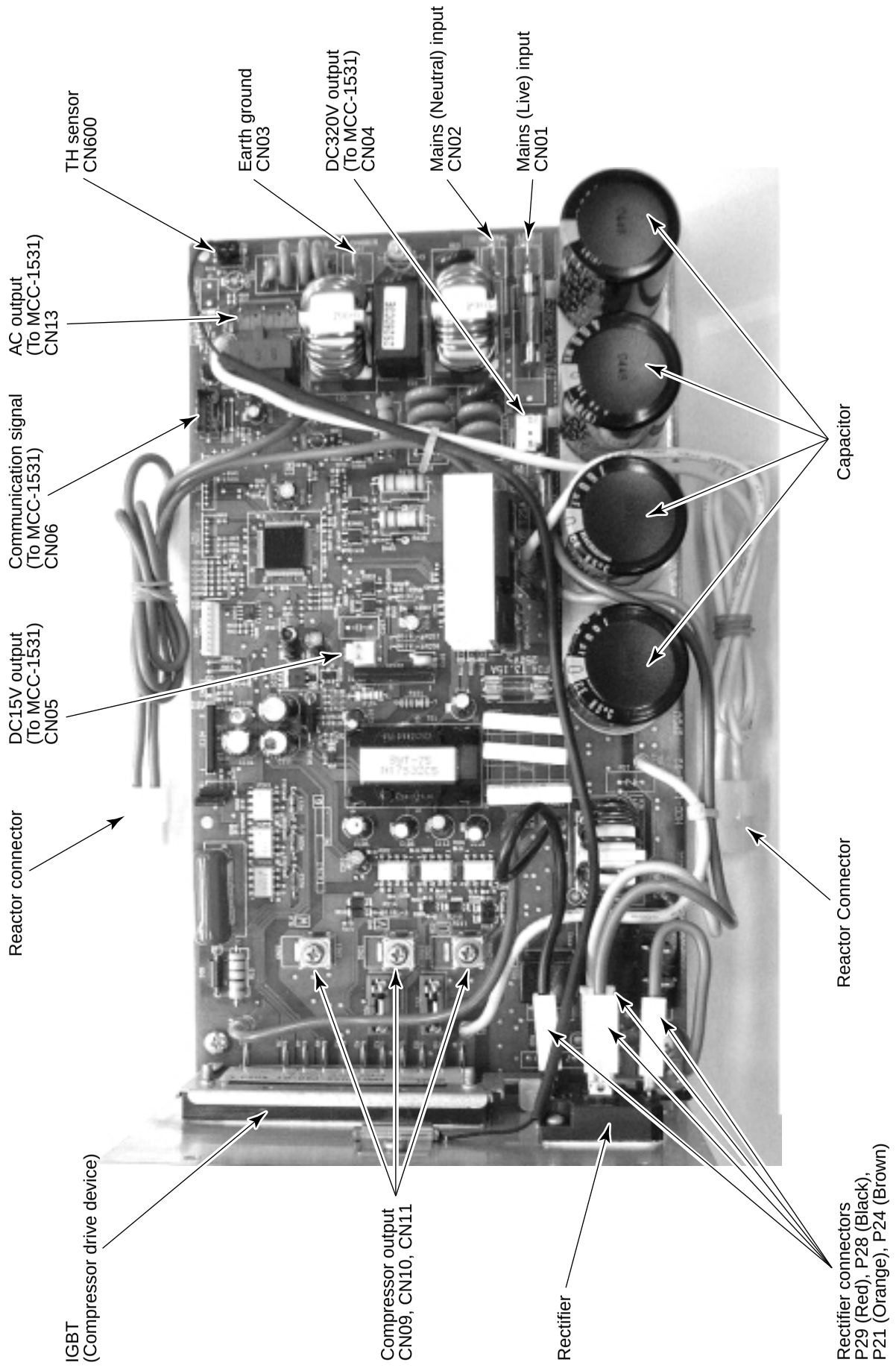
RAV-SM561AT-E, RAV-SM801AT-E

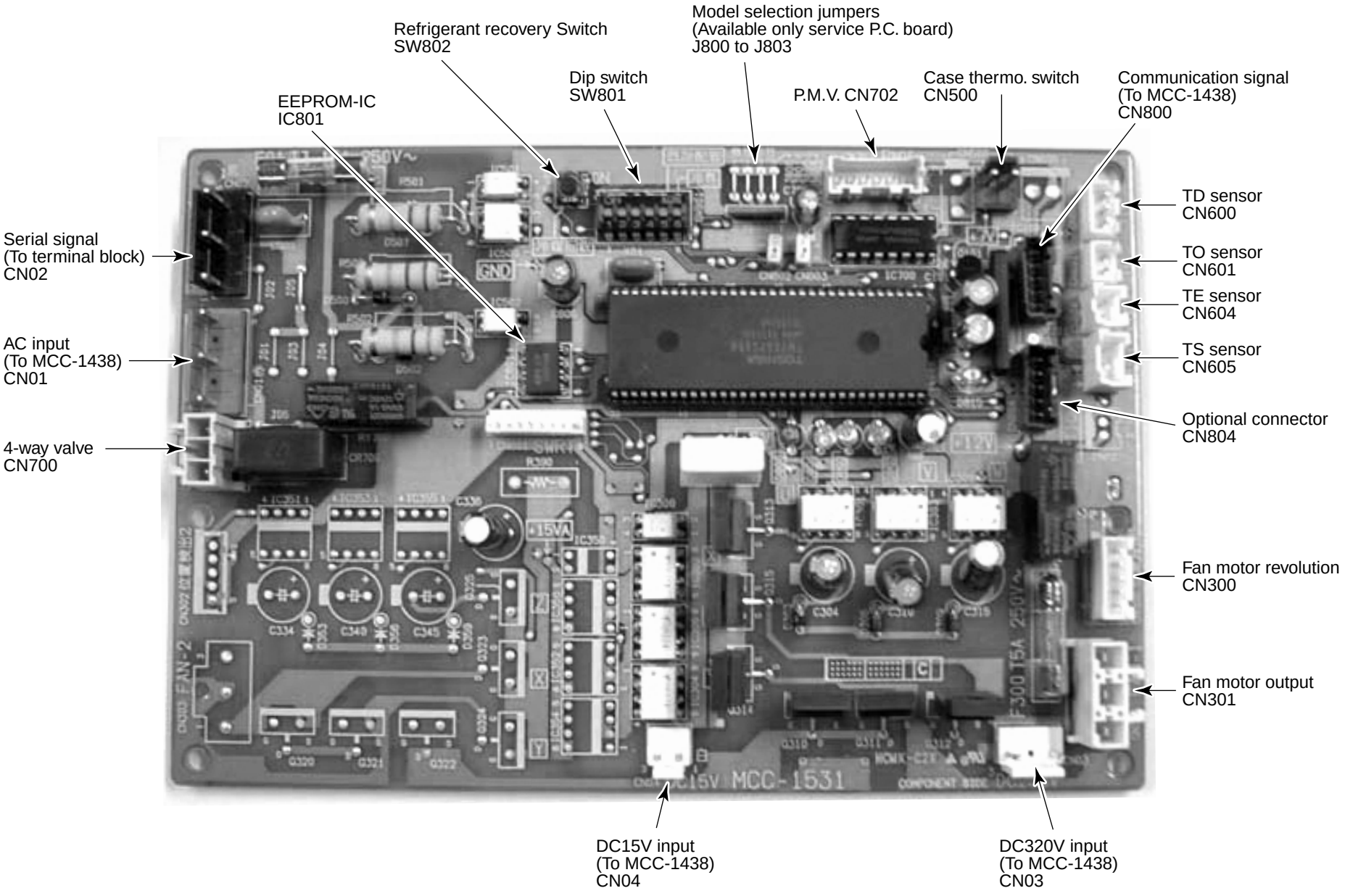
<MCC-5009>



RAV-SM1101AT-E, RAV-SM1401AT-E

<IPDU : MCC-1438>




Refrigerant recovery Switch
SW802
Model selection jumpers
(Available only service P.C. board)
J800 to J803
Dip switch
SW801
EEPROM-IC
IC801
P.M.V. CN702
Case thermo. switch
CN500
Communication signal
(To MCC-1438)
CN800
TD sensor
CN600
TO sensor
CN601
TE sensor
CN604
TS sensor
CN605
Optional connector
CN804
Serial signal
(To terminal block)
CN02
AC input
(To MCC-1438)
CN01
4-way valve
CN700
Fan motor revolution
CN300
Fan motor output
CN301
DC15V input
(To MCC-1438)
CN04
DC320V input
(To MCC-1438)
CN03
MCC-1531

7-2. Outline of Main Controls

1. Pulse Modulating Valve (PMV) control

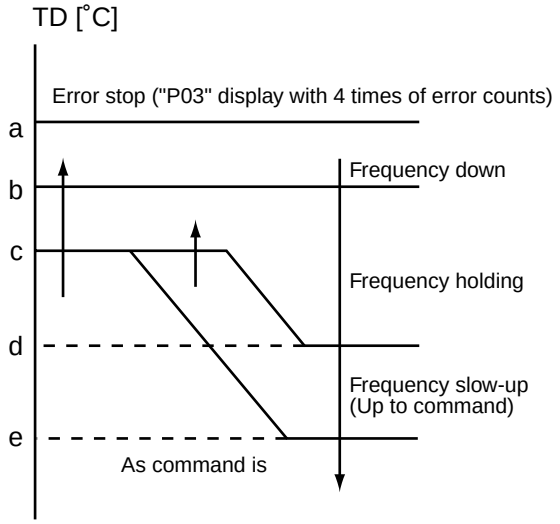
1) For PMV with 50 to 500 pulses during operation, respectively.
2) In cooling operation, PMV is controlled with the temperature difference between TS sensor and TC sensor.
3) In heating operation, PMV is controlled with the temperature difference between TS sensor and TE sensor.
4) For the temperature difference in items 2) and 3), 1 to 5K is aimed as the target in both cooling and heating operations.
5) When the cycle excessively rose in both cooling and heating operations, PMV is controlled by TD sensor. The aimed value is usually 103°C for SM561, SM801 and 92°C for SM1101, SM1401 in both cooling and heating operations.

REQUIREMENT

A sensor trouble may cause a liquid back-flow or abnormal overheat resulting in excessive shortening of the compressor life. In a case of trouble on the compressor, be sure to check there is no error in the resistance value an the refrigerating cycle of each sensor after repair and then start the operation.

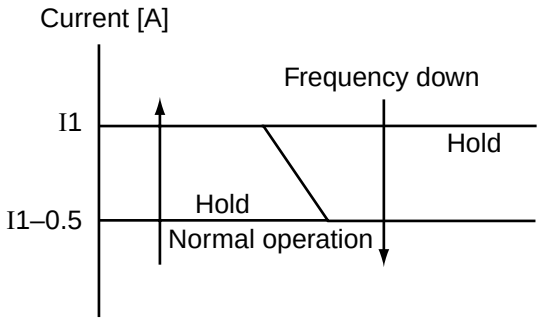
2. Discharge temperature release control

1) This function controls the operation frequency, that is, lowers the operation frequency when the discharge temperature has not lower or the discharge temperature has rapidly risen during PMV control. It subdivides the frequency control up to a unit of 0.6 Hz to stabilize the cycle.
2) When the discharge temperature is detected in an abnormal stop zone, the unit stops the compressor and restarts after 2 minutes 30 seconds. The error counter is cleared when it has continued the operation for 10 minutes.
   If the abnormal stop zone has been detected by 4 times without clearing of counter, an error “P03” is displayed.
   * The cause is considered as excessively little amount of refrigerant, defective PMV, or clogging of cycle.



[°C]

	a	b	c	d	e
SM561, SM801	117	107	103	100	93
SM1101, SM1401	111	106	100	95	90



3. Current release control

The output frequency and the output voltage are controlled by AC current value detected by T02 on the outdoor P.C. board so that input current of the inverter does not exceed the specified value.

Objective model	SM561		SM801		SM1101		SM1401	
	COOL	HEAT	COOL	HEAT	COOL	HEAT	COOL	HEAT
I1 value [A]	10.1	12.0	12.2	14.0	18.9	19.7	19.7	19.7

4. Outdoor fan control

Allocations of fan tap revolutions [rpm]

	W1	W2	W3	W4	W5	W6	W7	W8	W9	WA	WB	WC	WD	WE	WF
SM561	200	300	350	410	480	500	530	560	640	670	700	750	800	840	840
SM801	200	300	350	410	480	500	530	560	640	670	700	750	840	940	980
SM1101	250	280	320	360	410	460	520	580	640	700	760	860	860	900	930
SM1401	250	280	320	360	410	460	520	580	640	700	760	860	860	900	970

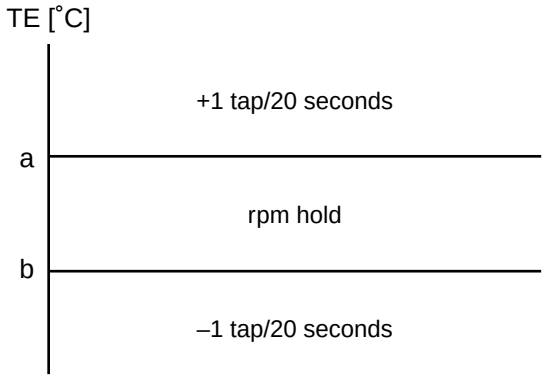
1) Cooling fan control

① The outdoor fan is controlled by TE, TD, and TO sensors and also revolution frequency of the operation. The outdoor is controlled by every 1 tap of DC fan control (15 taps).

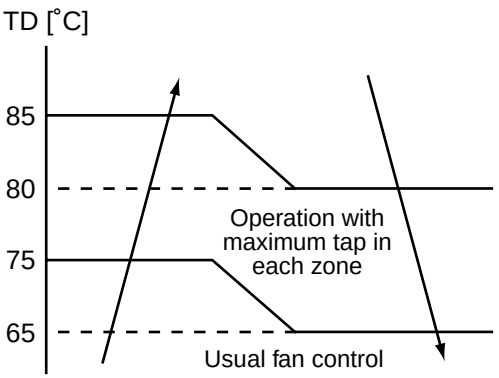
② Only during 60 seconds after the operation has started, the fan is fixed with the maximum fan tap which corresponds to the zone in the following table.
After then the fan is controlled by TE sensor temperature.

③ Considering a case that TE sensor has come out of the holder, the fan is controlled so that revolution frequency of the fan increases regardless of TE if temperature of TD sensor has risen.

	a	b
SM561, SM801	36	32
SM1101, SM1101	29	26



Operation with WE



(The operation frequency differs according to the model type.)

Temp. range	Below 30Hz		Above 30 Hz below 45 Hz		Above 45 Hz	
	Min	Max	Min	Max	Min	Max
29°C ≤ TO	W5	WA	W7	WC	W9	WF
15 ≤ TO < 29°C	W3	W7	W5	W9	W7	WB
5 ≤ TO < 15°C	W2	W5	W4	W7	W6	W9
0 ≤ TO < 5°C	W1	W3	W3	W5	W4	W7
TO < 0°C	W1	W2	W2	W4	W3	W5
TO error	W1	WF	W1	WF	W1	WF

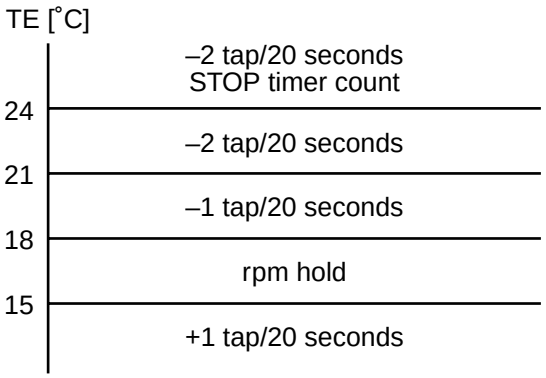
2) Heating fan control

① The outdoor fan is controlled by TE sensor, TO sensor and the operation frequency. (From Min. W1 to Max. are controlled according to the following table.)

② During 3 minutes after start-up, the fan is fixed with the maximum fan tap corresponding to zone in the following table. After then the fan is controlled by temperature of TE sensor.

③ If status, TE ≥ 24°C continues for 5 minutes, the operation stops. This status is same to the usual Thermo-OFF which has no alarm display, and the fan restarts after 2 minutes and 30 seconds. This intermittent operation is not abnormal.

④ When the above status ② occurs frequently, it is considered that the filter of suction part of the indoor unit is stain. Clean the filter and then restart the operation.

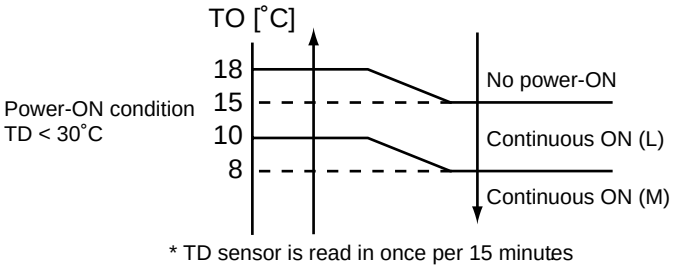


(The operation frequency differs according to the model type. The case of SM1101 is shown in the table below.)

	Temp. range	Below 33 Hz	Above 33 Hz below 51 Hz	Above 51 Hz
Maximum	10°C ≤ TO	W7	W8	W9
	5 ≤ TO < 10°C	WA	WB	WF
	TO < 5°C	WF	WF	WF
	TO error	WF	WF	WF

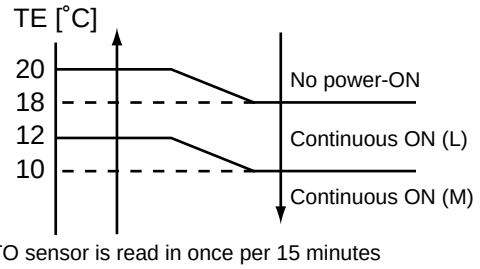
5. Coil heating control

1) This control function heats the compressor by turning on the stopped compressor instead of a case heater. It purposes to prevent slackness of the refrigerant inside of the compressor.
2) As usual, turn on power of the compressor for the specified time before a test run after installation, otherwise a trouble of the compressor may be caused. As same as a test run, it is recommended to turn on power of the compressor beforehand when starting operation after power of the compressor has been interrupted for a long time.
3) A judgment for electricity is performed by TD and TO sensors. If TO sensor is defective, a backup control is automatically performed by TE sensor. For a case of defective TO sensor, judge it with the outdoor LED display.
4) Coil heating is controlled by TD and TE sensor.
5) For every model, the power is turned off when TD is 30°C or more.



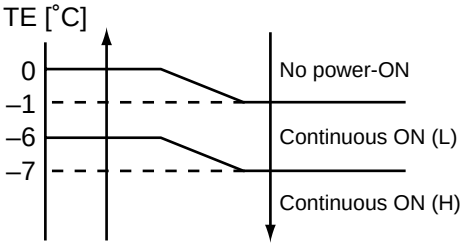
* TD sensor is read in once per 15 minutes

(In trouble of TE sensor)



* TO sensor is read in once per 15 minutes

(Object: SM561, SM801)



	SM1101, SM1401
L	20W and equivalent
M	40W and equivalent

	SM561, SM801
L	10W and equivalent
H	30W and equivalent

NOTIFICATION

It is not an abnormal phenomenon that electro-noise may be heard while heating the coil.

6. Short intermittent operation preventive control

① The compressor may not stop for preventing the compressor for 3 to 10 minutes after start of the operation even if Thermo-OFF signal has been received from the indoor. This phenomenon is not abnormal. (Continuous operation time of the compressor differs according to the operating status.)

② If the equipment is stopped from the remote controller, the operation does not continue.

7. High-pressure suppression TE control (Only for SM1101, SM1401)

① This control suppresses that voltage becomes abnormally higher during cooling operation.

② Stop the compressor under condition of TE ≥ 67°C, and count 1 on the error count.

③ After 2 minutes 30 seconds passed, if TE < 67°C, the compressor restarts and the error count is cleared when the operation continues for 10 minutes.

④ When TE ≥ 67°C is detected again within 10 minutes, 1 is added to the error count and restart is repeated.

⑤ If the error counts 10 are recognized, it is determined as an error and restart is not performed. Error code 'P04' is displayed.

⑥ After restarting the compressor, continue controlling by using 70% to 90% of the control value of the current release control for minimum 30 minutes.

8. Over-current preventive control

① This control function stops the compressor when over-current preventive circuit has detected an abnormal current.

② The compressor restarts with error count 1 after 2 minutes 30 seconds.

③ If the error counts 8 are recognized, it is determined as an error and restart is not performed. Error code 'H01', 'H02' or 'P26' is displayed.

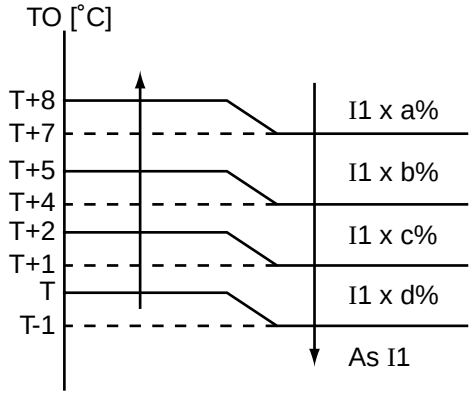
9. Current release value shift control (Cooling and Dry operation)

1) Object: SM1101, SM1401

① This control function prevents troubles of the electron parts such as G-Tr of inverter of compressor drive system and troubles of the compressor during cooling operation.

② This control function corrects the current release control value (I1) in item 7-2. by TO sensor value.

③ The value to be corrected is based upon the following control diagram and correction value table.



Corrected value

	T	a	b	c	d
SM1101, SM1401	39°C	70%	80%	85%	90%

2) Object: SM561, SM801

The current release value of the models above are selected from the right table according to TO sensor value.

Current release value shift control

TO	SM561	SM801
45 ≤ TO	4.7	5.1
40 ≤ TO < 45	6.2	7.1
TO < 40	10.1	12.2

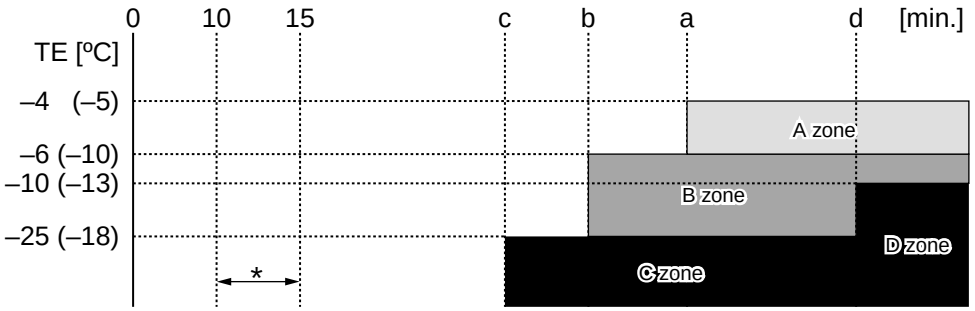
10. Defrost control

① In heating operation, defrost operation is performed when TE sensor temperature satisfies any condition in A zone to D zone.

② The defrost operation is immediately finished if TE sensor temperature has become 12°C or more, or it also is finished when condition of 7°C ≤ TE < 12°C has continued for 1 minute. The defrost operation is also finished when defrost operation has continued for 10 minutes even if TE sensor temperature has become 7°C or lower.

③ After defrost operation has finished, the compressor and the outdoor fan start heating operation after stopped for approx. 50 seconds.

Start of heating operation



Numerals enclosed with parentheses represent numeral values of SM1101 and SM1401.

* The minimum TE value between 10 and 15 minutes after heating operation has started is stored in memory as TE0.

A zone	Defrost operation is performed in this zone when TE0-TE ≥ 3 continued for T seconds.
B zone	Defrost operation is performed in this zone when TE0-TE ≥ 3 continued for T seconds.
C zone	Defrost operation is performed when this zone continued for T seconds.
D zone	Defrost operation is performed when this zone continued for T seconds.

	SM561, SM801	SM1101, SM1401
a	35	50
b	29	35
c	29	30
d	90	90
T	20	20

8. TROUBLESHOOTING

8-1. Summary of Troubleshooting

<Wired remote controller type>

1. Before troubleshooting

1) Required tools/instruments
   - ⊕ and ⊖ screwdrivers, spanners, radio cutting pliers, nippers, push pins for reset switch
   - Tester, thermometer, pressure gauge, etc.

2) Confirmation points before check

   ① The following operations are normal.

   a) Compressor does not operate.
      - Is not 3-minutes delay (3 minutes after compressor OFF)?
      - Does not thermostat turn off?
      - Does not timer operate during fan operation?
      - Is not outside high-temperature operation controlled in heating operation?
      - Is not Thermo-OFF setup by “Application Control Kit” (TCB-PCOS1E) sold separately?

   b) Indoor fan does not rotate.
      - Does not cool air discharge preventive control work in heating operation?

   c) Outdoor fan does not rotate or air volume changes.
      - Does not high-temperature release operation control work in heating operation?
      - Does not outside low-temperature operation control work in cooling operation?
      - Is not defrost operation performed?

   d) ON/OFF operation cannot be performed from remote controller.
      - Is not the control operation performed from outside/remote side?
      - Is not automatic address being set up?
        (When the power is turned on at the first time or when indoor unit address setting is changed, the operation cannot be performed for maximum approx. 5 minutes after power-ON.)

   ② Did you return the cabling to the initial positions?

   ③ Are connecting cables of indoor unit and remote controller correct?

3) Troubleshooting procedure

   When a trouble occurred, check the parts along with the following procedure.

Trouble → **Confirmation of check code display** → **Check defective position and parts.**

NOTE :
For cause of a trouble, power conditions or malfunction/erroneous diagnosis of microcomputer due to outer noise is considered except the items to be checked. If there is any noise source, change the cables of the remote controller to shield cables.

<Wireless remote controller type> (Only for 4-way air discharge cassette type models)

1. Before troubleshooting

1) Required tools/instruments
   - ⊕ and ⊖ screwdrivers, spanners, radio cutting pliers, nippers, etc.
   - Tester, thermometer, pressure gauge, etc.
2) Confirmation points before check
   ① The following operations are normal.
   a) Compressor does not operate.
      - Is not 3-minutes delay (3 minutes after compressor OFF)?
      - Does not thermostat turn off?
      - Does not timer operate during fan operation?
      - Is not outside high-temperature operation controlled in heating operation?
      - Is not Thermo-OFF setup by “Application Control Kit” (TCB-PCOS1E) sold separately?

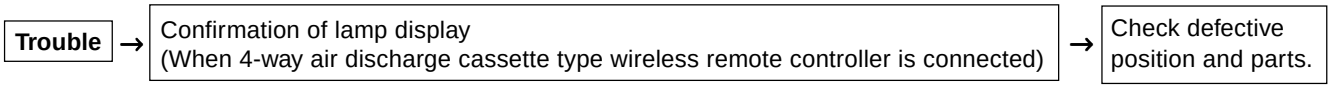
   b) Indoor fan does not rotate.
      - Does not cool air discharge preventive control work in heating operation?
3) Outdoor fan does not rotate or air volume changes.
   - Does not high-temperature release operation control work in heating operation?
   - Does not outside low-temperature operation control work in cooling operation?
   - Is not defrost operation performed?
4) ON/OFF operation cannot be performed from remote controller.
   - Is not forced operation performed?
   - Is not the control operation performed from outside/remote side?
   - Is not automatic address being set up?

   ① Did you return the cabling to the initial positions?
   ② Are connecting cables between indoor unit and receiving unit correct?

2. Troubleshooting procedure

(When the power is turned on at the first time or when indoor unit address setting is changed, the operation cannot be performed for maximum approx. 5 minutes after power-ON.)

When a trouble occurred, check the parts along with the following procedure.



1) Outline of judgment

   The primary judgment to check where a trouble occurred in indoor unit or outdoor unit is performed with the following method.

Method to judge the erroneous position by flashing indication on the display part of indoor unit (sensors of the receiving unit)

The indoor unit monitors operating status of the air conditioner, and the blocked contents of self-diagnosis are displayed restricted to the following cases if a protective circuit works.

8-2. Check Code List

Error mode detected by indoor unit

◎ : Flash, ○ : Go on, ● : Go off

Wireless sensor lamp display			Wired remote controller	Diagnostic function			Judgment and measures
				Cause of operation	Status of air conditioner	Condition	
Operation	Timer	Ready	Check code				
◎	●	●	E03	No communication from remote controller (including wireless) and communication adapters	Stop (Automatic reset)	Displayed when error is detected	1. Check cables of remote controller and communication adapters. • Handy remote controller LCD display OFF (Disconnection) • Central remote controller [97] check code
●	●	◎	E04	The serial signal is not output from outdoor unit to indoor unit. • Miswiring of inter-unit wires • Defective serial sensing circuit on outdoor P.C. board • Defective serial receiving circuit on indoor P.C. board	Stop (Automatic reset)	Displayed when error is detected	1. Outdoor unit does not completely operate. • Inter-unit wire check, correction of miswiring, case thermo operation • Outdoor P.C. board check, P.C. board wires check 2. In normal operation P.C. board (Indoor receiving/Outdoor sending) check
◎	●	●	E08	Duplicated indoor unit addresses	Stop	Displayed when error is detected	1. Check whether there is modification of remote controller connection (Group/Individual) or not after power has been turned on (finish of group configuration/address check). • If group configuration and address are not normal when the power has been turned on, the mode automatically shifts to address setup mode. (Resetting of address)
◎	●	◎	L03	Duplicated indoor master units			
◎	●	◎	L07	There is group line in individual indoor units.			
◎	●	◎	L08	Unsetting of indoor group address			
◎	●	◎	L09	Unset indoor capacity	Stop	Displayed when error is detected	1. Set the indoor capacity. (DN=I1)
◎	○	◎	L30	Abnormal outside interlock input	Stop	Displayed when error is detected	1. Check outside devices. 2. Check indoor P.C. board.
●	◎	◎	P01	Fan motor thermal protection	Stop	Displayed when error is detected	1. Check thermal relay of fan motor. 2. Check indoor P.C. board.
●	◎	◎	P10	Float switch operation • Disconnection, coming-off, defective float switch contactor of float circuit	Stop	Displayed when error is detected	1. Defect of drain pump 2. Clogging of drain pump 3. Check float switch. 4. Check indoor P.C. board.
●	◎	◎	P12	Indoor DC fan error	Stop	Displayed when error is detected	1. Defective detection of position 2. Over-current protective circuit of indoor fan driving unit operates. 3. Lock of indoor fan 4. Check indoor P.C. board.
◎	●	◎	P19	Error in 4-way valve system • Indoor heat exchanger temperature lowered after start of heating operation.	Stop (Automatic reset)	Displayed when error is detected	1. Check 4-way valve. 2. Check indoor heat exchanger (TC/TCJ) sensor. 3. Check indoor P.C. board.
◎	●	◎	P31	Own unit stops while warning is output to other indoor units.	Stop (Sub unit) (Automatic reset)	Displayed when error is detected	1. Judge sub unit while master unit is in [E03], [L03], [L07], [L08]. 2. Check indoor P.C. board.
◎	◎	●	F01	Coming-off, disconnection or short of indoor heat exchanger sensor (TCJ)	Stop (Automatic reset)	Displayed when error is detected	1. Check indoor heat exchanger temperature sensor (TCJ). 2. Check indoor P.C. board.
◎	◎	●	F02	Coming-off, disconnection or short of indoor heat exchanger sensor (TC)	Stop (Automatic reset)	Displayed when error is detected	1. Check indoor heat exchanger temperature sensor (TC). 2. Check indoor P.C. board.
◎	◎	●	F10	Coming-off, disconnection or short of indoor heat exchanger sensor (TA)	Stop (Automatic reset)	Displayed when error is detected	1. Check indoor heat exchanger temperature sensor (TA). 2. Check indoor P.C. board.
◎	◎	●	F29	Indoor EEPROM error • EEPROM access error	Stop (Automatic reset)	Displayed when error is detected	1. Check indoor EEPROM. (including socket insertion) 2. Check indoor P.C. board.
◎	●	●	E10	Communication error between indoor MCU • Communication error between fan driving MCU and main MCU	Stop (Automatic reset)	Displayed when error is detected	1. Check wires of remote controller. 2. Check power wires of indoor unit. 3. Check indoor P.C. board.
◎	●	●	E18	Regular communication error between master and sub indoor units or between main and sub indoor units	Stop (Automatic reset)	Displayed when error is detected	1. Check wires of remote controller. 2. Check indoor power wire. 3. Check indoor P.C. board.

Error mode detected by outdoor unit

◎ : Flash, ○ : Go on, ● : Go off

Wireless sensor lamp display			Wired remote controller	Diagnostic function			Judgment and measures
				Cause of operation	Status of air conditioner	Condition	
Operation	Timer	Ready	Check code				
●	◎	●	H01	Breakdown of compressor • Displayed when error is detected	Stop	Displayed when error is detected	1. Check power voltage. AC200V ± 20V 2. Overload operation of refrigerating cycle 3. Check current detection circuit at AC side.
●	◎	●	H02	Compressor does not rotate. • Over-current protective circuit operates after specified time passed when compressor had been activated.	Stop	Displayed when error is detected	1. Trouble of compressor (Compressor lock, etc.) : Replace compressor. 2. Defective wiring of compressor (Phase missing) 3. Phase-missing operation of power supply (3-phase model)
●	◎	●	H03	Current detection circuit error • Current value at AC side is high even during compressor-OFF. • Phase of power supply is missed.	Stop	Displayed when error is detected	1. Compressor immediately stops even if restarted. : Check IPDU. 2. Phase-missing operation of power supply Check 3-phase power voltage and wires.
◎	○	◎	L29	Outdoor unit and other errors • Communication error between CDB and IPDU (Coming-off of connector) • Heat sink temperature error (Detection of temperature over specified value)	Stop	Displayed when error is detected	1. Check wires of CDB and IPDU. 2. Abnormal overload operation of refrigerating cycle
◎	○	◎	L31	Phase detection protective circuit operates. (Normal models)	Operation continues. (Compressor stops.)	Displayed when error is detected	1. Check power phase order (Reversed phase)/phase missing. 2. Check outdoor P.C. board.
◎	●	◎	P03	Discharge temperature error • Discharge temperature over specified value was detected.	Stop	Displayed when error is detected	1. Check refrigerating cycle. (Gas leak) 2. Trouble of PMV 3. Check Td sensor.
◎	●	◎	P04	High-pressure protection error by TE sensor (Temperature over specified value was detected.)	Stop	Displayed when error is detected	1. Overload operation of refrigerating cycle 2. Check outdoor temperature sensor (TE). 3. Check outdoor CDB P.C. board.
◎	●	◎	P22	Outdoor DC fan error	Stop	Displayed when error is detected	1. Defective detection of position 2. Over-current protective circuit of outdoor fan driving unit operates. 3. Lock of outdoor fan 4. Check outdoor CDB P.C. board.
◎	●	◎	P26	Inverter over-current protective circuit operates. (For a short time) Short voltage of main circuit operates.	Stop	Displayed when error is detected	1. Inverter immediately stops even if restarted. : Compressor motor rare short 2. Check IPDU. : Cabling error
◎	●	◎	P29	IPDU position detection circuit error	Stop	Displayed when error is detected	1. Position detection circuit operates even if operating compressor by removing 3P connector. : Replace IPDU.
◎	◎	○	F04	Coming-off, disconnection or short of outdoor temperature sensor (TD)	Stop	Displayed when error is detected	1. Check outdoor temperature sensor (TD). 2. Check outdoor CDB P.C. board.
◎	◎	○	F06	Coming-off, disconnection or short of outdoor temperature sensor (TE/TS)	Stop	Displayed when error is detected	1. Check outdoor temperature sensor (TE/TS). 2. Check outdoor CDB P.C. board.
◎	◎	○	F08	Coming-off, disconnection or short of outdoor temperature sensor (TO)	Operation continues.	Displayed when error is detected	1. Check outdoor temperature sensor (TO). 2. Check outdoor CDB P.C. board.

For an error mode detected in outdoor unit, the fan operates because sub unit of a group operation does not communicate with the outdoor unit.

Error mode detected by remote controller or network adapter

◎ : Flash, ○ : Go on, ● : Go off

Wireless sensor lamp display			Wired remote controller	Diagnostic function			Judgment and measures
				Cause of operation	Status of air conditioner	Condition	
Operation	Timer	Ready	Check code				
—	—	—	No check code is displayed. (Remote controller does not operate.)	No communication with master indoor unit • Remote controller wire is not correctly connected. • Power of indoor unit is not turned on. • Automatic address cannot be completed.	Stop	—	Remote controller power error, Defective indoor EEPROM 1. Check remote controller inter-unit wires. 2. Check remote controller. 3. Check indoor power wires. 4. Check indoor P.C. board. 5. Check indoor EEPROM. (including socket insertion) : Phenomenon of automatic address repetition occurred.
◎	●	●	E01*2	No communication with indoor master unit • Disconnection of inter-unit wire between remote controller and master indoor unit (Detected at remote controller side)	Stop (Automatic restart) • When there is center, operation continues.	Displayed when error is detected	Signal receiving of remote controller is defective. 1. Check remote controller inter-unit wires. 2. Check remote controller. 3. Check indoor power wires. 4. Check indoor P.C. board.
◎	●	●	E02	Signal sending error to indoor unit (Detected at remote controller side)	Stop (Automatic restart) • When there is center, operation continues.	Displayed when error is detected	Signal sending of remote controller is defective. 1. Check sending circuit inside of remote controller. : Replace remote controller.
◎	●	●	E09	Multiple master remote controllers are recognized. (Detected at remote controller side)	Stop (Sub unit continues operation.)	Displayed when error is detected	1. Check there are multiple master units for 2 remote controllers (including wireless). : Master unit is one and others are sub units.
◎	○	◎	L20 Central remote controller 98	Duplicated indoor central addresses on communication of central control system (AI-NET) (Detected by central controller side)	Stop (Automatic restart)	Displayed when error is detected	1. Check address setup of central control system network. (Network adapter SW01) 2. Check network adapter P.C. board.
—	—	—	— *3 Central remote controller 99	Multiple network adapters on remote controller communication line (Detected by central controller side)	Operation continues.	Displayed when error is detected	1. Check multiple network adapters. 2. Check inter-unit wire/miswiring of remote controller. : Only one network adapter on remote controller communication line
—	—	—	— *3 Central remote controller 97	Interruption of central control system (AI-NET) communication circuit (Detected by central controller side)	Operation continues. (According to handy remote controller)	Displayed when error is detected	1. Check communication line/miswiring. Check power of indoor unit. 2. Check communication. (XY terminals) 3. Check network adapter P.C. board. 4. Check central controller (such as central control remote controller, etc.).
—	—	—	— Central remote controller b7	Indoor Gr sub unit error (Detected by central controller side)	Continuation/stop (Based on a case)	Displayed when error is detected	Check the check code of corresponding unit by handy remote controller.

*2 Check code is not displayed by wired remote controller. (Usual operation of air conditioner is disabled.)
For wireless type models, E01 is notified by the display lamp.

*3 These errors are related to communication of remote controllers (A, B) and central system (AI-NET, X, Y), and [E01], [E02], [E03], [E09], or [E18] is displayed or no check code is displayed on the remote controller according to the error contents.

8-3. Error Mode Judgment by LED Display of Outdoor Unit

There provided Dip switch (SW801) and LED on the “Application Control Kit” (TCB-PCOS1E) sold separately for SM56 and SM80 models, and on the outdoor unit P.C. board for SM110 and SM140 models respectively.
The status of the outdoor unit at that time can be known by switching this Dip switch. The lighting status of LED also notifies the judged stage before the outdoor error has been determined and displayed on the remote controller. An error of the outdoor temp. sensor (TO) may be confirmed only by LED display according to the indoor unit to be combined.

<table>
<tr><th>Model</th><th colspan="2">Dip SW</th><th colspan="4">LED</th></tr>
<tr><td>SM56, 80*</td><td colspan="2">SW01</td><td>D01 (Red)</td><td>D02 (Yellow)</td><td>D03 (Yellow)</td><td>D04 (Yellow)</td></tr>
<tr><td rowspan="2">SM110, 140
(MCC-1531)</td><td colspan="2" rowspan="2">SW802</td><td rowspan="2">D800 (Red)</td><td rowspan="2">D801 (Yellow)</td><td rowspan="2">D802 (Yellow)</td><td rowspan="2">D803 (Yellow)</td></tr>
<tr></tr>
<tr><td rowspan="11"></td><td>Bit 1</td><td>Bit 2</td></tr>
<tr><td rowspan="4">OFF</td><td rowspan="4">OFF</td><td></td><td colspan="2">For error display, refer to
(Table A) on the next page.</td><td></td></tr>
<tr><td colspan="4">During timer short</td></tr>
<tr><td>✧</td><td>●</td><td>●</td><td>●</td></tr>
<tr><td colspan="4">During pump down operation</td></tr>
<tr><td>●</td><td>✧</td><td>✧</td><td>✧</td></tr>
<tr><td>ON</td><td>OFF</td><td></td><td colspan="2">Protective operation count
In normal time, Count 1 ● ●
Count 2, Count 3 ● ○
Count 4, Count 5 ○ ●
Count 6, Count 7 ○ ○
Protective operation ✧ ✧</td><td>During backup
control
◎</td></tr>
<tr><td rowspan="2">OFF</td><td rowspan="2">ON</td><td colspan="4">PMV opening data (Lower 4 bit data)</td></tr>
<tr><td>Add 16 pulses
if this LED goes on.</td><td>Add 8 pulses
if this LED goes on.</td><td>Add 4 pulses
if this LED goes on.</td><td>Add 2 pulses
if this LED goes on.</td></tr>
<tr><td rowspan="3">ON</td><td rowspan="3">ON</td><td colspan="4">PMV opening data (Upper 4 bit data)</td></tr>
<tr><td>Add 256 pulses
if this LED goes on.</td><td>Add 128 pulses
if this LED goes on.</td><td>Add 64 pulses
if this LED goes on.</td><td>Add 32 pulses
if this LED goes on.</td></tr>
<tr><td colspan="4">The total pulse counts equivalent to lighting LED at each position represents PMV opening degree. For example, the case of ○●●○ ●●○○ (Upper 4 bit, Lower 4 bit) represents 256 + 32 + 4 + 2 = 294 pulses.</td></tr>
</table>

○ : Go on ● : Go off ✧ : 1Hz-flash ◎ : 5Hz-flash

* For Models ROA-AP40 to AP80, the error mode judgment by the above LED display is available under condition which “Application Control Kit” (TCB-PCOS1E) sold separately is connected.

(Note)

Never touch part other than Dip switch of “Application Control Kit” (TCB-PCOS1E).

AC230V is applied to all the electronic products, so an electric shock may be caused.

8-4. Contents of Error Display

- When multiple errors are detected, the latest error is displayed.
- When LED display is ○ (Go on), there is the main cause of trouble on the objective part of control at CDB side and the unit stops.
- When LED display is ◎ (Flash), there is the main cause of trouble on the objective part of control at IPDU side and the unit stops.
- When case thermostat operates, the communication is interrupted on the serial circuit. If continuing the case thermostat operation, a serial communication error occurs because serial sending to the indoor unit is interrupted.

No.	Item	Check code		LED display			
		Type A	Type B	D800 (Red)	D801 (Yellow)	D802 (Yellow)	D803 (Yellow)
1	TE sensor error	F06	18	○	●	●	●
2	TD sensor error	F04	19	○	○	●	●
3	TS sensor error	F06	18	●	●	○	●
4	TO sensor error	F08	1B	●	○	●	●
5	Discharge temp. error	P03	1E	●	○	○	●
6	DC outdoor fan error	P22	1A	○	○	○	●
7	Communication error between IPDU (with system suspended)	L29	1C	○	●	●	○
8	High-pressure release operation	P04	21	●	○	●	○
9	Case thermo operation	E04	04	●	○	●	○
10	EEPROM error	—	—	○	○	●	○
11	Communication error between IPDU (without system suspended)	—	—	●	●	○	○
12	G-Tr short-circuit protection	P26	14	◎	●	●	●
13	Detection circuit error	P29	16	●	◎	●	●
14	Current sensor error	H03	17	◎	◎	●	●
15	Comp. lock error	H02	1D	●	●	◎	●
16	Comp. breakdown	H01	1F	◎	●	◎	●
17	TH sensor error	L29	1C	◎	◎	◎	●

○ : Go on ● : Go off ◎ : Flash (5Hz)

<<Check code>>

The check codes are classified into Type A and Type B according to the used remote controller. Be sure to check the remote controller which you use.

Type A :
Neutral 2-cores type wired remote controller such as RBC-AMT21E, RBC-AS21E, and wireless remote controller kit such as TCB-AX21U (W)-E

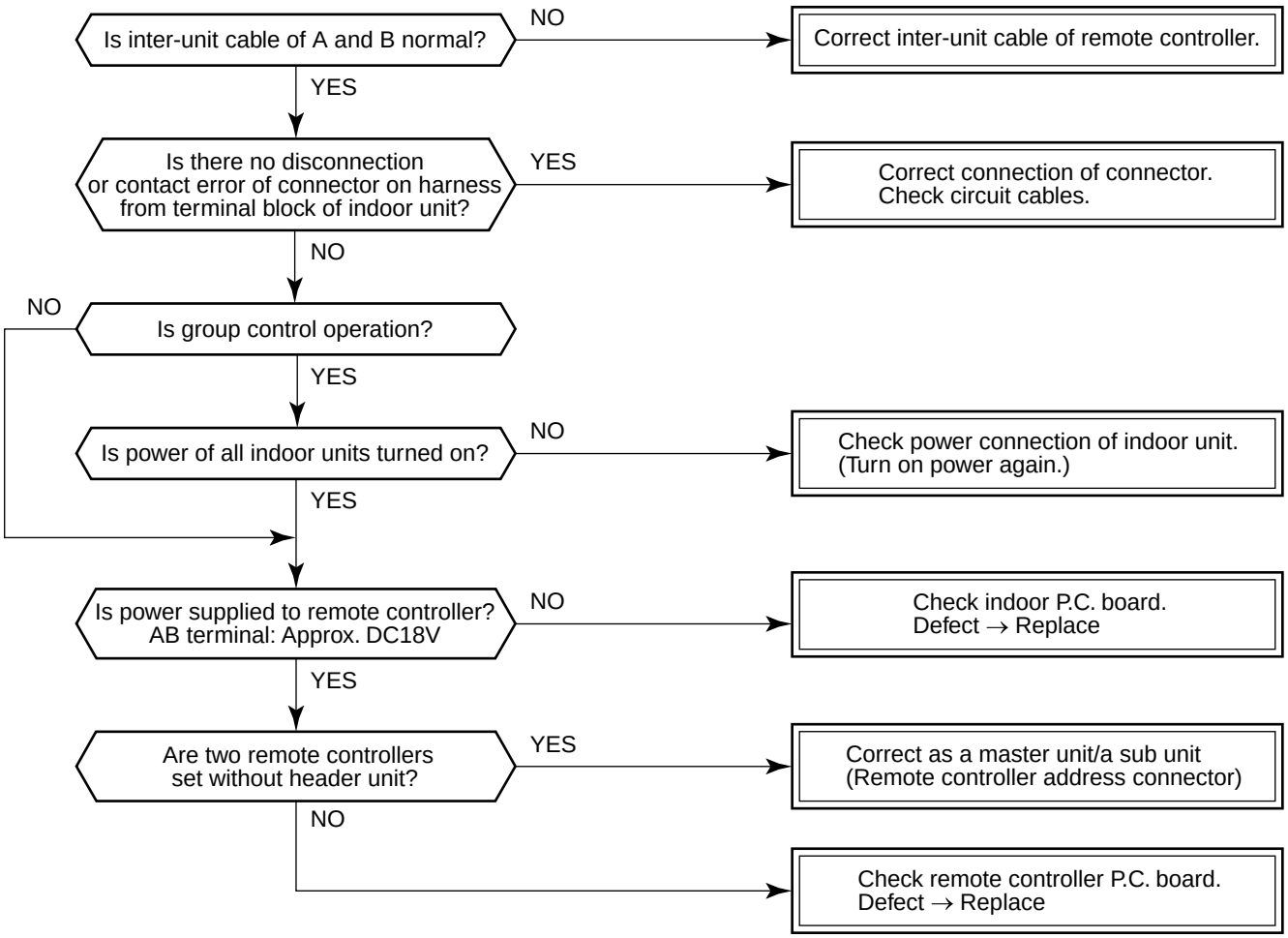
Type B :
Polarized 3-cores type wired remote controller such as RBC-SR1-PE, RBC-SR2-PE, and central control remote controller such as RBC-CR64-PE

8-5. Troubleshooting Procedure for Each Check Code

8-5-1. New Check Code/Present Check Code (Central Control Side)

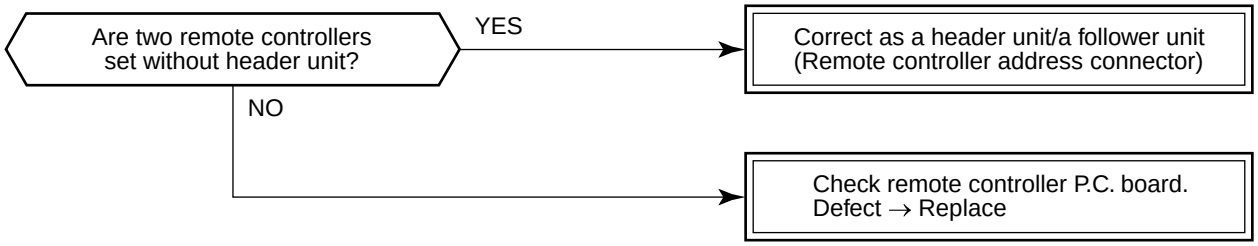
[E01 error]/*[99 error]

***** : When central controller **[99]** is displayed, there are other causes of error.

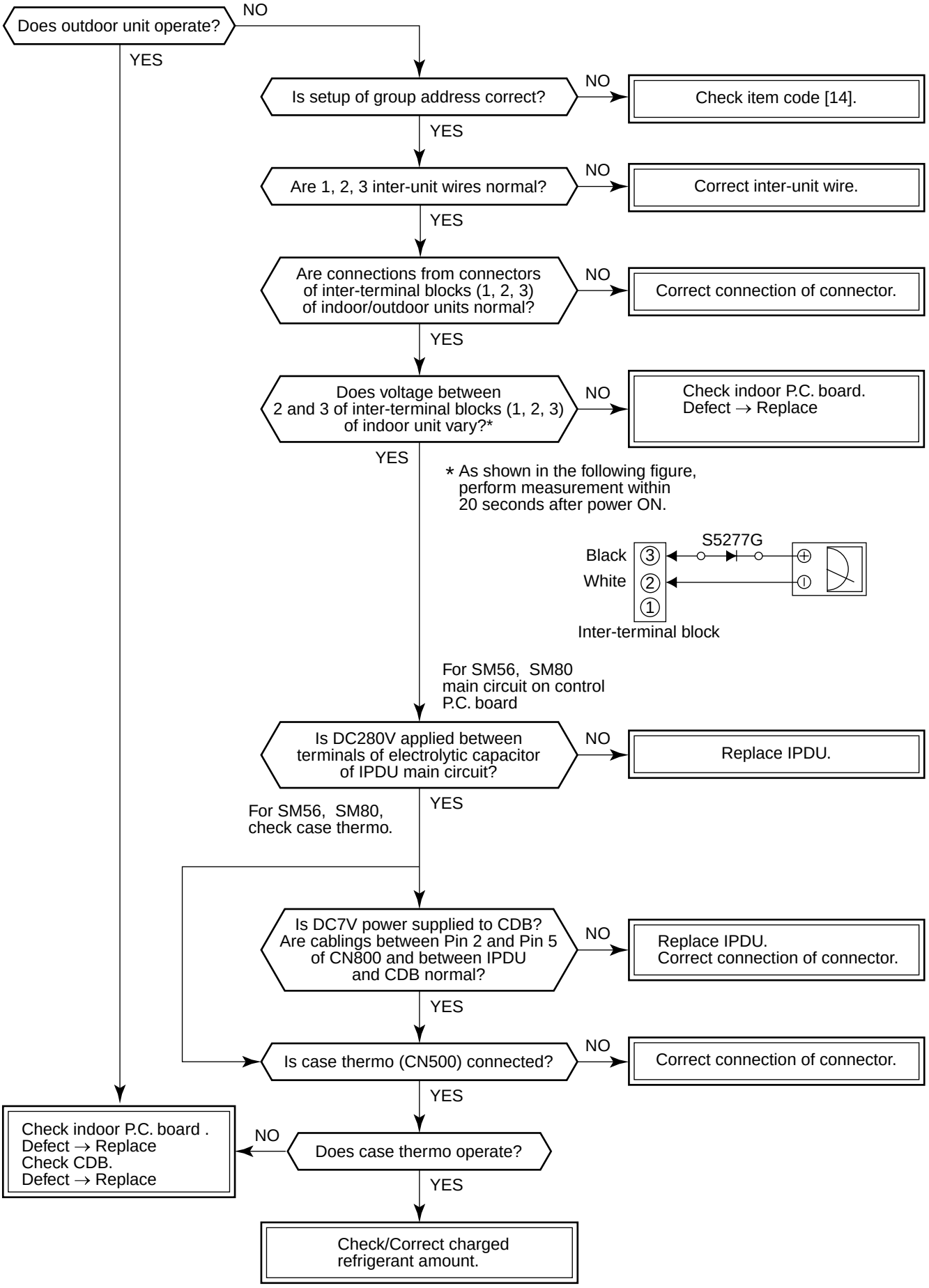


[E09 error]/*[99 error]

***** : When central controller **[99]** is displayed, there are other causes of error.



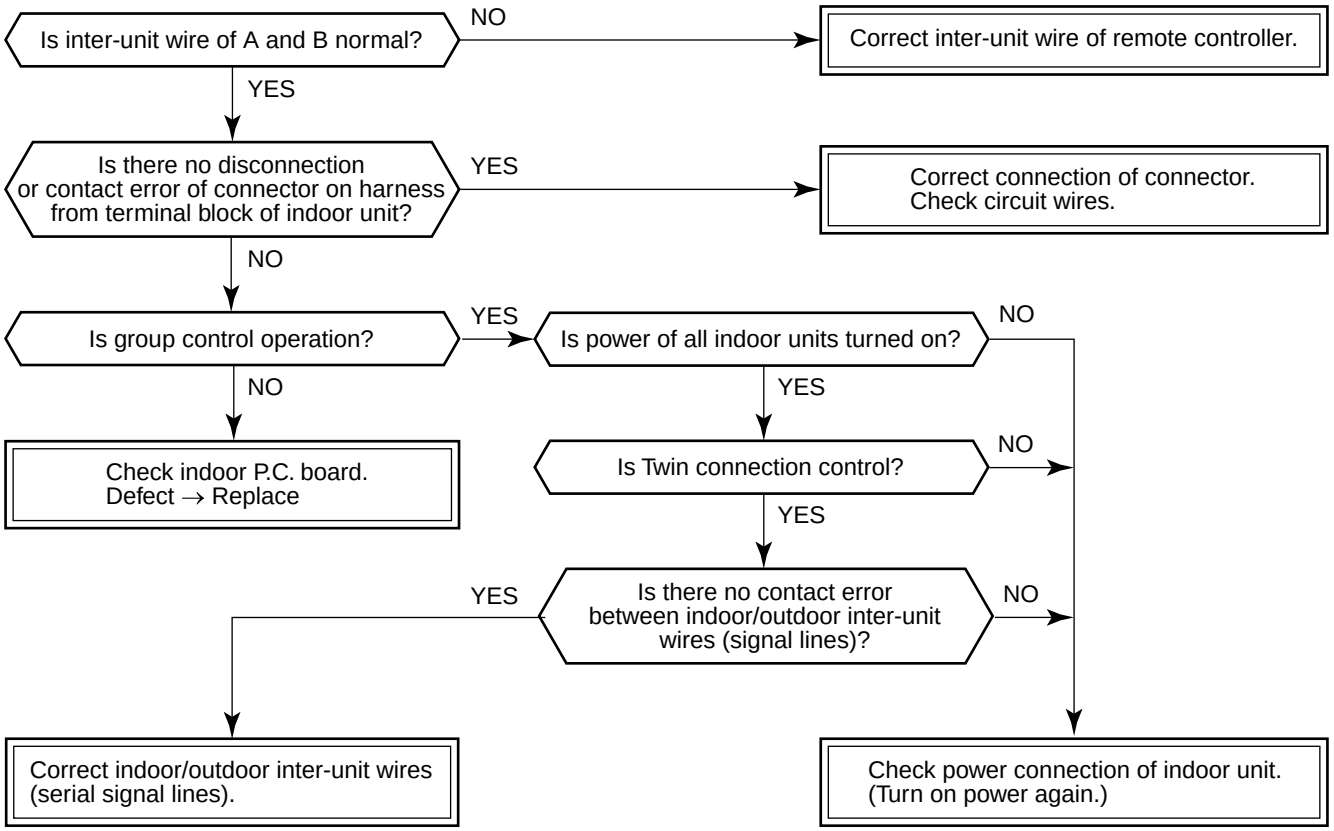
[E04 error]/[04 error]



[E10 error]/[CF error]

[E18 error]/[97 error] *[99 error]

***** : When central controller **[99]** is displayed, there are other causes of trouble.



[E08, L03, L07, L08 error]/ *[96 error] [99 error]

***** : When central controller **[99]** is displayed, there are other causes of trouble.

E08 : Duplicated indoor unit numbers

L03 : Two or more header units in a group control

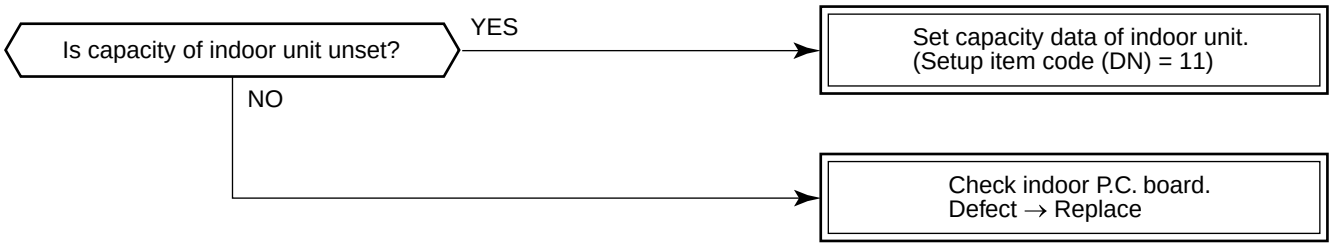
L07 : One or more group addresses of [Individual] in a group control

L08 : Unset indoor group address (99)

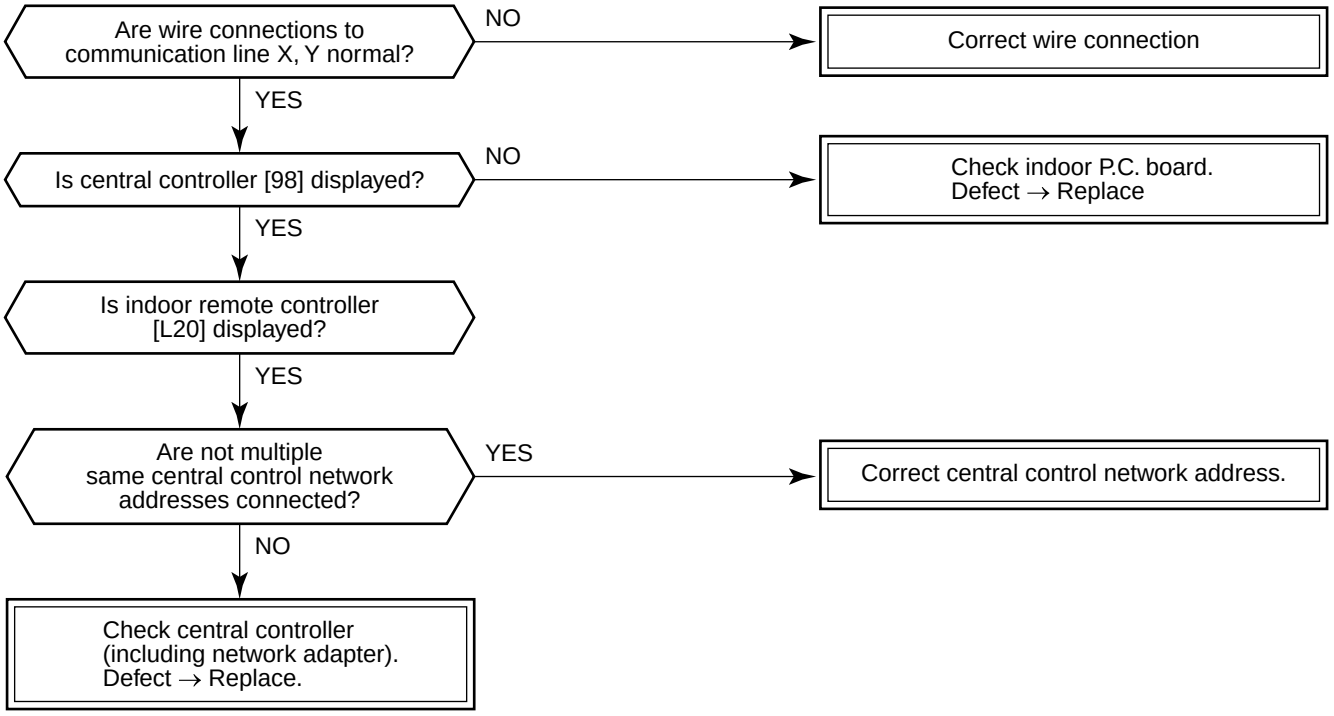
If the above is detected when power has been turned on, the mode automatically enters in automatic address setup mode. (Check code is not displayed.)

However, if the above is detected during automatic address setup mode, the check code may be displayed.

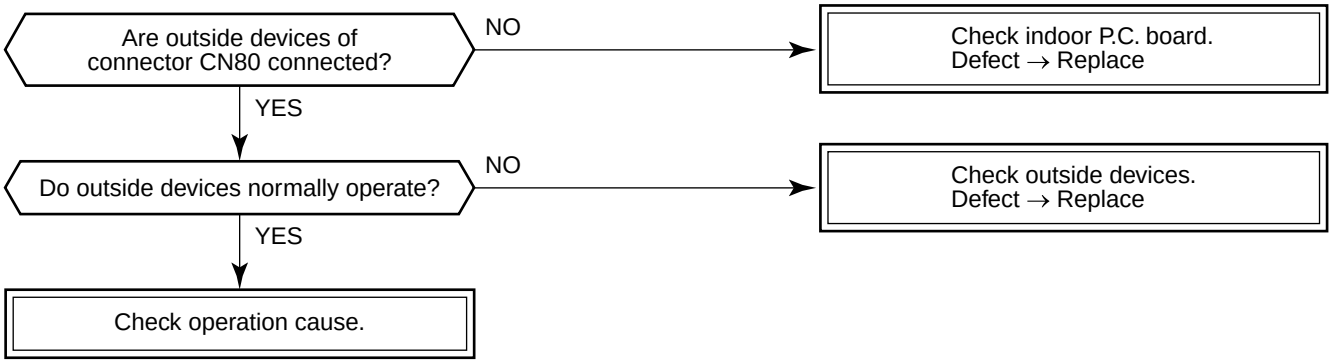
[L09 error]/[46 error]



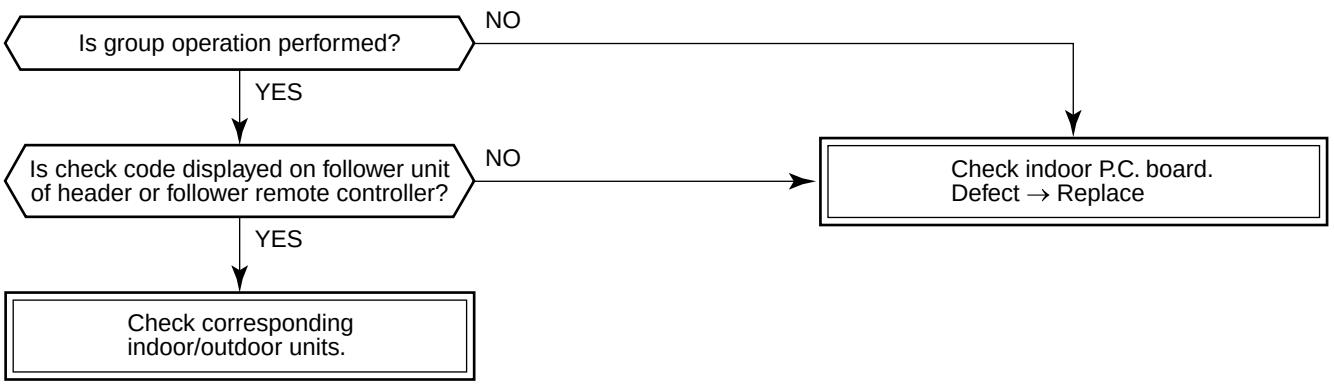
[L20 error]/[98 error]



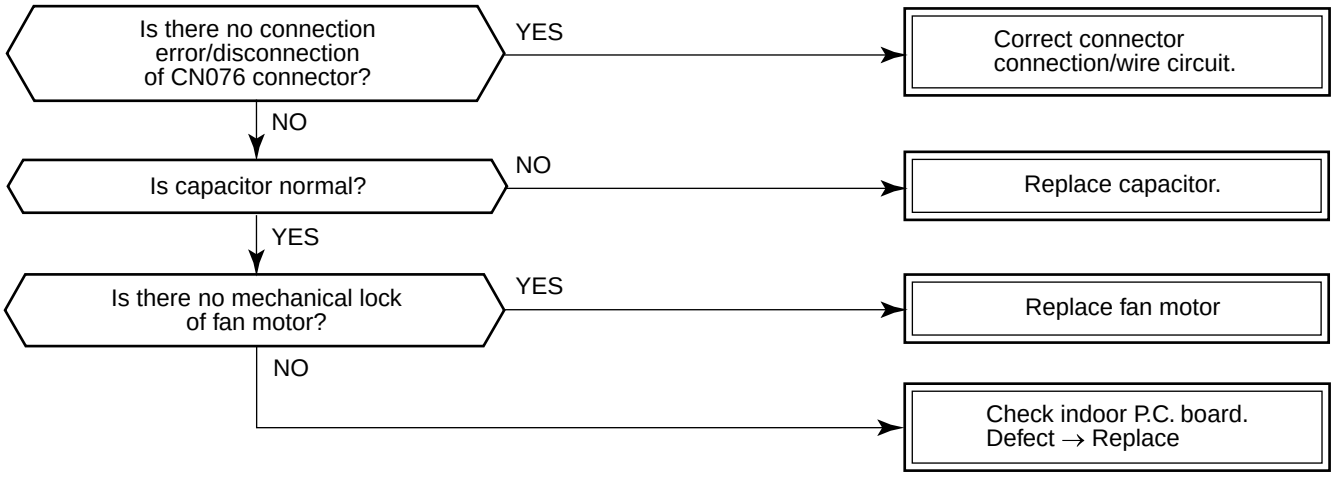
[L30 error]/[B6 error]



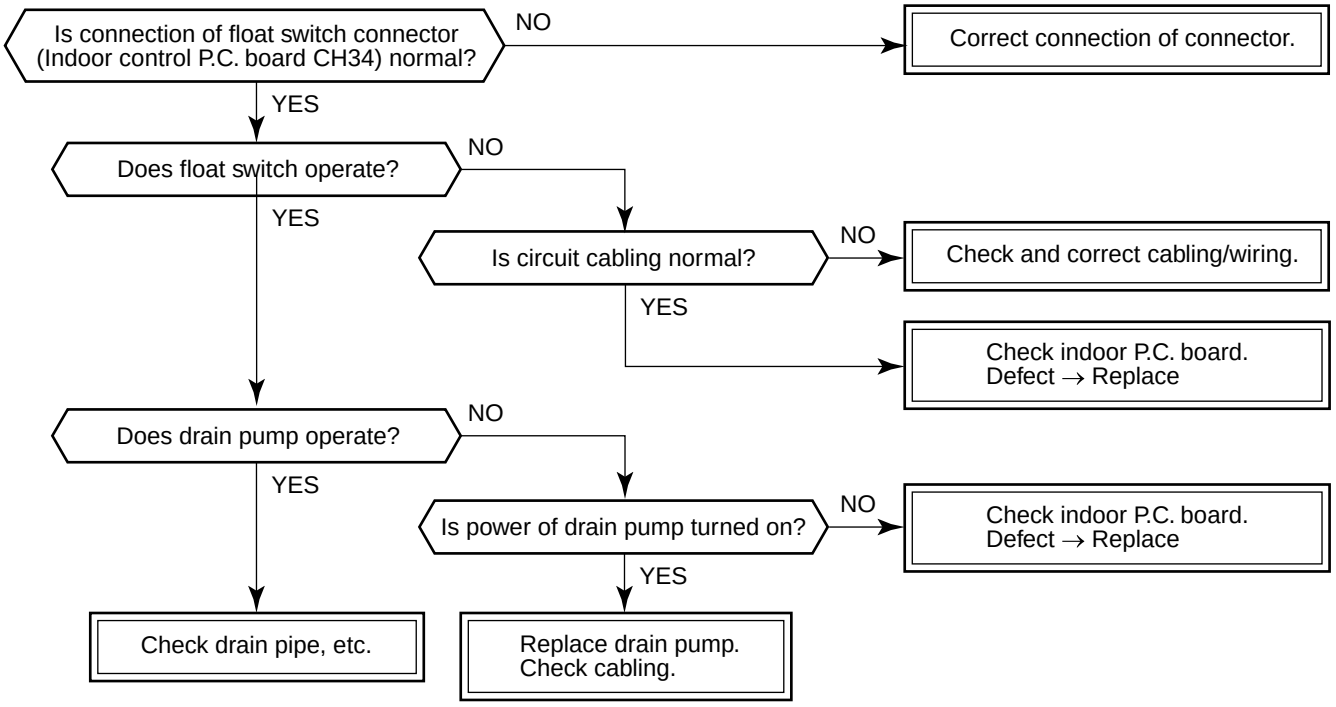
[b7 error] (Central controller)



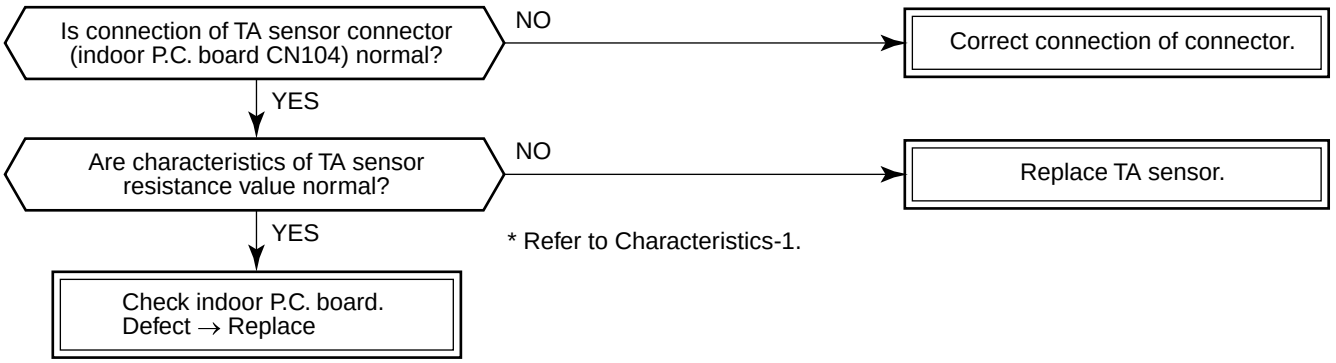
[P01 error]/[11 error]



[P10 error]/[Ob error]



[F10 error] [0C error]



[P12 error]/[11 error]

Turn off the power.

Are not there connections errors or disconnection on connectors CN333 and CN334 of indoor unit P.C. board?

YES → Correct connection of connector.

NO

Remove connectors CN333 and CN334 of indoor unit P.C. board.

Does the fan rotate without trouble when handling the fan with hands?

NO → Replace indoor fan motor.

YES

Are resistance values between phases at fan motor connector CN333 motor side of indoor P.C. board correct? *1

NO → Replace indoor fan motor.

YES

*1
- Are not coil windings between ① (Red lead) and ③ (White lead), between ③ (White lead) and ⑤ (Black lead), between ⑤ (Black lead) and ① (Red lead) opened or shorted?
  → For resistance, see the following values.
  RAV-SM56★, SM80★UT → Approx. 70 to 100Ω
  RAV-SM110★, SM140★UT → Approx. 35 to 50Ω
- Is not earthed between cabinet and 1, 3, 5 → 10MΩ or more

Is resistance value of fan motor connector CN333 at motor side of indoor P.C. board correct? *2

NO → Replace indoor fan motor.

YES

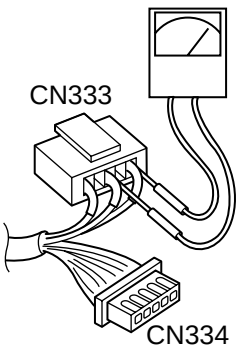
*2
Check resistance of fan motor position detection circuit.
Is not coil winding between ① (Yellow lead) and ④ (Pink lead) opened or shorted? → Resistance: Approx. 5 to 20kΩ

Is signal output of indoor fan motor position detection correct? *3

NO → Replace indoor fan motor.

YES

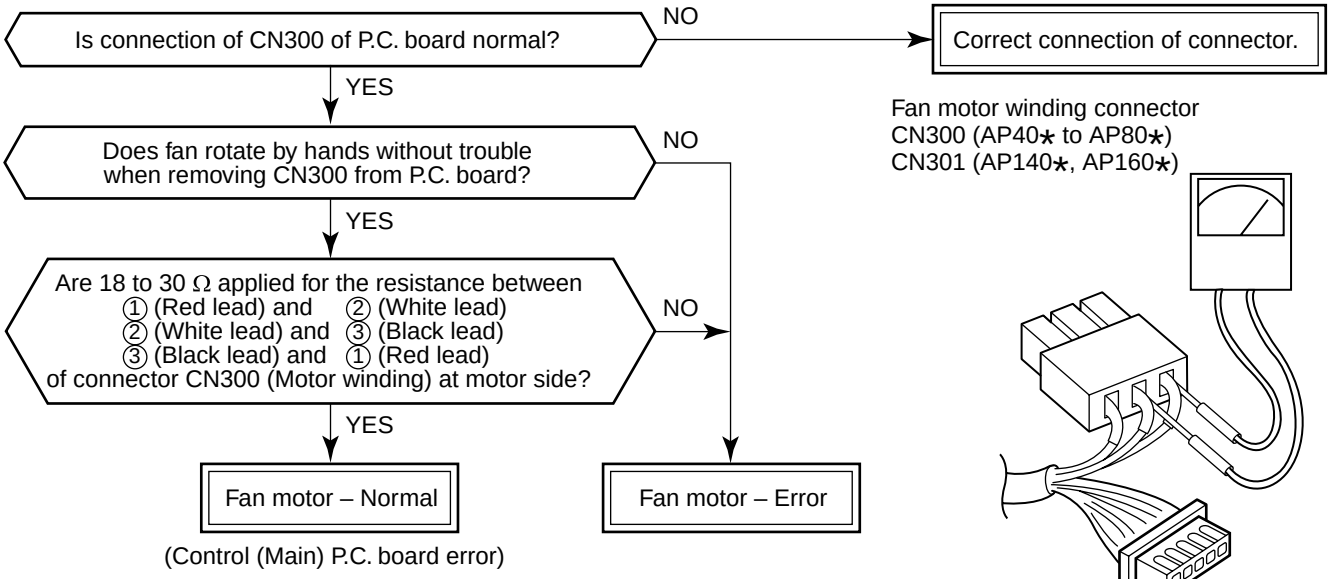
*3
Check fan motor position detection signal.
- Using a tester, measure the voltage between CN334 ① and ⑤ of indoor P.C. board (MCC-1402) under condition that CN333 and CN334 are mounted and the power is turned on.
  → Rotate the fan slowly with hands, and check the pin voltage swings between 0 to 5V voltage.
- Between ④ and ⑤ : 5V



Check indoor P.C. board.
Defect → Replace

[P22 error]/[1A error]

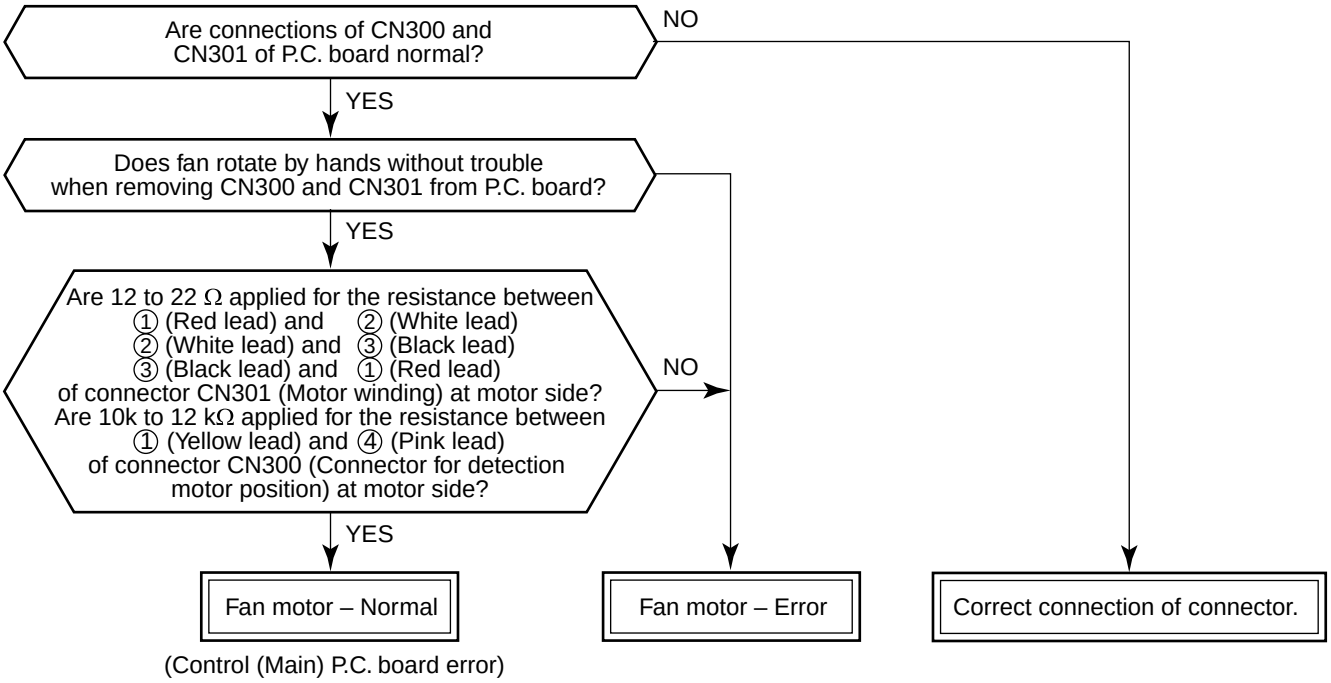
In case of RAS-SM56, SM80



Fan motor winding connector
CN300 (AP40★ to AP80★)
CN301 (AP140★, AP160★)

Connector for detection of motor position
CN300 (AP140★, AP160★)

In case of RAS-SM110, SM140

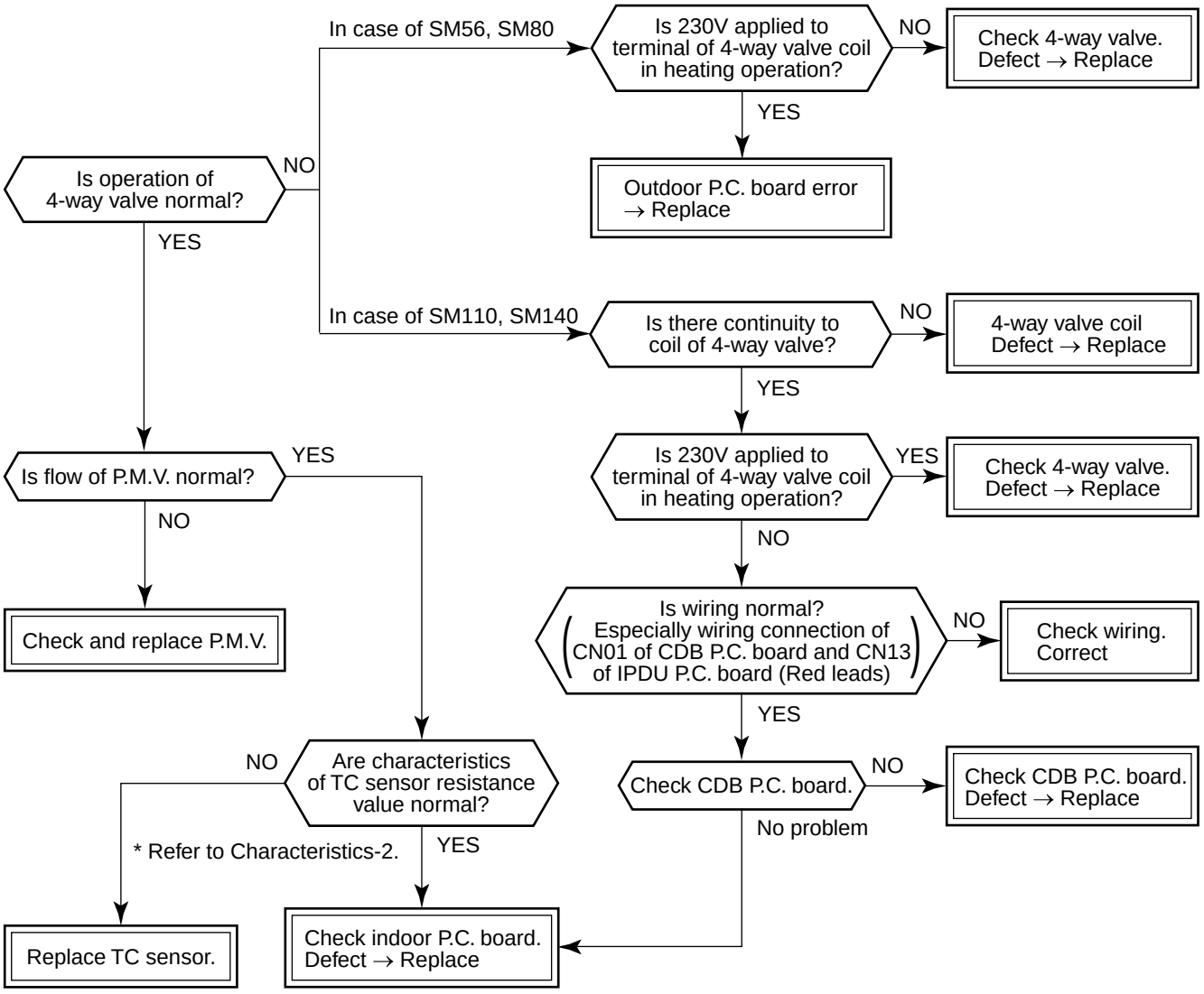


NOTE)

However, GND circuit error inside of the motor is rarely detected as OK by the above check.
When GND circuit does nor become normal even if P.C. board has been replaced, replace the outdoor fan motor.

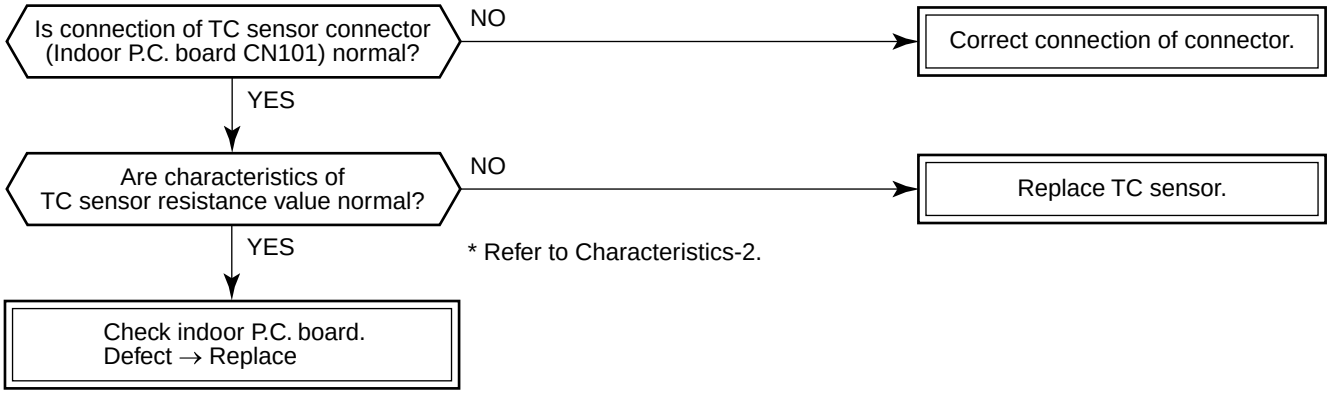
	SM56	SM80	SM110, SM140
Objective P.C. board	Control (Main) P.C. board MCC-5009	Control (Main) P.C. board MCC-1513	CDB P.C. board MCC-1531
Fan motor winding connector	CN300		CN301
Motor position detection connector	No connector for position detection		CN300
Fan motor name	ICF-140-43		ICF-280-100
Fan motor winding resistance value	18 to 30 Ω		12 to 22 Ω

[P19 error]/[08 error]

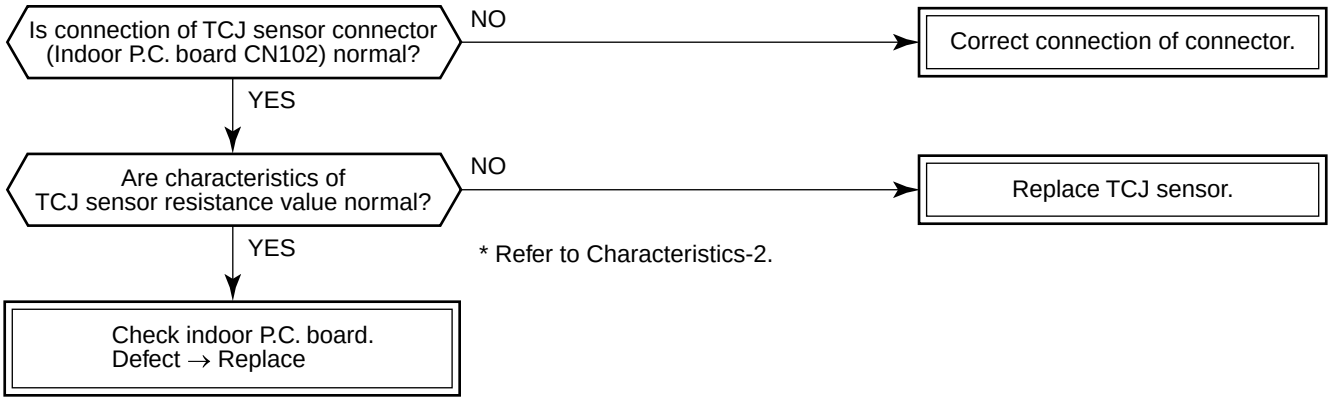


- In cooling operation, if high pressure is abnormally raised, **[P19 error]/[08 error]** may be displayed. In this case, remove cause of pressure up and then check again referring to the item **[P04 error]/[21 error]**.

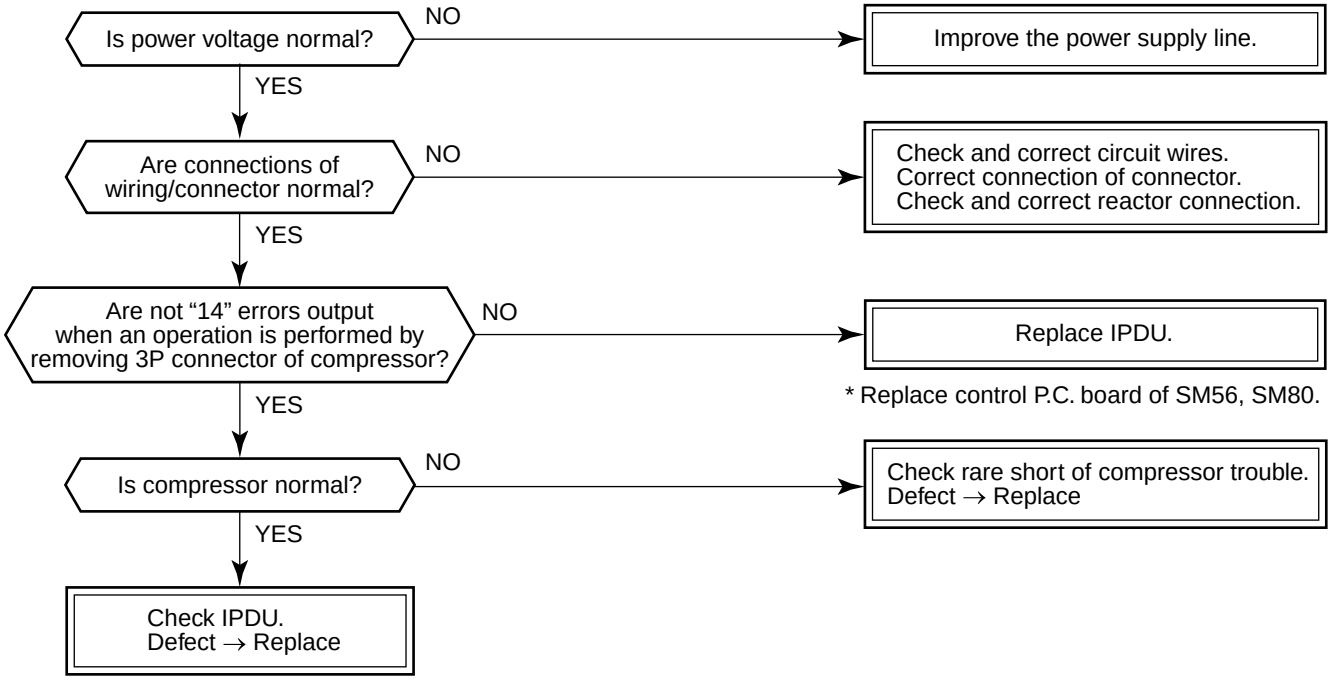
[F02 error]/[0d error]



[F01 error]/[0F error]

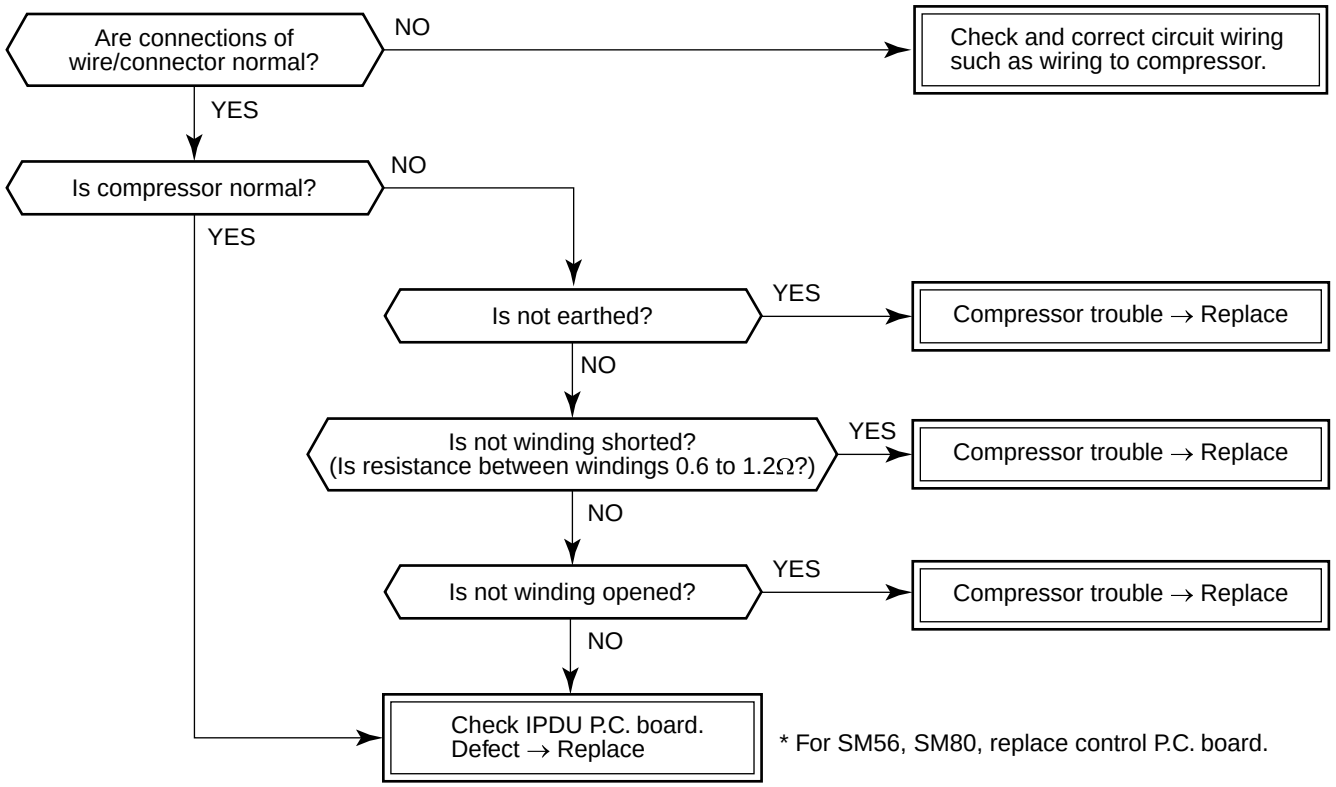


[P26 error]/[14 error]

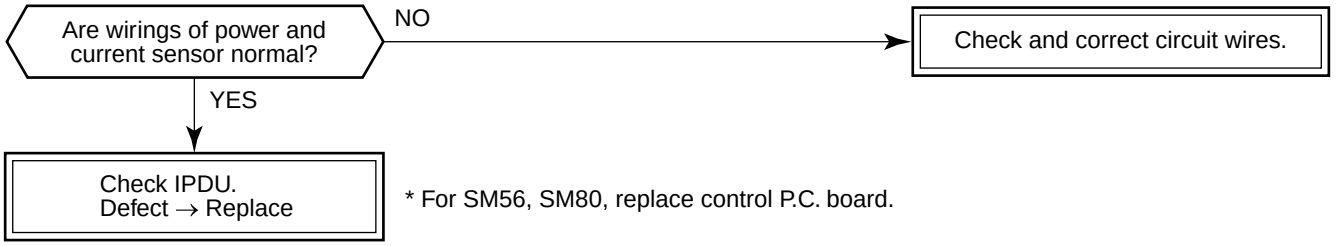


* Replace control P.C. board of SM56, SM80.

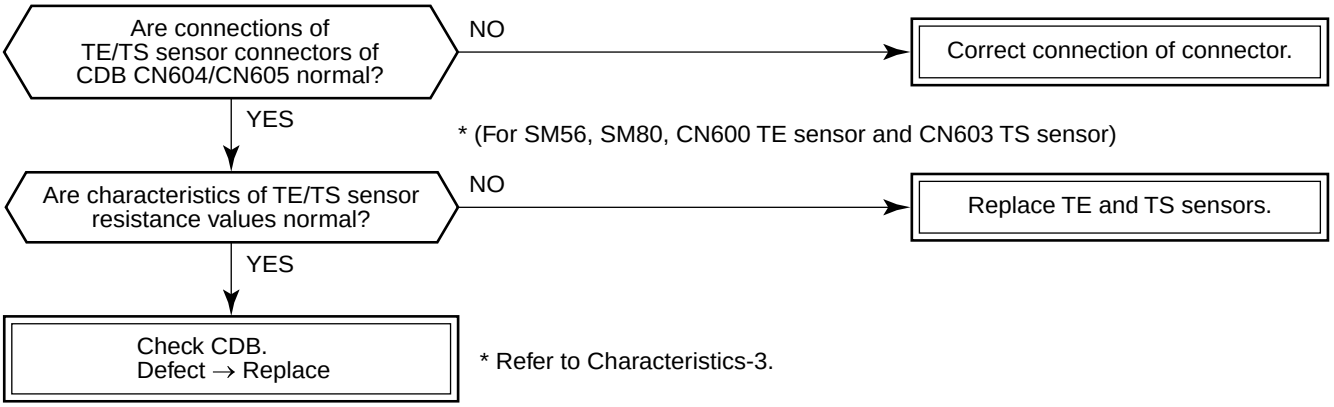
[P29 error]/[16 error]



[H03 error]/[17 error]

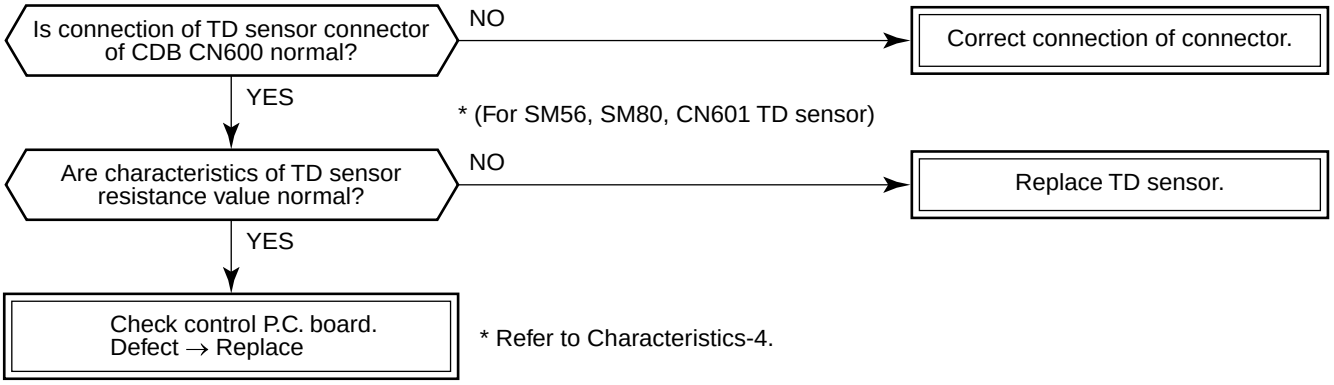


[F06 error]/[18 error]



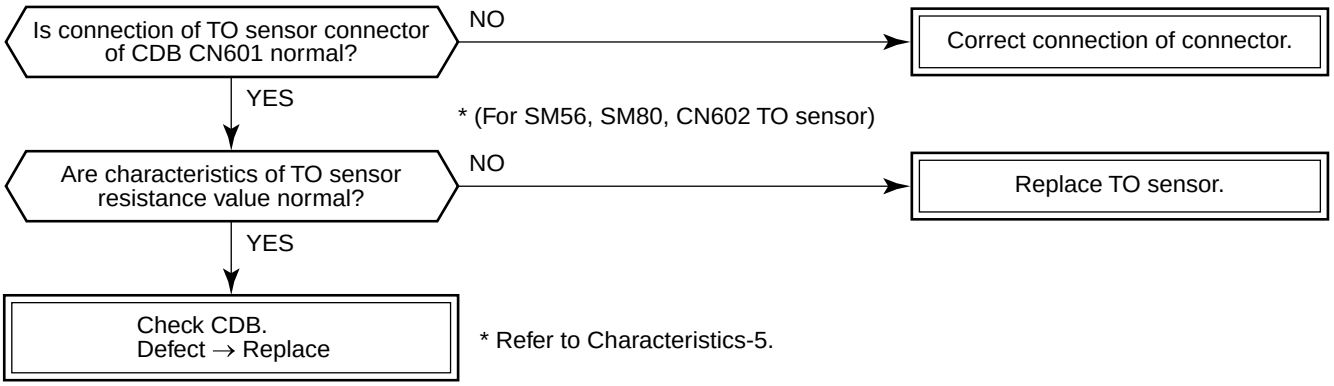
* For SM56, SM80, replace control P.C. board.

[F04 error]/[19 error]



* For SM56, SM80, replace control P.C. board.

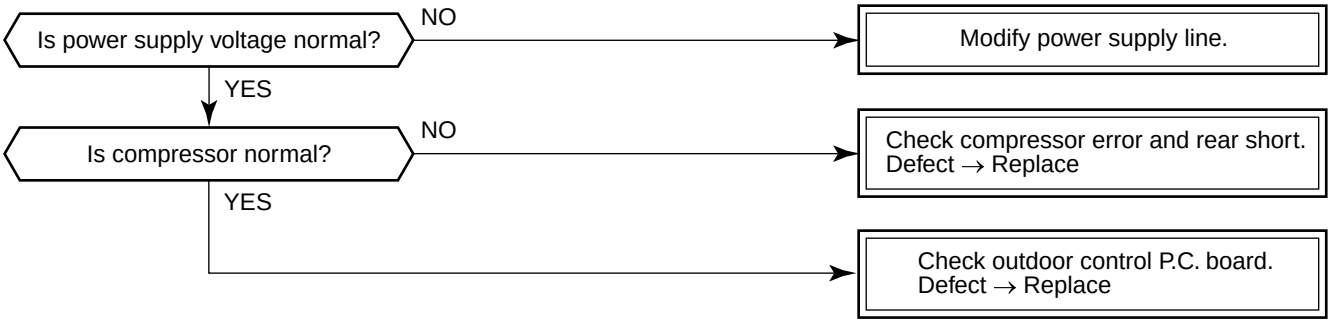
[F08 error]/[1b error]



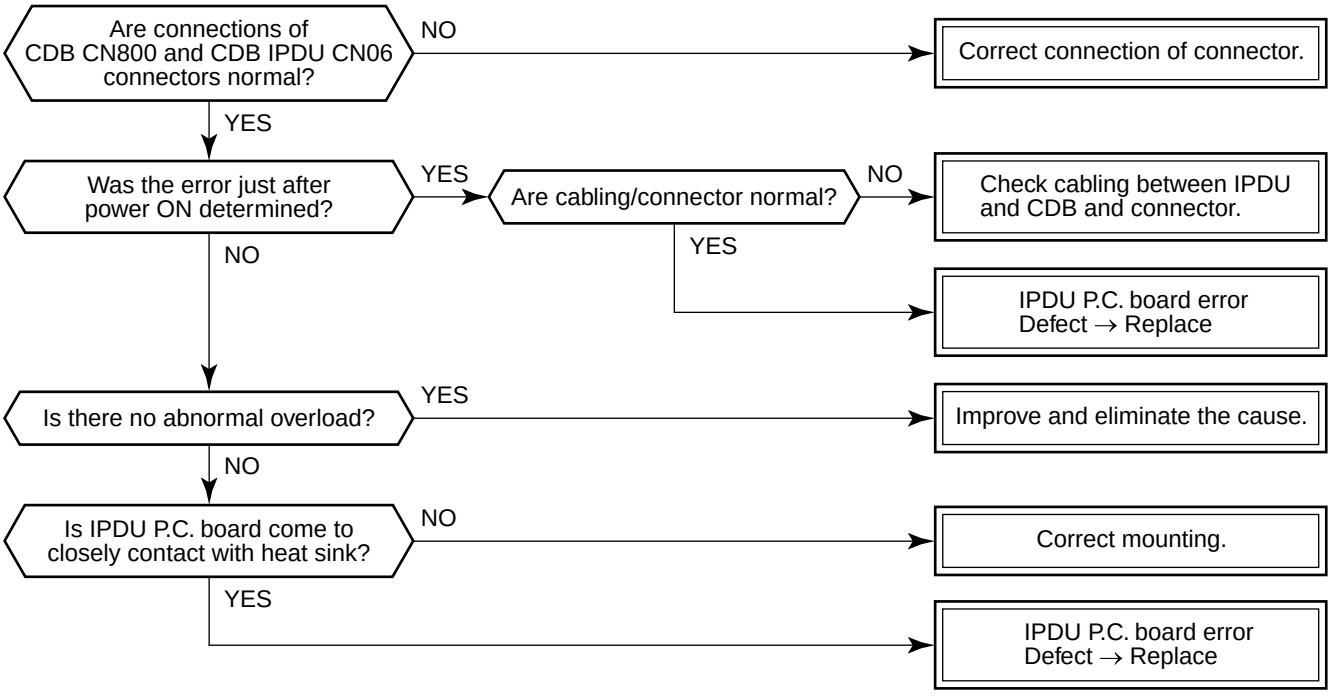
* For SM56, SM80, replace control P.C. board.

[L29 error]/[1C error]

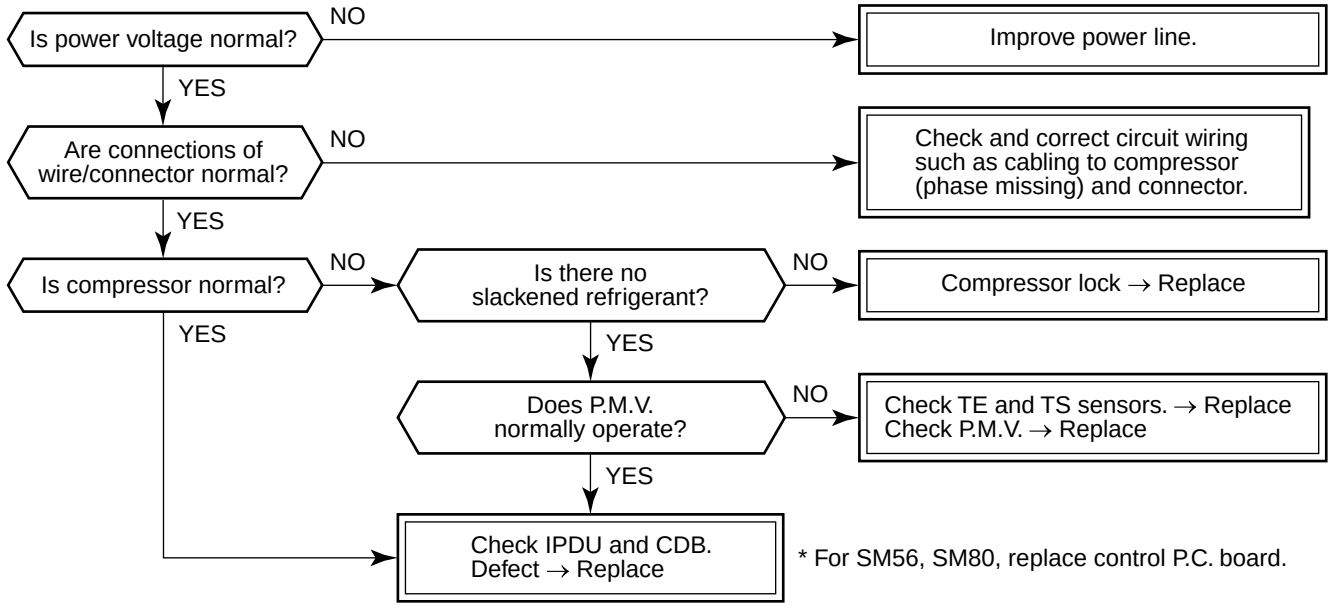
In case of RAS-SM56, SM80



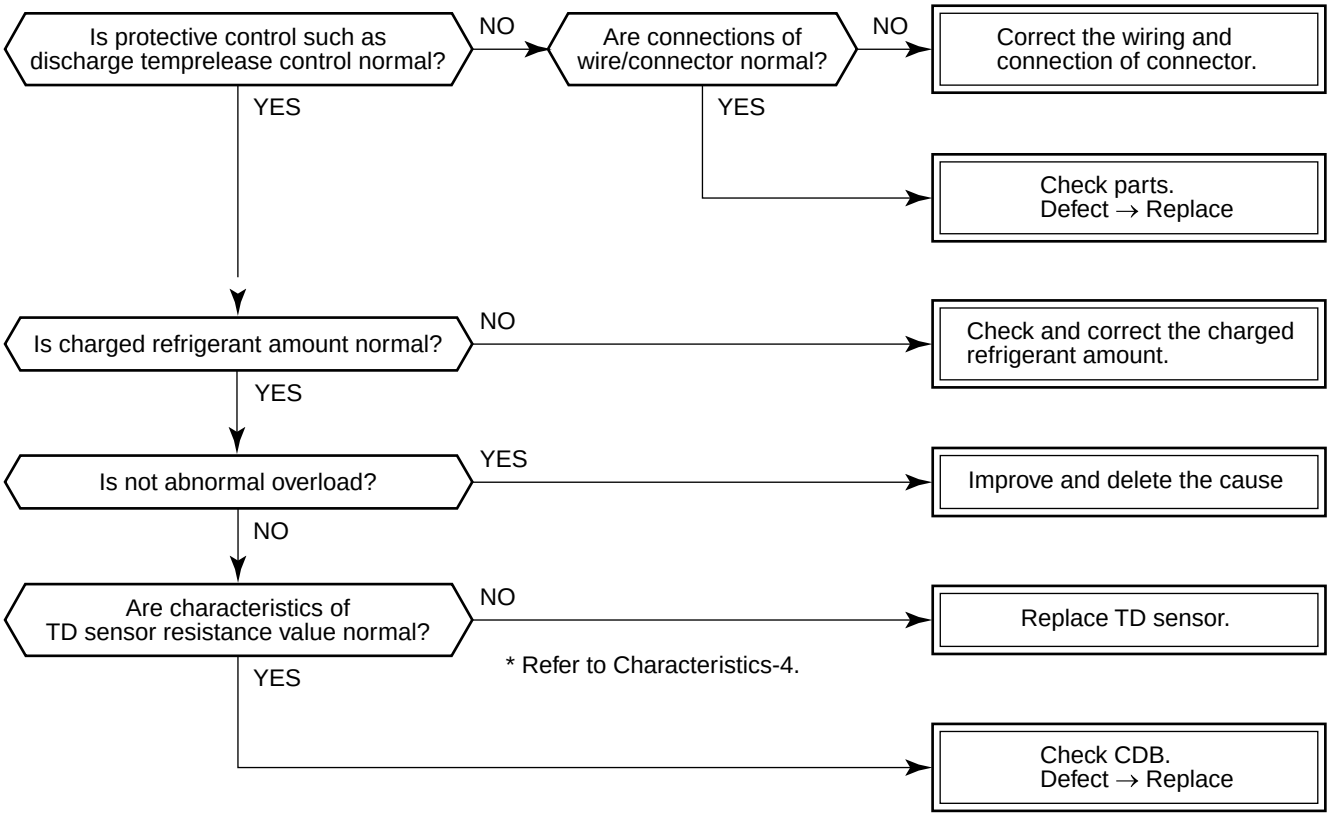
In case of RAS-SM110, SM140



[H02 error]/[1d error]

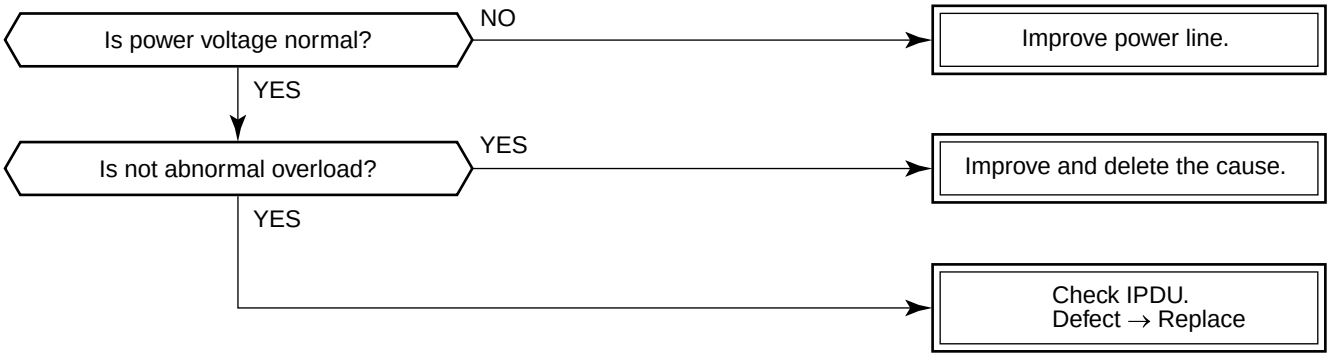


[P03 error]/[1E error]



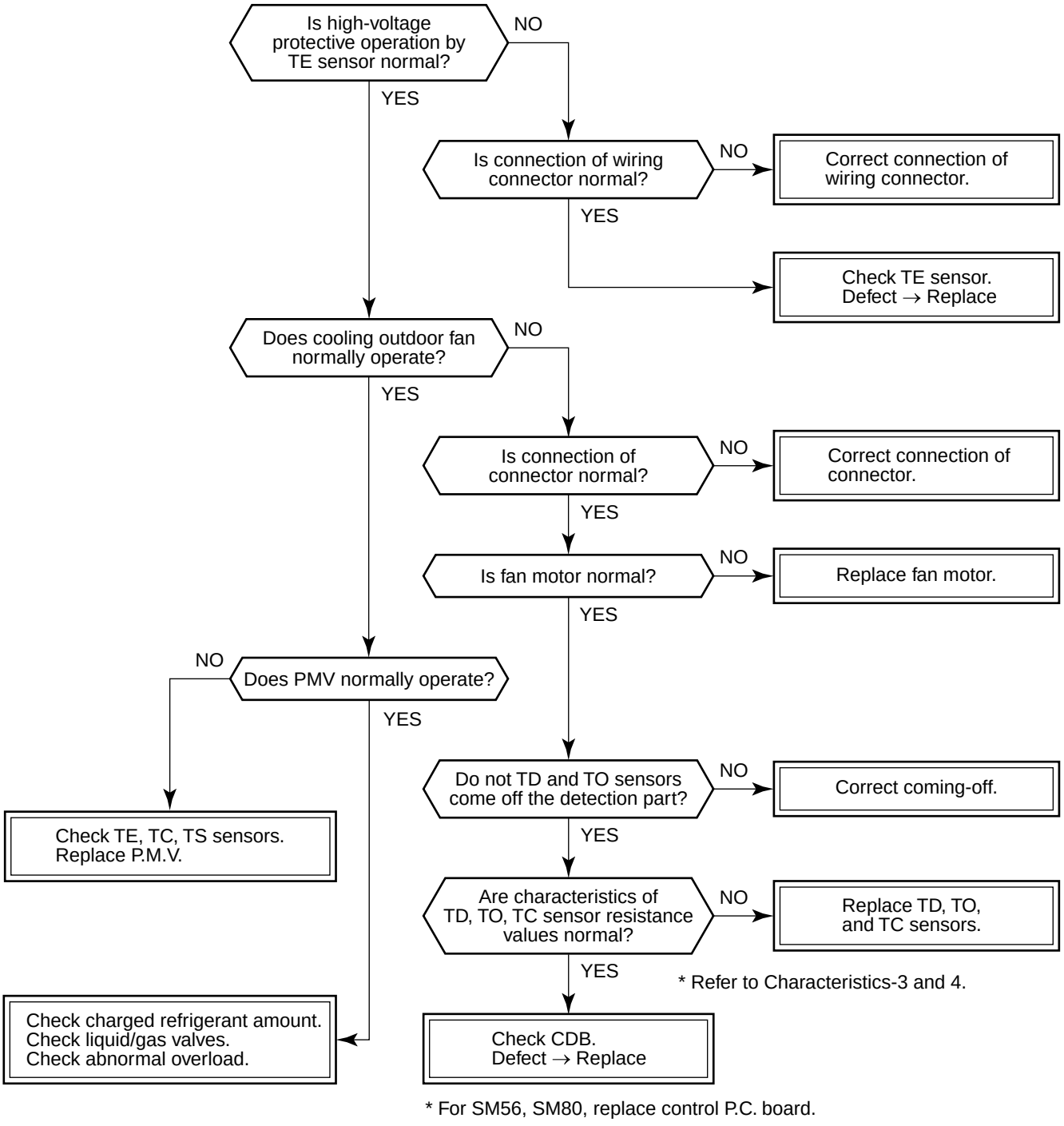
* For SM56, SM80, replace control P.C. board.

[H01 error]/[1F error]

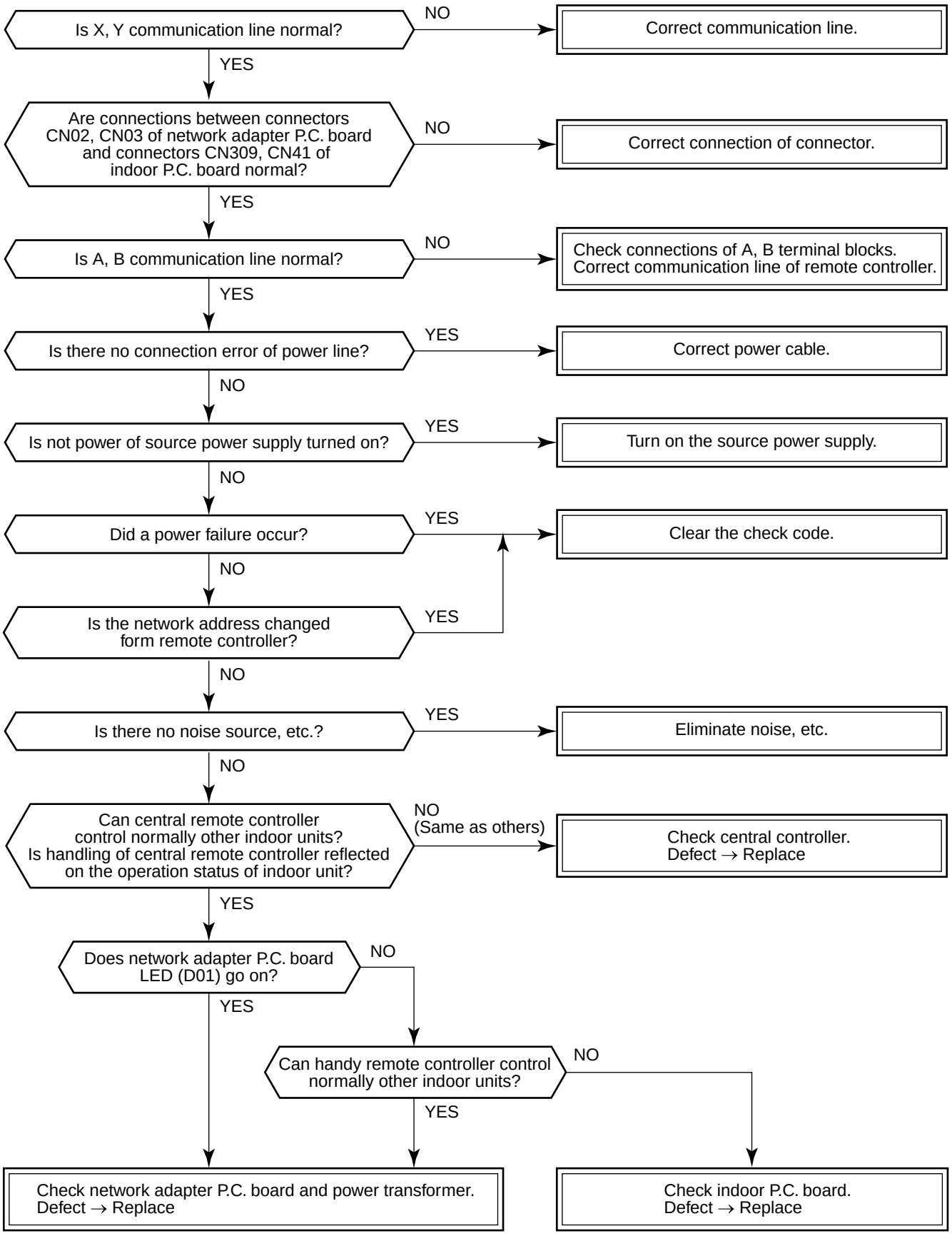


* For SM56, SM80, replace control P.C. board.

[P04 error]/[21 error]



[97 error] (Central controller)



[E03 error] (Master indoor unit)

[E03 error] is detected when the indoor unit cannot receive a signal sent from the main remote controller (and central controller).

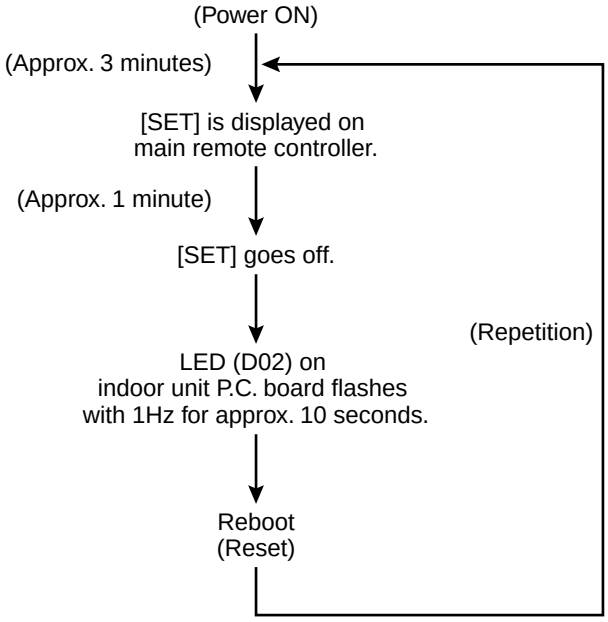
In this case, check the communication cables of the remote controllers A and B, the central control system X and Y. As communication is disabled, [E03] is not displayed on the main remote controller and the central controller. [E01] is displayed on the main remote controller and [97 error] on the central controller, respectively.

If [E03] occurs during an operation, the air conditioner stops.

[F29 error] / [12 error]

[F29 error] or [12 error] indicates detection of trouble which occurred on IC10 non-volatile memory (EEPROM) on the indoor unit P.C. board during operation of the air conditioner. Replace the service P.C. board.

* If EEPROM has not been inserted when the power was turned on or if EEPROM data never be read/written, the automatic address mode is repeated. In this time, the central controller displays [97 error].

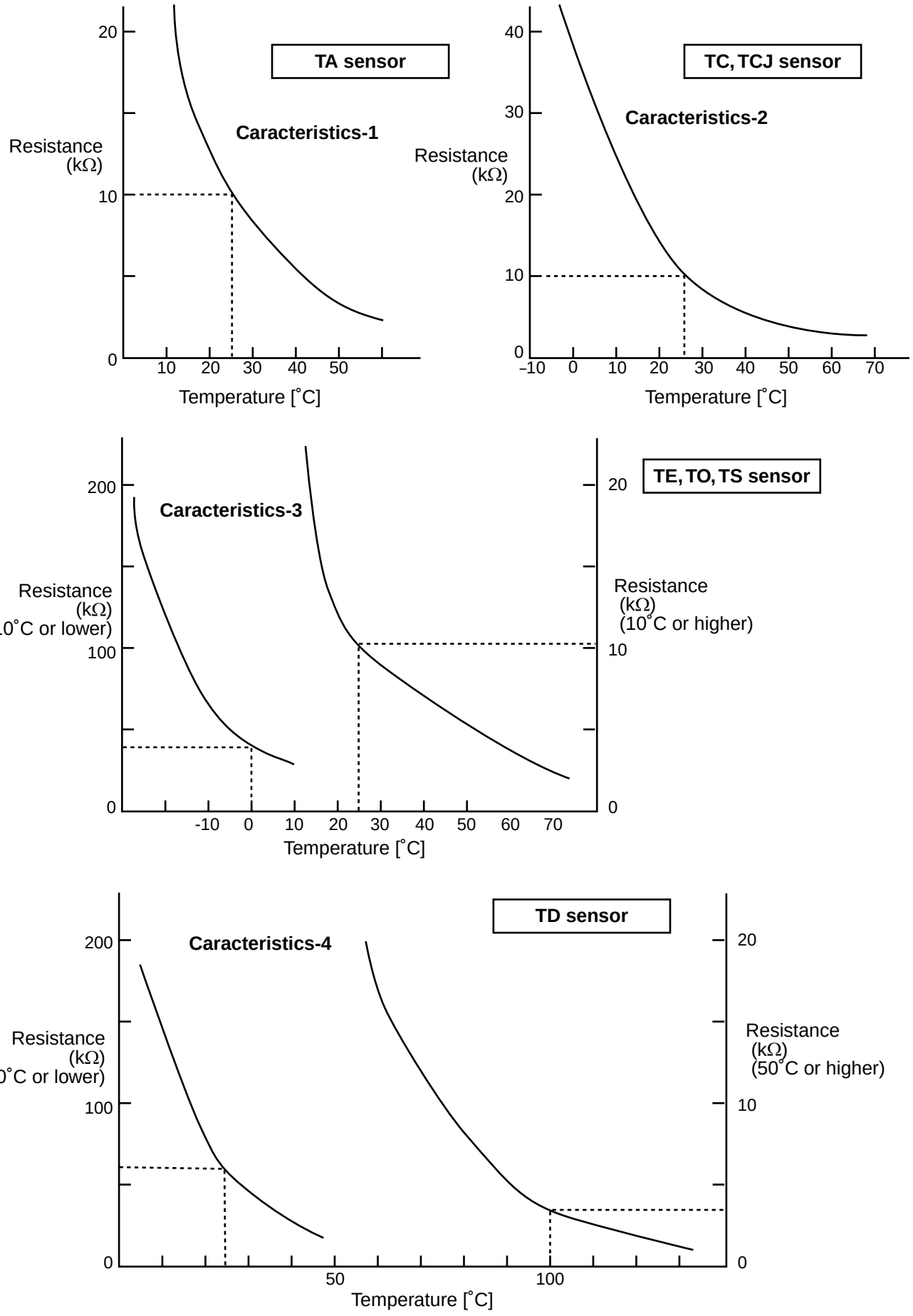


[P31 error] (Sub indoor unit)

When the master unit of a group operation has detected [E03], [L03], [L07], or [L08] error, the sub unit of the group operation detects [P31 error] and then it stops. There is no display of the check code or alarm history of the main remote controller.

(In this model, the mode enters in automatic address set mode when the master unit has detected [E03], [L03], [L07], or [L08] error.)

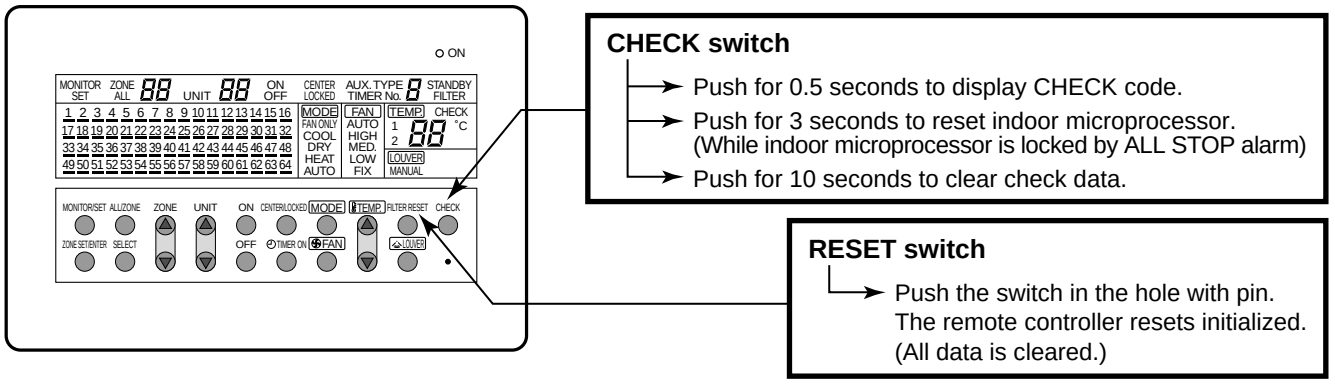
8-4-2. Relational Graph of Temperature Sensor Resistance Value and Temperature



8-4-3. Troubleshooting with CHECK Display of Central Remote Controller

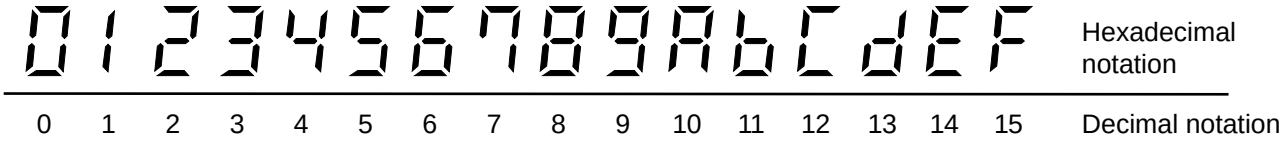
1. Operation for CHECK display

When pushing the CHECK switch, the indoor unit No. (Network address No.) including the check data is displayed in the UNIT No. display section, and the check code is displayed in the set up temp. display section.

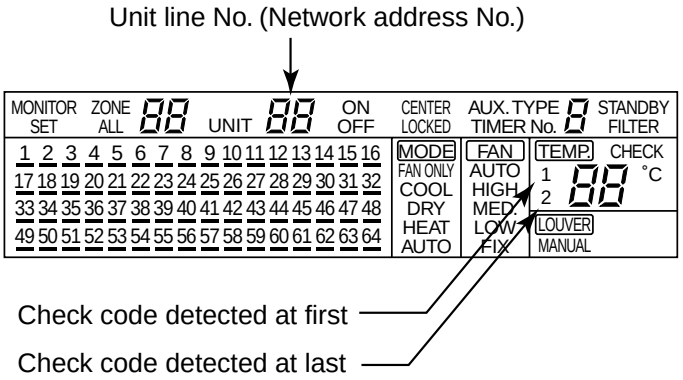


2. Reading of CHECK monitor display

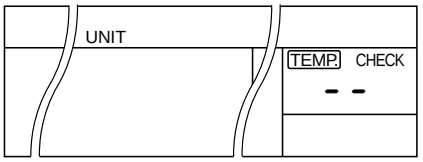
<7 segment display>



<Display on CHECK monitor>

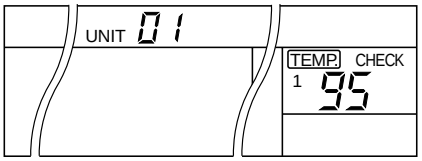


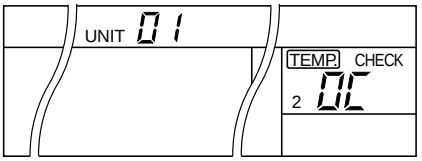
(Example)
There is no check data.

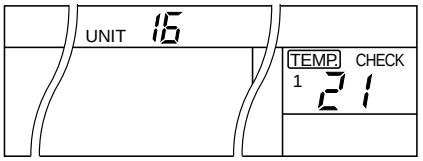


<CHECK data>

(Example)
In No.1 unit, first the interconnection wire (bus communication line) of indoor/outdoor has failed.
Next, the room temp. sensor is defective.
For No.16 unit, the high pressure switch at the inverter unit side operates.







8-4-4. Check Code Table

Error mode detected by indoor unit (1)

Operation of diagnostic function						Judgment and measures
Block display	**Check code A**	**Check code B**	**Cause of operation**	**Status of air conditioner**	**Condition**	
[MODE] [TIMER] lamp 5Hz flash	E04	04	The serial signal is not output from outdoor unit to indoor unit. • Miswiring of inter-unit wires • Defective serial sending circuit on outdoor P.C. board • Defective serial receiving circuit on outdoor P.C. board • Compressor case thermo operation	Operation continues	Displayed when error is detected	1. Outdoor unit does not completely operate. • Inter-unit wire check, correction of miswiring • Outdoor P.C. board check, P.C. board wires check • Compressor case thermo check 2. In normal operation When outdoor sending serial LED (Green) flashes, the receiving serial LED (Orange) also flashes. : Indoor P.C. board (Main P.C. board) check When the receiving serial LED (Orange) does not flash: Outdoor P.C. board check
		97	BUS communication circuit error * BUS communication was interrupted over the specified time.	Operation continues (According to remote controller of indoor unit)	Displayed when error is detected	1. Communication line check, miswiring check Power supply check for central controller (Central control remote controller, etc.) and indoor unit 2. Communication check (XY terminal) 3. Indoor P.C. board check 4. Central controller check (Communication P.C. board)
	L20	98	Network address miss-setting • Addresses of central controllers (Central control remote controller, etc.) are duplicated.	Operation continues	Displayed when error is detected	1. Check central control system network address setting. (SW02) 2. Indoor P.C. board check 3. Central controller check (Communication P.C. board)
	P19	08	Error in 4-way valve system • Indoor heat exchanger temperature rise after start of cooling operation. • Indoor heat exchanger temperature fall after start of heating operation.	Operation continues	Displayed when error is detected	1. Check 4-way valve. 2. Check 2-way valve and non-return valve. 3. Check indoor heat exchanger sensor (TC). 4. Check indoor P.C. board (Main P.C. board).
		09 *	Error in other cycles • Indoor heat exchanger temp (TC) does not vary after start of cooling/heating operation.	Operation continues	Displayed when error is detected	1. Compressor case thermo operation 2. Coming-off of detection part of indoor heat exchanger sensor 3. Check indoor heat exchanger sensor (TC). 4. Check indoor P.C. board (Main P.C. board).
[MODE] lamp 5Hz flash	F10	0C	Coming-off, disconnection or short of indoor temp sensor (TA)	Operation continues	Displayed when error is detected	1. Check indoor temp sensor (TA). 2. Check indoor P.C. board (Main P.C. board).
	F02	0d	Coming-off, disconnection or short of indoor temp sensor (TC)	Operation continues	Displayed when error is detected	1. Check indoor temp sensor (TC). 2. Check indoor P.C. board (Main P.C. board).
	F01	0F	Coming-off, disconnection or short of indoor temp sensor (TCJ)	Operation continues	Displayed when error is detected	1. Check indoor temp sensor (TCJ). 2. Check indoor P.C. board (Main P.C. board).

* : No display in the setting at shipment

Error mode detected by indoor unit (1)

Operation of diagnostic function						Judgment and measures
Block display	**Check code A**	**Check code B**	**Cause of operation**	**Status of air conditioner**	**Condition**	
[MODE] lamp 5Hz flash	P12	11	Error in indoor fan system Revolutions frequency error of fan	All stop	Displayed when error is detected	1. Check indoor fan motor connector circuit (CN210). 2. Check indoor fan. 3. Check indoor P.C. board (Main P.C. board).
	F29	12	Error in indoor unit or other positions 1. EEPROM access error	Operation continues	Displayed when error is detected	1. Check indoor P.C. board (EEPROM and peripheral circuits) (Main P.C. board).
		b5	Outside error input Detected by input voltage level from outside devices	Operation continues	Displayed when error is detected	1. Check outside devices. 2. Check indoor P.C. board (Main P.C. board).
		b6	Outside interlock input Detected by input voltage level from outside devices	All stop	Displayed when error is detected	1. Check outside devices. 2. Check indoor P.C. board (Main P.C. board).

Error mode detected by indoor unit (2)

Operation of diagnostic function				Judgment and measures
Check code	**Cause of operation**	**Status of air conditioner**	**Condition**	
99	Serial return signal is not sent from No. 1 indoor unit to remote controller. • Miswiring of inter-unit wire between remote controller and indoor unit • Miss-setting of indoor unit No. (Group address)	ON/OFF	Displayed when error is detected	1. Indoor unit does not completely operate. • Check inter-unit wire. • Check indoor P.C. board. (Main/Sub P.C. boards) • Check remote controller. 2. In normal operation • Check setting of indoor unit No. (SW01) (Sub P.C. board) • Check remote controller.

Error mode detected by outdoor unit (3)

Operation of diagnostic function					Judgment and measures
Check code A	Check code B	Cause of operation	Status of air conditioner	Condition	
P26	14	Inverter over-current protective circuit operates. (For a short time)	All stop	Displayed when error is detected	1. Inverter immediately stops even if restarted. • Compressor rare short 2. Check IPDU. • Cabling error
H03	17	Error on current detection circuit • Current value is high at AC side even while compressor stops. • Phase of power supply is missed.	All stop	Displayed when error is detected	1. Compressor immediately stops even if restarted. : Check IPDU. 2. Phase-missing operation of power supply • Check power voltage of R, S, T.
F06	18	Coming-off, disconnection or short of outdoor temp sensor	All stop	Displayed when error is detected	1. Check outdoor temp sensor (TE, TS). 2. Check CDB.
F04	19	Coming-off, disconnection or short of outdoor temp sensor	All stop	Displayed when error is detected	1. Check outdoor temp sensor (TD). 2. Check CDB.
L29	1C	Compressor drive output error • Tin thermistor temp, Tin error (IPDU heat sink temp. is high.) Communication error between IPDU • Connector coming-off between CDB and IPDU	All stop	Displayed when error is detected	1. Abnormal overload operation of refrigerating cycle 2. Loosening of screws and contact error of IPDU and heat sink 3. Cooling error of heat sink 4. Check wiring of CDB and IPDU.
H02	1d	Compressor does not rotate. (Over-current protective circuit works when constant time passed after activation of compressor.)	All stop	Displayed when error is detected	1. Compressor error (Compressor lock, etc.) : Replace compressor. 2. Wiring trouble of compressor (Phase missing)
P03	1E	Discharge temp error • Discharge temp over specified value was detected.	All stop	Displayed when error is detected	1. Check refrigerating cycle. (Gas leak) 2. Error of electron control valve 3. Check pipe sensor (TD).
H01	1F	Compressor breakdown • Operation frequency lowered and stops though operation had started.	All stop	Displayed when error is detected	1. Check power voltage. (AC200V ± 20V) 2. Overload operation of refrigerating cycle 3. Check current detection circuit at AC side.
P04	21	High-voltage protection error by TE sensor • TE temp over specified value was detected.	All stop	Displayed when error is detected	1. Overload operation of refrigerating cycle 2. Check outdoor temp sensor (TE).
P22	1A	DC outdoor fan motor error • IDC operation or lock was detected by DC outdoor fan driving.	All stop	Displayed when error is detected	1. Position detection error 2. Over-current protection circuit operation of outdoor fan drive unit • Check CDB. • Refer to Judgment of outdoor fan.
P29	16	Error on IPDU position detection circuit	All stop	Displayed when error is detected	1. Position detection circuit operates even if driving by removing 3P connector of compressor. • Replace IPDU.
F08	1b	Coming-off, disconnection or short of outdoor temp. sensor	Operation continues	Displayed when error is detected	1. Check outdoor temp sensor (TO). 2. Check P.C. board.

8-5. Other Function

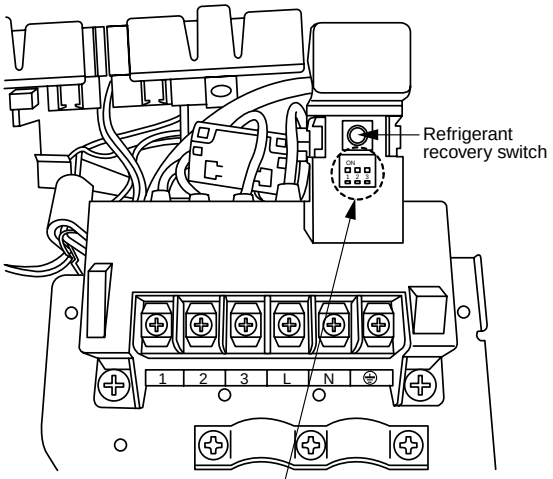
1. Recovery method of refrigerant

RAV-SM561AT-E, RAV-SM801AT-E

- When recovering refrigerant in case of reinstallation of the indoor or outdoor unit, etc., use the refrigerant recovery switch on the terminal block of the outdoor unit.

<Work procedure>

1. Turn on the power supply.
2. Using the remote controller, set FAN operation to the indoor unit.
3. Pushing the refrigerant recovery switch on the terminal block of the outdoor unit starts the forced cooling operation. (Max. 10 minutes), and then the refrigerant is recovered by operation of the valve.
4. After recovery of the refrigerant, push the refrigerant recovery switch together with closing the valve. The operation stops.
5. Turn off the power supply.



DANGER

Take care for an electric shock because the control P.C. board is electrified.

WARNING

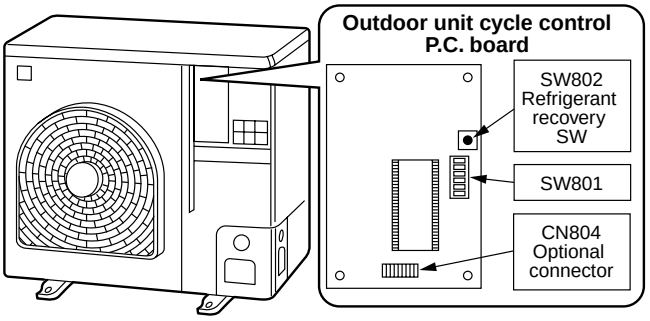
Never touch these switches. Otherwise the air conditioner may not operate normally.

RAV-SM1101AT-E, RAV-SM1401AT-E

- When recovering refrigerant in case of reinstallation of the indoor or outdoor unit, etc., use the refrigerant recovery switch SW802 on the cycle control P.C. board of the outdoor unit.

<Work procedure>

1. Turn on the power supply.
2. Using the remote controller, set FAN operation to the indoor unit.
3. Pushing the refrigerant recovery switch SW802 on the cycle control P.C. board of the outdoor unit starts the forced cooling operation. (Max. 10 minutes), and then the refrigerant is recovered by operation of the valve.
4. After recovery of the refrigerant, push the refrigerant recovery switch SW802 together with closing the valve. The operation stops.
5. Turn off the power supply.



DANGER

Take care for an electric shock because the control P.C. board is electrified.

2. Applicable Control of Outdoor Unit

You can response to the following items by attaching the parts sold separately "Application control kit" (TCB-PCOS1E).

<Demand control>

- It saves the capacity of the outdoor unit by outside Demand signal to correspond to the temporary peak cut.
- The capacity saving can be adjusted with three steps, 75%, 50%, and operation stop.

<Night operation control (Sound reduction)>

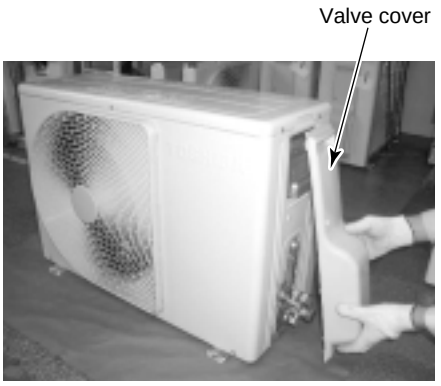
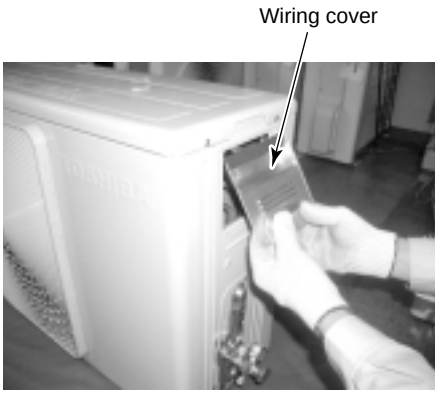
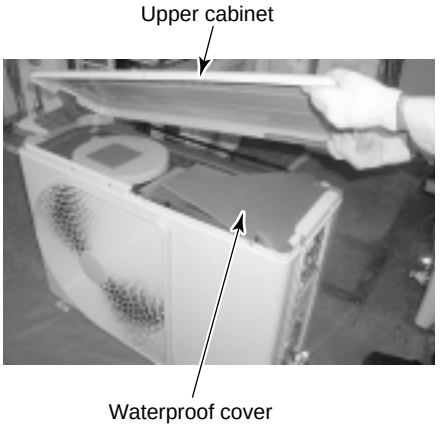
Sound is controlled to 45dB or less in inputting a timer point contact.

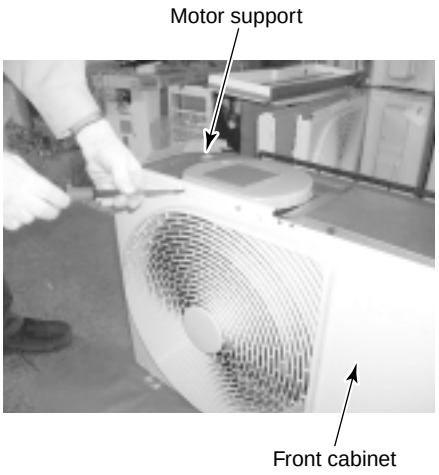
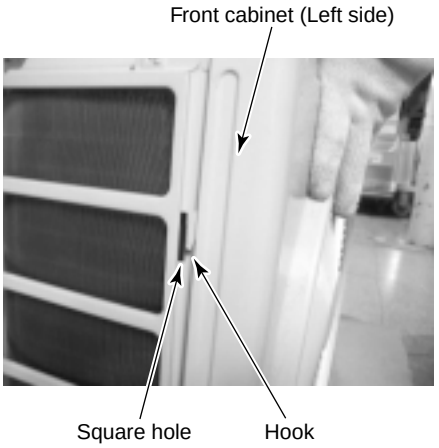
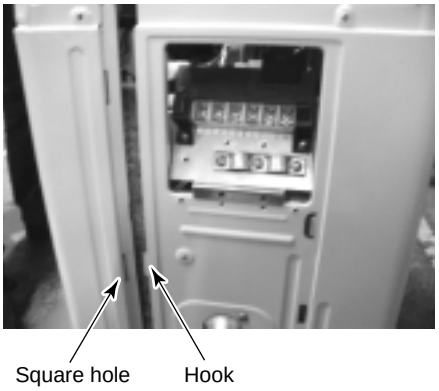
<Compressor operation output>

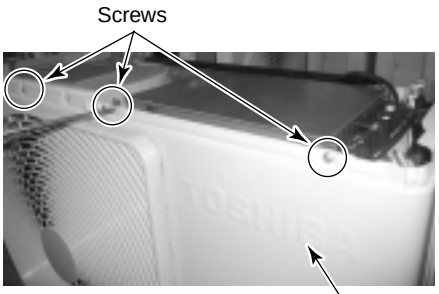
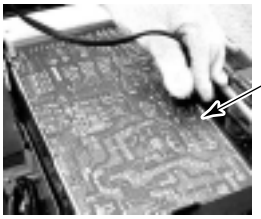
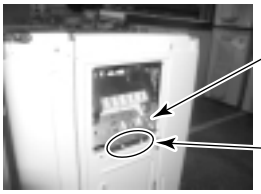
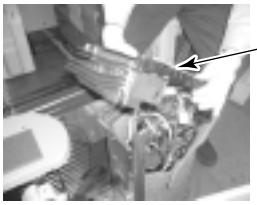
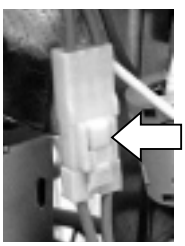
The check of the compressor operation time required of a maintenance etc.

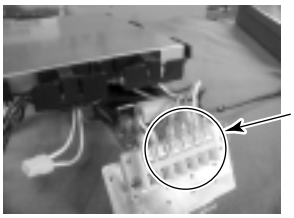
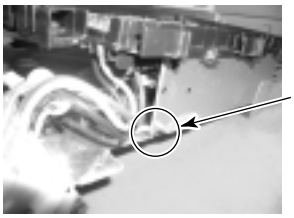
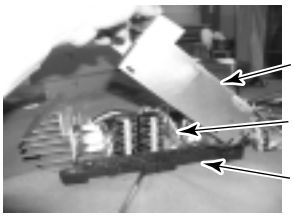
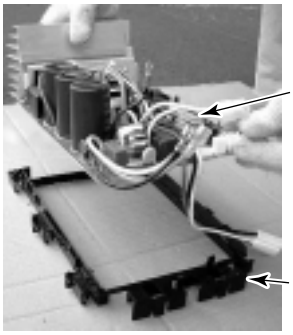
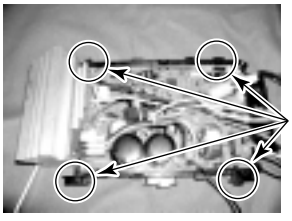
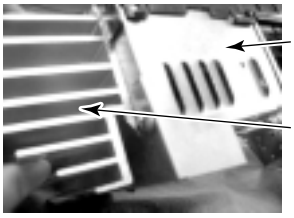
9. DETACHMENTS

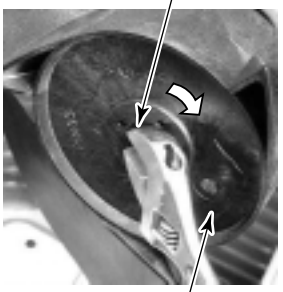
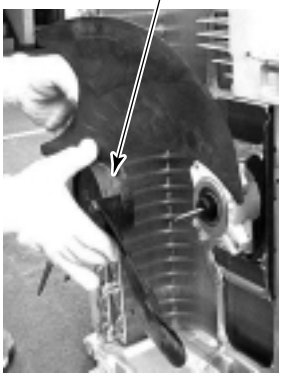
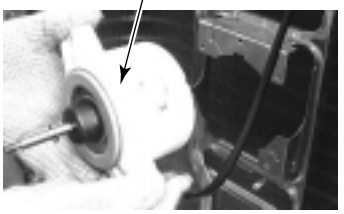
RAV-SM561AT-E, RAV-SM801AT-E

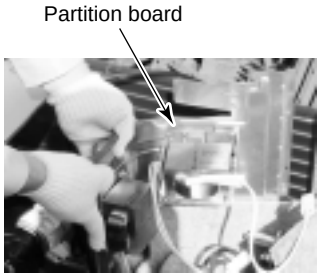
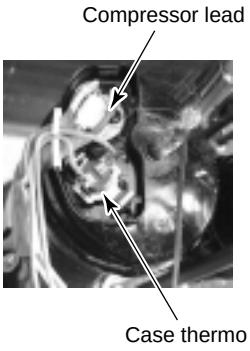
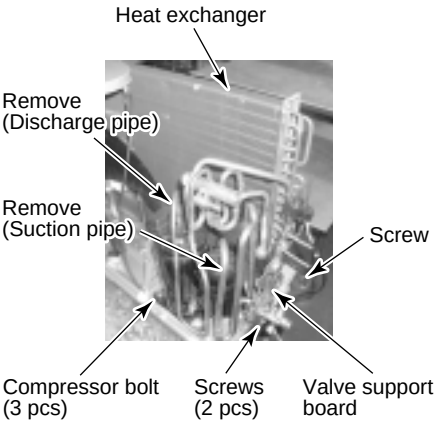
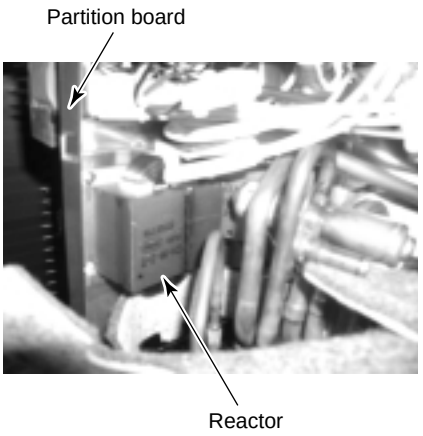
No.	Part name	Procedure	Remarks
①	Common procedure	**REQUIREMENT** Never forget to put on the gloves at working time; otherwise an injury will be caused by the parts, etc. **1. Detachment** 1) Stop operation of the air conditioner, and turn off switch of the breaker. 2) Remove the valve cover. (ST1T Ø4 × 10, 1 pc.) • After taking off screws, remove the valve cover while pulling downward. 3) Remove the wiring cover (ST1T Ø4 × 8, 2 pcs.), and remove the power supply cable and indoor/outdoor connecting cables. 4) Remove the upper cabinet. (ST1T Ø4 × 8, 5 pcs.) • After taking off screws, remove the front side of the upper cabinet while pulling upward. **2. Attachment** 1) Attach the waterproof cover. **REQUIREMENT** Be sure to attach a waterproof cover to prevent entering of rainwater, etc. 2) Attach the upper cabinet. (ST1T Ø4 × 8, 5 pcs) • Hook the rear side of the upper cabinet, and then cover the front cabinet with upper cabinet. 3) Connect the power cable and indoor/outdoor connecting cables to the terminal, and then fix them with cord clamp. (ST1T Ø4 × 10, 3 pcs) 4) Attach the wiring cover. (ST1T Ø4 × 8, 2 pcs) 5) Attach the valve cover. (ST1T Ø4 × 10, 1 pc)	  

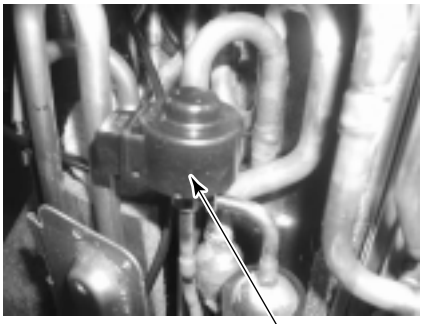
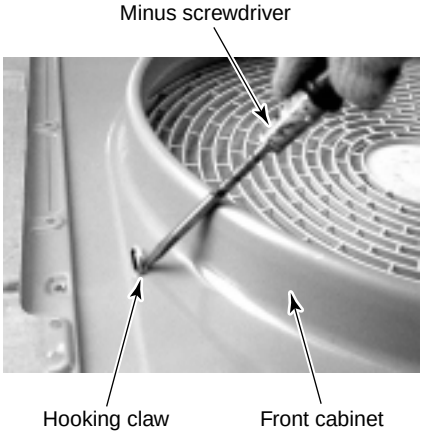
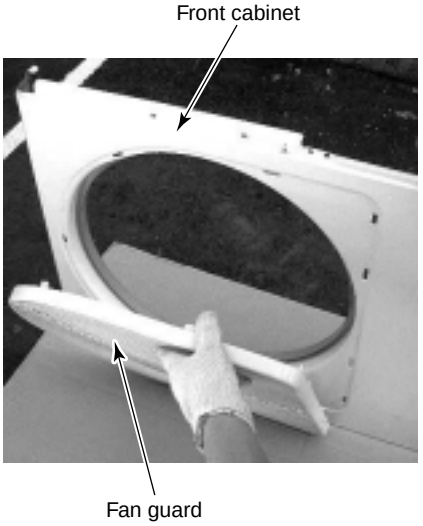
No.	Part name	Procedure	Remarks
②	Front cabinet	**1. Detachment** 1) Perform work of item **1** of ①. 2) Remove screws of the front cabinet and the inverter cover. (ST1T Ø4 × 8, 2 pcs) 3) Take off screws of the front cabinet and the bottom plate. (ST1T Ø4 × 8, 3 pcs) 4) Take off screws of the front cabinet and the motor support. (ST1T Ø4 × 8, 2 pcs) * The left side of the front side is made to insert to the side cabinet (Left), so remove it while pulling upward. **2. Attachment** 1) Insert hook at the left side of the front side into the side cabinet (Left). 2) Insert hook at the right side of the side cabinet into square hole of the front cabinet. 3) Attach the removed screws at the original positions.	  

No.	Part name	Procedure	Remarks
③	Inverter assembly	**1. Turn off the power supply.** 1) Perform work of item **1** of ①. 2) Take off screws fixing the upper part of the front cabinet and the inverter cover. (ST1T Ø4 × 8, 2 pcs) • If removing the inverter cover under this condition, P.C. board can be checked. The control circuits (including 5V and 12V of each sensor circuit, PMV circuit, etc.) of this control P.C. board are high-voltage circuits. Before work, be sure to turn off the power supply. Be careful sufficiently also for an electric shock at electrified portions of the control circuits and their parts. 3) Using resistance for discharge (approx. 100Ω/40W) or plug of soldering iron, electrify ⊕, ⊖ electrodes between ⊕ and ⊖ terminals of 3-phase: C10, 11 and single phase: C12, 13, 14 (printed as "CAUTION HIGH VOLTAGE") electrolytic capacitor of P.C. board for discharge. The electrolytic capacitor may not normally discharge according to error condition and the voltage may remain. Be sure to discharge the capacitor. **NOTE :** The electrolytic capacitor has a large capacity. Therefore it is very dangerous to short-circuit between ⊕, ⊖ electrodes with screwdrivers for discharge because big spark generates. 4) Perform work item **1** of ②. 5) Take off screws fixing the main unit and the inverter box. (Wiring port side) (ST1T Ø4 × 8, 2 pcs) 6) Take off screws fixing the partition board and the inverter box. (ST1T Ø4 × 8, 1 pc) 7) Remove various lead wires from the upper part of the inverter. 8) Pull up the inverter upward. In this time, cut off the bundling bands binding each lead wire. 9) Disconnect connectors of various lead wires. **NOTE :** When disconnecting each connector, avoid removing the connector by holding the lead wire, but by holding the connector.	       

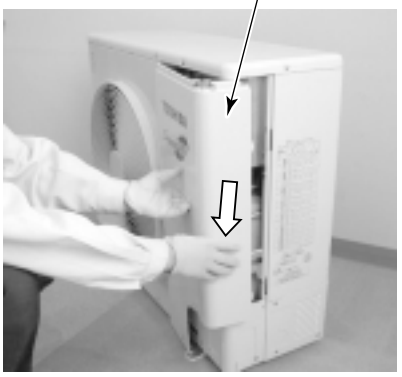
No.	Part name	Procedure	Remarks
④	Control P.C. board assembly	1) Remove the sub-board base from the inverter assembly. (ST1T Ø4 × 8, 2 pcs) * Remove connector at control P.C. board assembly side. 2) Remove lead wires and connectors connected from the control P.C. assembly to the other parts. 1. Lead wires * Connection with power terminal block: 3 wires (Black, White, Orange: Single phase, Red, White, Black, Orange: Three phase) * Earth wire (Black): 1 wire 2. Connectors Connection with compressor: (3P: Relay connector, White) *(Note 1) Reactor (2P: Relay connector, White) CN300: Outdoor fan (3P: White) *(Note 1) CN701: 4-way valve (3P: Yellow) *(Note 1) (Note 2) CN700: PMV coil (6P: White) CN601: TD sensor (3P: White) CN603: TS sensor (3P: White) *(Note 1) CN600: TE sensor (2P: White) *(Note 1) CN602: TO sensor (2P: White) CN500: Case thermo. (2P: Blue) *(Note 1) ***(Note 1)** For connectors, unlock the lock of the housing section, and then remove connectors. **(Note 2)** It is not provided for a cooling-only model. 3) Remove the inverter box (Metal sheet). 4) Remove the control P.C. board assembly from P.C. board support. (Remove heat sink and control P.C. board assembly as they are screwed.) **(Note3)** Remove 4 hooking claws of P.C. board support, and remove the heat sink with hands upward. 5) Take off 2 screws fixing the heat sink with the control P.C. board assembly. 6) Install a new control P.C. board assembly. **(Note 4)** When installing a new control P.C. board assembly, be sure to insert the board correctly in the board groove. Install it so that the heat sink comes to contact surely with the metal sheet.	      

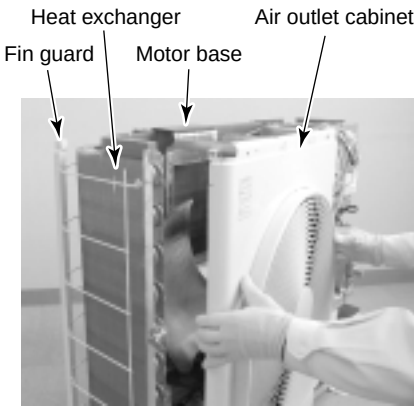
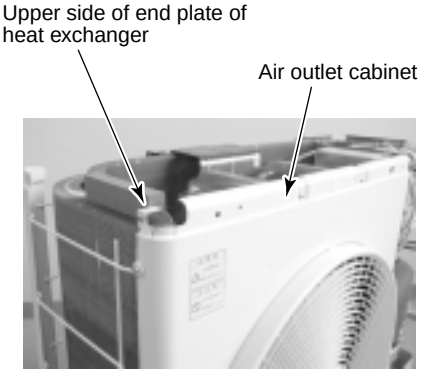
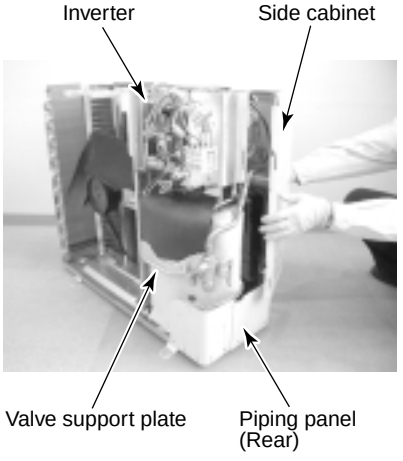
No.	Part name	Procedure	Remarks
⑤	Fan motor	1) Perform works of items **1** of ① and ②. 2) Remove the flange nut fixing the fan motor and propeller fan. • The flange nut is loosened by turning it clockwise. (Turn it counterclockwise to tighten it.) 3) Remove the propeller fan. 4) Disconnect connector for fan motor from the inverter. 5) Take off the fixing screws (2 pcs) while supporting the fan motor so that it does not fall. * Caution when assembling fan motor Tighten the flange nut with torque 4.9 Nm (50kgf/cm).	Flange nut  Loosen the nut by turning clockwise Propeller fan  Fan motor 

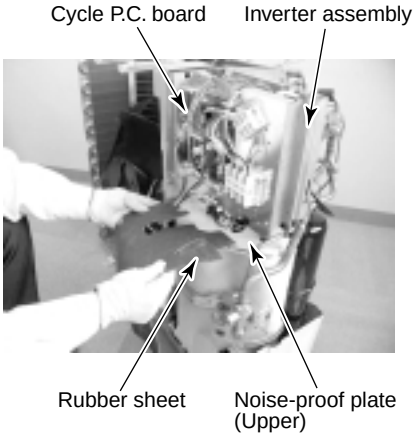
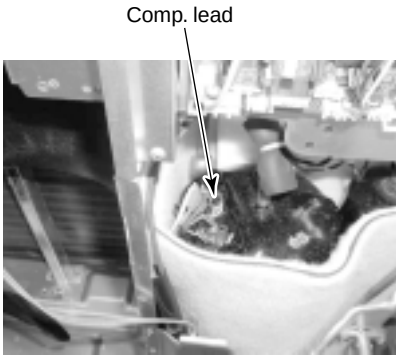
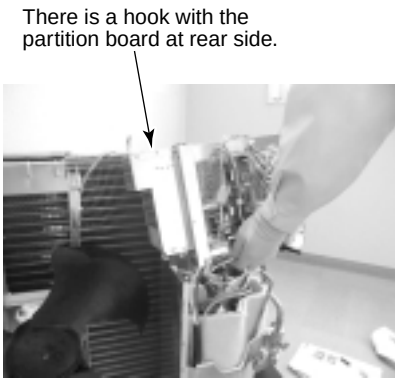
No.	Part name	Procedure	Remarks
⑥	Compressor	1) Perform works of items **1** of ①, **1** of ②, and ③. 2) Recover refrigerant gas. 3) Remove the partition board. (ST1T Ø4 × 8, 3 pcs) 4) Take off screws of the motor base and the bottom plate. (ST1T Ø4 × 8, 2 pcs) 5) Remove the noise-insulator. 6) Remove the terminal cover, and then disconnect the lead wires of the compressor. 7) Using a burner, remove the pipes connected to the compressor. **NOTE :** Pay attention to that flame does not involve 4-way valve or PMV. (If doing so, a malfunction may be caused.) 8) Take off screws of the bottom plate and the heat exchanger. (ST1T Ø4 × 8, 1 pc) 9) Take off the fixing screws of the bottom plate and the valve clamping plate. (ST1T Ø4 × 8, 2 pcs) 10) Pull out the refrigerating cycle with the heat exchanger. 11) Take off compressor bolts fixing the compressor to the bottom plate. (3 pcs)	  
⑦	Reactor	1) Perform woks of item **1** of ① and **1** of ②. 2) Take off screw fixing the reactor. (ST1T Ø4 × 8)	

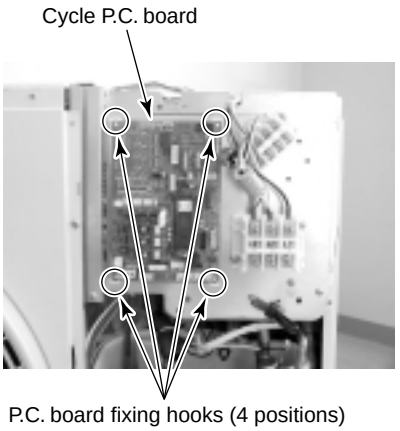
No.	Part name	Procedure	Remarks
⑧	Pulse Modulating Valve (PMV) coi	**1. Detachment** 1) Perform works of items **1** of ① and **1** of ②. 2) Remove the side cabinet (Right). 3) Pull upward the coil, and remove the coil from PMV body. **2. Attachment** 1) Fix the projection for coil positioning surely to pipe of PMV body and fix it. PMV coil	
⑨	Fan guard	**1. Detachment** 1) Perform works of items **1** of ① and **1** of ②. **REQUIREMENT** Perform works on a corrugated cardboard, cloth, etc. to prevent flaw on the product. 2) Remove the front cabinet, and then put it downward on the floor. 3) Take off the hooking claw of the fan guard by pushing with minus screwdriver, etc. **2. Attachment** 1) Insert the hooking claw of the fan guard into hole of the front cabinet. Fix claw while pushing the hooking claws (10 positions) with hands. **REQUIREMENT** Check that all the hooking claws are fixed to the specified positions.	 

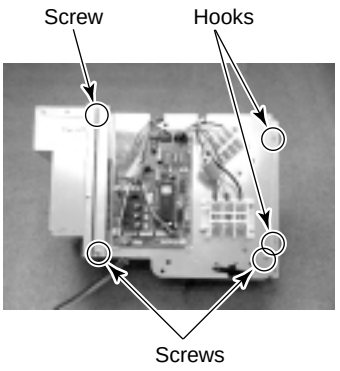
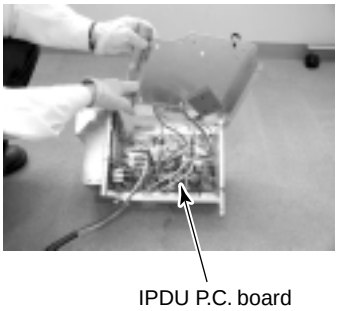
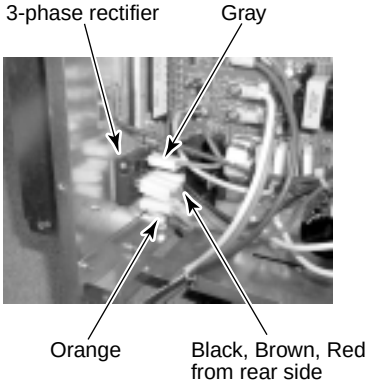
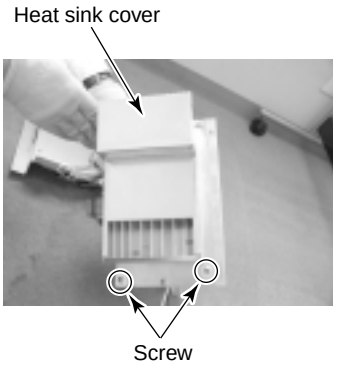
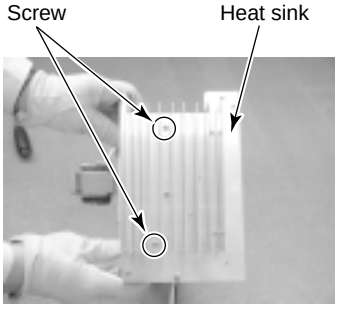
RAV-SM1101AT-E, RAV-SM1401AT-E

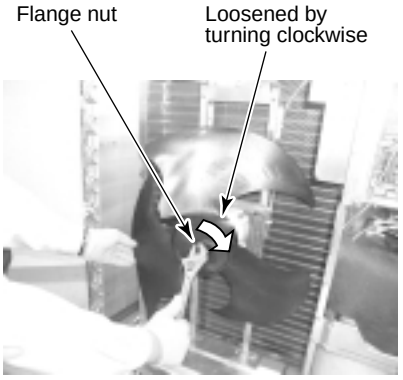
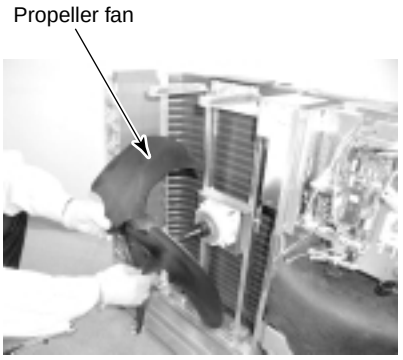
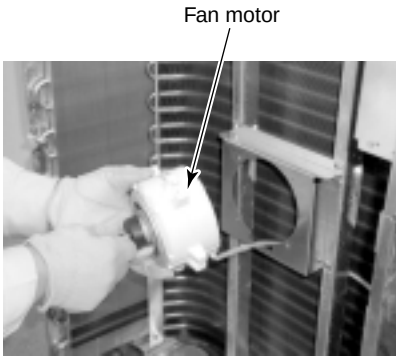
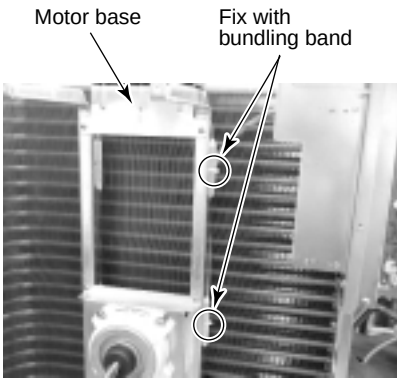
No.	Part name	Procedure	Remarks
①	Common procedure	**REQUIREMENT** Never forget to put on the gloves at working time; otherwise an injury will be caused by the parts, etc. **1. Detachment** 1) Stop operation of the air conditioner, and turn off switch of the breaker. 2) Remove the front panel. (Hex. screw Ø4 × 10, 3 pcs) * After taking off screws, remove the front panel while pulling downward. 3) Disconnect the power supply cable and indoor/outdoor connecting cables from the cord clamp and terminals. 4) Remove the ceiling plate. (Hex. screw Ø4 × 10, 6 pcs) **2. Attachment** 1) Attach the ceiling plate. (Hex. screw Ø4 × 10, 6 pcs) 2) Connect the power supply cable and indoor/outdoor connecting cable to the terminal, and then fix them with cord clamp. **REQUIREMENT** Using bundling band sold at a market, be sure to fix the power cables and indoor/outdoor connecting cables along the inter-unit cable so that they do not come to contact with the compressor, valve at gas side, pipe at gas side, and discharge pipe. 3) Attach the front panel. (Hex. screw Ø4 × 10, 3 pcs) and then cover the front cabinet with upper cabinet.	Front panel  Ceiling panel 

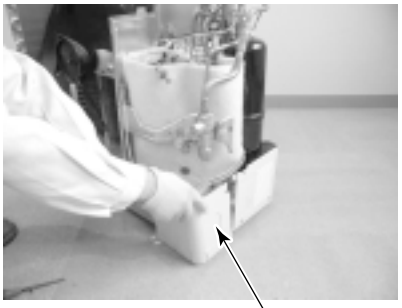
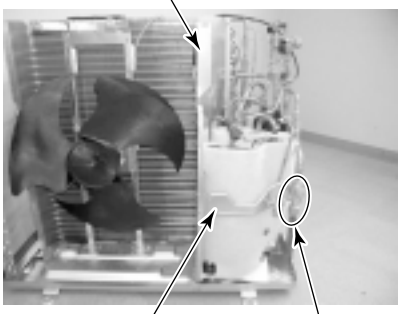
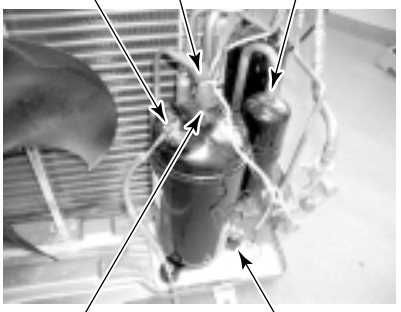
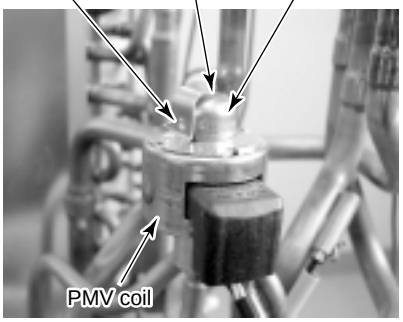
No.	Part name	Procedure	Remarks
②	Discharge port cabinet	**1. Detachment** 1) Perform work of item **1** of ①. 2) Take off screws of the air outlet cabinet and the partition board. (ST1T Ø4 × 8, 3 pcs) 3) Take off screws of the air outlet cabinet and the bottom plate. (Hex. screw Ø4 × 10, 2 pcs) 4) Take off screws of the air outlet cabinet and the heat exchanger. (ST1T Ø4 × 8, 1 pc) 5) Take off screws of the air outlet cabinet and the motor base. (ST1T Ø4 × 8, 2 pcs) 6) Take off screws of the air outlet cabinet and the fin guard. (Hex. screw Ø4 × 10, 2 pcs) **2. Attachment** 1) Put the upper left side of the air outlet cabinet on the end plate of the heat exchanger, and then fix it with screw. (ST1T Ø4 × 8, 1 pc) 2) Attach the removed screws to the original positions.	 
③	Side cabinet	1) Perform work of item **1** of ①. 2) Take off screw fixing the inverter and the side cabinet. (ST1T Ø4 × 8, 1 pc) 3) Take off screws of the side cabinet and the valve support plate. (ST1T Ø4 × 8, 2 pcs) 4) Take off screws of the side cabinet and the piping panel (Rear). (HEX. screw Ø4 × 10, 1 pc) 5) Take off screws of the side cabinet and the bottom plate (Rear). (HEX. screw Ø4 × 10, 1 pc) 6) Take off screws of the side cabinet and the fin guard (Heat exchanger). (HEX. screw Ø4 × 10, 2 pcs)	

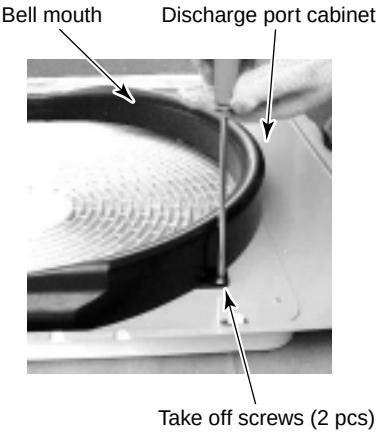
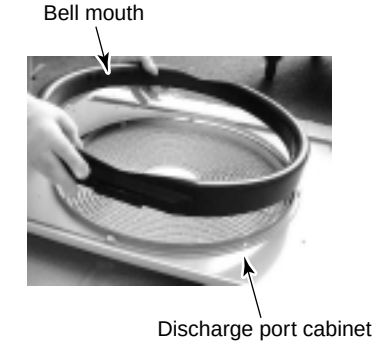
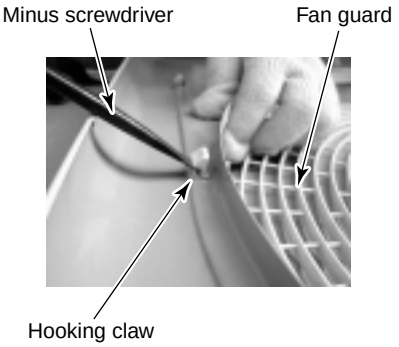
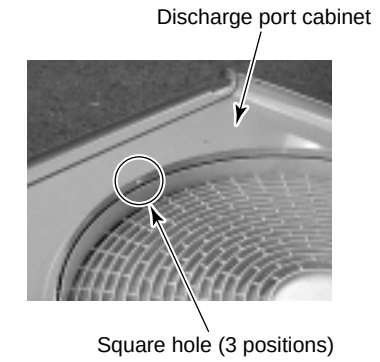
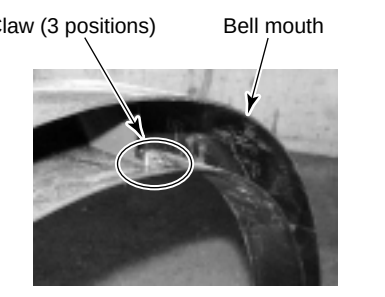
No.	Part name	Procedure	Remarks
④	Inverter assembly	1) Perform works of items of **1** of ①, **1** of ②, and ③. 2) Disconnect connectors connected from the cycle P.C. board to other parts. CN600: TD sensor (3P: White) CN601: TO sensor (2P: White) CN604: TE sensor (2P: White) *(Note 1) CN605: TS sensor (3P: White) *(Note 1) CN301: Outdoor fan (3P: White) *(Note 1) CN300: Position detection (5P: White) CN500: Case thermo (2P: Blue) *(Note 1) CN700: 4-way valve (3P: Yellow) *(Note 1) CN702: PMV coil (6P: White) *(Note 1) ***(Note 1)** Unlock the lock of housing part, and then disconnect the connectors. 3) Cut the tie lap fixing various lead wires to the inverter assembly. 4) Remove the rubber sheet and noise-proof plate (upper). 5) Remove terminal cover of the compressor and Comp. lead wire. 6) Pull upward the hook (Rear left) with the partition board as if removing it. • Caution when attaching inverter assembly When installing the inverter assembly to the partition board, attach hook (Rear left) of the partition board surely.	  

No.	Part name	Procedure	Remarks
⑤	Cycle P.C. board	1) Perform the work in item **1** of ①. 2) Disconnect connectors and lead wires connected from cycle P.C. board to other parts. 1. Connector CN600: TD sensor (3P: White) CN601: TO sensor (2P: White) CN604: TE sensor (2P: White) *(Note 1) CN605: TS sensor (3P: White) *(Note 1) CN301: Outdoor fan (3P: White) *(Note 1) CN300: Position detection (5P: White) CN500: Case thermo (2P: Blue) *(Note 1) CN700: 4-way valve (3P: Yellow) *(Note 1) CN702: PMV coil (6P: White) *(Note 1) CN800: Connection with IPDU P.C. board (5P: Red) *(Note 1) CN01: Connection with IPDU P.C. board (5P: Red) *(Note 1) CN02: Indoor/outdoor connecting terminal block (3P: Black) *(Note 1) CN03: Connection with IPDU P.C. board (3P: White) *(Note 1) CN04: Connection with IPDU P.C. board (2P: White) *(Note 1) ***(Note 1)** Unlock the lock of housing part, and then disconnect the connectors. 3) Remove claws fixing P.C. board at four corners, and then remove the cycle P.C. board. 4) Install a new cycle P.C. board.	

No.	Part name	Procedure	Remarks
⑥	IPDU P.C. board	1) Perform the works in item ④. 2) Take off screws of the inverter assembly, and then classify the inverter assembly. (M4 × 8, 3 pcs. hooks at two positions) 3) Disconnect connectors and lead wires connected from IPDU P.C. board to other parts. 1. Connector CN04: Connection with cycle P.C. board (3P: White) *(Note 1) CN05: Connection with cycle P.C. board (2P: White) *(Note 1) CN06: Connection with cycle P.C. board (5P: Red) CN13: Connection with cycle P.C. board (5P: Red) *(Note 1) CN600: Heat sink sensor (2P: Black) *(Note 1) 2. Lead wire CN01: Connection with power supply terminal block (Red) CN02: Connection with power supply terminal block (White) CN03: Connection with power supply terminal block (Black) CN07: Earth wire (Black) CN14: Connection with reactor (White) CN15: Connection with reactor (White) CN09: Connection with compressor (Red) CN10: Connection with compressor (White) CN11: Connection with compressor (Black) ***Note 1)** Unlock lock of the housing part, and then disconnect the connectors. 4) Remove lead wires of 3-phase rectifier. (5 pcs) 5) Remove cover of the heat sink. (M4 × 8, 3 pcs) 6) Take off screws (2 pcs) fixing the heat sink with IGBT, remove claws (4 positions) of P.C. board support, and then remove IPDU P.C. board. 7) Install a new IPDU P.C. board.	    

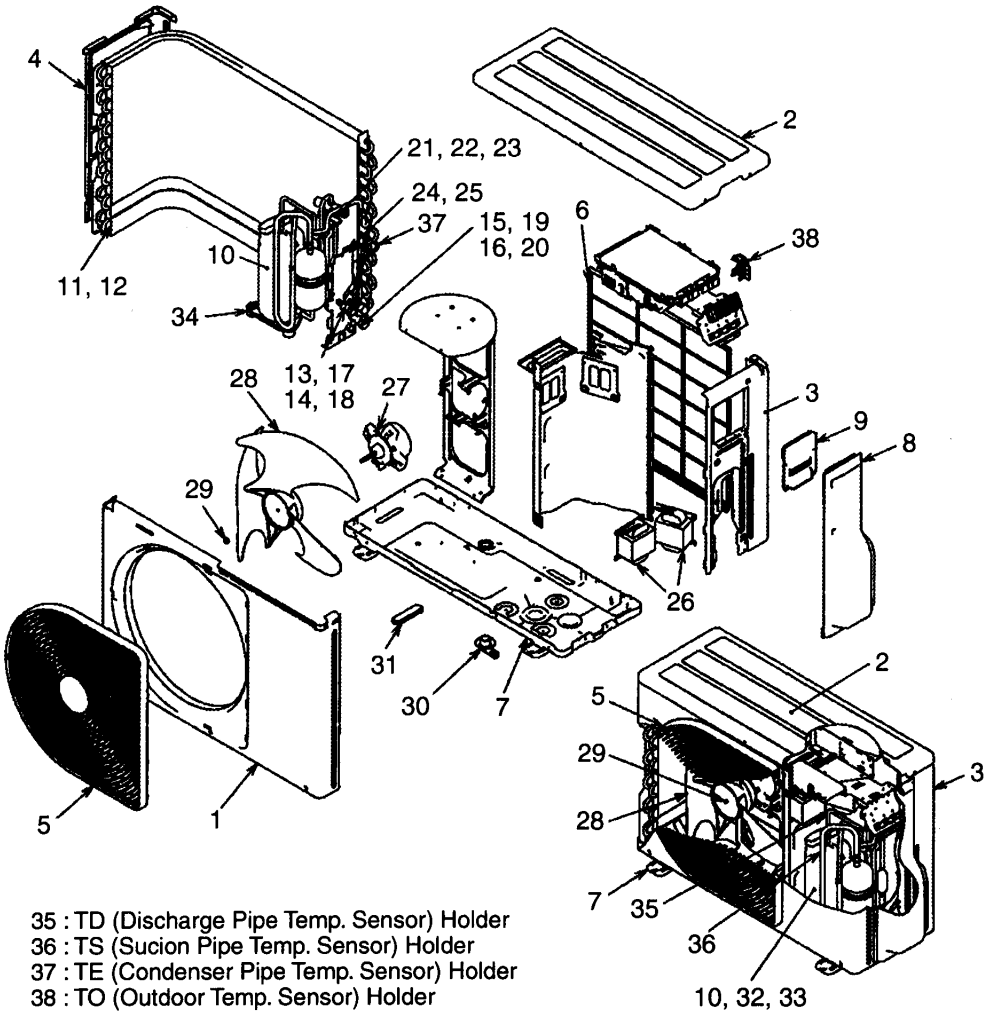
No.	Part name	Procedure	Remarks
⑦	Fan motor	1) Perform the works in item **1** of ① and **1** of ②. 2) Take off flange nut fixing fan motor with propeller fan. • The flange nut is loosened by turning it clockwise. (Turn it counterclockwise to tighten it.) 3) Remove the propeller fan. 4) Disconnect connector for fan motor from the inverter. 5) Take off the fixing screws (4 pcs) while supporting the fan motor so that it does not fall. * Caution when assembling fan motor • Tighten the flange nut with torque 4.9Nm (50kgf/cm). • Pay attention that the reactor at rear side of the inverter does not come to contact with the fan motor lead. **REQUIREMENT** Using bundling band sold at a market, be sure to fix the fan motor lead wires to the motor base so that they do not come to contact with the propeller fan.	   

No.	Part name	Procedure	Remarks
⑧	Compressor	1) Recover the refrigerant gas. 2) Perform the works in item **1** of ①, **1** of ②, and ③, ④. 3) Remove the piping panel (Front). Take off screws of the piping panel (Front) and the bottom plate. (HEX. screw Ø4 × 10, 2 pcs) Take off screws of piping panel (Front) and piping panel (Rear). (HEX. screw Ø4 × 10, 1 pc) 4) Remove the valve fixing plate. Take off screws of the valve fixing plate and the partition board. (ST1T Ø4 × 8, 2 pcs) Take off screws of valve fixing plate and valves at liquid and gas sides. (M6, 4 pcs) 5) Remove the partition board. Take off screws of the partition board and bottom plate. (ST1T Ø4 × 8, 1 pc) Take off screws of the partition board and the end plate of the heat exchanger. (ST1T Ø4 × 8, 2 pcs) 6) Remove the noise-proof plate. 7) Remove terminal cover of the compressor, and then remove case thermo of the compressor. 8) Remove the sensor and pipe cover fixed to the discharge pipe. 9) Using a burner, remove pipe connected to the compressor. **NOTE :** Pay attention to that flame does not involve 4-way valve or PMV. (If doing so, a malfunction may be caused.) 10) Pull out the discharge pipe and the suction pipe of the refrigerating cycle upward. 11) Take off the compressor bolts fixing the compressor to the bottom plate. (3 pcs) 12) Pull out the compressor toward you.	 Piping panel (Front) Partition board  Valve fixing plate Valves Sensor/pipe cover Case thermo Remove (Suction pipe)  Remove (Discharge pipe) Compressor bolts (3 pcs)
⑨	PMV coil	**1. Detachment** 1) Perform the works in item **1** of ① and ③. 2) Pull the coil upward while turning it, and then remove the coil from PMV body. **2. Attachment** 1) Be sure to match the projection for coil positioning with the concave part of PMV body, and then fix the coil.	Projection for positioning PMV body Concave part  PMV coil

No.	Part name	Procedure	Remarks
⑩	Fan guard	**1. Detachment** 1) Perform works of items **1** of ① and **1** of ②. **REQUIREMENT** Perform works on a corrugated cardboard, cloth, etc. to prevent flaw on the product. 2) Remove the front cabinet, and then put it downward on the floor. 3) Take off screws fixing the bell mouth. (ST1T Ø4 × 8, 2 pcs) 4) Remove the bell mouth. 5) Take off the hooking claw of the fan guard by pushing with minus screwdriver, etc. **2. Attachment** 1) Insert the projection at upper side of the fan guard into square hole of the discharge port cabinet, and then insert the hooking claw. Fix hooking claws while pushing them (5 positions) with hands. **REQUIREMENT** Check that all the hooking claws are fixed to the specified positions. 2) Attach the fan guard by hooking claws (3 positions) at upper side of the bell mouth to the square holes of the discharge port cabinet. 3) After attachment, fix it with screws. (ST1T Ø4× 8, 2 pcs)	    

10. EXPLODED VIEWS AND PARTS LIST

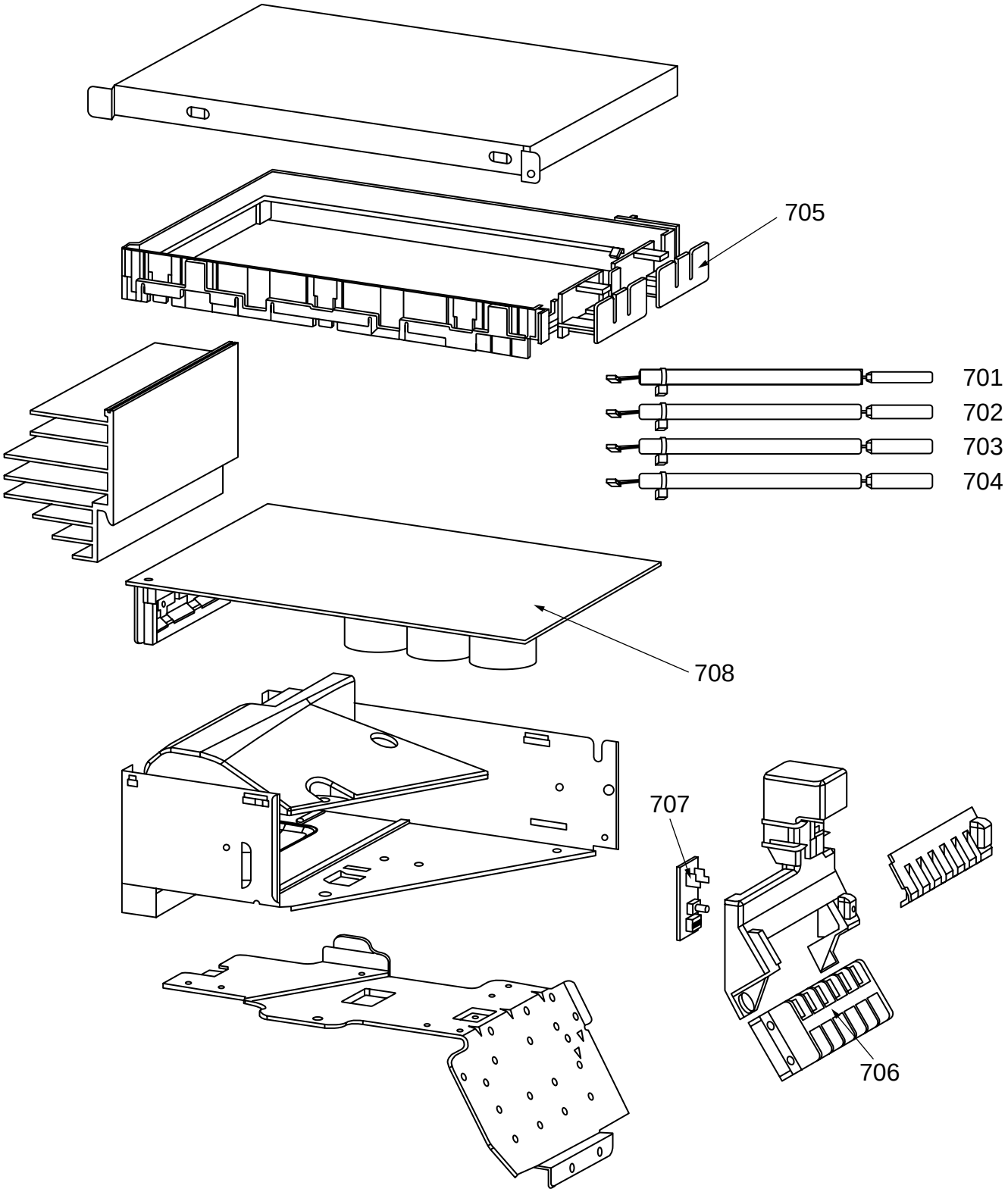
RAV-SM561AT-E, RAV-SM801AT-E



35 : TD (Discharge Pipe Temp. Sensor) Holder
36 : TS (Sucion Pipe Temp. Sensor) Holder
37 : TE (Condenser Pipe Temp. Sensor) Holder
38 : TO (Outdoor Temp. Sensor) Holder

Location No.	Part	Description
1	43005619	Cabinet, Front
2	43005616	Cabinet, Upper
3	43005617	Cabinet, Side, Right
4	43005569	Cabinet, Side, Left
5	4301V035	Guard, Fan
6	4301V053	Guard, Fin
7	43042479	Base, Ass'y
8	43119471	Cover, Valve, Packed
9	43062230	Cover, Wiring, Ass'y
10	43041627	Compressor, Ass'y, DA150, A1F-20F
11	43043730	Condenser, Ass'y (SM561AT-E)
12	43043720	Condenser, Ass'y (SM801AT-E)
13	43046392	Valve, Packed, 6.35 (SM561AT-E)
14	43046393	Valve, Packed, 12.7 (SM561AT-E)
15	43146584	Valve, Packed, 9.52 DIA (SM801AT-E)
16	43146670	Valve, Packed, 15.9 (SM801AT-E)
17	43147196	Bonnet, 1/4 IN (SM561AT-E)

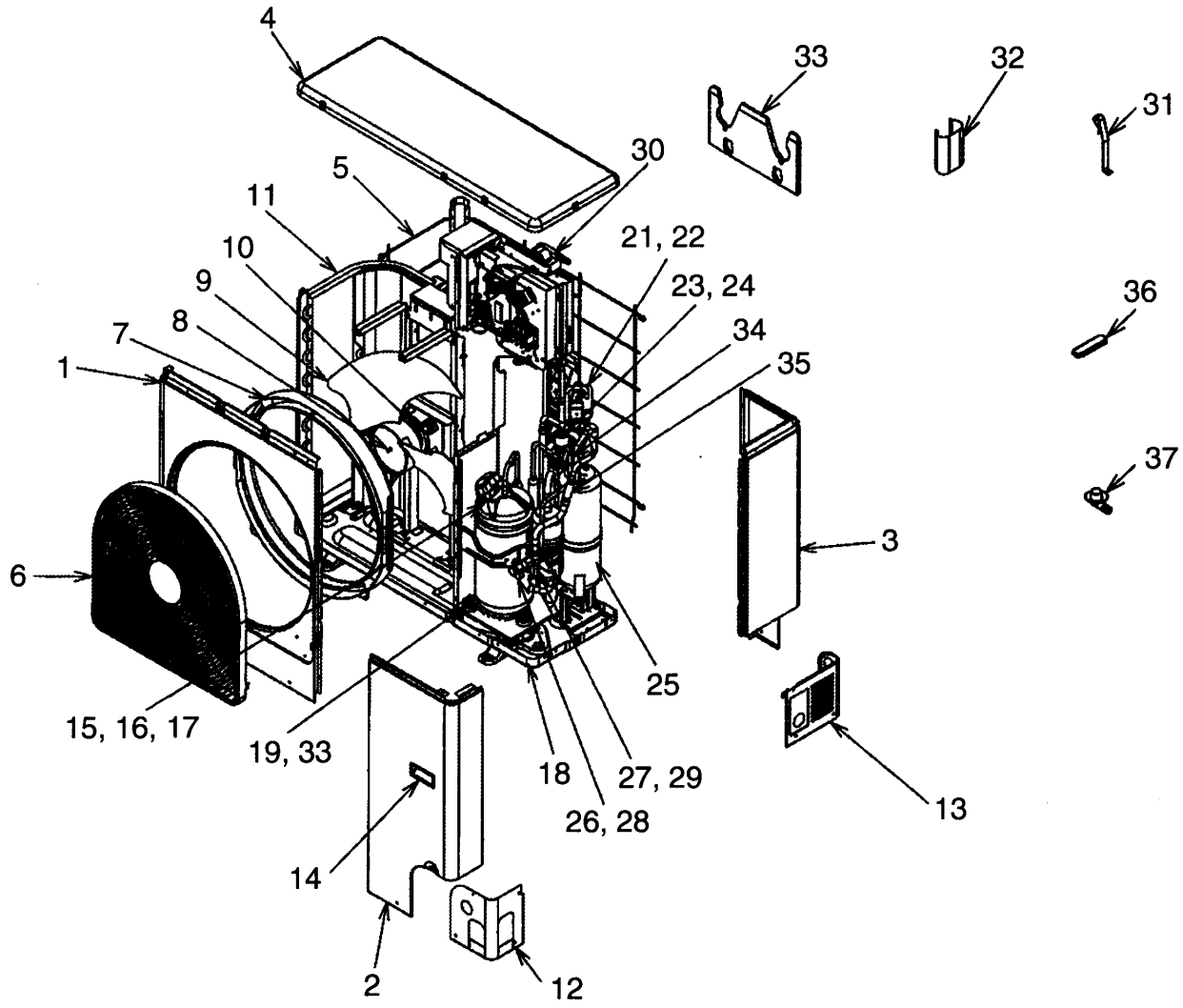
Location No.	Part	Description
18	43147195	Bonnet, 1/2 IN (SM561AT-E)
19	43194029	Bonnet (SM801AT-E)
20	43047401	Bonnet, 3/8 IN (SM801AT-E)
21	43046439	Valve, 4-Way, STF-0108Z (SM561AT-E)
22	43146619	Valve, 4-Way, STF-0213Z (SM801AT-E)
23	43046348	Coil, Solenoid,
24	43146662	Valve, Pulse, Modulating
25	43046411	Coil, PMV, CAM-MD12TF-1
26	43058270	Reactor
27	4302C048	Motor, Fan, ICF-140-43-4
28	43020329	Fan, Propeller, PJ421
29	43047667	Nut, Flange
30	43032441	Nipple, Drain
31	43089160	Cap, Waterproof
32	43050407	Thermostat, Bimetal
33	43063339	Holder, Sensor (TO)
34	43049749	Rebber, Cushion
35	43063321	Holder, Sensor
36	43063322	Holder, Sensor
37	43063325	Holder, Sensor
38	43063317	Holder, Thermostat



Location No.	Part	Description
701	43050410	Sensor, TD
702	43050412	Sensor, TE
703	43050413	Sensor, TS
704	43050415	Sensor, TO
705	43062228	Base, P.C. Board

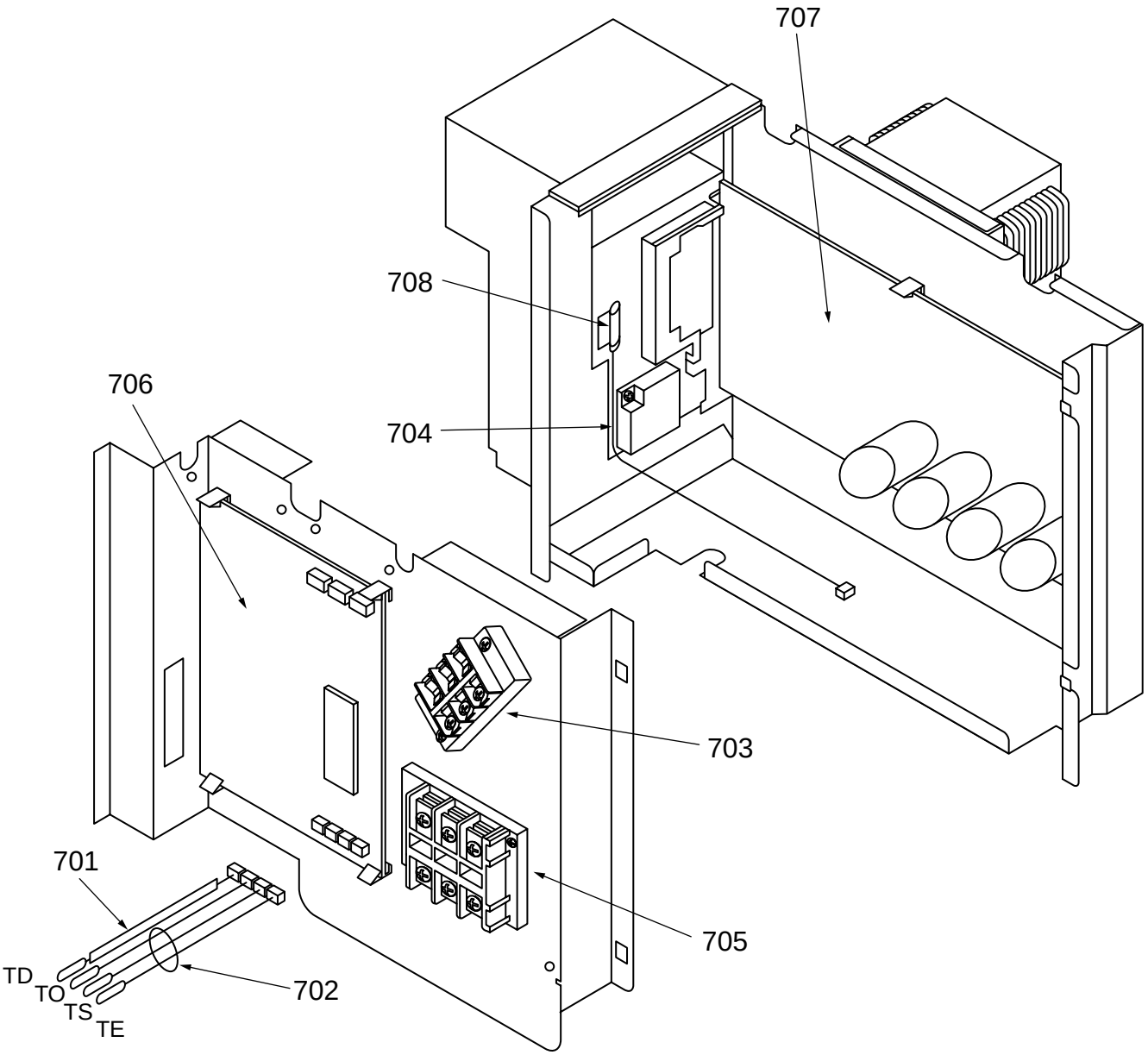
Location No.	Part	Description
706	4306A116	Terminal Block, 6P
707	4316V254	P.C. Board, Ass'y, SW, MCC-1530
708	4316V268	P.C. Board, Ass'y, MCC-5009

RAV-SM1101AT-E, RAV-SM1401AT-E



Location No.	Part	Description
1	43050406	Cabinet, Air Outled
2	43191636	Cabinet, Front, Ass'y
3	43191635	Cabinet, Side, Ass'y
4	43005491	Panel, Upper
5	43191633	Guard, Fin
6	43191651	Guard, Fan
7	43122065	Bell Mouth
8	43047667	Nut, Flange
9	43120224	Fan, Propeller, PE492
10	43121734	Motor, Fan, ICF-280-100-1
11	4314G178	Condenser, Ass'y
12	43191515	Panel, Front, Piping
13	43191605	Panel, Back, Piping
14	43119390	Hanger
15	43041774	Compressor, Ass'y, DA420A3F-21M
16	43050407	Thermostat, Bimetal
17	43063317	Holder, Thermostat
18	43100248	Base, Ass'y
19	43197157	Bolt, Compressor

Location No.	Part	Description
20	43149324	Rubber, Cushion, EPDM
21	43146619	Valve, 4-WAY, STF-0213Z
22	43146611	Coil, Solenoid, VHV-01AJ502E1
23	43146634	Valve, Pulse, Modulating
24	43146663	Coil, PMV, UKV-U048E
25	43148170	Accumulator, Ass'y
26	43146584	Valve, Packed, 9.52 DIA
27	43146613	Valve, Ball
28	43047401	Bonnet, 3/8 IN
29	43194029	Bonnet
30	43158190	Reactor
31	43019904	Holder, Sensor
32	43063188	Holder, TC Sensor
33	43063332	Holder, Sensor
34	43147611	Strainer
35	43148176	Strainer
36	43089160	Cap, Waterproof
37	43032441	Nipple, Drain



Location No.	Part	Description
701	43050354	Sensor TD
702	43050382	Sensor TC (F6)
703	43060750	Terminal Block, 3P
704	43150259	Rectifier
705	43160502	Terminal Block

Location No.	Part	Description
706	4316V255	P.C. Board, Ass'y, CDB, MCC-1531
707	4316V264	P.C. Board Ass'y, IPDU, MCC-1438
708	43050398	Sensor TG (F4)

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