HITACHI UTOPIA SERIES
INVERTER-DRIVEN SPLIT-SYSTEM
HEAT PUMP AIR CONDITIONERS

- DC Inverter UTOPIA for Europe -

SERVICE MANUAL

Models

Indoor Units

- **In-the-Ceiling Type**
  RPI-2.5HRG RPI-4.0HRG
  RPI-3.0HRG RPI-5.0HRG
- **4-Way Cassette Type**
  RCI-2.5HRG RCI-4.0HRG
  RCI-3.0HRG RCI-5.0HRG
- **2-Way Cassette Type**
  RCD-2.5HRG RCD-4.0HRG
  RCD-3.0HRG RCD-5.0HRG
- **Ceiling Type**
  RPC-2.5HRG RPC-4.0HRG
  RPC-3.0HRG RPC-5.0HRG

Outdoor Units
RAS-3HVRG RAS-4HVRG RAS-5HVRG

Hitachi Air Conditioning Systems Co., Ltd.

HITACHI
Inspire the Next

Catalog No. P5413554 2003 Printed in Japan (N)

P5413554

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1. TROUBLESHOOTING

1.1 Initial Troubleshooting

1.1.1 Rotary Switch and Dip Switch Setting

(1) Indoor Unit

The PCB in the indoor unit is equipped with 3 or 4 types of dip switches and rotary switch. 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.

⚠CAUTION

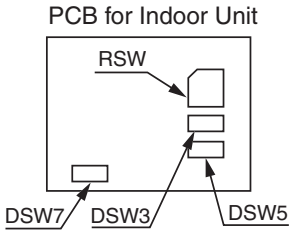
Before setting dip switches, firstly turn OFF power source and set the position of the dip switches. If the switches are set without turning OFF the power source, the switches can not function.

NOTE

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

<RCI Models>

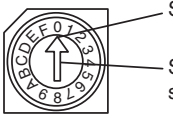
(A) Position of Dip Switches



(B) The PCB in the indoor unit is equipped with 3 types of dip switches and rotary switch. 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 (RSW)

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.



	No.0 Unit	No. 1 Unit	No. 2 Unit	No. 3 Unit	No. 4 Unit	No.5 Unit	No. 6 Unit	No. 7 Unit
Rotary Switch Setting								
	No. 8 Unit	No. 9 Unit	No. 10 Unit	No. 11 Unit	No. 12 Unit	No. 13 Unit	No. 14 Unit	No. 15 Unit
Rotary Switch Setting								

(b) Capacity Code Setting (DSW3)

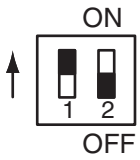
No setting is required, due to setting before shipment. This switch is utilized for setting the capacity code which corresponds to the Horse Power of the indoor unit.

Horsepower	2.5	3.0	4.0	5.0
Setting Position				

(c) Refrigerant Cycle No. Setting (DSW5)
Setting is required.
Setting position before shipment is all OFF.

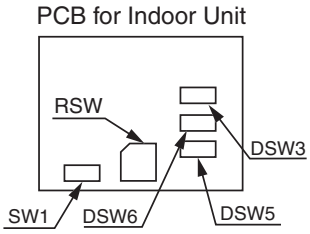
(d) Fuse Recover (DSW7)
* No Setting is required.
Setting position before shipment is all OFF.

* In the case of applying high voltage to the terminal 1, 2 of TB2, the fuse (0.5A) on the PCB, is cut. In such a case, firstly correct the wiring to TB2, and then turn on No.1 pin.



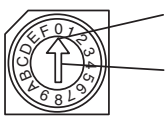
<RPI, RCD and RPC Models>

(A) Position of Dip Switches



(B) The PCB in the indoor unit is equipped with 4 types of dip switches and rotary switch. 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 (RSW)
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.



	No.0 Unit	No. 1 Unit	No. 2 Unit	No. 3 Unit	No. 4 Unit	No.5 Unit	No. 6 Unit	No. 7 Unit
Rotary Switch Setting								
	No. 8 Unit	No. 9 Unit	No. 10 Unit	No. 11 Unit	No. 12 Unit	No. 13 Unit	No. 14 Unit	No. 15 Unit
Rotary Switch Setting								

(b) Capacity Code Setting (DSW3)
No setting is required, due to setting before shipment. This switch is utilized for setting the capacity code which corresponds to the Horse Power of the indoor unit.

Horsepower	2.5	3.0	4.0	5.0
Setting Position				

(c) Refrigerant Cycle No. Setting (DSW5)
Setting is required.
Setting position before shipment is all OFF.

(d) Unit Model Code Setting (DSW6)
No setting is required. Setting the model code of the indoor unit.

RPI-2.0HRG
└ Model Code

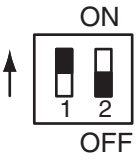
Model Code	(a)	(b)	(c)
Setting Position			

Model Code:
(a) RPI-HRG
(b) RCD-HRG
(c) RPC-HRG

(e) DSW7

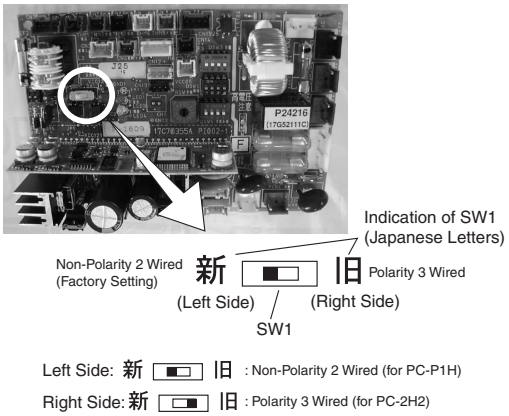
* Factory Setting

* No.1 Pin: Fuse Recover
When fuse is cut, turn No.1 Pin ON.



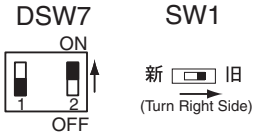
* No.2 Pin: Transmission Selection
OFF: Non-Polarity 2 Wired (PC-P1H)
ON: Polarity 3 Wired (PC-2H2)

(f) Transmission Selection (SW1)



NOTE

- Factory Setting is for PC-P1H.
  In the case of using PC-2H2, set as below.

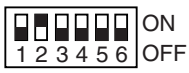


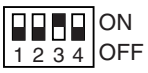
(2) Outdoor Unit
TURN OFF all power sources before setting. Without turning OFF, the switches do not work and the contents of the setting are invalid. Mark of "■" indicates the position of dip switches. Set the dip switches according to the figure below.

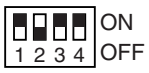
NOTE

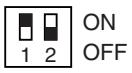
- By using switch DSW1 the unit is started or stopped after 10 to 20 seconds after the switch is operated.
- Make the outdoor unit No. clear to distinguish from other outdoor units for service and maintenance.

<table>
<tr><th>DSW1</th><th colspan="3">DSW2</th><th>DSW4</th></tr>
<tr><td rowspan="2">For Test Run
 

1. Test Run (Cooling)
2. Test Run (Heating)
3. OFF
4. Compressor Forced Stop</td><td colspan="3">Optional Function Setting
 

1. OFF
2. Energy Saving Operation (ON: Cancel, OFF: Set)
3. Night-Shift Mode (Low Sound) (OFF: No Set, ON: Set)
4. Cancellation of Outdoor Ambient Temp. Limit (OFF: No Set, ON: Set)
5. Cancellation of Fan Stop Operation during Defrost (OFF: No Set, ON: Set)
6. OFF</td><td>Ref. Cycle No. Setting
 
</td></tr>
<tr><th colspan="3">DSW3</th><th>DSW5</th></tr>
<tr><td colspan="3">Capacity
RAS-3HVRG
 

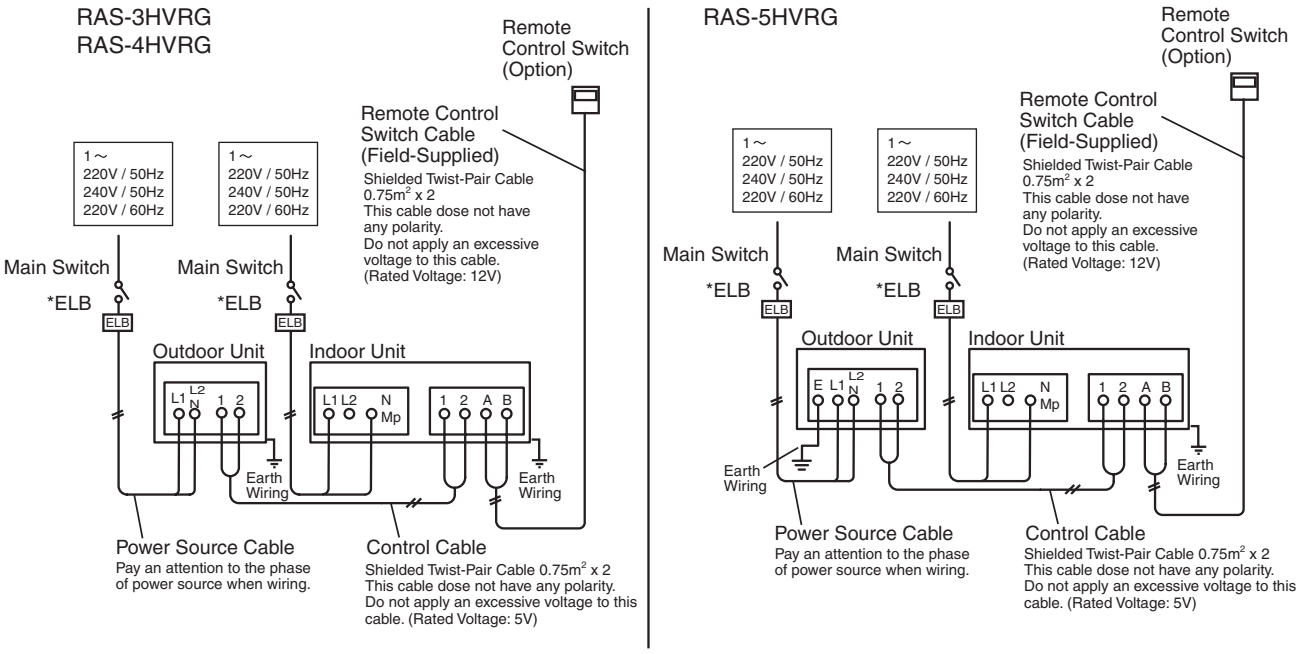
RAS-4HVRG
 

RAS-5HVRG
 
</td><td>Transmission Setting
 
</td></tr>
</table>

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: AC220V) and intermediate wiring (Operating Line: terminals “1” to “1” and “2” to “2” of each terminal board: DC5V) between the indoor unit and the outdoor unit coincide correctly, as figure below. If not, some component will be damaged.
- Check to ensure that the twist pair cable with shield (≧0.75mm2) are used for intermediate wiring to protect noise obstacle at total length of less than 1000m 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 codes.

Example for Electrical Wiring Connection (Single Type)



Wiring Connection for Single Type

NOTE:
In case of the other wiring connection, refer to Technical Catalogue II.

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

Model	Power Supply	Max. Running Current (A)	Power Supply Line (ϕmm)	ELB		Fuse (A)
				Nominal Current (A)	Nominal Sensitive Current (mA)	
RAS-3HVRG	220-240V/50Hz, 220V/60Hz	22	MLFC 1.25SQ	40	30	40
RAS-4HVRG		23				40
RAS-5HVRG		31	MLFC 2SQ	50		50

ELB: Earthleakage Breaker: Apply low sensibility type.
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 Unit(s)

✳ All the Indoor Unit(s) Connected to the Outdoor Unit

↓

2 Turn on the Outdoor Unit

↓

3 Auto-addressing Starts

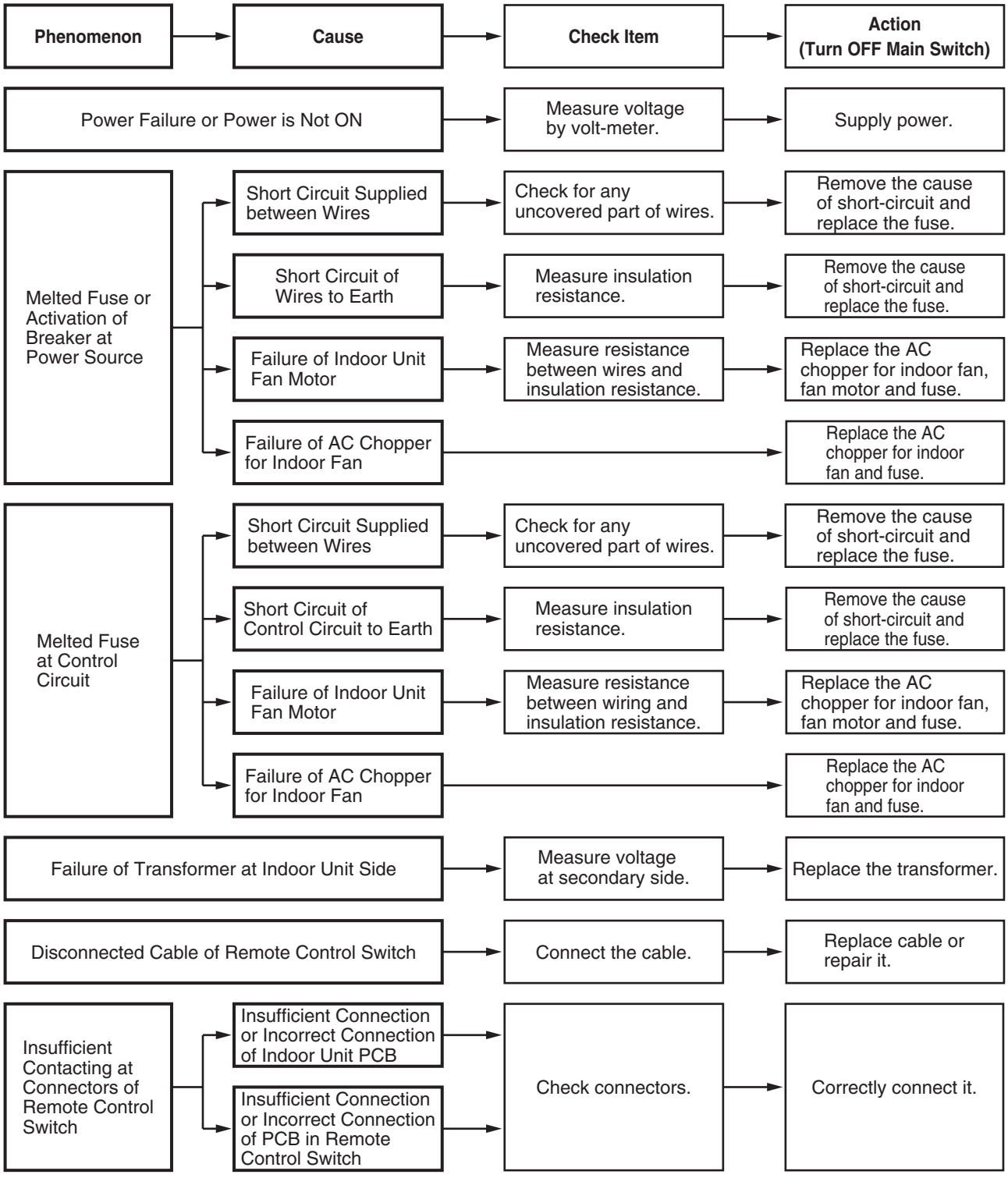
During auto-addressing, the following items can be checked using the outdoor unit's on-board 7-segment LED display.
(1) Disconnection of power supply to the indoor unit.
(2) Disconnection of the operating line between the outdoor and indoor unit(s).
In this case, "03" appears after 30 seconds.
(3) Duplication of indoor unit number. After turn ON by remote control switch, see Alarm Code 35. (Twin Type Only)

Outdoor Unit Printed Circuit Board PCB1

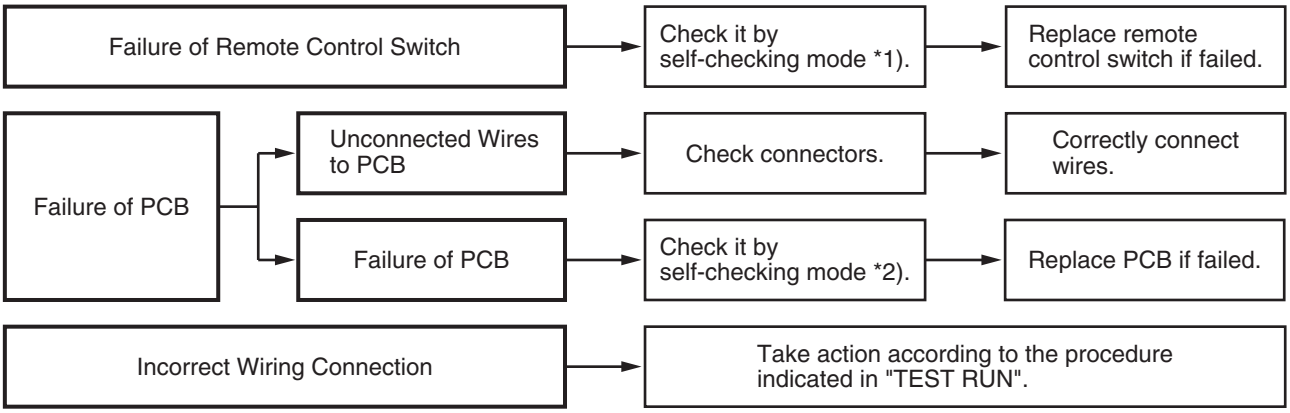
Normal Case	(1) The outdoor unit's on-board 7-segment LED display is not indicated.
Abnormal Case	(2) The outdoor unit's on-board 7-segment LED display indicates as follows if there is something wrong. (A) The indoor unit(s) are not supplied with power. ➡ 03 continues to flash after 30 seconds. (B) Disconnection of the operating line between the outdoor and indoor unit(s). ➡ 03 continues to flash after 30 seconds. (C) 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". [Twin Type Only])

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

- Lights and LCD are not Indicated.
- Not Operated
  If fuses are melted or a breaker is activated, investigate the cause of over current and take necessary action.



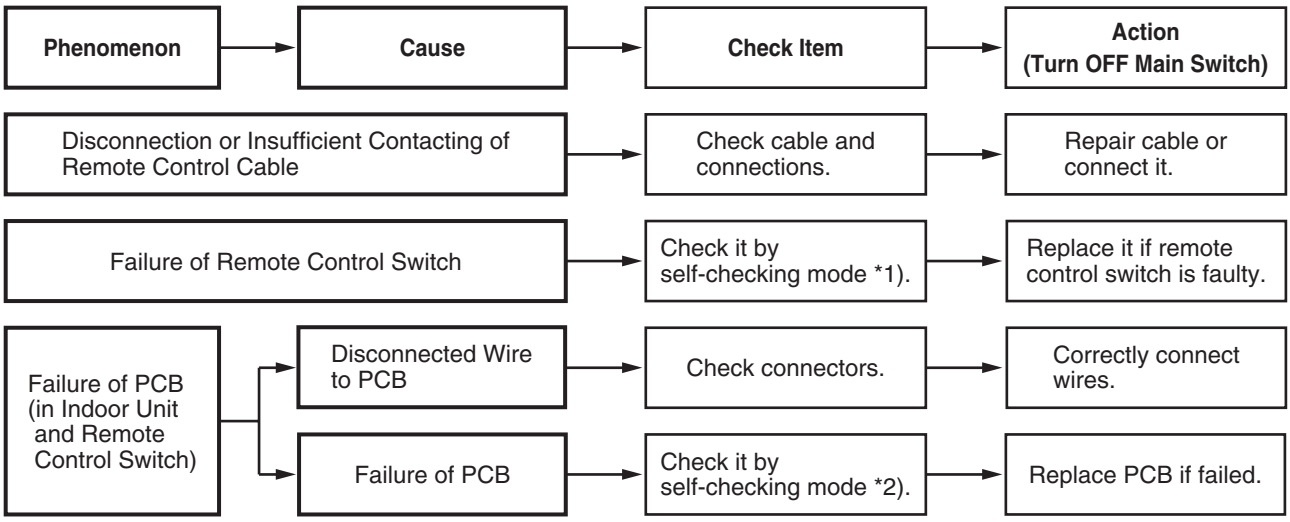
(1.1.4 Failure of Power Supply to Indoor Unit and Remote Control Switch)



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

1.1.5 Abnormal Transmission between Remote Control Switch and Indoor Unit

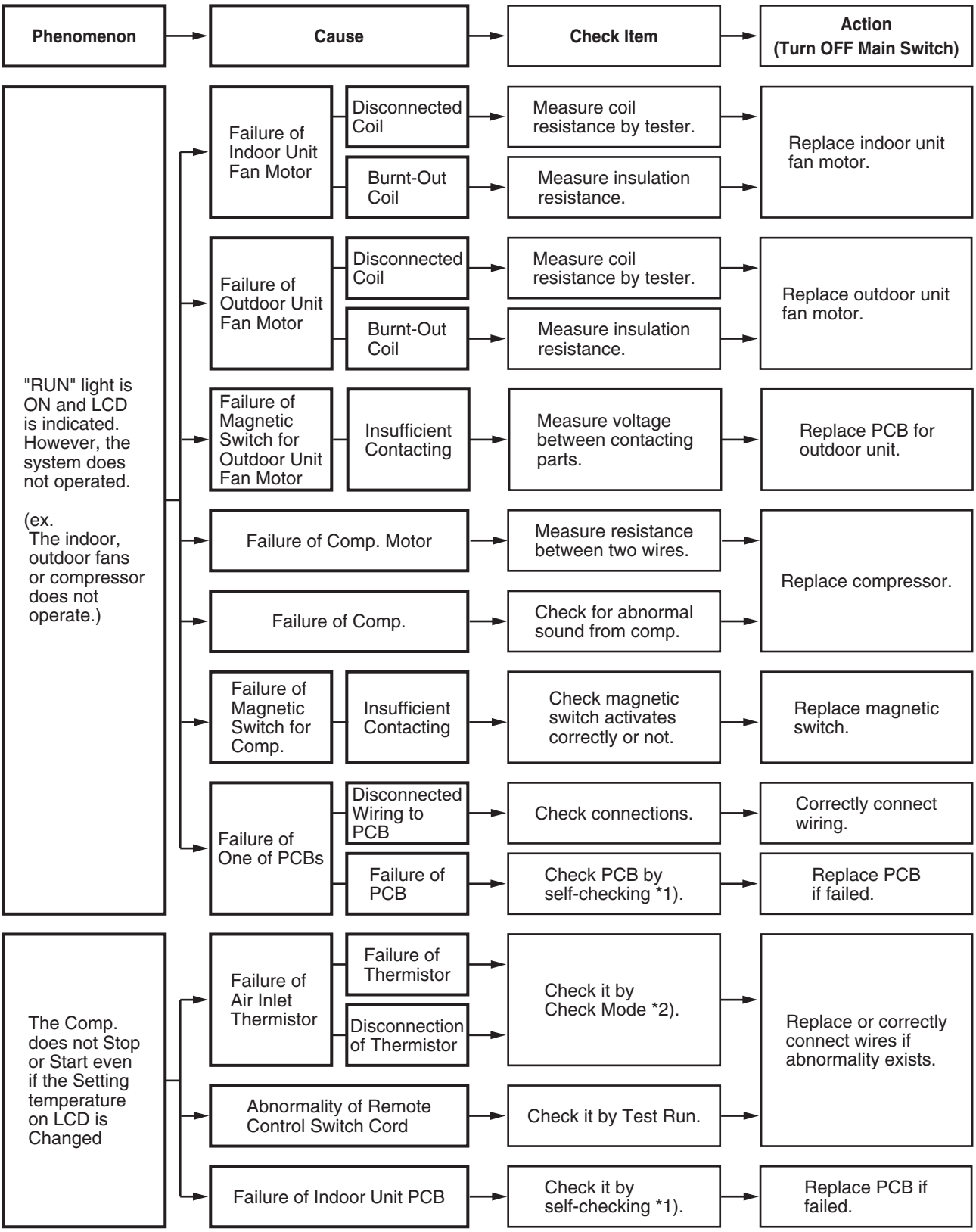
- "RUN" Lamp on Remote Control Switch:
  Flickering every 2 seconds



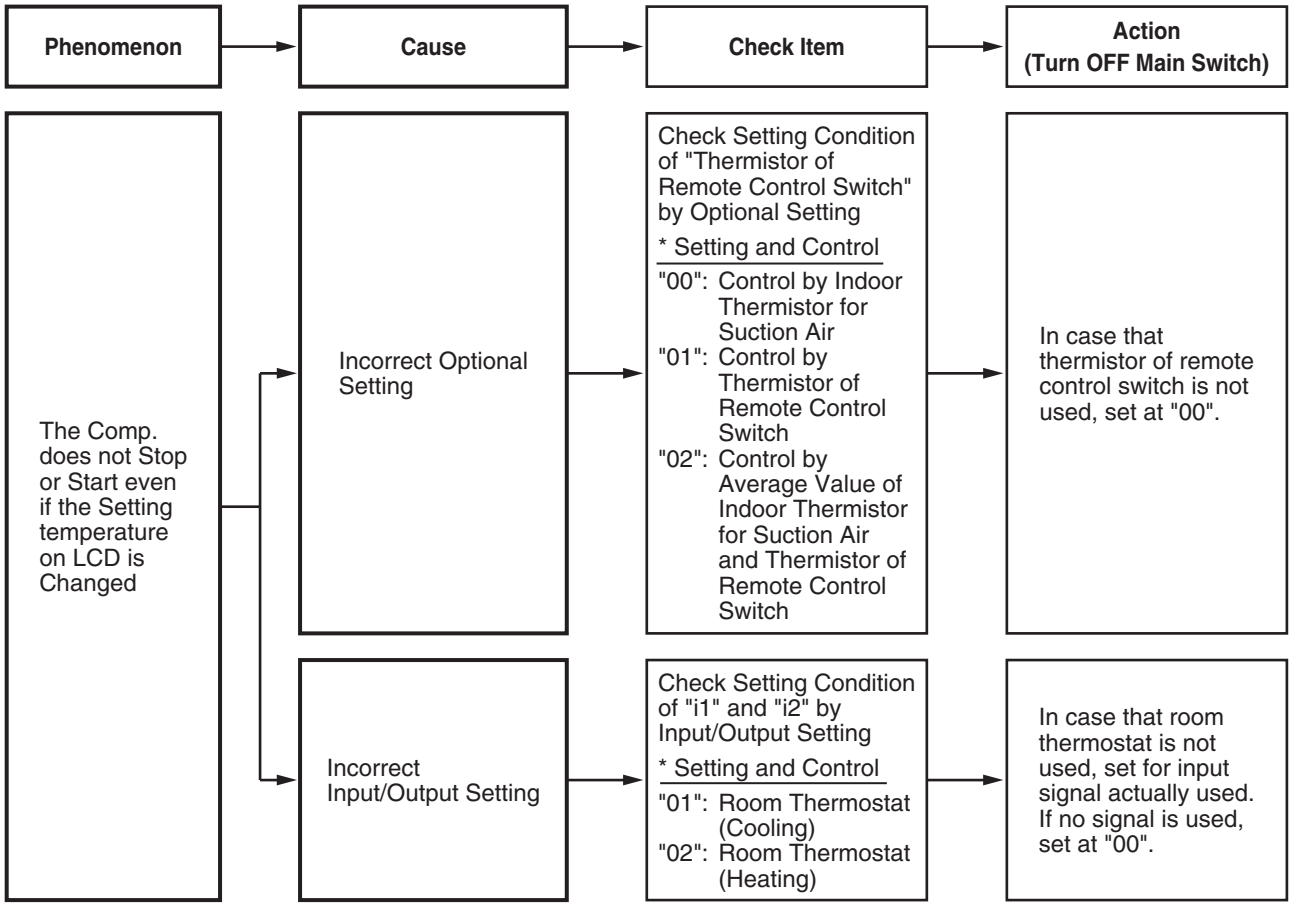
*1): Refer to Item 1.3.2.
*2): Refer to Item 1.3.1.

1.1.6 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.

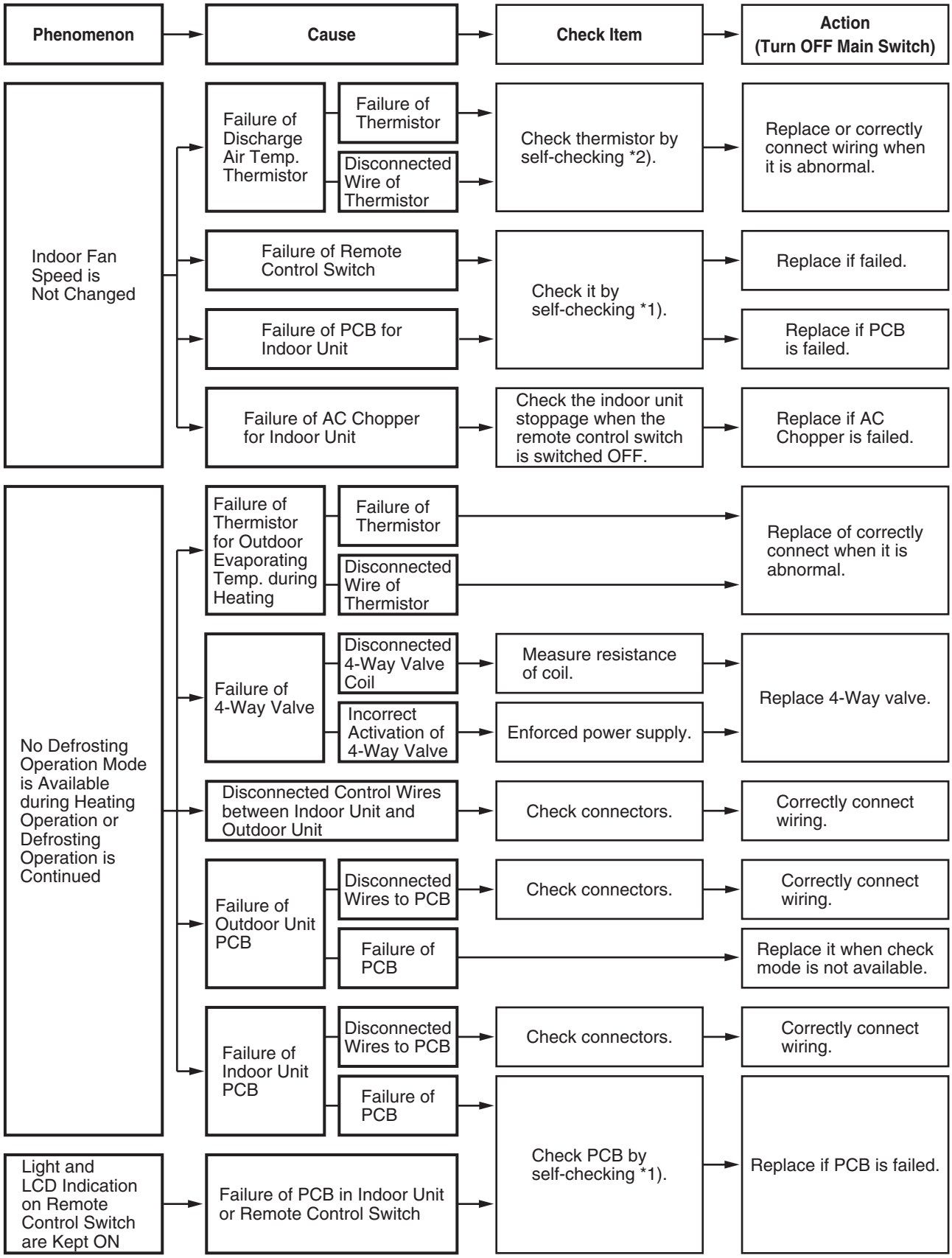


(1.1.6 Abnormalities of Devices)



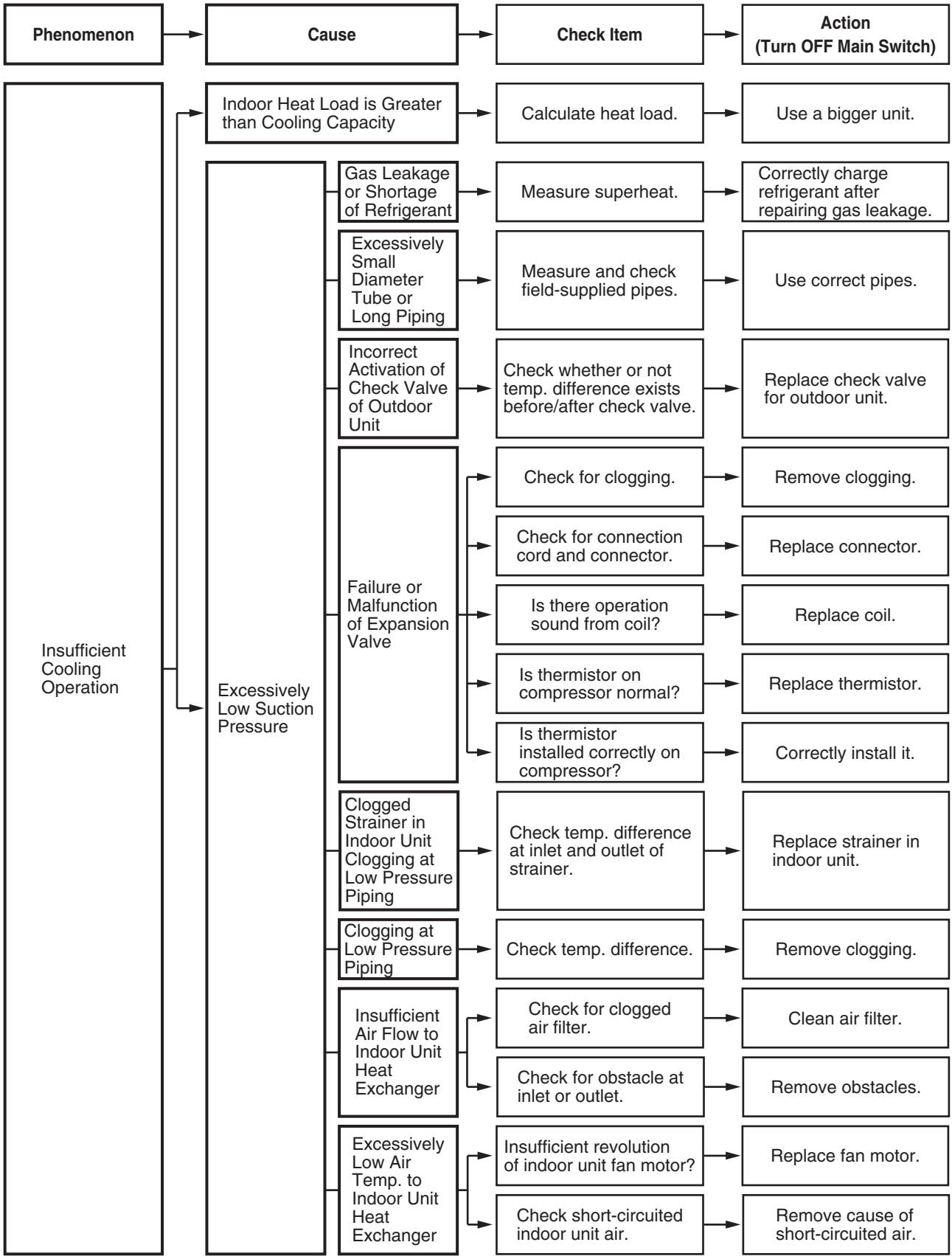
*1): Refer to Item 1.3.1.
*2): Refer to Item 1.2.3.
*3): Even if controllers are normal, the compressor does not operate under the following conditions.
* Indoor Air Temp. is lower than -21°C or Outdoor Air Temp. is lower than -5°C during cooling operation.
* Indoor Air Temp. is higher than 30°C or Outdoor Air Temp. is higher than 23°C during heating operation.
* 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.
* When an emergency stop signal is given to outdoor unit.

(1.1.6 Abnormalities of Devices)

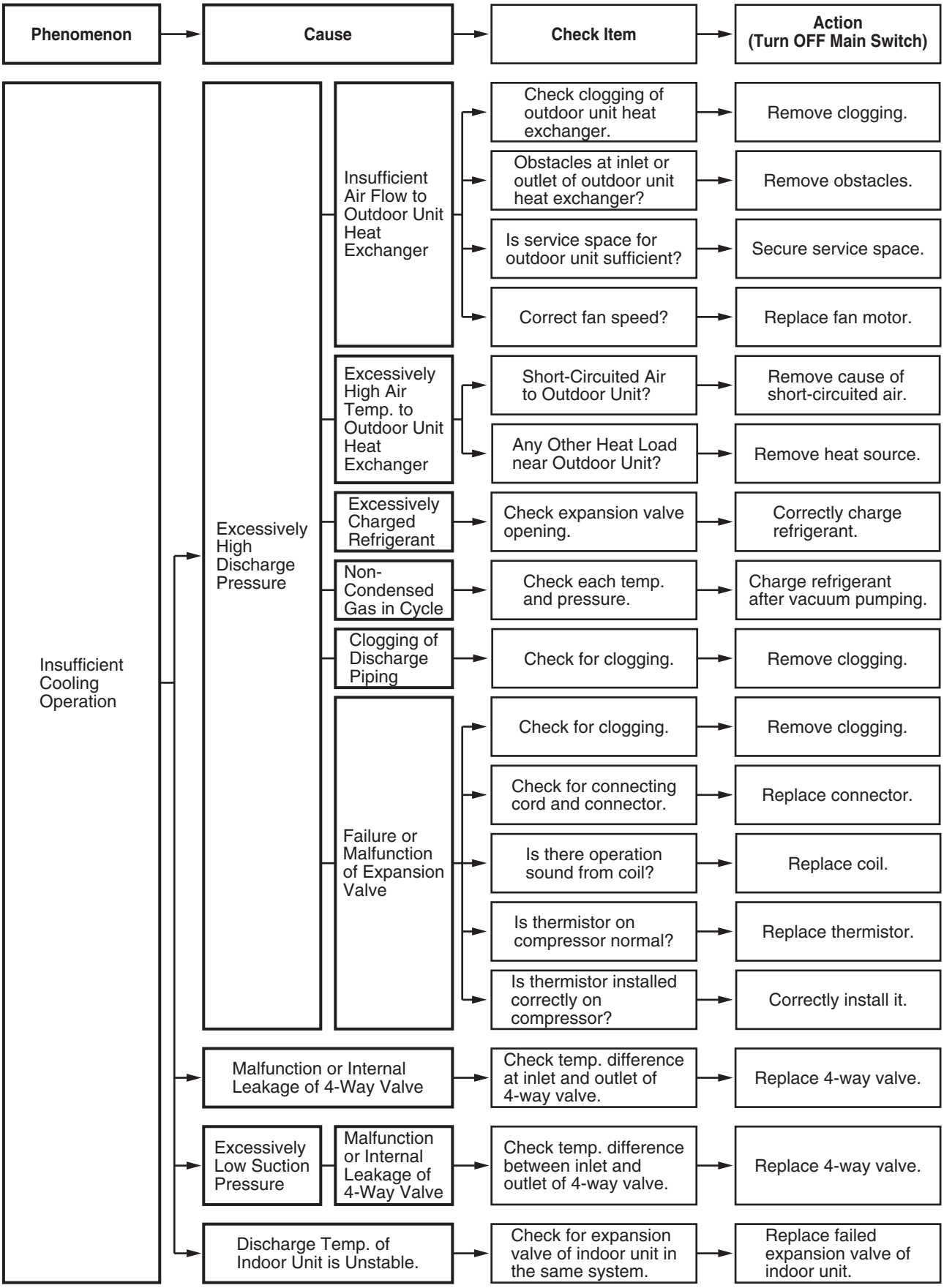


*1): Refer to Item 1.3.1 to 1.3.2.
*2): Refer to Item 1.2.3.

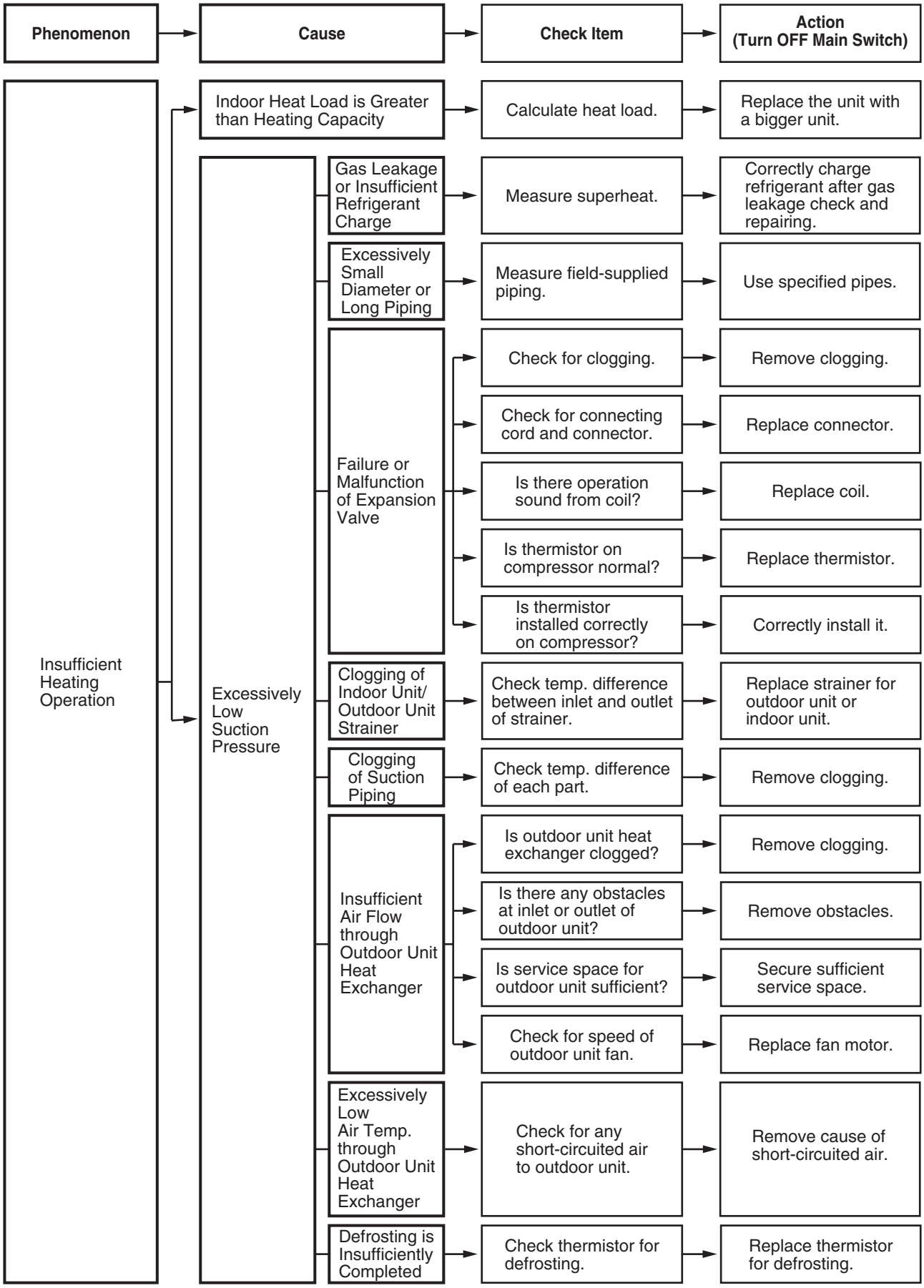
(1.1.6 Abnormalities of Devices)



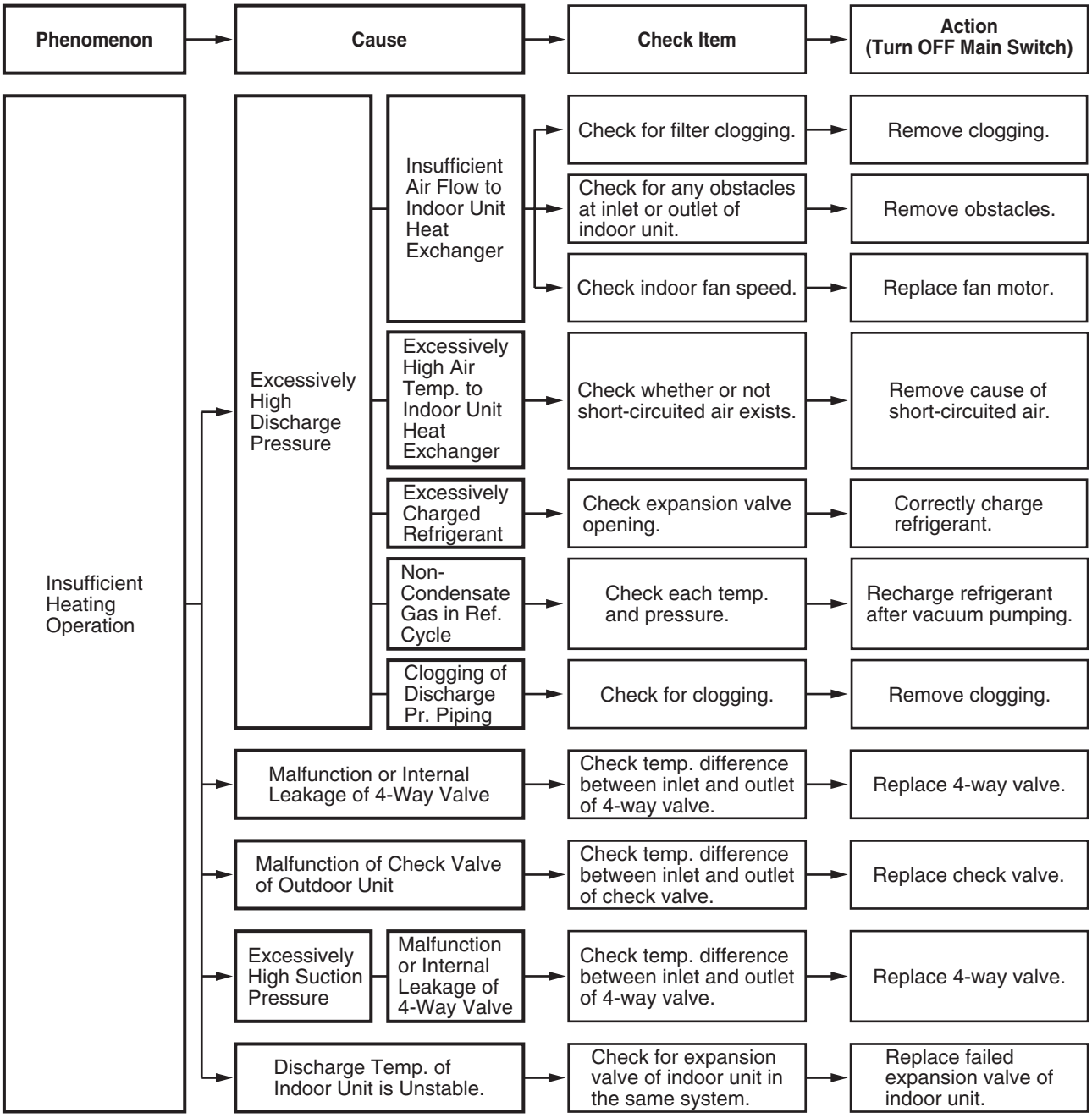
(1.1.6 Abnormalities of Devices)



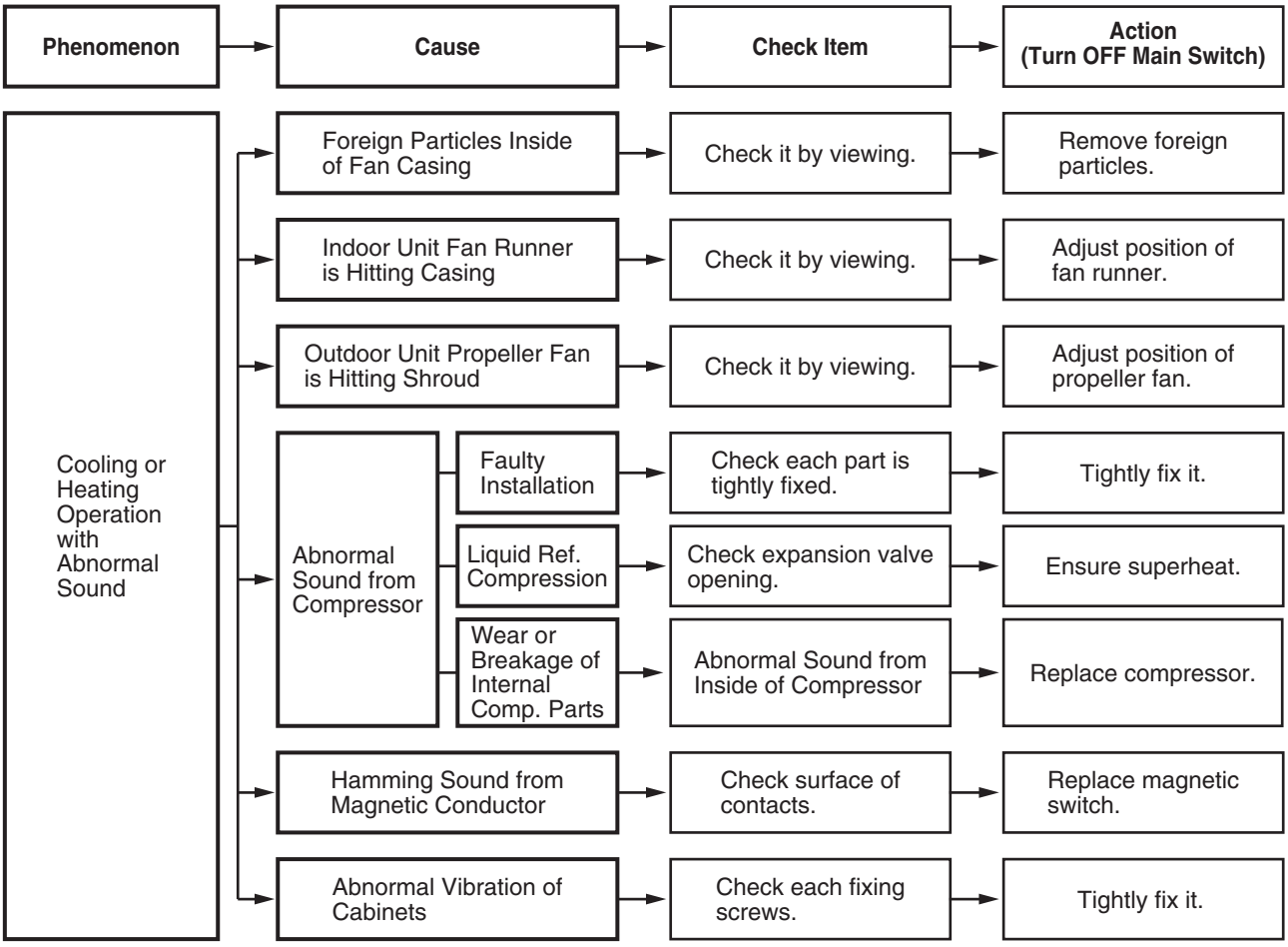
(1.1.6 Abnormalities of Devices)



(1.1.6 Abnormalities of Devices)

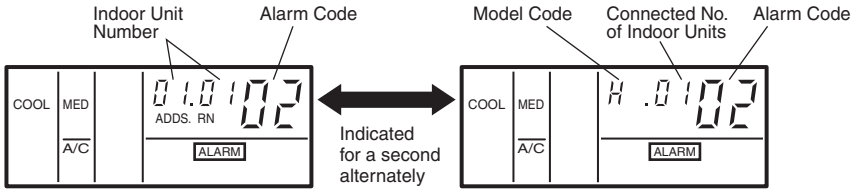


(1.1.6 Abnormalities of Devices)



1.2 Troubleshooting Procedure

- Alarm Code Indication of Remote Control Switch



1.2.1 Alarm Code Table

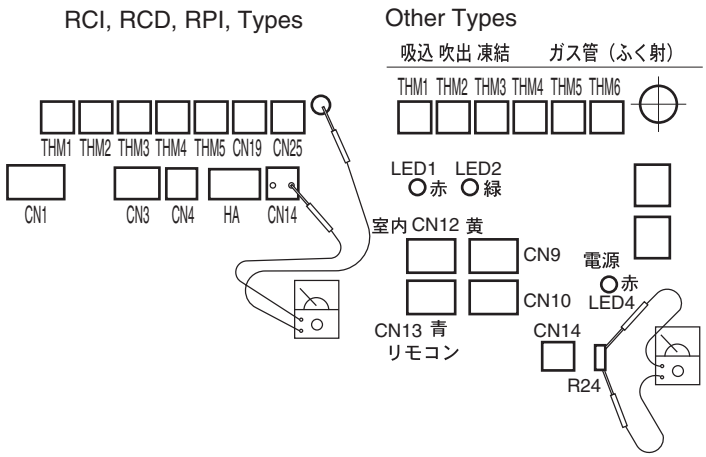
Code No.	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Tripping of Protection Device	High Water Level in Drain Pan, Activated Float Switch.
02	Outdoor Unit	Tripping of Protection Device (Except Alarm Code 41 and 42)	Activated High Pressure Switch. Locked Motor in Cooling Operation.
03	Transmission	Abnormality between Indoor and Outdoor	Incorrect Wiring. Loose Terminals, Disconnected wire, Tripping of Fuse.
04		Abnormality between Inverter and Control PCB	Failure in Transmission of PCB for Inverter.
06	Voltage Drop	Voltage Drop by Excessively Low or High Voltage to Outdoor Unit	Voltage Drop of Power Supply Insufficient Capacity of Power Supply Wiring.
07	Cycle	Decrease of Discharge Gas Superheat	Discharge Gas SUPERHEAT less than 10 deg. is maintained for one hour.
08		Increase of Discharge Gas Temperature	Temperature of the top of Compressor: Td Td ≧127°C(Cooling), Td ≧120°C(Heating) over 10 minutes, or Td ≧140°C over 5 seconds.
11	Sensor on Indoor Unit	Inlet Air Thermistor	Failure of Thermistor, Loose Terminal, Disconnected Wire.
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19		Tripping of Protection Device	Activated Internal Thermo of Fan Motor.
20	Sensor on Outdoor Unit	Compressor Thermistor	Failure of Thermistor, Loose Terminal, Disconnected Wire. Locked Motor in Heating Operation.
22		Outdoor Air Thermistor	
24		Evaporating Thermistor	
31	System	Incorrect Capacity of Outdoor and Indoor Unit	Incorrect Setting of Capacity Combination or Incorrect O.U. Capacity Setting.
35		Incorrect Indoor Unit No. Setting	Duplication of Indoor Unit No.
36		Incorrect Combination of Indoor Unit	FSG2E series connects to HVRG series outdoor unit (European Area Only). HRG series of the indoor unit is connected to FSG(1) and FXG(1) series outdoor units (European Area Only).
38		Abnormality of Protective Circuit in outdoor Unit	Failure of Protection detecting Circuit
41	Pressure	Overload cooling (Possibility of high pressure device activation.)	O.U. Pipe Thermistor Temp. is Higher than 55°C and the Comp. Top Temp. is Higher than 95°C when O.U. Protection Device is activated.
42		Overload heating (Possibility of high pressure device activation.)	I.U. Freeze Protection Thermistor Temp. is Higher than 55°C and the Comp. Top Temp. is Higher than 95°C when O.U. Protection Device is activated.
47		Activation of Low Pressure Decrease Protection Device	Stoppage by Excessively Decrease of evaporating Temperature (Te ≦-35°C) is activated 3 times in one hour, Locked Motor in Heating Operation.
51	Inverter	Abnormality of Current Sensor for Inverter	Failure of Control PCB, ISPM
52		Activating Overcurrent Protection	Failure of ISPM, Clogging of Heat Exchanger.
53		Activating Protection of ISPM	ISPM Abnormality Failure of Compressor, clogging of Heat Exchanger.
54		Inverter Fin Temperature Increase	Abnormal Inverter Fin Thermistor, Clogging of Heat Exchanger Abnormal Outdoor Fan
57	Outdoor Fan	Fan Motor Abnormality	Disconnected wire or Incorrect wiring between Control PCB and Inverter PCB. Incorrect Wiring or Fan Motor Abnormality
EE	Compressor	Compressor Protection Alarm	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., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when the contact between #1 and #2 of CN14 is not closed over 120 seconds during the cooling, fan or heating operation.



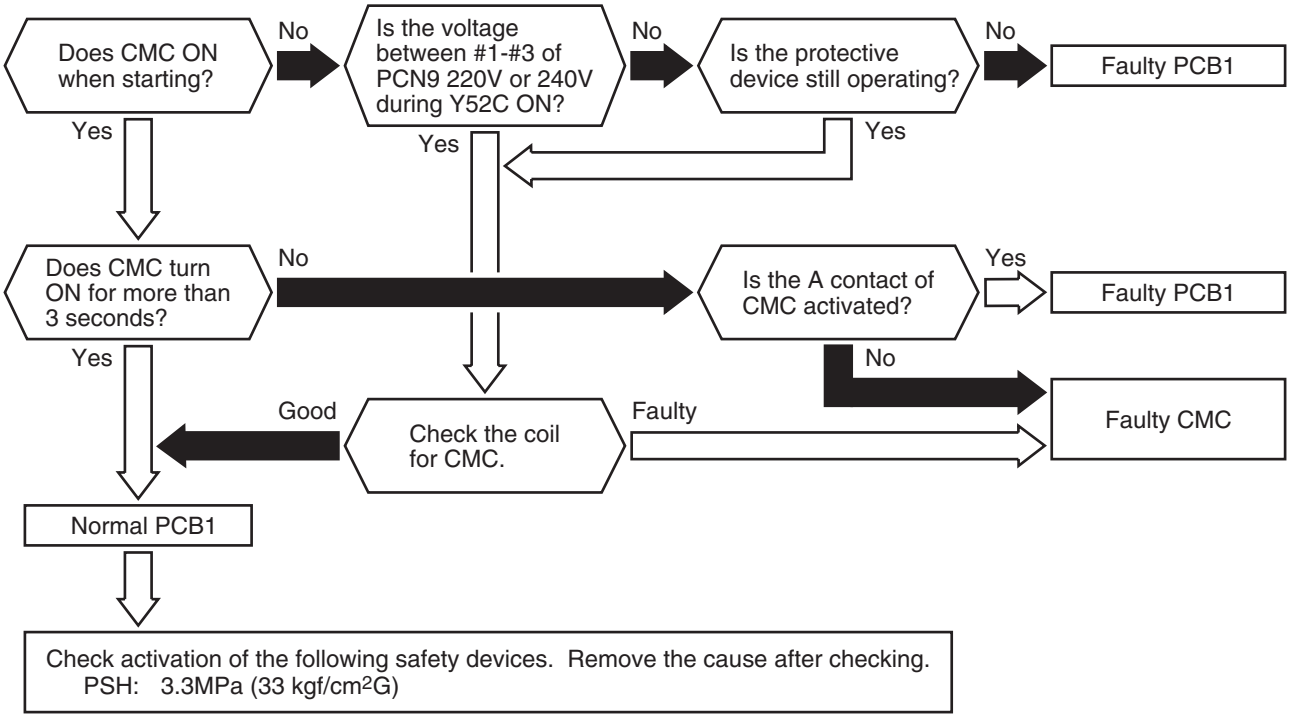
Phenomenon	Cause		Check Item	Action (Turn OFF Main Switch)
Activation of Float Switch	High Drain Level	Clogging of Drainage Up-Slope Drain Piping	Check drain pan.	Remove clogged foreign particles.
	Faulty Float Switch	Fault	Check continuity when drain level is low.	Replace float switch if faulty.
		Faulty Contacting	Measure resistance by tester.	Repair looseness and replace connector.
		Faulty Connection	Check connections.	Repair connection.
Faulty Indoor Unit PCB			Check PCB by self-checking *1).	Replace it if faulty.

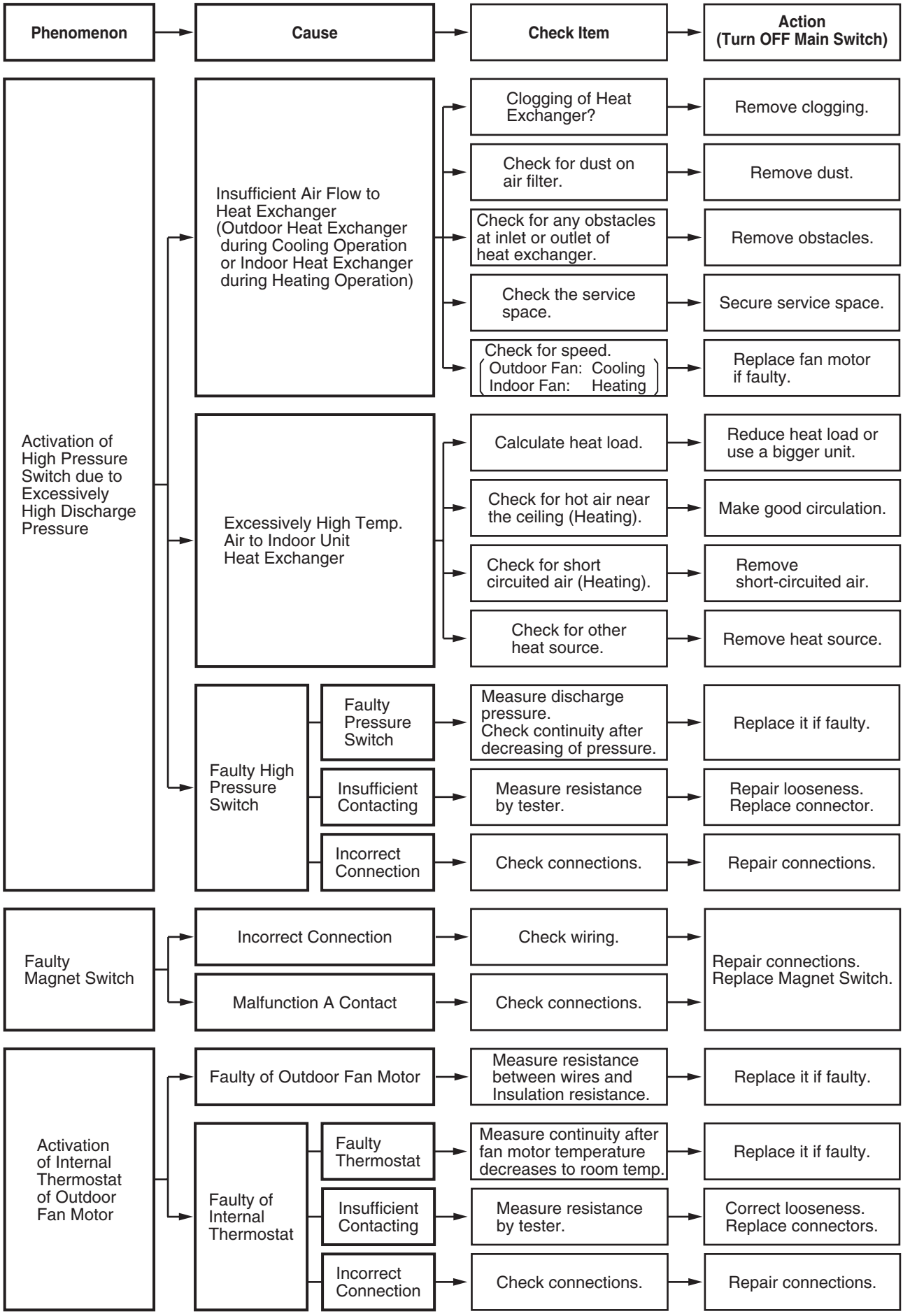
*1): Refer to 1.3.1 "Self Checking of PCBs using Remote Control Switch".

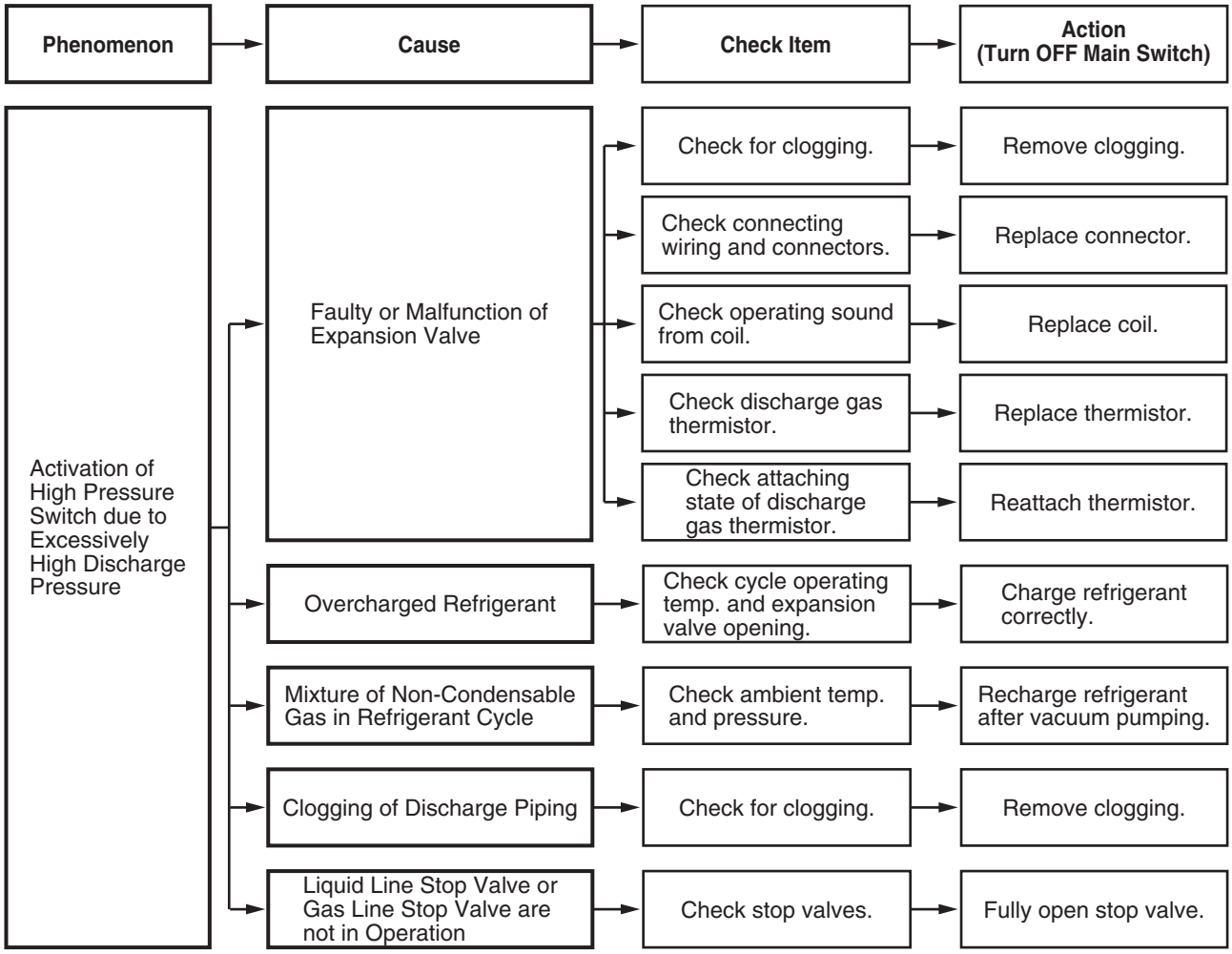
Alarm Code 07	Activation of Safety Device in Outdoor Unit

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section and the alarm code is indicated on the display of the outdoor unit PCB.
  If the stoppage of the unit is caused by cooling overload or heating overload, the alarm code 41 or 42 is indicated.

★ This alarm is indicated when one of safety devices is activated during compressor running.



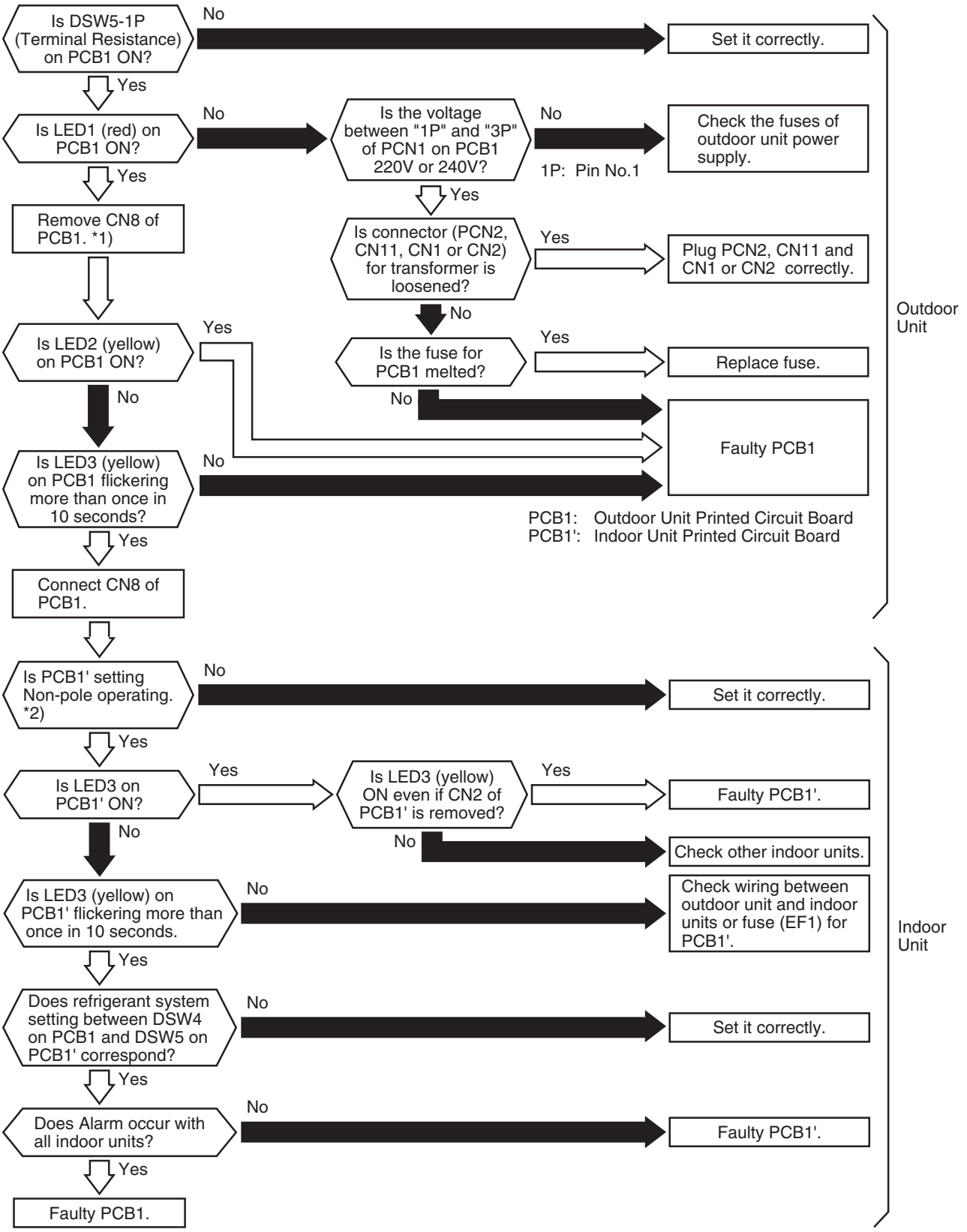

Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Activation of High Pressure Switch due to Excessively High Discharge Pressure
Insufficient Air Flow to Heat Exchanger (Outdoor Heat Exchanger during Cooling Operation or Indoor Heat Exchanger during Heating Operation)
Clogging of Heat Exchanger?
Remove clogging.
Check for dust on air filter.
Remove dust.
Check for any obstacles at inlet or outlet of heat exchanger.
Remove obstacles.
Check the service space.
Secure service space.
Check for speed.
Outdoor Fan: Cooling
Indoor Fan: Heating
Replace fan motor if faulty.
Excessively High Temp. Air to Indoor Unit Heat Exchanger
Calculate heat load.
Reduce heat load or use a bigger unit.
Check for hot air near the ceiling (Heating).
Make good circulation.
Check for short circuited air (Heating).
Remove short-circuited air.
Check for other heat source.
Remove heat source.
Faulty High Pressure Switch
Faulty Pressure Switch
Measure discharge pressure. Check continuity after decreasing of pressure.
Replace it if faulty.
Insufficient Contacting
Measure resistance by tester.
Repair looseness. Replace connector.
Incorrect Connection
Check connections.
Repair connections.
Faulty Magnet Switch
Incorrect Connection
Check wiring.
Repair connections. Replace Magnet Switch.
Malfunction A Contact
Check connections.
Activation of Internal Thermostat of Outdoor Fan Motor
Faulty of Outdoor Fan Motor
Measure resistance between wires and Insulation resistance.
Replace it if faulty.
Faulty of Internal Thermostat
Faulty Thermostat
Measure continuity after fan motor temperature decreases to room temp.
Replace it if faulty.
Insufficient Contacting
Measure resistance by tester.
Correct looseness. Replace connectors.
Incorrect Connection
Check connections.
Repair connections.


Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Activation of High Pressure Switch due to Excessively High Discharge Pressure
Faulty or Malfunction of Expansion Valve
Check for clogging.
Remove clogging.
Check connecting wiring and connectors.
Replace connector.
Check operating sound from coil.
Replace coil.
Check discharge gas thermistor.
Replace thermistor.
Check attaching state of discharge gas thermistor.
Reattach thermistor.
Overcharged Refrigerant
Check cycle operating temp. and expansion valve opening.
Charge refrigerant correctly.
Mixture of Non-Condensable Gas in Refrigerant Cycle
Check ambient temp. and pressure.
Recharge refrigerant after vacuum pumping.
Clogging of Discharge Piping
Check for clogging.
Remove clogging.
Liquid Line Stop Valve or Gas Line Stop Valve are not in Operation
Check stop valves.
Fully open stop valve.

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., alarm code and the unit code is alternately indicated on the set temperature section, or the alarm code is 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.
  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.



*1): In case that terminal resistance (DSW5-1P) is OFF when H-Link Connection is performed.
Set the terminal resistance to ON when CN8 is removed.
Set the terminal resistance to OFF when CN8 is reconnected.

*2): PCB1' Factory Setting for Non-Pole Transmitting

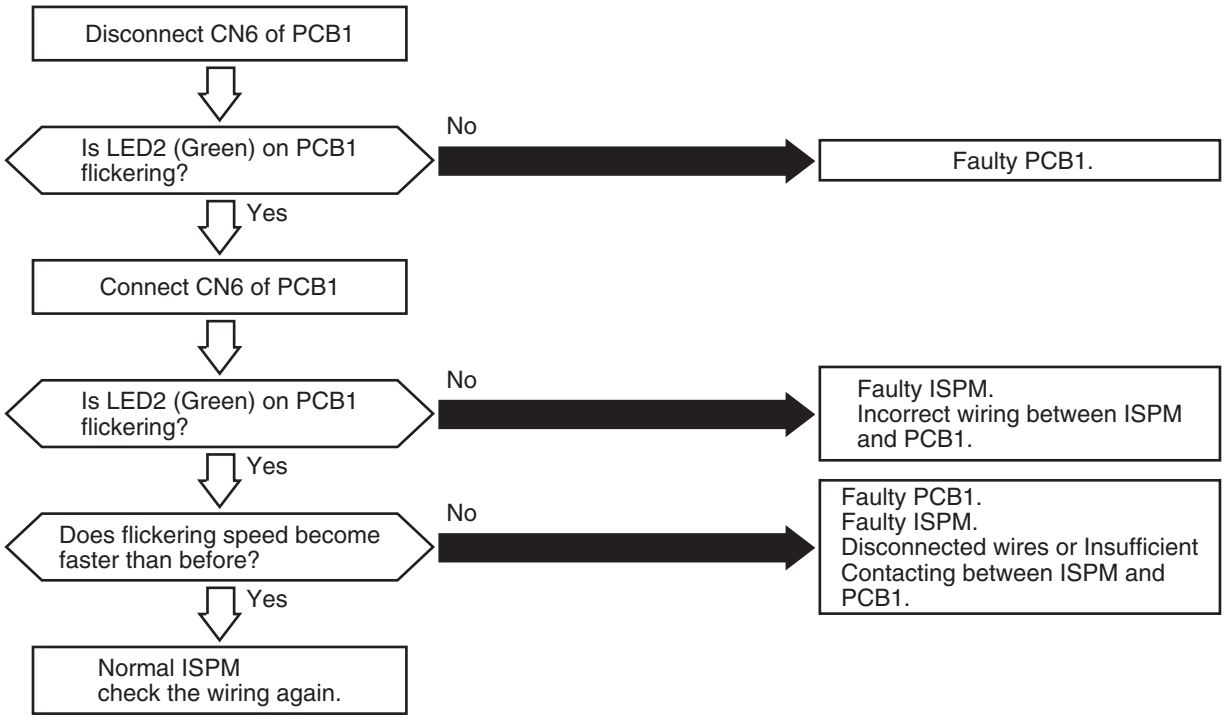
Item	Setting Position
SW2	Left Side (New Transmission Side)
JP1	Short Circuited
CN2	Transmission Wire Connecting
CN18	Non-Occupied

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Power Failure of No Power Supply		Measure voltage by tester.	Supply power.
Melted Fuse for Power Source or Activation of Outdoor Unit Breaker	Short Circuit between Wires	Check for breakage of insulation.	Remove short circuit and replace fuse.
	Short Circuited Wire to Ground	Measure insulation resistance.	Remove short circuit to ground and replace fuse.
	Faulty Comp. Motor	Measure resistance between wires and insulation resistance.	Replace comp. and fuse.
	Faulty Outdoor Unit Fan Motor	Measure resistance between wires and insulation resistance.	Replace outdoor unit fan motor and fuse.
Melted Fuse for Control Circuit or Activation of Outdoor Unit Breaker	Short Circuit between Wires	Check for breakage of insulation.	Remove short circuit and replace fuse.
	Short Circuit of Control Circuit (to Ground)	Measure insulation resistance.	Remove short circuit and replace fuse.
	Faulty Solenoid Coil for Magnetic Switch for Comp. Motor	Measure resistance of coil.	Replace magnetic switch and fuse.
	Failure of Outdoor Unit Fan Motor	Measure resistance between wires and insulation resistance.	Replace fan motor and fuse.
Disconnected Wires Insufficient Contacting or Incorrect Connection	Between Outdoor Unit and Indoor Unit	Check continuity of wires. Check for looseness of connection screws. Check terminal Nos.	Replacing wires, repairing, tightening screws and correct wiring.
	Power Source Wiring for Outdoor Unit		
Faulty PCB (Outdoor Unit, Indoor Unit)	Disconnected Wires to PCB	Check connections.	Correctly connect wires.
	Faulty PCB		Replace it if faulty.
Incorrect Wiring (SW1 Setting and CN2 Connection)	Disconnected Wire Insufficient Contacting	Check continuity and looseness of connection screws.	Replacing Wires, Repairing and Tightening Screws
	Incorrect Wiring	Check terminal Nos.	Correctly connect wires.
Incorrect Power Supply Circuit of PCB1		Measure output voltage of PCB1.	Replace PCB1.

Alarm Code 04	Abnormal Transmitting between Inverter and Outdoor PCB1

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

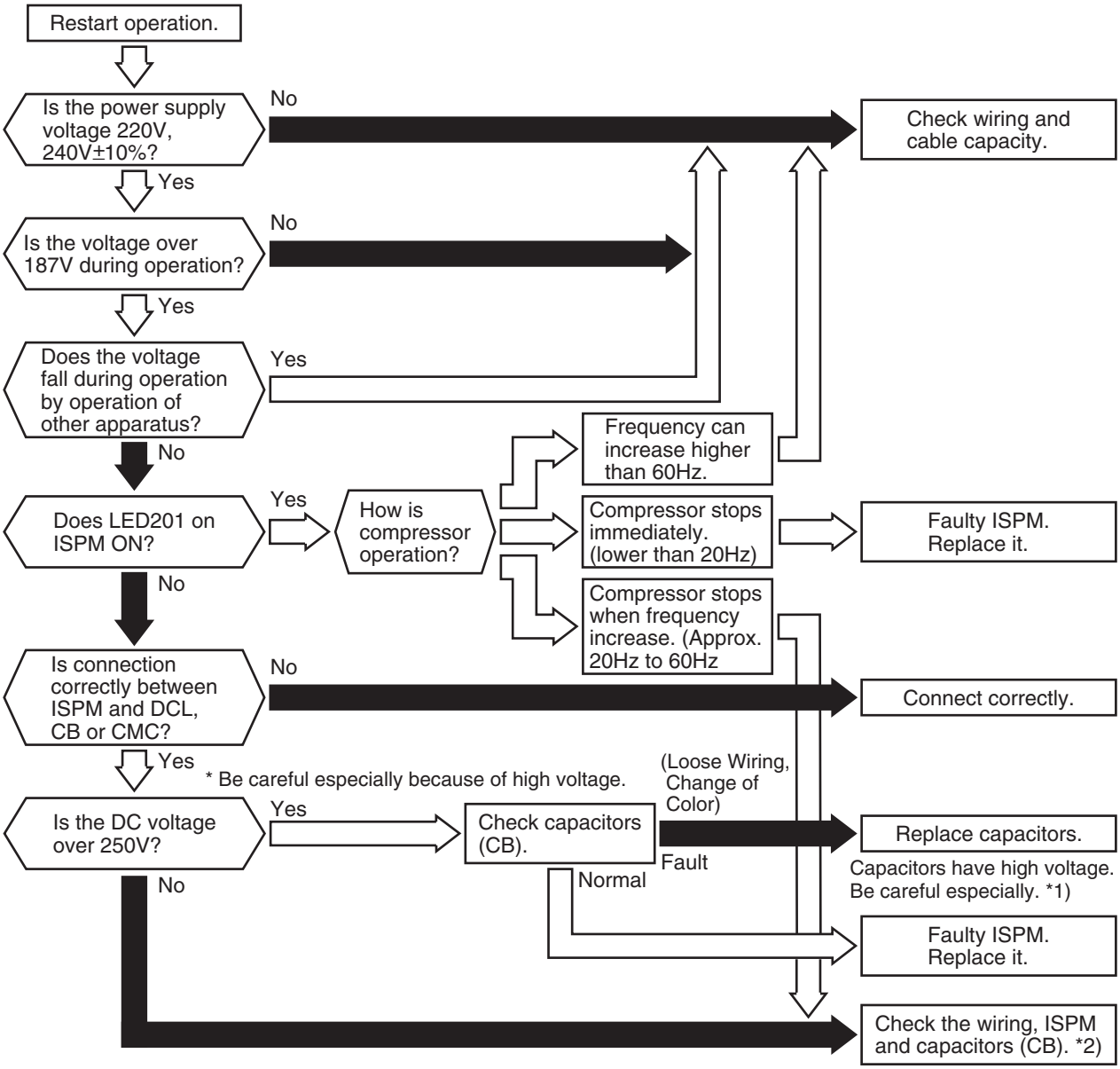
★ This alarm is indicated when abnormality is maintained for 30 seconds after normal transmitting between the outdoor unit PCB1 and ISPM, and also abnormality is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is indicated when the abnormal transmitting is maintained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

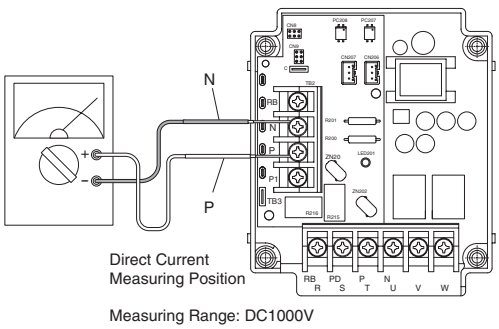


Alarm Code 06	Excessively Low or High Voltage for Inverter

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

★ This alarm code is indicated when voltage between terminal "P" and "N" of ISPM 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.



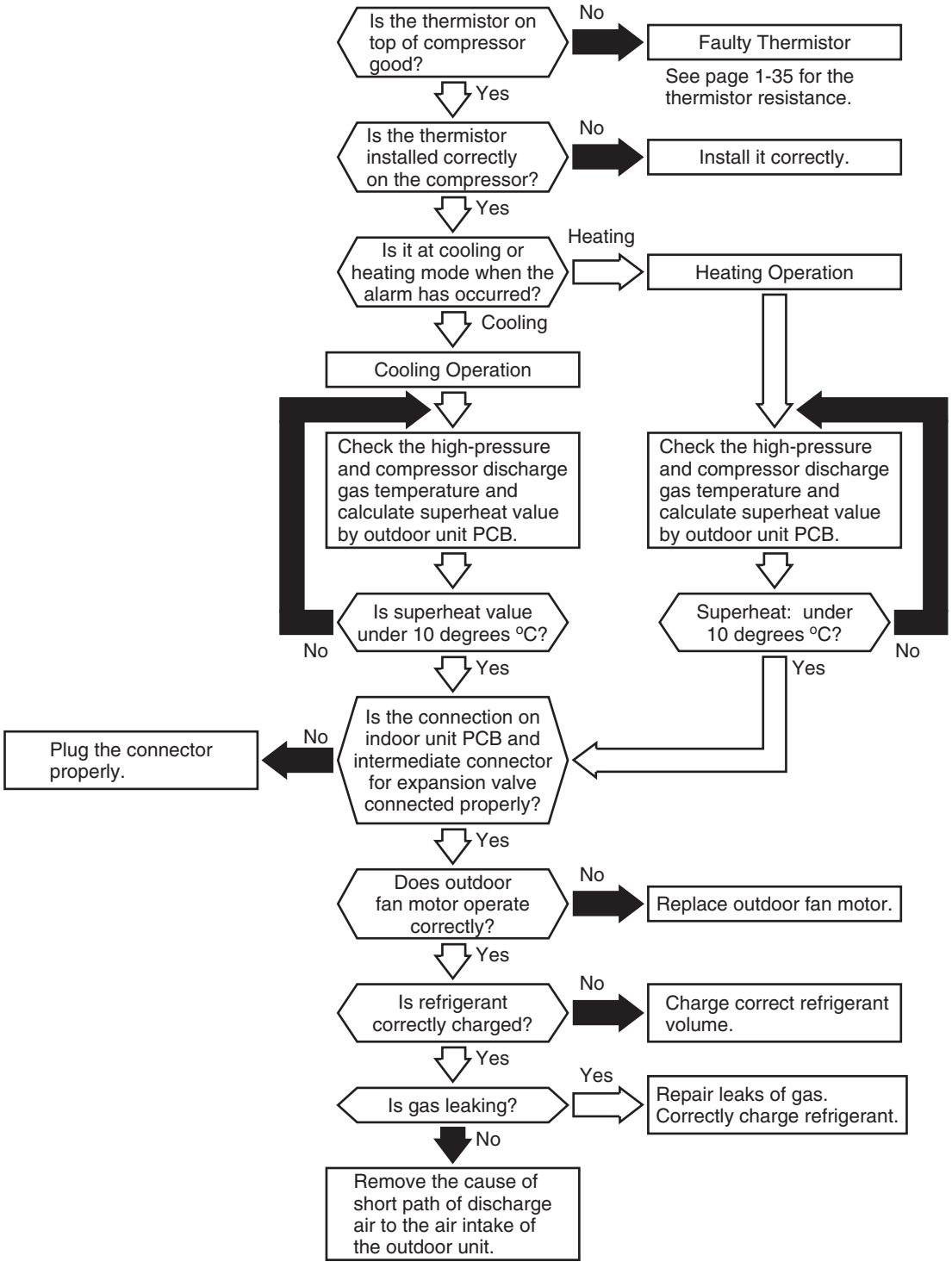


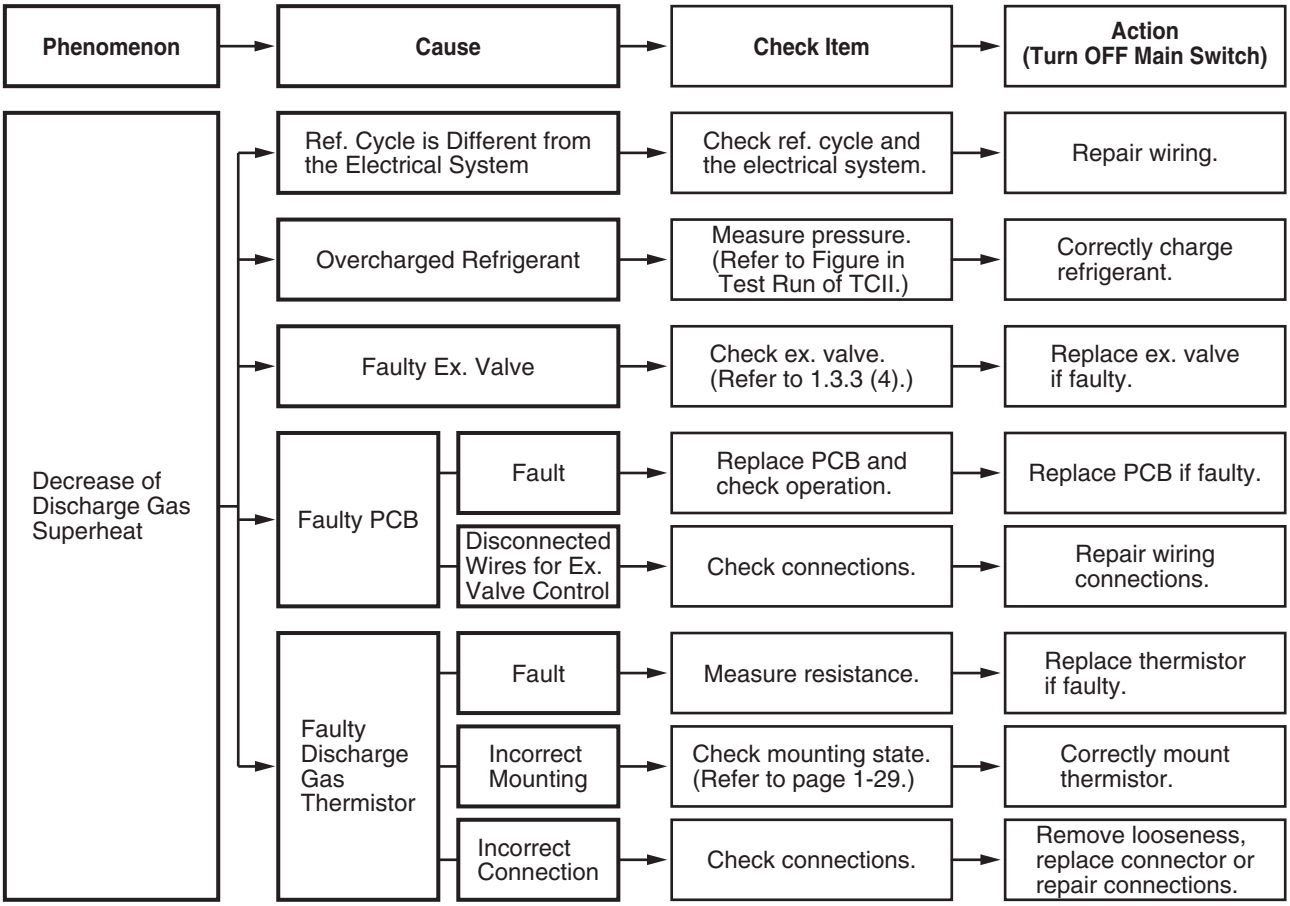
*1): If capacitor has high voltage, perform the high voltage discharge work refer to item 1.3.3.
*2): Checking procedures of ISPM is indicated in item 1.3.3.

Alarm Code 07	Decrease of Discharge Gas Superheat

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is 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 one hour, the alarm code is indicated.




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 the electrical system.
Repair wiring.
Overcharged Refrigerant
Measure pressure. (Refer to Figure in Test Run of TCII.)
Correctly charge refrigerant.
Faulty Ex. Valve
Check ex. valve. (Refer to 1.3.3 (4).)
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 connections.
Faulty Discharge Gas Thermistor
Fault
Measure resistance.
Replace thermistor if faulty.
Incorrect Mounting
Check mounting state. (Refer to page 1-29.)
Correctly mount thermistor.
Incorrect Connection
Check connections.
Remove looseness, replace connector or repair connections.

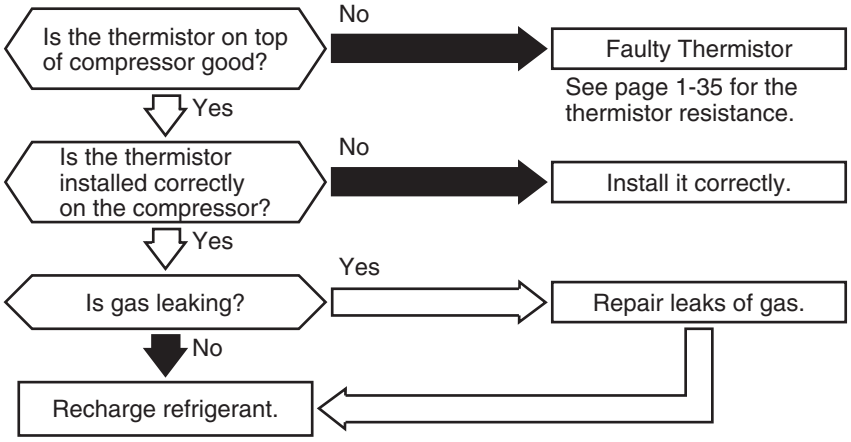
Alarm Code 08	Excessively High Discharge Gas Temperature at the Top of Compressor Chamber

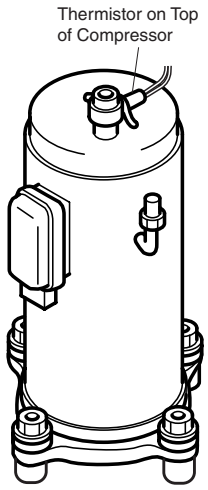
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB.

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

(1) The temperature of the thermistor on the top of the compressor is maintained higher than 127°C for 10 minutes, or the temperature of the thermistor on the top of the compressor is maintained higher than 140°C for 5 seconds during cooling.

(2) The temperature of the thermistor on the top of the compressor is maintained higher than 120°C for 10 minutes, or the temperature of the thermistor on the top of the compressor is maintained higher than 140°C for 5 seconds during heating.

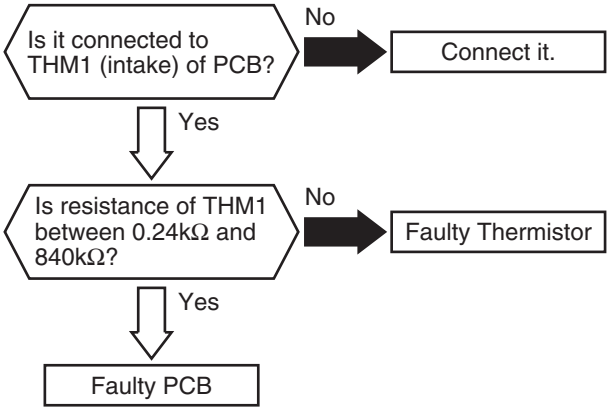


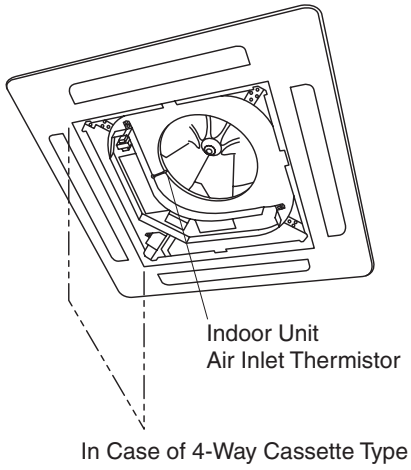


Alarm Code 1 1	Abnormality of Thermistor for Indoor Unit Inlet Air Temperature (Air Inlet Thermistor)

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

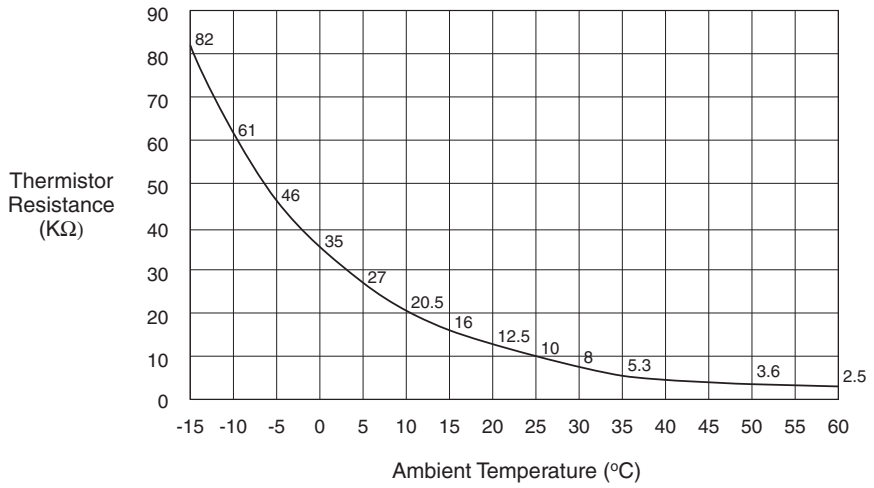
★ This alarm code is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling or heating operation. The system is automatically restarted when the fault is removed.





In Case of 4-Way Cassette Type

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



Thermistor Characteristics

NOTE:

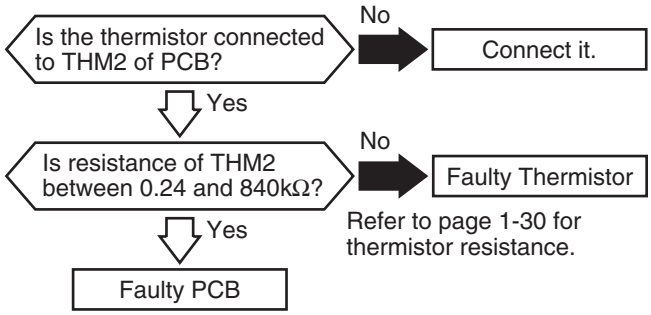
This data is applicable to the following thermistors;

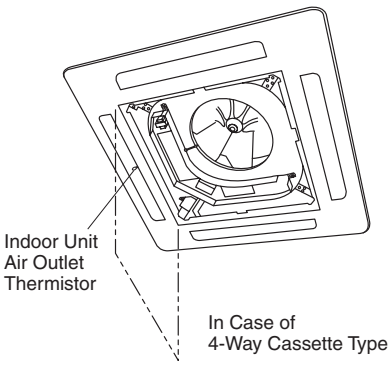
1. Indoor Unit Discharge Air Temperature, 2. Indoor Unit Liquid Refrigerant Temperature, 3 Indoor Unit Intake Air Temperature, 4. Outdoor Air Temperature, 5. Outdoor Unit Evaporating Temperature, 6. Indoor Unit Gas Piping

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., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is 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.



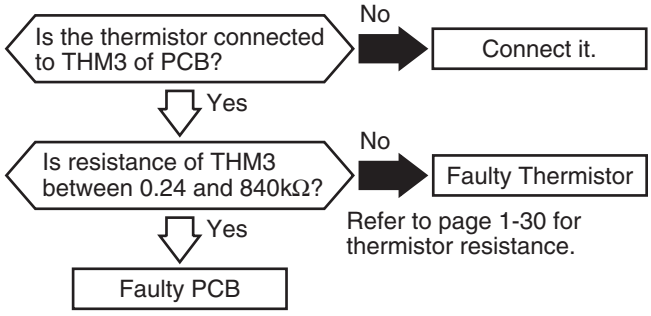


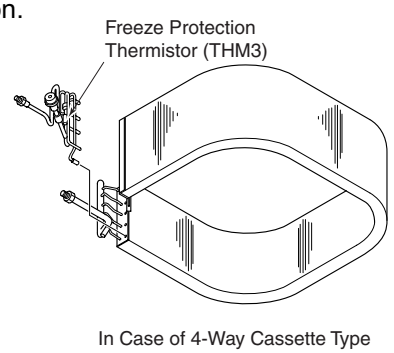
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Air Outlet Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.

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., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is 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.



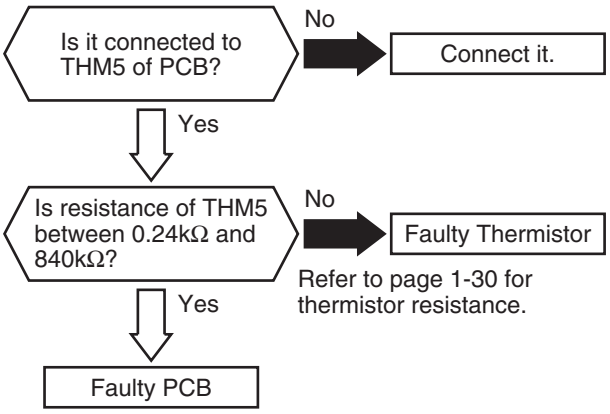


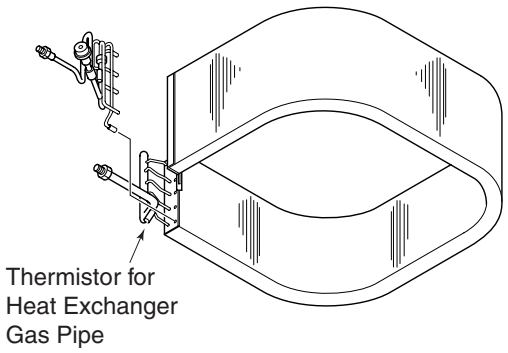
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Freeze Protection Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.

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., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is 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.





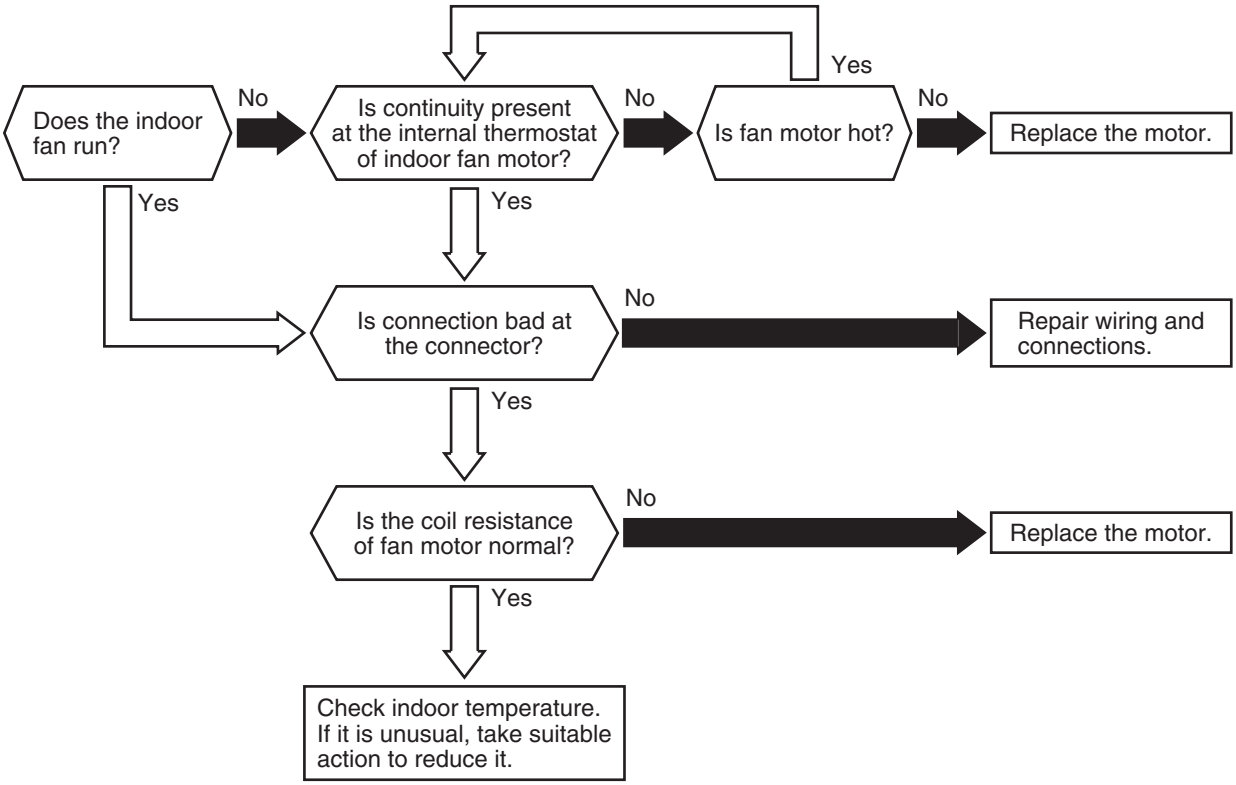
In Case of 4-Way Cassette Type

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 and check operation.	Replace PCB if faulty.

Alarm Code 19	Activation of Protection Device for Indoor Fan Motor (except RCI-Model)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is 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°C.

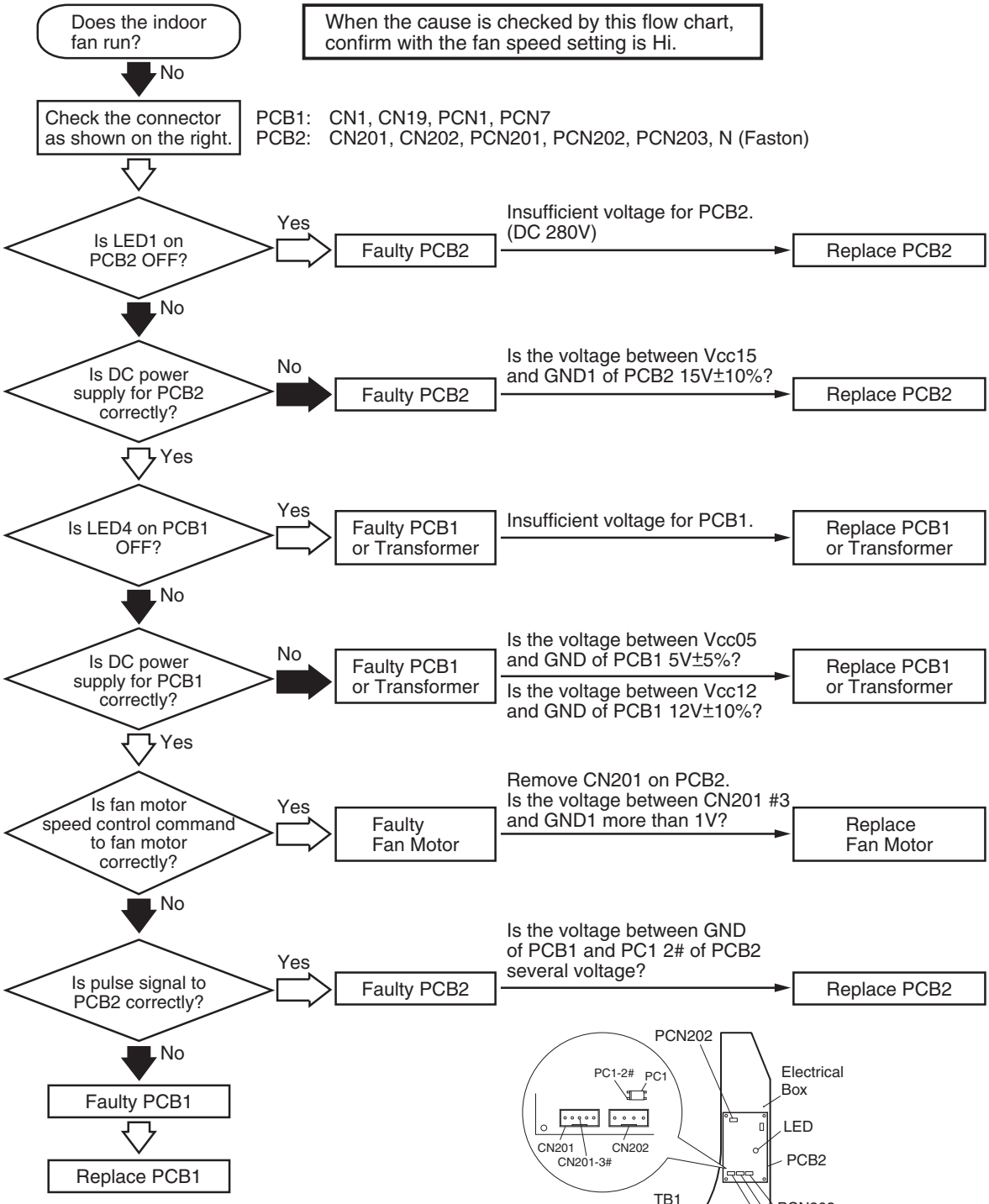


Phenomenon	Cause		Check Item	Action (Turn OFF Main Switch)
Activation of Internal Thermostat for Indoor Unit Fan Motor	Faulty Indoor Unit Fan Motor		Measure coil resistance and insulation resistance.	Replace motor if faulty.
	Faulty Internal Thermostat	Fault	Check continuity after fan motor temperature 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 19	Activation of Protection Device for Indoor Fan Motor (RCI-Model)

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

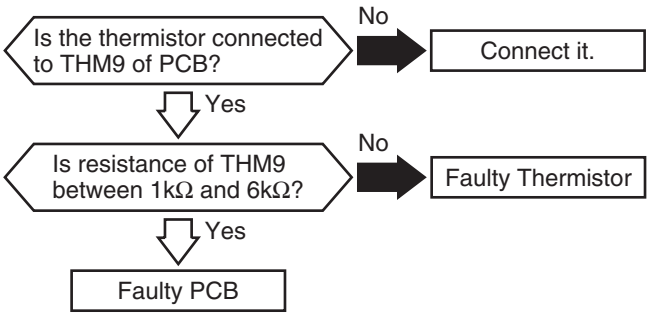
★ This alarm code is indicated when the following conditions occurs three times in 30 minutes.
* Indoor fan rotates less than 70rpm for 5 seconds during operation.



Alarm Code 20	Abnormality of Thermistor for Discharge Gas Temperature (Compressor Thermistor)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and 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 1 kΩ) or cut (greater than 6 MΩ) during the cooling or heating operation.



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Top of Compressor Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB1.	Repair wiring and connections.
Faulty PCB1		Replace PCB1 and check operation.	Replace PCB1 if faulty.

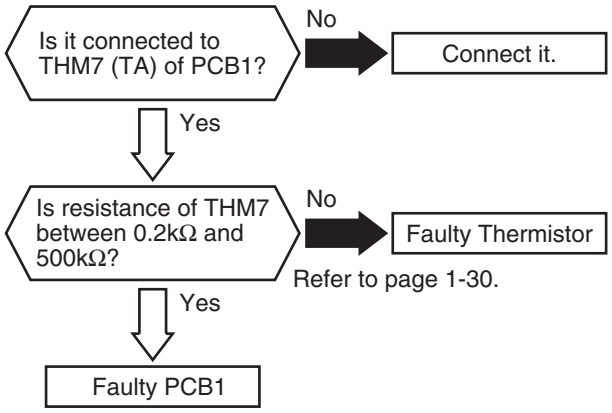
Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
0	640.44	65	41.79
5	500.66	70	35.11
10	394.16	75	29.61
15	312.41	80	25.07
20	249.20	85	21.31
25	200.00	90	18.17
30	161.45	95	15.55
35	131.06	100	13.35
40	106.96	105	11.50
45	87.74	110	9.93
50	72.32	115	8.60
55	59.97	120	7.47
60	49.96	125	6.51

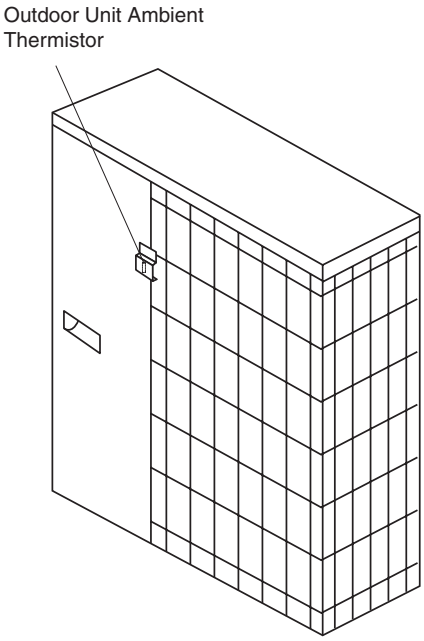
The resistance value have fudge factor (±10%).

Alarm Code 27	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., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is 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°C (Cooling) / 6°C (Heating).



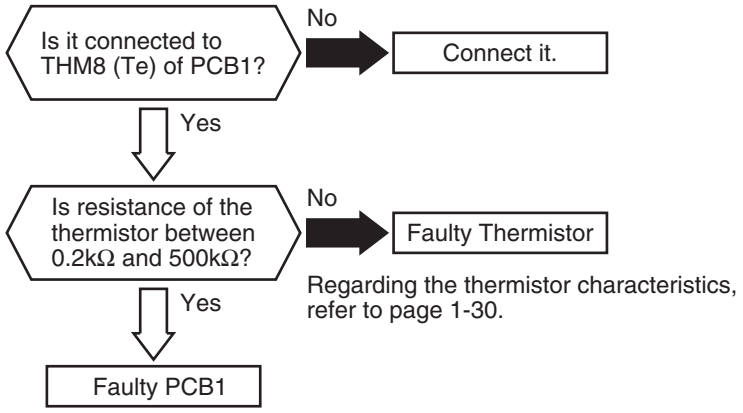


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Thermistor for Outdoor Unit Ambient	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB1.	Repair wiring and connections.
Faulty PCB1		Replace PCB1 and check operation.	Replace PCB1 if faulty.

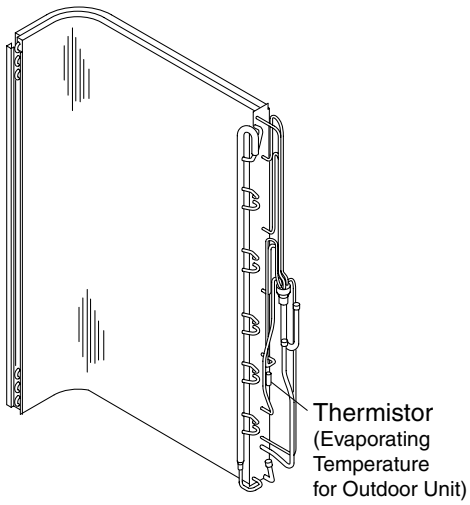
Alarm Code 24	Abnormality of Thermistor for Evaporating Temperature during Heating Operation (Outdoor Unit Evaporating Thermistor)

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB.
  If abnormality with the thermistor is found, check all the thermistors as shown below.

★ This alarm code is indicated when the thermistor is short-circuited (less than 0.2 kΩ) or cut (greater than 500 kΩ) during operation.
The evaporating thermistor during the heating operation is attached to the heat exchanger as shown below figure.



Regarding the thermistor characteristics, refer to page 1-30.



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 PCB1.	Repair wiring and connections.
Faulty PCB1		Replace PCB1 and check operation.	Replace PCB1 if faulty.

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., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when the total indoor unit capacity is not equal to 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, DSW3.
Total Indoor Unit Capacity Connected to the Outdoor Unit is Beyond Permissible Range		Check outdoor unit model by calculating total indoor units capacity.	Ensure that total indoor unit capacity is 100%.

NOTE:
In case of H-LINK system, this alarm code is indicated when DSW4 of outdoor unit PCB and DSW5 of indoor unit PCB are incorrectly set.
In this case, set correctly DSW4 and DSW5 after turning off main switch.

Alarm Code 35	Incorrect Indoor Unit No. Setting

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

★ This alarm code is indicated 3 minutes after power is supplied to the outdoor unit when the indoor unit No. connected to the outdoor unit is duplicated by setting of RSW.

★ This alarm code is indicated that it is connected the same indoor unit number in the same refrigerant cycle.

In the case of H-Link System, this alarm code is indicated when DSW4 of the outdoor unit PCB and DSW5 of the indoor unit PCB are incorrectly set.
In this case, set correctly DSW4 and DSW5 after turning off Main Switch.

Alarm Code 36	Incorrect Combined Unit between Indoor Unit and Outdoor Unit

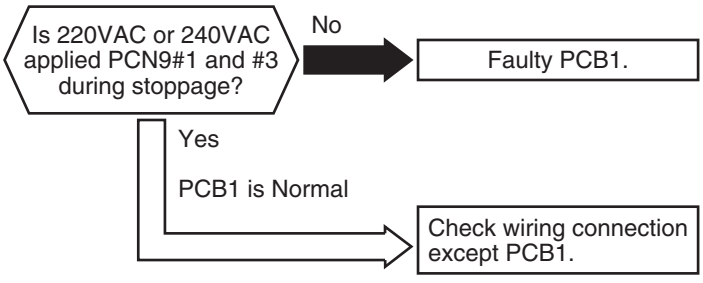
- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB.

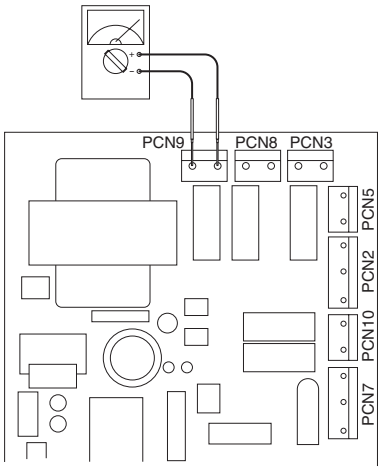
★ This alarm code is indicated when the indoor unit does not suit for this outdoor unit.

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., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB.

★ This alarm code is indicated when AC 220V or 240V is supplied to voltage PCN9#1 and #3 on PCB1 in the outdoor unit during CMC is opened.

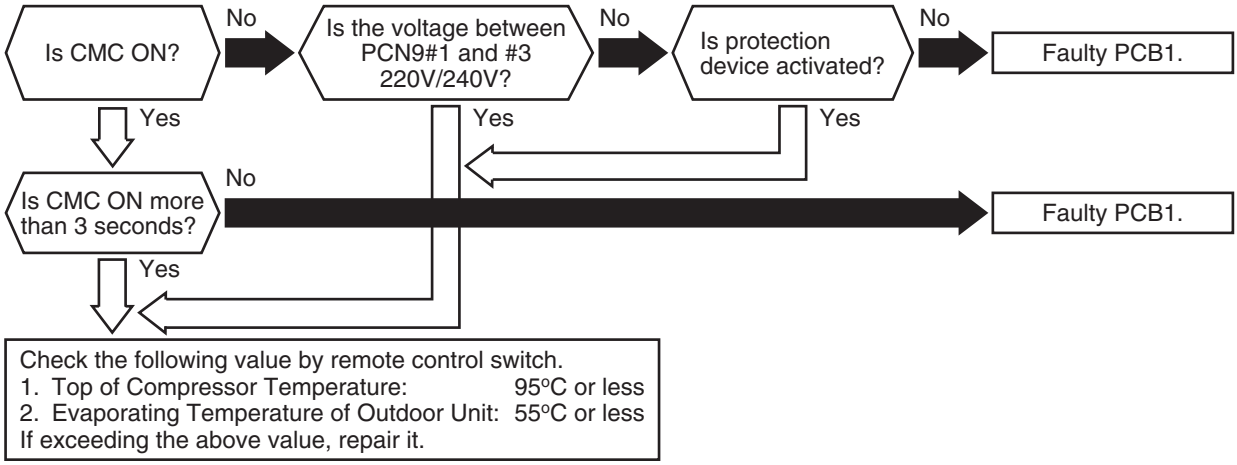




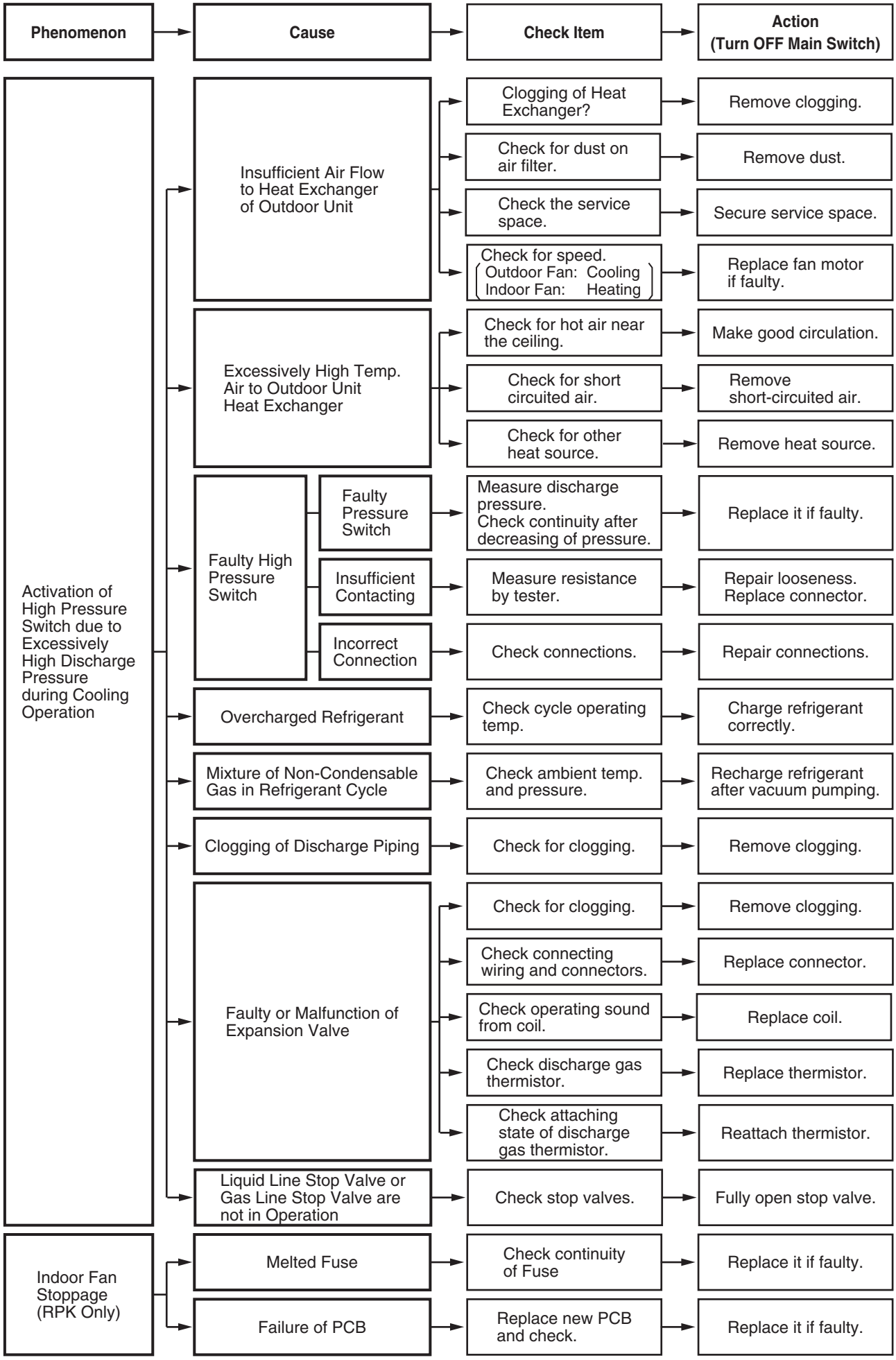
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
	Faulty PCB1	Check PCB1 by self-checking. (Refer to Item 1.3.1.)	Replace PCB1.

Alarm Code 41	Cooling Overload (High Pressure Switch will be Activate)

This alarm code is indicated when the protection device is activated at following condition.
Evaporating temperature of outdoor unit is more than 55 degree and top of compressor temperature is more than 95 degree.

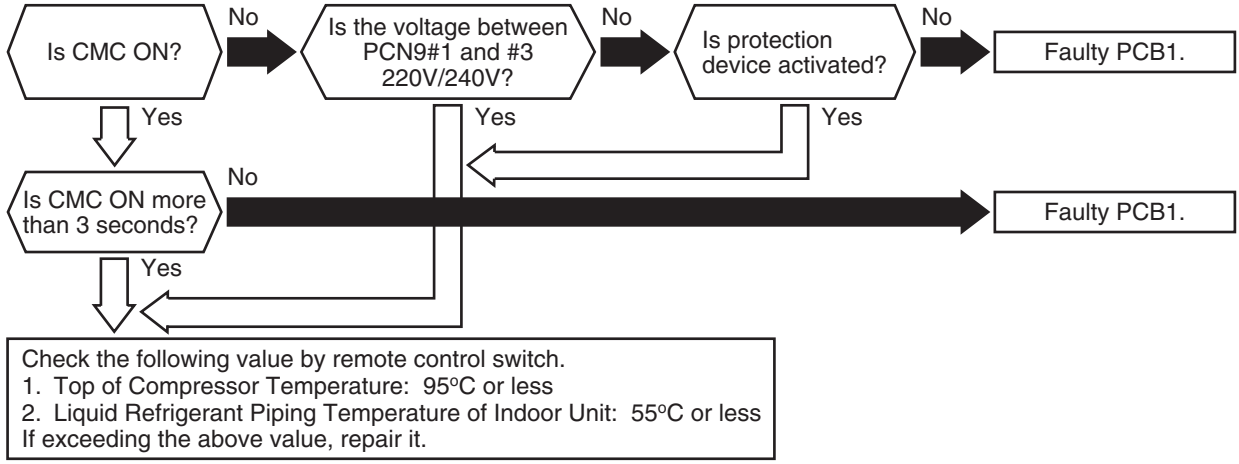


Check the following value by remote control switch.
1. Top of Compressor Temperature: 95°C or less
2. Evaporating Temperature of Outdoor Unit: 55°C or less
If exceeding the above value, repair it.

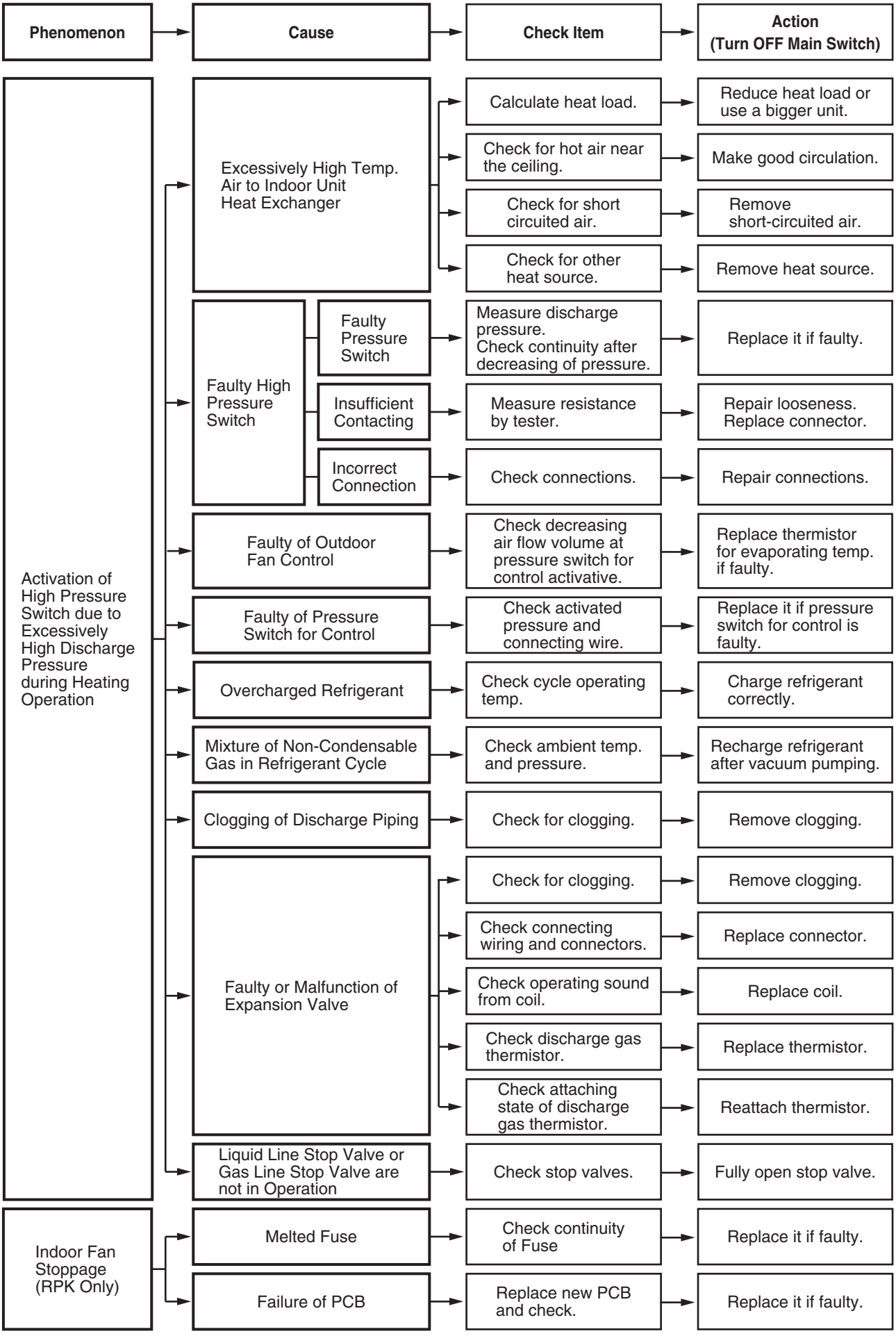

Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Activation of High Pressure Switch due to Excessively High Discharge Pressure during Cooling Operation
Insufficient Air Flow to Heat Exchanger of Outdoor Unit
Clogging of Heat Exchanger?
Remove clogging.
Check for dust on air filter.
Remove dust.
Check the service space.
Secure service space.
Check for speed.
Outdoor Fan: Cooling
Indoor Fan: Heating
Replace fan motor if faulty.
Excessively High Temp. Air to Outdoor Unit Heat Exchanger
Check for hot air near the ceiling.
Make good circulation.
Check for short circuited air.
Remove short-circuited air.
Check for other heat source.
Remove heat source.
Faulty High Pressure Switch
Faulty Pressure Switch
Measure discharge pressure.
Check continuity after decreasing of pressure.
Replace it if faulty.
Insufficient Contacting
Measure resistance by tester.
Repair looseness.
Replace connector.
Incorrect Connection
Check connections.
Repair connections.
Overcharged Refrigerant
Check cycle operating temp.
Charge refrigerant correctly.
Mixture of Non-Condensable Gas in Refrigerant Cycle
Check ambient temp. and pressure.
Recharge refrigerant after vacuum pumping.
Clogging of Discharge Piping
Check for clogging.
Remove clogging.
Faulty or Malfunction of Expansion Valve
Check for clogging.
Remove clogging.
Check connecting wiring and connectors.
Replace connector.
Check operating sound from coil.
Replace coil.
Check discharge gas thermistor.
Replace thermistor.
Check attaching state of discharge gas thermistor.
Reattach thermistor.
Liquid Line Stop Valve or Gas Line Stop Valve are not in Operation
Check stop valves.
Fully open stop valve.
Indoor Fan Stoppage (RPK Only)
Melted Fuse
Check continuity of Fuse
Replace it if faulty.
Failure of PCB
Replace new PCB and check.
Replace it if faulty.

Alarm Code 47	Heating Overload (High Pressure Switch will be Activate)

This alarm code is indicated when the protection device is activated at following condition.
Liquid refrigerant piping temperature of indoor unit is more than 55 degree and top of compressor temperature is more than 95 degree.



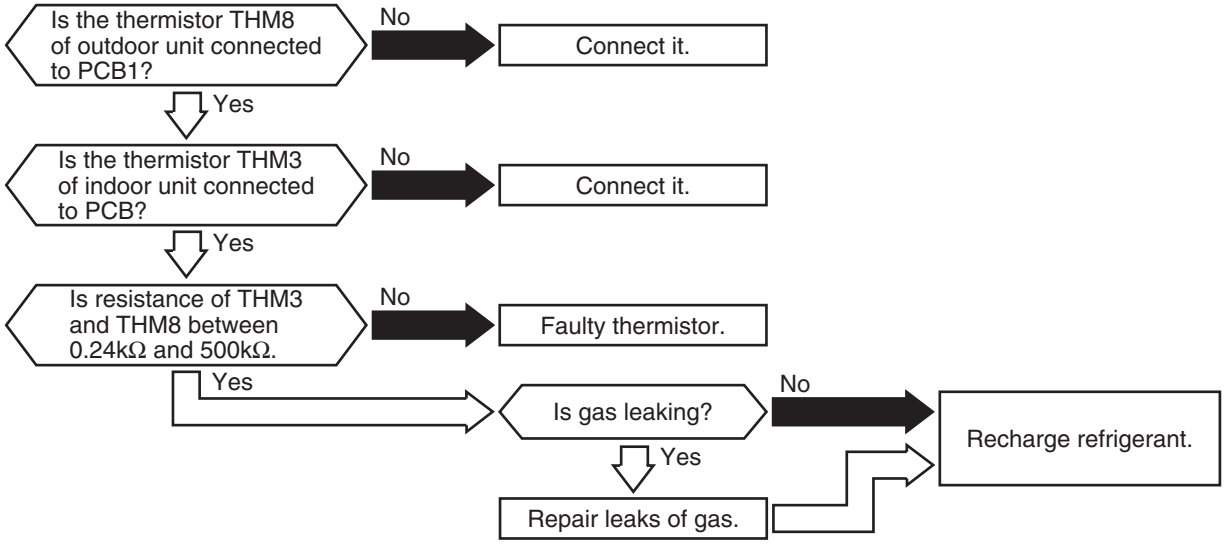
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Activation of High Pressure Switch due to Excessively High Discharge Pressure during Heating Operation	Insufficient Air Flow to Heat Exchanger of Indoor Unit	Clogging of Heat Exchanger	Remove it.
		Check for dust on air filter.	Remove it.
		Check for any obstacle at inlet or outlet of heat exchanger.	Remove it.
		Check the service space.	Secure service space.
		Check for fan speed. (Cooling: Outdoor Fan Heating: Indoor Fan)	Replace fan motor if faulty.


Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Activation of High Pressure Switch due to Excessively High Discharge Pressure during Heating Operation
Excessively High Temp. Air to Indoor Unit Heat Exchanger
Calculate heat load.
Reduce heat load or use a bigger unit.
Check for hot air near the ceiling.
Make good circulation.
Check for short circuited air.
Remove short-circuited air.
Check for other heat source.
Remove heat source.
Faulty High Pressure Switch
Faulty Pressure Switch
Measure discharge pressure. Check continuity after decreasing of pressure.
Replace it if faulty.
Insufficient Contacting
Measure resistance by tester.
Repair looseness. Replace connector.
Incorrect Connection
Check connections.
Repair connections.
Faulty of Outdoor Fan Control
Check decreasing air flow volume at pressure switch for control activative.
Replace thermistor for evaporating temp. if faulty.
Faulty of Pressure Switch for Control
Check activated pressure and connecting wire.
Replace it if pressure switch for control is faulty.
Overcharged Refrigerant
Check cycle operating temp.
Charge refrigerant correctly.
Mixture of Non-Condensable Gas in Refrigerant Cycle
Check ambient temp. and pressure.
Recharge refrigerant after vacuum pumping.
Clogging of Discharge Piping
Check for clogging.
Remove clogging.
Faulty or Malfunction of Expansion Valve
Check for clogging.
Remove clogging.
Check connecting wiring and connectors.
Replace connector.
Check operating sound from coil.
Replace coil.
Check discharge gas thermistor.
Replace thermistor.
Check attaching state of discharge gas thermistor.
Reattach thermistor.
Liquid Line Stop Valve or Gas Line Stop Valve are not in Operation
Check stop valves.
Fully open stop valve.
Indoor Fan Stoppage (RPK Only)
Melted Fuse
Check continuity of Fuse
Replace it if faulty.
Failure of PCB
Replace new PCB and check.
Replace it if faulty.

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., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB.

★ In the case that the evaporating temperature (Cooling: Liquid Refrigerant Piping Temp. of Indoor Unit, Heating: Evaporating Temp. of Outdoor Unit) is lower than -35 deg. retry operation is performed 3 minutes after compressor stoppage.
However, when the state occurs more than 3 times including 3 in one hour, this alarm code is indicated.



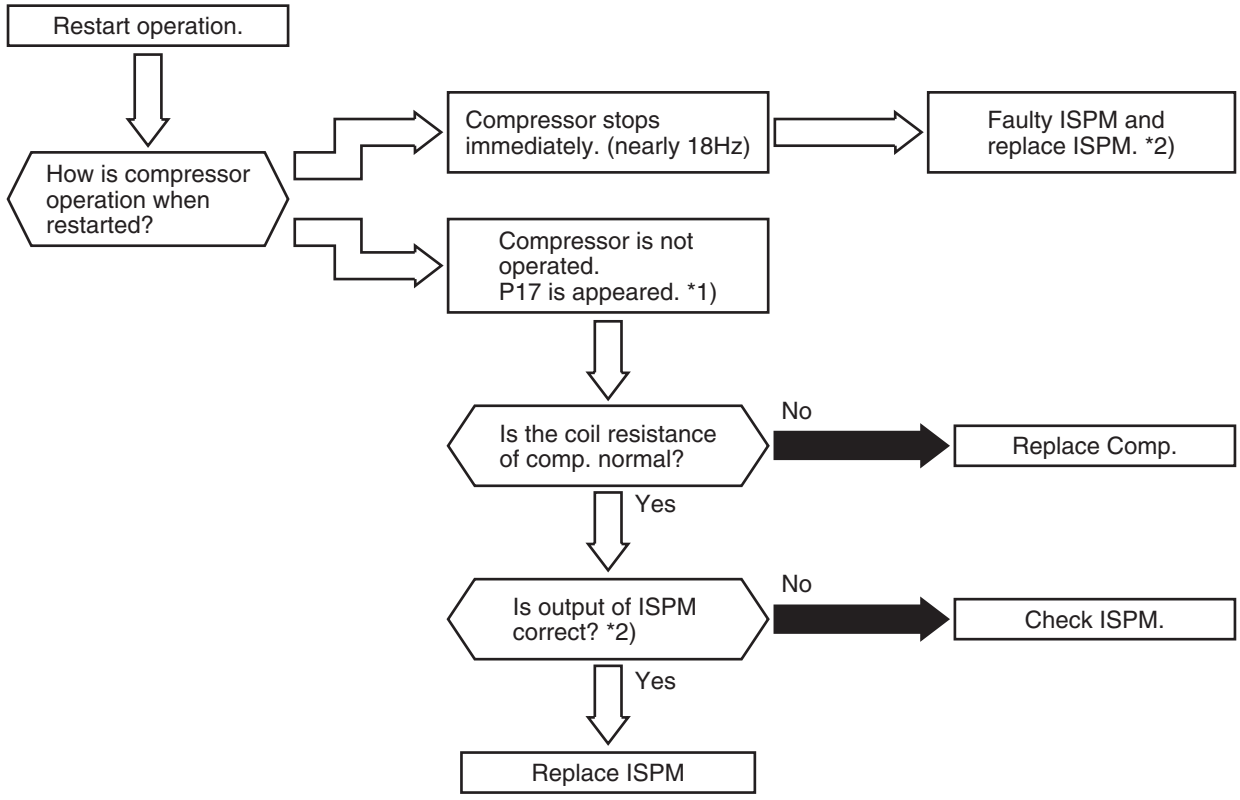
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Freeze Protection Thermistor of Indoor Unit Evaporating Thermistor of Outdoor Unit	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB (Outdoor Unit, Indoor Unit)		Replace PCB and check operation.	Replace PCB if faulty.
Excessively Low Suction Pressure (in Vacuum)	Liquid Line Stop Valve is not in Operation	Check stop valve.	Fully open stop valve.
	Faulty or Malfunction of Expansion Valve	Check for clogging.	Remove clogging.
		Check connecting wiring and connectors.	Replace connector.
		Check operating sound from coil.	Replace coil.
		Check discharge gas thermistor.	Replace thermistor.
		Check attaching state of discharge gas thermistor.	Reattach thermistor.
	Refrigerant Leakage	Check each temp. and pressure.	Charge refrigerant after vacuum pumping.
		Check gas leakage part.	Correctly charge refrigerant after repairing gas leakage.

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

- "RUN" light flickers and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is 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 to 18Hz after compressor is started, one of the absolute value of running current at each phase (Phase U+, Phase U-, Phase V+, Phase V-) is less than 0.5A (including 0.5A).



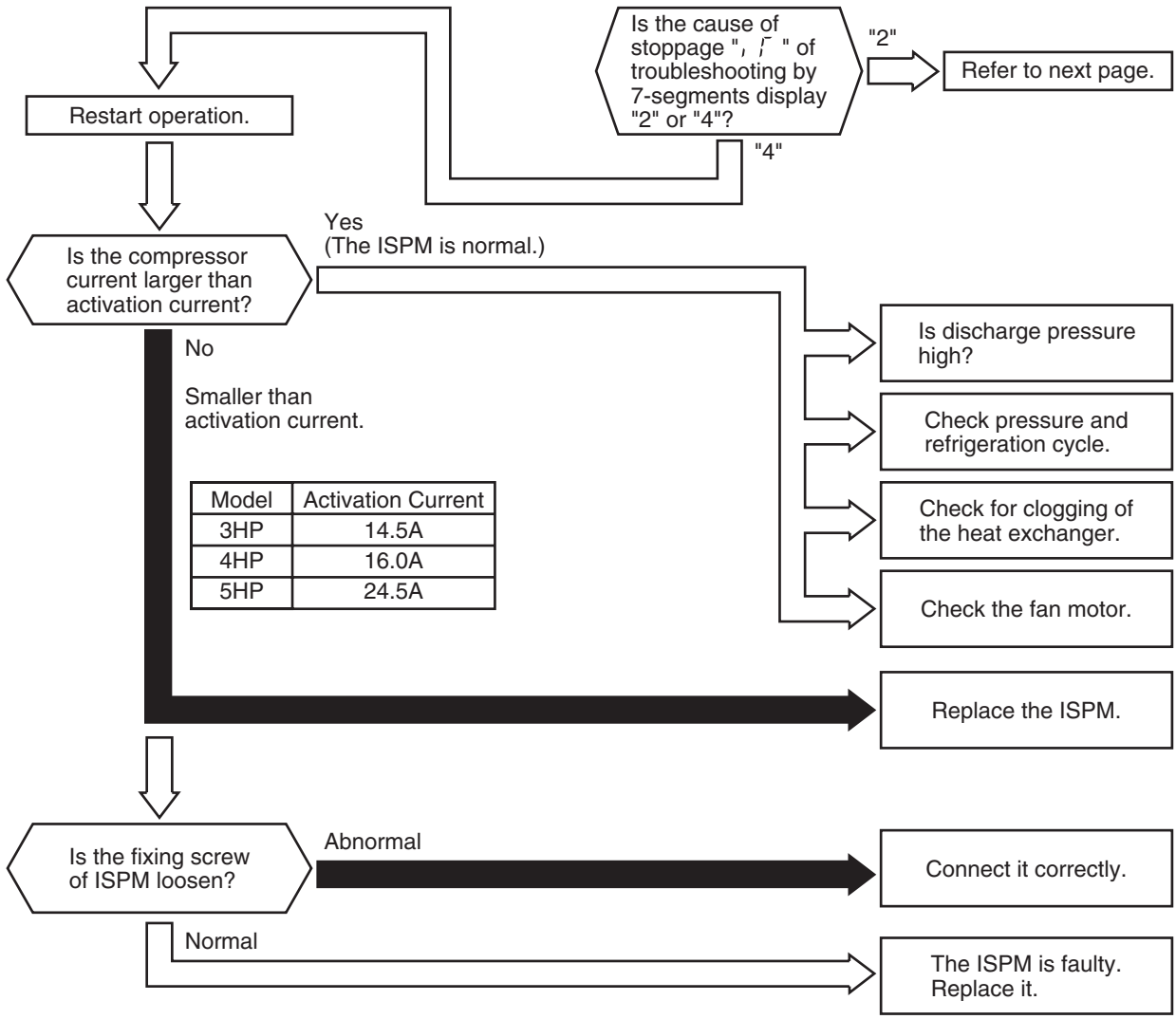
*1): P17 is shown at 7-segment on the outdoor unit PCB.
*2): Perform the high voltage discharge work by referring to 1.3.3 before checking and replacing the inverter parts.

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

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

★ This alarm code is indicated when the any alarm code of 51, 52, 53 and 54 is activated 3 times including 3 in 30 minutes. Retry operation is performed up to the occurrence of 2 times.

Conditions: Inverter current with 105% of the rated current, (1) runs continuously for 30 seconds or (2) runs intermittently and the accumulated time reaches up to 3.5 minutes, in 10 minutes.



Model	Activation Current
3HP	14.5A
4HP	16.0A
5HP	24.5A

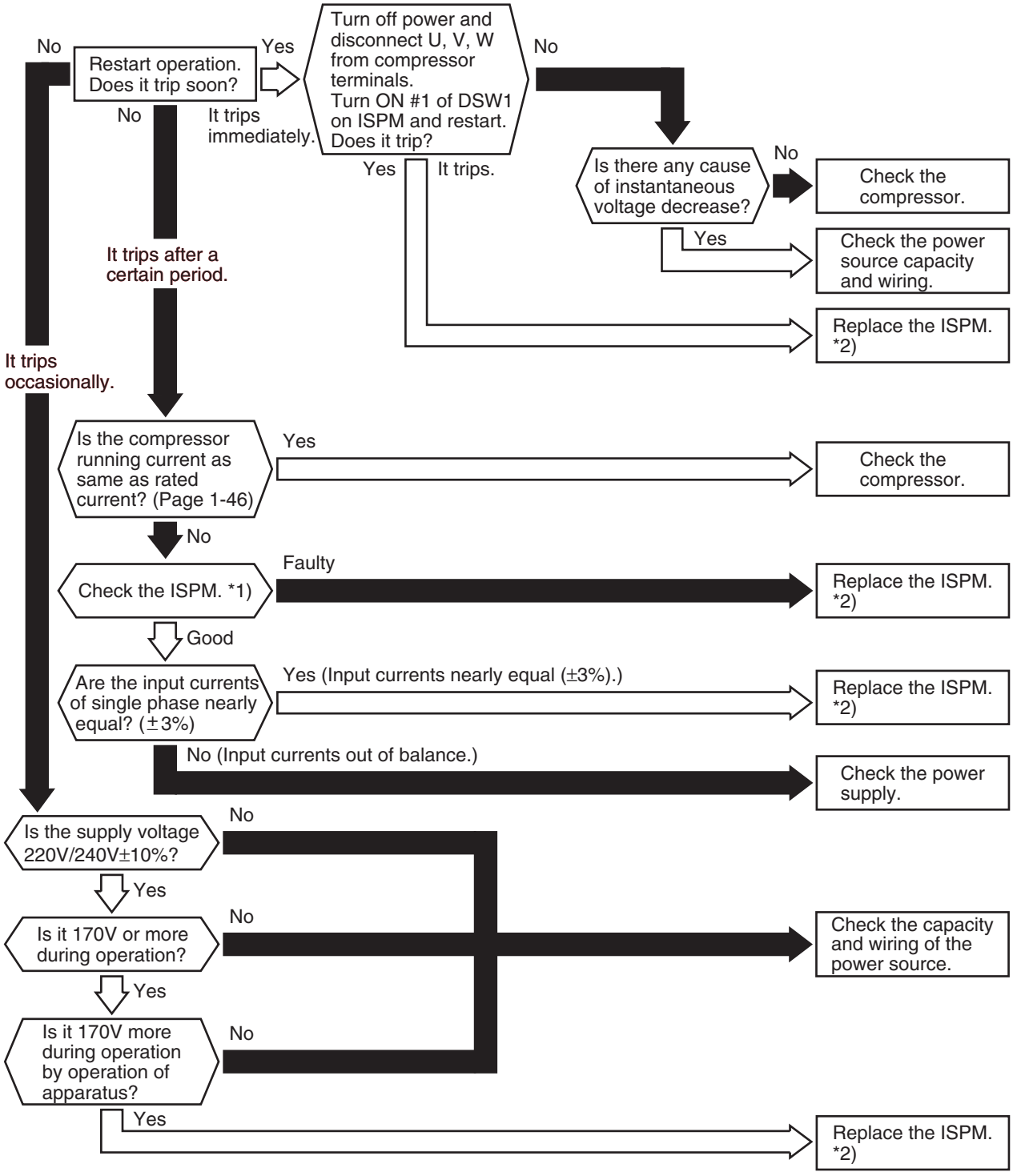
*1): Before replacing or the checking of inverter components, refer to item 1.3.3 regarding electrical discharge.

Alarm Code 57	Activating Protection Against Instantaneous Overcurrent of Inverter (2)

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

★ This alarm code is indicated when the any alarm code of 51, 52, 53 and 54 occurs 3 times including 3 in 30 minutes. Retry operation is performed up to the occurrence of 2 times.

Conditions: Inverter current with 150% of the rated current.



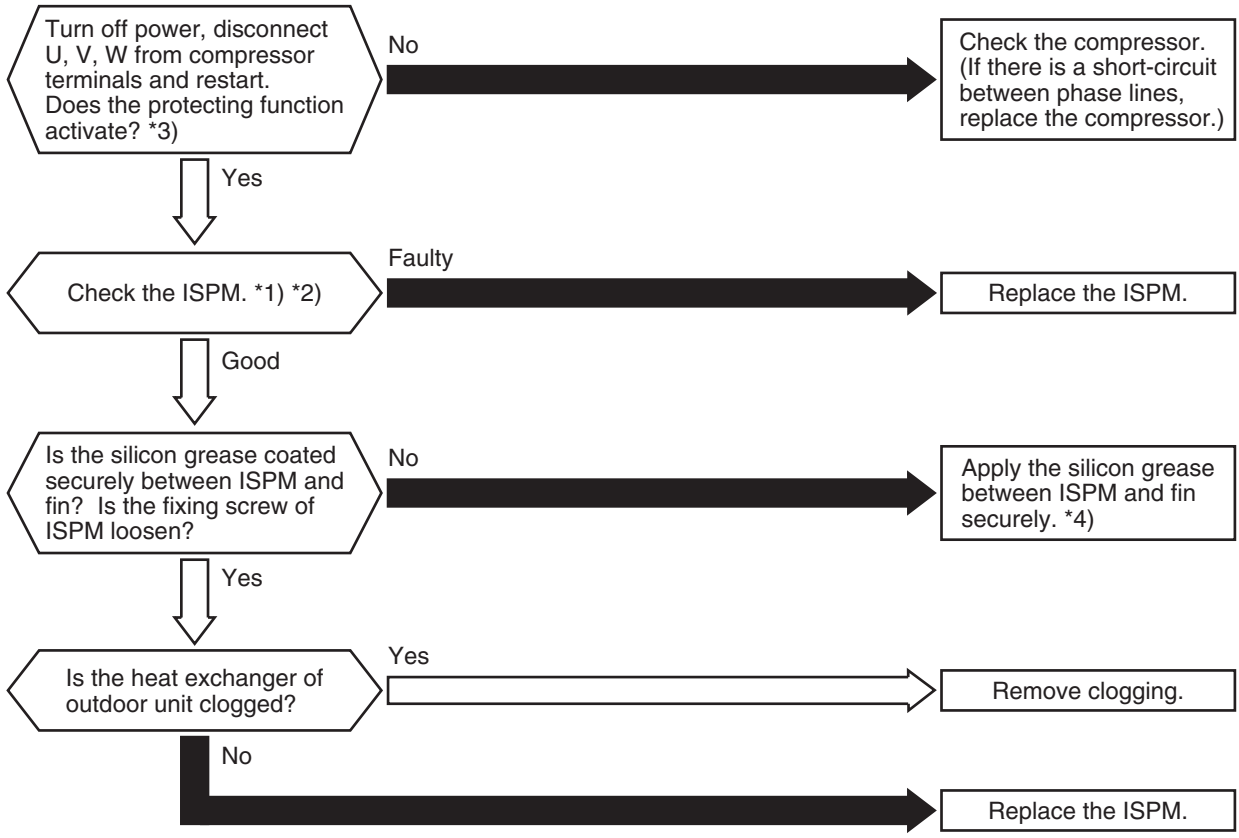
1*): Regarding the checking method for the ISPM, refer to item 1.3.3 (2).
2*): Before replacing the ISPM, refer to item 1.3.3 (1) regarding electrical discharge.

Alarm Code 53	Protection Activation of ISPM

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

★ ISPM have detecting function of abnormality.
This alarm is indicated when the any alarm code of 51, 52, 53 and 54 occurs 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 ISPM such as Short Circuited or Grounded
or
Abnormal Temperature of the ISPM
or
Control Voltage Decrease



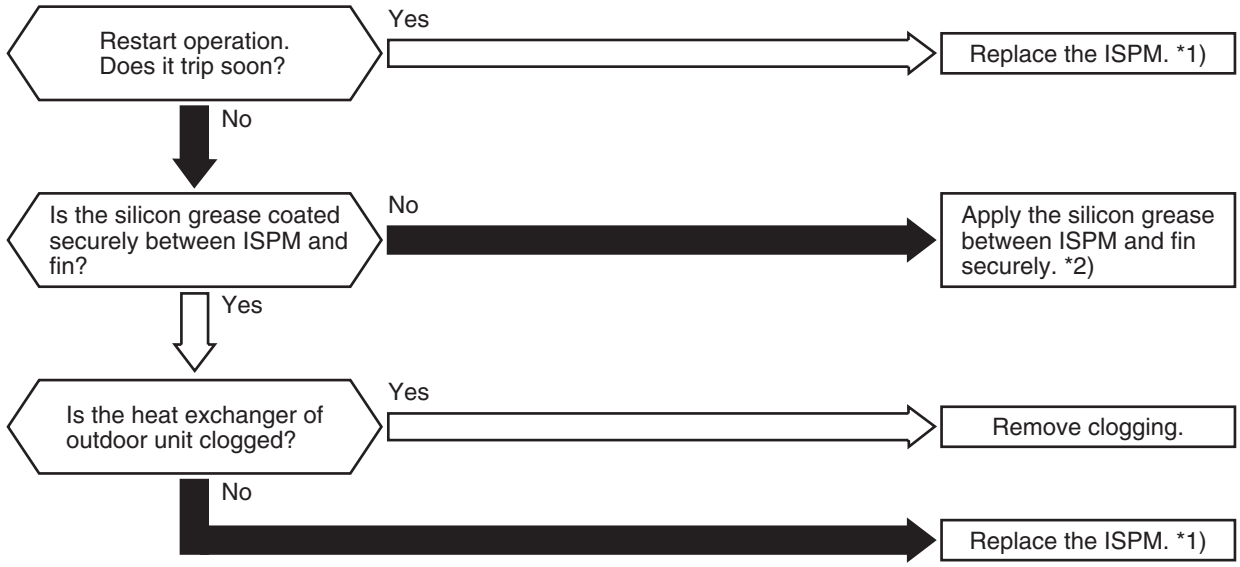
1*): Before replacing the ISPM, refer to item 1.3.3 (1) regarding electrical discharge.
2*): Regarding the checking of the ISPM, refer to item 1.3.3 (2).
3*): Turn ON the No.1 switch of the dip switch DSW1 on ISPM when restarting with disconnecting the terminals of the compressor. After troubleshooting, turn OFF the No.1 switch of the dip switch DSW1 on ISPM.
4*): Silicone grease (P22760) is available as a spare parts.

Alarm Code 54	Activating Protection Against Temperature Increasing of Inverter Fin

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

★ This alarm is indicated when the any alarm code of 51, 52, 53 and 54 occurs the abnormality 3 times in 30 minutes including 3. Retry operation is performed up to the occurrence of 2 times.

Conditions: ISPM Thermistor is more than 100 deg.

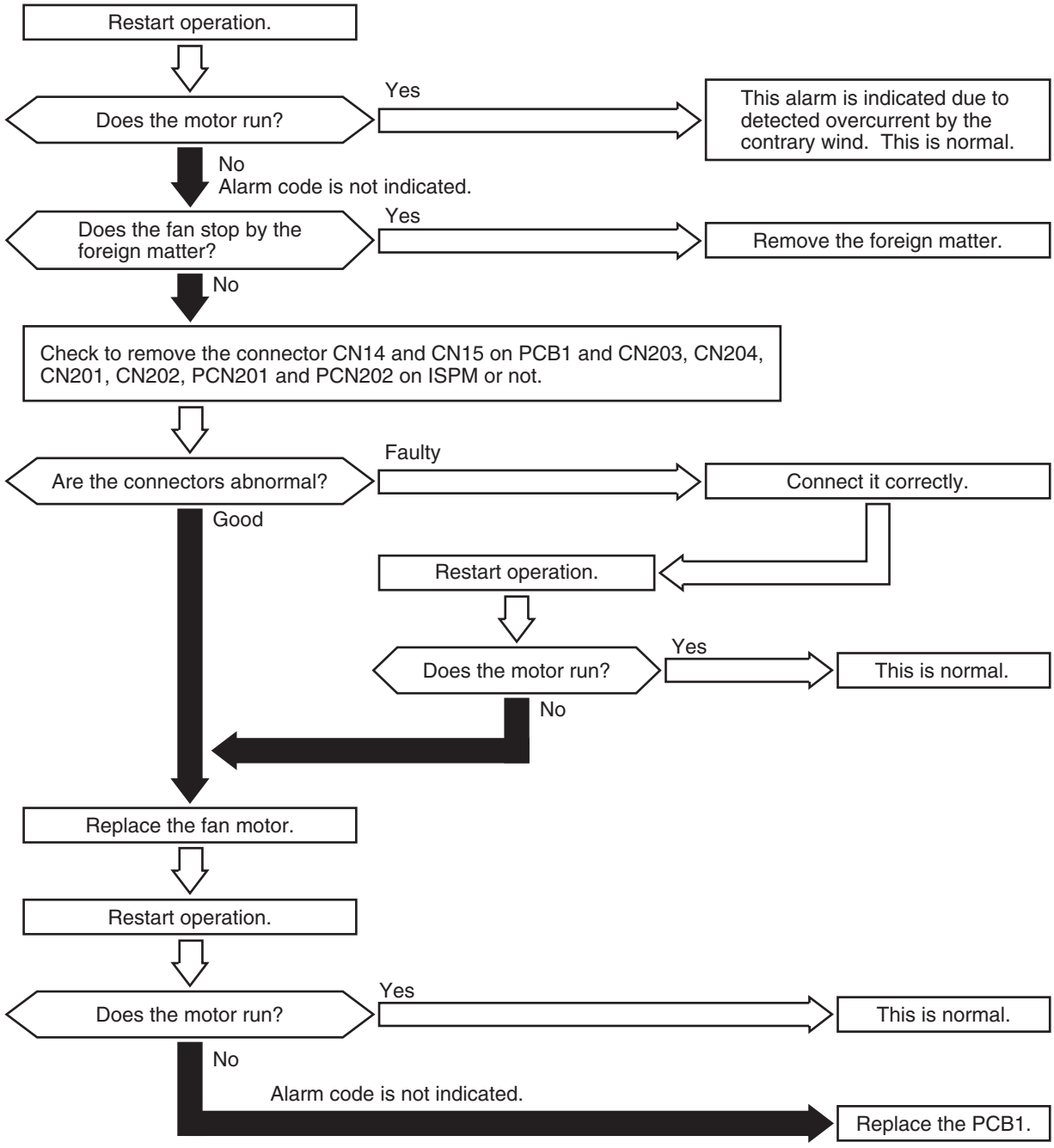


1*): Before replacing the ISPM, refer to item 1.3.3 (1) regarding electrical discharge.
2*): Silicone grease (P22760) is available as a spare parts.

Alarm Code 57	Abnormality of Fan Motor Protection

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

★ This alarm is indicated when the revolution pulse output from the fan motor is 10rpm or less and the reverse revolution signal is detected. The fan motor is stopped once, and restarted after 10 seconds. It occurs more than 10 times in 30 minutes, this alarm is indicated. The abnormality occurs when the fan motor is stopped.

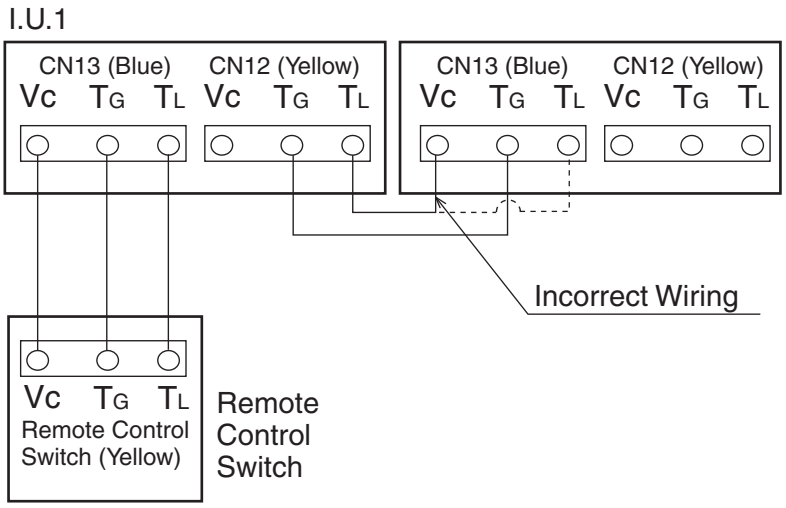


In the case that the fan motor does not run even the PCB1 is replaced, replace ISPM.

Alarm Code dd	Incorrect Wiring Among Indoor Units

★ This alarm code is indicated only when remote control switch PC-2H2 is used being connected to indoor unit.

★ This alarm occurs in the case of incorrect connection like that TL terminal is connected to Vc terminal as below when indoor units are wired.



The unit No. and unit code are as below regardless of the indoor unit.

Unit No. ***00***
Cycle System ***00***
Unit Code ***E.00***

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Wiring Trouble	Incorrect Wiring	Check the wiring No.	Repair the wiring correctly.

Alarm Code	Compressor Protection
E5	

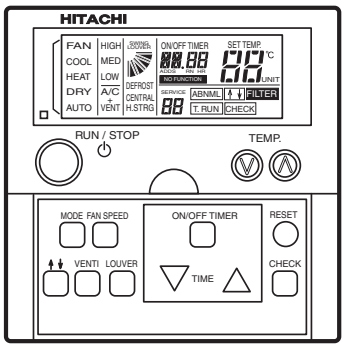
★ This alarm code appears when one of the following alarms occurs three times within 6 hours, which may result in serious compressor damages, if the outdoor unit is continuously operated without removing the cause.

Alarm Code:	*Content of Abnormality*
02	*Tripping of Protection Device in Outdoor Unit*
07	*Decrease in Discharge Gas Superheat*
08	*Increase in Discharge Gas Temperature*
41	*Cooling Overload*
42	*Heating Overload*
47	*Low Pressure Decrease Protection Activating*

These alarms are able to be checked by the CHECK Mode 1. Follow the action indicated in each alarm chart.
These alarms are cleared only by turning OFF the main power switch to the system. **However, careful attention is required before starting, since there is a possibility which will result in serious damages to the compressors.**

1.2.3 Troubleshooting in Check Mode by Remote Control Switch

(PC-P1H)



- Use the remote control CHECK switch in the following cases.
  (1) When the RUN lamp is flickering.
  (2) To trace back the cause of trouble after restarting from stoppage with the RUN lamp flickering.
  (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 2: Data held immediately before failure, will be displayed.

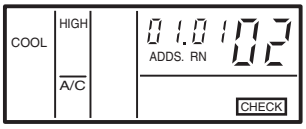
Normal Mode

CHECK — Press for more than 3 seconds.

NOTES:
- 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" or "255". These transient data produced temporarily by software do not affect device functions at all. (The alarm code may also be indicated as "FF".)
- If it is not indicated check mode 1, it has possibilities that the transmission between remote control switch and indoor unit is not collect.

★

Unit Number and Alarm Code Displayed



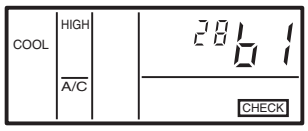
- Alarm code identifying the last fault that has occurred in the indicated unit.
- Unit number of connected unit or unit number for which checking mode was selected previously.

(A) Perform within 7 seconds to check another unit.

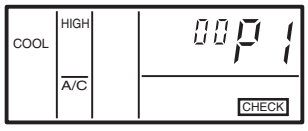
- Forward: Press the ∧ switch to rise from 00 to 01 to 02 …
- Backward: Press the ∨ switch to descend from 15 to 14 to 13 …

After 7 seconds *1

Check Mode 1 (See 1.2.3 (1) for details.)



To View the Previous Indication
TEMP ∨ Press



To View the Next Indication
TEMP ∧ Press

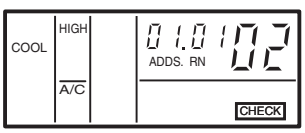
Unit Number and Alarm Code Displayed

CHECK — Press for more than 3 seconds.

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

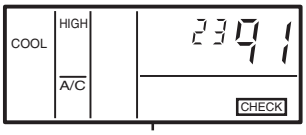
See (A)

After 7 seconds

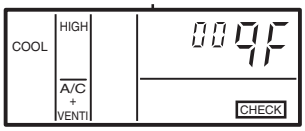


★ ADDS: Number of Indoor Unit in No. ** Cycle
RN: No. ** Refrigerant Cycle

Check Mode 2 (See 1.2.3 (2) for details.)



TEMP ∧ Press



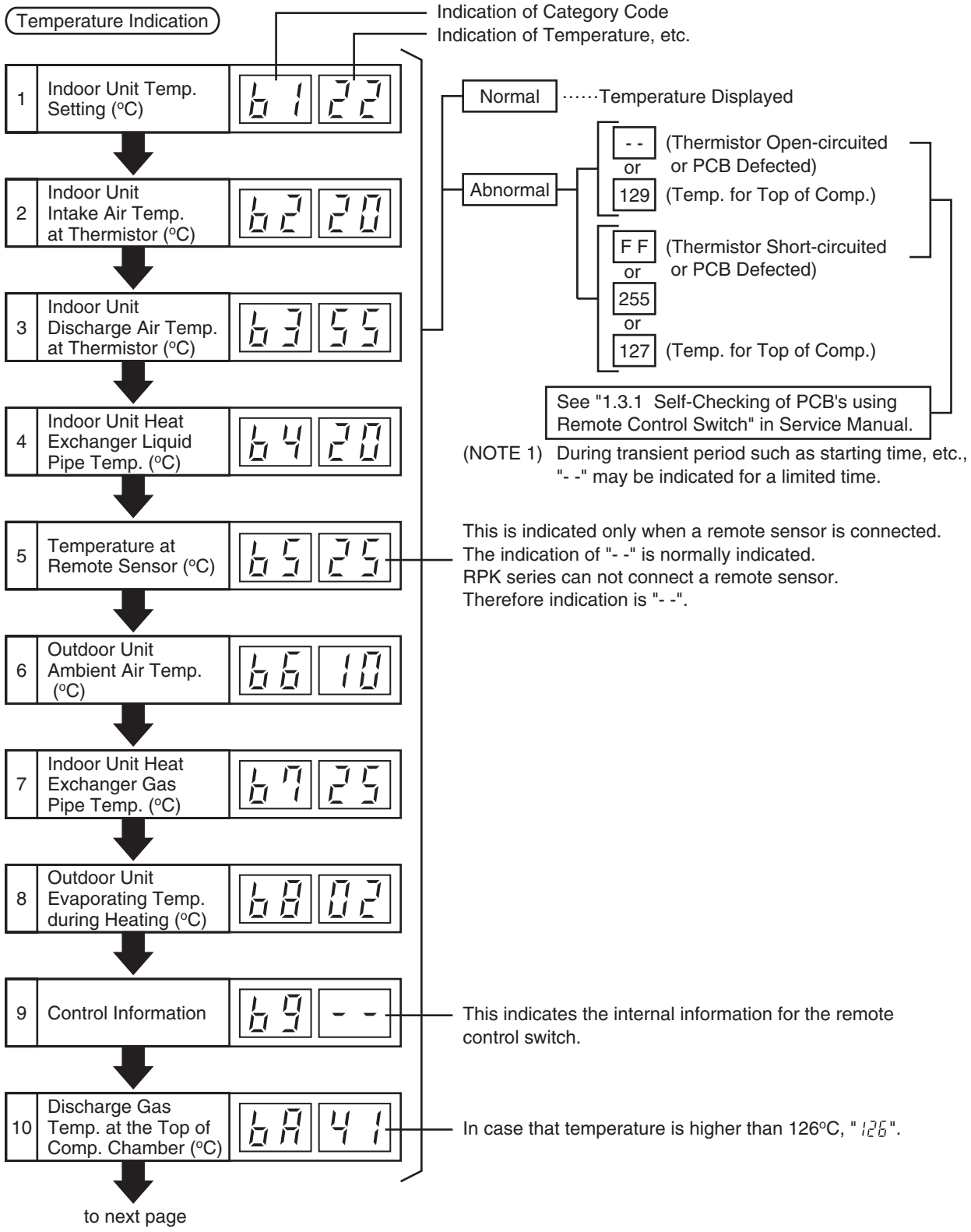
- In Check Mode 2, Data of the first three units connected serially to a remote control switch are available.
- You can press the CHECK switch to release Check Mode 2. Check Mode 1 cannot be released even if you press the CHECK switch.

Check Mode Released

CHECK Press

(1) Contents of Check Mode 1

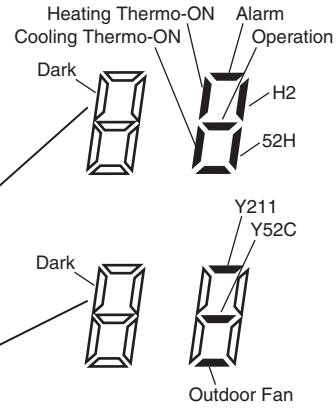
The next indication is shown by pressing Λ the part of “TEMP” switch. If the V part of “TEMP” switch is pressed the previous indication is shown.

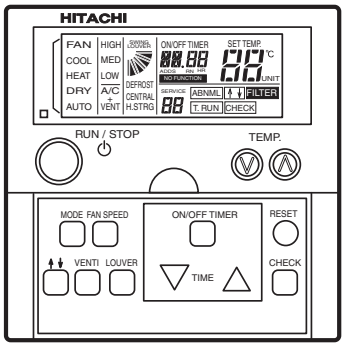


11	Thermo Temp. of Remote Control Switch	b b 2 3

Indication on Micro-Computer Input/Output

12	Micro-Computer Input/Output in Indoor Unit	C 1 4
13	Micro-Computer Input/Output in Outdoor Unit	C 2 -





Indication of Unit Stoppage Cause

14	Cause of Stoppage	d 1 0 1

Symbols with a letter Y are relays on PCB

00	Operation OFF, Power OFF
01	Thermo-OFF (NOTE 1), Activating Float Switch
02	Alarm (NOTE 2)
03	Freeze Protection, Overheating Protection
05	Instantaneous Power Failure at Outdoor Unit, Reset (NOTE 3)
06	Instantaneous Power Failure at Indoor Unit, Reset (NOTE 4)
07	Stoppage of Cooling Operation due to Low Outdoor Air Temperature, Stoppage of Heating Operation due to High Outdoor Air Temperature
10	Demand, Enforced Stoppage
13	Retry due to High Pressure Increase
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, Retry due to Abnormal Current to Comp.
18	Retry due to Voltage Decrease, Other Retry due to Inverter
19	Expansion Valve Opening Change Protection
20	Operation Mode Changeover of Indoor Unit
21	Enforced Thermo-OFF (Twin Type Only) (NOTE 5)
24	Thermo-OFF during Energy Saving Operation
25	Retry due to Input Protection

Abnormality Occurrence Counter

15	Abnormality Occurrence Times	E 1 0 1
16	Instantaneous Power Failure Occurrence Times in Indoor Unit	E 2 0 0
17	Transmission Error Occurrence Times between Remote Control Switch and Indoor Unit (NOTE 1)	E 3 0 0
18	Abnormality Occurrence Times on Inverter	E 4 0 0

Indication of Automatic Louver Condition

19	Louver Sensor	F 1 0 0

to next page

(NOTE 1) 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 2) Even if stoppage is caused by "Alarm", "02" is not always indicated.

(NOTE 3) 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 4) 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.

(NOTE 5) In the system "21" will be indicated at twin type, confirm the stoppage cause of the other indoor unit.

Countable up to 99.
Over 99 times, "99" is always indicated.
(NOTE 1) If a transmitting error continues for 30 seconds, one is added to the occurrence times.

Compressor Pressure/Frequency Indication

20	Discharge Pressure (High) (x 0.1 MPa)	H1 18	This is an indication for internal information.
21	Suction Pressure (Low) (x 0.01 MPa)	H2 04	This is an indication for internal information.
22	Control Information	H3 44	This is an indication for internal information for the remote control switch. This does not have any specific meaning.
23	Operation Frequency (Hz)	H4 44	This is an indication for frequency of inverter.

Indoor Unit Capacity Indication

24	Indoor Unit Capacity	J1 08	The capacity of the indoor unit is indicated as shown in the table below.
25	Outdoor Unit Code	J2 P.01	In case of Twin Type, it is indicated "P02".
26	Refrigerant Cycle Number	J3 01	J3: 01 to 16 (01: when shipment (DSW4), Decimal Indication) J4: 00 to 0F (00: when shipment (DSW4), Indication with 16 numbers)
27	Refrigerant Cycle Number	J4 00	

Capacity Code of Indoor Unit

Indication Code	Equivalent Capacity (HP)
20	2.5
26	3.0
32	4.0
40	5.0

Expansion Opening Indication

28	Indoor Unit Expansion Valve Opening (%)	L1 20	The indication of "255" is normal.
29	Outdoor Unit Expansion Valve MV1 Opening (%)	L2 99	
30	Outdoor Unit Expansion Valve MV2 Opening (%)	L3 99	
31	Outdoor Unit Expansion Valve MVB Opening (%)	L4 00	

Estimated Electric Current Indication

32	Compressor Running Current (A)	P1 25	The current is indicated when compressor is running. In case of inverter compressor, the running current of primary side of inverter is indicated.

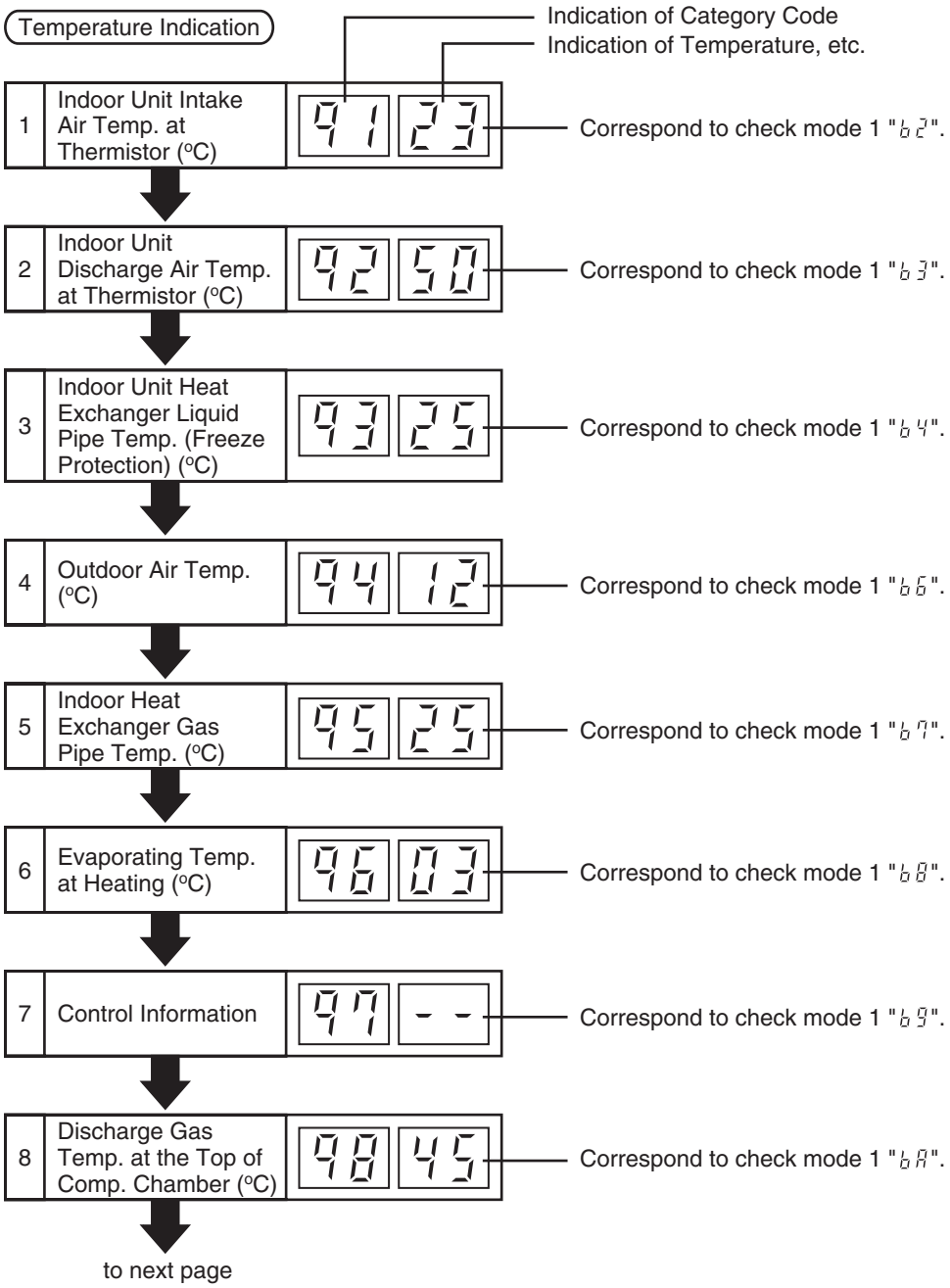
Returns to Temperature Indication

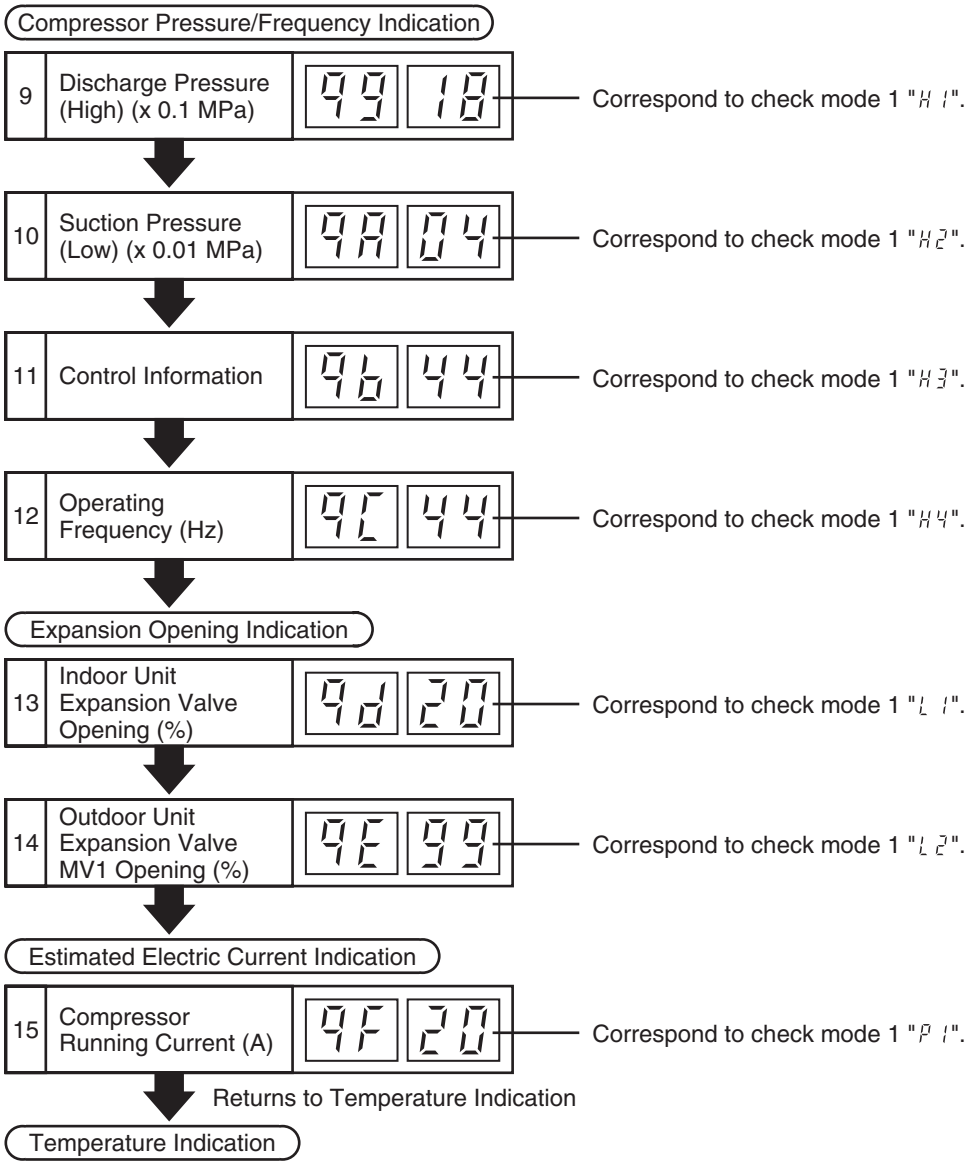
Temperature Indication

(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 Λ part of “TEMP” switch, the next display is indicated, If the V part of “TEMP” switch is pressed, the previous display is indicated.

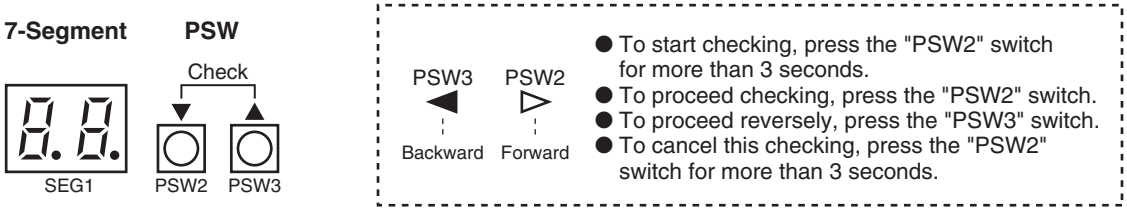


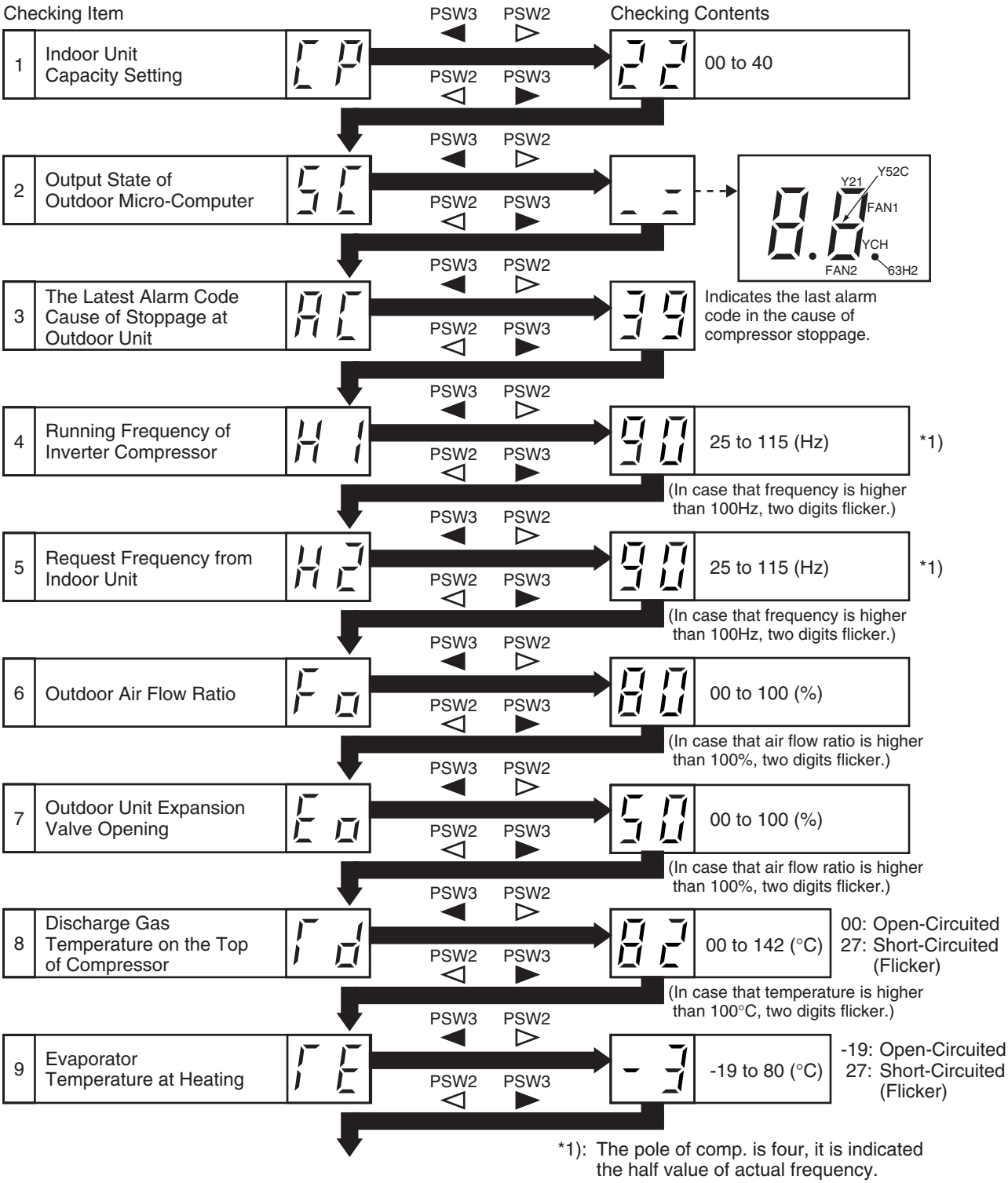

Compressor Pressure/Frequency Indication
9
Discharge Pressure (High) (x 0.1 MPa)
99 18
Correspond to check mode 1 "H1".
10
Suction Pressure (Low) (x 0.01 MPa)
9A 04
Correspond to check mode 1 "H2".
11
Control Information
9b 44
Correspond to check mode 1 "H3".
12
Operating Frequency (Hz)
9C 44
Correspond to check mode 1 "H4".
Expansion Opening Indication
13
Indoor Unit Expansion Valve Opening (%)
9d 20
Correspond to check mode 1 "L1".
14
Outdoor Unit Expansion Valve MV1 Opening (%)
9E 99
Correspond to check mode 1 "L2".
Estimated Electric Current Indication
15
Compressor Running Current (A)
9F 20
Correspond to check mode 1 "P1".
Returns to Temperature Indication
Temperature Indication

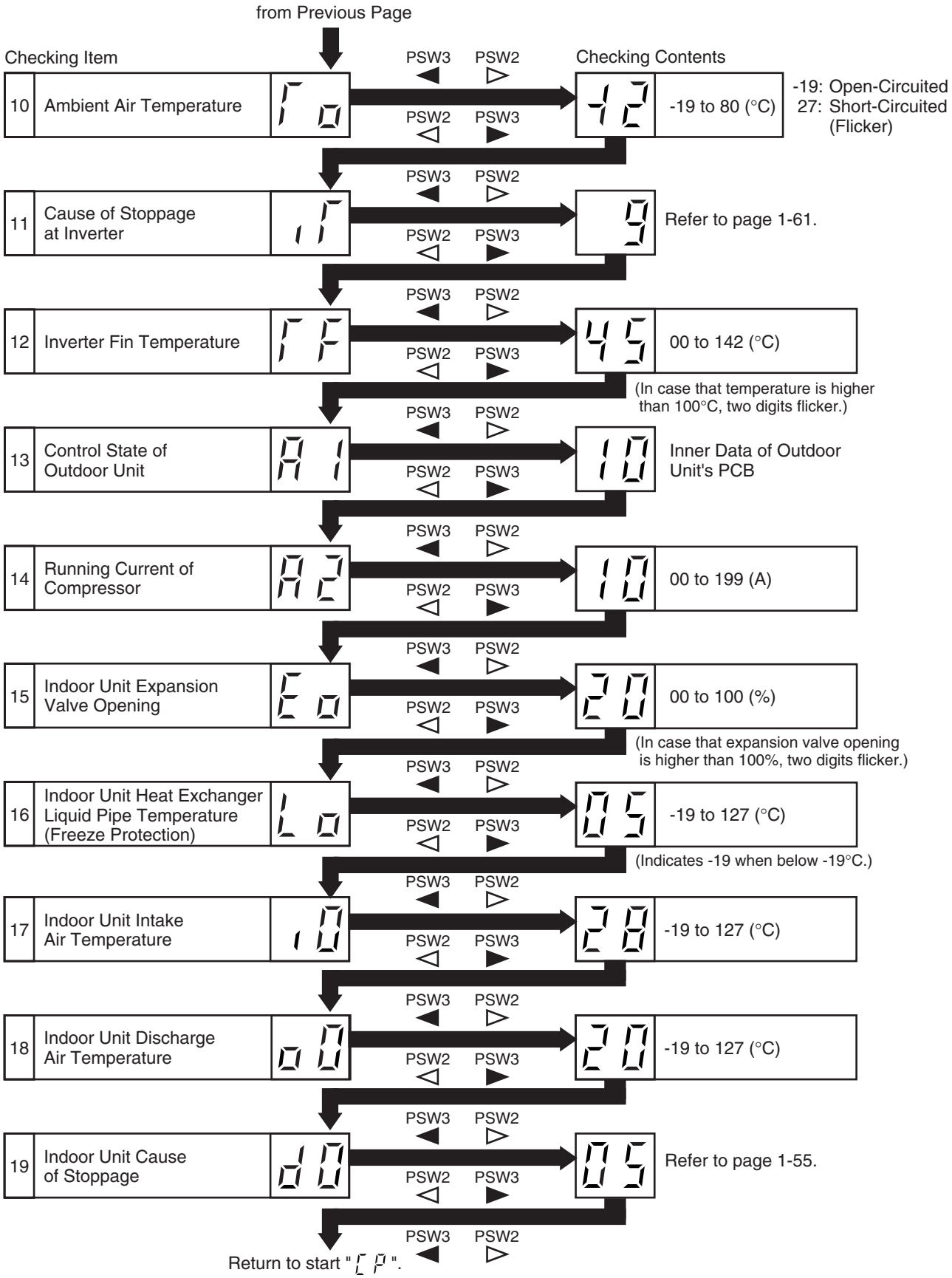
1.2.4 Troubleshooting by 7-Segment Display

(1) Checking Method by 7-Segment Display

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






from Previous Page
Checking Item
Checking Contents
PSW3 PSW2
PSW2 PSW3
10 Ambient Air Temperature
42
-19 to 80 (°C)
-19: Open-Circuited
27: Short-Circuited
(Flicker)
11 Cause of Stoppage at Inverter
9
Refer to page 1-61.
12 Inverter Fin Temperature
45
00 to 142 (°C)
(In case that temperature is higher than 100°C, two digits flicker.)
13 Control State of Outdoor Unit
10
Inner Data of Outdoor Unit's PCB
14 Running Current of Compressor
10
00 to 199 (A)
15 Indoor Unit Expansion Valve Opening
20
00 to 100 (%)
(In case that expansion valve opening is higher than 100%, two digits flicker.)
16 Indoor Unit Heat Exchanger Liquid Pipe Temperature (Freeze Protection)
05
-19 to 127 (°C)
(Indicates -19 when below -19°C.)
17 Indoor Unit Intake Air Temperature
28
-19 to 127 (°C)
18 Indoor Unit Discharge Air Temperature
20
-19 to 127 (°C)
19 Indoor Unit Cause of Stoppage
05
Refer to page 1-55.
Return to start "CP".

1.2.5 Protection Control Code on 7-Segment Display

(1) Protection control code is displayed on 7-segment when a protection control is activated.

(2) Protection control code is displayed while function is working, and goes out when released.

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

(a) Higher priority is given to protection control related to frequency control than the other.

<Priority Order>

* Low Pressure Ratio Protection
* High Pressure Ratio Protection
* High-Pressure Increase Protection
* Input Protection
* Current Protection
* Discharge Gas Temperature Increase Protection
* Frost Protection

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

Code	Protection Control
P0	Low Pressure Ratio Control
P1	High Pressure Ratio Control
P2	High-Pressure Increase Protection
P3	Current Protection
P3.	Input Protection
P4	Inverter Module Temperature Increase Protection

Code	Protection Control
P5	Discharge Gas Temperature Increase Protection
P6	Frost Protection
P7	Inverter Trip Retry
P8	Insufficient Voltage/Excessively High Voltage Retry
P9	Imbalanced Voltage Protection

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

NOTE:

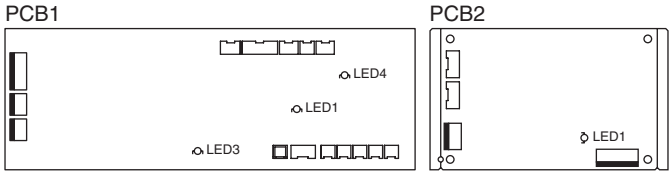
The protection control code being indicated on 7-segment display is changed to an alarm code when the abnormal operation occurs. Also, the same alarm code is indicated on the remote control switch.

Code	Cause	Cause of Stoppage for Corresponding Unit	Remark	
			Indication during Retry	Alarm Code
1	Automatic Stoppage of Transistor Module (IPM Error) (Over Current, Decrease Voltage, Increase Temperature)	17	P7	53
2	Instantaneous Over Current	17	P7	52
3	Inverter Fin Thermistor Error, Protection	17	P7	54
4	Electronic Thermal Activation	17	P7	52
5	Inverter Voltage Decrease	18	P8	06
6	Increase Voltage	18	P8	06
8	Abnormal Current Sensor	17	P7	51
9	Instantaneous Power Failure Detection	18	-	-
b	Reset of Micro-Computer for Inverter	18	-	-
C	Earth Fault Detection for Compressor (Only Starting)	17	P7	53
d	Abnormal Power Source Phase	18	-	-
	Increase Input	25	P8	-

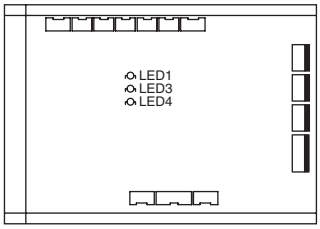
1.2.6 Function of LEDs

(1) Printed Circuit Board in Indoor Unit
(* Following figure shows a separated-board type PCB.)

RCI Series



RPI, RCD and RPC Series



■ LED Functions on Indoor Unit Printed Circuit Board for Control

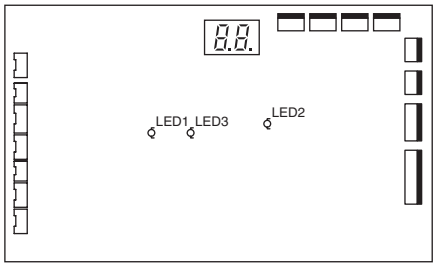
Part Name		Contents of Functions	Remarks
1	LED1 (Red)	This LED1 indicates the transmission state between the indoor unit and remote control switch. Normal Condition: Flickering Abnormal Condition: Activated or Deactivated	-
2	LED3 (Yellow)	This LED3 indicates the transmission state between the indoor unit and outdoor unit. Normal Condition: Flickering One Time/Some Seconds Abnormal Condition: Activated or Deactivated more than 30 seconds or Flickering (30 times/1 second)	-
3	LED4 (Red)	This LED4 indicates the power supply (5V) for micro-computer. Normal Condition: Activated Abnormal Condition: Deactivated	-

■ LED Functions on Indoor Unit Printed Circuit Boards for Power Supply (PCB2 for RCI Series only)

Part Name	Contents of Functions	Remarks
LED1 (Red)	This indicates the voltage between terminals of capacity C1 on the PCB for DC fan motor. Activated: The voltage between both terminals of capacity, C is 50±20V or greater. Deactivated: The voltage between both terminals of capacity, C is 50±20V or smaller.	-

(2) Printed Circuit Board in Outdoor Unit

PCB for Outdoor Unit

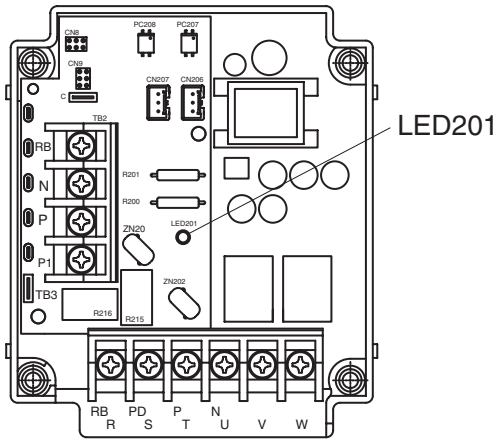


■ Dip Switches and LED Functions on Outdoor Unit Printed Circuit Boards

Name of Internal Circuit Board	Part Name		Contents of Functions
Controlling Board: PCB1	14	LED1 (Red)	Power Source for PCB1 Normal Condition: Activated Abnormal Condition: Deactivated
	15	LED2 (Green)	This LED2 indicates the transmission state between the PCB1 and ISPM. Normal Condition: Flickering Abnormal Condition: Activated or Deactivated
	16	LED3 (Yellow)	This LED3 indicates the transmission state between the indoor unit and outdoor unit. Normal Condition: Flickering Abnormal Condition: Activated or Deactivated
	18	SEG1	This SEG1 indicate the following: "alarm", "protective safety device has tripped" or "checking items".

<Inverter Printed Circuit Board on ISPM>

ISPM



- LED Functions on Outdoor Unit ISPM

Name of Printed Circuit Board	Function
* LED (Red) 201	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.

1.3 Procedure of Checking Each Main Parts

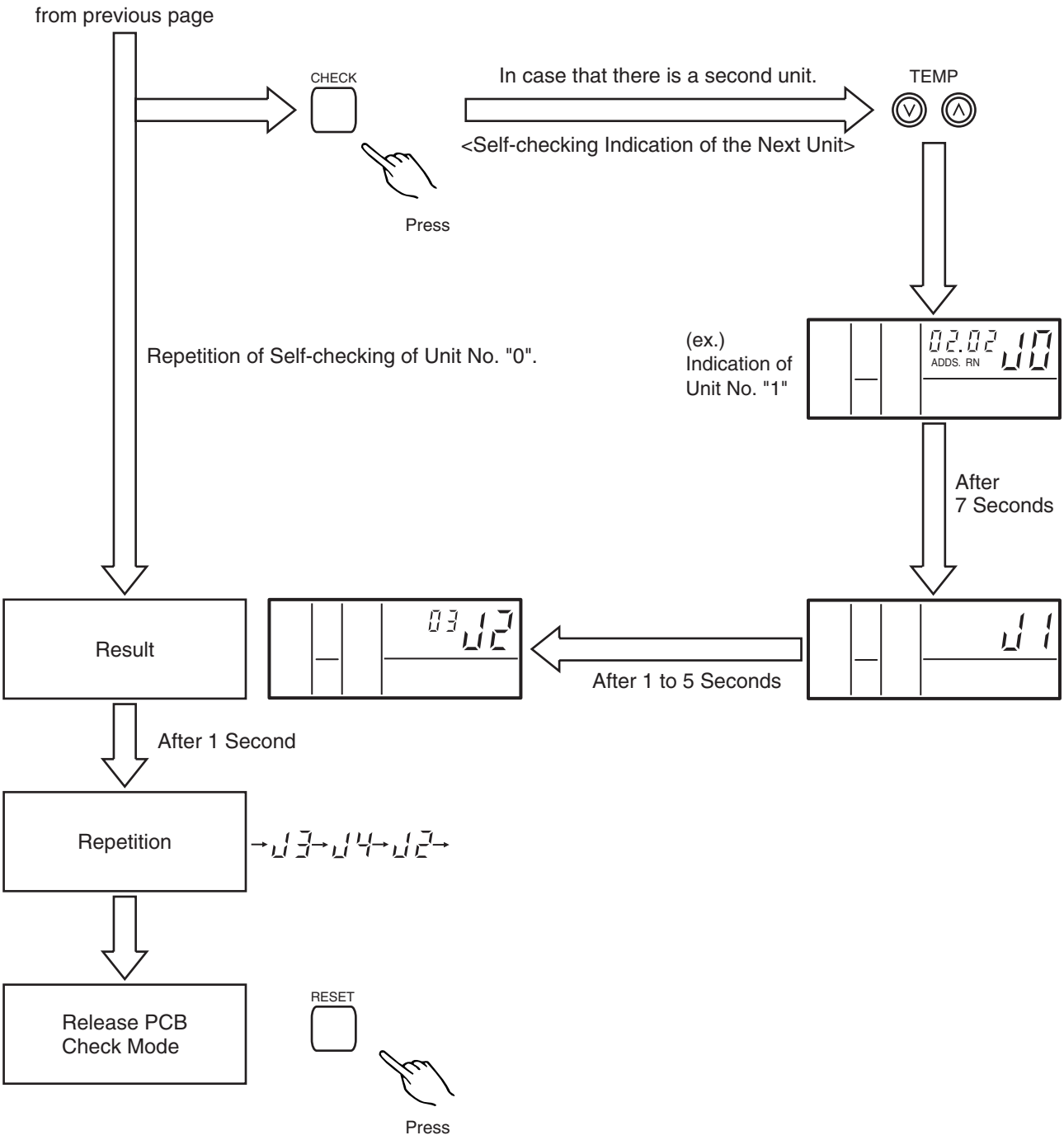
1.3.1 Self-Checking of PCBs using Remote Control Switch

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

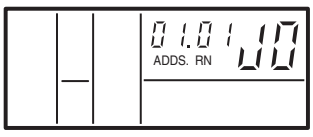
Indication	Contents	
00	Normal	
	Abnormality (Open-circuit, Short-circuit, etc.) in circuit for	
01	Intake Air Temp. Thermistor	Indoor Unit PCB
02	Discharge Air Temp. Thermistor	
03	Liquid Pipe Temp. Thermistor	
04	Remote Thermistor Abnormality	
05	Gas Pipe Temp. Thermistor	
06	Remote Sensor	
08	Transmission of Central Station	
0A	EEPROM	
0b	Zero Cross Input Failure	
EE	Transmission of Indoor Unit during This Checking Operation	
07	Transmission of Outdoor Unit	Outdoor Unit PCB
F4	ITO Input Failure	
F5	PSH Input Failure	
F6	Protection Signal Detection Circuit	
F7	Phase Detection	
F8	Transmission of Inverter	
FA	High Pressure Sensor	
Fb	Comp. Discharge Gas Temp. Thermistor	
FC	Low Pressure Sensor	
Fd	Heat Exchanger Evaporation Temp. Thermistor	
FF	Ambient Air Temp. Thermistor	
J1	means that automatic PCB checking is operating.	

NOTE:
In case of ***J2*** indication directly (***J1*** is not indication), it is not abnormal.

When the indoor unit of RPK series is using wireless remote controller (PC-LH3), the above check is used by PC-P1H and operate according to below items.
(1) Turn OFF of Power Supply
(2) Disconnect CN25 on PCB(M)
(3) Connect the Connector of PC-P1H to CN12 or CN13
(4) Turn ON of Power Supply
After checking turn OFF again and reconnectable perform the procedure in reverse.



NOTES:

(1) 

If this indication is continued and “J1” 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, Fan Circuit, Protection Circuit
PCB in Outdoor Unit: Relay Circuit, Dip Switch, Option Circuit

(3) 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.

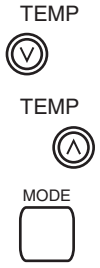
1. If the remote control switch readouts malfunction.
2. For regular maintenance check.

1 Turn ON the power source.

2 Simultaneously depress the following 3 switches. (During operation, they can be depressed.)

3 The LCD indication changes as shown in the right figure.

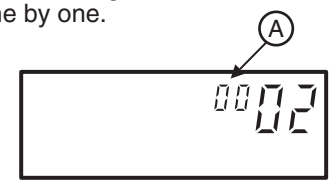
Only for cancellation of EEPROM, depress the following 3 switches simultaneously during changing LCD indication.



To 11

4 After the LCD indication changes as shown in the right figure, the RUN indicator flickers twice.

5 The LCD indication changes as shown below.
Depress all the switches (13 switches) one by one.
Every time the switch is depressed, the number of the indication of (A) part in the figure below increases one by one.



NOTES:
1. Any order of depressing switches is available.
2. Depressing 2 or more switches simultaneously is invalid and not counted.

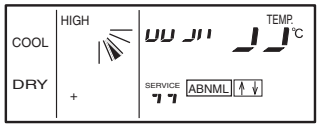
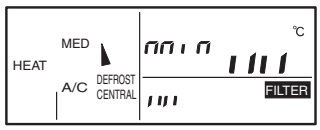
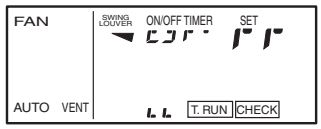
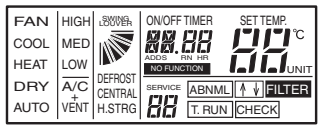
Unless all the switches are depressed, the checking do not proceed to the next item.

6 The LCD indication changes as shown below.
The remote control switch automatically starts to check the transmission circuit.

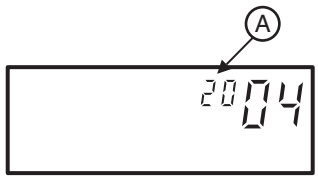
In case that the transmission circuit is abnormal, the LCD indication remains as the left figure and the checking do not proceed to the next item.

To the next page

Changing of LCD Indication

No.	LCD Indication	Indicating Period (sec.)
1		For 1 second
2		For 1 second
3		For 1 second
4		For 1 second
5		For 3 seconds

7 The LCD indication changes as shown below.
The detected temperature of remote control thermostat is indicated at the part (A) in the figure below.

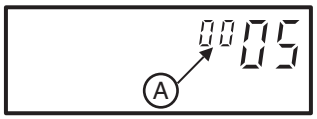


If the number "- -" or "FF" is indicated at the (A) part, the remote control thermostat is abnormal.

8 The LCD indication changes as shown below.

In case that EEPROM is not canceled, depress the CHECK switch.

In case of depressing the RESET switch or leaving the switches for 15 seconds, the data of EEPROM (storage cell inside of the remote control switch) is cleared.
At this time, the number is indicated at the (A) part shown in the figure below. When the number "99" is indicated, EEPROM is abnormal.



The number indicated at the (A) part is "99", the checking do not proceed to the next item.

9 The LCD indication changes as shown below.

After several seconds are passed, the remote control switch is automatically activated again.

10 When the remote control switch is activated again, the RUN indicator is ON and the operation is started. Therefore, depress switch and stop operation.

RUN/STOP

NOTES:
1. In case that the operation is not automatically started when the remote control switch is activated again, the detection circuit for momentary stoppage may be abnormal.
   However, it would not interfere the normal operation.
2. There is a case that the operation is automatically stopped after the automatic operation when the remote control switch is activated again.

Cancellation of EEPROM

3

11 The LCD indication changes as shown below and the EEPROM is automatically canceled by the remote control switch.

12 The LCD indication changes as shown below.

After several seconds are passed, the remote control switch is automatically activated again.
In this case, the operation is not started automatically.

1.3.3 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.>

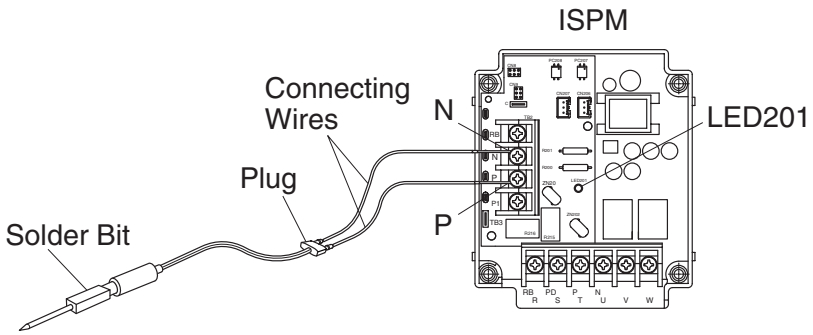
[Procedure]

(a) Check to ensure that no high voltage exists.
If LED201 is ON after start-up and LED201 is OFF after turning OFF the power source, the voltage will decrease lower than DC50V.

(b) Connect connecting wires to an electrical solder bit.

(c) Connect the wires to terminals P and N on ISPM. => Discharging is started, resulting in hot solder bit.

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

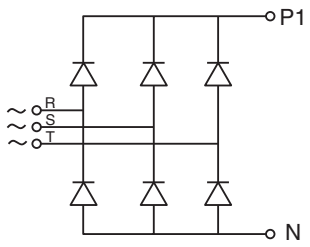


WARNING

Pay attention not to short-circuit between terminal P and N.
If it occurs short-circuit, it may cause a serious damage.

(2) Checking Procedures ISPM

Rectification Parts of Internal Circuit of ISPM (Common)

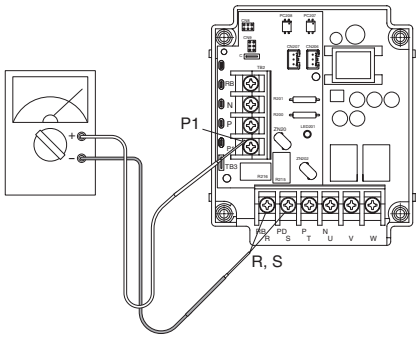


Remove all the terminals of the ISPM before check.
If items (a) to (h) are performed and the results are satisfactory, ISPM is normal. Measure it under 1 kΩ range of a tester.

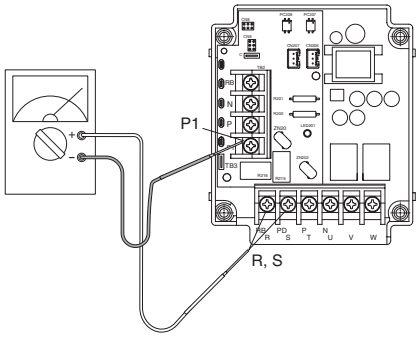
⚠CAUTION

Do not use a digital tester.

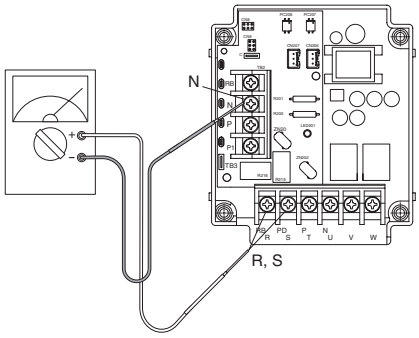
(a) By touching the + side of the tester to the P1 terminal of ISPM and the - side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



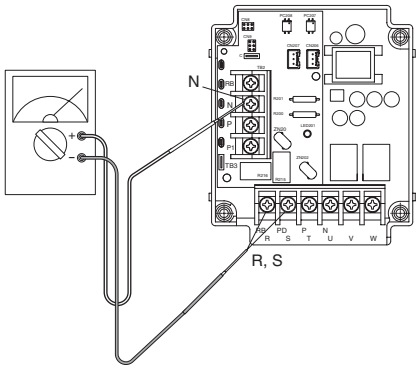
(b) By touching the - side of the tester to the P1 terminal of ISPM and the + side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.

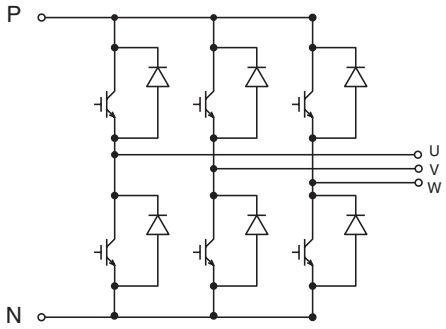


(c) By touching the - side of the tester to the N terminal of ISPM and the + side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.

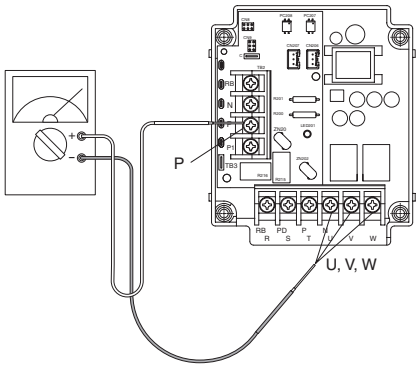


(d) By touching the + side of the tester to the N terminal of ISPM and the - side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.

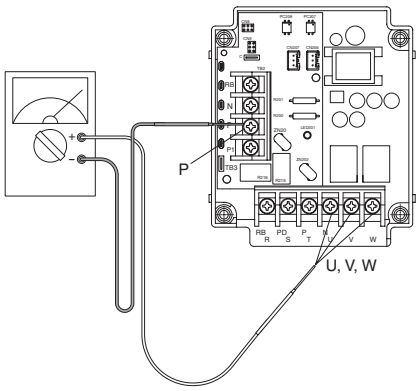




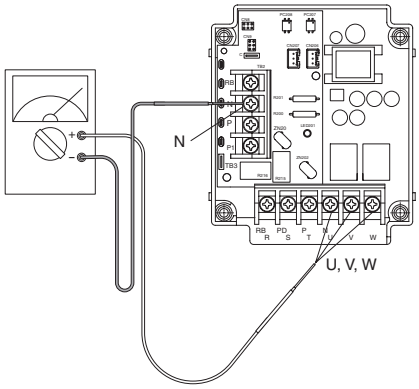
(e) By touching the + side of the tester to the P terminal of ISPM and the - side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



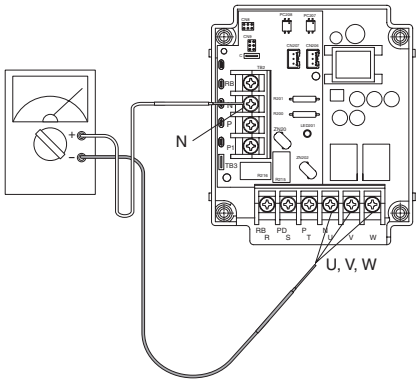
(f) By touching the - side of the tester to the P terminal of ISPM and the + side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



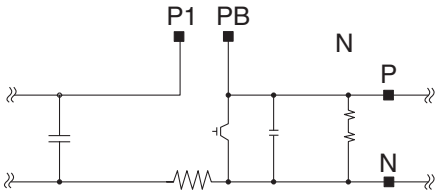
(g) By touching the - side of the tester to the N terminal of ISPM and the + side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



(h) By touching the + side of the tester to the N terminal of ISPM and the - side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



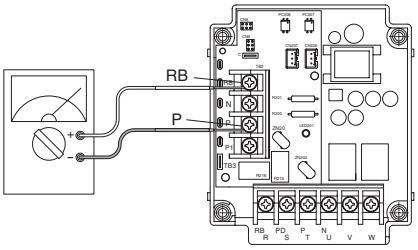
Active Parts of Internal Circuit of ISPM (for 3 and 4HP)



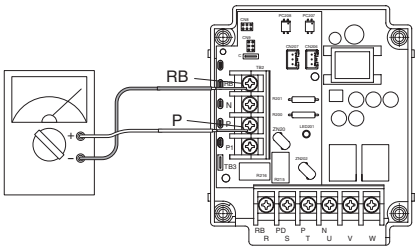
If item (i) to (m) are performed and the results are satisfactory, ISPM is normal.
Measure it under 1 kΩ range of a tester.
Do not use a digital tester.

(i) Perform the item (a) to (h).

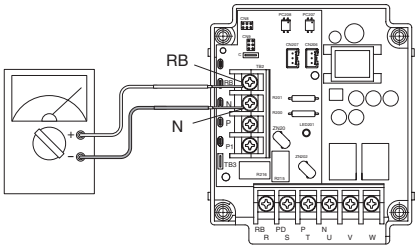
(j) By touching the + side of the tester to the RB terminal of ISPM and the - side of the tester to P terminal of ISPM. If the resistance is more than 1 kΩ, it is normal.



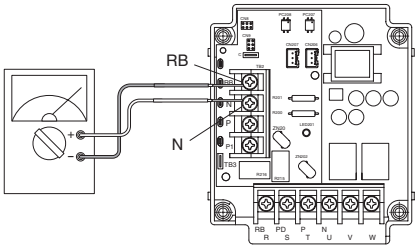
(k) By touching the - side of the tester to the RB terminal of ISPM and the + side of the tester to P terminal of ISPM. If the resistance is more than 100 kΩ, it is normal.



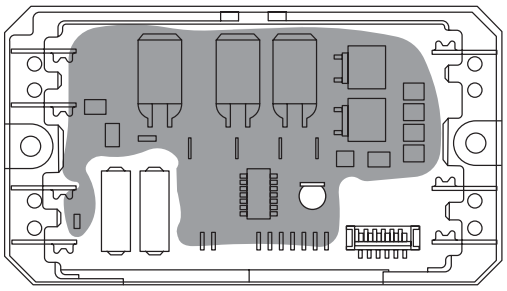
(l) By touching the + side of the tester to the RB terminal of ISPM and the - side of the tester to N terminal of ISPM. If the resistance is more than 90 kΩ, it is normal.

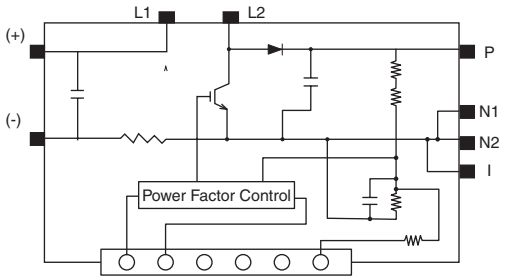


(m) By touching the - side of the tester to the RB terminal of ISPM and the + side of the tester to N terminal of ISPM. If the resistance is more than 90 kΩ, it is normal.



(3) Checking Procedures ACT Module (for 5HP only)
Outer Appearance and Internal Circuit of ACT Module

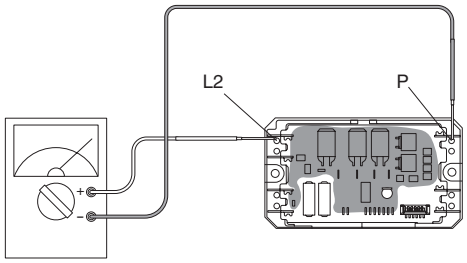




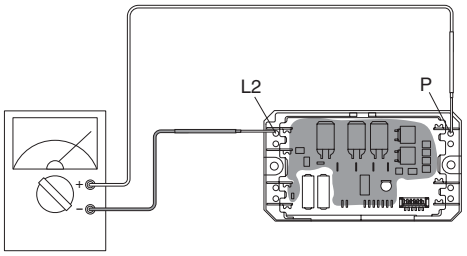
Remove all the terminals of the ACT module before check.
If items (a) to (f) are performed and the results are satisfactory, the ACT module is normal.
Measure it under 1 kΩ range of a tester. Do not use a digital tester.

(a) Check the mounted part is broken or not by visual check.

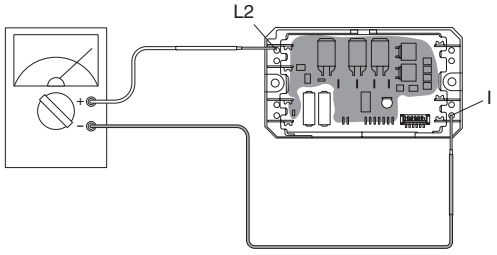
(b) By touching the + side of the tester to the L2 terminal of ACT module and the - side of the tester to the P terminal of ACT module, measure the resistance.
If all the resistances are greater than 100 kΩ, it is normal.



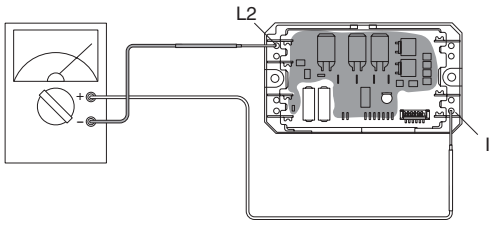
(c) By touching the - side of the tester to the L2 terminal of ACT module and the + side of the tester to the P terminal of ACT module, measure the resistance.
If all the resistances are from 1 to 5 kΩ, it is normal.



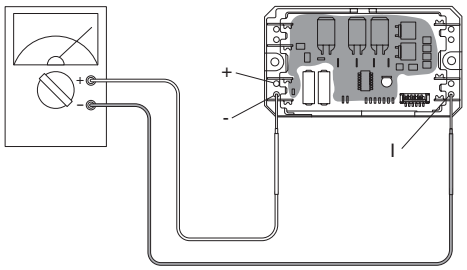
(d) By touching the + side of the tester to the L2 terminal of ACT module and the - side of the tester to the I terminal of ACT module, measure the resistance.
If all the resistances are from 50 to 200 kΩ, it is normal.



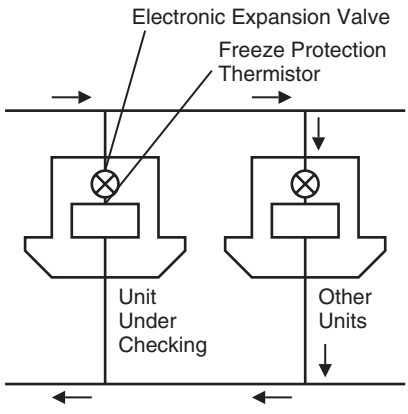
(e) By touching the - side of the tester to the L2 terminal of ACT module and the + side of the tester to the I terminal of ACT module, measure the resistance. If all the resistances are greater than 100 kΩ, it is normal.



(f) By touching the + side of the tester to the - terminal of ACT module and the - side of the tester to the I terminal of ACT module, measure the resistance. If all the resistances are less than 100 kΩ, it is normal.



(4) Checking Method of Electronic Expansion Valve

	Indoor Unit Electronic Expansion Valve	Outdoor Unit Electronic Expansion Valve
Locked with Fully Closed	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 Open		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.

2. SERVICING

2.1 Outdoor Unit

⚠WARNING

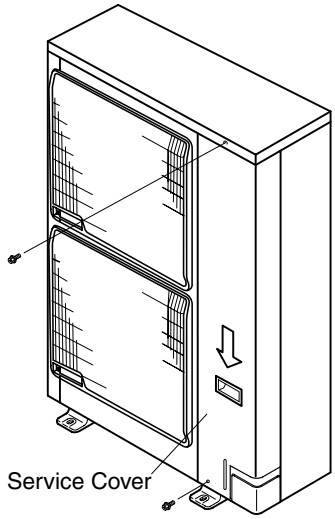
TURN OFF all power source switches.

2.1.1 Removing Service Cover

Remove the main parts according to the following procedures.
To reassemble perform the procedures in reverse.
To prevent contamination of the refrigerant with water or foreign particles, do not expose open to atmosphere for long periods.
If necessary, seal pipe ends using caps or tape.

Remove the two fixing screws (upper part 1, lower part 1), slide the service cover downward and remove.

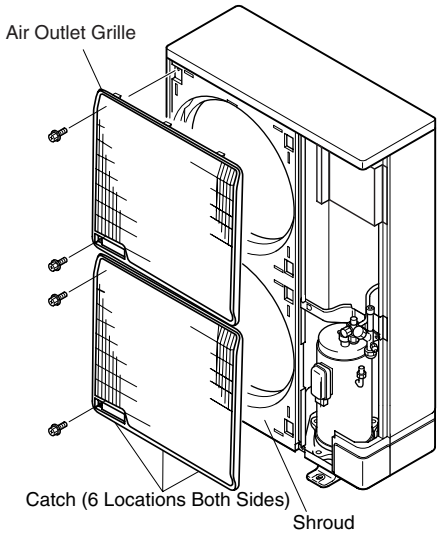
Tool	Phillips Screwdriver



2.1.2 Removing Air Outlet Grille

Remove the two (2) fixing screws of the shroud. Lift the air outlet grille holding the lower parts and unhook the extrusion (3 locations) of the air outlet grille from the shroud.

Tool	Phillips Screwdriver



⚠WARNING

TURN OFF all power source switches.

2.1.3 Removing Outdoor Fan

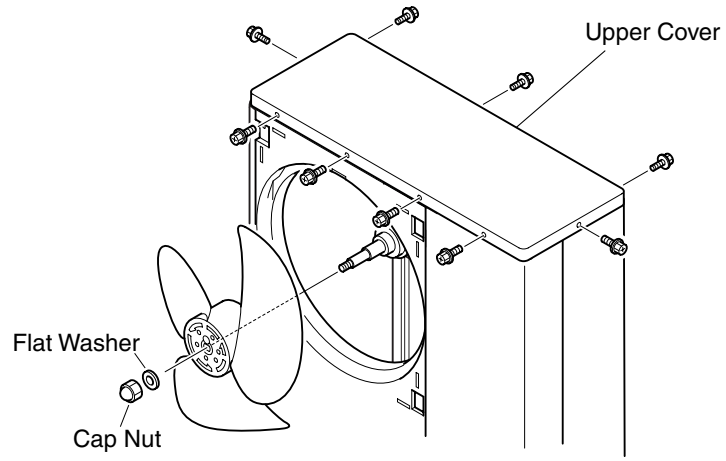
(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".**

(2) Remove the air outlet grille according to the item **2.1.2 "Removing Air Outlet Grille".**

(3) Remove the fans by removing the cap nuts and the flat washers fixing the propeller fans onto the motor shaft. If it is difficult to remove the fan, use pullers.

(4) Remove the eight (8) screws fixing the upper cover and remove the upper cover.

Tool	Phillips Screwdriver, Spanner, Adjustable Wrench or Puller



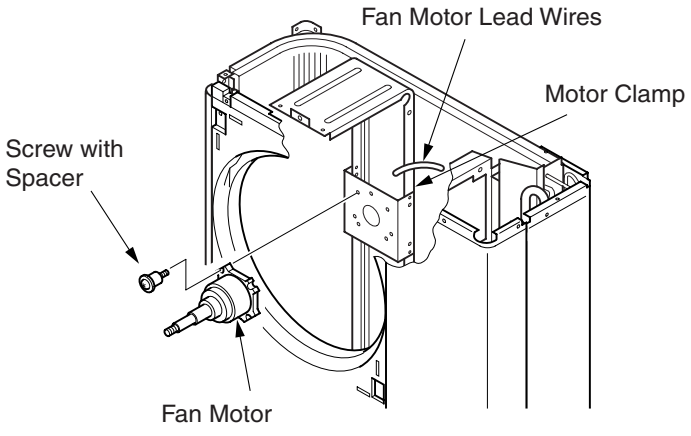
2.1.4 Removing Outdoor Fan Motor

(1) Disconnect the connectors for the motors in the electrical box.

(2) Cut the plastic tie of the motor clamp by using nipper.

(3) Remove the four (4) fixing screws for the motor.

Tool	Nipper, Phillips Screwdriver, Spanner, Adjustable Wrench or Puller



NOTES:

1. When mounting the motor, ensure the cables point directly downward. Fix the protection tube edge downward to ensure the water may not keep in it.
2. Fix the motor wires onto the motor clamp with a plastic tie to prevent them obstructing the propeller fans.
3. Mounting Propeller Fan
   Insert the skidding protection part of fan boss in accordance with the cutting part of the motor shaft, and fix the screw after exserting screw part of the shaft. (Tightening Torque of 8.0 N.m: 80kg.cm)
4. When connecting the motor wire, check to ensure that the colors of the connectors on the PCB are matched with wires.
5. Firmly fix the air outlet grille to the shroud.

⚠WARNING

TURN OFF all power source switches.

2.1.5 Removing Compressor

(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".** If the outdoor unit is installed close to a wall, disconnect the refrigerant pipe and move the outdoor unit away from the wall.

(2) Collect the refrigerant from the check joint.

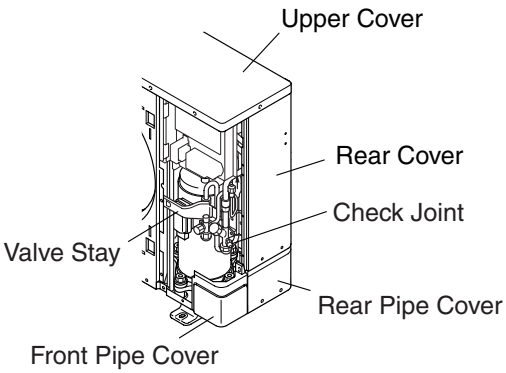
(3) Remove the valve stay.

(4) Open the soundproof cover of the compressor, remove the terminal cover for the compressor and disconnect the wiring from the compressor terminals.
NOTE:
Check to ensure each terminal Nos. when connecting the compressor power wires. If incorrectly connected, the compressor will fail due to reverse rotation.

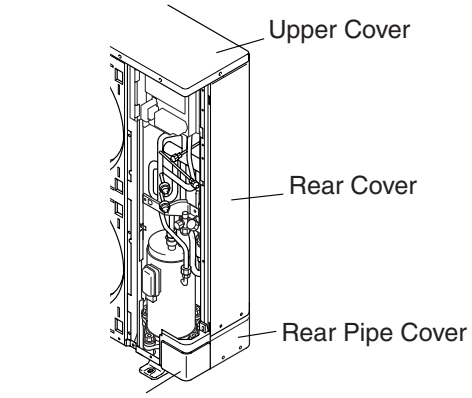
(5) Remove the soundproof cover, thermistor holder on the compressor and thermistor.

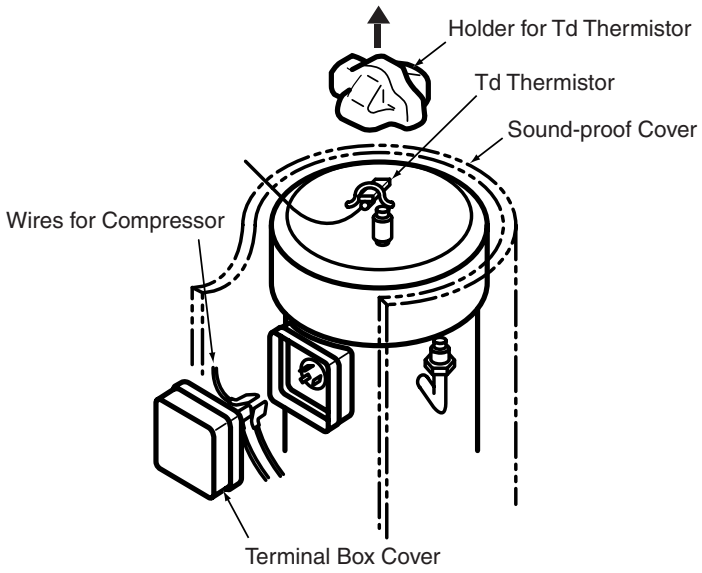
Tool	Phillips Screwdriver, Charge Hose, Adjustable Wrench (2)

●RAS-3HVRG and 4HVRG



●RAS-5HVRG





⚠WARNING

TURN OFF all power source switches.

(6) Disconnect the suction pipe from the compressor.

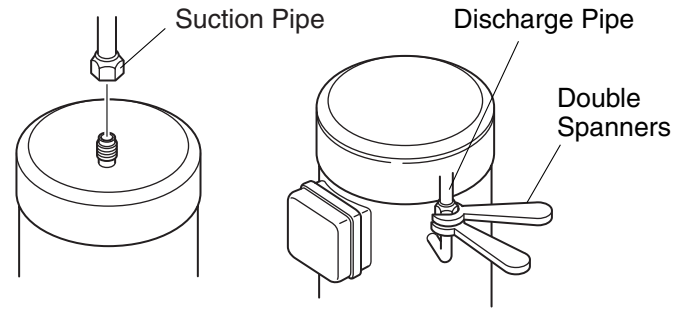
(7) Disconnect the discharge pipe from the compressor by using two spanners.

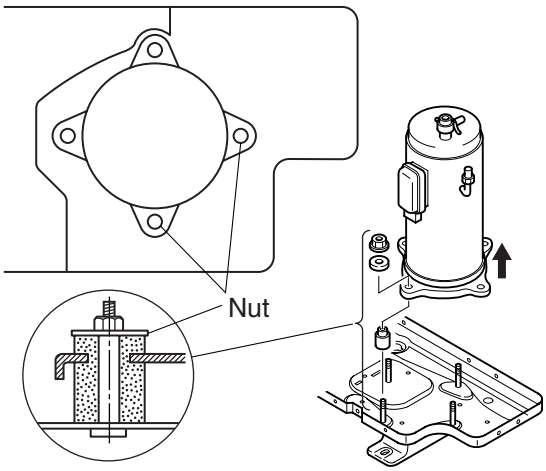
(8) Remove the two (2) nuts fixing the compressor and remove the compressor by lifting.

(a) Check to ensure that the faston terminals of the wires is normal. When a pulling force of 20N or more is required, it is normal.
If abnormal, replace the faston terminals with new ones.

(b) Check to ensure that wires are firmly fixed.

Tool	Phillips Screwdriver, Charge Hose, Adjustable Wrench (2)





NOTES:

1. To prevent contamination of the refrigerant with water or foreign particles, do not expose open pipes to atmosphere for long periods. If necessary, seal pipe ends using caps or tape.
2. Remove the caps for the new compressor just before replacing the compressor. Seal suction and discharge pipe using tape when mounting to prevent the foreign particles barge in the compressor.
3. Check to ensure each terminal Nos. when connecting the compressor power wires. If incorrectly connected, the compressor will fail due to reverse rotation.

⚠WARNING

TURN OFF all power source switches.

2.1.6 Removing High Pressure Switch and Pressure Switch for Control

(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".**

(2) Remove the nine (9) M5 screws fixing the rear cover and the five (5) M5 screws fixing the pipe rear cover. Slide the rear cover and pipe cover downward.

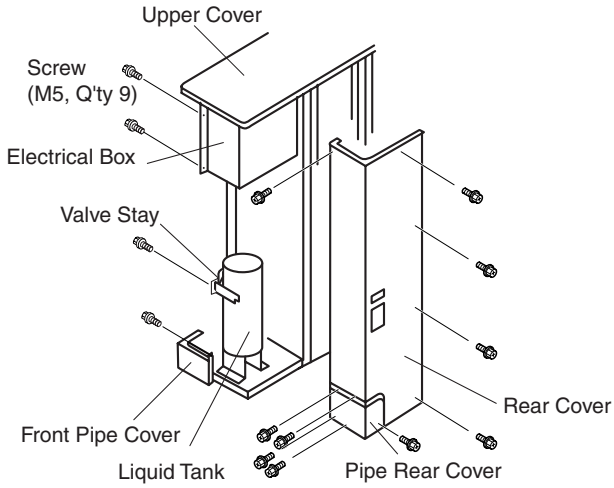
(3) Collect the refrigerant from the check joint according to the item **2.1.5 "Removing Compressor".**

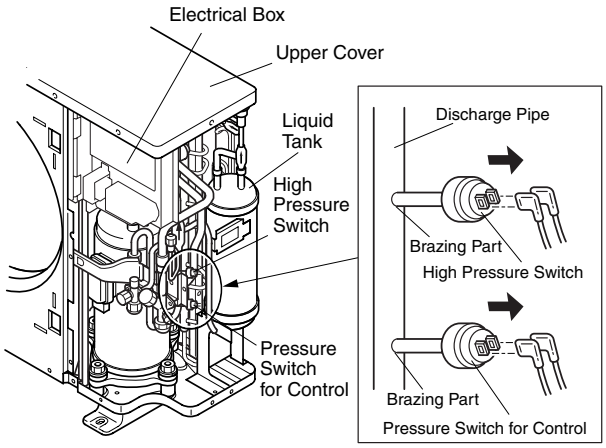
(a) Disconnect the fasten terminals.

(b) Remove the high pressure switch and pressure switch for control from the brazing part by a burner.

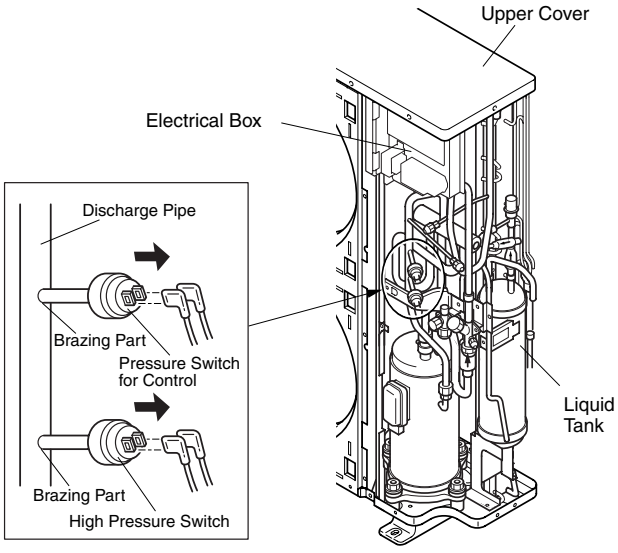
Tool	Phillips Screwdriver, Charge Hose, Burner

●RAS-3HVRG and 4HVRG





●RAS-5HVRG



⚠ WARNING

TURN OFF all power source switches.

2.1.7 Removing Coil for Reversing Valve

⚠ DANGER

Do not touch the electrical parts when LED201 (Red) on the ISPM is lit to prevent from an electrical shock.

(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".**

(2) ● RAS-3HVRG and 4HVRG

(a) Remove three (3) screws fixing the power plate and turn the one toward the front side.
NOTE:
Check to ensure that LED201 (Red) is OFF when turning the power plate.

(b) Disconnect the PCN6 on the PCB1 of the electrical box.

(c) Remove the coil for the reversing valve after removing the fixing screw (1 piece).

● RAS-5HVRG

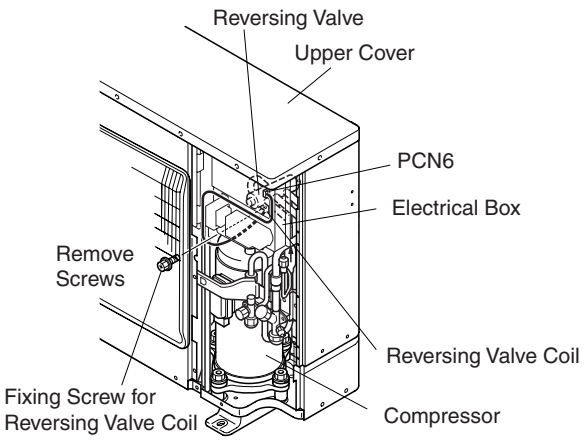
(a) Remove three (3) screws fixing the power plate and turn the one toward the front side.
NOTE:
Check to ensure that LED201 (Red) is OFF when turning the power plate.

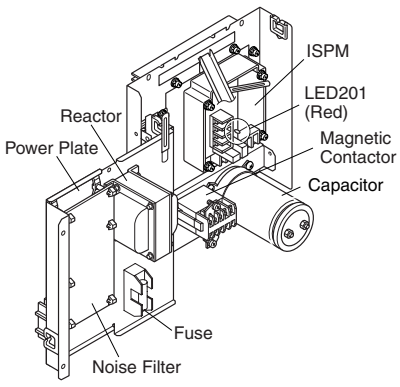
(b) Disconnect the PCN6 connector on the PCB1 of the electrical box.

(c) Remove the coil for the reversing valve after removing the fixing screw (1 piece).

Tool	Phillips Screwdriver

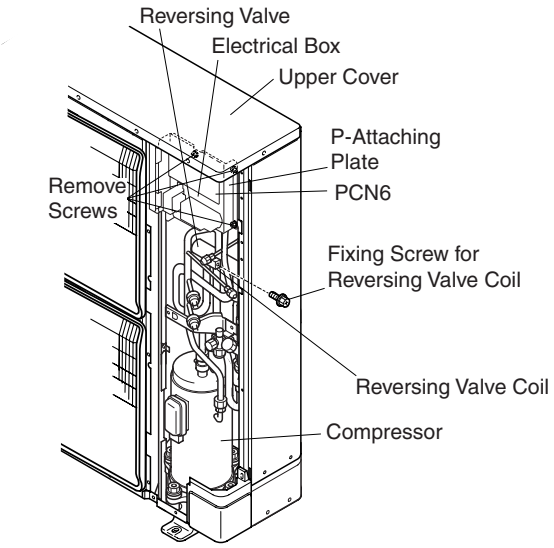
●RAS-3HVRG and 4HVRG

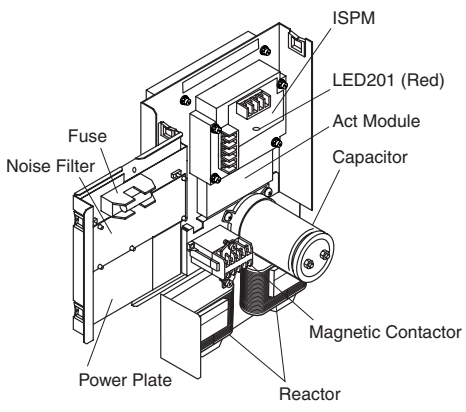




In Case of 3HP and 4HP

●RAS-5HVRG





In Case of 5HP

⚠ WARNING

TURN OFF all power source switches.

2.1.8 Removing Coil for Expansion Valve

⚠ DANGER

Do not touch the electrical parts when LED201 (Red) on the ISPM is lit to prevent from an electrical shock.

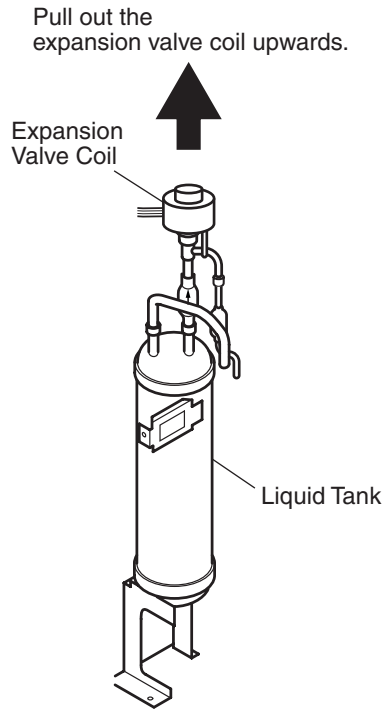
(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".**

(2) Remove the three (3) screws fixing the electrical box and turn the power plate toward the front side as shown in the item **2.1.7 "Removing Coil for Reverse Valve".**
NOTE:
Check to ensure that LED201 (Red) is OFF when turning the power plate.

(3) Disconnect the CN5A connector on the PCB1 of the electrical box.

(4) Pull out the coil for expansion valve on the liquid tank upwards.

Tool	Phillips Screwdriver, Spanner



⚠ WARNING

TURN OFF all power source switches.

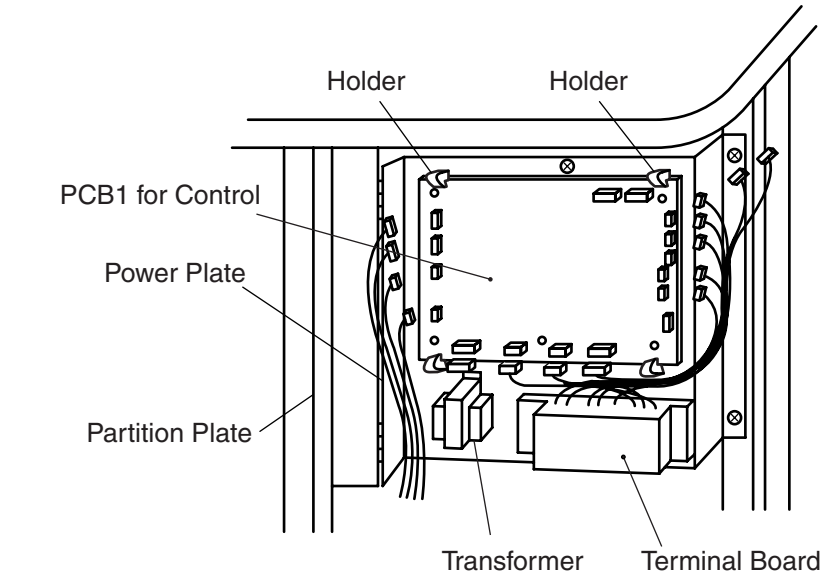
2.1.9 Removing Printed Circuit Board (PCB1)

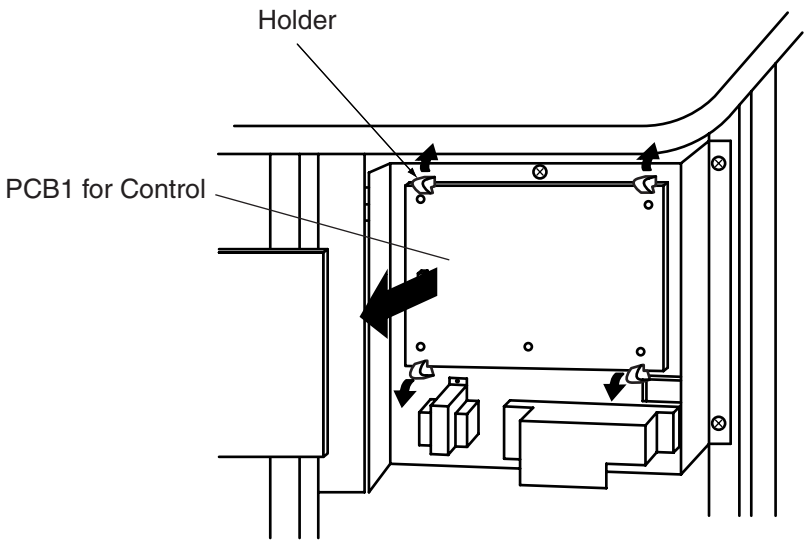
⚠ DANGER

Do not touch the electrical components.
When handling the PCB1, take care of not to use excessive force as this will cause damage.

(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".**
(2) Disconnect all the connectors connected to the PCB1.
(3) Pull out the PCB1 from the power plate by unhooking the extrusion parts.

Tool	Phillips Screwdriver, Long-Nose Pliers





⚠WARNING

TURN OFF all power source switches.

2.1.10 Removing ISPM and ACT Module

⚠DANGER

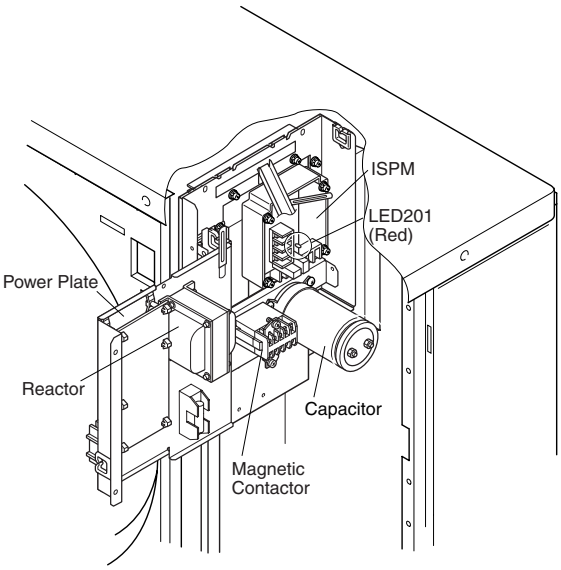
Do not touch the electrical parts when LED201 (Red) on the ISPM is lit to prevent from an electrical shock.

(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".**

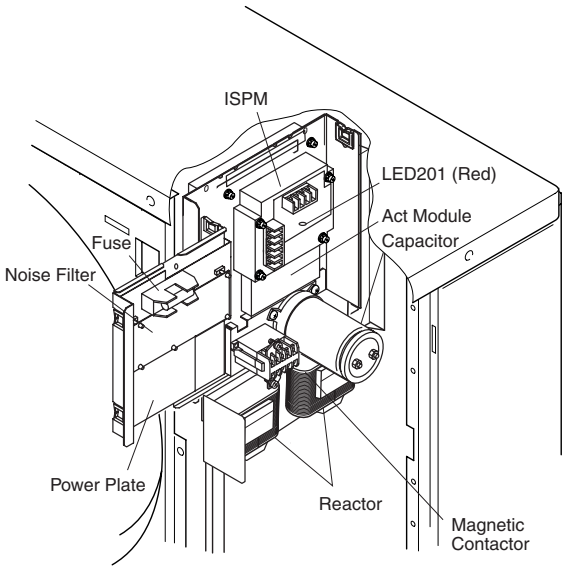
(2) Remove the three (3) screws fixing the electrical box and turn the power plate toward the front side.
NOTE:
Check to ensure that LED201 (Red) is OFF when turning the power plate.

Tool	Phillips Screwdriver, Spanner

●RAS-3HVRG and 4HVRG



●RAS-5HVRG



NOTES:

1. Identify terminal Nos. with the mark band Nos. when reassembling. If incorrectly connected, malfunction or damage to the electrical parts will occur.
2. When changing the PCB, ensure to set all the dip switches to the same configuration as the original.

⚠ WARNING

TURN OFF all power source switches.

(3) Disconnect all wires connecting to the ISPM.
- Disconnect CN201, CN202, PCN201, PCN202 (Wire for Fan Motor)
- Disconnect CN203, CN204, CN206, CN101 (5HVRG only)
- Disconnect RB, N, P, P1 and R, S, U, V, W on the terminal board and the faston terminal TB3 of ISPM.

(4) Remove the four (4) screws fixing the ISPM.

NOTE:
Do not hold the PCB on the ISPM when removing the ISPM.
When handling the PCB, take care of not to use
excessive force as this will cause damage.

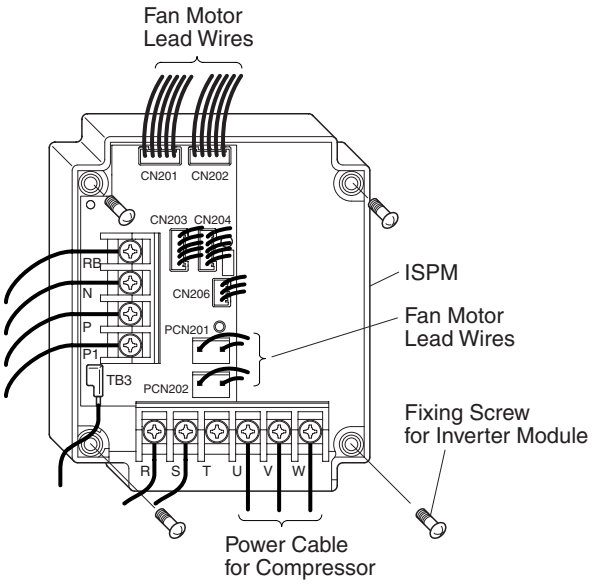
(5) Disconnect all wires connecting to the ACT module.
- Disconnect CN101
- Disconnect the faston terminal L1, L2, P, N1, + and - of ACT module.

(6) Remove the two (2) screws fixing the ACT module.

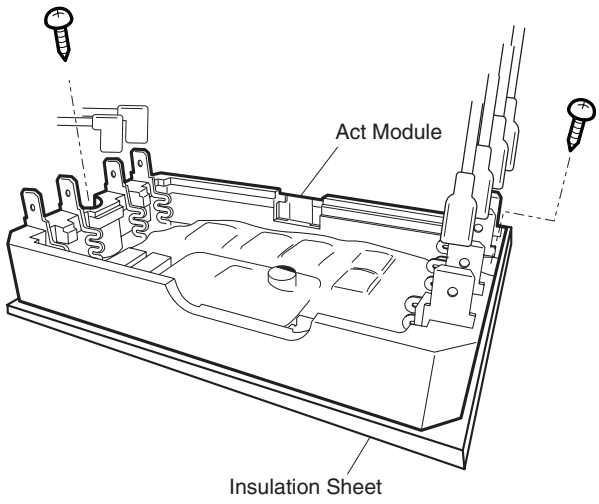
NOTES:
1. Do not remove the insulation part from the screw after removing the screws.
2. Do not lose the insulation sheet between ACT module and fin.

Tool	Phillips Screwdriver, Long-Nose Pliers

● ISPM



● ACT Module



NOTES:
1. Identify terminal Nos. with the mark band Nos. when reassembling. If incorrectly connected, malfunction or damage to the electrical parts will occur.
2. In the case of mounting ACT module, check the insulation sheet does not have any hole and insulation tube attach to the fixing screw.
3. Pay attention not to clamp the wires when close the power plate.

⚠WARNING

TURN OFF all power source switches.

2.1.11 Removing Electrical Components

⚠DANGER

Do not touch the electrical parts when LED201(Red) is on the ISPM is lit to prevent from an electrical shock.

(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".**

(2) Remove three (3) screws fixing the electrical box and turn the power plate toward the front side.
NOTE:
Check to ensure that LED201 (Red) is OFF when turning the power plate.

(3) Removing Other Electrical Components

(a) Remove the wire connecting to the capacitor.
NOTE:
Capacitor has polarity (+ and -), check to ensure each terminal No..

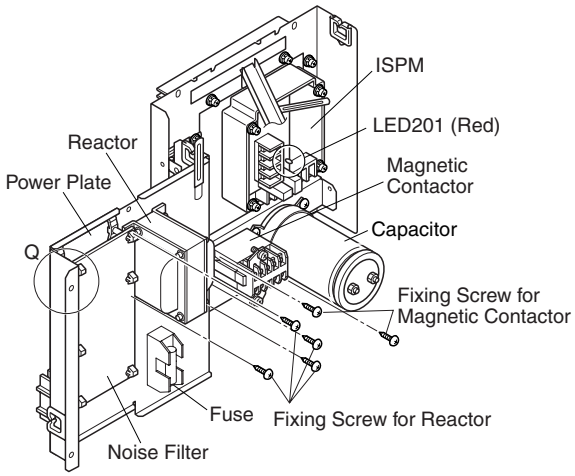
(b) Disconnect the wire connecting to the magnetic contactor.
Remove the magnetic contactor by removing two (2) screws.

(c) Remove the reactor by removing four (4) screws. (In case of 5HP the screws are eight.)

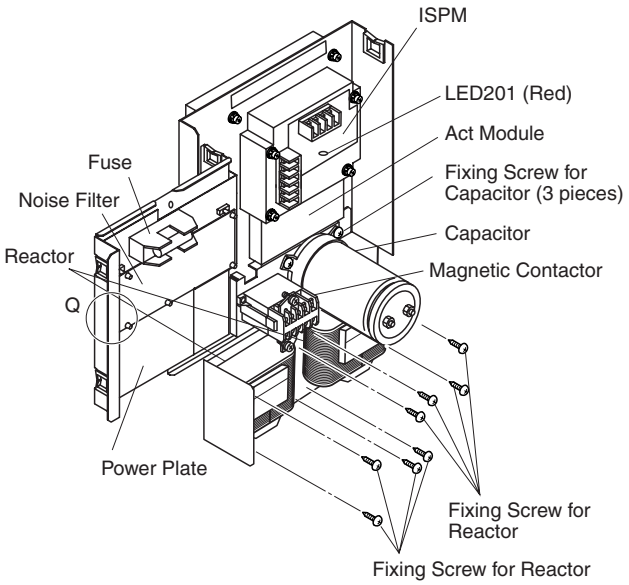
(d) Disconnect the wire connecting to the noise filter.
Remove the noise filter by holding the expanded part of the holders (6 pcs.) with long-nose pliers.
NOTE:
When reassembling, identify terminal Nos. with the mark band Nos.

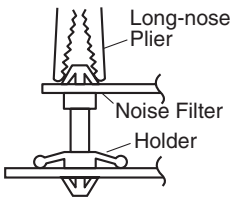
Tool	Phillips Screwdriver, Long-Nose Pliers

●RAS-3HVRG and 4HVRG



●RAS-5HVRG



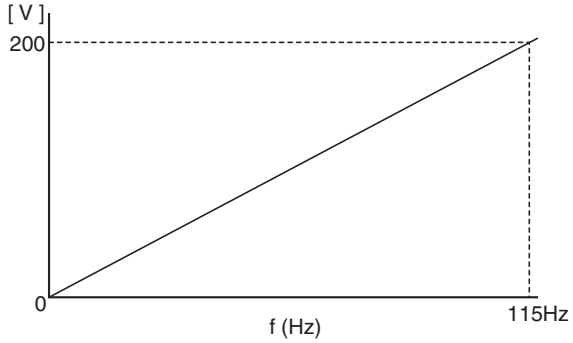
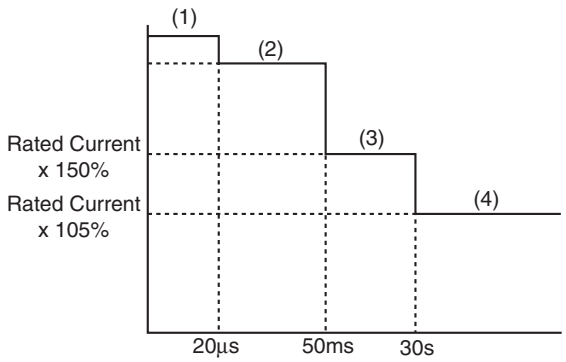


Details of Q

3. MAIN PARTS

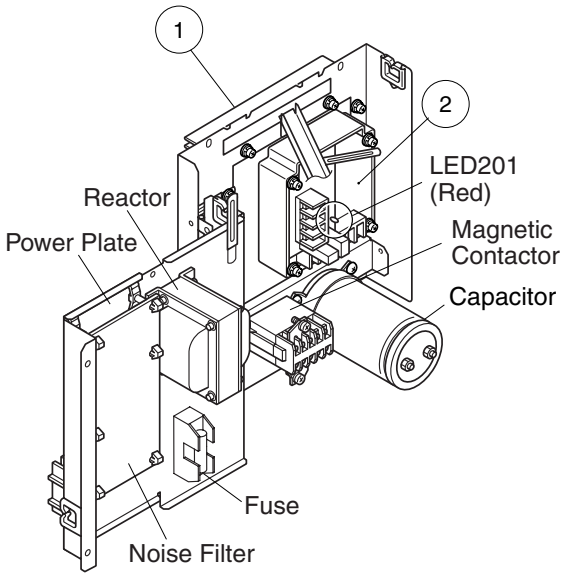
3.1 Inverter

3.1.1 Specifications of Inverter

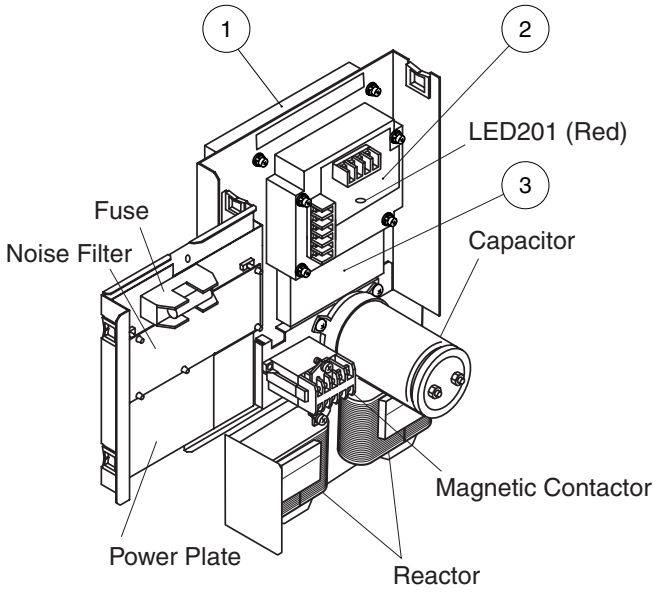
Applicable Model	RAS-3HVRG, RAS-4HVRG, RAS-5HVRG
Applicable Power Source	1 Phase, 220V, 240V 50Hz/220V 60 Hz
Output Voltage (Maximum)	200V, 3 Phase
Output Current (Maximum)	14.5/16/24.5 (3HVRG/4HVRG/5HVRG)
Control Method	Vector Control
Range Output Frequency	25 to 115Hz
Accuracy of Frequency	0.01Hz at Applicable Frequency Range
Controlled Frequency	1Hz
Output / Characteristics	 Characteristics are general idea.
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 194V DC Excessive High Voltage at a voltage is higher than 440V DC
Abnormality of Current Sensor (0A Detection)	Stoppage at a current of compressor smaller than 1.5A. When the frequency is 15 to 18Hz after starting. Cause of Abnormality: Failure of Current Sensor Failure of ISPM Failure of Compressor Disconnected Wiring
Protection Function Overcurrent Protection for Inverter	 (1) Short-Circuit Trip of Arm (2) Instantaneous Overcurrent Trip } Internal Protection of ISPM (3) Instantaneous Overcurrent Trip (4) Electronic Thermal Trip Condition is maintained longer than 30 seconds or accumulated longer than 3 minutes during 10 minutes sampling time.
Protection of ISPM	ISPM 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 the maximum rated current. (3) Temperature is measured by internal thermistor increases excessively. (4) Control voltage decreases excessively.
Overload Control	Overload control as a current greater than (Rated Current X105%). Overload control release at a current smaller than (Rated Current X 88%).
Fin Temperature Decrease	The unit is stopped when the ISPM temperature is higher than 100°C.
Earth Detection	The unit is stopped when the compressor is earthing.

3.1.2 Arrangement of Inverter Power Unit

RAS-3HVRG and RAS-4HVRG



RAS-5HVRG



No.	Parts	Model
1	Fin (mm)	-
2	ISPM	HS17A1F06 (3HP and 4HP), HF30A1F06 (5HP)
3	ACT Module	LACT33020B

3.2 AC Chopper

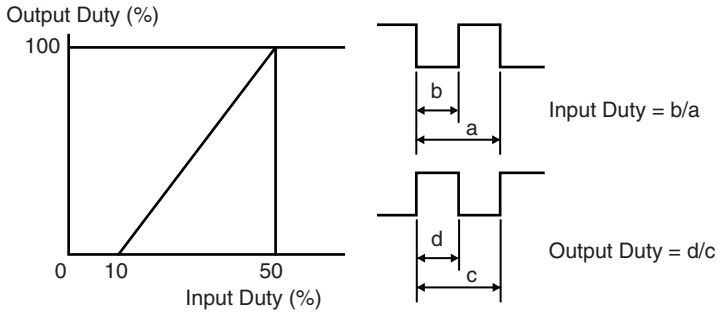
Reduction of Electromagnetic Sound
Fan Motor Control by AC Chopper:
Lower electromagnetic sound and vibration have been achieved by AC Chopper control than thyristor control.

AC Chopper Control

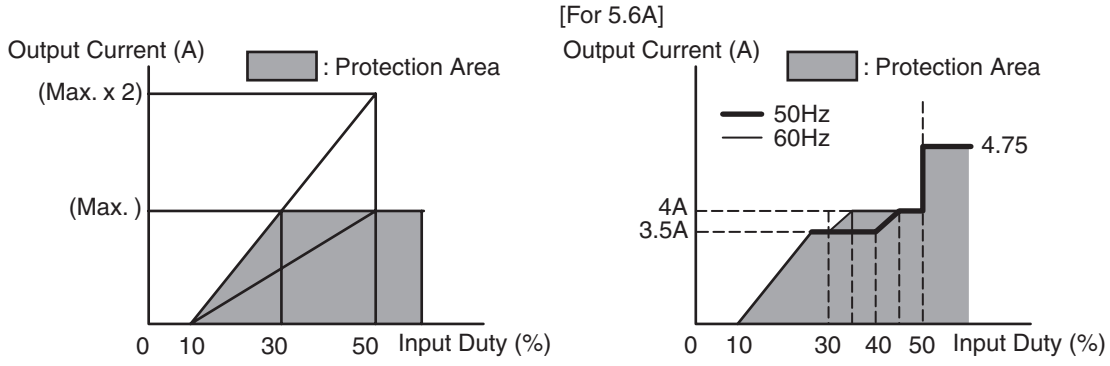
Concept of Fan Speed Control
The voltage applied to the fan motor is controlled by chopping (ON/OFF) the power supply voltage at a frequency of 20kHz.

Features
- Sinusoidal Wave Pattern and Remarkable Low Level of Electromagnetic Sound
- No Generation of Harmonic Current

(1) Specifications

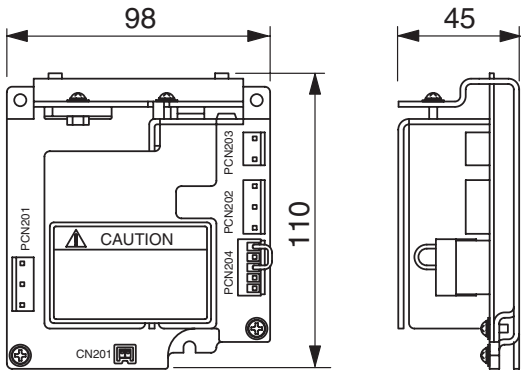
Rated Current of AC Chopper	2.1A	5.6A
Applicable Power Source	Single Phase 220/240V + 10% 50/60Hz	
Output Voltage	Single Phase 220/240V + 10%	
Output Current (Maximum)	2.1A	5.6A
Control Method	AC Chopper Control	
Chopping Frequency	20kHz ± 20%	
Input Duty Signal	100kHz ± 5% Current 2 to 8mA ± 10%	
Accuracy of Output Voltage	± 6%	
Output/Characteristics		
Soft Start	Input Duty: 10%/s	
Overcurrent Protection Method	Current Limiter	
Overcurrent Setting (Minimum)	2.1A	5.6A

Overcurrent Protection Area

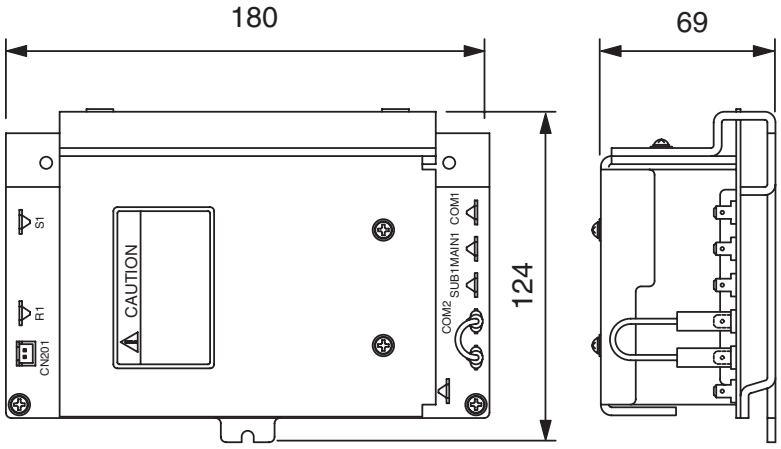


(2) Structure

a. 2.1A (For Indoor Units: RCD, RPC and RPI (2.5HP) Models)

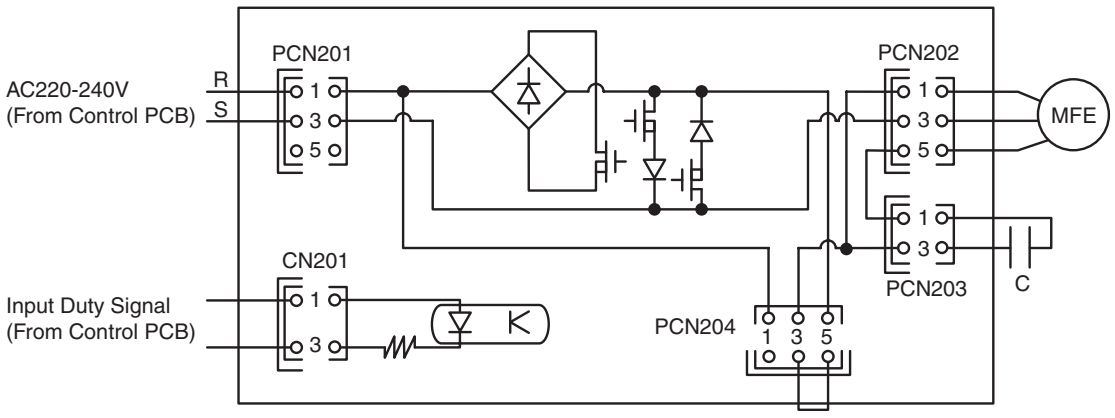


b. 5.6A (For Indoor Units: RPI (3.0 to 5.0HP) Models)

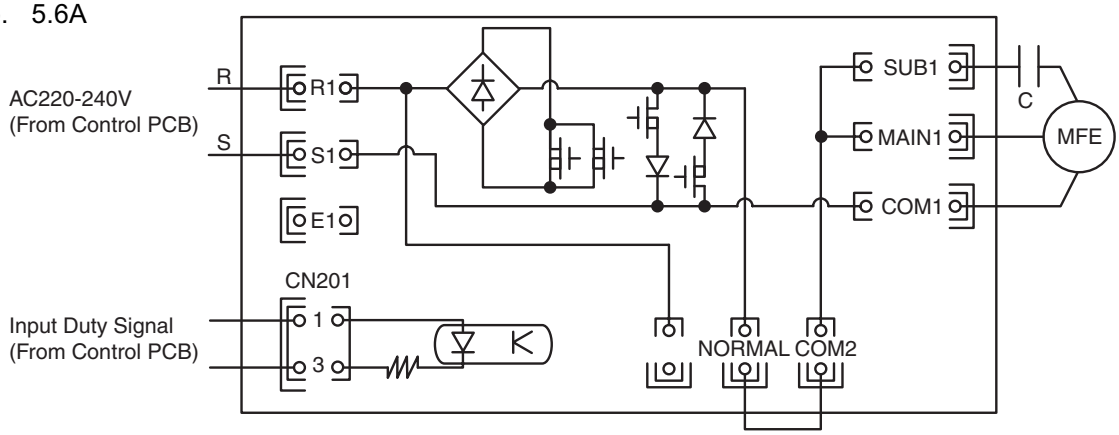


(3) Circuit Diagram (Outline)

a. 2.1A



b. 5.6A



3.3 Auto-Louver Mechanism

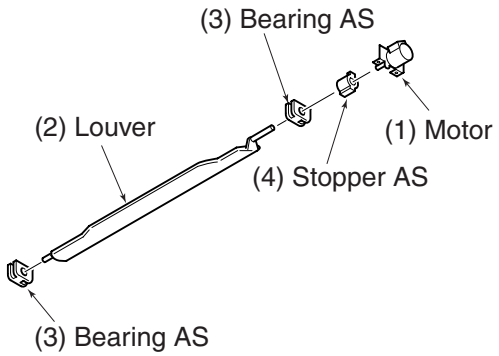
3.3.1 4-Way Cassette Type

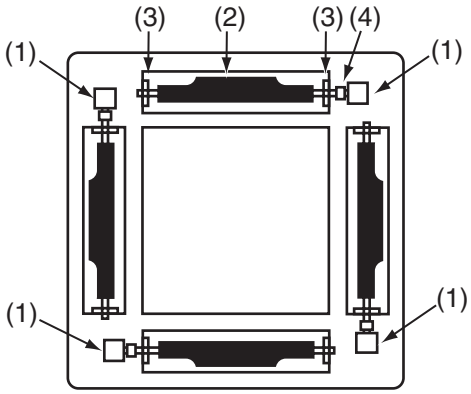
(1) Auto-Louver Operation

The louvers of the optional air panel with auto-louver swing simultaneously by four drive motor. The parts of the auto-louver mechanism are shown below.

The motor (1) is installed to the louver directly. The louver (2) is operated by rotating the motor.
Four pieces of the motor (1) are installed to the unit and rotated simultaneously.

No.	Part Name	No.	Part Name
1	Motor	3	Bearing
2	Louver	4	Stopper AS





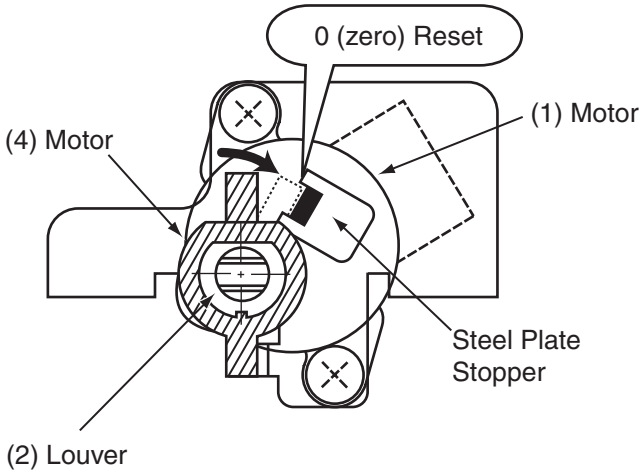
(2) Auto-Louver Stoppage

Press the "AUTO LOUVER" of the remote control switch during auto-louver operation.

The AS stopper of the louver (2) touches the steel plate stopper, and the louver is reset to the 0 position.

The power supply for the motor (1) is turned OFF when the louver is at the setting position.

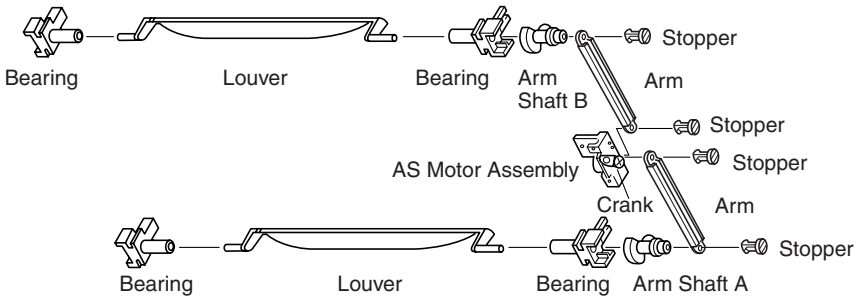
The louver is stopped at the setting position.



3.3.2 2-Way Cassette Type

(1) Auto-Louver Operation

The louvers of the optional air panel with auto-louver swing simultaneously by a drive motor. The parts of the auto-louver mechanism are shown below.



The principle of the auto-louver mechanism is as follows;
The motor (1) rotates, the crank (2) fixed to the shaft of the motor (1) rotates, the rotating torque is changed at the arm (3) and transmitted to the arm shaft A (4) and the arm shaft B (5).
The circular reciprocating force gives the driving force to the louver (6) and rotates the louver.

No.	Part Name	No.	Part Name
1	Motor	5	Arm Shaft B
2	Crank	6	Louver
3	Arm	7	Fixing Plate of Motor
4	Arm Shaft A		

(2) Auto-Louver Stoppage

Press the "AUTO LOUVER" of the remote control switch during auto-louver operation.

↓

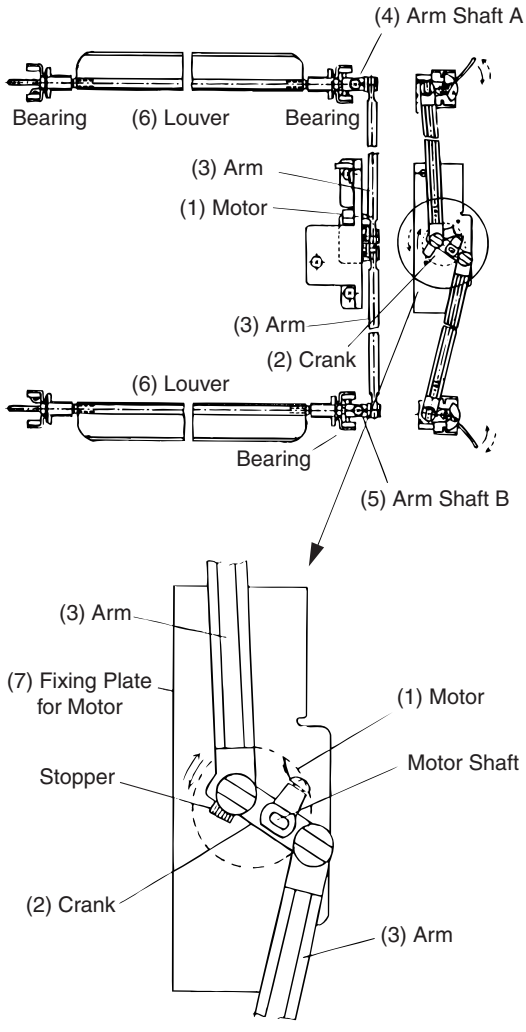
The crank (2) touches the stopper of the fixing plate of motor (7), and the louver is reset to the 0 position.

↓

The power supply for the motor (1) is turned OFF when the louver is at the setting position.

↓

The louver (6) is stopped at the setting position.



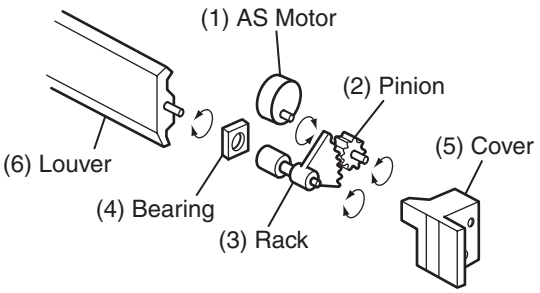
3.3.3 Ceiling Type

(1) Auto-Louver Operation

The louvers of the optional air panel with auto-louver swing simultaneously by a drive motor.

The parts and the principle of the auto-louver mechanism are shown in the right figure.

The AS motor (1) rotates, the pinion (2) fixed to the shaft of the AS motor (1) rotates, the rotating torque is changed at the rack (3) and the circular reciprocating force gives the driving force to the louver (4) and rotates the louver.



(2) Auto-Louver Stoppage

Press the "AUTO LOUVER" of the remote control switch during auto-louver operation.

↓

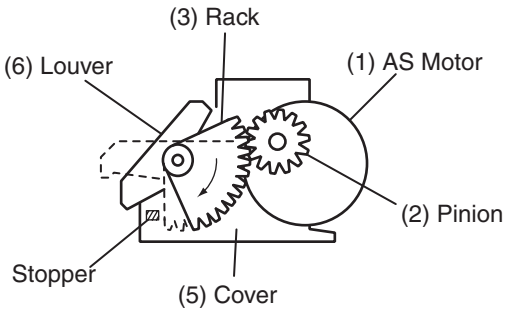
The rack (3) touches the stopper of the cover (6), and the louver is reset to the 0 position.

↓

The power supply for AS motor (1) is turned OFF when the louver is at the setting position.

↓

The louver (4) is stopped at the setting position.



3.4 Scroll Compressor

3.4.1 Reliable Mechanism for Low Vibration and Low Sound

(1) The rotating direction is definite.

(2) The pressure inside of the chamber is high pressure, and the surface temperature of the chamber is 60°C to 110°C.

3.4.2 Principle of Compression

(1) The gas is inhaled from the inlet port at the outer frame of the fixed scroll.

↓

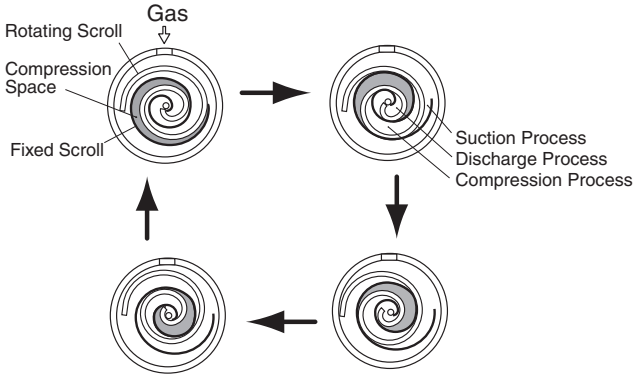
(2) The gas inside of the compression space is compressed toward the center of the scroll.

↓

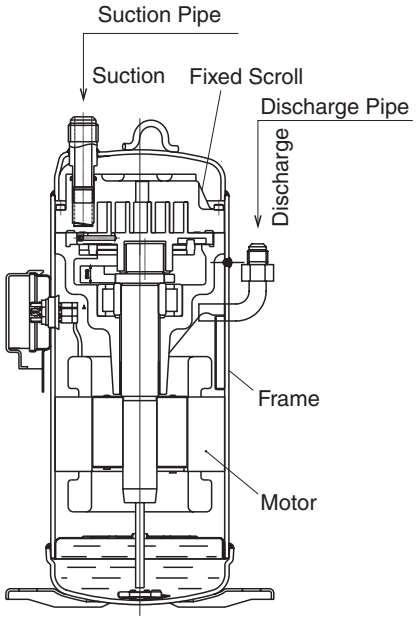
(3) The compression space is minimum at the center of the scroll, and the gas compressed at the maximum is discharged from the outlet port of at the center of the scroll.

↓

(4) The above procedures (Suction → Compression → Discharge) is repeated continuously.



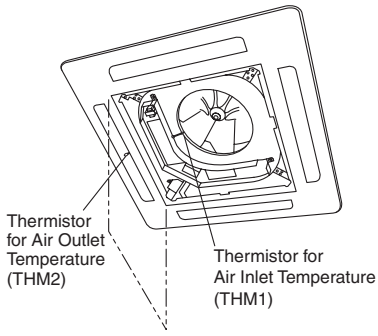
3.4.3 Structure

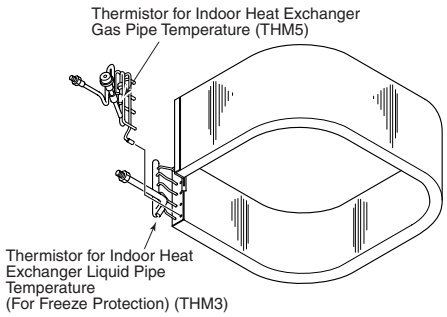


3.5 Thermistor

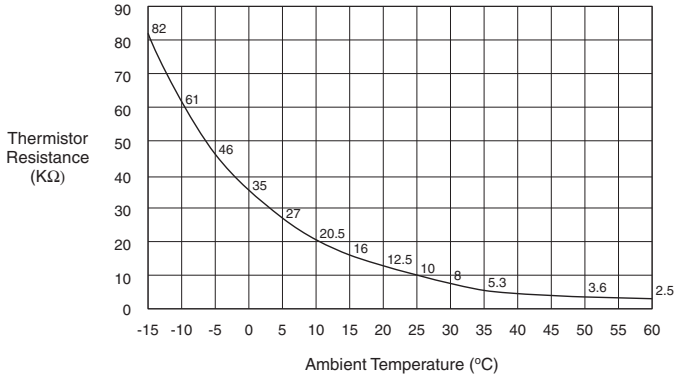
3.5.1 Thermistor for Indoor Unit

(1) Position of Thermistor (In Case of 4-Way Cassette Type)





(2) Thermistor for Indoor Suction Air Temperature (For Room Temperature Control)
The room temperature is controlled by the thermistor for indoor suction air temperature detecting the temperature at the suction air inlet of the indoor unit.
The setting temperature is indicated on the L.C.D. of the remote control switch by number.
Adjust the setting temperature for prevention from excessive cooling and heating.
It is recommended to set the temperature as follows;
Economical Cooling Operation: 27°C to 29°C / Economical Heating Operation: 18°C to 20°C
The resistance characteristics of thermistor is shown in the above figure.



Thermistor Characteristics

ATTENTION:
The thermo-off value of the indoor unit air inlet thermistor is set at the temperature higher than the value indicated on the remote control switch by 4°C and the maximum is 30°C, because the suction air temperature during heating operation has a tendency to become higher than that of the occupied zone, intending comfortable heating operation.

(3) Thermistor for Indoor Discharge Air Temperature (For Discharge Air Temperature Control)
The thermistor for indoor discharge air temperature is utilized for the control of prevention from cold air discharge in heating operation, etc.
The resistance characteristics of thermistor is shown in the above figure.

(4) Thermistor for Liquid Pipe Temperature of Indoor Heat Exchanger

When the temperature of the heat exchanger is below 0°C, thermostat is turned OFF automatically and over 14°C, thermostat is turned ON again.	⇒	Prevention from freezing onto the heat exchanger in COOL and DRY operation.

The resistance characteristics of thermistor is shown in the above figure.

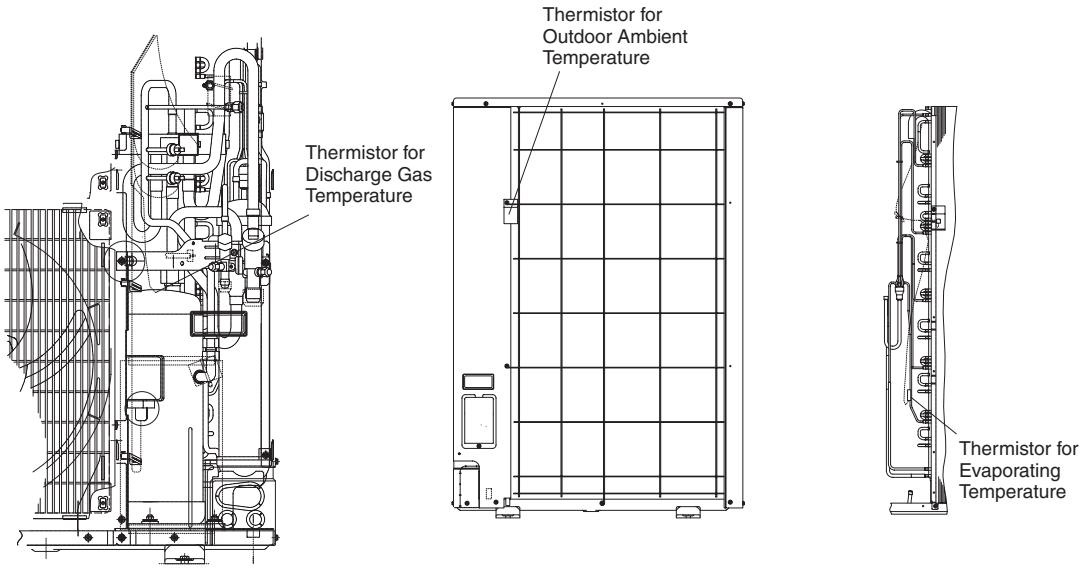
(5) Thermistor for Gas Pipe Temperature of Indoor Heat Exchanger

When the temperature of the heat exchanger is below 0°C, thermostat is turned OFF automatically and over 14°C, thermostat is turned ON again.	⇒	Prevention from freezing onto the heat exchanger in COOL and DRY operation.

The evaporating temperature in heating operation is detected.
The resistance characteristics of thermistor is shown in the above figure.

3.5.2 Thermistor for Outdoor Unit

(1) Position of Thermistor

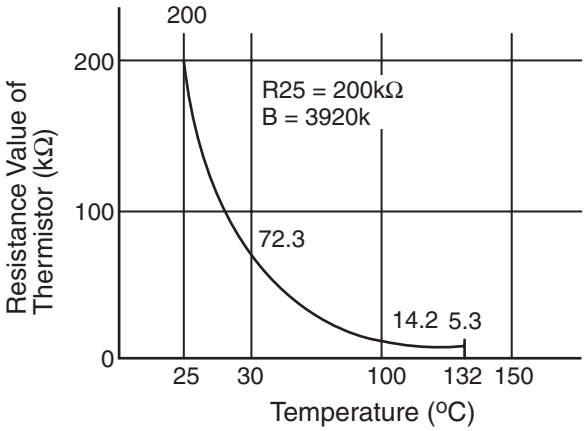


(2) Thermistor for Upper Part Temperature of Compressor
(For Prevention of Discharge Gas Overheating)

a. A thermistor for the upper part temperature of the compressor 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 upper part temperature of compressor increases during heating operation, the unit is controlled according to the following method.



Resistance Characteristics of Thermistor for Discharge Gas Overheating Protection

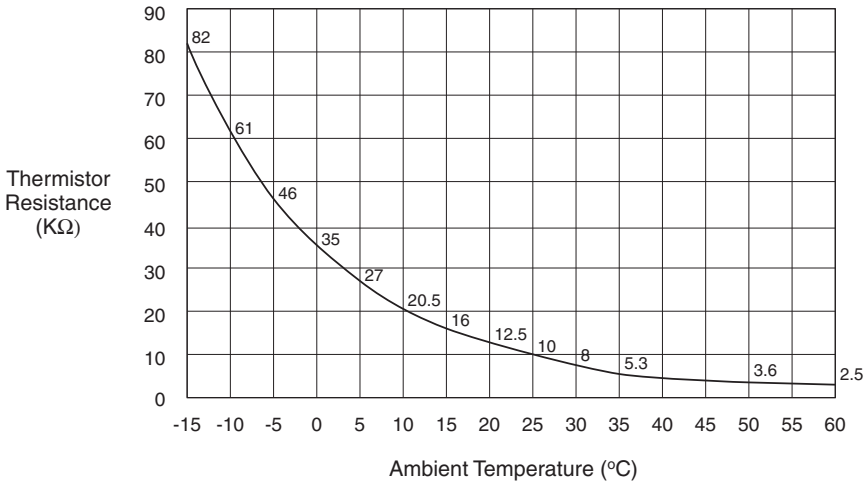
- An electronic expansion valve of indoor units and high pressure refrigerant is returned to the compressor through the accumulator, decreasing compressor temperature.
- If the compressor upper part temperature increases exceeding 132°C even if an electronic expansion valve opens, the compressor is stopped, in order to protect the compressor.
In cooling operation, the above function is also available.

d. If compressor upper part temperature increases excessively, the protection control is activated and the compressor is stopped according to the following method.

Operation	Upper Part Temperature of Compressor	Defecting Period
Cooling	Over 127°C	10 minutes (Continuously)
	Over 140°C	5 seconds (Continuously)
Heating	Over 120°C	10 minutes (Continuously)
	Over 140°C	5 seconds (Continuously)
Defrosting	Over 120°C	5 seconds (Continuously)

(3) Thermistor for Outdoor Ambient Temperature
The thermistor resistance characteristics are shown in the figure below.

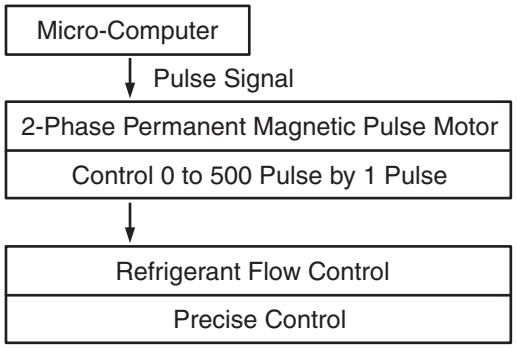
(4) Thermistor for Evaporating Temperature of Outdoor Unit in Heating Operation (For Defrosting)
The characteristics for the thermistor is the same with the value of outdoor ambient temperature thermistor as shown in the figure below.

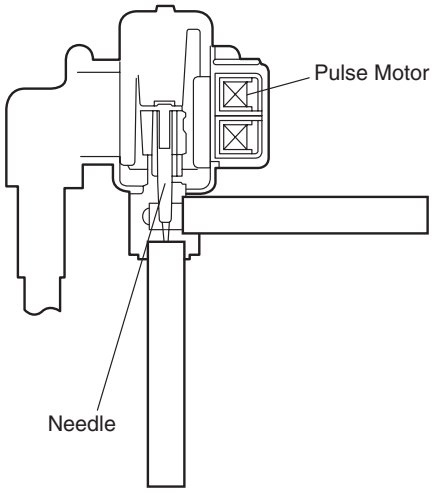


Thermistor Characteristics

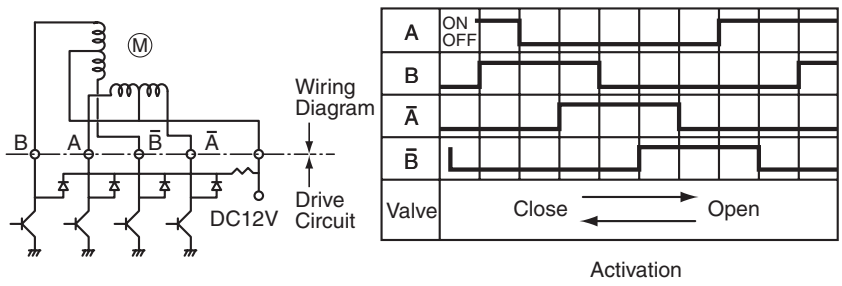
3.6 Electronic Expansion Valve

3.6.1 Electronic Expansion Valve for Outdoor Units

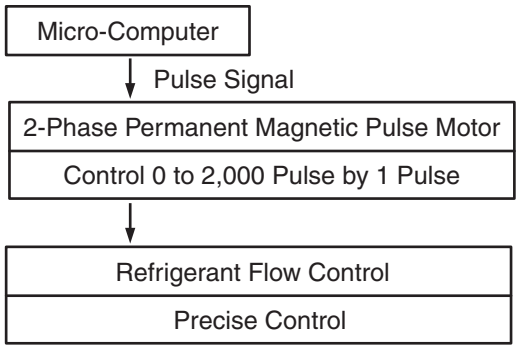


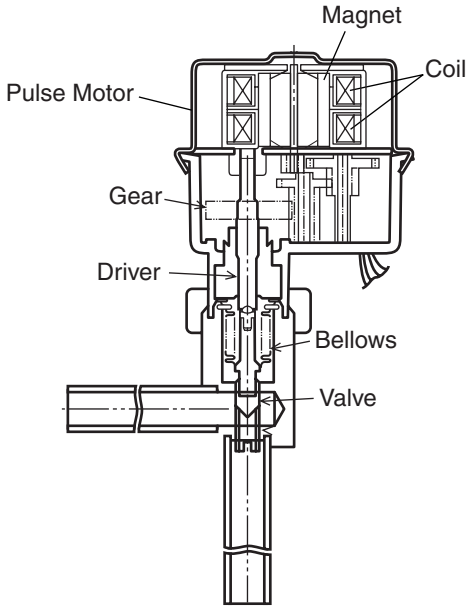


Specifications

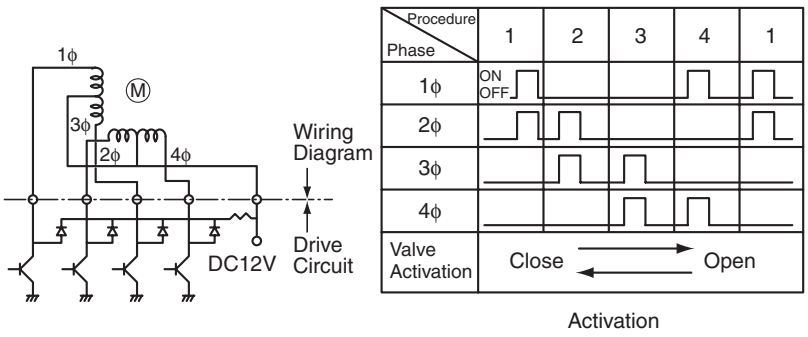
Items	Specifications
Type	EKV Series or CAM Series
Refrigerant Used	R22 or R407C
Working Temperature Range	-30°C to 65°C/ -30°C to 60°C (Operating Time of Coil: less than 50%)
Mounting Direction	Drive Shaft in Vertical Direction within an Angle of 45° as Maximum
Flow Direction	Reversible
Drive Method	4-Phase Pulse 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°C)
Wiring Diagram, Drive Circuit and Activation Mode	

3.6.2 Electronic Expansion Valve for Indoor Units





Specifications

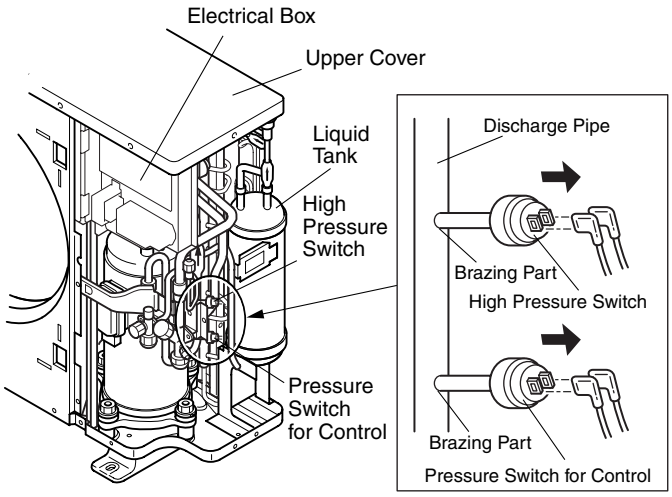
Items	Specifications
Type	EDM Type
Refrigerant Used	R22 or R407C
Working Temperature Range	-30°C to 70°C (With Coils Not Electrified)
Mounting Direction	Drive Shaft in Vertical Direction, Motor Upside and 90° in Four Direction
Flow Direction	Reversible
Rated Electricity	
Drive Method	4-Phase Pulse Motor Method
Rated Voltage	DC12V±1.2V
Drive Condition	100Ω±250PPS (Pulse Width Over 3mm) 2 Phase Excitation
Coil Resistance (1 Phase)	150±10% (at 20°C)
Wiring Diagram, Drive Circuit and Activation Mode	

3.7 High Pressure Switch and Pressure Switch for Control

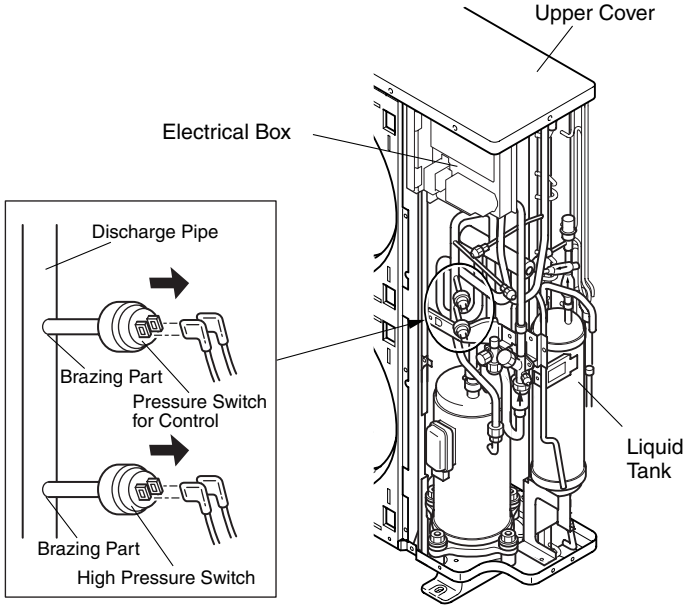
(1) High Pressure Switch (for Protection)
When the discharge pressure reaches 3.3Mpa, compressor is stopped to protect the refrigerant cycle components.

(2) Pressure Switch for Control
When the discharge pressure reaches 2.75MPa during heating operation, gas by-pass control or fan control are performed.

●RAS-3HVRG and 4HVRG



●RAS-5HVRG



4. FIELD WORK INSTRUCTION

4.1 Overheating in Case of Using PC-5H

Question and Answer for Field Work

Example 1: Overheating in Case of Using PC-5H

[Phenomenon]

After test run, indoor temperature increases more than 30°C even if the setting temperature is 20°C.

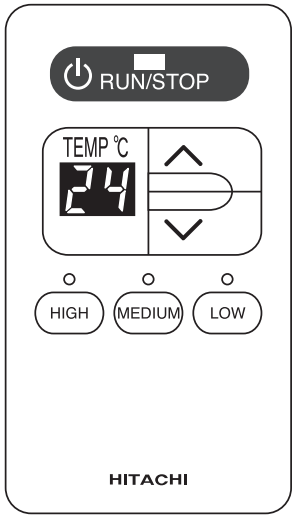
[Cause]

Test running is performed from the outdoor unit, the operation mode at the test running is memorized.

[Countermeasure]

In such case, perform the self checking and initialize the memory by following procedure.

1. Depress "Λ", "V", "High" and "Medium" simultaneously.
2. 7-segment and LED will be lit.
3. Depress all the touch type switches one by one.
4. 7-segment indicates "***Ou***".
5. Transmission check will be performed.
6. After 3 seconds, 7-segment indicates "***77***" (for Main Unit) or "***88***" (for Sub Unit) or "***EE***" (Abnormal).
7. After 3 seconds, voltage check will be performed.
8. After 3 seconds, 7-segment indicates "***AA***" (Normal) or "***EE***" (Abnormal).
9. After 3 seconds, automatically indicates "***5***", "***4***", "***3***", ... (Count Down).
10. Depress "Λ" before "***0***" is appeared.
11. If the temperature setting become 25 deg. and all the LEDs are turned OFF, initial condition is set.



4.2 Alarm 36

Question and Answer for Field Work

Example 2: Alarm 36

[Phenomenon]

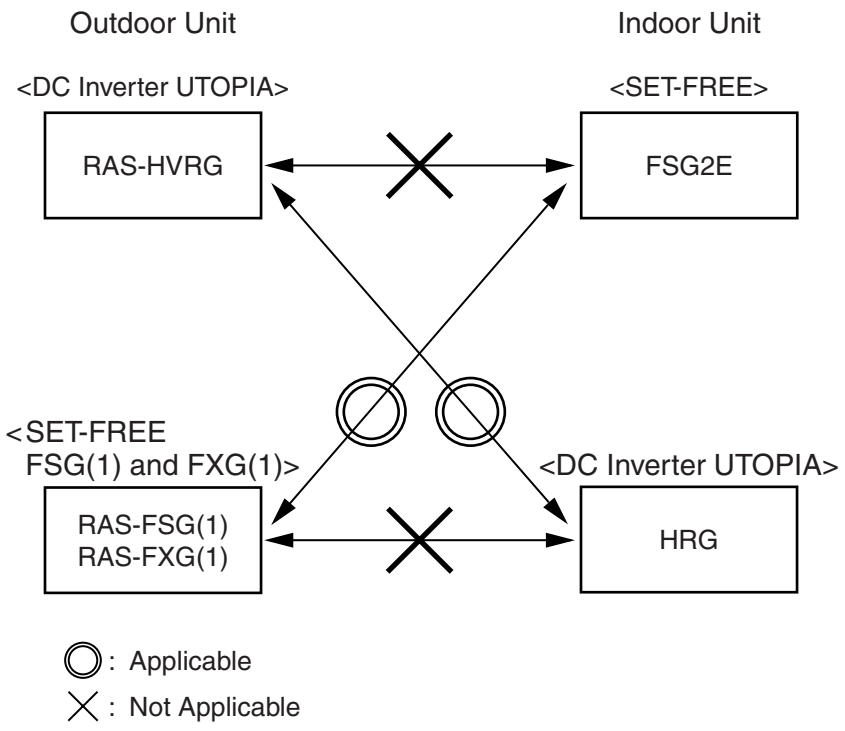
Alarm code “36” appeared and the system didn’t operate.

[Cause]

Combination of the indoor unit and outdoor unit was wrong.

[Countermeasure]

Check an applicable unit model code as shown below.



4.3 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

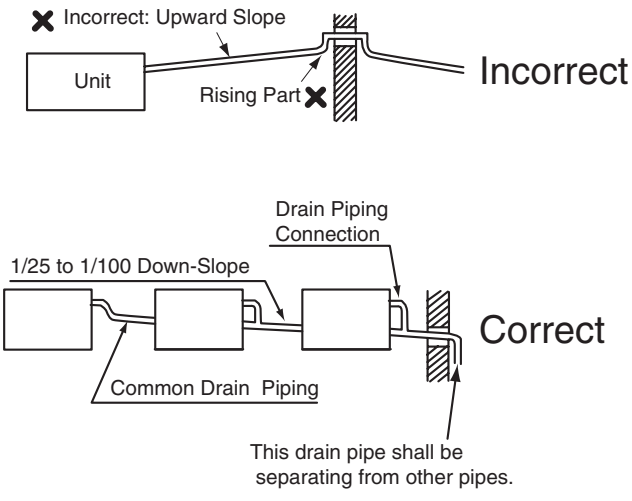
Table A. Permissible Drain Flow Volume of Horizontal Vinyl Pipe

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



4.4 Maintenance Work

(1) For Indoor Unit and Outdoor Unit

(a) 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.

(b) 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.

(c) Piping Connection

- Leakage - Inspect for refrigerant leakage at piping connection.

(d) 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.

(e) 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.

(f) 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 “9. SAFETY AND CONTROL DEVICE SETTING” of “TCII”.

(2) For Indoor Unit

(a) Air Filter

- Cleaning - Inspect and remove any accumulated dirt and dust according to “Common Chapter - 1.2 Filter Cleaning” of “TCII”.

(b) 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.

(c) Float Switch

- Activation - Inspect for activation of float switch.

(3) For Outdoor Unit

(a) 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.

(b) Reverse Valve

- Activation - Inspect for any abnormal activating sound.

(c) Strainer

- Clog - Inspect for that no temperature difference between both ends.

(d) Earth Wire

- Earth Line - Inspect for continuity to the earth.

(e) Oil Heater

- Activation - The oil heater should be activated at least 12 hours before start-up, by switching ON the main power source.

4.5 Service & Maintenance Record by 7-Segment Display

Data Sheet for Checking by 7-Segment Display

Client: Checked by: Date: . .

Outdoor Unit Model (Serial No.)		RAS- (Serial No.)	RAS- (Serial No.)	RAS- (Serial No.)	RAS- (Serial No.)	RAS- (Serial No.)
(1) Operation Model						
(2) Test Run Start Time						
(3) Data Collect Start Time						
(4) Read Out Data from 7-Segment in Outdoor Unit						
Total Indoor Unit Capacity (×1/8HP)	CP					
Outdoor Microcomputer Output	SC	52C FAN$_1$	52C FAN$_1$			
		FAN$_2$ 63H2 21 CH	FAN$_2$ 63H2 21 CH	21	21	21
Indoor Total Operating Capacity	oP					
Outdoor Alarm Code	AC					
Inverter Frequency	H1					
Required Frequency	H2					
Outdoor Fan Step	Fo					
Outdoor Unit Expansion Valve Opening	Eo					
Discharge Gas Temperature	Td					
Heat Exchanger Liquid Pipe Temperature	TE					
Outdoor Temperature	To					
Inverter Stoppage Cause Code	iT					
Inverter Fin Temperature	TF					
Control Information	A1					
Compressor Running Current						
Indoor Unit (Unit No.)						
Expansion Valve Opening	EO					
Heat Exchanger Liquid Temp.	LO					
Intake Air Temp.	iO					
Outlet Air Temp.	oO					
Indoor Unit Stoppage Cause Code	do					

R. C. Sw: Remote Control Switch, O.U.: Outdoor Unit, I.U.: Indoor Unit
52C: CMC, 63H$_2$: PSC, 21: RVR, CH: Oil Heater
*: Multiply 1/8 by the code on the 7-segment.

4.6 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	91								
Discharge Air Temp.	b3	92								
Liquid Pipe Temp.	b4	93								
Remote Thermistor Temp.	b5	- -								
Outdoor Air Temp.	b6	94								
Gas Pipe Temp.	b7	95								
Evaporating Temp. at Heating	b8	96								
Control Information	b9	97								
Comp. Top Temp.	bA	98								
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	99								
Suction Pressure	H2	9A								
Control Information	H3	9b								
Operating Frequency	H4	9C								
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	9d								
O.U. Ex. Valve 1	L2	9E								
O.U. Ex. Valve 2	L3	- -								
O.U. Ex. Valve B	L4	- -								
P Running Current Indication (Reference)										
Comp. Current	P1	9F								

Client:
Installation Date:
System No.:
Date Checked:
Checked by:

Result	

4.7 Service & Maintenance Record

Service & Maintenance Record

No.	Check Item	Action	Judgement
1	Is service space sufficient?		YES or NO
2	Short Circuit of Discharge 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.	TIGHTENED 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 liquid tank.	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
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)		°C DB/ °C WB
29	Indoor Outlet Air Temp. (DB/WB)		°C DB/ °C WB
30	Outdoor Inlet Air Temp. (DB/WB)		°C DB/ °C WB
31	Outdoor Outlet Air Temp. (DB/WB)		°C DB/ °C WB
32	Operating Voltage		V
33	Operating Current		A
34	Instruction Cleaning of Air Filter to Client		DONE or NOT YET
35	Instruction for Cleaning Method to Client		DONE or NOT YET
36	Instruction for Operation to Client		DONE or NOT YET