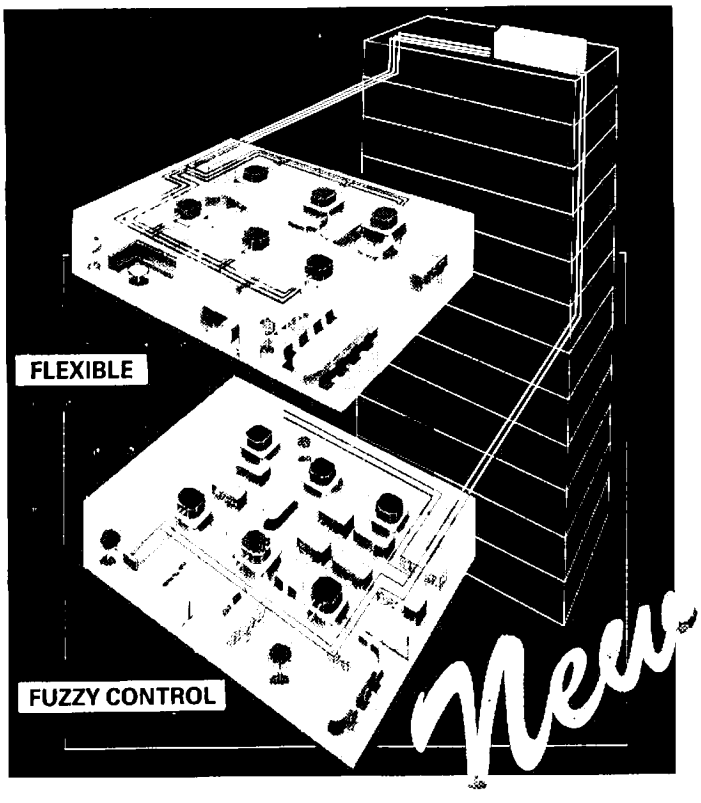
HITACHI INVERTER-DRIVEN MULTI-SPLIT SYSTEM HEAT PUMP AIR CONDITIONERS

HI-MULTI SET-FREE FS2 SERIES AND HI-MULTI SET-FREE FX2 SERIES

SERVICE MANUAL



Models:

Indoor Units

- **In-the-Ceiling Type**
  RPI-0.8FS
  RPI-1FS
  RPI-1.5FS
  RPI-2FS
  RPI-2.5FS
  RPI-4FS
  RPI-5FS
- **4-Way Cassette Type**
  RCI-1FSE
  RCI-1.5FSE
  RCI-2FSE
  RCI-2.5FSE
- **2-Way Cassette Type**
  RCD-1FS
  RCD-1.5FS
  RCD-2FS
  RCD-2.5FS
- **Wall Type**
  RPK-1.5FS
- **Floor Type**
  RPF-1.5FS
- **Floor Concealed Type**
  RPFI-1.5FS
- **Ceiling Type**
  RPC-2.5FS(E)

Outdoor Units

- **FS2 SERIES**
  RAS-5FS2
  RAS-8FS2
  RAS-10FS2
- **FX2 SERIES**
  RAS-5FX2
  RAS-8FX2
  RAS-10FX2

This service manual provides the technical information for the HITACHI Inverter-driven Multi-Split System Heat Pump Air Conditioners,"*HI-MULTI SET-FREE, FS2 and FX2 Series*".
Read this manual carefully before service activities are started.

HITACHI

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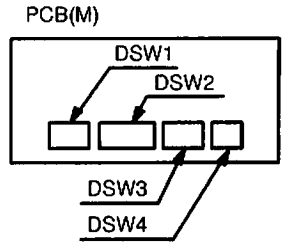
1. TROUBLESHOOTING

1.1 Initial Troubleshooting

1.1.1 Dip Switch Setting

(1) Indoor Unit



The PCB in the indoor unit is equipped with 4 dip switches. Before testing unit, set these dip switches according to the following instructions. Unless these dip switches are set in the field, the unit can not be operated.

a. Unit No. Setting (DSW1)

Setting is required. Set the unit No. of all indoor units respectively and serially, by following setting position shown in the table below. Numbering must start from "0" for every outdoor unit except the case using the central station.

Unit No.	Remote Control Switch PC-2H Display	1 2 3 4 ON/OFF			
0	A0	ON	ON	ON	ON
1	A1	OFF	ON	ON	ON
2	A2	ON	OFF	ON	ON
3	A3	OFF	OFF	ON	ON
4	A4	ON	ON	OFF	ON
5	A5	OFF	ON	OFF	ON
6	A6	ON	OFF	OFF	ON
7	A7	OFF	OFF	OFF	ON
8	A8	ON	ON	ON	OFF
9	A9	OFF	ON	ON	OFF
10	AA	ON	OFF	ON	OFF
11	Ab	OFF	OFF	ON	OFF
12	AC	ON	ON	OFF	OFF
13	Ad	OFF	ON	OFF	OFF
14	AE	ON	OFF	OFF	OFF
15	AF	OFF	OFF	OFF	OFF

.... Setting before Shipment

NOTES:

1. Automatic Address
   (Dip switch setting is not required.)
   The unit number for all indoor units in the same refrigerant cycle will be addressed automatically, when the remote control switch or the central station is used to the indoor units in same refrigerant cycle and the dip switches of all indoor units are set at "No.0" position.

2. For Other Cases
   See the chapter 4 for other cases of setting using the remote control switch or the central station.

b. Optional Function Setting (DSW2)

When setting the switch for optional function, refer to the chapter 4 for each optional functions.

Setting before Shipment

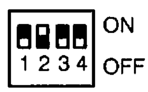
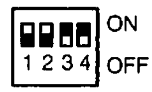
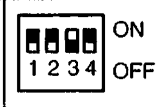
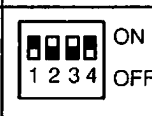
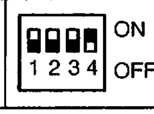
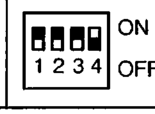
DSW2	Indoor Unit Model
1 2 3 4 5 6 7 8 ON/OFF	RPC-2.5FS(E) RPF-1.5FS RPFI-1.5FS
1 2 3 4 5 6 7 8 ON/OFF	RPI-0.8FS, RPI-1FS, RPI-1.5FS, RPI-2FS, RPI-2.5FS, RPI-4FS, RPI-5FS RCI-1FSE, RCI-1.5FSE, RCI-2FSE, RCI-2.5FSE RCD-1FS, RCD-1.5FS, RCD-2FS, RCD-2.5FS
1 2 3 4 5 6 7 8 ON/OFF	RPK-1.5FS

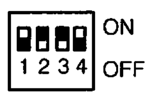
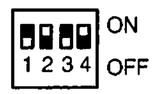
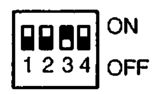
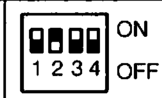
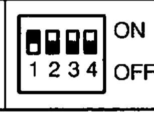
NOTE:

The "■" mark indicates position of dip switches. Figures show the setting before shipment.

c. Capacity Code Setting (DSW3)

No setting is required, due to setting before shipment. This switch is used for setting the capacity code which corresponds to the Horse-Power of the indoor unit.

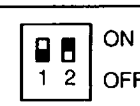
Horse-Power	0.8	1	1.3	1.5	1.8	2
Setting Pattern						

Horse-Power	2.2	2.5	2.8	4	5
Setting Pattern					

d. Capacity Adjustment Setting (DSW4)

No setting is required, due to setting before shipment.

This switch is used for setting the capacity adjustment.

Horse-Power	0.8~5
Setting Pattern	

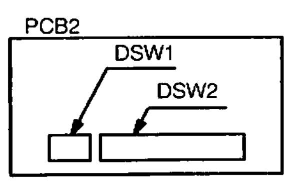
CAUTION:

1. Before setting dip switches, firstly turn OFF power source and set the position of the dip switches. If the switches are set without turning OFF the power source, the switches can not function.
2. Check to ensure that the connector from transformer is correctly connected to the PCN7 on PCB, corresponding with the power supply voltage.
   - CN29 (brown line) for 220V
   - CN30 (red line) for 240V

(2) CH Unit

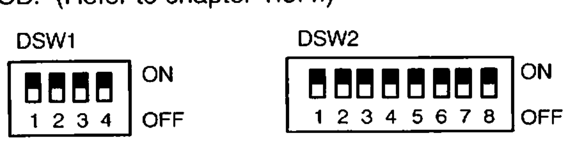
a. Position of Dip Switches

The PCB2 in the electrical box of CH unit is equipped with 2 types of dip switches (DSW1, DSW2), as figure below.



b. Setting of Dip Switches

No setting is required, due to setting before shipment as figure below. These are utilized for the self-diagnosis of PCB. (Refer to chapter 1.3.4.)



NOTE:

The "■" mark indicates position of dip switches. Figures show the setting before shipment.

CAUTION:

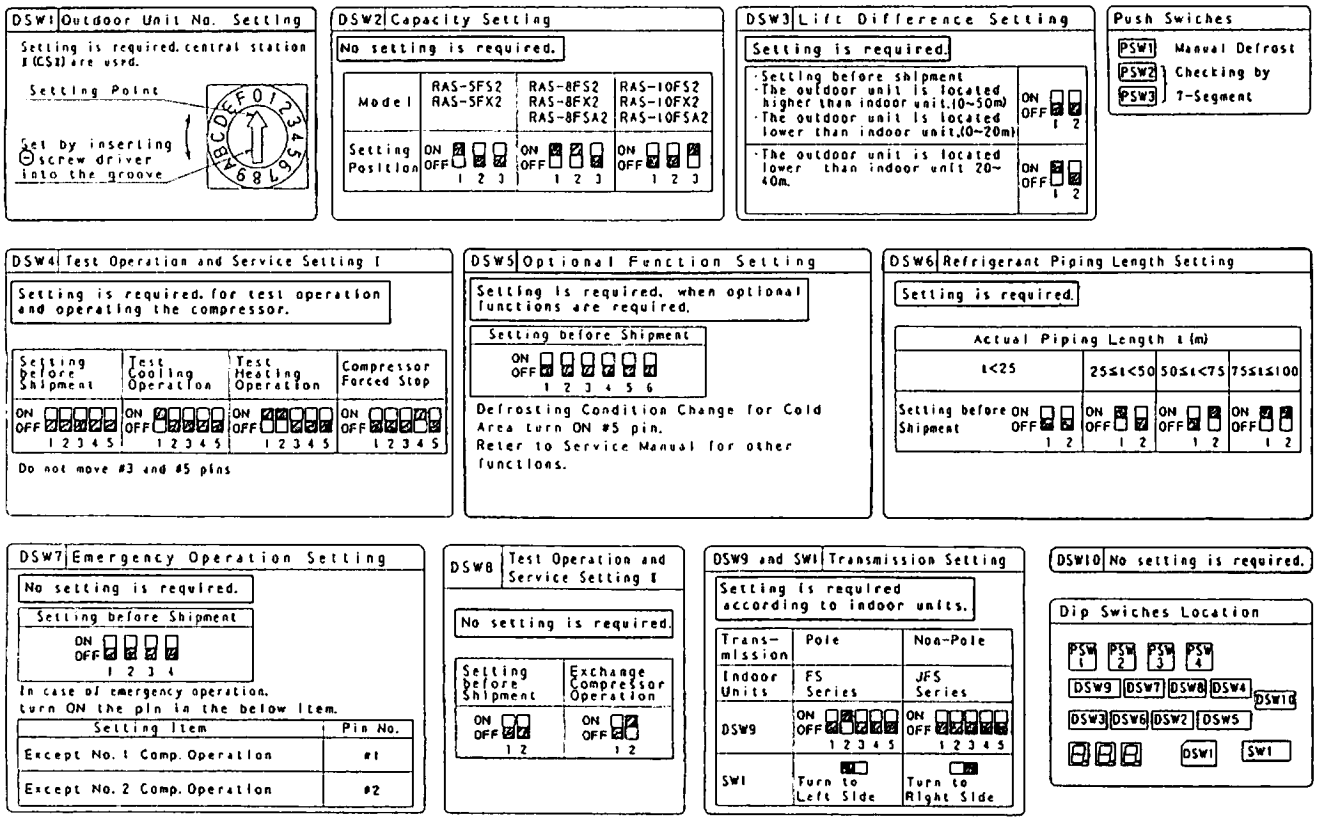
1. Before setting dip switches, firstly turn OFF power source and set the position of the dip switches. If the switches are set without turning OFF the power source, the switches can not function.
2. Check to ensure that the connector from transformer is correctly connected to the PCN7 on PCB, corresponding with the power supply voltage.
   - CN21 (brown line) for 220V
   - CN22 (red line) for 240V

(3) Outdoor Unit

TURN OFF all power sources before setting. Without turning OFF, the switches do not work and the contents of the setting are invalid. Mark of "■" indicates the position of dip switches. Set the dip switches according to the figure below.

NOTES:

1. By using switch DSW4, the unit is started or stopped 10 to 20 seconds after the switch is operated.
2. Make the outdoor unit No. clear to distinguish from other outdoor units for service and maintenance.

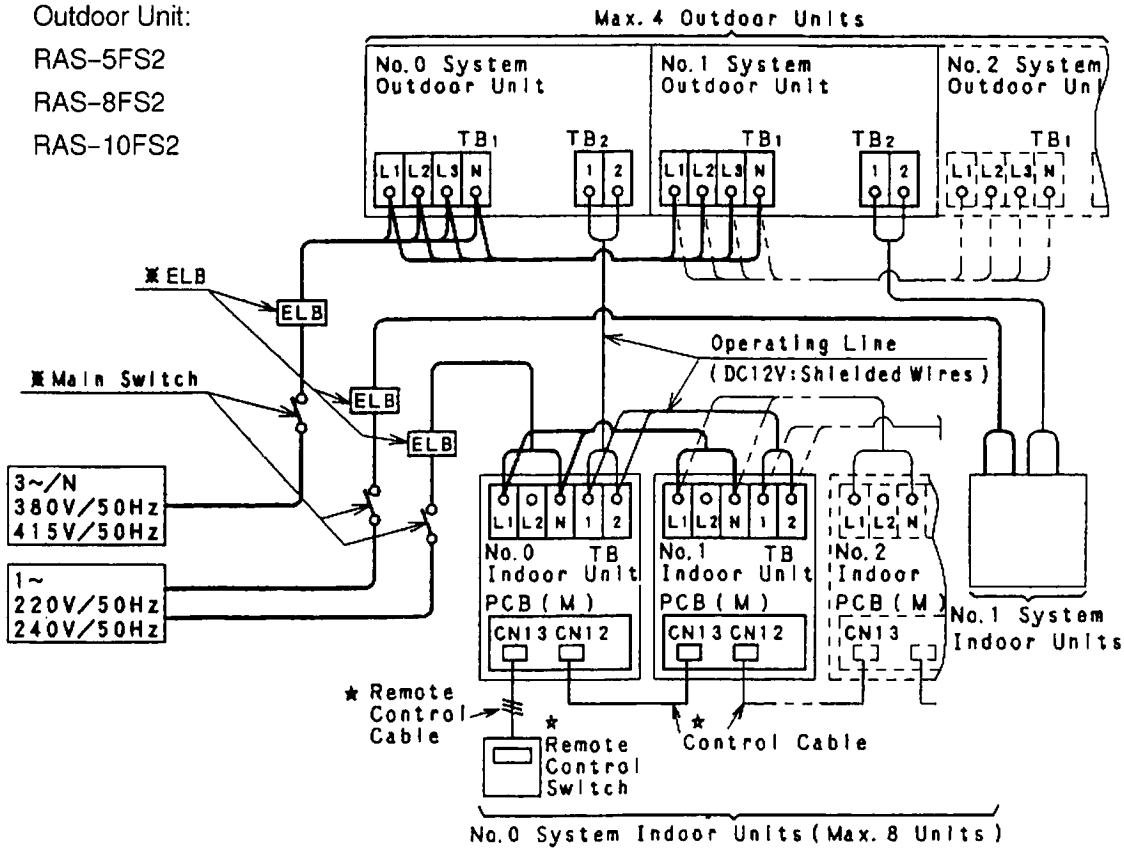


1.1.2 Checking of Electrical Wiring

- Check to ensure that the terminal for power source wiring (terminals "L1" to "L1" and "N" to "N" of each terminal board: AC380-415V) and intermediate wiring (Operating Line: terminals "1" to "1" and "2" to "2" of each terminal board: DC12V) between the indoor unit and the outdoor unit coincide correctly, as figure below.
- Check to ensure that the shielded wires are used for intermediate wiring to protect noise obstacle at length of less than 300m and size complied with local code.
- Check to ensure that the wirings and the breakers are chosen correctly, as shown in Table 1.1.
- All the field wiring and equipment must comply with local code.

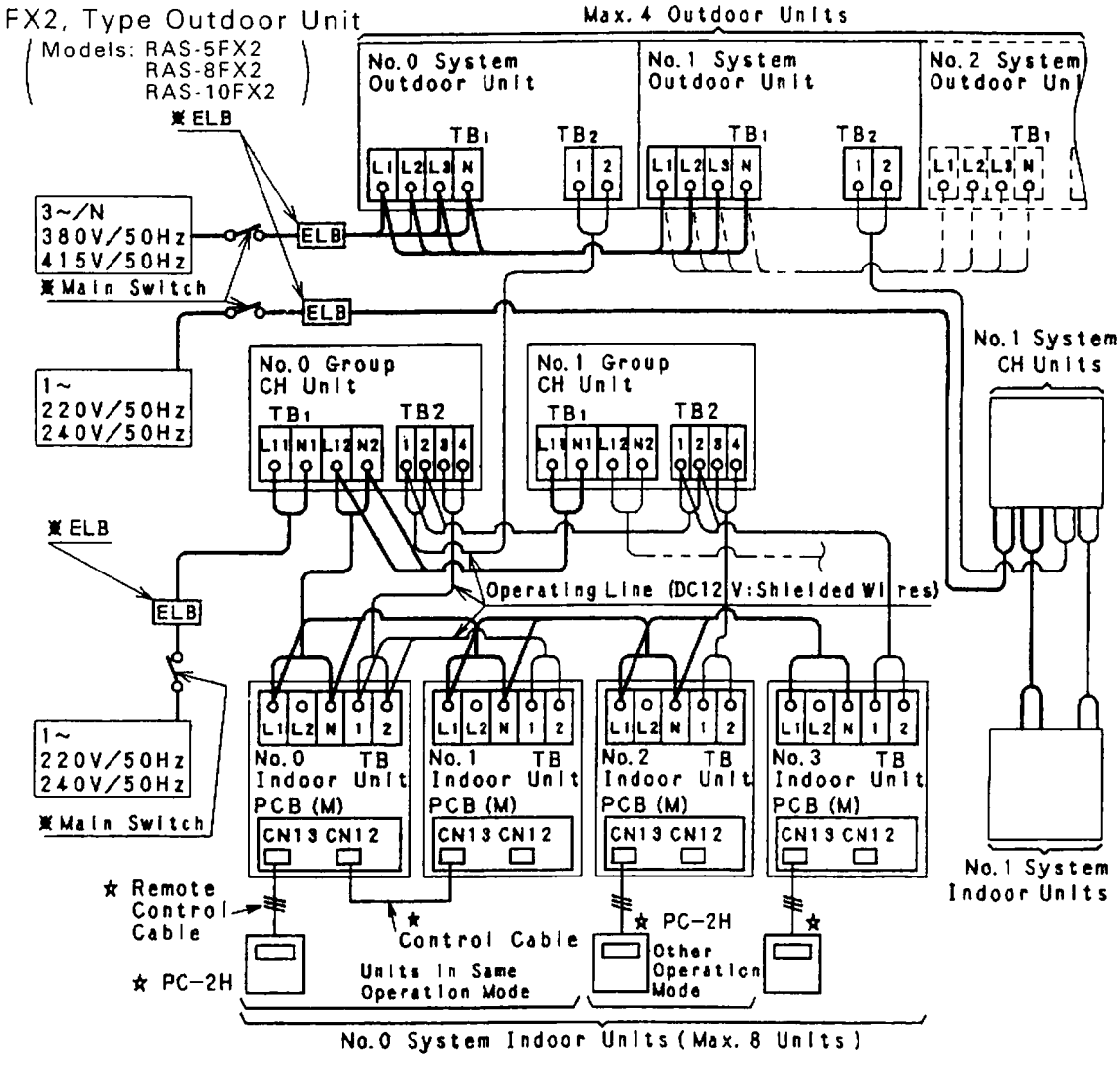
a. Example for Electrical Wiring Connection of FS2 System

Outdoor Unit:
RAS-5FS2
RAS-8FS2
RAS-10FS2



TB: Terminal Board
PCB: Printed Circuit Board
---: Field Wiring
---: Field Wiring (Further Extension)
※: Field-Supplied
☆: Optional Accessory

b. Example for Electrical Wiring Connection of FX2 System



c. Table for Terminal Connection

O.U.: Outdoor Unit, I.U.: Indoor Unit, CH: CH Unit

Wiring	System	[Connection (Connection of Terminals)]
Power Supply	FS2, FX2	[O.U.-O.U. (L1-L1, L2-L2, L3-L3, N-N)]
		[I.U.-I.U. (L1-L1, N-N)]
	FX2	[CH-CH (L12-L11, N2-N1)], [CH-I.U. (L12-L1, N2-N)]
Operating	FS2	[O.U.-I.U., I.U.-I.U. (1-1, 2-2)]
	FX2	[O.U.-CH, CH-CH (1-1, 2-2)]
		[CH-I.U. (3-1, 4-2)], [CH-I.U. (1-1, 2-2: Cooling Only)]
		[I.U.-I.U. (1-1, 2-2: Between Same Operation Mode Units)]

Table 1.1 Electrical Data and Recommended Wiring, Breaker Size/1 Outdoor Unit

Model	Max. Running Current (A)	Power Supply Line (φ mm)	ELB		Fuse (A)
			Nominal Current (A)	Nominal Sensitive Current (mA)	
RAS-5FS2, RAS-5FX2	17	MLFC2.0SQ	20	30	20
RAS-8FS2, RAS-8FX2	32	MLFC3.5SQ	40	30	40
RAS-10FS2, RAS-10FX2	36				

ELB: Earth Leakage Breaker, MLFC: Flame Retardant Polyflex Wire

NOTE: Regarding the wiring or breakers, follow to the local code.

1.1.3 Checking by 7-Segment Display

(1) Simple Checking by 7-Segment Display

1 ※Turn on All Indoor Units

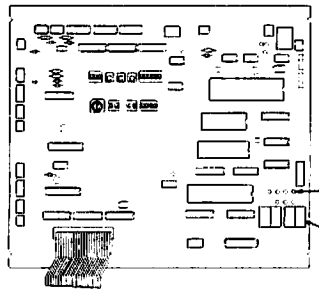
※ All the Indoor Units Connected to the Outdoor Unit

2 Turn on the Outdoor Unit

3 Auto-addressing Starts

During auto-addressing, the following items can be checked using the outdoor unit's on-board 7-segment LED display.
(1) Disconnection of power supply to the indoor unit.
(2) Reverse connection of the operating line between the outdoor and indoor units.
(3) Duplication of indoor unit number.

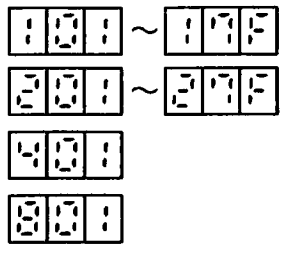
Outdoor Unit Printed Circuit Board PCB1



Normal Case

(1) The outdoor unit's on-board 7-segment LED display indicates as follows normally.

①



will be indicated a few times repeatedly.

may or may not be indicated momentarily.

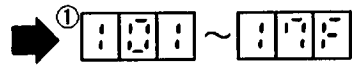
During this time, 2~5 minutes will pass (it depends on the number of indoor units.).

② LED's off.

Abnormal Case

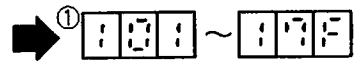
(2) The outdoor unit's on-board 7-segment LED display indicates as follows if there is something wrong.

(A) The indoor units are not supplied with power.



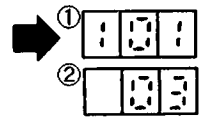
will be indicated continuously.

(B) Disconnection of the operating line between the outdoor and indoor units.



will be indicated continuously.

(C) Reverse connection of the operating line between the outdoor and indoor units.



continues to appear for 60 seconds.

continues to flash after then, for 60 seconds.

(D) Duplicated settings of the indoor unit number DIP switch DSW1 (Refer to the description of alarm code "35", in the item 1.2.2, "Troubleshooting by Alarm Code".)

1.1.4 Emergency Operation when Compressor is Damaged

(1) Failure of Inverter Compressor

a. Contents of Operation

① This operation is an emergency operation by a constant compressor, when the inverter compressor is failed.

② By turning ON "#1" of DSW7 on PCB1 and "#1" of DSW1 on PCB3, emergency operation is started.

③ Control of the emergency operation is same with normal control except the inverter compressor stoppage.

b. Operating Condition

The constant speed compressor is forced to be stopped for compressor protection under the condition below.

Total Capacity of Thermo-ON indoor units<50% of Outdoor Unit Capacity

In case of the above condition, the compressor is operated at a low frequency and stopped repeatedly. Therefore, the compressor is forced to be stopped to protect it.

NOTE:

If the printed circuit board for inverter (PCB3, 4) is damaged, this is not available.

c. Method of Emergency Operation

- Checking Before Emergency Operation.

① Measure insulation resistance of the inverter compressor.
If the insulation resistance is 0Ω, this emergency operation is not available.
There is a possibility that refrigerant oil may be oxidized, if the emergency operation is performed, the other compressor is damaged.

② In case of total capacity of Thermo-ON indoor units are more than 50% of outdoor unit capacity, emergency operation is available.

③ In this emergency operation, frequency of the compressor is not controlled at each 1Hz. Therefore, alarm code "07", "43", "44", "45" or "47" may be indicated on LCD. Details of alarm codes are shown in the alarm code table (page 1-16).

④ This emergency operation does not provide sufficient cooling capacity.

⑤ This method is an emergency operation temporarily when the inverter compressor is damaged. Therefore, change the new one as soon as possible.

⑥ Turn OFF "#1" of DSW1 on PCB7 and "#1" of DSW1 on PCB3 after changing the new compressor. If this setting is performed the inverter compressor will be damaged.

d. Emergency Operation

① Turn OFF all the power source switches.

② Disconnect the wiring from the inverter compressor. Insulate the faston terminals for inverter compressor wires by insulation tape.

③ Set the No.1 of DSW7 on the PCB1 at the "ON" side.

④ Turn ON all the power source switches.

⑤ Operate the system by remote control switches.

⑥ The system is stopped by turning OFF all the remote control switches or turning OFF all the power source switches.

(2) Failure of Constant Speed Compressor

a. Contents of Operation

① This operation is an emergency operation by the inverter compressor, when the constant speed compressor is failed.

② This operation is controlled by a normal control.

b. Operating Condition

① Set the No.2 of DSW7 on the PCB1 at the "ON" side.

② Temperature of THM2 & THM3 on the top of compressors are not ignored by setting DSW7. If the thermistor is short-circuited or cut, this operation is available.

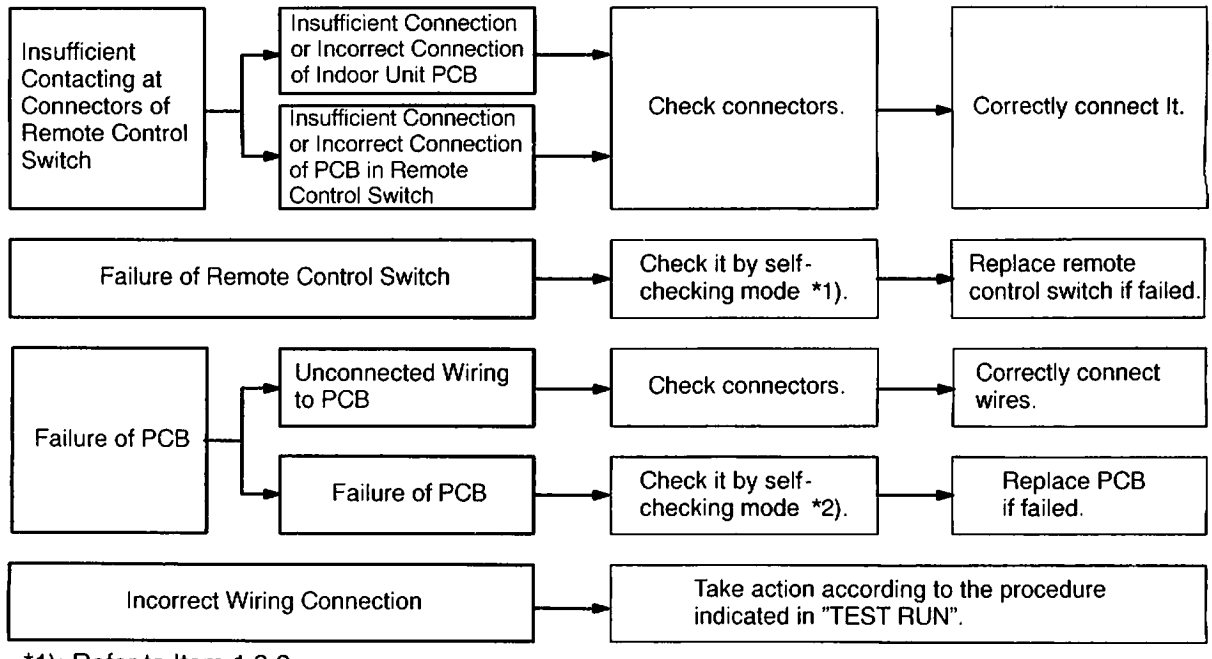
1.1.5 Failure of Power Supply to Indoor Unit and Remote Control Switch

- Lights and LCD is not Indicated
- Not Operated

If fuses are melted or a breaker is activated, investigate the cause of over current and take necessary action.

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Power Failure or Power is Not ON		Measure voltage by volt-meter.	Supply power.
Melted Fuse or Activation of Breaker at Power Source	Short Circuit Supplied between Wiring	Check for any uncovered part of wiring.	Remove the cause of short-circuit and replace the fuse.
	Short Circuit of Wiring to Earth	Measure insulation resistance.	Remove the cause of short-circuit and replace the fuse.
	Failure of Indoor Unit Fan Motor	Measure resistance between wiring and insulation resistance.	Replace the fan motor and fuse.
Melted Fuse at Control Circuit	Short Circuit Supplied between Wiring	Check for any uncovered part of wiring.	Remove the cause of short-circuit and replace the fuse.
	Short Circuit of Control Circuit to Earth	Measure insulation resistance.	Remove the cause of short-circuit and replace the fuse.
	Failure of Indoor Unit Fan Motor	Measure resistance between wiring and insulation resistance.	Replace the fan motor and fuse.
Failure of Transformer at Indoor Unit Side		Measure voltage at secondary side.	Replace the transformer.
Disconnected Cable of Remote Control Switch		Connect the cable.	Replace cable or repair It.

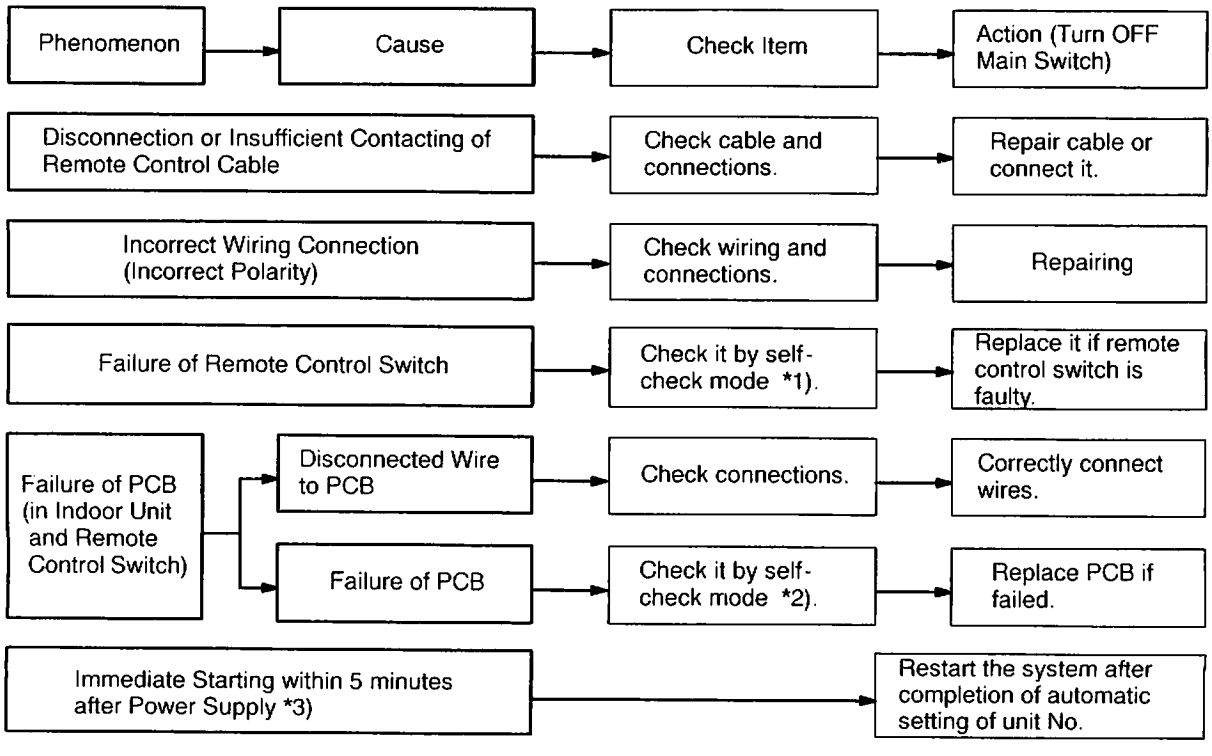
(1.1.5 Failure of Power Supply to Indoor Unit and Remote Control Switch)



*1): Refer to Item 1.3.2.
*2): Refer to Item 1.3.1.

1.1.6 Abnormal Transmission of Remote Control Switch

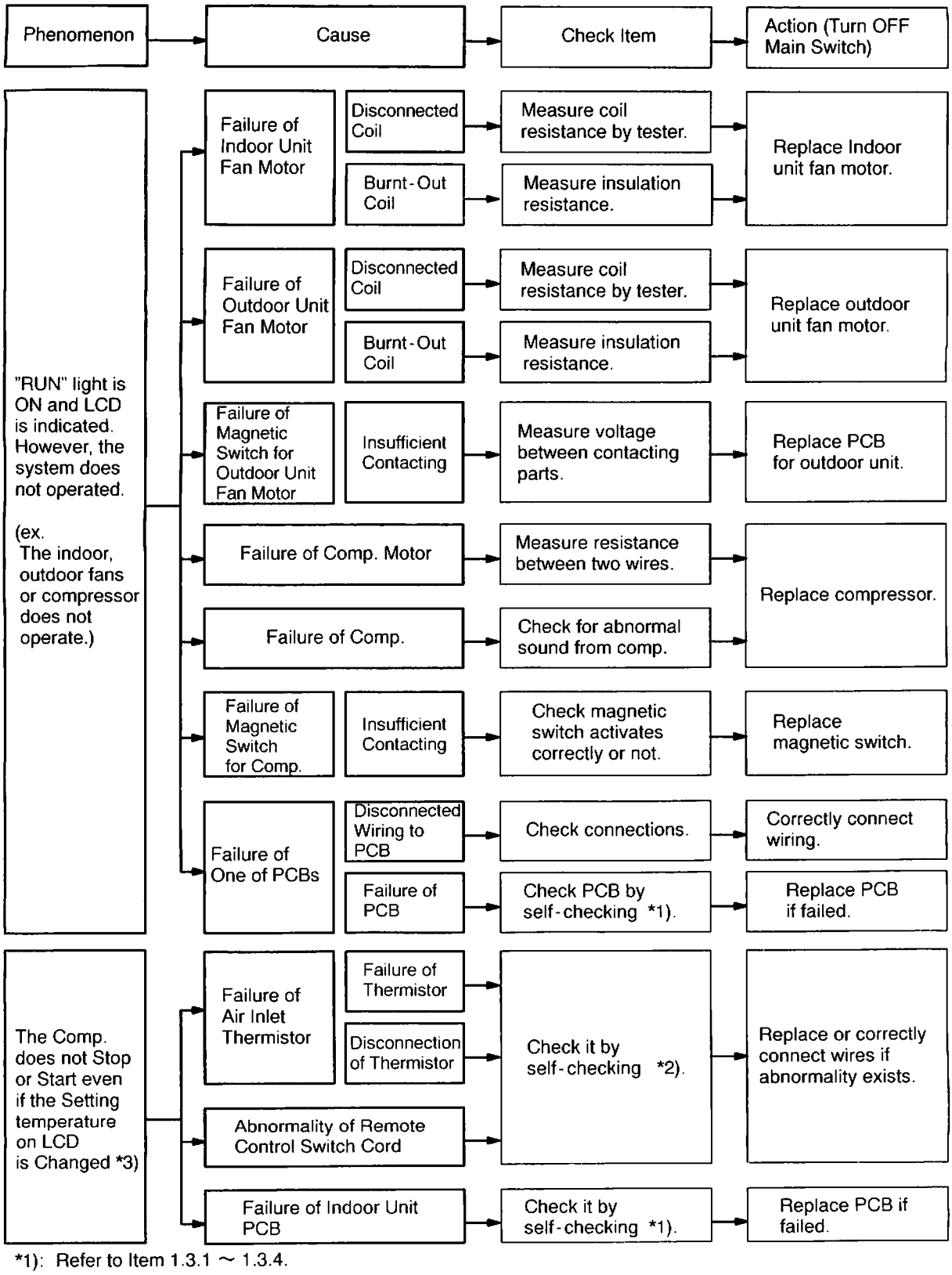
● "RUN" Lamp on Remote Control Switch:
Flickering every 2 seconds



*1): Refer to Item 1.3.2.
*2): Refer to Item 1.3.1.
*3): This phenomenon occurs when the system is newly installed and is started within 5 minutes after power supply, since automatic setting of unit No. is performed during this period.

1.1.7 Abnormalities of Devices

In the case that no abnormality (Alarm Code) is indicated on the remote control switch, and normal operation is not available, take necessary action according to the procedures mentioned below.



*1): Refer to Item 1.3.1 ~ 1.3.4.

*2): Refer to Item 1.3.1.

*3): Even if controllers are normal, the compressor does not operate under the following conditions.

① Indoor Air Temp. is lower than 21℃ or Outdoor Air Temp. is lower than -5℃ for FS2 and FX2 during cooling operation.

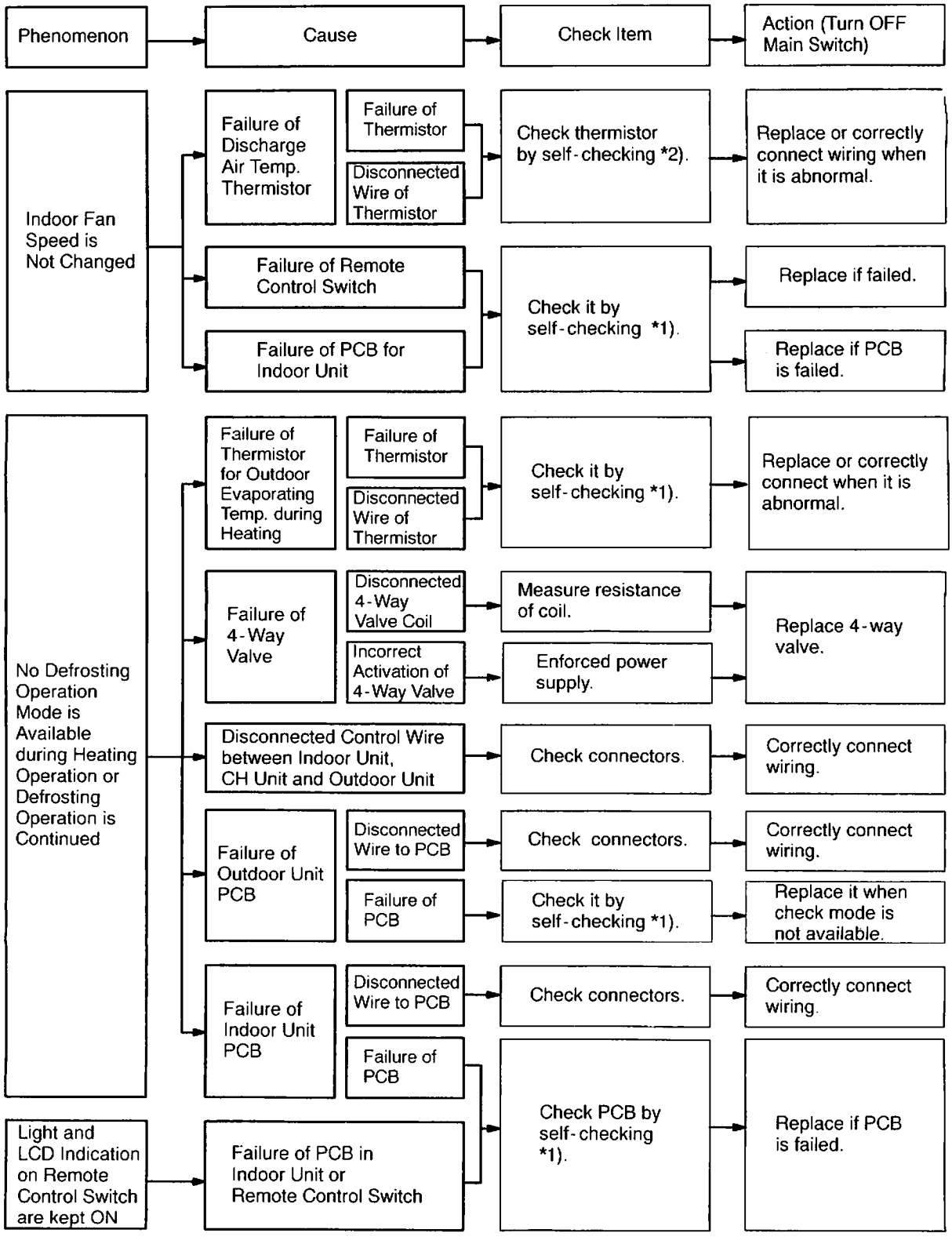
② Indoor Air Temp. is higher than 30℃ or Outdoor Air Temp. is higher than 23℃ during heating operation.

③ When a cooling (or heating) operation signal is given to the outdoor unit and a different mode as heating (or cooling) operation signal is given to indoor units for FS2.

④ When a emergency stop signal is given to outdoor unit.

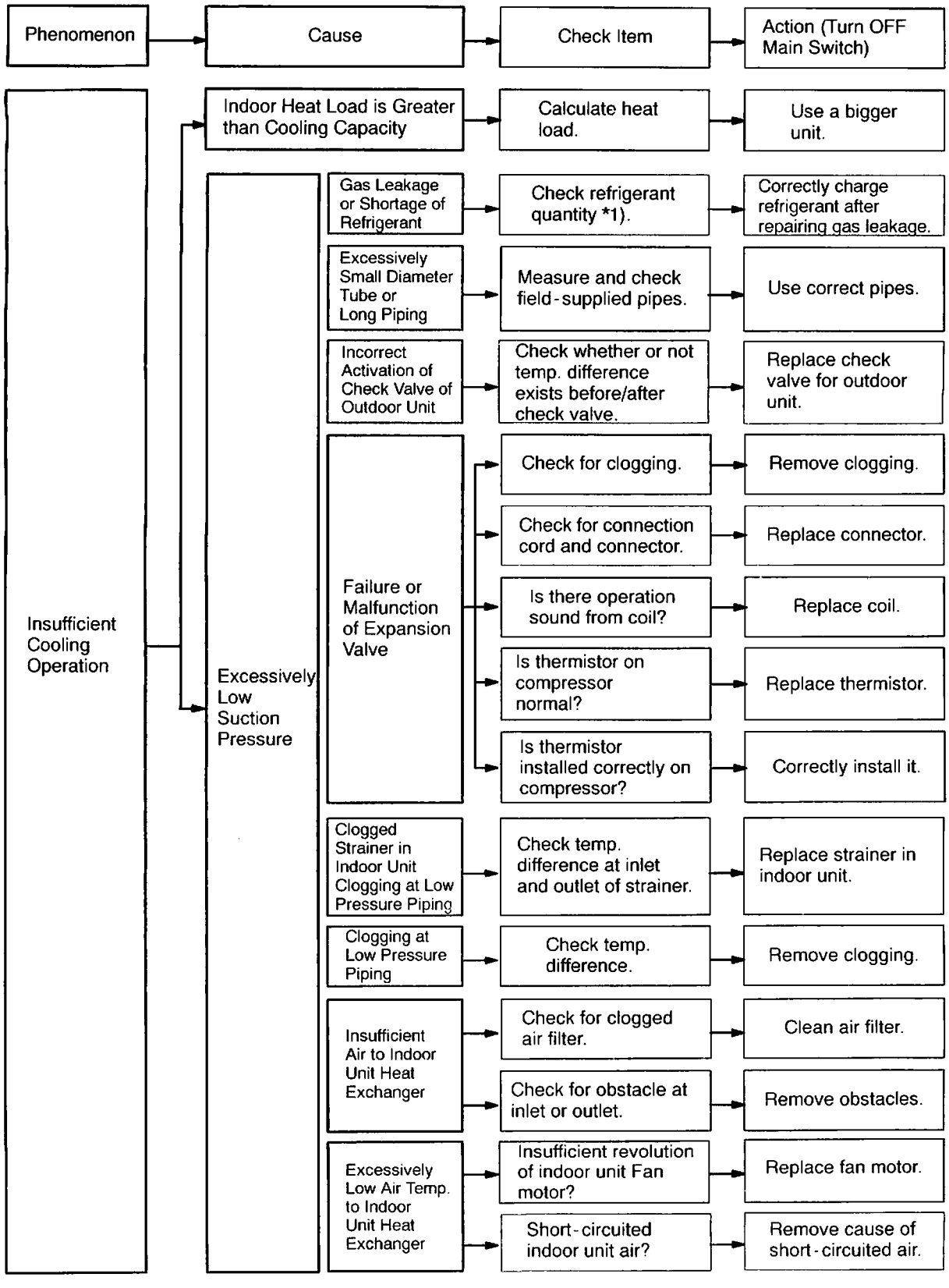
⑤ When the dip switch, DSW4 on the outdoor unit PCB is set at the "ON" side and the compressor is stopped.

(1.1.7 Abnormalities of Devices)



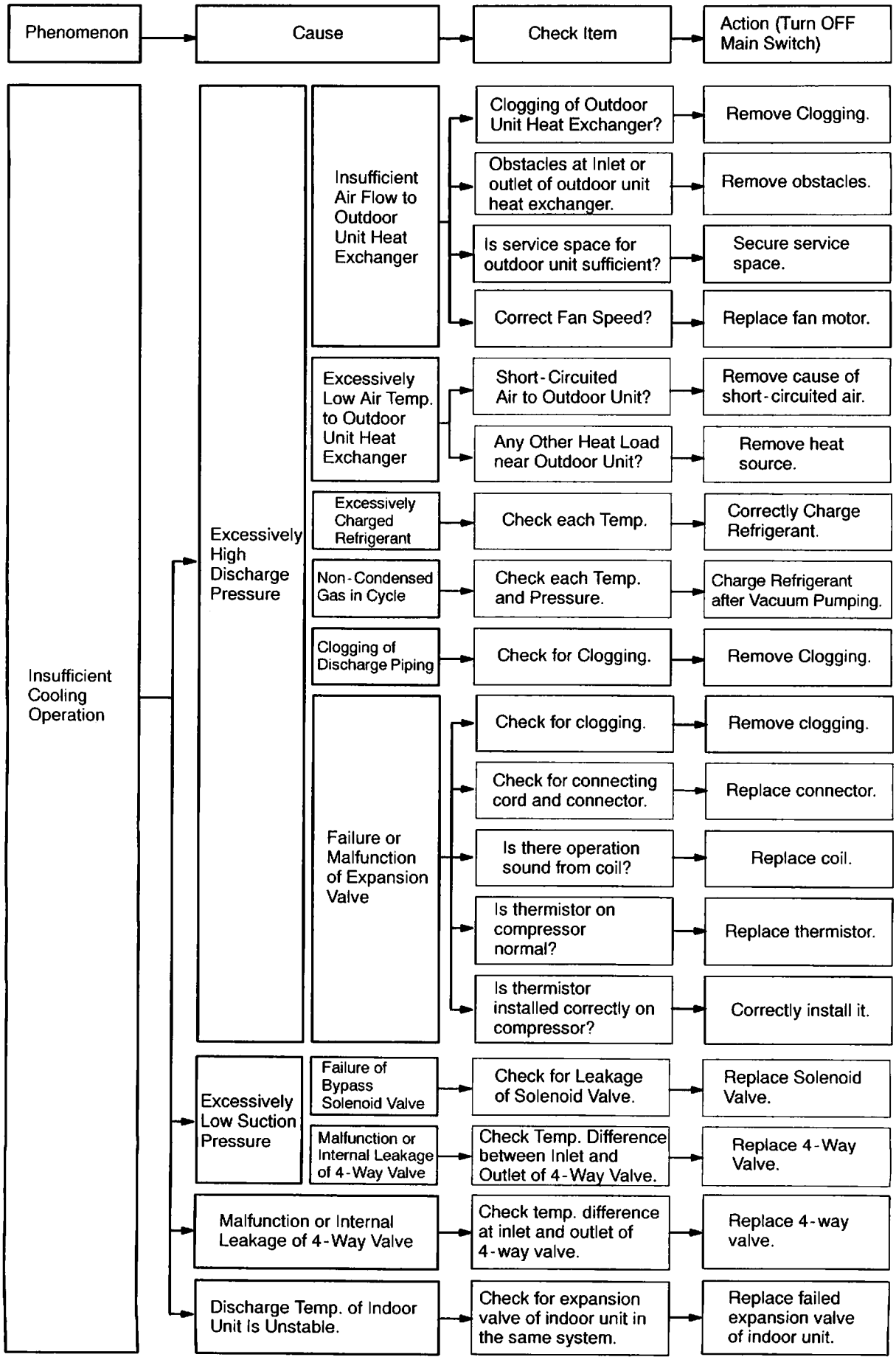
*1): Refer to Item 1.3.1 ~ 1.3.4.
*2): Refer to Item 1.3.1.

(1.1.7 Abnormalities of Devices)

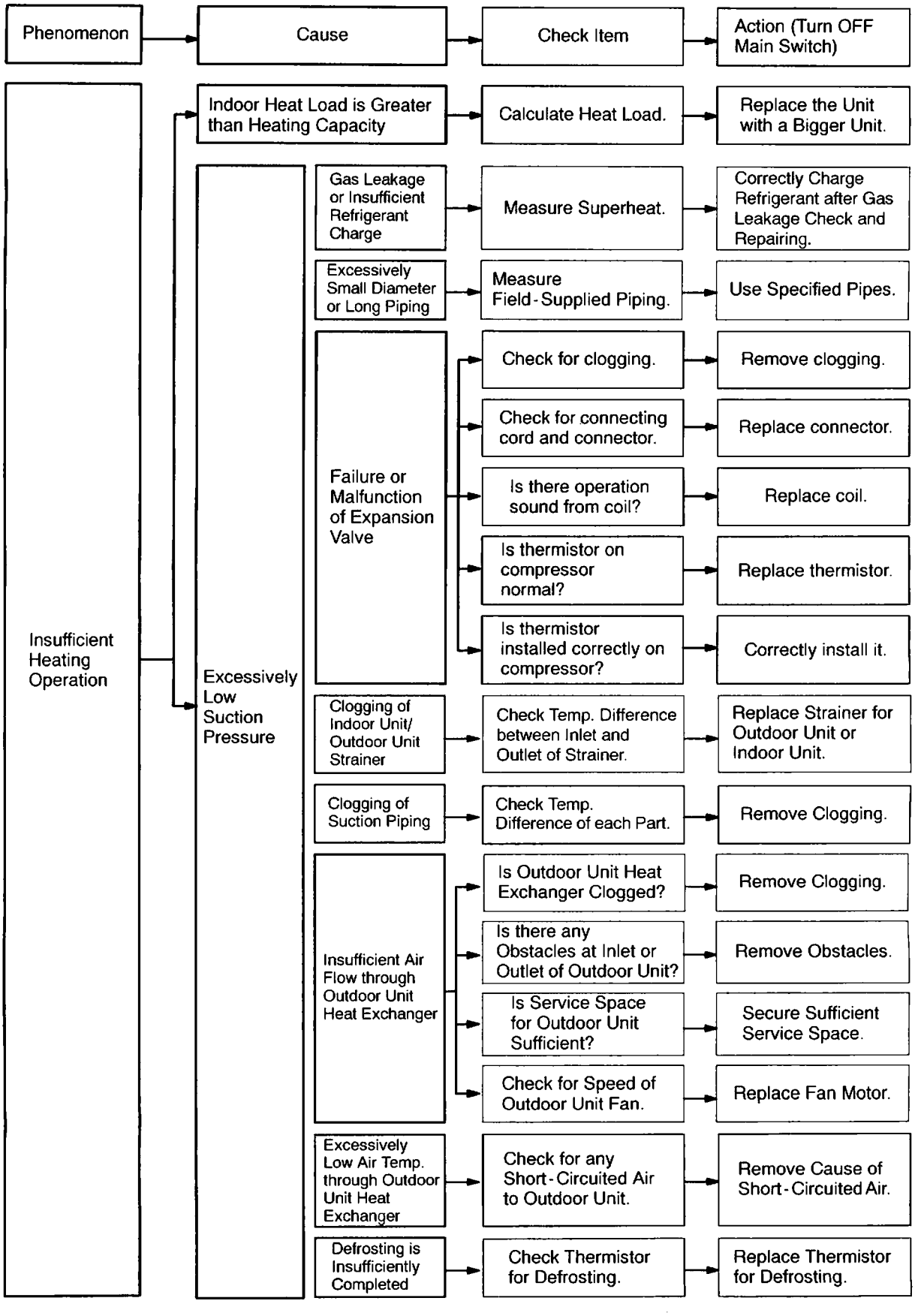


*1): Refer to item 9.3 of TC II .

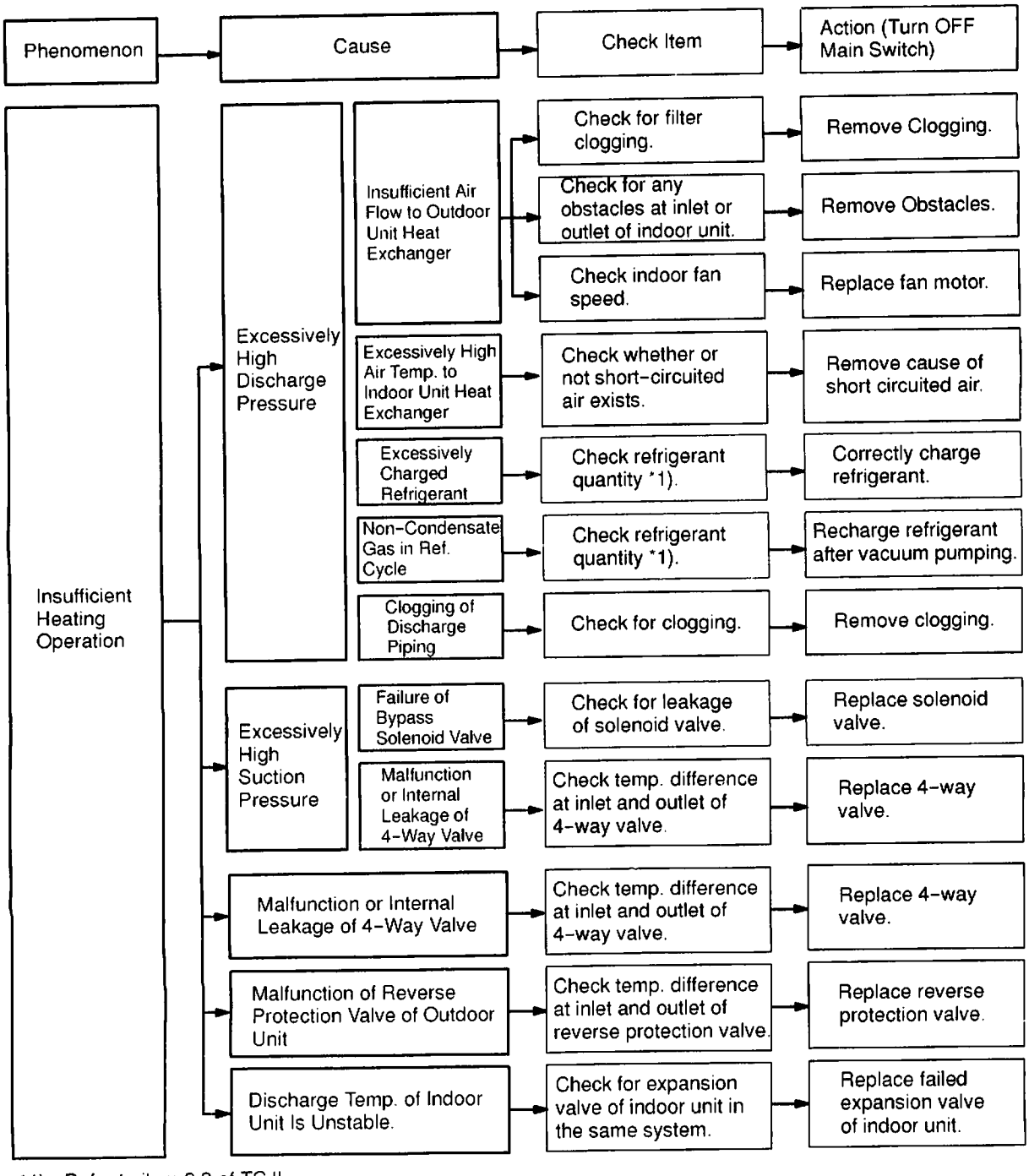
(1.1.7 Abnormalities of Devices)



(1.1.7 Abnormalities of Devices)

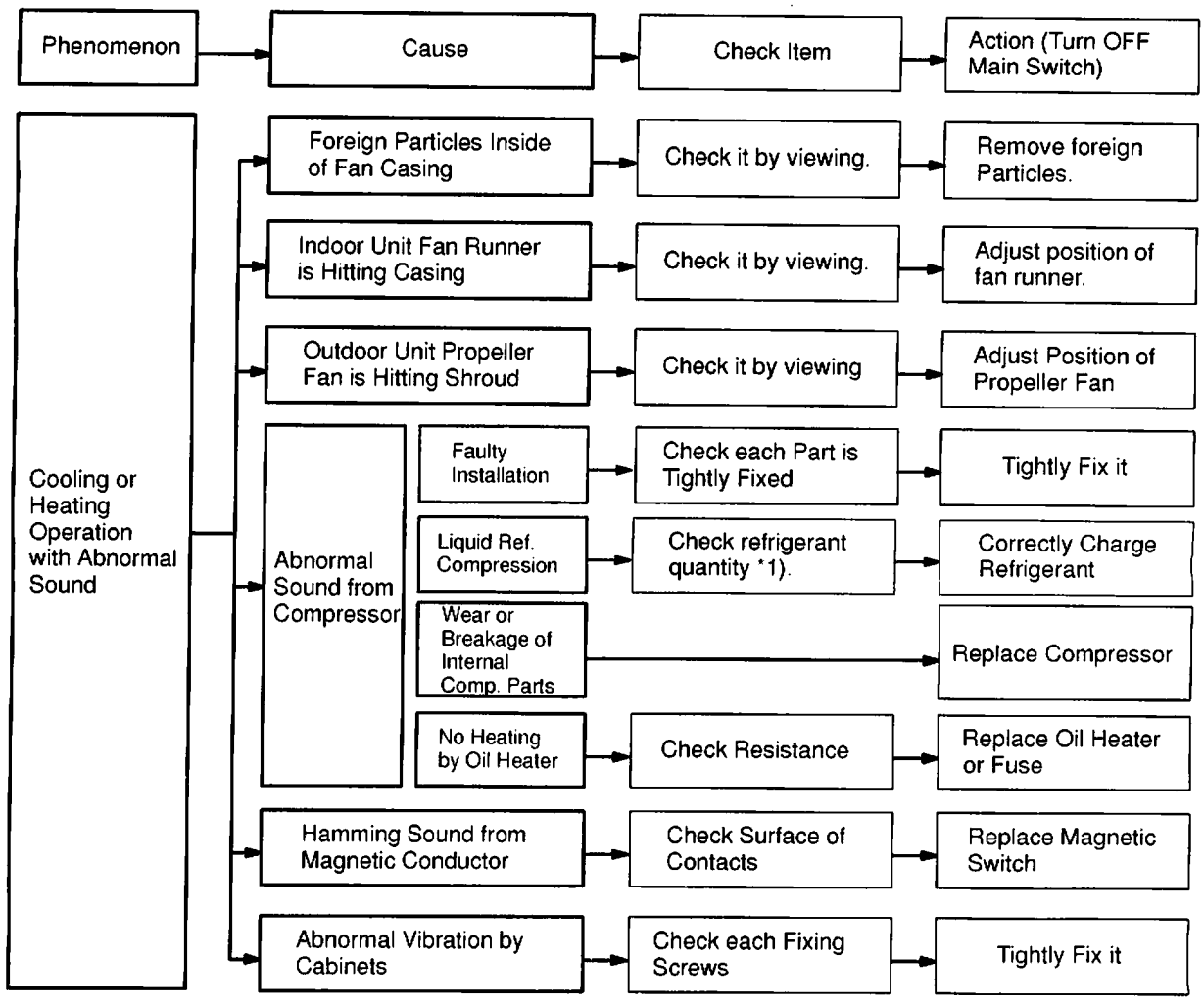


(1.1.7 Abnormalities of Devices)



*1): Refer to item 9.3 of TC II .

(1.1.7 Abnormalities of Devices)



*1): Refer to item 9.3 of TC II .

1.2 Troubleshooting Procedure

1.2.1 Alarm Code Table

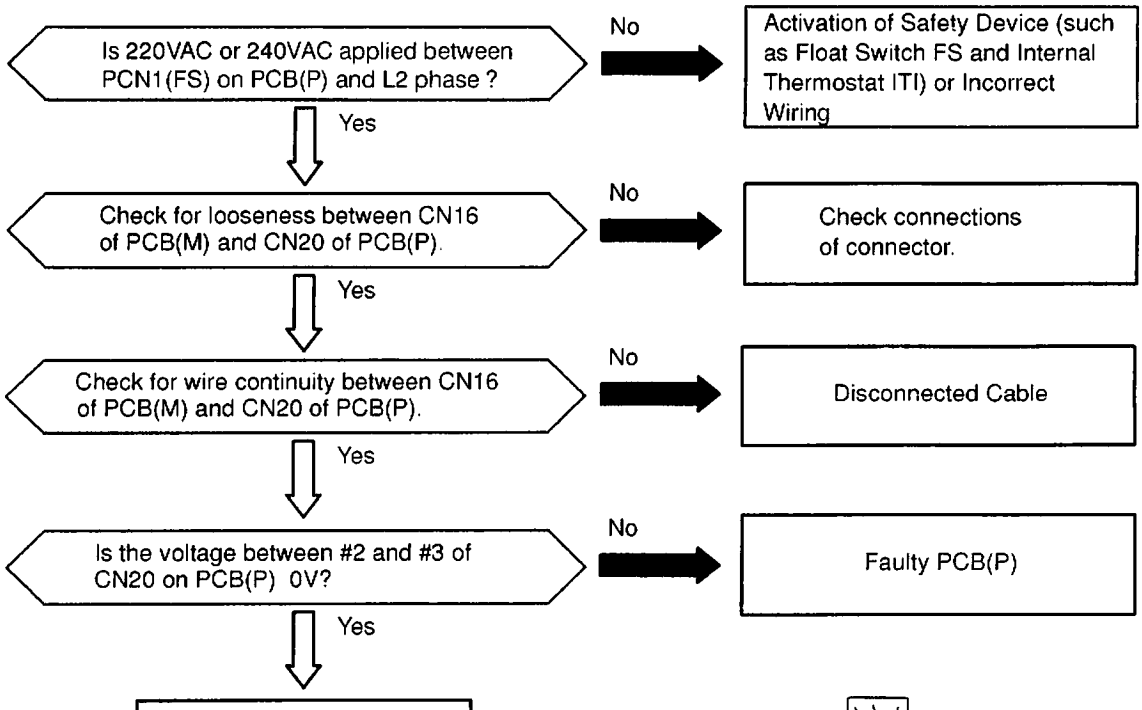
Code No.	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Tripping of Protection Device	Failure of Fan Motor, Drain Discharge, PCB, Relay.
02	Outdoor Unit	Tripping of Protection Device	Failure of Compressor, Refrigerant Quantity, Inverse Phase.
03	Transmission	Abnormality between Indoor and Outdoor (or Indoor)	Incorrect Wiring, Failure of PCB, Tripping of Fuse.
04	Inverter	Inverter Trip of Outdoor Unit	Failure in Transmission of PCB for Inverter.
05	Transmission	Abnormality of Power Source Wiring	Reverse Phase Incorrect Wiring.
06	Voltage Drop	Voltage Drop in Outdoor Unit Excessively Low or High Voltage to Outdoor Unit	Voltage Drop, Incorrect Wiring, Tripping of Fuse.
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor and Wiring
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant , Failure of Thermistor, Wiring.
09	Outdoor Unit	Tripping of Protection Device	Failure of Fan Motor, Incorrect Wiring.
11	Sensor on Indoor Unit	Inlet Air Thermistor	Failure of Thermistor, Sensor, Connection.
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19		Tripping of Protection Device	Failure of Fan Motor, Incorrect Wiring.
21	Sensor on Outdoor Unit	High Pressure Sensor	Failure of Thermistor, Sensor, Connection.
22		Outdoor Air Thermistor	
23		Discharge Gas Thermistor	
24		Evaporating Thermistor	
29		Low Pressure Sensor	
30 (FX2 Only)	System	Incorrect Setting of Outdoor and Indoor Unit Dip Switches	Incorrect Setting of Capacity Code.
31		Incorrect Setting of Outdoor and Indoor Unit	Incorrect Setting of Capacity Code.
32		Abnormal Transmission of Other Indoor Unit	Failure of Power Supply, PCB in Other Indoor Unit.
35		Incorrect Setting in Indoor Unit No.	Existence of the same Indoor Unit No.
38		Abnormality of Protective Circuit in Outdoor Unit	Incorrect Connection to PCB in Outdoor Unit.
39		Abnormality of Running Current at Constant Compressor	Incorrect Wiring.
43	Pressure	Pressure Ratio Decrease Protection Activating	Failure of Compressor, Inverter, Power Supply.
44		Low Pressure Increase Protection Activating	Overload to Indoor in Cooling, High Temperature or Outdoor Air.
45		High Pressure Increase Protection Activating	Overload Operation, Excessive Refrigerant.
46		High Pressure Decrease Protection Activating	Insufficient Refrigerant.
47		Low Pressure Decrease Protection Activating	Vacuum Condition in Cycle Failure of Expansion Valve.
51	Inverter	Abnormality of Current Sensor for Inverter Thermal Protection Activating	Failure of Compressor, PCB, IPM.
52		Overcurrent Protection Activating	Overload, Overcurrent, Locking of Compressor.
53		IPM Protection Activating	Overheating of Inverter, PCB.
EE		Compressor Protection	Failure of Compressor.

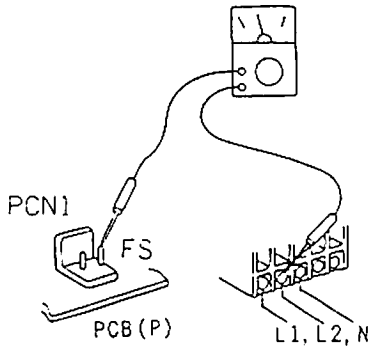
1.2.2 Troubleshooting by Alarm Code

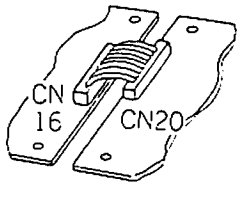
Alarm Code 01	Activation of Safety Device in Indoor Unit

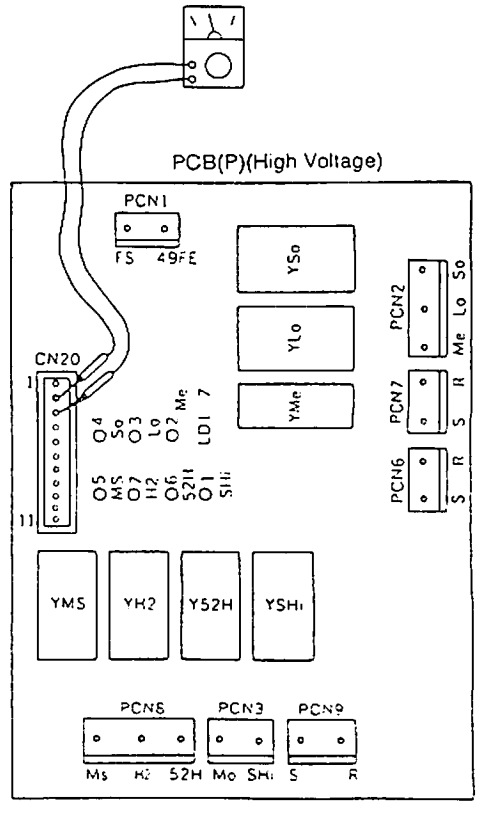
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when AC220V or 240V is not given between PCN1(FS) on PCB and L2(N) phase during the cooling, fan or heating operation.

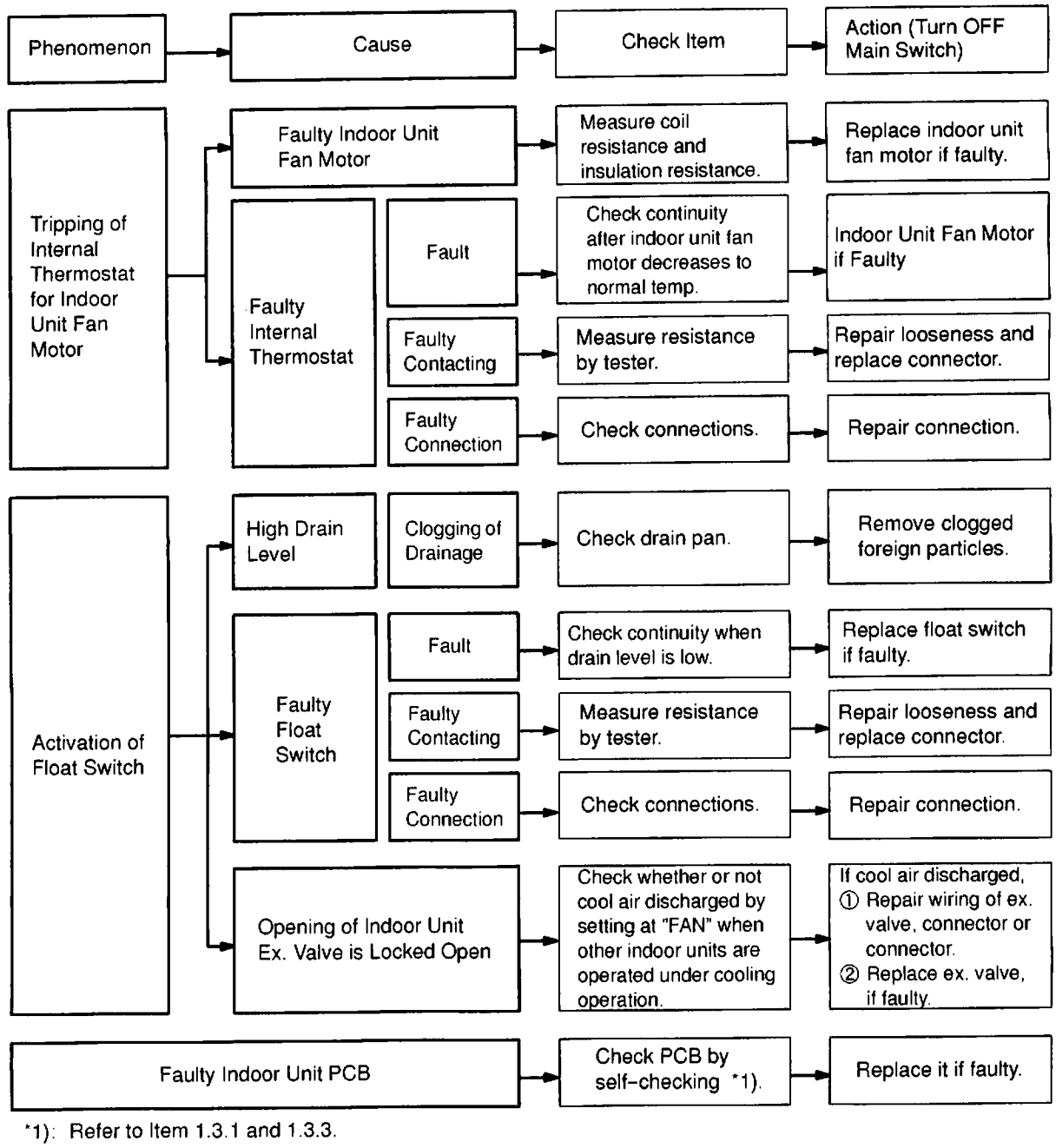








NOTE:
Above figure shows a separated-board type PCB, some unit has a one-board type PCB which has the same functions and devices with the separated-board type.

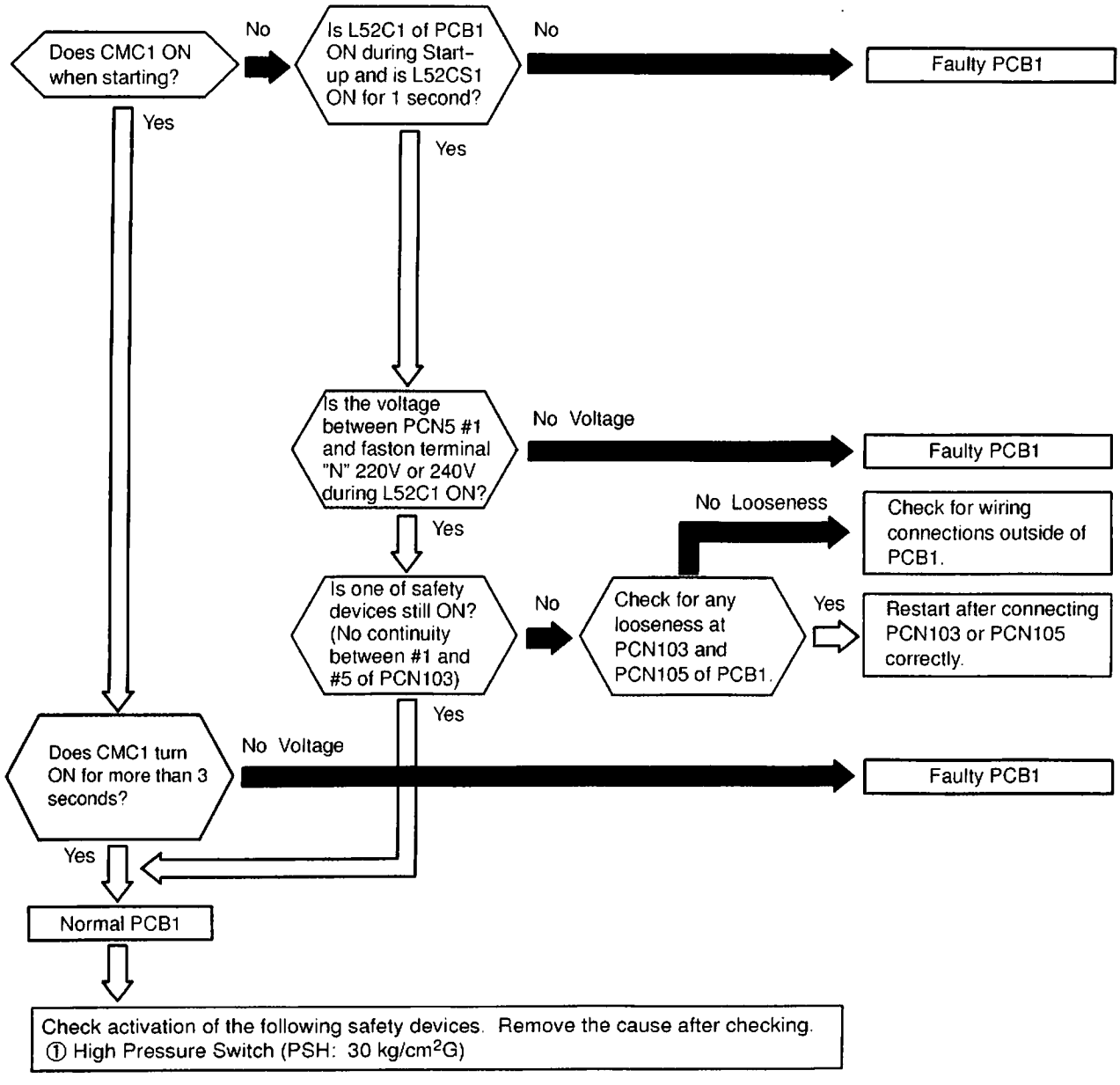


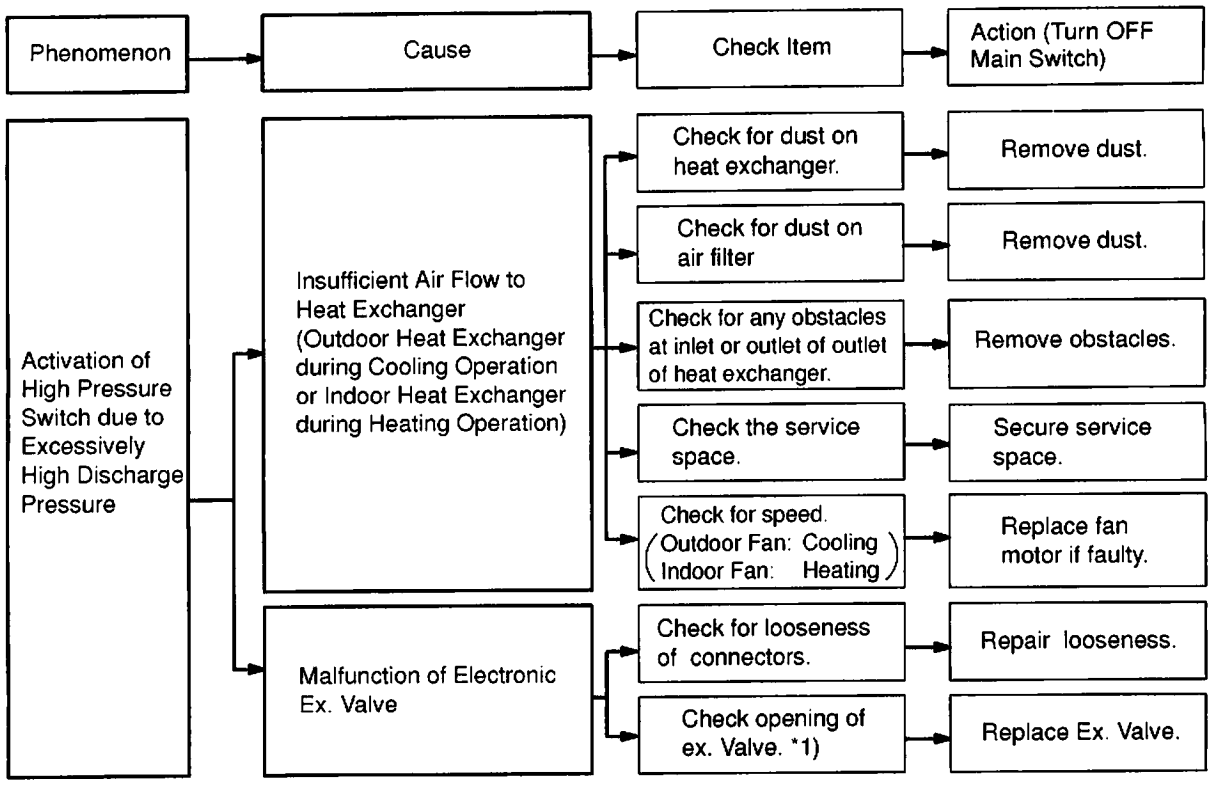
*1): Refer to Item 1.3.1 and 1.3.3.

Alarm Code 02	Activation of Safety Device for Outdoor Unit

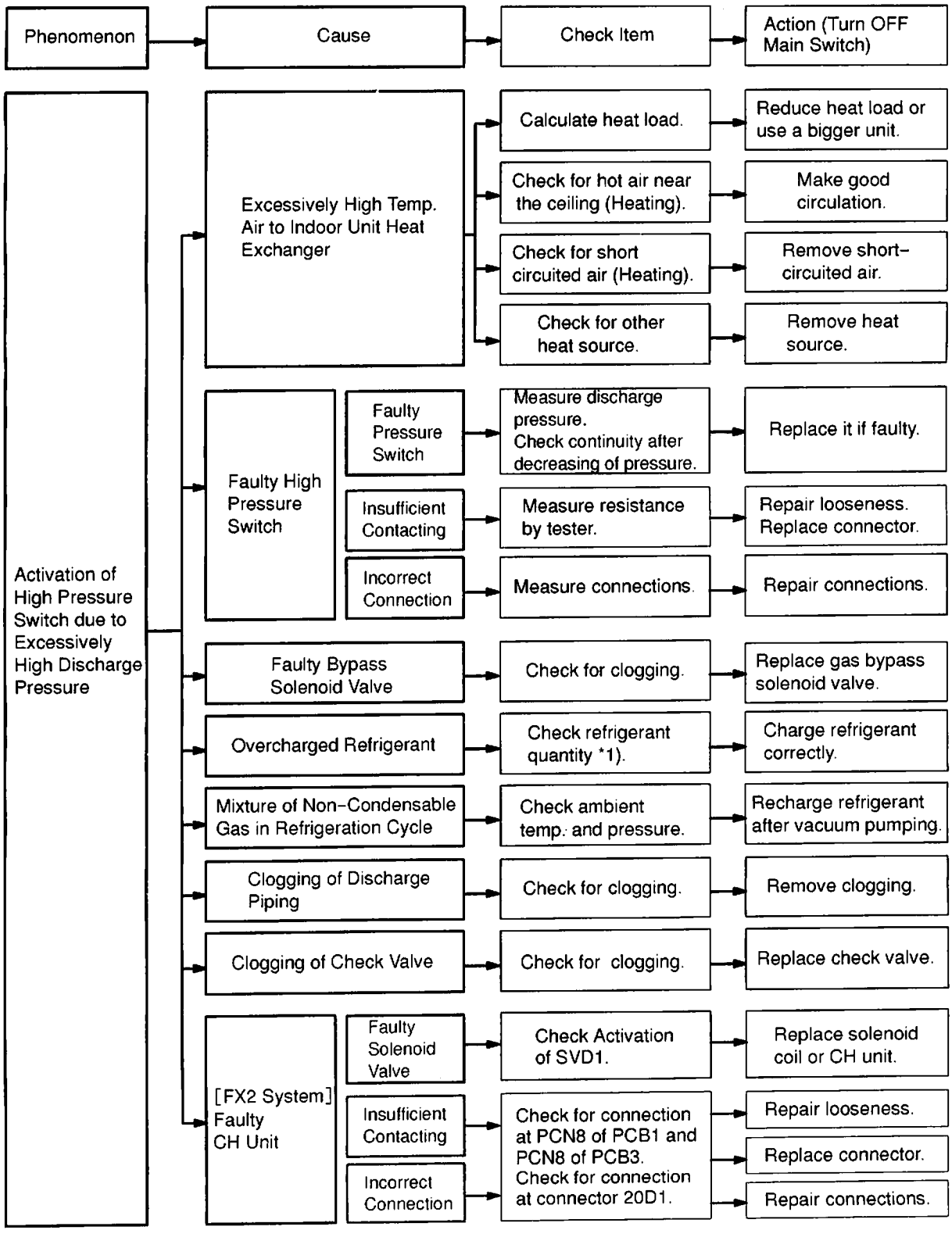
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

This alarm is indicated when one of safety devices is activated during compressor running (CMC1: ON).





*1): Refer to item 3.3.



*1): Refer to Item 9.3 of TC II .

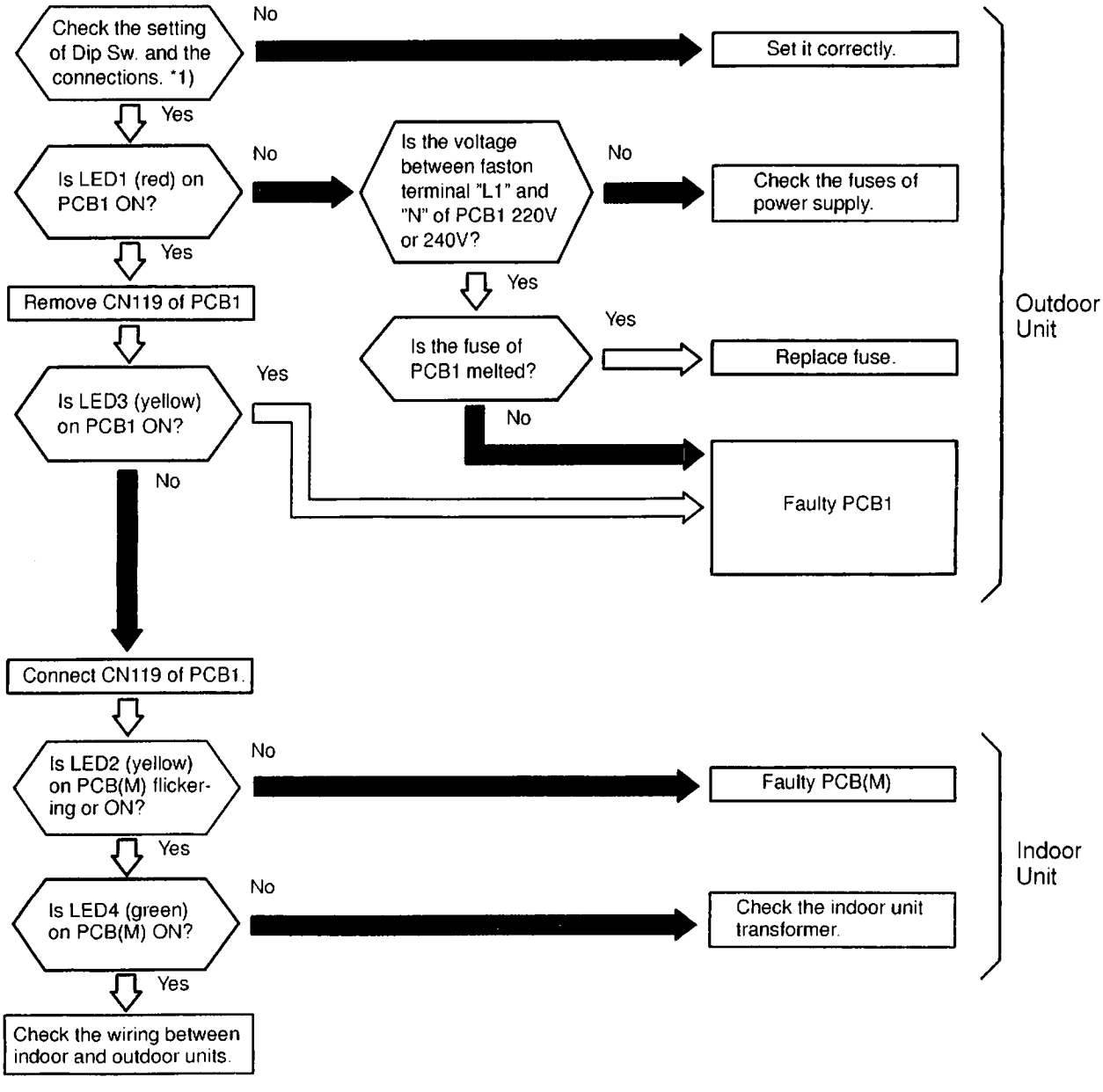
FS2 SYSTEM

Alarm Code 03	Abnormal Transmitting between Indoor Units and Outdoor Unit

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm is indicated when abnormality is maintained for 3 minutes after normal transmitting between indoor units and outdoor unit, and also abnormality is maintained for 30 seconds after the micro-computer is automatically reset, or the alarm is indicated when the abnormal transmitting is maintained for 30 seconds from starting of the outdoor unit.

★ Investigate the cause of overcurrent and take necessary action when fuses are melted or the breaker for the outdoor unit are activated.

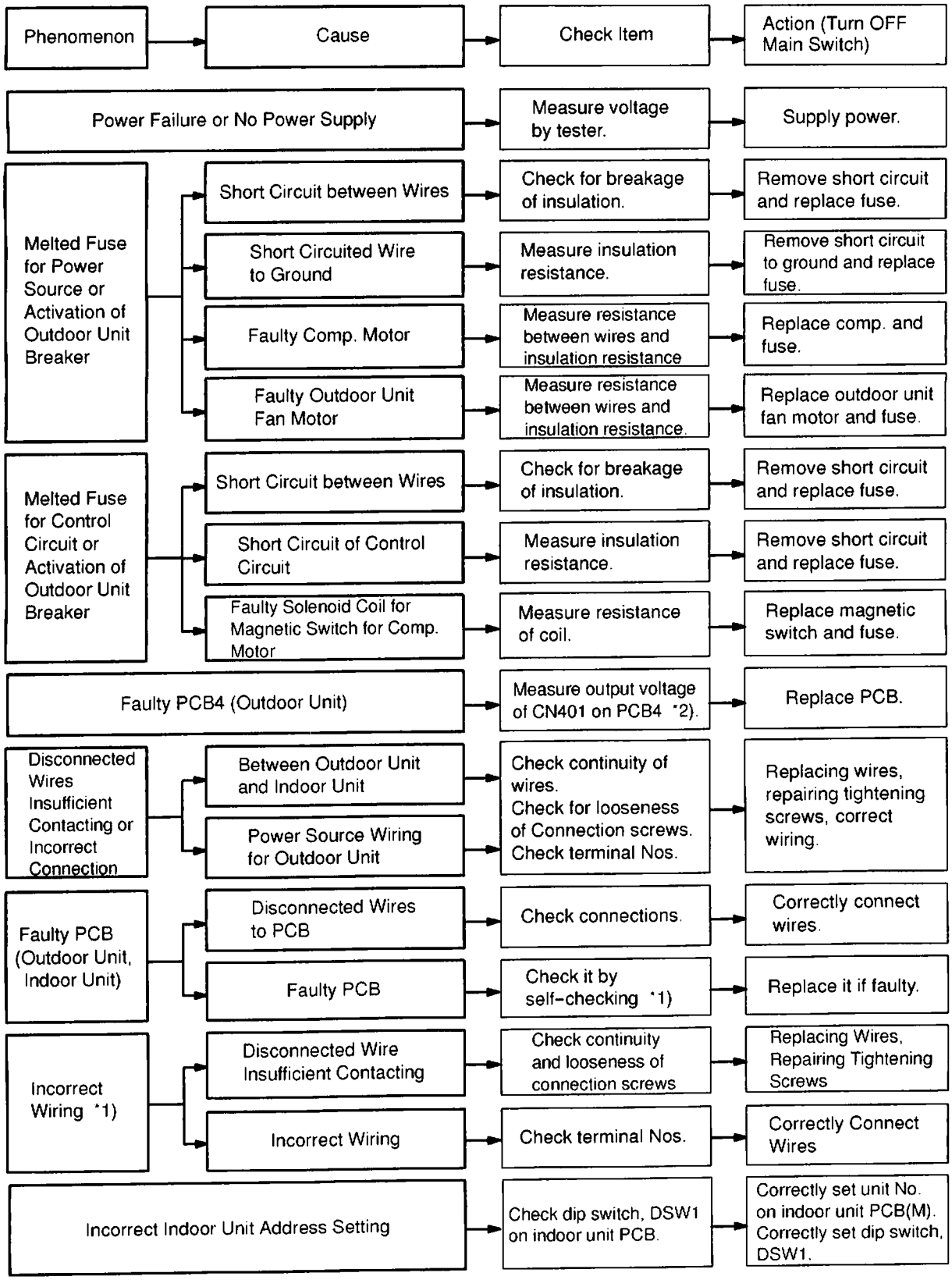


PCB1: Outdoor Unit PCB (for Control)

PCB(M): Indoor Unit PCB (Low Voltage)

*1): Refer to item 1.1.1.

FS2 SYSTEM



*1): Refer to Item 1.3.1 ~ 1.3.4.

*2): Output Voltage at CN401 on PCB4.
(5VDC between #1 and #4, 15VDC between #1 and #6, -15VDC between #1 and #5)

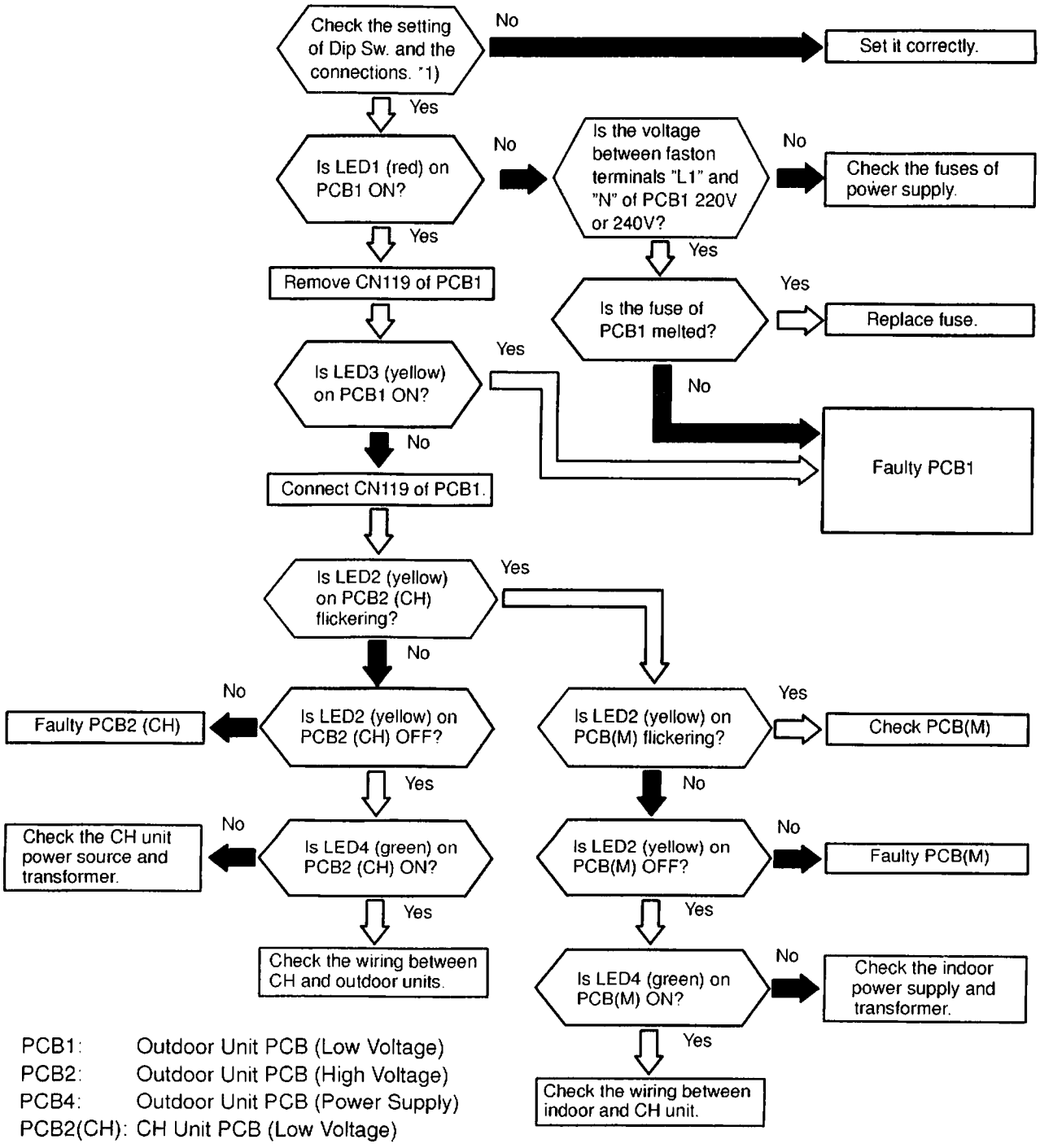
FX2 SYSTEM

Alarm Code	03	Abnormal Transmitting between Indoor Units, CH Units and Outdoor Unit

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

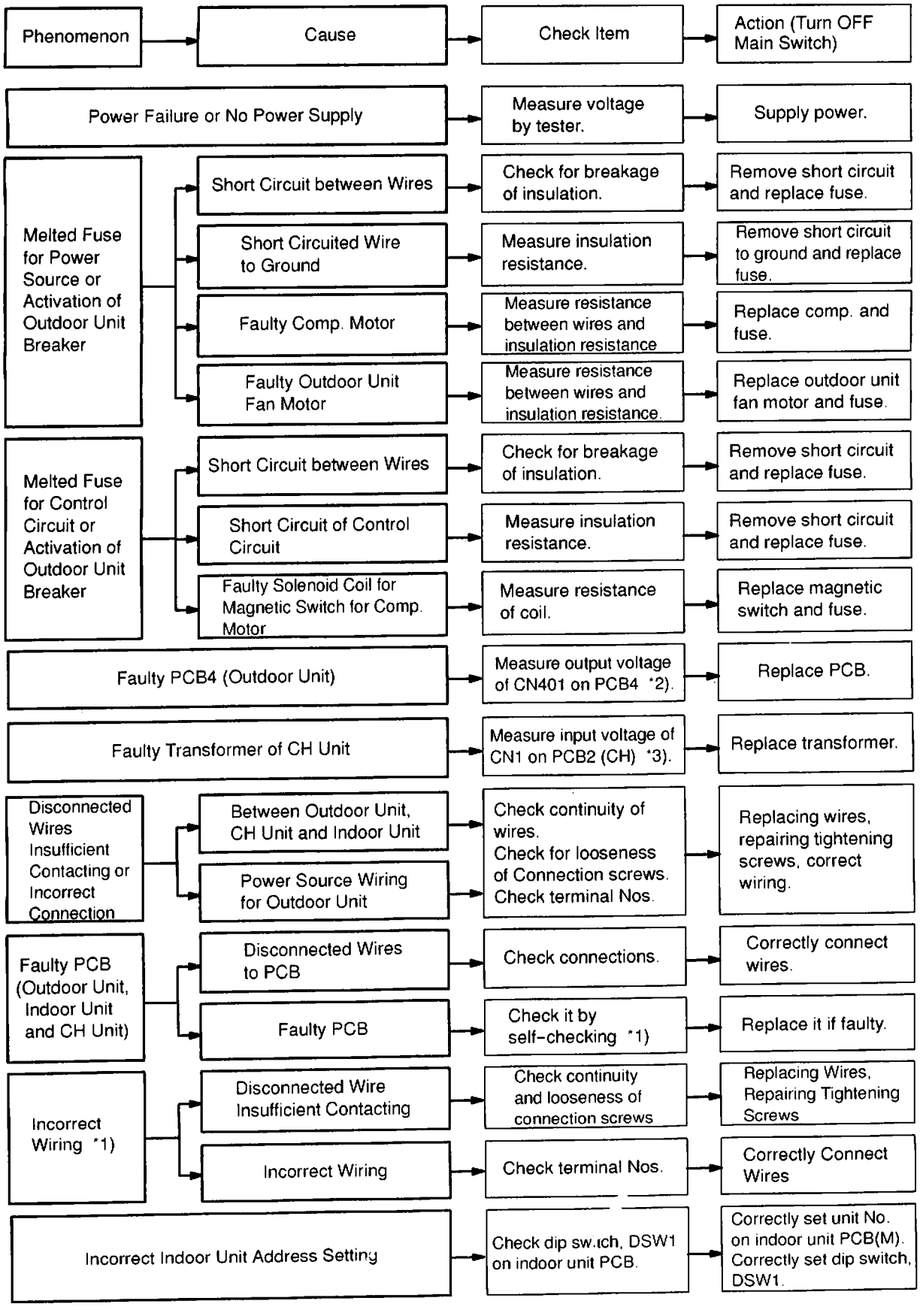
★ This alarm is indicated when abnormality is maintained for 3 minutes after normal transmitting between indoor units, CH units and outdoor unit, and also abnormality is maintained for 30 seconds after the micro-computer is automatically reset, or the alarm is indicated when the abnormal transmitting is maintained for 30 seconds from starting of the outdoor unit.

★ Investigate the cause of overcurrent and take necessary action when fuses are melted or the breaker for the outdoor unit are activated.



PCB1: Outdoor Unit PCB (Low Voltage)
PCB2: Outdoor Unit PCB (High Voltage)
PCB4: Outdoor Unit PCB (Power Supply)
PCB2(CH): CH Unit PCB (Low Voltage)

FX2 SYSTEM



*1): Refer to Item 1.3.1 ~ 1.3.4.

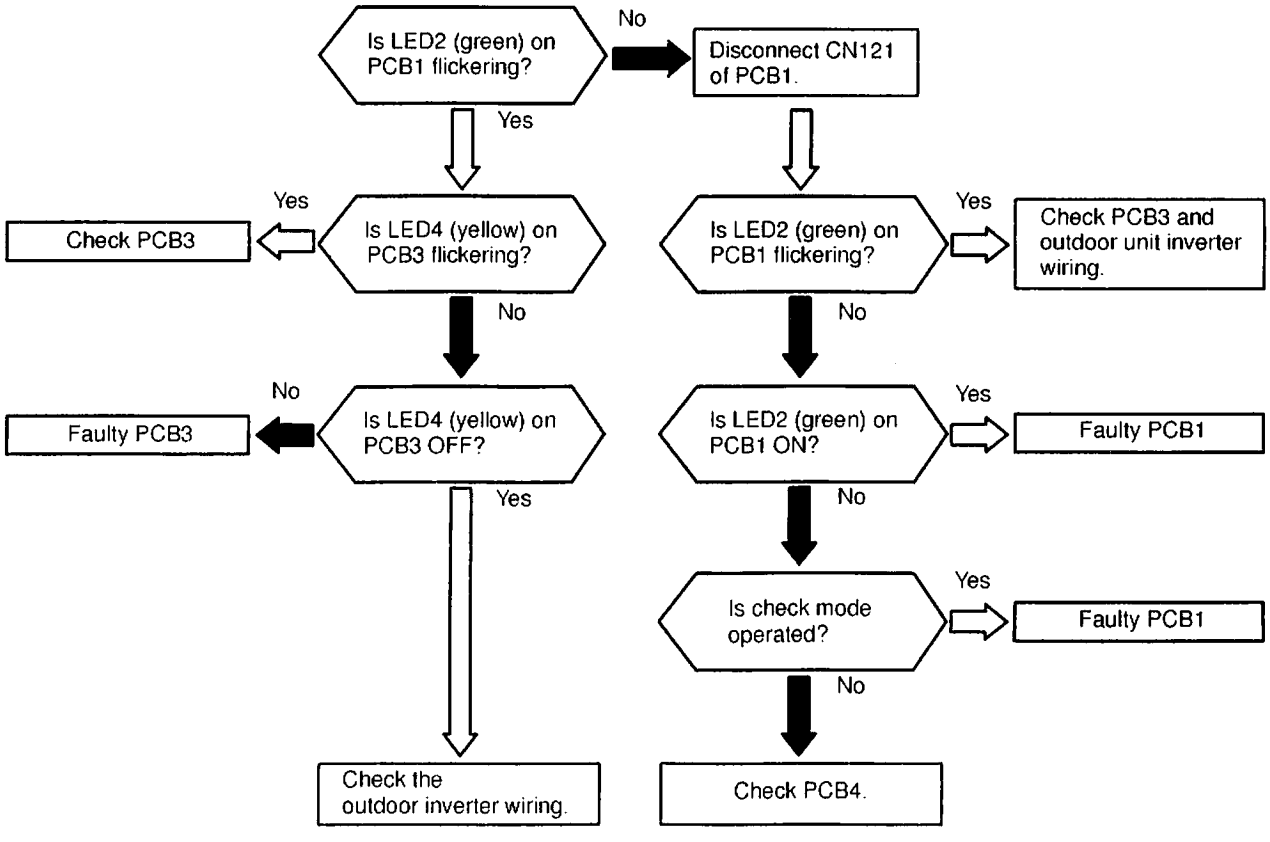
*2): Output Voltage at CN401 on PCB4.
(5VDC between #1 and #4, 15VDC between #1 and #6, -15VDC between #1 and #5)

*3): Input Voltage at CN1 on PCB2 (CH).
(22.2VAC between #1 and #2, 14.5VAC between #3 and #4)

Alarm Code 04	Abnormal Transmitting between Inverter and Outdoor PCB1, 3, 4

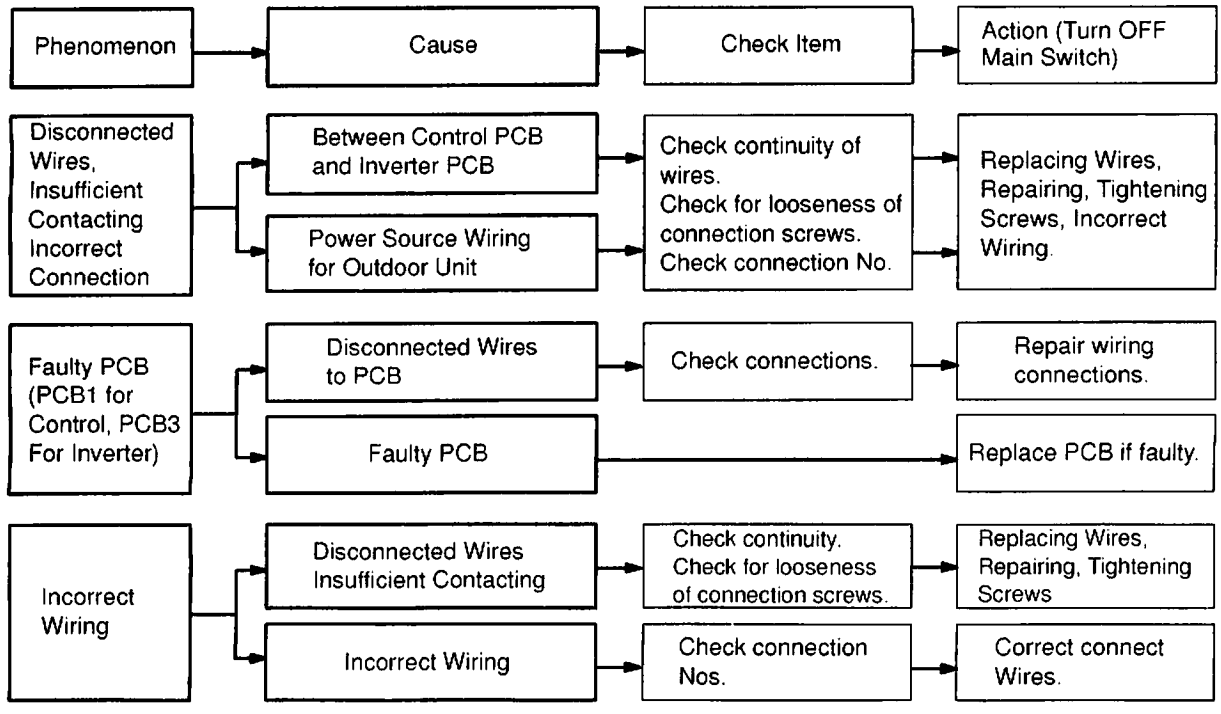
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.

★ This alarm is indicated when abnormality is maintained for 30 seconds after normal transmitting between the outdoor unit PCB1 and inverter PCB3, and also abnormality is maintained for 30 seconds after the micro-computer is automatically reset, or the alarm is indicated when the abnormal transmitting is maintained for 30 seconds from starting of the outdoor unit.



PCB1: Control PCB

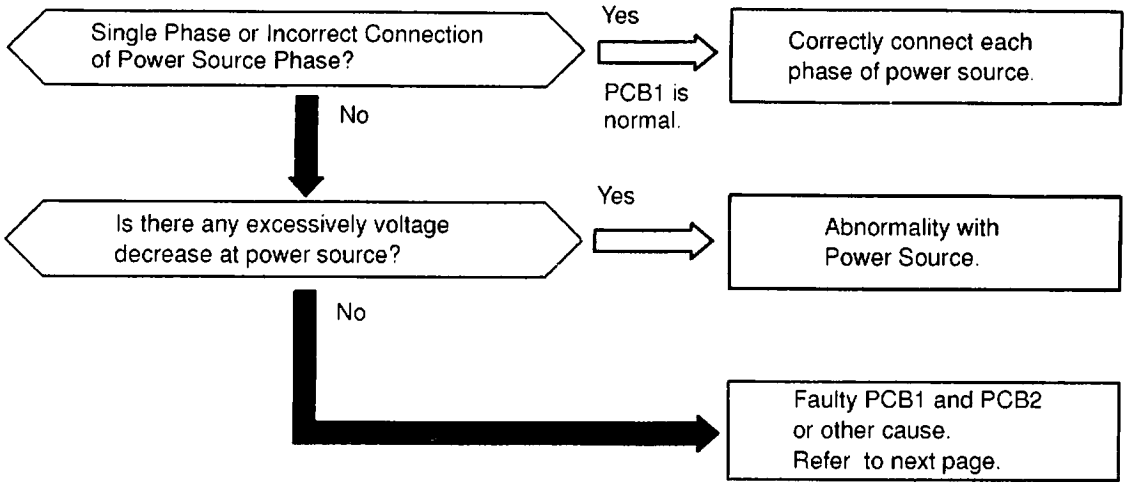
PCB3, 4: Inverter PCB (High Voltage)

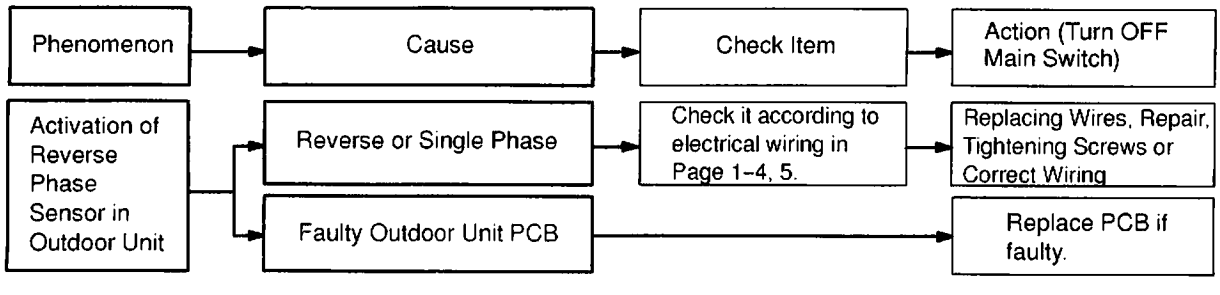

Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Disconnected Wires, Insufficient Contacting Incorrect Connection
Between Control PCB and Inverter PCB
Power Source Wiring for Outdoor Unit
Check continuity of wires.
Check for looseness of connection screws.
Check connection No.
Replacing Wires, Repairing, Tightening Screws, Incorrect Wiring.
Faulty PCB (PCB1 for Control, PCB3 For Inverter)
Disconnected Wires to PCB
Faulty PCB
Check connections.
Repair wiring connections.
Replace PCB if faulty.
Incorrect Wiring
Disconnected Wires Insufficient Contacting
Incorrect Wiring
Check continuity. Check for looseness of connection screws.
Check connection Nos.
Replacing Wires, Repairing, Tightening Screws
Correct connect Wires.

Alarm Code 05	Abnormality of Picking up Phase Signal

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm is indicated when the main power source phase is reversely connected or one phase is not connected during running of the constant speed compressor.

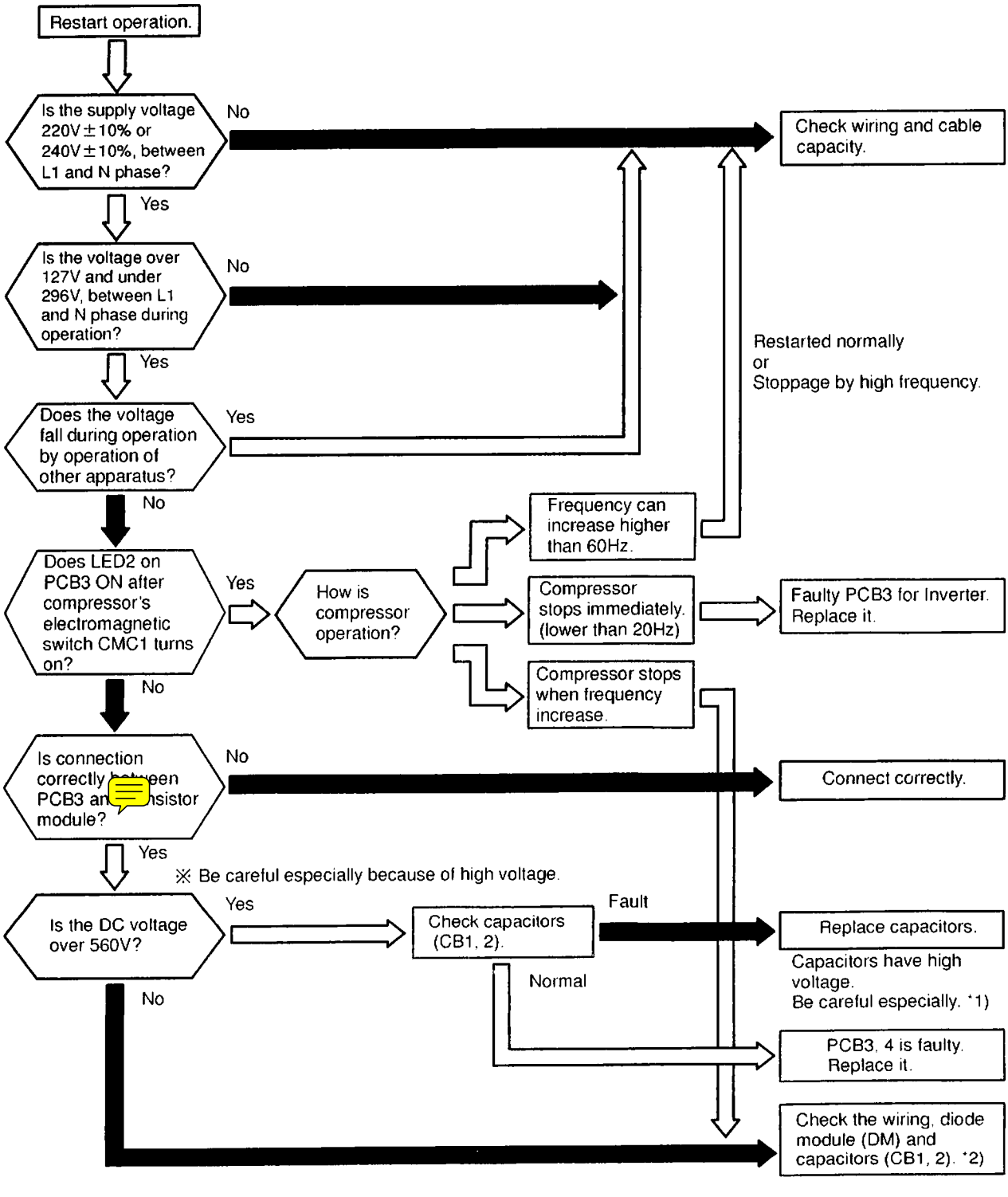




Alarm Code 06	Excessively Low or High Voltage for Inverter

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

This alarm code is indicated when voltage between terminal "P" and "N" of transistor module (IPM) is insufficient and its occurrence is three times in 30 minutes. In the case that the occurrence is smaller than 2 times, retry is performed.



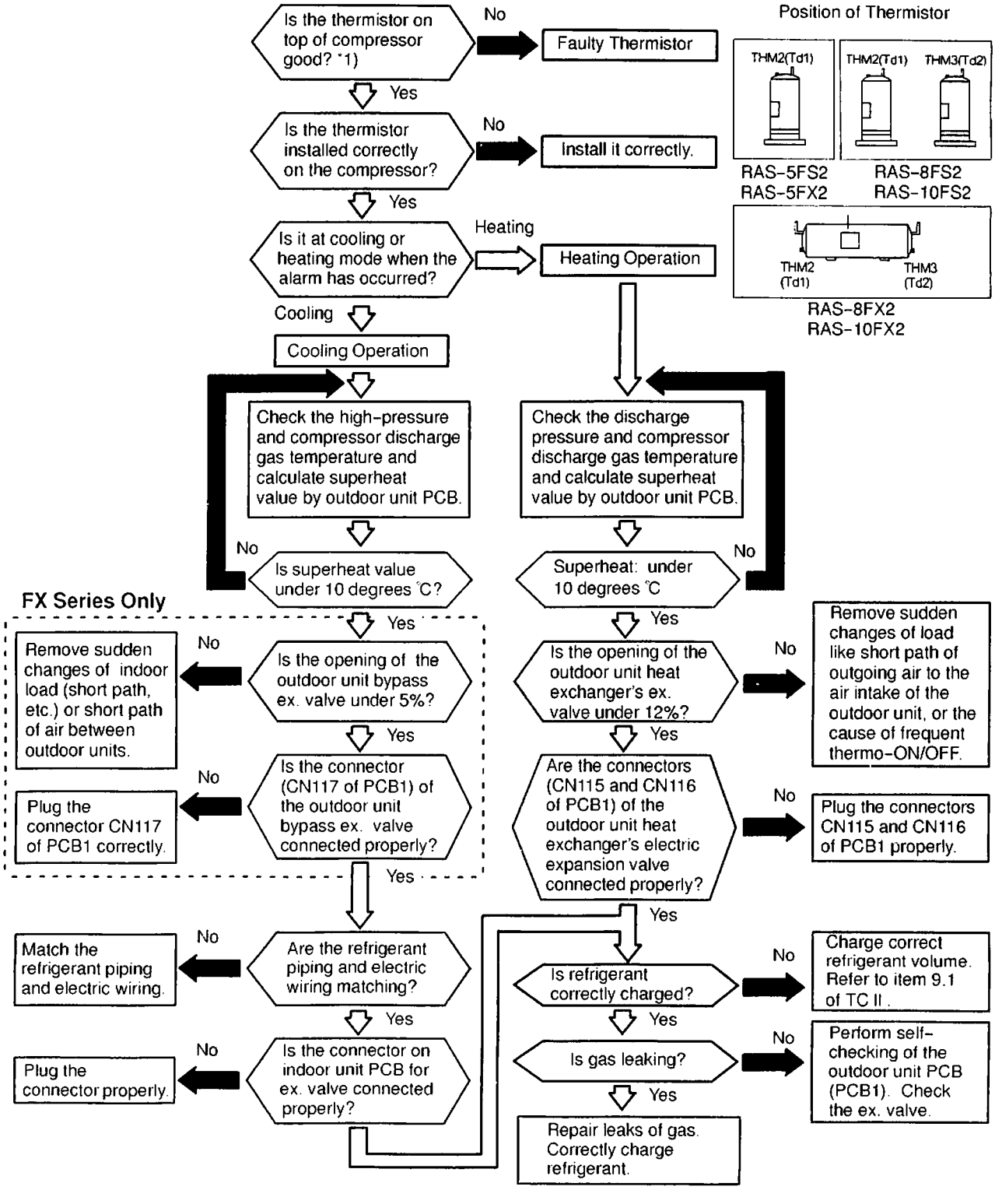
*1): If capacitor has high voltage, perform the high voltage discharge work refer to item 1.3.7.

*2): Checking procedures of diode module is indicated in item 1.3.7.

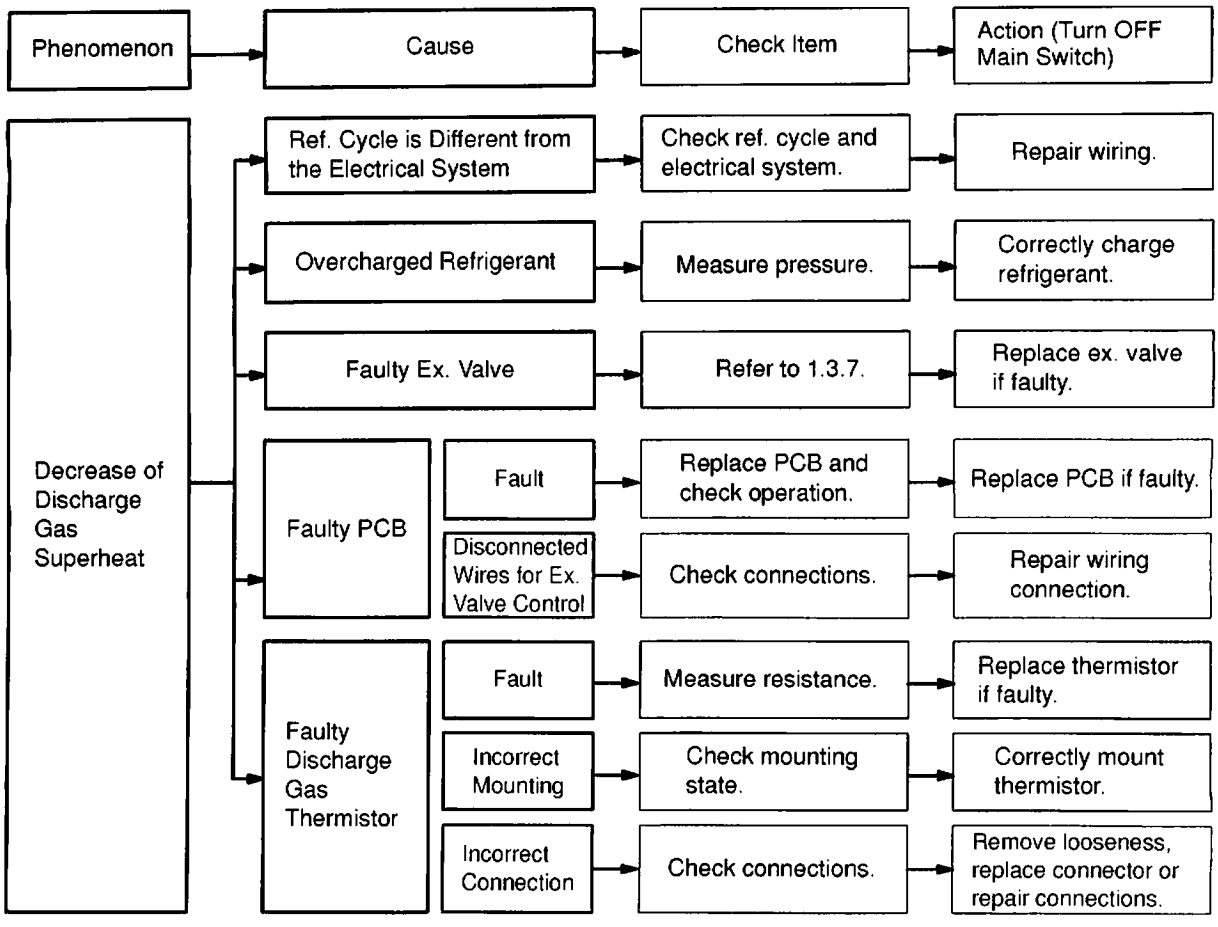
Alarm Code 07	Decrease of Discharge Gas Superheat

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★In the case that the discharge gas superheat less than 10 deg. at the top of the compressor is maintained for 1 hours, retry operation is performed. However, the alarm occurs again within two hours, this alarm code is indicated.



*1): Refer to "Characteristics of Thermistor" of page 1-42.


Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Decrease of Discharge Gas Superheat
Ref. Cycle is Different from the Electrical System
Check ref. cycle and electrical system.
Repair wiring.
Overcharged Refrigerant
Measure pressure.
Correctly charge refrigerant.
Faulty Ex. Valve
Refer to 1.3.7.
Replace ex. valve if faulty.
Faulty PCB
Fault
Replace PCB and check operation.
Replace PCB if faulty.
Disconnected Wires for Ex. Valve Control
Check connections.
Repair wiring connection.
Faulty Discharge Gas Thermistor
Fault
Measure resistance.
Replace thermistor if faulty.
Incorrect Mounting
Check mounting state.
Correctly mount thermistor.
Incorrect Connection
Check connections.
Remove looseness, replace connector or repair connections.

Alarm Code 08	Excessively High Discharge Gas Temperature at Top of Compressor Chamber

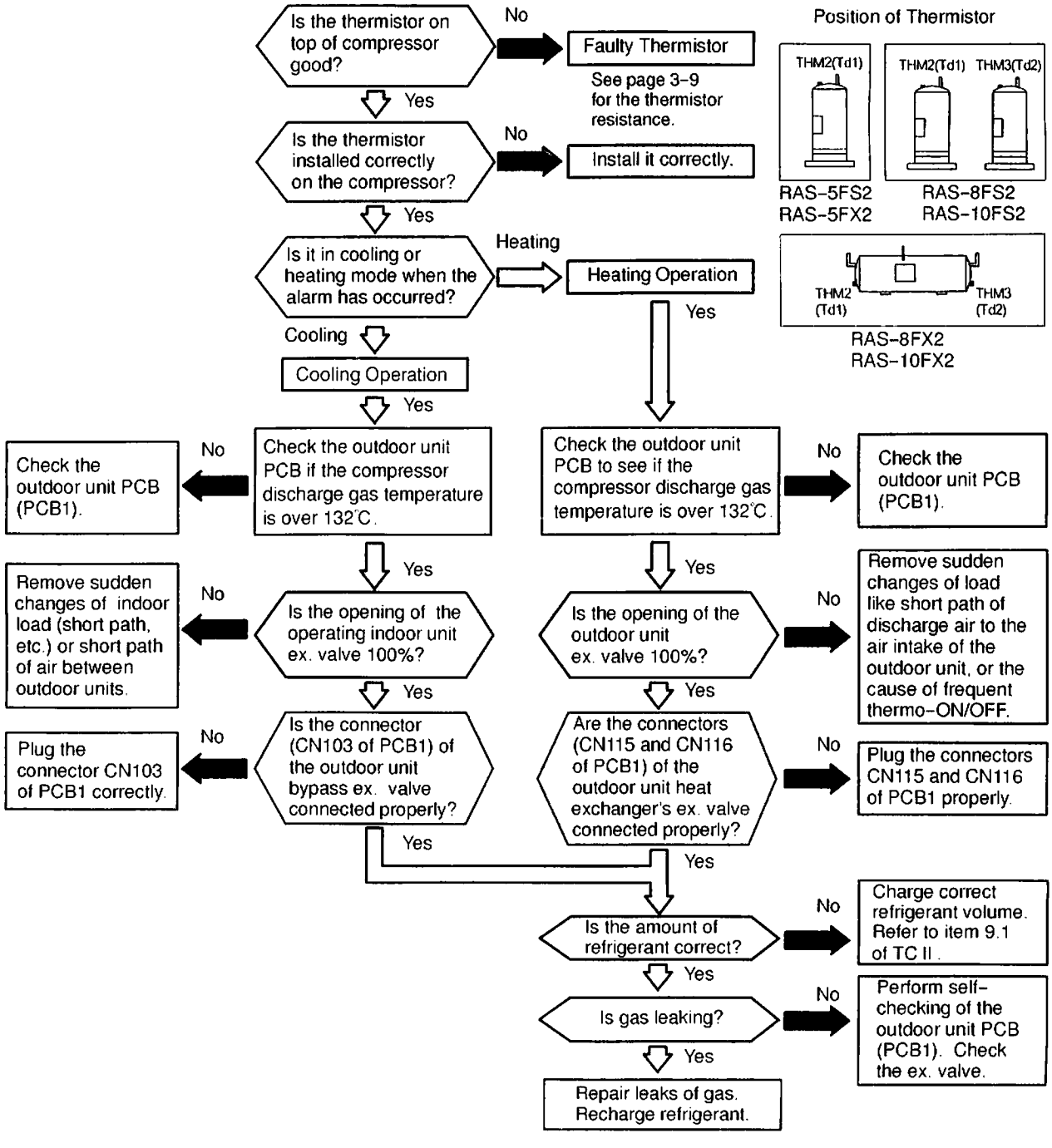
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

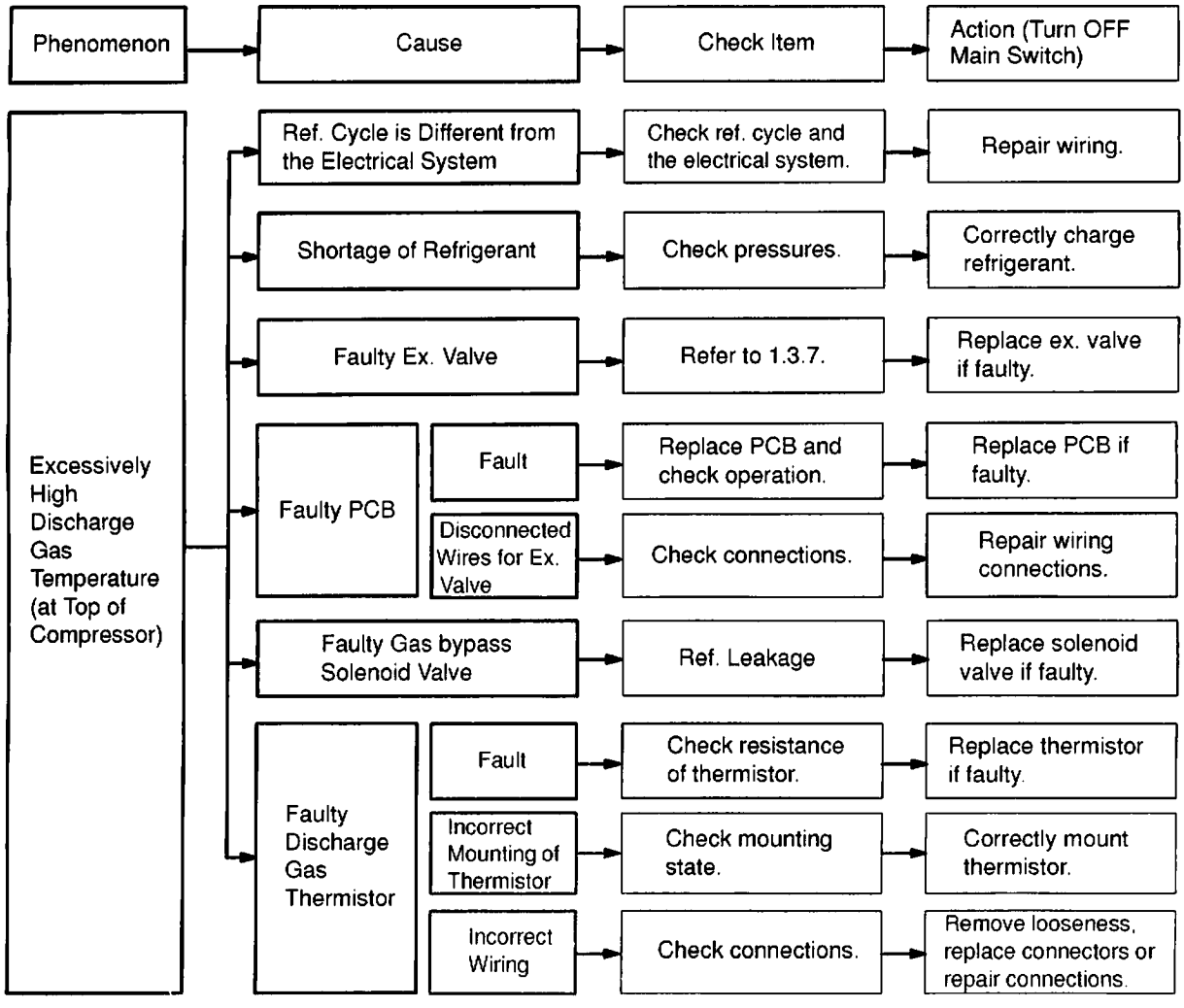
★This alarm is indicated when the following conditions occurs three times within one hour;

☐The temperature of the thermistor on the top of the compressor is maintained higher than 132℃ for 10 minutes.

or

☐The temperature of the thermistor on the top of the compressor is maintained higher than 140℃ for 5 seconds.

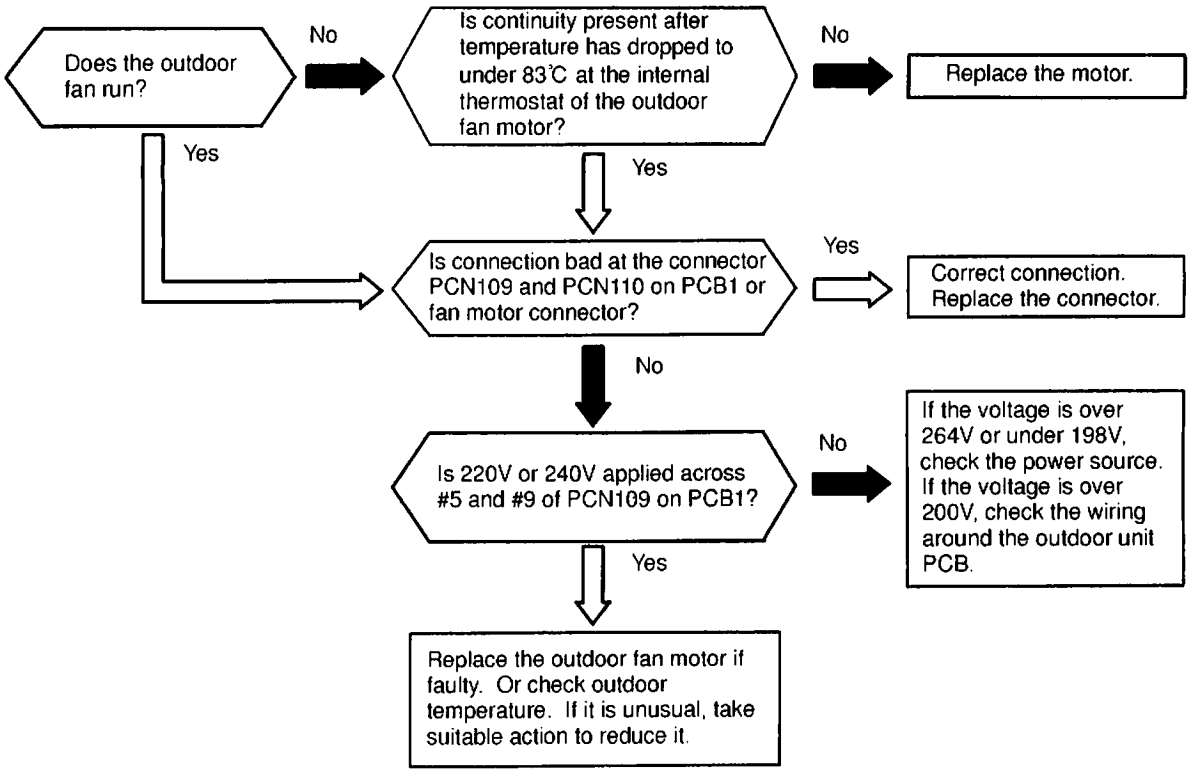



Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Excessively High Discharge Gas Temperature (at Top of Compressor)
Ref. Cycle is Different from the Electrical System
Check ref. cycle and the electrical system.
Repair wiring.
Shortage of Refrigerant
Check pressures.
Correctly charge refrigerant.
Faulty Ex. Valve
Refer to 1.3.7.
Replace ex. valve if faulty.
Faulty PCB
Fault
Replace PCB and check operation.
Replace PCB if faulty.
Disconnected Wires for Ex. Valve
Check connections.
Repair wiring connections.
Faulty Gas bypass Solenoid Valve
Ref. Leakage
Replace solenoid valve if faulty.
Faulty Discharge Gas Thermistor
Fault
Check resistance of thermistor.
Replace thermistor if faulty.
Incorrect Mounting of Thermistor
Check mounting state.
Correctly mount thermistor.
Incorrect Wiring
Check connections.
Remove looseness, replace connectors or repair connections.

Alarm Code 09	Activation of Protection Device for Outdoor Fan Motor

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the temperature of the internal thermostat for the outdoor fan motor is higher than 130°C

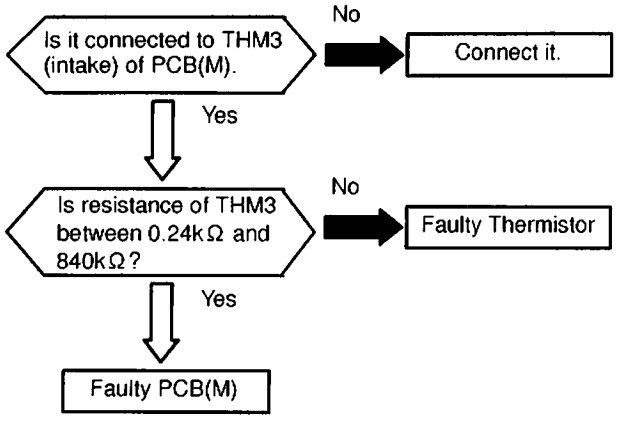


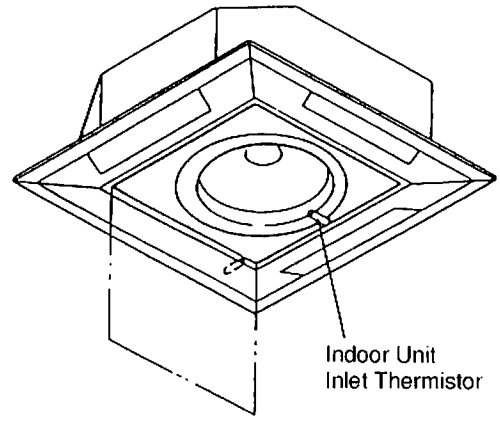
Phenomenon	Cause		Check Item	Action (Turn OFF Main Switch)
Activation of Internal Thermostat for Outdoor Unit Fan Motor	Faulty Outdoor Unit Fan Motor		Measure coil resistance and insulation resistance.	Replace motor if faulty.
	Faulty Internal Thermostat	Fault	Check continuity after Fan motor temperature decreases to room temp.	Replace fan motor if no continuity.
		Insufficient Contacting	Measure resistance by tester.	Correct Looseness. replace connectors.
		Incorrect Connection	Check connections.	Repair connections.

Alarm Code	Abnormality of Thermistor for Indoor Unit Inlet Air Temperature (Air Inlet Thermistor)

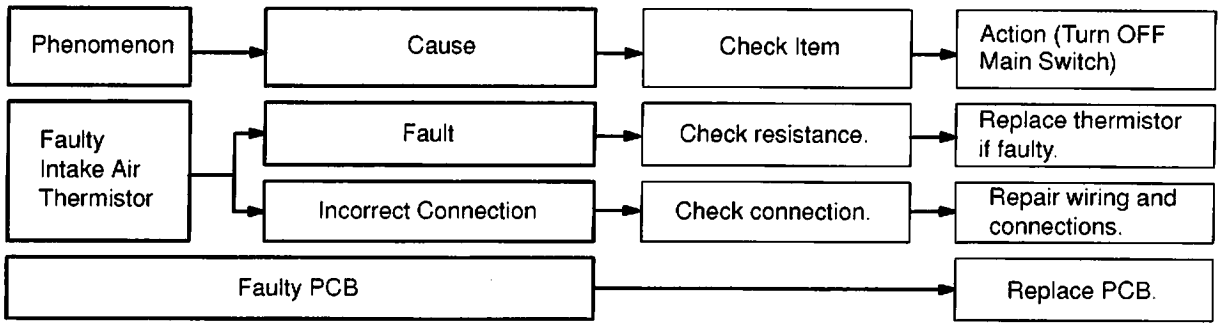
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

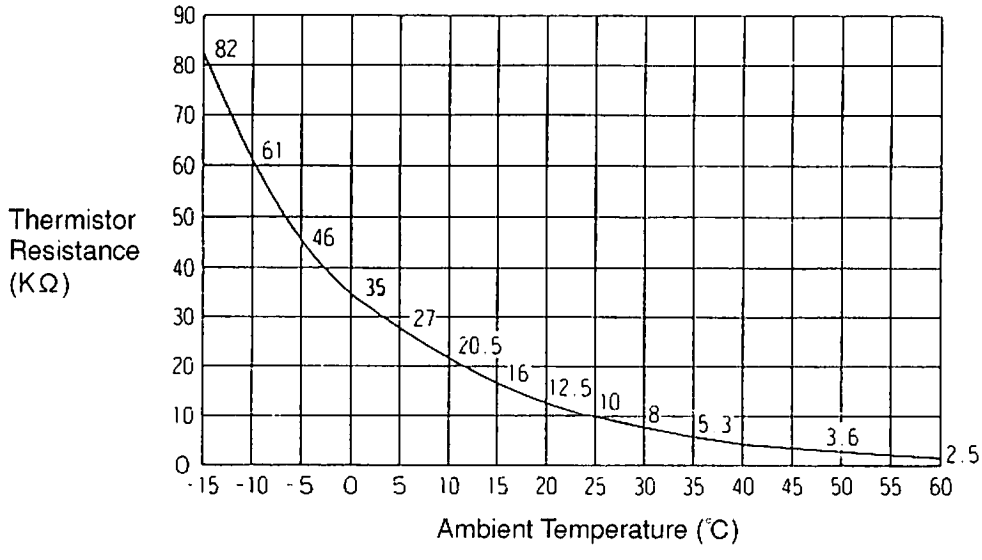
★This alarm code is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling or heating operation.





In Case of 4-Way Casette



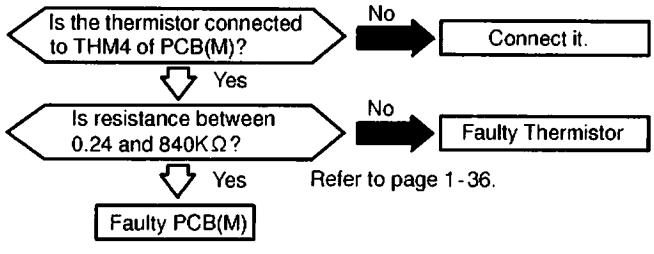


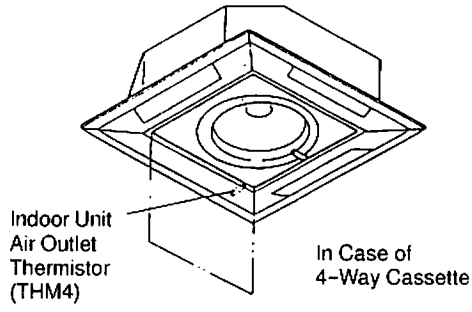
NOTE: This data is applicable to the following thermistors;
1. Indoor Unit Discharge Air Temperature, 2. Indoor Unit Liquid Refrigerant Temperature, 3. Indoor Unit Intake Air Temperature 4. Outdoor Air Temperature 5. Outdoor Unit Evaporating Temperature, 6. Indoor Unit Gas Piping

Alarm Code 12	Abnormality of Thermistor for Indoor Unit Discharge Air Temperature (Air Outlet Thermistor)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the heating operation.



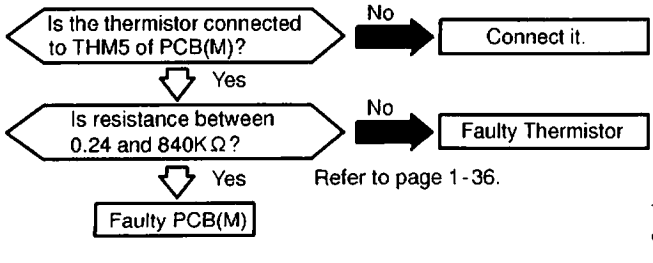


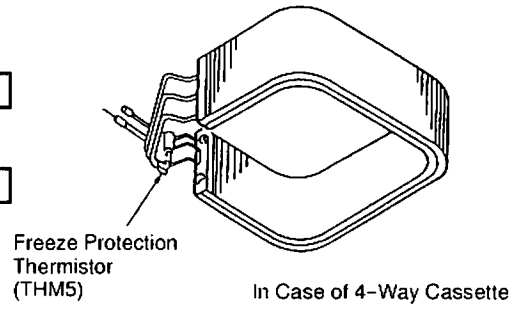
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Air Outlet Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB			Replace PCB.

Alarm Code 13	Abnormality of Thermistor for Indoor Unit Heat Exchanger Liquid Refrigerant Pipe Temperature (Freeze Protection Thermistor)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling operation(or heating operation at start-up only) and this state is maintained for 10 minutes.



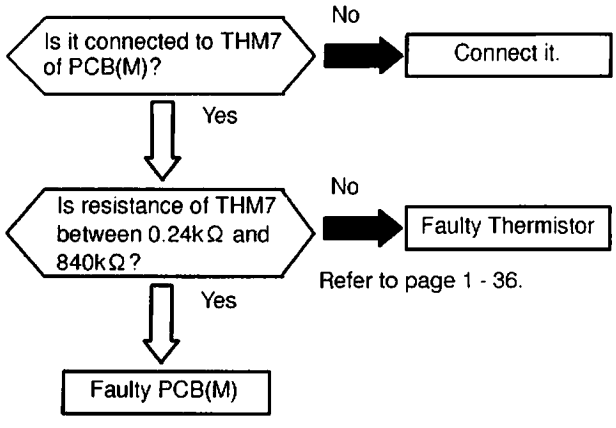


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Freeze Protection Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB			Replace PCB.

Alarm Code 14	Abnormality of Thermistor for Indoor Unit Heat Exchanger Gas Refrigerant Pipe Temperature (Gas Piping Thermistor)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling or heating operation. The system is automatically restarted when the fault is removed.

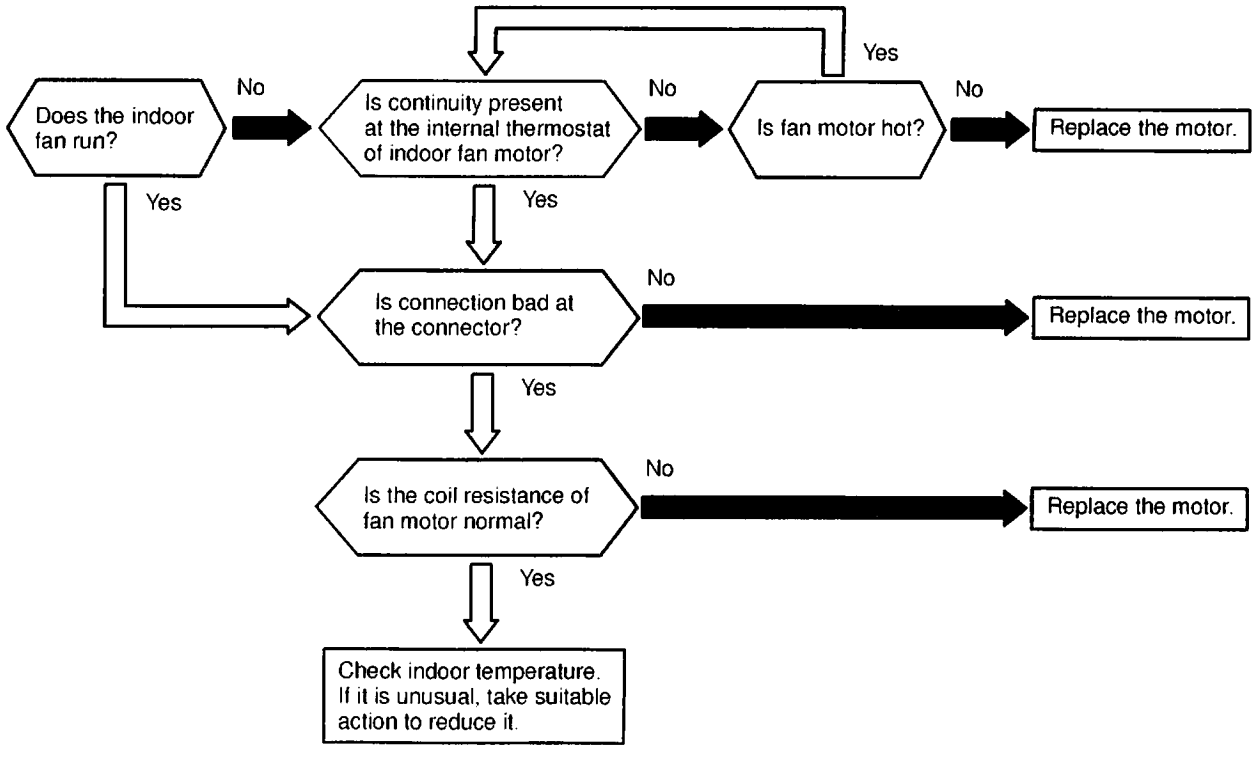


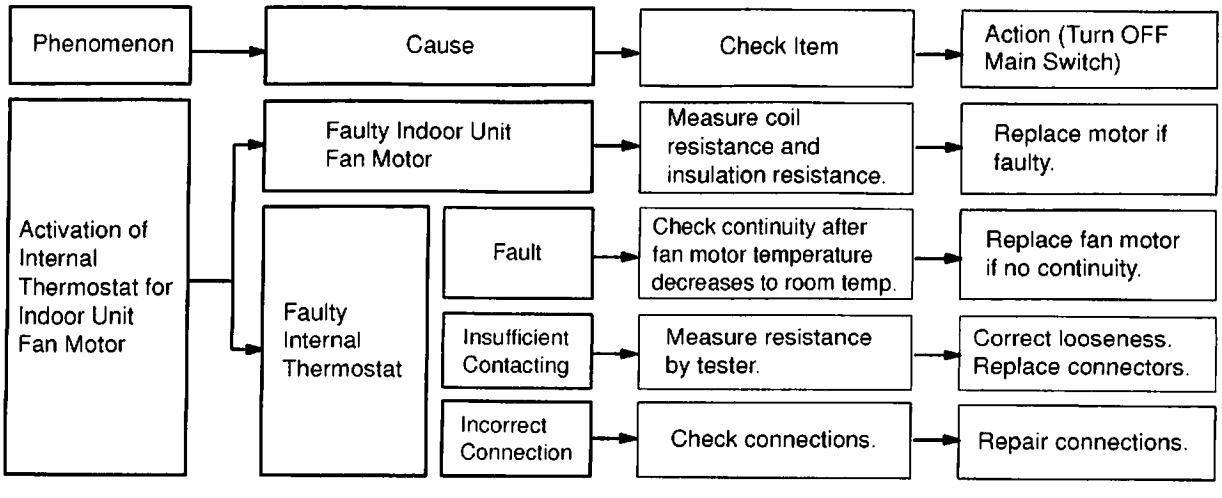
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Thermistor for Indoor Unit Heat Exchanger Gas Pipe Temp.	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB			Replace PCB.

Alarm Code 19	Activation of Protection Device for Indoor Fan Motor

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when the temperature of the internal thermostat for the indoor fan motor is higher than 130℃

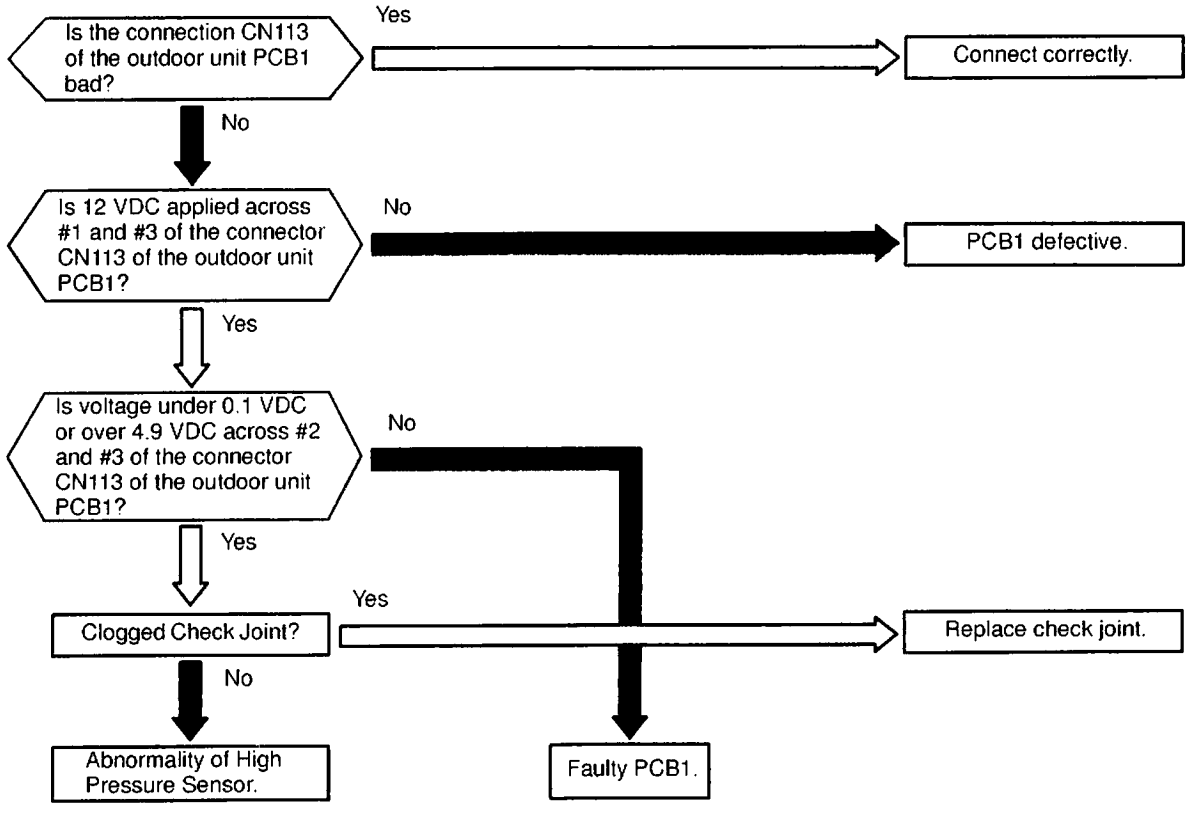




Alarm Code 21	Abnormality of High Pressure Sensor for Outdoor Unit

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when the pressure sensor voltage decreases lower than 0.1 V or increases higher than 4.9V during running.

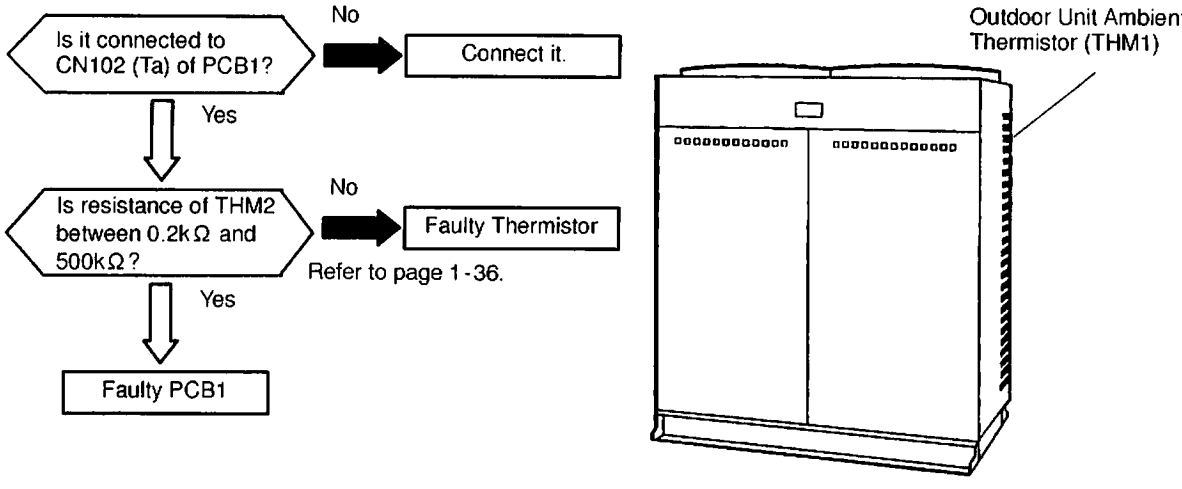


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty High Pressure Sensor	Fault	Check output voltage is correct.	Replace pressure sensor if faulty
	Incorrect Connection	Check connections.	Repair wiring and connections.
Faulty PCB			Replace PCB.
Indicated Pressure Value is Excessively High or Low	Malfunction of Pressure Sensor due to Faulty Check Joint	Check for clogging of check joint.	Replace check joint.

Alarm Code 22	Abnormality of Thermistor for Outdoor Air Temperature (Outdoor Unit Ambient Thermistor)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the thermistor is short-circuited (less than 0.2 kΩ) or cut (greater than 500 kΩ) during running. However, this alarm occurs during test running mode only. In the case that the thermistor is abnormal during running, operation continues based on the assumption that the outdoor temperature, is 35 ℃(Cooling) / 6 ℃(Heating).



Regarding the thermistor characteristics, refer to page 1-42.

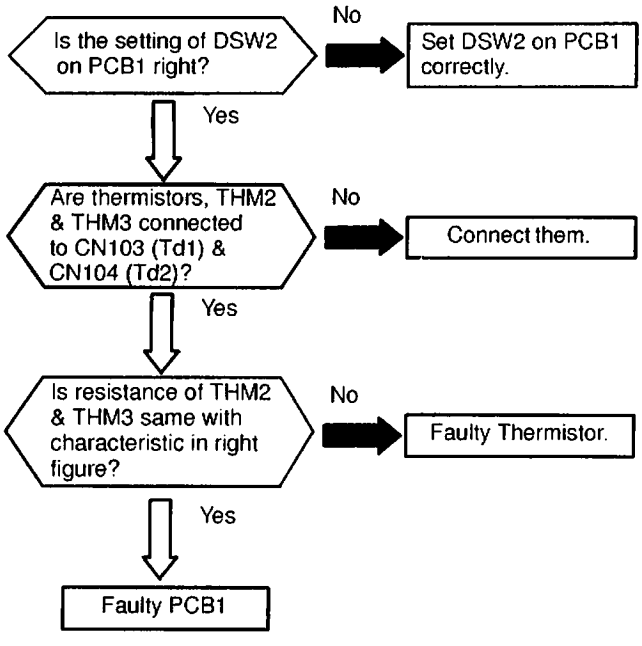
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Thermistor for Outdoor Unit Ambient	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB			Replace PCB.

Alarm Code 23	Abnormality of Thermistor for Discharge Gas Temperature on Top of Compressor Chamber

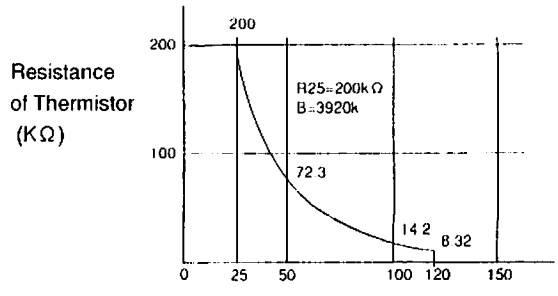
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the thermistor is short-circuited (less than 0.9 kΩ) or cut (greater than 2,350 kΩ) during running.

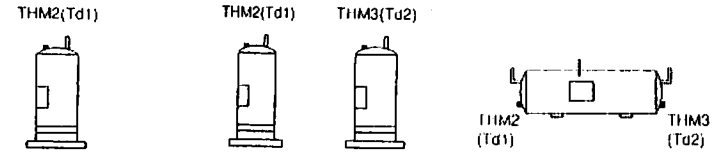
If abnormality with the thermistor is found, check all the thermistors as shown below.



Characteristics of Thermistor



Position of Thermistor



RAS-5FS2
RAS-5FX2

RAS-8FS2
RAS-10FS2

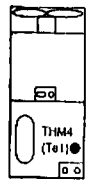
RAS-8FX2
RAS-10FX2

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Discharge Gas Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB			Replace PCB.
Incorrect Setting of DSW2 on PCB1		Check setting of DSW2 on PCB1.	Correctly set DSW2 on PCB1.

Alarm Code 24	Abnormality of Thermistor for Evaporating Temperature during Heating Operation (Outdoor Unit)

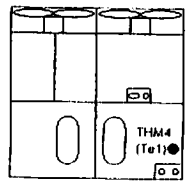
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.
- One evaporating thermistor (FS2 Series) during the heating operation is attached to the heat exchanger. Two evaporating thermistors (FX2 Series) during the heating operation are attached to the upper heat exchanger (for liquid) and the lower heat exchanger (for liquid). If one of the two is faulty, this alarm is indicated. Therefore, if this alarm occurs check two thermistors at the same time. The position is indicated below.

★This alarm code is indicated when the thermistor is short-circuited (less than 0.2 kΩ) or cut (greater than 500 kΩ) during running.



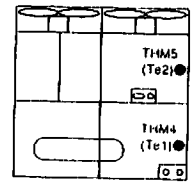
THM4

RAS-5FS2 and RAS-5FX2



THM4

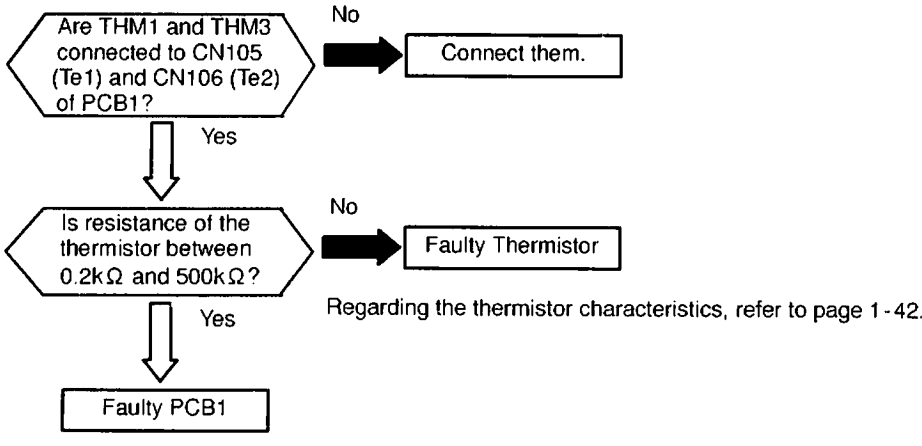
RAS-8FS2, RAS-10FS2



THM5

THM4

RAS-8FX2 and RAS-10FX2



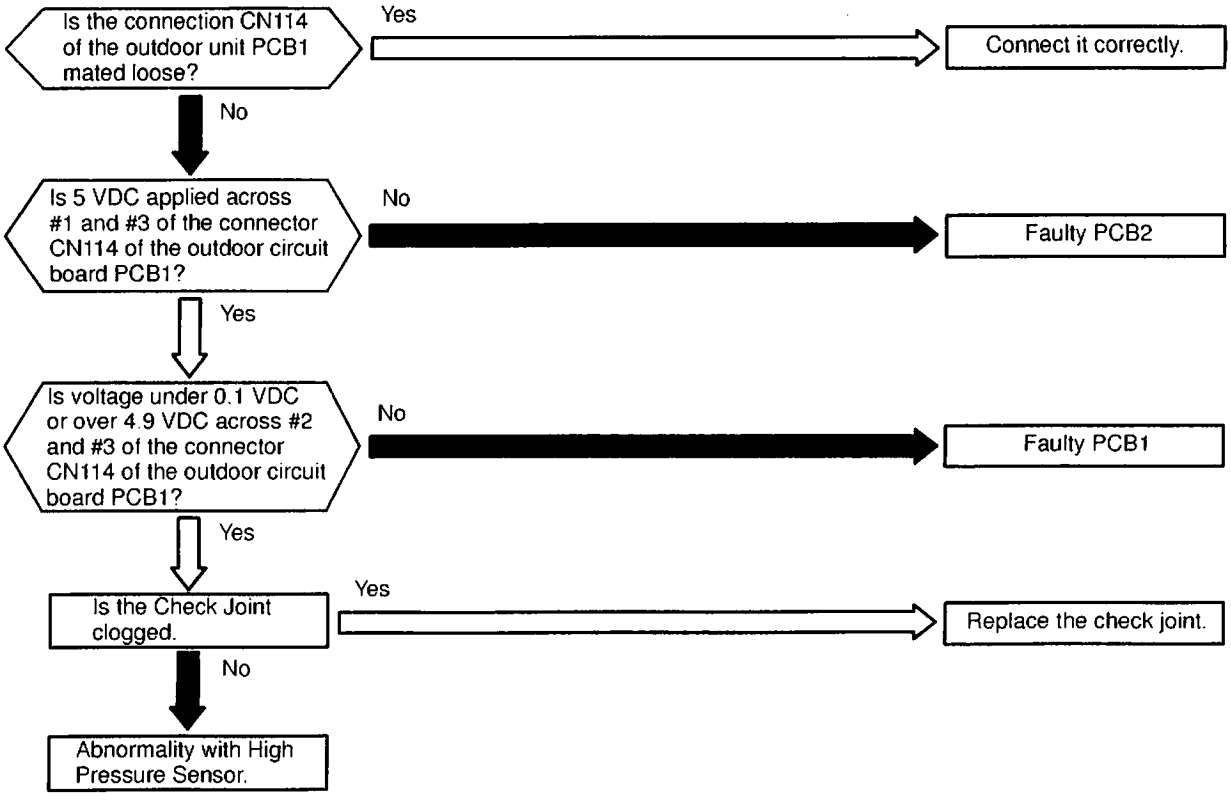
Regarding the thermistor characteristics, refer to page 1-42.

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Thermistor for Evaporating Temperature during Heating	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB			Replace PCB.

Alarm Code 29	Abnormality of Low Pressure Sensor (Outdoor Unit)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the pressure sensor voltage decreases lower than 0.1 V or increases higher than 4.9V during running.



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty High Pressure Sensor	Fault	Check output voltage is correct.	Replace pressure sensor if faulty.
	Incorrect Connection	Check connections.	Repair wiring and connections.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.
Indicated Pressure Value is Excessively High or Low	Malfunction of Pressure Sensor due to Faulty Check Joint	Check for clogging of check joint.	Replace Check joint.

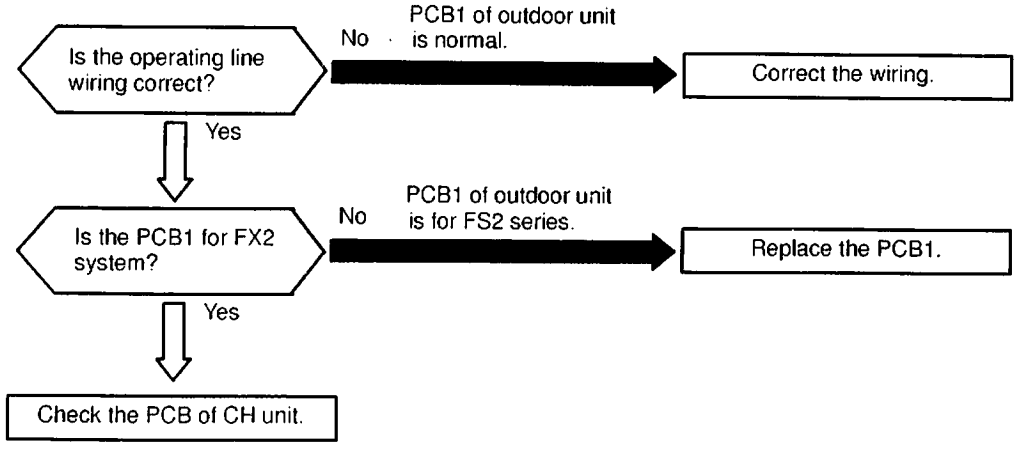
FX2 SYSTEM

Alarm Code 30	Incorrect Wiring Connection

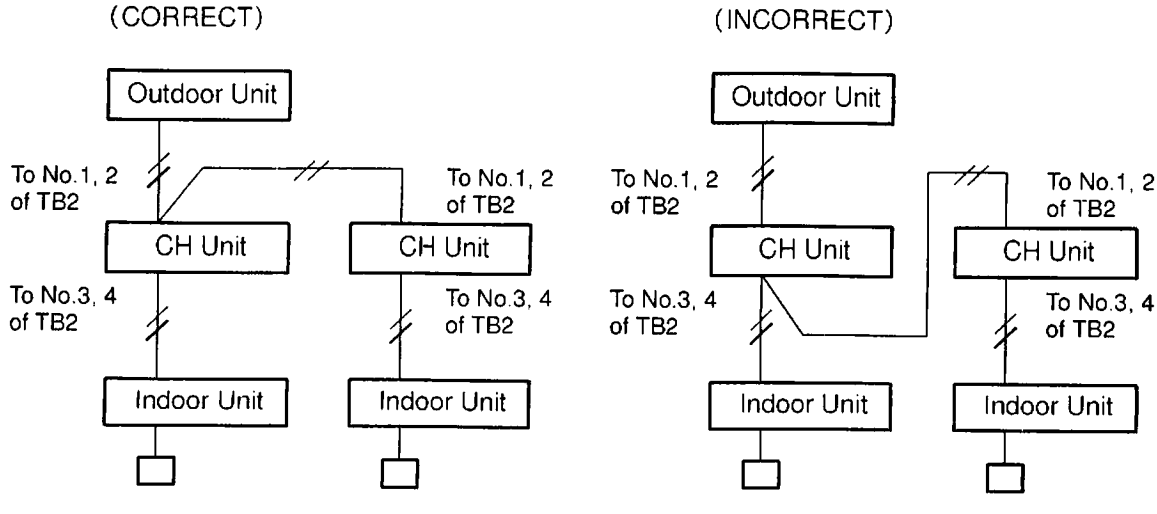
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when two or more CH units exist between outdoor unit and indoor unit in the operating line, caused by incorrect wiring.

★This alarm code is indicated when PCB1 for FS2 series outdoor unit is mounted by mistake.



〈Example of Operating Line Wiring〉

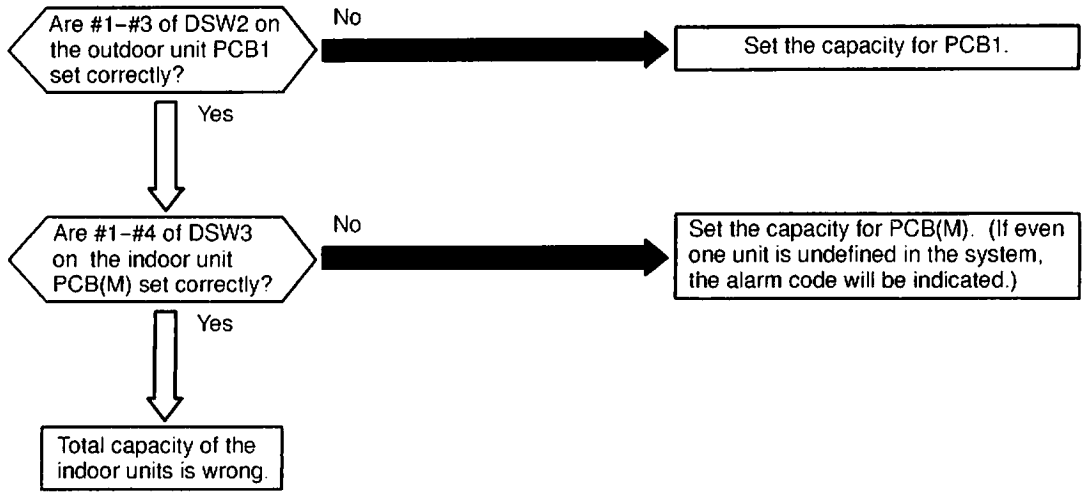


Alarm Code 31	Incorrect Capacity Setting or Combined Capacity between Indoor Units and Outdoor Unit

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the capacity setting dip switch, DSW2 on the outdoor unit PCB, PCB1 is not set(all the settings from #1 to #3 are OFF).

★This alarm code is indicated when the total indoor unit capacity is smaller than 50% or greater than 130% of the combined outdoor unit capacity.



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Incorrect Capacity Setting of Indoor Unit		Check combination of indoor units and capacity setting on PCB.	Correctly set dip switch, DSW3.
Incorrect Capacity Setting of Outdoor Unit		Check capacity setting on outdoor unit PCB.	Correctly set dip switch, DSW2.
Total Indoor Unit Capacity Connected to the Outdoor Unit is Beyond Working Range		Check outdoor unit model by calculating total indoor units capacity.	Ensure that total indoor unit capacity is from 50% to 130%.

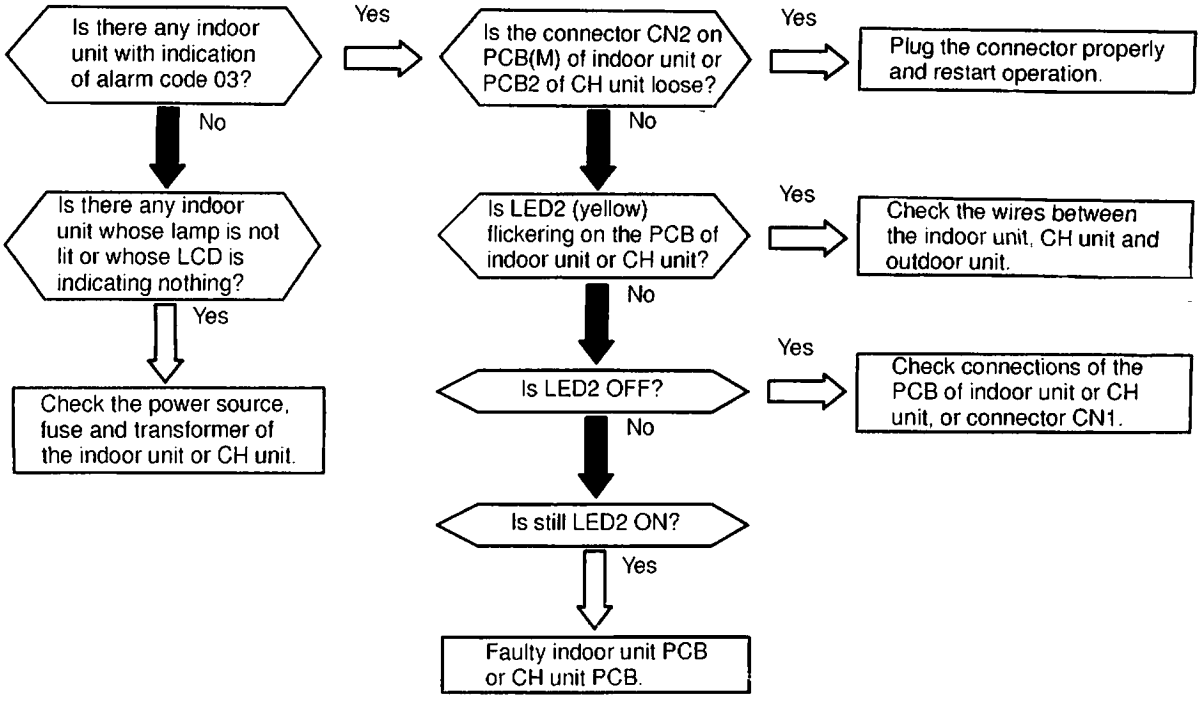
Combination

Outdoor Unit Model	Combined Indoor Unit		Notes
	Total Q'ty	Total Capacity (HP)	
RAS-5FS2, RAS-5FX2	2-8 sets *1)	2.5-6.5	*1): If the capacity of one indoor unit is the same as of the outdoor unit, the system can be operated.
RAS-8FS2	2-12 sets	4-10	
RAS-10FS2		5-13	
RAS-8FX2	2-8 sets	4-10	
RAS-10FX2		5-13	

Alarm Code 32	Abnormality in Transmitting of Other Indoor Units

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated on the remote control switch of other indoor unit when no transmitting data is issued from a malfunctioning indoor unit or CH unit for more than 60 minutes after receiving transmitting data from the indoor unit.



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Abnormal Transmitting from Other Units	Abnormal Transmitting Indoor Unit→Outdoor Unit Outdoor Unit→Indoor Unit	Check indoor unit showing alarm code "03".	Take action according to Pages 1-23 to 1-26.
	Incorrect Power Supply (to Indoor Unit or CH Unit) *1)	Check indoor unit showing no light ON on remote control switch.	Take action according to Page 1-8, 9.
	Faulty Indoor Unit PCB or CH Unit PCB	If all indoor unit show alarm code 32, check PCB by self-checking mode for all indoor unit or CH unit.	Replace PCB if faulty.

*1): This abnormality is indicated on an indoor unit which is normal, since this is due to abnormality of transmitting of the indoor units or power source abnormality in the same refrigeration cycle and electrical system. If the power source is abnormal, abnormality can not be indicated by its indoor unit, so, this alarm is indicated on the remote control switch of other indoor unit.

Alarm Code 35	Incorrect Indoor Unit No. Setting

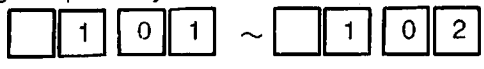
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated 10 minutes after power is supplied to the outdoor unit when the indoor unit No. connected to the outdoor unit is duplicated by setting of DSW1.

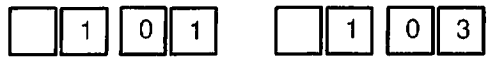
Indication of 7-Segment in Outdoor Unit when Unit Nos. are Duplicated

(1)The followings are indicated for 10 minutes after power is supplied to the outdoor unit.

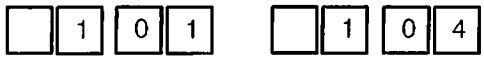
1) The following is repeatedly indicated when NO.1 indoor unit setting is duplicated



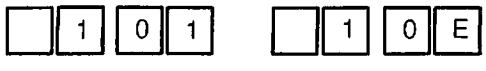
2) The following is repeatedly indicated when NO.2 indoor unit setting is duplicated



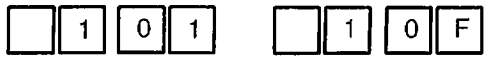
3) The following is repeatedly indicated when NO.3 indoor unit setting is duplicated



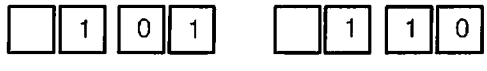
13) The following is repeatedly indicated when NO.D indoor unit setting is duplicated



14) The following is repeatedly indicated when NO.E indoor unit setting is duplicated

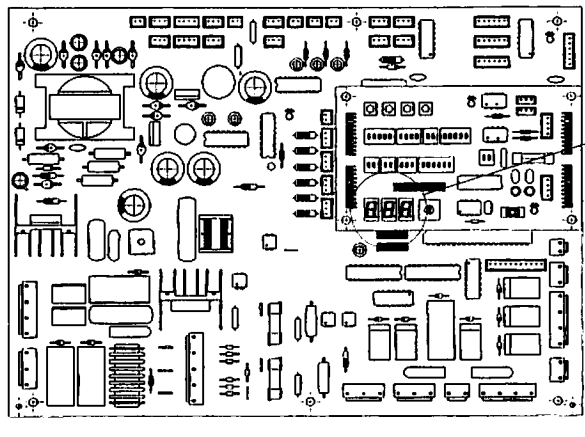


15) The following is repeatedly indicated when NO.F indoor unit setting is duplicated



(2)After 10 minutes, 「35」 flickers. This 「35」 is also flickered on the remote control switch.

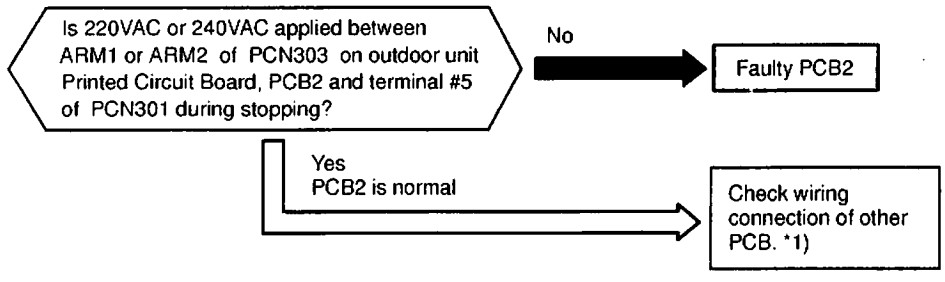
Outdoor Unit PCB
(PCB1: Control)



Alarm Code 38	Abnormality of Picking up Circuit for Protection (Outdoor Unit)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when AC 220V or 240V is supplied to voltage between terminal #3 of PCN105 on PCB1 and faston terminal N on PCB1 in the outdoor unit during stoppage.



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Abnormality of Picking up Circuit for Protection	Incorrect Connection	Check voltage supplied to connectors.	Repair wiring connections.
Faulty PCB			Replace PCB.

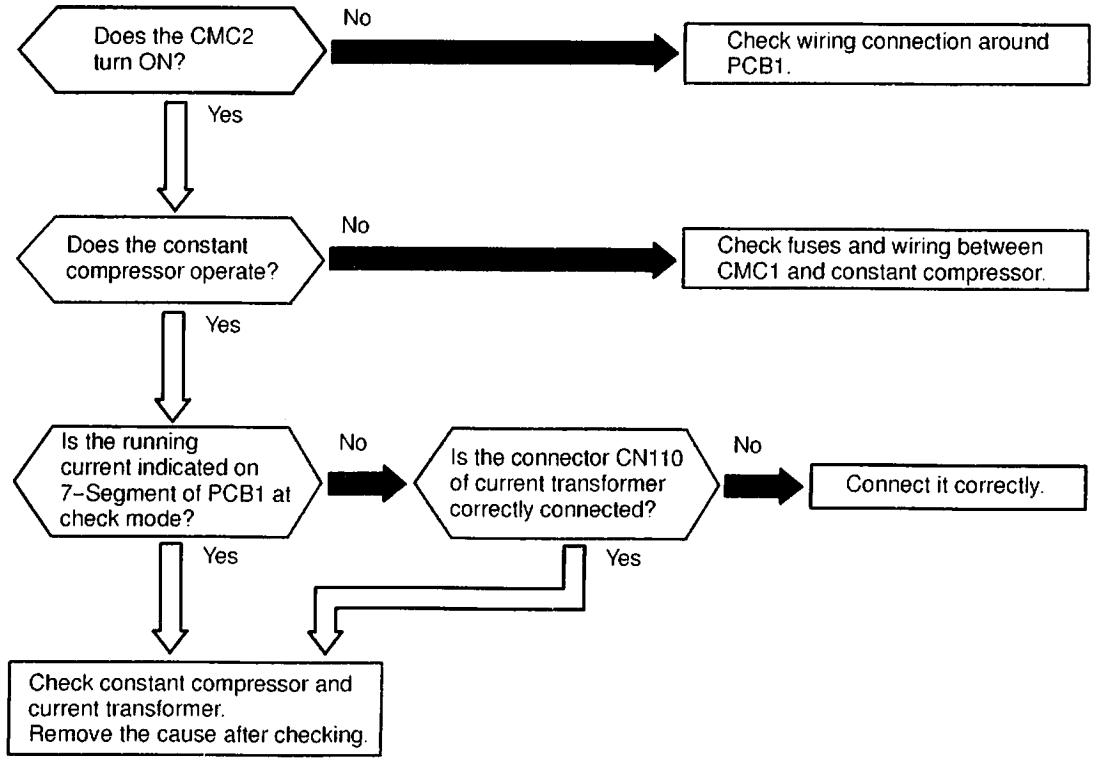
*1): Check wiring system connecting to PCN105 on PCB1.

Alarm Code 39	Abnormality of Running Current at Constant Compressor

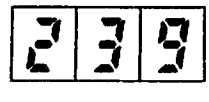
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when the following conditions occurs three times within one hour.

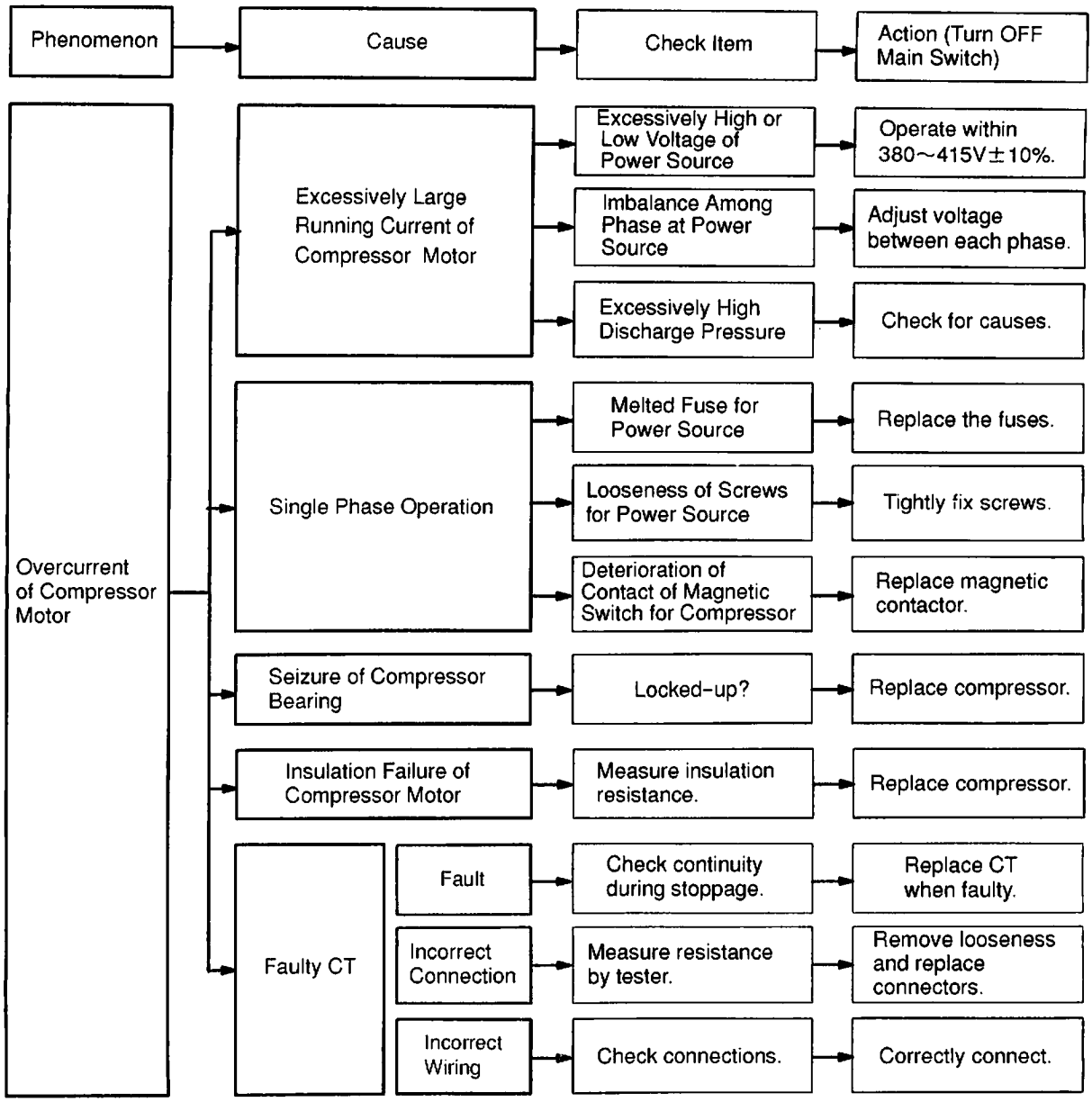
- The running current of the constant compressor exceeds the value of overcurrent limitation during operating.
- The running current of the constant compressor is less than 1A during operating.



Indication of 7-Segment



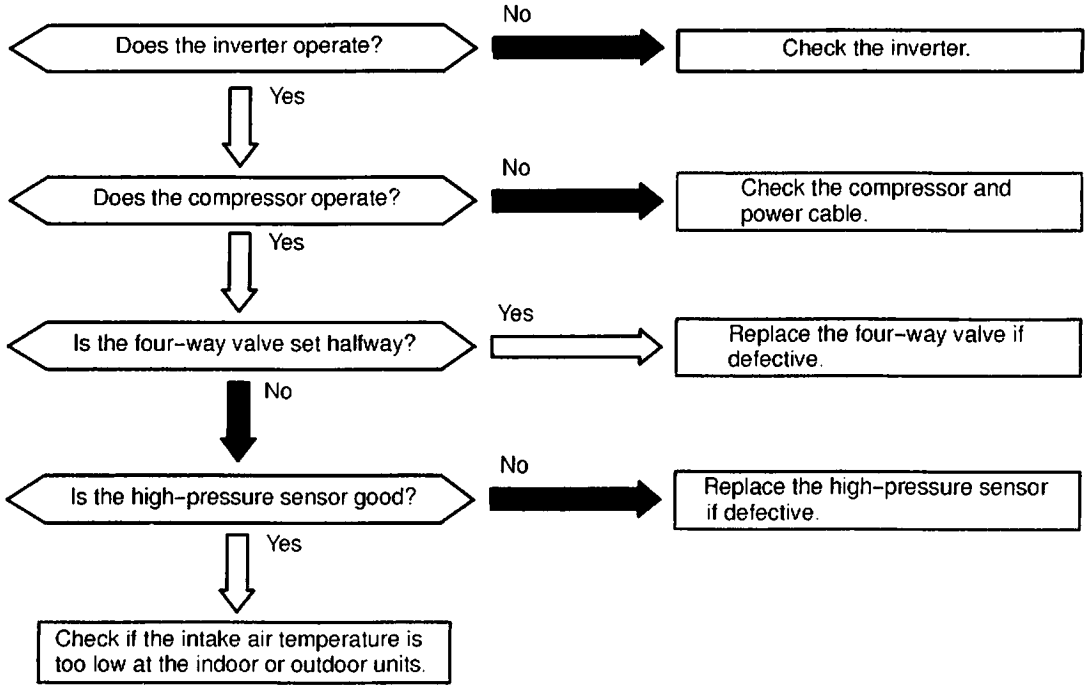
Abnormality of Constant Compressor


Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Overcurrent of Compressor Motor
Excessively Large Running Current of Compressor Motor
Excessively High or Low Voltage of Power Source
Operate within 380~415V±10%.
Imbalance Among Phase at Power Source
Adjust voltage between each phase.
Excessively High Discharge Pressure
Check for causes.
Single Phase Operation
Melted Fuse for Power Source
Replace the fuses.
Looseness of Screws for Power Source
Tightly fix screws.
Deterioration of Contact of Magnetic Switch for Compressor
Replace magnetic contactor.
Seizure of Compressor Bearing
Locked-up?
Replace compressor.
Insulation Failure of Compressor Motor
Measure insulation resistance.
Replace compressor.
Faulty CT
Fault
Check continuity during stoppage.
Replace CT when faulty.
Incorrect Connection
Measure resistance by tester.
Remove looseness and replace connectors.
Incorrect Wiring
Check connections.
Correctly connect.

Alarm Code 43	Activation to Protect System from Low Compression Ratio

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when a compression ratio , ε = {Pd /(Ps + 1.03)} is calculated from a discharge pressure(kg/cm^{2}G) and suction pressure(kg/cm^{2}G) and the condition lower than ε = 1.8 occurs more than 3 times including 3 in one hour.

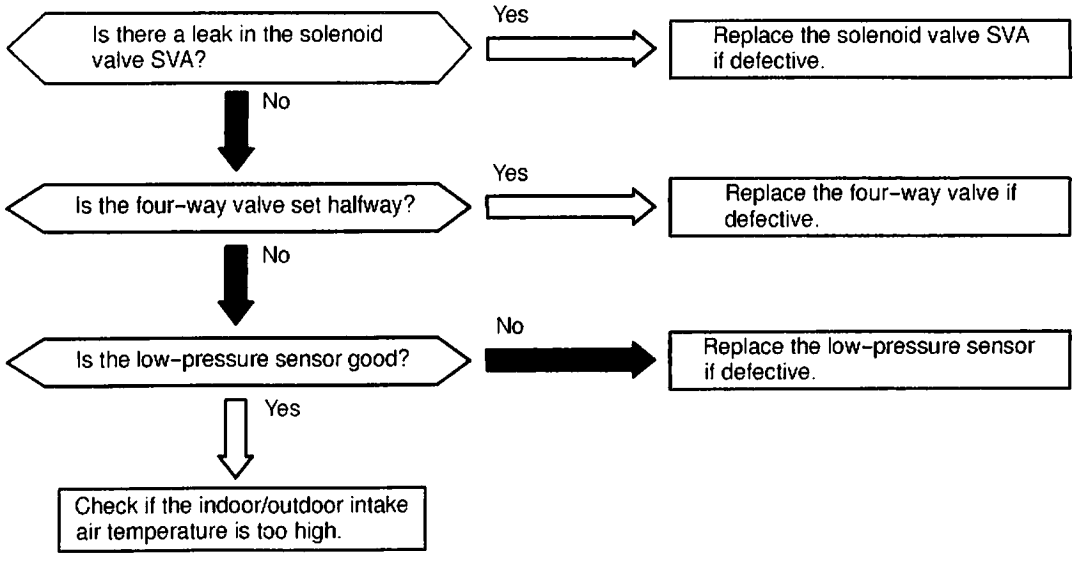


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Compression Ratio	Inverter is not Functioning	Check inverter.	Repair faulty part.
	Compressor is not Operating	Check compressor.	Replace comp. if faulty.
	Valve Stoppage at Medium Position of 4-Way Valve	Measure suction pipe temp. of 4-way valve.	Replace 4-way valve if faulty.
	Abnormality of High or Low Pressure Sensor	Check connector for PCB, power source and pressure indication.	Replace sensor if faulty.
	Excessively Low Indoor Intake Air Temperature	Check indoor unit and outdoor unit air temp. thermistor.	Replace thermistor if faulty.
	Leakage from Solenoid Valve: SVA Outdoor Unit or SVD1, SVD2 of CH Unit	Check refrigerant leakage.	Replace SVA or CH unit if leaking.

Alarm Code 44	Activation to Protect System from Excessively High Suction Pressure

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the compressor is operated under the conditions higher than 0.88 MPa (9 kg/cm2G) of suction pressure and its occurrence is more than 3 times including 3 in one hour.

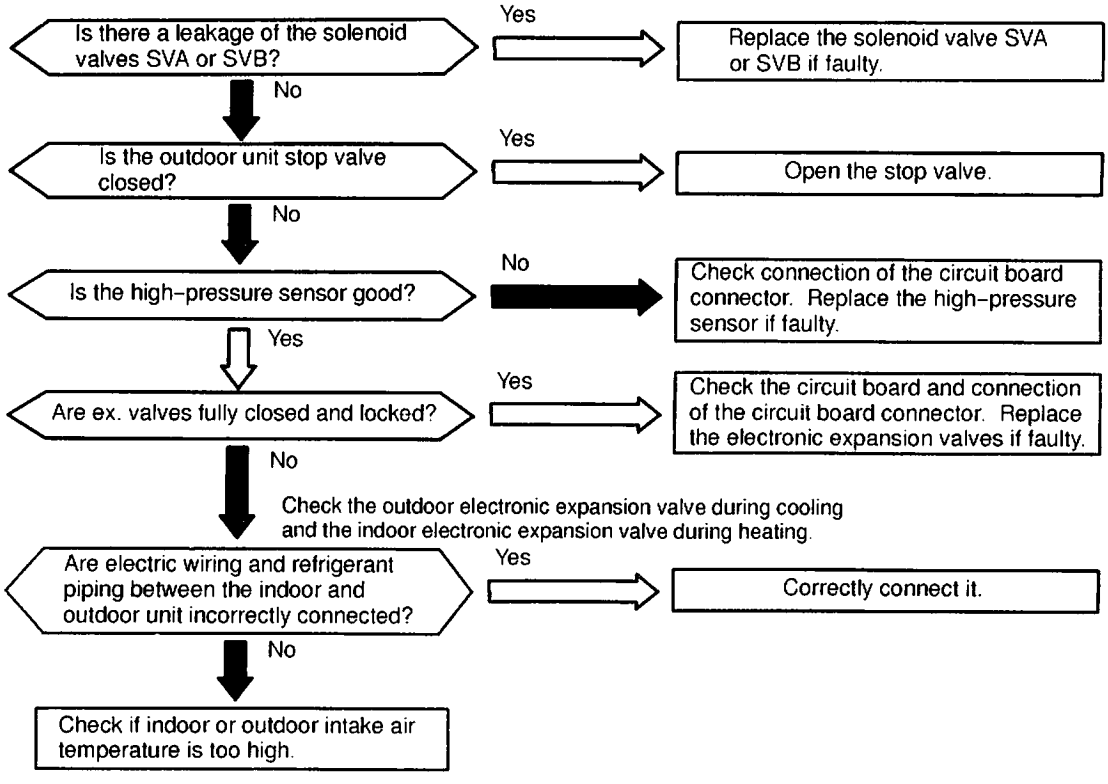


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively High Suction Pressure	Leakage of Solenoid Valve SVA	Check outlet pipe temp. of solenoid valve, SVA.	Check connecting wires. Replace solenoid valve, SVA if faulty.
	Valve Stoppage at Medium Position of 4-Way Valve	Measure suction gas pipe temp. of 4-way valve.	Replace 4-way valve if faulty.
	Abnormal Suction Pressure Sensor	Check connectors of PCB and power source.	Replace sensor if faulty.
	Excessively High Indoor Unit and Outdoor Unit Air Temperature	Check indoor unit and outdoor unit air temp. thermistor.	Replace thermistor if faulty.
	Leakage from Solenoid Valve: SVD1, SVD2 of CH Unit	Check refrigerant leakage.	Replace CH unit if leaking.

Alarm Code 45	Activation to Protect System from Excessively High Discharge Pressure

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the compressor is operated under the conditions higher than 2.65 MPa (27 kg/cm2G) of discharge pressure (in case of frequency 20 to 30Hz, Pd is higher than 2.45 MPa (25 kg/cm2G) and its occurrence is more than 3 times including 3 in one hour).



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively High Discharge Pressure	Leakage of Solenoid Valve SVA, SVB (Outdoor Unit)	Check outlet temp. of solenoid valve, SVA & SVB.	Check connection. Replace solenoid valve SVA or SVB if faulty.
	Closed Stop Valve	Check stop valve.	Open stop valve.
	Abnormal High Pressure Sensor	Check connectors for PCB.	Replace pressure sensor if faulty.
	Excessively High Indoor Unit and Outdoor Unit Inlet Air Temp.	Check thermistor for indoor unit and outdoor unit inlet air temp.	Replace thermistor if faulty.
	Incorrect Connection between Indoor Unit and Outdoor Unit	Check electrical system and ref. cycle.	Correctly Connect.
	Locked Ex. Valve	Check connector for PCB.	Repair connector for PCB or ex. valve. Replace it if faulty.
	Fully Open of Solenoid Valve SVD1 (CH Unit for FX)	Check solenoid valve SVD1 open in heating.	Replace coil or CH unit if faulty.

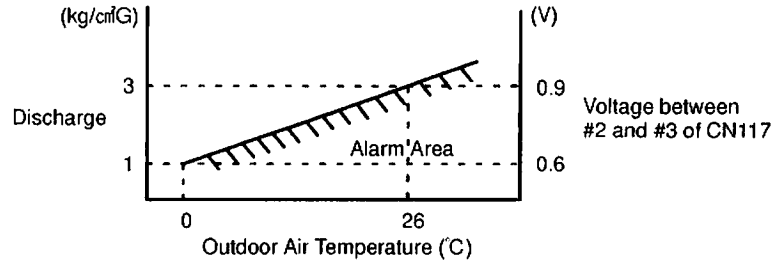
Alarm Code 46	Activation to Protect System from Excessively Low Discharge Pressure (for Protection of Refrigerant Shortage)

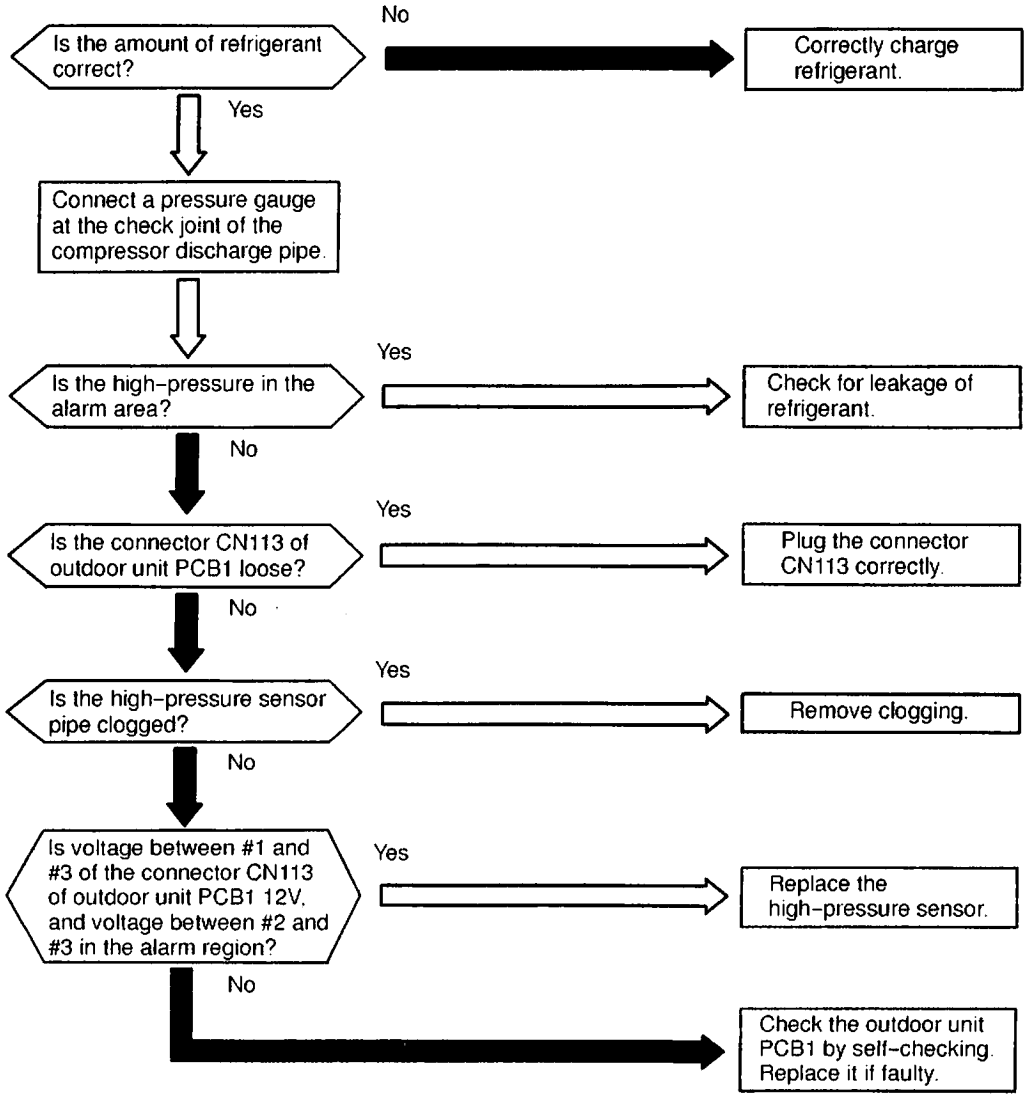
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when the discharge pressure is decreased due to insufficient refrigerant charge. Refer to the figure below.

★ This alarm code is indicated when the discharge gas superheat at the top of the compressor is higher than 80 deg. during running and bypass expansion valve: MVB is fully opened and its state is maintained for more than 25 minutes.

★ This alarm code is indicated when the compressor is operated under the condition less than 0.69 MPa (6 kg/cm2G) of discharge pressure and its occurrence is continued one hour.

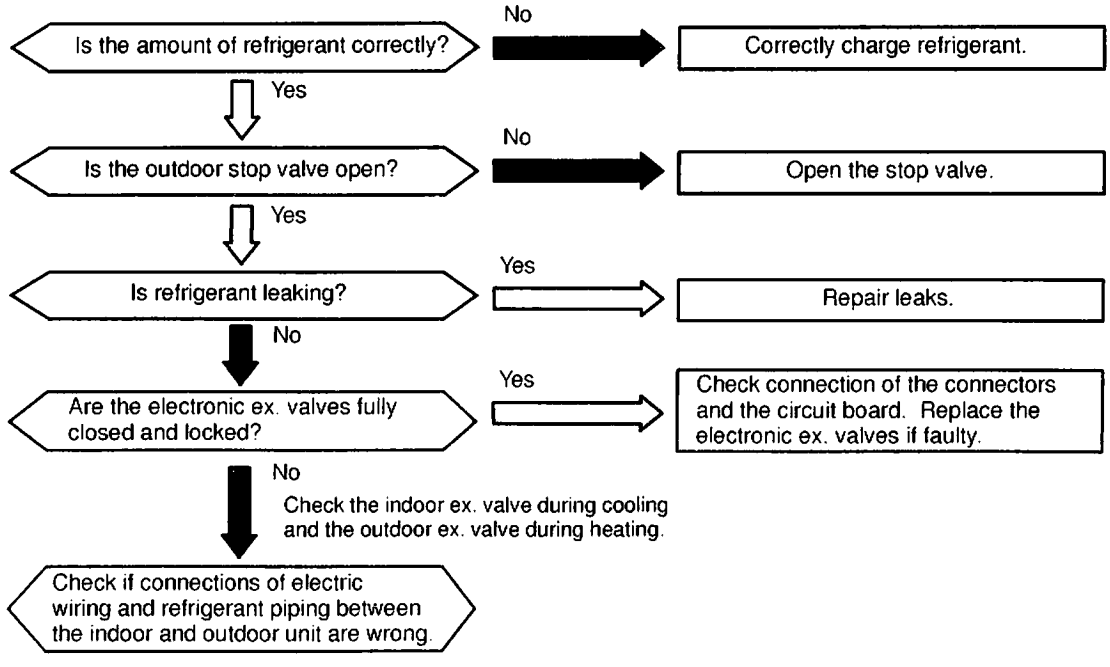




Alarm Code 47	Activation to Protect System from Excessively Low Suction Pressure (Protection from Vacuum Operation)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when a suction pressure is lower than 0.02 MPa (0.2 kg/cm2G) for over 10 minutes and its state occurs more than 3 times including 3 in one hour.



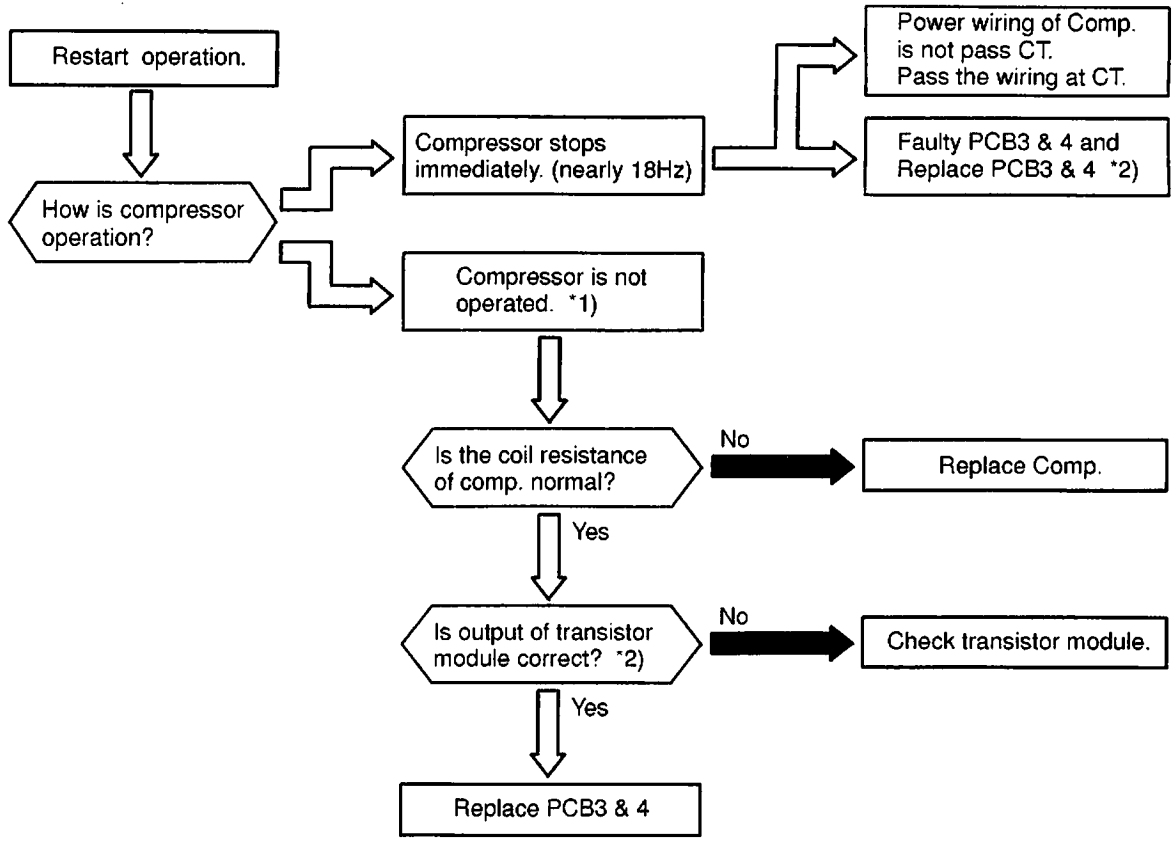
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Suction Pressure (in Vacuum)	Shortage of Ref.	Check ref. charged volume or check for leakage.	Repair leakage and correctly charge.
	Closed Valve	Check stop valve.	Open stop valve.
	Abnormal Low Pressure Sensor	Check connector for PCB.	Replace pressure sensor if faulty.
	Incorrect Connection between Indoor Unit and Outdoor Unit	Check electrical system and ref. cycle.	Correctly connect between indoor unit and outdoor unit.
	Locked Ex. Valve	Check connector for PCB.	Repair or replace connector of PCB or ex. valve.

Alarm Code 51	Abnormality of Current Transformer (0A Detection)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when the current transformer is abnormal (0A detection) and its state occurs more than 3 times in 30 minutes.

Condition of Activation ··· When the frequency of compressor is maintained at 15~18Hz after compressor is started, one of the absolute value of running current at phase U+, U-, V+ and V- is less than 0.5A.



*1): Number of operating comp. is shown 7-segment.

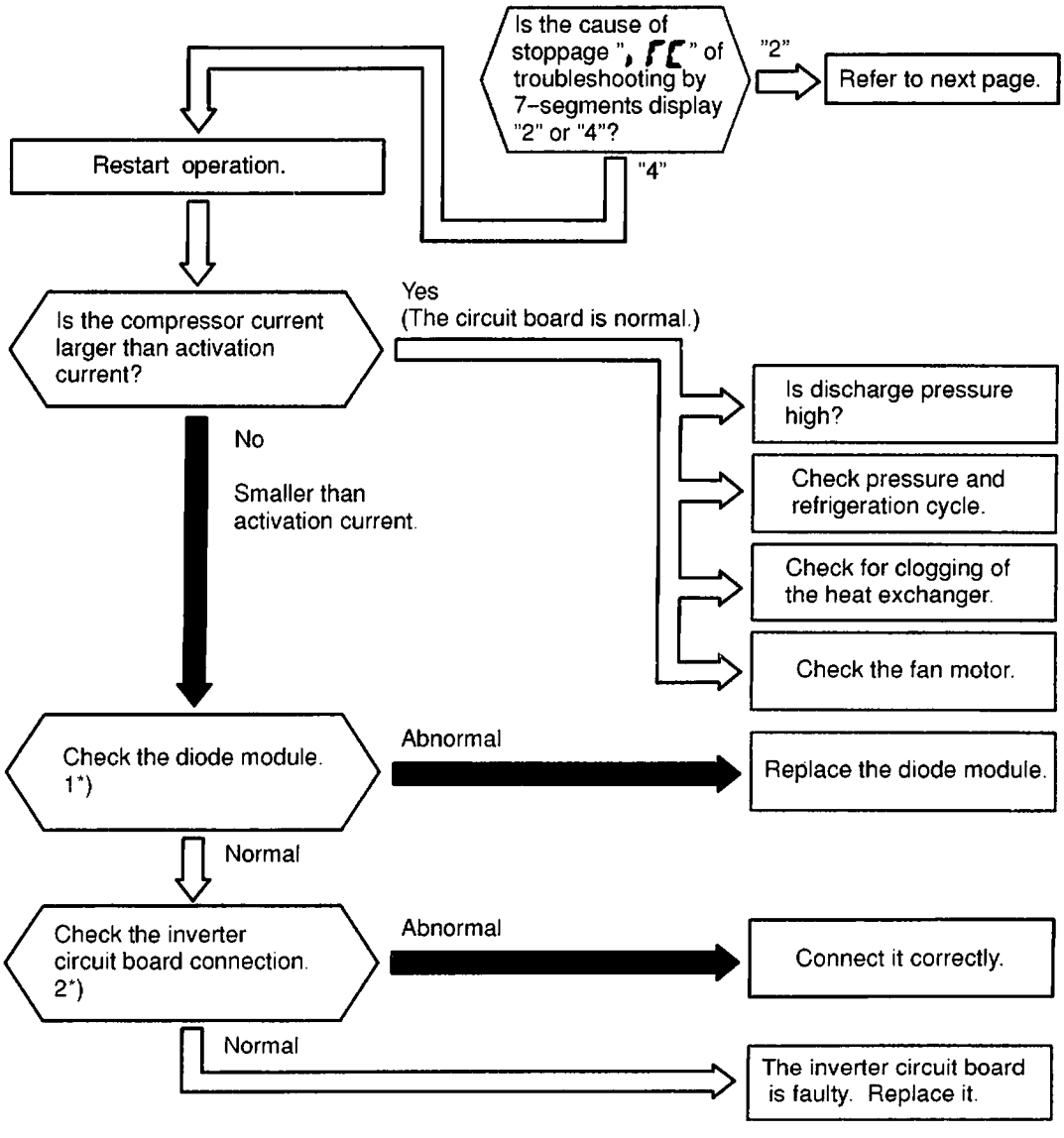
*2) Perform the high voltage discharge work refer to 1.3.7 before checking and replacing the inverter parts.

Alarm Code 52	Protection Activation Against Instantaneous Overcurrent of Inverter (1)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★This alarm code is indicated when the electronic thermal relay for the inverter is activated 3 times including 3 in 30 minutes. Retry operation is performed up to the occurrence of 2 times.

conditions: Inverter current is 105% of the rated current (14A), ① continuously for 30 seconds or ② the accumulated time reaches 3.5 minutes in 10 minutes .



NOTES:

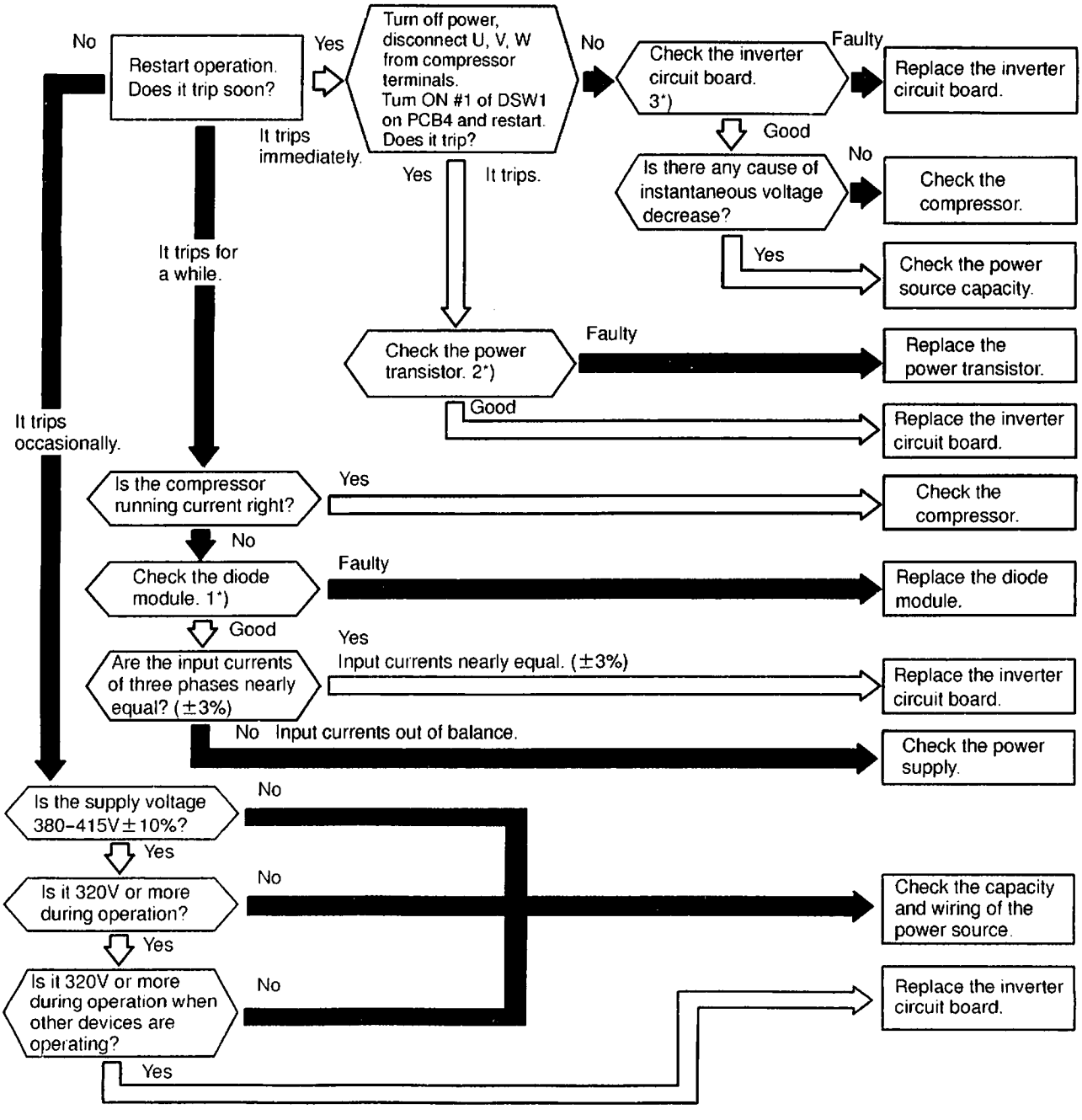
*1): Regarding the checking method for diode module, refer to page 1-92.

*2): Regarding the checking of inverter components, refer to page 1-93 regarding electrical discharge.

Alarm Code 52	Protection Activation Against Instantaneous Overcurrent of Inverter (2)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when the instantaneous overcurrent tripping occurs 3 times including 3 in 30 minutes. Retry operation is performed up to the occurrence of 2 times.
conditions: Inverter current is 150% of the rated current.



NOTES:

1*): Regarding the checking method for the diode module, refer to page 1-92.
2*): Regarding the checking method for power transistor, refer to page 1-91.
3*): Regarding the checking of inverter components, refer to page 1-93 regarding electrical discharge.

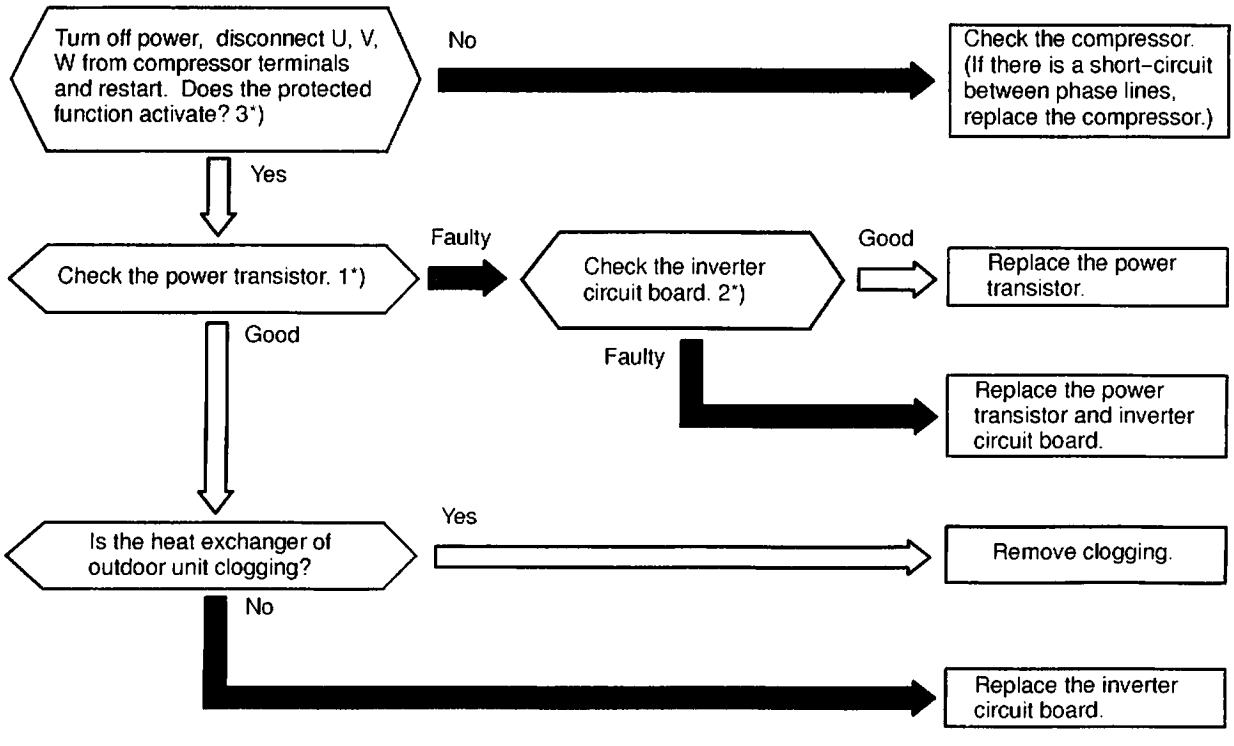
Alarm Code 53	Protection Activation of Transistor Module

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No. and alarm code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ Transistor module have detected function of abnormality.

★ This alarm is indicated when the transistor module detect the abnormality 3 times in 30 minutes including 3. Retry operation is performed up to the occurrence of 2 times.

Conditions: Abnormal Current to the Power Transistor such as Short Circuited or Grounded
Abnormal Temperature of the Power Transistor
Control Voltage Decrease



NOTES:

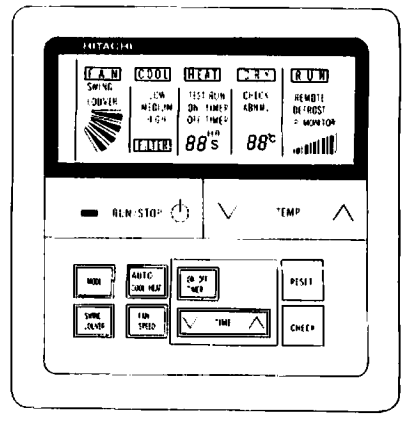
1*): Regarding the checking method for the power transistor, refer to page 1-91.

2*): Regarding the checking of inverter components, refer to page 1-93 regarding electrical discharge.

3*): Turn ON the No.1 switch of the dip switch DSW1 on PCB3 when restarting with disconnecting the terminals of the compressor. After troubleshooting, turn OFF the No.1 switch of the dip switch DSW1 on PCB3.

1.2.3 Troubleshooting in Check Mode by Remote Control Switch

- Use the remote control CHECK switch in the following cases.
  (1) When the RUN lamp is flashing.
  (2) To trace back the cause of trouble after restarting from stoppage with the RUN lamp flashing.
  (3) To check during normal operation or stoppage.
  (4) To monitor the temperatures of intake and discharge air.



Check Mode → Check Mode 1: Current data will be displayed.
Check Mode → Check Mode 2: Data held immediately before failure occurs will be displayed.

Check Mode

CHECK — Press for more than 3 seconds.

- Indication will delay as transmission between the remote control switch and indoor unit takes about 10 seconds.
- All data may be displayed as "FF" or "−1". These transient data produced temporarily by software do not affect device functions at all. (The alarm code may also be indicated as "FF".)

Unit Number and Alarm Code Displayed

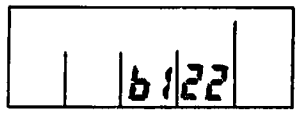
- Alarm code identifying the last fault that has occurred in the indicated unit.
- Unit number of connected unit or unit number for which checking mode was selected previously.

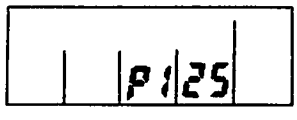
(A) ← Within 7 seconds to check another unit

- Forward: Press the ∧ switch to rise from A1 to A2 to A3 ···
- Backward: Press the ∨ switch to descend from AF to AE to Ad ···

After 7 seconds

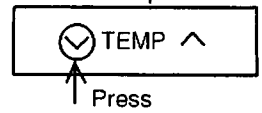
Check Mode 1
(See 1-62 for details.)



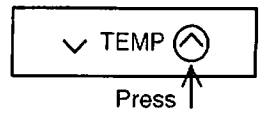


CHECK — Press for more than 3 seconds.

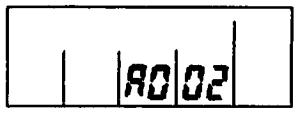
To view the previous indication



To view the next indication



Unit Number and Alarm Code Displayed

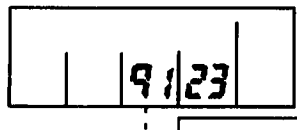


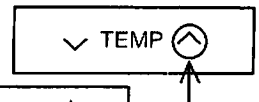
- Press ∧ to view the next data.
- Press ∨ to view the previous data.

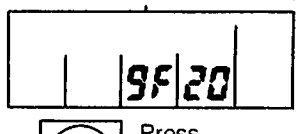
See (A)

After 7 seconds

Check Mode 2
(See 1-65 for details.)







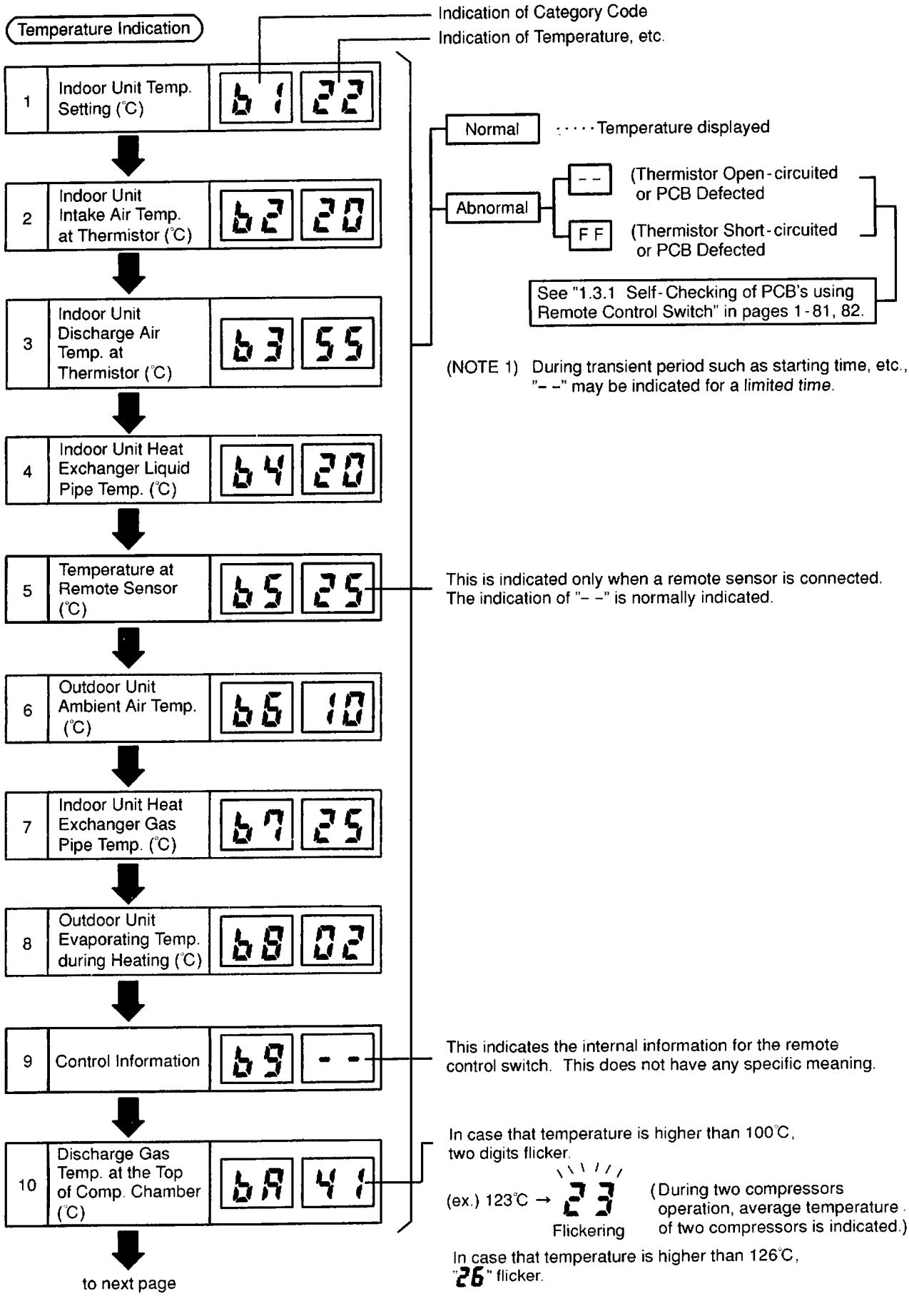
CHECK — Press

Check Mode Released

- In Check Mode 2, Data of the first three units connected serially to a remote control switch are available.
- You can press the CHECK switch to release Check Mode 2. Check Mode 1 cannot be released even if you press the CHECK switch.

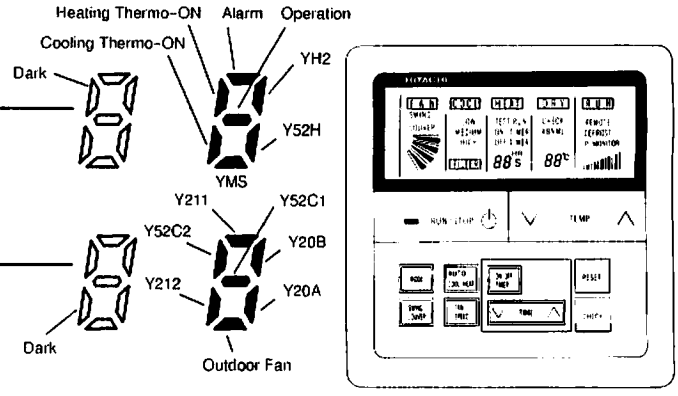
(1) Contents of Check Mode 1

The next indication is shown by pressing ∧ the part of "TEMP" switch. If the ∨ part of "TEMP" switch is pressed the previous indication is shown.



Indication on Micro-Computer Input/Output

11	Micro Computer Input/Output in Indoor Unit	C1 4
12	Micro-Computer Input/Output in Outdoor Unit	C2 :



Symbols with a letter Y are relays on PCB

Indication of Unit Stoppage Cause

13	Cause of Stoppage	d1 01

00	Operation OFF, Power OFF
01	Thermo-OFF
02	Alarm (NOTE 1)
03	Freeze Protection, Overheating Protection
05	Instantaneous Power Failure at Outdoor Unit, Reset
06	Instantaneous Power Failure at Indoor Unit, Reset
07	Stoppage of Cooling Operation due to Low Outdoor Air Temperature, Stoppage of Heating Operation due to High Outdoor Air Temperature (NOTE 4)
08	Compressor Quantity Changeover, Stoppage
09	Demand of 4-Way Valve Changeover Stoppage (FX Only)
10	Demand, Enforced Stoppage
11	Retry due to Compressor Ratio Decrease
12	Retry due to Low Pressure Increase
13	Retry due to High Pressure Increase
14	Retry due to Abnormal Current of Constant Compressor
15	Retry due to Abnormal High Temperature of Discharge Gas, Excessively Low Suction Pressure
16	Retry due to Decrease of Discharge Gas Superheat
17	Retry due to Inverter Tripping
18	Retry due to Voltage Decrease
19	Expansion Valve Opening Change Protection
20	Operation Mode Changeover of Indoor Unit (NOTE 3)

(NOTE 1) Even if stoppage is caused by "Alarm", "02" is not always indicated.
(NOTE 2) Explanation of Term,
Thermo-ON: A condition that an indoor unit is requesting compressor to operate.
Thermo-OFF: A condition that an indoor unit is not requesting compressor to operate.
(NOTE 3) In the FX2 system, "20" will be indicated at the indoor unit operation changeover, and the unit will automatically restart by the Thermo-ON.
In the FS2 system "20" will be indicated at the difference mode between indoor units.
(NOTE 4) If transmission between the inverter printed circuit board and the control printed circuit board is not performed during 30 seconds, the outdoor unit is stopped.
In this case, stoppage is d1-05 cause and the alarm code "04" may be indicated.
(NOTE 5) If transmission between the indoor unit and the outdoor unit is not performed during 3 minutes, indoor units are stopped.
In this case, stoppage is d1-06 cause and the alarm code "03" may be indicated.

Abnormality Occurrence Counter

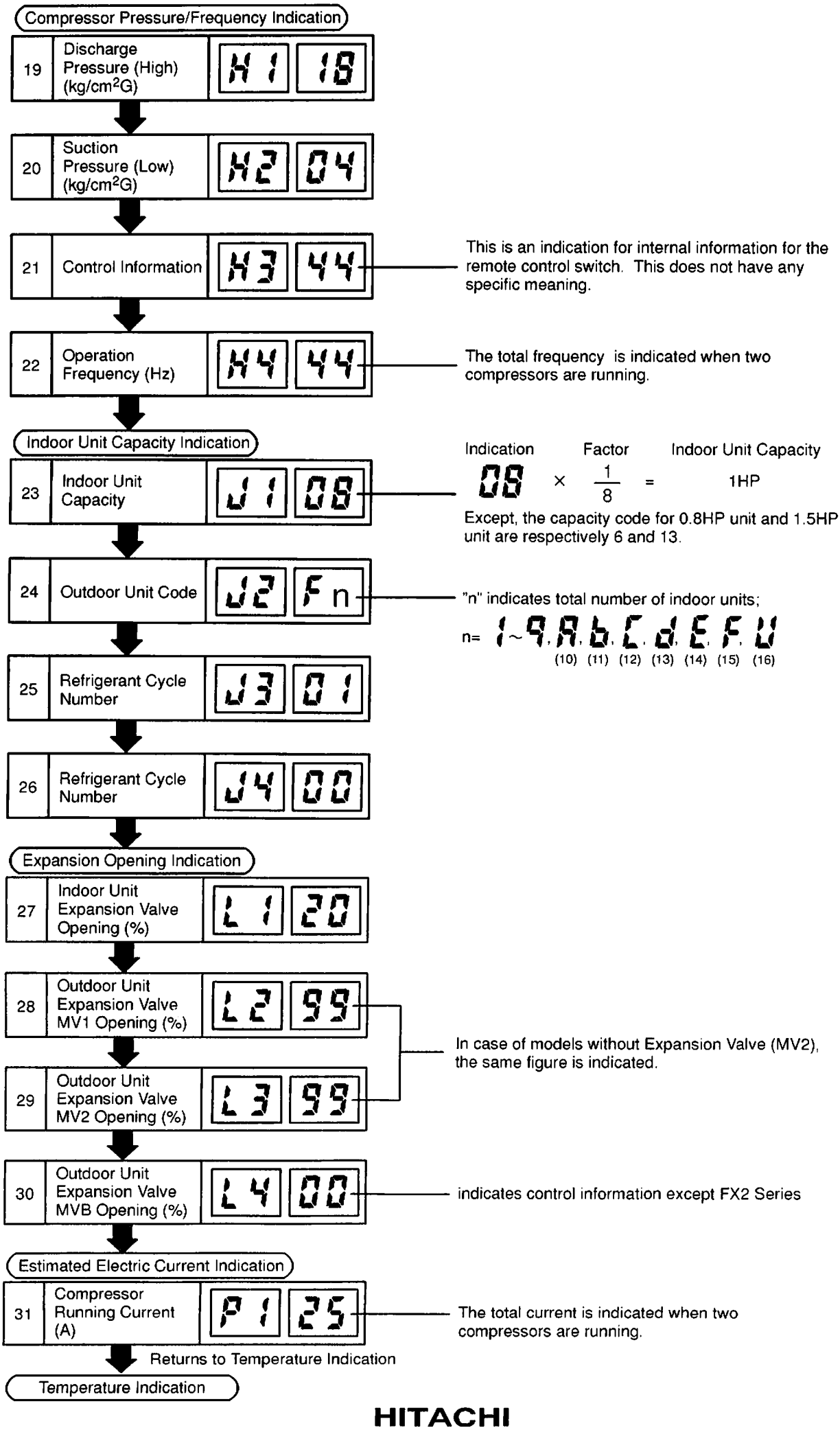
14	Abnormality Occurrence Times	E1 01
15	Instantaneous Power Failure Occurrence Times in Indoor Unit	E2 00
16	Transmission Error Occurrence Times between Remote Control Switch and Indoor Unit	E3 00
17	Abnormality Occurrence Times on Inverter	E4 00

Countable up to 99.
Over 99 times, "99" is always indicated.
(NOTE 1) If a transmitting error continues for 3 minutes, one is added to the occurrence times.
(NOTE 2) The memorized data can be cancelled by the method indicated in 1.3.1 "Self-checking of PCBs using Remote Control Switch" in pages 1-81, 82.

Indication of Automatic Louver Condition

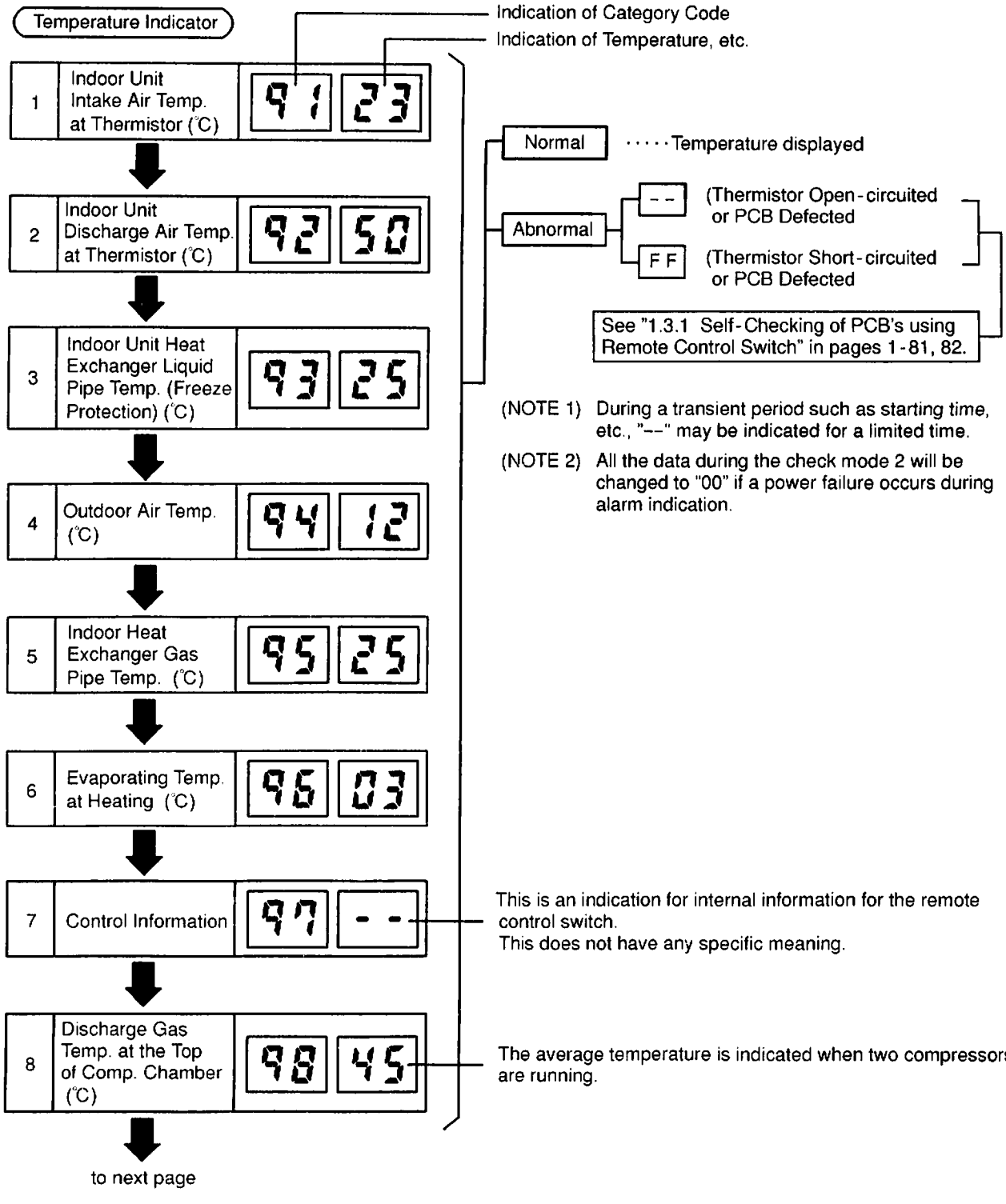
18	Louver Sensor	F1 00

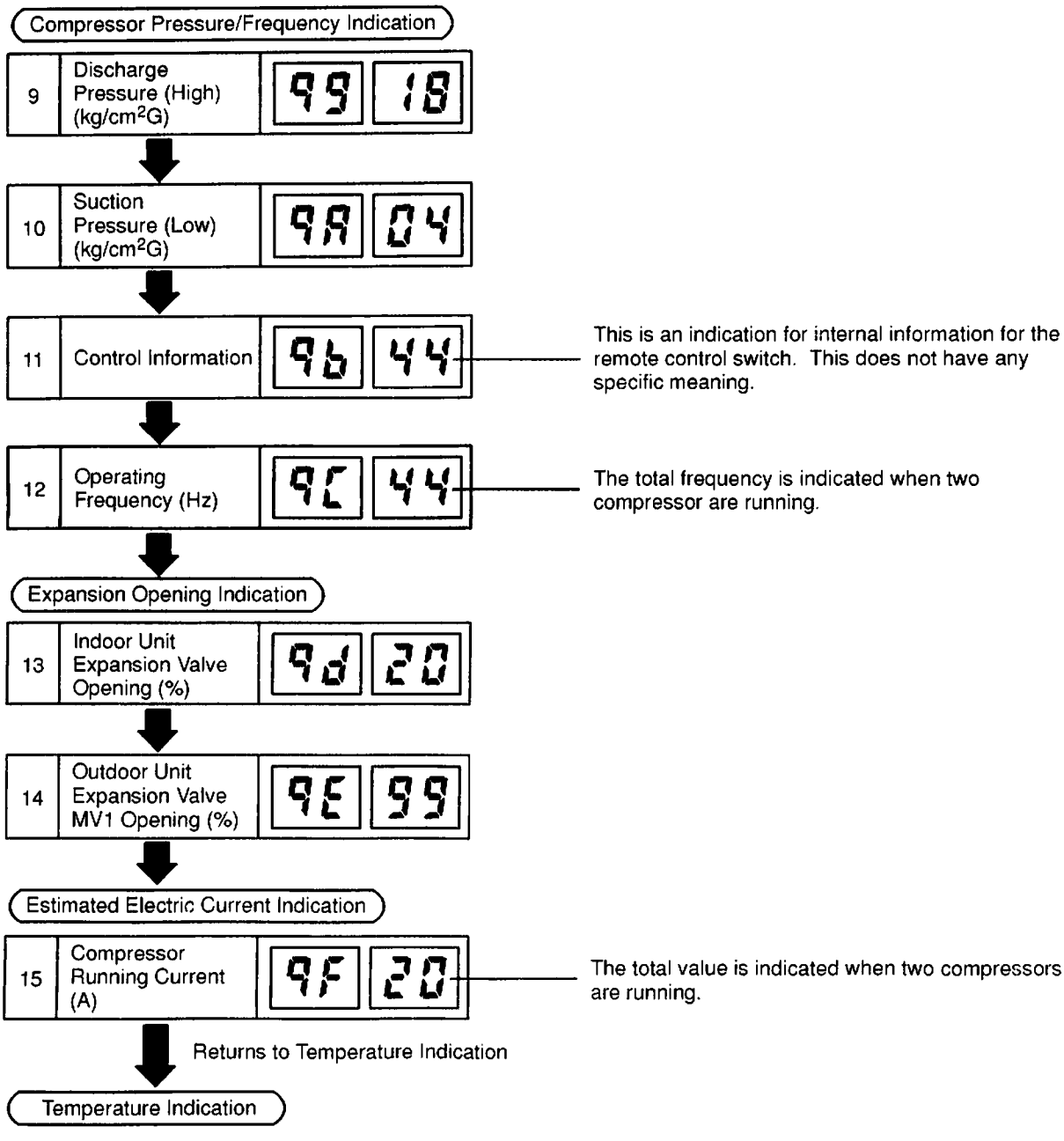
to next page


Compressor Pressure/Frequency Indication
19 Discharge Pressure (High) (kg/cm²G) H1 18
20 Suction Pressure (Low) (kg/cm²G) H2 04
21 Control Information H3 44
22 Operation Frequency (Hz) H4 44
Indoor Unit Capacity Indication
23 Indoor Unit Capacity J1 08
24 Outdoor Unit Code J2 Fn
25 Refrigerant Cycle Number J3 01
26 Refrigerant Cycle Number J4 00
Expansion Opening Indication
27 Indoor Unit Expansion Valve Opening (%) L1 20
28 Outdoor Unit Expansion Valve MV1 Opening (%) L2 99
29 Outdoor Unit Expansion Valve MV2 Opening (%) L3 99
30 Outdoor Unit Expansion Valve MVB Opening (%) L4 00
Estimated Electric Current Indication
31 Compressor Running Current (A) P1 25
Returns to Temperature Indication
Temperature Indication
This is an indication for internal information for the remote control switch. This does not have any specific meaning.
The total frequency is indicated when two compressors are running.
Indication Factor Indoor Unit Capacity
08 × 1/8 = 1HP
Except, the capacity code for 0.8HP unit and 1.5HP unit are respectively 6 and 13.
"n" indicates total number of indoor units;
n= 1~9, A, b, C, d, E, F, U
(10) (11) (12) (13) (14) (15) (16)
In case of models without Expansion Valve (MV2), the same figure is indicated.
indicates control information except FX2 Series
The total current is indicated when two compressors are running.

(2) Contents of Check Mode 2

The latest data of the first three indoor units only connected serially are indicated when more than three indoor units are connected to one remote control switch.
By pressing the ∧ part of "TEMP" switch, the next display is indicated. If the ∨ part of "TEMP" switch is pressed, the previous display is indicated.

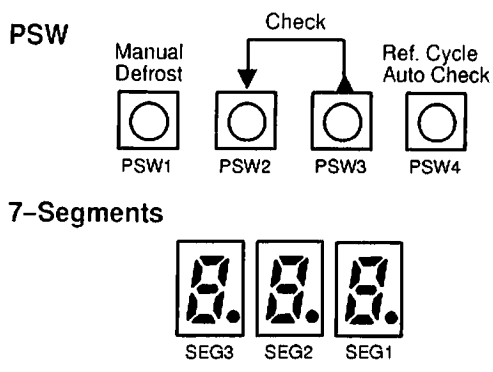


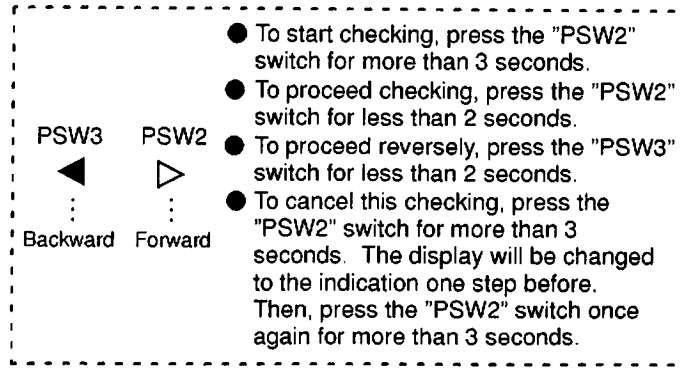

Compressor Pressure/Frequency Indication
9
Discharge Pressure (High) (kg/cm²G)
99 18
10
Suction Pressure (Low) (kg/cm²G)
9A 04
11
Control Information
9b 44
This is an indication for internal information for the remote control switch. This does not have any specific meaning.
12
Operating Frequency (Hz)
9C 44
The total frequency is indicated when two compressor are running.
Expansion Opening Indication
13
Indoor Unit Expansion Valve Opening (%)
9d 20
14
Outdoor Unit Expansion Valve MV1 Opening (%)
9E 99
Estimated Electric Current Indication
15
Compressor Running Current (A)
9F 20
The total value is indicated when two compressors are running.
Returns to Temperature Indication
Temperature Indication

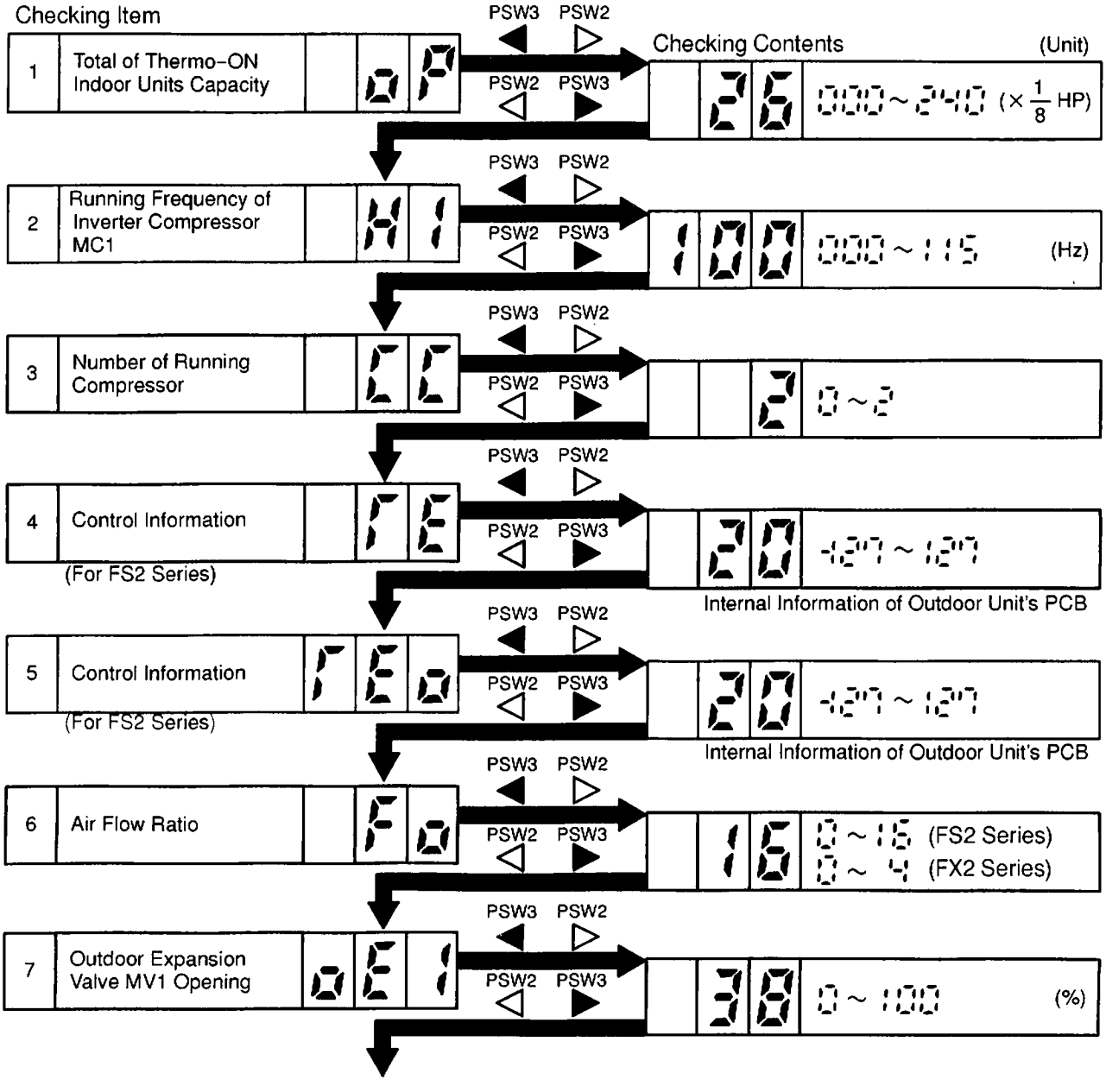
1.2.4 Troubleshooting by 7-Segment Display

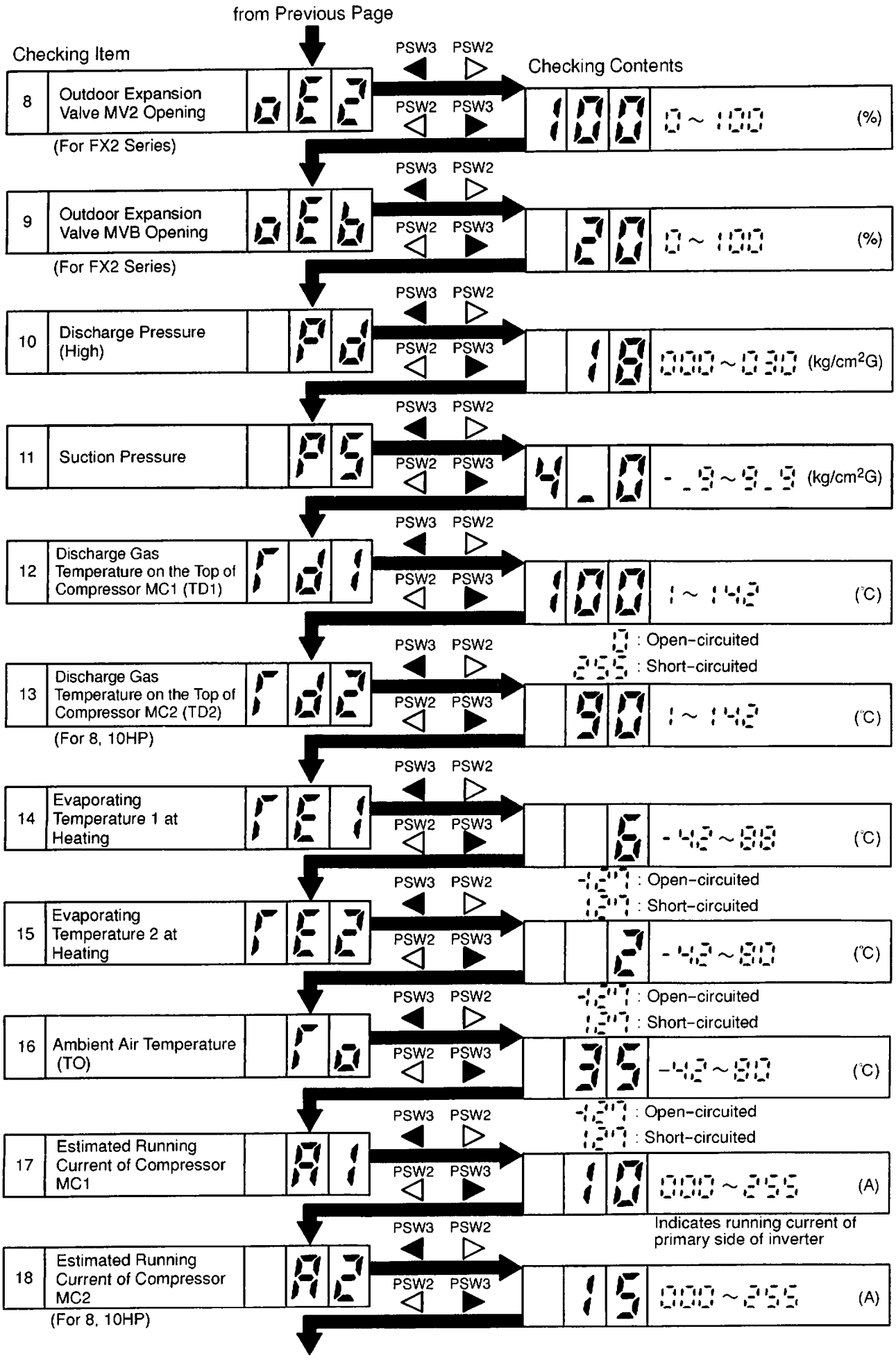
(1) Checking Method by 7-Segment Display

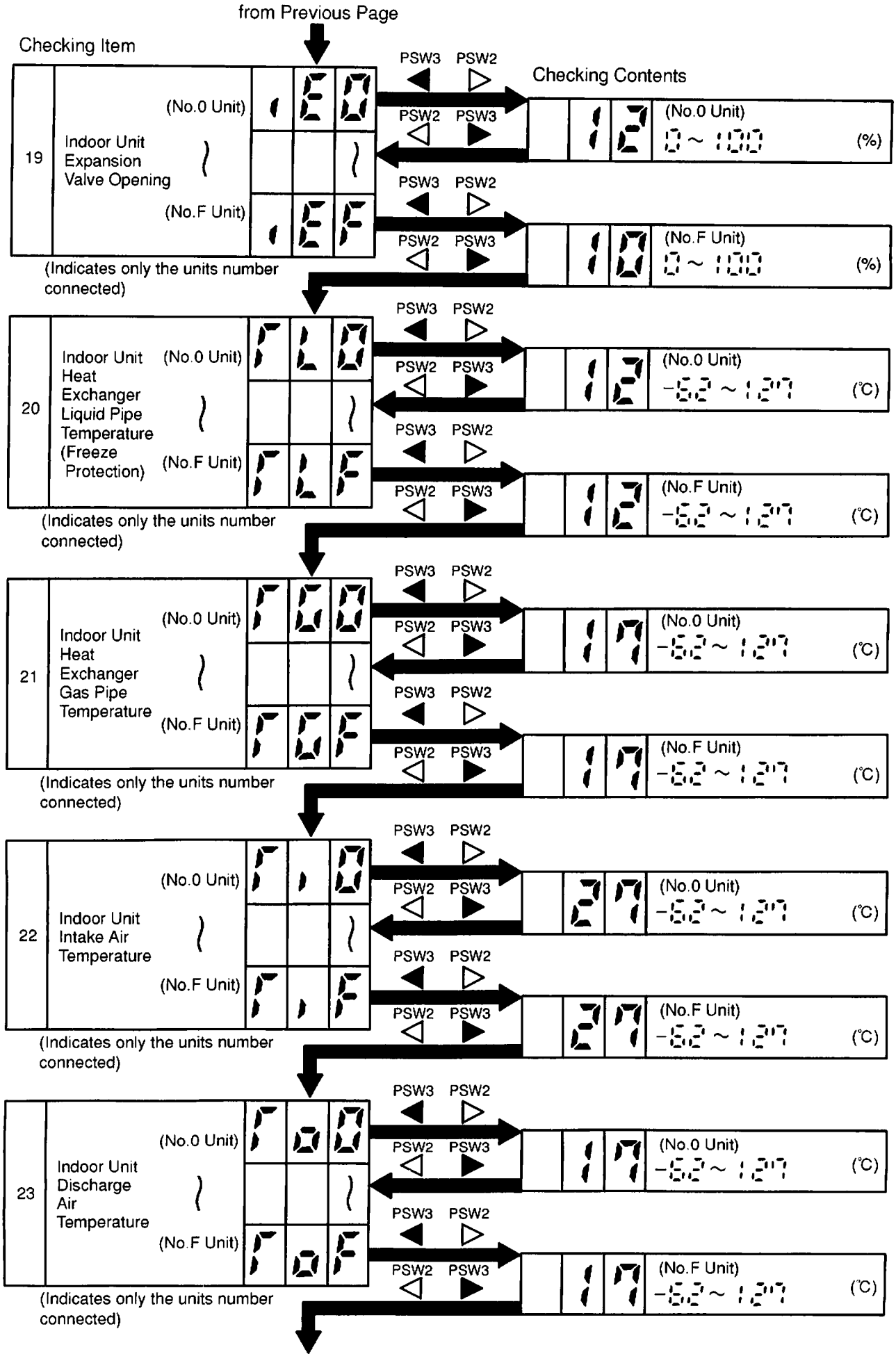
By using the 7-segments and check switch (PSW) on the PCB1 in the outdoor unit, total quantity of combined indoor units, 7-segments operation conditions and each part of refrigeration cycle, can be checked.

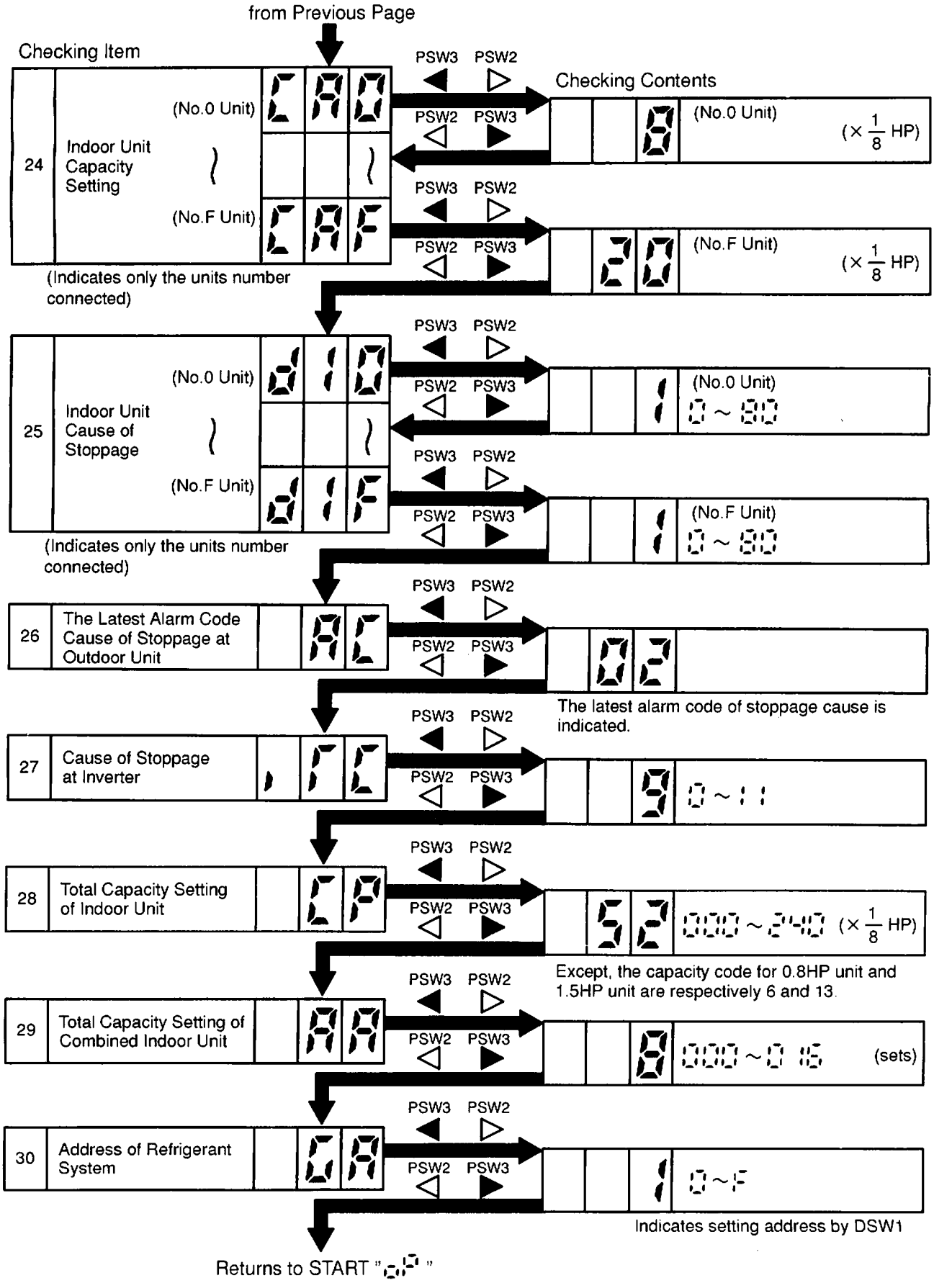







from Previous Page
Checking Item
Checking Contents
PSW3 PSW2
PSW2 PSW3
8 Outdoor Expansion Valve MV2 Opening
(For FX2 Series)
0 ~ 100 (%)
9 Outdoor Expansion Valve MVB Opening
(For FX2 Series)
0 ~ 100 (%)
10 Discharge Pressure (High)
0.00 ~ 0.30 (kg/cm2G)
11 Suction Pressure
-.9 ~ 9.9 (kg/cm2G)
12 Discharge Gas Temperature on the Top of Compressor MC1 (TD1)
1 ~ 142 (°C)
0 : Open-circuited
255 : Short-circuited
13 Discharge Gas Temperature on the Top of Compressor MC2 (TD2)
(For 8, 10HP)
1 ~ 142 (°C)
14 Evaporating Temperature 1 at Heating
-49 ~ 88 (°C)
-128 : Open-circuited
127 : Short-circuited
15 Evaporating Temperature 2 at Heating
-49 ~ 80 (°C)
16 Ambient Air Temperature (TO)
-49 ~ 80 (°C)
17 Estimated Running Current of Compressor MC1
0.0 ~ 25.5 (A)
Indicates running current of primary side of inverter
18 Estimated Running Current of Compressor MC2
(For 8, 10HP)
0.0 ~ 25.5 (A)

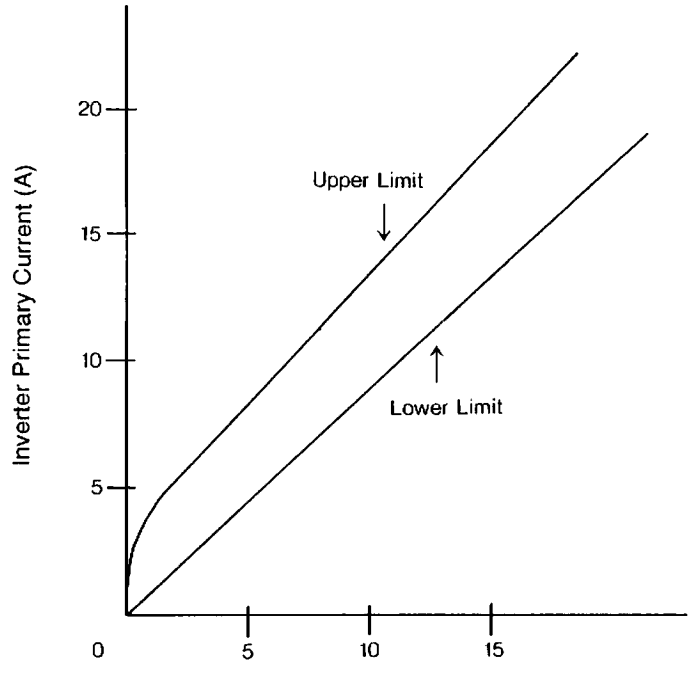

from Previous Page
Checking Item
Checking Contents
PSW3 PSW2
PSW2 PSW3
19
Indoor Unit Expansion Valve Opening
(No.0 Unit)
(No.F Unit)
(No.0 Unit)
0 ~ 100
(%)
(No.F Unit)
0 ~ 100
(%)
(Indicates only the units number connected)
20
Indoor Unit Heat Exchanger Liquid Pipe Temperature (Freeze Protection)
(No.0 Unit)
(No.F Unit)
(No.0 Unit)
-6.2 ~ 129
(℃)
(No.F Unit)
-6.2 ~ 129
(℃)
(Indicates only the units number connected)
21
Indoor Unit Heat Exchanger Gas Pipe Temperature
(No.0 Unit)
(No.F Unit)
(No.0 Unit)
-6.2 ~ 129
(℃)
(No.F Unit)
-6.2 ~ 129
(℃)
(Indicates only the units number connected)
22
Indoor Unit Intake Air Temperature
(No.0 Unit)
(No.F Unit)
(No.0 Unit)
-6.2 ~ 129
(℃)
(No.F Unit)
-6.2 ~ 129
(℃)
(Indicates only the units number connected)
23
Indoor Unit Discharge Air Temperature
(No.0 Unit)
(No.F Unit)
(No.0 Unit)
-6.2 ~ 129
(℃)
(No.F Unit)
-6.2 ~ 129
(℃)
(Indicates only the units number connected)


from Previous Page
Checking Item
Checking Contents
PSW3 PSW2
PSW2 PSW3
24
Indoor Unit Capacity Setting
(No.0 Unit)
(No.F Unit)
(Indicates only the units number connected)
(No.0 Unit) (× 1/8 HP)
(No.F Unit) (× 1/8 HP)
25
Indoor Unit Cause of Stoppage
(No.0 Unit) 0 ~ 80
(No.F Unit) 0 ~ 80
(Indicates only the units number connected)
26
The Latest Alarm Code Cause of Stoppage at Outdoor Unit
The latest alarm code of stoppage cause is indicated.
27
Cause of Stoppage at Inverter
0 ~ 11
28
Total Capacity Setting of Indoor Unit
000 ~ 240 (× 1/8 HP)
Except, the capacity code for 0.8HP unit and 1.5HP unit are respectively 6 and 13.
29
Total Capacity Setting of Combined Indoor Unit
000 ~ 015 (sets)
30
Address of Refrigerant System
0 ~ F
Indicates setting address by DSW1
Returns to START "00"

(2) Running Current of Compressor

● Inverter Primary Current

The inverter primary current is estimated from the running current of the compressor MC1 which is indicated on 7-segments, as shown in the chart below.



Running Current of Compressor MC1
indicated on 7-segment

● Indicated Running Current of Compressor MC2

The running current of the compressor MC2 is detected by current sensor.

● Cause of Stoppage for Inverter

Code	Cause	Cause of Stoppage for Corresponding Unit	Remark	
			Indication during Retry	Alarm Code
1	Automatical Stoppage of Transistor Module (IPM Error) (Over Current, Decrease Voltage, Increase Temperature)	17	P 17	53
2	Instantaneous Over Current	17	P 17	52
4	Electronic Thermal Activation	17	P 17	52
5	Inverter Voltage Decrease	18	P 18	06
6	Increase Voltage	18	P 18	06
8	Abnormal Current Sensor	17	P 17	51
9	Instantaneous Power Failure Detection	18	-	-
11	Reset of Micro-Computer for Inverter	18	-	-

- Protection Control Code on 7-Segment Display

  a) The protection control indication can be seen on 7-segments when a protection control is activated.

  b) The 7-segment continues ON while function is working, and goes out when released.

  c) When several protection controls are activated, code number with higher priority will be indicated (see below for the priority order).

  ① Higher priority is given to protection control related to frequency control than the other.

  <Priority Order>

  * Pressure Ratio Control
  * High-Pressure Rise Protection
  * Current Protection
  * Discharge Gas Temperature Rise Protection
  * Low-Pressure Fall Protection
  * Oil Return Control

  ② In relation to retry control, the latest retrial will be indicated unless a protection control related to frequency control is indicated.

Code	Protection Control
P01	Pressure Ratio Control
P02	High-Pressure Rise Protection
P03	Current Protection
P05	Discharge Gas Temperature Rise Protection
P06	Low-Pressure Fall Protection
P07	Reversing Valve Changeover Control (FX2 Only)
P08	Oil Return Control
P11	Pressure Ratio Falling Retry

Code	Protection Control
P12	Low-Pressure Rising Retry
P13	High-Pressure Rising Retry
P14	Over Current Retry of Constant Compressor
P15	Vacuum/Discharge Gas Temperature Rising Retry
P16	Discharge Gas SUPERHEAT Falling Retry
P17	Inverter Trip Retry
P18	Voltage Falling Retry

- Retry indication continues for 30 minutes unless a protection control is indicated.
- Retry indication disappears if the stop signal comes from all rooms.

NOTE:

The protection control code being indicated on 7-segment display is changed to an alarm code when the abnormal operation occurs. Also, the same alarm code is indicated on the remote control switch.

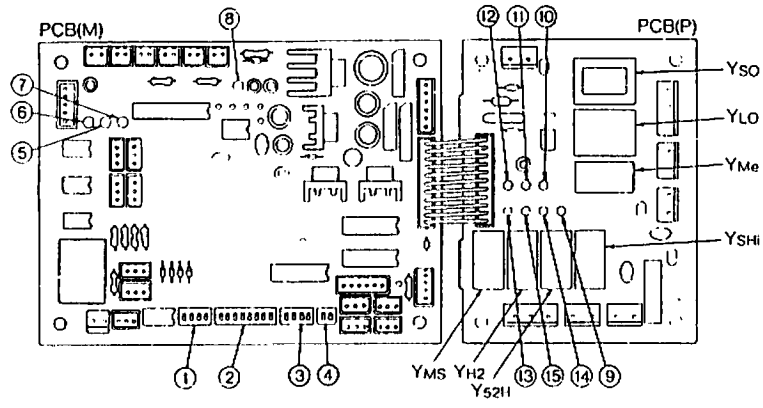
Code	Protection Control	Activation Condition	Remark
P01	Pressure Ratio Control	Compression Ratio≧9 ⇒ Frequency Decrease (Pd/(Ps+1.3))≦2.2 ⇒ Frequency Increase	Ps: Suction Pressure
P02	High-Pressure Rise Protection	Pd≧23.5kg/cm^{2}G ⇒ Frequency Decrease	Pd: Discharge Pressure
P03	Current Protection	Inverter Output Current≧14.5 ⇒ Frequency Decrease	-
P05	Discharge Gas Temperature Rise Protection	Temperature at the top of compressor is high. ⇒ Frequency Decrease (Temp. is different depending on frequency.)	-
P06	Low-Pressure Fall Protection	Low pressure is low. ⇒ Frequency Decrease (Pressure is different depending on Ambient Temp.)	-
P07	Reversing Valve Changeover Control (FX2 Only)	When Changing; ΔP < 5kgf/cm^{2}G ⇒ Frequency Increase ΔP > 13kgf/cm^{2}G ⇒ Frequency Decrease	ΔP = Pd - Ps
P08	Oil Return Control	Frequency less than 40Hz is maintained for one hour. ⇒ Frequency≧40Hz	-
P11	Pressure Ratio Falling Retry	Compression Ratio (Pd/(Ps+1.3)<1.8)	3 times operation in one hour, 43 alarm is indicated.
P12	Low-Pressure Rising Retry	Ps>9kg/cm^{2}G	3 times operation in one hour, 44 alarm is indicated.
P13	High-Pressure Rising Retry	Pd>27kg/cm^{2}G (In case of 20~30Hz, Pd>25kg/cm^{2}G)	3 times operation in one hour, 45 alarm is indicated.
P14	Over Current Retry of Constant Compressor	Running Current≧13.1 (8FSA2) Running Current≧16.2 (10FSA2)	3 times operation in 30 minutes, 39 alarm is indicated.
P15	Vacuum/Discharge Gas Temperature Rising Retry	a.Ps<0.2kg/cm^{2}G is more than 12 minutes. b.Discharge Gas Temp.≧132℃ is more than 10 minutes. c.Discharge Gas Temp.≧140℃ is more than 5 seconds.	3 times operation in one hour, 47 or 08 alarm is indicated.
P16	Discharge Gas SUPERHEAT Falling Retry	Discharge Gas SUPERHEAT less than 10℃ is maintained for one hour.	2 times operation in two hours, 07 alarm is indicated.
P17	Inverter Trip Retry	Automatical Stoppage of Transistor Module, Electronic Thermal Activate or Abnormal Current Sensor	3 times operation in 30 minutes, 51, 52 or 53 alarm is indicated.
P18	Voltage Falling Retry	Voltage Falling or Rising at Circuit of Inverter, Capacitor (CB)	3 times operation in 30 minutes, 06 alarm is indicated.

1.2.5 Function of DSWs and LEDs

(1) Printed Circuit Board in Indoor Unit

(* Following figure shows a separated-board type PCB.)

PCB(M): Controlling Board PCB(P): Power Supply Board



* Some unit has an one-board type PCB which has the same functions and devices with the separated-board type.

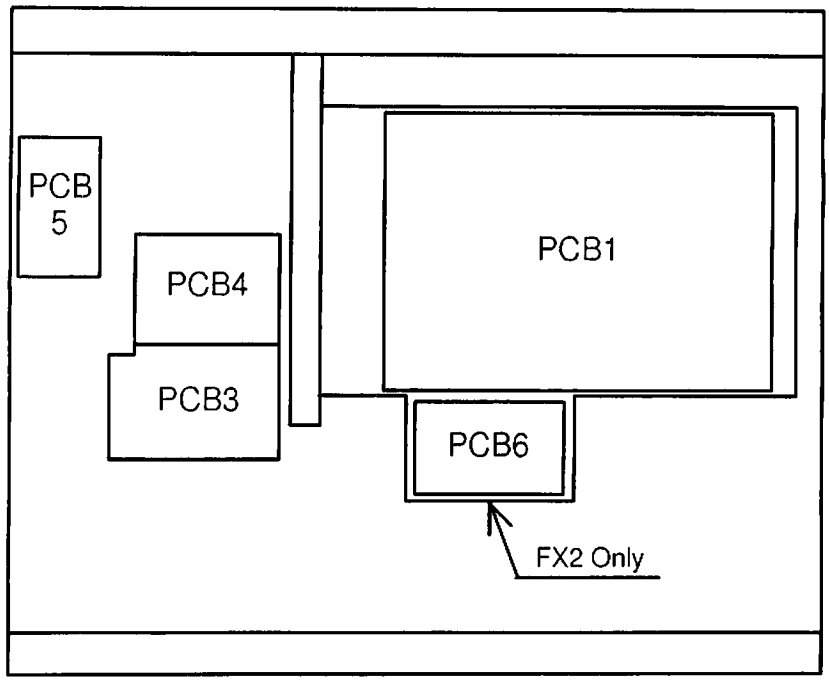
■ Dip Switch and LED Functions on Indoor Unit Printed Circuit Board

Name of Printed Circuit Board	Part Name	Contents of Functions
Controlling Board: PCB(M)	① DSW1	Setting of Indoor Unit Number
	② DSW2	Setting of Optional Functions A. Self-Diagenosis B. Remote ON/OFF Control C. Automatic Restart after Short Power Failure D. Remote Sensor Control E. Setting of Filter Indication Interval
	③ DSW3	Setting of Indoor Unit Capacity Code
	④ DSW4	Setting of Capacity Adjustment
	⑤ LED1 (Red)	This LED1 indicates the transmission state between the indoor unit and remote control switch. Normal Condition: Flickering Abnormal Condition: Activated or Deactivated
	⑥ LED2 (Yellow)	This LED2 indicates the transmission state between the indoor unit and outdoor unit. Normal Condition: Flickering Abnormal Condition: Activated or Deactivated
	⑦ LED3 (Green)	This LED3 indicates the transmission state between the indoor unit and central station. When Disconnected: Normal Condition: Deactivated Abnormal Condition: Activated When Connected: Normal Condition: Flickering Abnormal Condition: Activated or Deactivated
	⑧ LED4 (Green)	This LED4 indicates the power supply (5V) for micro-computer. Normal Condition: Activated Abnormal Condition: Deactivated
Power Supply Board: PCB(P)	⑨ LD1	Relay YSHi ON: Activated
	⑩ LD2	Relay YMe ON: Activated
	⑪ LD3	Relay YLo ON: Activated
	⑫ LD4	Relay YSo ON: Activated
	⑬ LD5	Relay YMs ON: Activated
	⑭ LD6	Relay Y52H ON: Activated
	⑮ LD7	Relay YH2 ON: Activated

(2) Printed Circuit Board in Outdoor Unit

●Arrangement

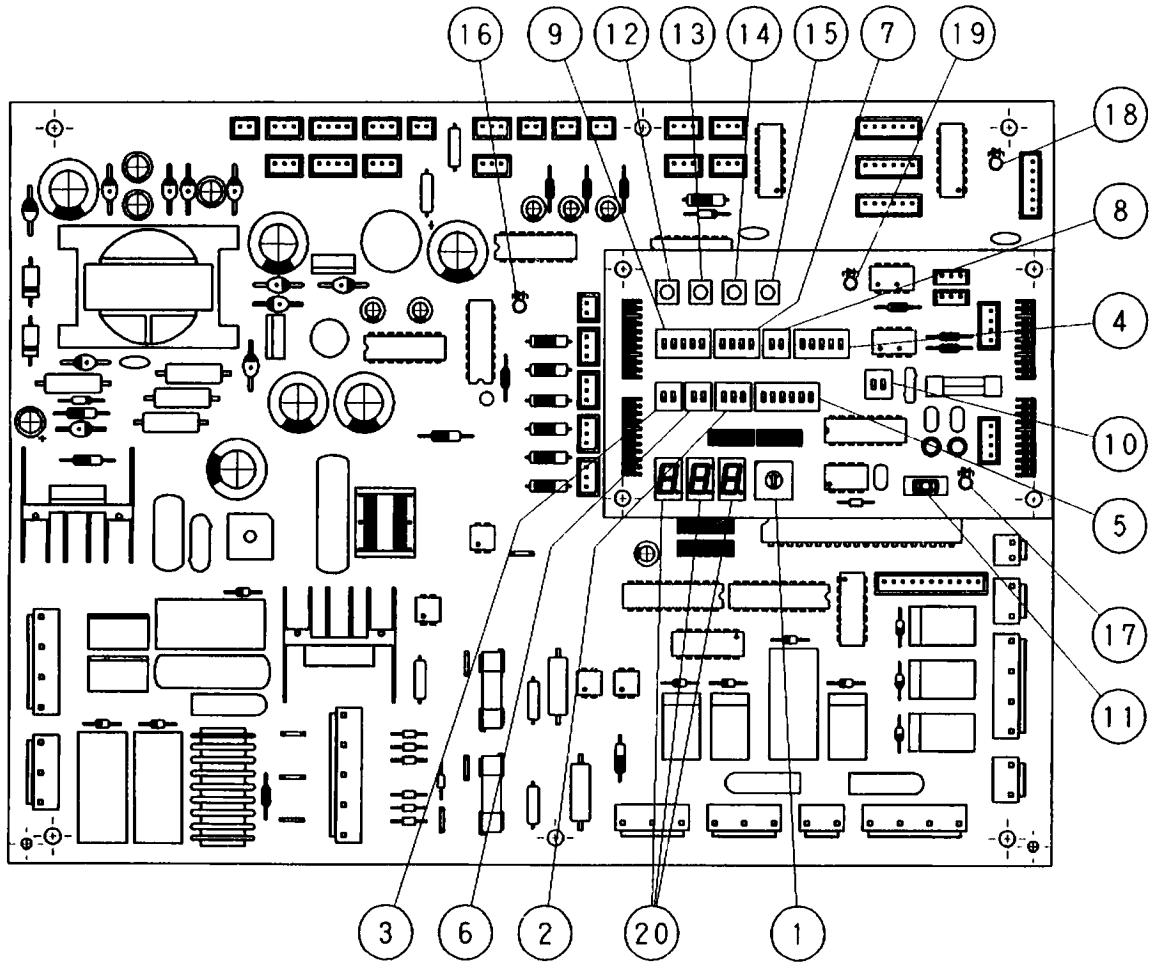
Inside of Main Electrical Box



●Purpose

Symbol	PCB	Purpose
PCB1	for Control	1. Transmitting between Indoor Unit and Outdoor Unit 2. Processing for Sensor Input 3. Processing for Dip Switch Input 4. Operation Control for Above items 1 to 3. Compressor Operation Control, Bypass Valve Control, Fan Control and Overcurrent Control 5. 7-Segment Indication 6. Processing of Safety Device Input 7. Processing of Relay Output 8. Reverse Phase Detection for Power Source
PCB3 PCB4	for Inverter	1. Inverter power part is driven by instruction of PCB1 and compressor is driven. 2. Overcurrent Control 3. Protection Control for Inverter Part
PCB5	for "SNUBBER"	1. Restraining of Surge Voltage added to Transistor Module (IPM) 2. Absorbing for Switching Noise of Transistor Module (IPM)
PCB6	Sub-PCB (FX2 Only)	For Control of 4-Way Valve and Solenoid Valve

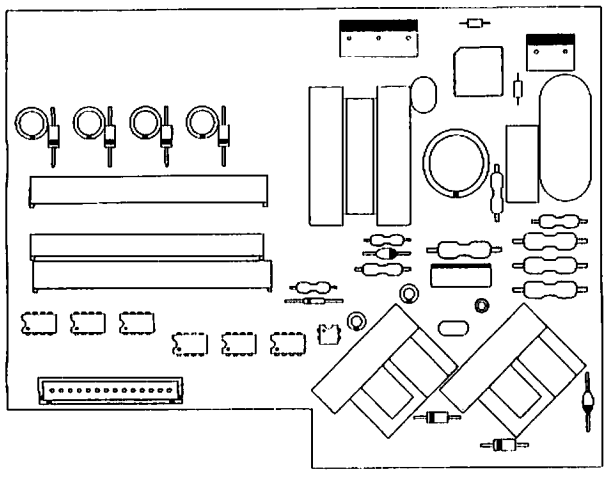
a. Control Printed Circuit Board: PCB1



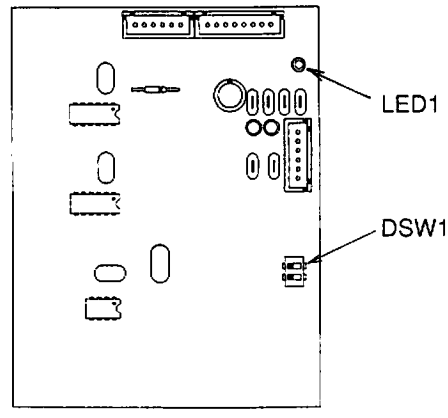
■ Dip Switches and LED Functions on Outdoor Unit Printed Circuit Boards

Name of Internal Circuit Board	Part Name	Contents of Functions
Controlling Board: PCB1	① RSW	Setting of Outdoor Unit Number
	② DSW2	Setting of Capacity Code Outdoor unit capacity is set according to nominal capacity (HP).
	③ DSW3	Setting of Height Difference The height difference between outdoor and indoor units is set.
	④ DSW4	A. Test Running for Cooling or Heating An outdoor unit can be run for testing. When testing has been finished, reset the function. B. Forced Stoppage of Compressor When performing test running or inspection, compressors can be forcedly stopped to ensure safety.
	⑤ DSW5 (Optional Function)	A. Changeover of Defrosting Condition The defrosting operation for normal areas or cold areas can be changed over.
	⑥ DSW6	Setting of Piping Length The total piping length between the outdoor unit and indoor unit is set.
	⑦ DSW7	Setting of Emergency Operation
	⑧ DSW8	Test Operation and Service Setting II No setting is required.
	⑨ DSW9 ⑪ SW1	Transmission Setting The transmission form of indoor units is set.
	⑩ DSW10	No specific Meaning
	⑫ PSW1	Manual Defrosting Switch The defrosting operation is manually available under the forced defrosting area.
	⑬ PSW2 ⑭ PSW3	Check Switches When checking units, checking items can be selected by these switches.
	⑮ PSW4	No Specific Meaning
	⑯ LED1 (Red)	Power Source for PCB1 Normal Condition: Deactivated Abnormal Condition: Activated
	⑰ LED2 (Green)	This LED2 indicates the transmission state between the PCB1 and PCB3 & 4. Normal Condition: Flickering Abnormal Condition: Activated or Deactivated
	⑱ LED3 (Yellow)	This LED3 indicates the transmission state between the indoor unit and outdoor unit. Normal Condition: Flickering Abnormal Condition: Activated or Deactivated
	⑲ LED4	In case of Central Station II is connected, LED4 is flickering.
	⑳ SGE1 SGE2 SGE3	These indicate the following: "alarm", "protective safety device has tripped" or "checking items".

b. Inverter Printed Circuit Board: PCB3 and PCB4

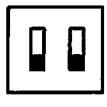


PCB3



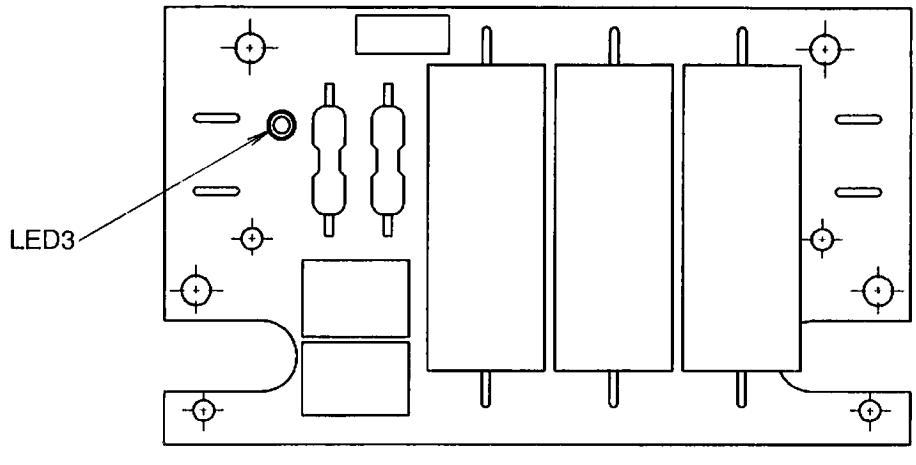
PCB4

* Dip Switch and LED Functions on Outdoor Unit Inverter Printed Circuit Board

Switch Name DSW1	Function
ON OFF 	Normal: No.1 and No.2 of DSW1 are OFF. Emergency Operation or Troubleshooting: No.1 of DSW1 is ON No.2 of DSW1 is OFF The above setting aims not to trip even if the CT detects 0A.

Name of Printed Circuit Board	Function
LED1 (Red)	This indicates the state of transmission. Flickering: Normal Transmission Activated or Deactivated: Abnormality in Transmission Circuit

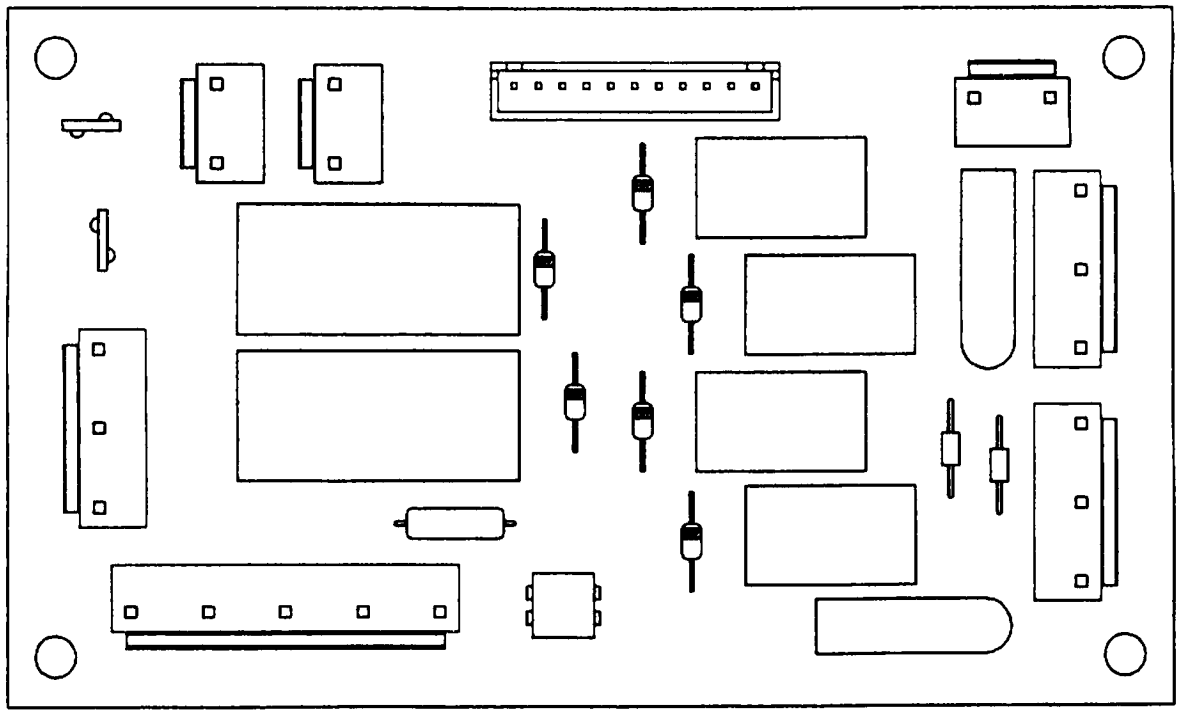
c. "SNUBBER" Board: PCB5



* LED Function on Outdoor Unit Printed Circuit Board

Name of Printed Circuit Board	Function
LED3 (Red)	This indicates the voltage between both terminal of capacitor CB1 and CB2 for inverter part. Activated: The voltage between both terminals of capacitor, CB is 50V±20V or greater. Deactivated: The voltage between both terminals of capacitor, CB is 50V±20V or smaller.

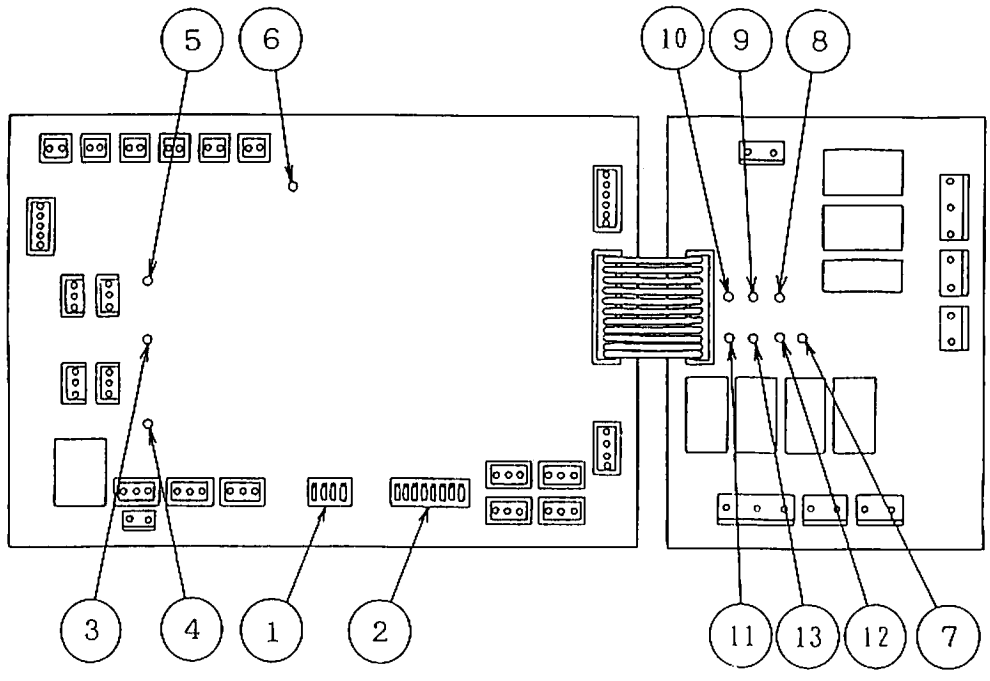
d Sub-PCB: PCB6 (FX2 Only)



(3) Printed Circuit Board in CH Unit

PCB2: Controlling Board

PCB1: Power Supply Board



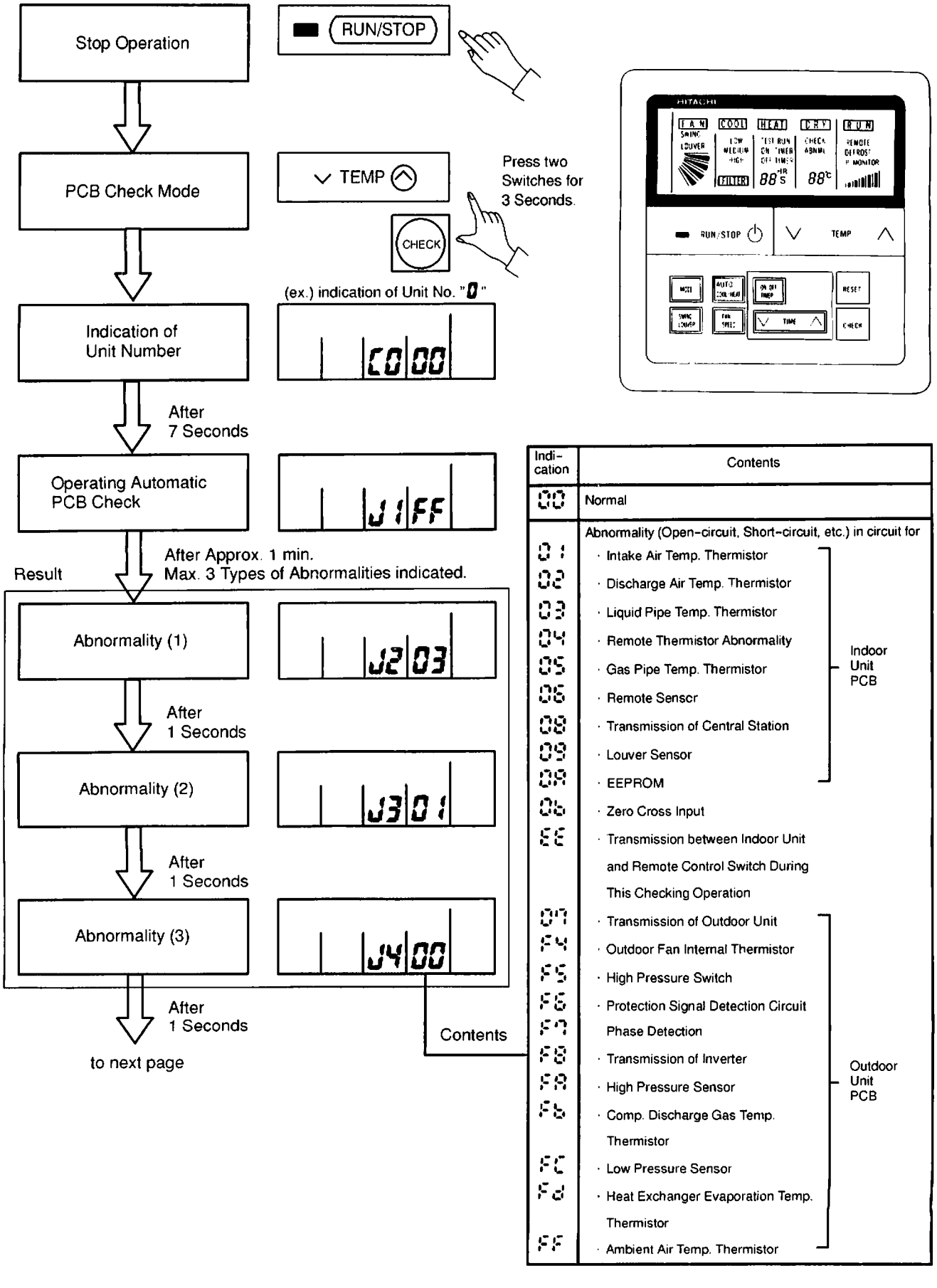
■Dip Switches and LED Functions on CH Unit Printed Circuit Boards

Name of Printed Circuit Board	Part Name	Contents of Functions
Controlling Board: PCB2 (Low Voltage)	① DSW1	Performing of Self-checking Function
	② DSW2	Setting of Self-checking Mode When only switch #1 is OFF, Self-checking of PCB is available. ON / OFF 1 2 3 4 5 6 7 8
	③ LED1 (Red)	This LED1 indicates the transmission state between the indoor unit and CH unit. Normal Condition: Flickering Abnormal Condition: Activated or Deactivated
	④ LED2 (Yellow)	This LED2 indicates the transmission state between the outdoor unit and CH unit. Normal Condition: Flickering Abnormal Condition: Activated or Deactivated
	⑤ LED3 (Green)	This LED3 is not applied. Normal Condition: Deactivated Abnormal Condition: Activated
	⑥ LED4 (Green)	This LED4 indicates the power supply (5V) for micro-computer. Normal Condition: Activated Abnormal Condition: Deactivated
Power Supply Board: PCB1 (High Voltage)	⑦ LD1	Solenoid Valve SVS2 ON (Relay YSHi): Activated
	⑧ LD2	Solenoid Valve Changeover Operation ON: Deactivated Abnormality of Power Supply to PCB: Deactivated (Alarm Code "03")
	⑨ LD3	Transmission State Between Indoor Unit and CH Unit Abnormal: Deactivated (Alarm Code "03")
	⑩ LD4	Transmission State Between Outdoor Unit and CH Unit Abnormal: Deactivated (Alarm Code "03")
	⑪ LD5	Solenoid Valve SVS1 ON (Relay YMS): Activated
	⑫ LD6	Solenoid Valve SVD2 ON (Relay Y52H): Activated
	⑬ LD7	Solenoid Valve SVD1 ON (Relay YH2): Activated

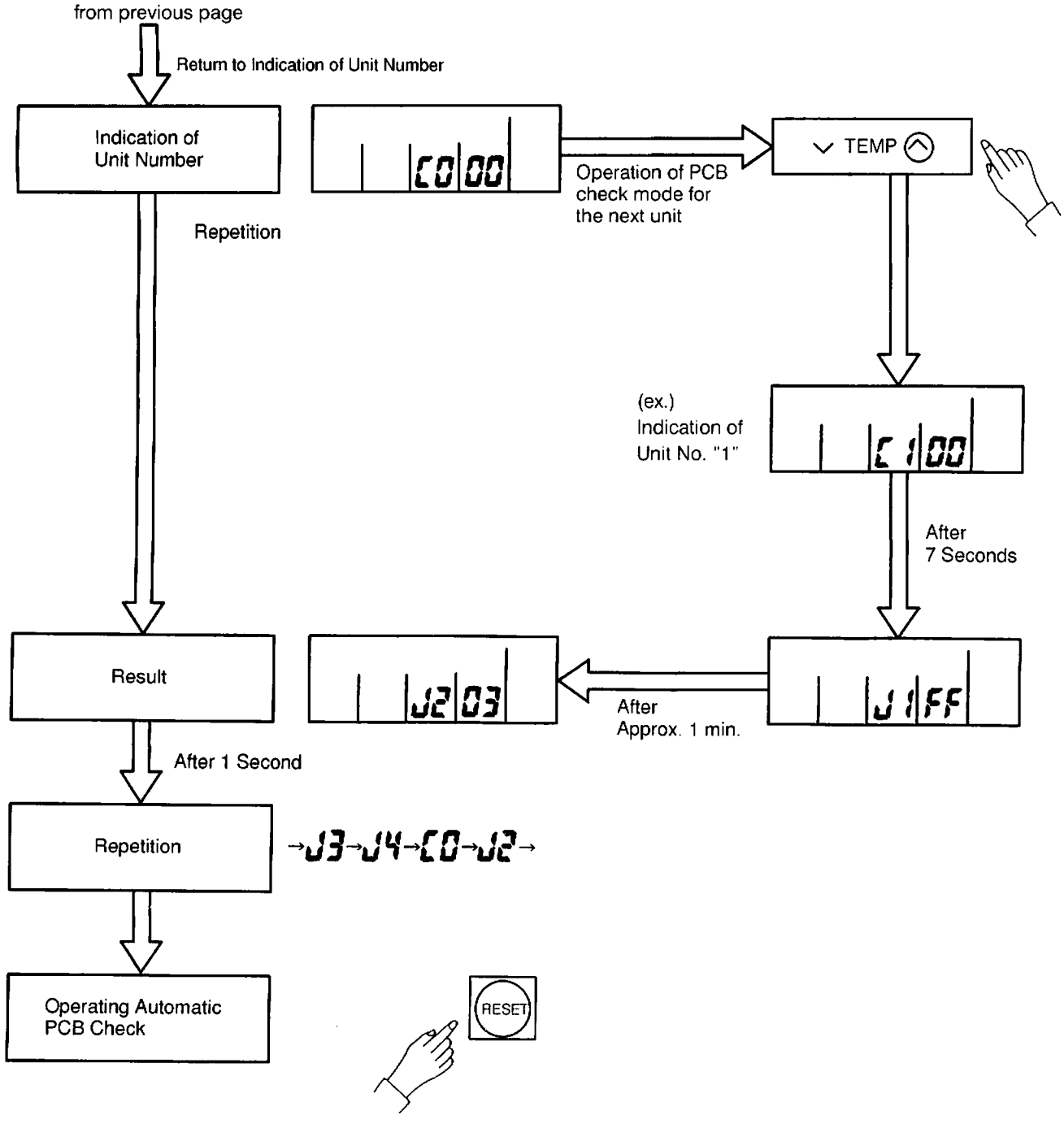
1.3 Procedure of Checking Each Main Parts

1.3.1 Self-Checking of PCBs using Remote Control Switch

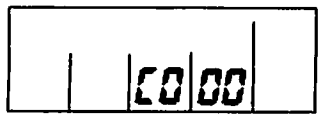
The following troubleshooting procedure is utilized for function test of PCBs in the indoor unit and outdoor unit.



Indi-cation	Contents	
00	Normal	
	Abnormality (Open-circuit, Short-circuit, etc.) in circuit for	
01	· Intake Air Temp. Thermistor	Indoor Unit PCB
02	· Discharge Air Temp. Thermistor	
03	· Liquid Pipe Temp. Thermistor	
04	· Remote Thermistor Abnormality	
05	· Gas Pipe Temp. Thermistor	
06	· Remote Sensor	
08	· Transmission of Central Station	
09	· Louver Sensor	
0A	· EEPROM	
0b	· Zero Cross Input	
EE	· Transmission between Indoor Unit and Remote Control Switch During This Checking Operation	
07	· Transmission of Outdoor Unit	Outdoor Unit PCB
F4	· Outdoor Fan Internal Thermistor	
F5	· High Pressure Switch	
F6	· Protection Signal Detection Circuit	
F7	Phase Detection	
F8	· Transmission of Inverter	
F9	· High Pressure Sensor	
Fb	· Comp. Discharge Gas Temp. Thermistor	
FC	· Low Pressure Sensor	
Fd	· Heat Exchanger Evaporation Temp. Thermistor	
FF	· Ambient Air Temp. Thermistor	



NOTE:

(1) 

If this indication is continued and "J1FF" is not shown, this indicates that each one of indoor units is not connected to the remote control switch. Check the wiring between the remote control switch and indoor unit.

(2) In this troubleshooting procedure, checking of the following part of the PCB's is not available.
PCB in Indoor Unit: Relay Circuit, Dip Switch, Option Circuit
PCB in Outdoor Unit: Relay Circuit, Dip Switch, Option Circuit

(3) If no result is given using this troubleshooting procedure (J1FF), there is a possibility of abnormal transmission of the central station (short-circuit: TL-TG).

(4) In the case that this troubleshooting is performed in the system using the central station, indication of the central station may change during this procedure. However, this is not abnormal.

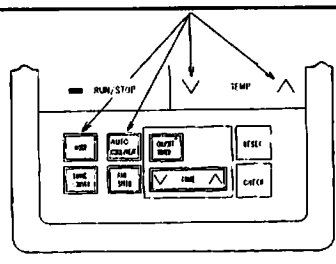
1.3.2 Self-Checking of Remote Control Switch

Cases where CHECK switch is utilized.
(1) If the remote control switch reads out malfunction.
(2) For regular maintenance check

NOTES:
1. AUTO COOL/HEAT Switch is available for FX2 system only.
2. SWING LOUVER Switch is available for indoor unit with swing louver only.

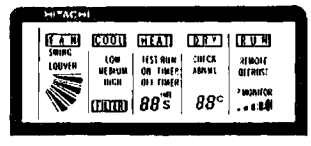
1 Turn ON the power source.

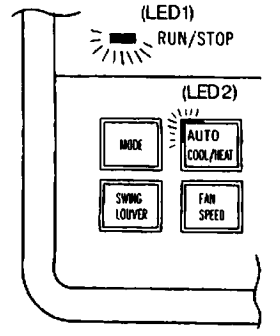
2 Simultaneously depress the following 4 switches. (During Operation, they can be depressed.



Checking of LCD, LED and Indicating Circuit

Normal: All the LCD indications one by one and LEDs are activated, for 1 seconds.





3 Depress all the touch type switches one by one. Any one of the switches can be depressed.

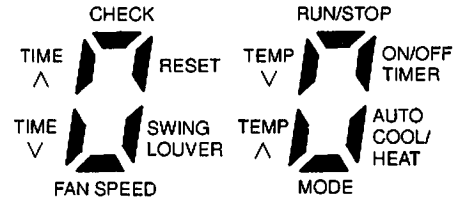
Depress the switch corresponding at "AUTO HEAT/COOL".

After 15 seconds

Normal

Checking of touch type switch function
By depressing a particular touch type switch, the corresponding segment is activated.

Temperature Indicated.

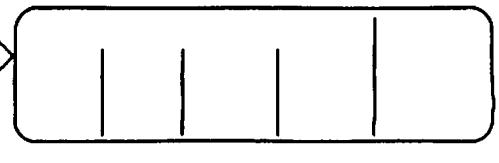


4 The transmission circuit is checked automatically.

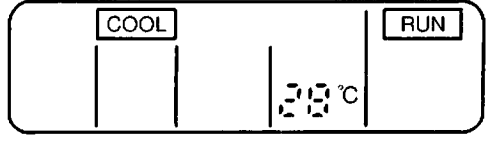
Normal		Abnormal
Main Remote Control Switch	Sub Remote Control Switch	
77	88	EE

5 Depress the Reset switch for initialization.

The indications return after 15 seconds, when the unit is operating.



Example



1.3.3 Self-Checking of Indoor Unit PCB

(1) Self-Checking by Relays and LED on Indoor Unit PCB

●To Check Abnormality on Indoor Unit PCB due to Malfunction

●To check Abnormality on Indoor Unit PCB Based on Results of Checking by CHECK switch on the remote control switch and Self-Checking Function

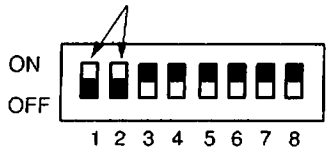
■Procedure

Refer to page 1-74 for location and function of DSW and LED.

① Turn OFF the main power switch.

② Disconnect connectors CN12 and CN2, and set dip switch DSW2 as shown below.

Set #1 and #2 at OFF side.



Dip Switch DSW2

NOTE: Before turning ON the power, see checking procedure mentioned in next page.

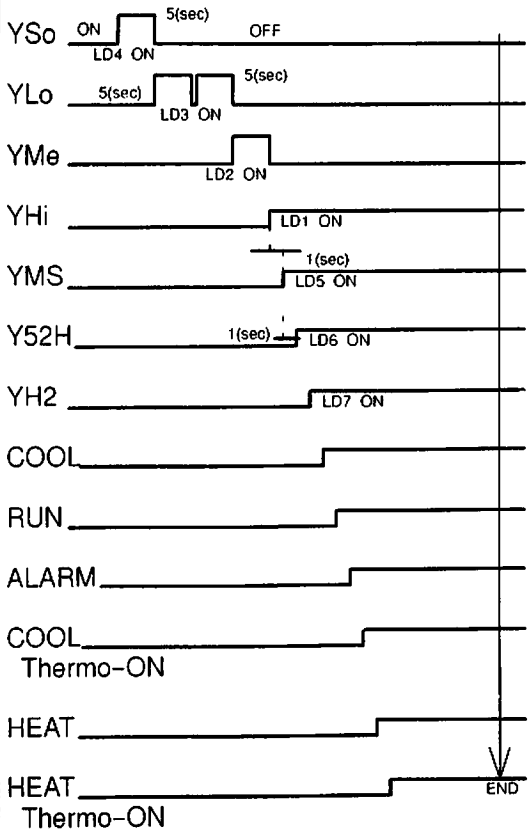
③ Turn ON the main power switch.

Check Mode starts. (See next page.)

Ⓐ Analog Test
Ⓑ Relay Test
Ⓒ LED Test

④ After completion of self-checking, turn OFF the power and reset the dip switch as before.

(2) Self-Checking Procedures in Check Mode

Check Item	State of Mode	Confirmation Method
Ⓐ Analog Test ↓ ↓ Ⓑ Each Relay Test ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ Repeatedly ↓ ↓ Perform. ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ Ⓒ LED Test ↓ ↓	If each thermistor for intake air, discharge air and freeze protection is normal, proceed to the next step.  Transmitting (I.U.-O.U.) Transmitting (I.U.-R.C.Sw.) Transmitting (I.U.-Central Station)	Check ON/OFF sound of relays and LED lamp. LED2-Instantaneous ON LED1-Instantaneous ON LED3-Instantaneous ON
Termination	Turn OFF and reset all dip switches as they were.	

1.3.4 Self-Checking of CH Unit PCB

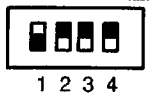
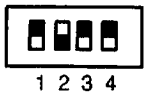
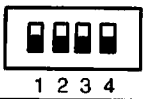
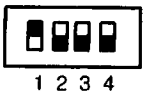
Troubleshoot CH unit PCB if abnormalities are found.

(1) Self-Checking Procedures

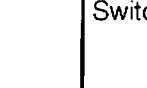
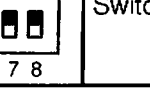
Refer to page 1-80 for location and function of DSW and LED.

① Turn OFF the main power switch.
② Set switch only #1 of DSW2 at OFF position.
③ Turn ON the main power switch. Check to ensure that LED4 is ON.
④ Start the test according to next item (2).
⑤ End the test.
⑥ Turn OFF the main power switch.
⑦ Reset the dip switches as before.

(2) Contents of Test

Test Name	PSW1 Setting	Contents of Test
① DSW 「H」 Test	ON / OFF  1 2 3 4	Checking on ON State of DSW
② Relay Test	ON / OFF  1 2 3 4	Checking on ON/OFF Function of Relays on PCB1
③ Transmission Test	ON / OFF  1 2 3 4	Checking on Transmission Circuit to Outdoor Unit and to Indoor Unit
④ DSW 「L」 Test	ON / OFF  1 2 3 4	Checking on OFF State of DSW
⑤ Reset Test	ON / OFF  1 2 3 4	Resetting of Micro-computer

① DSW 「H」 Test

DSW	Setting	Checking Item
DSW1	ON / OFF  1 2 3 4	Switch #1 to #4 ON State Normal: LD4 on PCB1 Activated
DSW2	ON / OFF  1 2 3 4 5 6 7 8	Switch #1 to #4 ON State Normal: LD3 on PCB1 Activated
DSW2	ON / OFF  1 2 3 4 5 6 7 8	Switch #5 to #8 ON State Normal: LD2 on PCB1 Activated

② Relay Test

Check ON/OFF sound of relay and LED lamp.

Relay	LED	0 1 2 3 4 5 6 7 8 (sec)
YTG	–	No Checking
YSHI	LD1	OFF ON
Y52H	LD6	OFF ON
YH2	LD7	OFF ON
YMS	LD5	OFF ON
YSo	LD4	OFF ON
YLo	LD3	OFF ON
YMe	LD2	OFF ON

③ Transmission Test

Check on LD4 activation and LD5 flicker with 1 second interval.

Transmission Circuit	Normal	Abnormal
To Indoor Unit (LED1 on PCB2)	LD4 ON	LD4 OFF
To Outdoor Unit (LED2 on PCB2)	LD5 ON	LD5 OFF

④ DSW 「L」 Test

DSW	Setting	Checking Item
DSW1	ON / OFF  1 2 3 4	Switch #1 to #4 OFF State Normal: LD4 on PCB1 Activated
DSW2	ON / OFF  1 2 3 4 5 6 7 8	Switch #1 to #4 OFF State Normal: LD3 on PCB1 Activated
DSW2	ON / OFF  1 2 3 4 5 6 7 8	Switch #5 to #8 OFF State Normal: LD2 on PCB1 Activated

⑤ Reset Test

All LD1 to LD7 are activated, and after one second they are deactivated by resetting of micro-computer.

1.3.5 Self-Checking of 7-Day Timer (PSC-3T)

This procedure is utilized for regular maintenance check, and if the 7-day timer is malfunction.

① Turn ON the main power switch.

↓

② Checking of LCD and Indicating Circuit:
Simultaneously depress the following 4 switches, [HOUR] of "PRESENT TIME" [PRESENT DAY] of "DAY OF WEEK" [ON TIME] [OFF TIME] of " MONITOR".
During operation, they can be depressed.

→ All the LCD indications activated, for 5 seconds.

↓

All the LCD indications deactivated, for 1 second.

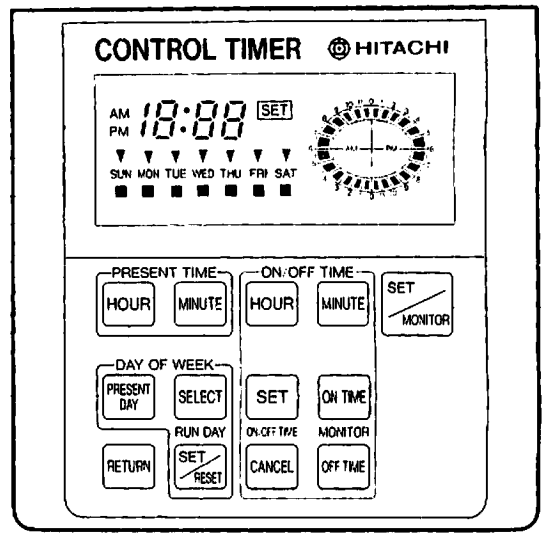
↓

NORMAL:

All the LCD indications activated, for 5 seconds.

↓

All the LCD indications deactivated, for 1 second.



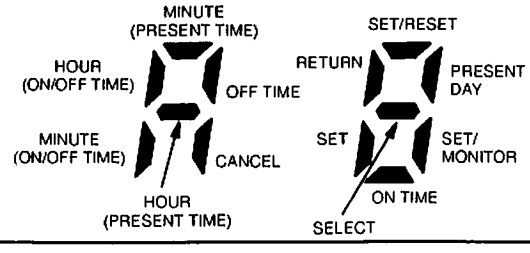
③ Checking of Touch Type Switch Function:
Depress all the touch type switches one by one.
Any one of the switches can be depressed.

NORMAL:

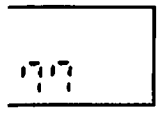
After 15 Seconds

By depressing a particular touch type switch, the corresponding segment is activated.

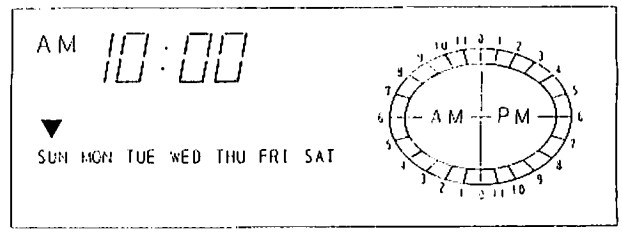
Indication



④ Completion of self-checking, "77" is indicated, for 3 seconds.



⑤ Return to the indication before the self-checking.

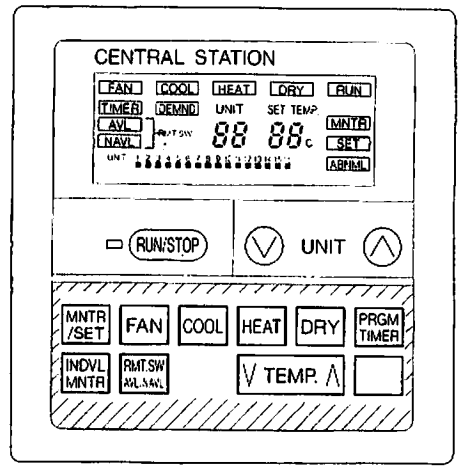


1.3.6 Self-Checking of Central Station (PSC-3S1)

This procedure is utilized for regular maintenance check, and if the central station is malfunction.

① Turn ON the main power switch.

② Checking of LCD and Indicating Circuit:
Simultaneously depress the following 4 switches, [FAN] [COOL] and [▽] [△] of "UNIT".
During operation, they can be depressed.



→ All the LCD indications activated, for 5 seconds.

↓

All the LCD indications deactivated, for 1 second.

NORMAL:

↓

All the LCD indications activated, for 5 seconds.

↓

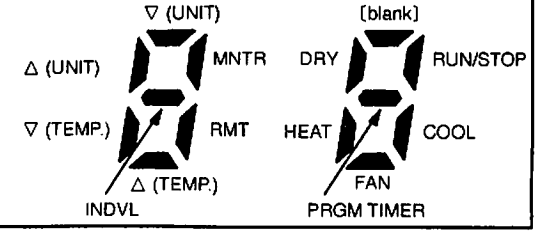
All the LCD indications deactivated, for 1 second.

③ Checking of Touch Type Switch Function:
Depress all the touch type switches one by one.
Any one of the switches can be depressed.

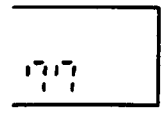
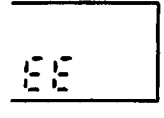
NORMAL: 

After 15 Seconds

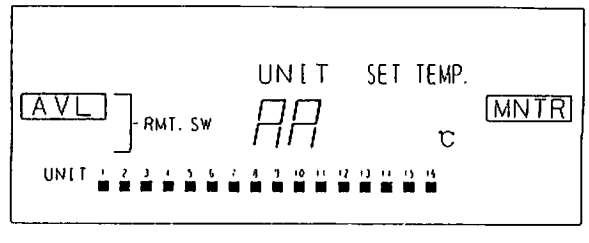
By depressing a particular touch type switch, the corresponding segment is activated.
Temp. Indication Part



④ Checking of Transmission Circuit:
Automatically checked, and the result will be indicated as figure right, for 3 seconds.

NORMAL	ABNORMAL
	

⑤ Return to the indication before the self-checking.



1.3.7 Procedure of Checking Other Main Parts

(1) High Voltage Discharge Work for Replacing Parts

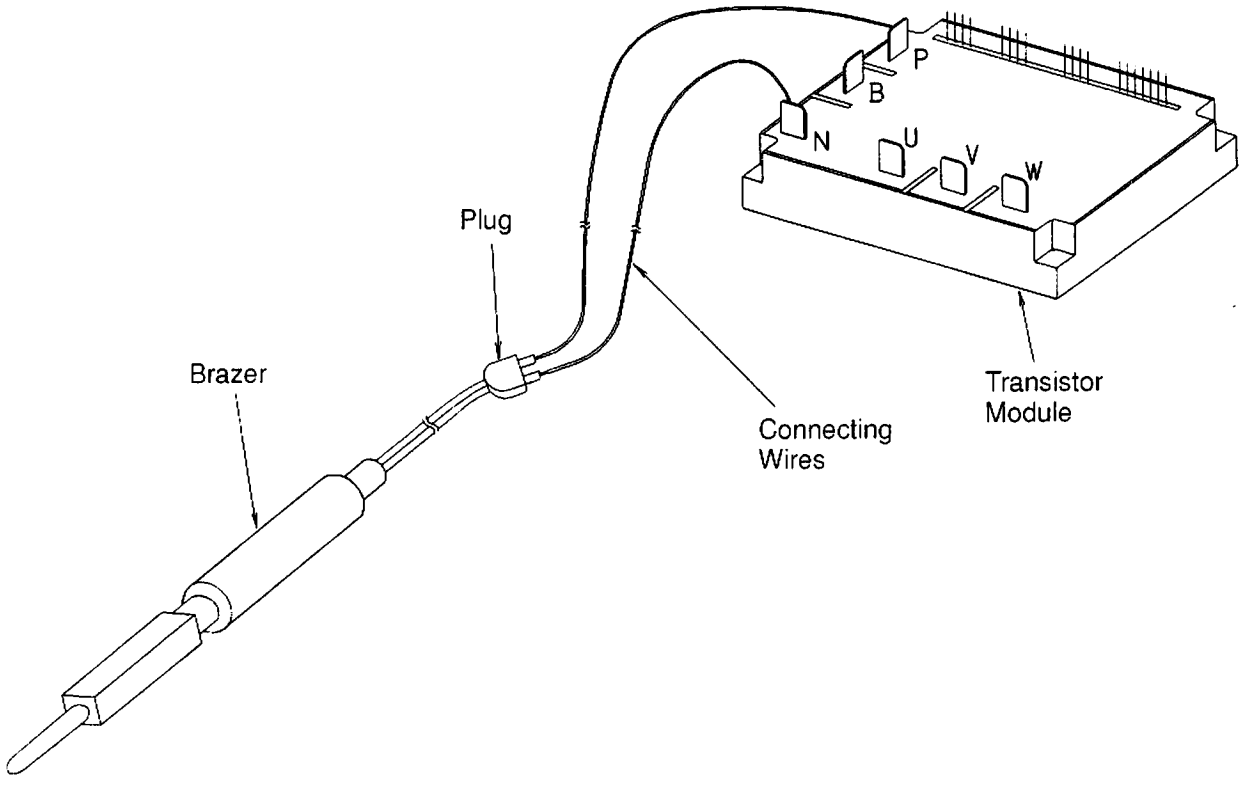
[Perform this high voltage discharge work to avoid an electric shock.]

Procedure

(a) Turn OFF the main switches and wait for three minutes. Check to ensure that no high voltage exists. If LED3 is ON after start-up and LED3 is OFF after turning OFF power source, the voltage will decrease lower than DC50V.

(b) Connect connecting wires to an electrical brazer.

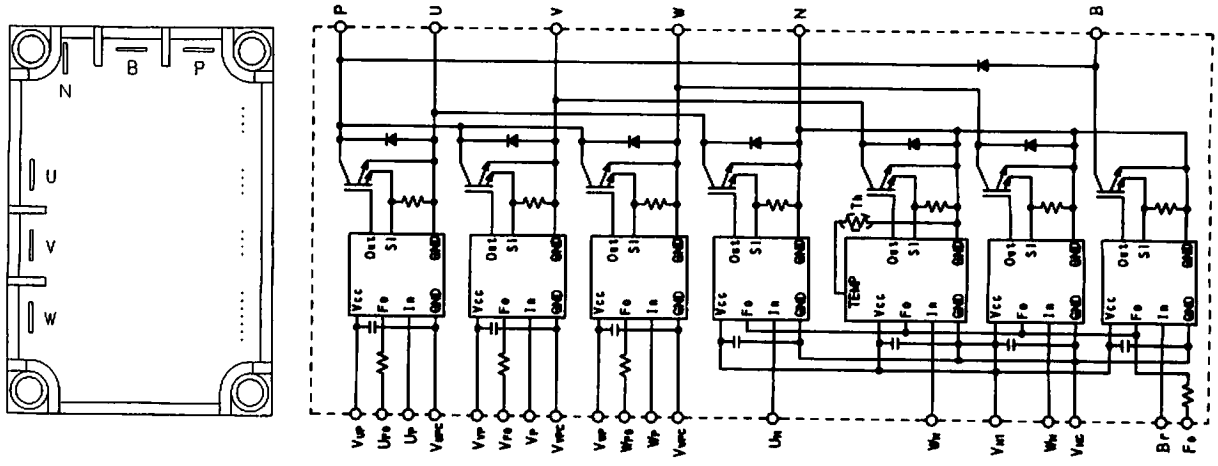
(c) Connect the wires to terminals, P and N on transistor module. →Discharging is started, resulting in hot brazer. Pay attention not to short-circuit between terminal P and N .



(d) Wait for 2 or 3 minutes and measure the voltage once again. Check to ensure that no voltage is charged.

(2) Checking Procedures Transistor Module

Outer Appearance and Internal Circuit of Transistor Module

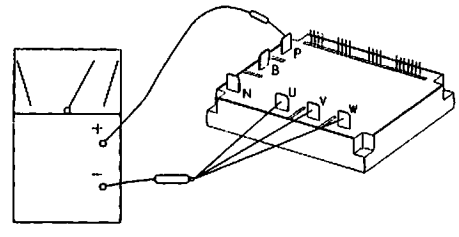


Remove all the terminals of the transistor module before check.

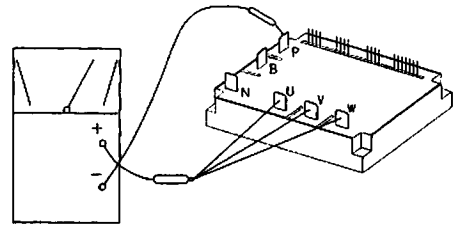
If items (a) to (e) are performed and the results are satisfactory, the transistor module is normal.

Measure it under 1 kΩ range of a tester. Do not use a digital tester.

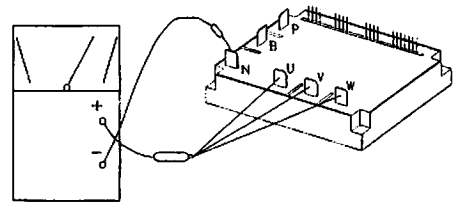
(a) By touching the + side of the tester to the P terminal of transistor module and the – side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are from 1 to 5 kΩ, it is normal.



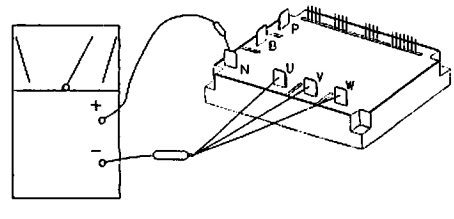
(b) By touching the – side of the tester to the P terminal of transistor module and the + side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than 100 kΩ, it is normal.



(c) By touching the – side of the tester to the N terminal of transistor module and the + side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are from 1 to 5 kΩ, it is normal.

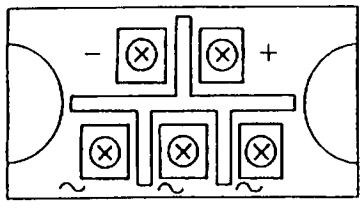


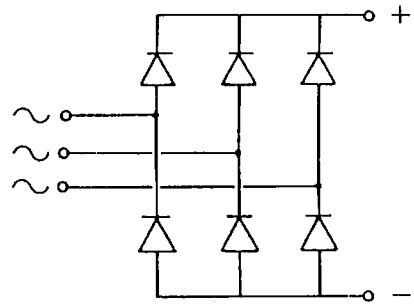
(d) By touching the + side of the tester to the N terminal of transistor module and the – side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than 100 kΩ, it is normal.



(3) Checking Procedures on Diode Module

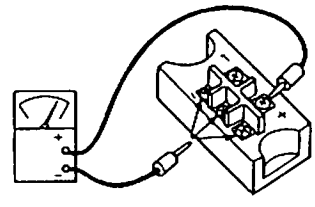
Outer Appearance and Internal Circuit of Diode Module



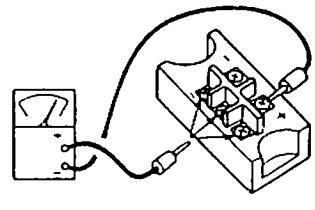


If items (a) to (d) are performed and the results are satisfactory, the diode module is normal. Measure it under 1 kΩ range of a tester. Do not use a digital tester.

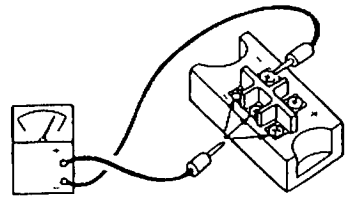
(a) By touching the + side of the tester to the + terminal of the diode module and the - side of tester to the ~ terminals (3 NOs.) of the diode module, measure the resistance. If all the resistances are from 5 to 50 kΩ, it is normal.



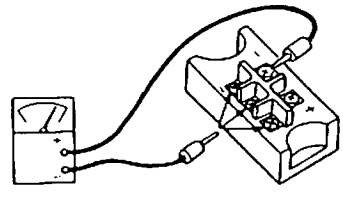
(b) By touching the - side of the tester to the + terminal of the diode module and the + side of tester to the ~ terminals(3 Nos.) of the diode module, measure the resistance. If all the resistances are greater than 500 kΩ, it is normal.



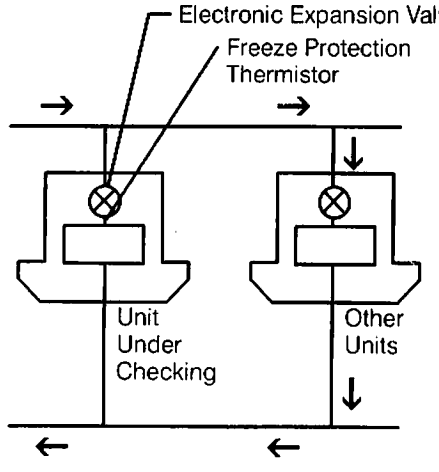
(c) By touching the - side of the tester to the - terminal of the diode module and the + side of tester to the ~ terminals(3 Nos.) of the diode module, measure the resistance. If all the resistances are from 5 to 50 kΩ, it is normal.



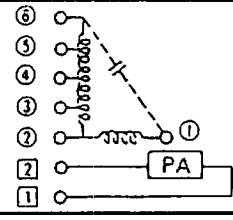
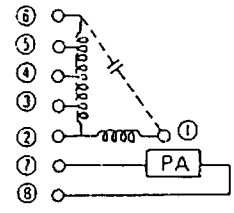
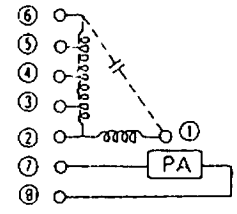
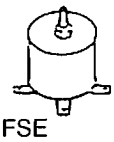
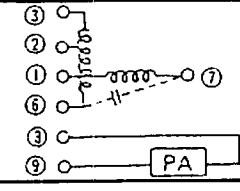
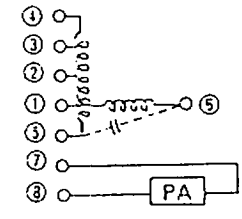
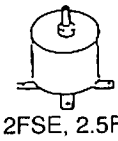
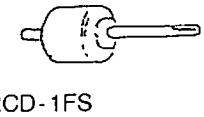
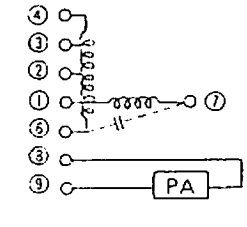
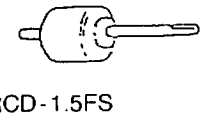
(d) By touching the + side of the tester to the - terminal of the diode module and the - side of tester to the ~ terminals(3 Nos.) of the diode module, measure the resistance. If all the resistances are greater than 500 kΩ, it is normal.

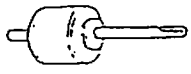
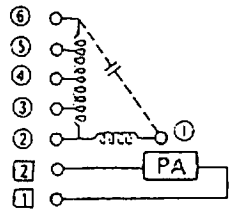
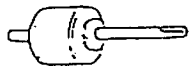
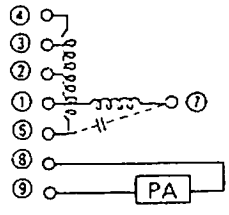
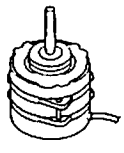
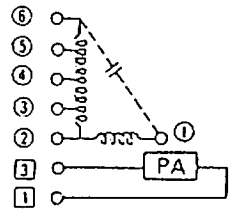
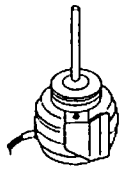
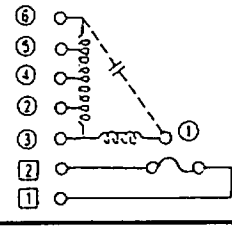
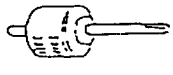
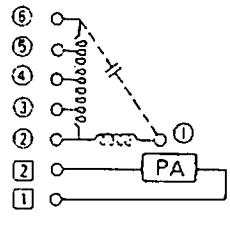
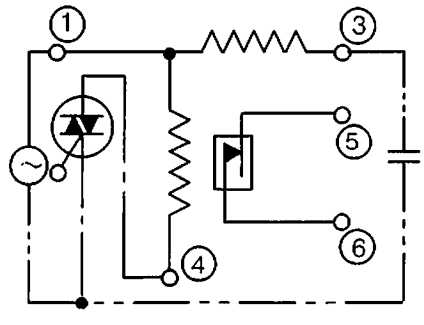


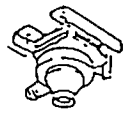
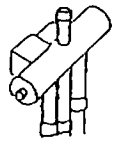
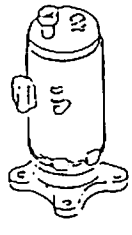
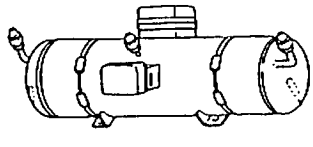
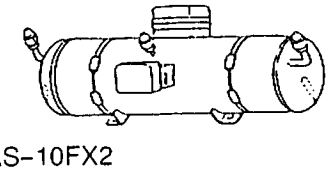
(4) Checking Method of Electronic Expansion Valve

	Indoor Unit Electronic Expansion Valve	Outdoor Unit Electronic Expansion Valve
Locked with Fully Open	Check for the liquid pipe temperature during heating operation. It is abnormal if the temperature does not increase.	It is abnormal if the liquid pipe pressure does not increase during cooling operation.
Locked with Slightly Open	It is abnormal under the following conditions; The temperature of freeze protection thermistor becomes lower than the suction air temperature when the unit under checking is stopped and other units are under cooling operation.	It is abnormal if the liquid pipe pressure does not increase and the outlet temperature of the expansion valve decreases after the cooling operation is started.
Locked with Fully Closed		It is abnormal under the following conditions; After heating operation for more than 30 min., the discharge gas temperature of compressor is not 10°C higher than the condensing temperature and there is no other faults such as excessive charge of refrigerant, etc.

(5) Checking of Electrical Coil Parts

Name of Parts	Model	Electrical Wiring Diagram	Wiring No.	Resistance (Ω)
Fan Motor for Indoor Unit  for RPI-0.8FS, 1FS, 1.5FS	ENO-KPPA 55W		①-② ②-③ ③-④ ④-⑤ ⑤-⑥	44.8 41.1 21.0 4.3 2.9 at 25℃
Fan Motor for Indoor Unit  for RPI-2FS	ENO-KPPA 160W		①-② ②-③ ③-④ ④-⑤ ⑤-⑥	12.7 12.8 4.4 6.6 3.7 at 25℃
Fan Motor for Indoor Unit  for RPI-2.5FS	ENO-KPPA 180W		①-② ②-③ ③-④ ④-⑤ ⑤-⑥	23.7 10.4 4.1 4.7 4.2 at 25℃
Fan Motor for Indoor Unit  for RPI-4FS	ENO-KPPA 200W		①-② ②-③ ③-④ ④-⑤ ⑤-⑥	23.6 7.8 6.3 8.6 5.2
Fan Motor for Indoor Unit  for RPI-5FS	ENO-KPPA 200W		①-② ②-③ ③-④ ④-⑤ ⑤-⑥	23.6 7.8 6.3 8.6 5.2
Fan Motor for Indoor Unit  for RCI-1FSE	CL2361 12W		⑥-① ①-② ②-③ ①-⑦	397.5 66.91 52.93 389.3 at 25℃
Fan Motor for Indoor Unit  for RCI-1.5FSE	CL3060 23W		⑤-① ①-② ②-③ ③-④ ①-⑥	139.8 31.94 31.94 42.62 115.1 at 25℃
Fan Motor for Indoor Unit  for RCI-2FSE, 2.5FSE	CP3030 30W		⑤-① ①-② ②-③ ③-④ ①-⑦	102.2 16.27 47.80 51.78 154.9 at 25℃
Fan Motor for Indoor Unit  for RCD-1FS	ENO-KPPA 20W		⑥-① ①-② ②-③ ③-④ ①-⑦	156.18 46.9 25.5 67.4 111.8 at 25℃
Fan Motor for Indoor Unit  for RCD-1.5FS	CP2559 20W		⑥-① ①-② ②-③ ③-④ ①-⑦	113.4 31.29 27.68 74.58 133.9 at 25℃

Name of Parts	Model	Electrical Wiring Diagram	Wiring No.	Resist-ance (Ω)
Fan Motor for Indoor Unit  for RCD-2FS	ENO-KPPA 65W		①-② ②-③ ③-④ ④-⑤ ⑤-⑥	64.5 22.2 16.1 6.6 13.2 at 25℃
Fan Motor for Indoor Unit  for RCD-2.5FS	CP3045 85W		⑥-① ①-② ②-③ ③-④ ①-⑦	88.85 34.25 37.02 109.2 107.8 at 25℃
Fan Motor for Indoor Unit  for RPK-1.5FS	ENO-KPPA 15W		①-② ②-③ ③-④ ④-⑤ ⑤-⑥	316.5 54.3 37.8 41.1 117.5 at 25℃
Fan Motor for Indoor Unit  for RPF-1.5FS, RPFI-1.5FS	TNO-KP 20W		⑥-① ①-② ②-③ ①-⑦	161.4 61.1 26.3 51.7 73.8 at 25℃
Fan Motor for Indoor Unit  for RPC-2.5FS(E)	CH3531 65W		⑤-⑥ ④-⑤ ③-④ ②-③ ①-②	5.4 8.8 4.5 10.8 32.5 at 25℃
Fan Motor for Indoor Unit  for RAS-5FS2, RAS-5FX2	CX5004 150W		④-① ①-③	30.37 32.51
Fan Motor for Indoor Unit  for RAS-8FS2, RAS-8FX2	CX5004 150W		④-① ①-③	30.37 32.51
Fan Motor for Indoor Unit  for RAS-10FS2, RAS-10FX2	CX5004 150W		④-① ①-③	30.37 32.51

Name of Parts	Model			Resistance (Ω)	
Drain-up Motor  for RCI-1FSE, 1.5FSE, 2FSE, 2.5FSE	PCD-4N230HS-3			135 at 20°C	
Drain-up Motor  for RCD-1FS, 1.5FS, 2FS, 2.5FS	PCD-4N230HS-2			135 at 20°C	
Solenoid Valve for Gas Bypass  for RAS-5FS2, 8FS2, 10FS2, RAS-5FX2, 8FX2, 10FX2	ST10PA			1,900 at 20°C	
4-Way Valve  for RAS-5FS2, 8FS2, 10FS2, RAS-5FX2, 8FX2, 10FX2	RAS-5FS2 RAS-5FX2	CHV-0403 + CHV-01AJS03C1		1,740 at 20°C	
	RAS-8FS2 RAS-10FS2	VH60100 + LB62012			
	RAS-8FX2 RAS-10FX2	VH60100 + LB60012			
Compressor Motor  for RAS-5FS2, RAS-5FX2, RAS-8FS2, RAS-10FS2	RAS-5FS2 RAS-5FX2	401DHV		at 20°C	
	RAS-8FS2	401DHVM	400DHM	1,746 at 75°C	4,006 at 75°C
	RAS-10FS2		500DHM		3,319 at 75°C
Compressor Motor  for RAS-8FX2	803TLV			for Inverter: 1.68 for Constant Speed: 3.93 at 20°C	
Compressor Motor  for RAS-10FX2	1003TLV			for Inverter: 1.68 for Constant Speed: 2.90 at 20°C	
Contactor for Compressor Motor  for RAS-5FS2, 8FS2, 10FS2, RAS-5FX2, 8FX2, 10FX2	A25			520 at 20°C	

(6) Checking of Compressor

CHECK LIST ON COMPRESSOR

CLIENT: MODEL: DATE:

Serial No.: Production Date: Checker

No.	Check Item	Check Method	Result	Remarks
1	Are THM2(CN103) and THM3(CN104) correctly connected? THM2, THM3: Discharge Gas Thermistor (THM3 is only for RAS-8FS2, 8FX2, 10FS2 and 10FX2)	① Are wires between THM2 and CN103, and THM3 and CN104 correctly connected by viewing? ② Check to ensure that 7-segment indication of Td1 is higher than Td2 when No.1 comp. is operating. Td1: Temperature of THM2 Td2: Temperature of THM3		
2	Are thermistors, THM2 and THM3 disconnected?	① Check to ensure that thermistor on the top of comp. is correctly mounted by viewing? ② Check to ensure that actually measured temp. are greatly different from the indication(Td1, Td2) during check mode.		
3	Are connectors for current sensor (CN110 and current sensor connector)?	①Check to ensure that indication A1 and A2 are 0 during compressor stopping. ②Check to ensure that indication A1 and A2 are not 0 during compressor running.(However, A2 is 0 during stopping of No. 2 comp.)		
4	Is current sensor faulty?			
5	Is current sensing part on PCB3 faulty?			
6	Is the direction of current sensor(CTU, CTV) reverse?	Check the direction ◗ by viewing.		
7	Are power source wires, U and V inserted correctly into current sensor?	Check to ensure that wires are correctly inserted.		
8	Are ex. valves(MV1, MV2 and MVB) correctly connected?	Check to ensure that MV1~CN115, MV2~CN116 and MVB~CN117 are correctly connected.		
9	Are ex. valve coils(MV1, MV2 and MVB) correctly mounted?	Check to ensure that each coil is correctly mounted on the valve.		
10	Are the refrigeration cycle and electrical wiring system incorrectly connected?	Check to ensure that refrigerant is flowing into indoor units by operating one refrigerating cycle only from the outdoor unit.		
11	Is opening of ex. valve completely closed(locked)?	Check the following by the check mode of outdoor unit. ①Liquid Pipe Temp.(TL)<Air Intake Temp.(Ti) during Cooling Operation ②Liquid Pipe Temp.(TL)>Air Intake Temp.(Ti) during Heating Operation		
12	Is opening of ex. valve fully opened (locked)?	Check to ensure that liquid pipe temp. is lower than air intake temp. of stopping indoor unit when other indoor units are operating under cooling operation.		
13	Are the contacts for comp. magnetic switch CMC faulty?	Check the surface of each contact(R, S and T) by viewing.		
14	Is there any voltage abnormality among L1-L2, L2-L3 and L3-L1?	Check to ensure that voltage imbalance is smaller than 3%. Please note that power source voltage must be within 380V or 415V ±10%.		
15	Is the comp. oil acidified during compressor motor burning?	Check to ensure that the oil color is not black.		

Additional Information for "CHECK LIST ON COMPRESSOR"

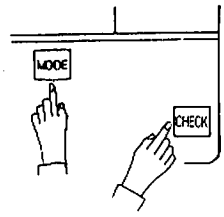
Check Item	Additional Information(Mechanism of Compressor Failure)
1 & 2	The liquid refrigerant return volume to the compressor is controlled by the discharge gas temperature Td1 when only No.1 compressor is operating. If Td1 and Td2 are reversely connected, the liquid refrigerant return volume will become small by detecting the temperatures even if the actual discharge gas temperature is high. Therefore, this abnormal overheating operation will result in insulation failure of the motor winding.
3, 4 & 5	Overcurrent control(operating frequency control) is performed by detecting current by the current sensor. In this case, winding insulation failure will occur, since control is not available in spite of actually high current.
6, 7	The current sensor checks phase and adjusts output electrical wave in addition to the above mentioned items. If fault occurs, the output electrical wave becomes unstable giving stress to the motor winding, resulting in winding insulation failure.
8, 9	During a cooling operation, Pd is controlled by MV1 and MV2, and Td and SH are controlled by MVB. During a heating operation, Td and SH are controlled by MV1 and MV2, and MVB is fully closed. If expansion valves are incorrectly connected, correct control is not available, resulting in compressor seizure depending on liquid refrigerant returning conditions or motor winding insulation failure depending on overheating conditions.
10	If the refrigeration cycle and electrical system are incorrectly connected, abnormally low suction pressure operation is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
11	ditto
12	The compressor may be locked due to the liquid return operation during the cooling operation.
13	In the case that the contacting resistance becomes big, voltage imbalance among each phase will cause abnormal overcurrent.
14	In this case, overcurrent will occur, efficiency will decrease or the motor winding will be excessively heated.
15	In the case, it will result in motor burning or compressor seizure.

1.4 Test Run

1.4.1 Test Run Mode by Remote Control Switch

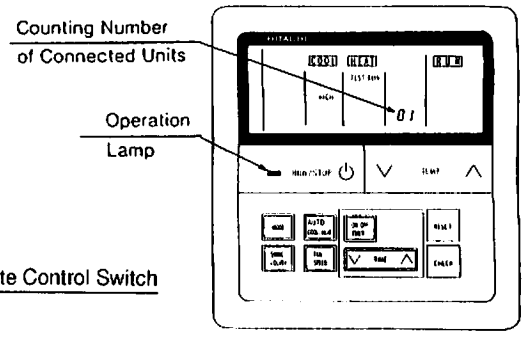
I Turn ON the power source of the units.

II Procedure for "TEST RUN" mode of remote control switch.
Depress the MODE and the CHECK switches together for more than 3 second.



→ If "TEST RUN" and the counting number of the connected units to the remote control switch (for example "01") are indicated on the remote control switch, the connection of remote control cable is correct.
This indication will last for approximately 1 minute.

→ If no indication appears or the number of the units indicated is smaller than the actual number of the units, some abnormalities exist.



Remote Control Switch

III

Remote Control Switch Indication	Fault	Inspection Points after the Power Source OFF
No Indication	· The power source is not turned ON. · The connection of the remote control cable is incorrect. · The connecting wires of power supply line are incorrect or loosened.	1. Connection between the connector and the wires: Red wire–No.1, Black wire–No.2, White wire–No.3 2. Connecting points of Remote Control Cable 3. Contact of Connectors of Remote Control Cable 4. Connection Order of each Terminal Boards 5. Screw Fastening of each Terminal Boards
Counting number of connected units is incorrect.	· The setting of unit number is incorrect. · The connection of control cables between each indoor units are incorrect. (When one remote control switch controls multiple units.)	6. Dip Switch Setting on Printed Circuit Board 7. Wire Connecting Order of Bridge Cable 8. Connecting Points of Bridge Cable 9. Contact of Connectors of Bridge Cable

IV Select TEST RUN MODE by depressing MODE Switch. (COOL or HEAT)

V Depress RUN/STOP switch.

→ The "TEST RUN" operation will be started. (The "TEST RUN" operation will be finished after 2 hours unit operation or by depressing the RUN/STOP switch again.)

→ If the units do not start or the operation lamp on the remote control switch is flickered, some abnormalities exist.

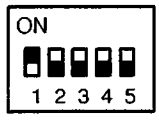
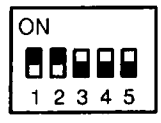
VI

Remote Control Switch Indication	Unit Condition	Fault	Inspection Points after the Power Source OFF
The operation lamp flickers. (1 Time/1 Sec.) And the Unit No. and Alarm Code "03" flicker.	The unit does not start.	The connecting wires of operating line are incorrect or loosened.	Connecting Order of each Terminal Boards. Screw Fastening of each Terminal Boards.
The operation lamp flickers. (1 Time/2 Sec.)	The unit does not start.	The connection of remote control cable is incorrect.	This is the same as item III 1,2 and 3.
Indication or Flicker different to above.	The unit does not start, or starts once and then stops.	The connection of the thermistors or other connectors are incorrect. Tripping of protector exists, etc.	Check by the alarm code table in the service manual. (Do it by service people.)
Normal	The outdoor fans rotate reversely.	The connecting order of power supply line is incorrect.	Connecting Order of the Terminal Board: TB1 in the Outdoor Unit.
Normal	The outdoor fans do not start.	Some wires of power supply line is disconnected.	Connecting Point of Power Supply Line. Contact Outdoor Fan Motor Connector.

1.4.2 Test Run Mode by Outdoor Unit

(1) Purpose: This function is used to check operation conditions of components by test operation from the outdoor unit by a service engineer.

(2) Operation Method: After setting the dip switch, DSW4 on the outdoor unit PCB, turn ON the main switch. After power supply, wait for more than 5 minutes due to automatic address setting by the micro-computer, and then, start the test operation.

Cooling Operation	Heating Operation
	

a. All the indoor units connected to the outdoor unit are automatically started under the same operation mode such as cooling or heating.

b. During this test running, the remote control switch indicates "TEST" on the display. If temperature setting is not performed, the following setting is given.

- Cooling Operation
  Fan Speed: Setting Speed before Test Run
  Temperature: 28
- Heating Operation
  Fan Speed: Setting Speed before Test Run
  Temperature: 22

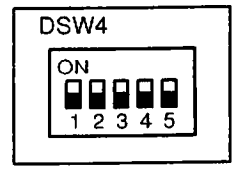
c In the case that the operation mode such as operation controlled by remote control switches or central station, the normal test operation is not available.
◎Remote Control Switch: Switch OFF the "RUN/STOP switch.
◎Central Station: Stop the central control and give instruction for individual operation.
After the test operation by the outdoor unit is started, If the above mentioned controller are used, operation mode may be changed or this test operation may be automatically stopped. Therefore, do not touch any controllers.

d. If the system is stopped due to an alarm during this test operation, turn OFF the main power switch and remove the cause of the alarm and then, supply power to the system so that the test operation can be re-started.

(3) Cause of Stoppage

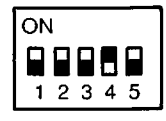
a. Turning OFF Main switch to Outdoor Unit (Power OFF to Outdoor Unit PCB)
b. Alarm
c. Switching RUN/STOP Switch OFF
d. Resetting the dip switch, DSW4

Check to ensure that the dip switch, DSW4 is reset as it was after this test operation.

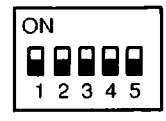


(4) Compressor Forced Stop

a. If #4 of DSW4 is turned ON during operating comp., immediately comp. are stopped and indoor units are Thermo-OFF.



b. If #4 of DSW4 is turned OFF, comp. are operated after cancelling enforced 3 minutes stoppage.



NOTE: Do not turn ON/OFF frequently the compressor.

1.4.3 Checking List (FS2 Series)

CHECK LIST ON TEST OPERATION

CLIENT: INSTALLER: DATE:

O.U. MODEL: O.U. Serial No.: Checker

I.U. Model								
I.U. Serial No.								

I.U. Indoor Unit, O.U.: Outdoor Unit

Piping Length: m Additional Refrigerant Charge: kg

(1)General

No.	Check Item	Result
1	Was the dip switch, DSW6 for piping length in O.U. set?	
2	Was the dip switch, DSW3 for piping lift in O.U. set?	
3	Is the transmitting wire contacting to power lines?	
4	Was an earth wire connected?	
5	Is there any short circuit?	
6	Is there any voltage abnormality among each phase(L1-L2, L2-L3, L3-L1)?	

(2)Refrigeration Cycle

a. Operation (Cooling/Heating)

No.	Check Item	Result
1	Operate all the indoor units ("TEST RUN" mode).	
2	Operate all the indoor units at "HIGH" speed.	
3	In case that the constant compressor is turned ON and OFF repeatedly, stop one indoor unit (small capacity one).	

b. Sampling Data

No.	Check Item	Result
1	After the operation for more than 20 min.	
2	Check Pd and Td. Is Td - SH 20 to 40 deg.?	
3	Is Ps 2.0 to 5.0?	
4	Is Pd 12 to 22? (If the outdoor temperature is high, Pd becomes high.)	

(3)Check Item after Sampling Data

a. Cooling Operation (It is applicable when outdoor temperature is higher than 15°C.)

No.	Check Item	Standard	Causes	Result
1	Is H1(Compressor Frequency) + (CC(Numbers of Running Compressor)−1)×(※) abnormally low or high? (It is applicable when Intake Air Temp. is 3 deg. higher than Setting Temp.)	Running Horsepower of Indoor Units × 15Hz	·Low: Insufficient Refrigerant ·High: Excessive Refrigerant ·DSW for I.U. Capacity; Incorrect Setting	
2	Is fan actually running at "HIGH" speed when Fo(Air Flow Rate of Fan) is 「15」 or 「16」?	—	·Fan Motor; Failure ·PCB; Failure ·Condenser; Failure	
3	Is Td1 higher than Td2 when only No. 1 compressor is running(when CC(Numbers of Running Compressor) is 「1」)?	—	·Td Thermistor; Incorrect Connection or Incorrect Mounting	
4	Is the total of iE(Indoor Ex. Valves Opening) abnormally low or high?	Total of iE: Horsepower of Outdoor Unit × (5~30)	·Low: Excessive Refrigerant ·High: Insufficient Refrigerant,	
5	Is TL(Liquid Pipe Temp. of I.U. Heat Exchanger) lower than Ti(Intake Air Temp. of I.U.)?	It is normal when TL−Ti <−5.	·TL Thermistor; Failure ·Ex. Valve; Fully Closed ·Short-circuit	
6	Is TG(Gas Pipe Temp. of I.U. Heat Exchanger) lower than Ti(Intake Air Temp. of I.U.)?	It is normal when TG−Ti <−5.	·TG Thermistor; Failure ·Ex. Valve; Fully Closed or Slightly Open ·Short-circuit	
7	Is there any excessive difference among I.U. at SHTG−TL of I.U. heat exchanger? (It is applicable when Intake Air Temp. is 3 deg. higher than Setting Temp.)	It is normal if the difference among units is within 7 deg.	·TL/TG Thermistor; Failure ·Ex. Valve; Fully Open, Slightly Open or Fully Closed	
8	Is there any I.U. with the I.U. heat exchanger SHTG−TL excessively different from other units' value? (It is applicable when Intake Air Temp. is 3 deg. higher than Setting Temp.)	It is normal if SH is within 3 deg. lower than other units.	·Ex. Valve; Locked with Fully Open ·	
9	Is there any I.U. with SH excessively lower than other units' value, under the condition of iE(I.U. Ex. Valve) 「100」?	It is normal if SH is within 3 deg. higher than other unit	·Ex. Valve; Locked with Slightly Open or Closed ·	
10	Is the difference between Discharge Air Temp. and Intake Air Temp. more than 7 deg.?	—	—	

b. Heating Operation (It is applicable when outdoor temperature is higher than 0℃.)

No.	Check Item	Standard	Causes	Result
1	Is oE1(O.U. Ex. Valves Opening) abnormally low or high when Td – SH is 15 to 30 deg.?	oE1 = 30~75%	·Low: Insufficient Refrigerant ·High: Excessive Refrigerant ·DSW for I.U. Capacity; Incorrect Setting	
2	Is Pd ⌜16⌟ to ⌜22⌟? (Pd is high when the indoor temperature is high.)	–	·Low: Solenoid Valve 20A Leakage ·High: Excessive Gas Pipe Resistance	
3	Is H1(Compressor Frequency) + (CC(Numbers of Running Compressor)–1)×(※) abnormally low or high? (The lower is the room temp. and outdoor temp., the higher is the above value.)	–	·Low: Excessive Refrigerant ·High: Insufficient Refrigerant, Excessive Pipe Resistance	
4	Is Ps ⌜2⌟ to ⌜5⌟? (Only under the condition that electrical expansion valve 20A is OFF.)	–	·Low: O.U. Short-circuit ·Low/High: O.U. Fan Thyristor Failure or Outdoor Air Sensor; Failure	
5	Is the temperature difference between I.U.* more than 15 deg. when iE(I.U. Ex. Valve) is 100? *The temperature difference between I.U. means the following; b3(Discharge Gas Temp.) – b2(Intake Air Temp.) indicated on the remote control switch by check mode. However, this is applicable only when b2(Intake Air Temp.) – b1(Setting Temp.) is higher than 3 deg.	–	·Failure such as P.C.B., Wiring, Coil, Valve ·Excessive Pipe Resistance ·Thermistor Failure for Discharge Air	

NOTES: 1. The symbol with an underline ___ indicates checking item and the mark ⌜ ⌟ indicates checking data.

2. Regarding (※), the following value should be applied; 8FS2···50/60, 10FS2···62/75 (This is not applicable to 5FS2.)

1.4.4 Checking List (FX2 Series)

CHECK LIST ON TEST OPERATION

CLIENT: INSTALLER: DATE:

O.U. MODEL: O.U. Serial No.: Checker

I.U. Model								
I.U. Serial No.								

I.U. Indoor Unit, O.U.: Outdoor Unit

Piping Length: m Additional Refrigerant Charge: kg

(1)General

No.	Check Item	Result
1	Was the dip switch, DSW6 for piping length in O.U. set?	
2	Was the dip switch, DSW3 for piping lift in O.U. set?	
3	Is the transmitting wire contacting to power lines and operation lines?	
4	Was an earth wire connected?	
5	Check for any short circuit?	
6	Is there any voltage abnormality among each phase(L1-L2, L2-L3, L3-L1)?	

(2)Refrigeration Cycle

NOTE: Perform checking after all the indoor units are operated at the "HIGH" speed and the system becomes stable.

a. Common

No.	Check Item	Result
1	Is A1 (compressor running current) is greater than 「1」 when compressor is running?	
2	Is Td1 (discharge gas temp.) higher than Td2 when only No. 1 comp. is operating?	
3	Is there any abnormal sound or vibration?	

b. Cooling Operation (It is applicable when outdoor temperature is higher than 15℃.)

No.	Check Item	Result
1	Is oEb (O.U. Ex. Valve Opening) within "7" to "40" when Td - SH is 15 to 30 degC.?	
2	Is Ps 「3」 to 「5」 when solenoid valve, SVA is OFF?	
3	Is the H1 + H2 (compressor frequency) abnormally low or high? If outdoor temp. or indoor temp. is high, H1 + H2 becomes high. H2 is "50" when constant comp. is running.	
4	Is Pd 「11」 to 「22」 ?	
5	Is solenoid valve SVA OFF?	

No.	Check Item	Result
6	Is indoor unit heat exchanger SH 2 to 10 deg. when iE (I.U. ex valve) is less than 「7」 or 「100」 ? Indoor unit heat exchanger SH indicates the following; b7 (I.U. Heat Exchanger Gas Temp.) - b4 (I.U. Heat Exchanger Liquid Temp.) which are indicated on the remote control switch However, The above is applicable only when the data can meet the following. b2 (Intake Air Temp.) - b1 (Setting Temp.) >3 deg.	
7	Are TL (I.U. heat exchanger liquid temp.) and Ti (I.U. Intake Air Temp.) almost same when iE (I.U. ex. valve) is 「2」 (at stoppage or thermostat OFF)?	

c. Heating Operation (It is applicable when outdoor temperature is higher than 0℃.)

No.	Check Item	Result
1	Is oE1 + oE2 (O.U. Ex. Valves (No. 1 & 2) Opening) abnormally low of high when Td - SH is 15 to 30 degC.?(If operating frequency is high, oE1 + oE2 will become high.)	
2	Is Pd 「16」 to 「22」 ?	
3	Is the H1 + H2 (compressor frequency) abnormally low or high? If outdoor temp. or indoor temp. is low, H1 + H2 becomes high.	
4	Is Ps 「1」 to 「5」 when solenoid valve SVA is OFF?	
5	Check for leakage on liquid bypass ex. valve(oEb) by touching.	
6	Is the temperature difference between I.U. more than15 deg. when iE (I.U. ex. valve) is 「100」 ? The temperature difference between I.U. means the following; b3 (Discharge Gas Temp.) - b2 (Intake Air Temp.) indicated on the remote control switch by check mode. However, this is applicable only when b2 (Intake Air Temp.) - b1 (Setting Temp.) > 3 deg.	

NOTE: The symbol with an underline ___ indicates checking item and the mark 「 」 indicates checked data.

(3) Others

No.	Contents	Page
1	TROUBLESHOOTING	1-1～1-105
2	SERVICING	2-1～2-129
3	MAIN PARTS	3-1～3-27
4	OPTIONAL FUNCTIONS	4-1～4-29
5	FIELD WORK INSTRUCTIONS	5-1～5-18

2. SERVICING

2.1 Outdoor Unit

⚠ WARNING

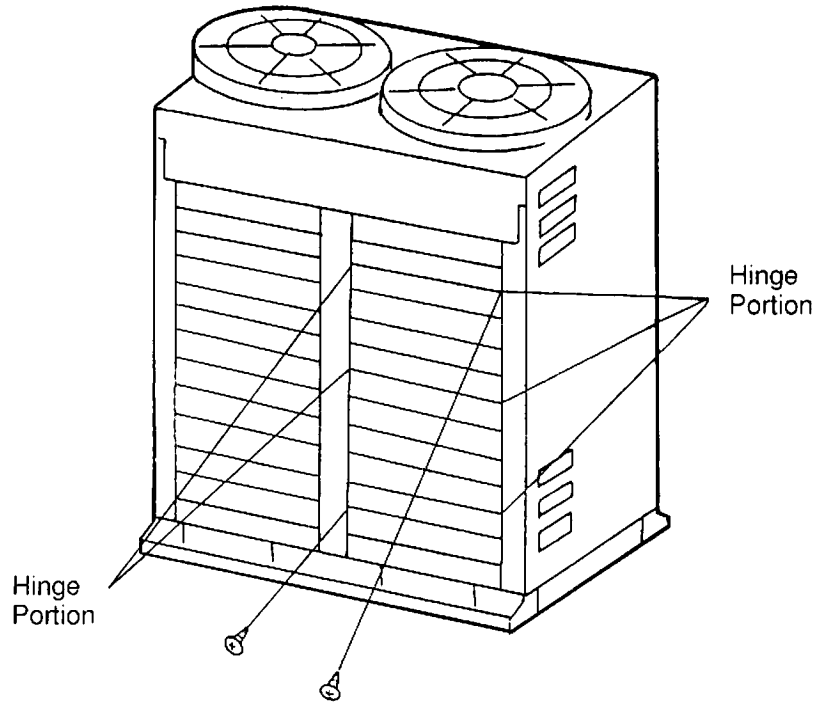
TURN OFF all power source switches.

2.1.1 Removing Air Intake Grille

(1) Remove two screws for the air intake grille (4 screws for 8 and 10HP models).

(2) Remove the air intake grille by pulling towards your side after unhooking two hooks at the left side and pull three hooks at the right side.

Tool	Phillips Screwdriver



2.1.2 Removing Front Service Panel

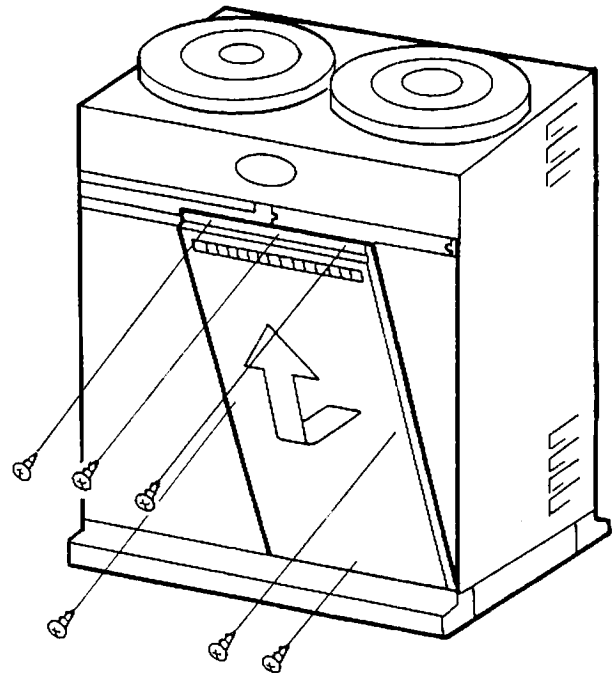
⚠ WARNING

TURN OFF all power source switches.

(1) Remove six screws. Slightly lift the panels upwards and remove them.

Tool	Phillips Screwdriver

8 and 10HP models



2.1.3 Removing Fan Guard Nets

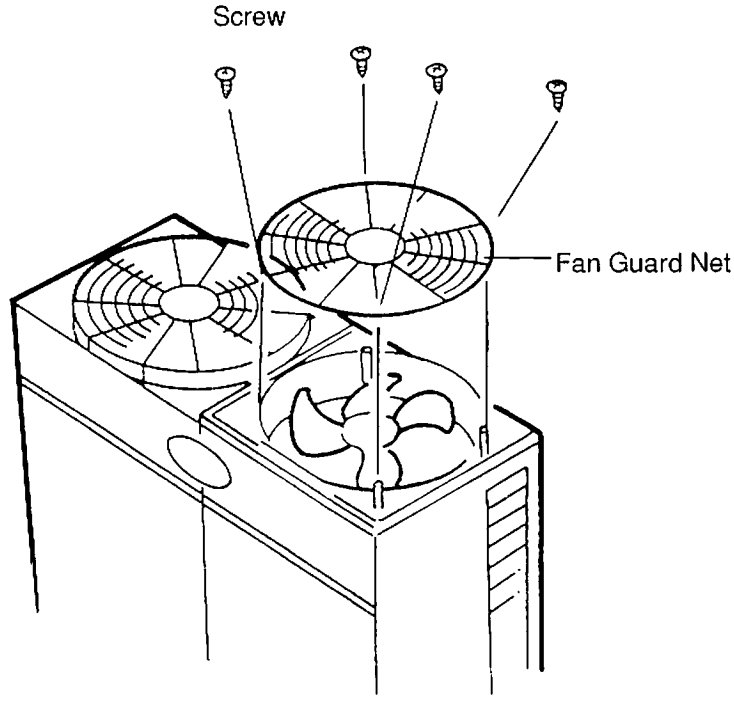
⚠ WARNING

TURN OFF all power source switches.

(1) This fan guard can be removed after removing four screws (eight screws for 8 and 10HP models).

Tool	Phillips Screwdriver

Quantity of Fan Guards:
1 No.: RAS-5FS2 and RAS-5FX2
2 Nos.: RAS-8FS2, RAS-8FX2, RAS-10FS2 and RAS-10FX2



2.1.4 Removing Compressor (RAS-5FS2 and RAS-5FX2)

⚠ WARNING

TURN OFF all power source switches.

- Do not expose the inner refrigeration cycle to the atmosphere for a long period of time when replacing a compressor to protect the cycle from mixing water or foreign particles. If exposed for a long time, seal pipe ends using caps or tape.
- Remove the caps for the compressor just before replacing the compressor.
- Check to ensure each terminal No. when connecting compressor power wires. If incorrectly connected, the compressor will fail due to reverse rotation.

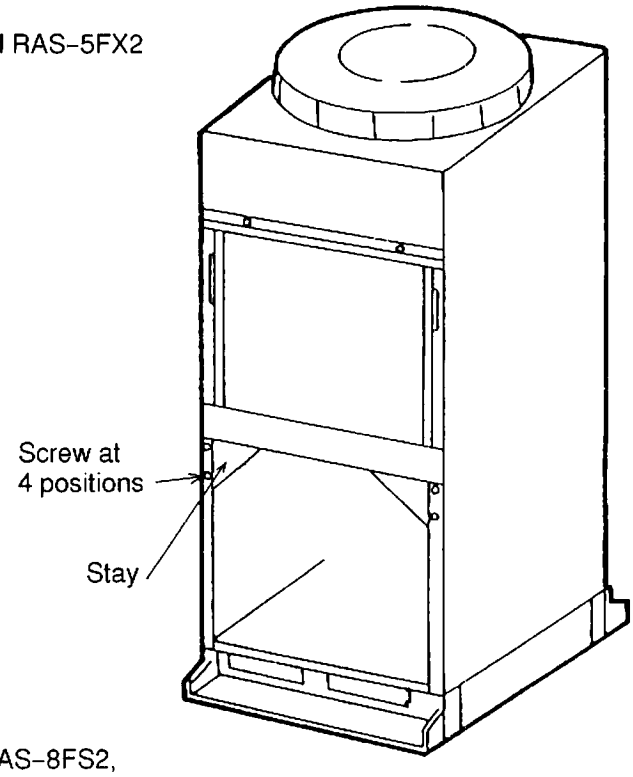
Before starting this work, collect refrigerant into a cylinder from the cycle.

(1) Remove four screws at four positions and the stay.

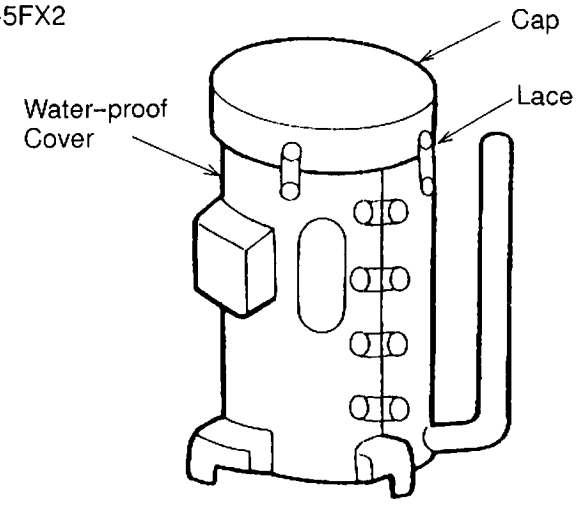
(2) Remove the cap after removing fixing laces.

Tool	Phillips Screwdriver, Charge-Hose, Adjustable Wrench or Spanner

●RAS-5FS2 and RAS-5FX2



● RAS-5FS2, RAS-8FS2, RAS-10FS2 and RAS-5FX2



(3) Remove the Td thermistor on the top of the compressor.

NOTE:

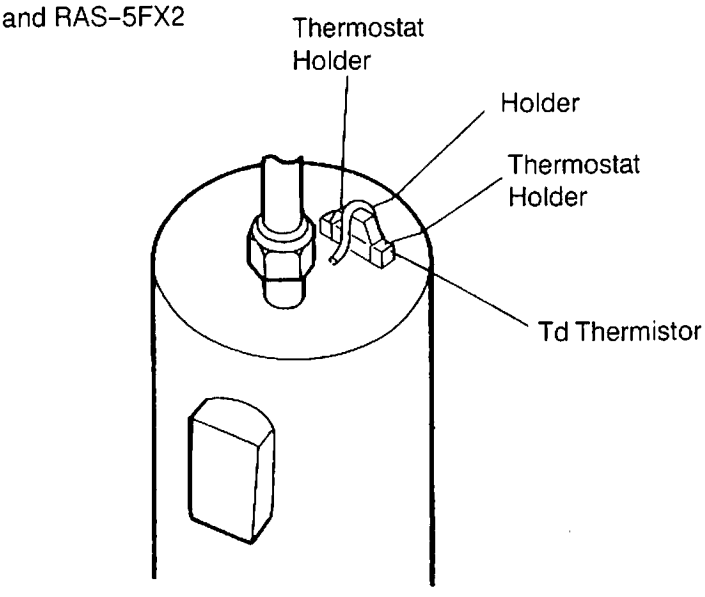
The thermostat fixer, holder, thermostat holder are used again when reassembling. Put them in a box so that the parts are stored correctly.

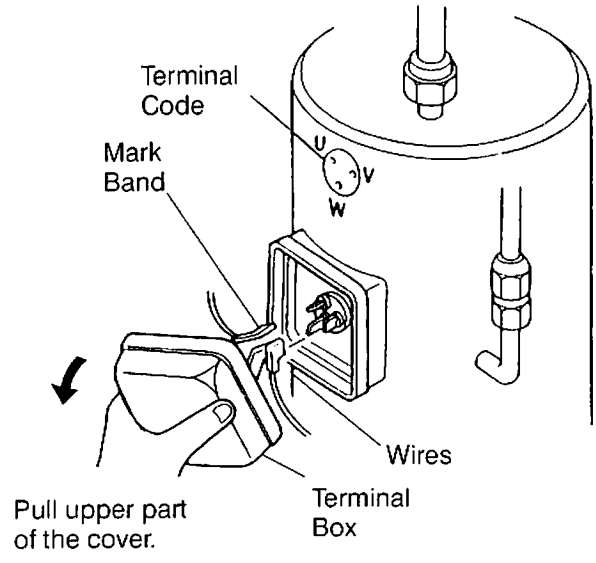
(4) Release the lace for the water-proof cover, open the water-proof cover from the front side. Remove the terminal cover for the compressor and disconnect the wiring to the compressor terminals. Check to ensure that the terminals Nos. are indicated. If the terminal Nos. are not identified, this will cause incorrect wiring when reassembling.

NOTES:

1. Check to ensure that the terminals for the compressor are normal. If a pulling force of 2kg or more is required, it is normal.
2. Check to ensure that wires are firmly fixed.
3. It is recommended that the faston terminals be clamped to increase a contacting force before reassembling.

●RAS-5FS2 and RAS-5FX2

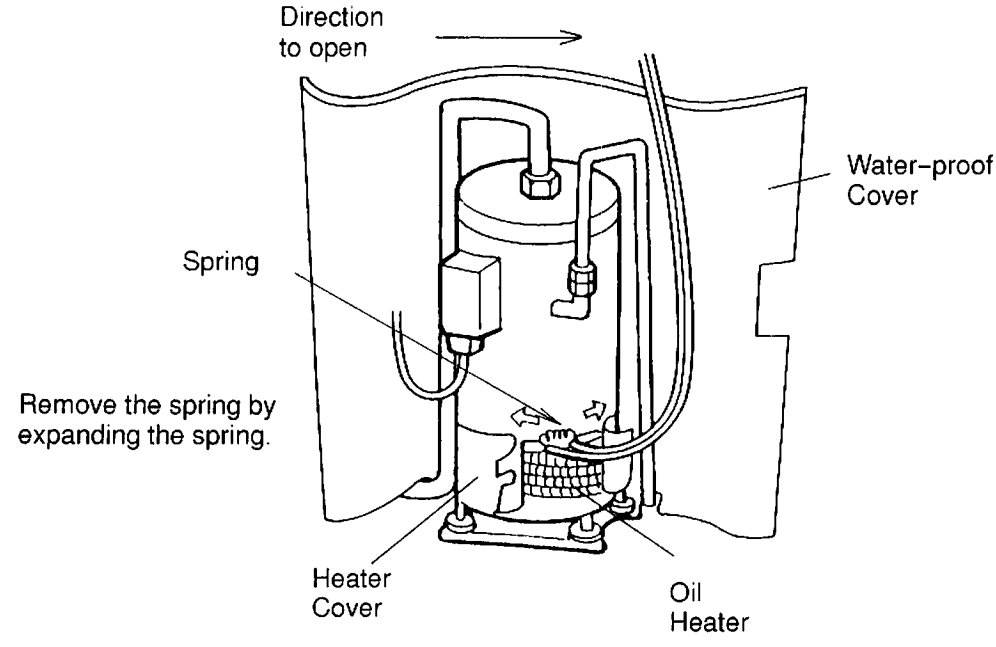




(5) Remove the heater cover and the spring for the oil heater.

(6) Remove the water-proof cover in the arrow mark direction as shown by paying attention to the cut part of the water-proof cover in order to avoid any damages.

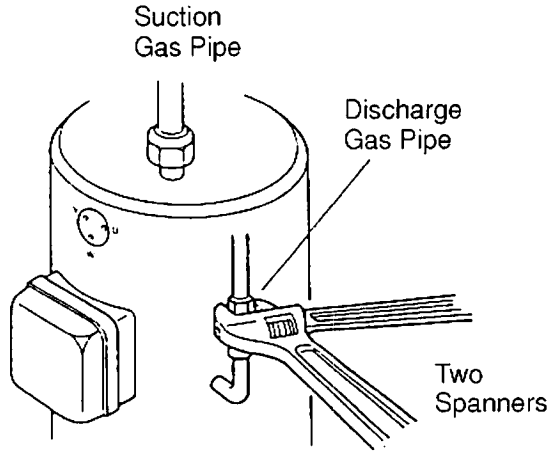
● RAS-5FS2 and RAS-5FX2



(7) Disconnect the discharge pipe of the compressor.
Use two spanners when disassembling the flare-nuts.

Tool	Adjustable Wrench or Spanner

● RAS-5FS2 and RAS-5FX2



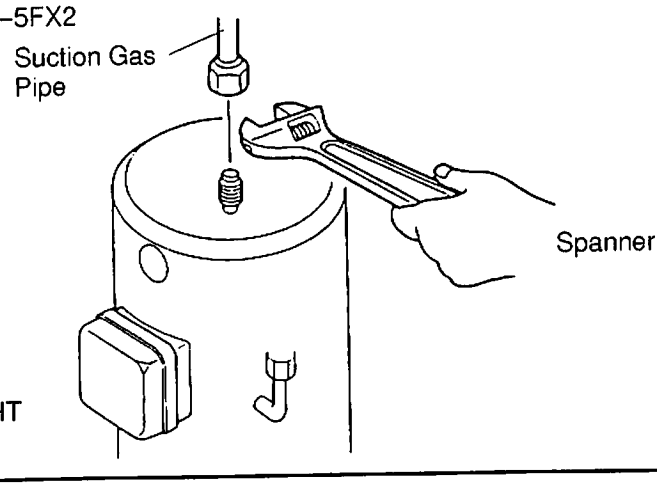
(8) Disconnect the suction pipe of the compressor. Use spanner when disassembling the flare-nuts.

NOTES:

1. Completely wipe off the oil if the oil is spread to the other parts such as the compressor cover, wiring, bottom base, etc. If not, this will cause many problems to the unit.
2. If the oil is spilt, charge new oil equivalent to the oil.
3. Check to ensure that the oil is not foul. If foul, replace it with new one.

Tool	Adjustable Wrench or Spanner

● RAS-5FS2 and RAS-5FX2



OIL : SUNISO 4GDI-HT

(9) Remove the nuts fixing the compressor and remove the compressor.

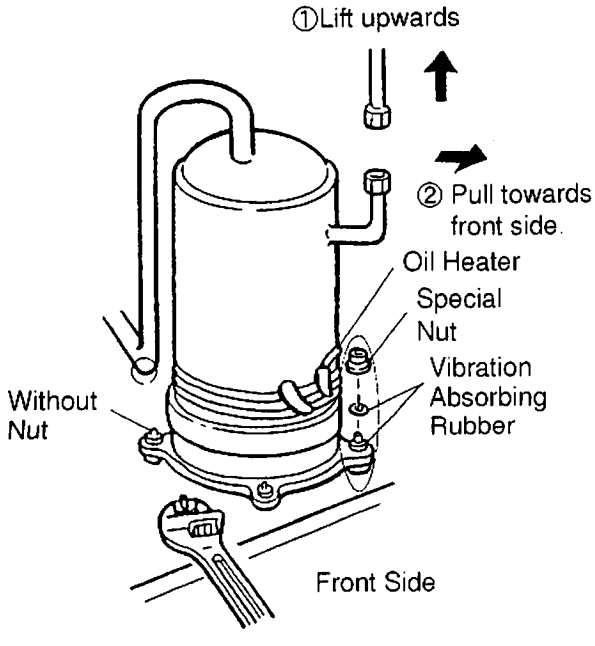
NOTE:

In the case that the compressor is lifted, hold the discharge pipe vertically and turn to the right and pull the compressor towards the front side by paying attention to the compressor leg not to touch the suction pipe.

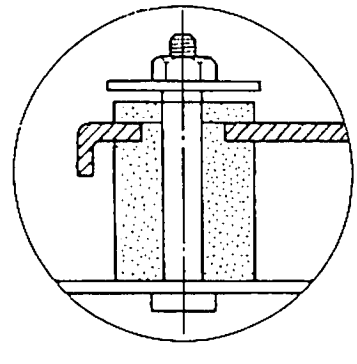
(10) Regarding remounting the compressor work, perform the above work in the reverse processes.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver

● RAS-5FS2 and RAS-5FX2



Remove two fixing screws for base frame



Pull out the compressor toward the front side, and remove the vibration absorbing rubbers.

2.1.5 Removing Compressor (RAS-8FS2 and RAS-10FS2)

⚠ WARNING

TURN OFF all power source switches.

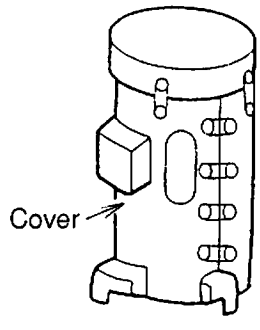
- Do not expose the inner refrigeration cycle to the atmosphere for a long period of time when replacing a compressor to protect the cycle from mixing water or foreign particles. If exposed for a long time, seal pipe ends using caps or tape.
- Remove the caps for the compressor just before replacing the compressor.
- Check to ensure each terminal No. when connecting compressor power wires. If incorrectly connected, the compressor will fail due to reverse rotation.

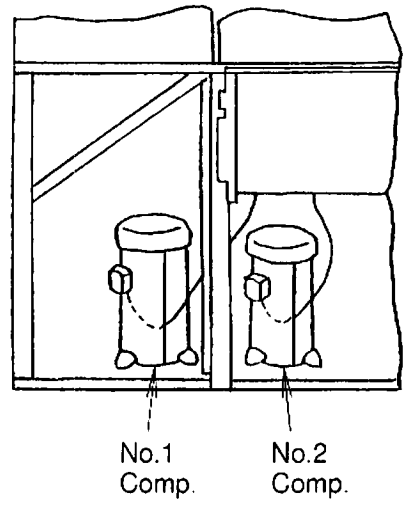
Before starting this work, collect refrigerant into a cylinder from the cycle.
(1) Release the lace for top cap of the compressor and remove the cap.
(2) Remove the Td thermistor on the compressor.

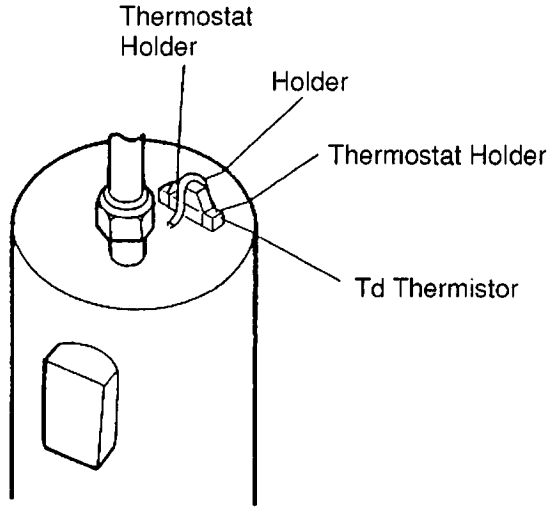
NOTE:
Put the thermostat holder, holder and thermostat in a box.
These parts are used when assembling again.

Tool	Charge-Hose, Adjustable Wrench or Spanner

●RAS-8FS2 and RAS-10FS2

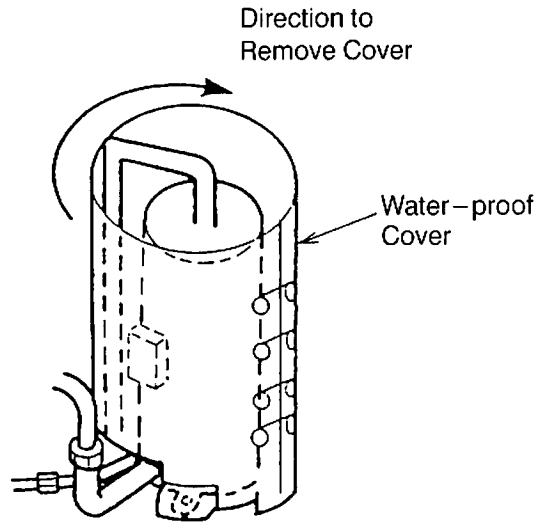






(3) Remove the water-proof cover in the arrow mark direction as shown by paying attention to the cut part of the water-proof cover in order to avoid any damages.

●RAS-8FS2 and RAS-10FS2



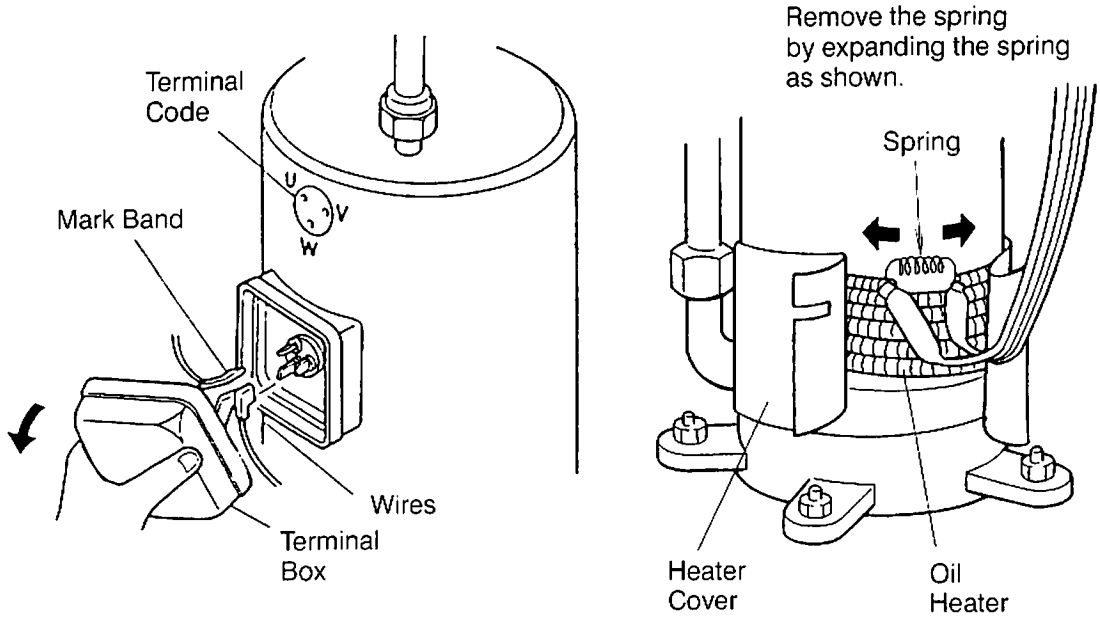
(4) Remove the terminal cover for the compressor and disconnect the wiring to the compressor terminals. Check to ensure that the terminals Nos. are indicated. If the terminal Nos are not identified, this will cause incorrect wiring when reassembling.

NOTES:

1. Check to ensure that the terminals for the compressor are normal. If a pulling force of 2kg or more is required, it is normal.
2. Check to ensure that wires are firmly fixed.
3. It is recommended that the faston terminals be clamped to increase a contacting force before reassembling.

Tool	Adjustable Wrench or Spanner

●RAS-8FS2 and RAS-10FS2

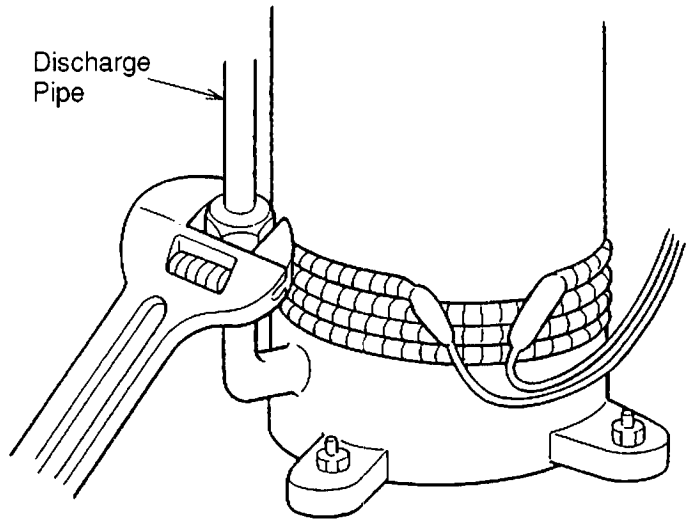


(5) Remove the heater cover and the spring for the oil heater.

(6) Disconnect the discharge pipe from the compressor.
Use two spanners when dismounting

Tool	Adjustable Wrench or Spanner

●RAS-8FS2 and RAS-10FS2



(7) Remove the flare-nut at the oil separator when the oil pipe is disconnected. Remove the flare-nut at the compressor side. There is a possibility that the oil may flow from the inside of the oil pipe. Therefore, prepare an oil pan, etc. to collect the oil.

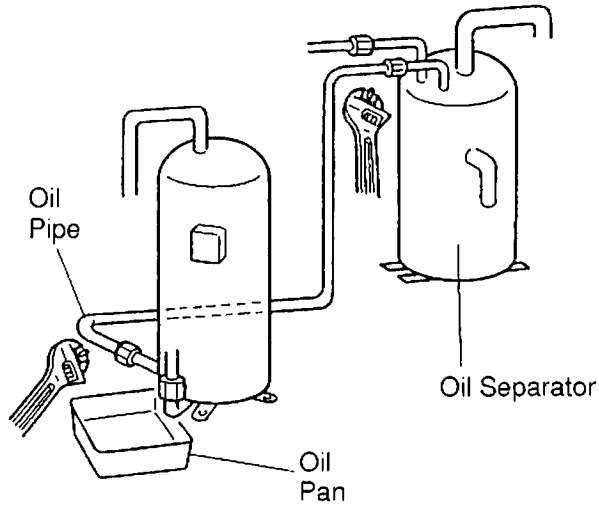
NOTES:

1. Completely wipe off the oil if the oil is spread to the other parts such as the compressor cover, wiring, bottom base, etc. If not, this will cause many problems to the unit.
2. If the oil is spilt, charge new oil equivalent to the oil.
3. Check to ensure that the oil is not foul. If foul, replace it with new one.

Tool	Adjustable Wrench or Spanner

●RAS-8FS2 and RAS-10FS2

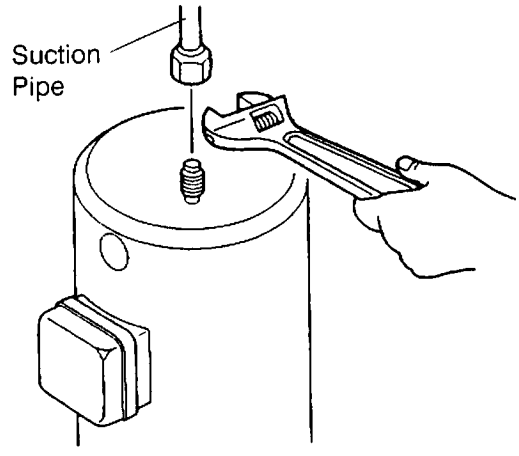
OIL : SUNISO 4GDI-HT



(8) Remove the nuts fixing the compressor and remove the compressor.

Tool	Adjustable Wrench or Spanner

●RAS-8FS2 and RAS-10FS2



(9) Remove three nuts fixing the compressor. There is no nut at the right rear side.

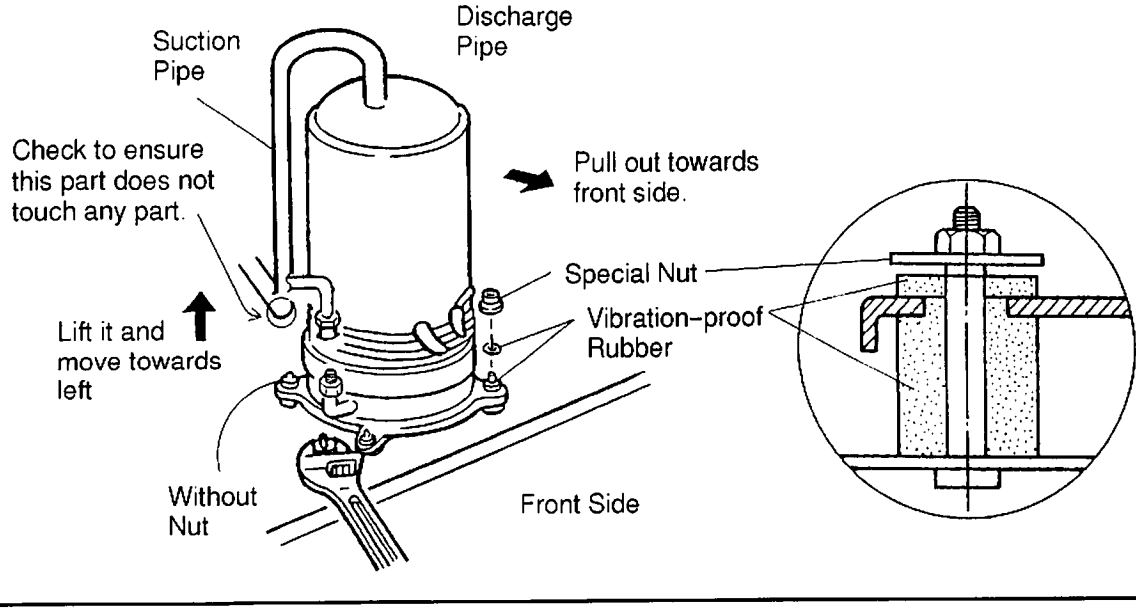
NOTES:

1. Pull out the compressor without removing the oil heater. Remove the oil heater after the compressor is put outside the unit. (Constant Comp. Only)
2. In the case that the compressor is lifted, hold the discharge pipe vertically and turn to the left and pull the compressor towards the front side by paying attention to the compressor leg not to touch the suction pipe.

(10) Regarding remounting the compressor work, perform the above work in the reverse processes.

Tool	Adjustable Wrench or Spanner

●RAS-8FS2 and RAS-10FS2



2.1.6 Removing Compressor (RAS-8FX2 and RAS-10FX2)

⚠ WARNING

TURN OFF all power source switches.

- Do not expose the inner refrigeration cycle to the atmosphere for a long period of time when replacing a compressor to protect the cycle from mixing water or foreign particles. If exposed for a long time, seal pipe ends using caps or tape.
- Remove the caps for the compressor just before replacing the compressor.
- Check to ensure each terminal No. when connecting compressor power wires. If incorrectly connected, the compressor will fail due to reverse rotation.

NOTES:

1. If the refrigeration cycle is exposed to atmosphere after dismounting the compressor, moisture or foreign particles may flow into the refrigeration cycle. Replace the compressor as soon as possible.
2. Do not remove the cap for the compressor until the service compressor is replaced. Cover the inlet and outlet of the compressor by taping and remove it when connecting.
3. Check to ensure that the terminal numbers of the compressor are correct when connecting. If incorrectly connected, the scroll will turn reversely, resulting in damages of the scrolls.

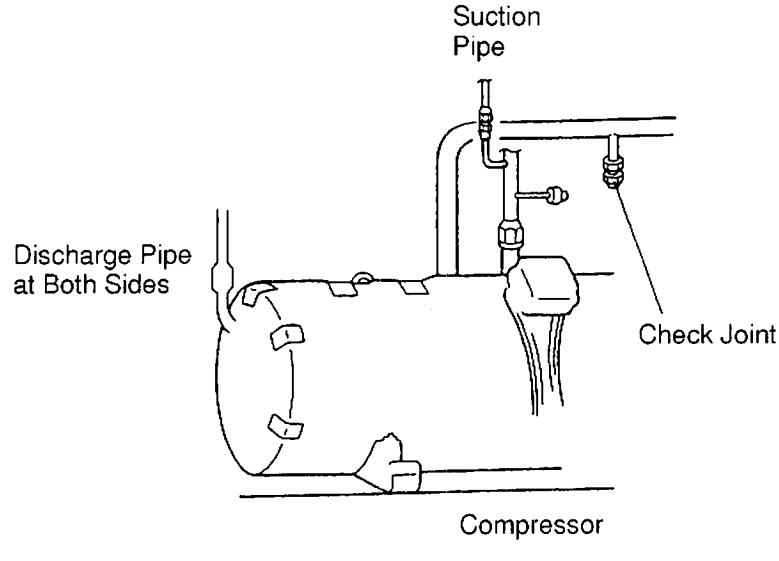
Before starting this work, collect refrigerant into a cylinder from the cycle.

(1) Remove the front service panel according to item 2.1.2.

(2) Collect refrigerant from the suction side check joint.
Use two spanners to loosen the nut.

Tool	Charge-Hose, Adjustable Wrench or Spanner

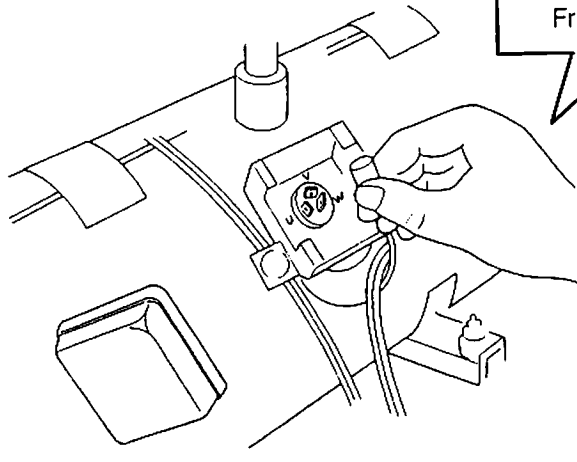
●RAS-8FX2 and RAS-10FX2



(3) Remove the terminal cover for the compressor and remove the wires to the compressor. Check to ensure that the terminals Nos. are indicated. If the terminal Nos. are not identified, this will cause incorrect wiring when reassembling.

Tool	Adjustable Wrench or Spanner

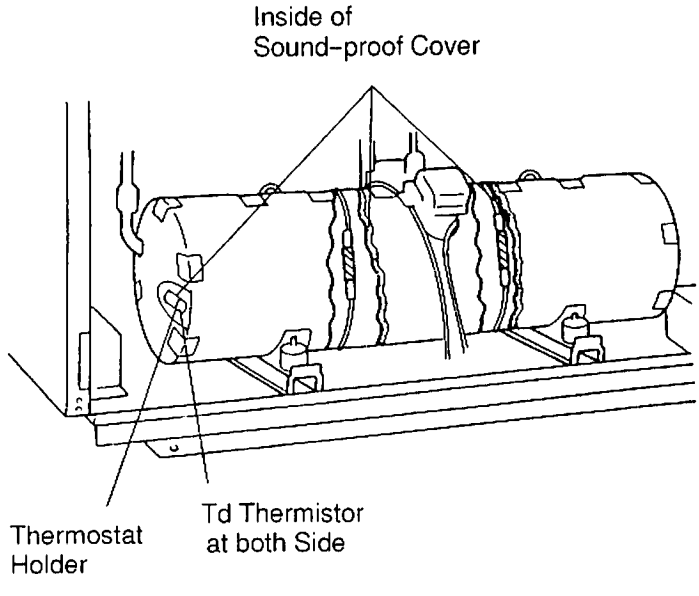
●RAS-8FX2 and RAS-10FX2



(4) Remove the oil heaters by pulling each spring connecting the heater. Remove the Td thermistor with the thermostat holder. Before this work, remove the sound-proof cover for the compressor.

Tool	Adjustable Wrench or Spanner

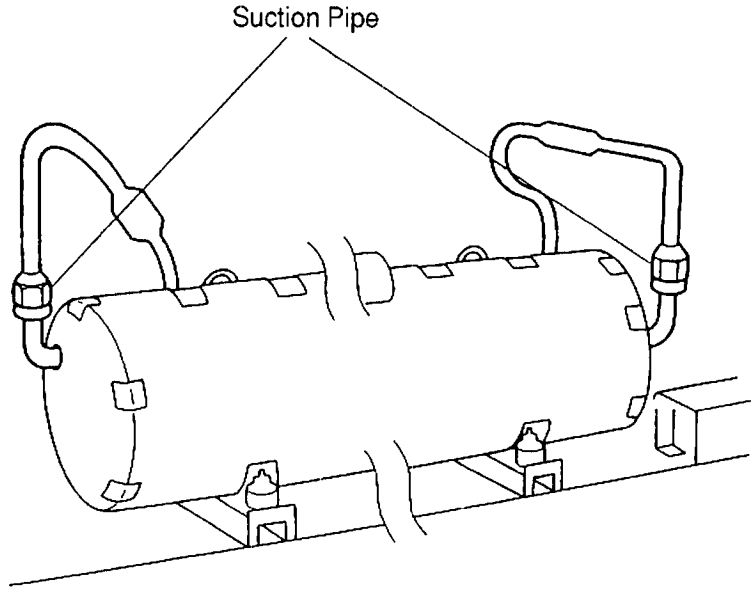
●RAS-8FX2 and RAS-10FX2



(5) Disconnect the suction pipe from the compressor.
Use two spanners when dismounting.

Tool	Adjustable Wrench or Spanner

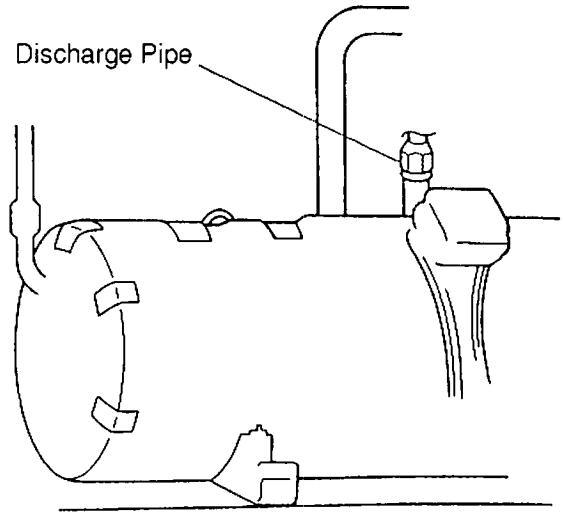
●RAS-8FX2 and RAS-10FX2



(6) Remove the discharge pipe of the compressor.
Use two spanners when loosening flare-nuts.

Tool	Adjustable Wrench or Spanner

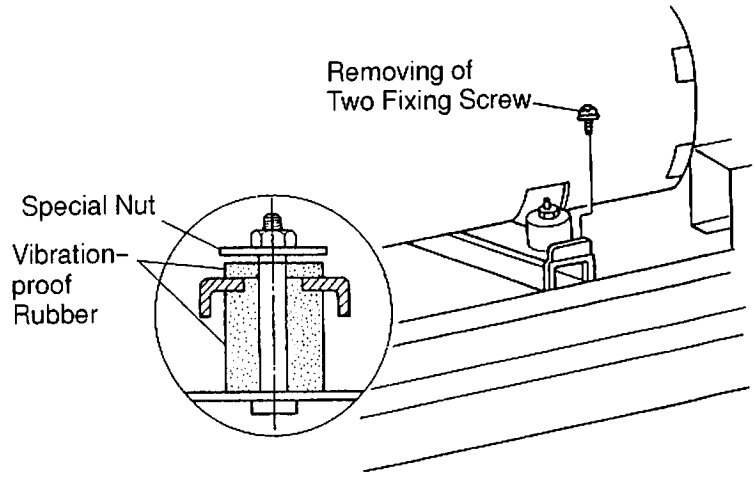
●RAS-8FX2 and RAS-10FX2



(7) Remove the fixing screws for the base and pull the compressor towards you.
Remove the compressor after removing a special nut for *fixing the compressor.*

Tool	Adjustable Wrench or Spanner

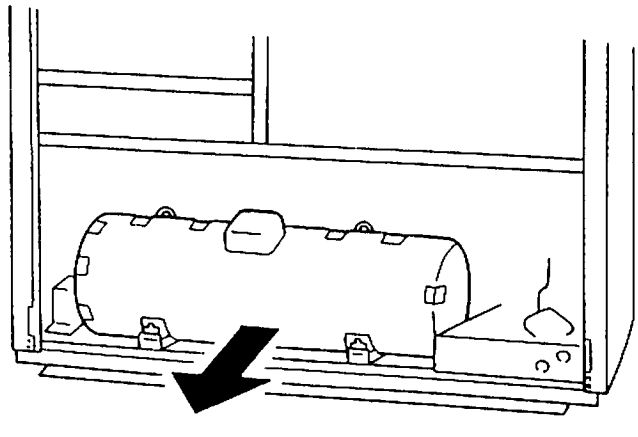
●RAS-8FX2 and RAS-10FX2



(8) Perform the reverse work after mounting the compressor.

Tool	Adjustable Wrench or Spanner

●RAS-8FX2 and RAS-10FX2



Remove the vibration-proof rubbers after pulling the compressor as shown.

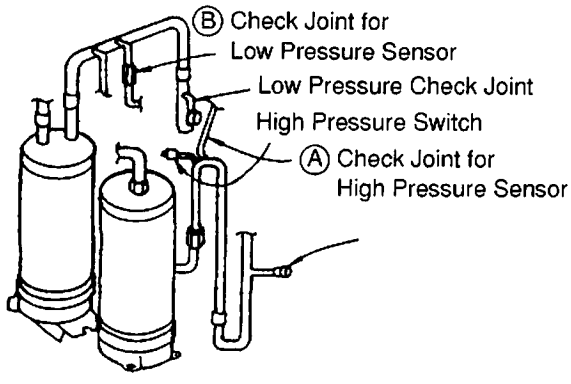
2.1.7 Removing High Pressure Switch, High Pressure Sensor and Low Pressure Sensor

(1) Remove the front service panel according to item 2.1.2.

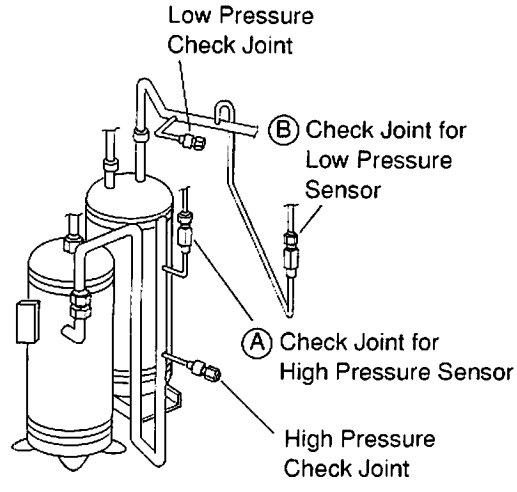
(2) Collect all refrigerant from the low pressure side check joint when the high pressure switch is removed. Use two spanners when removing the pressure sensors.

Tool	Adjustable Wrench or Spanner and Charge Hose

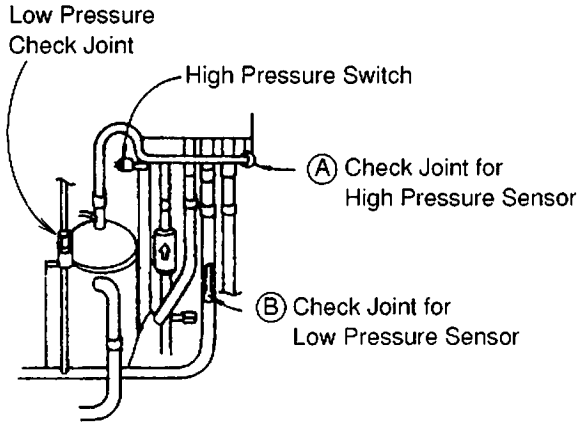
●RAS-5FS2



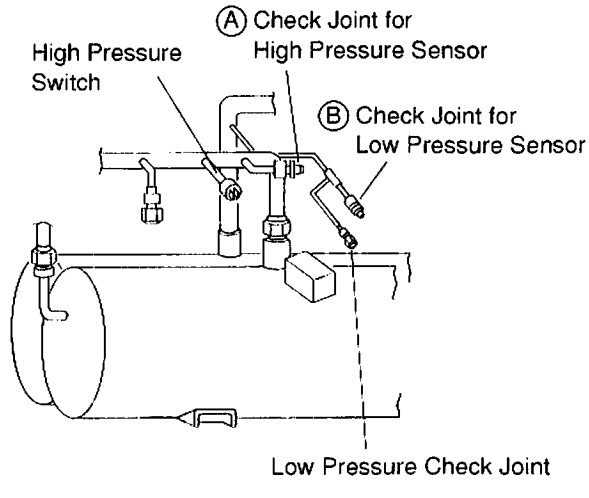
●RAS-5FX2



●RAS-8FS2 and RAS-10FS2



●RAS-8FX2 and RAS-10FX2



The above figure is viewed from the front side.

a. Removing High Pressure Switch

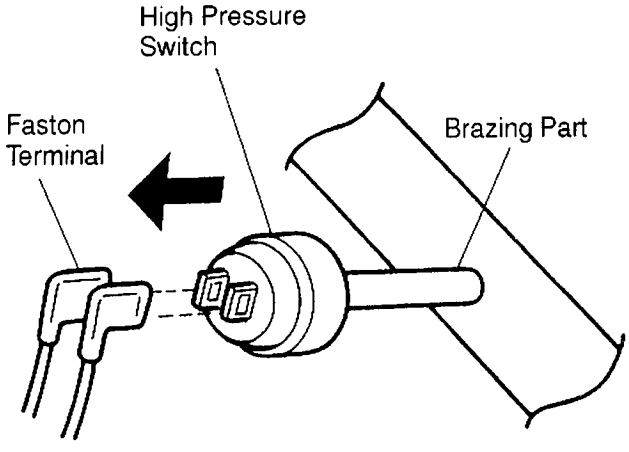
① Disconnect the faston terminals.

② Remove the high pressure switch pipe connected to the discharge pipe by using a gas burner.

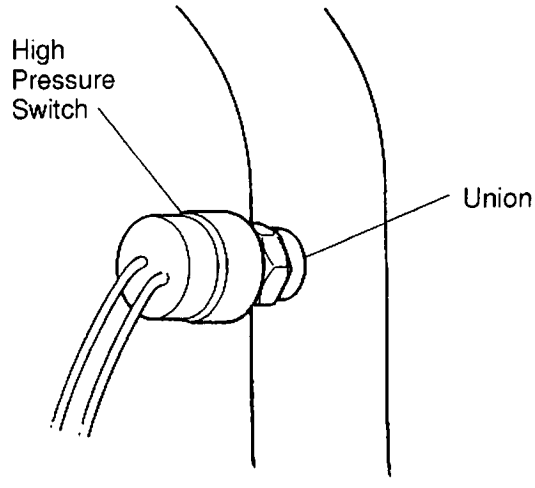
Tool	Spanner or Adjustable Wrench Phillips Screwdriver

NOTE:

Do not expose the refrigeration cycle to the atmosphere for a long period to avoid mixing of water and foreign particles into the refrigeration cycle. If exposed for a long period, seal the hole.



RAS-5FS2, RAS-5FX2, RAS-8FX2 and RAS-10FX2



RAS-8FS2 and RAS-10FS2

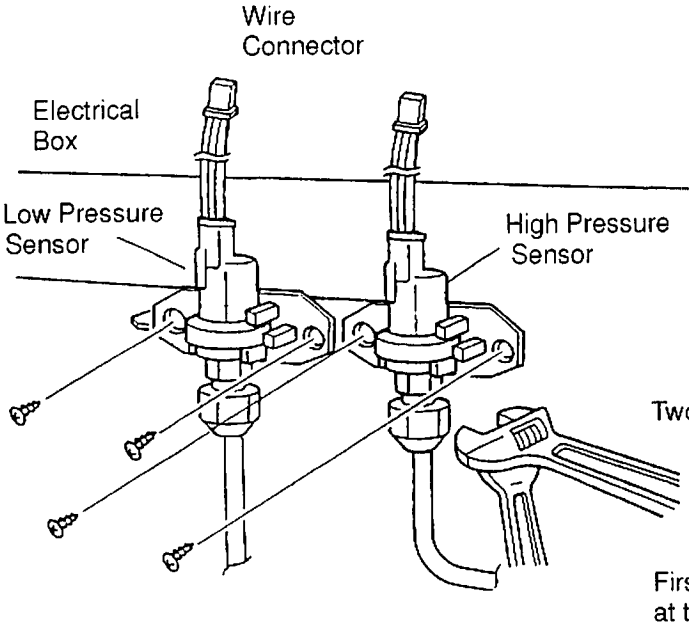
b. Removing High Pressure Sensor (See the mark Ⓐ on page 2-16.)

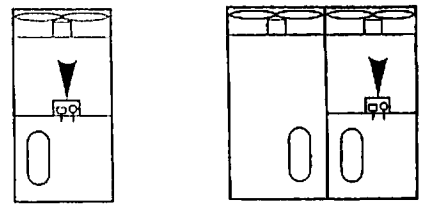
① Remove the pipe of the high pressure sensor using two spanners. Firstly, remove it at the mark Ⓐ .

② Remove the connector for the pressure sensors.

③ Remove the high pressure sensor after removing each two fixing screws for the high pressure sensors.

Tool	Spanner or Adjustable Wrench Phillips Screwdriver





5HP 8HP and 10HP

Two Spanners

Firstly remove the main pipe at the check joint.
If the sensor side is removed refrigerant will be discharged.

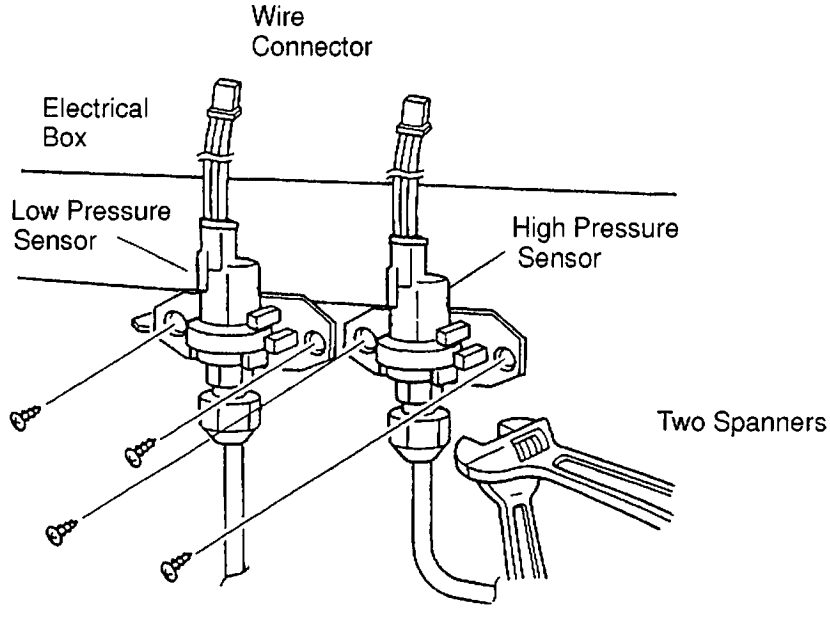
c. Removing Low Pressure Sensor (See the mark Ⓑ on page 2-16.)

①Remove the pipe of the low pressure sensor using two spanners. Firstly, remove it at the mark Ⓑ.

②Remove the connector for low pressure sensor and earth wire.

③Remove the low pressure sensor after removing two fixing screws for the sensor fixing plate.

Tool	Spanner or Adjustable Wrench Phillips Screwdriver



The main refrigeration side pipe is used with a check joint. Remove the check joint of the mark Ⓑ firstly. If the sensor side is removed, refrigerant will be discharged.

2.1.8 Removing Electrical Components

⚠ DANGER

DO NOT touch the electrical parts when the LED(red) on the SNUBBER PCB(PCB5) is lit, since the voltage is higher than 50V.

⚠ WARNING

1. In the case that transistor module (IPM) and diode module (DM) on heat radiation fins are replaced, spread silicone grease (made by Shinetsu chemical Co., KS61) lightly over the surface touching fins.
2. Identify terminals Nos. with the mark band Nos. when reassembling. If incorrectly connected, malfunctions or damages of electric components will occur.
3. Correctly insert two wires of U and V phases for the power cable of Inv. Comp. into the current sensor, CTU and CTV on PCB3. Connect the U phase of the power cable and U phase of the current sensor as a combination, and the V phase of the power cable and V phase of the current sensor as a combination respectively. If incorrectly combined, malfunction or damages will occur.
4. Do not clamp electrical wires between a mounting electric component and plates or electric parts when a PCB is remounted.
5. Screws and collars are used to fix the inverter PCB. Check to ensure to use the screws and collars. If not used, it may cause malfunction.
6. In the case that the control PCB is replaced, set all the dip switch at the same position as the original ones were. If not set, malfunction may occur.
7. Do not apply a strong force to electric components and PCBs to avoid damages.

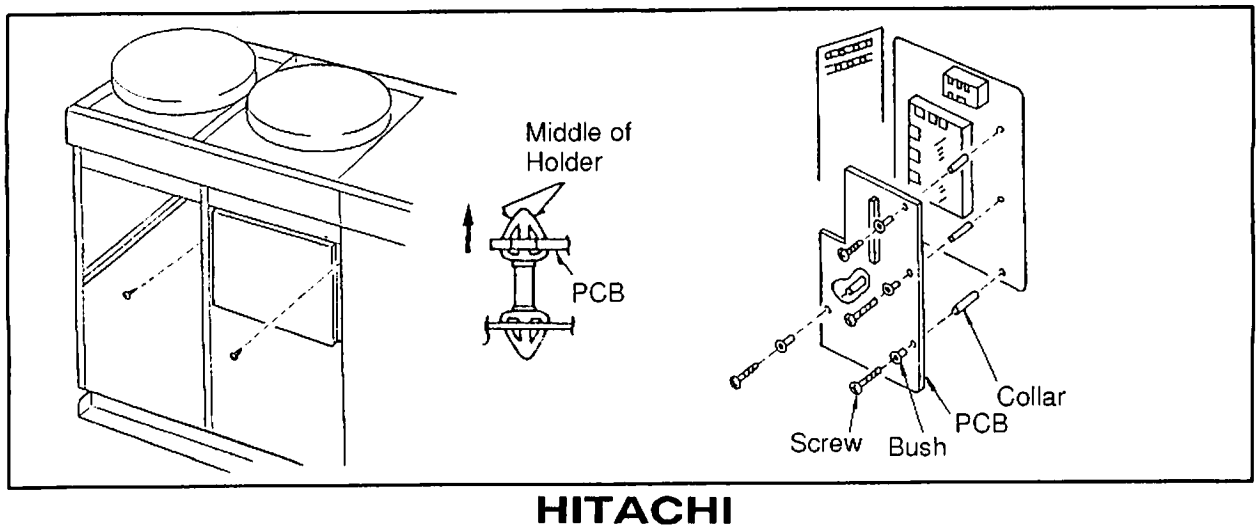
(1) Removing PCBs

a. Remove two screws fixing the electrical box cover and remove the electrical box cover.

b. Disconnect the connector connected to the PCB and clamp the middle portion of the holder by pinchers and pull it out. Pull the PCB by applying a force to the portion near the mounting legs of the PCB from the rear side.

c. Replacing Inverter PCB (PCB3 & PCB4)
After removing four M3 screws and remove bushes and collars from the PCB. When remounting, firmly mount the bushes and collars.

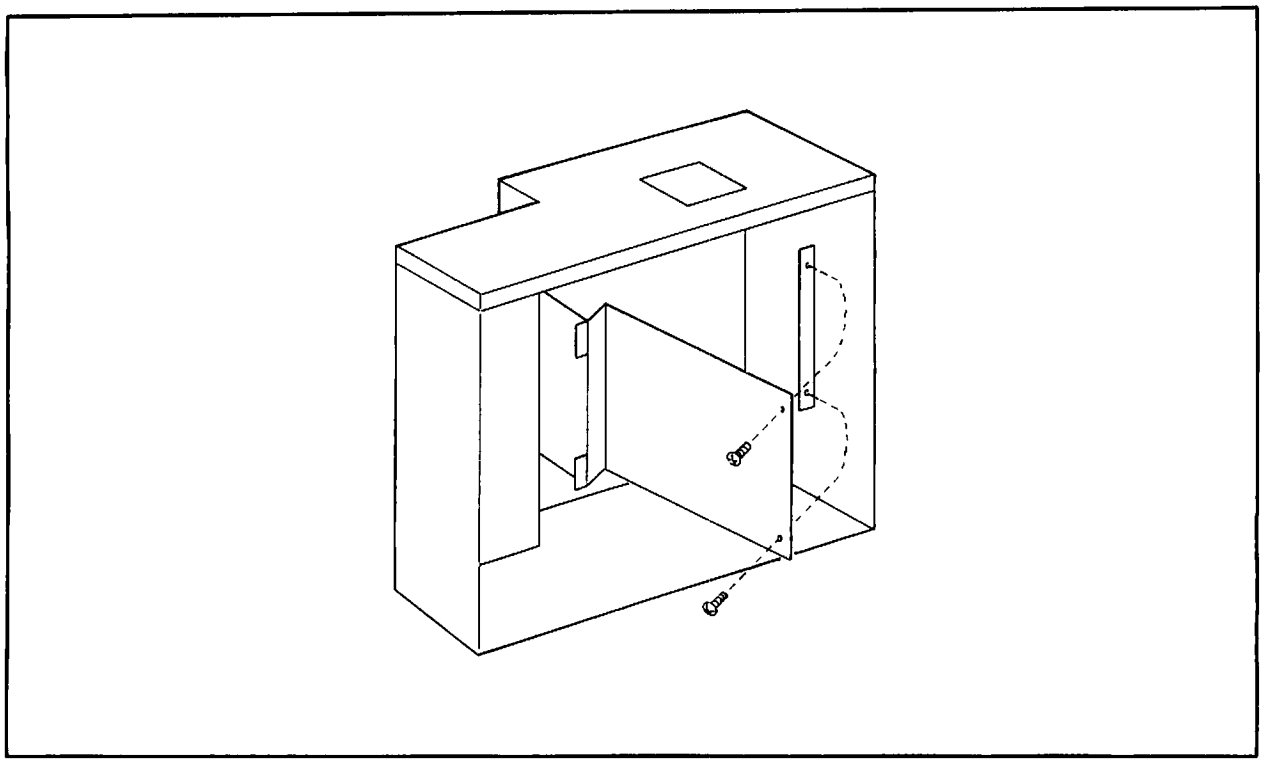
Tool	Phillips Screwdriver Pincher



(2) Others

Other parts located at the rear side of PCB mounting plate should be replaced as follows.

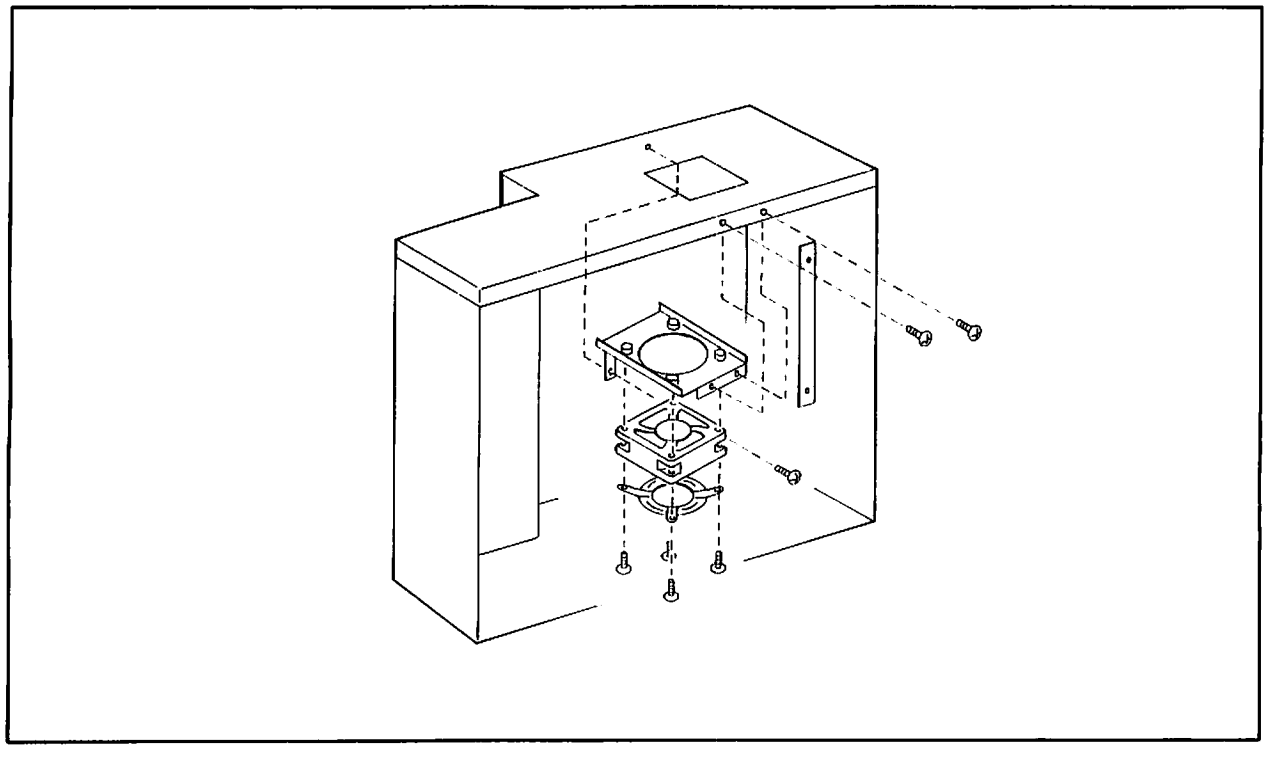
a. Remove two screws fixing the mounting plate for the PCB and turn the plate towards the front side.



(3) Removing Cooling Fan

a. Remove three screws fixing the cooling fan and pull out the fan assembly.

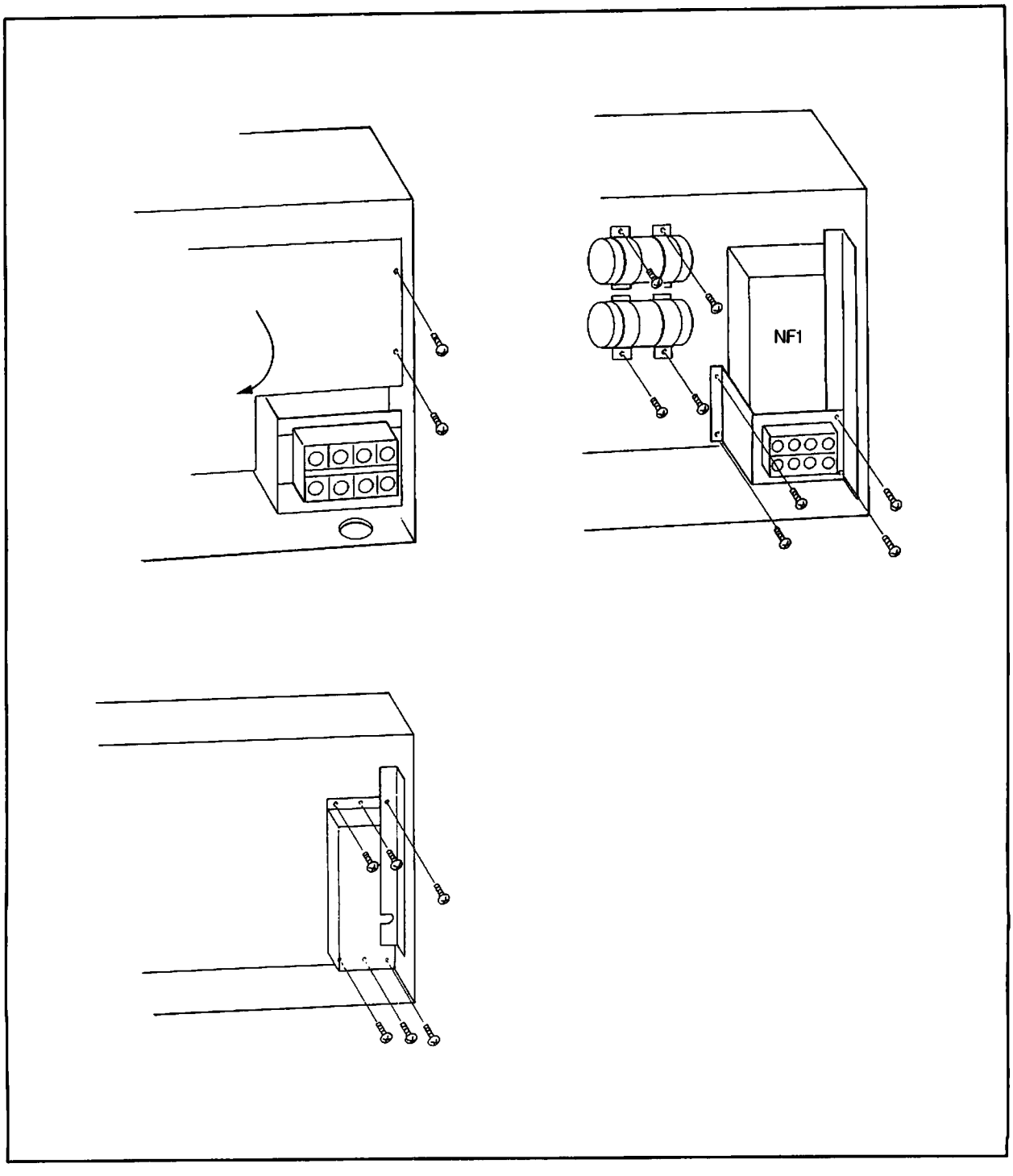
b. Remove the screws fixing the fan unit.



(4) Removing NF1

a. Remove four screws at the L1, L2, L3 and N terminals for field wiring.
b. Remove two screws fixing the mounting plate for PCB and turn the plate to open.
c. Remove four screws fixing the mounting plate for TB1.
d. Remove each two screws for fixing plate of CB1 and CB2.
e. Remove the connecting wires to NF1 and remove six screws fixing NF1 to remove NF1.
f. Regarding reassembling work, perform the above-mentioned work in reverse processes. Pay attention to wires not to make incorrect wiring.

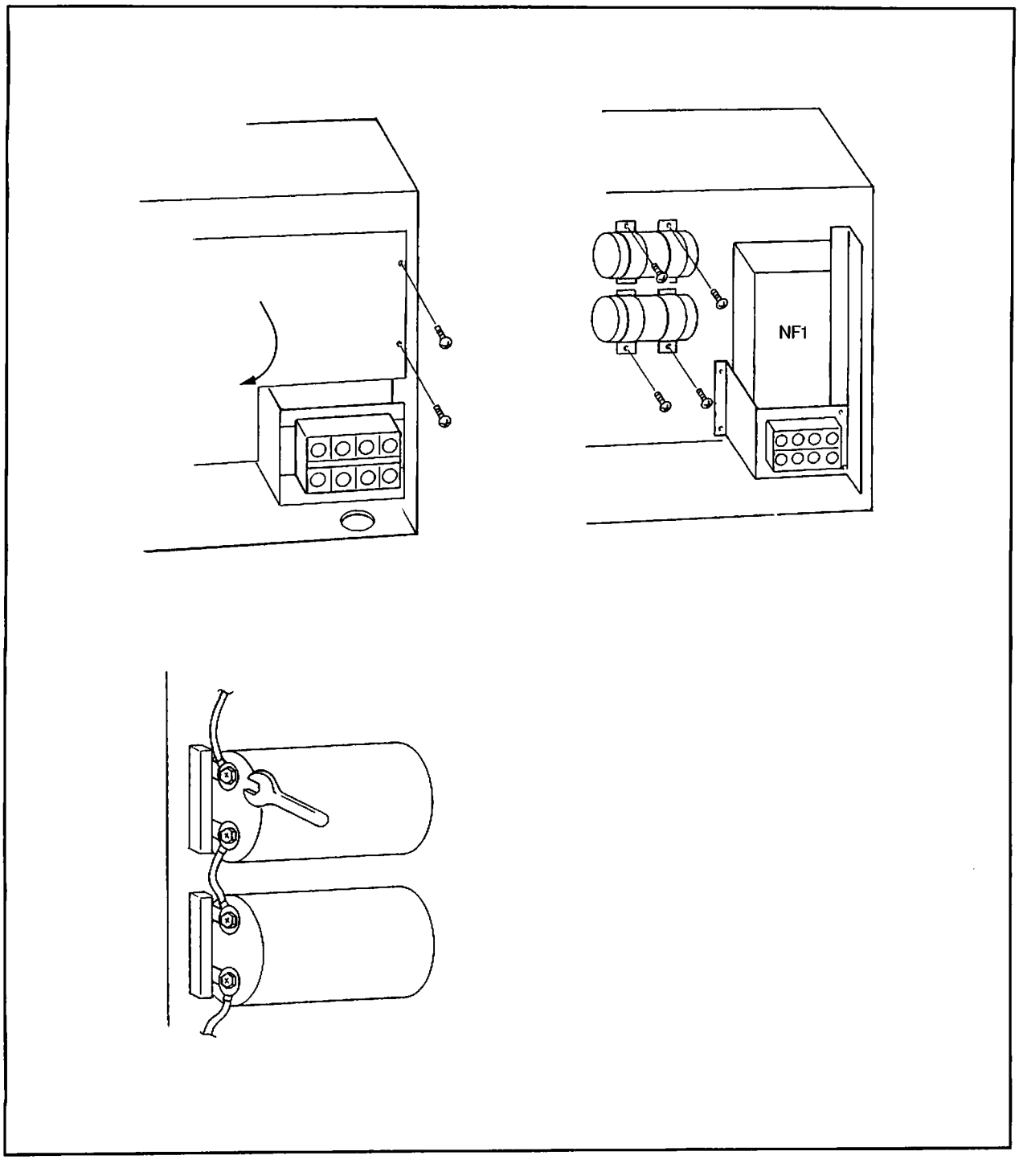
Tool	Phillips Screwdriver



(5) Removing CB1 and CB2

a. Remove two screws fixing the mounting plate for PCB and turn the plate to open it.
b. Remove each two screws for fixing plate of CB1 and CB2.
c. Loosen screws by using a spanner or adjustable wrench when disassembling.
d. Connect wires after checking + and – of CB. Check to ensure that resistors, R1 and R2 are connected to the screws for CB1 and CB2.
e. Regarding assembling work, perform the above-mentioned work in reverse processes.

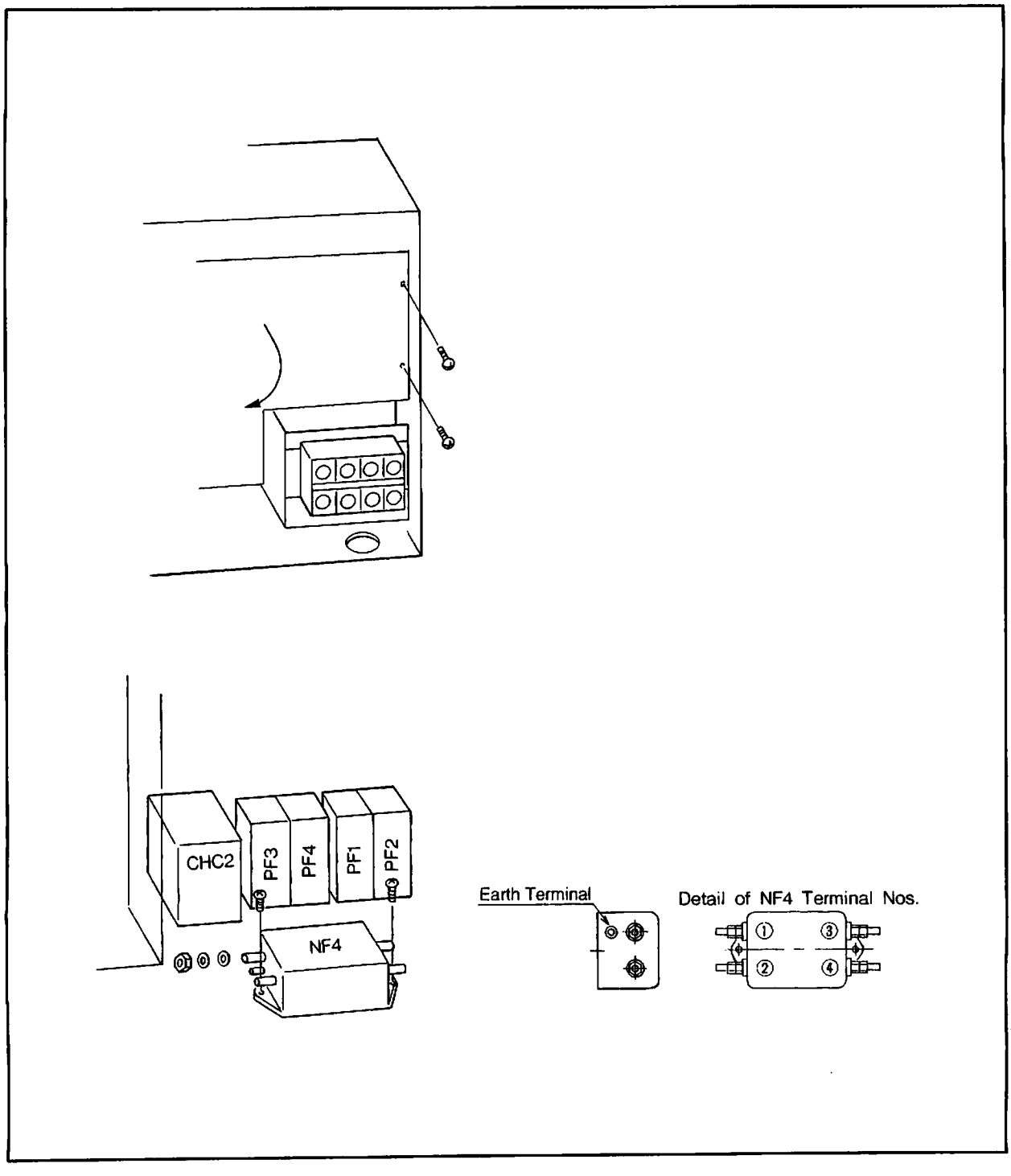
Tool	Phillips Screwdriver, Spanners or Adjustable Wrench



(6) Removing NF4

a. Remove two screws fixing the mounting plate for PCB and turn the plate to open it.
b. Loosen nuts by using a spanner or adjustable wrench to remove wires to NF4.
c. Remove two screws fixing NF4.
d. When reassembling, identify the mark band of the wires and terminal position Nos. by referring to the figure below.
e. Fix the NF4 by two screws.
f. Turn the mounting plate and fix it by using two screws.

Tool	Phillips Screwdriver, Spanners or Adjustable Wrench



2.1.9 Removing Outdoor Fan

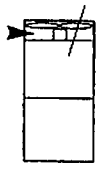
⚠ WARNING

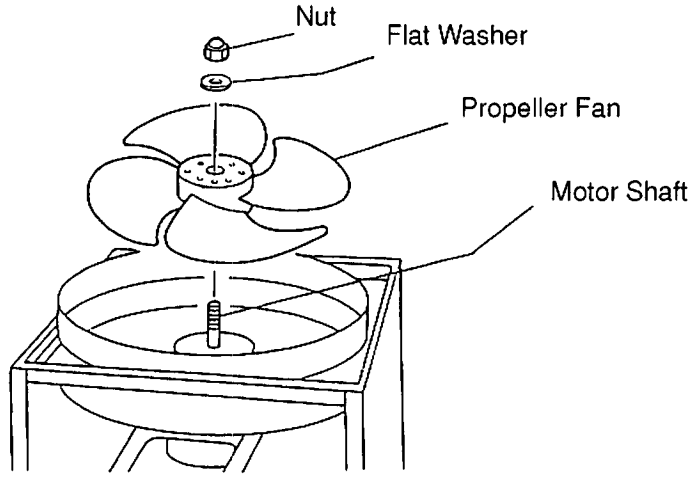
TURN OFF all power source switches.

(1) Remove the fan guard nets according to item 2.1.3, "Removing Fan Guard Nets".
(2) Remove the fans by removing the nuts and washers fixing the propeller fans onto the motor shafts. If it is difficult to remove the fan, use a puller.

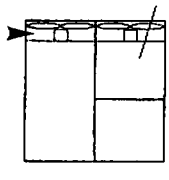
Tool	Spanner, Adjustable Wrench or Puller

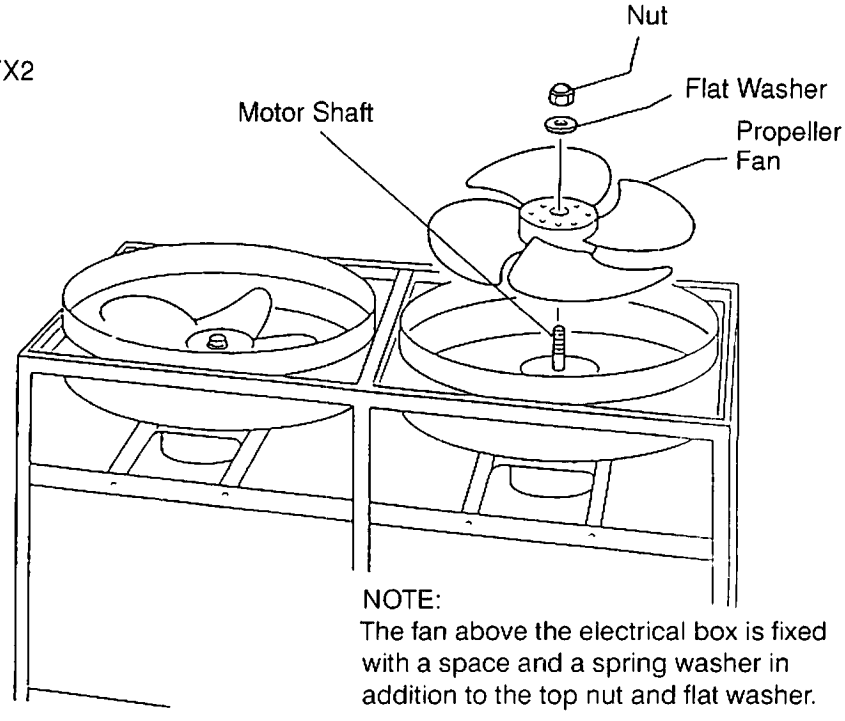
● RAS-5FS2 and RAS-5FX2





● RAS-8FS2, RAS-8FX2, RAS-10FS2 and RAS-10FX2





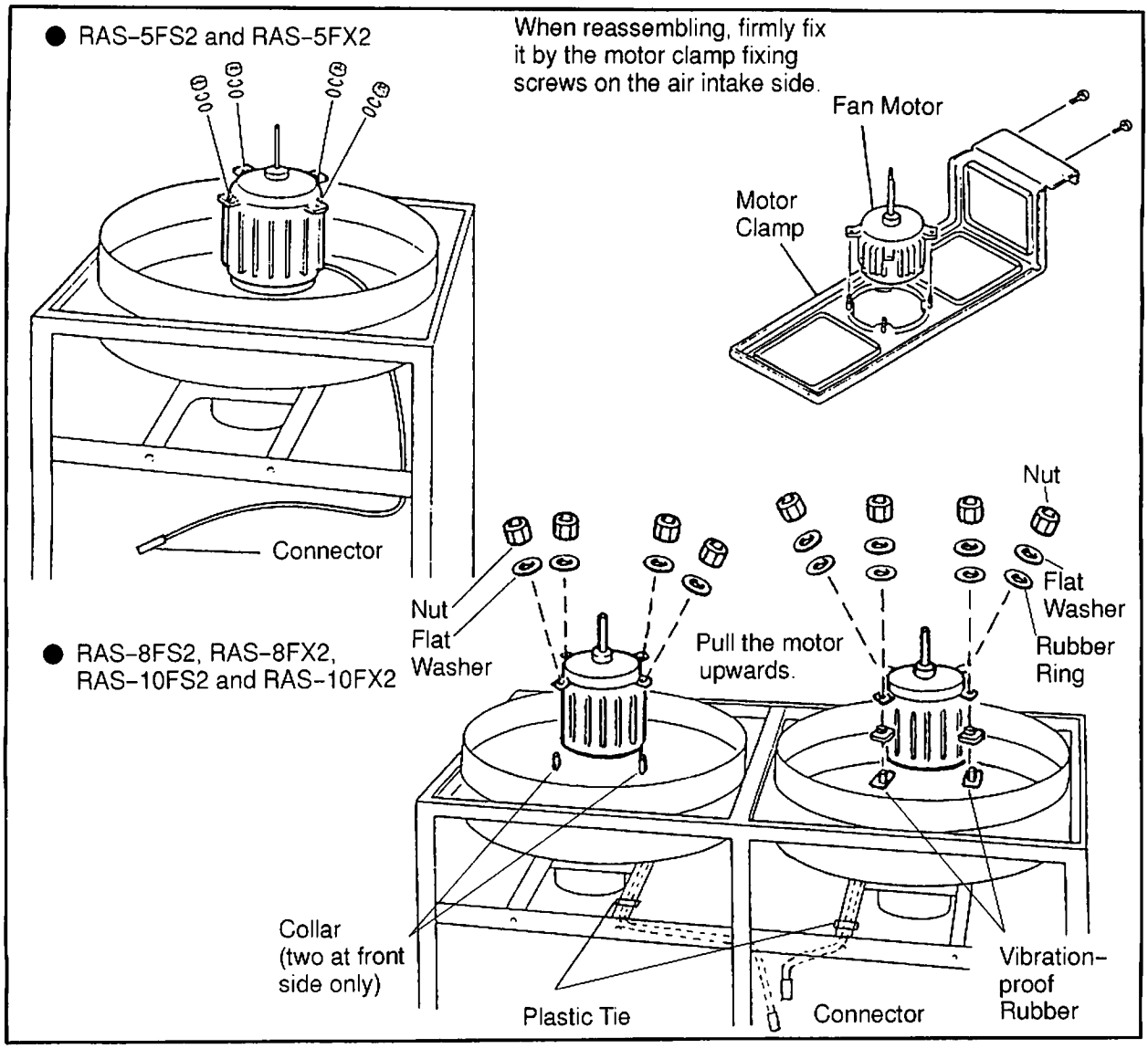
NOTE:
The fan above the electrical box is fixed with a space and a spring washer in addition to the top nut and flat washer.

(3) Removing Wires

a. Remove the electrical box cover according to item 2.1.8, "Removing Electrical Components".
b. Remove the sub-box according to the item, 2.1.8, "Removing Electrical Components".
c. Pull out wires through the wire hole at the side plate, after disconnecting the connectors for the motors in the electrical box.
d. Cut the plastic tie fixing wires.
e. Remove the motors by removing four fixing screws for the motors.

NOTE:
When reassembling RAS-5FS2 or RAS-5FX2, push in fan motor wiring between left side panel and left side partition by using a stick to insert the wiring into the hole of partition.

Tool	Phillips Screwdriver, Adjustable Wrench, Spanner, Cutter, Stick



NOTES:

1. Provide a looseness at the cord outlet of the motor when mounting the motor, as shown above.
2. Firmly fix the motor cord onto the motor clamp, not to touch the propeller fans.
3. Mounting Propeller Fan
   Put and push the propeller fan by identifying the ⌓ mark with the cut part of the motor shaft. Firmly fix the propeller fan twice with a tightening torque of 145 to 150 kg-cm after the head of the fan shaft comes up.
4. Connect the motor wires to the electrical connecting part at the lower part of the electrical box.
5. Firmly attach the fan guard net onto the shroud. When fixing fan motor, Firmly attach the vibration-proof rubber, rubber ring, washer, collar and so on.

2.1.10 Removing Coil for Reversing Valve and Solenoid Valve

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the front cover according to the item, 2.1.2, "Removing Front Service Panel". It is not required to dismantle the upper panel. As for models, RAS-8FS2, RAS-8FX2, RAS-10FS2 and RAS-10FX2, it is also not required to dismantle the front left side panel.

(2) Remove the coil for the reversing valve as shown below.

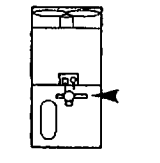
⚠ DANGER

Do not touch the electrical parts when the LED6(red) on the SNUBBER PCB(PCB5) is lit, since the voltage is higher than 50V.

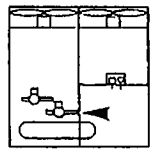
Tool	Phillips Screwdriver Adjustable Wrench, Spanner,

NOTE:
The reversing valve in RAS-8FX2 and RAS-10FX2 is located at the upper position.

The arrow mark (◄) indicates the position of the reversing valve coil. The figure is the front view one.

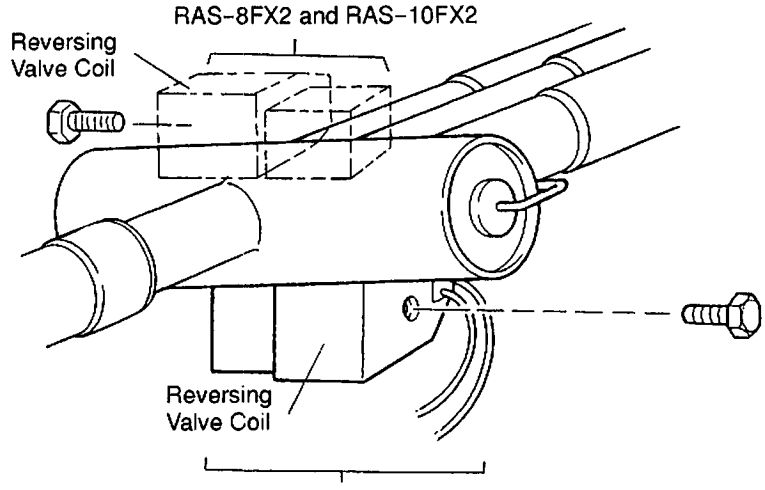


RAS-5FS2

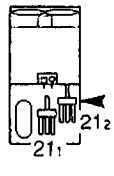


RAS-8FX2
RAS-10FX2

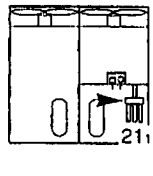
RAS-8FX2 and RAS-10FX2



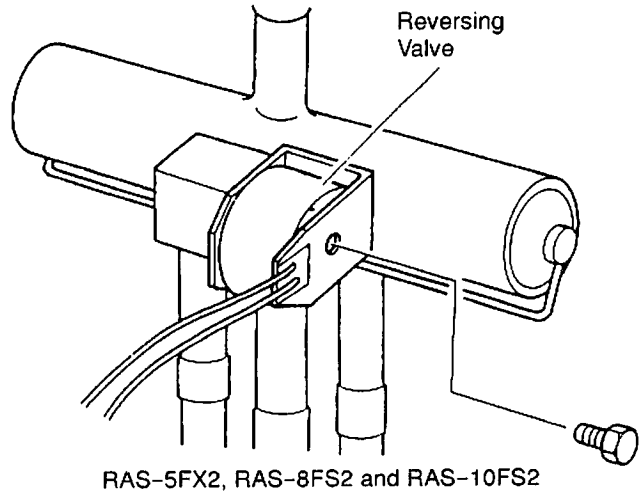
RAS-5FS2



RAS-5FX2



RAS-8FS2
RAS-10FS2

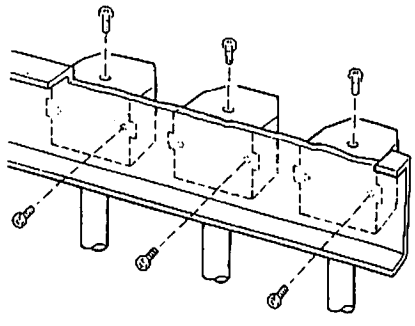


RAS-5FX2, RAS-8FS2 and RAS-10FS2

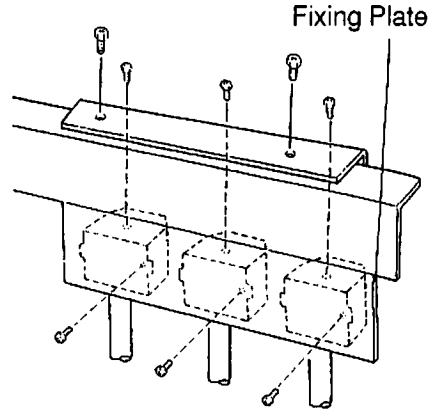
(3) Remove the front cover according to item 2.1.2, "Removing Front Service Panel".

(4) Remove the fixing screws (2 pieces for FS2 Series, 1 piece for FX2 Series) for solenoid valve coil.

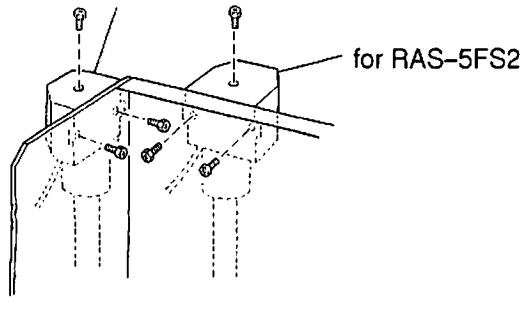
(5) Dismount the solenoid valve coil after removing the one screw for the solenoid valve.



for RAS-5FX2



for RAS-8FX2 and RAS-10FX2



for RAS-5FS2, RAS-8FS2 and RAS-10FS2

2.1.11 Removing Reversing Valve

⚠ WARNING

TURN OFF all power source switches.

〈For FS2 Models〉

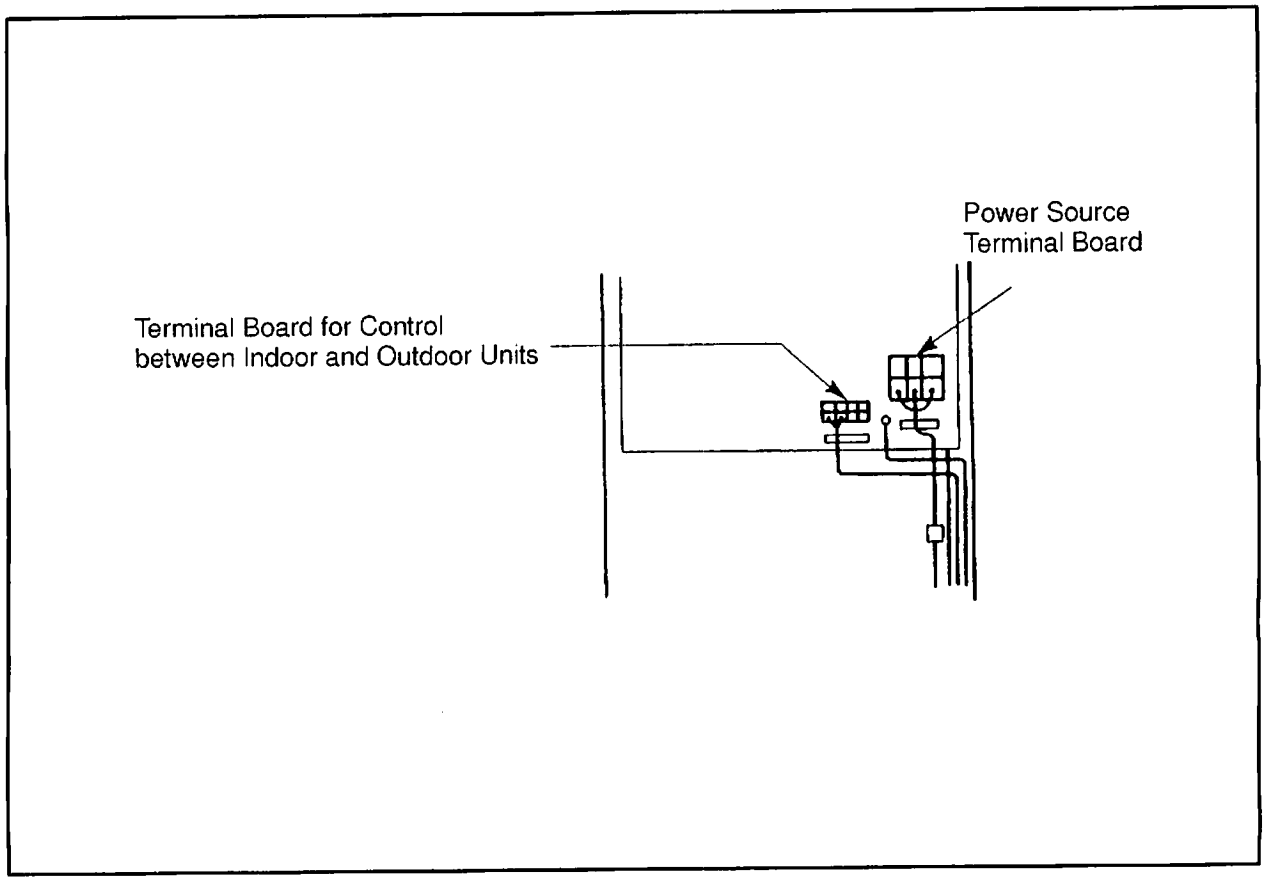
Before starting this work, collect refrigerant into a cylinder from the cycle.

(1) Remove the front service panel according to item, 2.1.2.

(2) Remove the electrical box cover according to item, 2.1.8.

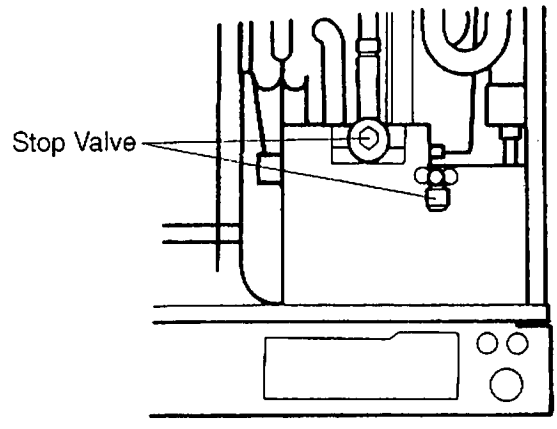
(3) Remove all the field wiring at the terminal board for control between the indoor and outdoor units, and electrical wiring terminal board.

Tool	Phillips Screwdriver, Spanner, Hexagon Wrench, Wet Cloth, Burner, Plyers



(4) Disconnect the pipes and check to ensure that two stop valves are open.

Tool	Phillips Screwdriver, Spanner, Hexagon Wrench, Wet Cloth, Burner, Plyers



(5) Disconnect the following to remove the reversing valve.

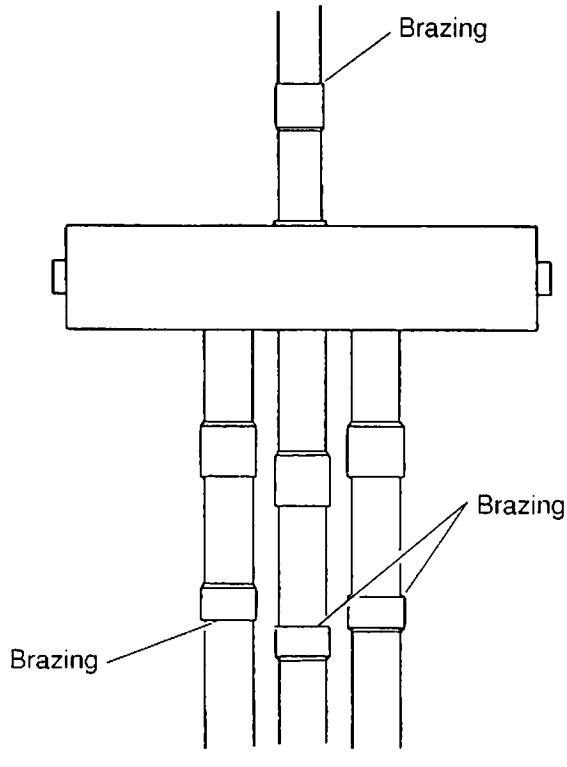
a. Connecting Portion between Reversing Valve and Discharge Pipe

b. Brazing Portion of Branched Pipes at the right and left where three pipes come from the reversing valve.

c. Brazing Portion of Center Pipe where three pipes come from the reversing valve.

NOTE:
Cover the reversing valve with wet cloth to protect it from excessively high temperature by a burner.

Tool	Phillips Screwdriver, Spanner, Hexagon Wrench, Wet Cloth, Burner, Plyers



⚠ WARNING

TURN OFF all power source switches.

〈For FX2 Models〉

The following is the instruction for RAS-5FX2.

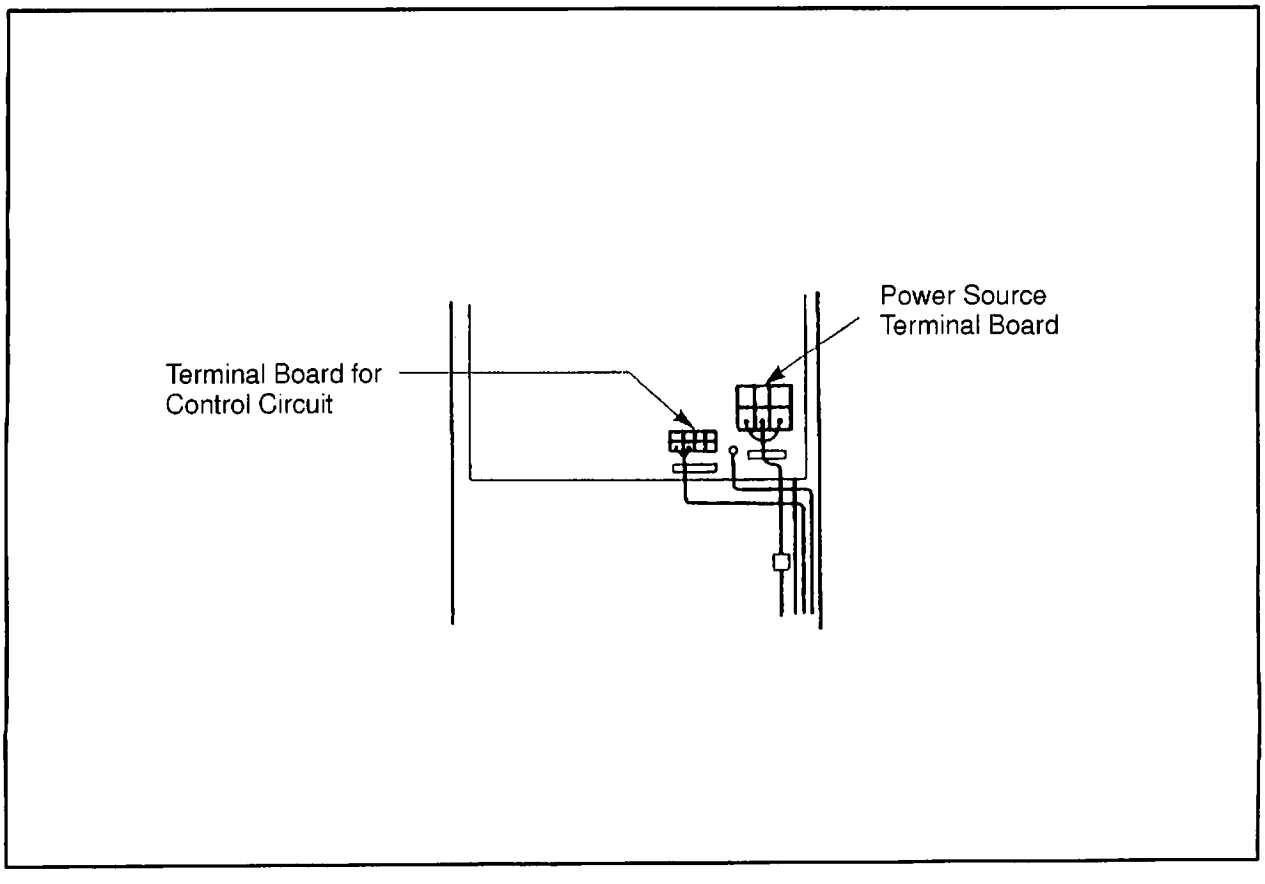
Before starting this work, collect refrigerant into a cylinder from the cycle.

(1) Remove the front service panel according to item, 2.1.2.

(2) Remove the electrical box cover according to item, 2.1.8.

(3) Remove the field wiring from the electrical wiring terminal board and the terminal board for control wiring between the indoor and outdoor units.

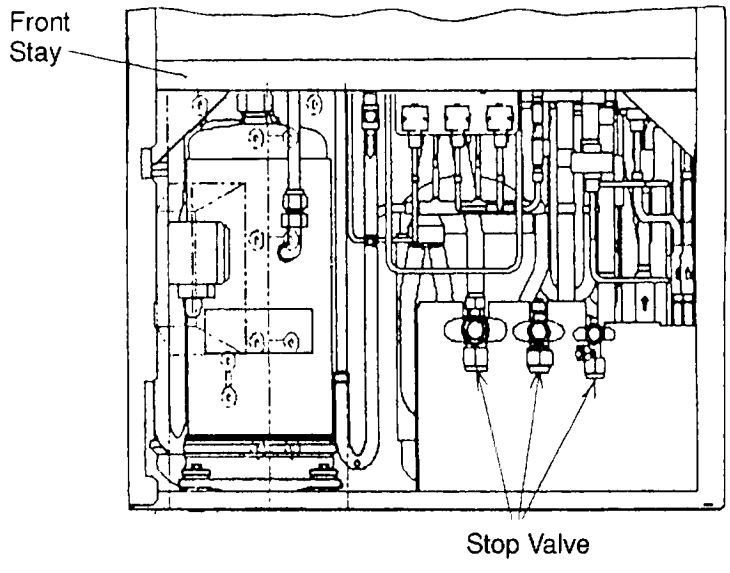
Tool	Phillips Screwdriver, Spanner, Hexagon Wrench, Wet Cloth, Burner, Plyers



(4) Disconnect the pipes and check to ensure that three pipes are opened.

(5) Remove the reversing valve coil, solenoid valve coil and attaching plate for the solenoid valve.
Disconnect the wiring for the high pressure switch according to item, 2.1.7.
Remove the front stay and electrical box.
In case of RAS-8FX2 and RAS-10FX2, remove the top cover also.

Tool	Phillips Screwdriver, Spanner, Hexagon Wrench, Wet Cloth, Burner, Plyers



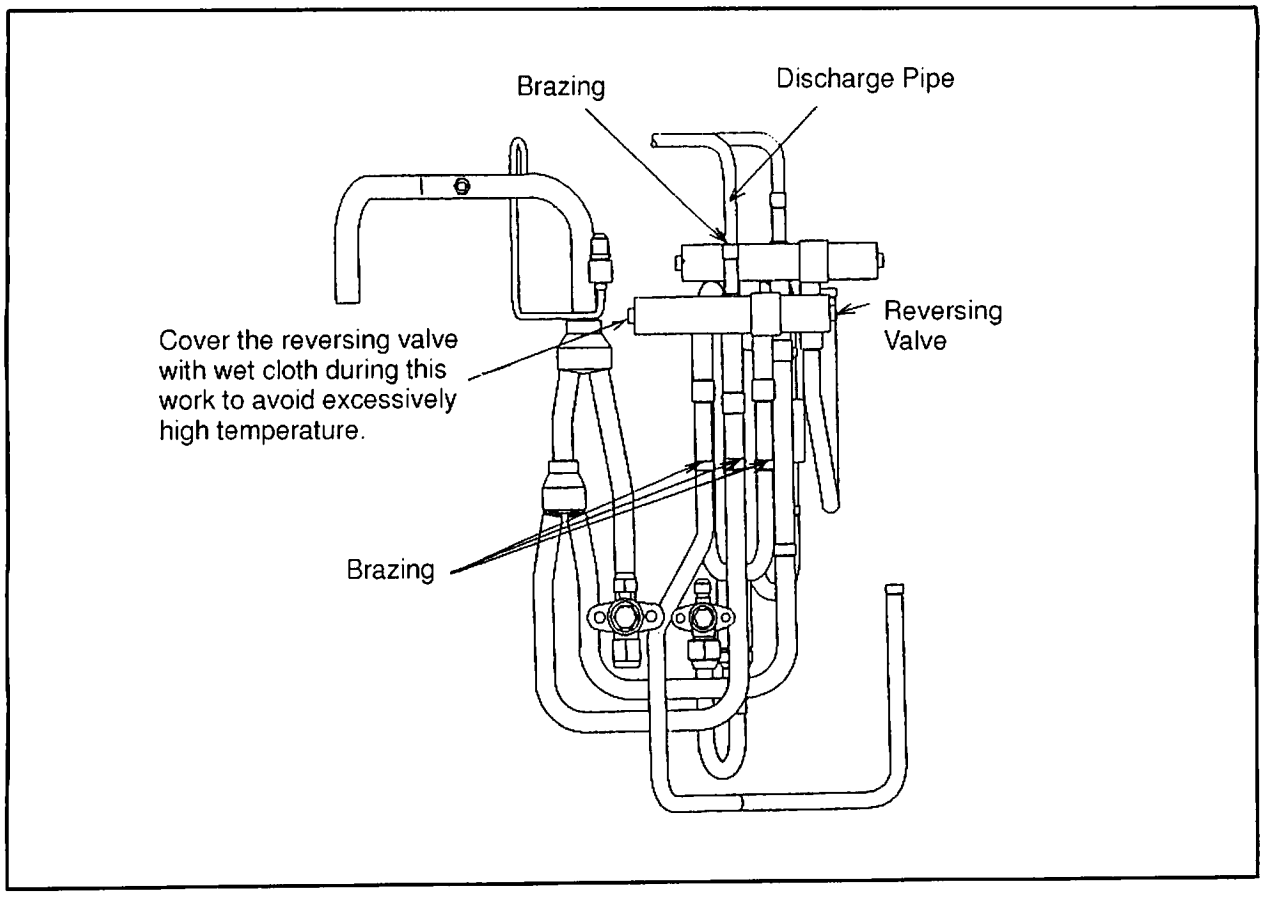
(6) When removing the reversing valve, cover the reversing valve with wet cloth and disconnect the following.

a. Brazing Portion between Reversing Valve and Discharge Pipe

b. Brazing Portion of Branched Pipes at the right and left where three pipes come from the reversing valve.

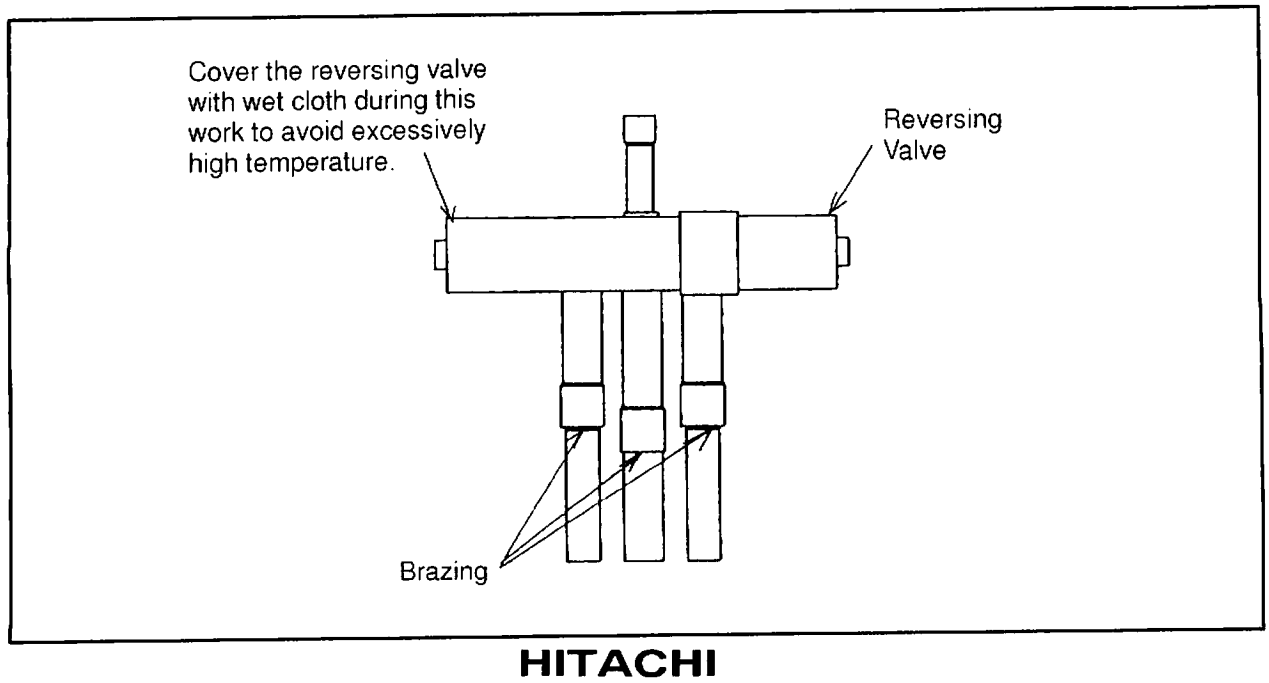
c. Brazing Portion of Center Pipe where three pipes come from the reversing valve.

Tool	Phillips Screwdriver, Spanner, Hexagon Wrench, Wet Cloth, Burner, Plyers



(7) Disconnect three pipes connected to the reversing valve by a burner after the reversing valve is taken out. Cover the reversing valve with wet cloth to avoid excessively high temperature.

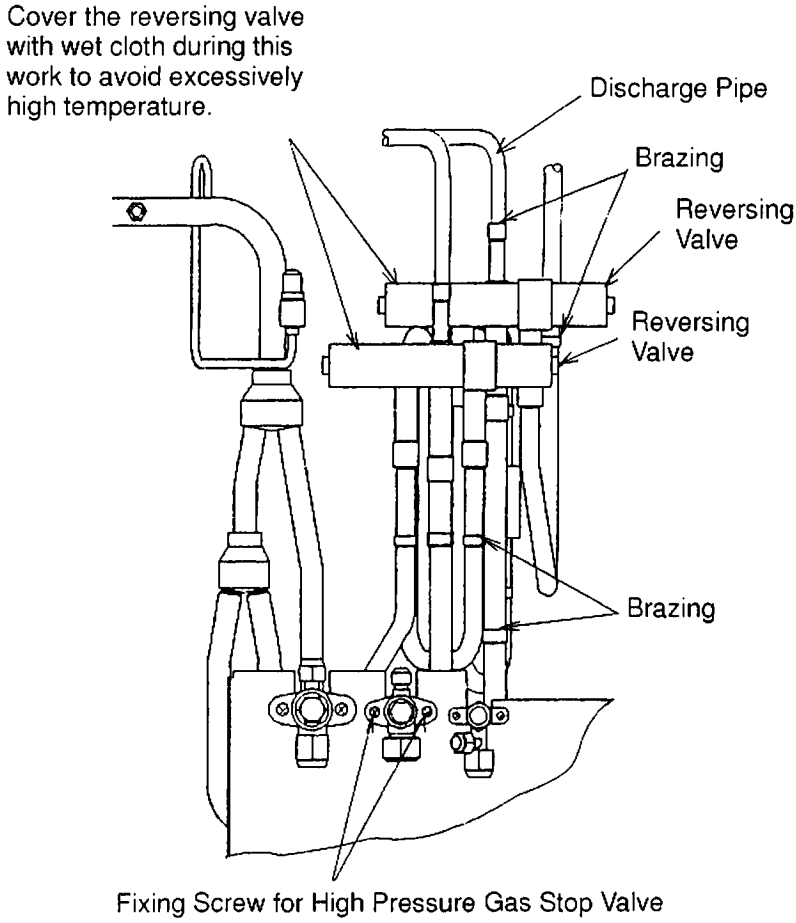
Tool	Phillips Screwdriver, Spanner, Hexagon Wrench, Wet Cloth, Burner, Plyers



(8) When removing the reversing valve, cover the reversing valve with wet cloth and disconnect the following.

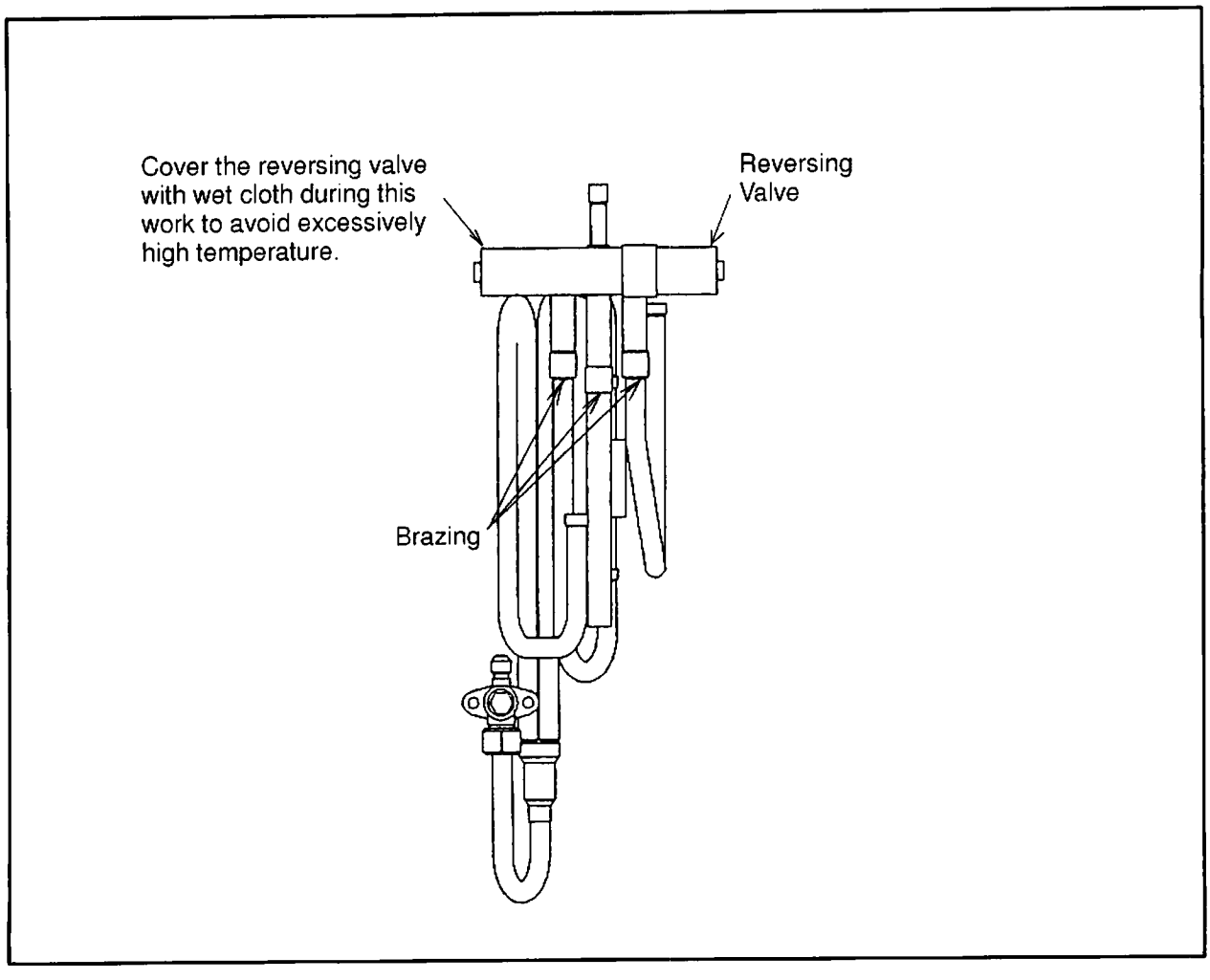
a. Brazing Portion between Reversing Valve and Discharge Pipe
b. Brazing Portion of Branched Pipes at the right where three pipes come from the reversing valve.
c. Remove two screws fixing the stop valve on the valve fixing plate.
d. Disconnect the center pipe where three pipes come from the reversing valve.
e. Remove the pipe to the Gas Header at the upper position, which comes from the right side among three pipes from the lower part of the reversing valve.

Tool	Phillips Screwdriver, Spanner, Hexagon Wrench, Wet Cloth, Burner, Plyers



(9) Disconnect three pipes connected to the reversing valve by a burner after the reversing valve is taken out. Cover the reversing valve with wet cloth to avoid excessively high temperature.

Tool	Phillips Screwdriver, Spanner, Hexagon Wrench, Wet Cloth, Burner, Plyers



2.1.12 Removing Thermistor for Liquid Pipe

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the front service panel according to the item, 2.1.2, "Removing Front Service Panel".

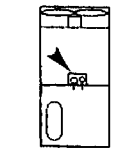
(2) Remove the electrical box cover according to the item, 2.1.8.

⚠ DANGER

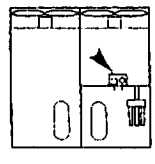
Do not touch the electrical parts when the LED6(red) on the SNUBBER PCB(PCB5) is lit, since the voltage is higher than 50V.

(3) Remove the side cover panel, R after removing fifteen fixing screws.
During this work, remove one screw fixing the side cover R and air intake grille and unhook the side cover at two positions.

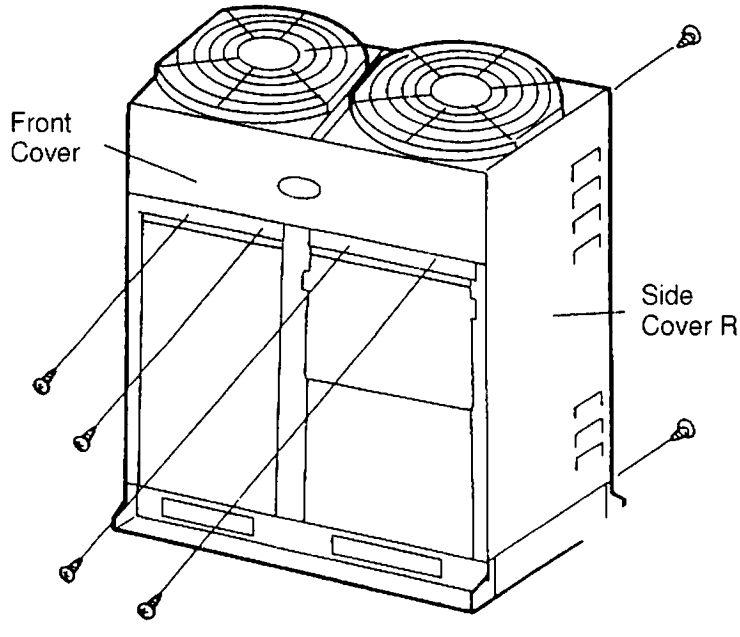
Tool	Phillips Screwdriver



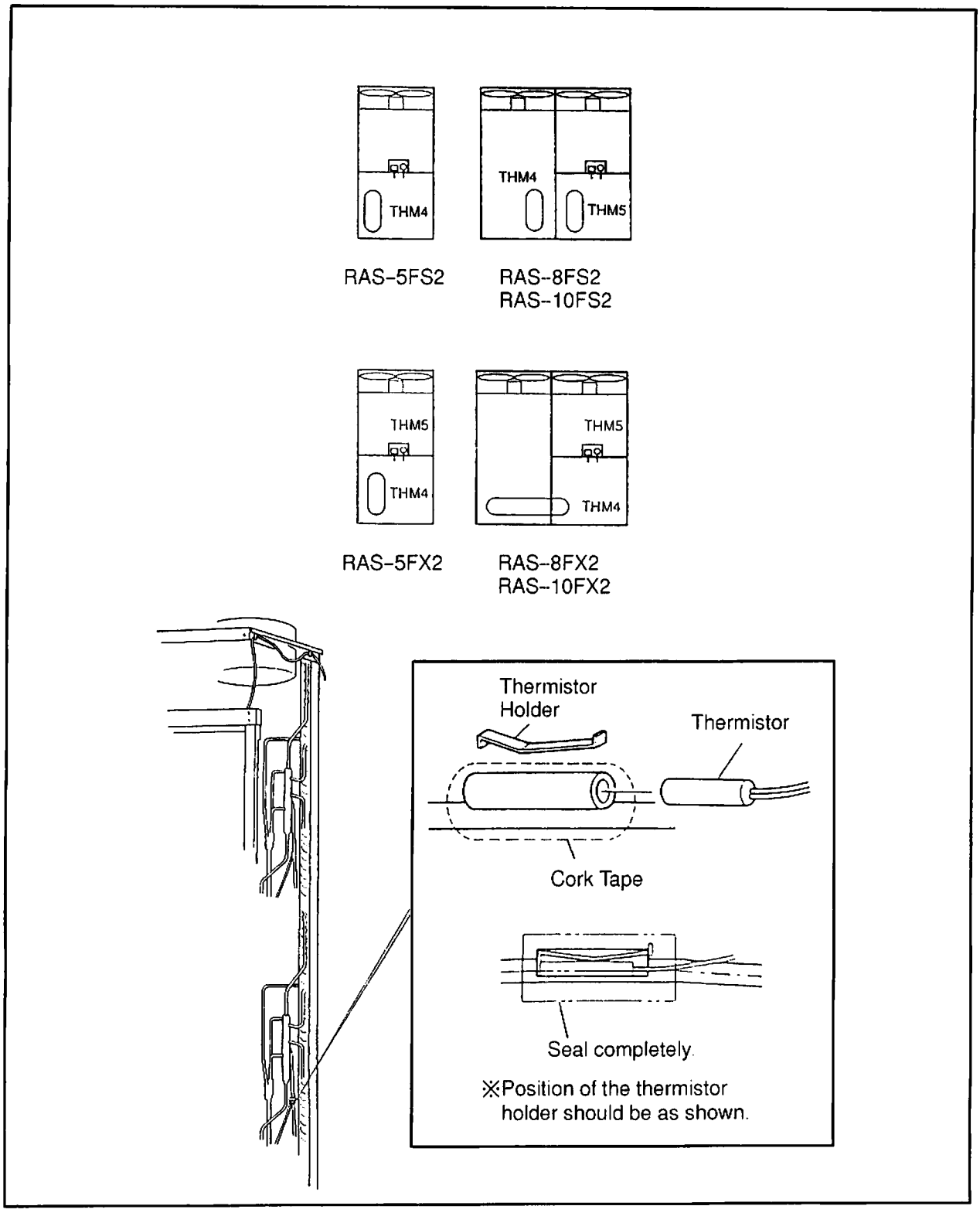
RAS-5FS2
RAS-5FX2



RAS-8FS2
RAS-10FS2
RAS-8FX2
RAS-10FX2



(5) Pull out the thermistor fixing plate from the pipe after detaching the CORK TAPE, and remove the thermistor for the liquid pipe.

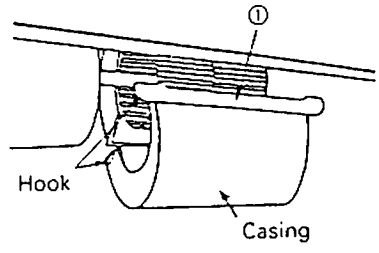
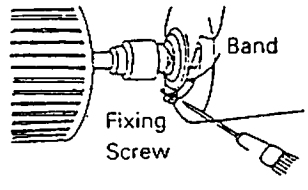


2.2 In-the-Ceiling Type (Models: RPI-0.8FS, RPI-1FS and RPI-1.5FS)

2.2.1 Removing Indoor Fan Motor

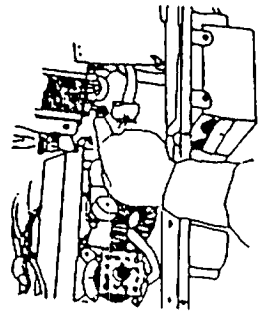
⚠ WARNING

TURN OFF all power source switches.

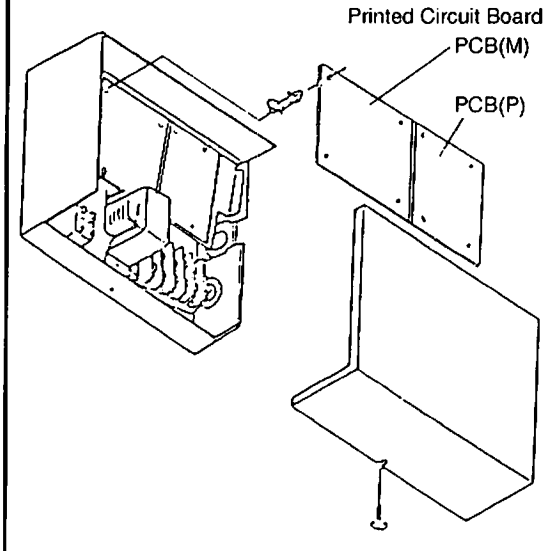
Step	Procedure		Required Tool
1	Remove seven screws and projected lower cover.		•Phillips Screwdriver
2	Remove the connector of the lead wire for the indoor fan motor.		
3	Remove the lower part ① of the 2-division casing by pushing four hooks.		
4	Remove the holding band for motor and remove the motor carefully.		•Phillips Screwdriver

(2.2 In-the-Ceiling Type [0.8~1.5HP])

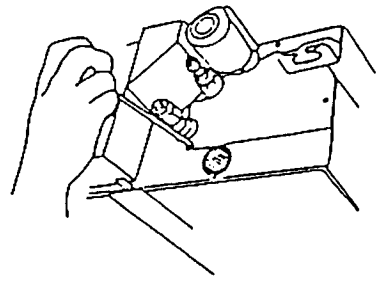
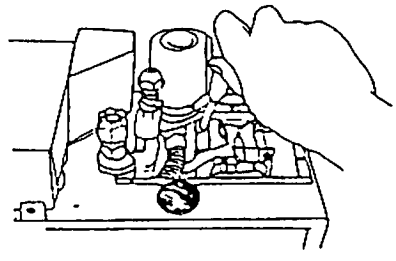
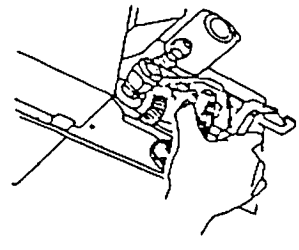
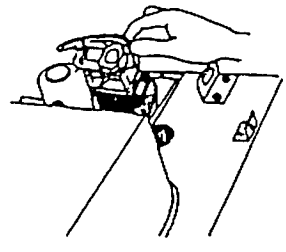
2.2.2 Removing Thermistors for Liquid Piping and Gas Piping

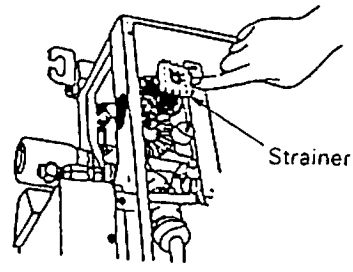
Step	Procedure		Required Tool
1	Remove the drain pan according to item 2.2.6, "Removing Drain Pan".		•Phillips Screwdriver
2	Remove the thermistors for the liquid piping and gas piping attached to the liquid piping and gas piping of the heat exchanger.		•Phillips Screwdriver

2.2.3 Removing Printed Circuit Board (PCB)

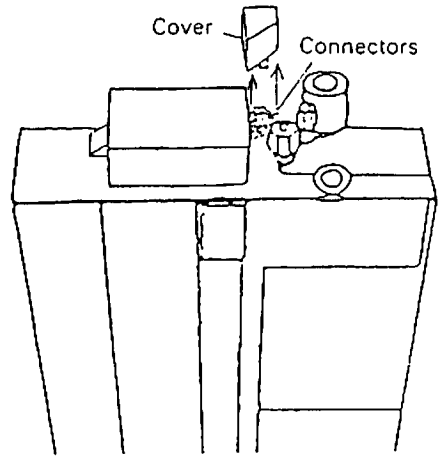
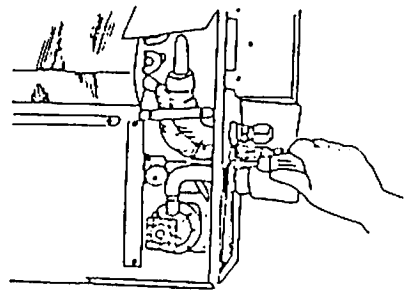
Step	Procedure		Required Tool
1	Remove the electrical box cover after removing one fixing screw.		•Phillips Screwdriver
2	Remove the PCB. The electrical box can be removed according to the following procedures. (1) Remove the wiring cover at the right side and remove all the connectors from inside. (2) Remove the wiring cover at the left side. (3) Remove the connectors from the PCBs. (4) Remove two screws fixing the electrical box.		•Phillips Screwdriver •Long-nose Pliers

2.2.4 Removing Drain-Up Mechanism

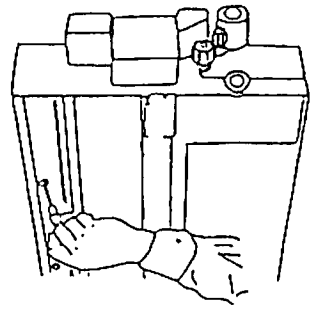
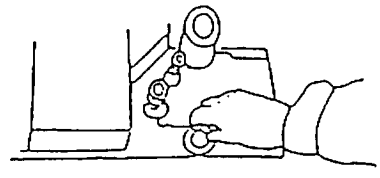
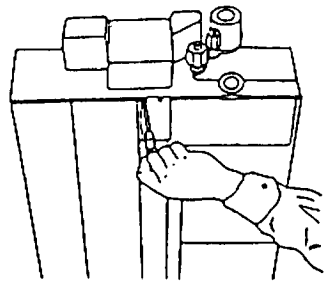
Step	Procedure		Required Tool
1	Remove the screws (3 pcs.) fixing the service cover and remove the service cover.		•Phillips Screwdriver
2	Remove the screws (2 pcs.) fixing the drain-up motor and remove the service cover.		
3	Turn and draw out the drain-up motor towards the open space from the service panel.		
4	Remove the hose band and remove the drain-up motor from the drain hose.		
5	Remove the connector of the lead wire for the drain-up motor.		

Step	Procedure		Required Tool
6	When reassembling the drain-up motor, check to ensure that the strainer is attached to the suction hole at the end of the drain-up motor.		

2.2.5 Removing Float Switch

Step	Procedure		Required Tool
1	Remove the drain pan according to item "2.2.6 Removing of Drain Pan".		•Phillips Screwdriver •Bucket
2	Remove the connectors (FS) (1-Pin, 1 pc.) of the lead wire for the float switch inside of the wiring cover at the right side of the electrical box.		•Phillips Screwdriver
3	Remove the service cover according to item "2.2.4 Removing Drain-Up Mechanism".		•Phillips Screwdriver
4	Remove the screw (1 pc.) of the plate fixing the float switch and remove the float switch.		•Phillips Screwdriver

2.2.6 Removing Drain Pan

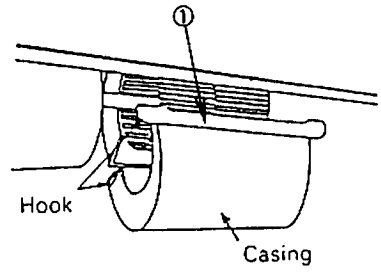
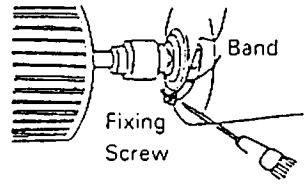
Step	Procedure		Required Tool
1	Remove the screws (17 pcs.) fixing the lower covers and remove both of the lower covers.		•Phillips Screwdriver
2	Remove the screws (5 pcs.) fixing the plate for water protection.		•Phillips Screwdriver
3	Pull out the rubber bush of the drain pan and discharge the drain water left in the drain pan. Check to ensure that the drain hole is not clogged by pricking with pencil or others.		•Bucket (about 5 liters content)
4	Remove the screws (2 pcs.) for the plates fixing the drain pan at both sides and draw out the drain pan downward.		•Phillips Screwdriver

2.3 In-the-Ceiling Type (Models: RPI-2FS and RPI-2.5FS)

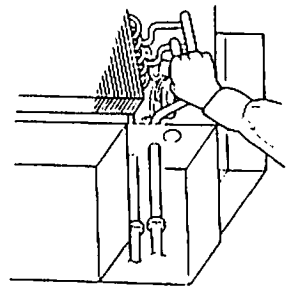
2.3.1 Removing Indoor Fan Motor

⚠ WARNING

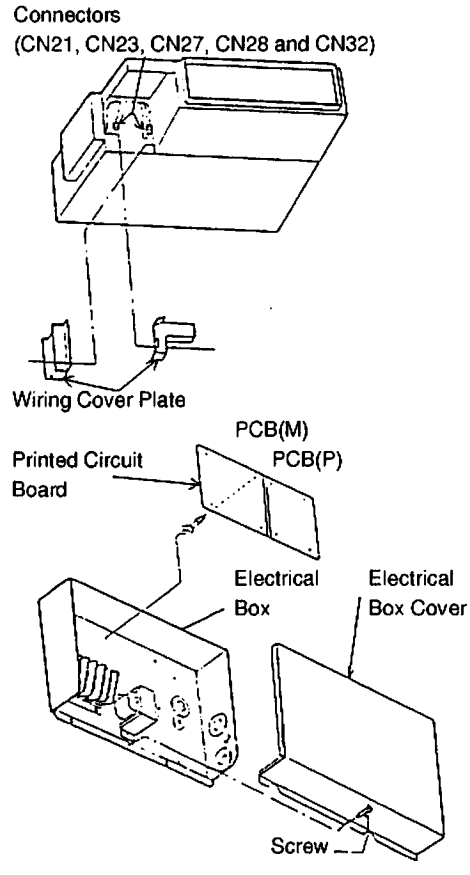
TURN OFF all power source switches.

Step	Procedure		Required Tool
1	Remove seven screws and remove the lower cover. At this time, remove the connector of the electric heater for condensate air protection at the inside of the lower cover.		•Phillips Screwdriver
2	Remove the connector of the lead wire for the indoor fan motor.		
3	Remove the lower part ① of the 2-division casing by pushing four hooks.		
4	Remove the holding band for the motor and remove the motor carefully.		•Phillips Screwdriver

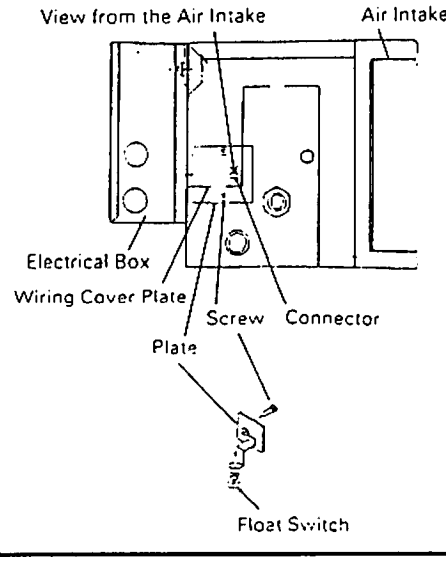
2.3.2 Removing Thermistors for Liquid Piping and Gas Piping

Step	Procedure		Required Tool
1	Remove the drain pan according to item "2.3.5 Removing Drain Pan".		•Phillips Screwdriver
2	Remove the thermistors for the liquid piping and gas piping attached to the liquid piping and gas piping of the heat exchanger.		•Phillips Screwdriver

2.3.3 Removing Printed Circuit Board (PCB)

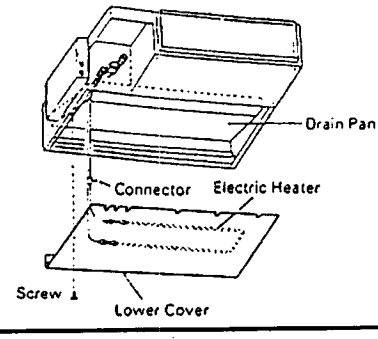
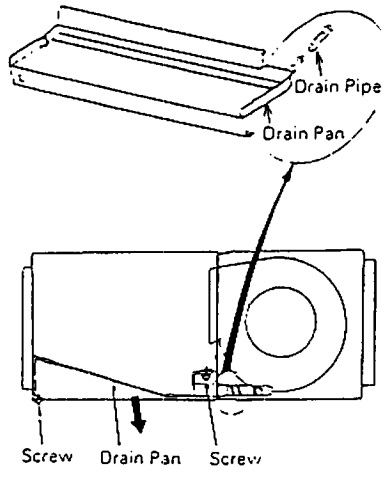
Step	Procedure		Required Tool
1	Remove the screw (1 pc.) fixing the electrical box cover and remove the electrical box cover.		•Phillips Screwdriver
2	Remove the printed circuit board. The electrical box can be removed according to the following procedures. (1) Remove the screws (4 pcs.) fixing the wiring cover plate and remove the connectors CN21 (for indoor fan motor), CN23 (for float switch), CN27 (for freeze protection thermistor), CN28 (for gas piping thermistor) and CN32 (for capacitor of RPI-2.5FS). (2) Remove the connectors from the printed circuit boards. (3) Remove the screws (4 pcs.) fixing the electrical box.		•Long-nose Plier •Phillips Screwdriver

2.3.4 Removing Float Switch

Step	Procedure		Required Tool
1	Remove the screws (2 pcs.) fixing the wiring cover plate and remove the connector CN23 (for float switch).		•Phillips Screwdriver
2	Remove the screws (2 pcs.) of the plate fixing the float switch and remove the plate with the float switch.		•Phillips Screwdriver

(2.3 In-the-Ceiling Type [2, 2.5HP])

2.3.5 Removing Drain Pan

Step	Procedure		Required Tool
1	Remove the screws (16 pcs.) fixing the lower covers and remove both of the lower covers. At this time, remove the connector of the electric heater for dew protection at the inside of the lower cover.		•Phillips Screwdriver
2	Disconnect the drain piping and drain pan. It is necessary to remove the drain water left in the drain pan.		•Bucket (about 5 liters content)
3	Remove the screws (6 pcs.) for fixing the drain pan and draw out the drain pan downward. NOTE: Be careful not to damage the insulation at the inside of the unit. If the insulation at the inside of the unit is damaged, change the insulation with a new one.		•Phillips Screwdriver

2.4 In-the-Ceiling Type (Models: RPI-4FS and RPI-5FS)

2.4.1 Removing Printed Circuit Board (PCB)

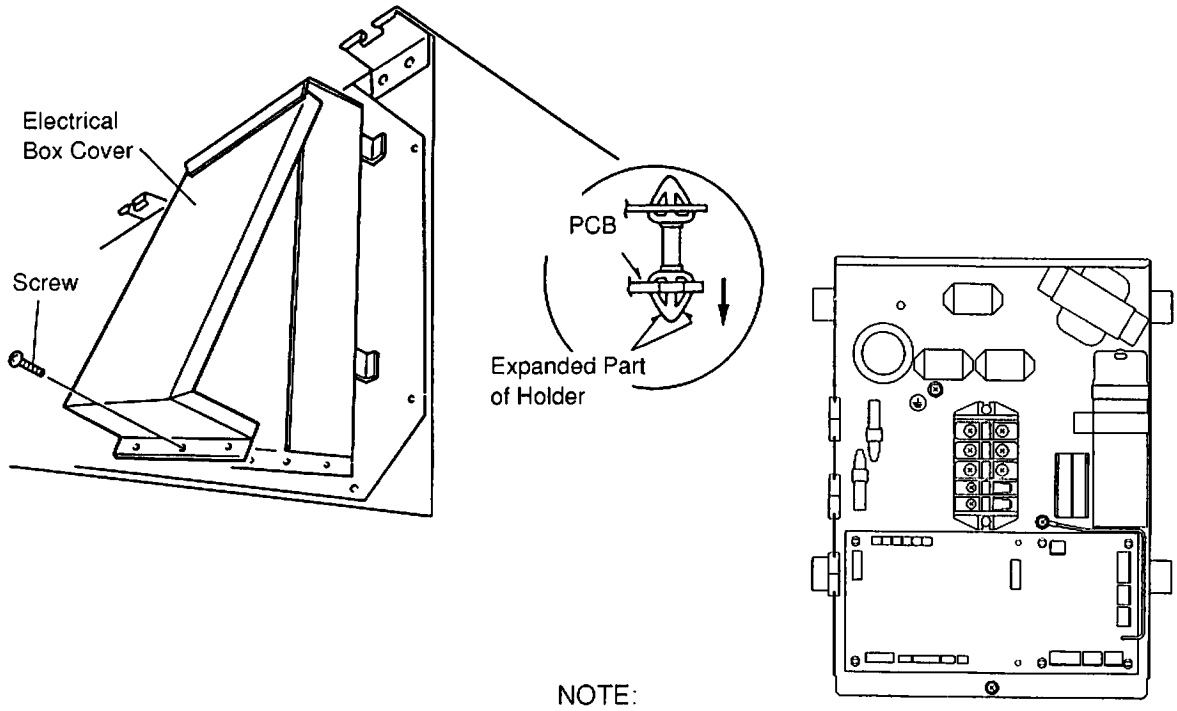
⚠ WARNING

TURN OFF all power source switches.

(1) Remove the screw (1 pc.) fixing the electrical box cover and remove the electrical box cover.

(2) Disconnect the connectors. Remove the PCB by holding the expanded part of the holders using long-nose pliers.

Tool	Phillips Screwdriver, Long-nose Plier



NOTE:
Do not touch electrical components on the PCB.
If a big force is applied to the PCB, it will be damaged.

(2.4 In-the-Ceiling Type [4, 5HP])

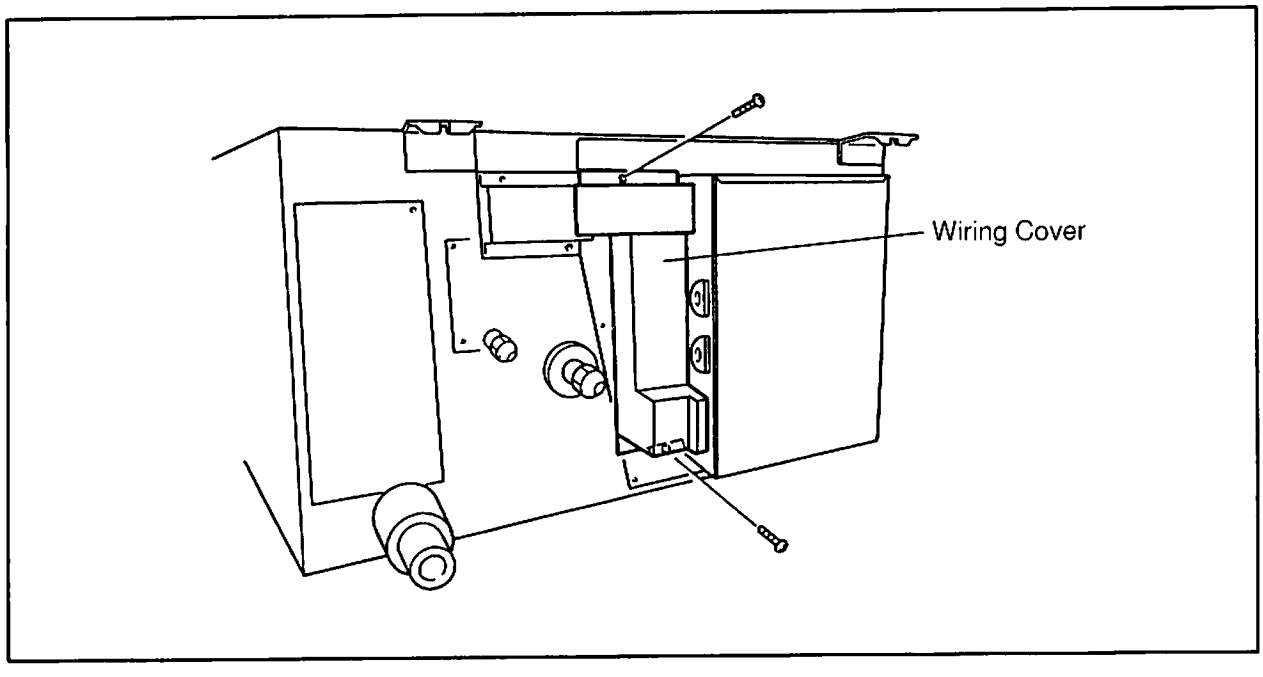
2.4.2 Removing Indoor Fan Motor

⚠ WARNING

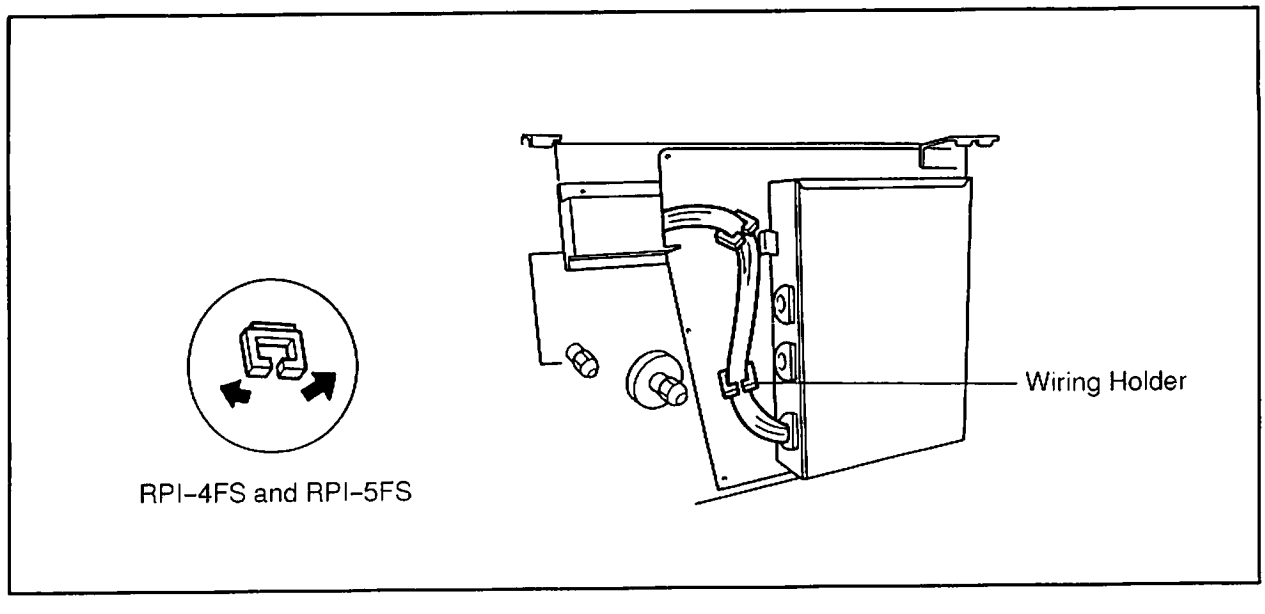
TURN OFF all power source switches.

(1) Remove the wiring cover after removing the screws (2 pcs.) fixing the wiring cover.

Tool	Phillips Screwdriver

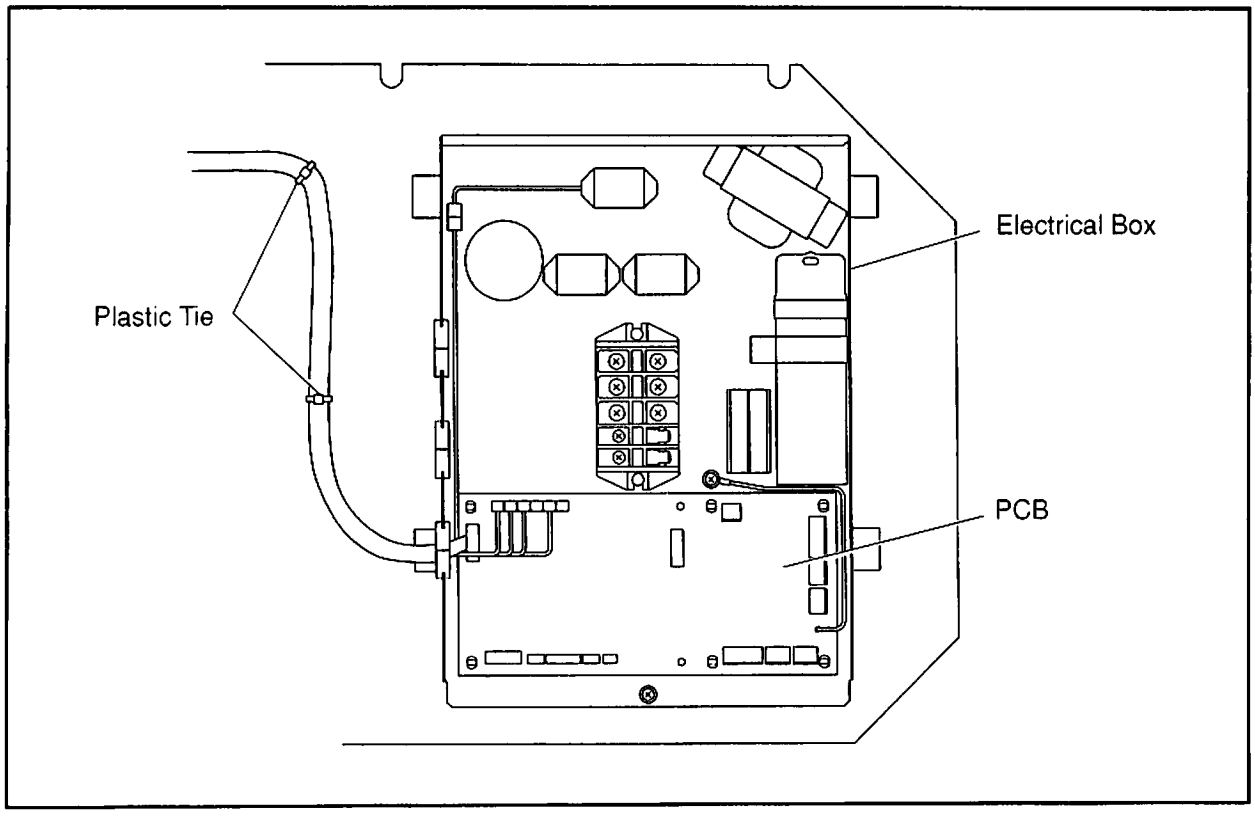


(2) Remove the wiring from the wiring holder.



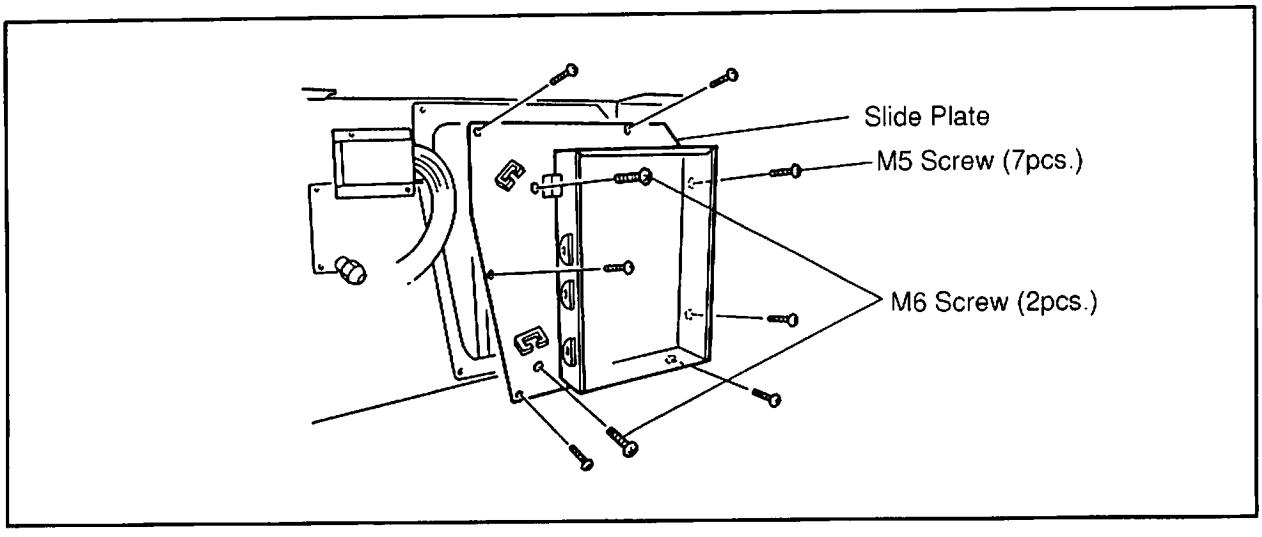
(3) Remove the electrical box cover according to the item 2.4.1, "Removing Printed Circuit Board (PCB)".

(4) Remove the connector CN23 (for float switch), the blue connector (6 Pins) for the electronic expansion valve, the blue connector (2 Pins) for air inlet, the red connector (2 Pins) for air outlet, the black connector (2 Pins) for the liquid pipe thermistor and the yellow connector (2 Pins) for the gas pipe thermistor connected to the PCB.

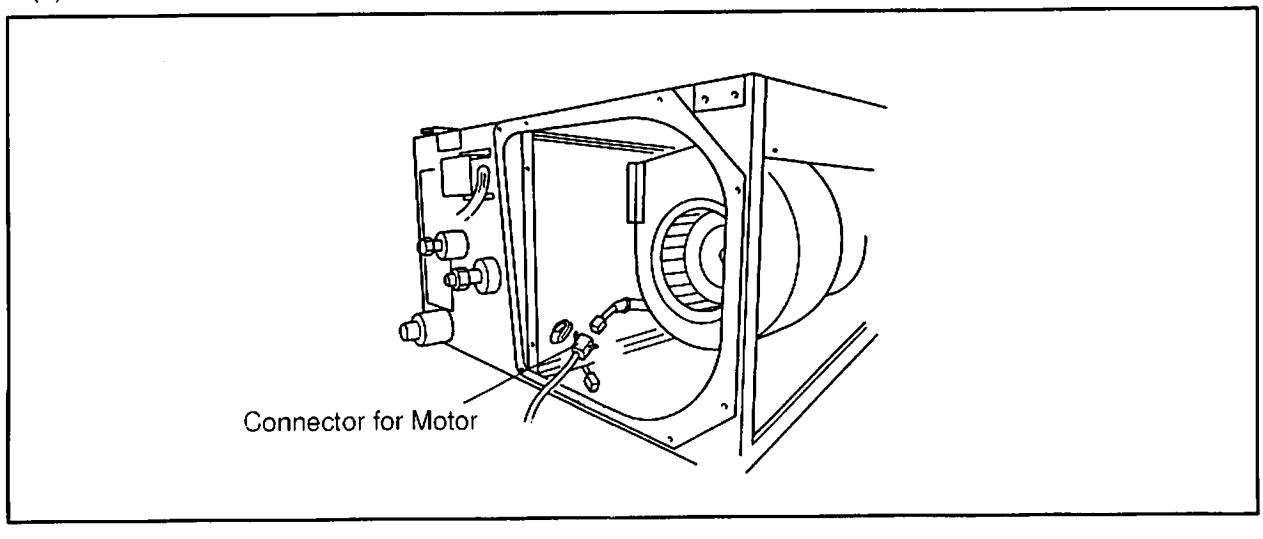


(5) Remove the screws (7 pcs. for M5 screws and 2 pcs. for M6 screws) fixing the side plate clinging the electrical box.

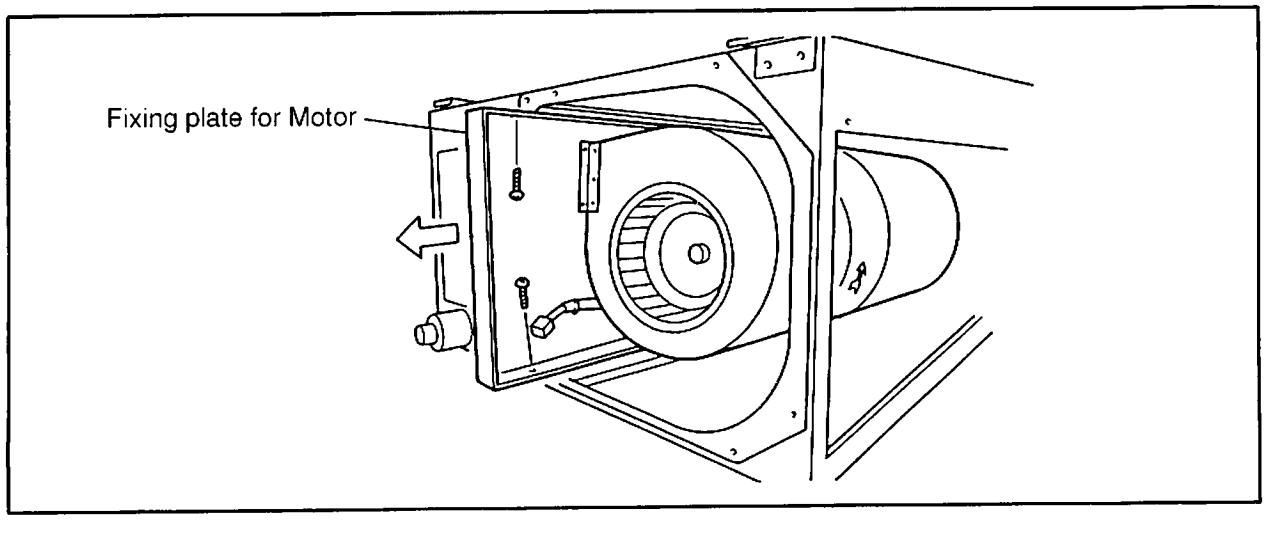
Tool	Phillips Screwdriver



(6) Disconnect the connector for the motor.

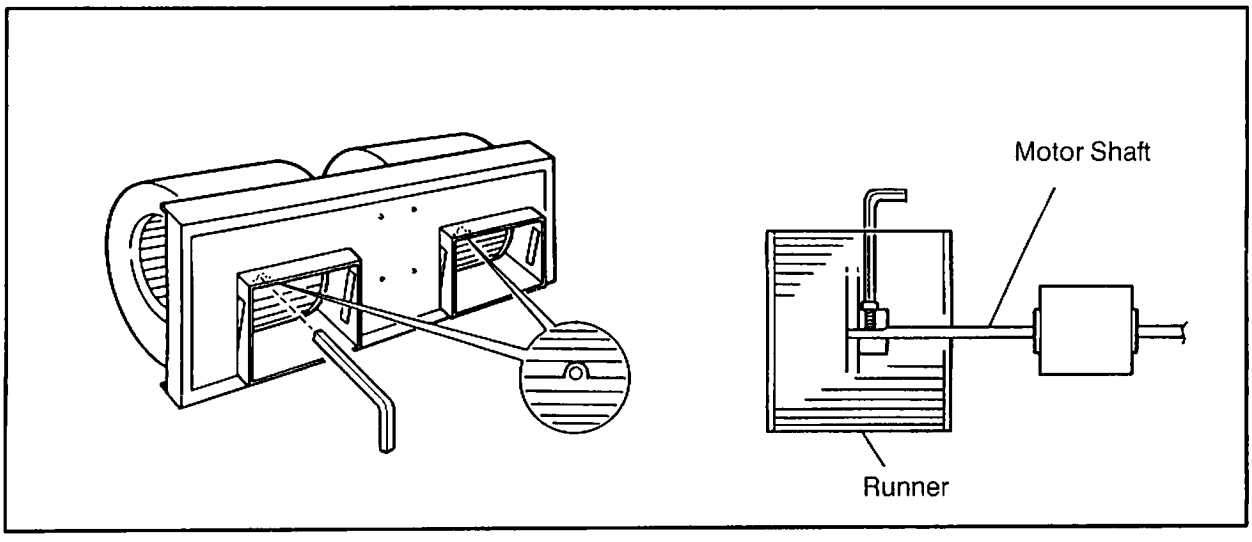


(7) Pull out the fixing plate for the motor.



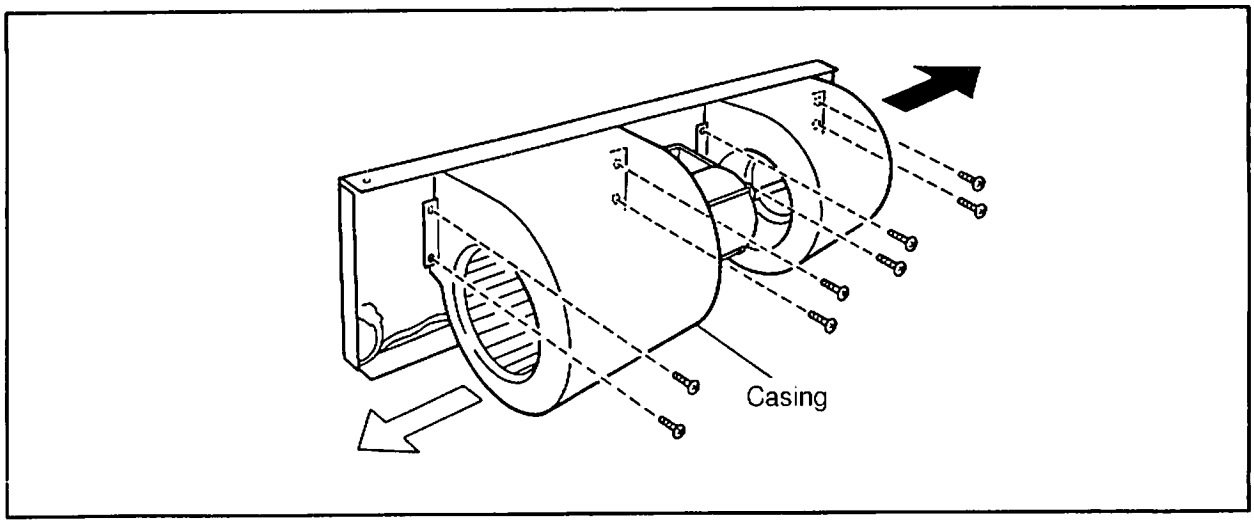
(8) Loosen the screw fixing each fan runner by a hexagon wrench.

Tool	Hexagon Wrench



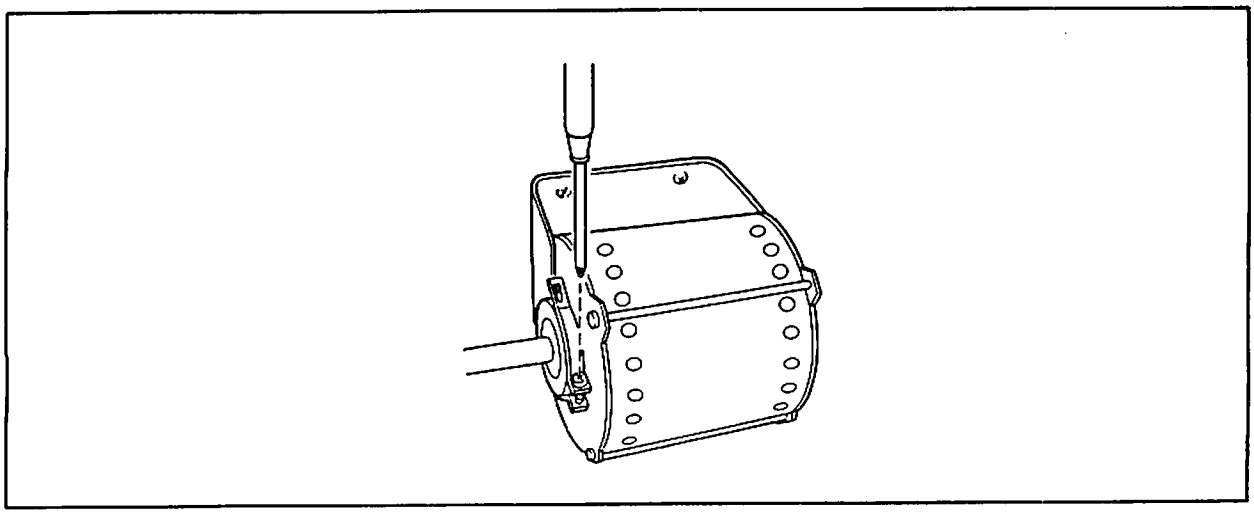
(9) Remove the screws (4 pcs.) fixing each casings and pull out each casings.

Tool	Phillips Screwdriver



(10)Remove the holding band for the motor and remove the motor carefully.

Tool	Phillips Screwdriver



2.4.3 Removing Thermistors for Liquid Pipe and Gas Pipe

⚠ WARNING

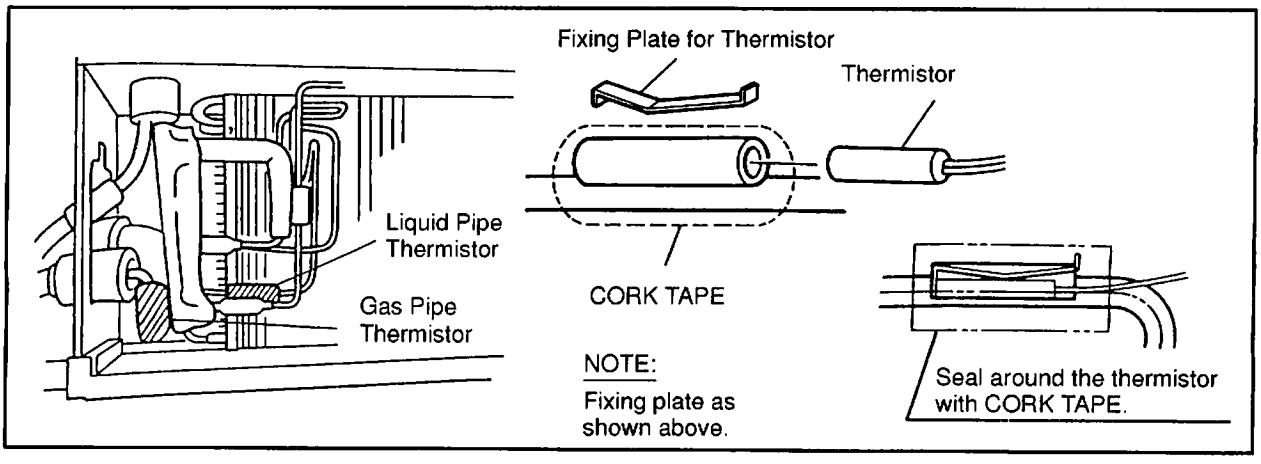
TURN OFF all power source switches.

(1) Remove the fixing plate for the motor according to the item 2.4.2, "Removing Indoor Fan Motor".

(2) Remove the wiring cover after removing the screws (2 pcs.) fixing the wiring cover.

(3) Remove the fixing plate for heat exchanger piping after removing the screws (4 pcs.) fixing plate for heat exchanger piping.

(4) Remove the CORK TAPE and pull out the thermistors after removing the fixing plate for the thermistor.



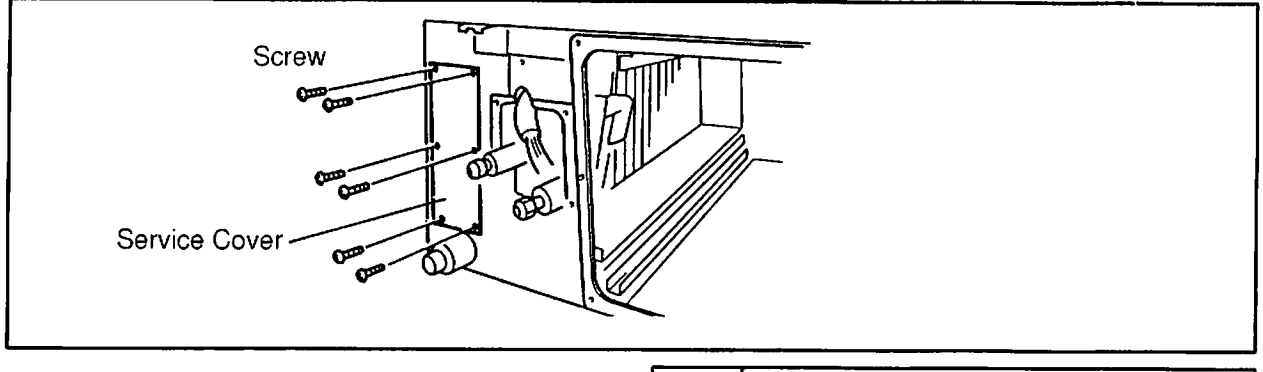
2.4.4 Removing Float Switch

⚠ WARNING

TURN OFF all power source switches.

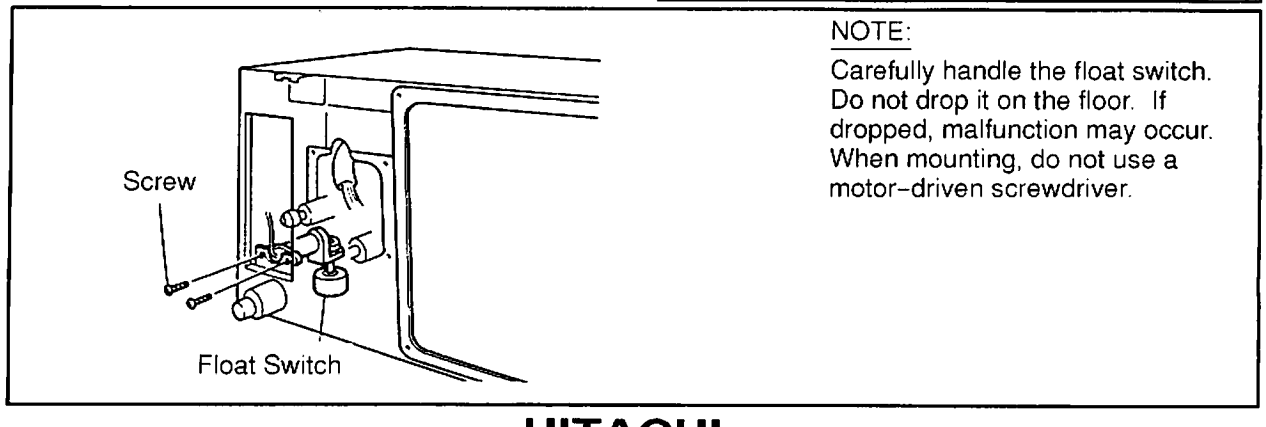
(1) Remove the screws (6 pcs.) fixing the service cover and remove the service cover.

Tool	Phillips Screwdriver



(2) Remove the screws (2 pcs.) of the plate fixing the float switch and remove the float switch.

Tool	Phillips Screwdriver



NOTE:
Carefully handle the float switch. Do not drop it on the floor. If dropped, malfunction may occur. When mounting, do not use a motor-driven screwdriver.

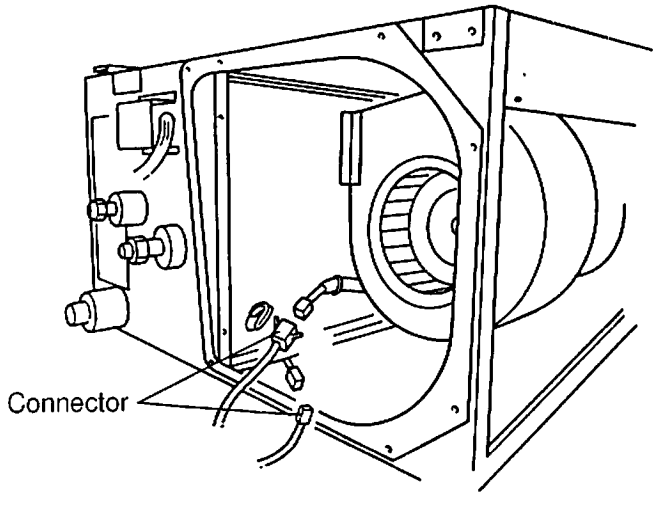
2.4.5 Removing Drain Pan

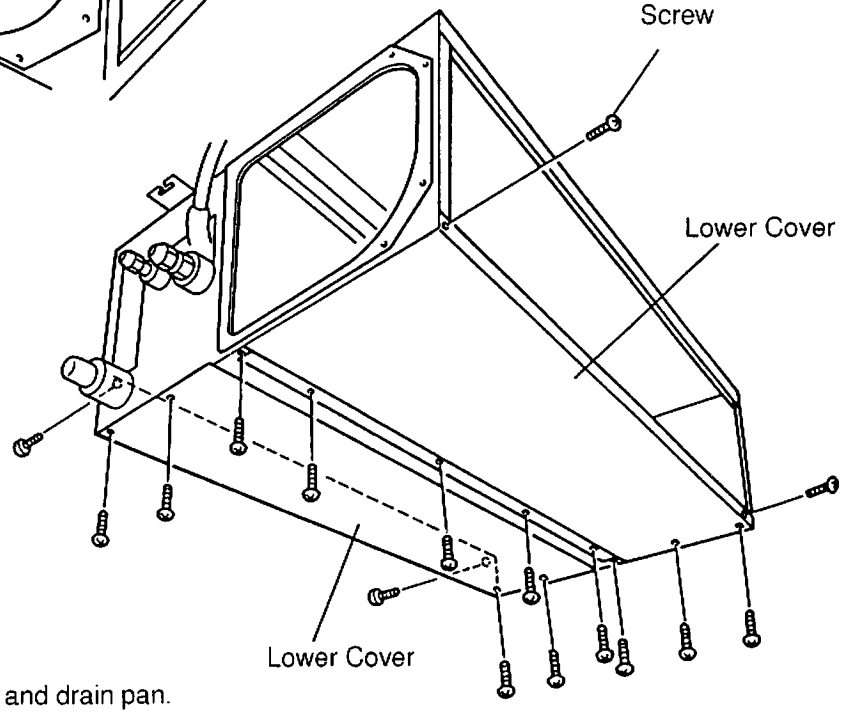
⚠ WARNING

TURN OFF all power source switches.

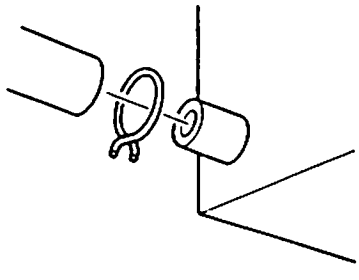
(1) Remove the screws (20 pcs.) fixing the lower covers and remove both of the lower covers.

Tool	Phillips Screwdriver





(2) Disconnect the drain piping and drain pan.

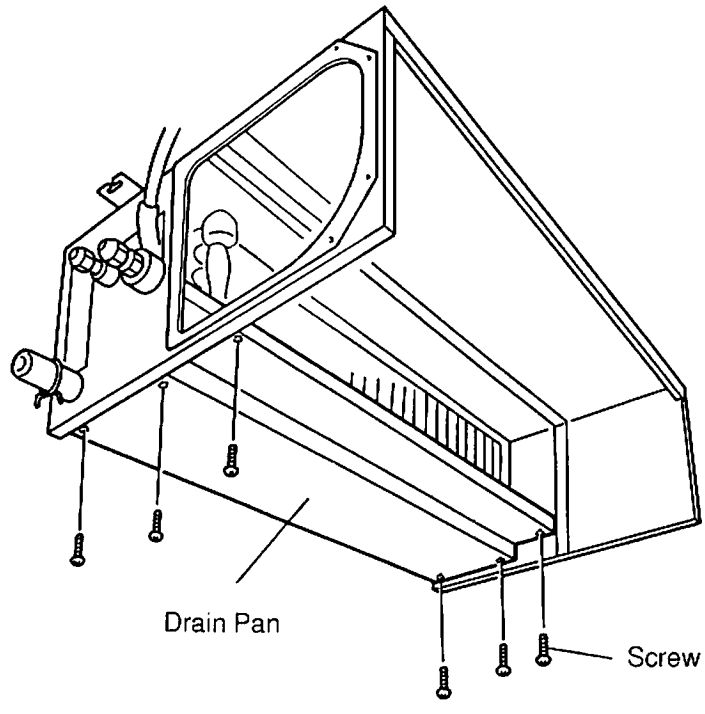


Loosen the Wire Clamp

NOTE:
Be careful not to damage the insulation of the drain piping. If the insulation of the drain piping is damaged, change the insulation with a new one.

(3) Remove the screws (6 pcs.) for fixing the drain pan and draw out the drain pan downward.

Tool	Phillips Screwdriver



NOTE:
Be careful not to damage the insulation at the inside of the unit.
If the insulation at the inside of the unit is damaged, change the insulation with a new one.

2.5 4-Way Cassette Type

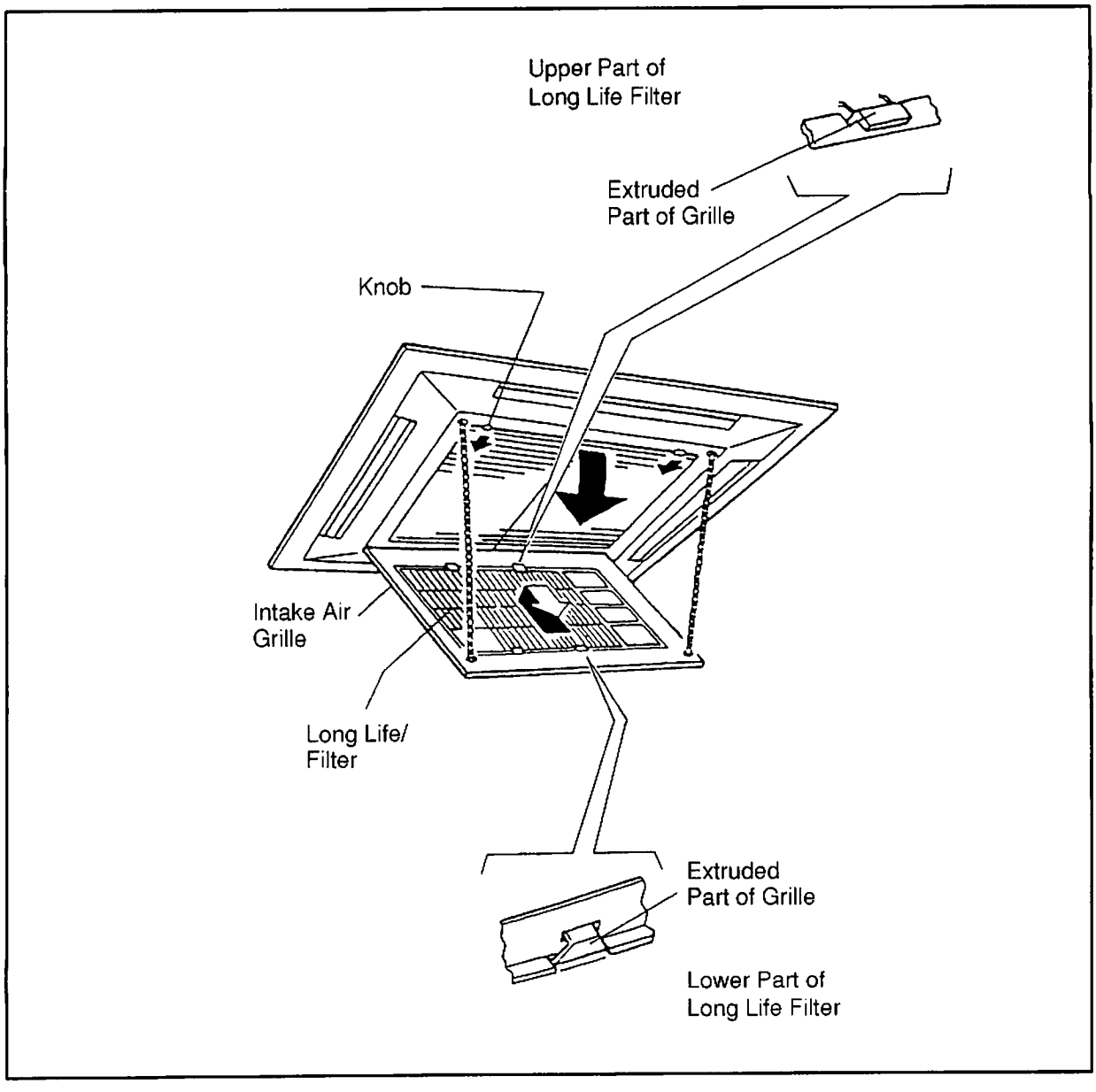
2.5.1 Removing Long Life Filter

⚠ WARNING

TURN OFF all power source switches.

(1) The long life filter is located inside of the intake air grille. Detach the filter after opening the intake air grille. By pushing the knob in the arrow mark direction, the intake air grille can be opened.

(2) The filter can be removed from the intake air grille by supporting the lower side of the intake air grille and filter, and unhooking it from the extrusion part.

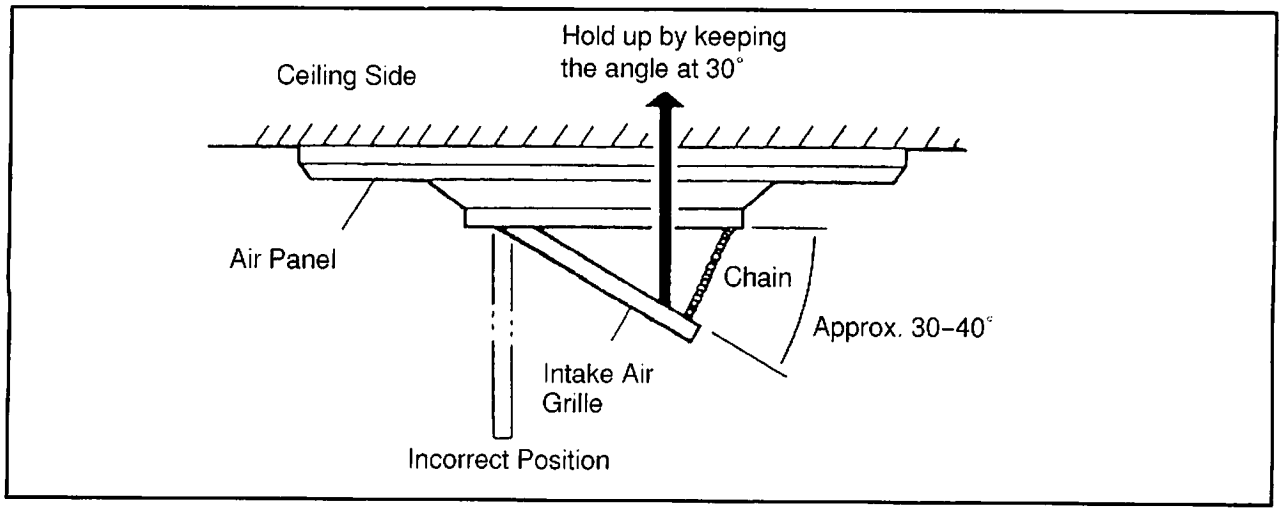


2.5.2 Removing Intake Air Grille

⚠ WARNING

TURN OFF all power source switches.

1. By lifting the intake air grille at an angle of approximately 30° and releasing its chain, the intake air grille can be removed by holding it upwards and then towards you. If the chain is released and the angle is 90° , the intake air grille can not be removed.



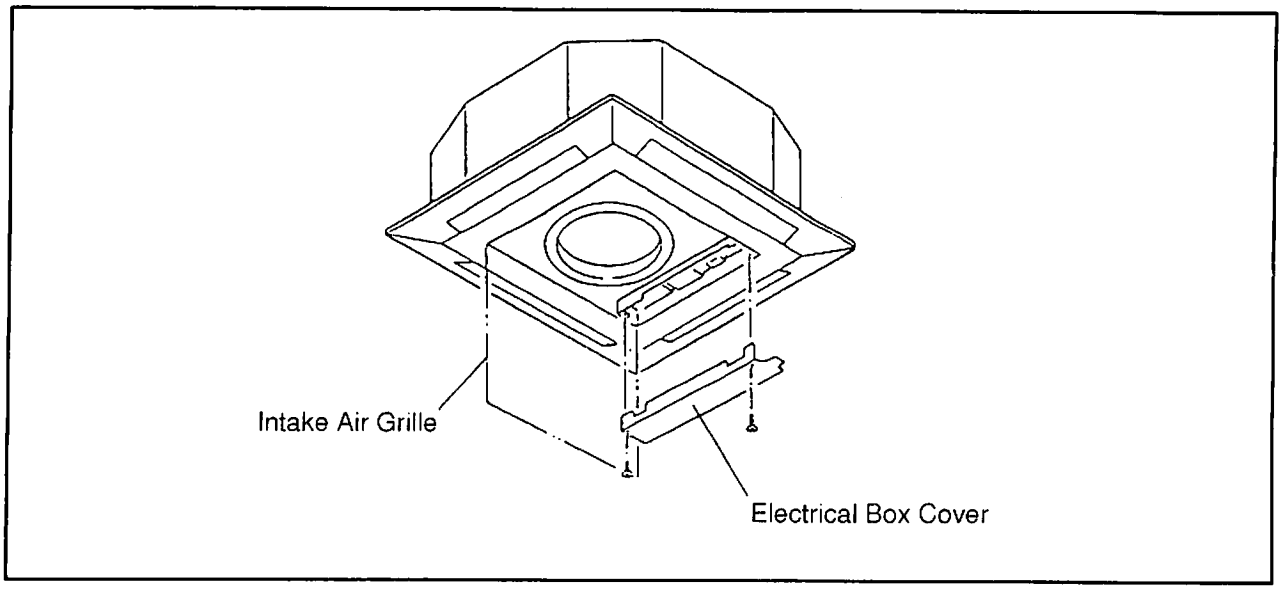
2.5.3 Removing Electrical Box Cover

⚠ WARNING

TURN OFF all power source switches.

1. By opening the intake air grille, the electrical box can be seen.
Remove two screws fixing the electrical box cover and remove the cover.

Tool	Phillips Screwdriver

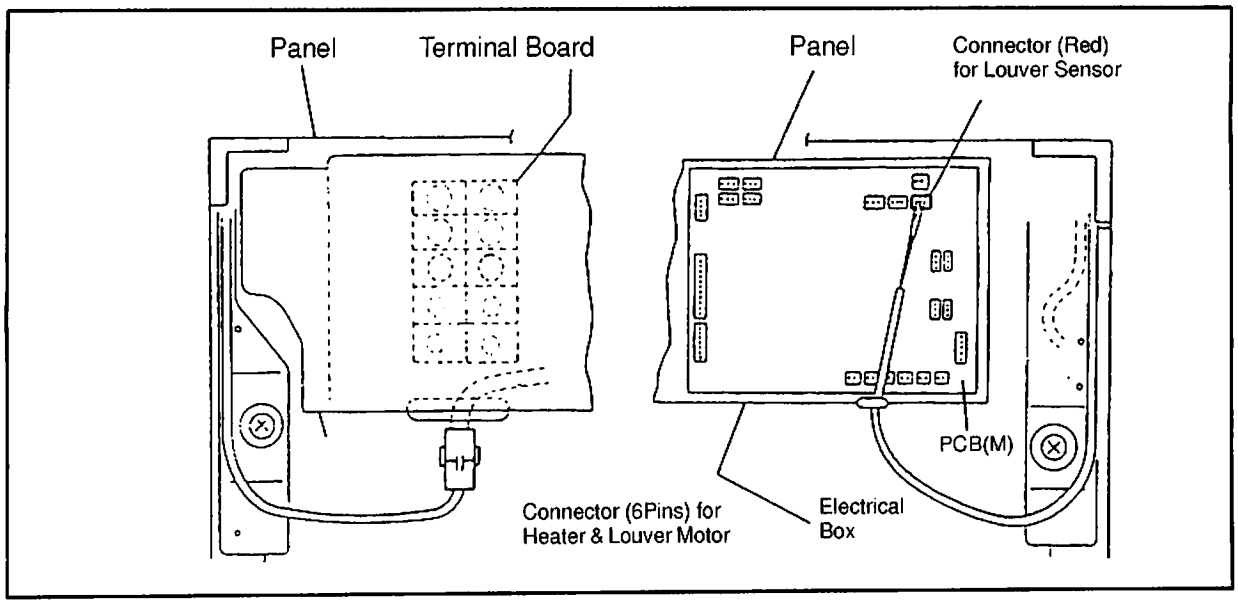


2.5.4 Removing Optional Air Panel

⚠ WARNING

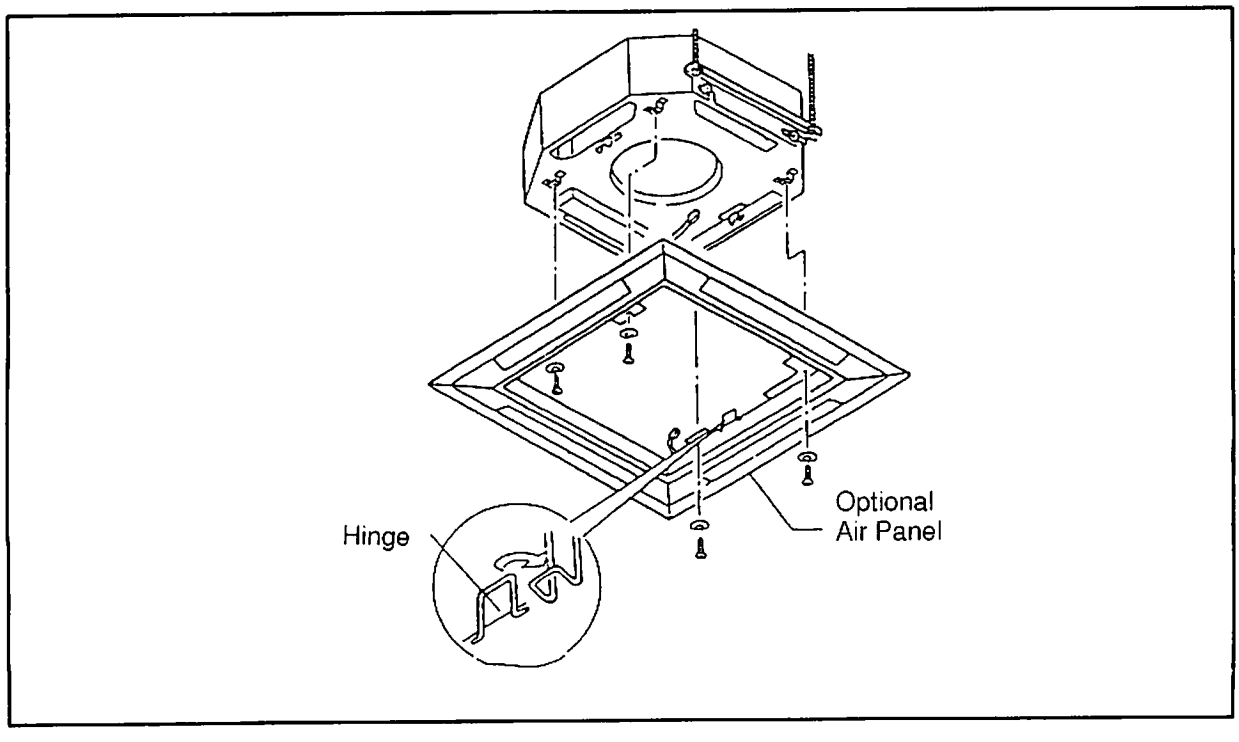
TURN OFF all power source switches.

(1) By opening the intake air grille, the electrical box can be seen.
Remove two screws fixing the electrical box cover and remove the cover.
① Disconnect the connector (6 Pins) for heater and louver motor.
② Disconnect the connector (Red) for louver sensor.



(2) Remove four screws fixing the optional air panel. (Remove the fixing screws by hooking on the hinge.) Remove the optional air panel after unhooking the hinge onto the hooks at the two positions near the drain pan.

Tool	Phillips Screwdriver



2.5.5 Removing Fan Runner and Fan Motor

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the intake air grille according to item 2.5.2, "Removing Intake Air Grille".

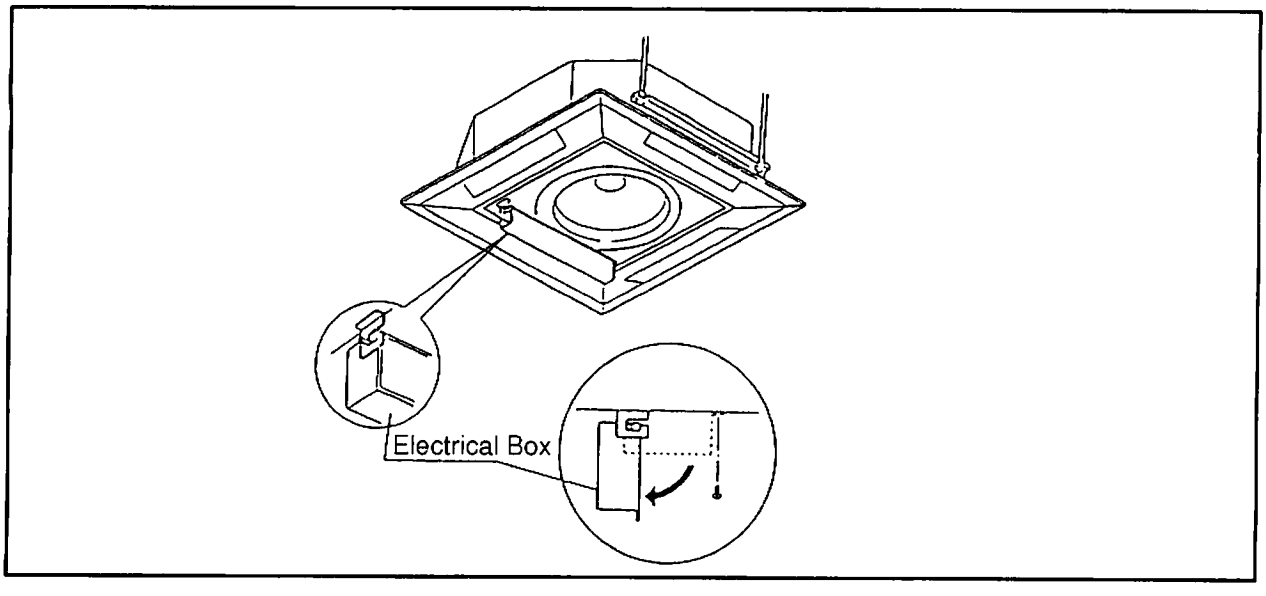
(2) Drawing Electrical Box

① Remove the discharge air thermistor from the PCB.

② Disconnect the connector of each wire.

③ Remove two fixing screws for the electrical box and pull the electrical box towards the front, then the electrical box will turn with an angle of approximately 90° .

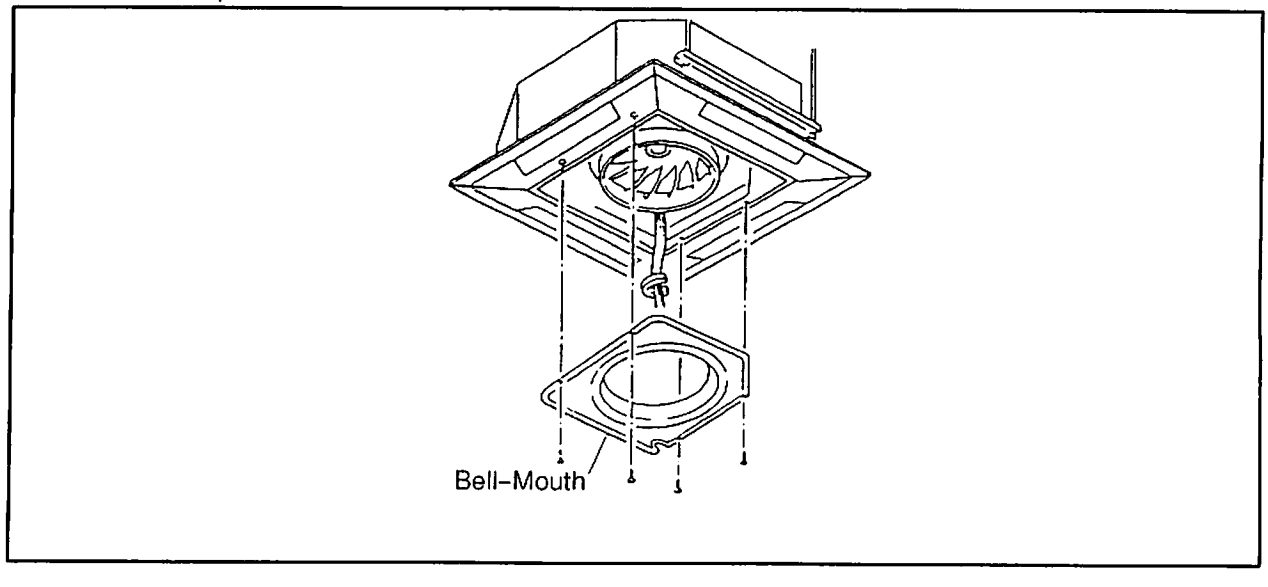
Tool	Phillips Screwdriver



(3) Removing Bell-Mouth

① Remove four screws which fix the bell mouth onto the drain pain and remove the bell-mouth.

Tool	Phillips Screwdriver



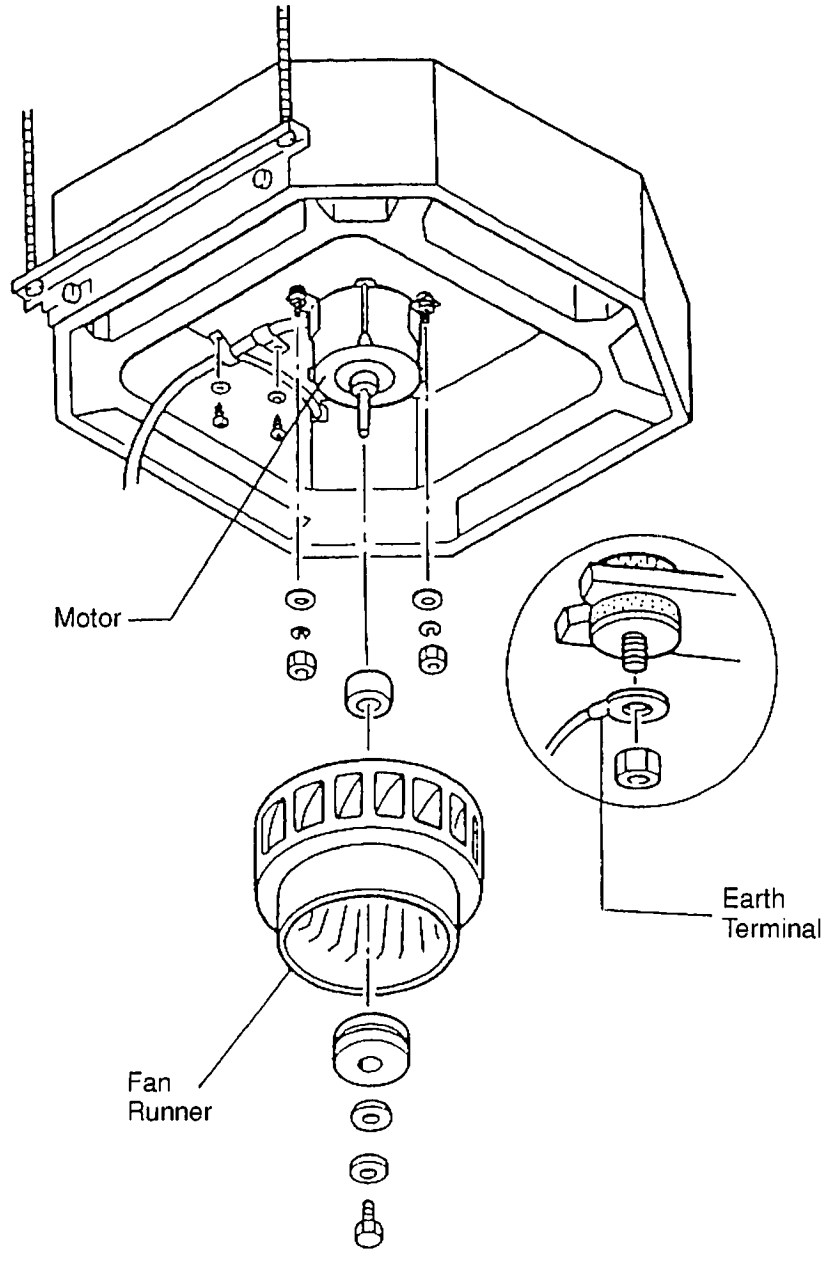
(4) Removing Fan Runner and Fan Motor

The fan runner can be removed after removing the fixing screws for the fan runner, vibration absorbing rubber, special washers and flat washers.

① Remove the wiring connector for the fan motor and the earth wire.

② Remove the motor after removing four fixing screws.

Tool	Phillips Screwdriver, Adjustable Wrench, Spanner



NOTE:

Fix the fan runner with a fixing torque of approximately 30kg-cm for each screw after mounting the vibration absorbing rubber onto the fan runner when assembling.

2.5.6 Removing Printed Circuit Board (PCB)

⚠ WARNING

TURN OFF all power source switches.

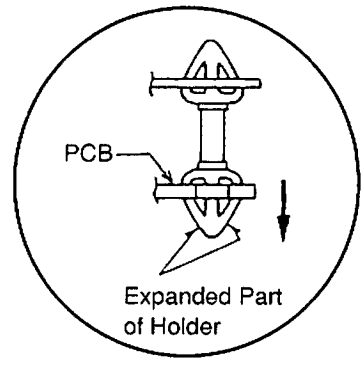
(1) Remove the intake air grille according to the item, 2.5.2 "Removing Intake Air Grille".

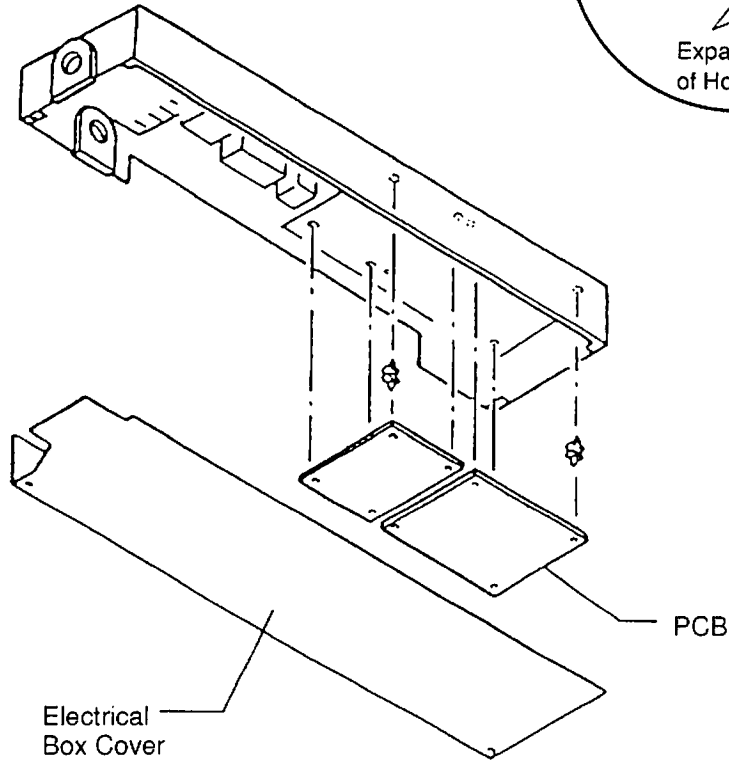
(2) Remove the electrical box cover according to the item, 2.5.3, "Removing Electrical Box Cover".

(3) There are two printed circuit boards (PCBs) in the electrical box. Disconnect the connectors. Each PCB is supported by four holders. Remove the PCBs by holding the expanded part of the holders using long-nose pliers.

Tool	Phillips Screwdriver, Long-nose Plier

NOTE:
Do not touch electrical components on the PCBs.
If big force is applied to the PCB, it will be faulty.





2.5.7 Removing Float Switch

⚠ WARNING

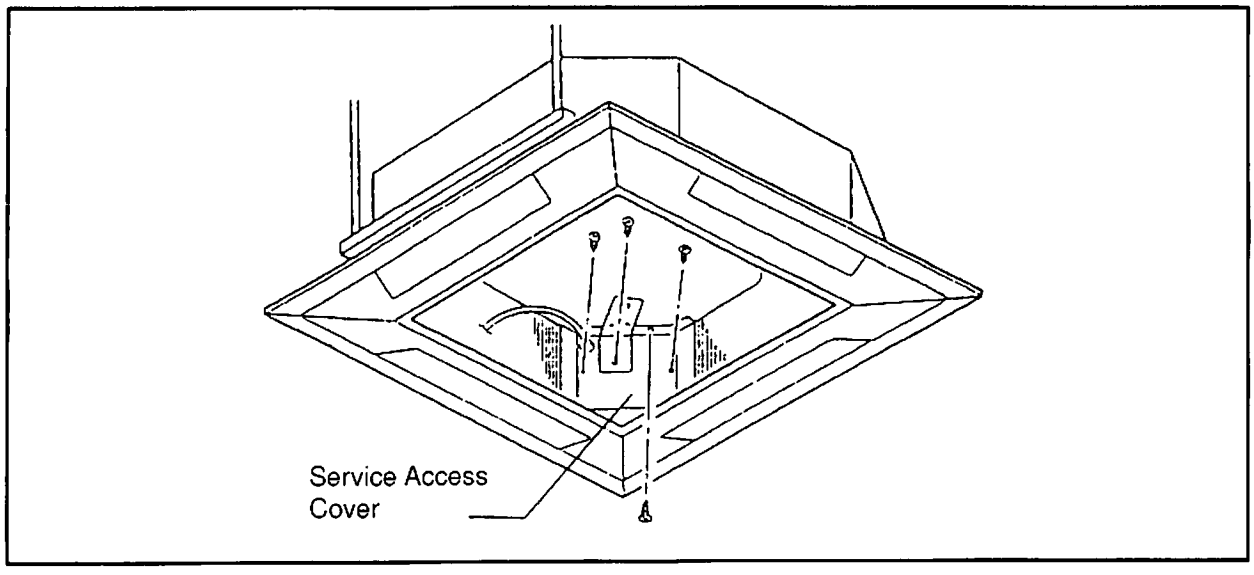
TURN OFF all power source switches.

(1) Remove the intake air grille according to the item, 2.5.2, "Removing Intake Air Grille".

(2) Remove the bell-mouth and fan runner according to the item, 2.5.5, "Removing Fan Runner and Fan Motor".

(3) Remove the service access cover after removing three fixing screws near the pipes inside of the indoor unit.

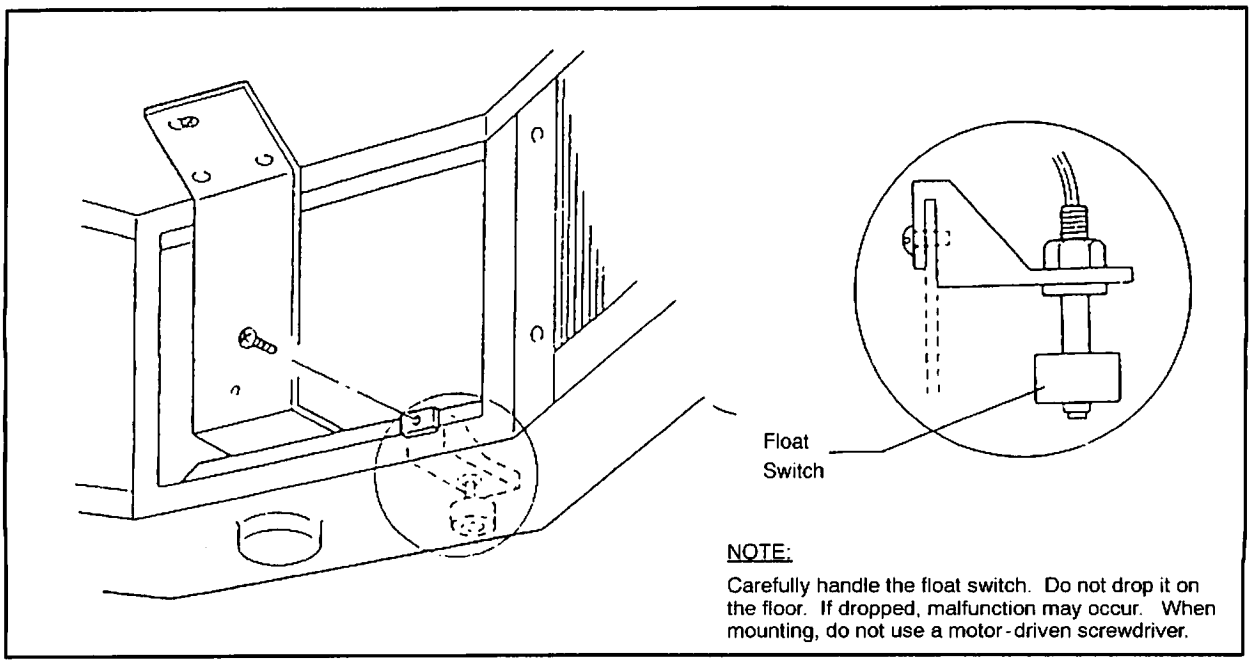
Tool	Phillips Screwdriver



(4) Removing Float Switch

Remove the float switch after removing one fixing screw from the fixing plate of the heat exchanger.

Tool	Phillips Screwdriver



NOTE:
Carefully handle the float switch. Do not drop it on the floor. If dropped, malfunction may occur. When mounting, do not use a motor-driven screwdriver.

2.5.8 Removing Drain-Up Mechanism

⚠ WARNING

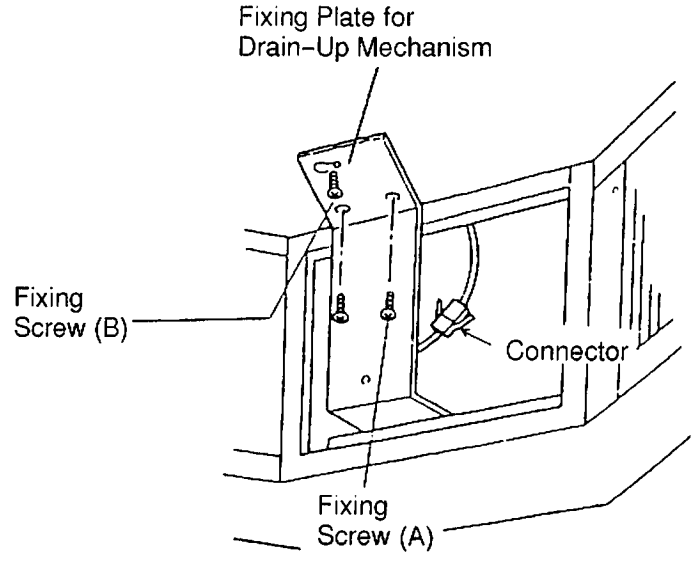
TURN OFF all power source switches.

(1) Remove the service access cover near the pipes according to the item 2.5.7, "Removing Float Switch".

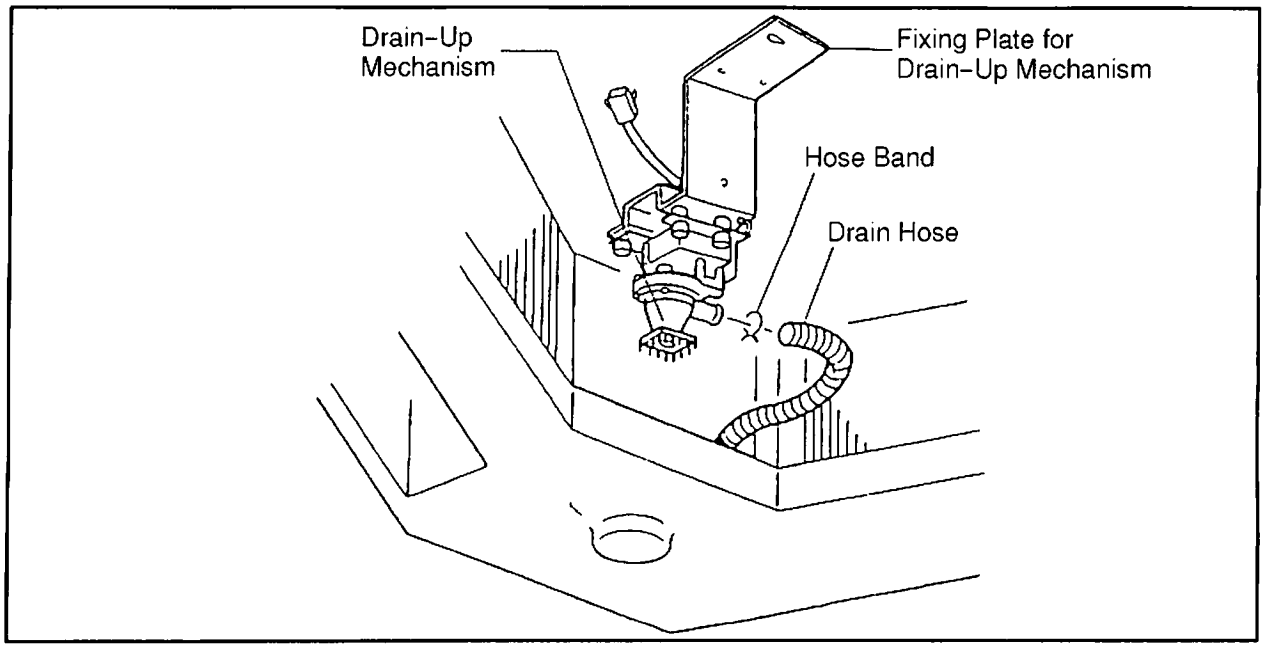
(2) Remove two screws(A) fixing the fixing plate for the drain-up pump after removing the wiring connector. Loosen the fixing screw(B) remove the fixing plate from the fixing screw(B) and pull out the drain-up mechanism.

Tool	Phillips Screwdriver

NOTE:
Do not remove the screw (B).
If removed, the drain-up mechanism will drop.



(3) Firstly support the drain-up mechanism by hand so as not to drop. Then remove the hose band from the drain hose and then disconnect the drain hose and then remove the drain-up mechanism.



2.5.9 Removing Drain Pan

⚠ WARNING

TURN OFF all power source switches.

(1) Disconnect the connectors between indoor unit and outdoor unit , and in the electrical box after opening the electrical box cover according to the item, 2.5.3, "Removing Electrical Box Cover".

(2) Remove the optional air panel according to the item, 2.5.4, "Removing Optional Air Panel".

(3) Remove the bell-mouth according to No.3 of item, 2.5.5, "Removing Fan Runner and Fan Motor".

(4) Remove drain water.

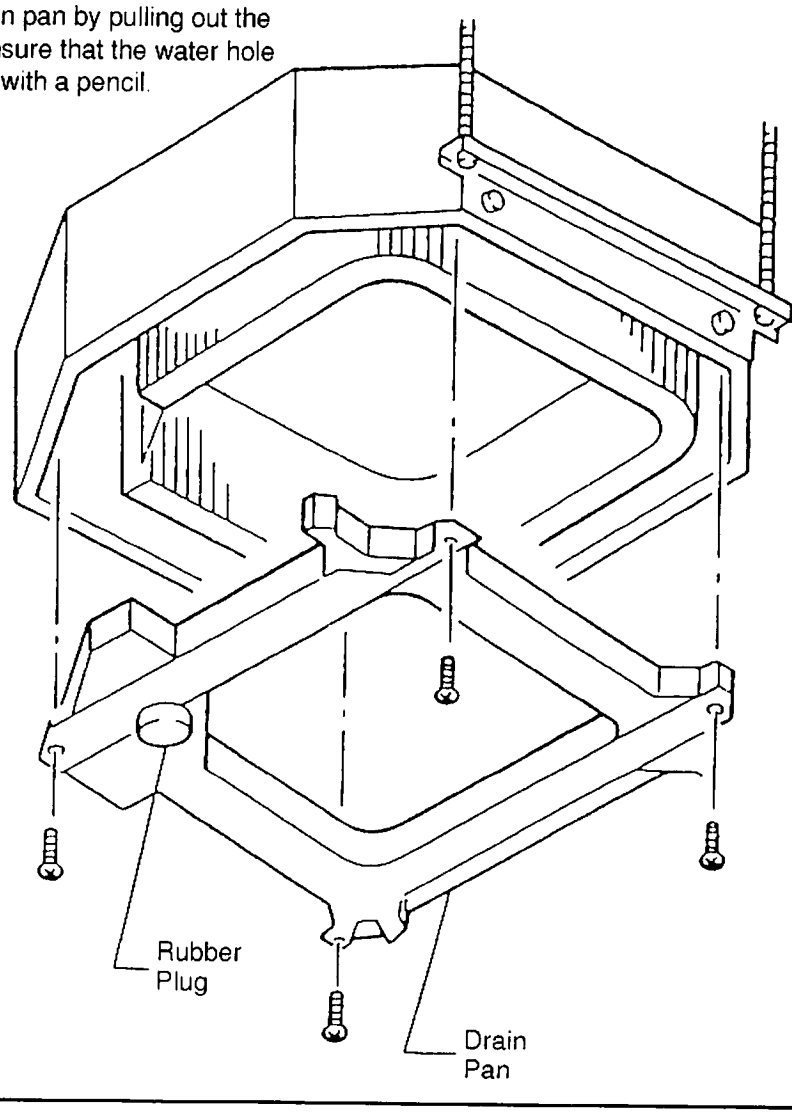
(5) Remove the drain pan after removing four screws fixing the drain pan onto the indoor unit.

Tool	Bucket (Approx. 5 liters)

Tool	Phillips Screwdriver

NOTE:

Remove water on the drain pan by pulling out the rubber plug. Check to ensure that the water hole is not clogged by pricking with a pencil.



2.5.10 Removing Thermistors for Liquid Pipe and Gas Pipe

⚠ WARNING

TURN OFF all power source switches.

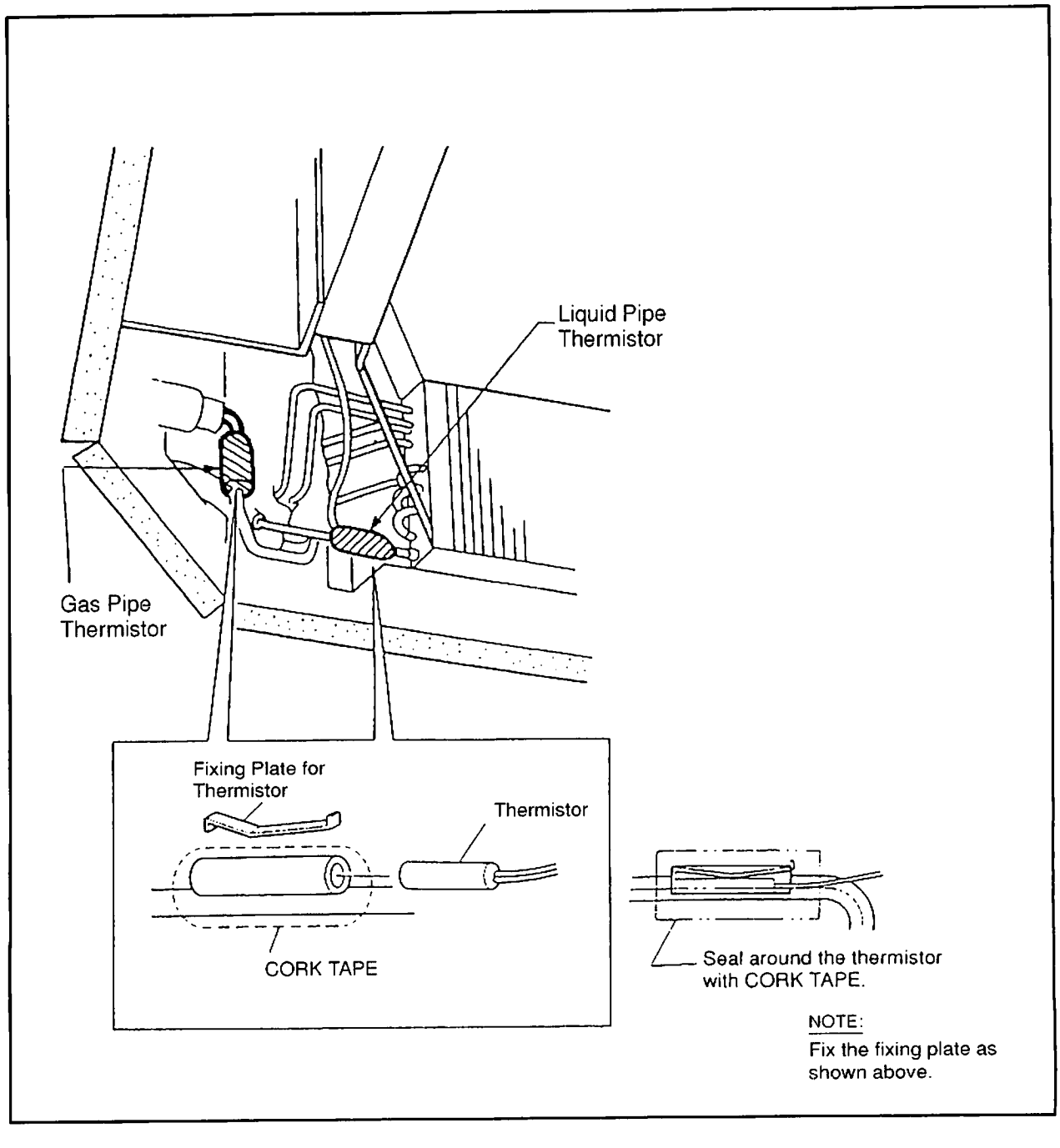
(1) Remove the optional air panel according to the item, 2.5.4, "Removing Optional Air Panel".

(2) Remove the bell-mouth according to No.3 of item, 2.5.5, "Removing Fan Runner and Fan Motor".

(3) Remove the drain pan according to the item, 2.5.9, "Removing Drain Pan".

(4) Remove the CORK TAPE from the liquid pipe or gas pipe, where the thermistor fixed by a fixing plate is located, and then pull out the thermistor.

Tool	Phillips Screwdriver



2.5.11 Removing Automatic Louver Motor

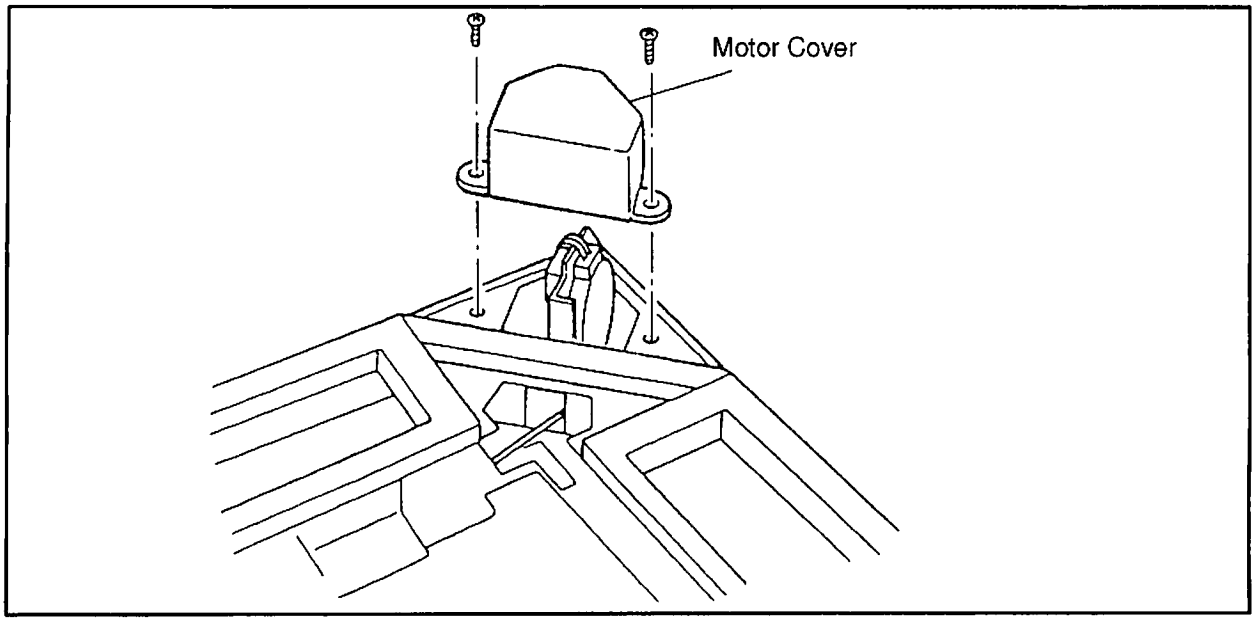
⚠ WARNING

TURN OFF all power source switches.

(1) Remove the optional air panel according to the item, 2.5.4, "Removing Optional Air Panel".

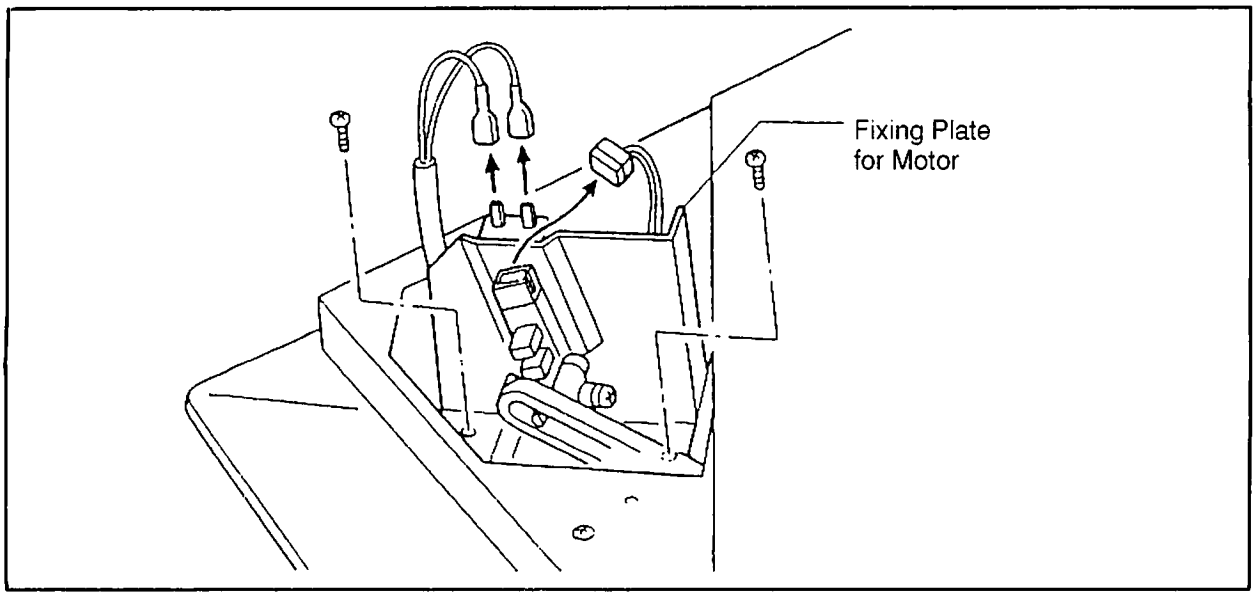
(2) Remove the motor cover after removing two screws fixing the cover for the automatic louver motor.

Tool	Phillips Screwdriver



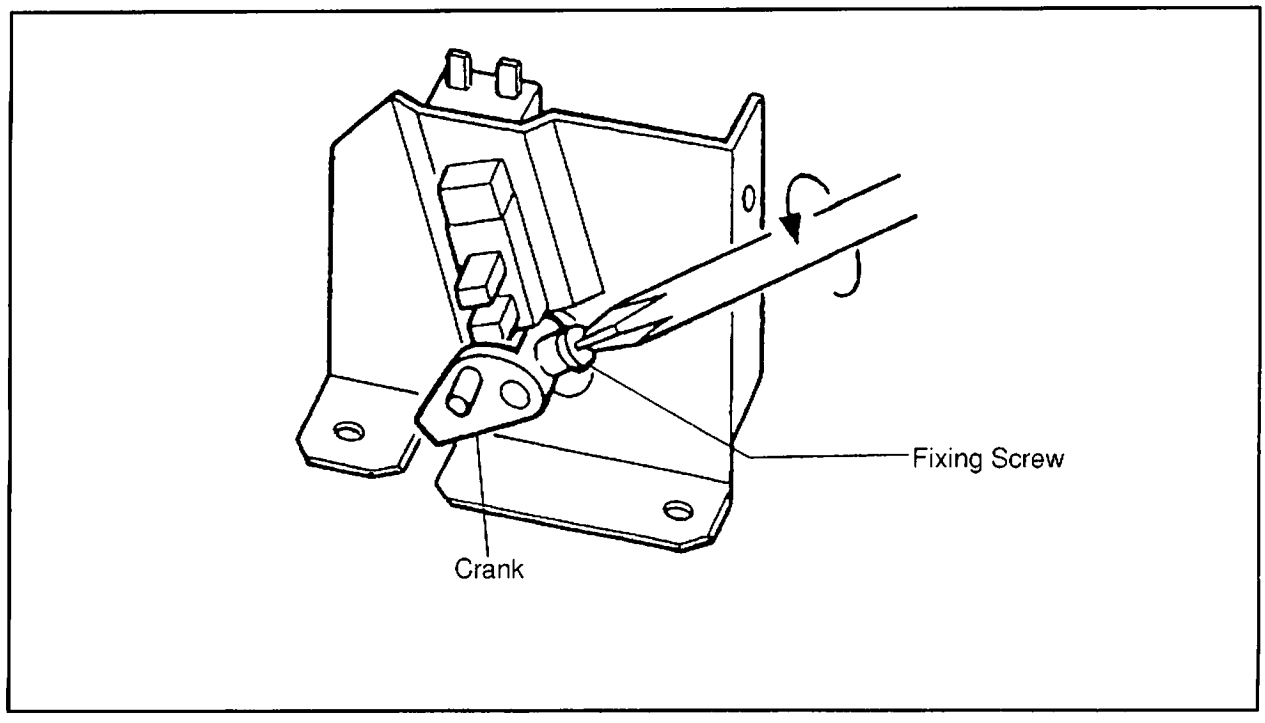
(3) Disconnect all the connectors connected to the motor. Remove the motor after removing two screws fixing the motor onto the air panel.

Tool	Phillips Screwdriver



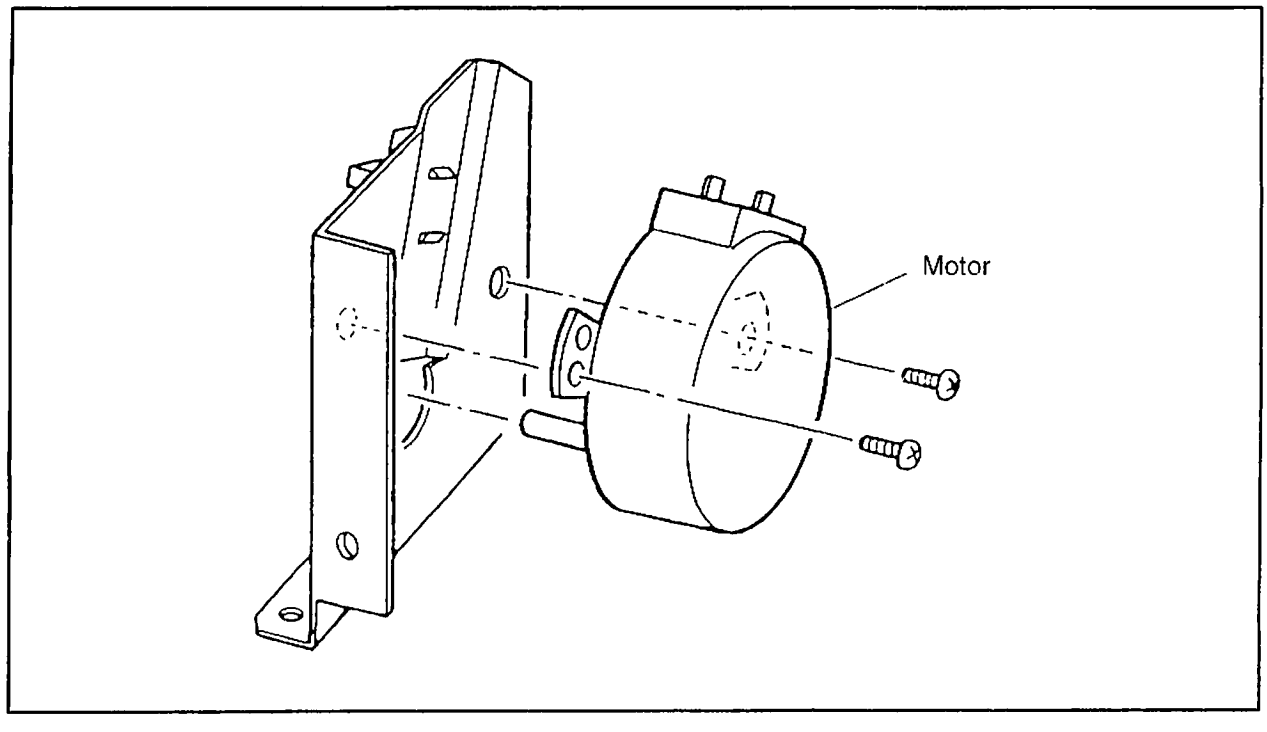
(4) Remove the crank after loosening the fixing screw on the motor shaft.

Tool	Phillips Screwdriver



(5) Remove the motor after removing two fixing screws.

Tool	Phillips Screwdriver



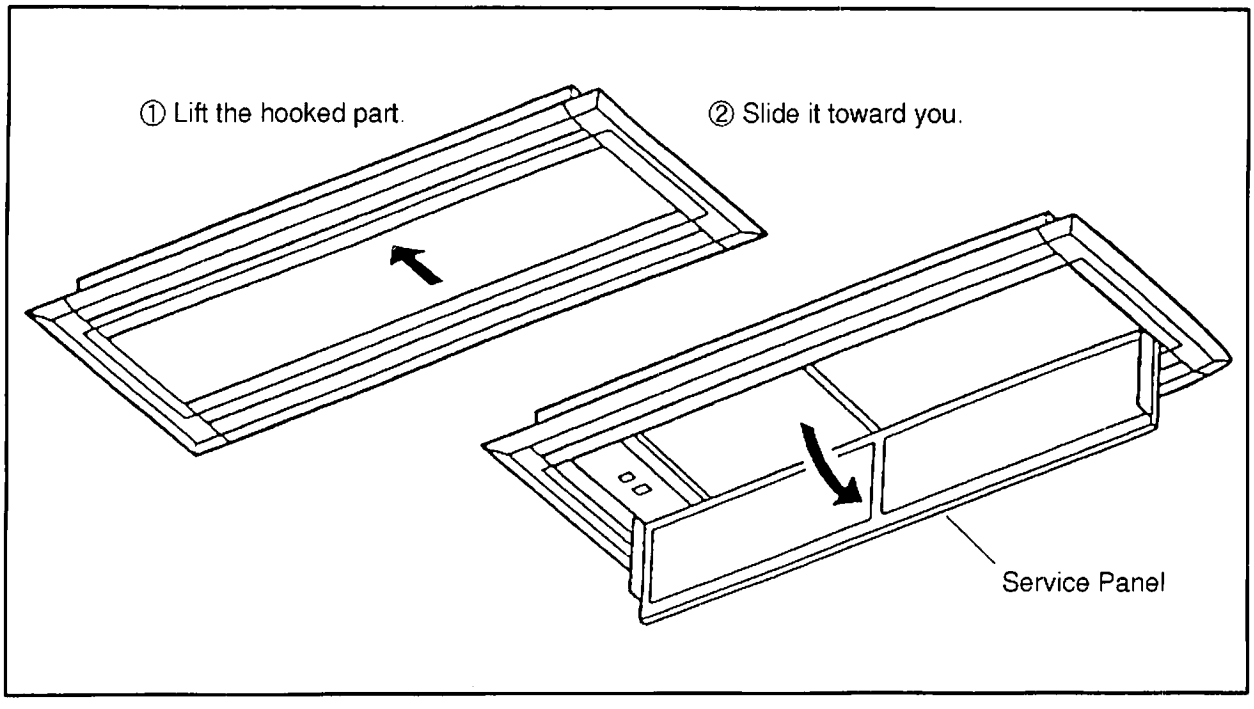
2.6 2-Way Cassette Type

2.6.1 Removing Long Life Filter

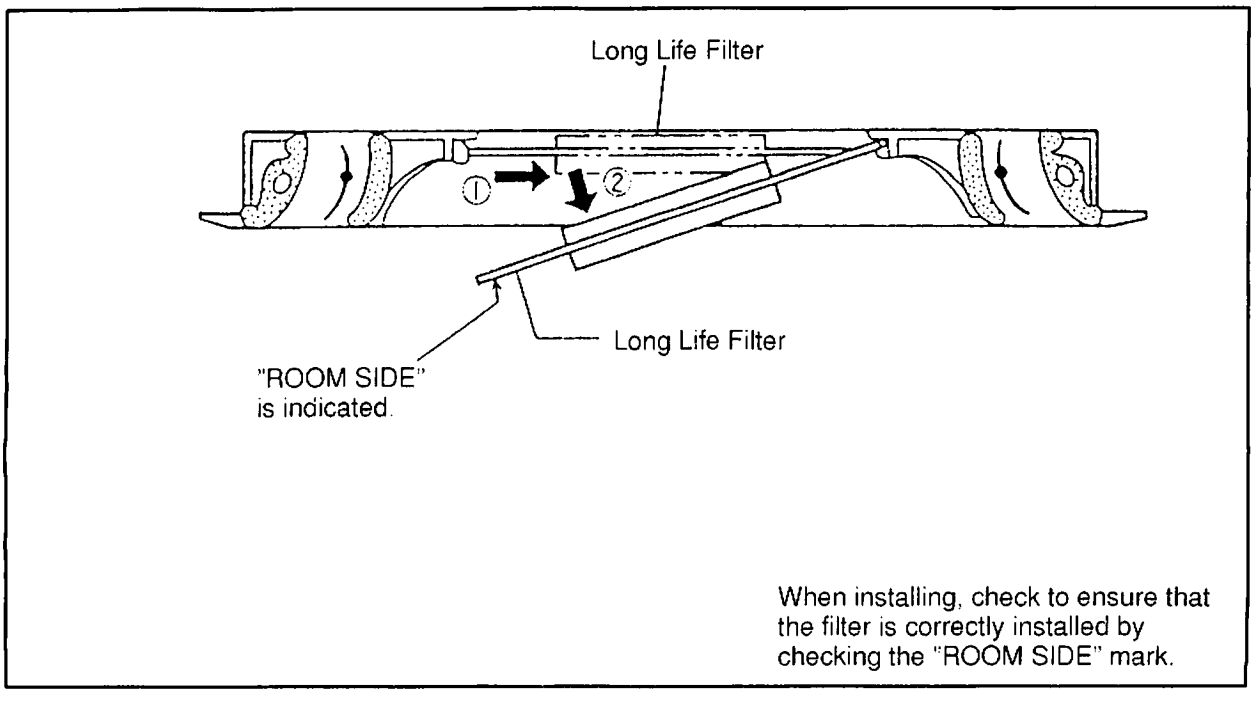
⚠ WARNING

TURN OFF all power source switches.

(1) Open the service panel by supporting the hooked part upwards, and slide it towards the front side ②.



(2) By sliding the air filter towards the fixed part and pulling downwards, remove the air filter ②.



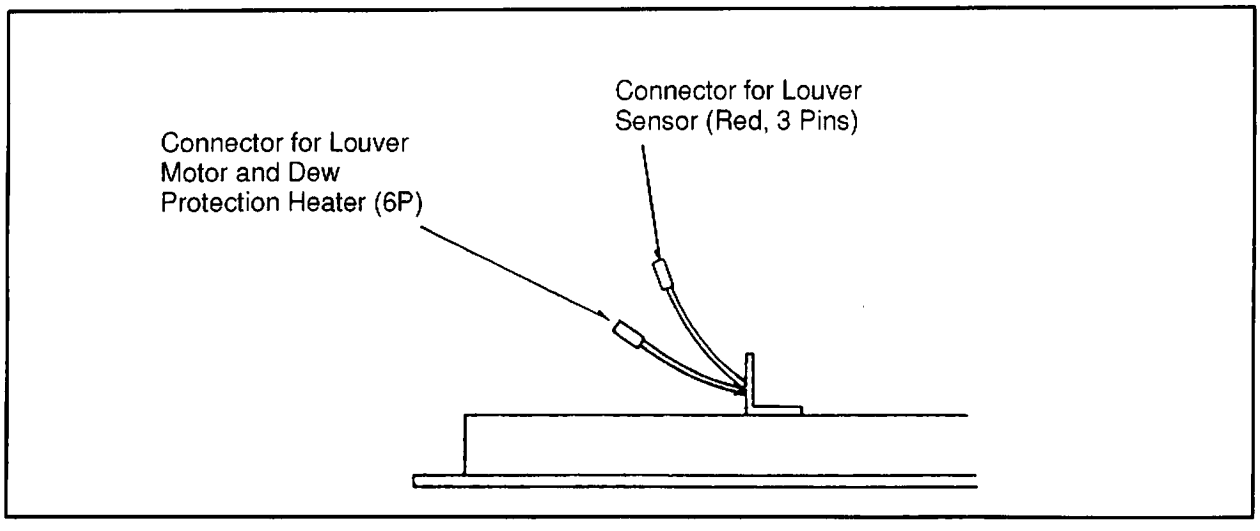
(2.6 2-Way Cassette Type)

2.6.2 Removing Optional Air Panel

⚠ WARNING

TURN OFF all power source switches.

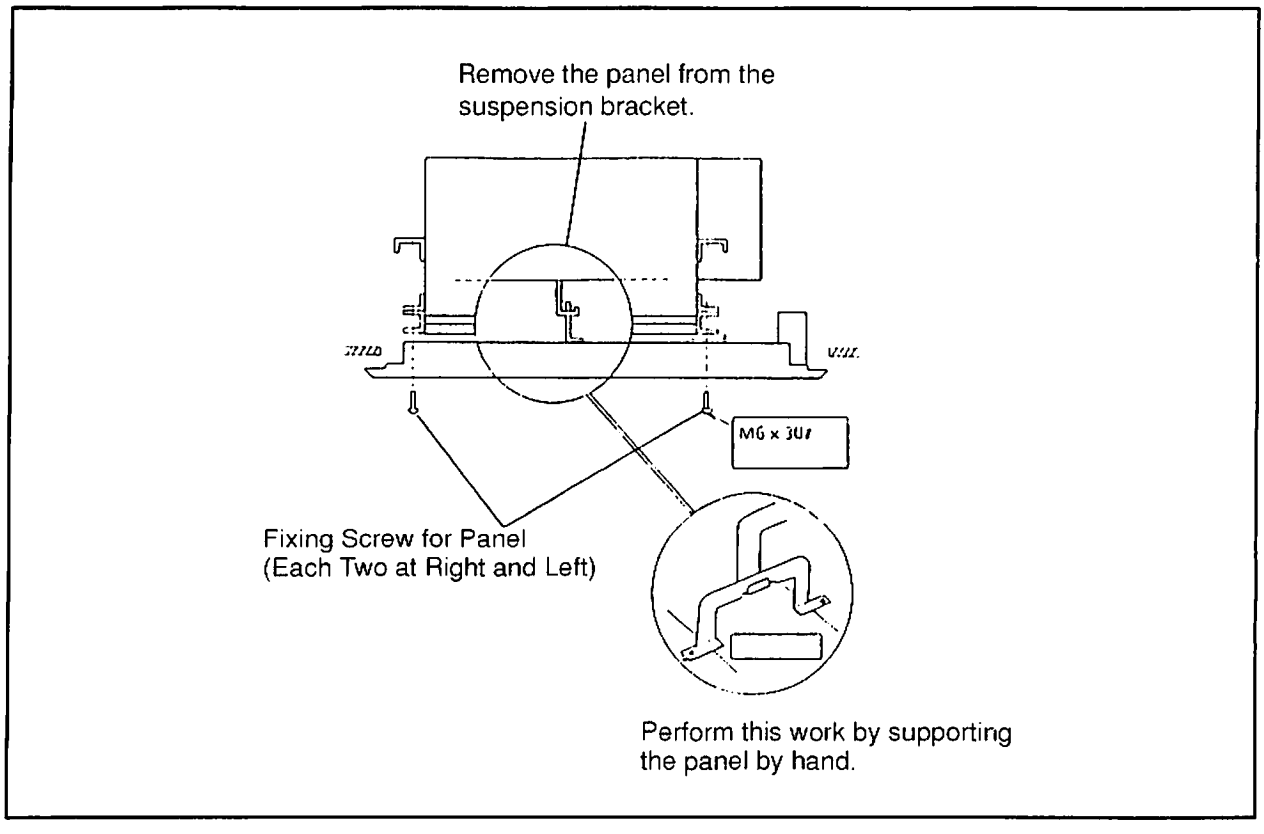
(1) Disconnect the wiring connectors after opening the service panel and service access cover.



(2) Remove four screws fixing the panel onto the indoor unit.

(3) Remove the panel by unhooking the hook of the suspension bracket.

Tool	Phillips Screwdriver



2.6.3 Removing Fan Motor

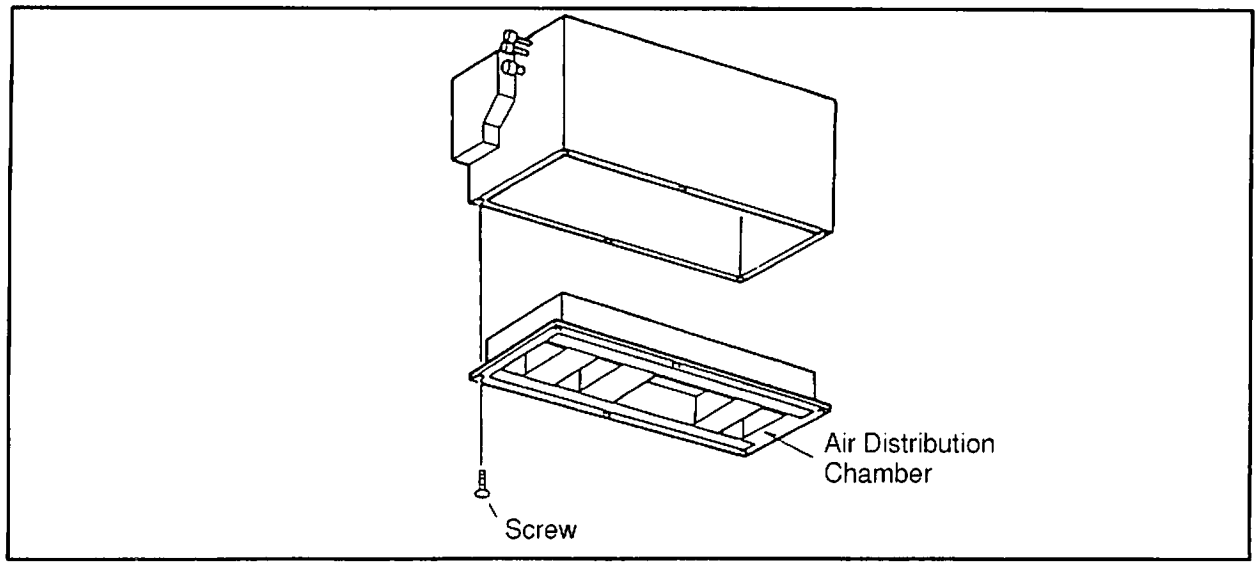
⚠ WARNING

TURN OFF all power source switches.

(1) Remove the optional air panel according to the item, 2.6.2, "Removing Optional Air Panel".

(2) Remove the air distribution chamber after removing six fixing screws.

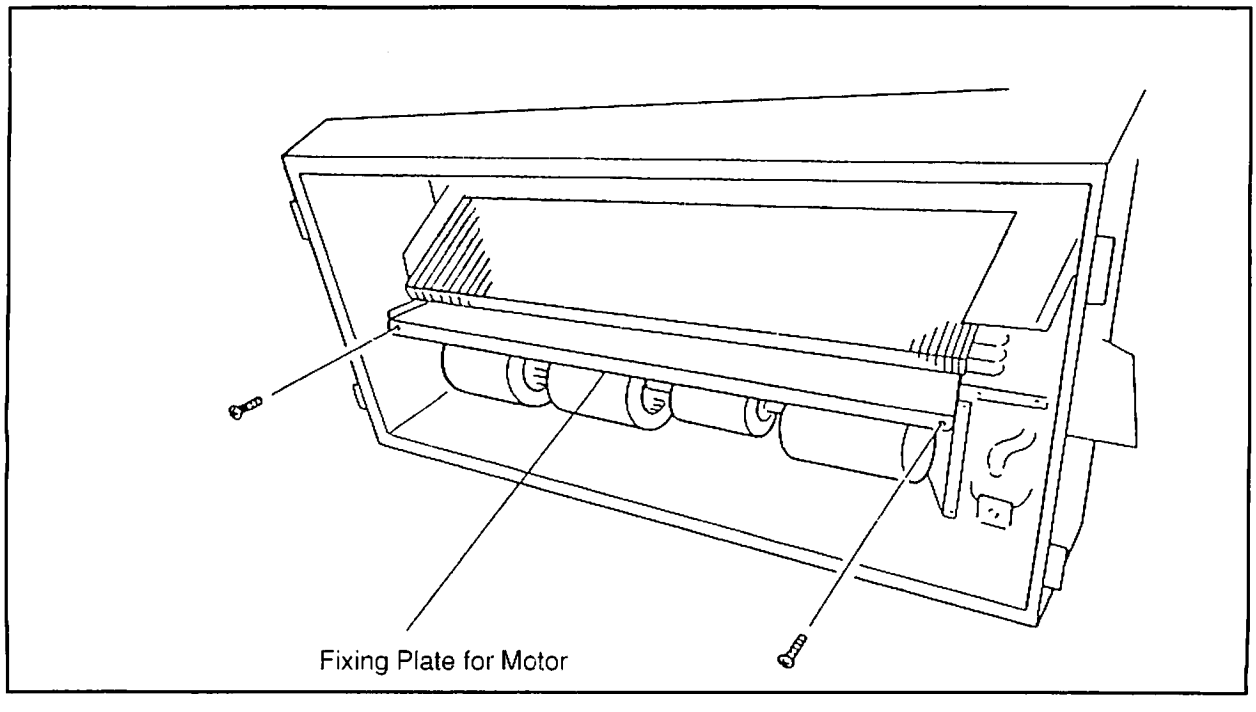
Tool	Phillips Screwdriver



(3) Disconnect the connector for the fan motor.

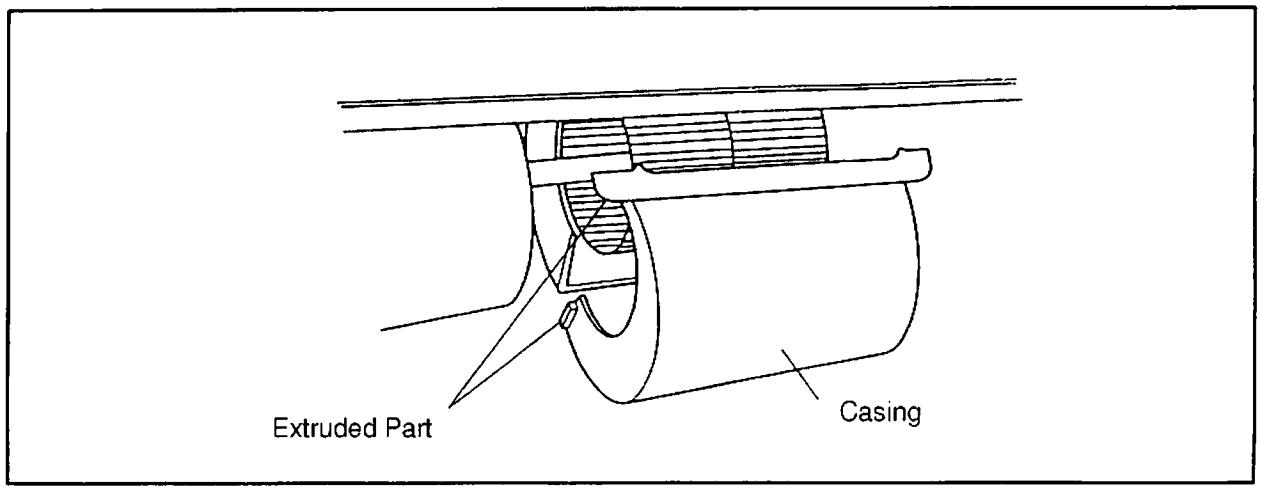
(4) Remove the fan motor mounted on the fixing plate, after removing two fixing screws.

Tool	Phillips Screwdriver



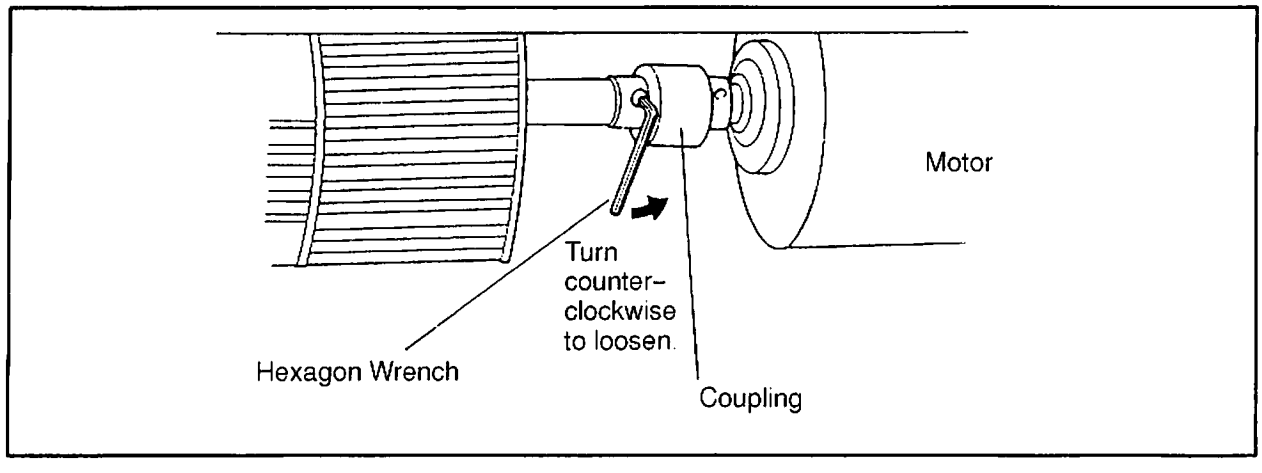
(2.6 2-Way Cassette Type)

(5) Remove the casing by pushing four extruded parts at the lower part of the casing, which consists of two parts.



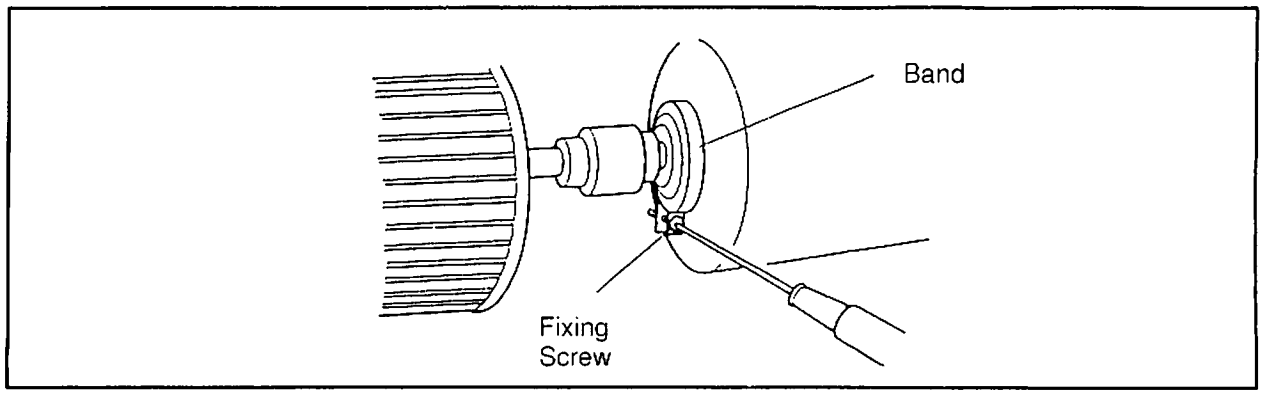
(6) Loosen the screw by a hexagon wrench. This work is not required for model RCD-1FS.

Tool	Hexagon Wrench



(7) Remove the motor, after removing the fixing band for the motor. Perform this work by supporting the motor by hand.

Tool	Phillips Screwdriver



2.6.4 Removing Bearing (not required for Model RCD-1FS)

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the optional air panel according to the item, 2.6.2, "Removing Optional Air Panel".

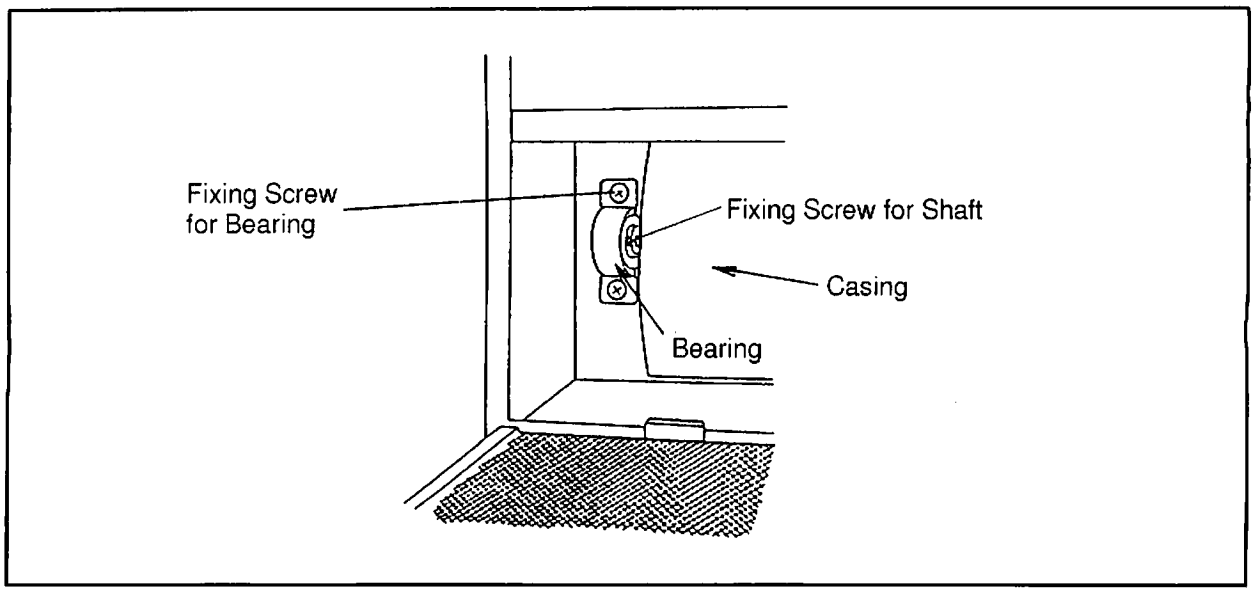
(2) Remove the air distribution chamber according to No. 2 of the item, 2.6.3, "Removing Fan Motor".

(3) Loosen two fixing screws (M8 screw) fixing the bearings and shaft by a hexagon wrench.

(4) Remove the bearings.

Tool	Hexagon Wrench

Tool	Phillips Screwdriver



2.6.5 Removing Coupling (not required for Model RCD-1FS)

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the optional air panel according to the item, 2.6.2, "Removing Optional Air Panel".

(2) Remove the air distribution chamber according to No. 2 of the item, 2.6.3, "Removing Fan Motor".

(3) Remove the bearing according to the item, 2.6.4, "Removing Bearing".

(4) Remove the coupling after removing the shaft and fan runner assembly.

2.6.6 Removing Printed Circuit Board (PCB)

⚠ WARNING

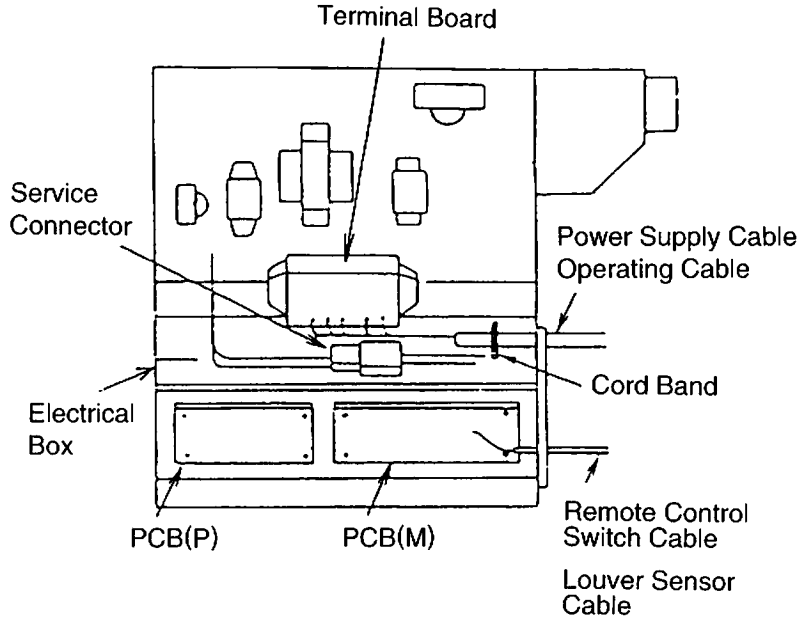
TURN OFF all power source switches.

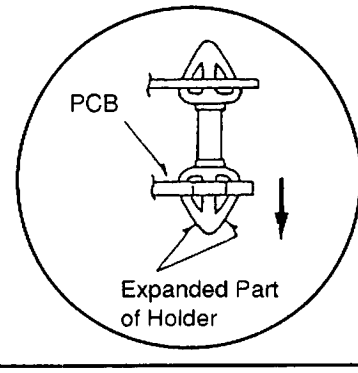
(1) Remove the service access cover after opening the service panel according to the item, 2.6.1, "Removing Long Life Filter".

(2) Remove the cover after removing one fixing screws on the electrical box in the unit.

(3) Disconnect the connector. Pull out the PCB by pinching the expanded part of the PCB holders by long-nose plier.

Tool	Phillips Screwdriver, Long-nose Plier





NOTE:
Do not touch electrical components on the PCB.
Do not apply big force to the PCB. If applied, it will be faulty.

2.6.7 Removing Drain Pan

⚠ WARNING

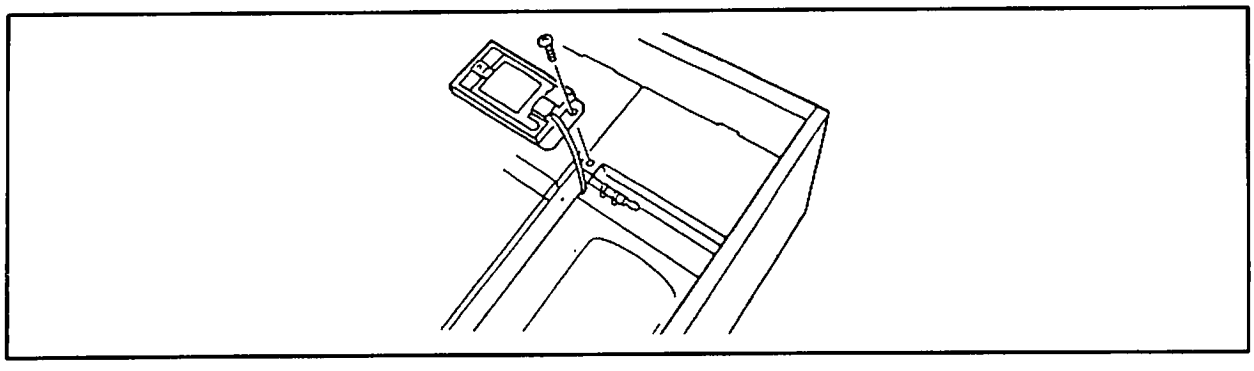
TURN OFF all power source switches.

(1) Remove the optional air panel according to the item, 2.6.2, "Removing Optional Air Panel".

(2) Remove the air distribution chamber according to No. 2 of the item, 2.6.3, "Removing Fan Motor".

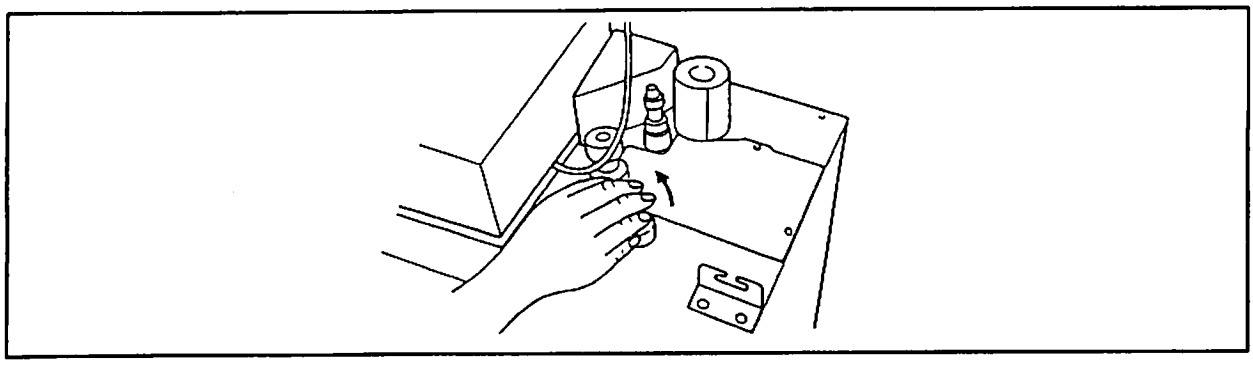
(3) Remove the radiation sensor after removing one fixing screw.

Tool	Phillips Screwdriver



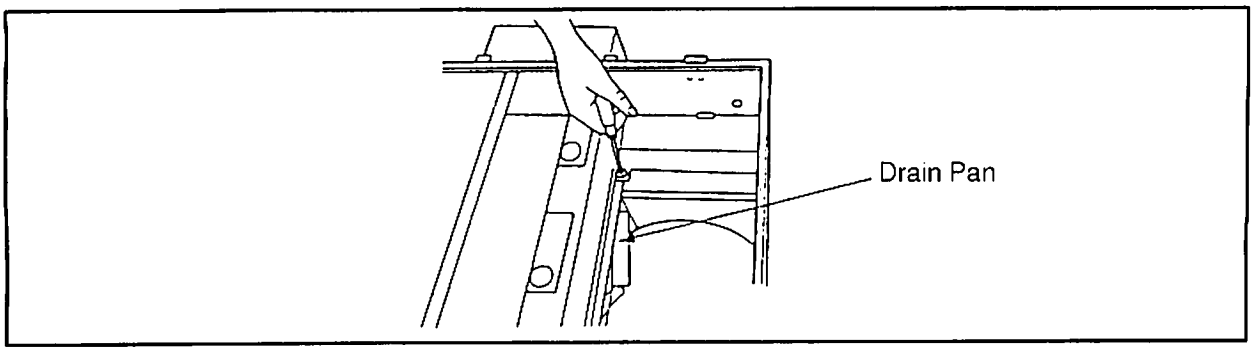
(4) Wipe off water on the drain pan after pulling out the rubber plug. Prick the drain hole with a pencil, etc., to check whether or not water can flow.

Tool	Bucket (Approx. 5 liters)



(5) Draw out the drain pan in a downward motion after removing the screws fixing both sides of the drain pan.

Tool	Phillips Screwdriver



2.6.8 Removing Drain-Up Mechanism

⚠ WARNING

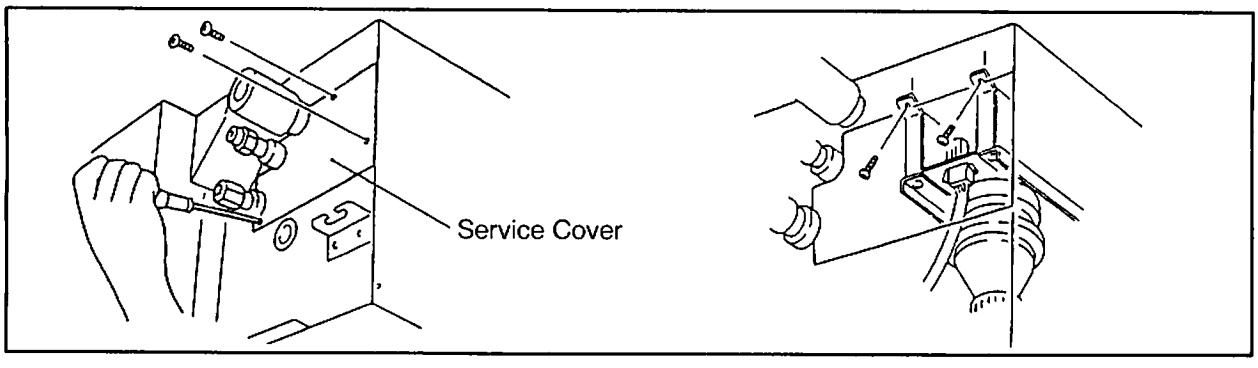
TURN OFF all power source switches.

(1) Remove the optional air panel according to the item, 2.6.2, "Removing Optional Air Panel".

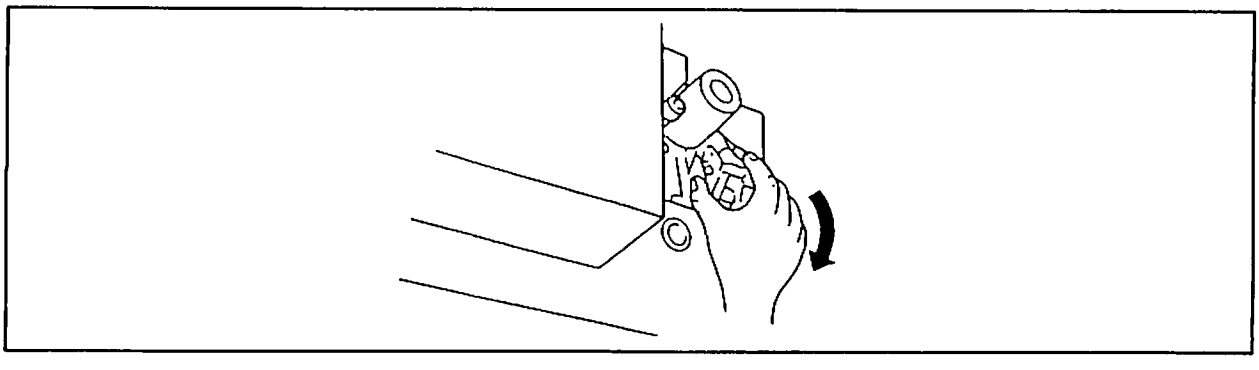
(2) Remove the service cover after removing three screws fixing the service cover on the unit.

(3) Remove two screws fixing the drain-up motor.

Tool	Phillips Screwdriver

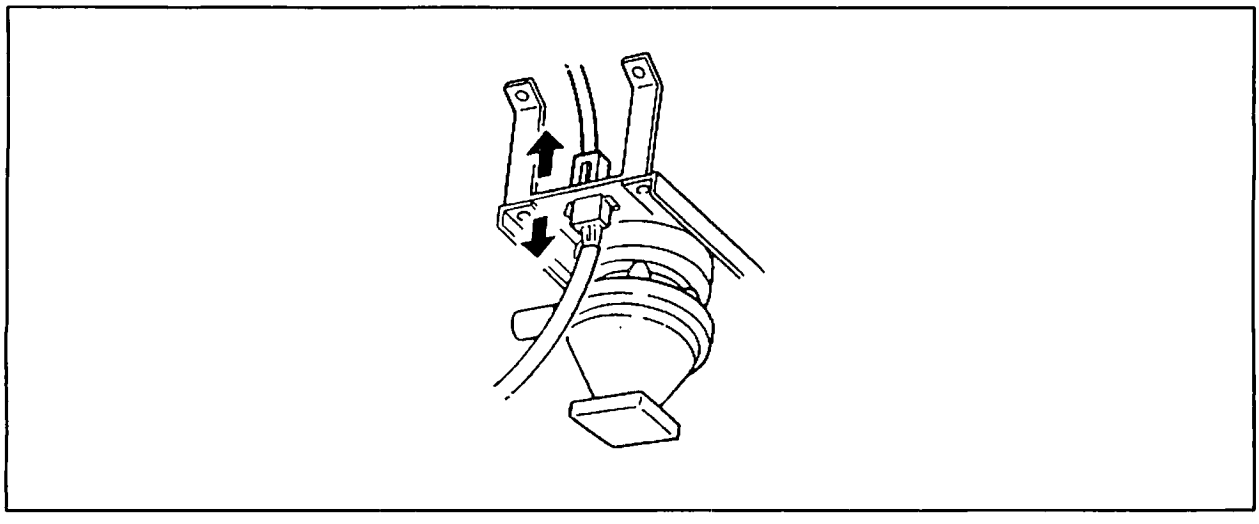


(4) Pull the drain-up motor towards you from the service access hole by rotating it.

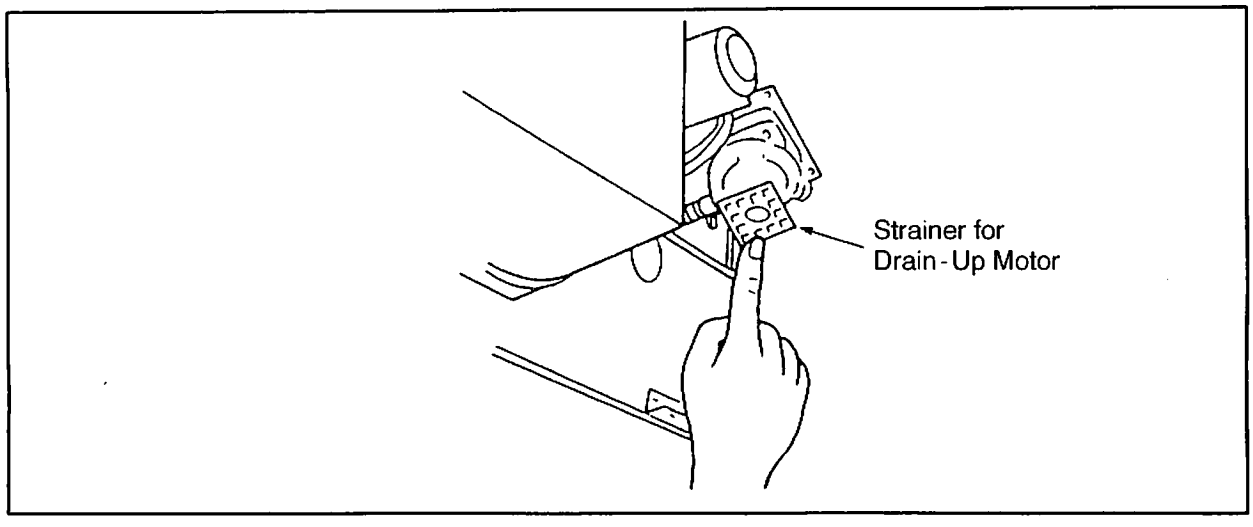


(5) Remove the drain hose from the drain-up motor after removing the hose band.

(6) Disconnect the connector for drain-up motor wiring.



(7) When assembling the drain-up motor, check to ensure that a strainer is mounted at the inlet of the drain-up motor.



2.6.9 Removing Float Switch

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the optional air panel according to the item, 2.6.2, "Removing Optional Air Panel".

(2) Remove the air distribution chamber according to No. 2 of the item, 2.6.3, "Removing Fan Motor".

(3) Remove the drain pan according to the item, 2.6.7, "Removing Drain Pan".

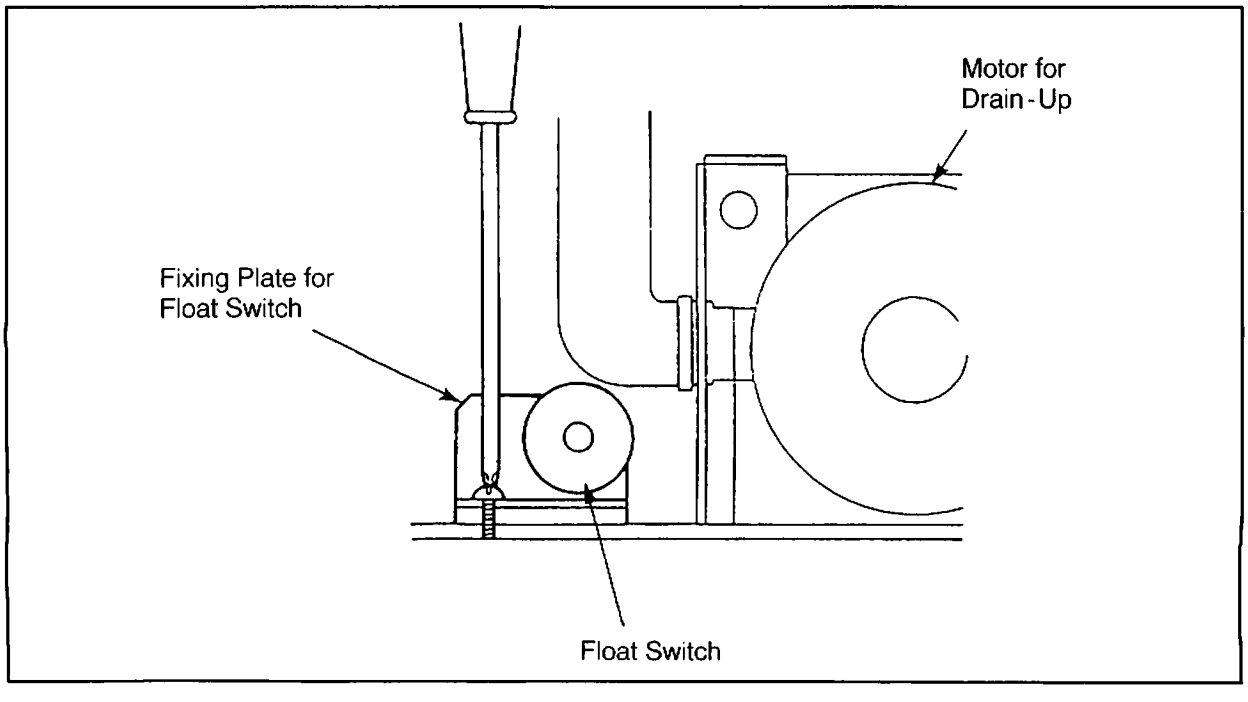
(4) Remove the electrical box cover after removing one fixing screw.

(5) Disconnect the connector for the wiring of the float switch.

(6) Remove the service cover of the unit according to No.2 of the item 2.6.8, "Removing Drain-up Mechanism".

(7) Remove the float switch after removing one screw fixing the fixing plate to the float switch.

Tool	Phillips Screwdriver



2.6.10 Removing Thermistors for Liquid and Gas Pipes

⚠ WARNING

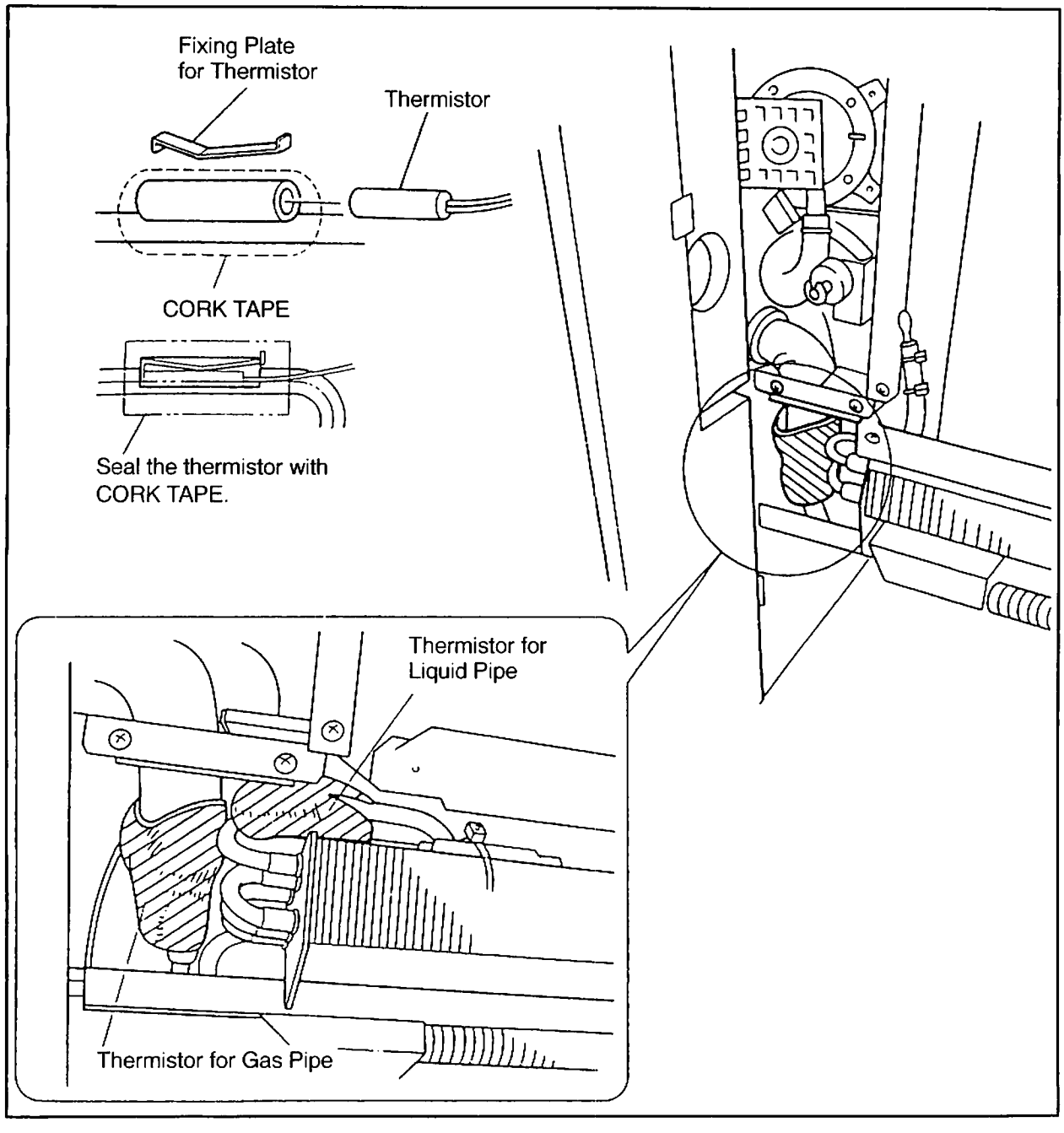
TURN OFF all power source switches.

(1) Remove the optional air panel according to the item, 2.6.2, "Removing Optional Air Panel".

(2) Remove the air distribution chamber according to No. 2 of the item, 2.6.3, "Removing Fan Motor".

(3) Remove the drain pan according to the item, 2.6.7, "Removing Drain Pan".

(4) Remove the CORK TAPE fixing the thermistor after removing the fixing plate for the the thermistor.



2.6.11 Removing Motor for Automatic Louver

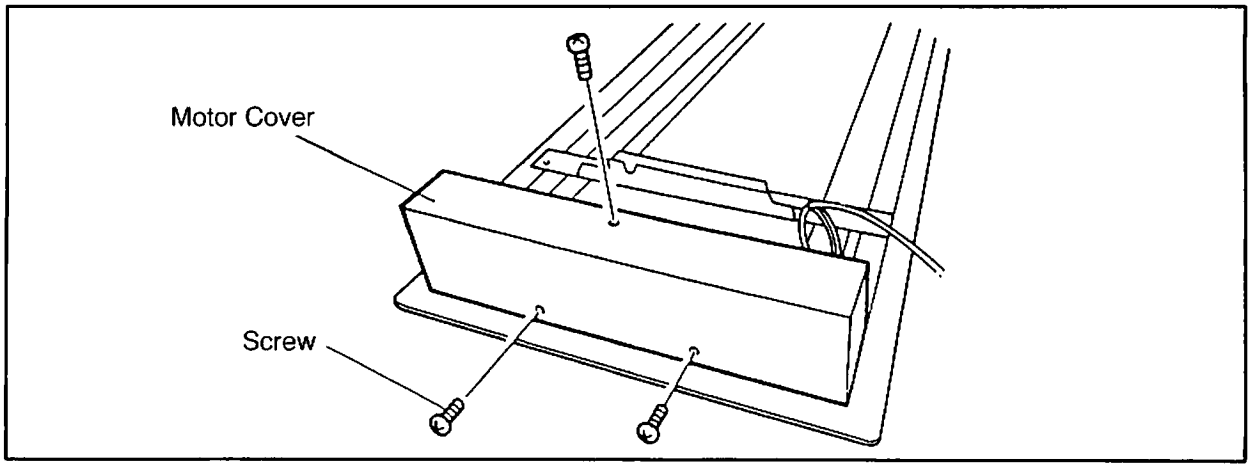
⚠ WARNING

TURN OFF all power source switches.

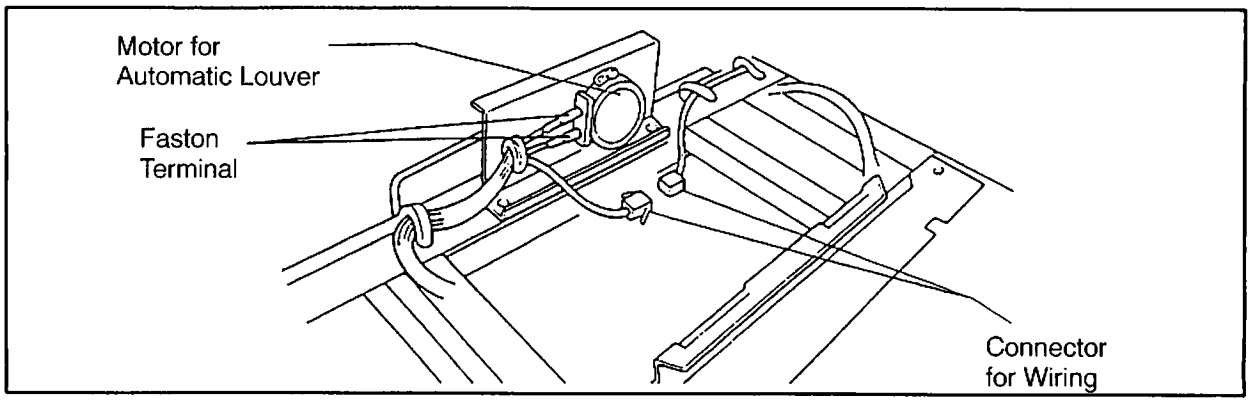
(1) Remove the optional air panel according to the item, 2.6.2, "Removing Optional Air Panel".

(2) Remove the motor cover after removing three fixing screws.

Tool	Phillips Screwdriver

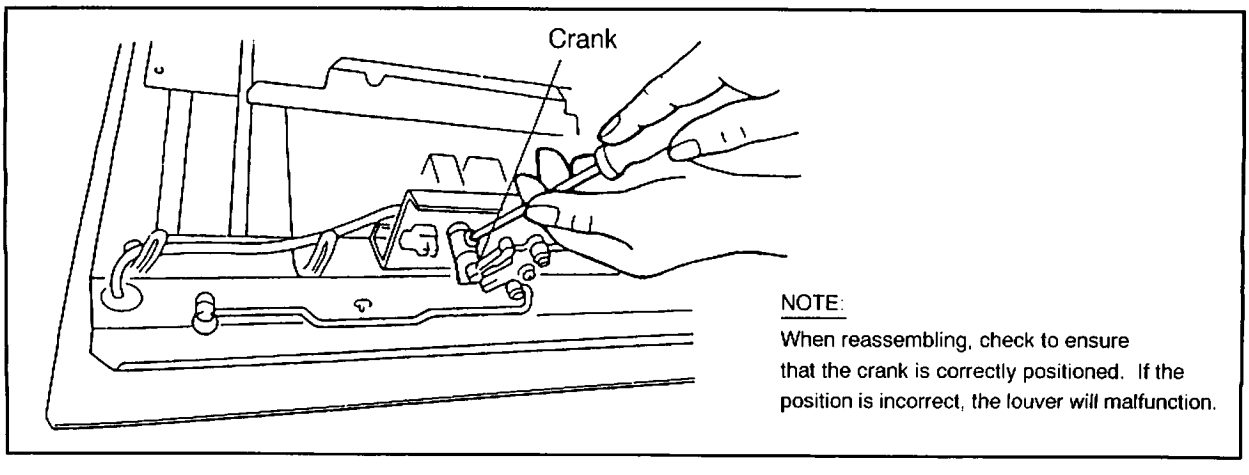


(3) Remove all the wiring connectors and terminals connected to the motor.



(4) Remove the crank from the motor shaft after loosening the fixing screw.

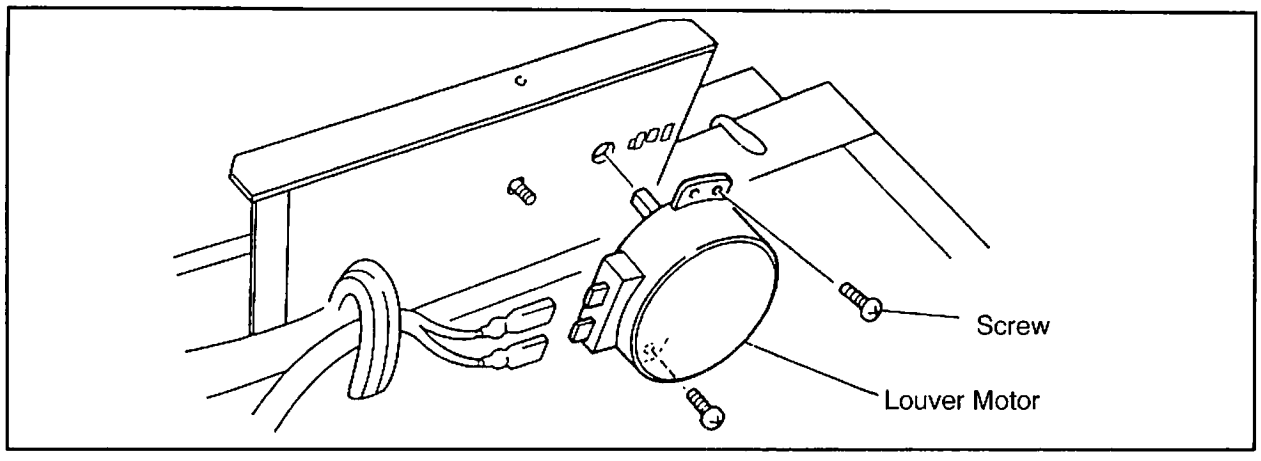
Tool	Phillips Screwdriver



(2.6 2-Way Cassette Type)

(5) Remove the motor after removing two fixing screws.

Tool	Phillips Screwdriver



2.7 Wall Type

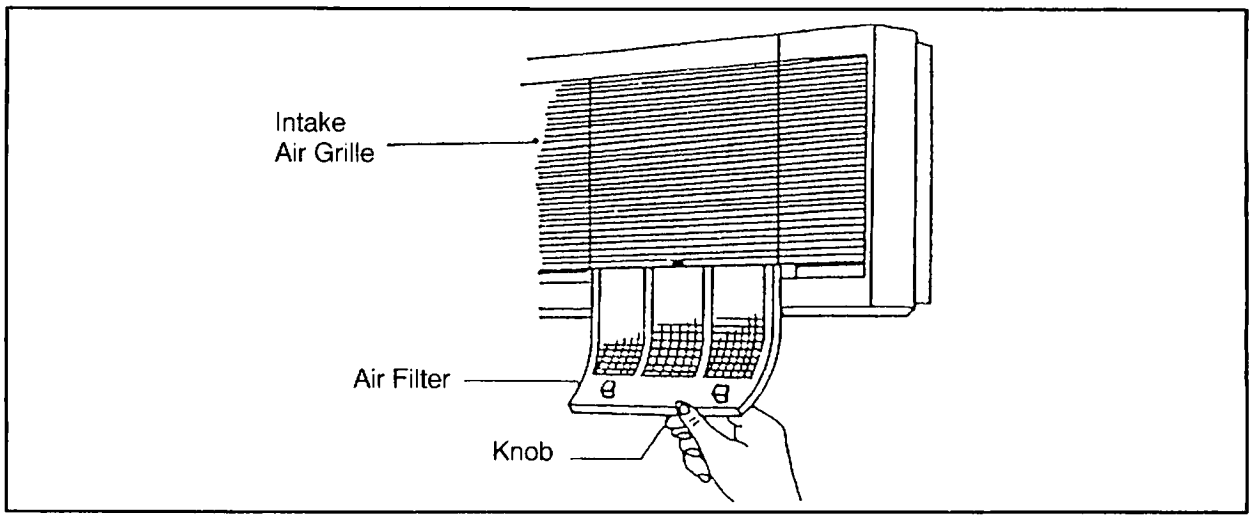
2.7.1 Removing Air Filter

⚠ WARNING

TURN OFF all power source switches.

(1) Check to ensure that the horizontal deflector is positioning vertically. The deflector stops at the vertical position when operation is stopped.

(2) Remove the air filter by pulling it downwards, as shown below.



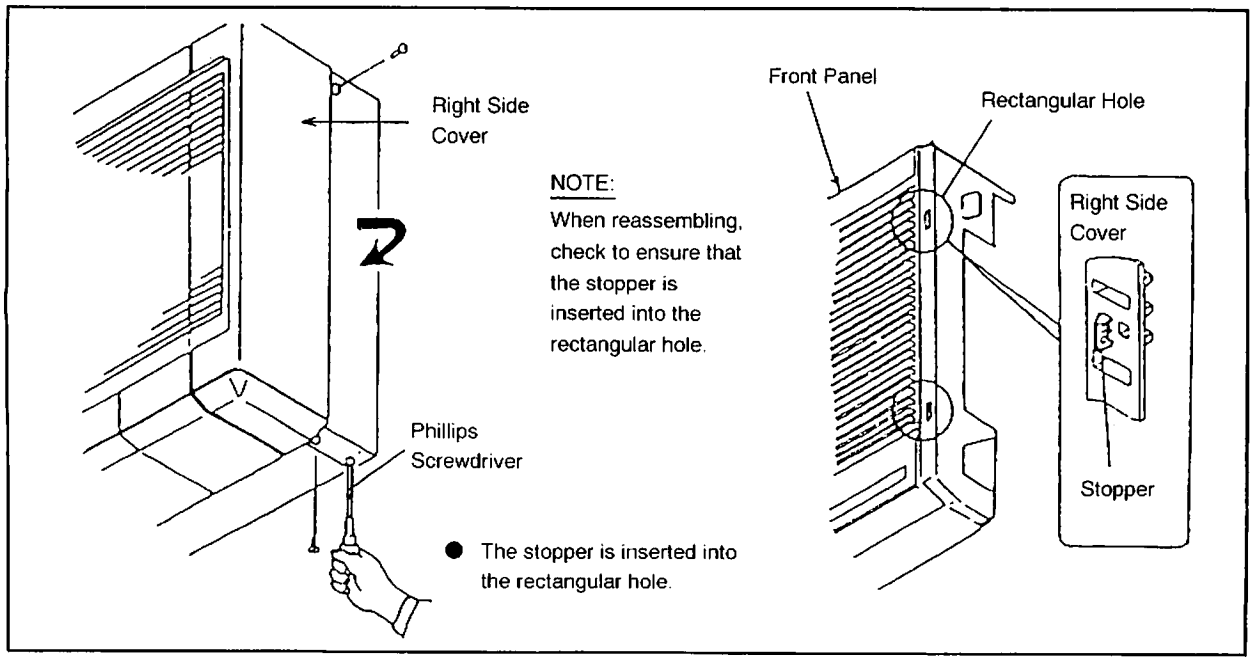
2.7.2 Removing Right Side Cover

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the right side cover by turning it slightly, after removing three fixing screws as shown below.

Tool	Phillips Screwdriver



2.7.3 Removing Front Panel

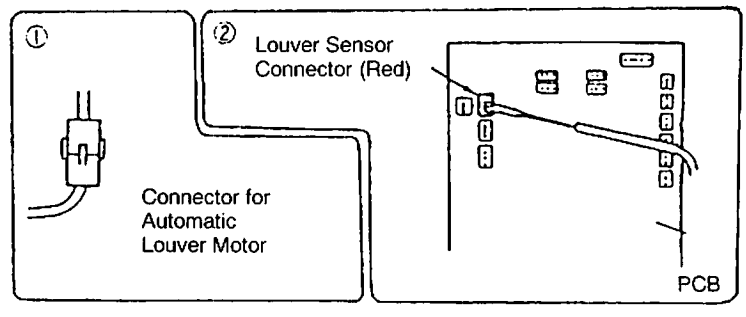
⚠ WARNING

TURN OFF all power source switches.

(1) Remove the right side cover according to the item, 2.7.2, "Removing Right Side Cover".

(2) Disconnect the automatic louver connector, ① and louver sensor connector, ②.

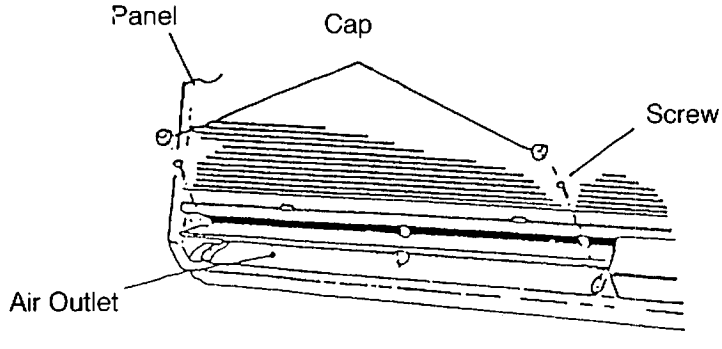
Tool	Phillips Screwdriver



NOTE:
Refer to the item, 2.6.6 regarding removing electrical box.

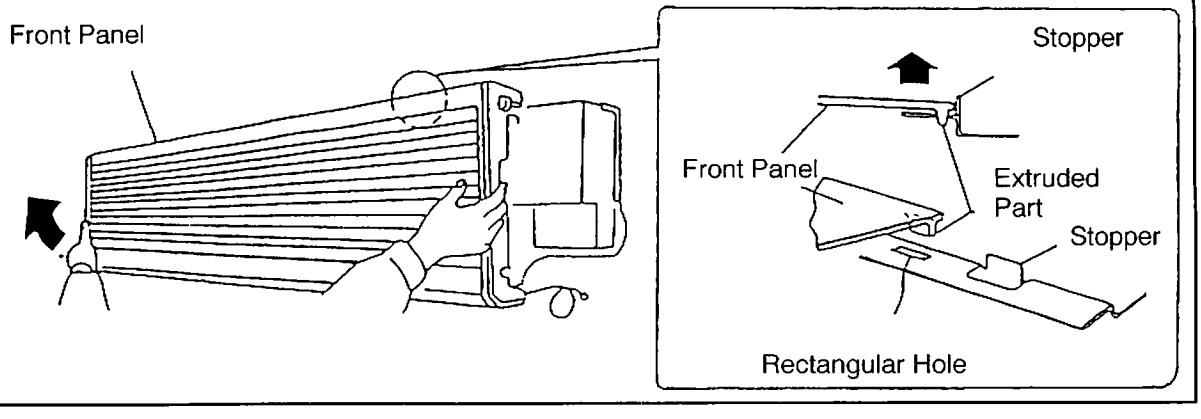
(3) Remove the caps at the air discharge side on the front panel and then remove screws from the holes.

Tool	Phillips Screwdriver



NOTE:
Remove the cap firstly and then remove the screws.

(4) Remove the front panel by pulling the lower side of the front panel slowly towards you and by paying attention that the lower end of the drain pan does not touch the panel.



2.7.4 Removing Motor for Automatic Louver

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the front panel according to the item, 2.7.3, "Removing Front Panel".

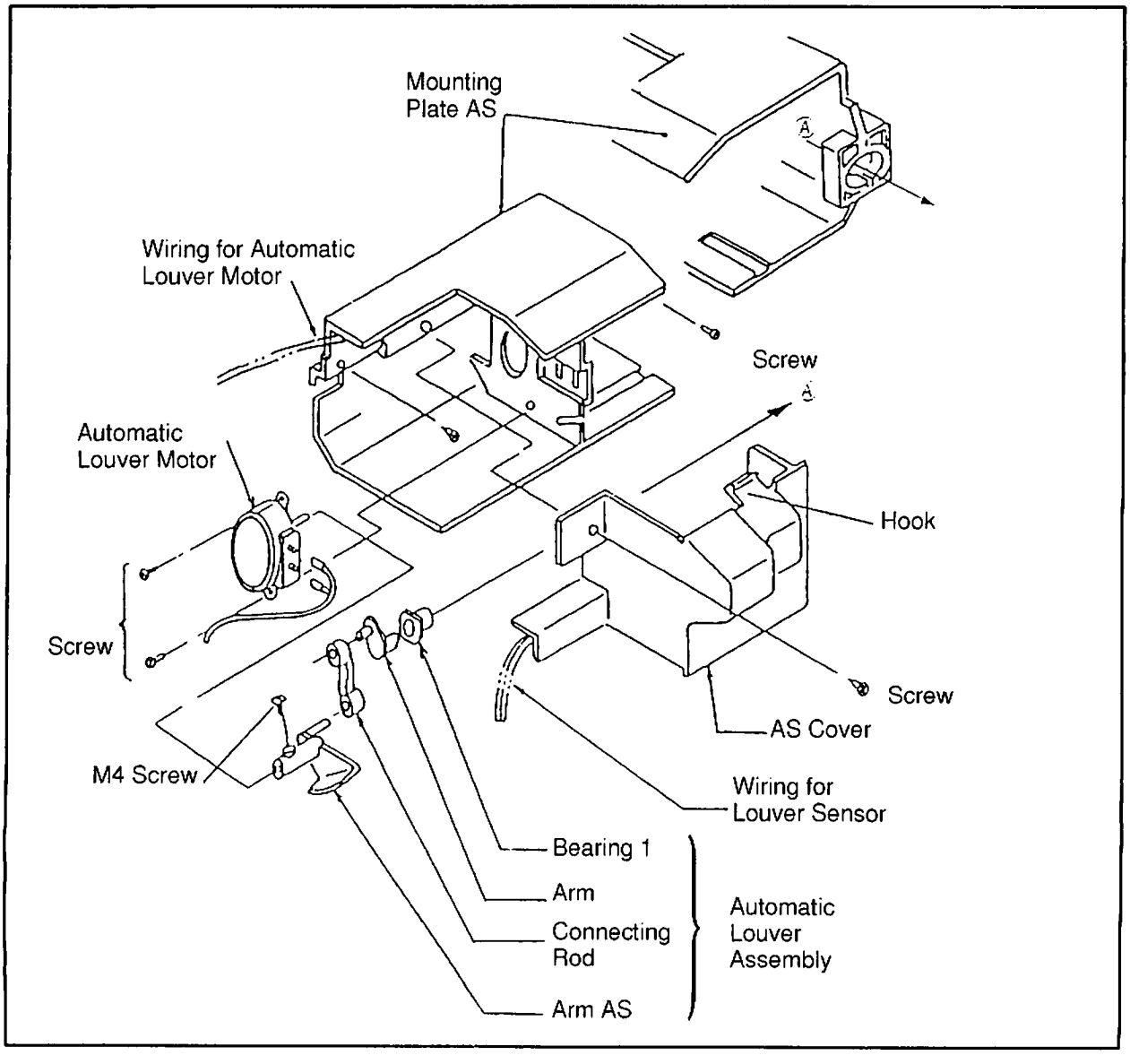
(2) Remove the AS cover after removing one fixing screw and unhooking the extruded part.

(3) Remove two screws fixing the mounting plate AS. Remove the shaft of the horizontal deflector inserted into the arm by sliding the louver assembly horizontally, and then remove the louver assembly from the front panel.

(4) Disconnect the connector connected to the motor.

(5) Loosen one screw fixing the arm AS. Remove the louver motor from the mounting plate AS after removing two screws fixing the louver motor.

Tool	Phillips Screwdriver



2.7.5 Removing Thermistors for Liquid Pipe and Gas Pipe

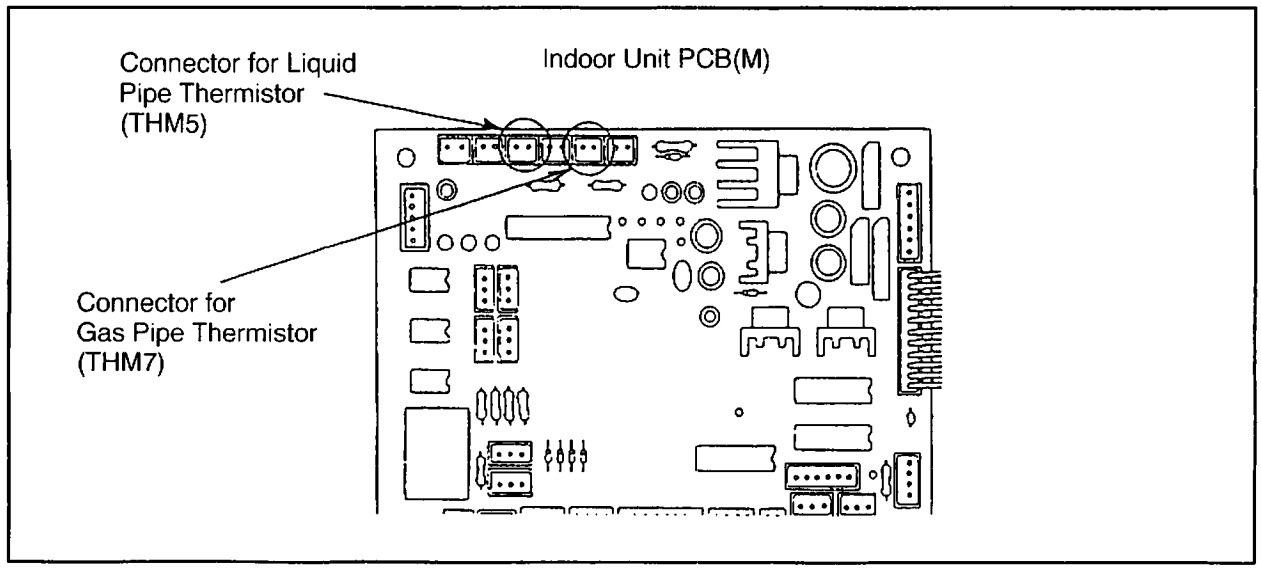
⚠ WARNING

TURN OFF all power source switches.

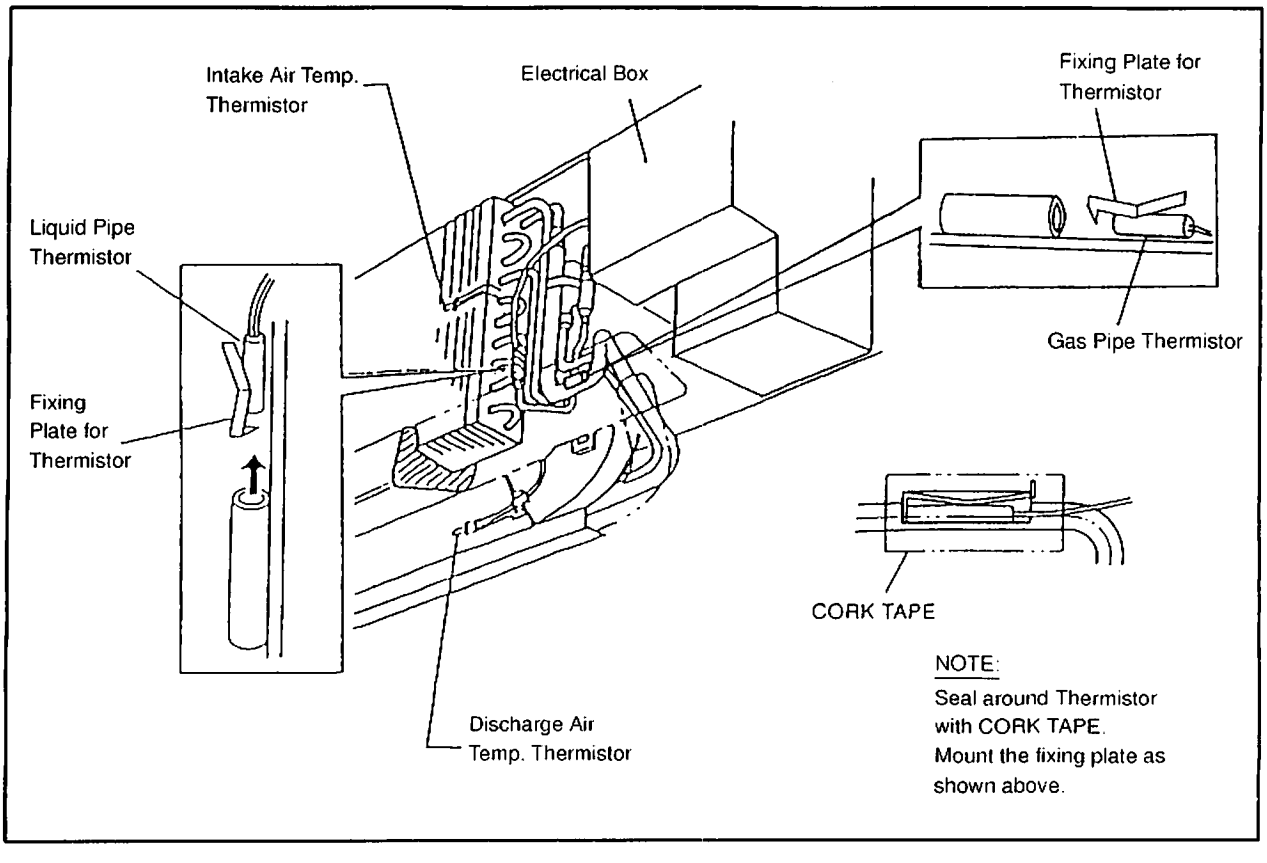
(1) Remove the right side cover according to the item, 2.7.2, "Removing Right Side Cover".

(2) Remove the front panel according to the item, 2.7.3, "Removing Front Panel".

(3) Remove the black connector for the liquid pipe thermistor and the yellow connector for the gas pipe thermistor connected to the PCB(M) in the electrical box.



(4) Remove the CORK TAPE and pull out the thermistors after removing the fixing plate for the thermistor.



2.7.6 Removing Electrical Box Cover and PCB

⚠ WARNING

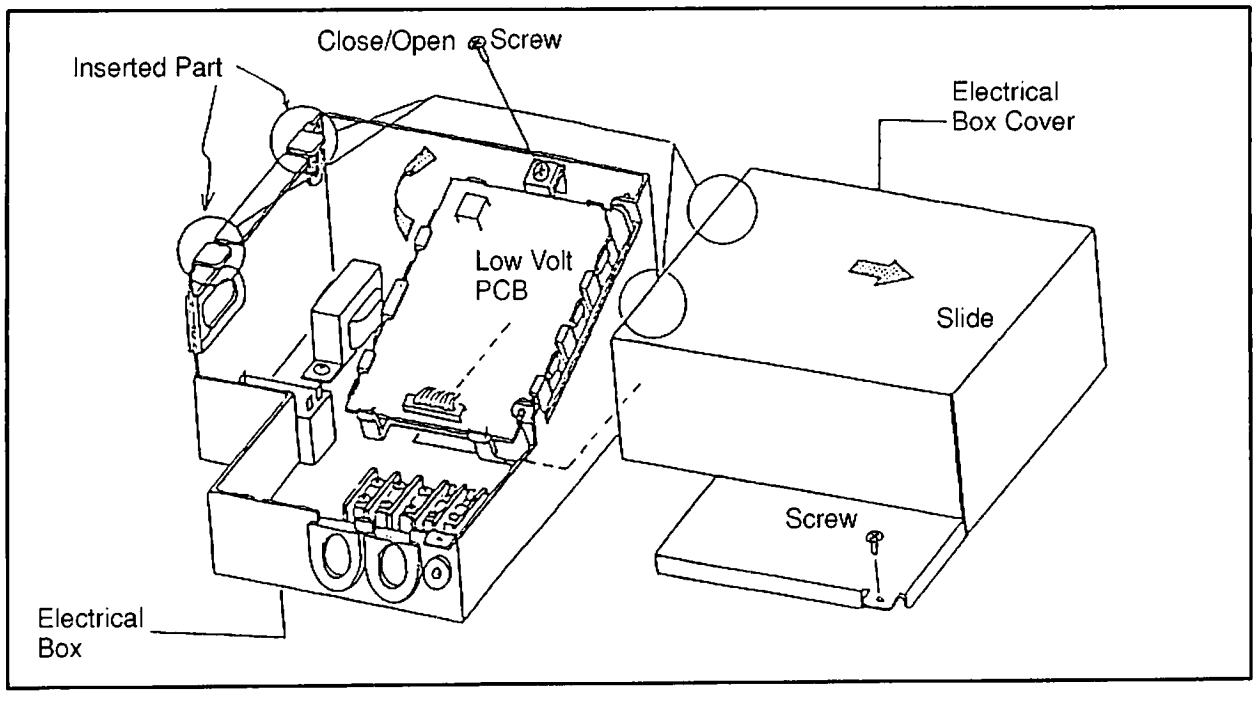
TURN OFF all power source switches.

(1) Remove the right side cover according to the item, 2.7.2, "Removing Right Side Cover".

(2) Remove the screw for the electrical box cover.

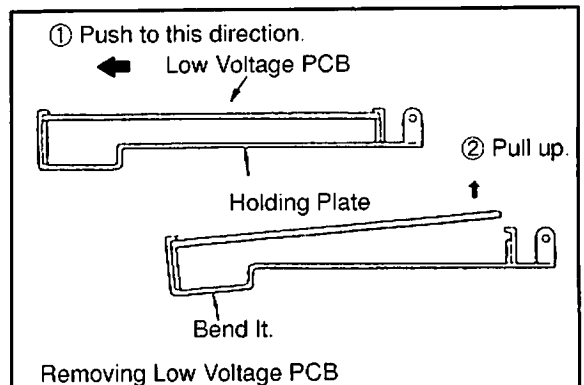
(3) The PCB (low voltage) is supported by the holder. The holder can be opened by removing the close/open screw fixing the holder. High voltage PCB is located at the bottom side.

Tool	Phillips Screwdriver

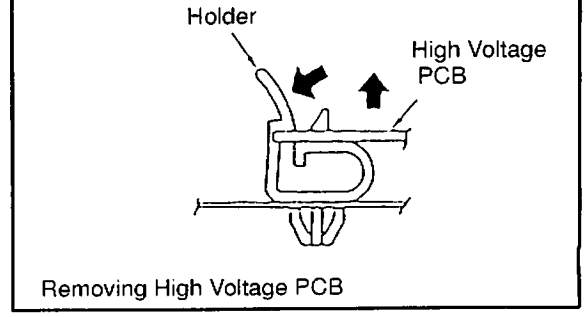


(4) Removing Low Voltage PCB.
Remove the low voltage PCB by pushing the PCB to the left side and bending the holder, as shown in the right figure.

(5) Removing High Voltage PCB.
Bend the holder (4 pieces) supporting the PCB towards the arrow mark direction and pull the PCB upwards.
NOTE:
Do not touch electrical components. Do not apply big force to the PCB. If applied, the PCB will be faulty.



Removing Low Voltage PCB



Removing High Voltage PCB

2.7.7 Removing Protection Net

⚠ WARNING

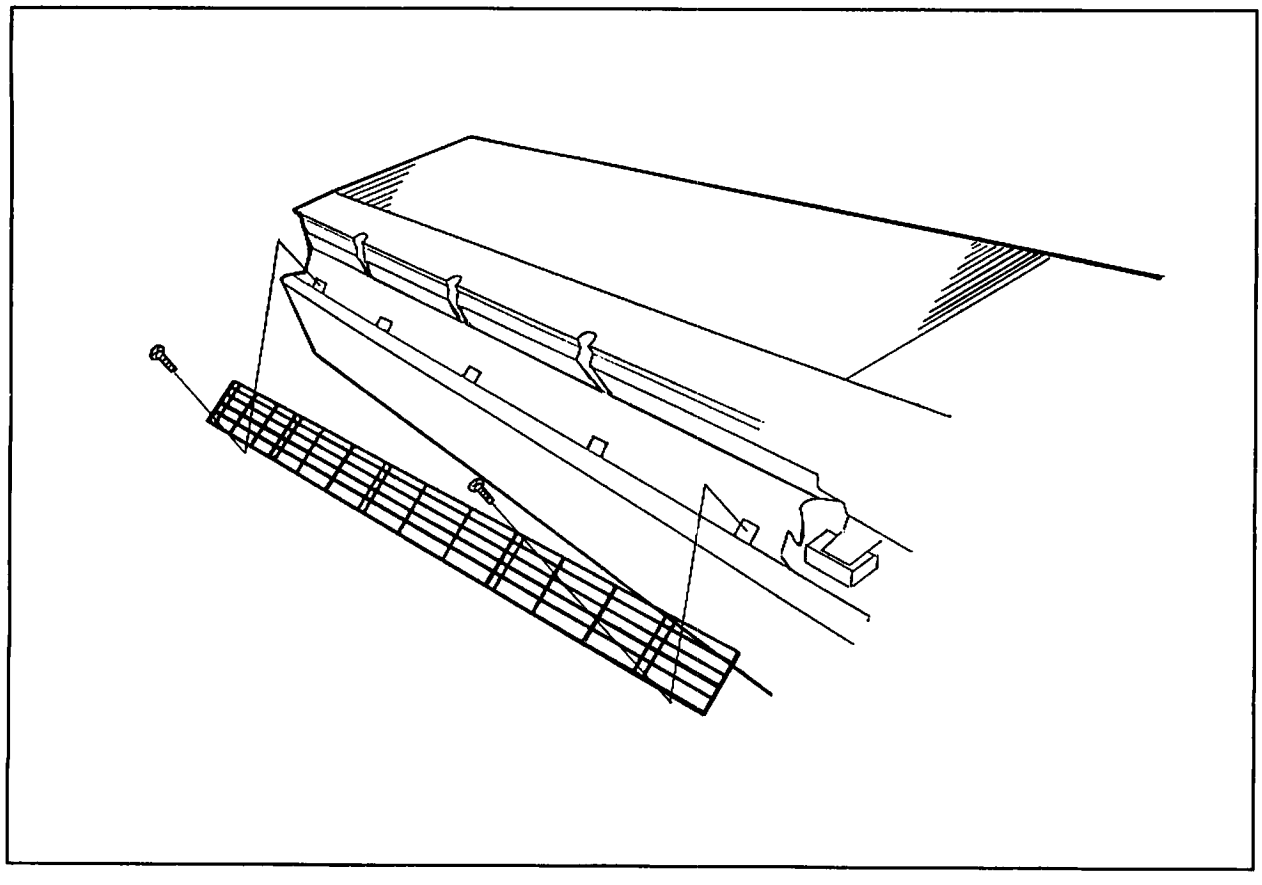
TURN OFF all power source switches.

(1) Remove the right side cover according to the item 2.7.2, "Removing Right Side Cover".

(2) Remove the front panel according to the item 2.7.3, "Removing Front Panel".

(3) Remove the protection net after removing five screws fixing the protection net.

Tool	Phillips Screwdriver



2.7.8 Removing Drain Pan

⚠ WARNING

TURN OFF all power source switches.

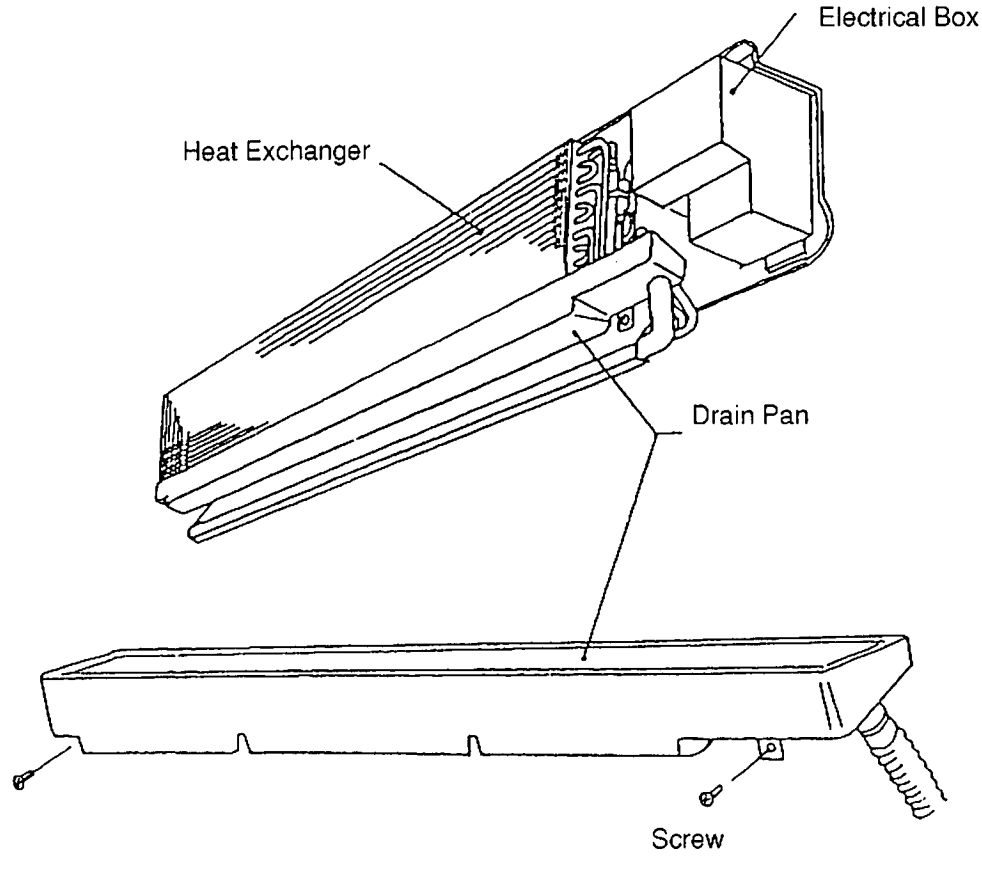
(1) Remove the right side cover according to the item, 2.7.2, "Removing Right Side Cover".

(2) Remove the front panel according to the item, 2.7.3, "Removing Front Panel".

(3) Separate the drain pipe from the drain hose.

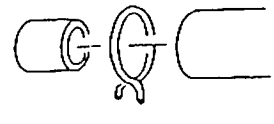
(4) Pull out the drain pan by drawing it towards you after removing two screws fixing the drain pan at the right and left.

Tool	Phillips Screwdriver, Bucket (Approx. 5 liters)



NOTE:

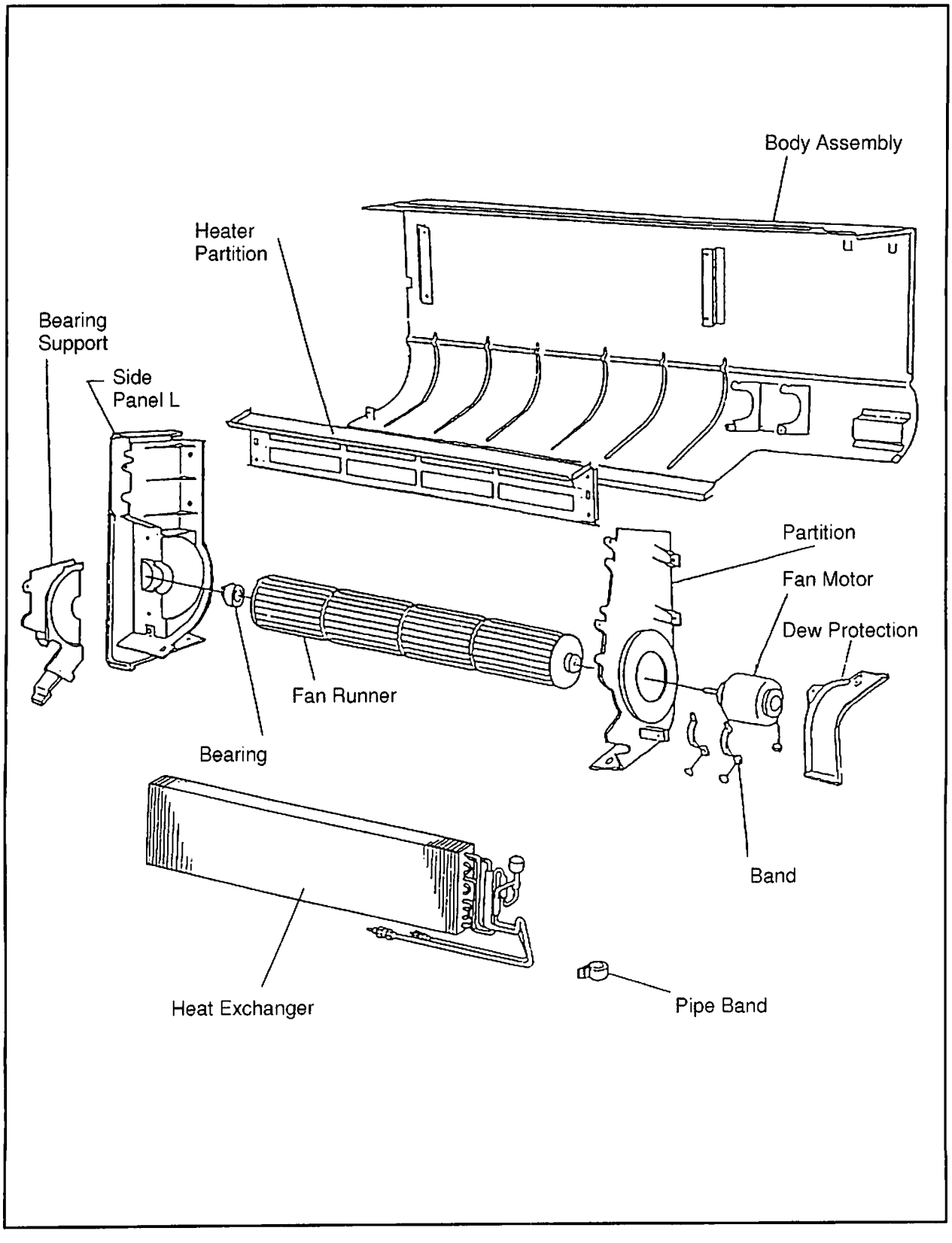
Remove drain on the drain pan by pulling out the rubber plug. Check to ensure that water can flow through the hole by pricking the hole with a pencil.



2.7.9 Removing Heat Exchanger and Fan Motor

⚠ WARNING

TURN OFF all power source switches.



● Removing Heat Exchanger

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the right side cover according to the item, 2.7.2, "Removing Right Side Cover".

(2) Remove the front panel according to the item, 2.7.3, "Removing Front Panel".

(3) Remove the drain pan according to the item, 2.7.8, "Removing Drain Pan".

(4) Collect refrigerant from the low pressure check joint in the outdoor unit.

(5) Remove the flare-nuts of refrigerant piping (liquid and gas side) from the indoor unit.

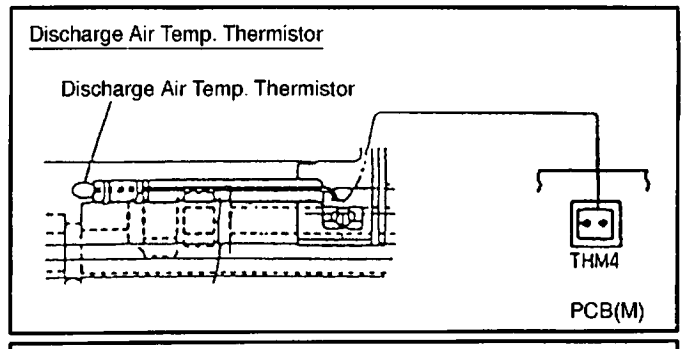
(6) Remove the fixing band for refrigerant pipes after removing one fixing screw.

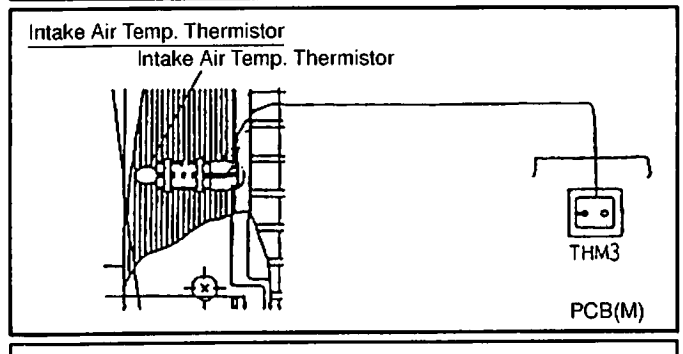
(7) Disconnect the connectors to the discharge air temperature thermistor, intake air temperature thermistor, freeze protection thermistor and gas pipe thermistor which are connected to the low voltage PCB(M) in the electrical box. Take out wires for the discharge air temperature thermistor, intake air temperature thermistor, freeze protection thermistor and gas pipe thermistor from the electrical box.

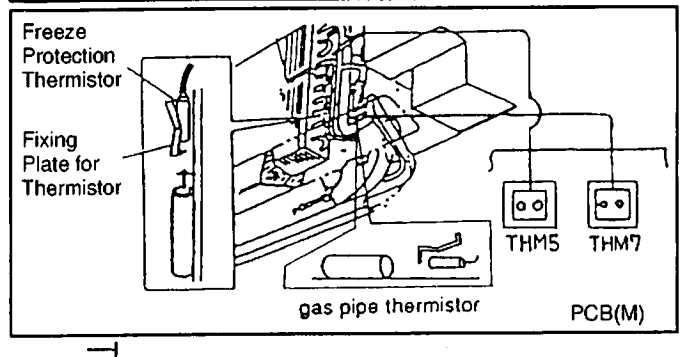
(8) Remove each two screws at the right and left, fixing the heat exchanger at the both sides.

(9) Draw out the heat exchanger by pushing it upwards.

Removing each Thermistor and Connector (Item7)

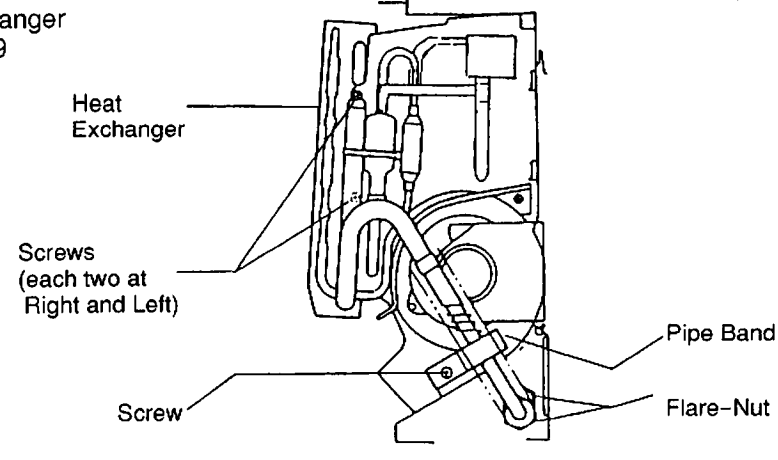






Tool	Phillips Screwdriver

Removing Heat Exchanger
for Items 5, 6, 8 and 9



(2.7 Wall Type)

● Removing Fan and Fan Motor (after Removing Heat Exchanger)

⚠ WARNING

TURN OFF all power source switches.

Remove the heat exchanger according to the item 2.7.9, "Removing Heat Exchanger and Fan Motor".

(10) Draw out the bearing support after removing two fixing screws.

(11) Remove the female fixing screw(ϕ 6) fixing the fan runner on the motor shaft by a hexagon wrench.

(12) Remove the side plate L by changing the position to the left side after removing four screws fixing the side plate L onto the body.

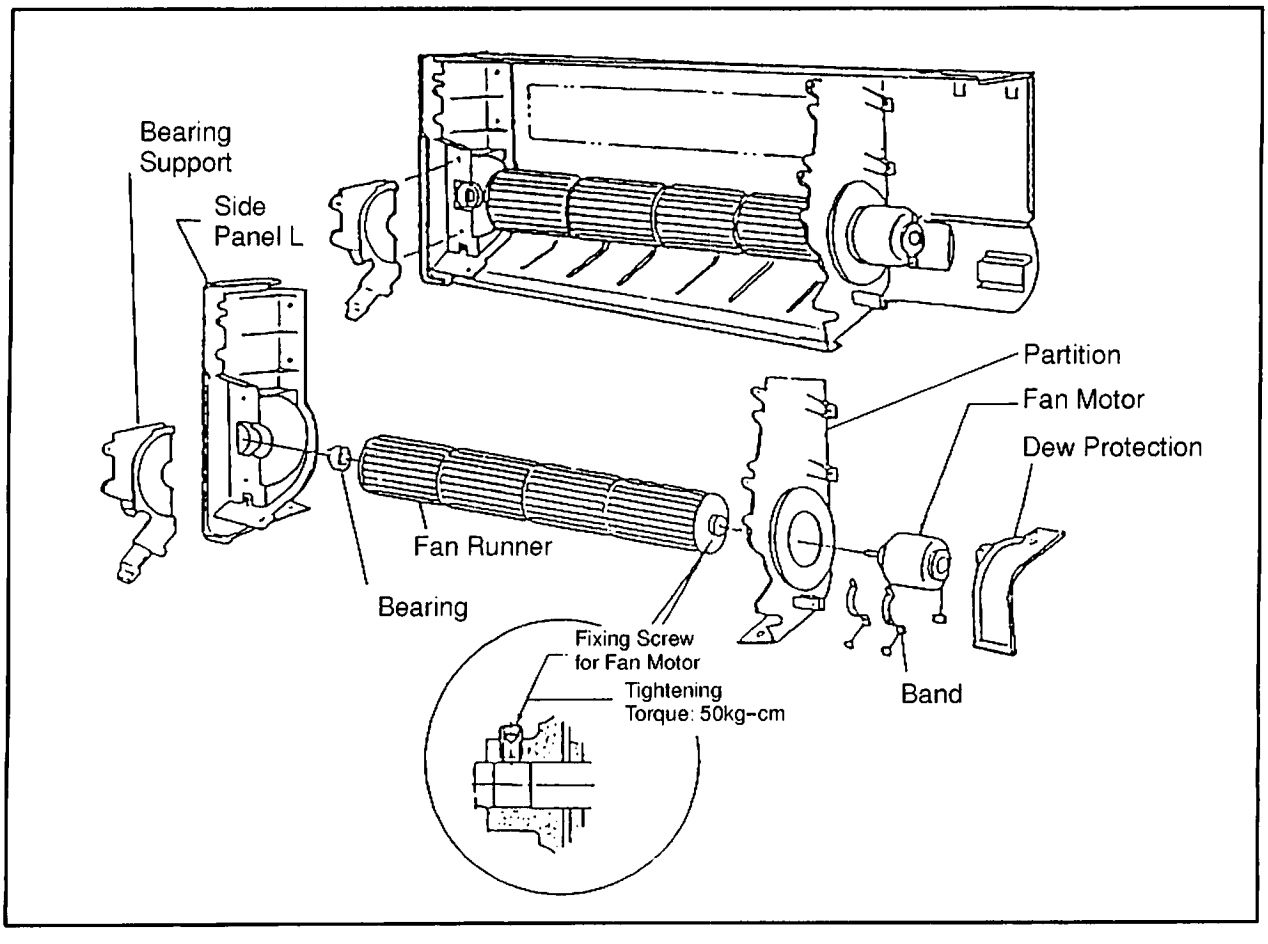
(13) Remove the fan shaft from the fan runner by pulling out to the left side.

(14) Remove the partition after removing four screws fixing the partition onto the body.

(15) Disconnect the motor wiring connectors (6P and 3P connectors in the electrical box).

(16) Remove the fan motor after removing the screw (each one, totally 2 pieces) fixing the motor fixing band for the motor.

Tool	Phillips Screwdriver, Hexagon Wrench



2.8 Floor Type

2.8.1 Removing Intake Air Grille

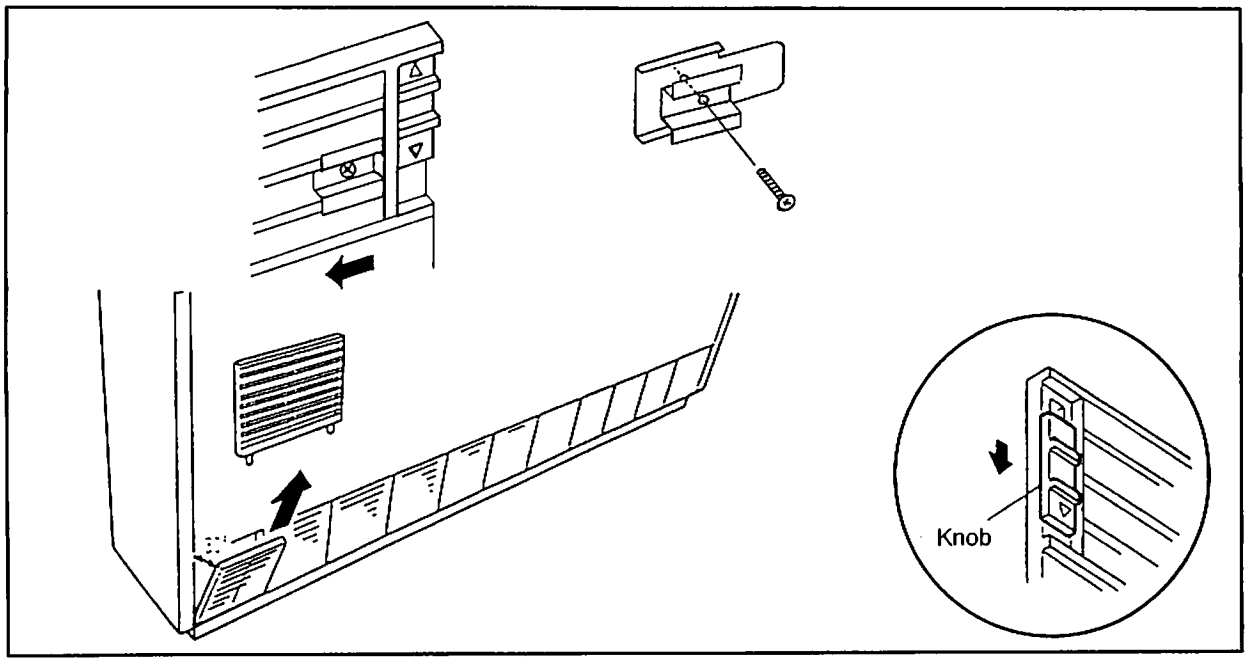
⚠ WARNING

TURN OFF all power source switches.

(1) Loosen the screws for fixing plate at the right side of each intake air grille, and move the fixing plates.

(2) By pushing the knob at both sides of the intake air grille towards the arrow mark direction, the grille can be opened with an angle of 30° .

(3) Remove it from the hinged part.



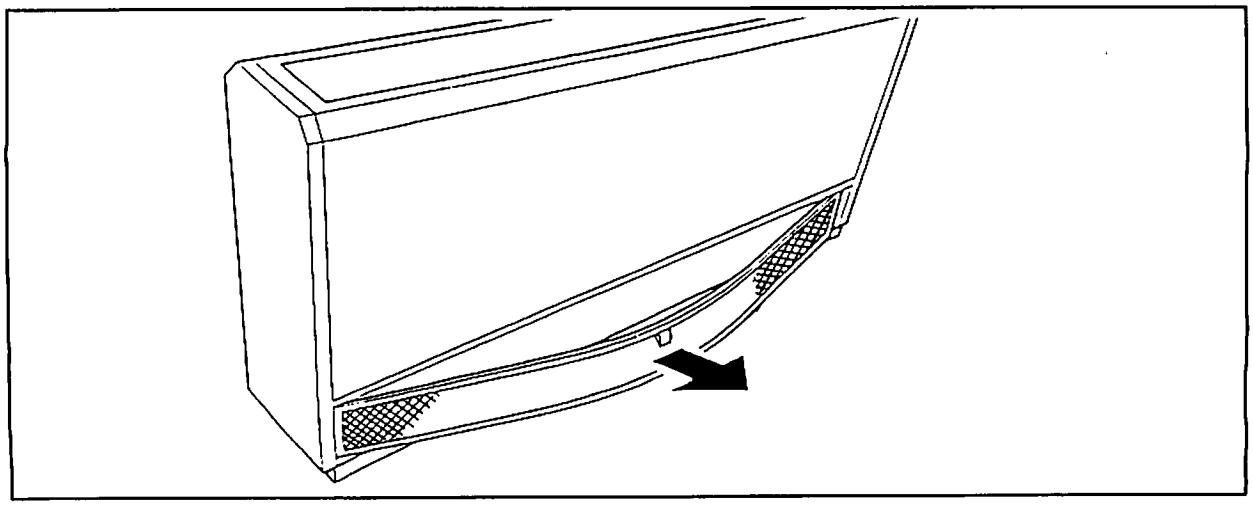
2.8.2 Removing Air Filter

⚠ WARNING

TURN OFF all power source switches.

(1) The air filter is located at the inner side of the intake air grille. Remove all the intake air grilles.

(2) Remove the air filter by pulling the knob of the air filter.



(2.8 Floor Type)

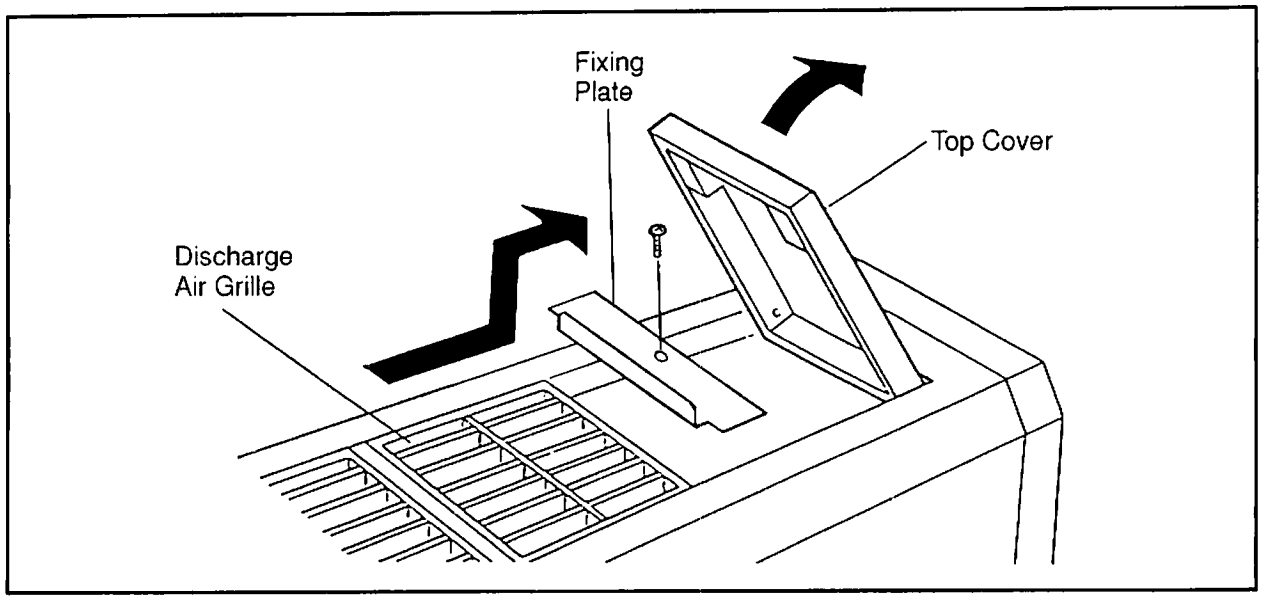
2.8.3 Removing Discharge Air Grille

⚠ WARNING

TURN OFF all power source switches.

(1) The discharge air grilles are mounted on the top by using a guide-rail.

(2) By opening the top cover and sliding the discharge air grilles, the grilles can be removed.



2.8.4 Removing Front Cover

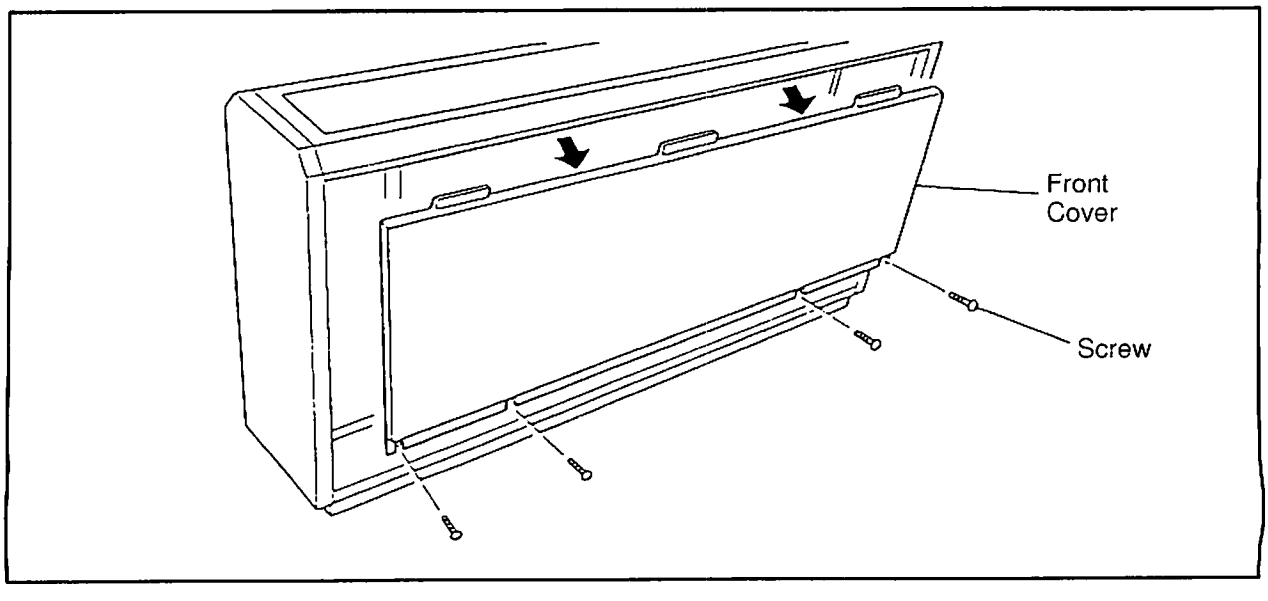
⚠ WARNING

TURN OFF all power source switches.

(1) Remove the air filter according to the item, 2.8.2, "Removing Air Filter".

(2) Remove the front cover from the slit after removing four fixing screws at the lower part and pulling it out downwards.

Tool	Phillips Screwdriver



2.8.5 Removing Fan Motor

⚠ WARNING

TURN OFF all power source switches.

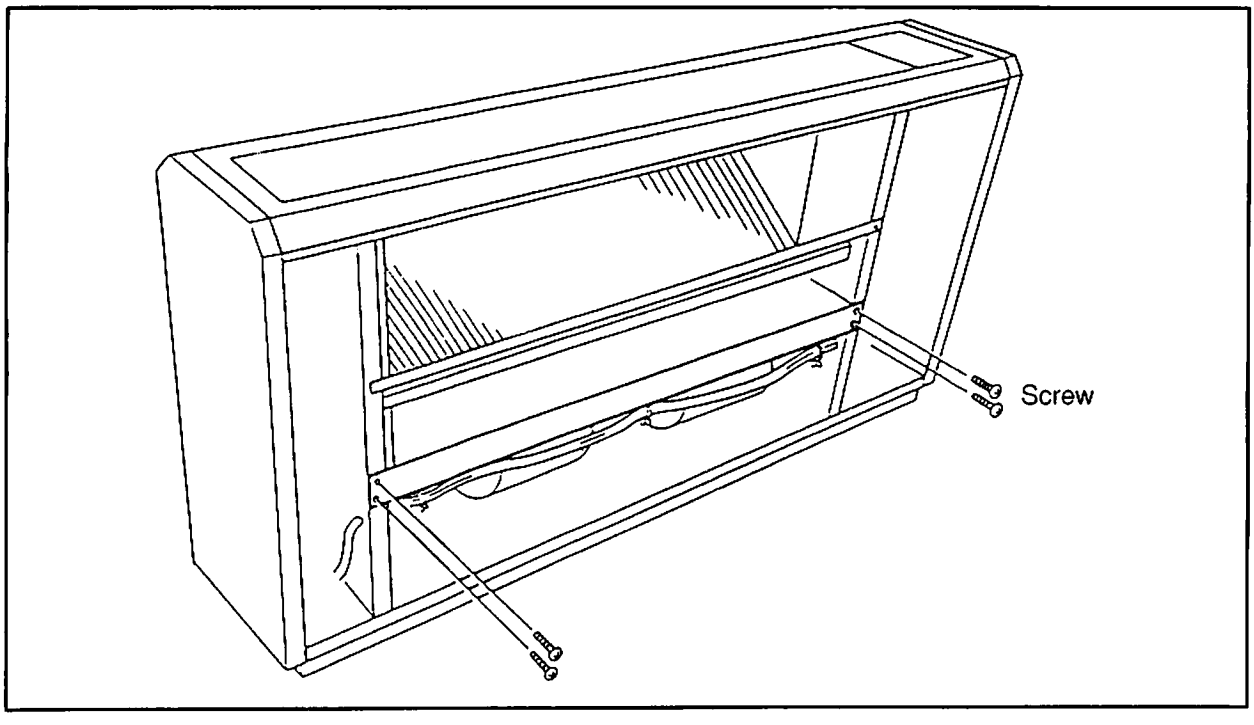
(1) Remove the intake air grille according to the item, 2.8.1, "Removing Intake Air Grille".

(2) Remove the air filter according to the item, 2.8.2, "Removing Air Filter".

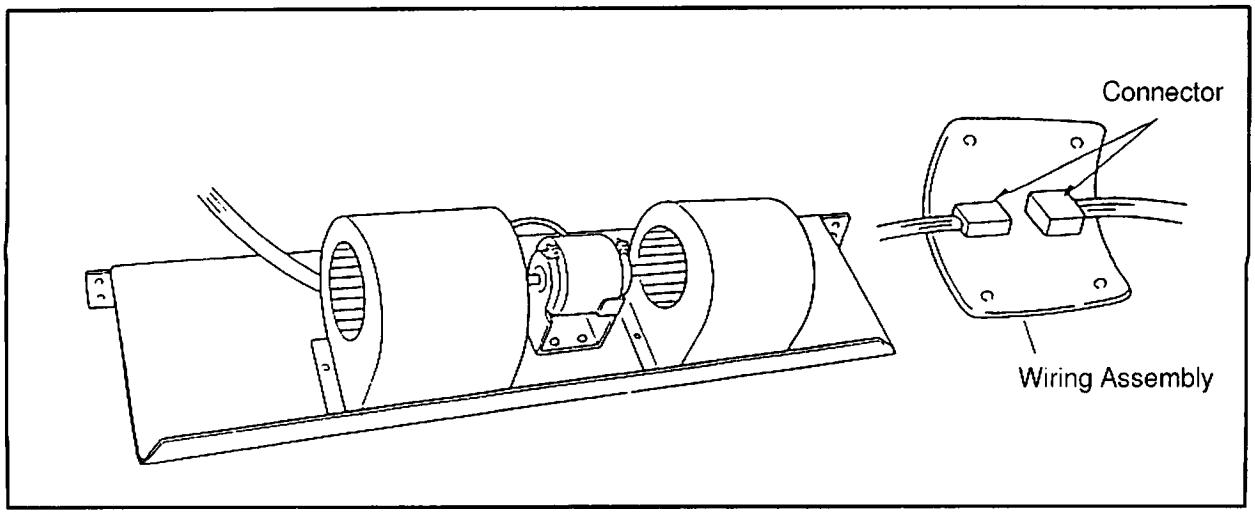
(3) Remove the front cover according to the item, 2.8.4, "Removing Front Cover".

(4) Remove the mounting plate for the fan motor after removing four fixing screws.

Tool	Phillips Screwdriver

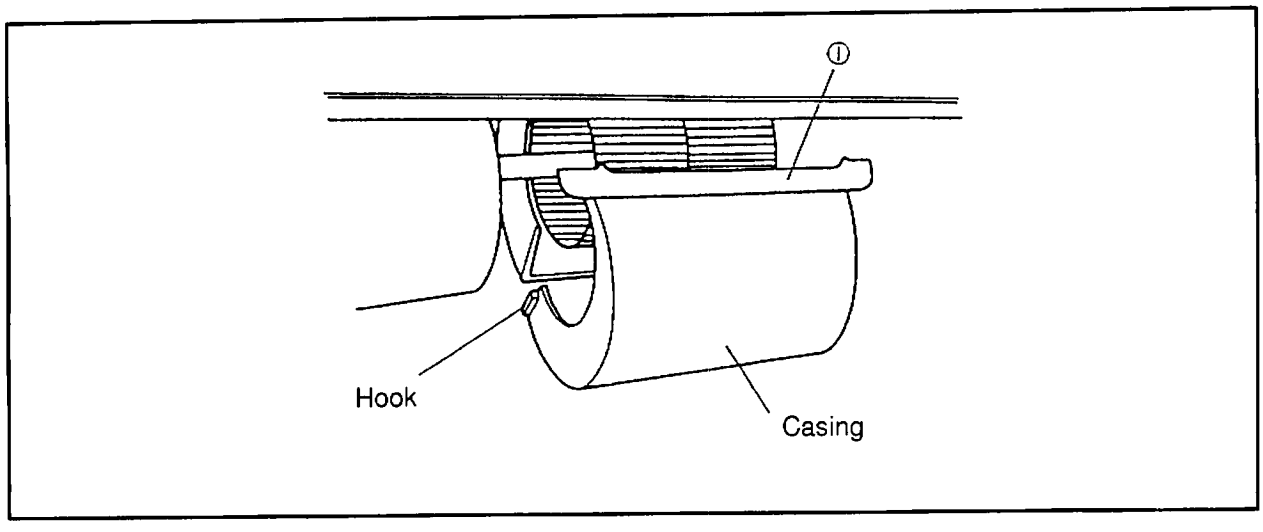


(5) Disconnect the wiring connector for the fan motor. Remove the wiring assembly and connector.



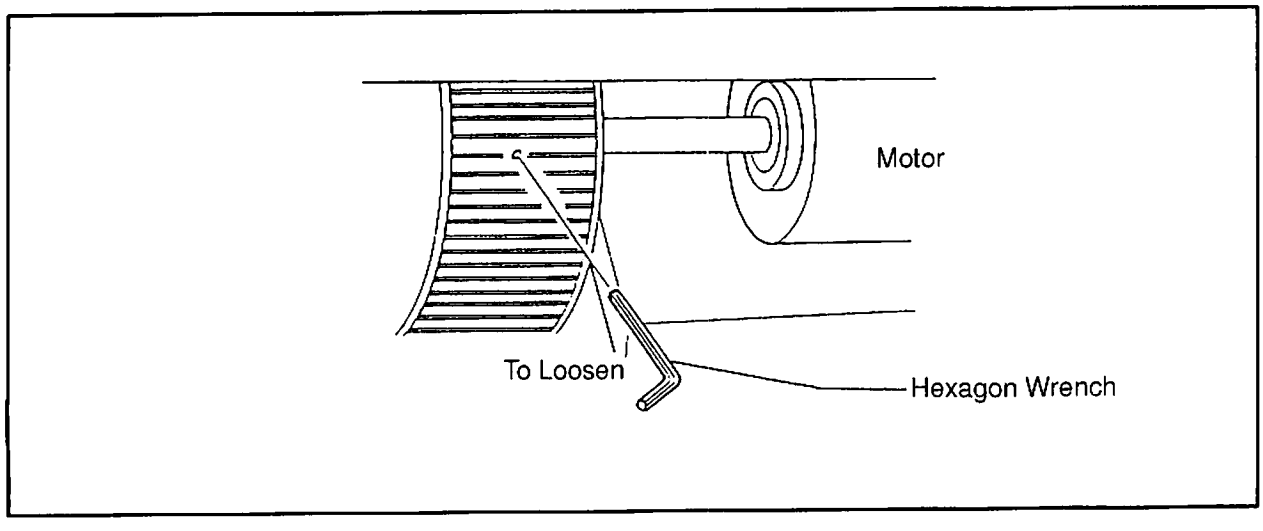
(6) Remove the casing ① by pushing the hook part at four positions towards the inner side.

Tool	Phillips Screwdriver



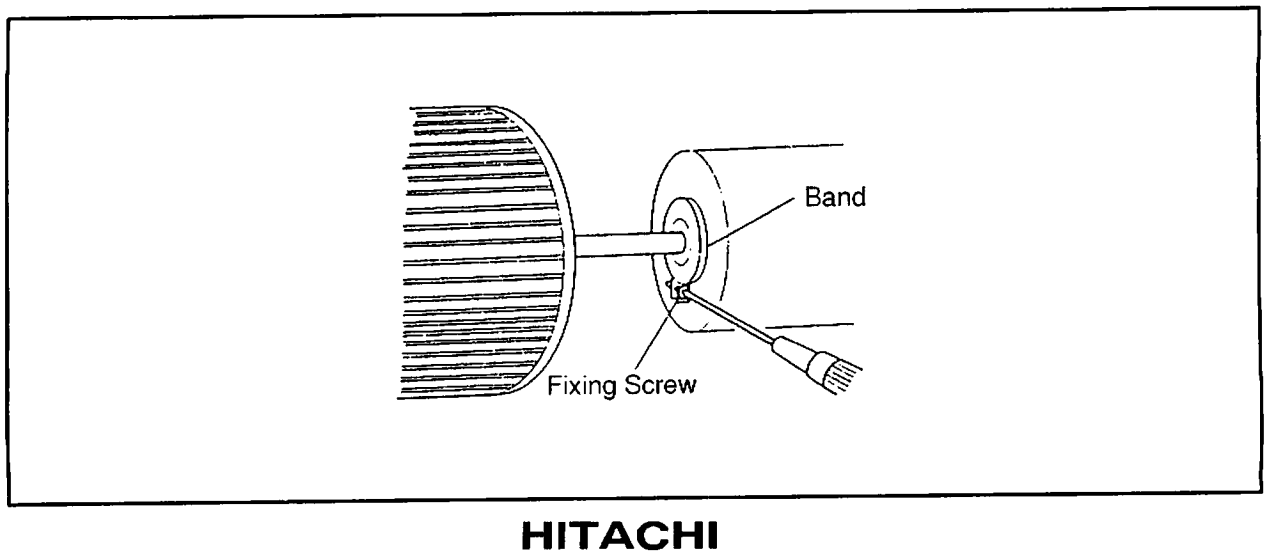
(7) Loosen the screw by a hexagon wrench.

Tool	Hexagon Wrench



(8) Remove the fan motor by sliding it backwards after removing the fixing plate. Pay attention not to drop it.

Tool	Phillips Screwdriver



2.8.6 Removing Printed Circuit Board (PCB)

⚠ WARNING

TURN OFF all power source switches.

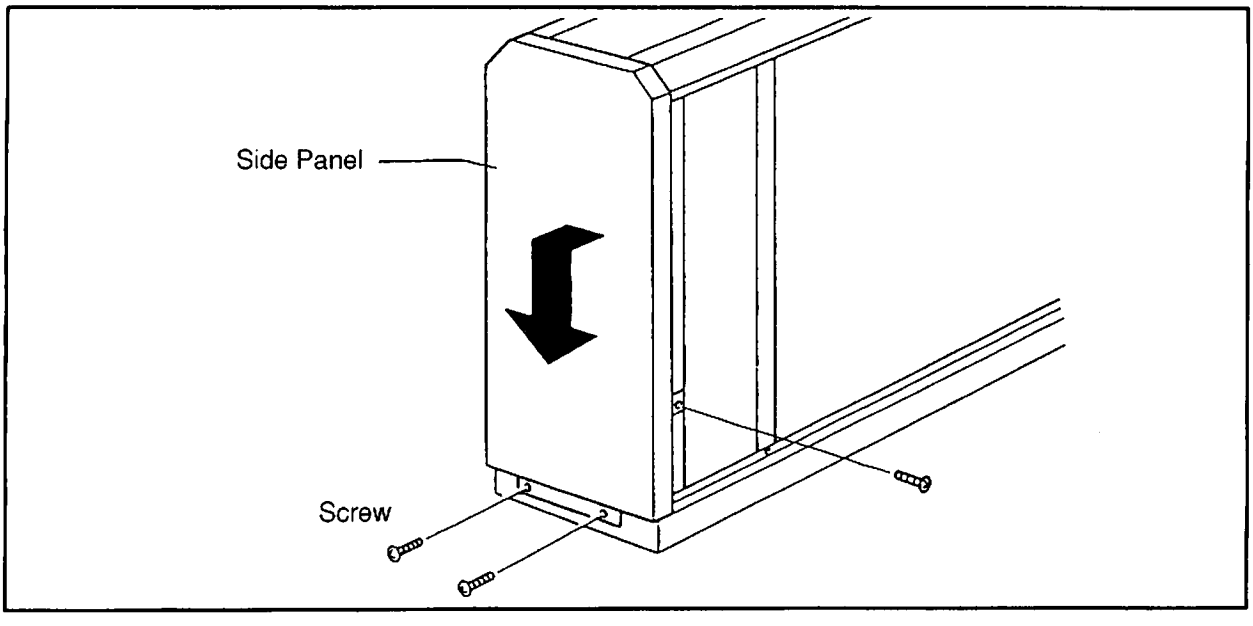
(1) Remove the intake air grille according to the item, 2.8.1, "Removing Intake Air Grille".

(2) Remove the air filter according to the item, 2.8.2, "Removing Air Filter".

(3) Remove the front cover according to the item, 2.8.4, "Removing Front Cover".

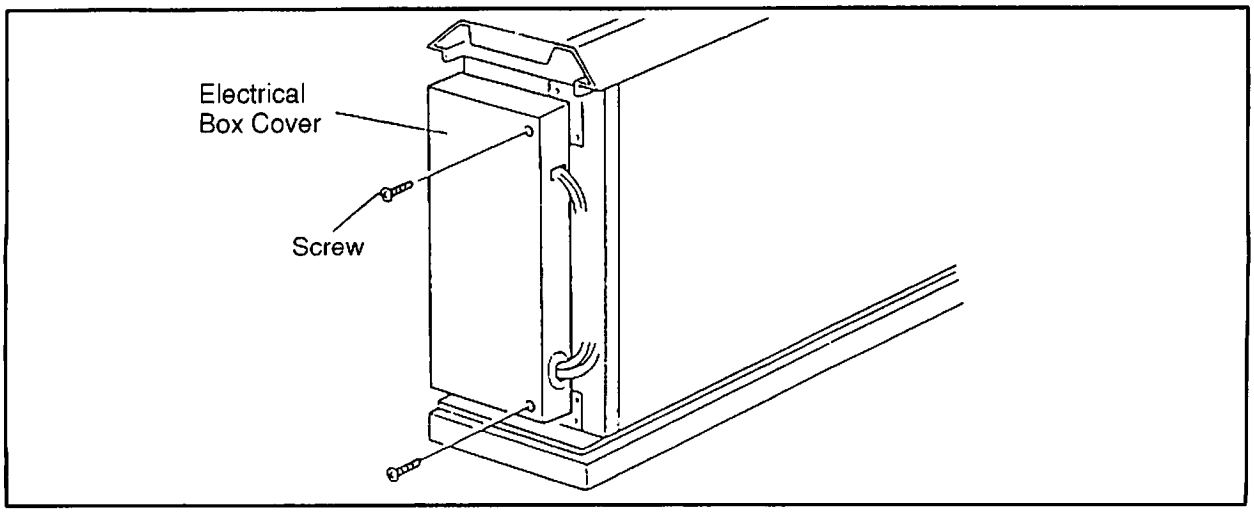
(4) The side cover can be removed by removing the three fixing screws and pulling it downwards.

Tool	Phillips Screwdriver



(5) Remove the electrical box cover after removing the two fixing screws.

Tool	Phillips Screwdriver

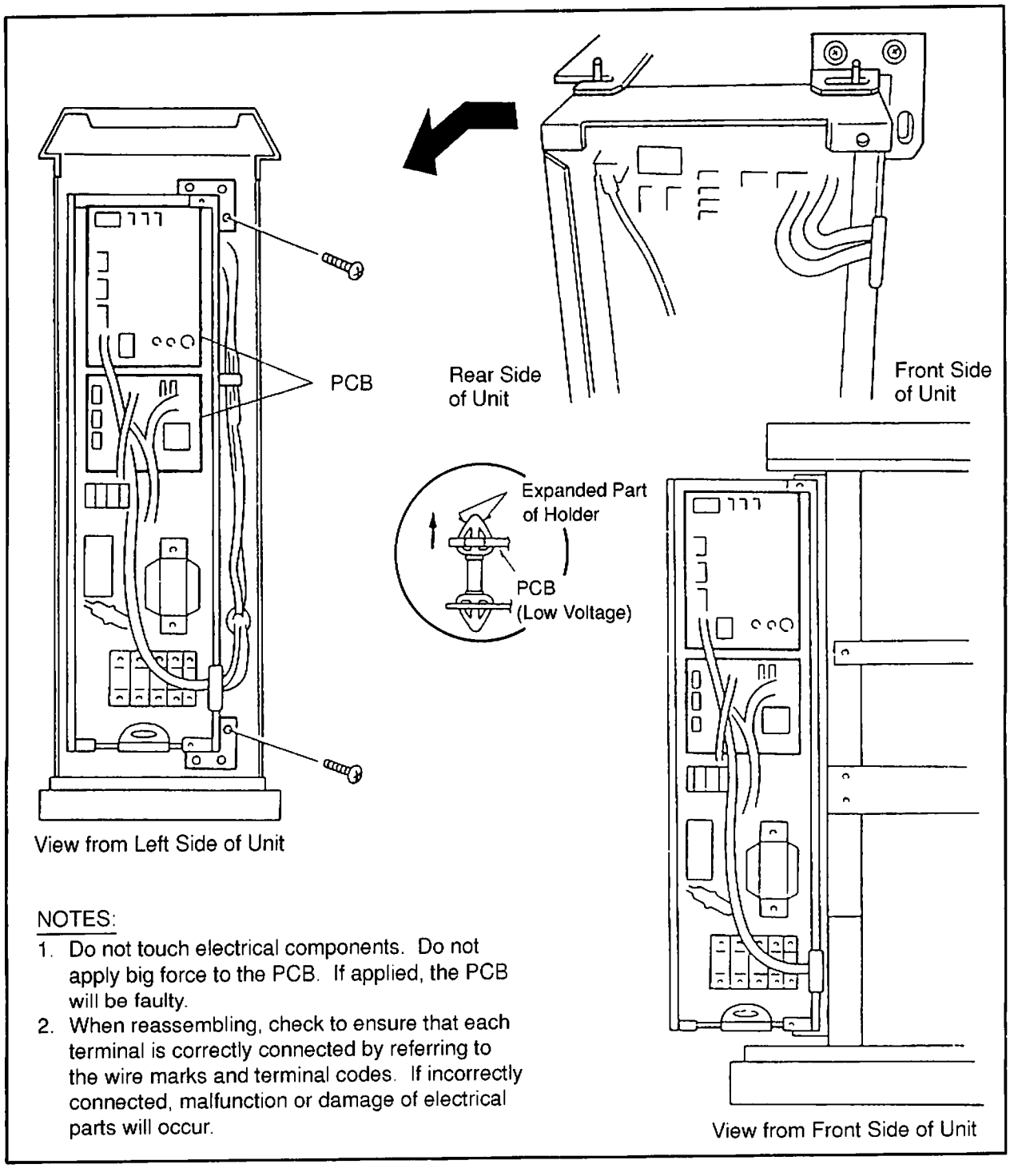


(2.8 Floor Type)

(6) The electrical box can be turned up to an angle of 90° by removing two fixing screws and unhooking the hook at the rear side of the electrical box.

(7) The PCB is supported by four holders. Pull out the PCB from the PCB hole by pushing the expanded part of the holder using long-nose pliers and putting a finger near the hole of the PCB.

Tool	Phillips Screwdriver, Long-nose Pliers



NOTES:

1. Do not touch electrical components. Do not apply big force to the PCB. If applied, the PCB will be faulty.
2. When reassembling, check to ensure that each terminal is correctly connected by referring to the wire marks and terminal codes. If incorrectly connected, malfunction or damage of electrical parts will occur.

2.8.7 Removing Thermistors for Liquid Pipe and Gas Pipe

⚠ WARNING

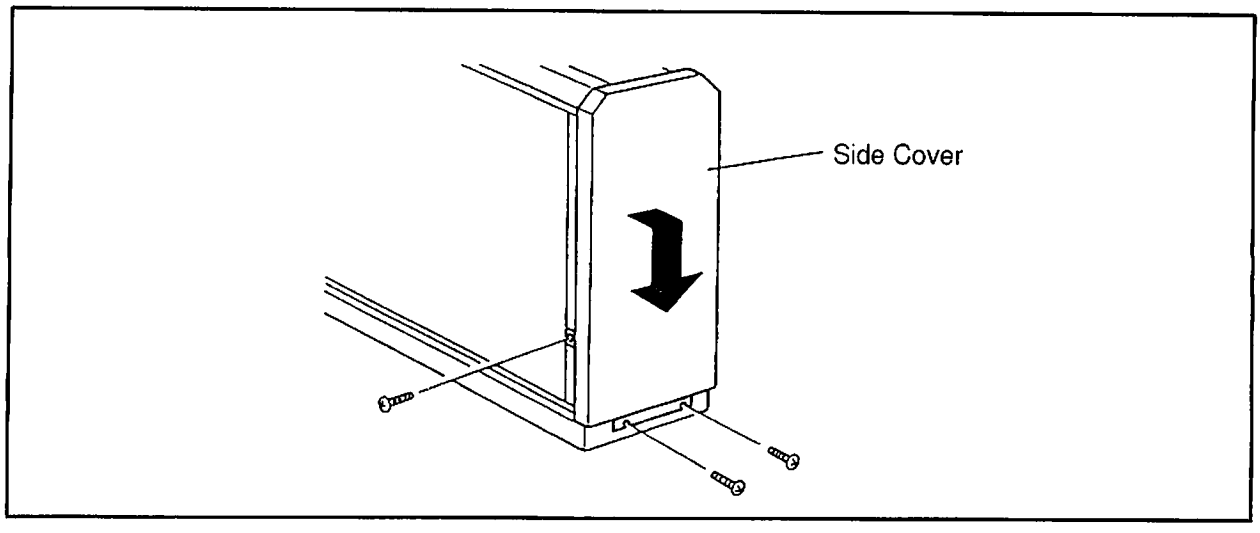
TURN OFF all power source switches.

(1) Remove the intake air grille according to the item, 2.8.1, "Removing Intake Air Grille".

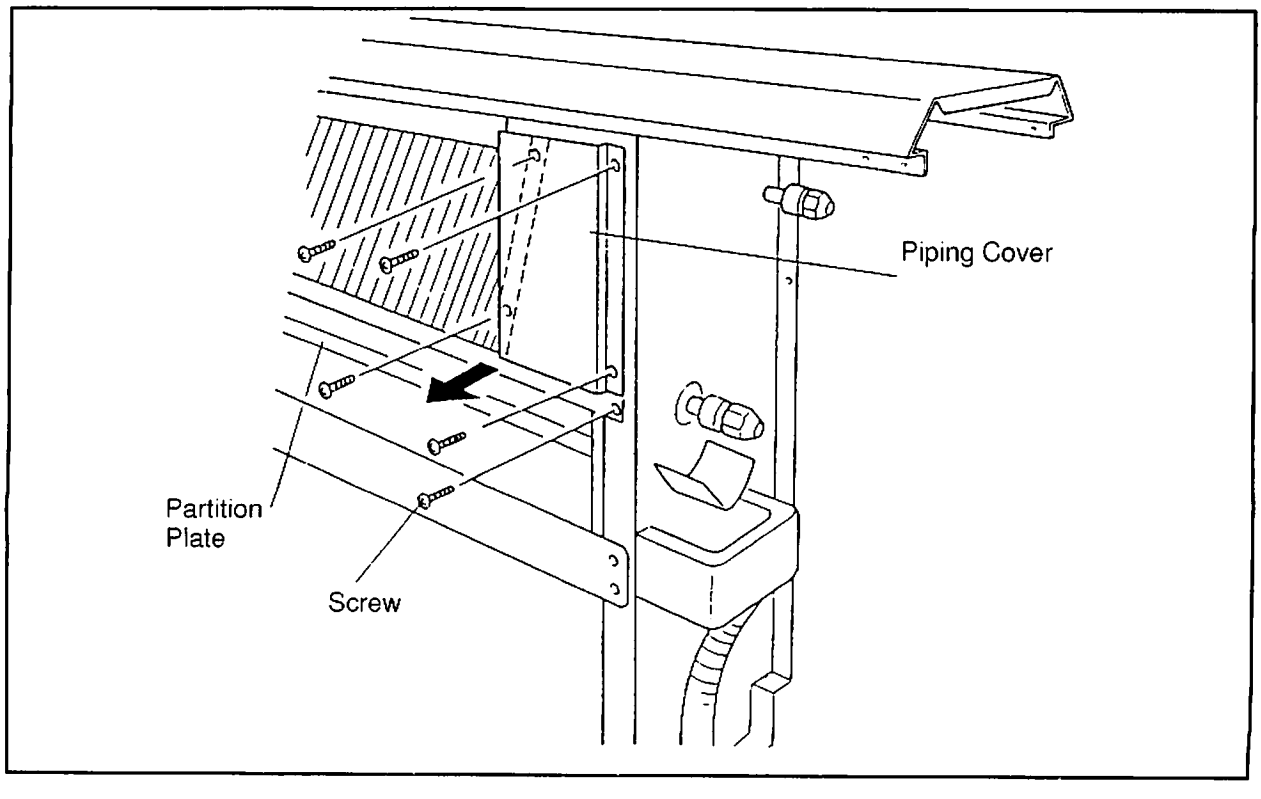
(2) Remove the air filter according to the item, 2.8.2, "Removing Air Filter".

(3) Remove the front cover according to the item, 2.8.4, "Removing Front Cover".

(4) Remove the side cover after removing three fixing screws.

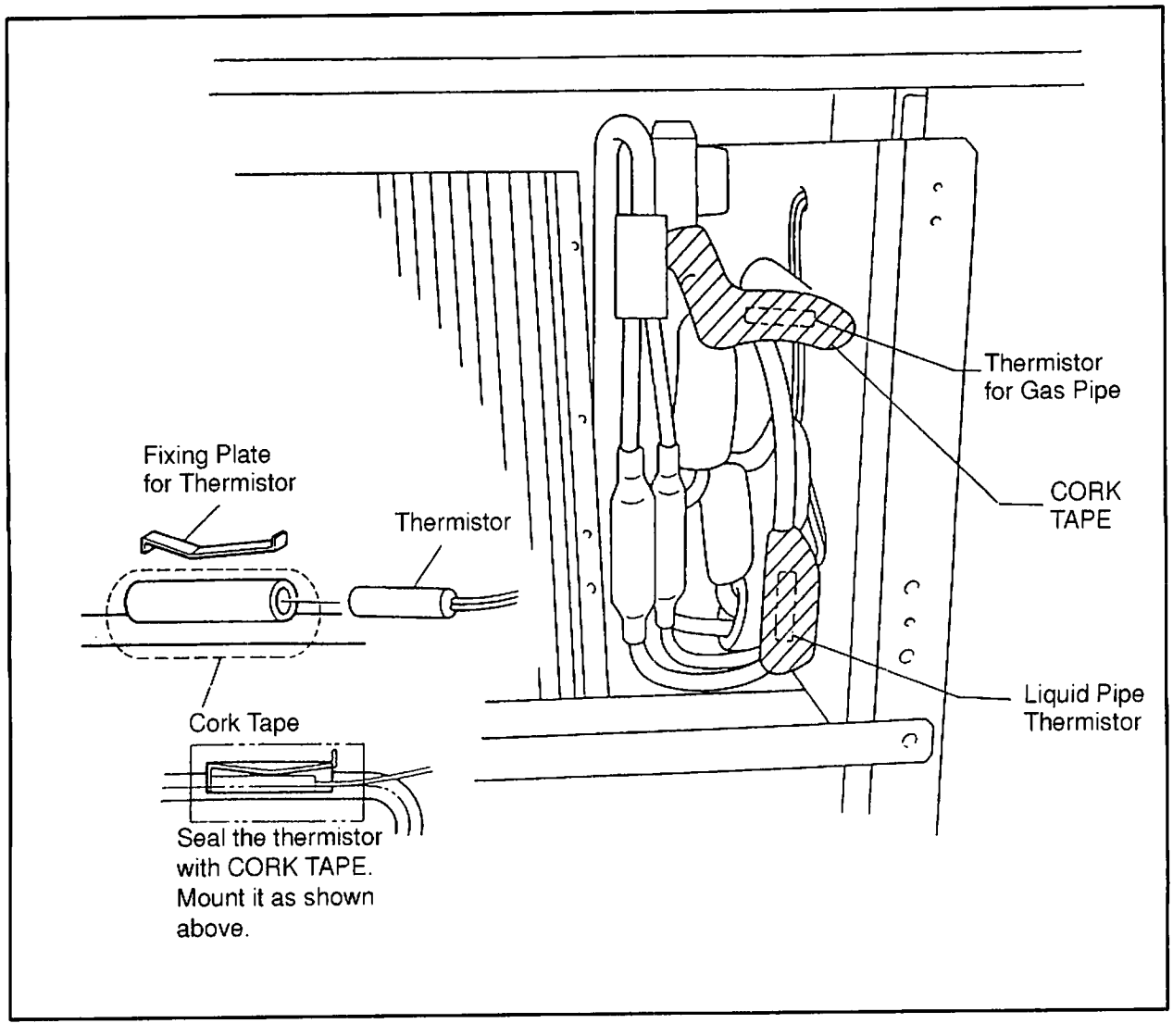


(5) Remove the piping cover after removing two fixing screws for the partition plate and four fixing screws for piping cover.



(2.8 Floor Type)

(6) Remove CORK TAPE and pull out the thermistor after removing the fixing plate for the thermistors.



2.9 Floor Concealed Type

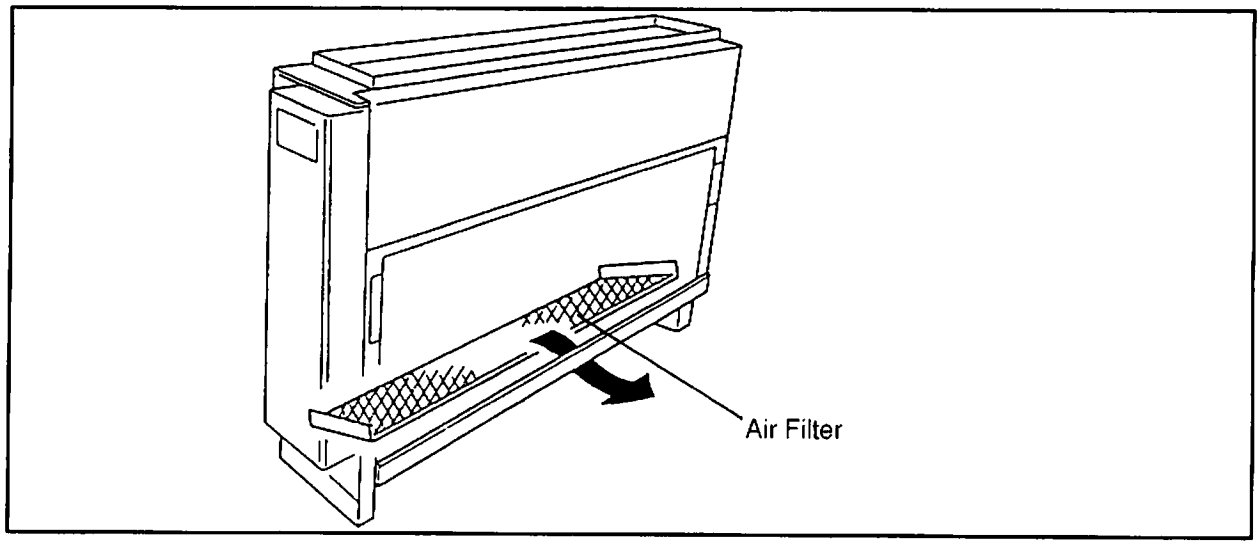
2.9.1 Removing Air Filter

⚠ WARNING

TURN OFF all power source switches.

(1) The air filter is located at the inner upper part of the inlet.

(2) Remove the air filter by pulling the center knob and bending the filter.



2.9.2 Removing Front Covers

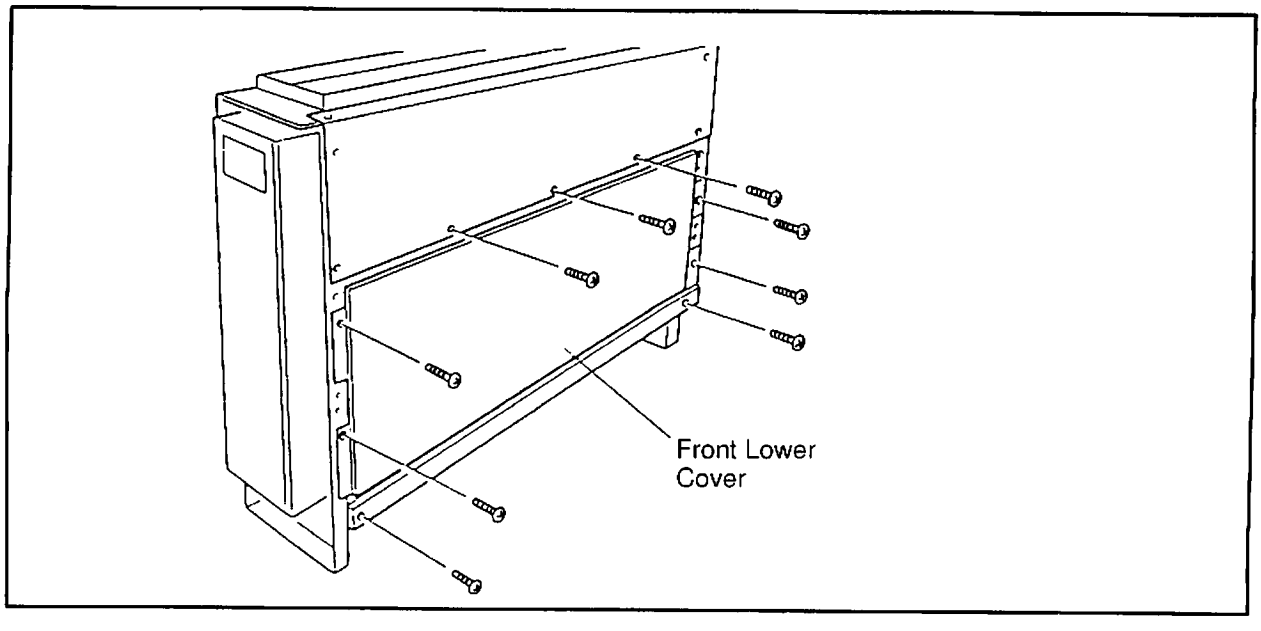
⚠ WARNING

TURN OFF all power source switches.

(1) Remove the air filter according to the item, 2.9.1, "Removing Air Filter".

(2) Remove the front lower cover after removing ten screws at the lower part of the front cover.

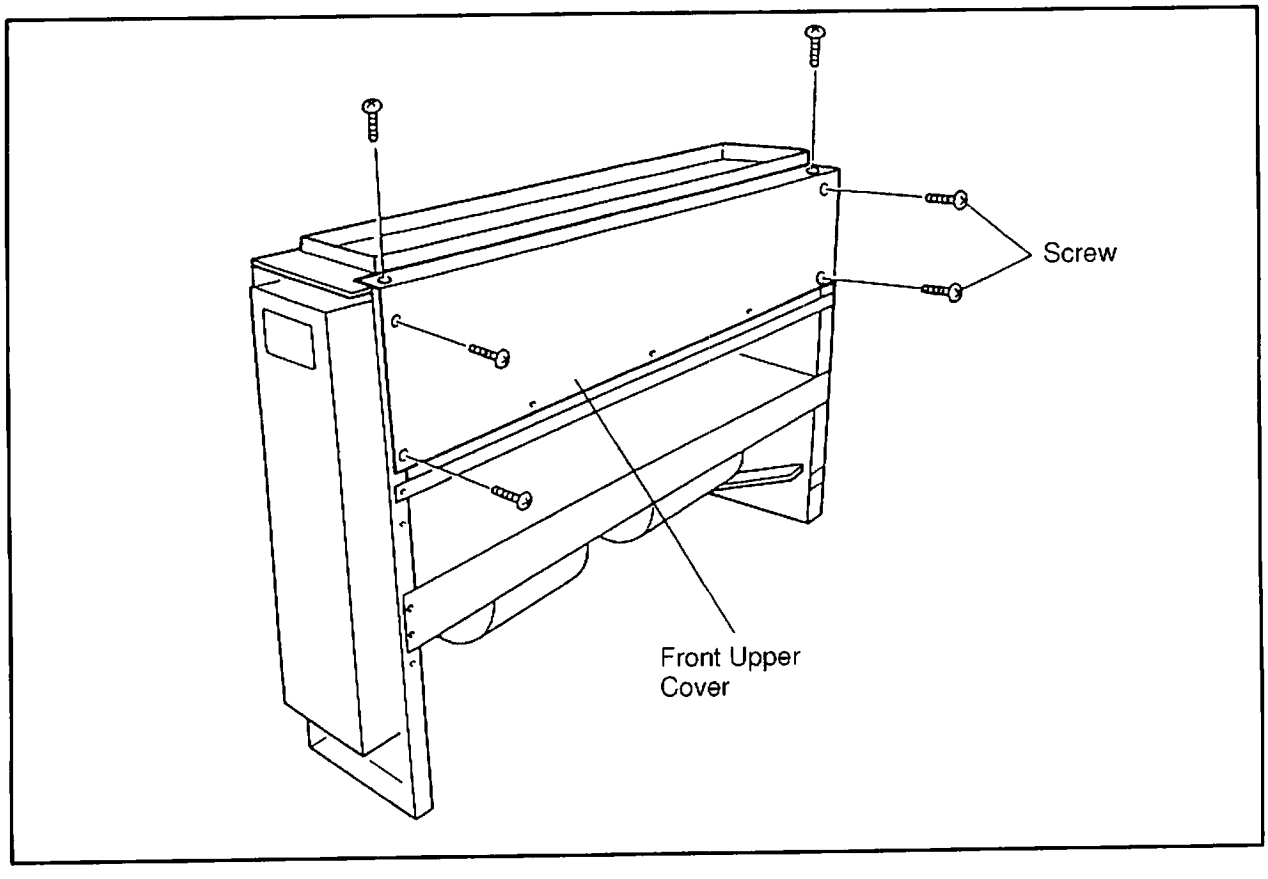
Tool	Phillips Screwdriver



(2.9 Floor Concealed Type)

(3) Remove the front upper cover after removing eleven fixing screws.

Tool	Phillips Screwdriver



2.9.3 Removing Fan Motor

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the air filter according to the item, 2.9.1, "Removing Air Filter".

(2) Remove the front covers according to the item, 2.9.2, "Removing Front Covers".

(3) Remove the fan motor as same as indicated in No. 4 to No.8 of the item, 2.8.5, "Removing Fan Motor".

Tool	Phillips Screwdriver, Hexagon Wrench

2.9.4 Removing Printed Circuit Board (PCB)

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the front covers according to the item, 2.9.2, "Removing Front Covers".

(2) Remove the PCBs as same as indicated in No. 5 to No.7 of the item, 2.8.6, "Removing Printed Circuit Board (PCB)".

Tool	Phillips Screwdriver, Pincers

2.9.5 Removing Thermistors for Liquid Pipe and Gas Pipe

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the air filter according to the item, 2.9.1, "Removing Air Filter".

(2) Remove the front covers according to the item, 2.9.2, "Removing Front Covers".

(3) Remove the thermistor as same as indicated in No. 4 to No.6 of the item, 2.8.7, "Removing Thermistors for Liquid Pipe and Gas Pipe".

Tool	Phillips Screwdriver

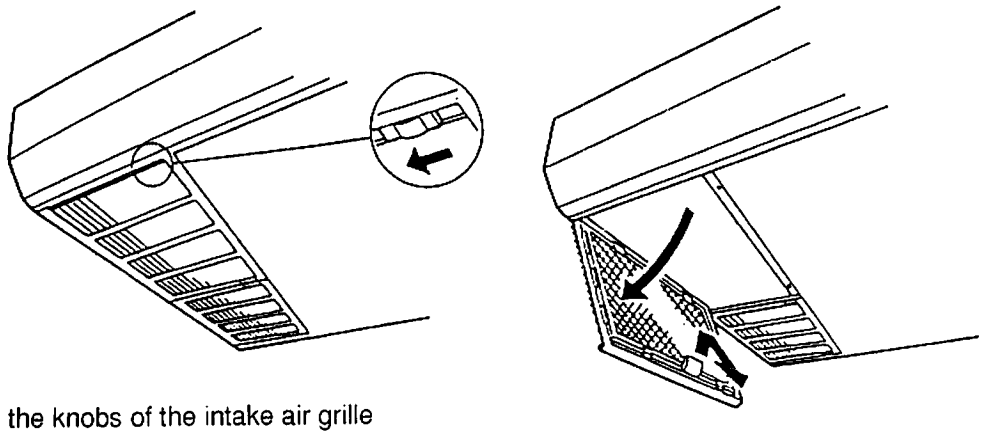
2.10 Ceiling Type

2.10.1 Removing Air Filter

⚠ WARNING

TURN OFF all power source switches.

(1) The air filter is located inside of the intake air grille. Remove the air filter after opening the intake air grilles.



① Push the knobs of the intake air grille backwards.
② Open the intake air grille downwards.
③ By lifting the knob upwards, the filter can be removed.

2.10.2 Removing Side Cover

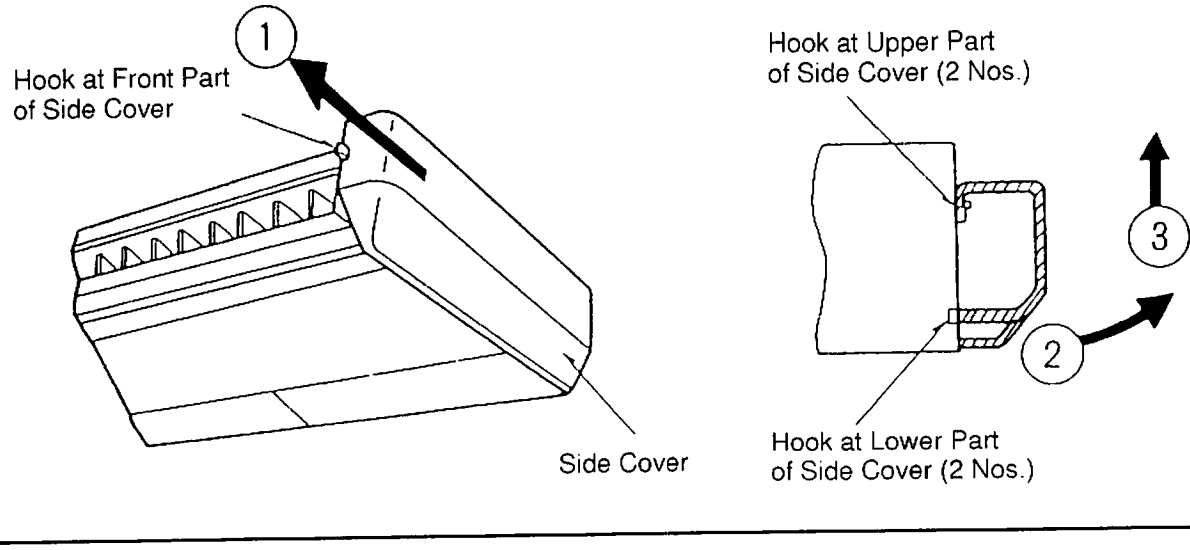
⚠ WARNING

TURN OFF all power source switches.

(1) Pull the side cover towards you.

(2) Unhook the hook at the lower part of the side cover.

(3) Lift it upwards.



2.10.3 Removing Discharge Air Grille

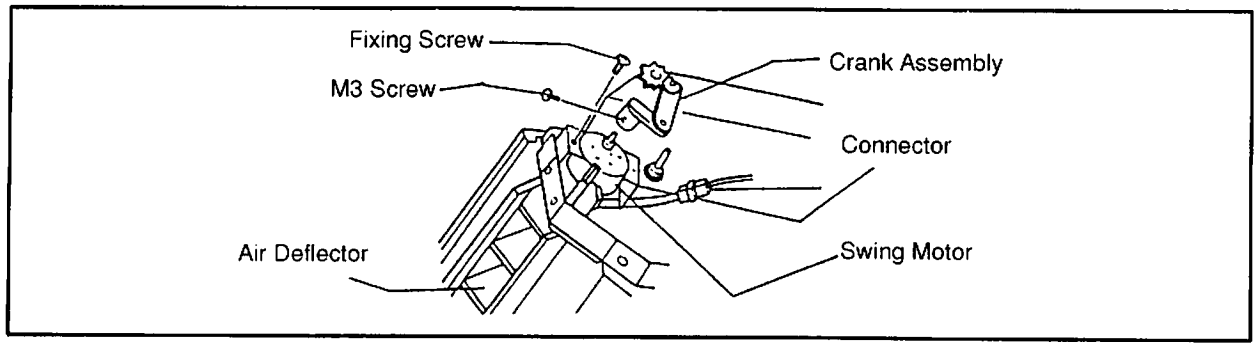
⚠ WARNING

TURN OFF all power source switches.

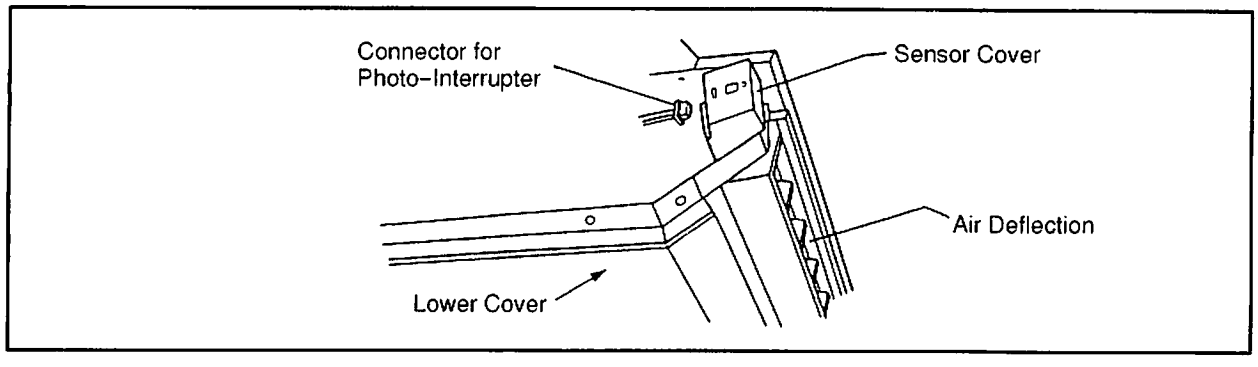
(1) Remove the side covers according to the item, 2.10.2, "Removing Side Cover".

(2) Remove the crank assembly mounted on the right side shaft of the air deflector.

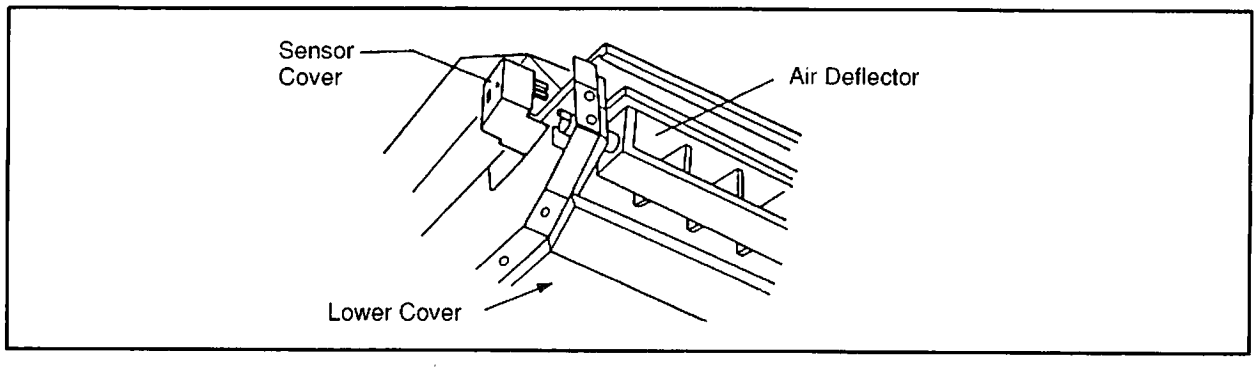
Tool	Phillips Screwdriver



(3) Disconnect the connector for the photo-interrupter at the left side.

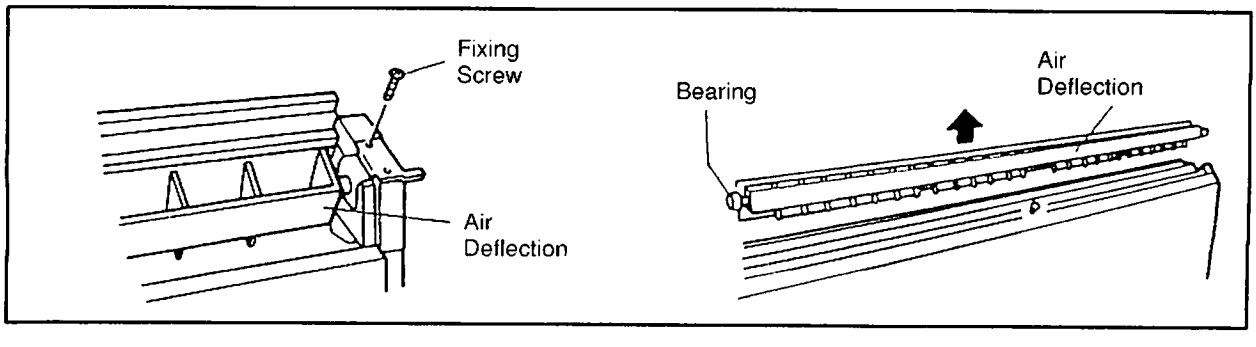


(4) Remove the sensor cover.



(5) Pull out the deflector including the bearing after removing four fixing screws at the right and left.

Tool	Phillips Screwdriver



2.10.4 Removing Fan Motor

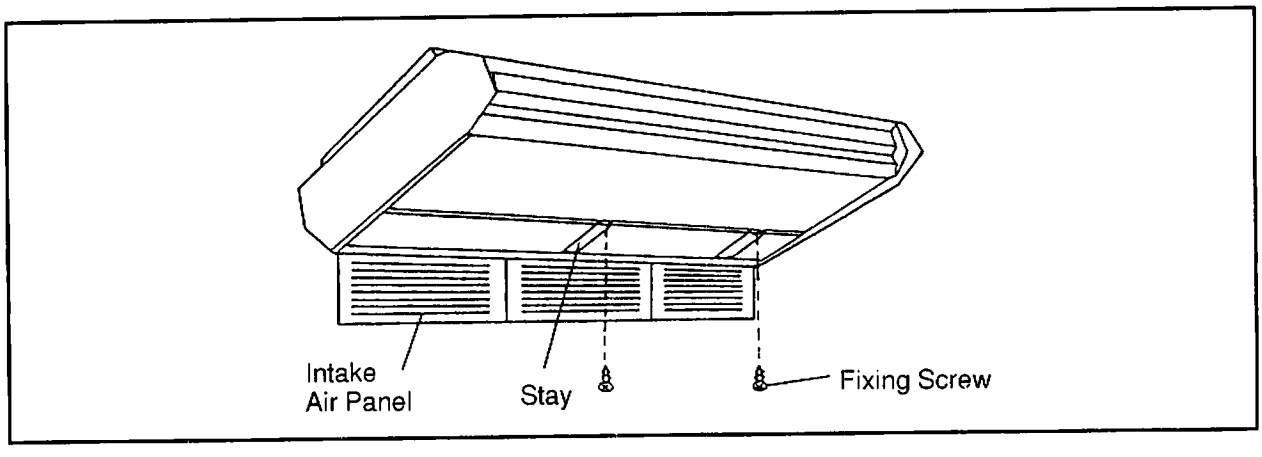
⚠ WARNING

TURN OFF all power source switches.

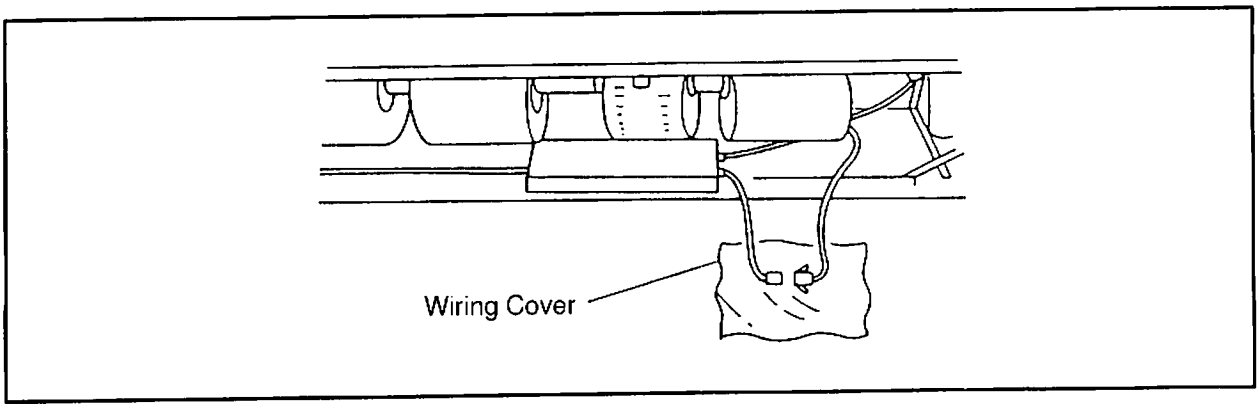
(1) Open the intake air grille according to the item, 2.10.1, "Removing Air Filter".

(2) Remove the stay at the air inlet.

Tool	Phillips Screwdriver

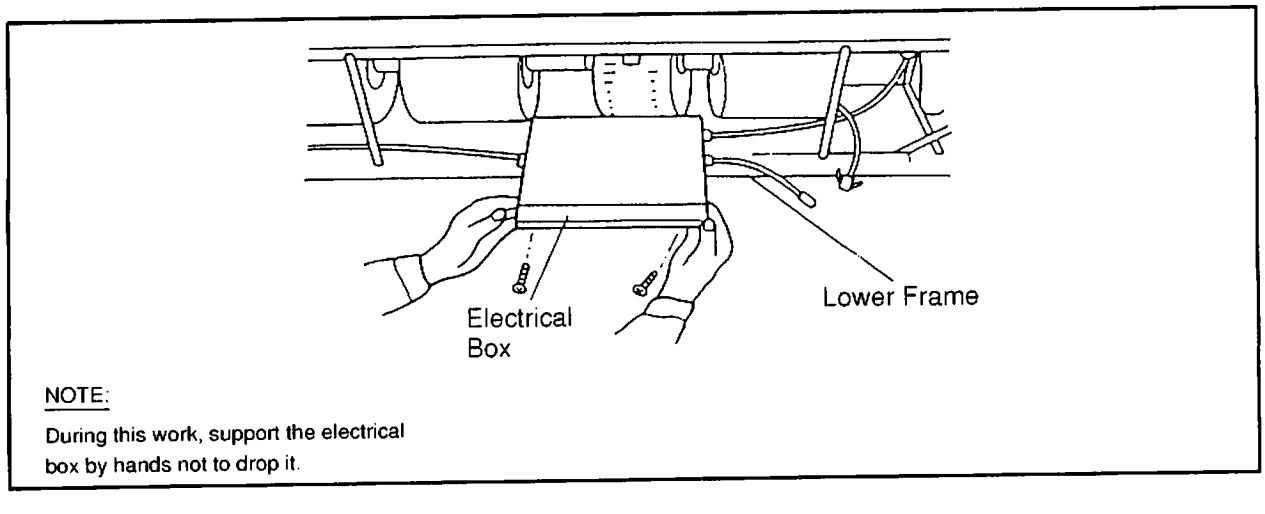


(3) Disconnect the connector for the indoor fan motor.



(4) Hook the electrical box on the lower frame after removing the screws fixing the electrical box.

Tool	Phillips Screwdriver

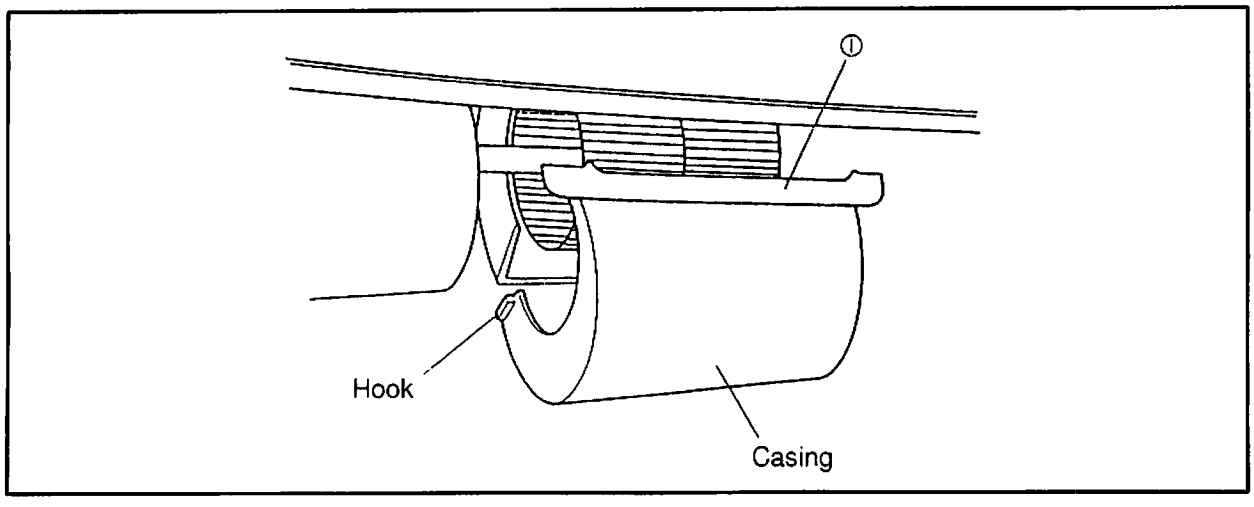


NOTE:

During this work, support the electrical box by hands not to drop it.

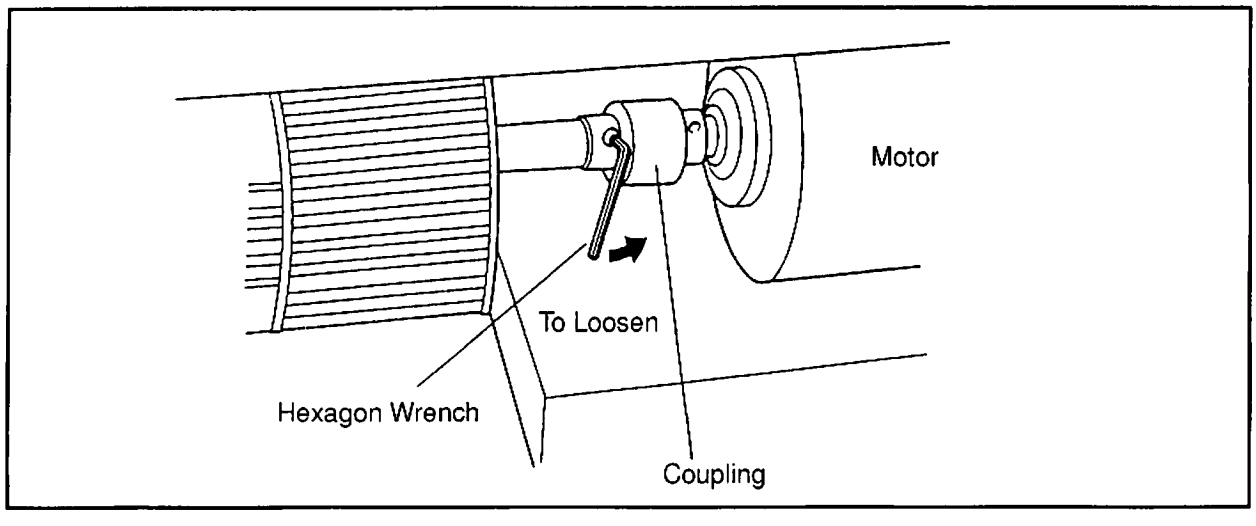
(5) Remove the casing ① by pushing the hook part at four positions towards the inner side.

Tool	Phillips Screwdriver



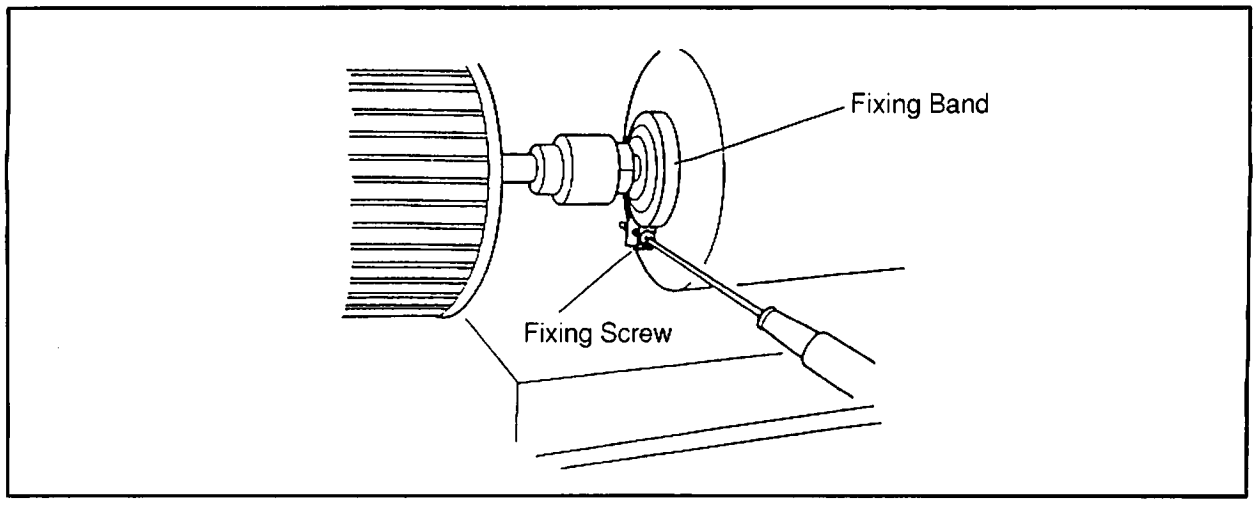
(6) Loosen the screws by a hexagon wrench.

Tool	Hexagon Wrench



(7) Remove the fan motor by sliding it backwards after removing the fixing band. Pay attention not to drop it.

Tool	Phillips Screwdriver



2.10.5 Removing Bearing

⚠ WARNING

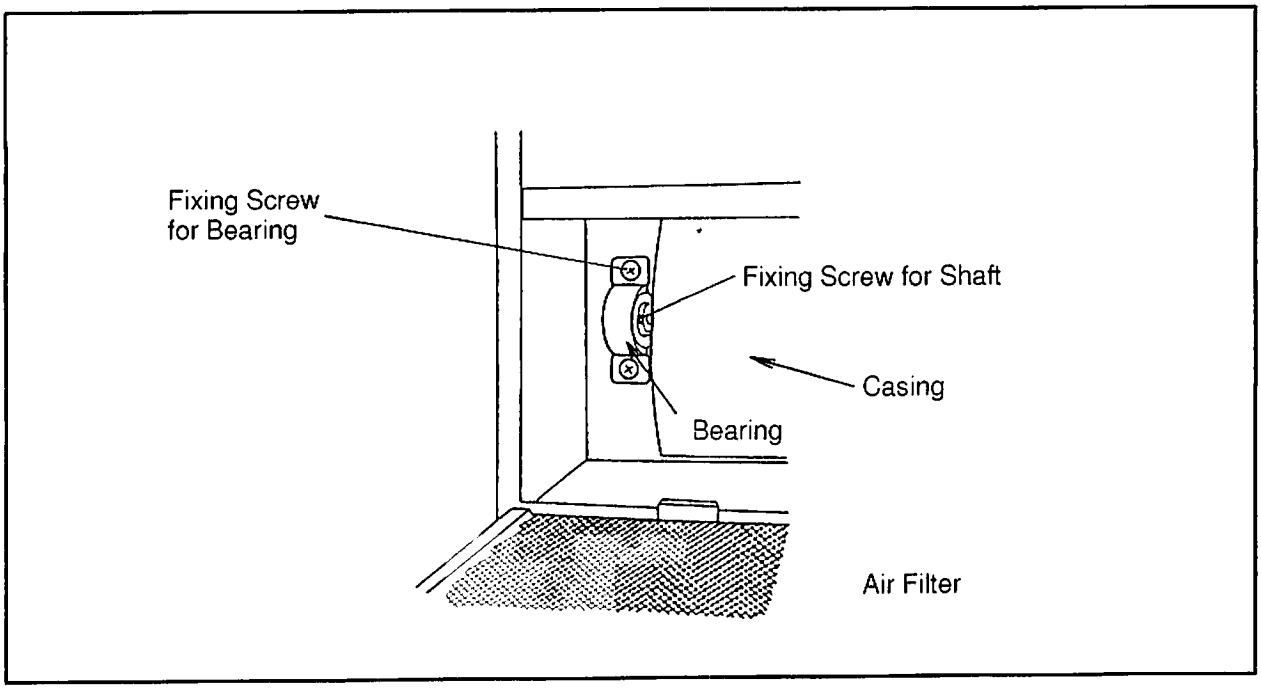
TURN OFF all power source switches.

(1) Remove the side covers according to the item, 2.10.2, "Removing Side Cover".

(2) Loosen two screws fixing the bearing and shaft by a hexagon wrench.

(3) Remove the bearing after removing two fixing screws (M8).

Tool	Hexagon Wrench, Phillips Screwdriver



2.10.6 Removing Coupling

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the side covers according to the item, 2.10.2, "Removing Side Cover".

(2) Separate the casing into two pieces according to the item, 2.10.4, "Removing Fan Motor". Loosen the screw for the coupling by a hexagon wrench.

(3) Remove the M8 screw fixing the bearing according to the item, 2.10.5, "Removing Bearing".

(4) Remove the coupling after removing the shaft and fan runner assembly.

2.10.7 Removing Automatic Louver Motor

⚠ WARNING

TURN OFF all power source switches.

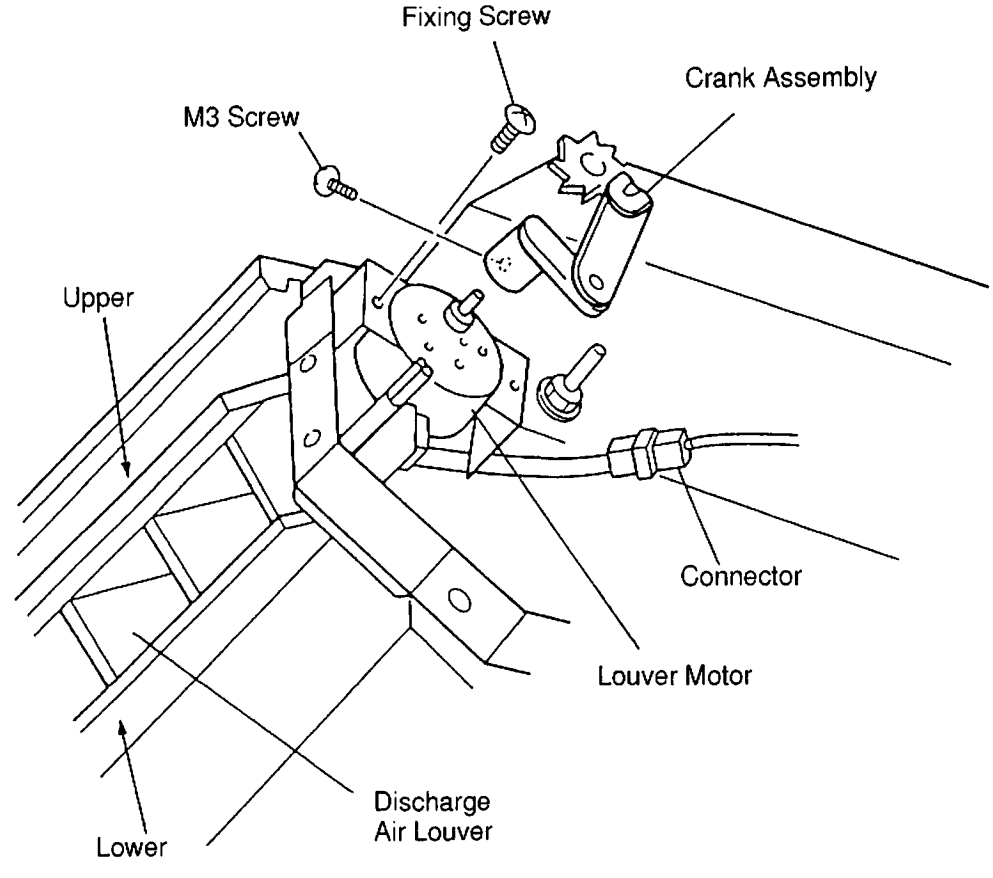
(1) Remove the side covers according to the item, 2.10.2, "Removing Side Cover".

(2) Remove the crank assembly after removing the two M3 screws. Pay attention not to damage the crank assembly.

(3) Disconnect the connector for the louver motor.

(4) Remove the motor after removing two fixing screws.

Tool	Phillips Screwdriver



NOTE:
When assembling, tighten two screws with a torque of 3.5kg-cm using a torque wrench. When the crank assembly is disassembled, the louver will be positioned upside down due to its weight. Therefore, when assembling, set the louver correctly as it was.

Tool	Torque Wrench

(2.10 Ceiling Type)

2.10.8 Troubleshooting on Automatic Louver

■ The louver does not turn.
■ The louver stops quickly.

⇩

Check the following connectors are correctly connected.
① Louver Sensor connector on PCB
② Photo-Interrupter Connector (Fig.1)
③ PCB Connector for Louver Motor (PCN8)
④ Mediate Connector Connected to ③

⇩

⑤ Check to ensure that the extruded part of the sensor cover is firmly inserted. (Fig. 1)

⇩

⑥ Check to ensure that the sensor flap is correctly mounted on the shaft. (Fig. 2)

⇩

⑦ Check to ensure that the sensor flap can cross the photo-interrupter.

⇩

(Measure it in a KΩ range.)

⑧ Measure the resistance of the photo-interrupter between No.1 pin (⊖) and No.2 pin (⊕), or between No.1 pin (⊕) and No.2 pin (⊖). Is the resistance greater than 500 KΩ?

No ⇩ Replace photo-interrupter.

⇩

⑨ Does the louver motor rotate by applying 220V?

No ⇩ Replace louver motor.

⇩

⑩ Is 220V applied between MS of PCN8 and S phase of PCN6 on the indoor unit PCB?

No ⇩ Replace PCB.

⇩

⑪ Is DC24 of output obtained between No.1 and No.2 of the louver sensor connector? Or, DC5V between No.3 and No.2?

No ⇩ Replace PCB.

⇩

⑫ Is the indication on the remote control switch shown when the louver switch is depressed?

No ⇩ Replace remote control switch.

⇩

END

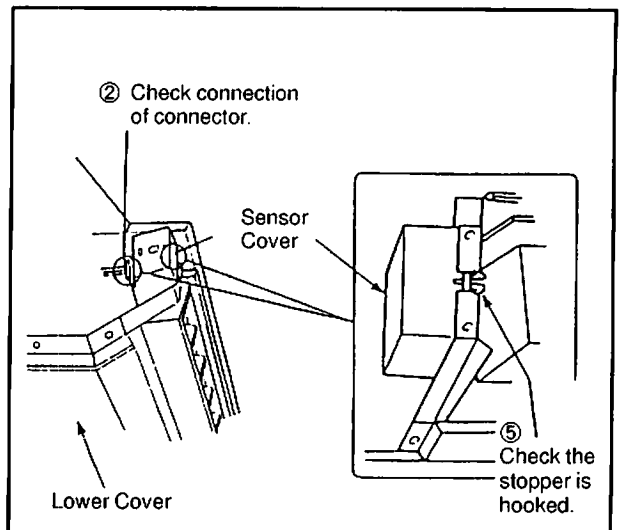


Fig. 1 Connector for Photo-Interrupter

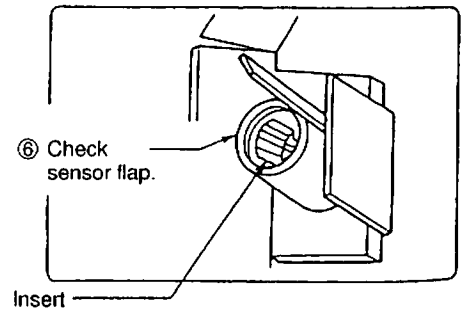


Fig. 2 Sensor Flap

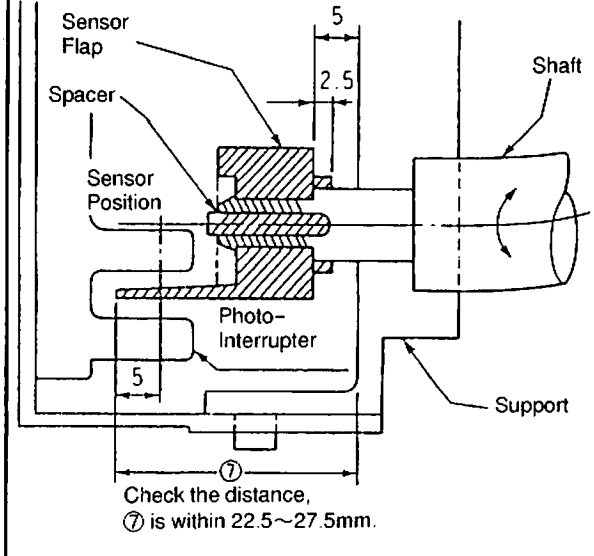


Fig. 3 Sensor Flap and Photo-Interrupter

NOTE:

Utilization of the automatic louver mechanism is checked by the PCB within one minute after power supply.
Check the function after power supply when repairing work is completed.

2.10.9 Removing Thermistors for Liquid Pipe and Gas Pipe

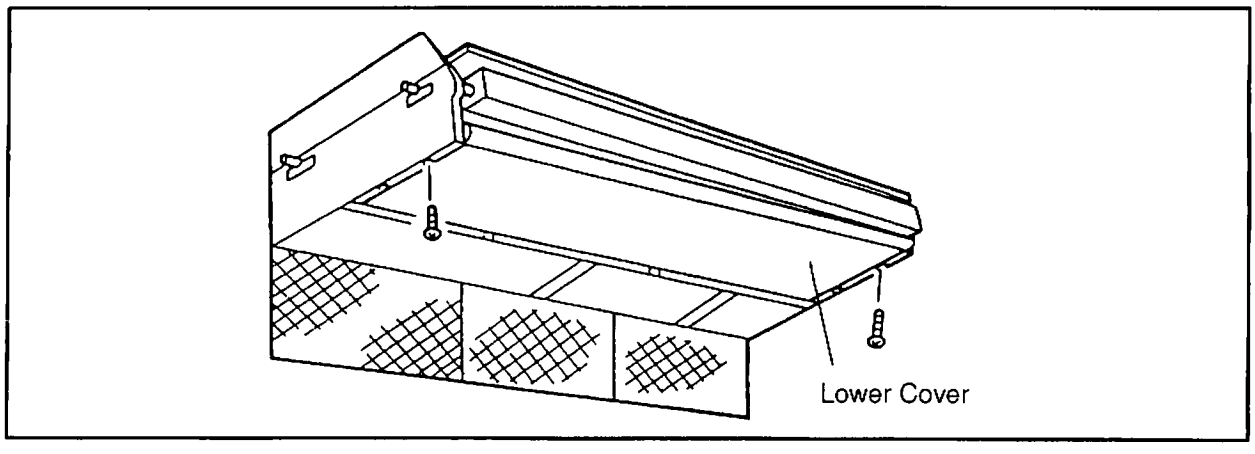
⚠ WARNING

TURN OFF all power source switches.

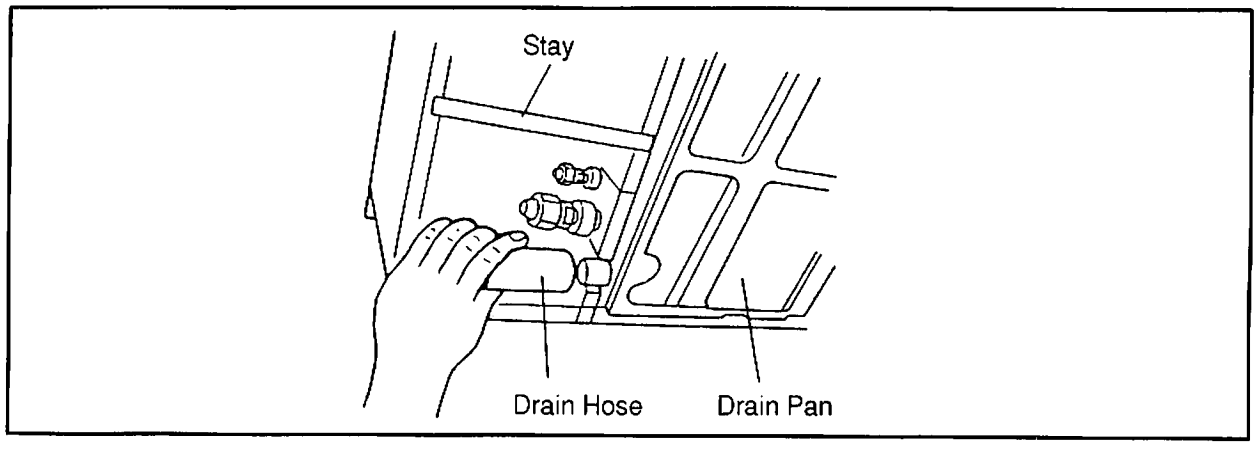
(1) Remove the right and left side covers according to the item, 2.10.2, "Removing Side Cover".

(2) Remove the lower cover.

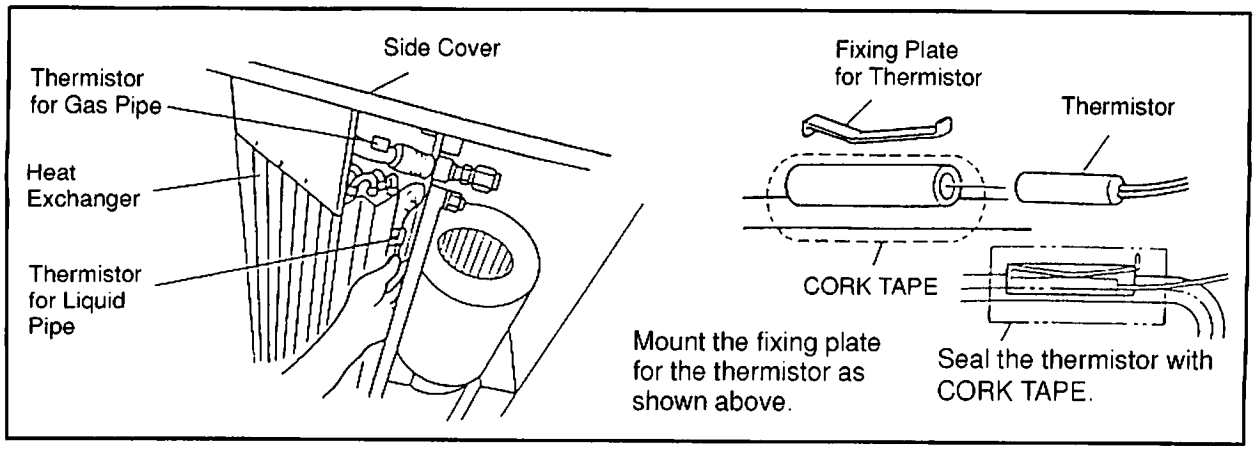
Tool	Phillips Screwdriver



(3) Remove the drain pan after disconnecting the drain hose.



(4) Remove the thermistors for the liquid pipe and gas pipe.



2.10.10 Removing Printed Circuit Board (PCB)

⚠ WARNING

TURN OFF all power source switches.

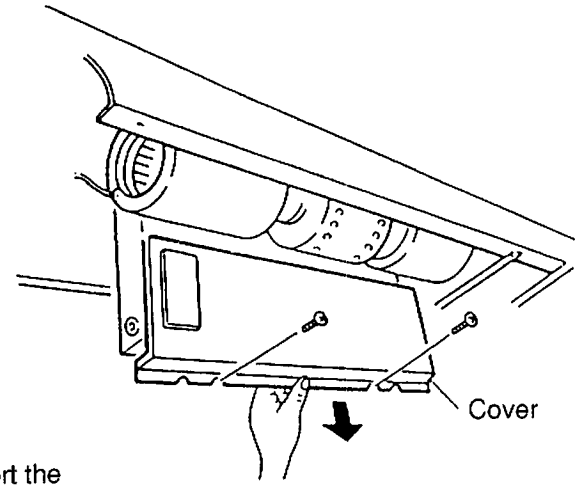
(1) Open the intake air panel according to the item, 2.10.1, "Removing Air Filter".

(2) Disconnect the wiring connector for the fan motor.

(3) Turn the electrical box according to No. 4 of the item, 2.10.4, "Removing Fan Motor" and hook the electrical box at the lower frame.

(4) Remove the cover after removing two screws fixings electrical box cover.

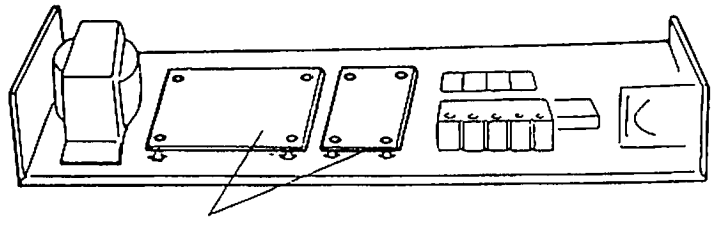
Tool	Phillips Screwdriver

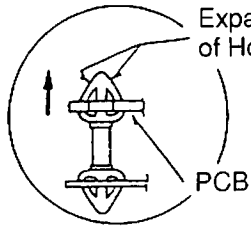


NOTE:
During this work, support the electrical box not to drop it.

(5) There are two PCBs. The PCB is supported by four holders. Pinch the expanded part of the holder with long-nose pliers.

Tool	Long-nose Pliers

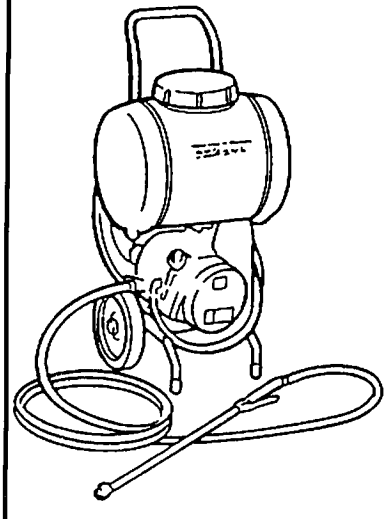
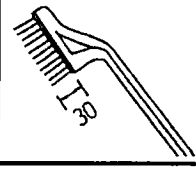




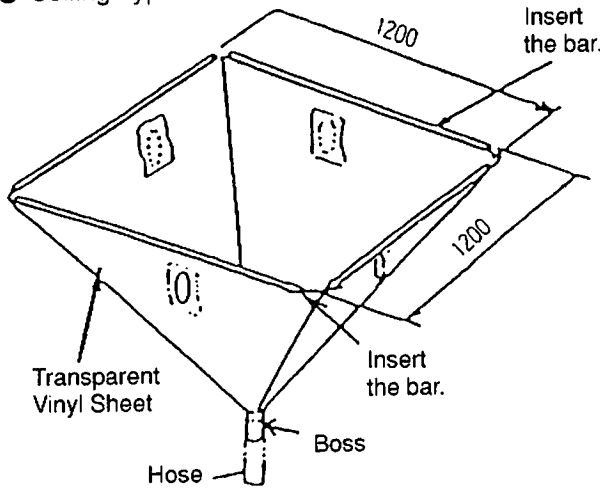
NOTE:
Do not touch the electrical components. Do not apply big force to the PCB. If applied, the PCB will be faulty.

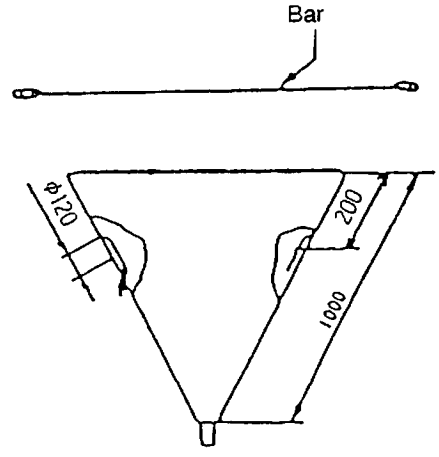
2.11 Cleaning Indoor Unit Heat Exchanger

2.11.1 Required Tools for Cleaning (for All Indoor Units)

No.	Remark	No.	Tool	Remark
1	Cleaning Water Pump A water pump equipped with a tank is recommended. 	2	Water Tank Clean Water	Approx. 18 liters
		3	Nozzle	
		4	Brush (non-metal) 	If the heat exchanger is heavily clogged with dust, remove it with this brush. The length of brush should be 25~35mm.
		5	Hose for Water Pan	Select a hose according to site requirements.
		6	Bucket	2 Nos. for 5 liters
		7	Phillips Screwdriver	1 No.
		8	Pincers	1 No.
		9	Adjustable Wrench	1 No.
		10	Megohm Tester	500V
		11	Cleaning Agent	Select a neutral type cleaning agent.
		12	Spray	To spray cleaning water.
		13	Tape with Adhesive	To fix the vinyl sheet to protect the room from cleaning water.
		14	Rope	1m, 4 Pieces
		15	Vinyl Sheet	Select a vinyl sheet with 0.5mm thickness.
		16	Gloves	

No.	Remark
17	Cleaning Water Collector ● In-the-Ceiling Type ● 2-Way Cassette Type ● Wall Type ● Ceiling Type

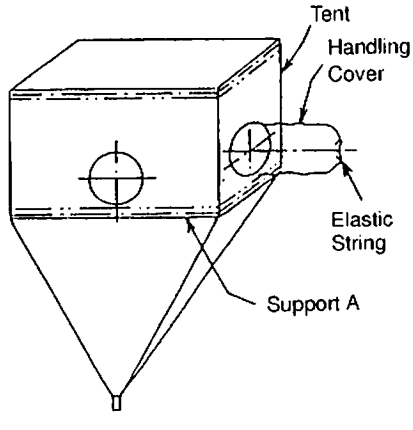


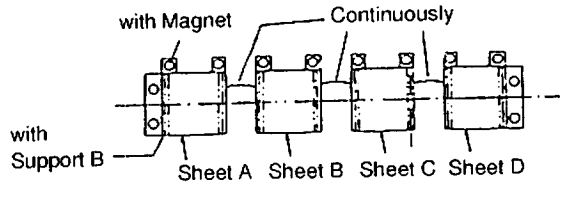


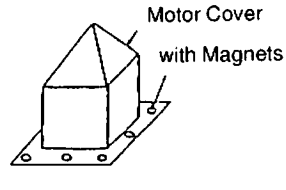
Inner Side of φ120 hole should be covered with felt sheet to insert the spray nozzle.

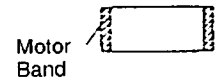
18 Cleaning Water Collector Kit
● 4-Way Cassette Type

No	Part	Material	Remarks	Q'ty
1	Tent with Handling Cover	Vinyl Chloride Sheet	1t, with Handling Cover 0.3t	1
2	Support A	Stainless	φ10	8
3	Sheet A	Vinyl Chloride Sheet	1t, with Support B and Magnet	1
4	Sheet B	Vinyl Chloride Sheet	1t, with Support B and Magnet	1
5	Sheet C	Vinyl Chloride Sheet	1t, with Support B and Magnet	1
6	Sheet D	Vinyl Chloride Sheet	1t, with Support B and Magnet	1
7	Motor Cover	Vinyl Chloride Sheet	1t, with Magnet	1
8	Motor Band	Vinyl Chloride Sheet	1t, Magic Tape	1
9	Wiring Cover	Vinyl Chloride Sheet		1
10	Gloves	Rubber		1
11	Sling Rope		1m	4









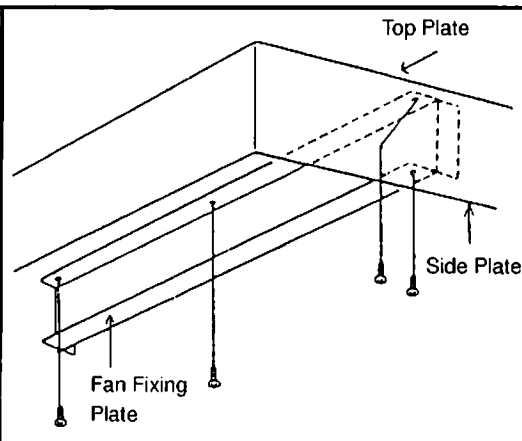
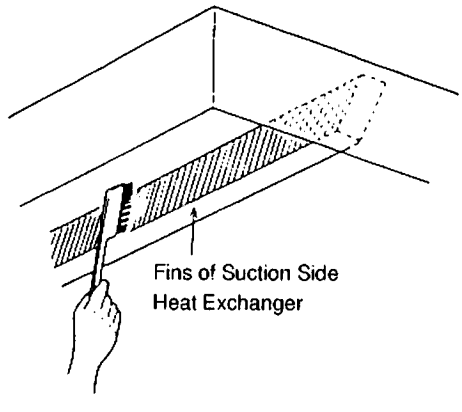
2.11.2 In-the-Ceiling Type

⚠ WARNING

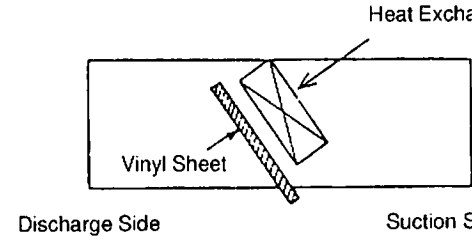
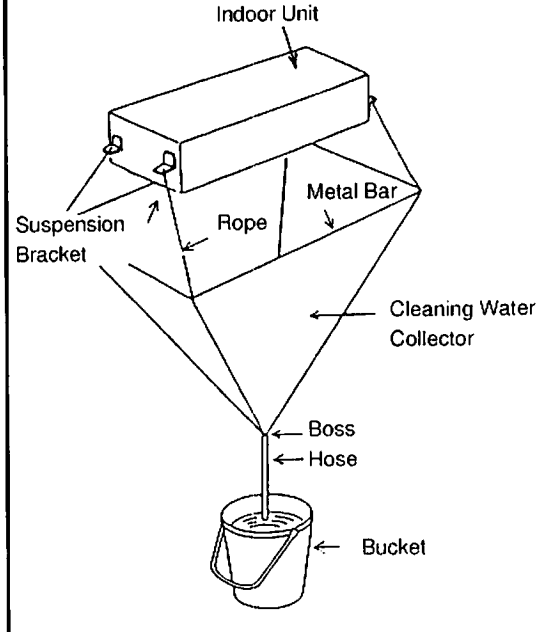
TURN OFF all power source switches.

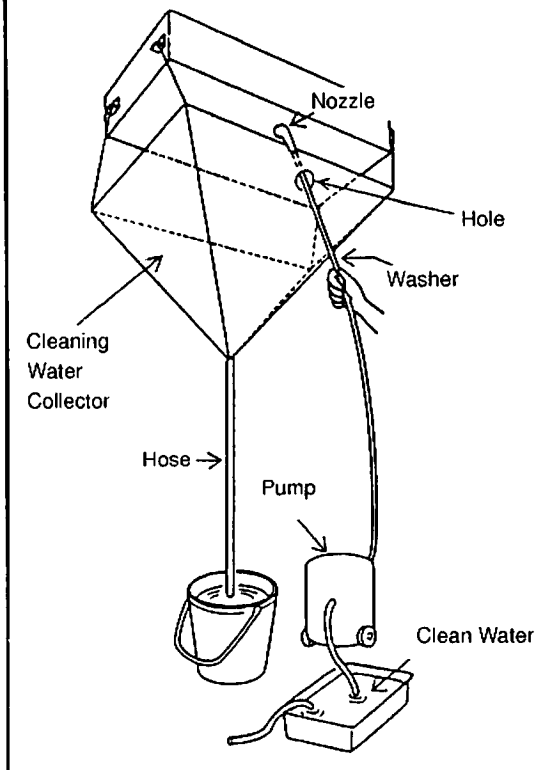
● Before cleaning, cover the floor with a vinyl sheet.

* Refer to Chapter 2.11.1 about cleaning tools.

Step	Procedure		Required Tool
1	Remove the drain pan according to the items, 2.2.6, 2.3.5 and 2.4.5, "Removing Drain Pan" and clean the drain pan.		
2	Remove the indoor fan motor and the fan runner assembly according to the items 2.2.1, 2.3.1 and 2.4.2 "Removing Indoor Fan Motor".		
3	Removing Fan Fixing Plate	 Remove the screws fixing the fan fixing plate and then pull out the fan fixing plate downwards. After removing the fan fixing plate, cover the lead wire with a vinyl sheet to avoid cleaning water.	•Phillips Screwdriver
4	Removing Dust Clogged in Heat Exchanger	 Scratch and remove the dust clogged in the fins of the suction side exchanger with a brush. Collect the dust in a bucket.	•Brush •Bucket or Paper Board Box

(2.11 Cleaning Indoor Unit Heat Exchanger)

Step	Procedure		Required Tool
5	Protection from Cleaning Water	 Cover the discharge side of the heat exchanger with a vinyl sheet to protect the insulation materials inside the unit from cleaning water. Seal the vinyl sheet properly so as to make no gaps with the adhesive tape. NOTE: Perform the work by wearing gloves to prevent any injuries from touching the fins of the heat exchanger. Attach the vinyl sheet to protect the insulation materials from the cleaning water. (A transparent board is also applicable instead of the vinyl sheet.)	•Vinyl Sheet •Adhesive Tape •Cutter
6	Attaching Cleaning Water Pan	 Hang a cleaning water collector from the indoor unit. (1) Attach ropes to the suspension brackets. (2) Put the metal bars through the holes of the cleaning water collector. (3) Attach the ropes to the four bars of the cleaning water collector and suspend the cleaning water collector. (4) Attach the hose to the boss of the cleaning water collector and set the bucket at the end of the hose.	
7	Spraying the Cleaning Water	Spray the cleaning water over the fins of the heat exchanger.	•Cleaning Agent

Step	Procedure		Required Tool
8	Cleaning with Clean Water	 Insert the nozzle into the hole of the cleaning water collector. Operate the pump, wash the dust off on the fins with clean water thoroughly. If the cleaning agent is left on the fins, it may cause corrosion.) Adjust the pressure of the spray at approximately 2.5 to 5.0 kg/cm² so as not to crush the fins and direct the nozzle in a straight line toward the fins.	•Water Tank •Pump •Washer
9	Make sure that there are no drops of water left after cleaning the fins and reassemble the fan assembly and the drain pan.		•Screwdriver •Hexagon Wrench
10	Measure the condition of insulation of the drain pump with a megohm-meter tester. (Check to ensure that the resistance is bigger than 1 MΩ at 500V.)		
11	Connect the electrical wiring as it was.		•Screwdriver
12	Neutralization Treatment after Cleaning The cleaning agent specified in the item, 2.11.1, is of neutral type. However, the cleaning water after cleaning may be not neutral due to dust or other foreign particles. Collect all cleaning water and make necessary neutralization for the cleaning water.		

(2.11 Cleaning Indoor Unit Heat Exchanger)

2.11.3 Cleaning 4-Way Cassette type Indoor Unit

Spread a vinyl sheet over the floor to protect furnitures, etc. from cleaning water before this work.

⚠ WARNING

TURN OFF all power source switches.

No.	Procedure	Tool
1	Remove the optional air panel according to page 2-55 and the item, 2.5.4, "Removing Optional Air Panel".	Phillips Screwdriver
2	Remove the electrical box after opening the electrical box cover and disconnecting the connectors between the indoor and outdoor units and other connectors according to page 2-54 and the item, 2.5.3, "Removing Electrical Box Cover".	Phillips Screwdriver
3	Remove the bell-mouth and fan according to page 2-56 and the item, 2.5.5, "Removing Fan Runner and Fan Motor".	Phillips Screwdriver Adjustable Wrench
4	Remove the drain pan according to page 2-61 and the item, 2.5.9, "Removing Drain Pan".	Phillips Screwdriver
5	Remove the float switch according to page 2-59 and the item, 2.5.7, "Removing Float Switch".	Phillips Screwdriver
6	Remove the drain-up mechanism according to page 2-60 and the item, 2.5.8, "Removing Drain-up Mechanism".	Phillips Screwdriver

NOTES:

Remove the drain pan after removing drain water on the drain pan.

① Remove the drain water on the drain pan after pulling out the rubber plug. Check to ensure that water can flow smoothly through the hole by pricking it with a pencil.

② Insert the rubber plug into the hole after the above checking.

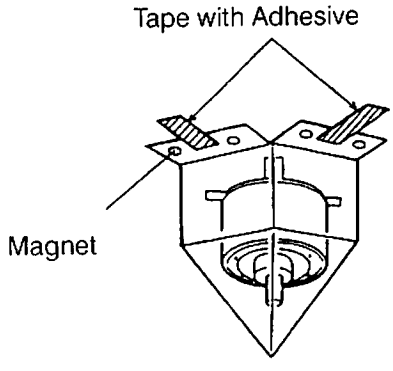
③ Remove the drain pan after removing four fixing screws. Carefully remove the drain pan, since drain water may remain at the bottom of the drain pan.

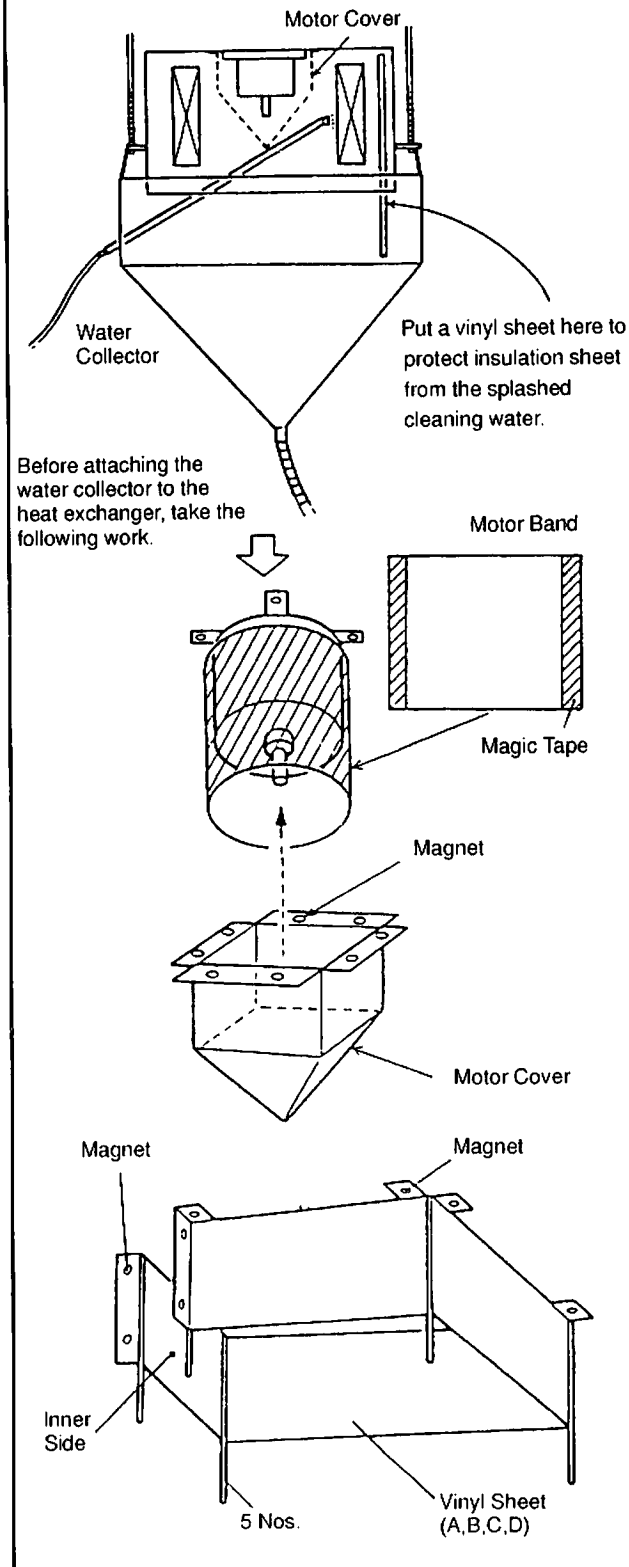
④ Clean and dry the drain pan after removing. Carefully handle the drain pan not to damage it.

⚠ WARNING

TURN OFF all power source switches.

(1) Attach a vinyl sheet around the heat exchanger so that cleaning water will not be splashed over the insulation surface and drain-up pump. Fix the vinyl sheet on the side plate of the heat exchanger by using tape with adhesive. Seal the gap between vinyl sheets using tape with adhesive.



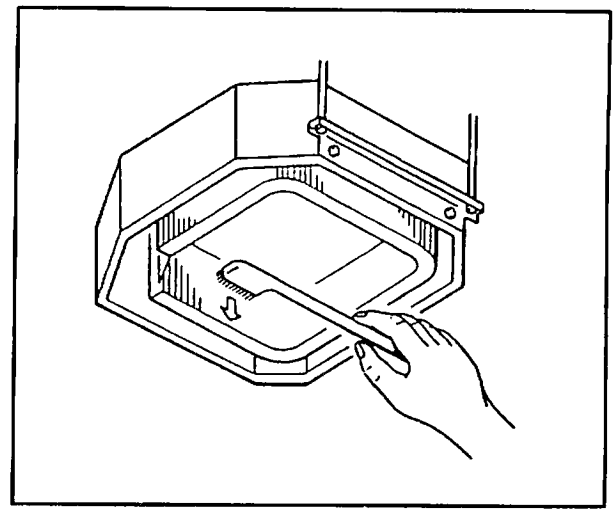


NOTES:
1. Wear gloves to avoid any injury by fins of the heat exchanger.
2. In addition to magnets, fix the motor cover using tape with adhesive.

Tool	Vinyl Sheet, Tape, Cutter and Phillips Screwdriver

(2.11 Cleaning Indoor Unit Heat Exchanger)

(2) Scratch off the dust on the inner surface of the heat exchanger downwards using a brush. Collect all dust in a bucket or carton box.



Tool	Brush, Bucket (or Carton Box)

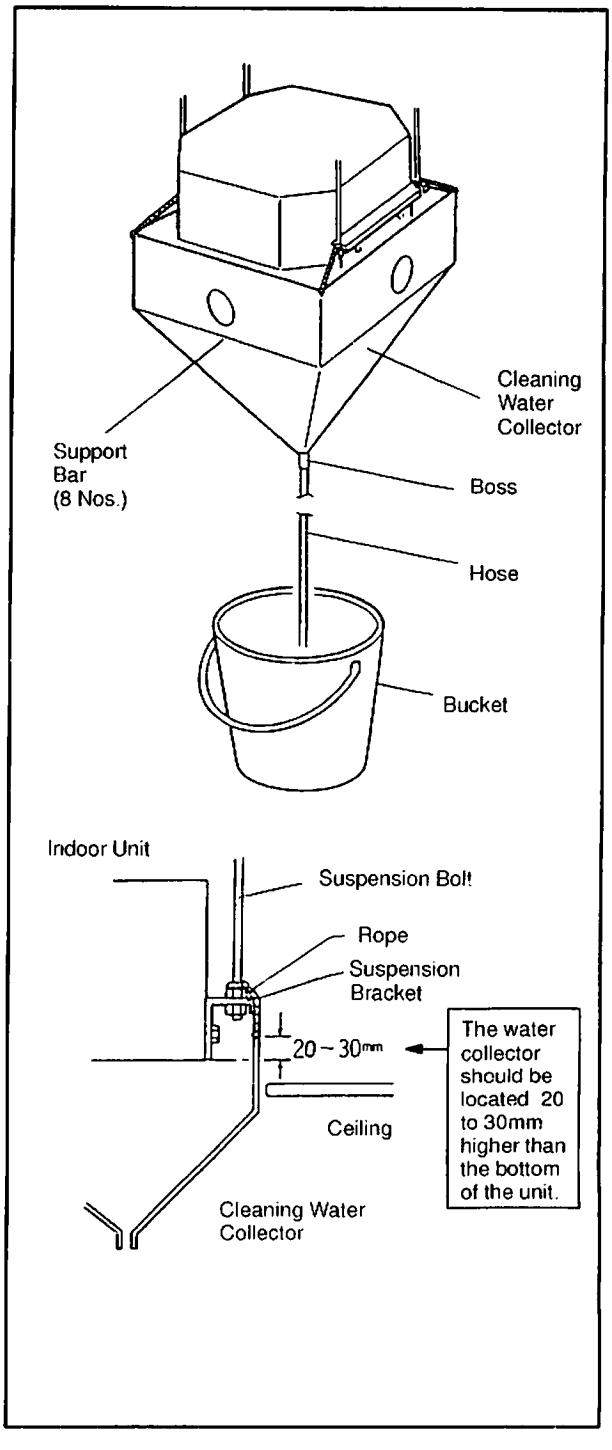
(3) Suspend the cleaning water collector from the indoor unit.

a. Tie the rope on the suspension bolts for the indoor unit and put it downwards.

b. Insert the support bars into the holes of the water collector.

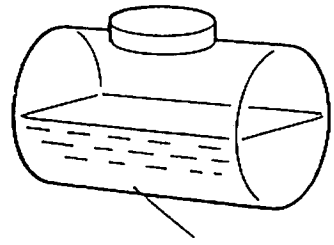
c. Tie the rope on the support bar of the water collector and suspend the water collector.

d. Connect a hose to the boss and put the end of the hose in a bucket.

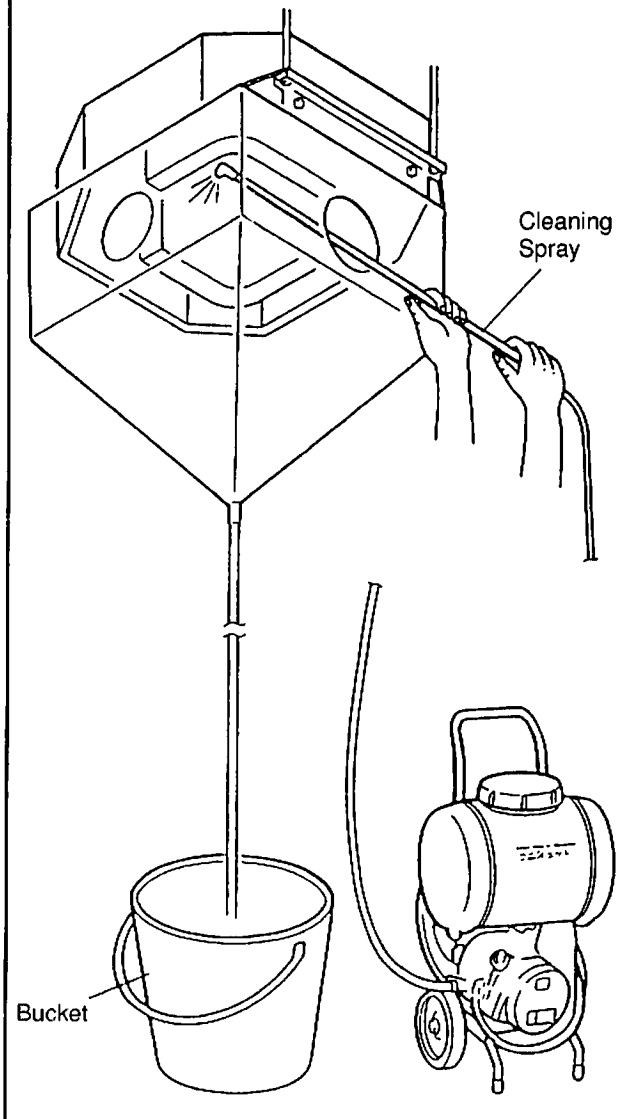


Tool	Cutter, Bucket

(4) Put approximately 15 liters of cleaning agent for aluminum fins in a supply tank.



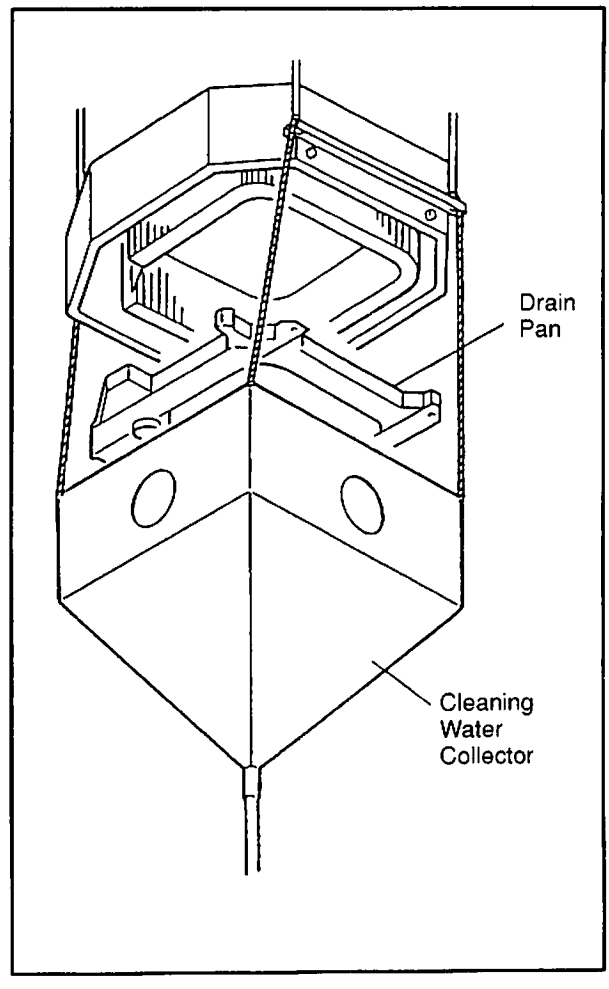
(5) Insert the spray nozzle through the hole of the cleaning water collector. Operate the water pump and clean the dust on the heat exchanger. After cleaning, spray clean water to remove the cleaning water. Adjust the pressure of the water pump so as not to damage the fins.



NOTES:
1. If the cleaning water remains, fins will be corroded.
2. Adjust the pressure of the pump at 2.5 to 5.0 kg/cm2 so as not to damage fins.

Tool	Clean Water, Cleaning Agent, Water Pump, Cleaning Spray

(6) After cleaning, mount the drain pan by extending the rope downwards.



NOTE:
In the case that the cleaning water collector is removed, wipe off the drops from the indoor unit.

Tool	Phillips Screwdriver

(7) Check the insulation of the drain pump with a megohm-meter. Check to ensure that the insulation is grater than 1 MΩ when 500V is applied.

(8) Connect wiring as it was.

(9) Neutralization Treatment after Cleaning
The cleaning agent specified in the item, 2.11.1 is of the neutral type. However, the cleaning water after use may be not neutral. Collect all cleaning water and make necessary neutralization treatment for the cleaning water.

2.11.4 Cleaning 2-Way Cassette Type Indoor Unit

Spread a vinyl sheet over the floor to protect furnitures, etc. from cleaning water before this work.

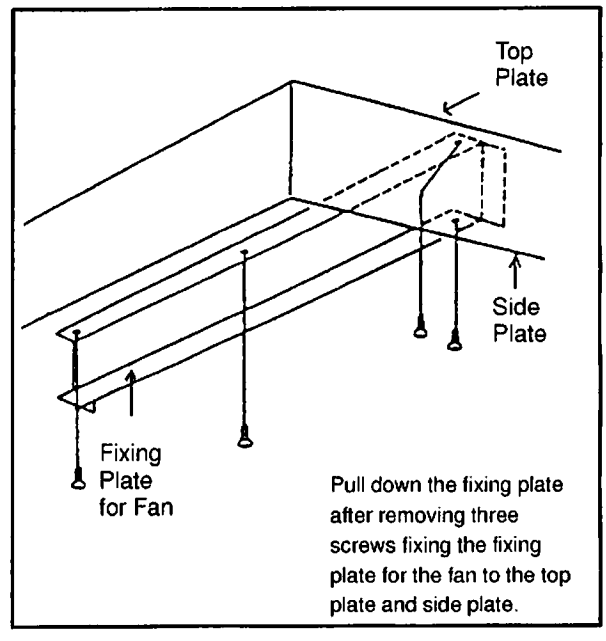
⚠ WARNING

TURN OFF all power source switches.

(1) Remove the drain pan according to page 2-71 and the item, 2.6.7, "Removing Drain Pan". Clean the drain pan after removal.

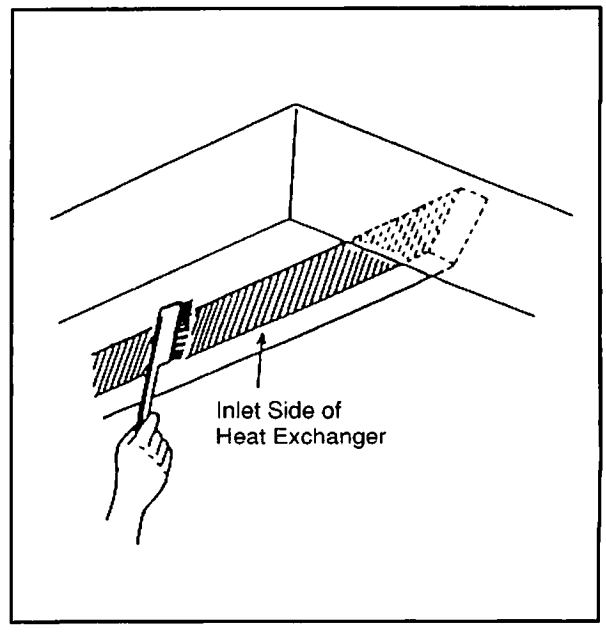
(2) Remove the indoor fan motor and fan runner assembly according to page 2-67, and the item, 2.6.3, "Removing Fan Motor", and page 2-69 and the item, 2.6.4, "Removing Bearing". and also, according to page 2-69 and the item, 2.6.5, "Removing Coupling".

(3) Removing Fixing Plate
Protect the wiring from cleaning water during the cleaning after removing fixing plate for the fan.



Tool	Phillips Screwdriver

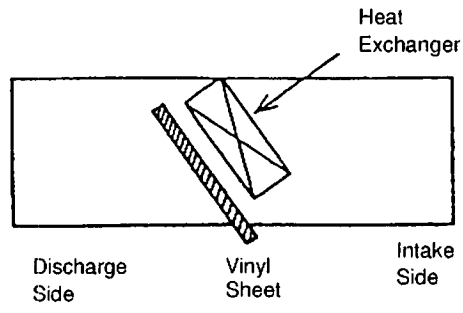
(4) Removing Dust on Heat Exchanger
Remove dust on the fins at the inlet side of the heat exchanger by scratching off downwards.
Collect all dust in a bucket or carton box.



Tool	Brush, Bucket (or Carton Box)

(2.11 Cleaning Indoor Unit Heat Exchanger)

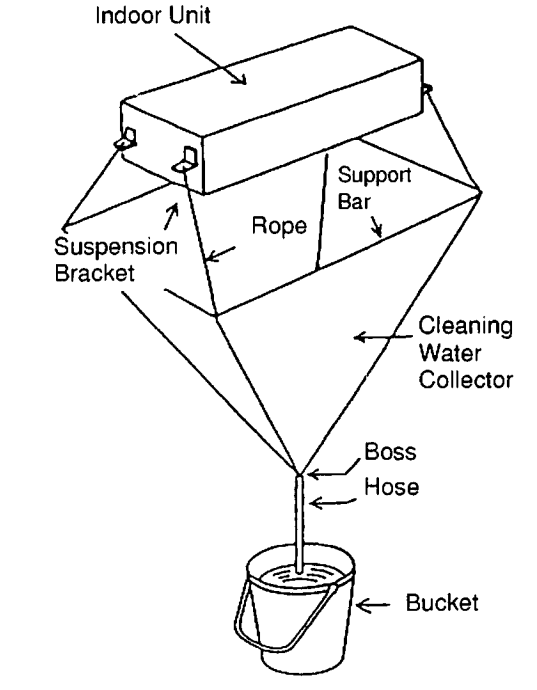
(5) Put a vinyl sheet behind the heat exchanger so that cleaning water will not be splashed on the insulation surface of the unit. Seal the gap between vinyl sheets.



NOTES:
1. It is recommended that gloves be used during this work to avoid any injury.
2. Put a vinyl sheet to avoid splashed cleaning water.

Tool	Vinyl Sheet, Tape, Cutter

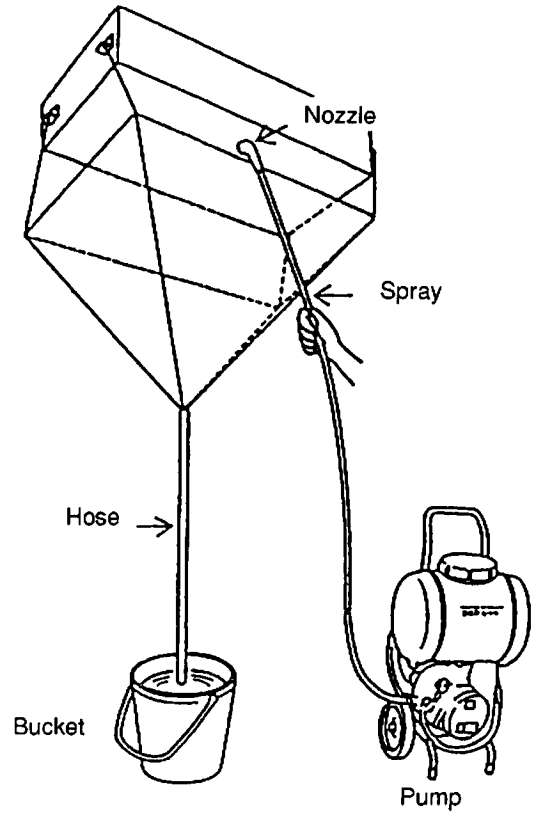
(6) Suspend the cleaning water collector from the indoor unit.
   a. Connect a rope to the suspension bracket of the indoor unit put is downwards.
   b. Insert the support bar into the cleaning water collector hole.
   c. Suspend the cleaning water collector with the rope from the indoor unit.
   d. Connect a hose to the boss for the cleaning water collector and put the other end in a bucket.



(7) Spraying Cleaning Water
Spray the cleaning water over the fins of the heat exchanger.

Tool	Cleaning Water

(8) Cleaning with Clean Water
Insert the spray nozzle through the hole of the cleaning water collector.
Operate the pump and clean the fins with clean water. Adjust the water pump pressure so as not to damage the fins.



NOTES:
1. If the cleaning water remains, fins will be corroded.
2. Adjust the pressure of the pump at 2.5 to 5.0 kg/cm^2 so as not to damage fins.

Tool	Clean Water, Pump, Spray

(9) Attach the fan assembly and drain pan after cleaning is completed and dropping of cleaning water is stopped.

Tool	Phillips Screwdriver, Hexagon Wrench

(10) Check the insulation of drain-up pump by megohm-meter. Check to ensure that the insulation is greater than 1 MΩ when 500V is applied.

(11) Connect the wiring as it was. Mount the air distribution chamber and optional air panel.

Tool	Phillips Screwdriver, Megohm-meter

(12) Neutralization Treatment after Cleaning
The cleaning agent specified in the item, 2.11.1 is of the neutral type. However, the cleaning water after use may be not neutral. Collect all cleaning water and make necessary neutralization treatment for the cleaning water.

(2.11 Cleaning Indoor Unit Heat Exchanger)

2.11.5 Cleaning Wall Type Indoor Unit

Spread a vinyl sheet over the floor to protect furnitures, etc. from cleaning water before this work.

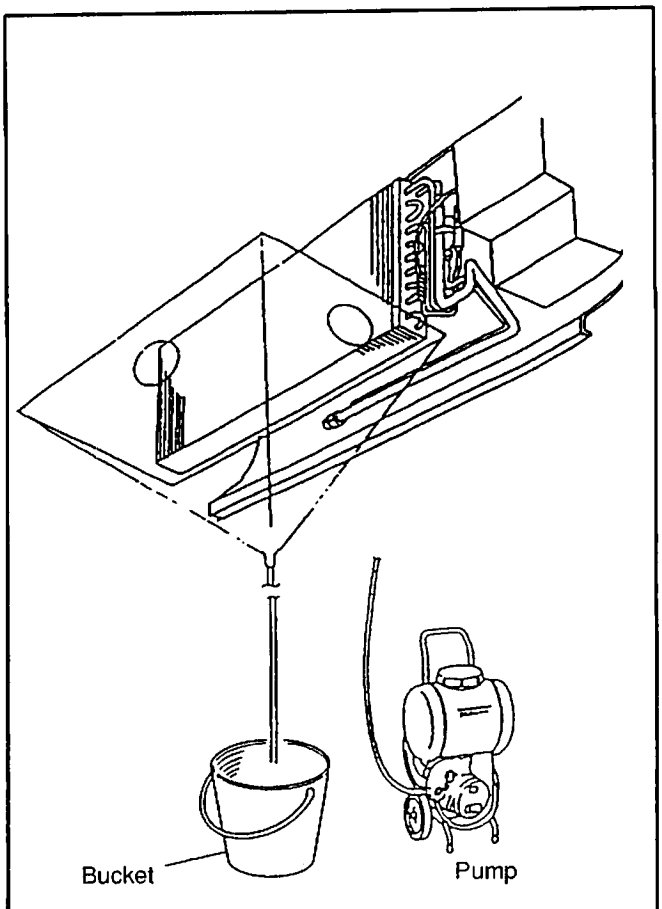
⚠ WARNING

TURN OFF all power source switches.

(1) Remove side cover R according to page 2-77 and the item, 2.7.2, "Removing Right Side Cover".

(2) Remove the front panel according to page 2-78 and the item, 2.7.3, "Removing Front Panel".

(3) Standard Cleaning
   a. Remove dust with a brush.
   b. Cover a vinyl sheet over the electrical components to protect them from splashed cleaning water.
   c. In the case that cleaning agent is used, clean the heat exchanger with clean water completely.
   d. Adjust the pressure of the pump so as not to damage fins.



NOTES:
1. If the cleaning water remains, fins will be corroded.
2. Adjust the pressure of the pump at 2.5 to 5.0 kg/cm^2 so as not to damage fins.

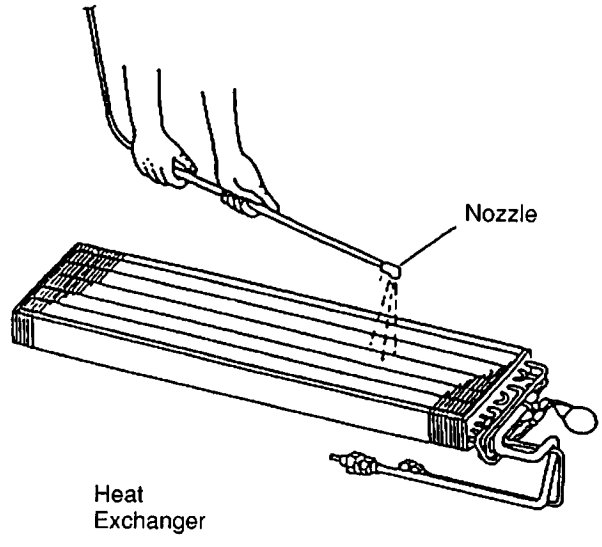
Tool	Cleaning Water, Clean Water, Pump, Spray

⚠ WARNING

TURN OFF all power source switches.

(4) Extra Cleaning

a. Remove the heat exchanger according to page 2-84 and the item, 2.7.9, "Removing Heat Exchanger and Fan Motor".
b. Remove the dust with a brush.
c. Spraying Cleaning Water
The higher the cleaning water temperature is, the more cleaning effect is normally increased.
Follow the instruction of each cleaning agent.
d. Clean the heat exchanger completely with clean water.
e. Adjust the pressure of the pump so as not to damage the fins.



NOTES:
1. If the cleaning water remains, fins will be corroded.
2. Adjust the pressure of the pump at 2.5 to 5.0 kg/cm^2 so as not to damage fins.

Tool	Cleaning Water, Clean Water, Pump, Spray

(5) Reassemble the unit and connect the wiring as it was.

(6) Check insulation of the terminal board in the electrical box. If the Insulation is greater than 1MΩ by a 500 Megohm-meter, it is normal.

(7) Neutralization Treatment after Cleaning
The cleaning agent specified in the item, 2.11.1 is of the neutral type. However, the cleaning water after use may be not neutral. Collect all cleaning water and make necessary neutralization treatment for the cleaning water.

(2.11 Cleaning Indoor Unit Heat Exchanger)

2.11.6 Cleaning Floor Type and Floor Concealed Type Indoor Unit

Spread a vinyl sheet over the floor to protect furnitures, etc. from cleaning water before this work.

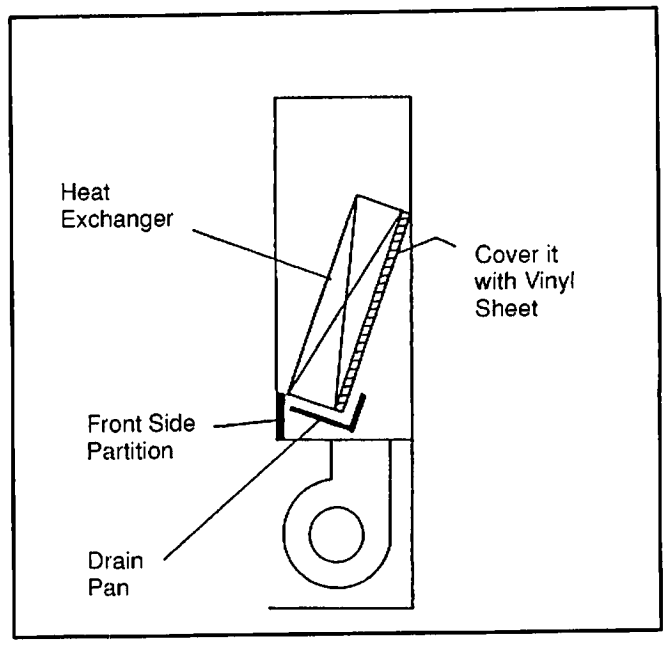
⚠ WARNING

TURN OFF all power source switches.

(1) Remove the front cover according to page 2-88 and the item, 2.8.4, "Removing Front Cover".

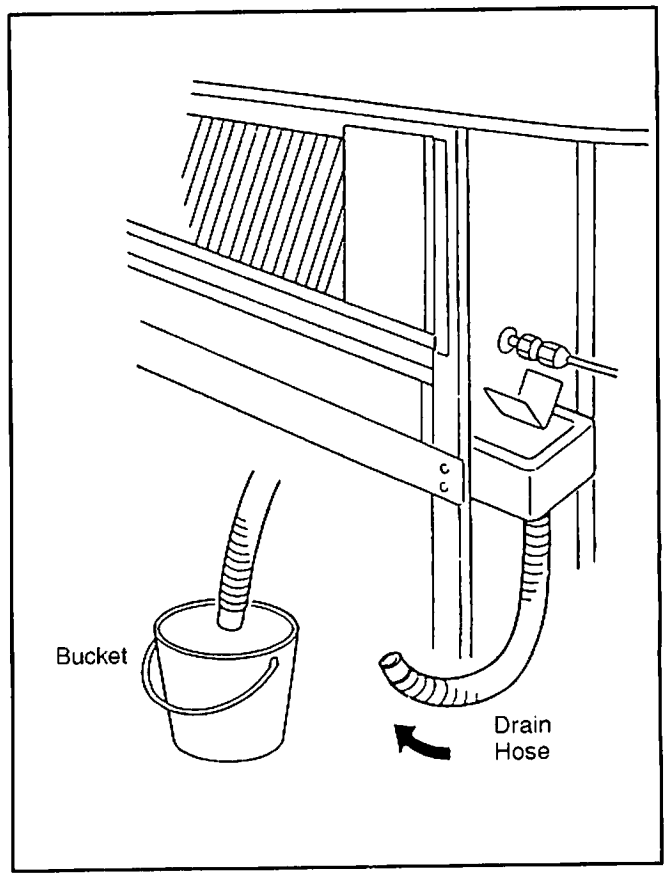
(2) Disconnect the drain hose from the field-supplied pipe.

(3) Cover the rear side of the heat exchanger with a vinyl sheet after removing front side partition and drain pan. After covering, remount the front side partition and drain pan.



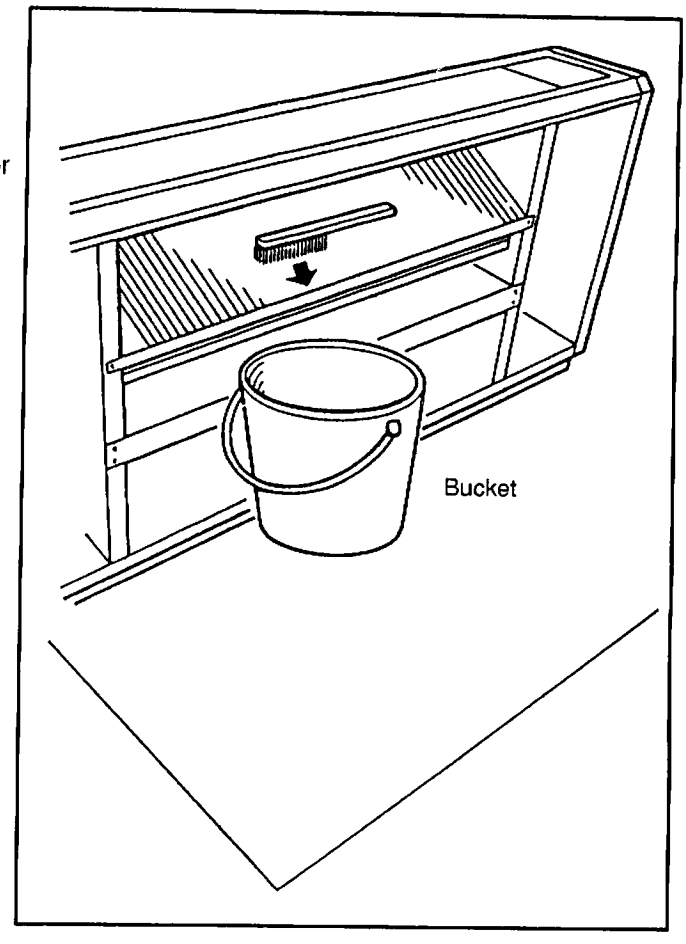
Tool	Vinyl Sheet, Tape, Cutter

(4) By lifting the drain hose and put the end in a bucket.



(5) Removing Dust on Heat Exchanger
Remove the dust on the heat exchanger with a brush by scratching dust downwards. Collect all dust in a bucket or carton box.

Tool	Brush, Bucket (or Carton Box)

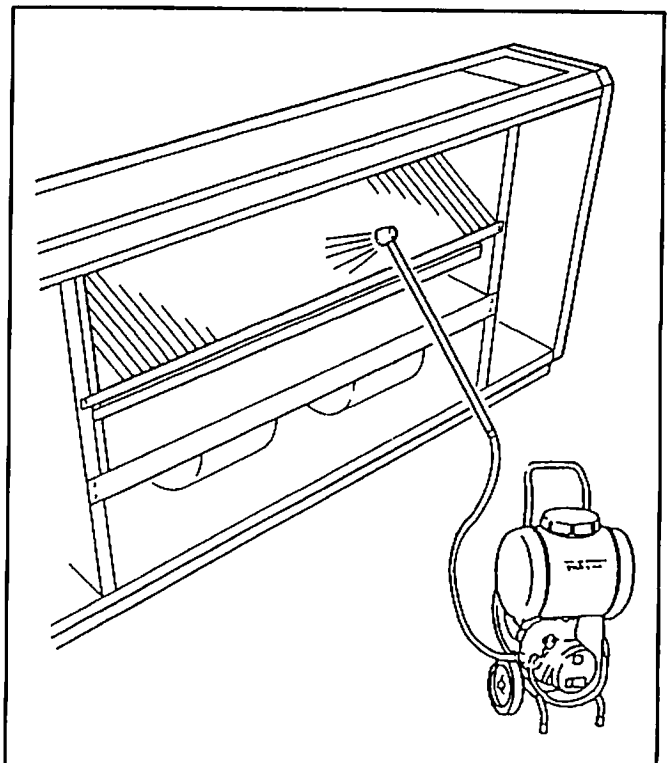


(6) Spray cleaning water over the fins of the heat exchanger.

Tool	Spray

(7) Cleaning with Clean Water
Cover the wiring connectors with insulation tape. Operate the pump and clean the heat exchanger with clean water completely.
Adjust the pressure of pump so as not to damage fins.

Tool	Clean Water, Pump, Spray



NOTES:
1. If the cleaning water remains, fins will be corroded.
2. Adjust the pressure of the pump at 2.5 to 5.0 kg/cm^2 so as not to damage fins.

(2.11 Cleaning Indoor Unit Heat Exchanger)

(8) After checking that no power is supplied, connect the drain pipe and remove the insulation tape for the wiring connectors and then mount the front cover correctly.

(9) Check insulation of the terminal board in the electrical box. If the insulation is greater than 1MΩ by a 500 Megohm-meter, it is normal.

Tool	Megohm-meter, Voltage-Checker, Phillips Screwdriver

(10) Neutralization Treatment after Cleaning

The cleaning agent specified in the item, 2.11.1 is of the neutral type. However, the cleaning water after use may be not neutral. Collect all cleaning water and make necessary neutralization treatment for the cleaning water.

2.11.7 Cleaning Ceiling Type Indoor Unit

Spread a vinyl sheet over the floor to avoid cleaning water before this work.

⚠ WARNING

TURN OFF all power source switches.

(1) Remove the left and right side covers according to page 2-98 and the item, 2.10.2, "Removing Side Cover".

(2) Remove the discharge deflector according to page 2-99 and the item, 2.10.3, "Removing Discharge Air Grille".

Tool	Philips Screwdriver

(3) Open the intake air grille according to page 2-98 and the item, 2.10.1, "Removing Air Filter".

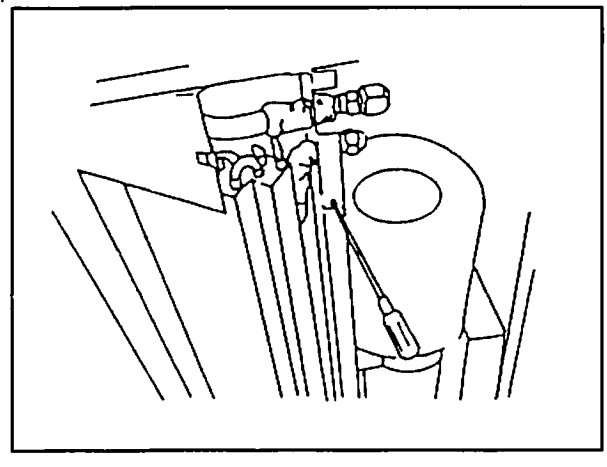
(4) Remove the lower cover and drain pan according to page 2-105 and the item 2.10.9, "Removing Thermistors for Liquid Pipe and Gas Pipe".

Tool	Phillips Screwdriver

Tool	Philips Screwdriver

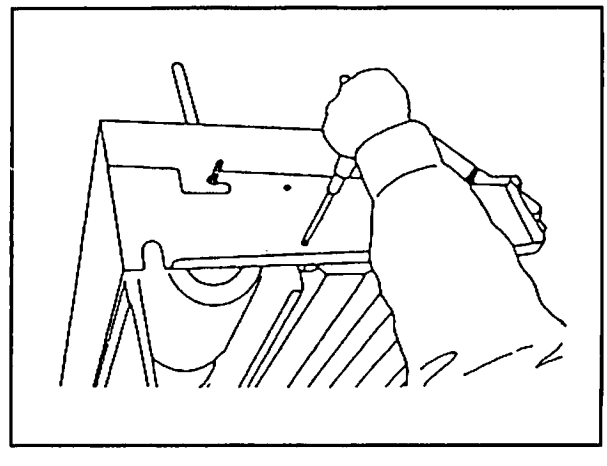
(5) Remove the indoor fan motor and fan assembly according to page 2-100 and 2.10.4, "Removing Fan Motor".

(6) Remove the partition plate 2 after removing two fixing screws.



Tool	Phillips Screwdriver

(7) Remove the fixing plate for the fan after removing two screws at the left and one screw at the right side partition.



Tool	Phillips Screwdriver

(8) Attach the drain pan and lower cover according to the reverse procedures in the item. (4).

Tool	Phillips Screwdriver

(2.11 Cleaning Indoor Unit Heat Exchanger)

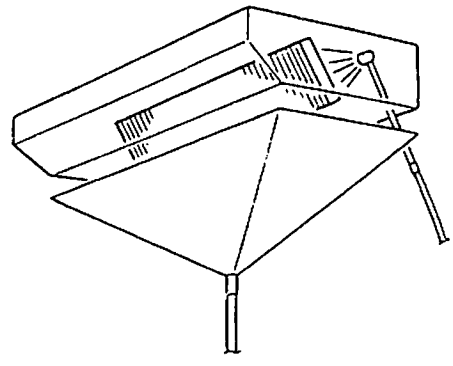
(9) Cover all components except the drain pan with a vinyl sheet avoid splashed cleaning water.

NOTE:
Wear gloves to avoid any injury during this work due to sharp edge of fins.

Tool	Vinyl Sheet, Tape, Cutter, Philips Screwdriver

(10) Spray the cleaning water over the fins from the rear side of the heat exchanger. If the heat exchanger is heavily covered with dust, use a brush to wipe off.

Tool	Spray, Brush



(11) Cleaning with Clean Water

a. Operate the pump and clean the heat exchanger with clean water completely.
b. Adjust pressure of the pump so as not to damage fins.

NOTES:
1. If the cleaning water remains, fins will be corroded.
2. Adjust the pressure of the pump at 2.5 to 5.0 kg/cm^2 so as not to damage fins.

Tool	Clean Water, Pump, Cleaning Water

(12) Check insulation of the terminal board with a megohm-meter. Check to ensure that the insulation is greater than 1 MΩ when 500V is applied.

Tool	Megohm-Meter

(13) Check to ensure that water can flow smoothly after pouring water on the drain pan.

NOTE:
Pay attention to the drain pan not to overflow.

(14) Neutralization Treatment after Cleaning
The cleaning agent specified in the item, 2.11.1 is of the neutral type. However, the cleaning water after use may be not neutral. Collect all cleaning water and make necessary neutralization treatment for the cleaning water.

2.12 Removing Remote Controller

2.12.1 Removing Remote Controller

See next page for the revised remote control switch.

⚠ WARNING

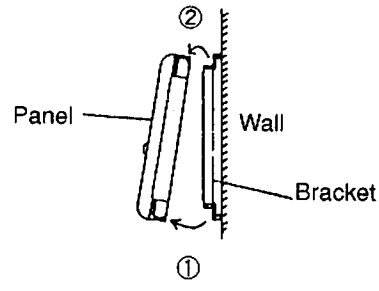
TURN OFF all power source switches.

(1) Remove the panel from the bracket.

a. For Remote Control Switch and Central Station

① Snap out the bottom part of the panel from the bracket, and

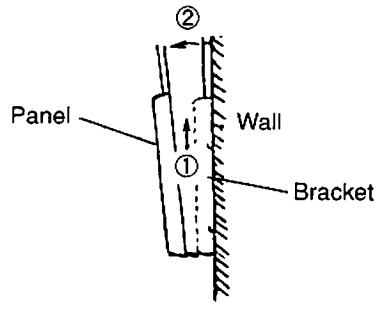
② unhook the top part.



b. For 7-Day Timer

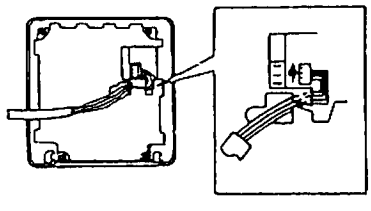
① Slide up the panel from the bracket, and

② unhook the top part.

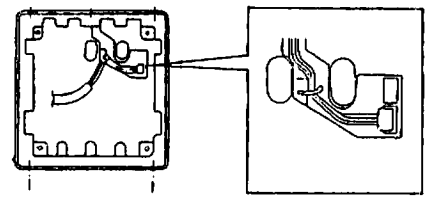


(2) Remove the connector with the cable from the panel.

a. Remote Control Switch and Central Station

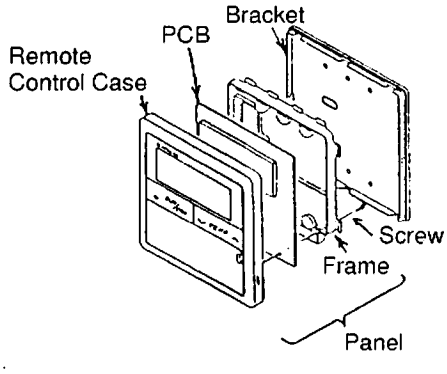


b. 7-Day Timer

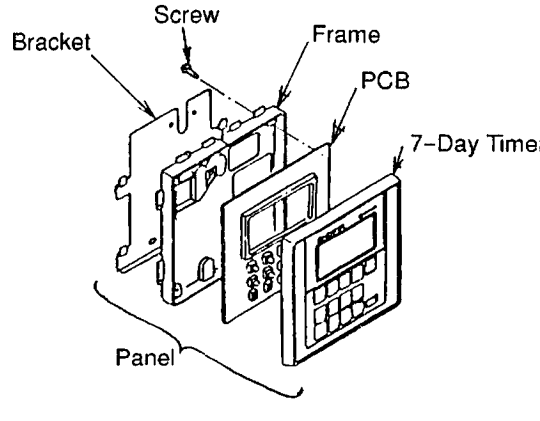


(3) Disassemble the panel by removing four screws.

a. Remote Control Switch and Central Station



b. 7-Day Timer



NOTES:

1. When holding the printed circuit board by hand, hold the edge and do not touch the electrical parts especially the micro-computer part. The electrical parts may be broken by the static electricity.
2. When reassembling, pay attention to the followings.
   - Blow the dust of each part away and then assembly them.
   - When tightening screws, pay attention not to break the plastic part.

(2.12 Removing Remote Controller)

2.12.2 Removing Remote Control Switch (Revised)

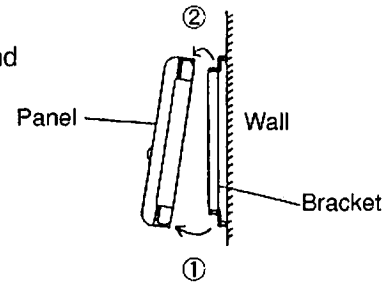
⚠ WARNING

TURN OFF all power source switches.

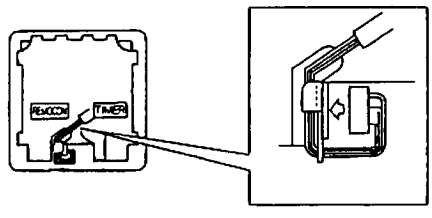
(1) Remove the panel from the bracket.

① Snap out the bottom part of the panel from the bracket, and

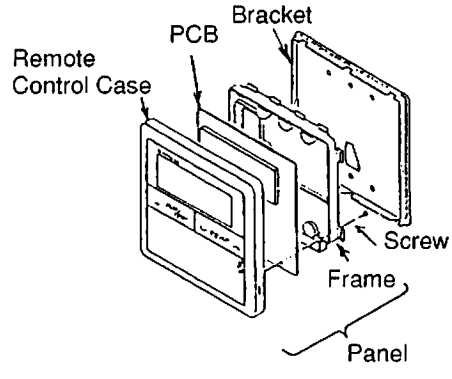
② unhook the top part.



(2) Remove the connector with the cable from the panel.

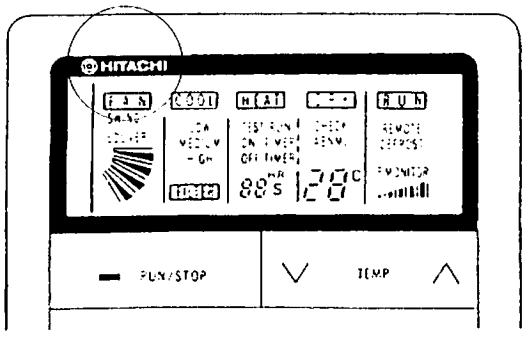
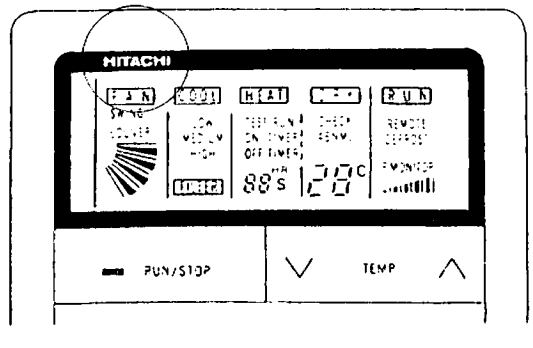


(3) Disassemble the panel by removing four screws.



NOTES:

1. When holding the printed circuit board by hand, hold the edge and do not touch the electrical parts especially the micro-computer part. The electrical parts may be broken by the static electricity.
2. When reassembling, pay attention to the followings.
   - Blow the dust of each part away and then assembly them.
   - When tightening screws, pay attention not to break the plastic part.
3. Distinguish the revised remote control switch "After Revised" from "Before Revised", with HITACHI mark at the upper left of L.C.D, as below.

Before Revised	After Revised
	

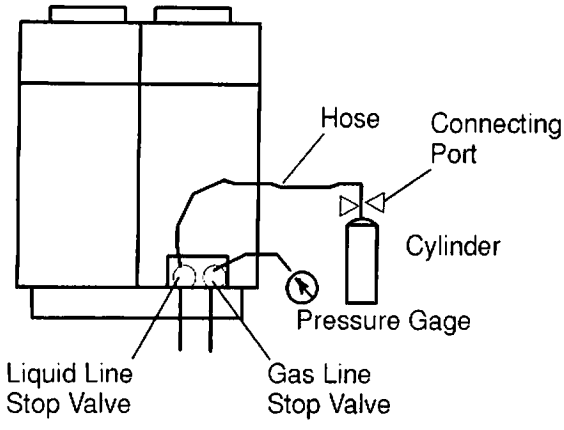
2.13 Collecting Refrigerant for Replacing Indoor Unit

(1) Prepare an empty refrigerant cylinder at -760mmHg with a charging hose. Measure the empty cylinder's weight.

(2) After shutting the stop valve on the cylinder, connect the charge hose to the liquid line stop valve. Connect a pressure gauge to the check joint on the gas line stop valve.

(3) Air purge inside of the hose between the liquid line stop valve and cylinder by loosening connection of the liquid line stop valve and close the connecting port of the cylinder after air purging.

(4) Operate the unit as cooling mode at a frequency of 48Hz.



NOTES:

1. The cylinder capacity shall be equivalent to half of the total refrigerant capacity.
2. In case of 8HP and 10HP outdoor units; Remove the terminals of the constant speed compressor, and cover the terminals of the cables by insulator.

(5) Open the liquid line stop valve on the cylinder to collect refrigerant into it. The cylinder capacity shall be equivalent to half of the total refrigerant capacity. Check the refrigerant quantity by measuring the weight.

(6) Close the liquid line stop valve on the cylinder gradually during the cooling operation.

(7) Fix the opening of the liquid line stop valve at a slightly opened position. Continue the cooling operation.

(8) Finally close the liquid line stop valve and then gas line stop valve and stop the units at the same time when the pressure at the liquid line stop valve reaches at -400mmHg.

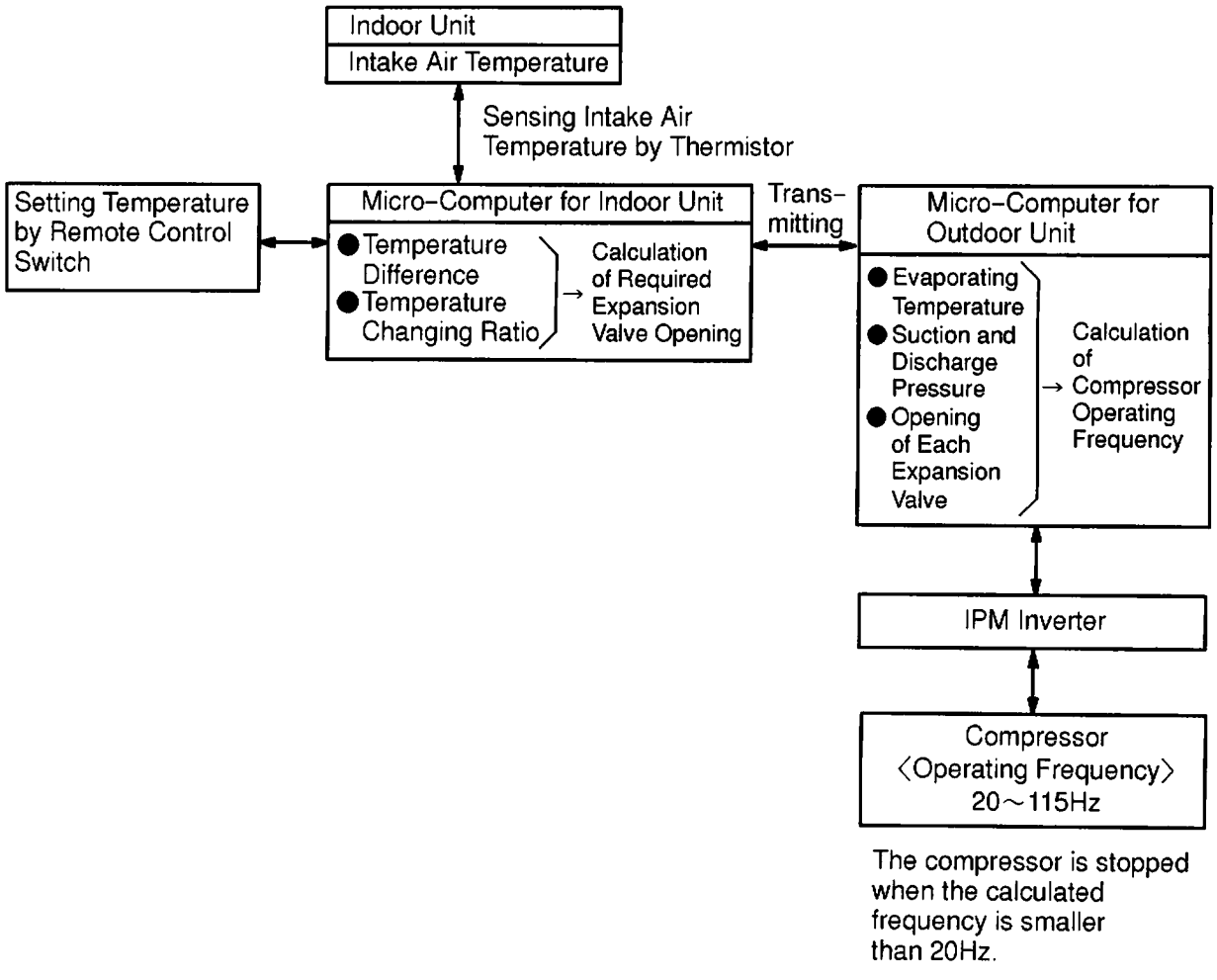
NOTE:

In the case that the collected refrigerant is recharged into the system, charge it by let the cylinder up side down so that refrigerant and oil can be charged together.

3. MAIN PARTS

3.1 IPM (Intelligent Power Module) Inverter

3.1.1 Calculation of Operating Frequency



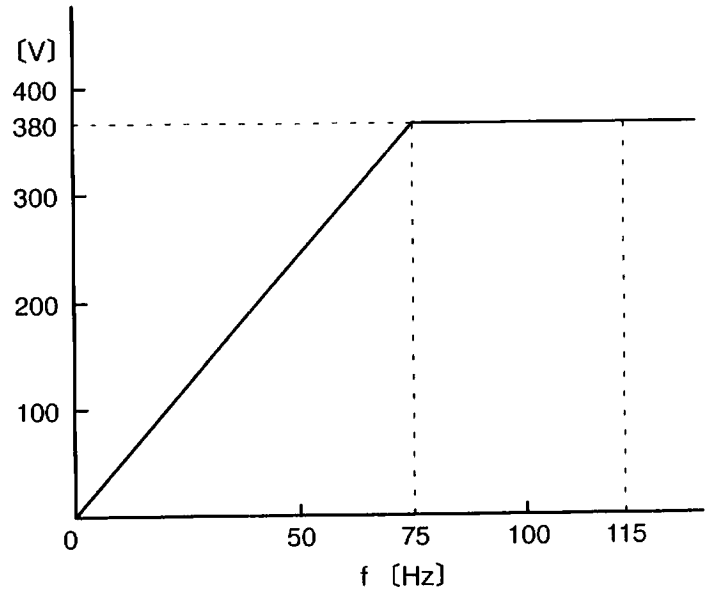
The compressor is stopped when the calculated frequency is smaller than 20Hz.

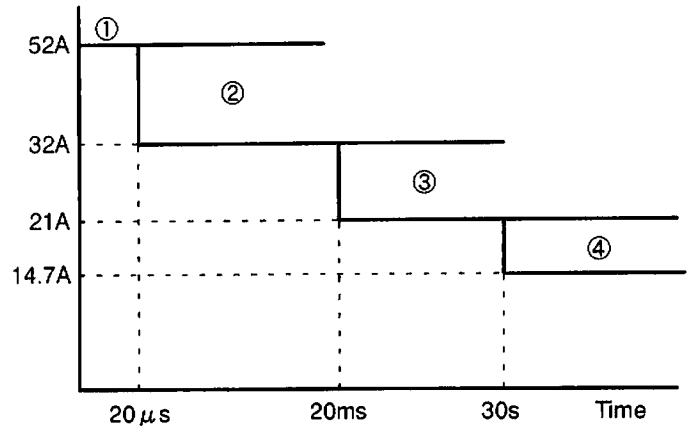
Control System of Refrigerant Cycle

Control Subject	Purpose	
	Cooling Operation	Heating Operation
Opening Degree of Exp. V for Liquid Bypass: MVB (FX2 Only)	For Controling Temperature of Discharge Super-Heat: Td SH	Closed
Opening Degree of Exp. V for Heat Exchanger of Outdoor Unit: MV1, MV2 (FX2 Only)	Fully Open	For Controlling Temperature of Discharge Super-Heat: Td SH
Opening Degree of Exp. V of Indoor Unit: MV	1. For Controlling Temperature Difference between Air Inlet and Air Outlet of Indoor Unit 2. For Controlling Temperature Difference between Gas Pipe and Liquid Pipe of Indoor Unit Heat Exchanger (FX2)	1. For Controlling Temperature Difference between Air Inlet and Air Outlet of Indoor Unit 2. For Balancing Temperature Differences between Gas Pipe and Liquid Pipe of each Indoor Unit
Inverter Frequency of Compressor	For Controlling Temperature of Evaporating: Te (FS2) For Controlling Pressure of Refrigerant Suction: PS (FX2)	For Controlling Pressure of Refrigerant Discharge: Pd

Exp. V: Micro-Computer Control Expansion Valve

3.1.2 Specifications of Inverter

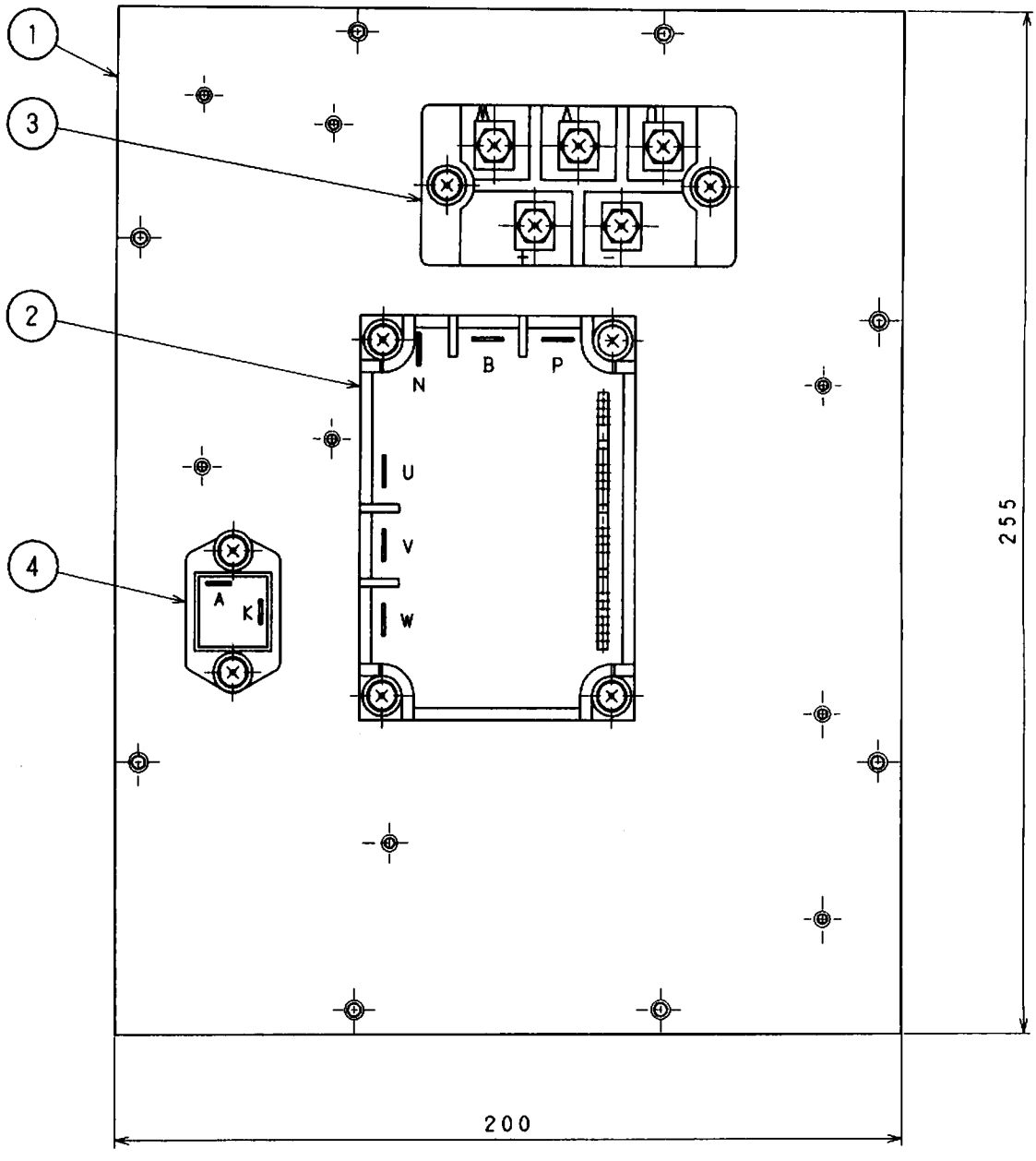
Applicable Compressor	5HP
Applicable Power Source	3 Phase 380/415V ±10% 50Hz ±5%
Output Voltage (Maximum)	380/415V, 3 Phase
Output Current (Maximum)	14A
Time Rating	Continuous
Control Method	Frequency≦75Hz, Space Vector PWM Control 75Hz<Frequency≦115Hz, V/F Control
Range Output Frequency	20~115Hz
Accuracy of Frequency	0.005Hz at Applicable Frequency Range
Controlled Frequency	0.01Hz
Accuracy of Output Voltage	±10% at Applicable Frequency Range
Output/Characteristics	Conditions: 1. Power Source Voltage AC380/415V 2. Non-Loading (Free Output) 3. Anmeter Type Volt-Meter (×1.1)  Refer to the note in next page.
Soft Start·Stop	0.5Hz/S, 1Hz/S, 3Hz/S, 6Hz/S, 30Hz/S (5 Steps)
Protection Function	
Excessive High or Low Voltage for Inverter	Excessive Low Voltage at a voltage is lower than 350V Excessive High Voltage at a voltage is higher than 750V
Abnormality of Current Sensor	Stoppage at a current of compressor smaller than 0.5A When the frequency is 15~18Hz after starting. Cause of Abnormality: Failure of current sensor Failure of transistor module Failure of compressor Disconnected wiring

Protection Function	
Overcurrent Protection for Inverter	 ① Short-circuit Trip of Arm } Internal Protection of Transistor Module ② Instantaneous Overcurrent Trip } ③ Instantaneous Overcurrent Trip ④ Electronic Thermal Trip Condition is maintained longer than 30 seconds or accumulated longer than 3.5 minutes during 10 minutes sampling time.
Protection of Transistor Module	Transistor module has four protection function for self-protection. ① Some of the output terminals between "U" and "V", "V" and "W", "W" and "U" has a short-circuit. ② Running current reaches 32A. ③ Temperature is measured by internal thermistor exceeds 150°C. ④ Control voltage decreases to 12.5V.
Overload Control	Overload control at a current greater than 14A. Overload control release at a current smaller than 12.6A.

NOTE:

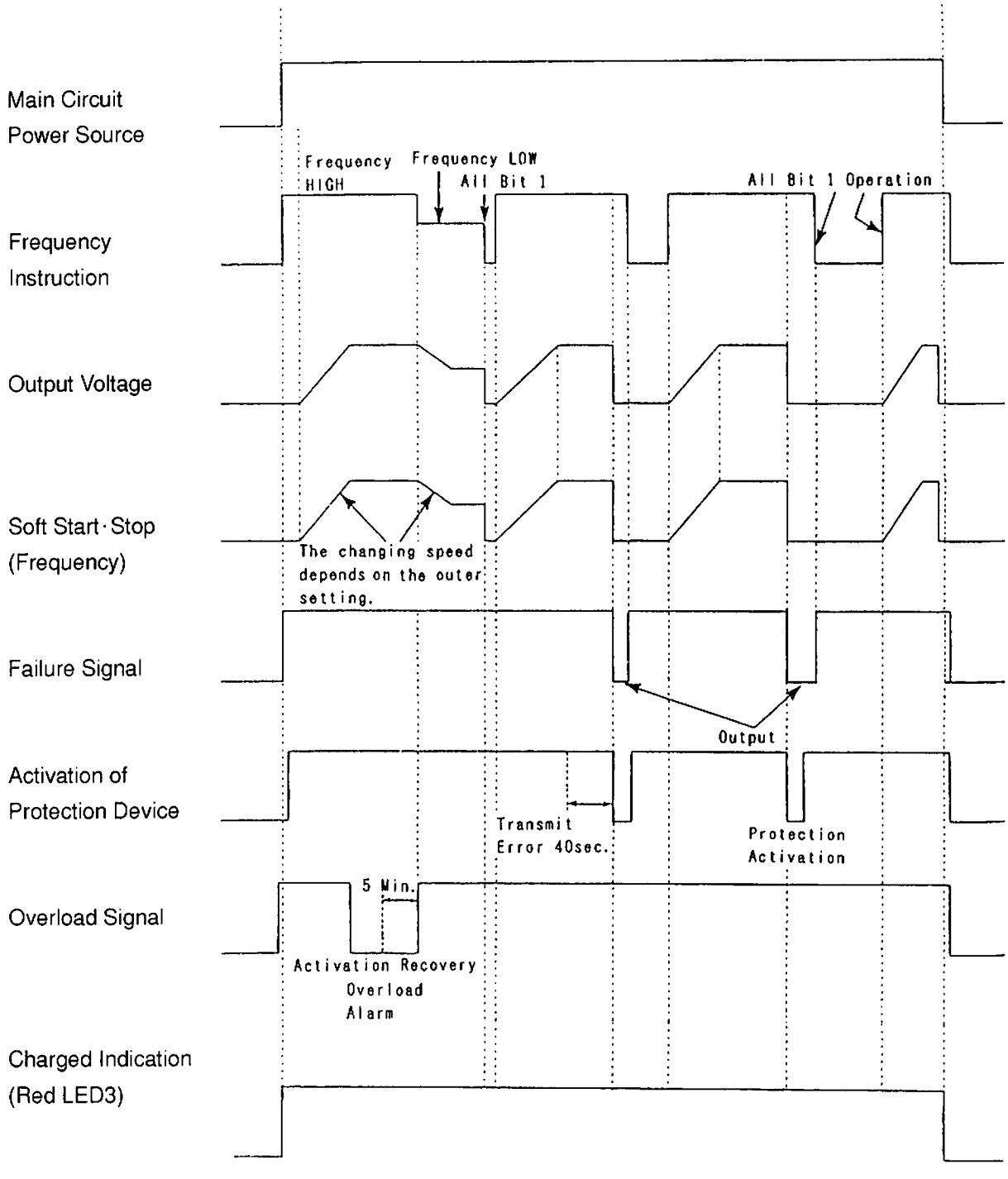
Characteristics are fluctuated by the current minimize control.

3.1.3 Arrangement of Inverter Power Unit



No.	Parts	Model	Name
1	Fin	(200mm×255mm×50mm)	-
2	Transistor Module	PM25RSB120	IPM
3	Diode Module	DF40AA160	DM
4	Diode Module	RM201-1A-20F	D

3.1.4 Inverter Time Chart



3.1.5 Protective Function

(1) Excessive High or Low Voltage for Inverter

a. Level of Detection

① When the voltage of direct current is greater than 750 V, abnormalities are detected.

② When the voltage of direct current is smaller than 350 V, abnormalities are detected.

b. Function

When abnormalities are detected, the inverter compressor is stopped and transmit the signal code of stoppage cause to PCB1.

c. Cancellation of Protection Function

Transmission for signal code of stoppage cause is cancelled when a stopping order is given or main power source is cut off.

(2) Abnormality of Current Sensor

a. Level of Detection

When current of the inverter compressor decreases lower than 0.5 A during the inverter compressor frequency between 15Hz and 18Hz, an abnormality is detected.

b. Function

When abnormalities are detected, the inverter compressor is stopped, and transmit the signal code of stoppage cause to PCB1.

c. Cancellation of Protection Function

Transmission for signal code of stoppage cause is cancelled when a stopping order is issued or main power source is cut off.

(3) Overcurrent Protection for Inverter

a. Level of Detection

① When the current detected by current sensor reaches 150% of the rated current, overcurrent is detected. (Instantaneous Overcurrent)

② When the current detected by current sensor exceeds 105% of the rated current continuously for 30 seconds or for 3.5 minutes in total during a 10 minutes period, overcurrent is detected. (Electric Thermal Relay)

b. Function

When abnormalities are detected, the inverter compressor is stopped and transmit the signal code of stoppage cause to PCB1.

c. Cancellation of Protection Function

Transmission for signal code of stoppage cause is canceled by stopping order is issued or main power source is cut off.

(4) Protection of Transistor Module

a. Level of Detection

① When some of the output terminals between "U" and "V", "V" and "W", "W" and "U" of transistor module are short-circuited, an abnormality is detected.

② When the running current of transistor module reaches 32A (maximum rated current), an abnormality is detected.

③ When an internal temperature is measured by internal thermistor of transistor module exceeds 150℃, an abnormality is detected.

④ When the control voltage of transistor module decreases to 12.5V, an abnormality is detected.

b. Function

When abnormalities are detected, the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1.

c. Cancellation of Protection Function

Transmission for signal code of stoppage cause is canceled when a stopping order is issued or main power source is cut off.

(5) Overload Control

a. Level of Detection

When the output current exceeds 105% of the maximum output current, an abnormality is detected.

b. Function

An overload signal is issued when output current exceeds 105% of the maximum output current, and the frequency decreases at a rate of 0.5Hz/s.

In the case that the output current decreases lower than 88% of the rated current for 10 seconds, the compressor frequency is limited to the upper level frequency when the output current decreases lower than 88% of the rated one.

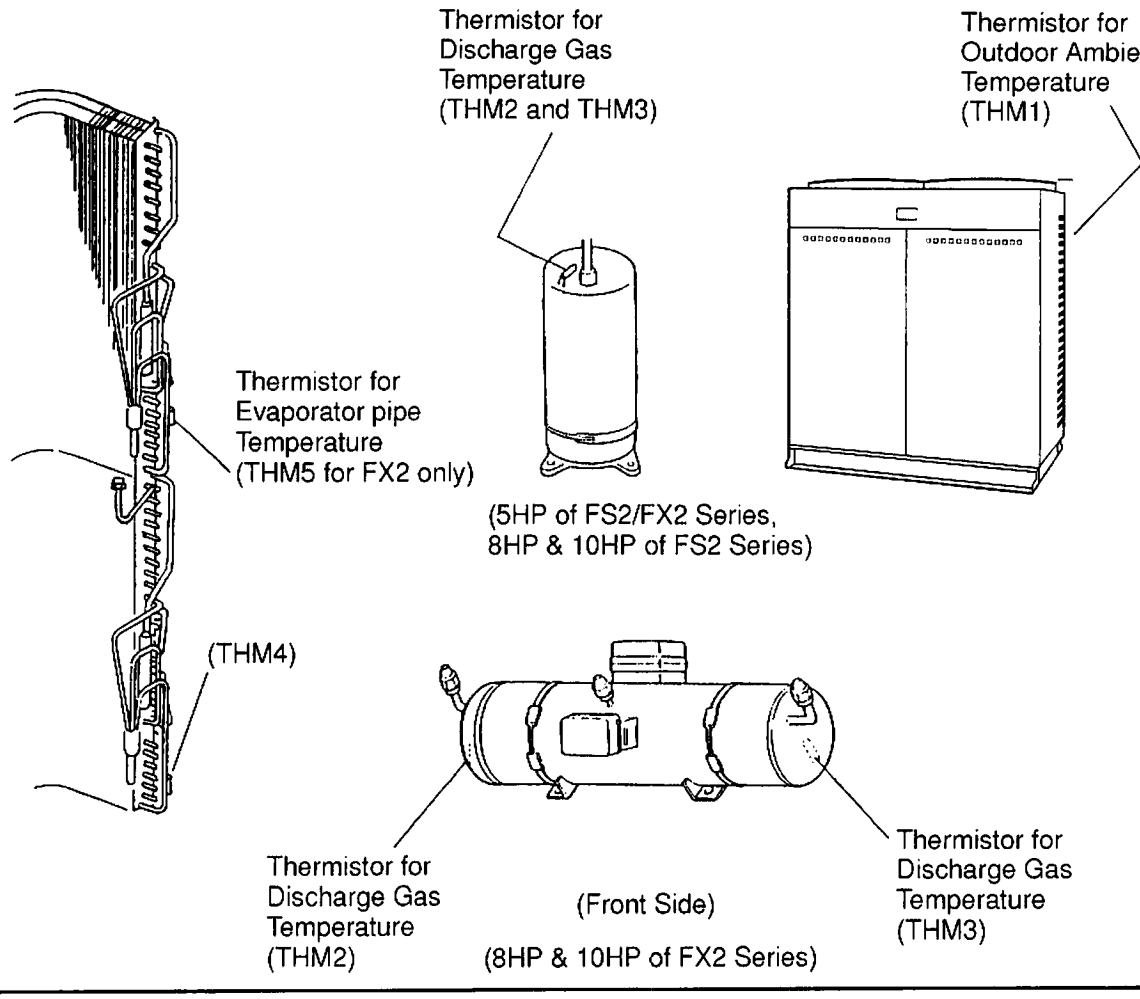
However, if the frequency order is smaller than the maximum value, the operation is performed according to the order.

c. Cancellation of Protection Function

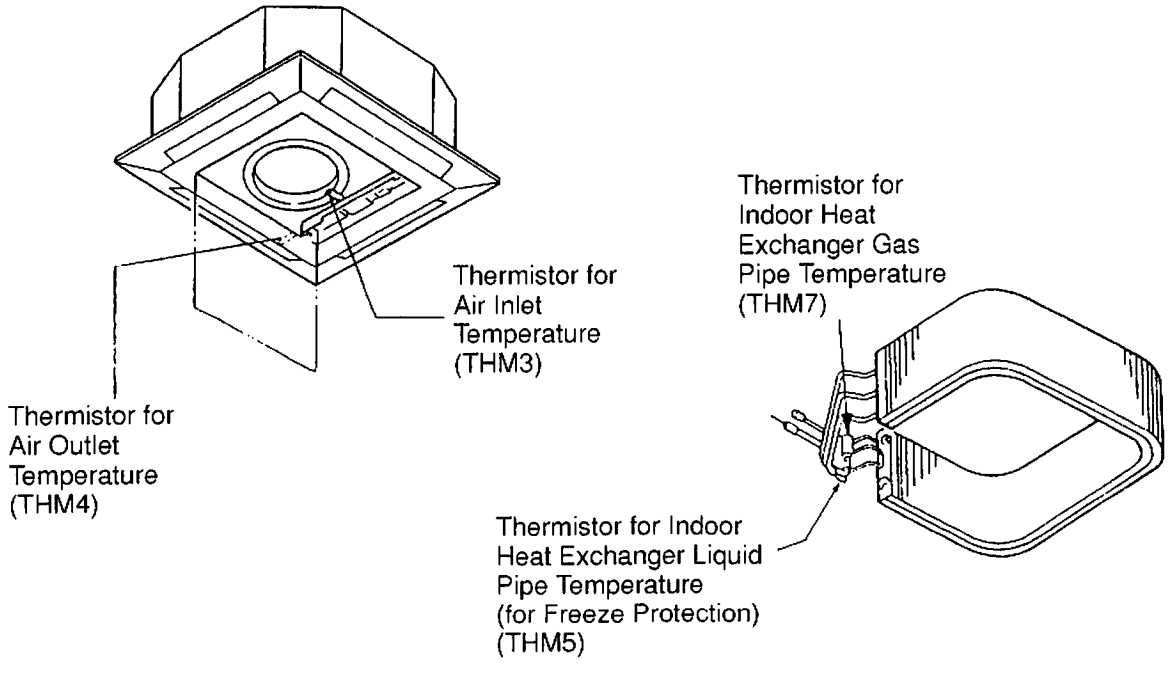
When the output current decrease down to 90% of maximum output current, this control is canceled.

3.2 Thermistor

Thermistors for Outdoor Unit



Thermistors for Indoor Unit



3.2.1 Resistance Value of Thermistor

(1) Discharge Gas Overheating Prevention
(Thermistor for Checking Upper Part of Compressor,THM2 and THM3)

a. A thermistor checking the temperature of the compressor upper part is installed, to prevent discharge gas from overheating. If discharge gas temperature increases excessively lubricating oil deterioration occurs and lubricating properties deteriorate, resulting in short compressor life.

b. If discharge gas temperature increases excessively, compressor temperature increases. At the worst, compressor motor winding will be burnt out.

c. When the compressor upper part temperature increases during heating operation, the unit is controlled according to the following method.

- An electronic expansion valve of liquid bypass opens and high pressure refrigerant is returned to the compressor through the accumulator, decreasing compressor temperature.

- If the compressor upper part temperature increases exceeding 127℃ for 10 minutes even if an electronic expansion valve opens, the compressor is stopped, in order to protect the compressor. Thermistor resistance characteristics are shown in Fig. 3.1.

d. If compressor upper part temperature increases exceeding 127℃ for 10 minutes during cooling operation, the compressor is stopped. (Refer to the block diagram for details.)

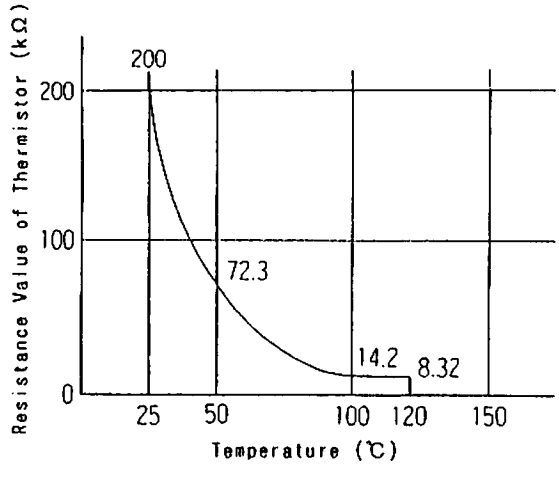


Fig. 3.1 Resistance Characteristics of Thermistor for Discharge Gas Overheating Protection

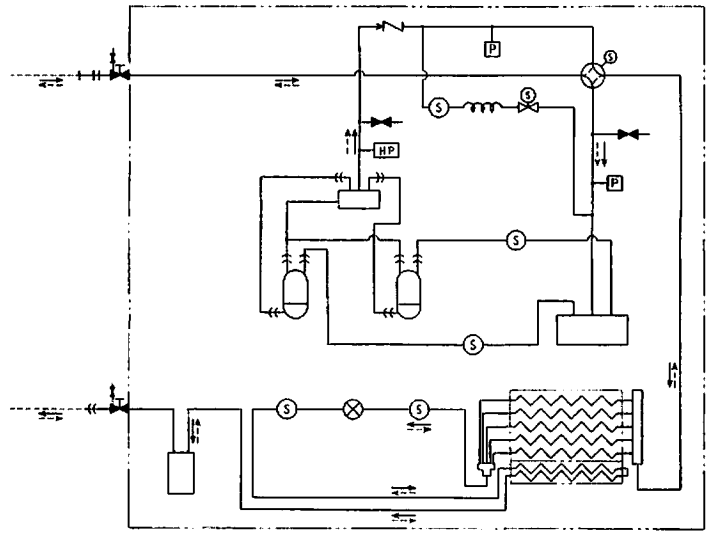


Fig. 3.2 Refrigeration Cycle of Outdoor Unit (RAS-10FS2)

(2) Thermistor for Outdoor Ambient Temperature (THM1)

When outdoor temperature decrease to -8°C or lower, the compressor is stopped, during cooling operation. Thermistor resistance characteristics are shown in Fig. 3.3.

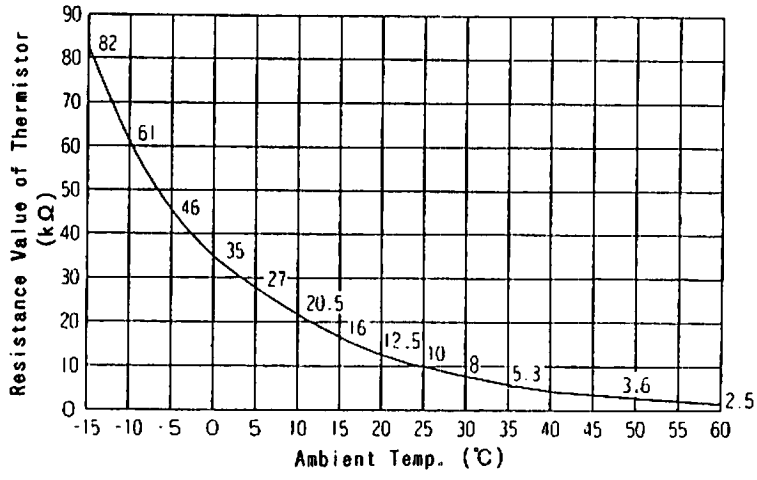


Fig. 3.3 Resistance Characteristics of Outdoor Air Temperature Thermistor

(3) Thermistor for Defrosting (THM4, THM5)

The characteristics for the thermistor is the same with the value of outdoor ambient temperature thermistor.

(4) Thermistor for Room Temperature Control

(Indoor Unit Air Inlet Temperature Thermistor, THM3)

The room temperature control is performed by this air inlet temperature thermistor, THM3. The setting temperatures are indicated on the remote control switch with figures. Set room temperature so that room temperature dose not become too cool or too hot.

We recommend that temperature be set in the following ranges.

Economical Cooling Operation: 27°C to 29°C

Economical Heating Operation: 18°C to 20°C

The resistance characteristics of the thermistor is shown in Fig. 3.4.

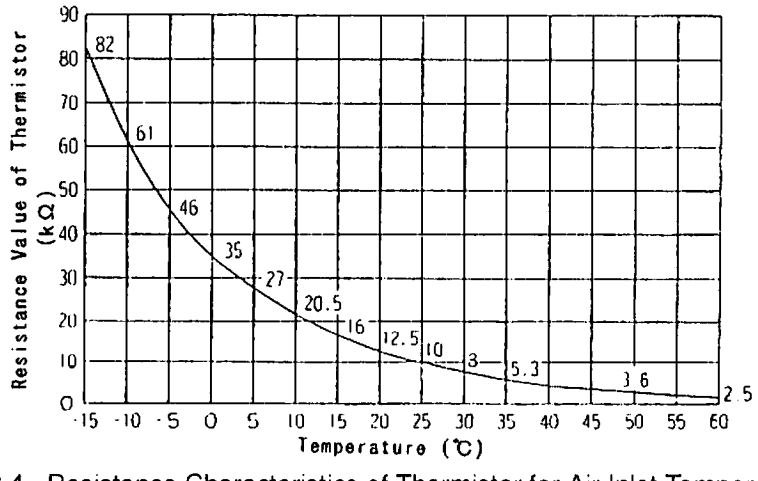


Fig. 3.4 Resistance Characteristics of Thermistor for Air Inlet Temperature

CAUTION

The thermo-off valve of the indoor unit air inlet thermistor is set at the temperature higher than the valve indicated on the remote control switch by 4°C and the maximum is 34°C, because suction air temperature during heating operation has a tendency to become higher than that of the occupied zone, intending comfortable heating operation.

(5) Thermistor for Discharge Air Temperature Control
(Indoor Unit Discharge Air Temperature Thermistor, THM4)
This thermistor (THM4) has been installed to prevent cold blow during heating operation. The characteristics of the thermistor resistance is shown in Fig. 3.4.

(6) Thermistor for Liquid Pipe of Indoor Heat Exchanger

When the temperature of the indoor heat exchanger decreases to 0℃ or lower for 3 minutes, the thermostat is automatically turned off. When the temperature increase to 16℃ or higher, the thermostat is turned on.

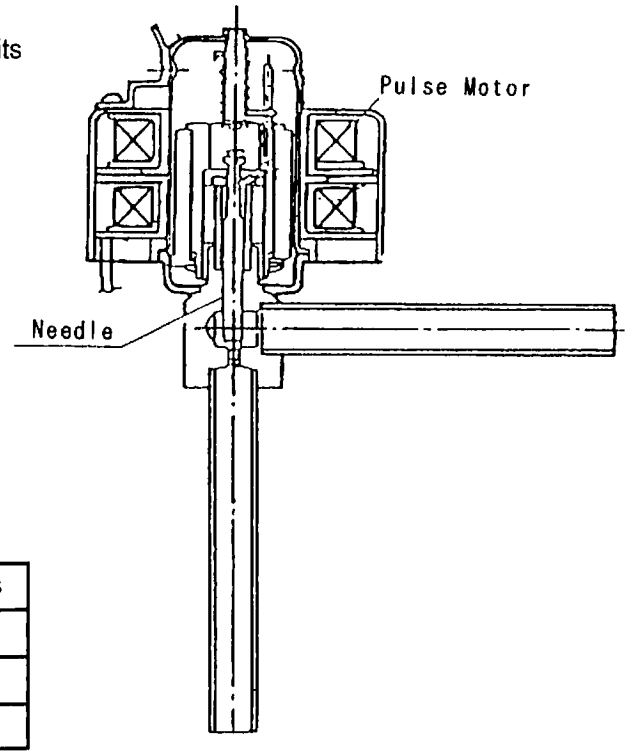
The purpose of this function is to prevent frosting on the heat exchanger during cooling operation and dry operation.

The characteristics of the thermistor resistance is shown in Fig. 3.4.

(7) Thermistor for Gas Pipe of Indoor Heat Exchanger
This thermistor senses the evaporating temperature during heating operation.
The characteristics of the thermistor resistance is shown in Fig. 3.4.

3.3 Electronic Expansion Valve

3.3.1 Electronic Expansion Valve for Outdoor Units



Micro-Computer

↓ Pulse Signal

2-Phase Permanent Magnetic Pulse Motor

Control 0 to 500 Pulse by 1 Pulse

↓

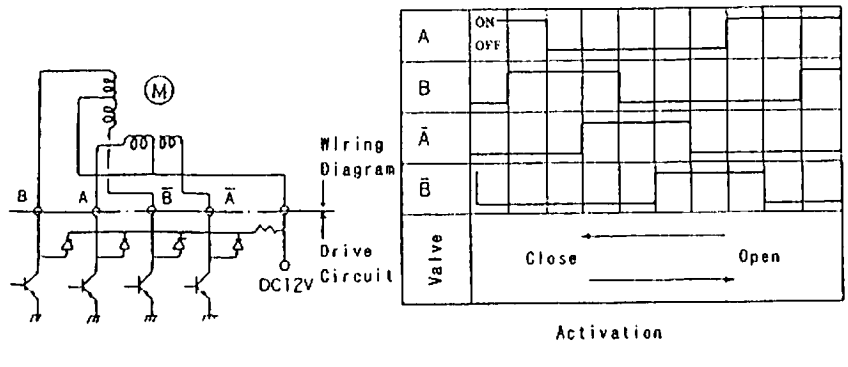
Refrigerant Flow Control

Precise Control

Connector Color

Applied Cycle	Main		Bypass
Mark in Diagram	MV1	MV2	MVB
For Unit	White	Red	Blue
For Service	White		

Specifications

Items	Specifications		
Models to be Applied	For Main Cycle of RAS-5FS2, RAS-5FX2, RAS-8FX2, RAS-10FX2 and for Liquid Bypass of RAS-8FX2, RAS-10FX2	For Main Cycle of RAS-8FS2 and RAS-10FS2	For Liquid Bypass of RAS-5FX2
Type	EKV (5.0USRT)	EKV (10.0USRT)	DKV (1.5USRT)
Refrigerant Used	R-22		
Working Temperature Range	-30℃~65℃ (Operating Time of Coil: less than 50%)		
Mounting Direction	Drive shaft in Vertical Direction within an Angle of 45° as Maximum		
Flow Direction	Reversible		
Drive Method	4-Phase Canned Motor Method		
Rated Voltage	DC12V±1.8V		
Drive Condition	83PPS (Pulse Width at ON: 36mm sec, OFF: 60mm sec) 1, 2 Phase Excitation		
Coil Resistance (each Phase)	46Ω±10% (at 20℃)		
Wiring Diagram, Drive Circuit and Activation Mode			

3.3.2 Electronic Expansion Valve for Indoor Units

Micro-Computer

↓ Pulse Signal

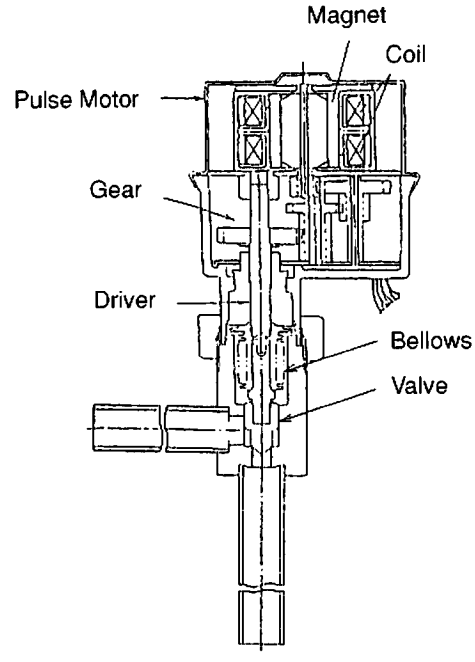
2-Phase Permanent Magnetic Pulse Motor

Control 0 to 2,000 Pulse by 1 Pulse

↓

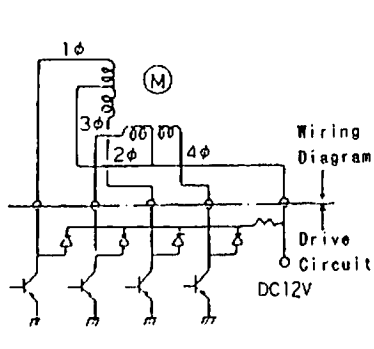
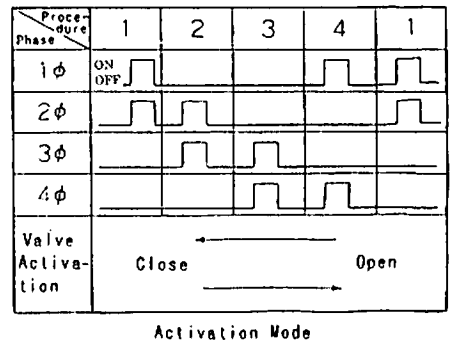
Refrigerant Flow Control

Precise Control



EDM Type

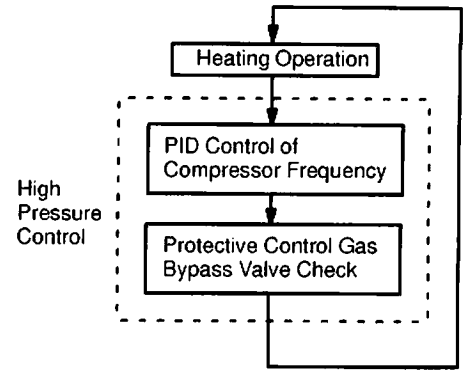
Specifications

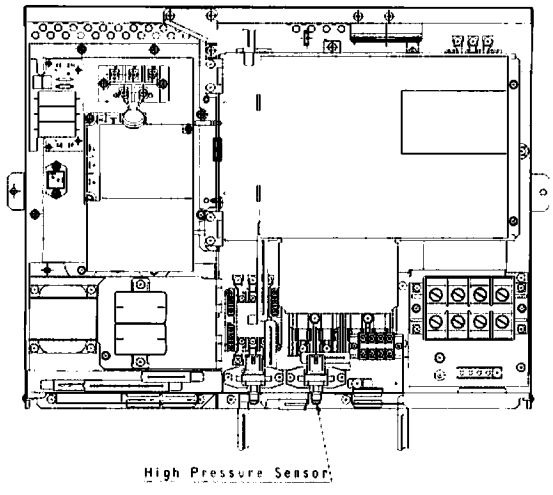
Items	Specifications
Type	EDM Type
Refrigerant Used	R-22
Working Temperature Range	-30℃~70℃ (With Coils Not Electrified)
Mounting Direction	Drive shaft in Vertical Direction, Motor Upside and 90° in Four Direction
Flow Direction	Reversible
Rated Electricity	
Drive Method	4-Phase Pulse Motor
Rated Voltage	DC12V±1.2V
Drive Condition	100 to 250PPS (Pulse Width Over 3mm) 2 Phase Excitation
Coil Resistance (1 Phase)	150Ω±10% (at 20℃)
Wiring Diagram, Drive Circuit and Activation Mode	 

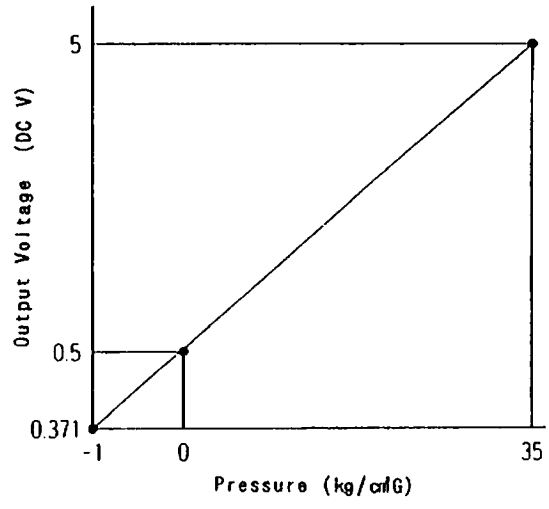
3.4 Pressure Sensor

(1) High Pressure Control

The high pressure during heating operation is detected by a high pressure sensor, and compressor frequencies are controlled according to the PID controlling method so that the high pressure is controlled in an appropriate range. The output of the high pressure sensor during heating operation performs protective control; gas by-pass control.



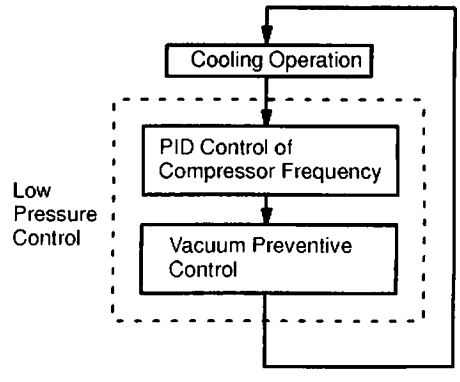


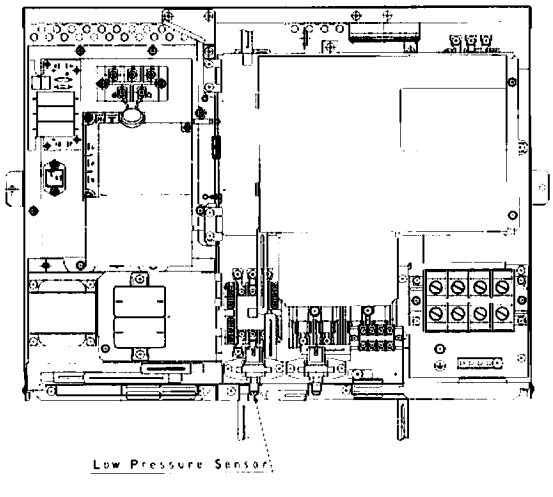


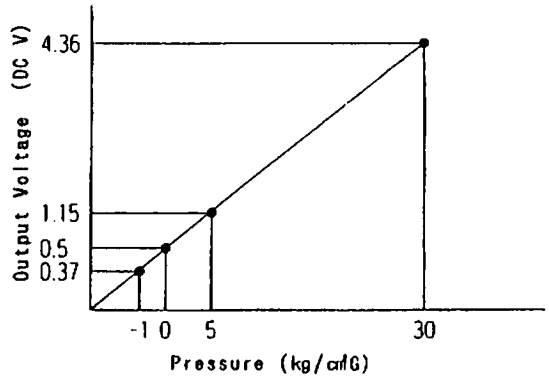
Output Characteristics of Pressure Sensor

(2) Low Pressure Control

The suction pressure during cooling operation is detected by a low pressure sensor, and compressor frequencies are controlled according to the PID controlling method so that the suction pressure is controlled in an appropriate range. If the suction pressure reaches excessively low, the cooling can be insufficient and parts composing the refrigeration cycle can be damaged. For this reason,if the output of the low pressure sensor indicates vacuum and the valve is maintained 10 minutes or longer, the compressor is stopped for the purpose of protection.





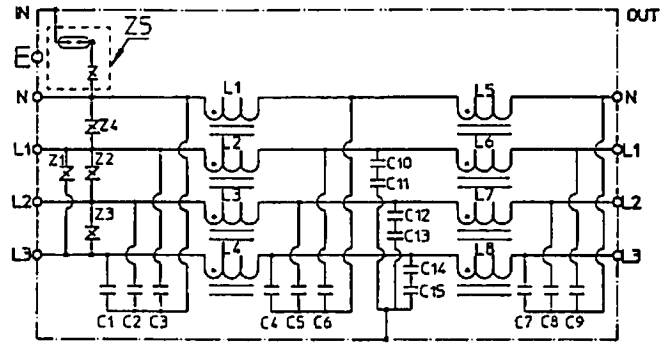


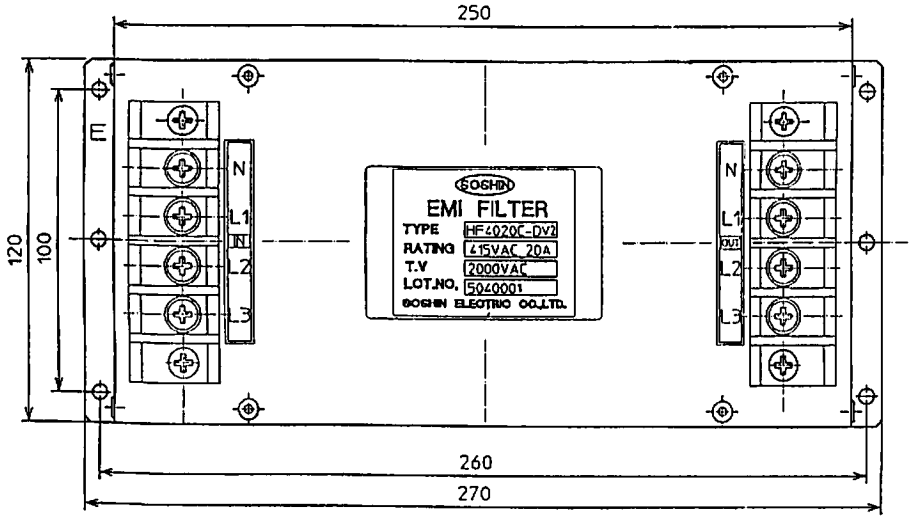
Output Characteristics of Pressure Sensor

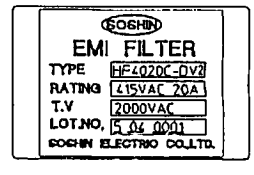
3.5 Noise Filter (NF)

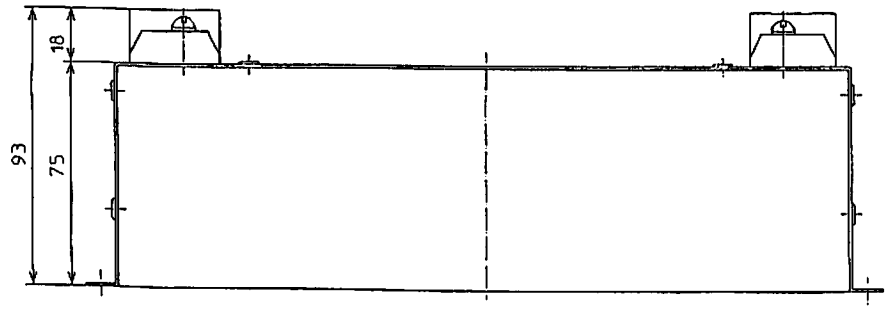
The noise filter decreases the leakage of noise made by the inverter to the power supply side. Terminals indicated with "OUT" are connected to the inverter side and terminals indicated with "IN" to the power supply side.

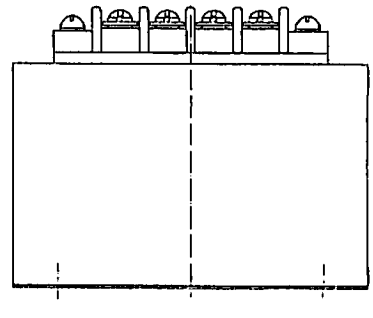
Specifications

Items	Specifications
Model	HF4020C-DV
Rated Current	AC415V 20A
Permissible Temperature Range	-20℃ ~ 65℃
Circuit Diagram	







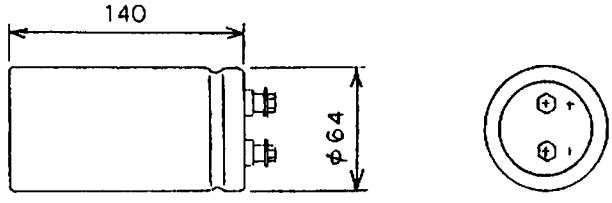


3.6 Capacitor (CB1, CB2)

This part is used for changing the alternative current to the direct current for the inverter. Connect two capacitor in line and used.

Specifications

Items	Specifications
Models	HCGFAR2G272N
Capacity of Static Electricity	2700 μF
Rated Voltage	400V
Permissible Temperature Range	-25℃ to 105℃

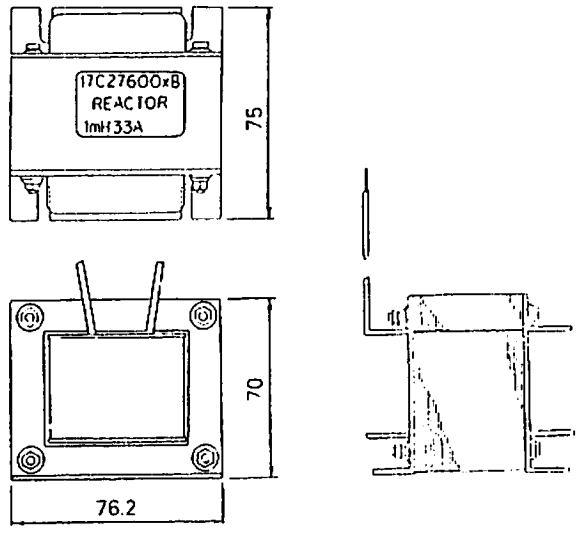


3.7 Reactor (DCL)

This part is used for changing the alternative current to the direct current for the inverter.

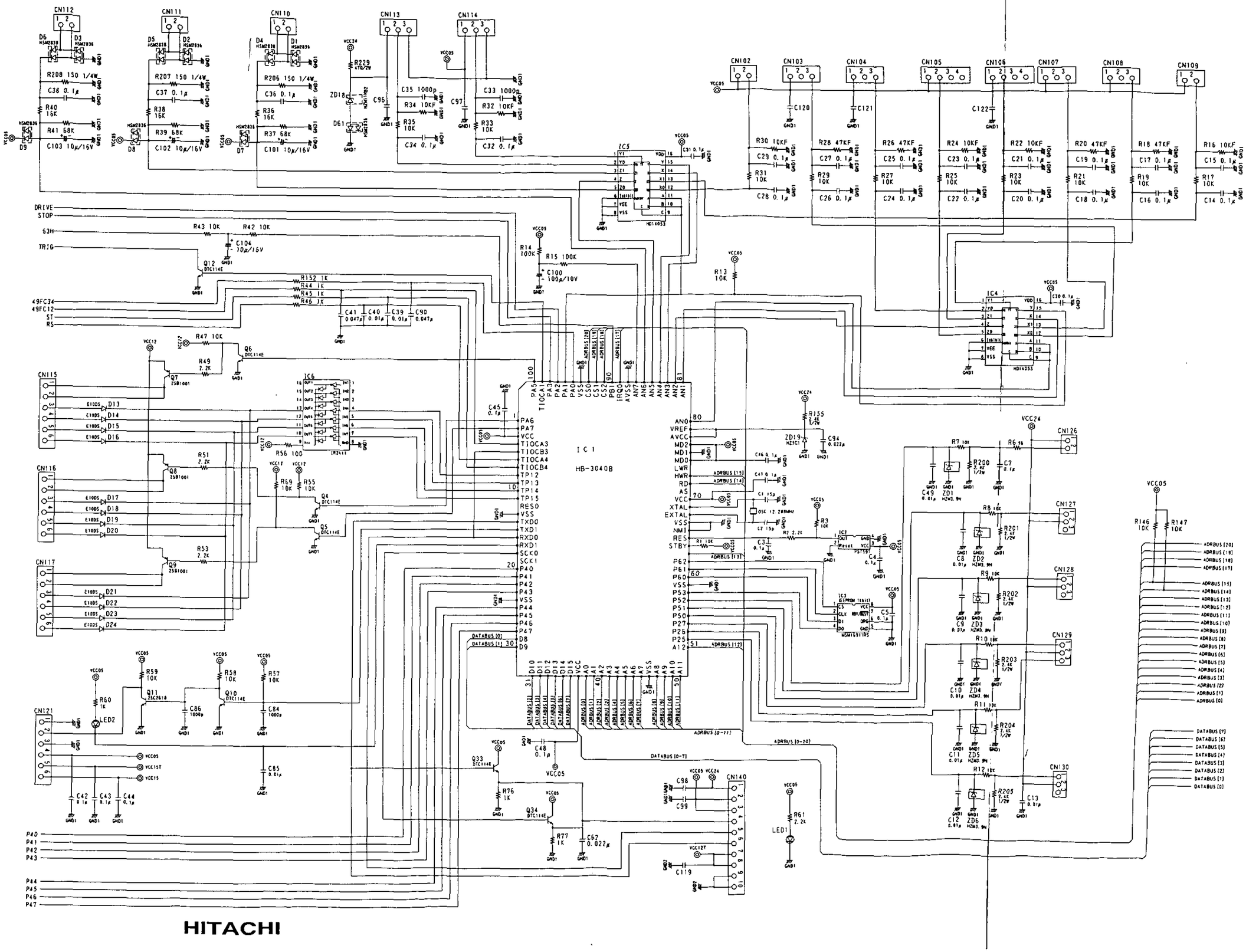
Specifications

Items	Specifications
Character	1mH±10% (at 1kHz)
Rated Current	33A
Direct Resistance	25.1mΩ±20% (at 20℃)
Permissible Temperature Range	-20℃ to 60℃



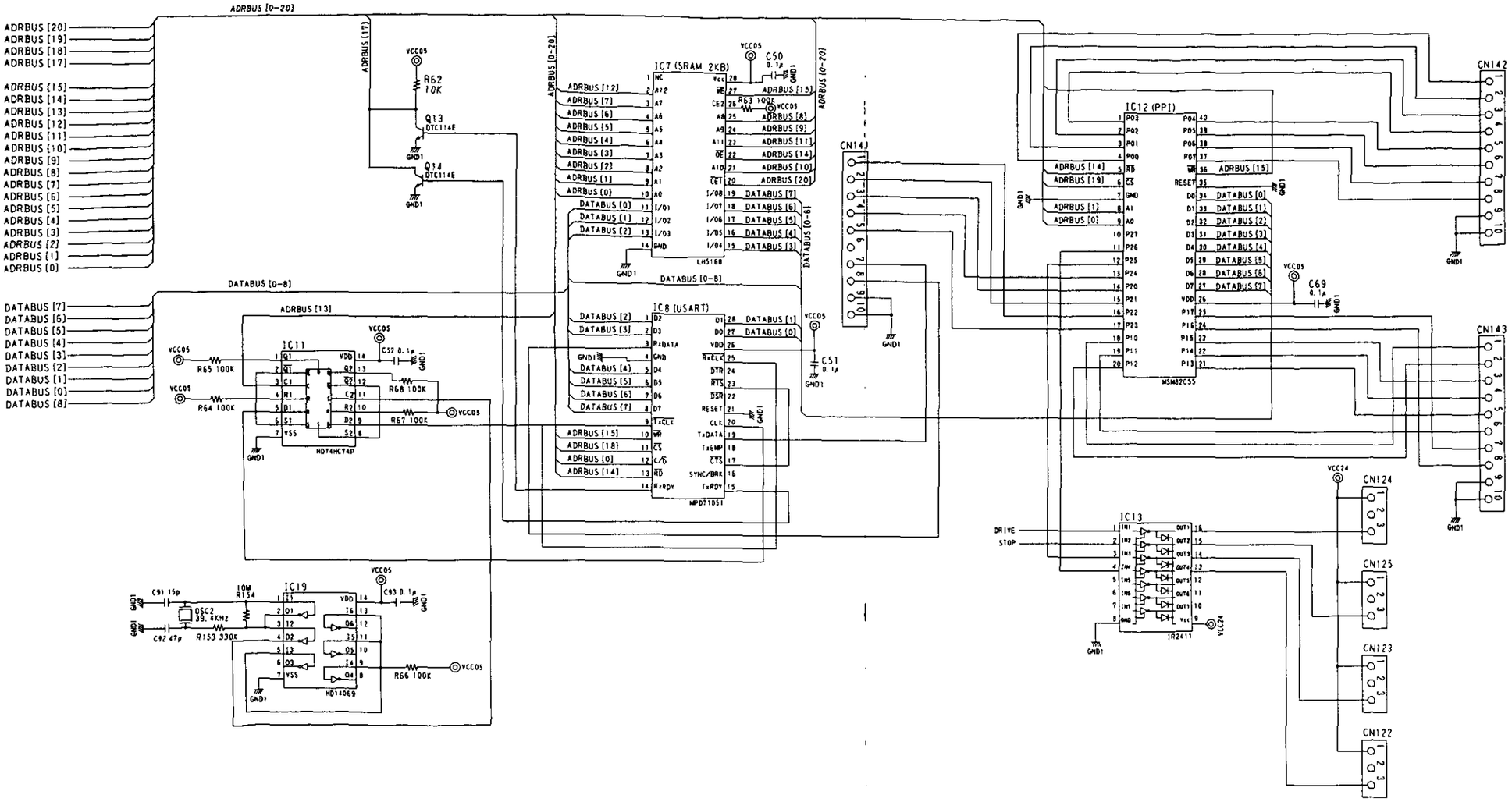
3.8 Circuit Diagram for Printed Circuit Board of Outdoor Unit

Control Board 1: PCB1 (1/4)

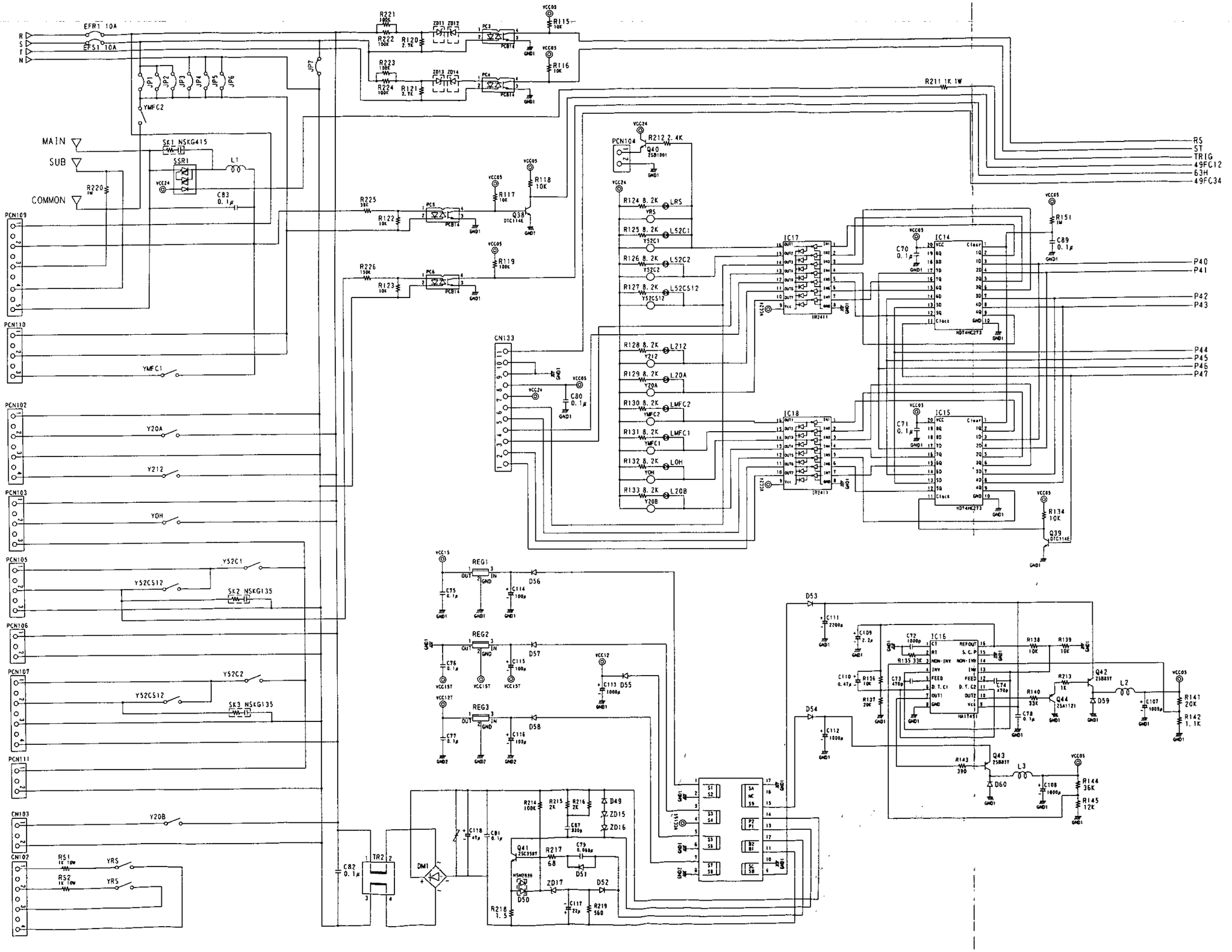


(3.8 Circuit Diagram for Printed Circuit Board of Outdoor Unit)

Control Board 1: PCB1 (2/4)

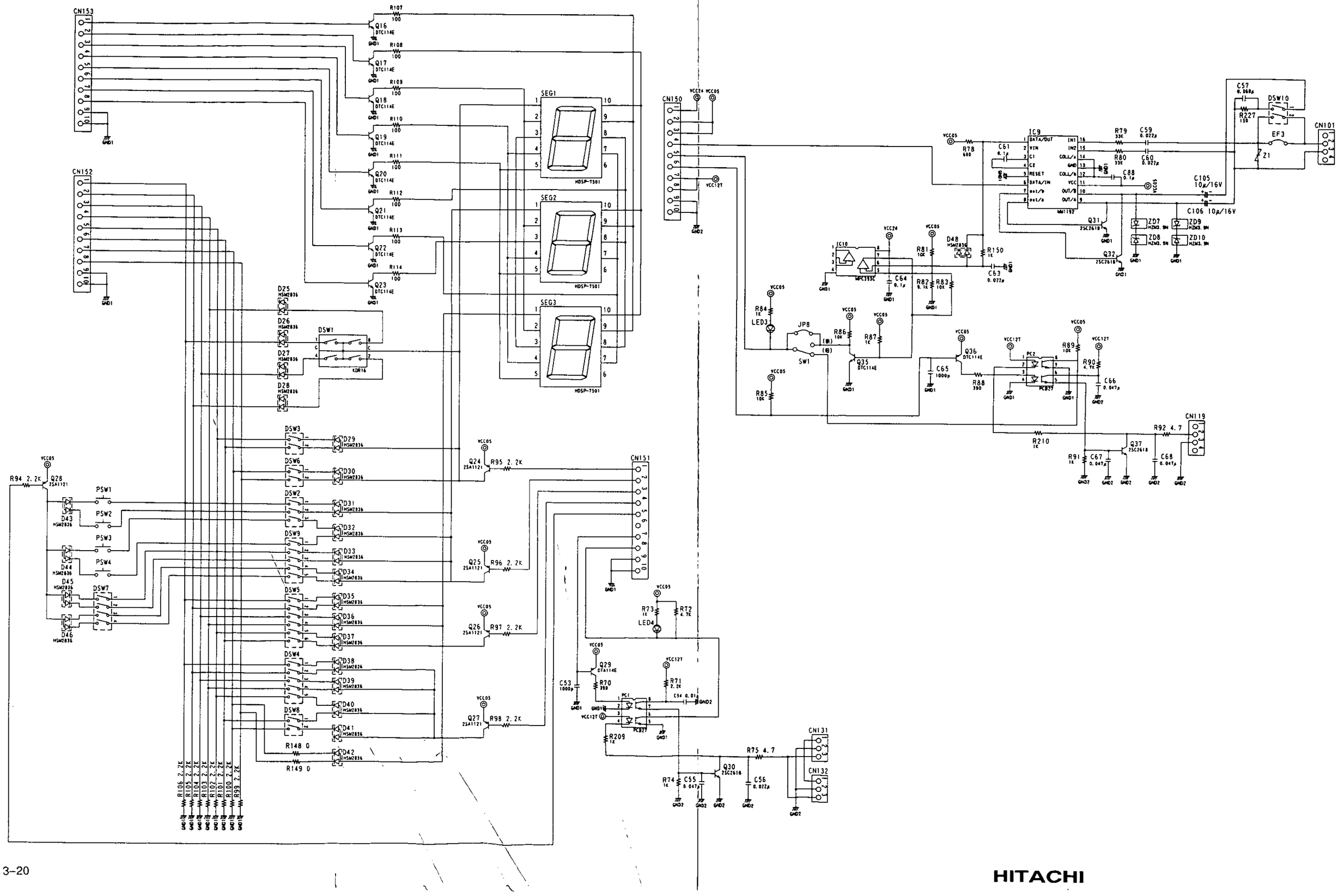


Control Board 1: PCB1 (3/4)

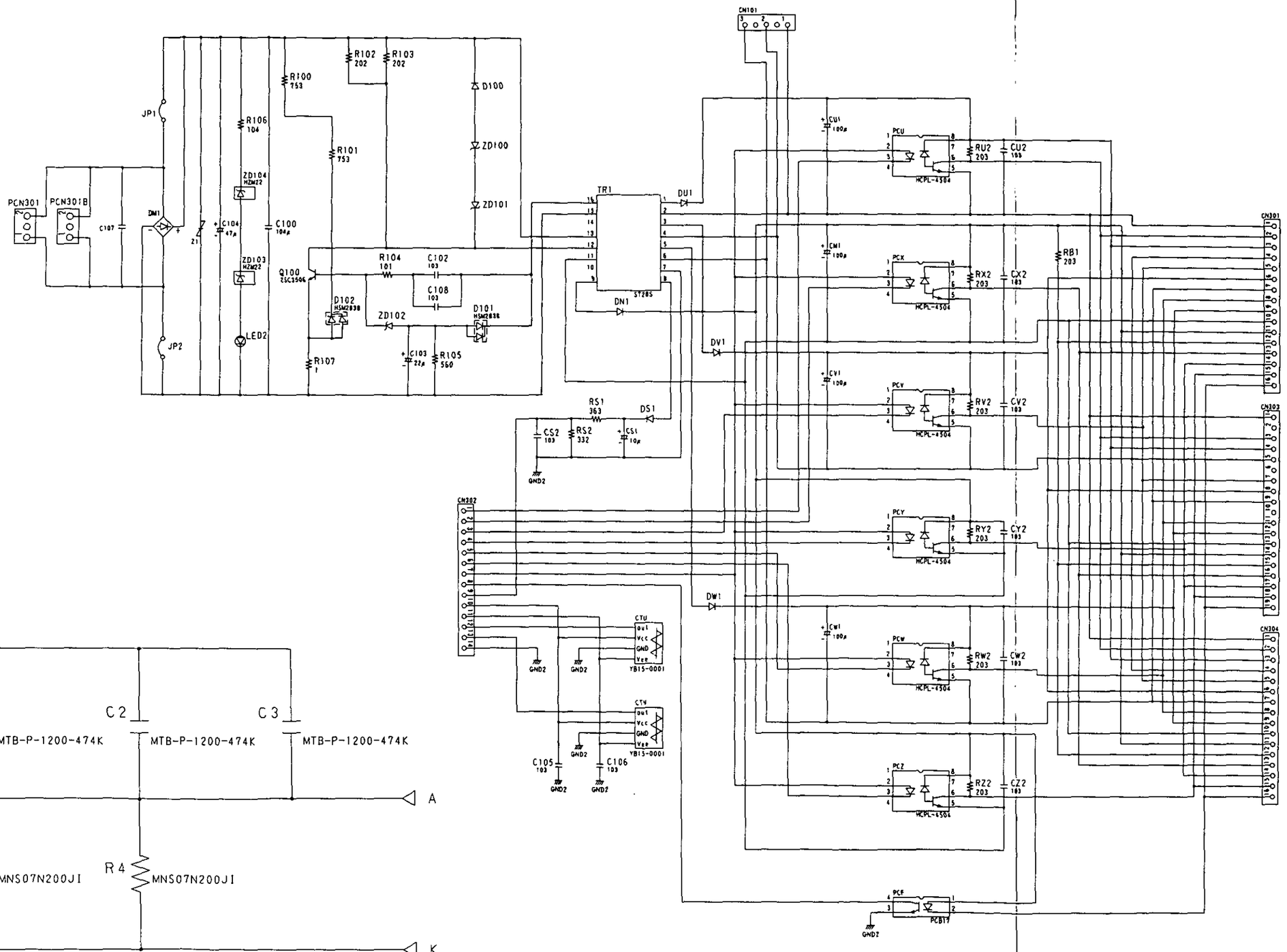


(3.8 Circuit Diagram for Printed Circuit Board of Outdoor Unit)

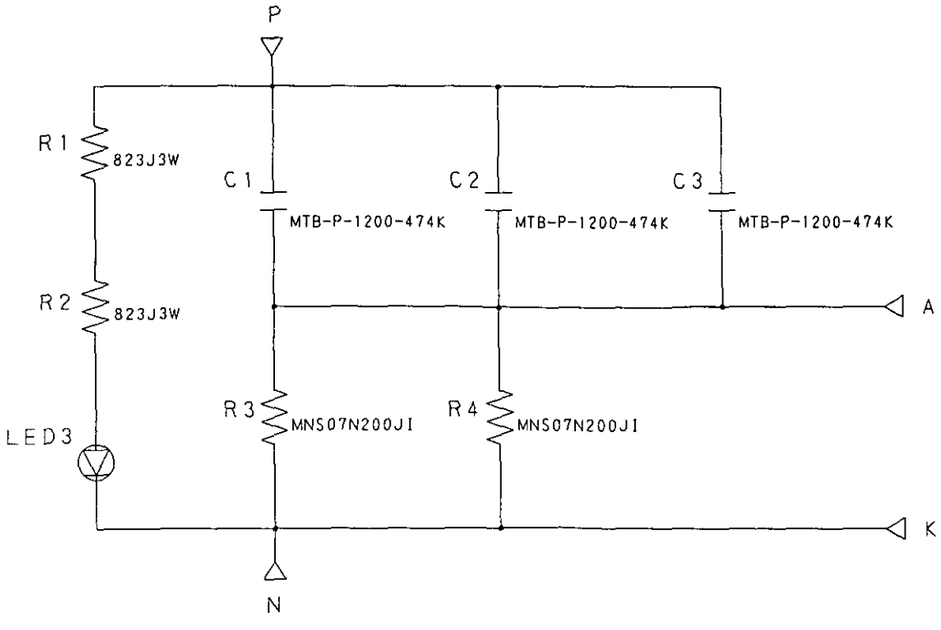
Control Board 1: PCB1 (4/4)



Inverter Board: PCB3

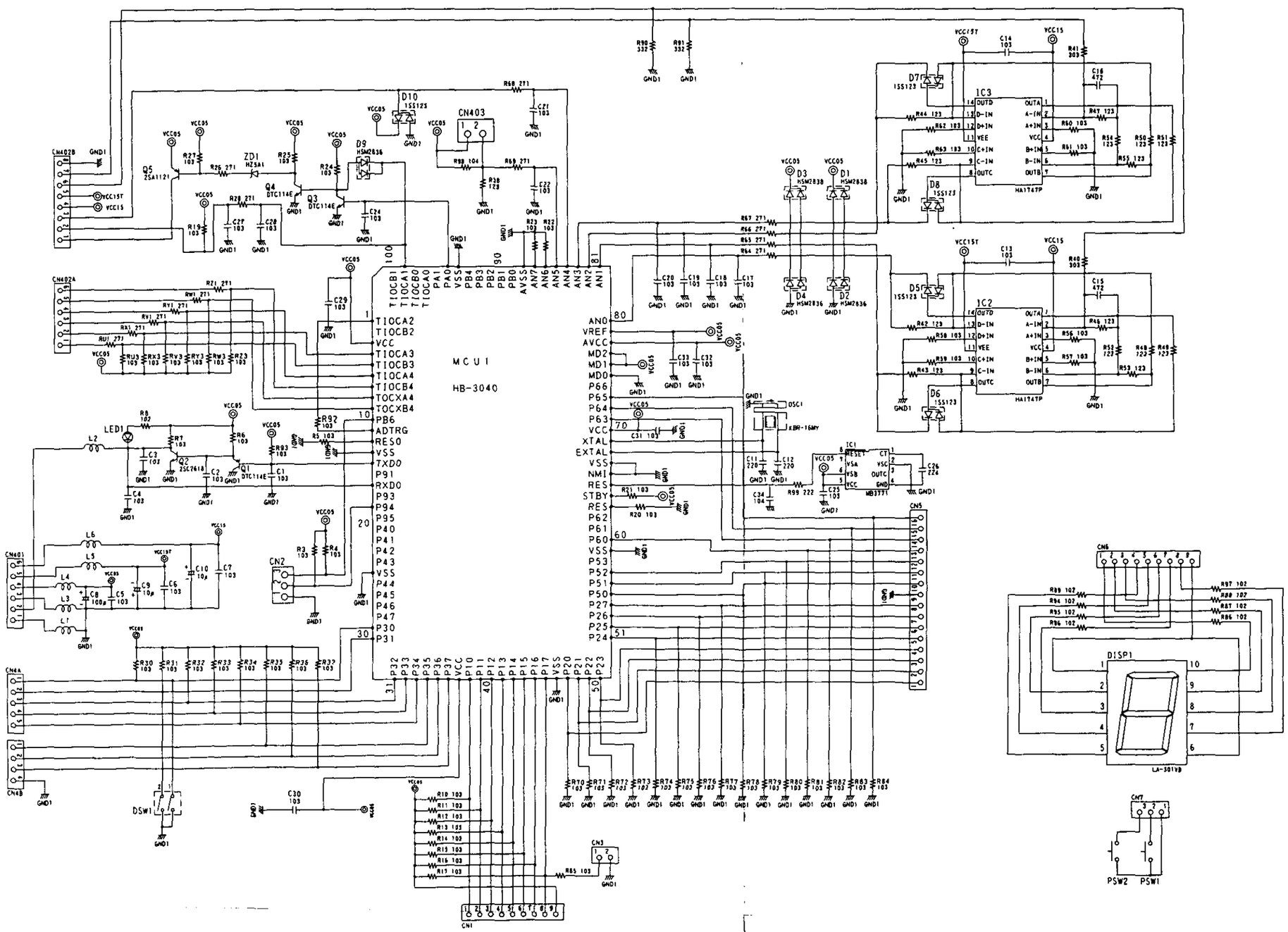


Snubber Board: PCB5

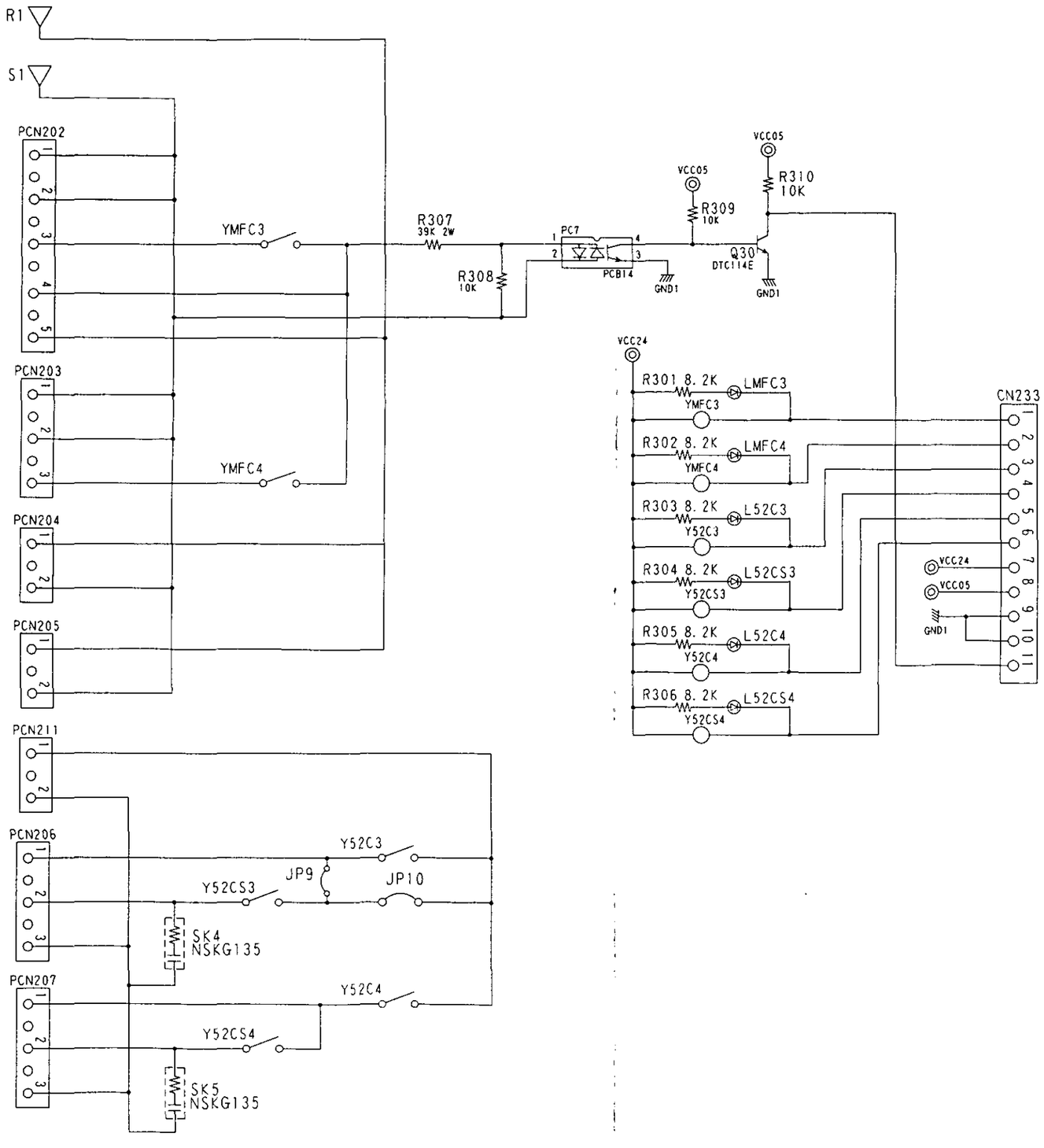


(3.8 Circuit Diagram for Printed Circuit Board of Outdoor Unit)

Inverter Board: PCB4



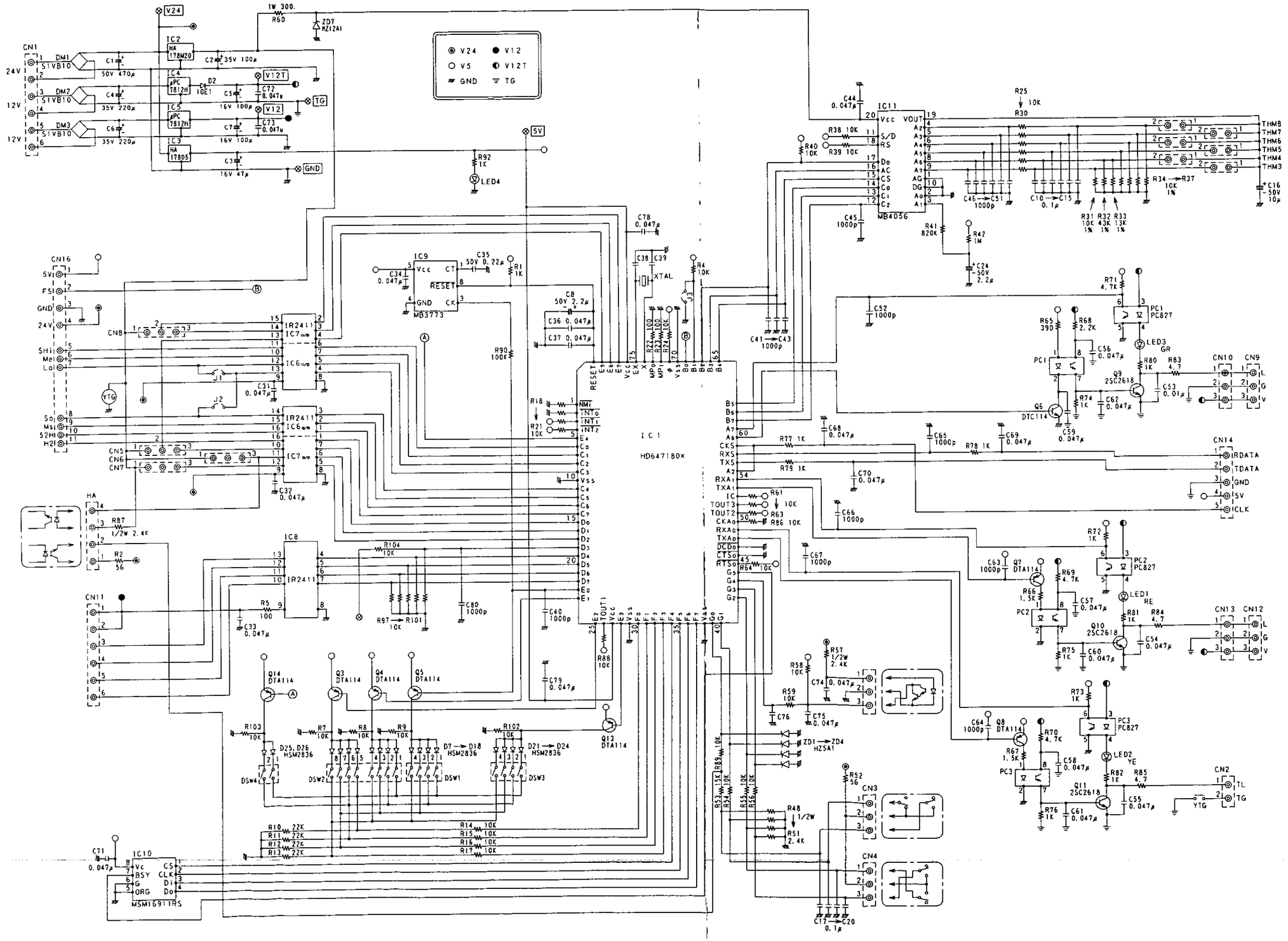
Control Board 2: PCB6 (FX2 Only)



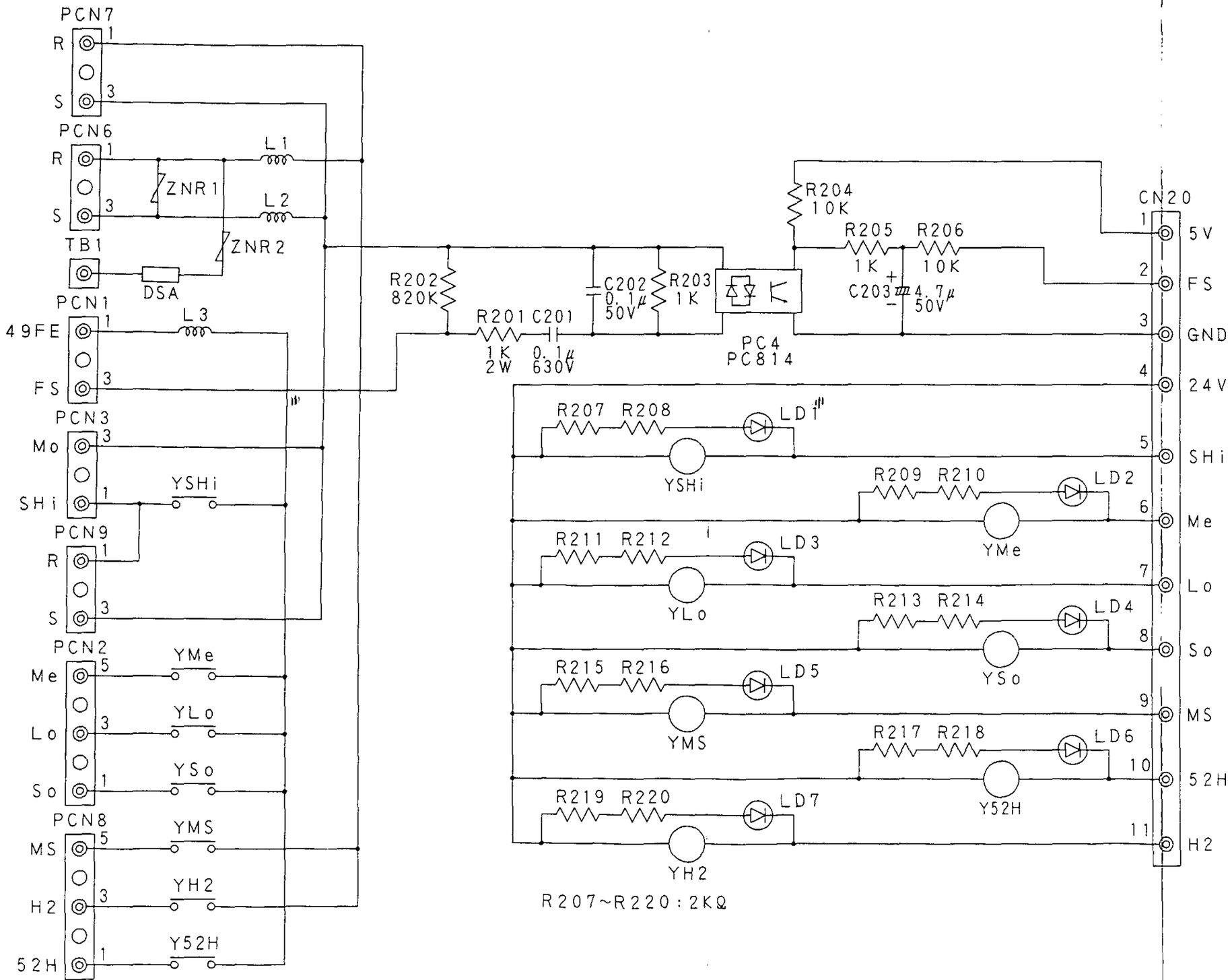
(3.9 Circuit Diagram for Printed Circuit Board of Indoor Unit and CH Unit)

3.9 Circuit Diagram for Printed Circuit Board of Indoor Unit and CH Unit

Control Board (Low Voltage): PCB (M) of Indoor Unit, PCB1 of CH Unit

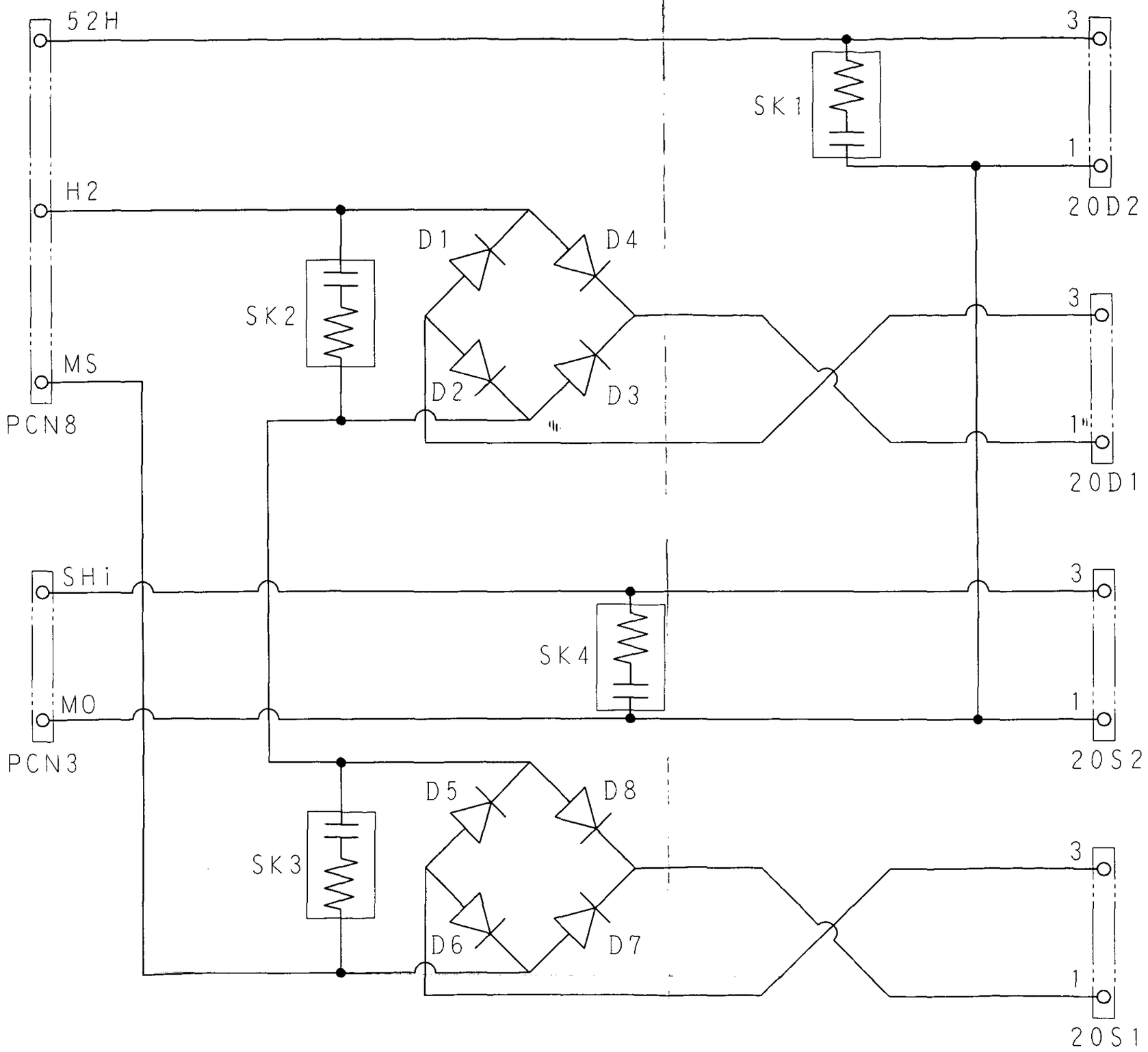


Power Supply Board (High Voltage): PCB (P) of Indoor Unit, PCB2 of CH Unit



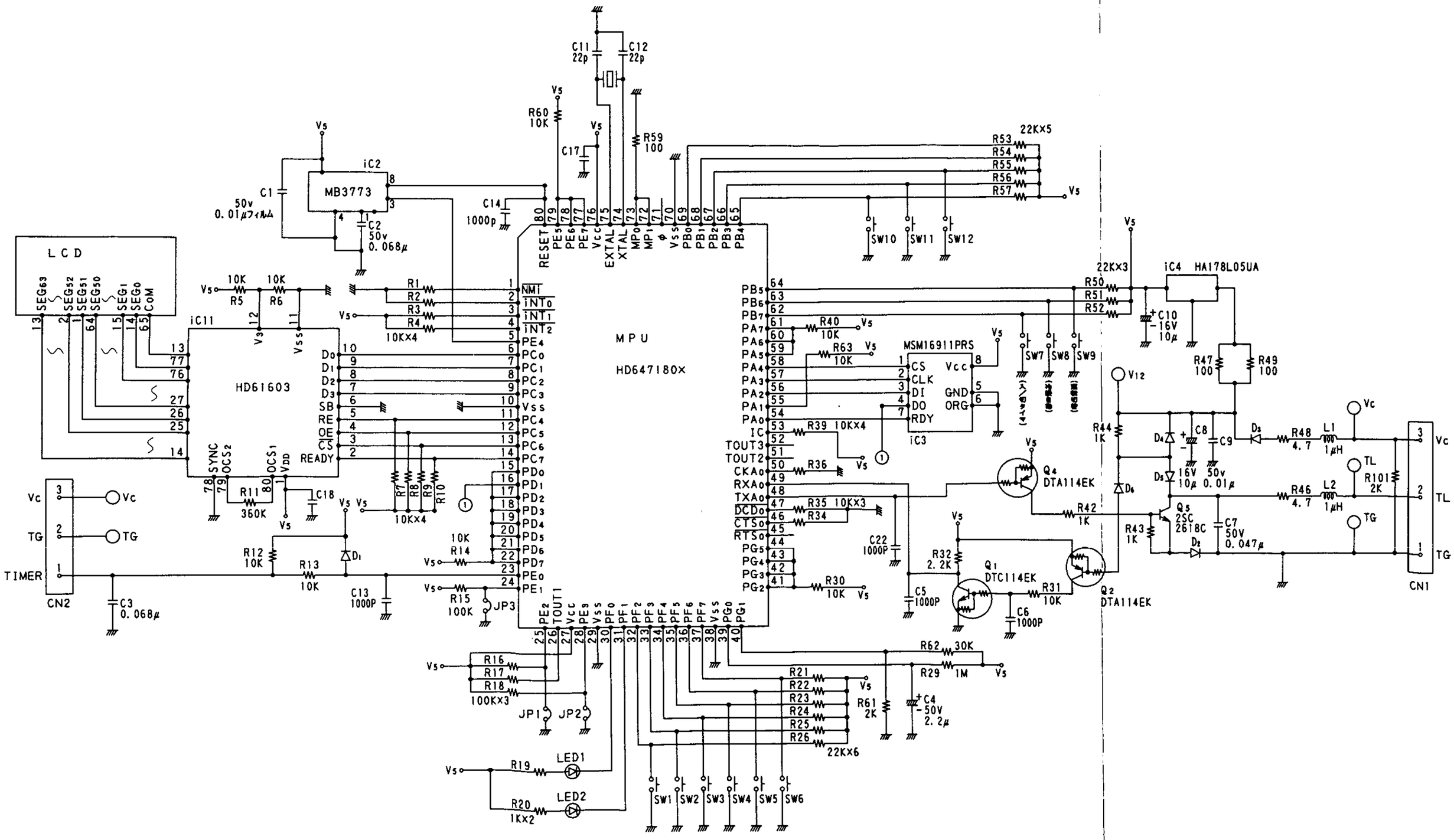
(3.9 Circuit Diagram for Printed Circuit Board of Indoor Unit and CH Unit)

Valve Control Board (High Voltage): PCB3 of CH Unit



3.10 Circuit Diagram for Printed Circuit Board of Remote Control Switch

PC-2H



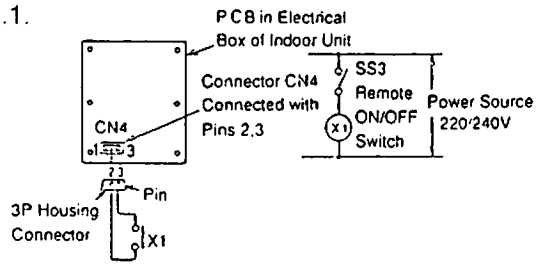
4. OPTIONAL FUNCTION

4.1 Indoor Unit

4.1.1 Remote Control ON/OFF Function

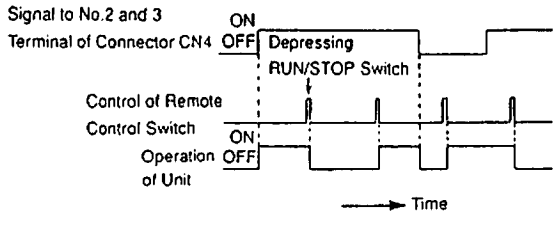
This function provides a control to stop and start the system automatically from a remote place. Three methods are available by using each signal from a building management system.

(1) Remote Control 1 (Level Signal Input)
This is an ON/OFF function from a remote place by using level signal (or ON/OFF). The basic wiring is shown in Fig. 4.1 and time chart in Fig. 4.2 and the required parts are shown in Table 4.1.



When the unit is started by the remote ON/OFF switch, the fan speed is subject to the mode memorized in the remote control switch.

Fig. 4.1 Remote ON/OFF

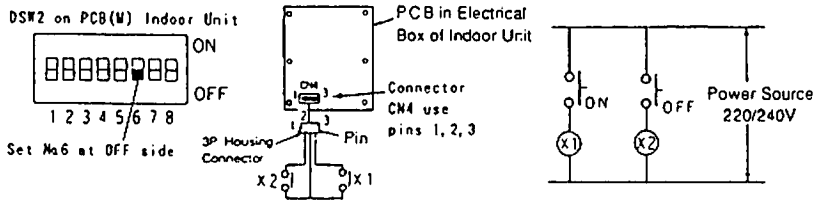


Operation priority is given to the remote ON/OFF signal or remote control switch signal which is given last.

Fig. 4.2 Time Chart

NOTES:
1. This function is available when "4.1.2 Automatic Restart Function (after Power Failure)" is applied.
2. Picking up signal within 10 seconds after power supply is turned ON is not available due to initializing of components.

(2) Remote Control 2 (Pulse Signal Input)
This is an ON/OFF function from a remote place by using pulse signal. The basic wiring is shown in Fig. 4.3 and time chart in Fig. 4.4 and the required components are shown in Table 4.1.



The pulse width shall be wider than 200ms.

Fig. 4.3 Remote ON/OFF

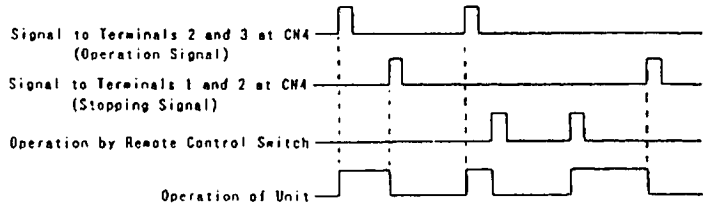


Fig. 4.4 Time Chart

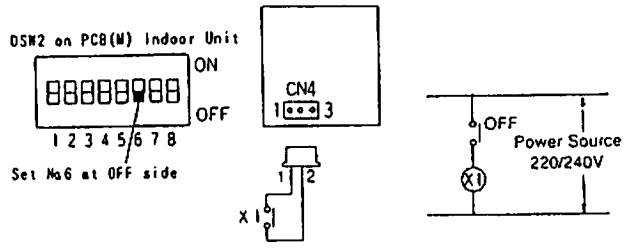
NOTES:
1. This function is available when "4.1.2 Automatic Restart Function (after Power Failure)" is applied.
2. Picking up signal within 10 seconds after power supply is turned ON is not available due to initializing of components.

OPTIONAL FUNCTION

(4.1 Indoor Unit)

(3) Remote Control 3

By using the signal from a building management system, the air conditioners can be stopped. If a signal is input during stoppage of air conditioner, the air conditioner remains unchanged. The basic wiring is shown in Fig. 4.5, time chart in Fig. 4.6. The required parts are shown in Table 4.1.



The pulse signal shall be longer than 200ms.

Fig. 4.5 Remote ON/OFF

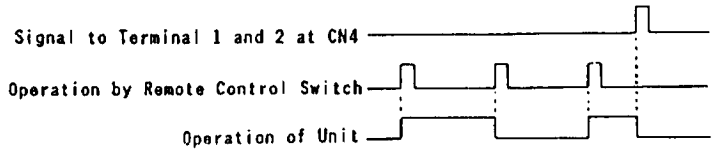


Fig. 4.6 Time Chart

NOTES:

1. This function is available when "4.1.2 Automatic Restart Function (after Power Failure)" is applied.
2. Picking up signal within 10 seconds after power supply is turned ON is not available due to initializing of components.

Table 4.1 Specifications on Required Components

Component		Manufacturer or Specifications	Remarks
Auxiliary Relay (X1, X2)		OMRON Mini Power Relay Model: MY1F or Equivalent	Voltage 220V or 240V
Changeover Switch (SS2, SS3)		Manual Type	
3P Connector Cord		Optional Part PCC-1 (Able to Connect JST Connector XHP-3)	Five Cords with Connectors as one set
Cord (Indoor)	Low Voltage	0.3mm²	less than 24V
	220V/240V Class	0.5~0.75mm²	
Cord (Outdoor)	Low Voltage	0.3~0.75mm²	less than 24V
	220V/240V Class	2mm²	

NOTE:

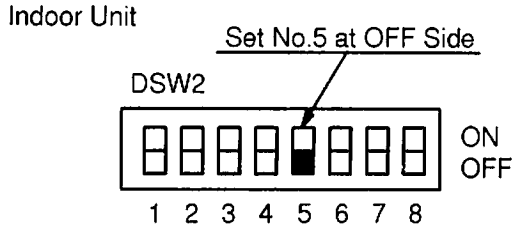
Make the wires CN4 as short as possible. Do not install the wires along the 200-400V power line. Separately install them at a distance of more than 30cm. (Intersecting as applicable.)

If the wires are installed along the power line, put the wires in a metal tube and connect a wire to an end for grounding. The maximum wiring length is 70m.

In the case that this function is used, it is recommended that safety devices such as electric leakage breaker or smoke detector, etc. be used.

4.1.2 Automatic Restart Function (after Power Failure)

Set the dip switch on the PCB for the indoor unit as shown in the figure below to restart the system automatically even if power failure continues for more than 2 seconds.
The standard setting provides automatic restarting in less than 2 seconds after a power failure.
The compressor starts in 2 seconds after a 3 minute time guard after power failure.



NOTE:
In the case that the dip switch is set at the automatic restart function, the unit will be automatically restarted after power resupply or turning ON the power switch even if the unit is stopped by using the remote control switch, etc. before power failure or turning OFF the main switch, except the case of that the "REMOTE" is indicated on the LCD of the remote control switch.

4.1.3 Control by Field-Supplied Room Thermostat

In the case that a field-supplied room thermostat instead of the inlet thermistor of the indoor unit is used, connect wires as shown below.

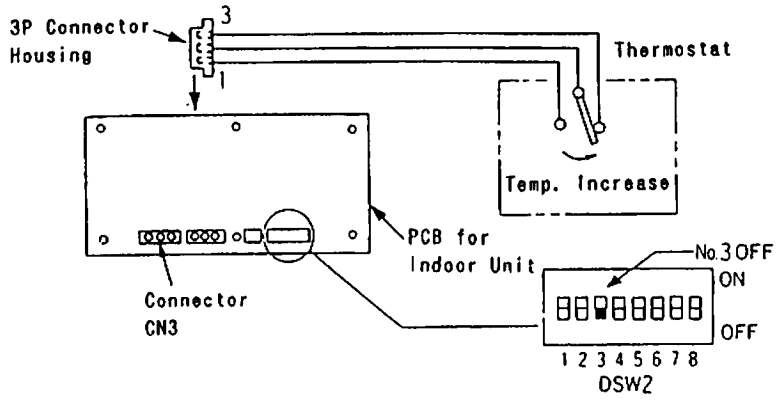


Fig. 4.7 Field-Supplied Room Thermostat

Operation

Cooling Operation:	Compressor is ON by closing terminals 2 and 3 at CN3
	Compressor is OFF by opening terminals 2 and 3 at CN3
Heating Operation:	Compressor is ON by closing terminals 1 and 2 at CN3
	Compressor is OFF by opening terminals 1 and 2 at CN3

NOTES:

1. When setting the dip switch DSW2, turn OFF power source and set the dip switch. If the dip switch is set without turning OFF the power source, it does not correctly function.
2. When a field-supplied room thermostat is used, select the specified thermostat as below.
   Contactor Load: DC24V 50 to 6 mA
   Differential: more than 1.5 degree
3. Do not use a thermostat utilizing mercury.
4. This function can be used together with "4.1.1 Remote Control ON/OFF Function".

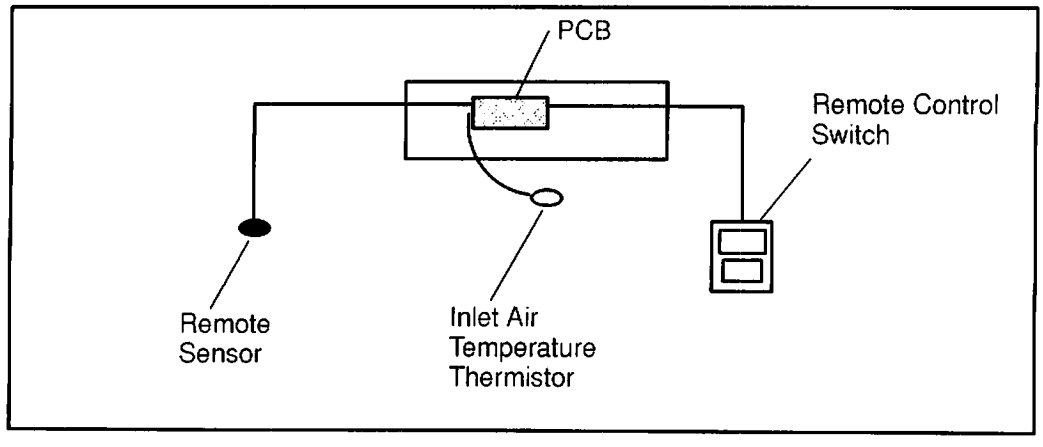
4.1.4 Operation Control by Remote Temperature Sensor

By using an optional remote temperature sensor, the following are available.

(1) The unit is controlled by the average temperature of the inlet air thermistor and remote temperature sensor.

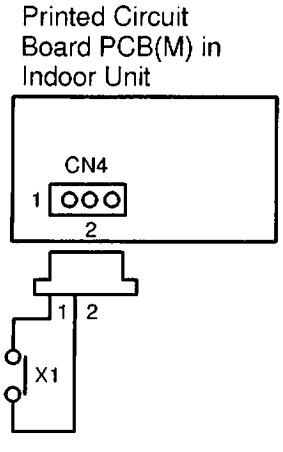
(2) In the case that the discharge air temperature exceeds 60℃, the fan speed increases from "Medium" to "High" or " Low" to "Medium".

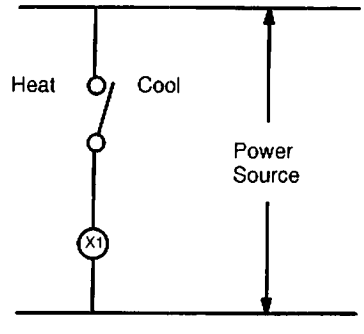
NOTES:
1. In the case that the outdoor temperature is high, the high pressure switch may activate.
2. Operation sound, changes according to fan speed.
3. During the heating operation, "Heating Temperature Calibration" is automatically cancelled. (Ref. Page 4-17)

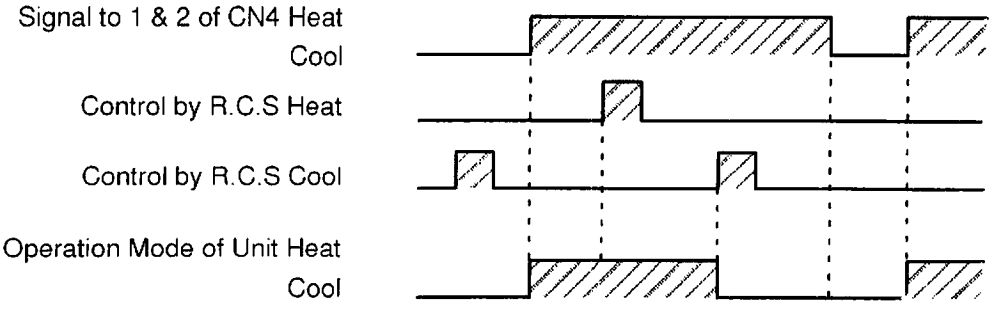


4.1.5 Cooling or Heating Operation Mode Setting Change by External Input

By utilizing this function, the cooling or heating operation mode can be changed by giving a contact signal from the outside to the unit. The operation mode is followed by the field-supplied switch or the remote control switch, which is used last.







4.1.6 Picking Up Operation Signal

(1) Picking Up Operation Signal

This function is utilized to pick up the operation signal. By this function, operation signal at a remote place can be checked, or operation at the fresh air intake fan motor can be interlocked. Connect wires as shown below. The required parts are indicated in Table 4.2. Please note that the contact of the auxiliary relay "RYa" is closed when this operation signal is given.

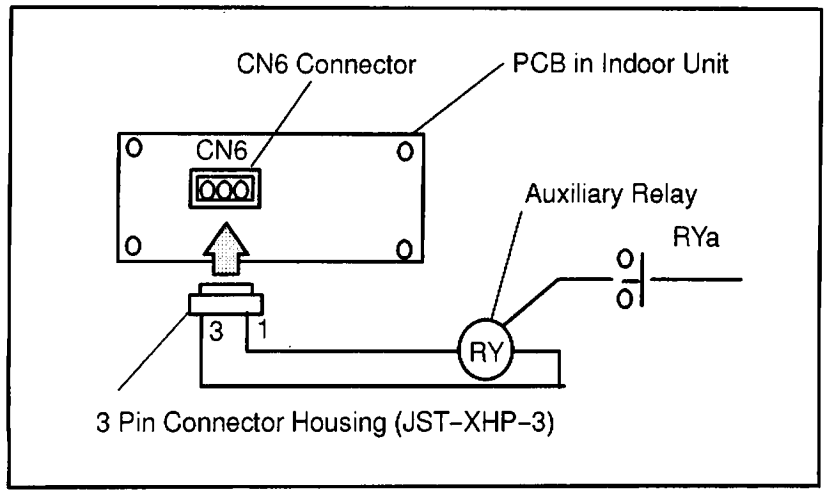


Fig. 4.8 Picking Up Operation Signal

Table 4.2 Required Parts for Modification

Parts Name	Specifications
Auxiliary Relay	OMRON made High Power Relay Model LY2F DC24V

(2) Picking Up Alarm Signal

This signal is utilized to pick-up activation of safety devices and is normally indicated on the remote control switch. However, this function is not available under abnormal transmission conditions. Connect the wires as shown below. The required parts are indicated in Table 4.2. Please note that the contact of auxiliary relay, RYa is closed when one of the safety devices is activated.

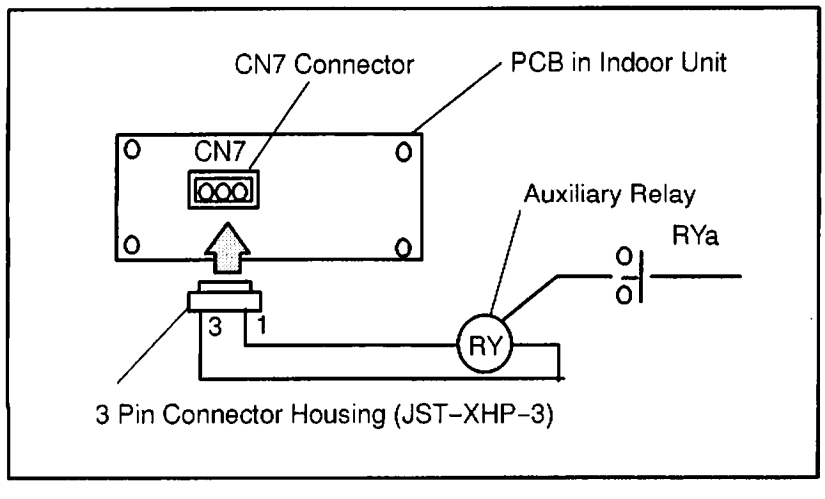


Fig. 4.9 Picking Up Alarm Signal

(4.1 Indoor Unit)

(3) Picking Up Heating Operation Signal

This function is utilized to pick up the heating operation signal. The contact of RYa is closed when heating operation signal is ON despite "Thermo-ON" or "Thermo-OFF". Connect the wires as shown below.

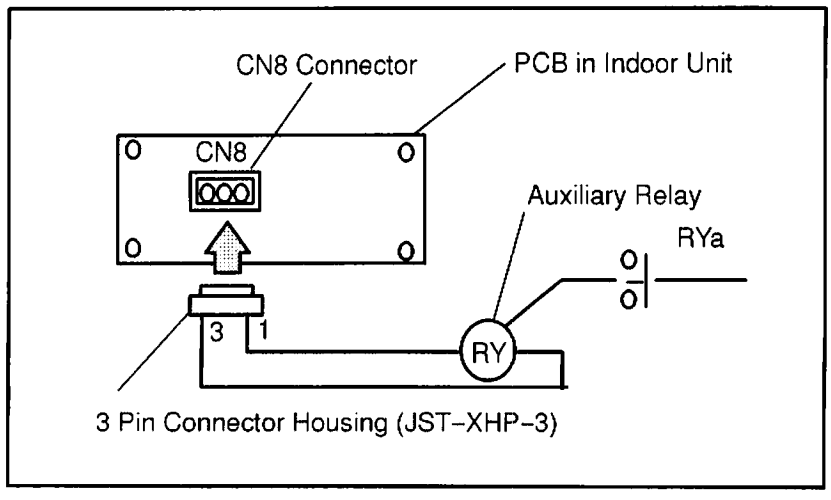


Fig. 4.10 Picking Up Heating Operation Signal

(4) Picking Up "Thermo-ON" Signal during Heating Operation

This function is utilized to pick up the heating "Thermo-ON" signal of compressor running to control a circulator or a humidifier. Connect wires as shown below. The required parts are indicated in Table 4.2. The contact of RYa is closed when "THERMOSTAT" is ON during heating operation mode.

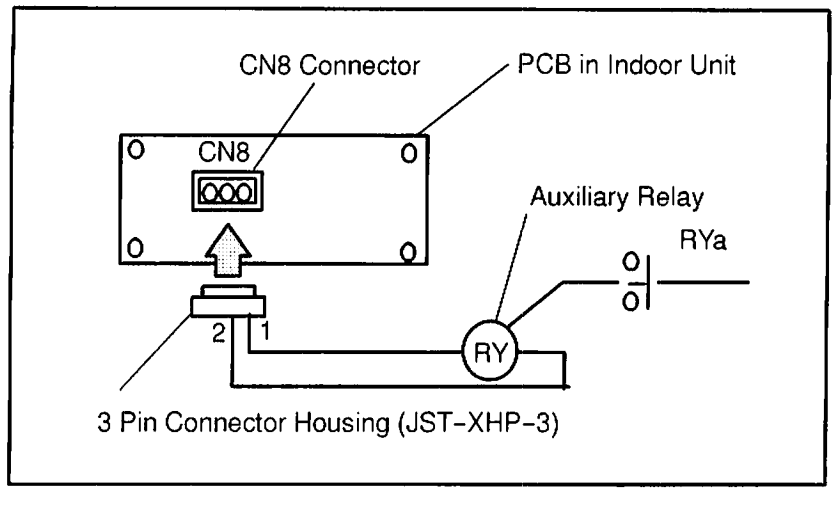


Fig. 4.11 Picking Up "Thermo-ON" Signal during Heating Operation

NOTE:

"Thermo-ON" indicates that one of the micro-computer control function "THERMOSTAT" is ON as a thermostat.

(5) Picking Up Cooling Operation Signal

This function is utilized to pick up the cooling signal. The contact of RYa is closed when cooling operation signal is ON despite "Thermo-ON" or "Thermo-OFF". Connect the wires as shown below. The required main parts are indicated in Table 4.2.

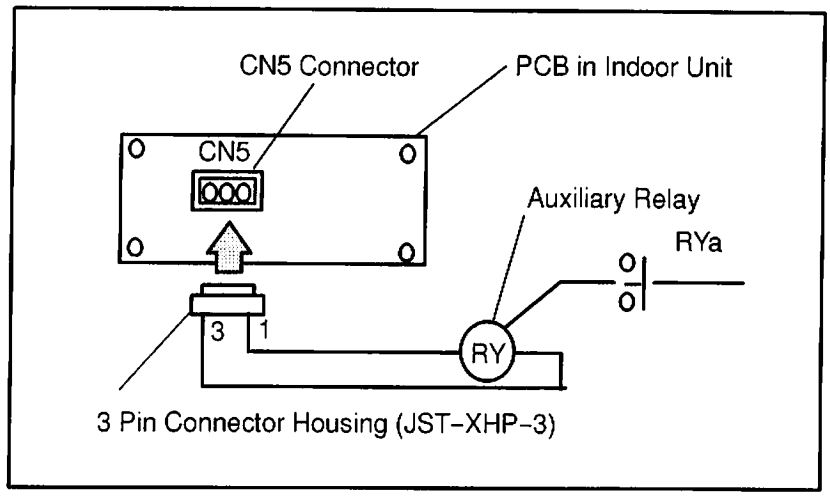


Fig. 4.12 Picking Up Cooling Operation Signal

(6) Picking Up "Thermo-ON" Signal during Cooling Operation

This function is utilized to pick up the cooling "Thermo-ON" signal of compressor running. Connect the wires as shown below. The required parts are indicated in Table 4.2. The contact of RYa is closed when "THERMOSTAT" is ON during cooling operation mode.

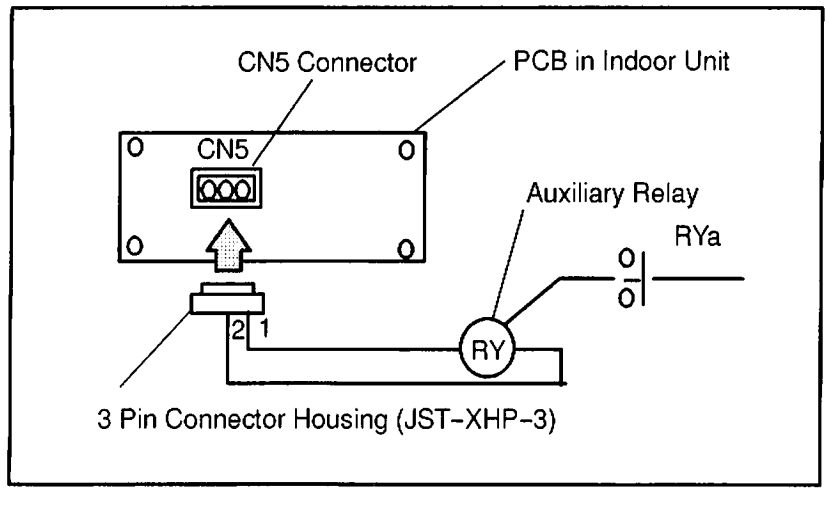


Fig. 4.13 Picking Up "Thermo-ON" Signal during Cooling Operation

NOTE:
"Thermo-ON" indicates that one of the micro-computer control function "THERMOSTAT" is ON as a thermostat.

4.2 Outdoor Unit

4.2.1 Forced Stoppage

The compressor is stopped and the indoor fan motor is stopped when the forced stoppage input terminals(CN127 #1~#2) on the outdoor unit PCB is short-circuited during running. However, the remote control switch display remains at the same mode with an alarm code of "d1-10".
In this case, if the input terminals are opened, operation is resumed.

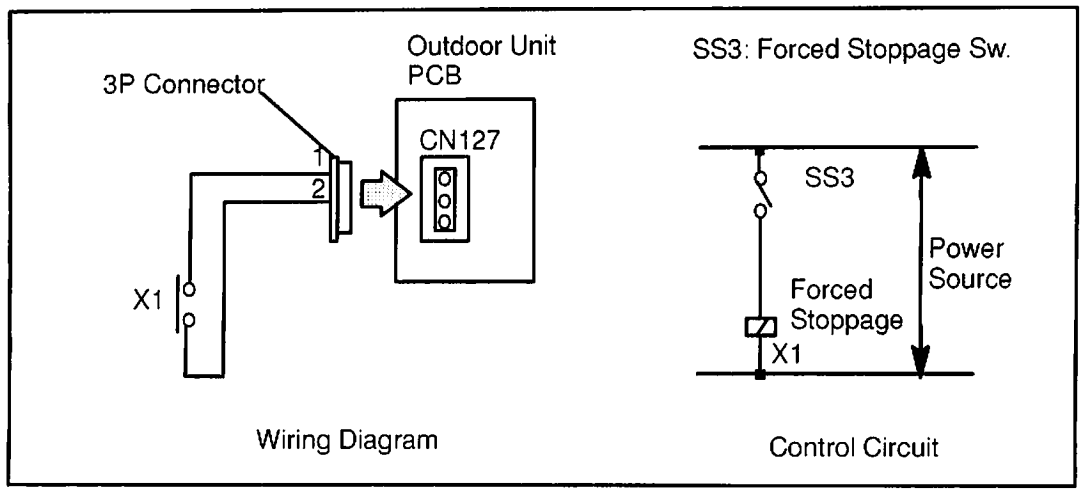


Fig. 4.14 ON/OFF Control by Demand Input Terminals

4.2.2 Fixing Operation Mode

In the case that the operation mode fixing input terminals on the outdoor PCB are short-circuited, the operation mode can be fixed at the cooling or heating mode.

Short-circuit between Terminals 1 and 2 of CN129: Fixed Heating Mode

Short-circuit between Terminals 2 and 3 of CN129: Fixed Cooling Mode

During this fixed heating (or cooling) mode, no cooling (or heating) operation is available. The indoor units under the cooling or dry operation (or heating operation) will be changed to the Thermo-OFF condition during this mode, and an alarm code of "d1-20" appears.

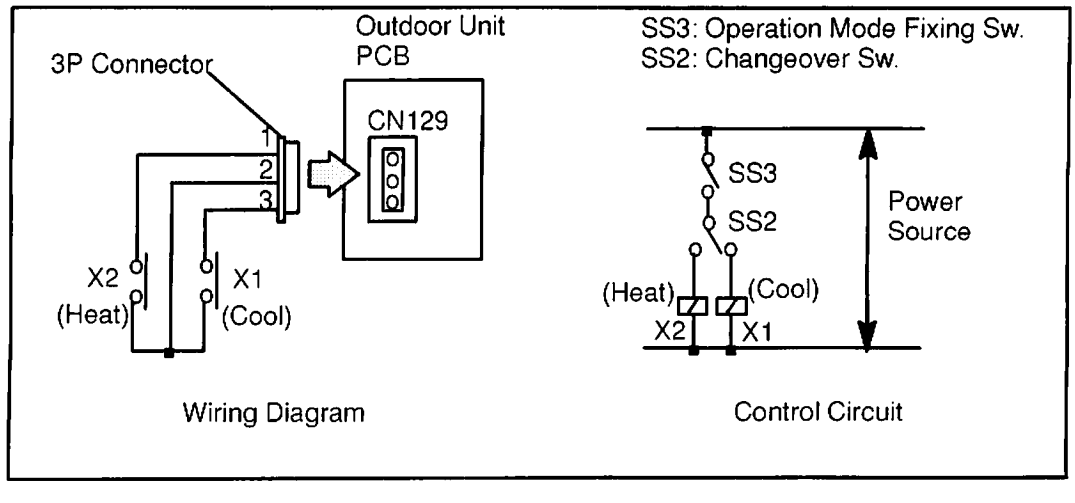


Fig. 4.15 ON/OFF Control from Remote Place

4.2.3 Snow Sensor

In the case that the snow sensor input terminals are short-circuited during compressor stoppage, all the outdoor fan motors are operated at the full speed. However, the compressor is called for compressor operation, the fan operation is changed to a normal operation. If the input terminal is opened, the fan(s) is stopped. This function protects the outdoor units from a condition covered with snow.

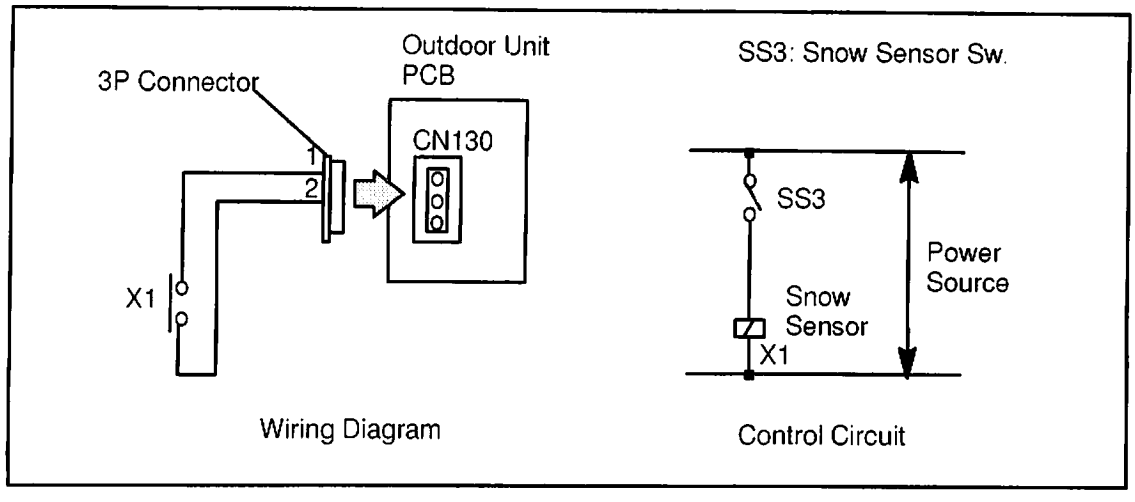


Fig. 4.16 ON/OFF Control by Demand Input Terminals

Table 4.3 Specifications of Required Main Parts

Parts		Specifications	Remarks
Auxiliary Relay (X1, X2)		Mini-Power Relay, MY1F (or 2F) made by OMRON	220/240V
Changeover Switch (SS2, SS3)		Manual Switch	220/240V
3 Pin Connector Cord		PCC-1 (connected to JST connector, XHP-3)	five cords with connectors as one set
Cord (inside of Unit)	Low Volt.	0.3mm^2	lower than 24V
	220/240V	0.5~0.75mm^2	
Cord (outside of Unit)	Low Volt.	0.5~0.75mm^2	lower than 24V
	220/240V	2mm^2	

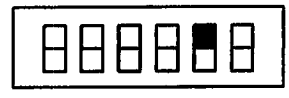
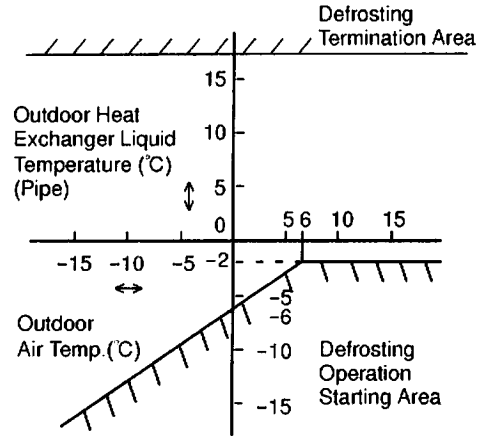
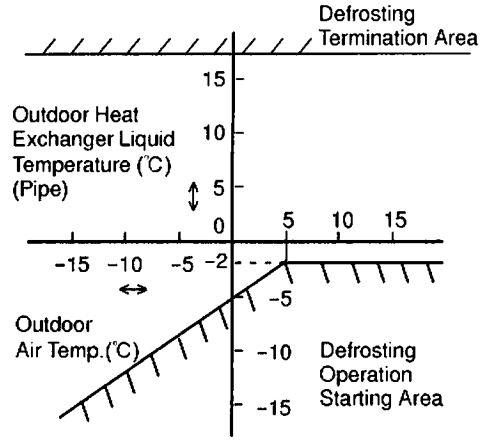
NOTES:

1. Make the wire to the terminals as short as possible.
2. Do not run the wires along high voltage cable. (crossing is applicable.)
   If necessary to run wires along high voltage cable, insert the low voltage cable(s) into metal tube and ground it at one end. If sealed wires are used at the low voltage wire side, ground it at one end of shield wires. The maximum length should be 70m.

(4.2 Outdoor Unit)

4.2.4 Defrosting Condition Changeover

By changing the position of No.5 on dip switch, DSW5, defrosting operation conditions can be changed.

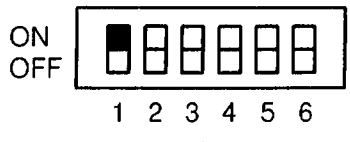
	Standard Specifications	Cold Area Specifications
Dip Switch Setting	 ON OFF 1 2 3 4 5 6 DSW5	 Set No.5 at ON side. 1 2 3 4 5 6 DSW5
Temperature Conditions under Defrosting Operation		

(1) No. 5 of DSW5 is set at OFF before shipment.

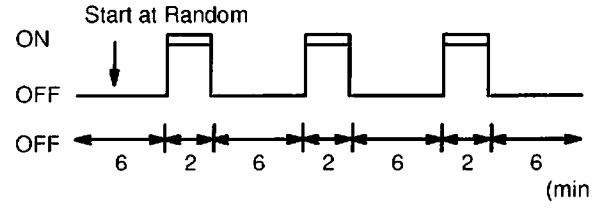
(2) Turn OFF the main switch and set the dip switch.

4.2.5 Indoor Fan Control during Thermo-OFF at Heating

By setting the dip switch as shown below, the indoor fan operates for 2 min. and stop for 6 min. as a cycle when the activation conditions are satisfied.



Set No.1 at "ON"

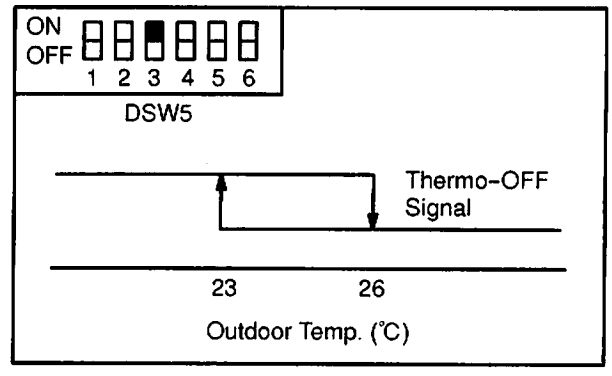
Operation Conditions	Operation
Under compressor running except defrosting operation.	When the indoor unit is at thermo-OFF during the heating operation, the indoor fan operates and stops for 6 minutes in 2 minute cycles. 

NOTES: When the indoor fan is stopped by another control, it is not available to operate indoor fans.

4.2.6 All Season Heating Operation

By setting the dip switch, the heating operation through the year is available.
The heating operation is continued under a high outdoor temperature.

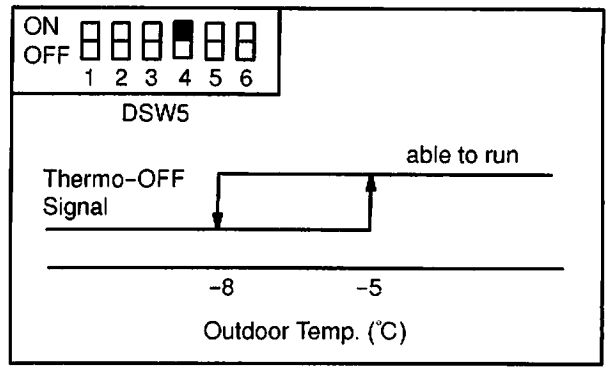
NOTE:
The operation may be OFF due to high outdoor temperature protection control, since protection control is not cancelled.



4.2.7 All Season Cooling Operation

By setting the dip switch, the cooling operation through the year is available.
The cooling operation is continued under a low temperature.

NOTE:
The operation may be OFF due to low outdoor temperature protection control since protection control is not cancelled.



4.3 Picking Up Signals from Outdoor Unit Printed Circuit Board

The parts applied to picking up operation signals are shown in Table 4.4.

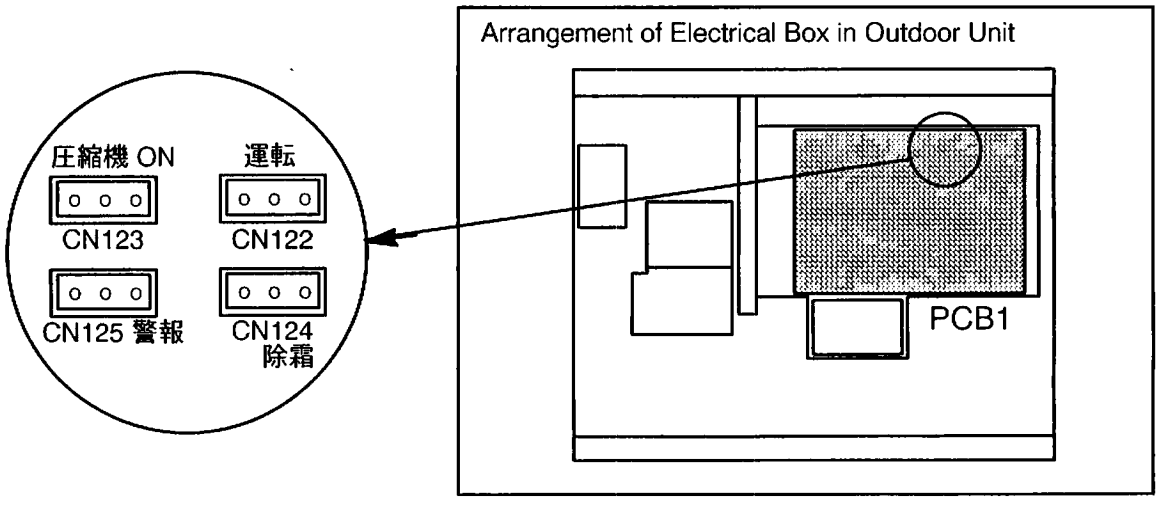


Table 4.4 Main Required Part

Part Name	Manufacturer etc.
Auxiliary Relay	OMRON High Power Relay Model: LY2F DC24V

4.3.1 Picking up Alarm Signal

With this procedure the indoor unit alarm signals can be picked up. The method is explained in Fig. 4.17. The required part is indicated in Table 4.4. Connecting relay contactors (RYa) are closed at the time of alarm. (When either one of the units issues an alarm, an alarm signal is indicated.)

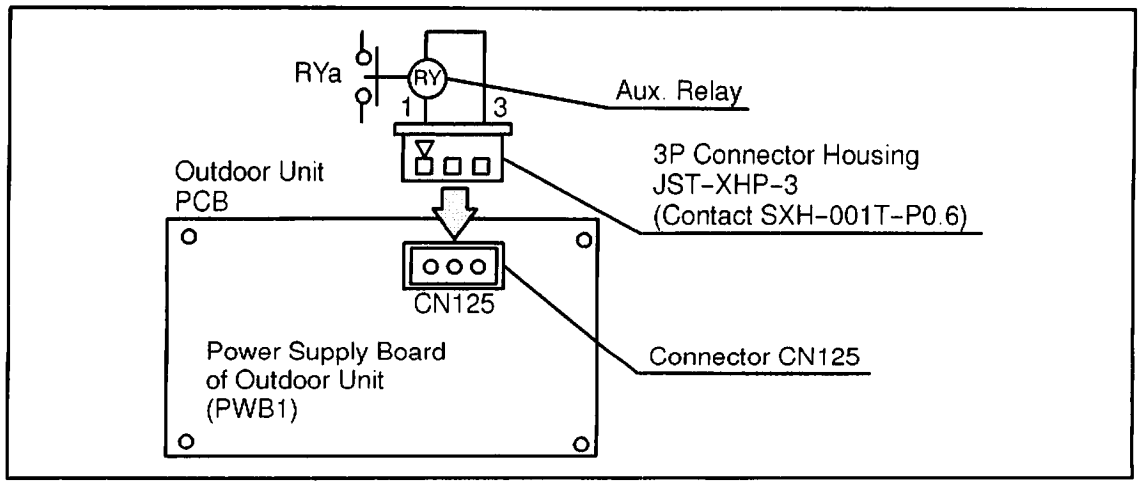


Fig. 4.17 Picking up Alarm Signal

4.3.2 Picking up Operation Signal

With this procedure the operation signal of cooling or heating can be picked up. The method for picking up the signal is explained in Fig. 4.18. The required part is the same as in Table 4.4. Connecting relay contactors RYa are closed at the time of cooling or heating. These signals can be applied to the operation of circulators and humidifiers.

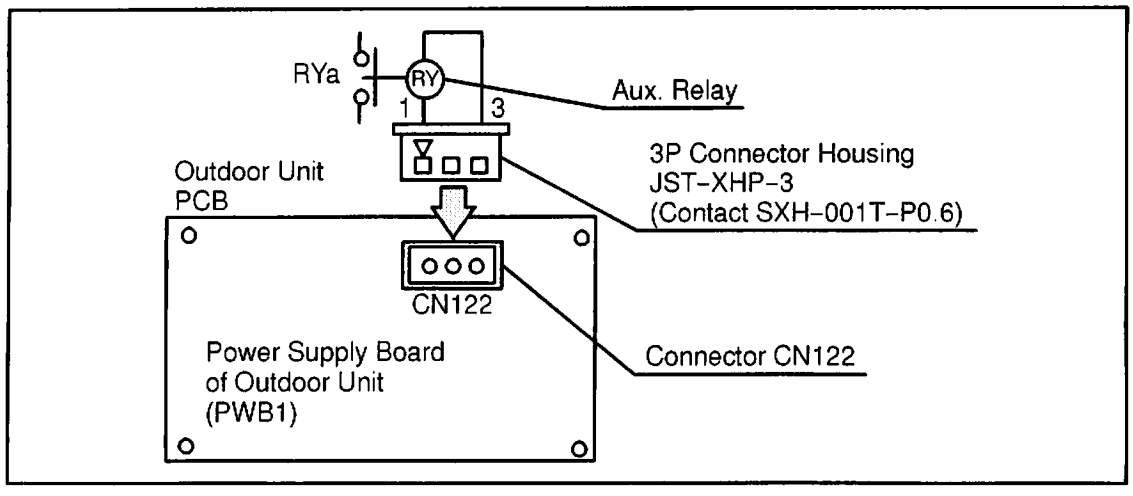


Fig. 4.18 Picking up Operation Signal

4.3.3 Picking up Compressor ON Signal

With this procedure the compressor operation signal can be picked up. The method is explained in Fig. 4.19. The required part is the same part as in Table 4.4. Connecting relay contactors RYa are closed at the time of compressor running. This signal can be applied to the check of signals at the time of remote controlling and to the fan interlock of outdoor fresh air.

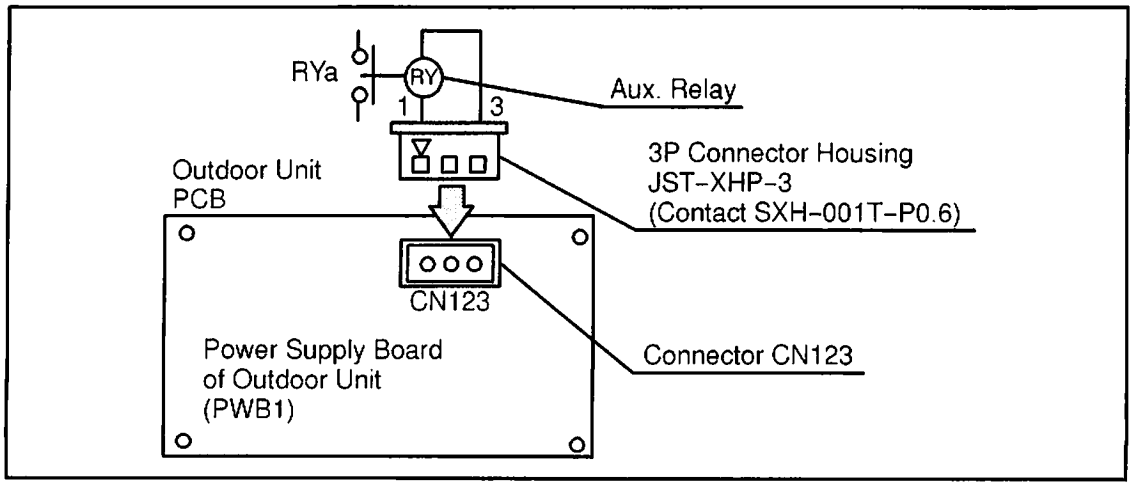


Fig. 4.19 Picking up Compressor ON Signal

4.3.4 Picking up Defrosting Signal

With this procedure the defrosting signal can be picked up. The method is explained in Fig. 4.20. The required part is the same as in Table 4.4. Connecting relay contactors are closed at the time of defrosting.

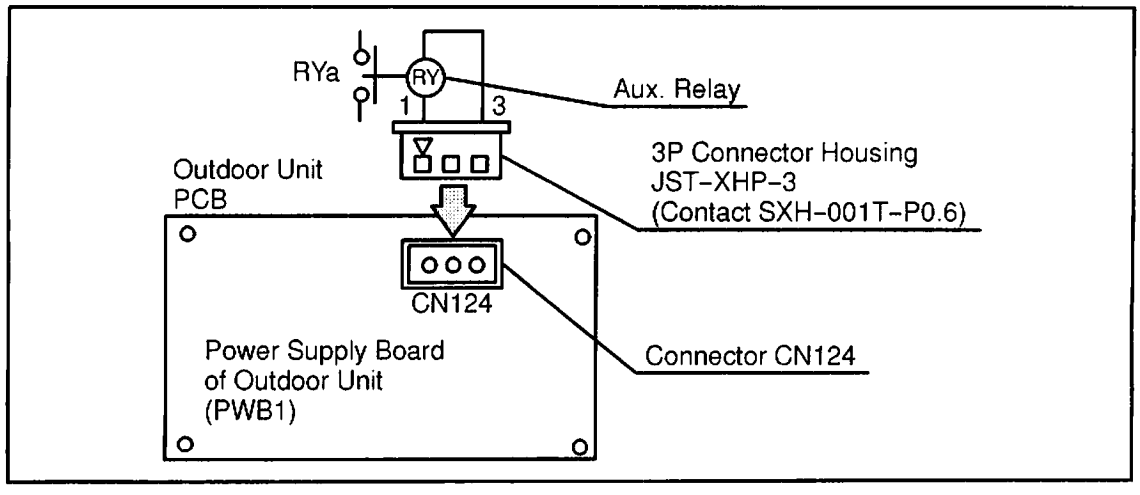


Fig. 4.20 Picking up Defrosting Signal

4.4 Remote Control Switch, PC-2H

4.4.1 Name of Part

Liquid Crystal Display (L.C.D) Section

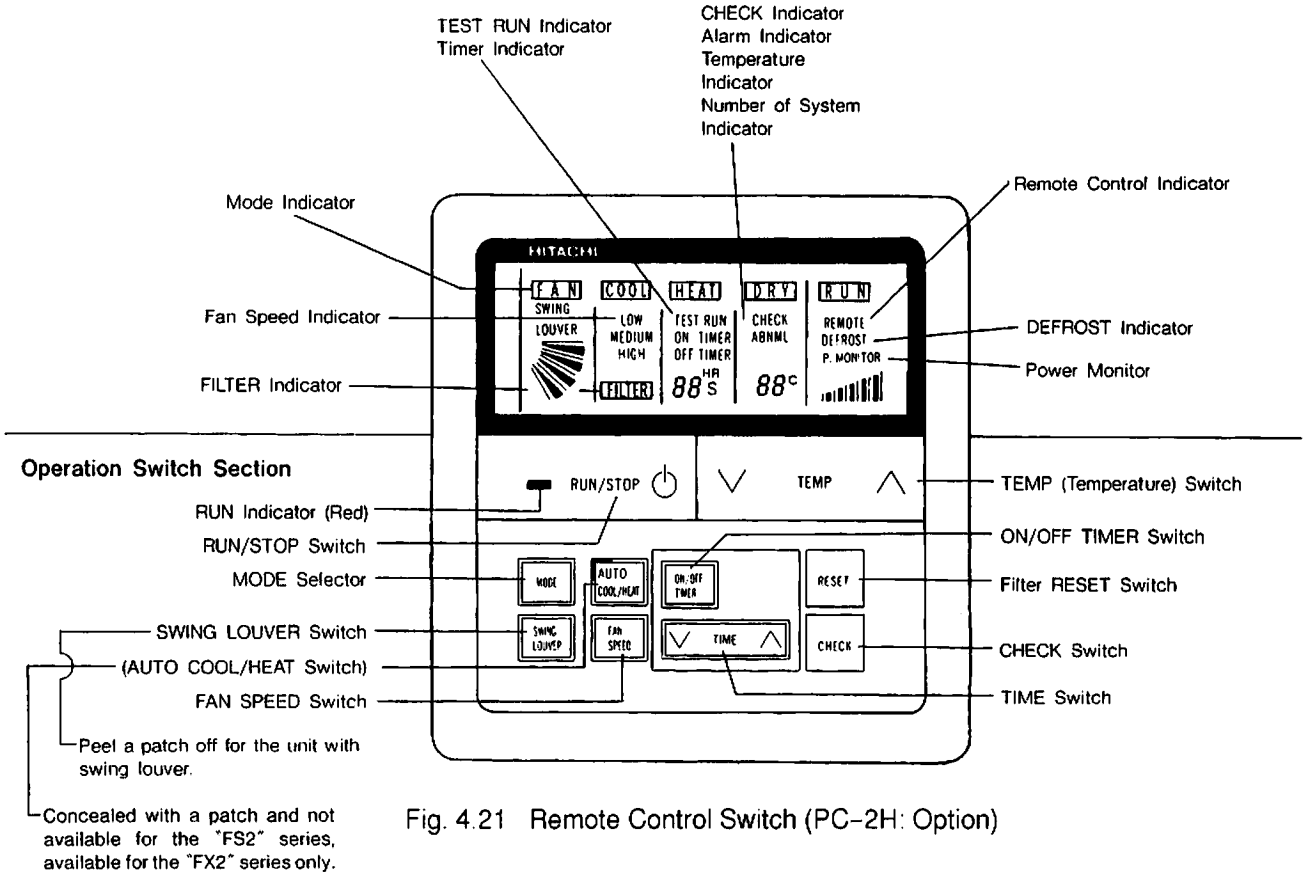


Fig. 4.21 Remote Control Switch (PC-2H: Option)

NOTES:

1. In-the-Ceiling type indoor unit RPI-0.8FS and RPI-1FS have approximately the same fan speed when "MEDIUM" and "LOW" are pressed.

4.4.2 Simultaneous Operation

(1) Simultaneous Indoor Unit Operation with Remote Control Switch

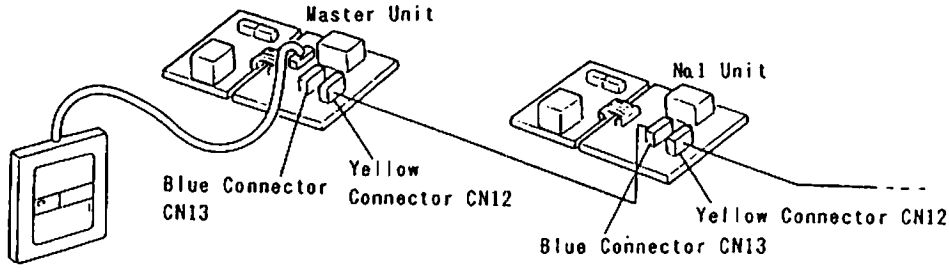
[All power sources must be turned off!!]

Up to 16 indoor units can be simultaneously controlled using one remote control switch. The operation mode such as fan, cooling or heating, the setting of air flow, the setting of temperature and the setting of run/stop can only be set uniformly for all units. However, on/off operation of each thermostat can be done individually. Defrosting, protective devices function, etc. are individually performed.

a. Perform wiring between indoor units as shown in the following figure.

* The total length of the wire shall be 200m or shorter. (for 0.75mm^2 wire 500m or shorter)
* Use the following three cable wire in the system parts.

Model	PRC-10E	PRC-15E	PRC-20E
Length	10m	15m	20m



CAUTION

When 0.3mm^2 wires are used, the length between units must be 100m or shorter, and the total length must be 200m or shorter.
(When 0.75mm^2 wires are used, the total length can be extended up to 500m.)

b. Connected unit control wires should not be installed parallel to 200-400V power cables. Fix them by utilizing bands. It is recommended, that cables be installed at least 30cm away from power cables or be put into grounded metal pipes.

c. Set dip switches DSW1 on the printed circuit boards of respective units as shown in the following figure.

〔Turn off all power sources!!〕

〈Setting of Dip Switches〉 When indoor units are connected to the same outdoor unit, it is unnecessary to set dip switches, because they are automatically addressed.

	Master Unit	No.1 Unit	No.2 Unit	No.3 Unit	No.4 Unit	No.5 Unit	No.6 Unit	No.7 Unit
Dip SW Setting	All ON 	1 OFF 	2 OFF 	1, 2 OFF 	3 OFF 	1, 3 OFF 	2, 3 OFF 	1, 2, 3 OFF 
	No.8 Unit	No.9 Unit	No.10 Unit	No.11 Unit	No.12 Unit	No.13 Unit	No.14 Unit	No.15 Unit
Dip SW Setting	4 OFF 	1, 4 OFF 	2, 4 OFF 	1, 2, 4 OFF 	3, 4 OFF 	1, 3, 4 OFF 	2, 3, 4 OFF 	All OFF 

CAUTION

Pay attention not to overlap addresses.

d. Confirming Method of Number of Connected Units

Perform this confirmation after finishing wiring, refrigerant piping, additional refrigerant charge and other items required for operation.

Test Running Mode

① Turn ON the power sources of all units.

Depress the CHECK switch and the MODE switch on the remote control switch simultaneously for three seconds or longer, to change the unit(s) to the test running mode. (Refer to the checking procedure by the CHECK switch.)

Number of Units Connected

② When the number of units connected is indicated where usually the temperature is indicated, the system is functioning normally.

False Number of Connected Units is Indicated

③ When the indicated number of connected units is smaller than the actual number or zero, presumable causes are as follows:

1) The power source of some units is not turned ON.
2) Incorrect setting of unit numbers was performed.
3) Control wires between units or remote control switch were incorrectly connected regarding polarity and order.

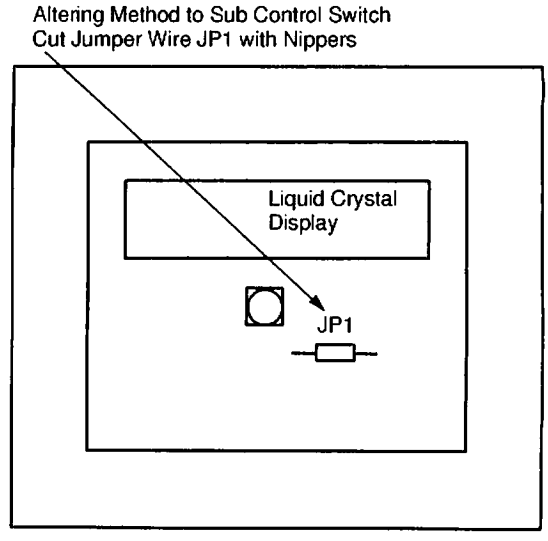
Ending of Test Running Mode

e. When the confirmation of the number of connected units and the wiring-checking are finished, end the test running mode by depressing the "RESET" switch.

4.4.3 Operation System with Two Remote Control Switches

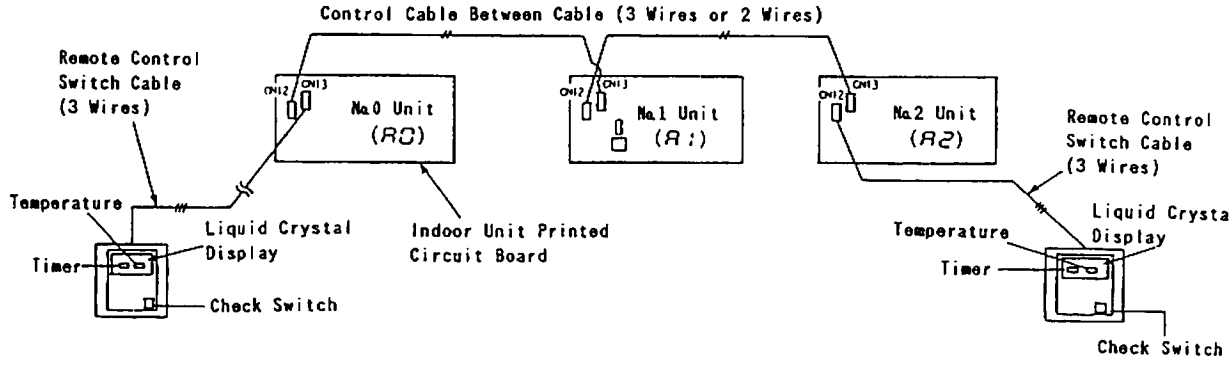
(1) By installing an additional remote control switch, a maximum of 16 units can be controlled from two different locations.

Main and Sub Control Switch
Determine one of the two remote control switches to be the main switch and the other as a sub switch. Cut the jumper wire JP1 in the sub remote control switch as shown in the right figure.



(2) Wiring Method

a. Perform wiring between units as shown in the following figure:
(Three Unit Case)



Main Switch — Sub-Switch

Connect the main remote control switch to CN13 (or CN12) and the sub-remote control switch to CN12 (or CN13).

Wiring Method

b. Decide the number of units. The method should be the same as in "Simultaneous Indoor Unit Operation with One Remote Control Switch".

(3) Checking the Main and Sub Remote Control Switches
When, during the self-checking procedure of a remote control switch, an "88" is displayed where usually the temperature is indicated, it is a sub-remote control switch. If a "77" is indicated, it is the main remote control switch.

CAUTION

1. When a main remote control switch malfunctions, unit operation stops. Units cannot be operated with only a sub-remote control switch.
2. When a main switch and a sub-switch are simultaneously operated, the units will operate according to either one of the modes after 30 seconds.

4.4.4 Optional Functions of Remote Control Switch

The following optional functions are available with a remote control switch (PC-2H or PC-2C).

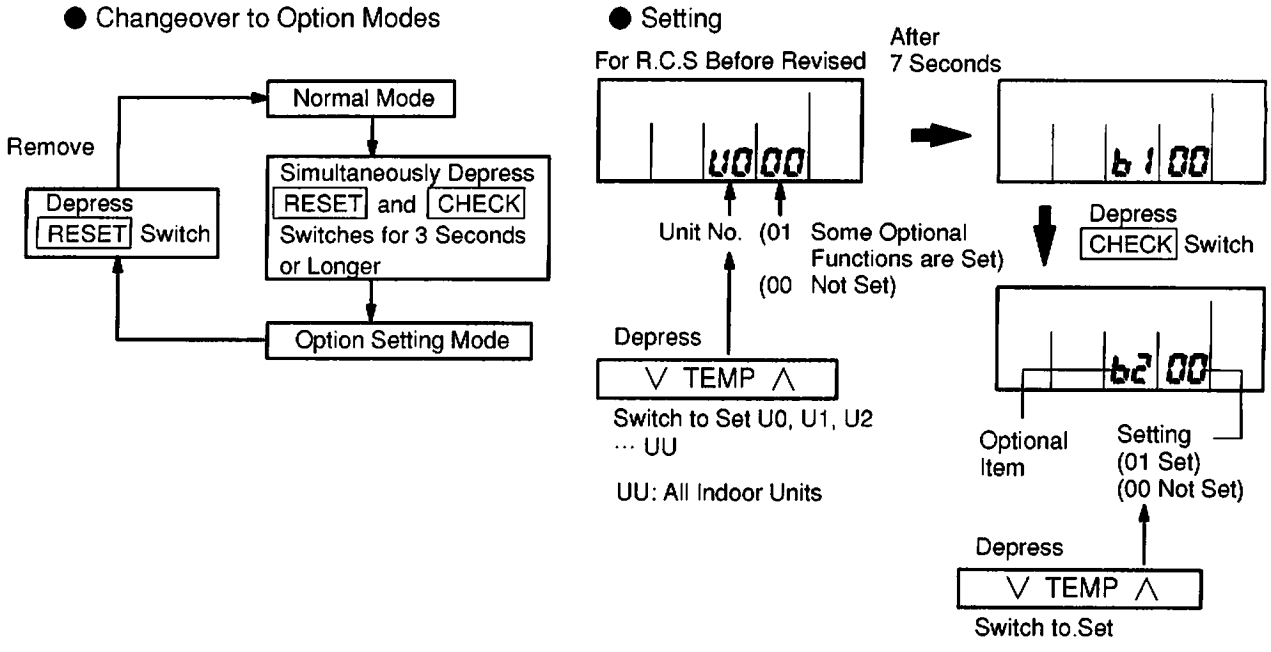


Table 4.5 Optional Functions with Remote Control Switch

No.	Item	Display on Remote Control Switch
(1)	Removal of Heating Temperature Calibration	b1 (NOT SET)00 ⟷ 01 (SET)
(2)	Circulator Function at Heating Thermo-OFF	b2 (NOT SET)00 ⟷ 01 (SET)
(3)	Enforced 3 Minutes Minimum Operation Time of Compressor	b3 (NOT SET)00 ⟷ 01 (SET)
(4)	Change of Filter Cleaning Interval Time	b4 00→01→02→03→04
(5)	Fixing of Operation Mode	b5 (NOT SET)00 ⟷ 01 (SET)
(6)	Fixing of Setting Temperature	b6 (NOT SET)00 ⟷ 01 (SET)
(7)	Fixing of Operation as Exclusive Cooling Unit	b7 (NOT SET)00 ⟷ 01 (SET)

(1) Removal of Heating Temperature Calibration

When the temperature settings of the remote control switch and the suction air temperature of the indoor unit are required to be equal, this optional function can be used.
In standard heating operation, the suction air temperature is higher than the room temperature, therefore the suction air temperature is calibrated -4℃.
(Indicated Setting Temperature = Inlet Air Temperature -4℃ <=> 0℃)
This is useful when the thermistor at the suction side of an indoor unit is removed and installed in another place.

(2) Circulator Function at Heating Thermo-OFF

In heating operation, there is a case that the room air is stratified because warm air stagnates near the ceiling. In this case, it is recommended that the circulator function explained below be utilized.

* Circulator Function

Units can be programmed so that a set level of air flow will be held on, when the heating is turned thermo-OFF. In this case, air movement in the room will be kept on the same level as before, ensuring a homogenous air distribution. Additionally, when the temperature of discharge air decreases to 25℃ or lower, the unit is programmed so that the air flow is automatically adjusted to "LOW". In the case that an Auto Louver is equipped, this operation will be also held on when the heating is turned thermo-OFF.

CAUTION

Perceptions of coolness, heat and air flow are subject to personal tastes and behaviors. It is therefore recommended to discuss this with customers thoroughly and then to set the unit accordingly.

(3) Enforced 3 Minutes Minimum Operation Time of Compressor

When a compressor frequently starts and stops in short intervals, this function should be used to guard the compressor. By setting this function, the mode of a minimum 3 minutes operation will be added to the standard mode of a minimum 3 minutes stoppage.

(4) Change of Filter Cleaning Time

Filter cleaning time is set by the No.7 switch of DSW2 on the indoor unit PCB, when the indication on LCD of Remote Control Switch is set at "00 (Factory Set)".

Setting of No.7 Switch of DSW2

OFF --Filter cleaning time is set at approx. 1,200 hours.

ON ---Filter cleaning time is set at approx. 100 hours.

However, this filter cleaning time can be changed depending on the condition of the filter.

Filter Cleaning Time	Indication on LCD of Remote Control Switch
Factory Set	b4 00
Approx. 100 hours	b4 01
Approx. 1,200 hours	b4 02
Approx. 2,500 hours	b4 03
No Indication	b4 04

(5) Fixing of Operation Mode

When changes in operation modes are not required, this mode can be used.
The operation mode which has been set cannot be changed.

(6) Fixing of Setting Temperature (Revised Remote Control Switch Only)

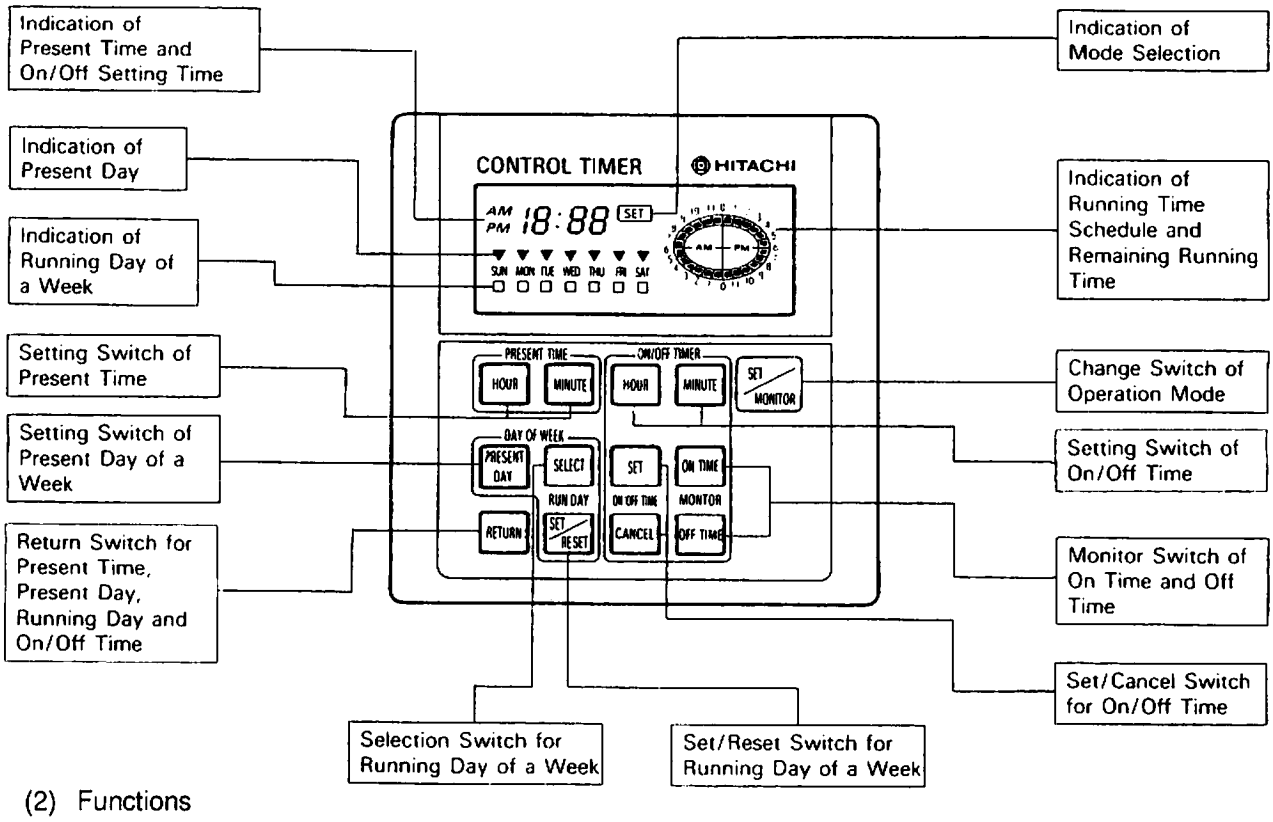
When changes in setting temperature are not required, this mode can be used.
The setting temperature which has been set cannot be changed.

(7) Fixing of Operation as Exclusive Cooling Unit (Revised Remote Control Switch Only)

When exclusive cooling operation is required, this mode can be used. This function invalidates the heating operation and the automatic COOL/HEAT operation, as the operation of exclusive cooling unit.

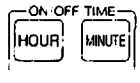
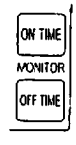
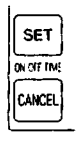
4.5 7-Day Timer, PSC-3T

(1) Name of Parts



(2) Functions

Liquid Crystal Display Indication	Function
Indication of Present Time and ON/OFF Setting Time AM PM 18:88 SET	This indicates present time and ON or OFF setting time.
Indication of Present Day SUN MON TUE WED THU FRI SAT	This indicates the present day of a week.
Indication of Running Day of a Week SUN MON TUE WED THU FRI SAT	In the case that the running day is set, this light is ON.
Indication of Mode Selection AM PM 18:88 SET	In the case that "SET" is not shown, this indicates "MONITOR" mode. In the case that "SET" is shown, this indicates "SETTING" mode. In the case that "SET" is flickered, this indicates "CLOCK" mode.
Indication of Running Time Schedule and Remaining Running Time	In case of "MONITOR" mode, the operation time schedule is indicated. In case of "CLOCK" mode, the remaining running time is indicated.

Operation Switch	Function
Setting Switch of Present Time 	Present time is set by this switch at "CLOCK" mode.
Setting Switch of Present Day of a Week 	Present day of a week is set by this switch at "CLOCK" mode.
Return Switch for Present Time, Present Day, Running Day and ON/OFF Time 	In the case that this switch is depressed and the other switch is simultaneously depressed at "SETTING" mode or "CLOCK" mode, the "Present Time", "Present Day", "Run Day" and "ON/OFF Time" are returned into reverse.
Change Switch of Operation Mode 	"SETTING" mode, "MONITOR" mode and "CLOCK" mode are set by this switch. In the case that "SET" is indicated after depressing this switch, the control is changed to "SETTING" mode. If "SET" indication is turned off, this indicates "MONITOR" mode.
Change Switch of Operation Mode 	When this switch is continuously depressed for longer than 3(three) seconds at the "MONITOR" mode, the "SET" indication is flickered and "MONITOR" mode appears.
Setting Switch of ON/OFF Time 	"ON or OFF Time" of running operation is set by this switch.
Monitor Switch of ON Time and OFF Time 	By depressing the "ON TIME" or "OFF TIME" switch at "SETTING" mode, the set "ON Time" or "OFF Time" is indicated on the "Present Time and ON/OFF Setting Time" indication area.
SET/CANCEL Switch 	By depressing the "SET" switch after adjusting the "ON TIME" or "OFF TIME" switch at the required time, the "ON Time" or "OFF Time" is set. By depressing the "CANCEL" switch, the set "ON TIME" or "OFF TIME" is canceled at the "SETTING" mode.
Selection Switch for Running Day of a Week 	Running days of a week are selected by this switch. The "▼" mark is flickered at the position of the required running day.
SET/RESET Switch for Running Day of a Week 	By depressing this switch, the selected running days of a week are set or reset.

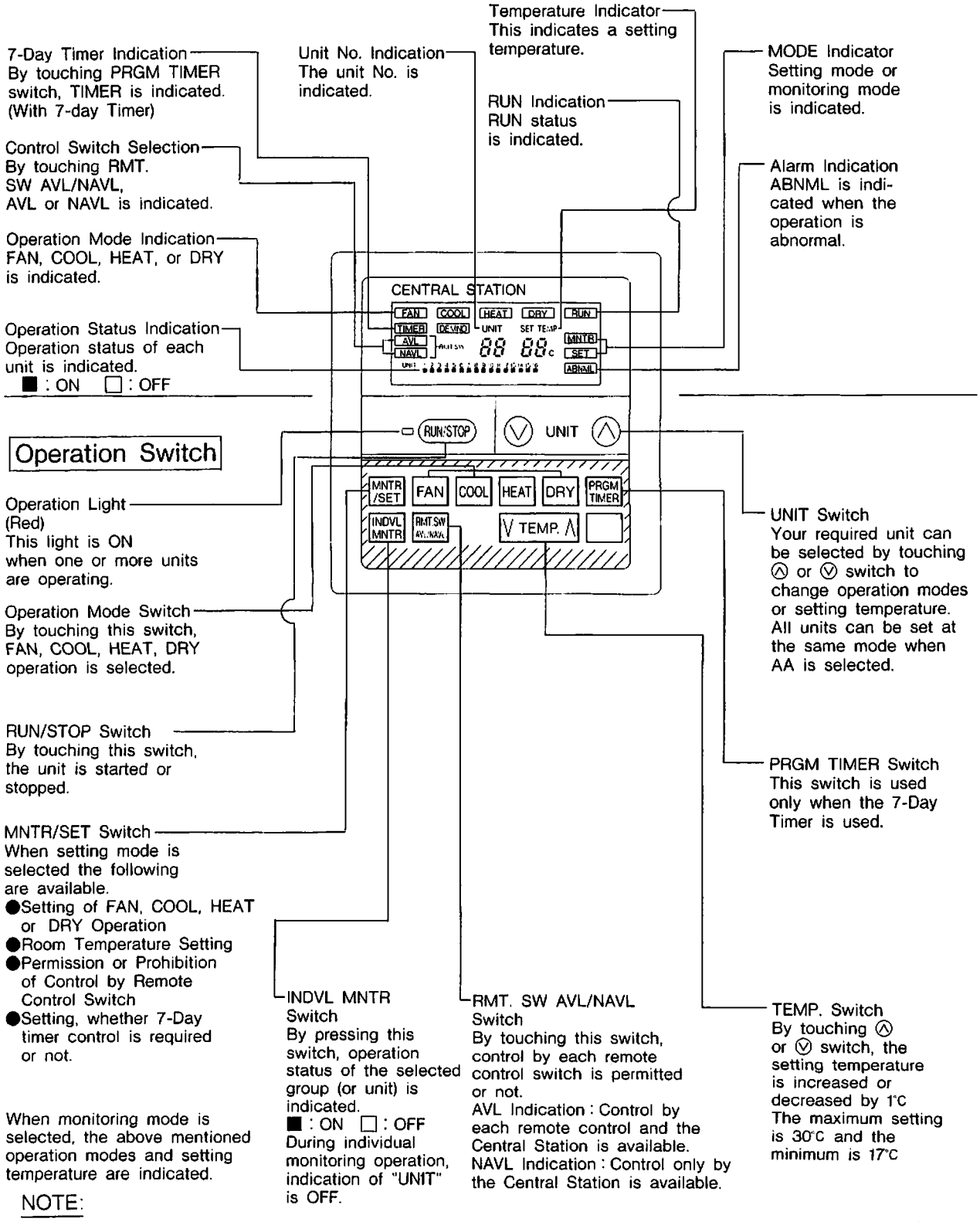
NOTE:
In the case that power is turned ON to the system, set the 7-day timer at the OFF-TIME. If not set, the unit is not automatically restarted until the OFF-TIME period is over, even if time reaches the ON-TIME setting.

4.6 Central Station, PSC-3S1

This central station is of the soft touch type. (Operation except with finger is not recommended.)
Activation can be checked by referring to the liquid crystal display and LEDs.

4.6.1 Name of Parts

INDICATION



NOTE:

In the case that the unit is operated under the following conditions, "REMOTE" is indicated on the LCD and control by the remote control switch is not available.

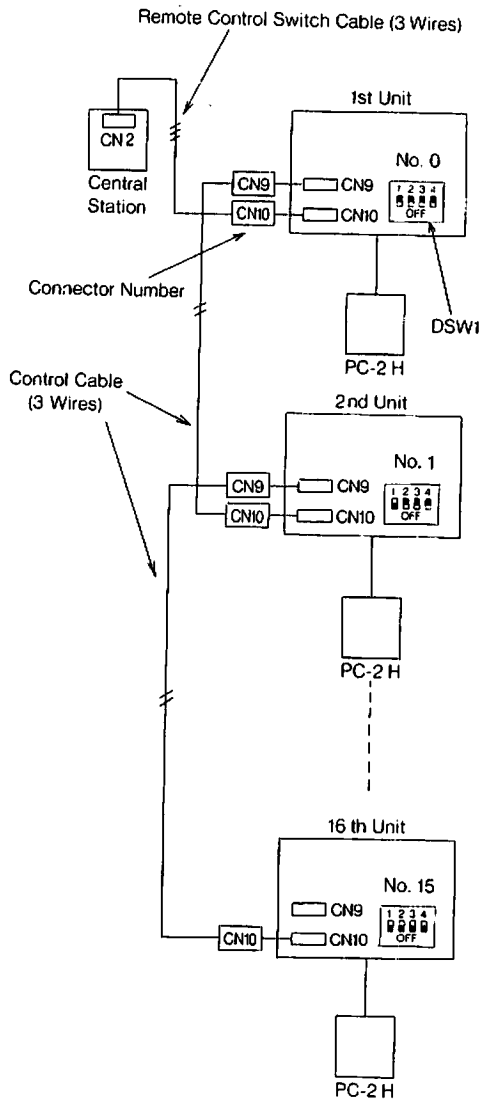
① NAVL is selected by the control station.

② Two minutes after resetting of the Central Station even if AVL is selected.

4.6.2 System

(1) System of Up to 16 Units

Layout and Electrical Wiring



Setting of Dip Switches

Set the unit number of all the units using the dip switch (DSW1) of indoor unit PCB.

	1st Unit	2nd Unit	3rd Unit	4th Unit	5th Unit	6th Unit	7th Unit	8th Unit
Dip SW Setting	All ON	1 OFF	2 OFF	1, 2 OFF	3 OFF	1, 3 OFF	2, 3 OFF	1, 2, 3 OFF
	9th Unit	10th Unit	11th Unit	12th Unit	13th Unit	14th Unit	15th Unit	16th Unit
Dip SW Setting	4 OFF	1, 4 OFF	2, 4 OFF	1, 2, 4 OFF	3, 4 OFF	1, 3, 4 OFF	2, 3, 4 OFF	All OFF

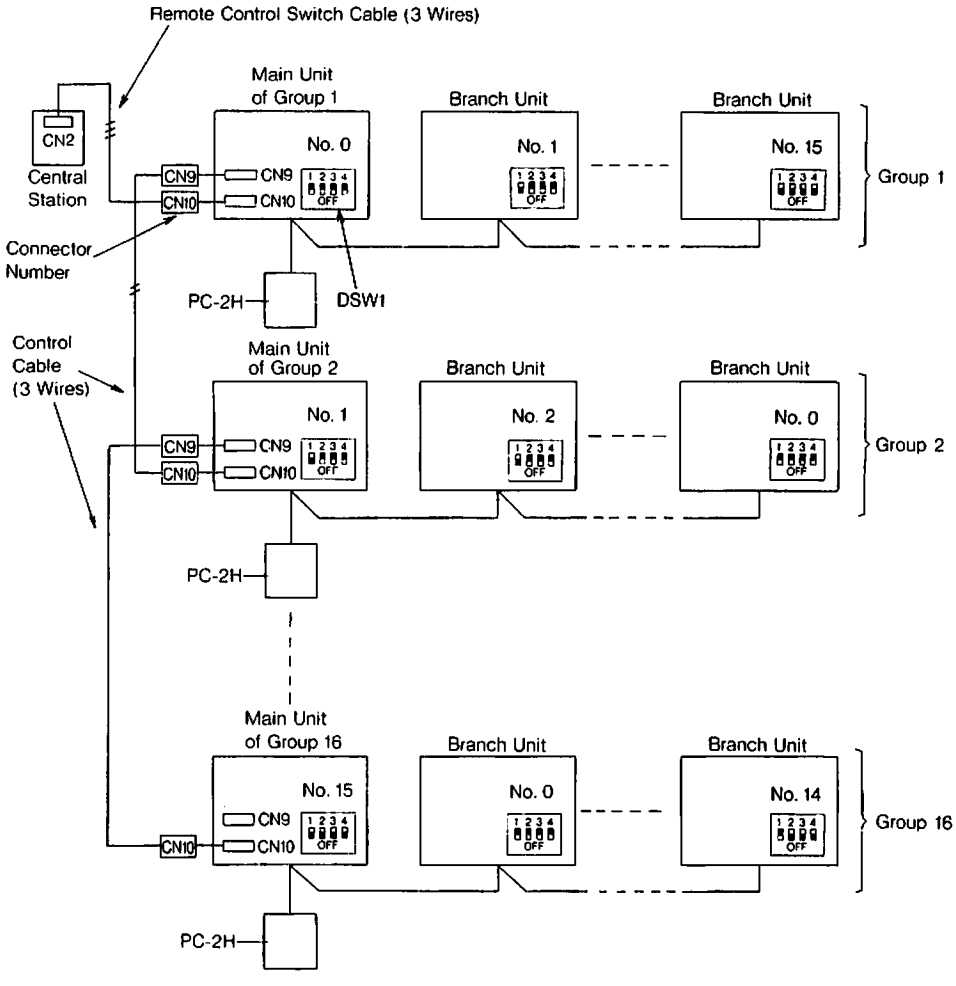
NOTE:

The above setting is same with the setting when the remote control switch (PC-2H) is used.

(2) System of more than 16 Units

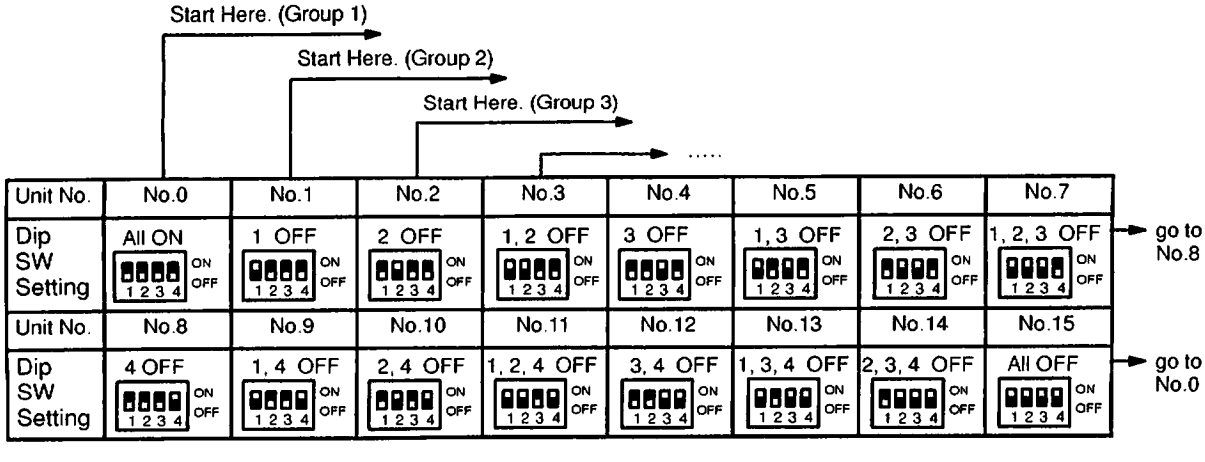
Layout and Electrical Wiring

A maximum of 16 groups can be controlled by the Central Station and each group can consist of a maximum of 16 units. ON/OFF control of each group is available. Furthermore, the operation status of all indoor units can be monitored by the Central Station.



Setting of Dip Switches

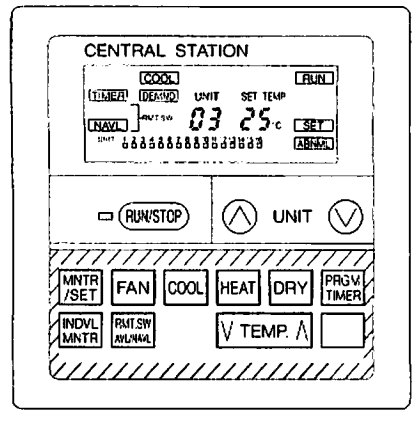
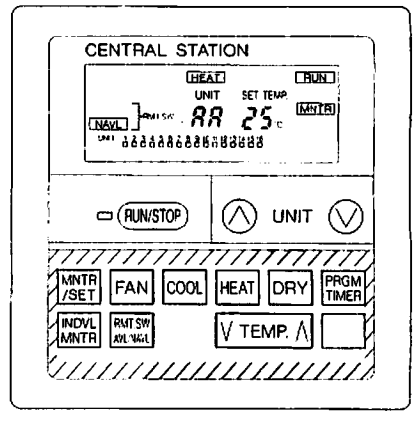
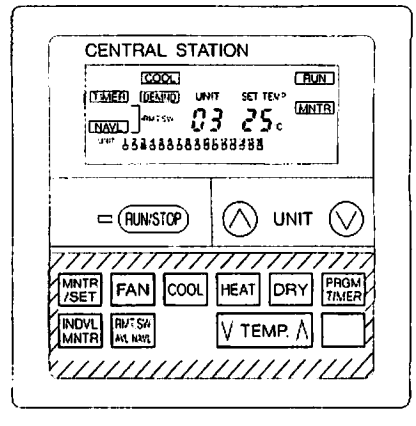
Set the number by using the dip switch, DSW1 on the PCB in the indoor units. Firstly set the unit number for the main unit in group 1 and secondly set the unit numbers for the branch units one by one according to the figure below. Next, set the unit number for the main unit in group 2 and set the unit numbers for the branch units one by one. However, please note that the unit number for the main unit in group 2 should be set from the next number as shown below. Repeat this work for the remaining units.



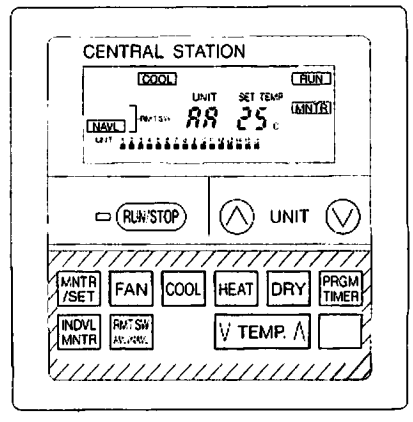
4.6.3 Operation Procedure for the Central Station

(Multi-Function Centralized Controller)

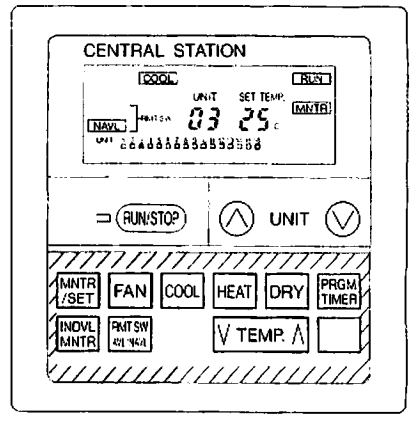
Setting (or changing) Operation Patterns

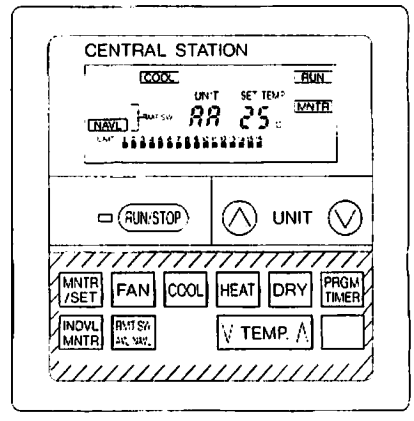
Mode	Operation Procedure	Display Example
Setting	1. Press the mode selection switch[MNTR/SET] to select the [SET] mode. 2. Press the unit selection switch[UNIT] (∧ or ∨) to select the unit number to be set. (When setting all the units simultaneously, select the "AA" indication.) 3. Press one of the operation selection switches [FAN], [COOL], [HEAT] and [DRY] to select the operation mode. 4. Press the temperature adjustment switch[TEMP] (∧ or ∨) to set the temperature. (In the [FAN] mode, there is no need to set the temperature. The temperature range which can be set is from 17℃ to 30℃.) When the temperature is not set by the multi-function centralized controller (the temperature is set by the individual remote control switch), set the temperature to 17℃ or 30℃ and press and hold the ∧ or ∨ switch for more than 3 seconds to display "– –". 5. When the timer operation is to be performed by an optional control timer, press the 7-day timer selection switch[PRGM TIMER] to select the [TIMER] mode. 6. When the operation by the individual remote control switch is not required, press the remote control selection switch[RMT, SW AVL/NAVL] to select "NAVL". 7. Press the [RUN/STOP] switch to set RUN or STOP.	 
Monitor	By doing this, the operation choices are set. However, the operation choices cannot be sent to the unit in this status. Press the mode selection switch[MNTR/SET] to select the [MNTR] mode. NOTE: When the switch is left unpressed for more than 1 minute in the [SET] mode, the mode will automatically change to the [MNTR] mode.	

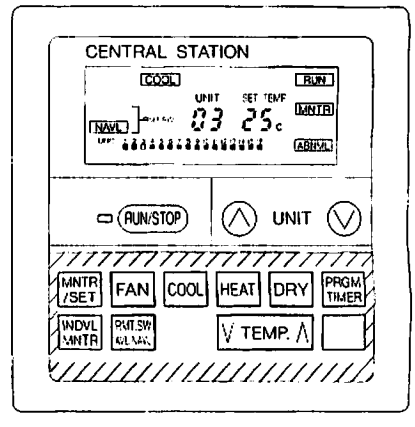
Simultaneous RUN/STOP Operation

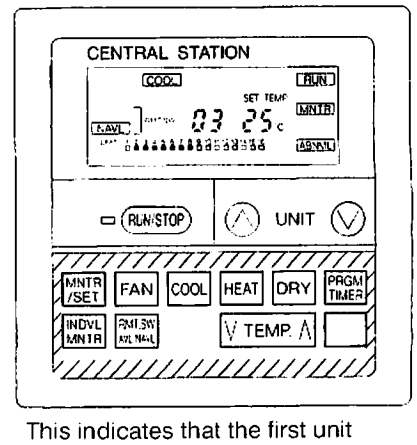
Mode	Operation Procedure	Display Example
Monitor	1. Press the unit selection switch[UNIT]. (∧ or ∨) to display "AA". 2. If the [RUN/STOP] switch is pressed when the operation of more than one unit is set, all the units will operate simultaneously. 3. If the [RUN/STOP] switch is pressed again, all the units will operate simultaneously.	

Individual RUN/STOP Operation

Mode	Operation Procedure	Display Example
Monitor	1. Press the [UNIT] switch (∧ or ∨) to set the unit number. 2. When the [RUN/STOP] switch is pressed in this status, the unit will operate or stop.	

<table>
<tr><th colspan="2">Monitoring Contents</th><th>Mode</th><th>Operation Procedure
and Display Contents</th><th>Display Contents</th></tr>
<tr><td colspan="2">Operation Status
of All Units
(Up to 16 Units
Connected)</td><td>Monitor</td><td>■: Run
□: Stop or Not Connected
▨(Flickering): Alarm
The [ALARM] lamp on
the lower right of
the display section
lights simultaneously.</td><td> 

This indicates a normal operation.</td></tr>
<tr><td rowspan="2">17 or more
Units
Connected</td><td>Operation
Status
of
Group</td><td>Monitor</td><td>■: One or more air conditioners
in the group are operated.
□: All units in the group are
stopped or not connected.
▨(Flickering):
One or more air conditioners
in the group are faulty.
The [ALARM] lamp on
the lower right of
the display section
lights simultaneously.</td><td>UNIT 1 2 3 4 5 ...
■ ■ □ ■ ■
 

This indicates when a fault exists
in the group 3.</td></tr>
<tr><td>Operation
Status
in
Group</td><td>Monitor</td><td>Press the unit selection switch
[UNIT] to set the unit number
and press the [INDVL MNTR]
switch. The display disappears
and "UNIT 03" will change to
"03".
The air conditioner operation
status in the group which is
specified by the unit number is
monitored.
■: Run
□: Stop
▨(Flickering): Alarm
The [ALARM] lamp on
the lower right of
the display section
lights simultaneously.</td><td>UNIT 1 2 3 4 5 ...
□ ■ ■ ■ ■
 

This indicates that the first unit
(Unit No.2) in the group 3 is faulty.</td></tr>
</table>

NOTE:
When the system is controlled only by the central station, select "NAVL" for "RMT. SW AVL/NAVL" switch, and:
① Fan speed setting will be "Hi" and not be selected.
② Automatic-louver position will be horizontal and not be selected.

5. FIELD WORK INSTRUCTION

5.1 Abnormal Flickering of "RUN" Lamp on Remote Control Switch during Automatic Setting of Unit Address

Question and Answer for Field Work

Example 1: Abnormal Flickering of "RUN" Lamp on Remote Control Switch during Automatic Setting of Unit Address

[Phenomenon]

In the case that multiple indoor units are controlled by one remote control switch and indoor units are started by the remote control switch after power supply, the "RUN" lamp may flicker 30 seconds after the start-up.

[Cause]

The automatic setting of each unit address is performed within 5 minutes after power supply. During this period, if the unit is started, the"RUN" lamp may flicker approximately 30 seconds after start-up due to this automatic setting.

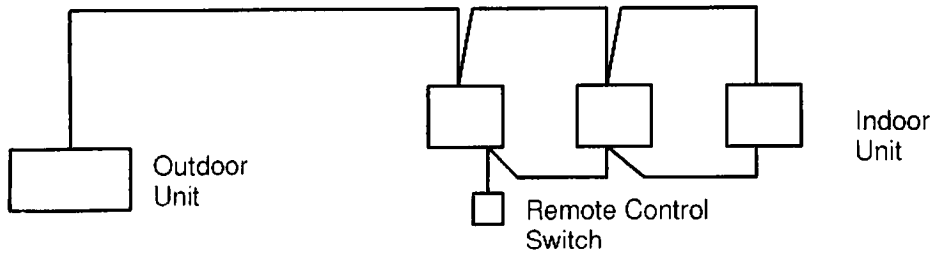
[Countermeasure]

Start the system 5 minutes after power supply.

[Remarks]

The following example indicates three indoor units controlled by one remote control switch. During the period up to completion of automatic setting of unit addresses, all indoor unit addresses are registered as No. 0 unit. Therefore, if the units are started before completion of the automatic setting, a micro-computer judges that duplicated unit address exist, resulting in flickering of "RUN" lamp. However, this flickering will disappear after the automatic setting of unit addresses is completed.

System Example



5.2 Intake Air Temperature and Setting Temperature by Remote Control Switch

Question and Answer for Field Work

Example 2: Intake Air Temperature and Setting Temperature by Remote Control Switch

[Phenomenon]

An actual room temperature does not reach the temperature shown on the remote control switch.

[Cause]

In case of normal one-to-one system air conditioners, air conditioners are simply controlled by comparing the setting temperature and the indoor intake air temperature. Therefore, the intake air temperature reaches the setting temperature.
However, regarding the FS2 Series, the intake air target temperature varies between the setting temperature and setting temperature plus 4℃ during the cooling operation, and between the setting temperature minus 4℃ and setting temperature plus 8℃ during the heating operation.
This is due to the temperature calibration control, capacity control and fuzzy control.

[Countermeasure]

Change of Room Temperature Setting by Remote Control Switch

[Remarks]

Operation Example

During a cooling operation, the room temperature and the indoor intake air temperature (this temperature can be shown by using Check Mode "b2") did not reach the setting temperature despite light heat load. By changing the room temperature setting using the remote control switch, the room temperature reached the setting.

5.3 Discharge Air Temperature by Check Mode "b3"

Question and Answer for Field Work

Example 3: Discharge Air Temperature by Check Mode "b3"

[Phenomena]

During a cooling operation, the discharge air temperature indicated by the Check Mode "b3" was higher than the intake air temperature indicated by the Check Mode "b2" by the remote control. Therefore, it was judged that abnormality with the air conditioner existed.

[Cause]

The discharge air temperature indicated by Check Mode "b3" is the temperature at the discharge air thermistor. This temperature is different from the average discharge air temperature.

[Countermeasure]

Use the temperature indicated by the Check Mode "b3" as reference.

5.4 Power Monitor on Remote Control Switch

Question and Answer for Field Work

Example 4: Power Monitor on Remote Control Switch

【Phenomenon】

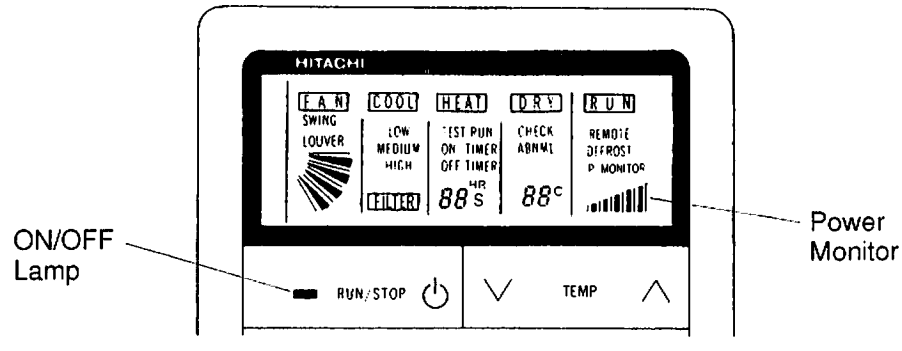
The power monitor data indicated on the remote control switch is different from the compressor frequency.

【Cause】

The power monitor data indicated on the remote control switch is based on the following relation and is different from the compressor frequency.

【Countermeasure】

No special countermeasure is required.



Power Monitor on Remote Control Switch

Indication	Mode	Temperature
No Indication	FAN	-
	COOL and HEAT	Small ↑ Temperature Difference Setting and Intake Air Temperatures ↓ Large

5.5 What is the relation between Compressor Frequency and Other Factors?

Question and Answer for Field Work

Example 5: What is the relation between Compressor Frequency and Other Factors?

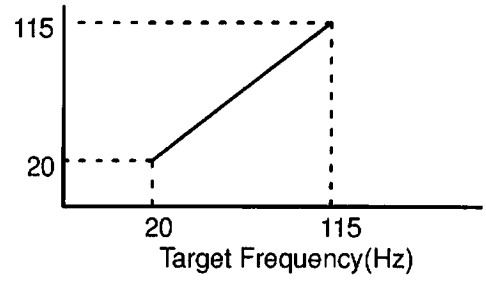
【Answer】

The compressor control frequency is changed by the PID calculation method according to cooling or heating load and the degree of its change. Based on this target frequency, frequency output is given to the compressor or the constant speed compressor is started or stopped. Therefore, in the case that the heat load is comparatively small, the constant speed compressor may not run.

Relation between Inverter-driven Compressor Speed and Target Frequency

1. RAS-5FS2 and RAS-5FX2

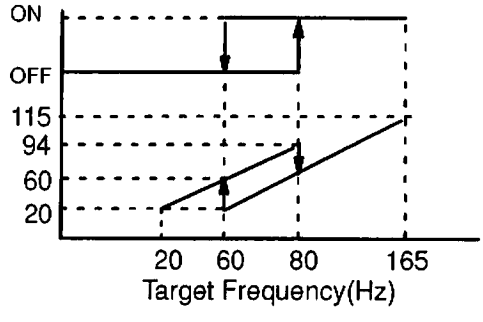
Inverter Driven Compressor Frequency (Hz)



2. RAS-8FS2 and RAS-8FX2

Constant Speed Compressor

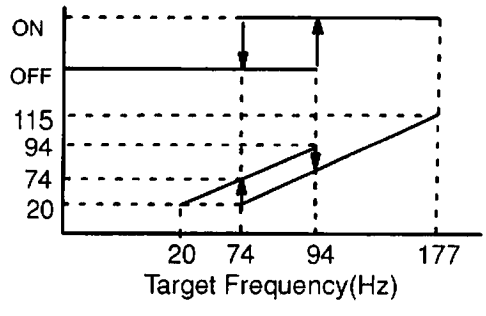
Inverter Driven Compressor Frequency (Hz)



3. RAS-10FS2 and RAS-10FX2

Constant Speed Compressor

Inverter Driven Compressor Frequency (Hz)



5.6 How are the discharge and suction pressure checked?

Question and Answer for Field Work

Example 6: How are the discharge and suction pressure checked?

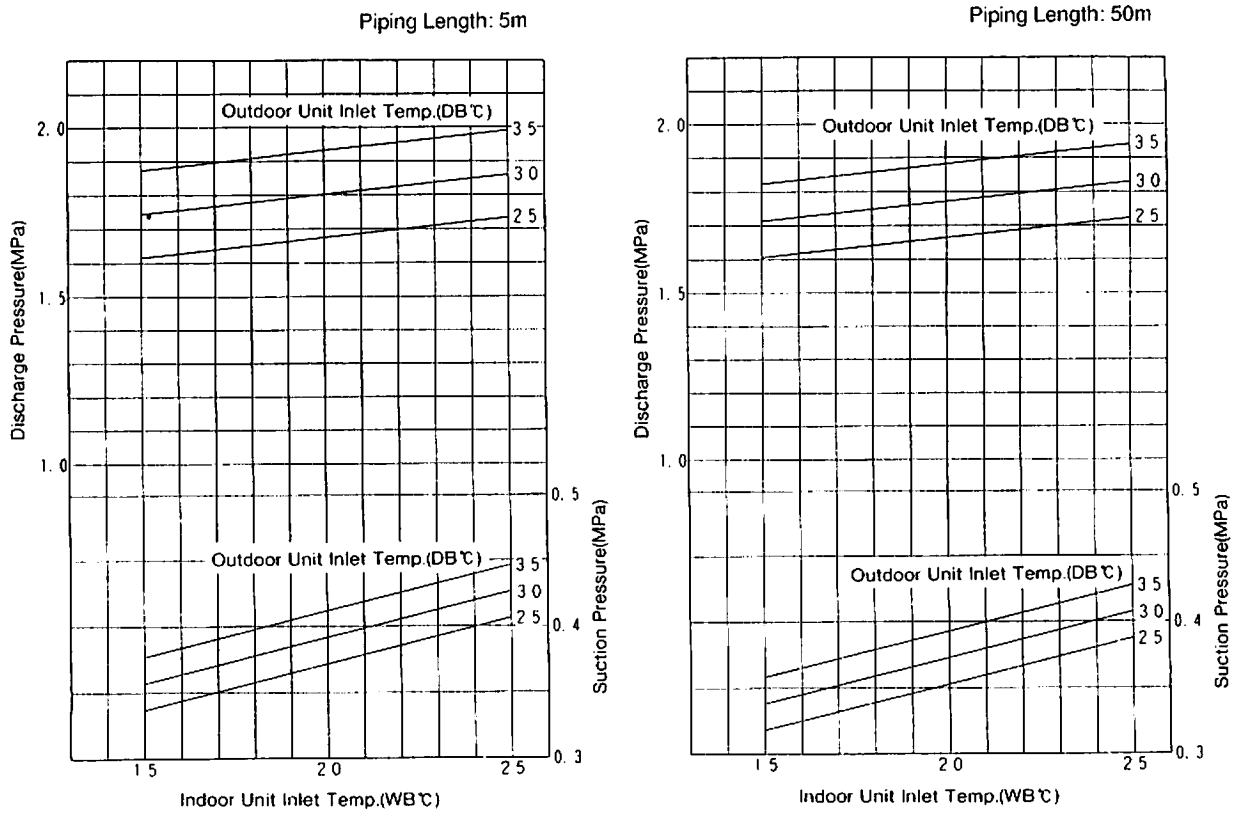
[Answer]

The suction pressure during the cooling operation or discharge pressure during the heating operation regarding this FS2 and FX2 series are always controlled by an inverter.
In order to check the unit operation conditions, please perform checking according to the following procedures.

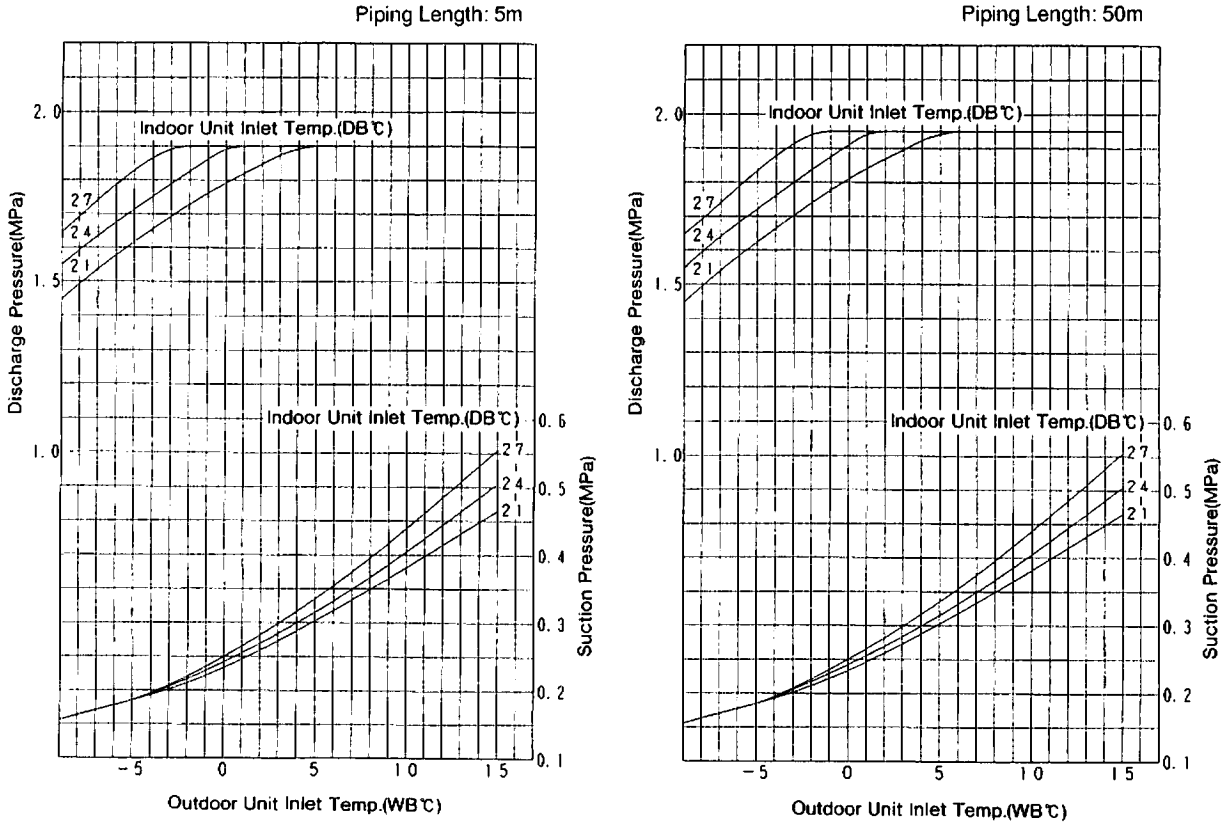
1. Set all the indoor units at the same cooling or heating mode.
2. Operate all the units at the high speed.
3. Wait for a while until the system becomes stable.
4. Compare the measured data with the pressures shown in the figures below.

NOTES:

1) During the cooling operation, use the discharge pressure data as a reference, since the discharge pressure depends on the accumulated actual indoor unit capacity, outdoor coil inlet temperature, etc.
2) During the heating operation, use the suction pressure data as a reference, since the suction pressure depends on the accumulated actual indoor unit capacity, outdoor coil inlet air temperature, etc.



Operating Pressure Curves during Cooling Operation



Operating Pressure Curves during Heating Operation

5.7 Select Guide of Drain Pipe for Indoor Unit

● Selecting Method of Drain Pipe Diameter

Step 1. Calculation of Drain Flow Volume

Calculate from that the drain flow volume is approximately 3 〔ℓ/hr〕 per 1HP of the indoor unit nominal capacity.

For Example:

Common drain pipe for four 2HP indoor units and four 2.5HP indoor units.

① Total Horse Power of Indoor Unit: 4×2HP+4×2.5HP=18HP

② Total Drain Flow Volume: 18HP×3 〔ℓ/hr · HP〕 =54 〔ℓ/hr〕

Step 2. Select Drain Pipe from Table A and B

① Horizontal Common Pipe with Slope 1/50: VP30 for above Example

② Horizontal Common Pipe with Slope 1/100: VP30 for above Example

③ Vertical Common Pipe: VP30 for above Example

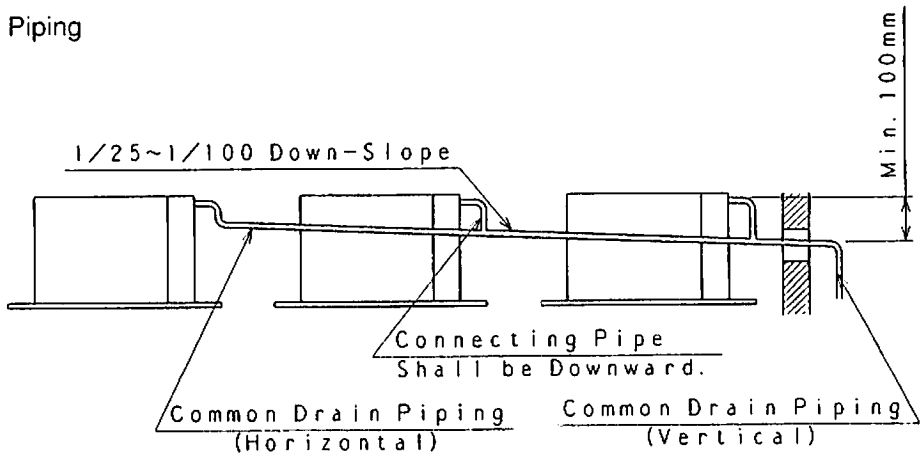
Table A. Permissible Drain Flow Volume of Horizontal Vinyl Pipe

JIS Symbol	Inner Diameter 〔mm〕	Permissible Flow Volume 〔ℓ/hr〕		NOTE
		Slope=1/50	Slope=1/100	
VP20	20	39	27	Not Applicable to Common Pipe
VP25	25	70	50	
VP30	31	125	88	Applicable to Common Pipe
VP40	40	247	175	
VP50	51	473	334	

Table B. Permissible Drain Flow Volume of Vertical Vinyl Pipe

JIS Symbol	Inner Diameter 〔mm〕	Permissible Flow Volume 〔ℓ/hr〕	NOTE
VP20	20	220	Not Applicable to Common Pipe
VP25	25	410	
VP30	31	730	Applicable to Common Pipe
VP40	40	1,440	
VP50	51	2,760	
VP65	67	5,710	
VP75	77	8,280	

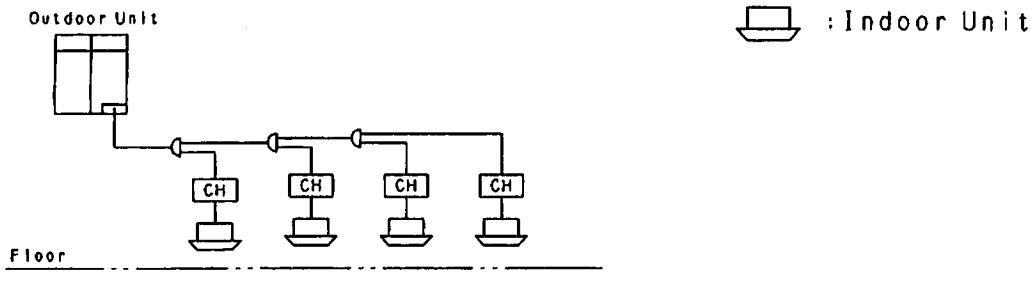
● Drain Piping



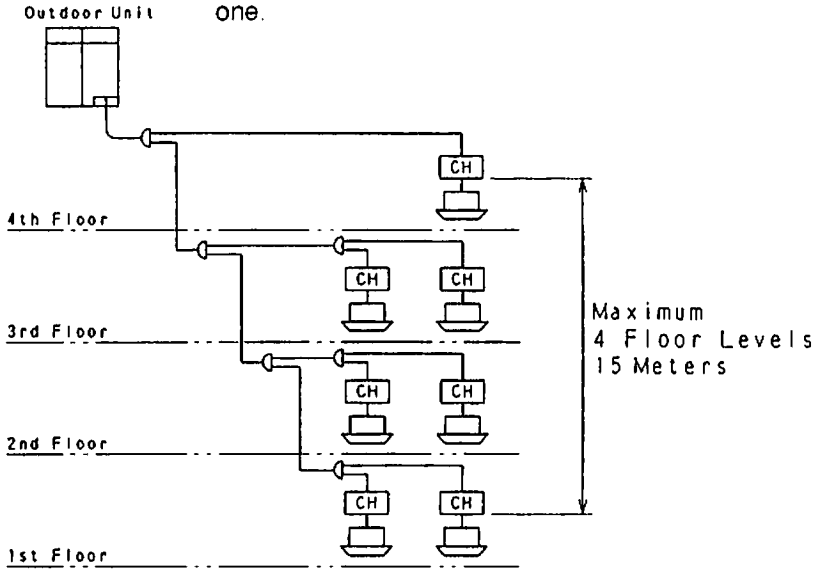
5.8 Caution for Installation Height of CH Unit [FX2 System]

- All the indoor units, especially CH units, in the same refrigerant cycle (connected to the same outdoor unit.) shall be installed on as same floor level as possible.
- All the CH units in the same refrigerant cycle must be installed within four floor levels as shown in the following figure (2).
- If not installed, uneven refrigerant distribution to indoor units will occur during the heating operation. (Insufficient capacity of indoor unit located at the lowest level will occur.)

(1) Good Example: All indoor units and CH units are located on the same floor level.

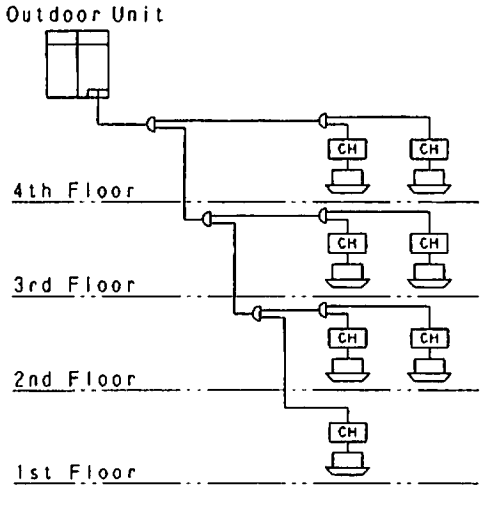


(2) Permissible Example: CH units are located within 4 floor levels, and the lowest CH units are not one.

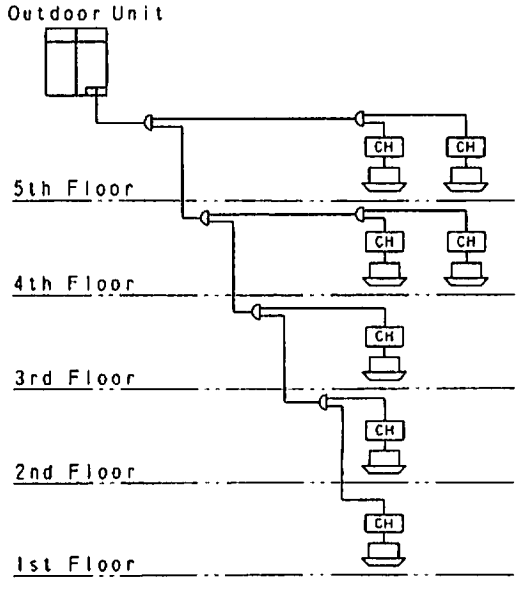


(3) Incorrect Example:

① CH units are located within 4 floor levels, but the lowest CH unit is one.



② CH units are located on each floor more than 5 floors.

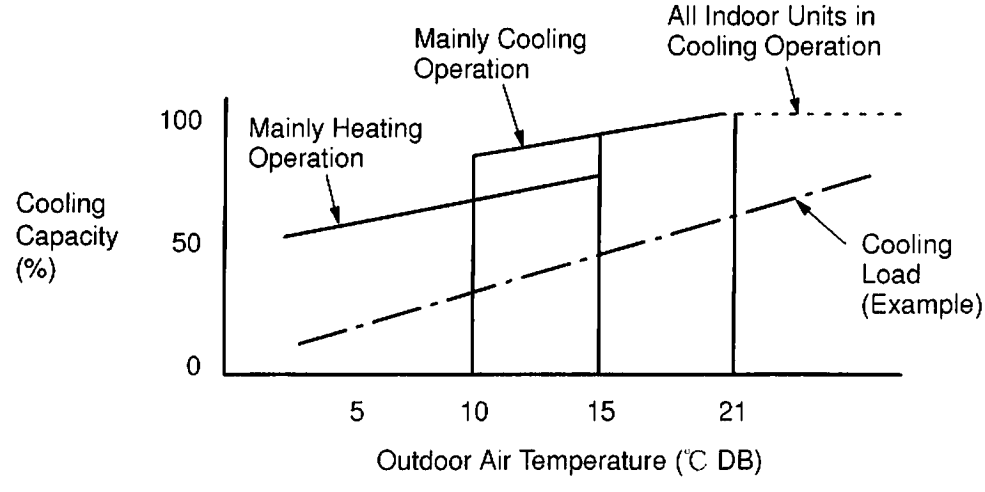


5.9 Attention for SET-FREE FX2 Series

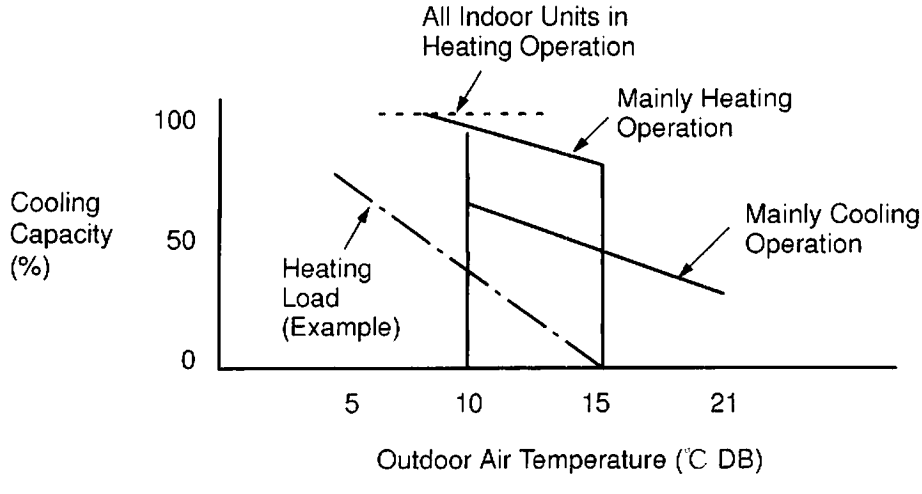
(1) Attention for Application

- The SET-FREE FX2 series has been designed for the system to provide simultaneous cooling and heating operations during the temperate season. However, the current SET-FREE FS2 series is unable to function as a cooling and heating system simultaneously.
- The FX2 series is for general office building air conditioning. Therefore, it is recommended that different air conditioning systems be selected where systems are utilized for machine rooms or computer rooms, providing big heat load.
- During the simultaneous cooling and heating operations, the actual capacity is decreased for a short period of time due to the influence of heat balance if the cooling or heating operation on some indoor units is started or stopped. Therefore, in the case that there is a room where the heat load change is big or an ON/OFF operation of an indoor unit is excessively frequent, it is not appropriate to use this system, since other indoor units may be influenced by the indoor unit. However, this system can be applied to a room where gradual heat load change is given, such as a heating operation in the morning, cooling operation during day time and heating operation in the evening.
- During the simultaneous cooling and heating operation, the performance comparatively decreases when compared with the performance whilst operating all the indoor units at the same mode.

[Cooling Operation]



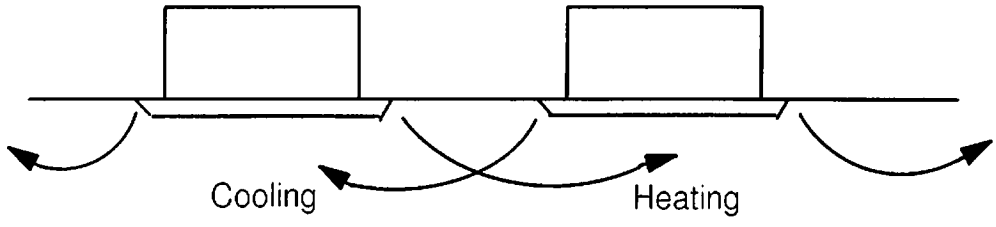
[Heating Operation]



(2) Attention for Automatic COOL/HEAT Operation

In the case that the indoor units are operated under an automatic cooling/heating operation by pressing the AUTO COOL/HEAT switch, pay attention to the following.

① In the case that more than 2 indoor units are closely installed and operated in the same room, each indoor unit interferes with the next unit, resulting in inefficient operation.



② In the case that room temperature rapidly increases during this automatic COOL/HEAT operation, the operation mode is changed in order, heating operation → fan operation →cooling operation. During this mode change, the fan operation continues for more than 10 minutes in order to avoid unwanted influences to other indoor units. Therefore, it is recommended that other systems be considered if very precise temperature control is required.

(3) Attention for Installing CH Unit

Before installing the CH units, pay attention to the service access and sound.

①The CH unit consists of mechanical components such as solenoid valves in order to change the operation mode from cooling to heating or heating to cooling respectively. Therefore, please provide a service access door(minimum of 600 x 1,000 mm) beneath the CH unit.

② Flowing sound of refrigerant may be heard from the CH unit when the solenoid valve in the CH unit is activated. Therefore, take the following action to minimize the sound.

- Install the CH unit inside the ceiling. As for the ceiling material, select a material which minimizes operation sound.
- Do not install the CH units in near a bed room or hospital room.

5.10 Caution on Refrigerant Leakage

(1) Maximum Permissible Concentration of HCFC Gas

The refrigerant R-22, charged in the SET-FREE FS2 and FX2 system, is an incombustible and non-toxic gas. However, if leakage occurs and gas fills a room, it may cause suffocation.

The maximum permissible concentration of HCFC gas, R-22 in air is 0.3 kg/m^3, according to the refrigeration and air conditioning facility standard (KHK S 0010) by the KHK (High Pressure Gas Protection Association) Japan.

Therefore, some effective measure must be taken to lower the R-22 concentration in air below 0.3 kg/m^3, in case of leakage.

(2) Calculation of Refrigerant Concentration

① Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of rooms to be air conditioned.

② Calculate the room volume V (m^3) of each objective room.

③ Calculate the refrigerant concentration C (kg/m^3) of the room according to the following equation.

$$\frac{\text{R: Total Quantity of Charged Refrigerant (kg)}}{\text{V: Room Volume (m}^3\text{)}} = \text{C: Refrigerant Concentration} \leqq 0.3\ (\text{kg/m}^3)$$

(3) Countermeasure for Refrigerant Leakage According to KHK Standards

The facility shall be arranged as follows referring to the KHK standards, so that the refrigerant concentration will be below 0.3 kg/m^3.

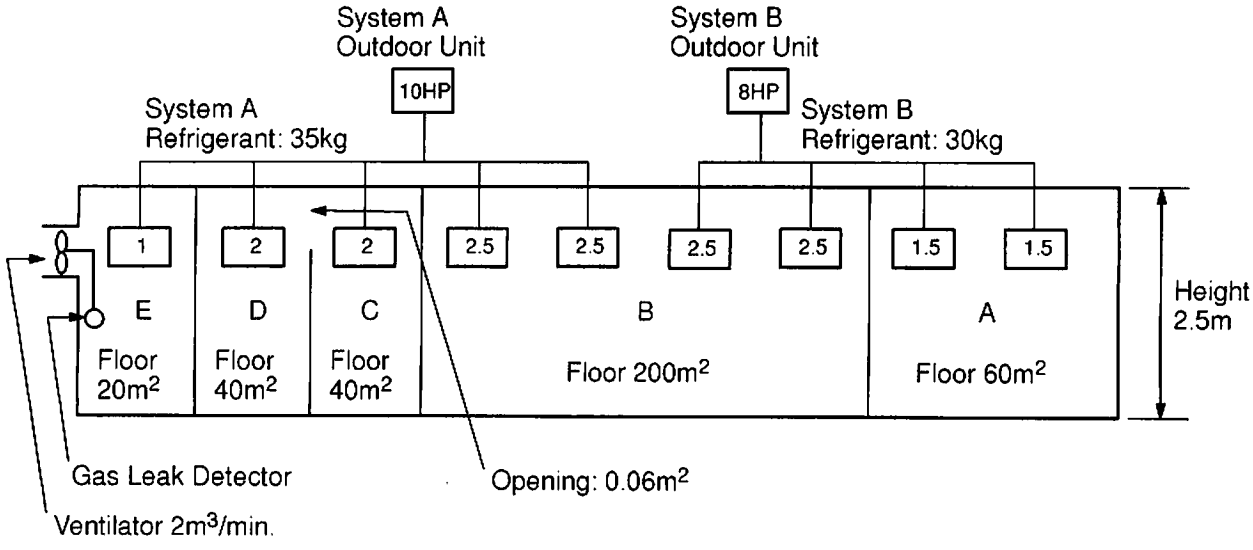
① Provide a shutterless opening which will allow fresh air to circulate into the room.

② Provide a doorless opening of 0.15% or more size to the floor area.

③ Provide a ventilator, linked with a gas leak detector, of 0.4 m^3/min. or more ventilating capacity per Japanese Refrigeration Ton(= compressor displacement m^3/h / 8.5) of the air conditioning system utilizing refrigerant R-22.

RAS-5FS2 and RAS-5FX2 ..... 2.49 ton
RAS-8FS2 and RAS-8FX2 ..... 4.32 ton
RAS-10FS2 and RAS-10FX2 ..... 4.64 ton

<Example>



Room	R (kg)	V (m^3)	C (kg/m^3)	Countermeasure
A	30	150	0.2	-
B	65	500	0.13	-
C	35	100	0.35	0.06 m^2 Opening
D	35	100	0.35	0.06 m^2 Opening
C + D	35	200	0.175	-
E	35	50	0.7	2 m^3/min. Ventilator Linked with Gas Leak Detector

If local codes or regulations are specified, follow them.

<Example>

British Standard BS4434 1989

R22 Commercial Office Building Class D Occupancy

MR = C × V

MR: Maximum Charge or Leakage of Refrigerant (kg)

C: Maximum Allowable Concentration = 0.17 (kg/m^3)

V: Volume of Space (m^3)

5.11 Maintenance Work

(1) For Indoor Unit and Outdoor Unit

① Fan and Fan Motor

- Lubrication – All fan motors are pre-lubricated and sealed at the factory. Therefore, no lubricating maintenance is required.
- Sound and Vibration – Inspect for abnormal sound and vibration.
- Rotation – Inspect for clockwise rotation and rotating speed.
- Insulation – Inspect for electrical insulation resistance.

② Heat Exchanger

- Clog – Inspect and remove any accumulated dirt and dust from the heat exchanger at regular intervals. As for outdoor unit, other obstacles such as growing grass and pieces of paper, which might restrict air flow, should also be removed.

③ Piping Connection

- Leakage – Inspect for refrigerant leakage at piping connection.

④ Cabinet

- Stain and Lubrication – Inspect and remove any stain and lubrication.
- Fixing Screw – Inspect and fix loosened or lost screws.
- Insulation – Inspect and repair peeled thermal insulation material on cabinet.

⑤ Electrical Equipment

- Activation – Inspect for abnormal activation of the magnetic contactor, auxiliary relay, PCB and etc.
- Line Condition – Pay attention to working voltage, amperage and phase balance. Inspect for faulty contact caused by loosened terminal connections, oxidized contacts, foreign matter, and other items. Inspect for electrical insulation resistance.

⑥ Control and Protective Devices

- Setting – Do not readjust the setting in the field unless the setting is maintained at a point other than the point listed in "11. SAFETY AND CONTROL DEVICE SETTING" of "TC II",

(2) For Indoor Unit

① Air Filter

- Cleaning – Inspect and remove any accumulated dirt and dust according to "12.2 Filter Cleaning" of "TC II".

② Drain Pan, Drain-up Mechanism and Drain Pipe

- Drain Line – Inspect and clean the condensate drain line at least twice a year.
- Drain-up Mechanism – Inspect for activation of drain-up mechanism.

③ Float Switch

- Activation – Inspect for activation of float switch.

(3) For Outdoor Unit

① Compressor

- Sound and Vibration – Inspect for abnormal sound and vibration.
- Activation – Inspect for that the voltage drop of power supply line is within 16% at start and within 2% during operation.

② Reverse Valve

- Activation – Inspect for any abnormal activating sound.

③ Strainer

- Clog – Inspect for that no temperature difference between both ends.

④ Earth Wire

- Earth Line – Inspect for continuity to the earth.

⑤ Oil Heater

- Activation – The oil heater should be activated at least 12 hours before start-up, by switching ON the main power source.

5.12 Service & Maintenance Record by 7-Segment Display

Data Sheet for Checking by 7-Segment Display Client: Checked by: Date: . .

O.U. Model /Serial No.			/	/	/	/	
Operation Mode							---
Starting Time of Test Running			:	:	:	:	---
Time of Collecting Data			:	:	:	:	---
O.U.	Protection Control Code Indication						---
	Total of Thermo-ON I.U. Capacity	op					×1/8HP*
	Frequency of Inv. Comp. (MC1)	H1					Hz
	Running Comp. Q'ty	CC					---
	Control Information 1	TE					---
	Control Information 2	TEo					---
	Air Flow Ratio	Fo					---
	Opening of O.U. Ex. Valve MV1	oE1					%
	Opening of O.U. Ex. Valve MV2	oE2					%
	Opening of O.U. Ex. Valve MVb	oEb					%
	Discharge Pressure	Pd					kg/cm²G
	Suction Pressure	Ps					kg/cm²G
	Discharge Gas Temp. on the Top of Comp. MC1	Td1					℃
	Discharge Gas Temp. on the Top of Comp. MC2	Td2					℃
	Evaporating Temp. at Heating	TE1					℃
		TE2					℃
	Ambient Air Temp.	To					℃
	Estimated Running Current of Comp. MC1	A1					A
	Estimated Running Current of Comp. MC2	A2					A
	Opening of Indoor Ex. Valve	iE					%
	I.U. Heat Exchanger Liquid Pipe Temp. (Freeze Protection)	TL					℃
	I.U. Heat Exchanger Gas Pipe Temp.	TG					℃
	I.U. Intake Air Temp.	Ti					℃
	I.U. Discharge Air Temp.	To					℃
	I.U. Capacity Setting	CA					---
	I.U. Cause of Stoppage	d1					---
	Alarm Code of O.U. Stoppage	AC					---
	Cause of Stoppage at Inverter	iTC					---
	Total Capacity Setting of I.U.	CP					×1/8HP*
	Connected I.U. Q'ty.	AA					sets
	Address of Refrigerant Cycle	GA					---
Activation of Y20A			ON·OFF	ON·OFF	ON·OFF	ON·OFF	---
Activation of Y20B			ON·OFF	ON·OFF	ON·OFF	ON·OFF	---

5.13 Service & Maintenance Record by Remote Control Switch

Data Sheet for Checking by Remote Control Switch

Time			:	:	:	:	:	:	:	:
I.U. Model										
I.U. Serial No.										
I.U. No./Alarm Code										
	Check Mode 1	Check Mode 2	1 · 2	1 · 2	1 · 2	1 · 2	1 · 2	1 · 2	1 · 2	1 · 2
B Temp. Indication										
Set Temp.	b1	--								
Inlet Air Temp.	b2	q1								
Discharge Air Temp.	b3	q2								
Liquid Pipe Temp.	b4	q3								
Remote Thermistor Temp.	b5	--								
Outdoor Air Temp.	b6	q4								
Gas Pipe Temp.	b7	q5								
Evaporating Temp. at Heating	b8	q6								
Control Information	b9	q7								
Comp. Top Temp.	bA	q8								
C Micro-Computer State Indication										
I.U. Micro-Computer	C1	--								
O.U. Micro-Computer	C2	--								
D Stopping Cause State Indication										
Stopping Cause State Indication	d1	--								
E Alarm Occurrence										
Times of Abnormality	E1	--								
Times of Power Failure	E2	--								
Times of Abnormal Transmitting	E3	--								
Times of Inverter Tripping	E4	--								
F Automatic Louver State										
Louver Sensor State	F1	--								
H Pressure, Frequency State Indication										
Discharge Pressure	H1	q9								
Suction Pressure	H2	qA								
Control Information	H3	qb								
Operating Frequency	H4	qC								
J I.U. Capacity Indication										
I.U. Capacity (×1/8HP)	J1	--								
O.U. Code	J2	--								
Refrigerant Cycle Number	J3	--								
Refrigerant Cycle Number	J4	--								
L Opening of Ex. Valve										
I.U. Ex. Valve	L1	qd								
O.U. Ex. Valve 1	L2	qE								
O.U. Ex. Valve 2	L3	--								
O.U. Ex. Valve B	L4	--								
P Running Current Indication (Reference)										
Comp. Current	P1	qF								

Client:

Installation Date:

System No.:

Date Checked:

Checked by:

Result	

5.14 Service & Maintenance Record

Service & Maintenance Record

No.	Check Item	Action	Judgement
1	Is service space sufficient?		YES or NO
2	Short Circuit of Discharged Air?		YES or NO
3	Any Heat Influence		YES or NO
4	Is earth wire connected?		YES or NO
5	Refrigeration Piping		GOOD or NOT GOOD
6	Fixing of Units		GOOD or NOT GOOD
7	Any Damage on Outer or Internal Surface?		YES or NO
8	Checking of Screw and Bolts	Tighten if loosen.	TIGHTENED or NOT TIGHTENED
9	Tightening of Terminal Screws	Tighten all terminal screws by phillips driver.	TIGHTEN or NOT TIGHTENED
10	Are compressor terminals tightly fixed?	Push all terminals.	PUSHED or NOT PUSHED
11	Insulation Resistance	Measure insulation resistance by insulation resistance-meter. Comp. and Fan Motor: greater than 3MΩ Others: greater than 3MΩ	GOOD or NOT GOOD
12	Does drain water smoothly flow?	Check for smooth flow by pouring water.	GOOD or NOT GOOD
13	Check for leakage at compressor.	Check for any leakage.	GOOD or NOT GOOD
14	Check for leakage at outdoor heat exchanger.	ditto	GOOD or NOT GOOD
15	Check for leakage at indoor heat exchanger.	ditto	GOOD or NOT GOOD
16	Check for leakage at 4-way valve.	ditto	GOOD or NOT GOOD
17	Check for leakage at check valve.	ditto	GOOD or NOT GOOD
18	Check for leakage at accumulator.	ditto	GOOD or NOT GOOD
19	Check for leakage at strainer.	ditto	GOOD or NOT GOOD
20	Check for leakage at electronic Ex. Valve.	ditto	GOOD or NOT GOOD
21	Check for leakage at piping.	ditto	GOOD or NOT GOOD

No.	Check Item	Action	Judgement
22	Check direction of fans.	by Viewing or Air Flow Volume	GOOD or NOT GOOD
23	Voltage among each Phase	higher than 220V	GOOD or NOT GOOD
24	Vibration and Sound	Check fan, compressor, piping, etc.	GOOD or NOT GOOD
25	Activation of Each Operation Mode	Check activation of COOL, HEAT, STOP and TEMP. switches.	GOOD or NOT GOOD
26	High Pressure Cut-out Switch	Check actual activation value.	GOOD or NOT GOOD
27	Check activation of drain mechanism.	Check it during cooling operation.	GOOD or NOT GOOD
28	Indoor Inlet Air Temp. DB/WB		℃DB/ ℃WB
29	Indoor Outlet Air Temp. DB/WB		℃DB/ ℃WB
30	Outdoor Inlet Air Temp. DB/WB		℃DB/ ℃WB
31	Outdoor Outlet Air Temp. DB/WB		℃DB/ ℃WB
32	High Pressure Switch		kg/cm2G
33	Low Pressure Switch		kg/cm2G
34	Operating Voltage		V
35	Operating Current		A
36	Instruction Cleaning of Air Filter to Client		DONE or NOT YET
37	Instruction for Cleaning Method to Client		DONE or NOT YET
38	Instruction for Operation to Client		DONE or NOT YET

Specifications in this catalog are subject to change without notice, in order that HITACHI may bring the latest innovations to our customers.

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