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

SET-FREE mini FSVG SERIES

SERVICE MANUAL

Models

<Outdoor Units>
RAS-3FSVG
RAS-4FSVG
RAS-5FSVG

This service manual provides the technical information for the HITACHI Inverter-Driven Multi-Split System Heat Pump Air Conditioners, *"SET-FREE mini, FSVG Series"*.
Read this manual carefully before starting service activities.

Hitachi Air Conditioning Systems Co., Ltd.

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This technical catalog is the supplementary version to the Service Manual, P5413553, and introduces the new-line up of the SET-FREE mini FSVG series outdoor units.

* For the common information of the SET-FREE FSG, FSG1 and FXG series, and the information of the indoor units, remote control switches, optional accessories, etc., refer to the Service Manual, P5413553.

1. TROUBLESHOOTING

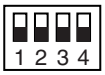
1.1 Initial Troubleshooting

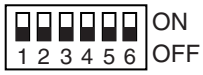
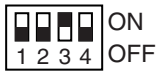
1.1.1 Dip Switch Setting for Outdoor Unit

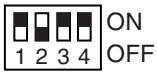
TURN OFF all power sources before setting. Without turning OFF, the switches do not work and the contents of the setting are invalid. Mark of "■" indicates the position of dip switches. Set the dip switches according to the figure below.

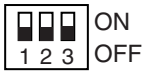
NOTE

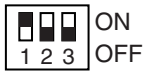
- By using switch DSW1 the unit is started or stopped after 10 to 20 seconds after the switch is operated.
- Make the outdoor unit No. clear to distinguish from other outdoor units for service and maintenance.

<table>
<tr><th>DSW1</th><th colspan="2">DSW2</th><th>DSW4</th><th>DSW5</th></tr>
<tr>
<td rowspan="2">For Test Run
 

1. Test Run
2. Operation Mode (OFF: Cooling, ON: Heating)
3. Intermittent Fan Operation during Thermo-OFF (Heating)
4. Compressor Forced Stop</td>
<td>Optional Function Setting
 
</td>
<td>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)</td>
<td>Ref. Cycle No. Setting
 
</td>
<td>Transmission Setting
 
</td>
</tr>
<tr><th colspan="2">DSW3</th><th colspan="2">DSW6</th></tr>
<tr>
<td colspan="2">Capacity
RAS-3FSVG
 

RAS-4FSVG
 

RAS-5FSVG
 
</td>
<td colspan="2">Piping Length Setting
Setting before Shipment
0 to 25m
 

25 to 75m
 

1. ON: Piping Length 25 to 75m
2. ON: Outdoor Unit is Installed 20 to 30m Lower than Indoor Unit</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: 1ϕ, AC220-240/220V, 50/60Hz) 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 code.

Example for Electrical Wiring Connection

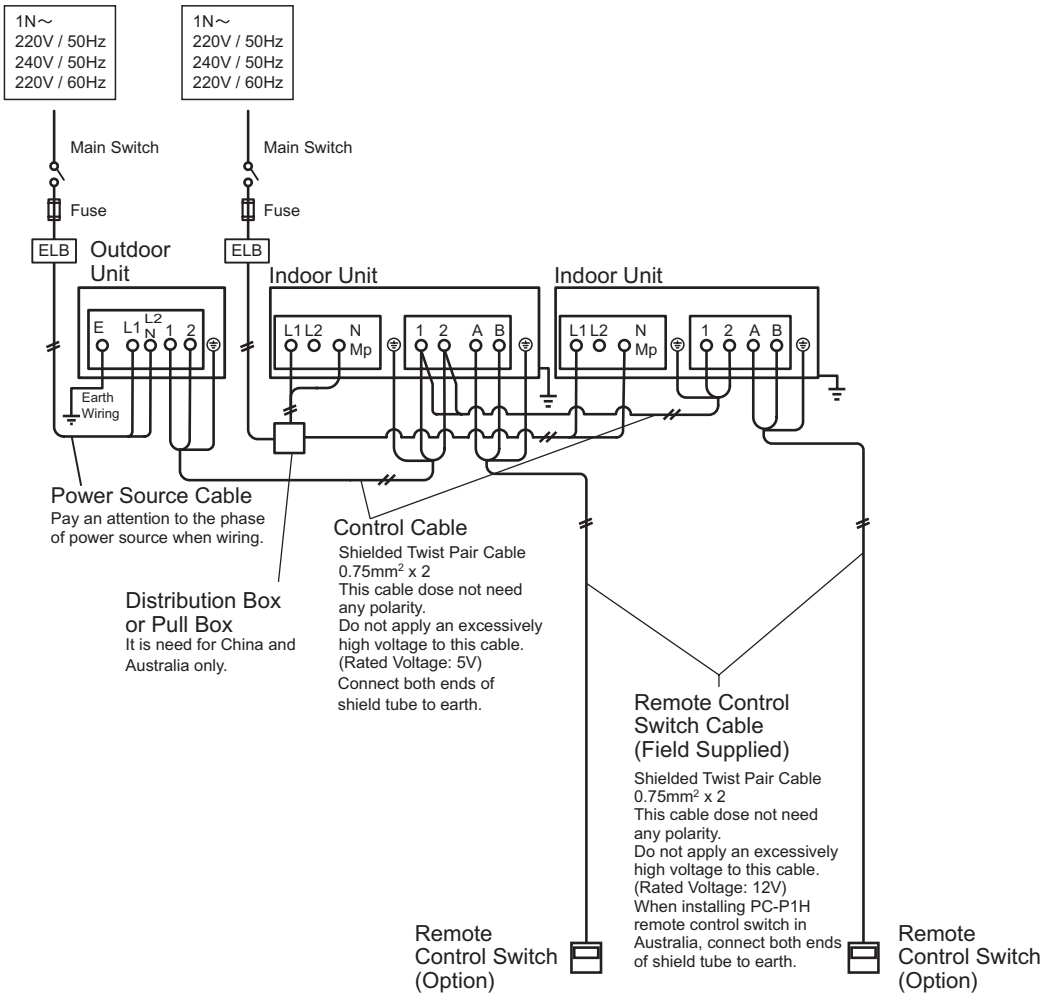


Table 1.1 Electrical Data and Recommended Wiring, Breaker Size/1 Outdoor Unit

Model	Power Supply	Max. Running Current (A)	Power Supply Line (ϕmm)	ELB		Fuse (A)
				Nominal Current (A)	Nominal Sensitive Current (mA)	
RAS-3FSVG	220-240V/50Hz, 220V/60Hz	22	MLFC 1.25SQ	40	30	40
RAS-4FSVG		28	MLFC 2SQ	50		50
RAS-5FSVG		31				

ELB: Earthleakage Breaker: Apply low sensitivity type.
MLFC: Flame Retardant Polyflex Wire

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

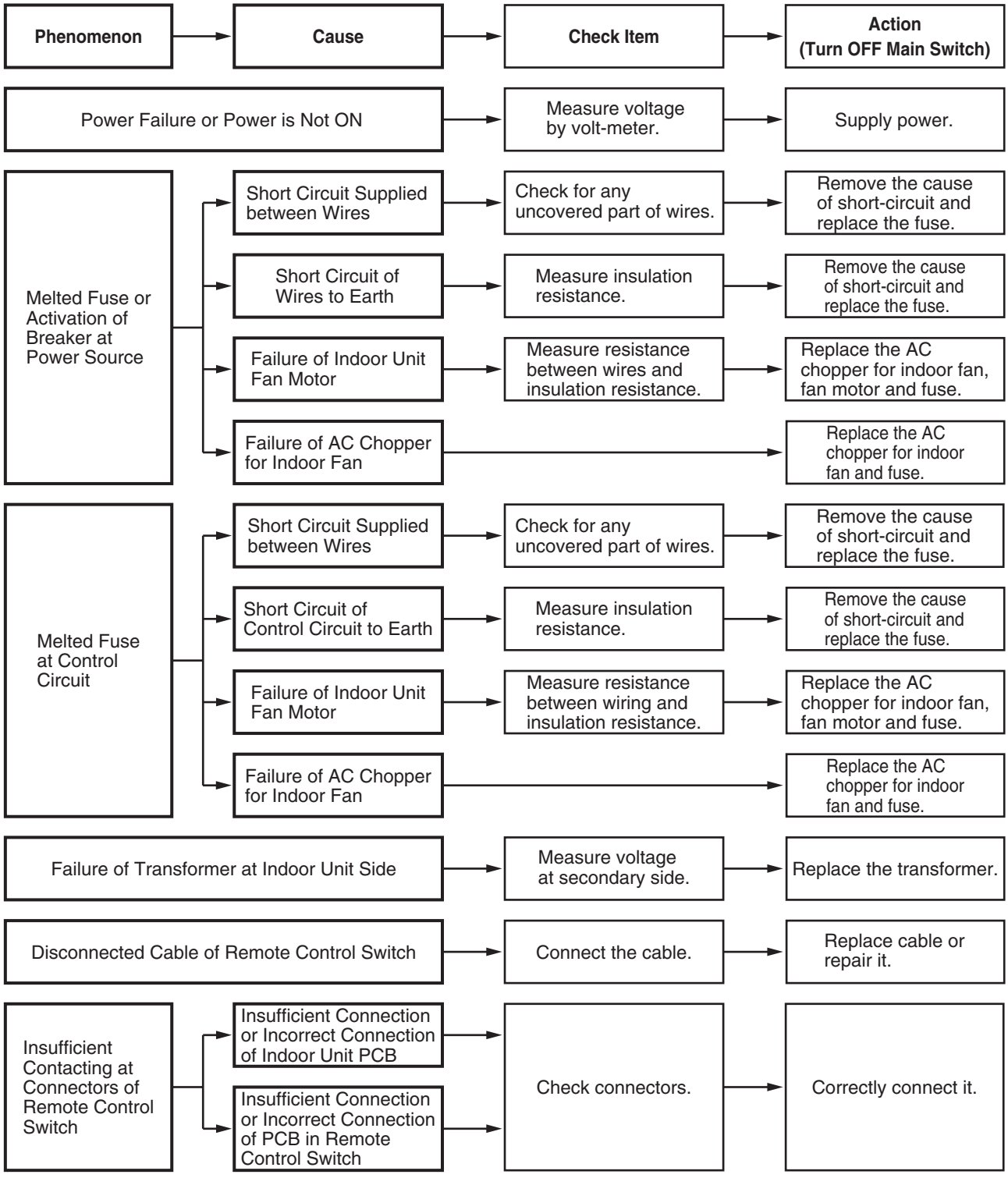
During auto-addressing, the following items can be checked using the outdoor unit's on-board 7-segment LED display.
(1) Disconnection of power supply to the indoor unit.
(2) Disconnection of the operating line between the outdoor and indoor unit(s).
In this case, "03" appears after 30 seconds.
(3) Duplication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

Outdoor Unit Printed Circuit Board PCB1

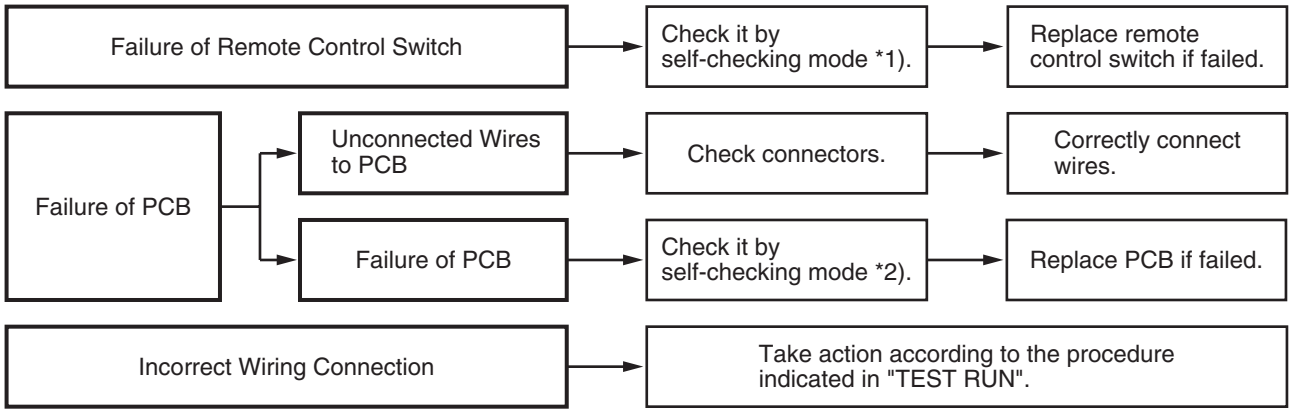
Normal Case	(1) The outdoor unit's on-board 7-segment LED display is not indicated.
Abnormal Case	(2) The outdoor unit's on-board 7-segment LED display indicates as follows if there is something wrong. (A) The indoor unit(s) are not supplied with power. ➡ 03 continues to flash after 30 seconds. (B) Disconnection 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".

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.



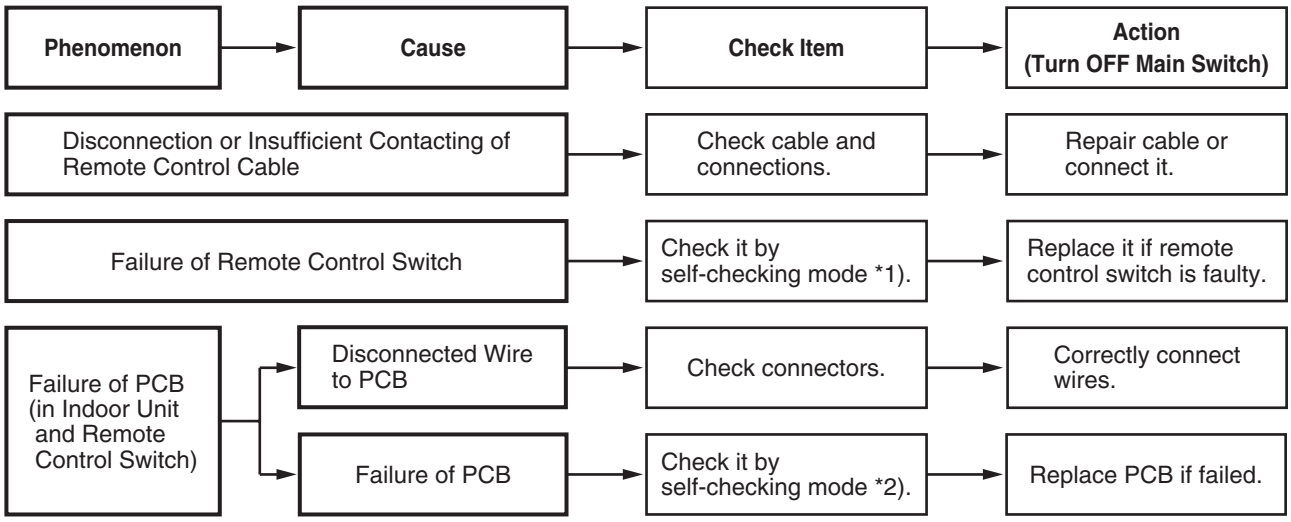
(1.1.4 Failure of Power Supply to Indoor Unit and Remote Control Switch)



*1): Refer to Item 1.3.2 and 1.3.3.
*2): Refer to Item 1.3.1 and 1.3.3.

1.1.5 Abnormal Transmission between Remote Control Switch and Indoor Unit

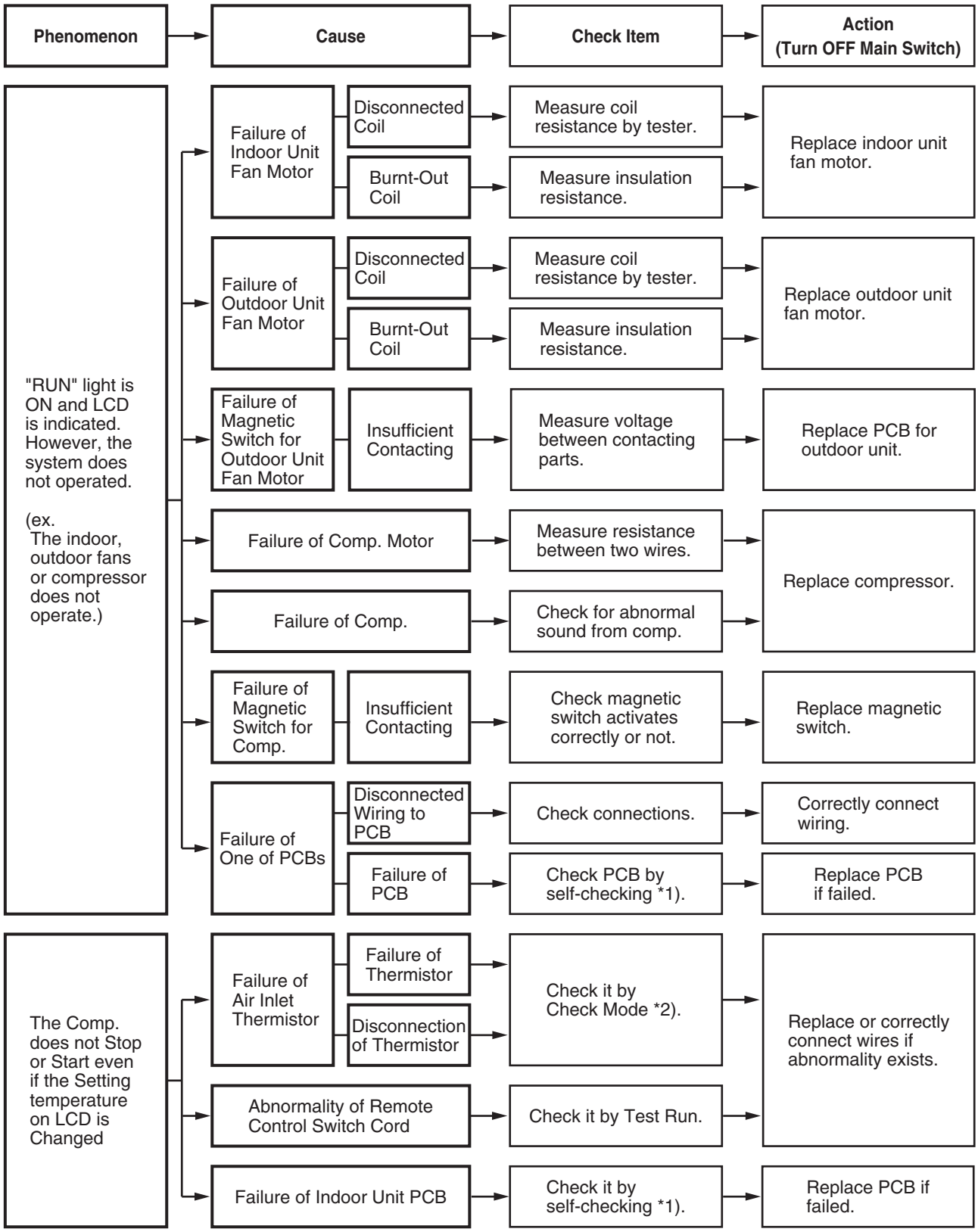
- "RUN" Lamp on Remote Control Switch:
  Flashing every 2 seconds



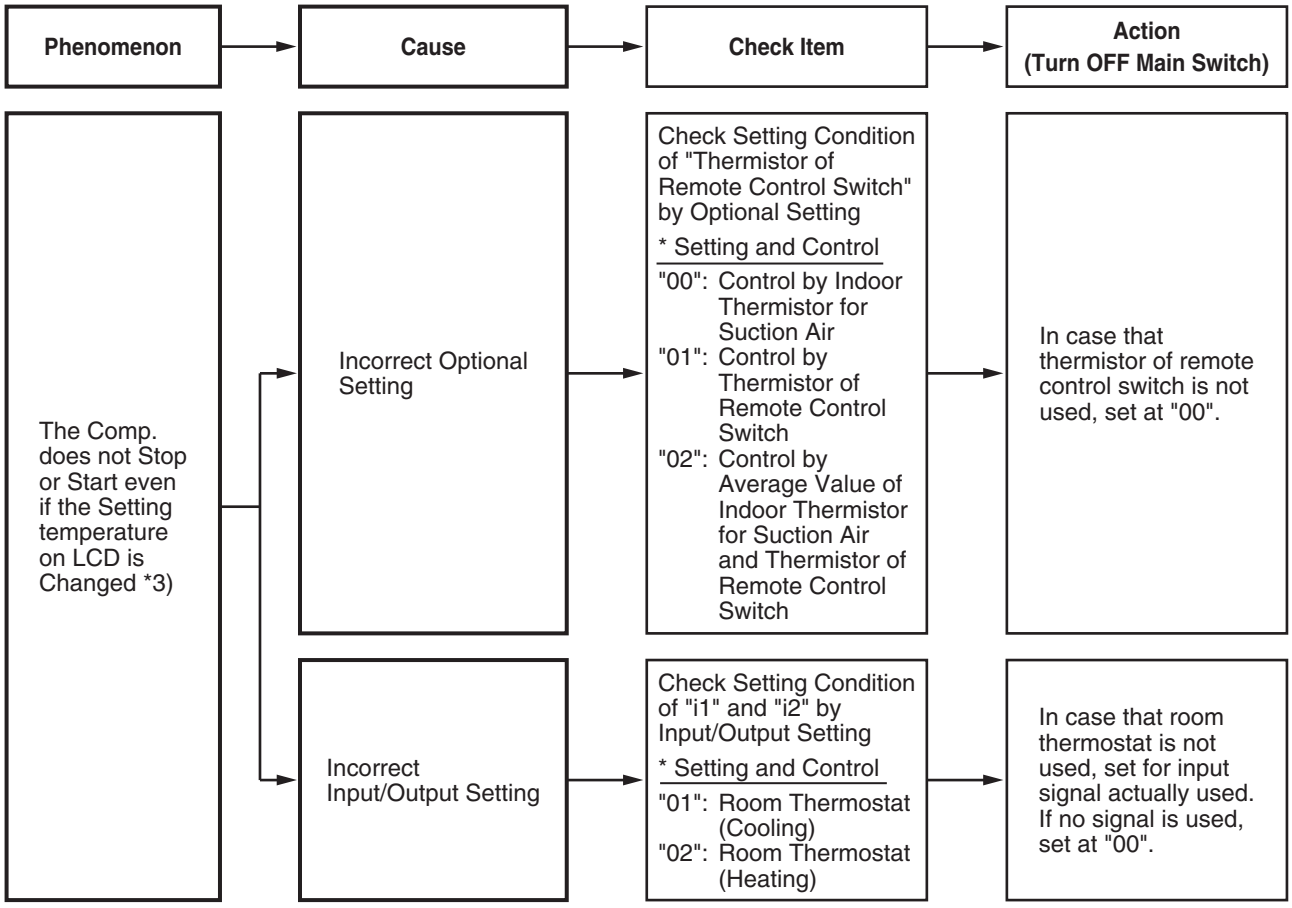
*1): Refer to Item 1.3.2 and 1.3.3.
*2): Refer to Item 1.3.1 and 1.3.3.

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.

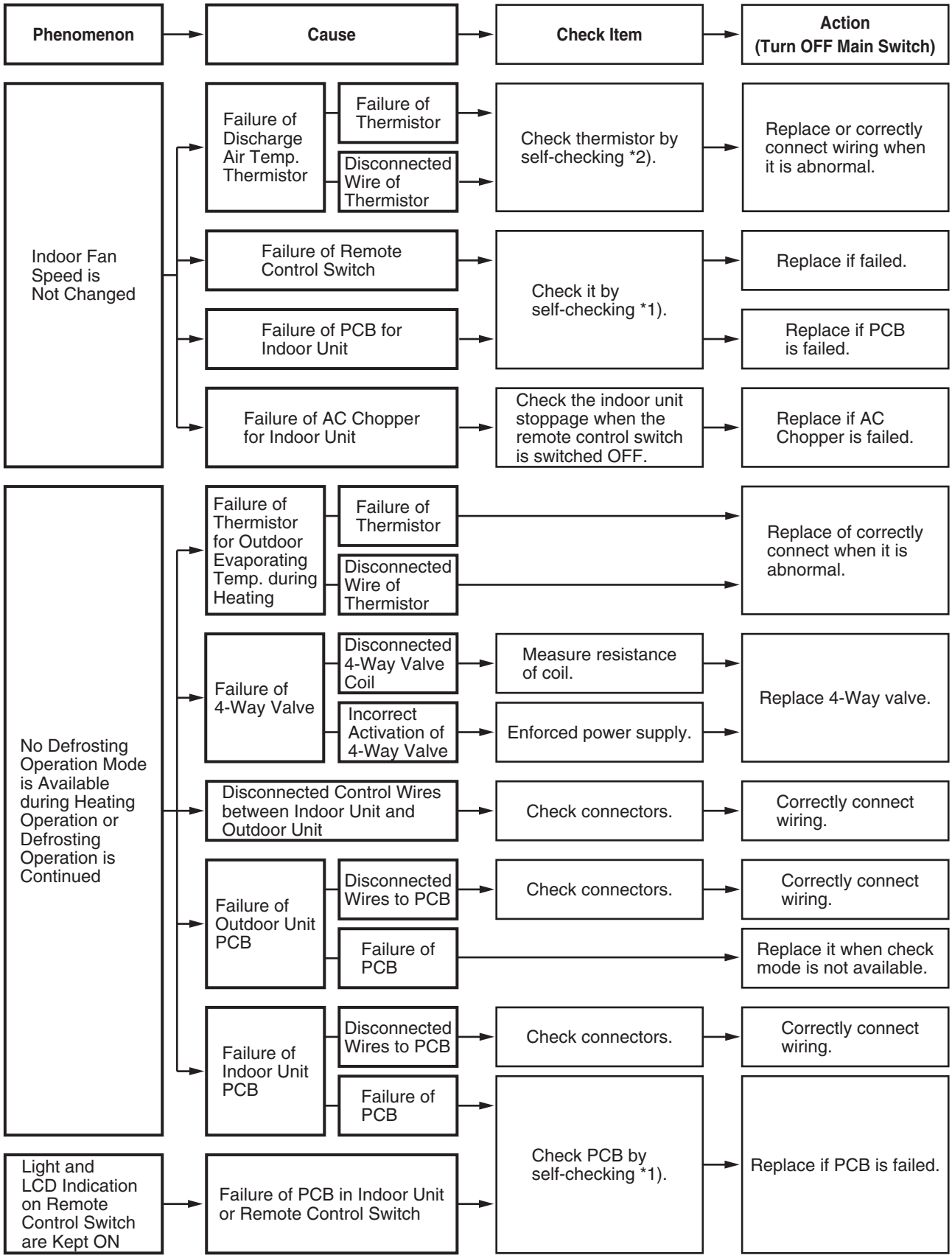


(1.1.6 Abnormalities of Devices)



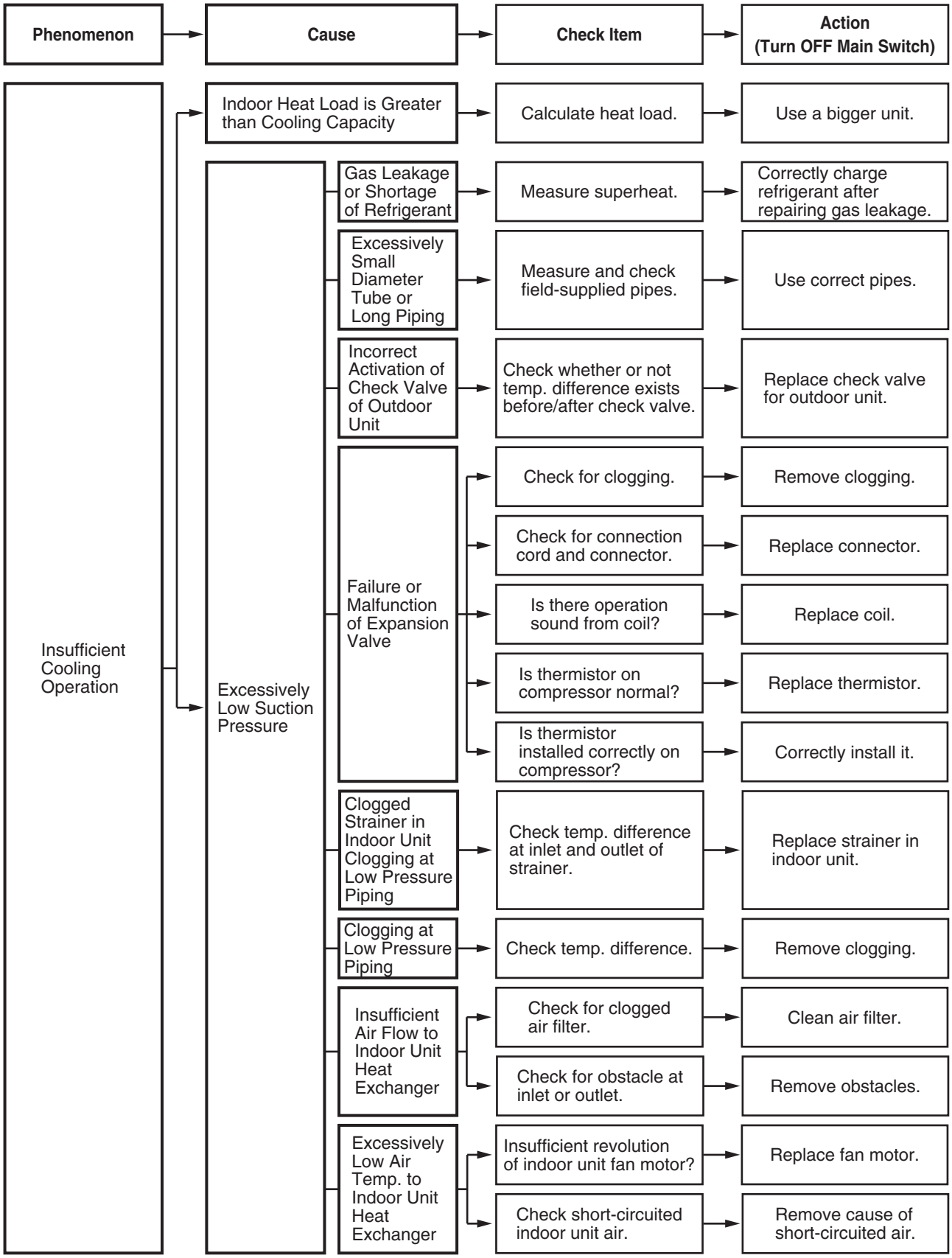
*1): Refer to Item 1.3.3.
*2): Refer to Item 1.2.3.
*3): Even if controllers are normal, the compressor does not operate under the following conditions.
* Indoor Air Temp. is lower than 19°C or Outdoor Air Temp. is lower than -5°C during cooling operation.
* Indoor Air Temp. is higher than 30°C or Outdoor 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)

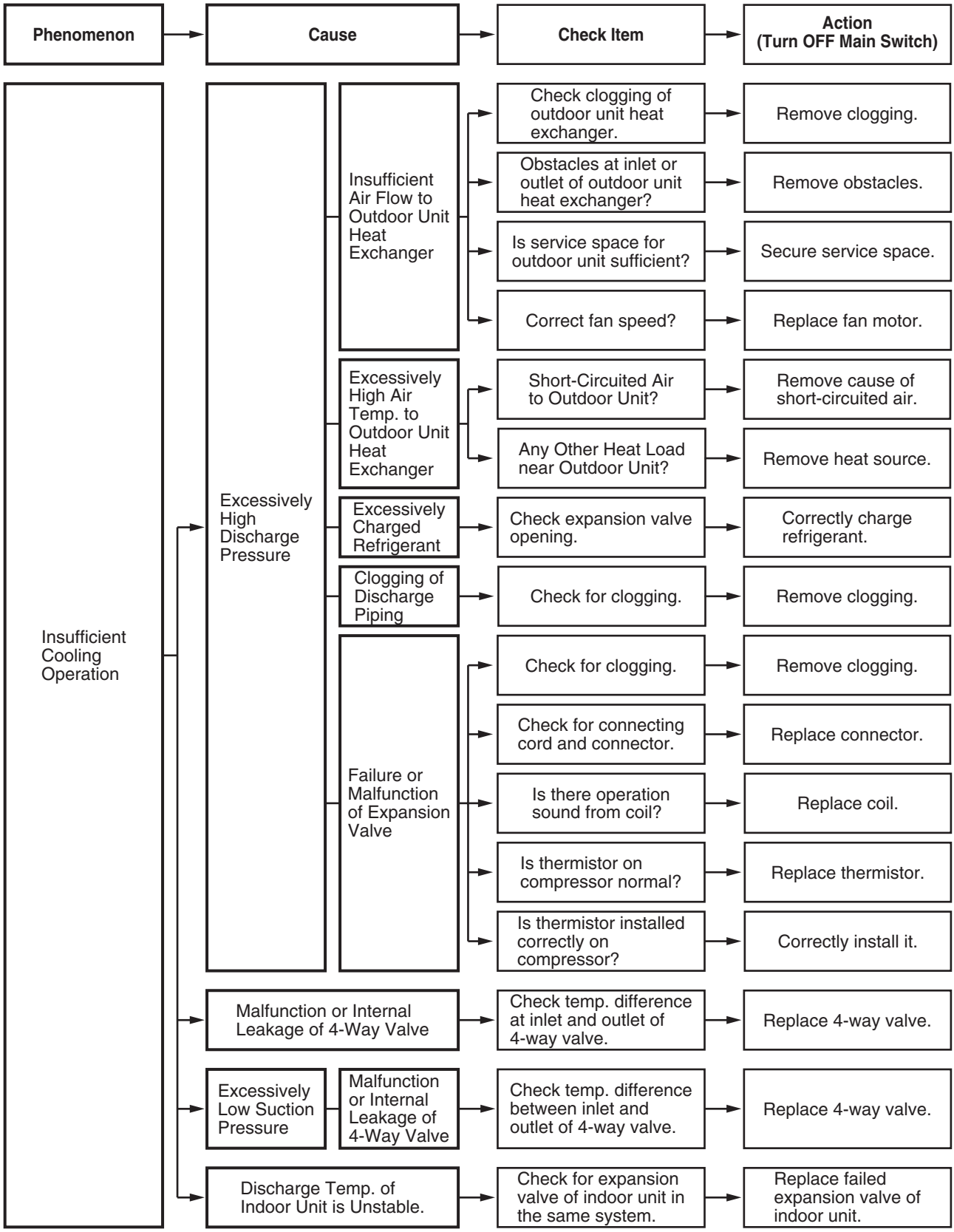


*1): Refer to Item 1.3.1 and 1.3.2.
*2): Refer to Item 1.2.3.

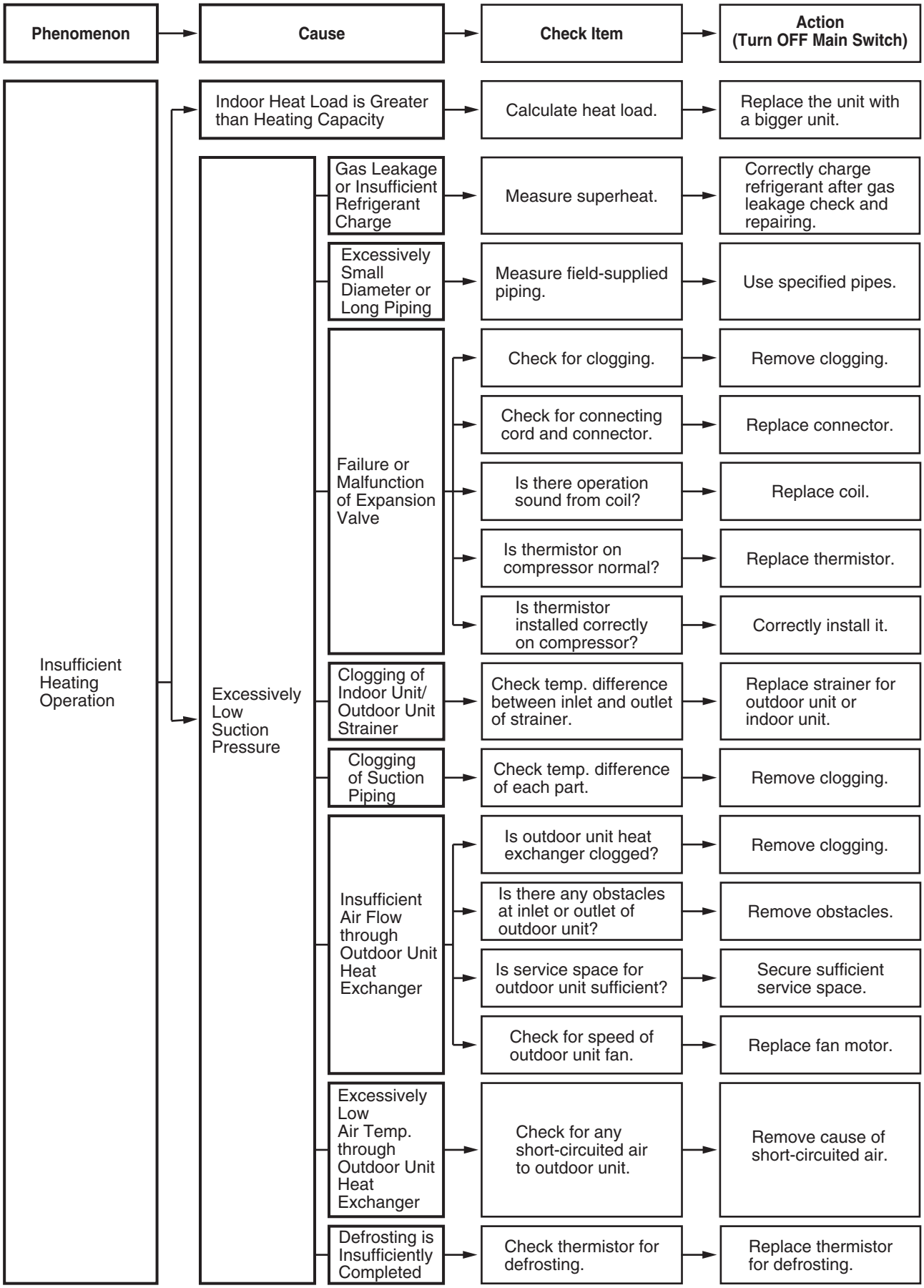
(1.1.6 Abnormalities of Devices)



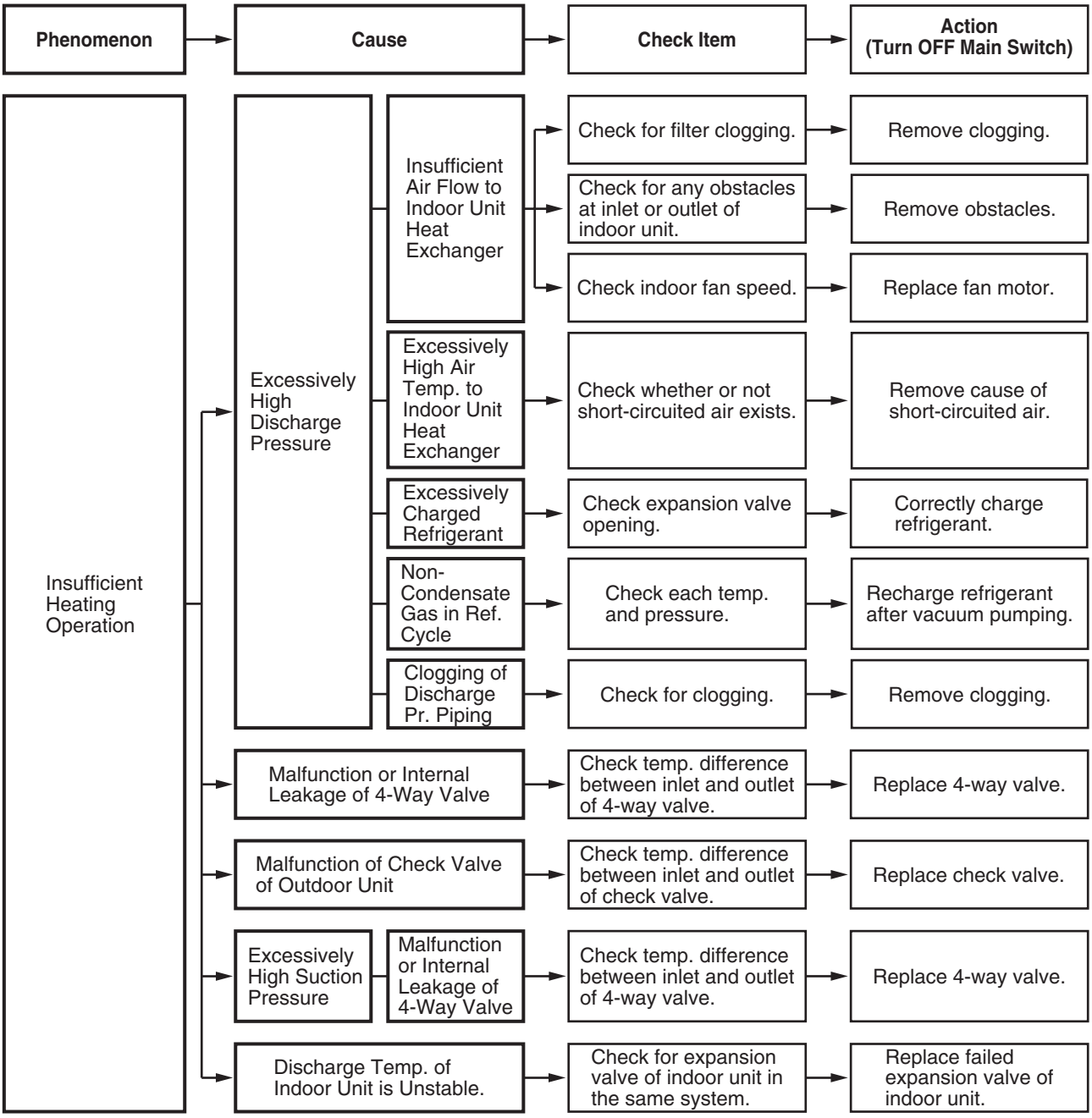
(1.1.6 Abnormalities of Devices)



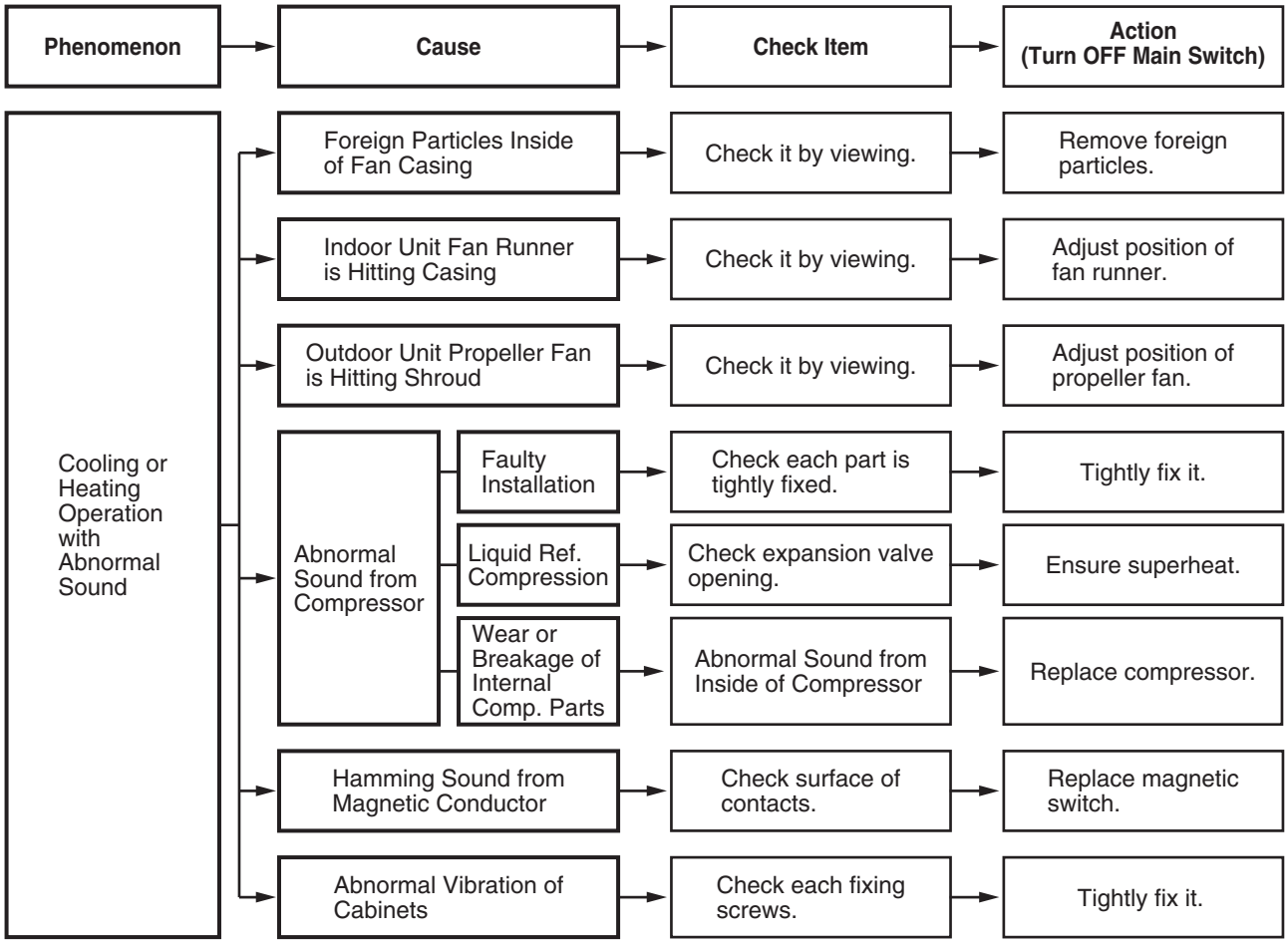
(1.1.6 Abnormalities of Devices)



(1.1.6 Abnormalities of Devices)

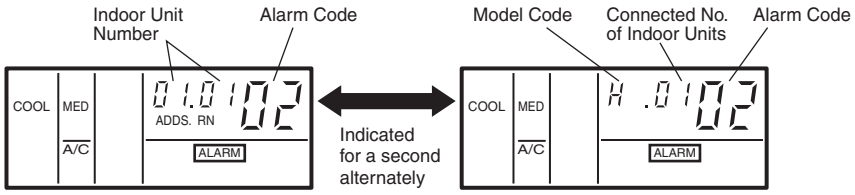


(1.1.6 Abnormalities of Devices)



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	Failure of Fan Motor, Drain Discharge, PCB, Relay.
02	Outdoor Unit	Tripping of Protection Device	Failure of Compressor, Refrigerant Quantity, Inverse Phase.
03	Transmission	Abnormality between Indoor and Outdoor (or Indoor)	Incorrect Wiring, Failure of PCB, Tripping of Fuse.
04	Inverter	Abnormality between Inverter and Control PCB	Failure in Transmission of PCB for Inverter.
05	Transmission	Abnormality of Power Source Wiring	Reverse Phase Incorrect Wiring.
06	Voltage Drop	Voltage Drop in Outdoor Unit Excessively Low or High Voltage to Outdoor Unit	Voltage Drop, Incorrect Wiring, Tripping of Fuse.
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge. Failure of Thermistor, Wiring.
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant. Failure of Thermistor, Wiring.
11	Sensor on Indoor Unit	Inlet Air Thermistor	Failure of Thermistor, Sensor, Connection.
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19		Tripping of Protection Device	Failure of Fan Motor, Incorrect Wiring.
21	Sensor on Outdoor Unit	High Pressure Sensor	Failure of Thermistor, Sensor, Connection.
22		Outdoor Air Thermistor	
23		Discharge Gas Thermistor	
24		Evaporating Thermistor	
29		Low Pressure Sensor	
31	System	Incorrect Setting of Outdoor and Indoor Unit	Incorrect Setting of Capacity Code.
32		Abnormal Transmission of Other Indoor Unit	Failure of Power Supply, PCB in Other Indoor Unit.
35		Incorrect Setting in Indoor Unit No.	Existence of the same Indoor Unit No.
38		Abnormality of Protective Circuit in Outdoor Unit	Incorrect Connection to PCB in Outdoor Unit.
43	Pressure	Pressure Ratio Decrease Protection Activating	Failure of Compressor, Inverter.
44		Low Pressure Increase Protection Activating	Overload to Indoor in Cooling. High Outdoor Air Temperature in Heating.
45		High Pressure Increase Protection Activating	Overload Operation. Excessive Refrigerant.
46		High Pressure Decrease Protection Activating	Insufficient Refrigerant.
47		Low Pressure Decrease Protection Activating	Vacuum Condition for Cycle, Failure of Expansion Valve, Insufficient Refrigerant
51	Inverter	Abnormality of Current Sensor for Inverter	Failure of Compressor, Inverter PCB
52		Activating Overcurrent Protection	Overload, Overcurrent, Failure of Compressor, Clogging of Heat Exchanger
53		Activating Protection of ISPM	ISPM Abnormality, Failure of Compressor, Clogging of Heat Exchanger
54		Increase in Inverter Fin Temperature	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	Failure of Compressor.
dd***	Transmission	Incorrect Wiring between Indoor Units	Incorrect Wiring between Indoor Units and Remote Control Switch.

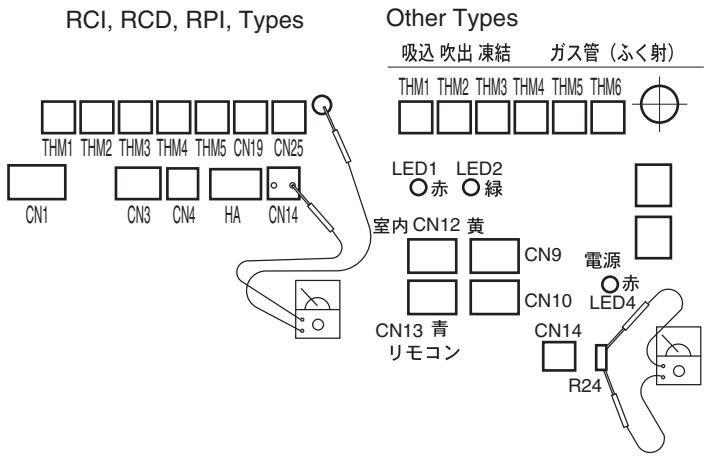
***: In the Case of PC-2H2

1.2.2 Troubleshooting by Alarm Code

Alarm Code 01	Activation of Safety Device in Indoor Unit

- "RUN" light flashes 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.



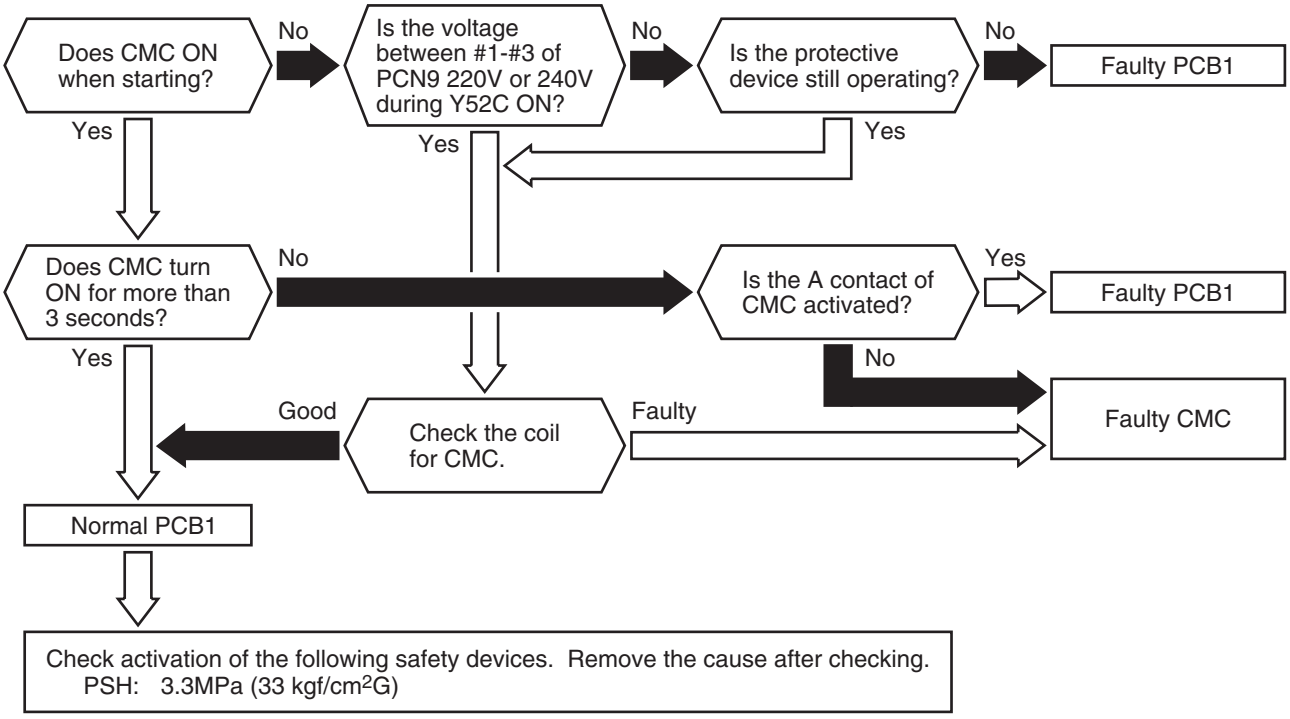
Phenomenon	Cause		Check Item	Action (Turn OFF Main Switch)
Activation of Float Switch	High Drain Level	Clogging of Drainage Up-Slope Drain Piping	Check drain pan.	Remove clogged foreign particles.
	Faulty Float Switch	Fault	Check continuity when drain level is low.	Replace float switch if faulty.
		Faulty 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.

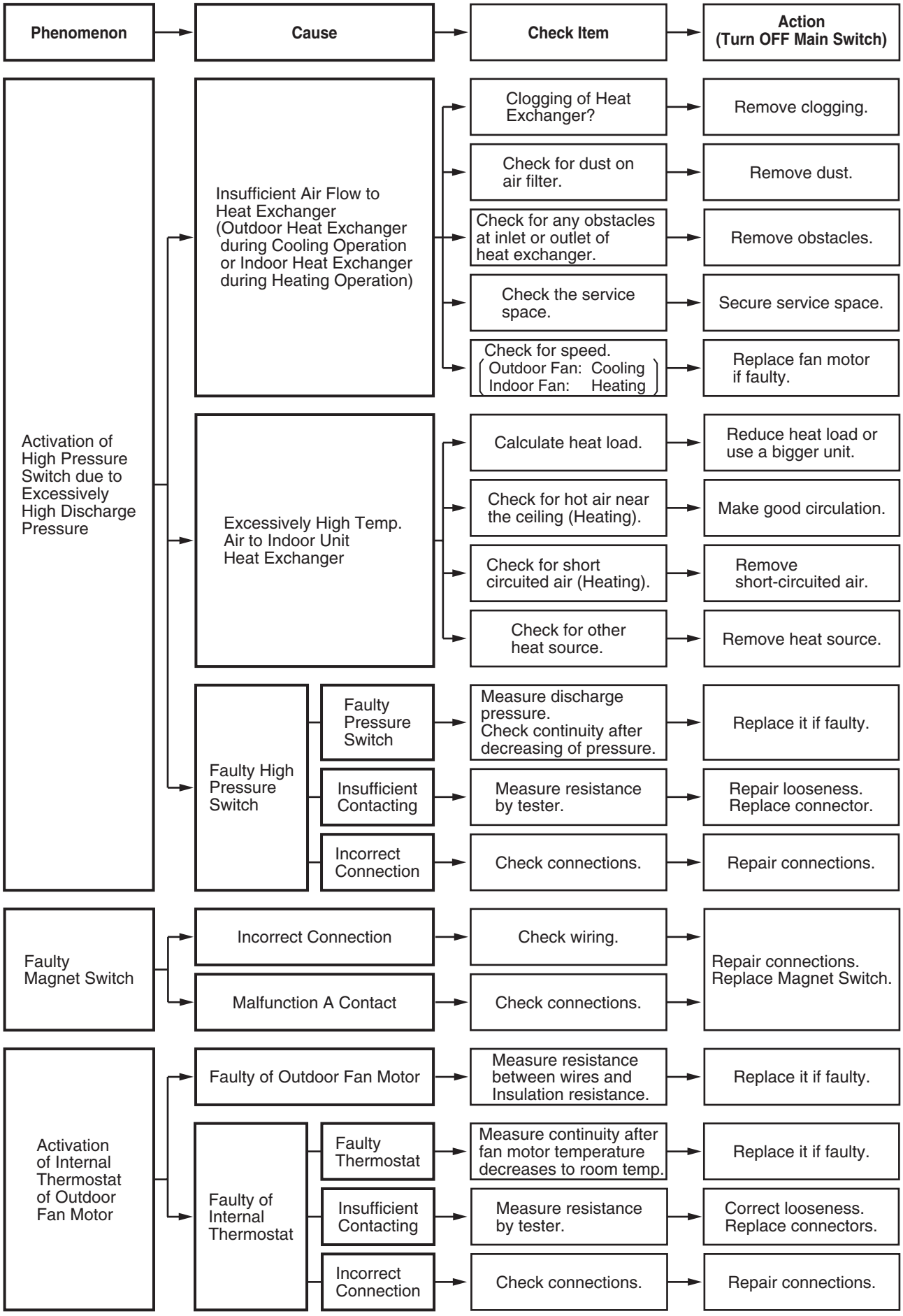
*1): Refer to 1.3.1 "Self Checking of PCBs using Remote Control Switch".

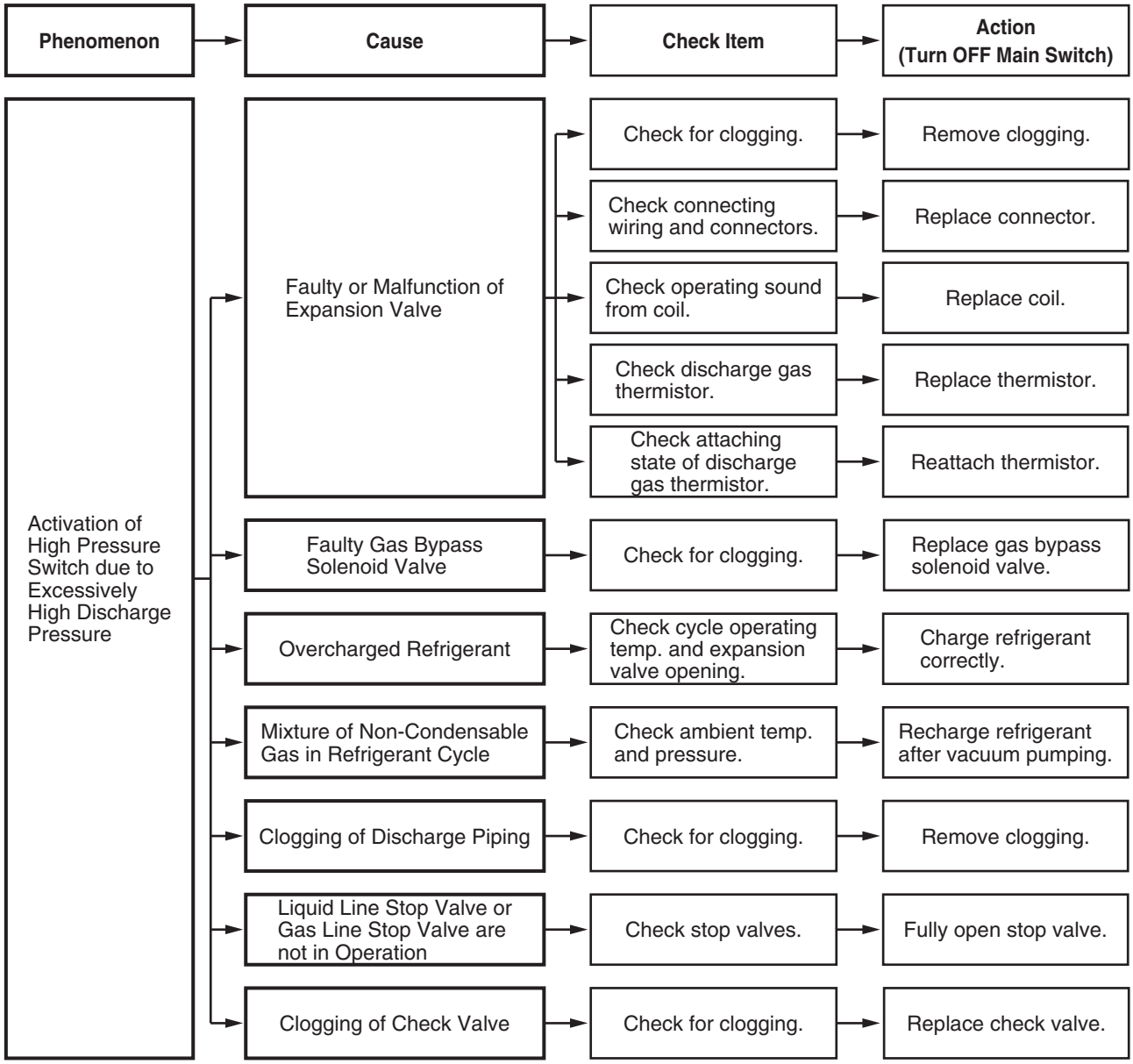
Alarm Code 07	Activation of Safety Device in Outdoor Unit

- "RUN" light flashes 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 one of safety devices is activated during compressor running.



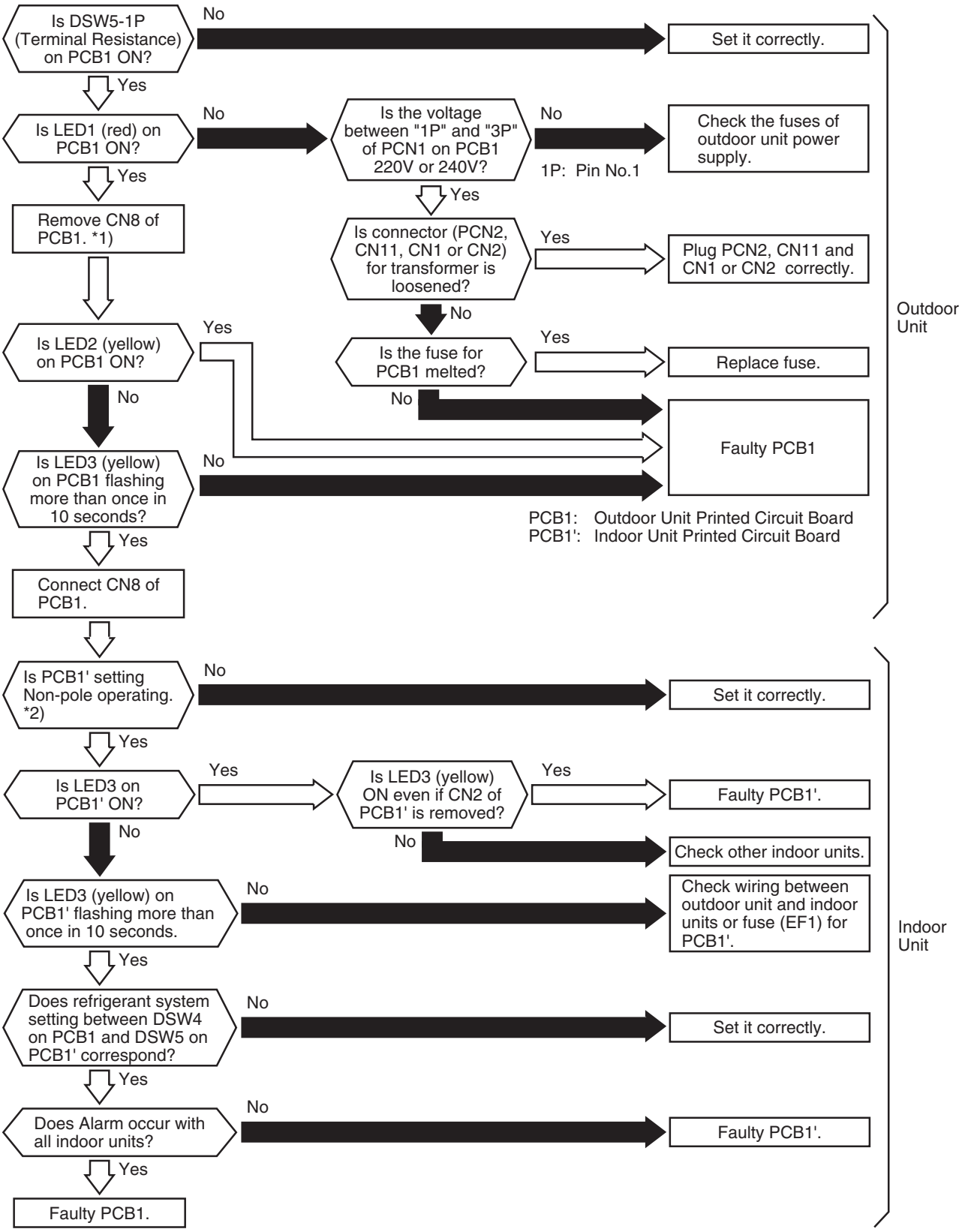

Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Activation of High Pressure Switch due to Excessively High Discharge Pressure
Insufficient Air Flow to Heat Exchanger (Outdoor Heat Exchanger during Cooling Operation or Indoor Heat Exchanger during Heating Operation)
Clogging of Heat Exchanger?
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.
Faulty Gas Bypass Solenoid Valve
Check for clogging.
Replace gas bypass solenoid valve.
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.
Clogging of Check Valve
Check for clogging.
Replace check valve.

Alarm Code 03	Abnormal Transmitting between Indoor Units and Outdoor Unit

- "RUN" light flashes 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

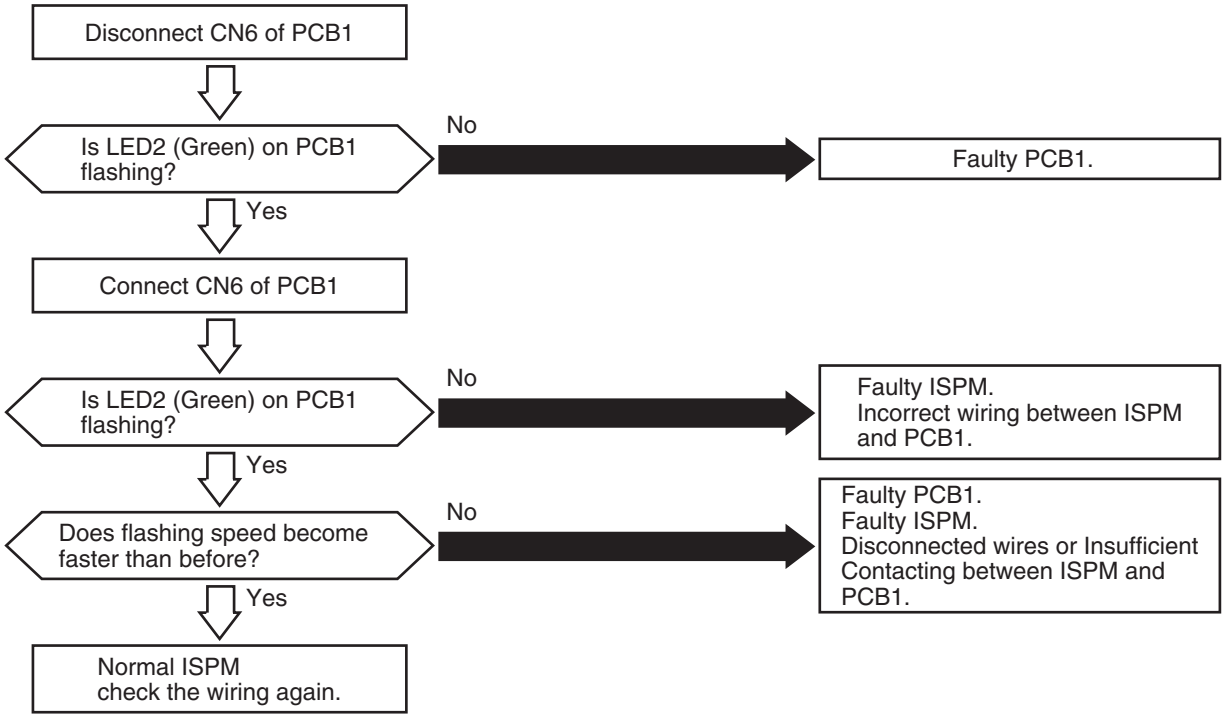
Item	Setting Position
SW1	Left Side (New Transmission Side)
CN2	Transmission Wire Connecting

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 flashes 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.

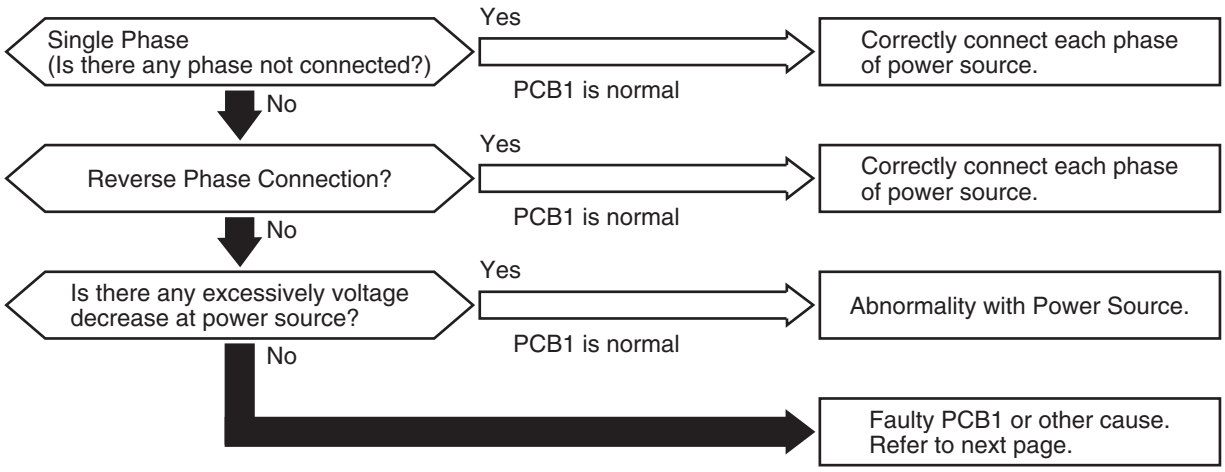
★ This alarm is indicated when abnormality is maintained for 30 seconds after normal transmitting between the outdoor unit PCB1 and ISPM, and also abnormality is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is indicated when the abnormal transmitting is maintained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



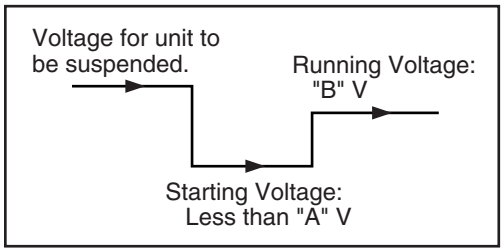
Alarm Code 05	Abnormality of Picking up Phase Signal

- "RUN" light flashes 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.

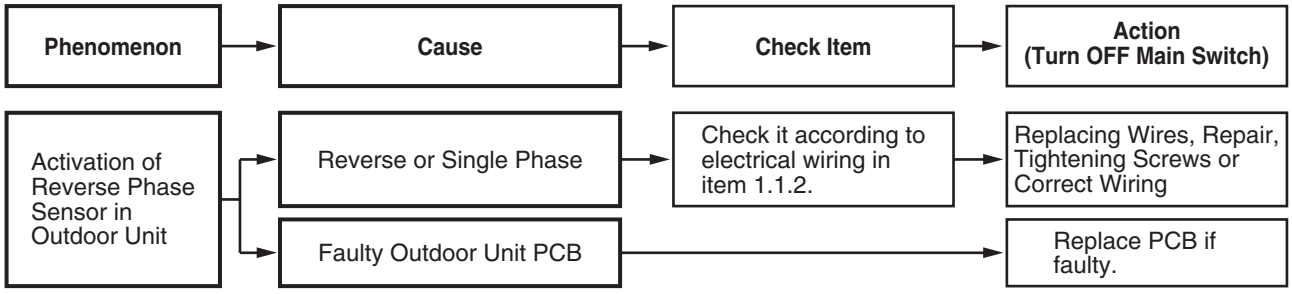
★ This alarm code is indicated when the main power source phase is faulty.



NOTE:
PCB1: Outdoor Unit Printed Circuit Board



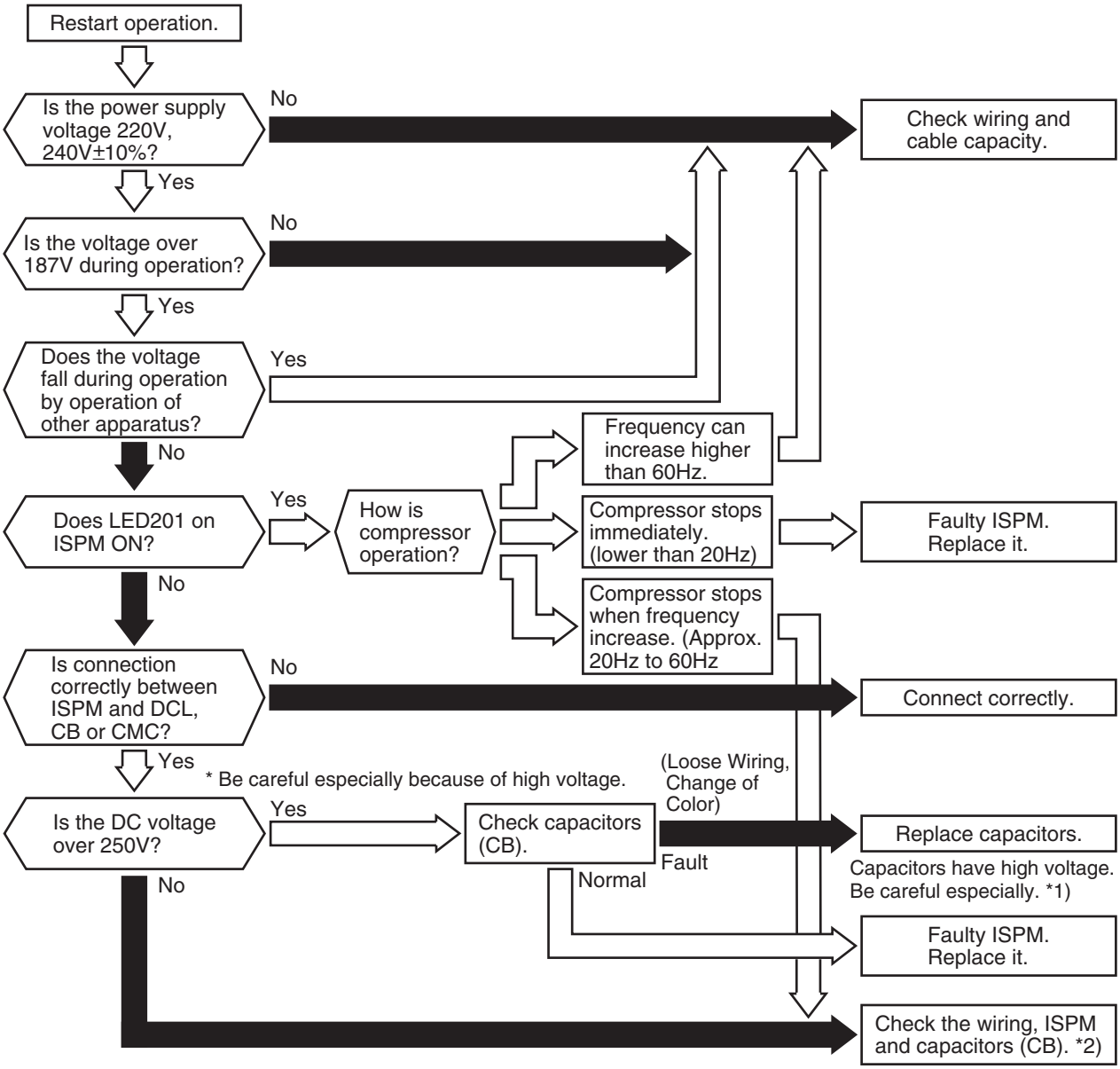
Power Supply	"A"	"B"
220-240V, 50Hz	187	198 to 264
220V, 60Hz		198 to 242

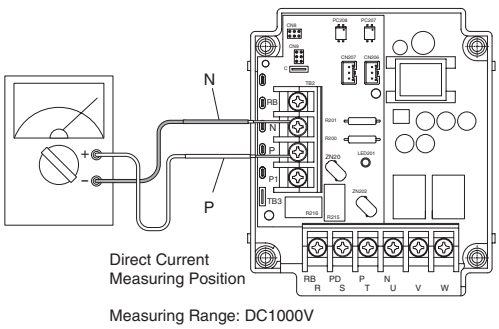


Alarm Code 06	Excessively Low or High Voltage for Inverter

- "RUN" light flashes 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.



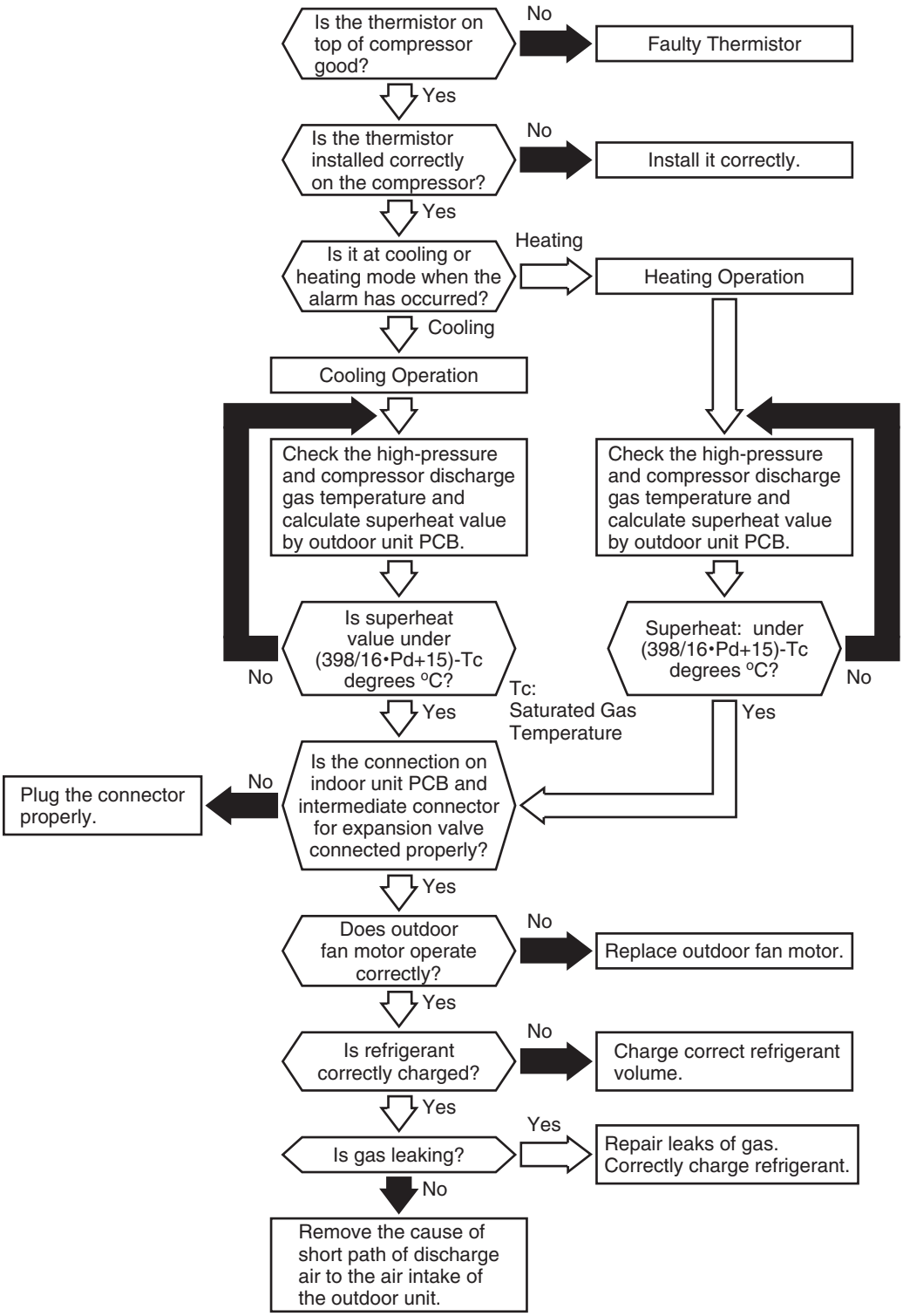


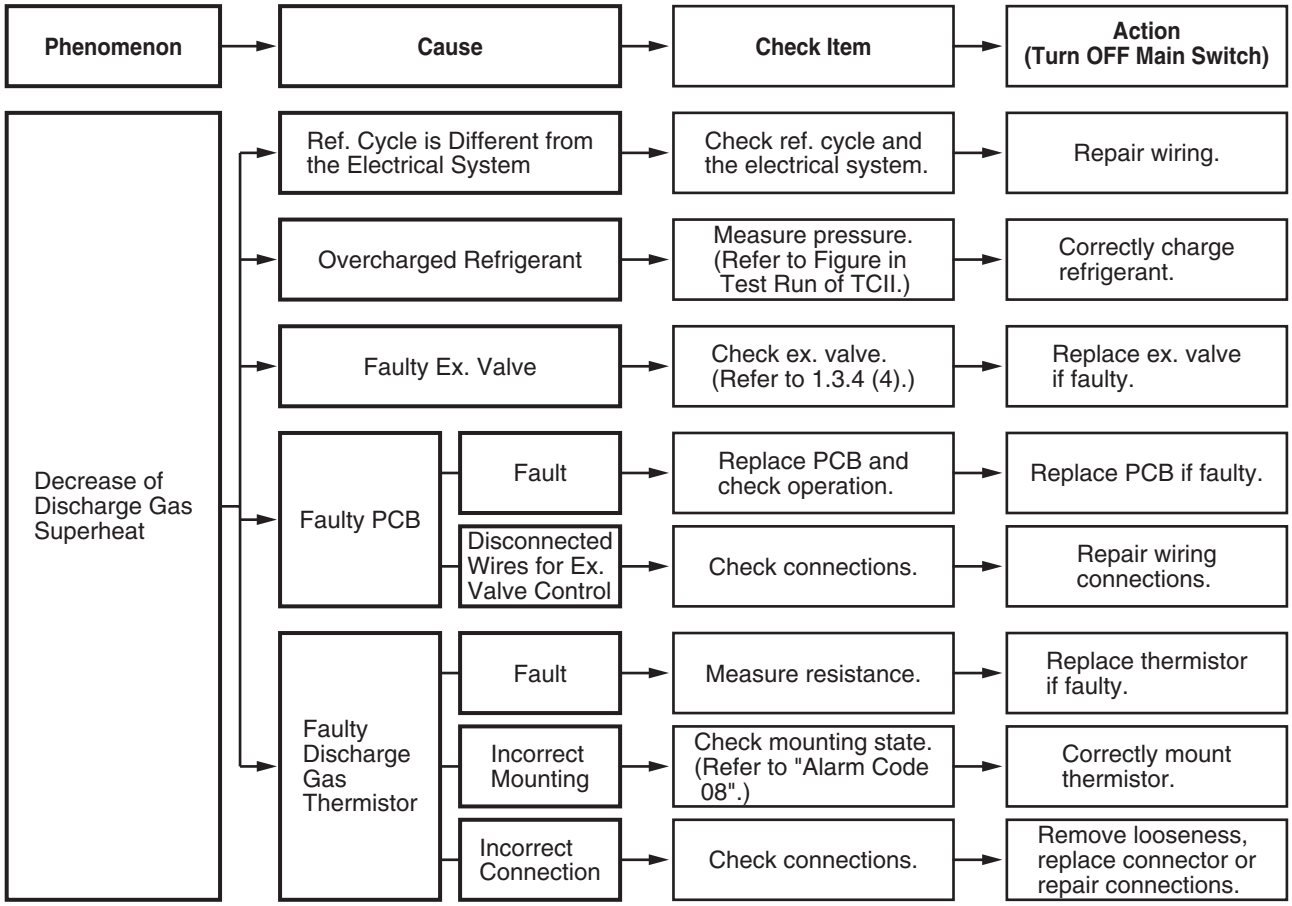
*1): If capacitor has high voltage, perform the high voltage discharge work refer to item 1.3.4.
*2): Checking procedures of ISPM is indicated in item 1.3.4.

Alarm Code 07	Decrease of Discharge Gas Superheat

- "RUN" light flashes 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 (398/16•Pd+15)-Tc deg. (Tc: Saturated Gas Temperature) at the top of the compressor is maintained for one hour, the alarm code is indicated.



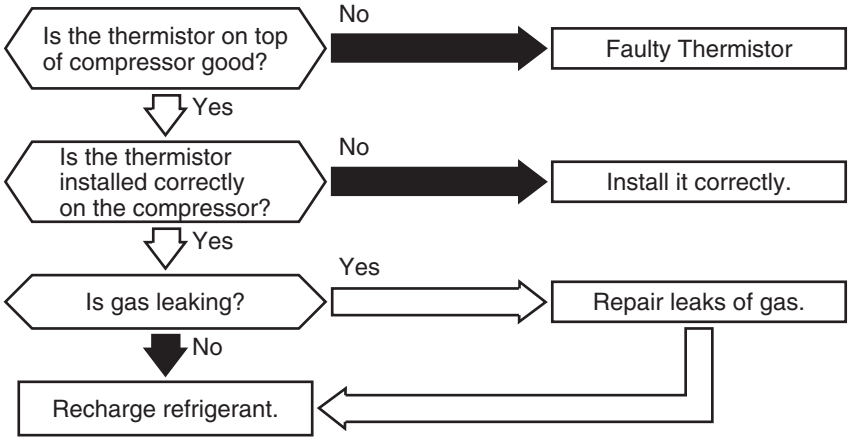

Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Decrease of Discharge Gas Superheat
Ref. Cycle is Different from the Electrical System
Check ref. cycle and the electrical system.
Repair wiring.
Overcharged Refrigerant
Measure pressure. (Refer to Figure in Test Run of TCII.)
Correctly charge refrigerant.
Faulty Ex. Valve
Check ex. valve. (Refer to 1.3.4 (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 "Alarm Code 08".)
Correctly mount thermistor.
Incorrect Connection
Check connections.
Remove looseness, replace connector or repair connections.

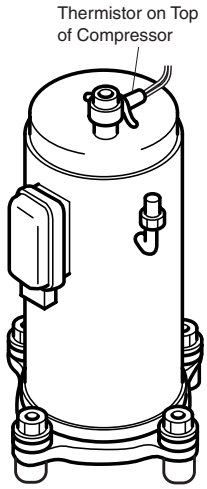
Alarm Code 08	Excessively High Discharge Gas Temperature at the Top of Compressor Chamber

- "RUN" light flashes 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;

The temperature of the thermistor on the top of the compressor is maintained higher than 132°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.

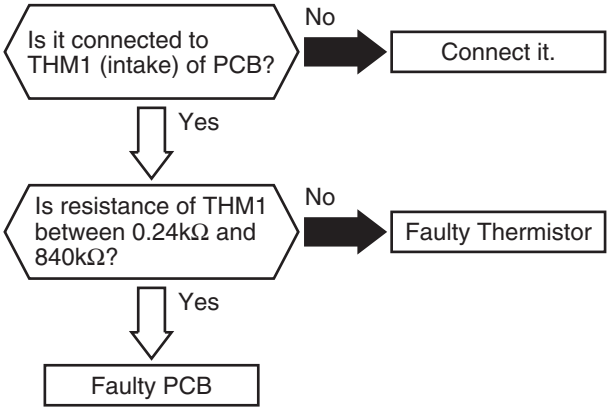


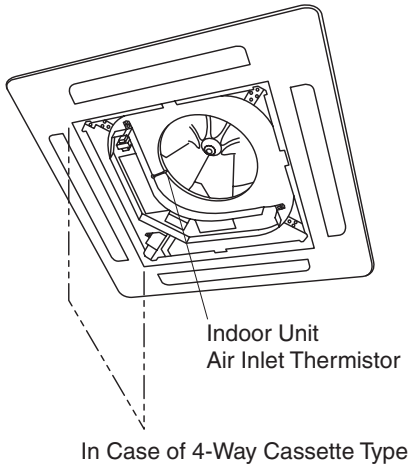


Alarm Code	Abnormality of Thermistor for Indoor Unit Inlet Air Temperature (Air Inlet Thermistor)
11	

- "RUN" light flashes 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.

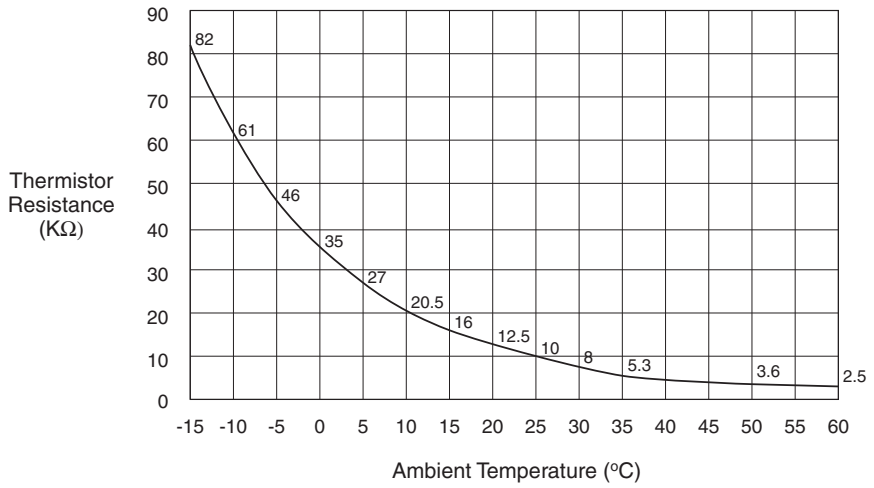
★ This alarm code is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling or heating operation. The system is automatically restarted when the fault is removed.





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:

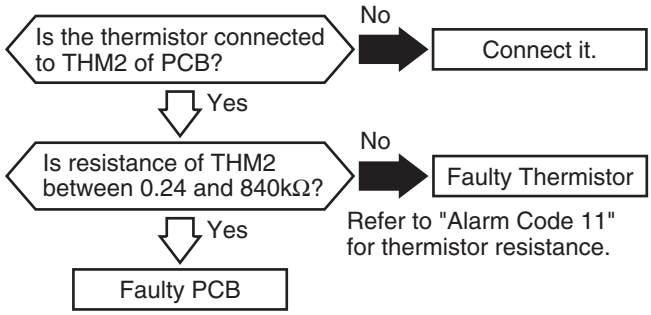
This data is applicable to the following thermistors;

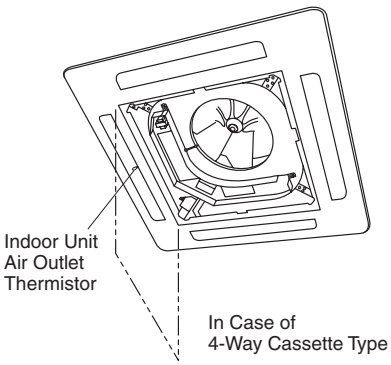
1. Indoor Unit Discharge Air Temperature, 2. Indoor Unit Liquid Refrigerant Temperature, 3. Indoor Unit Intake Air Temperature, 4. Outdoor Air Temperature, 5. Outdoor Unit Evaporating Temperature, 6. Indoor Unit Gas Piping

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

- "RUN" light flashes 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.



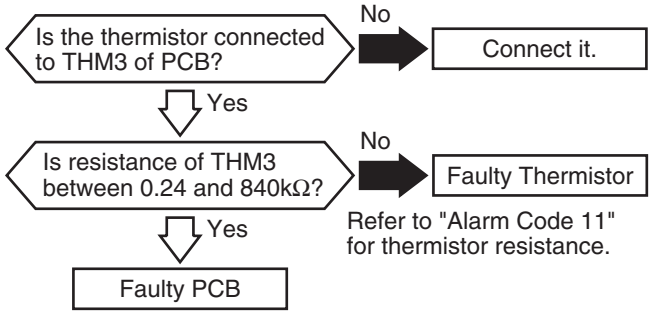


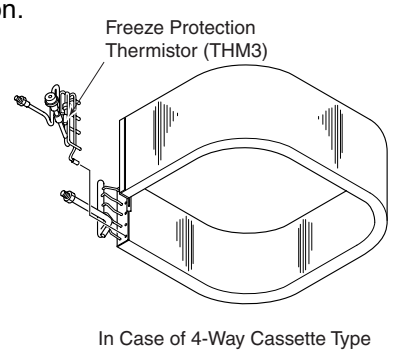
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Air Outlet Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.

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

- "RUN" light flashes 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.



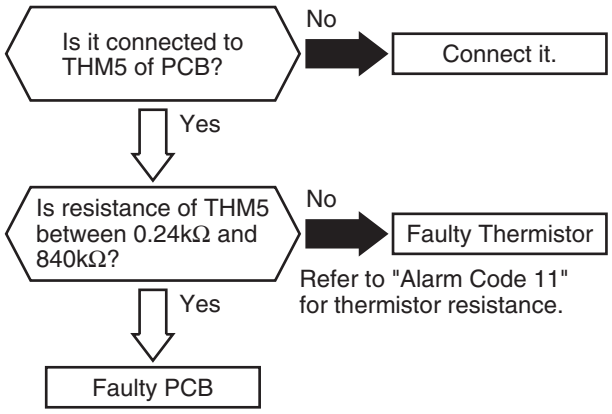


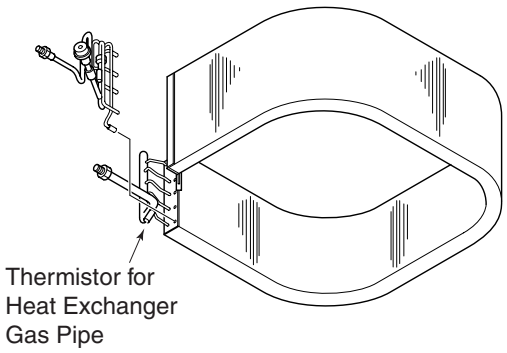
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Freeze Protection Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.

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

- "RUN" light flashes 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.





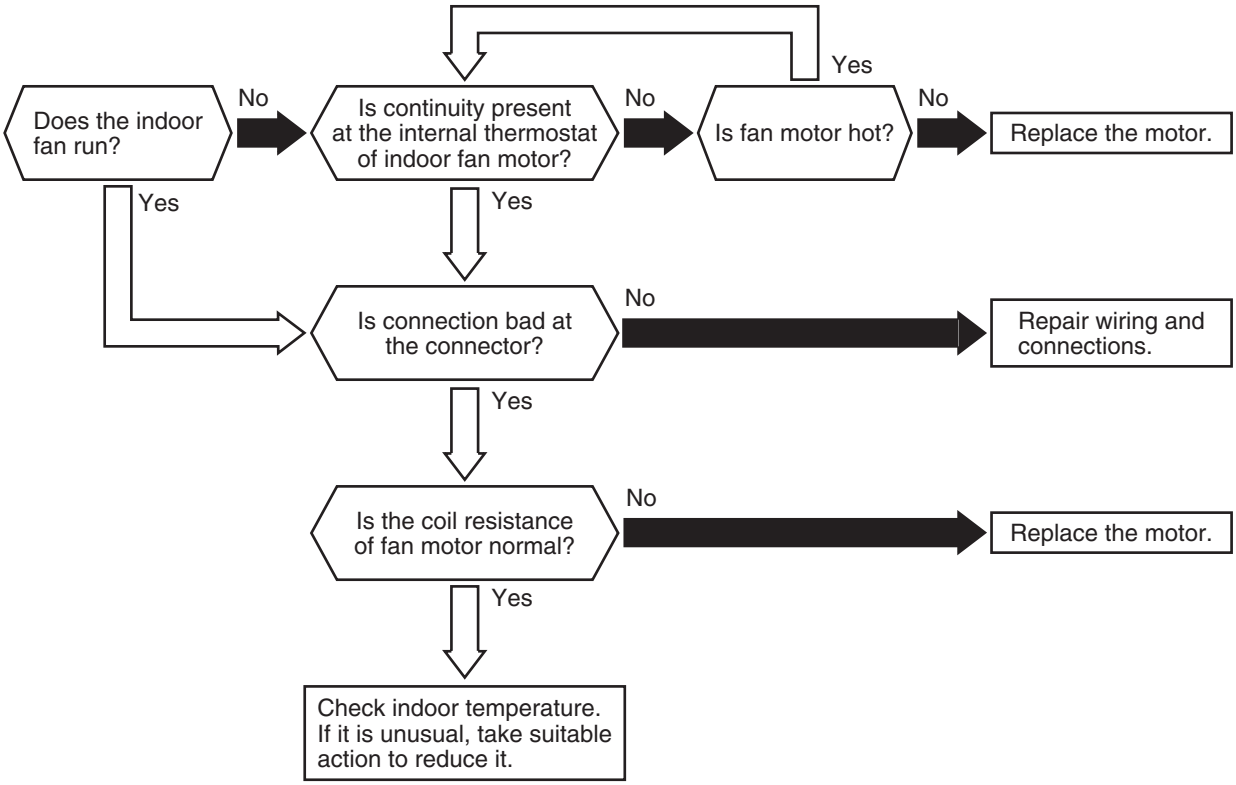
In Case of 4-Way Cassette Type

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 and RPK Model)

- "RUN" light flashes 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.

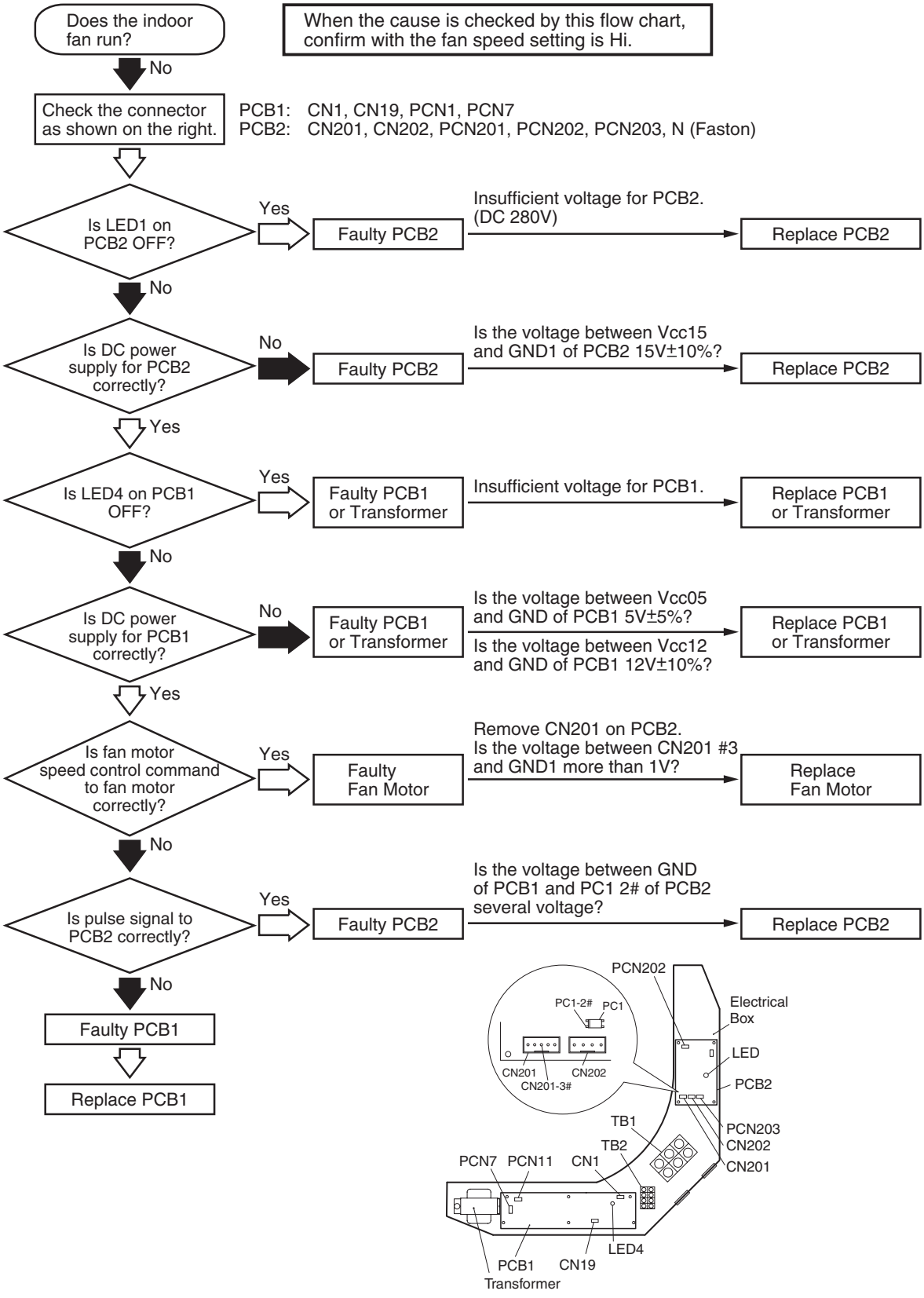


Phenomenon	Cause		Check Item	Action (Turn OFF Main Switch)
Activation of Internal Thermostat for Indoor Unit Fan Motor	Faulty Indoor Unit Fan Motor		Measure coil resistance and insulation resistance.	Replace motor if faulty.
	Faulty Internal Thermostat	Fault	Check continuity after fan motor temperature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

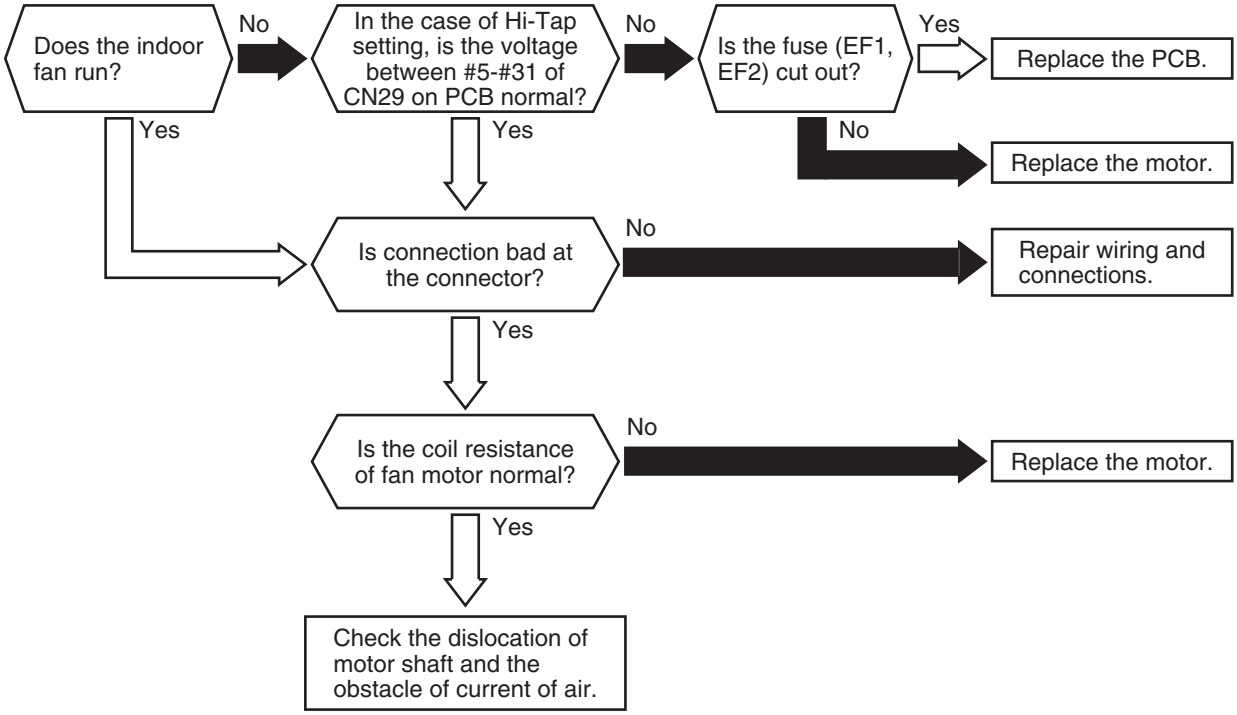
★ This alarm code is indicated when the following conditions occurs three times in 30 minutes.
* Indoor fan rotates less than 70rpm for 5 seconds during operation.



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

- "RUN" light flashes 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 running current of the indoor fan motor is higher than 1A.

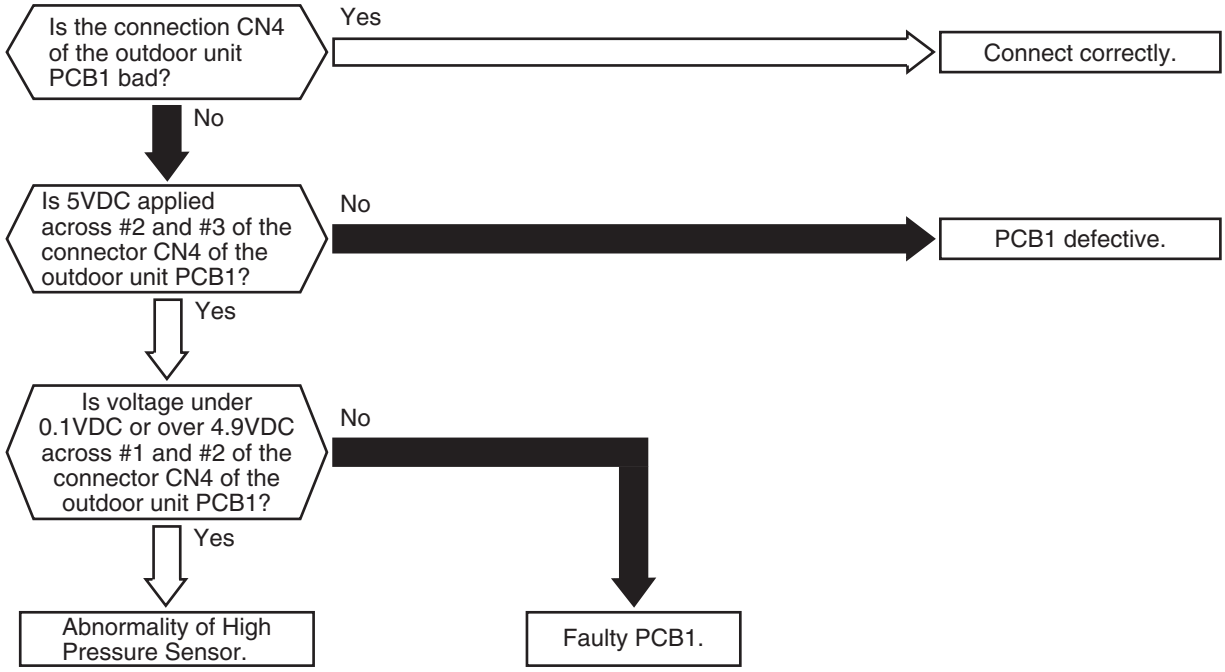


Phenomenon	Cause		Check Item	Action (Turn OFF Main Switch)
Activation of Overcurrent Protection Device for Indoor Fan Motor	Faulty Indoor Unit Fan Motor		Measure coil resistance and insulation resistance.	Replace motor if faulty.
	Faulty PCB	Fault	Check the output voltage and fuse in the case of Hi-Tap Setting.	Replace PCB.
		Insufficient Contacting	Measure resistance by tester.	Correct looseness. Replace connectors.
		Incorrect Connection	Check connections.	Repair connections.

Alarm Code 21	Abnormality of High Pressure Sensor for Outdoor Unit

- "RUN" light flashes 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 pressure sensor voltage decreases lower than 0.1V or increases higher than 4.9V during running.

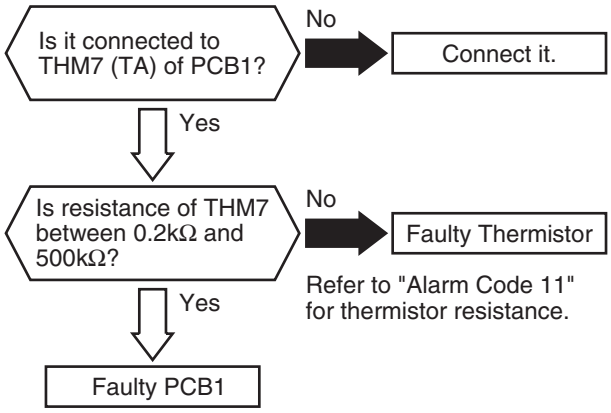


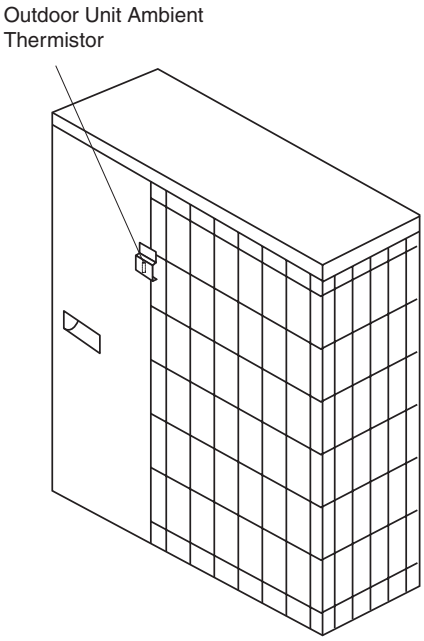
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty High Pressure Sensor	Fault	Check output voltage is correct.	Replace pressure sensor if faulty.
	Incorrect Connection	Check connections.	Repair wiring and connections.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.

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

- "RUN" light flashes 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).



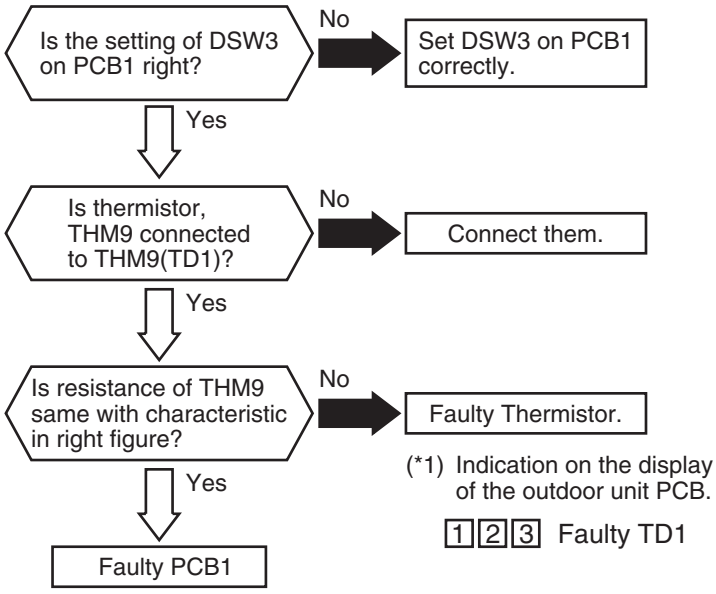


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Thermistor for Outdoor Unit Ambient	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB1.	Repair wiring and connections.
Faulty PCB1		Replace PCB1 and check operation.	Replace PCB1 if faulty.

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

- "RUN" light flashes 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 unit No. and alarm code are indicated on the display of the outdoor unit PCB. (*1)
  If abnormality with the thermistor is found, check all the thermistors as shown below.

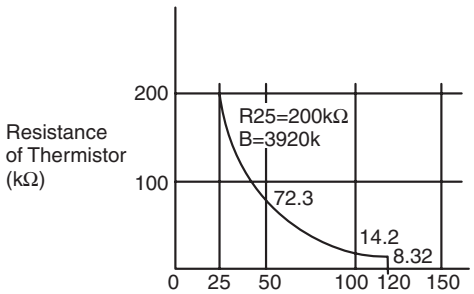
★ This alarm code is indicated when the thermistor is short-circuited (less than 0.9 kΩ) or cut (greater than 2,350 kΩ) during running.



(*1) Indication on the display of the outdoor unit PCB.

1 2 3 Faulty TD1

Characteristics of Thermistor



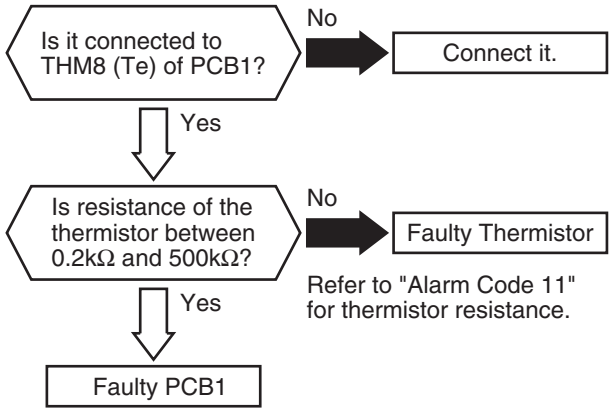
Position of Thermistor

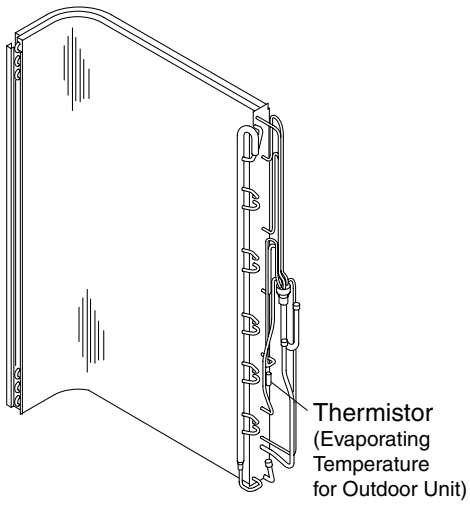
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Discharge Gas Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Repair wiring and connections.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.
Incorrect Setting of DSW3 on PCB1		Check setting of DSW3 on PCB1.	Correctly set DSW3 on PCB1.

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

- "RUN" light flashes 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.



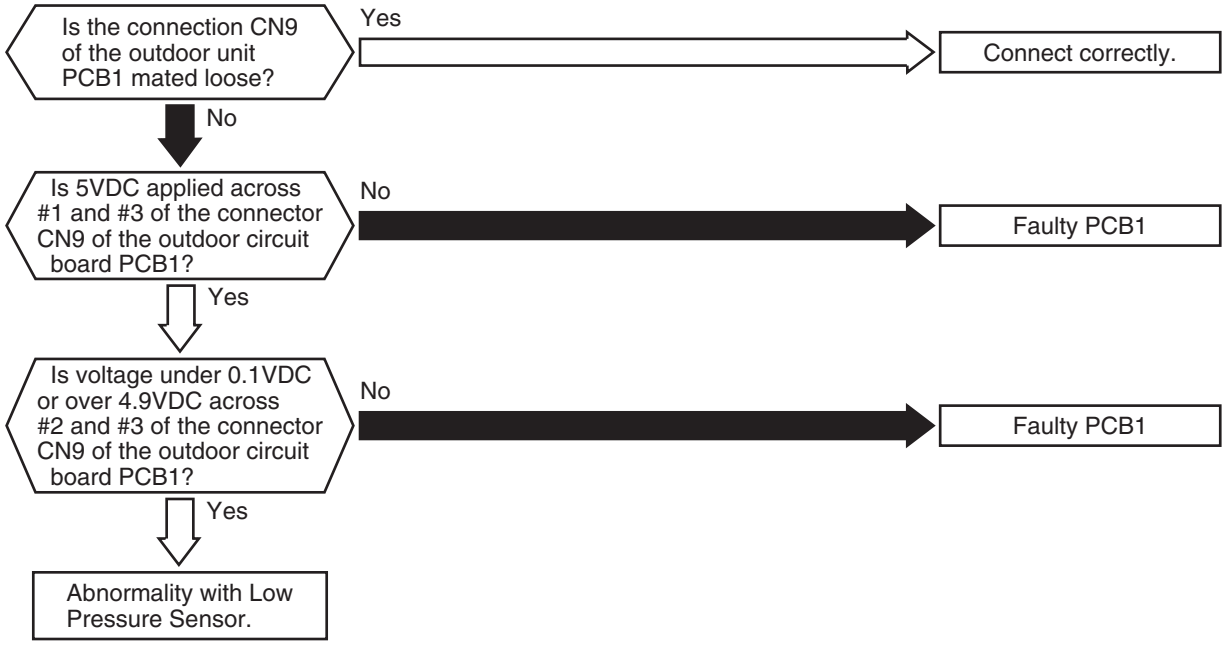


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Thermistor for Evaporating Temperature during Heating	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB1.	Repair wiring and connections.
Faulty PCB1		Replace PCB1 and check operation.	Replace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

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

- "RUN" light flashes 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 pressure sensor voltage decreases lower than 0.1V or increases higher than 4.9V during running.



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Low Pressure Sensor	Fault	Check output voltage is correct.	Replace pressure sensor if faulty.
	Incorrect Connection	Check connections.	Repair wiring and connections.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.

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

- "RUN" light flashes 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 capacity setting dip switch, DSW3 on the outdoor unit PCB1, is not set (all the settings from #1 to #3 are OFF) or mis setting.

★ This alarm code is indicated when the total indoor unit capacity is smaller than 50% or greater than 150% of the combined outdoor unit capacity.

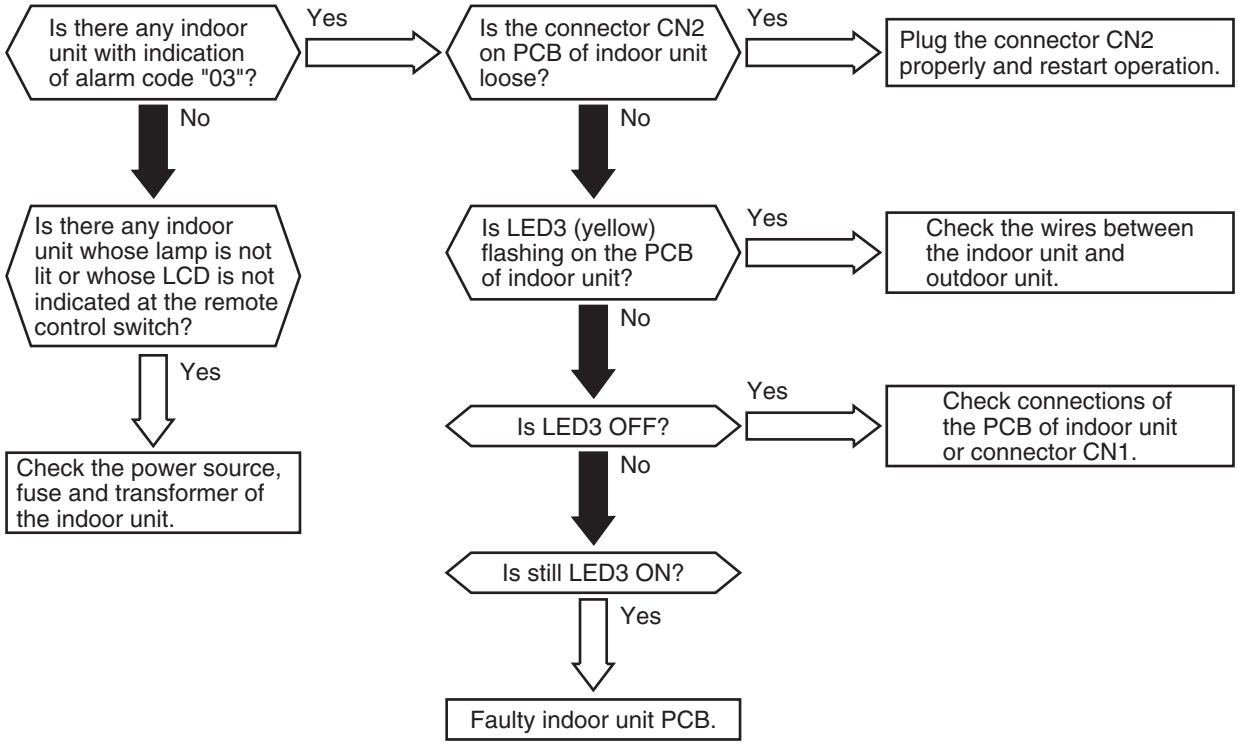
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Incorrect Capacity Setting of Indoor Unit		Check combination of indoor units and capacity setting on PCB.	Correctly set dip switch, DSW3.
Incorrect Capacity Setting of Outdoor Unit		Check capacity setting on outdoor unit PCB.	Correctly set dip switch, 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 from 50% to 130%.
Refrigeration Cycle Setting of Outdoor Unit and Indoor Unit is Different		Check refrigeration cycle setting on outdoor unit PCB and indoor unit PCB.	Set them correctly.

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 32	Abnormality in Transmitting of Other Indoor Units

- "RUN" light flashes 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 on the remote control switch of other indoor unit when no transmitting data is issued from a malfunctioning indoor unit for more than 60 minutes after receiving transmitting data from the indoor unit.



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Abnormal Transmitting from Other Units	Abnormal Transmitting Indoor Unit → Outdoor Unit Outdoor Unit → Indoor Unit	Check indoor unit showing alarm code "03".	Take action according to "Alarm Code 3".
	Incorrect Power Supply (to Indoor Unit) *1)	Check indoor unit showing no light ON on remote control switch.	Take action according to item 1.1.4 and 1.1.5.
	Faulty Indoor Unit PCB	If all indoor unit show alarm code 32, check PCB by self-checking mode for all indoor unit.	Replace PCB if faulty.

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

Alarm Code 35	Incorrect Indoor Unit No. Setting

- "RUN" light flashes 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.

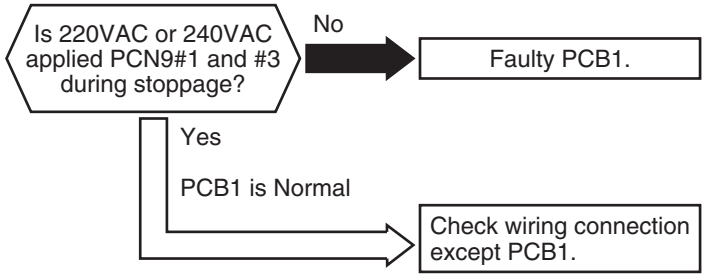
★ This alarm code is indicated that it is connected the same indoor unit number in the same refrigerant cycle.

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

- "RUN" light flashes 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.

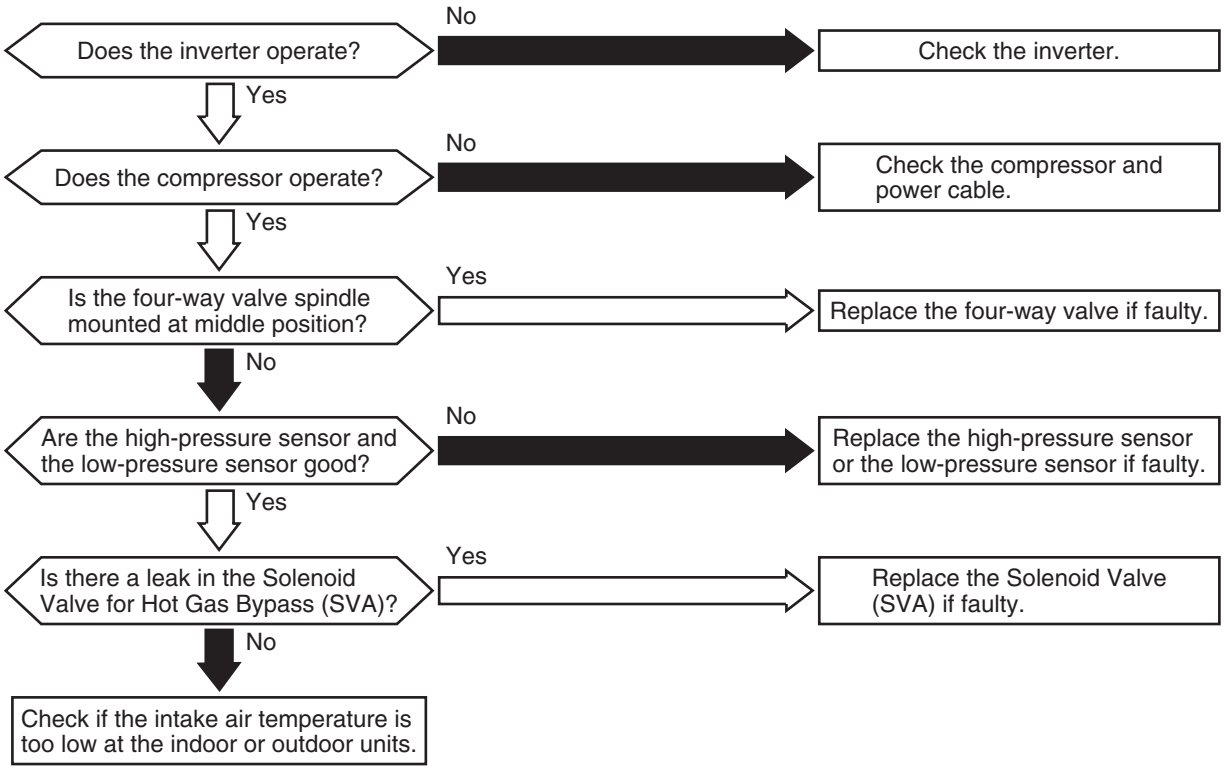


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
	Faulty PCB1	Check PCB1 by self-checking. (Refer to Item 1.3.1 in P5413553.)	Replace PCB1.

Alarm Code 43	Activation to Protect System from Low Compression Ratio

- "RUN" light flashes 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 a compression ratio, $\varepsilon = \{(Pd + 0.1) / (Ps + 0.1)\}$ is calculated from a discharge pressure (MPa) and suction pressure (MPa) and the condition lower than $\varepsilon = 1.8$ occurs more than 3 times including 3 in one hour.

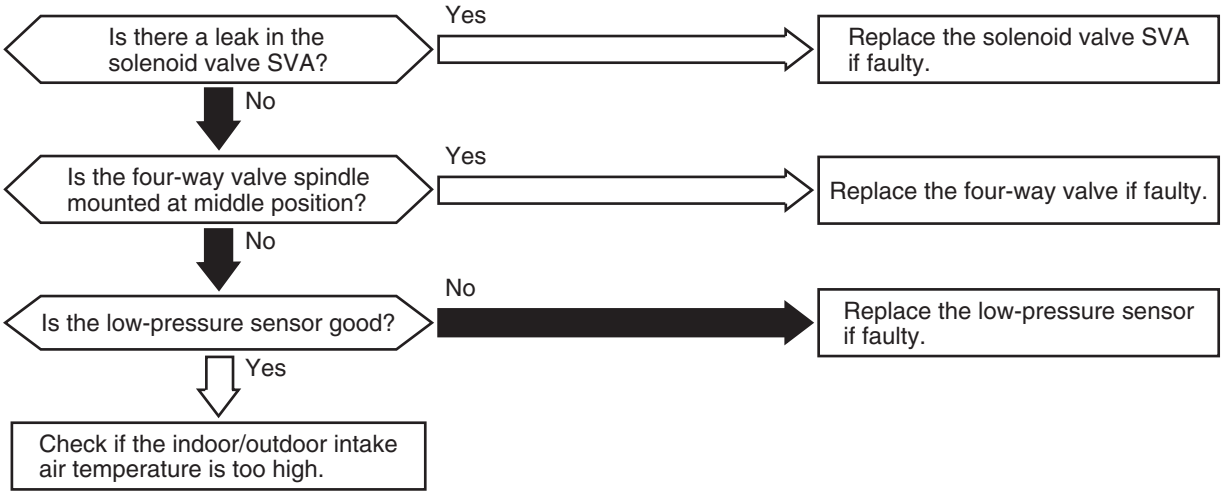


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Compression Ratio	Inverter is not Functioning	Check inverter.	Repair faulty part.
	Compressor is not Operating	Check compressor.	Replace comp. if faulty.
	Valve Stoppage at Medium Position of 4-Way Valve	Measure suction pipe temp.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

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

- "RUN" light flashes 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 compressor is operated under the conditions higher than 0.9 MPa of suction pressure and its occurrence is more than 3 times including 3 in one hour.

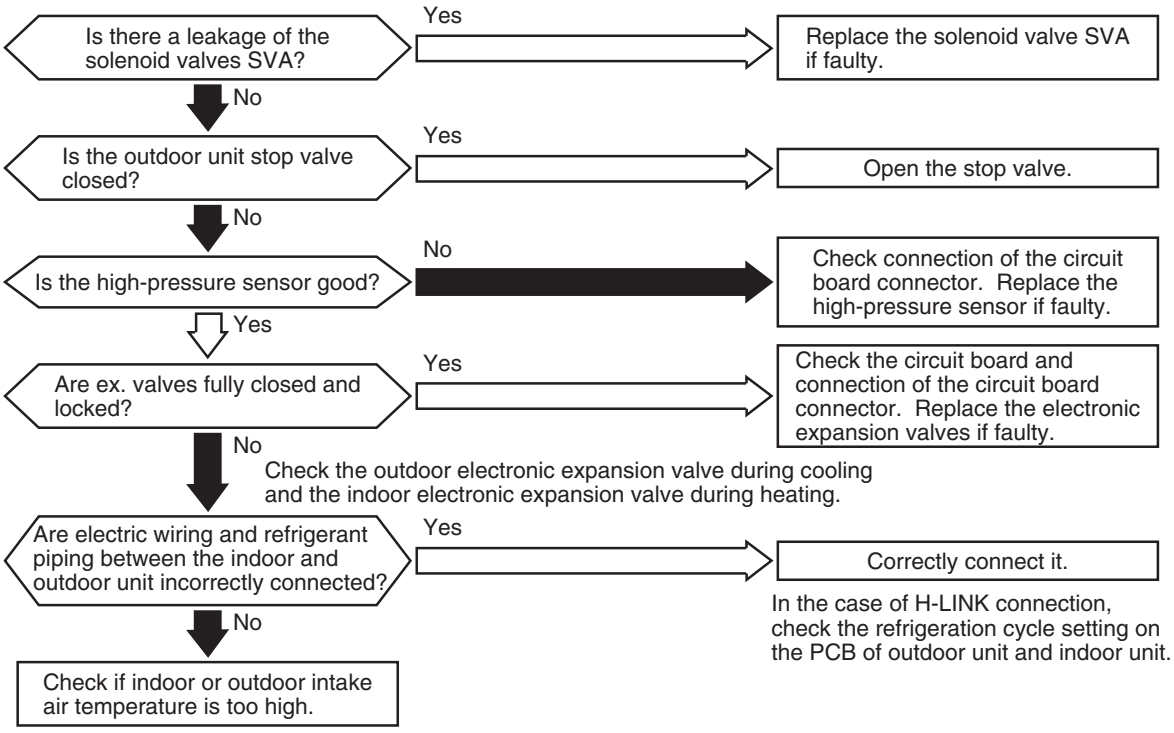


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Suction Pressure	Leakage of Solenoid Valve SVA	Check outlet pipe temp. of solenoid valve, SVA.	Check connecting wires. Replace solenoid valve, SVA if faulty.
	Valve Stoppage at Medium Position of 4-Way Valve	Measure suction gas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

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

- "RUN" light flashes 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 compressor is operated under the conditions higher than 2.65 MPa (26.5 kg/cm^{2}G) of discharge pressure and its occurrence is more than 3 times including 3 in one hour.

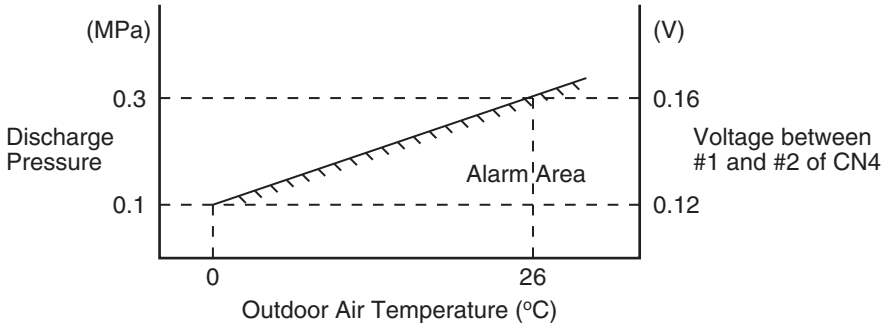


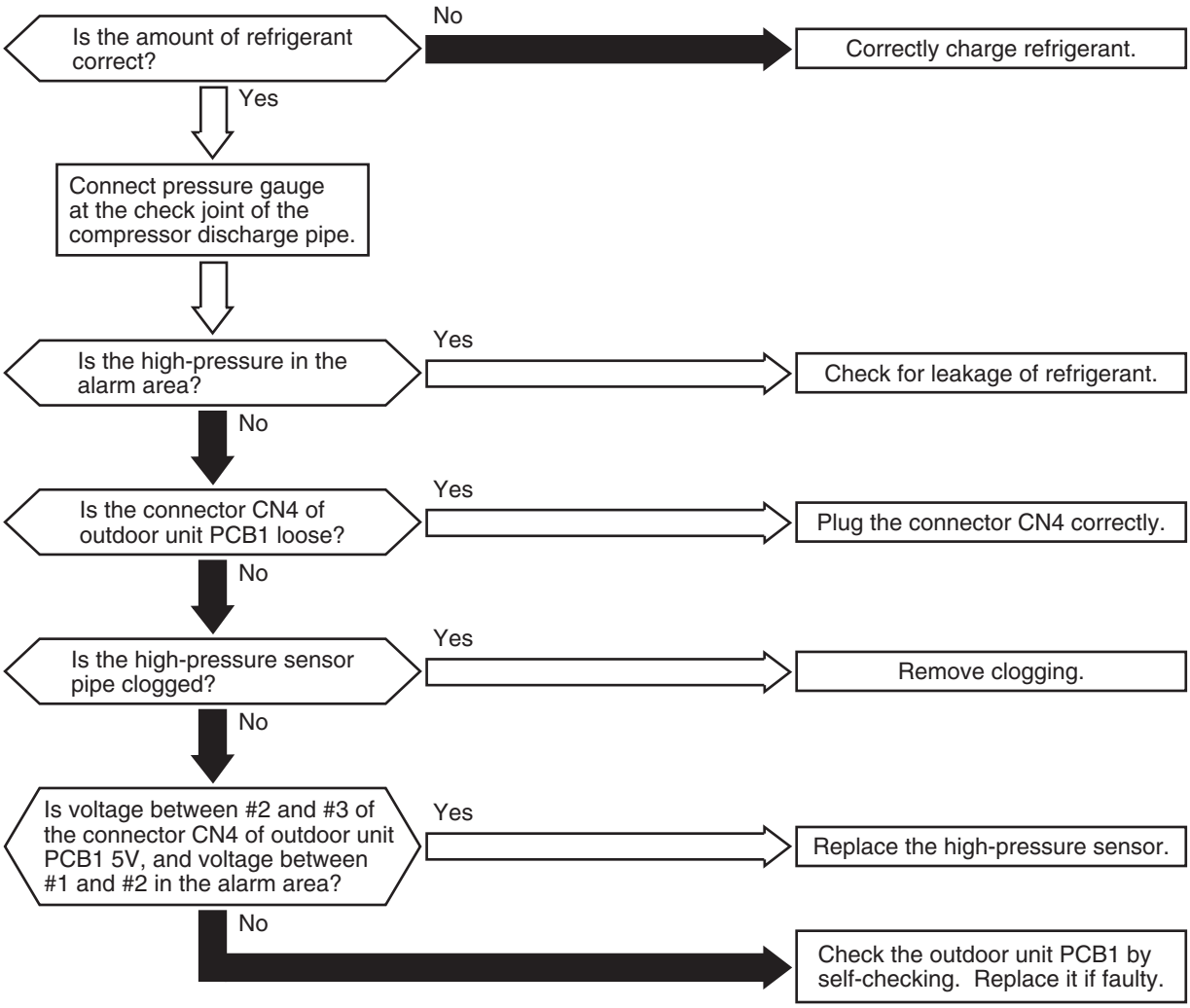
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively High Discharge Pressure	Leakage of Solenoid Valve SVA (Outdoor Unit)	Check outlet temp. of solenoid valve, SVA.	Check connection. Replace solenoid valve SVA if faulty.
	Closed Stop Valve	Check stop valve.	Open stop valve.
	Abnormal High Pressure Sensor	Check connectors for PCB.	Replace pressure sensor if faulty.
	Excessively High Indoor Unit and Outdoor Unit Inlet Air Temp.	Check thermistor for indoor unit and outdoor unit inlet air temp.	Replace thermistor if faulty.
	Incorrect Connection between Indoor Unit and Outdoor Unit	Check electrical system and ref. cycle.	Correctly connect.
	Locked Ex. Valve with Fully Closed	Check connector for PCB.	Repair connector for PCB or ex. valve. Replace it if faulty.
Stoppage of Indoor Fan <Wall Type Only>	Melted Fuses	Check continuity of fuses.	Replace fuses.
	Faulty PCB	Replace PCB and check operation.	Replace PCB if faulty.

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

- "RUN" light flashes 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 compressor is operated under the conditions lower than 0.6MPa (6kgf/cm²G) for an hour.

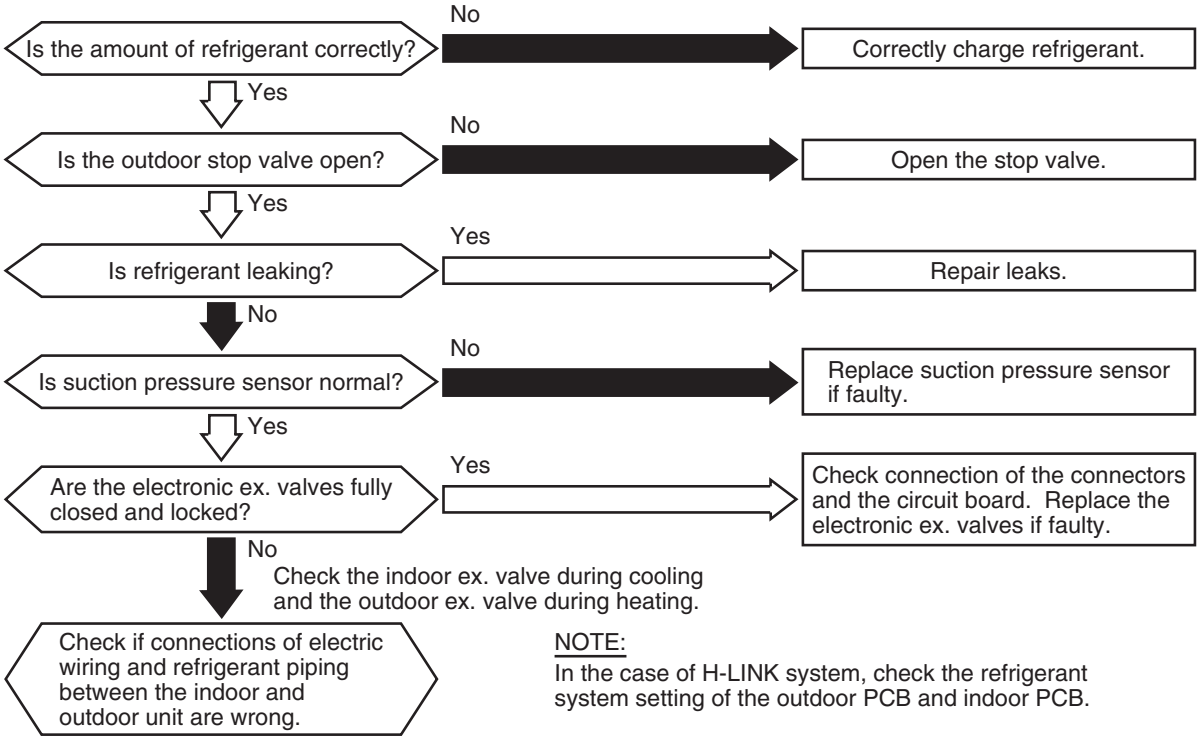




Alarm Code 47	Activation to Protect System from Excessively Low Suction Pressure (Protection from Vacuum Operation)

- "RUN" light flashes 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 a suction pressure is lower than 0.02 MPa (0.2 kg/cm^{2}G) for over 12 minutes and its state occurs more than 3 times including 3 in one hour.



NOTE:
In the case of H-LINK system, check the refrigerant system setting of the outdoor PCB and indoor PCB.

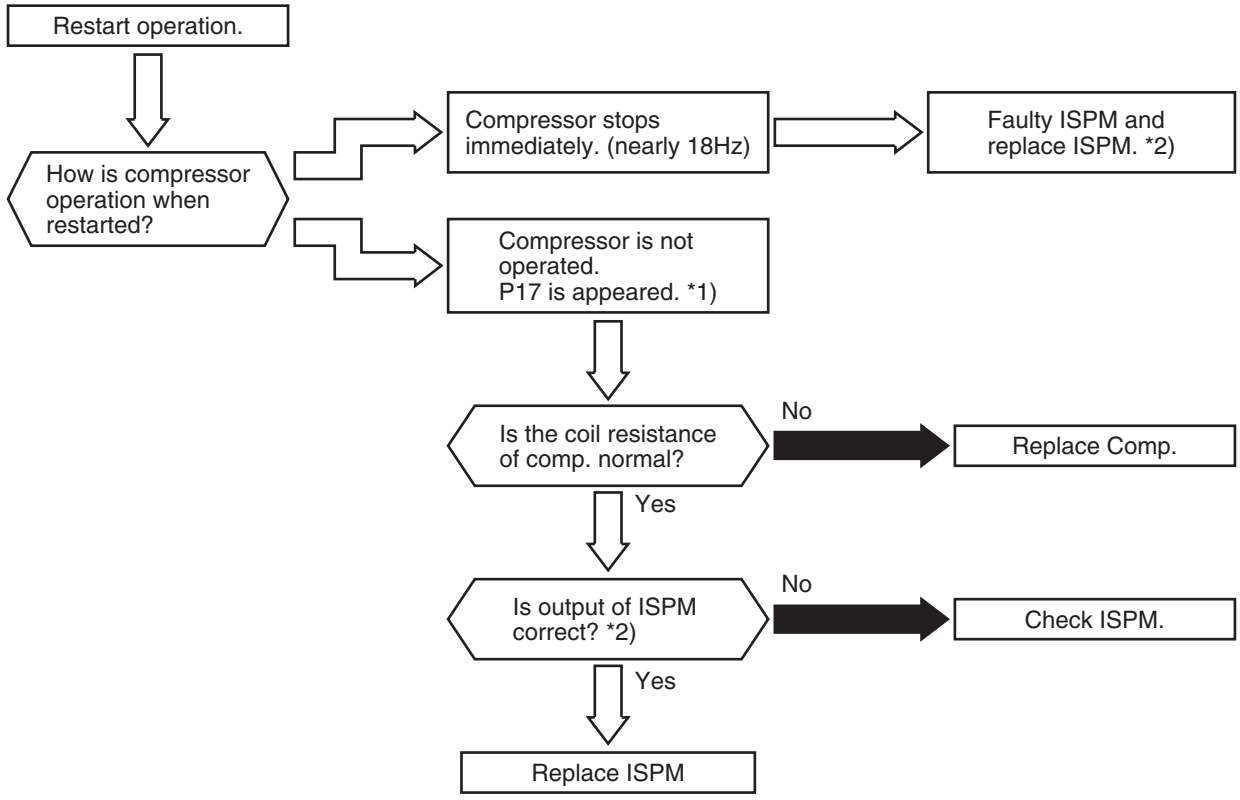
Phenomenon	Cause		Check Item	Action (Turn OFF Main Switch)
Excessively Low Suction Pressure (in Vacuum)	Shortage of Ref.		Check ref. charged volume or check for leakage.	Repair leakage and correctly charge.
	Closed Stop Valve		Check stop valve.	Open stop valve.
	Abnormal Low or High Pressure Sensor		Check connector for PCB.	Replace pressure sensor if faulty.
	Incorrect Connection between Indoor Unit and Outdoor Unit		Check electrical system and ref. cycle.	Correctly connect between indoor unit and outdoor unit.
	Locked Ex. Valve		Check connector for PCB.	Repair or replace connector of PCB or ex. valve.
	Closed Expansion Valve by Disconnecting Td Thermistor		Check Td Thermistors	Repair or replace Td thermistor.
Internal Thermostat for Outdoor Fan is Activated in Heating Operation	Faulty Outdoor Fan Motor		Measure coil resistance and insulation resistance.	Replace outdoor fan motor if faulty.
	Faulty Internal Thermostat	Fault	Check for conduction after temperature of outdoor fan motor is decreased.	Replace outdoor fan motor.
		Incorrect Contact	Measure resistance by tester.	Remove looseness and replace connector.
		Incorrect Connection	Check connection.	Connect correctly.

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

- "RUN" light flashes 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).



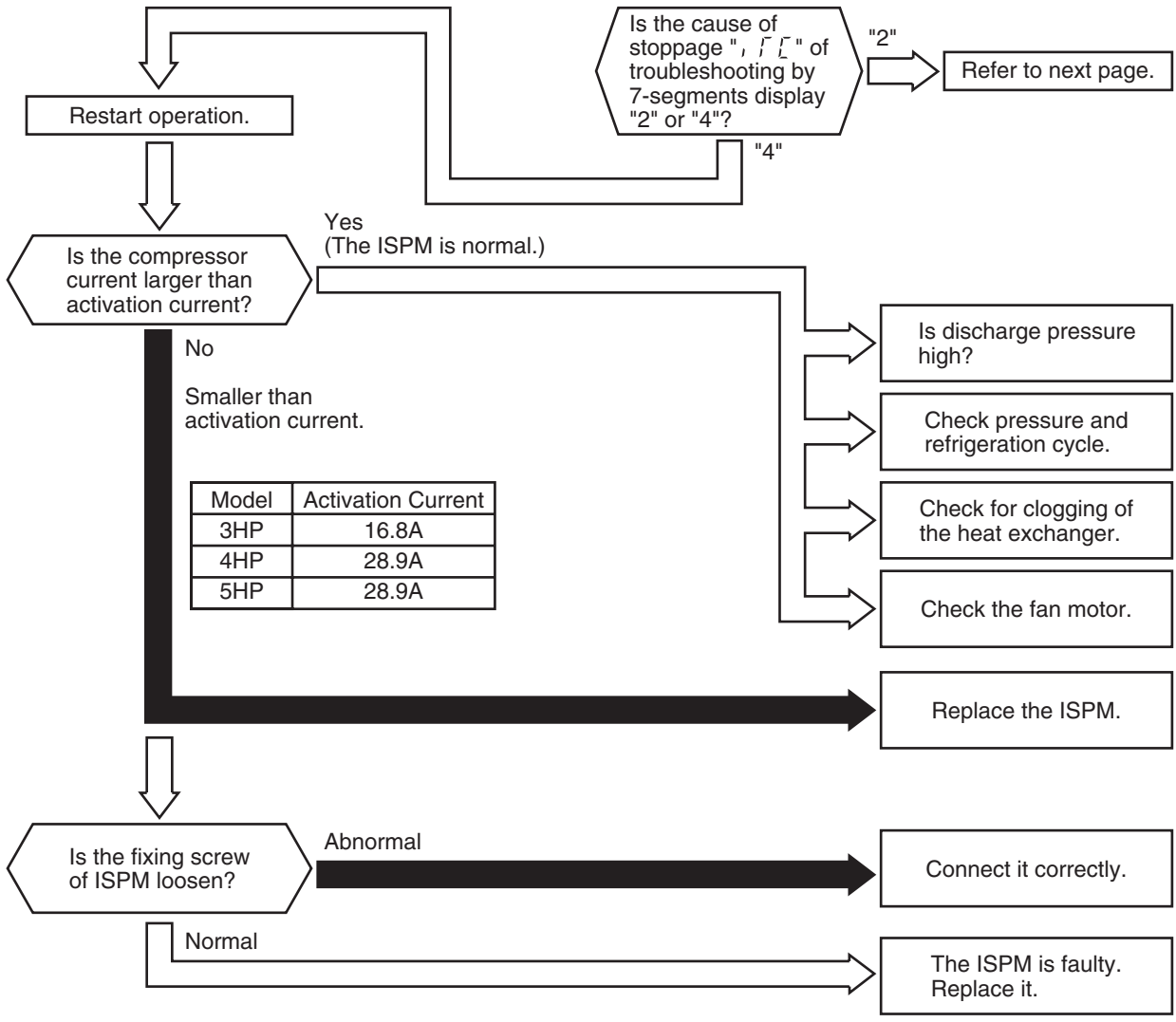
*1): P17 is shown at 7-segment on the outdoor unit PCB.
*2): Perform the high voltage discharge work by referring to item 1.3.4 before checking and replacing the inverter parts.

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

- "RUN" light flashes 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	16.8A
4HP	28.9A
5HP	28.9A

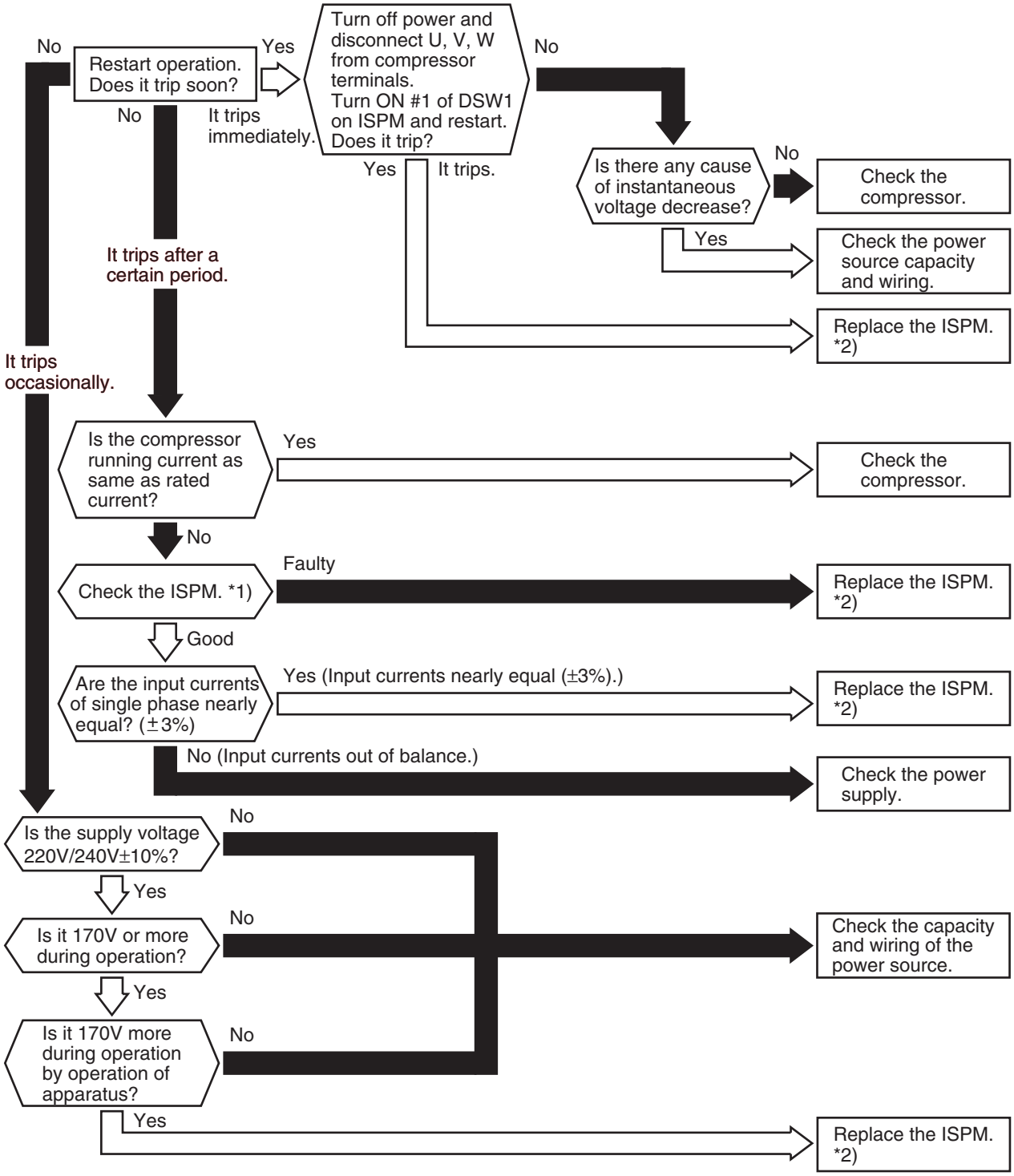
*1): Before replacing or the checking of inverter components, refer to item 1.3.4 regarding electrical discharge.

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

- "RUN" light flashes 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.



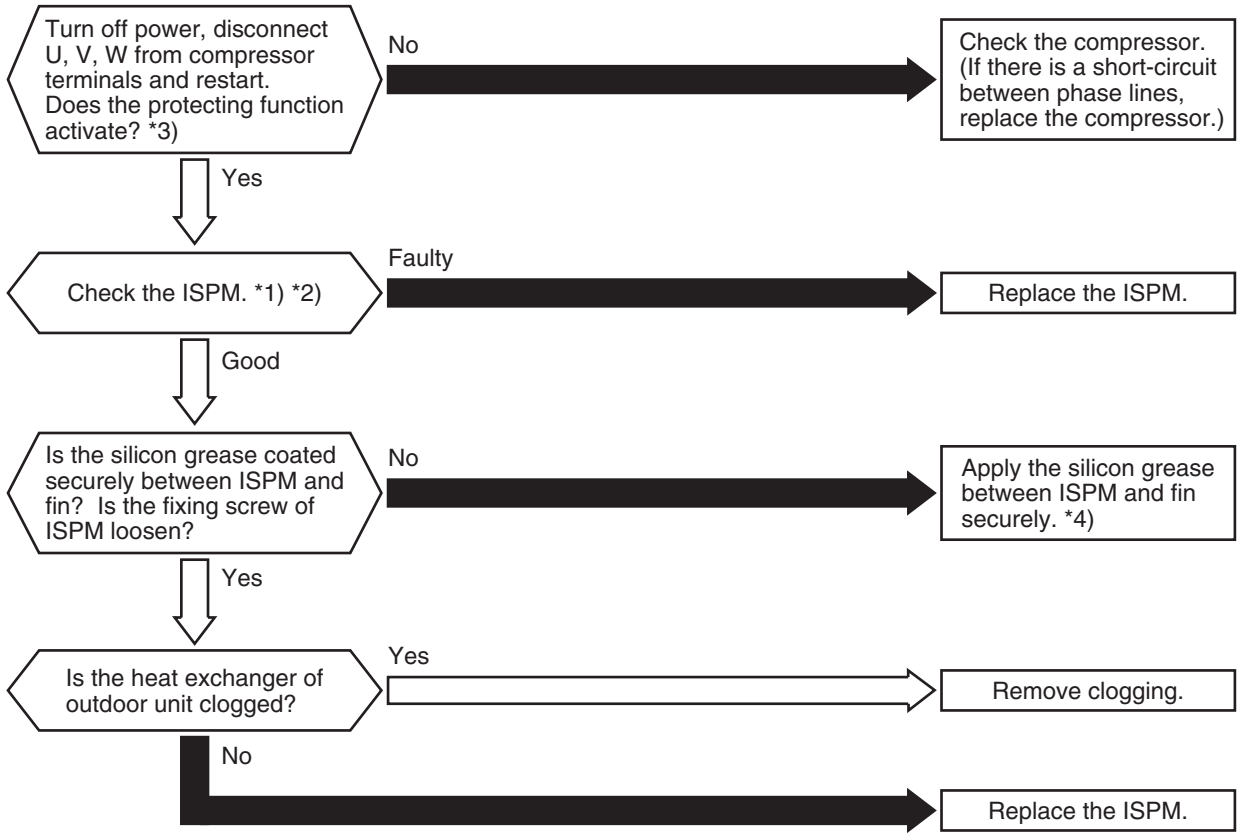
1*): Regarding the checking method for the ISPM, refer to item 1.3.4 (2).
2*): Before replacing the ISPM, refer to item 1.3.4 (1) regarding electrical discharge.

Alarm Code 53	Protection Activation of ISPM

- "RUN" light flashes 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



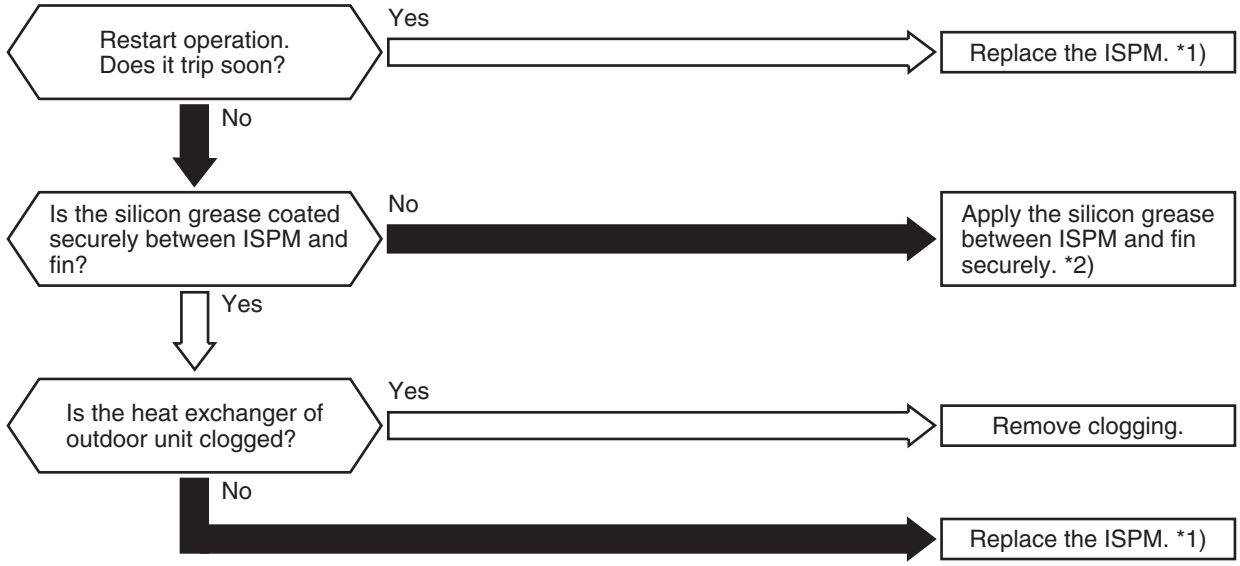
1*): Before replacing the ISPM, refer to item 1.3.4 (1) regarding electrical discharge.
2*): Regarding the checking of the ISPM, refer to item 1.3.4 (2).
3*): Turn ON the No.1 switch of the dip switch DSW1 on ISPM when restarting with disconnecting the terminals of the compressor. After troubleshooting, 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 flashes 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.

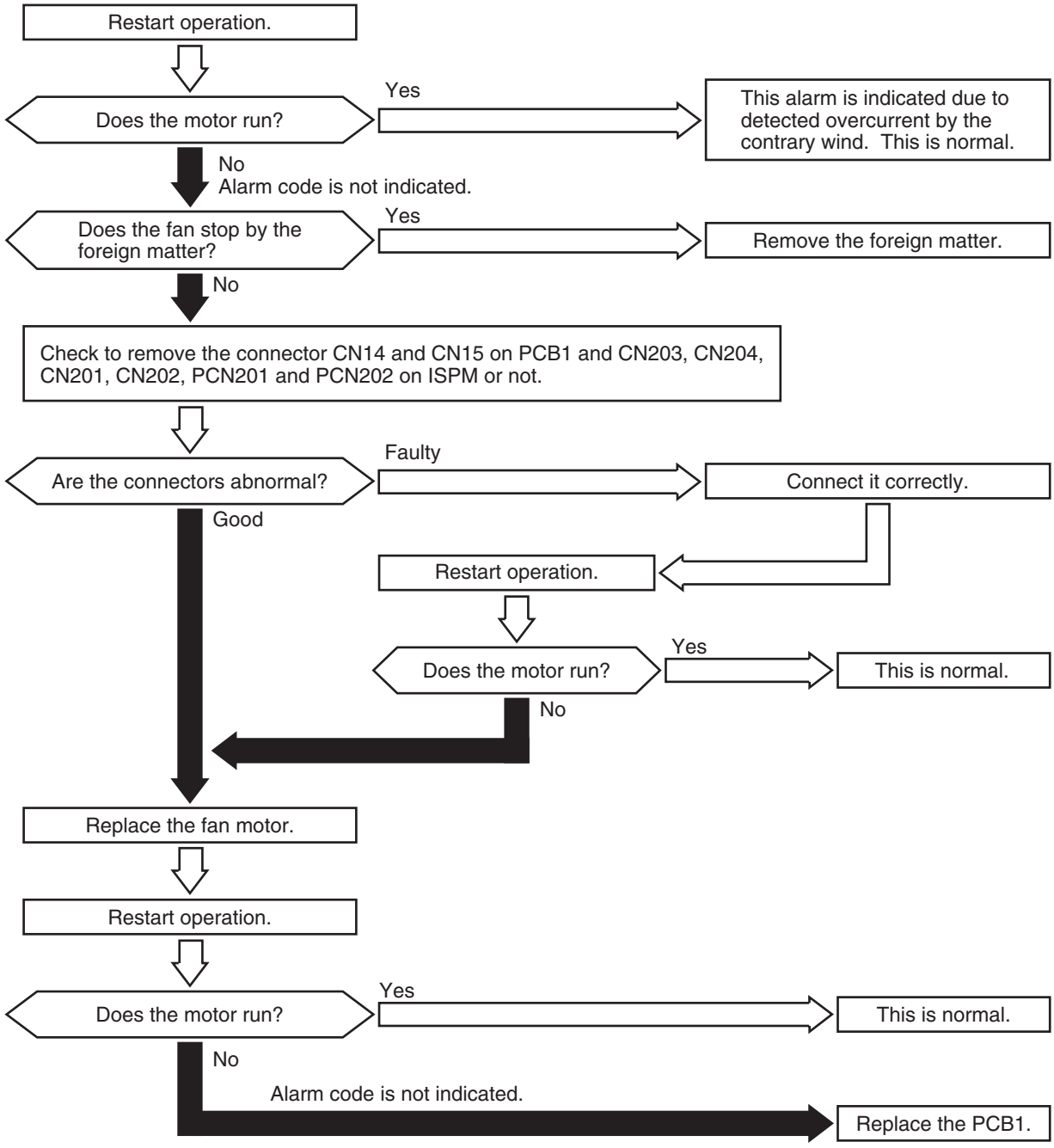


1*): Before replacing the ISPM, refer to item 1.3.4 (1) regarding electrical discharge.
2*): Silicone grease (P22760) is available as a spare parts.

Alarm Code 57	Abnormality of Fan Motor Protection

- "RUN" light flashes 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.

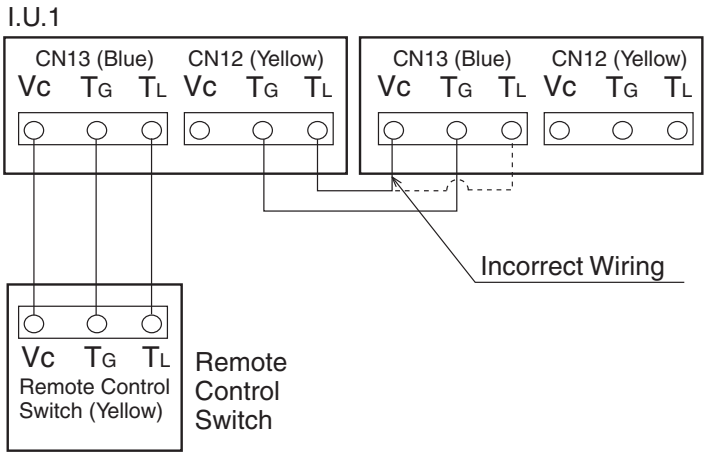


In the case that the fan motor does not run even the PCB1 is replaced, replace ISPM.

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*
43	*Pressure Ratio Decrease Protection Activating*
44	*Low Pressure Increase Protection Activating*
45	*High Pressure Increase Protection Activating*
46	*High Pressure Decrease Protection Activating*
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.**

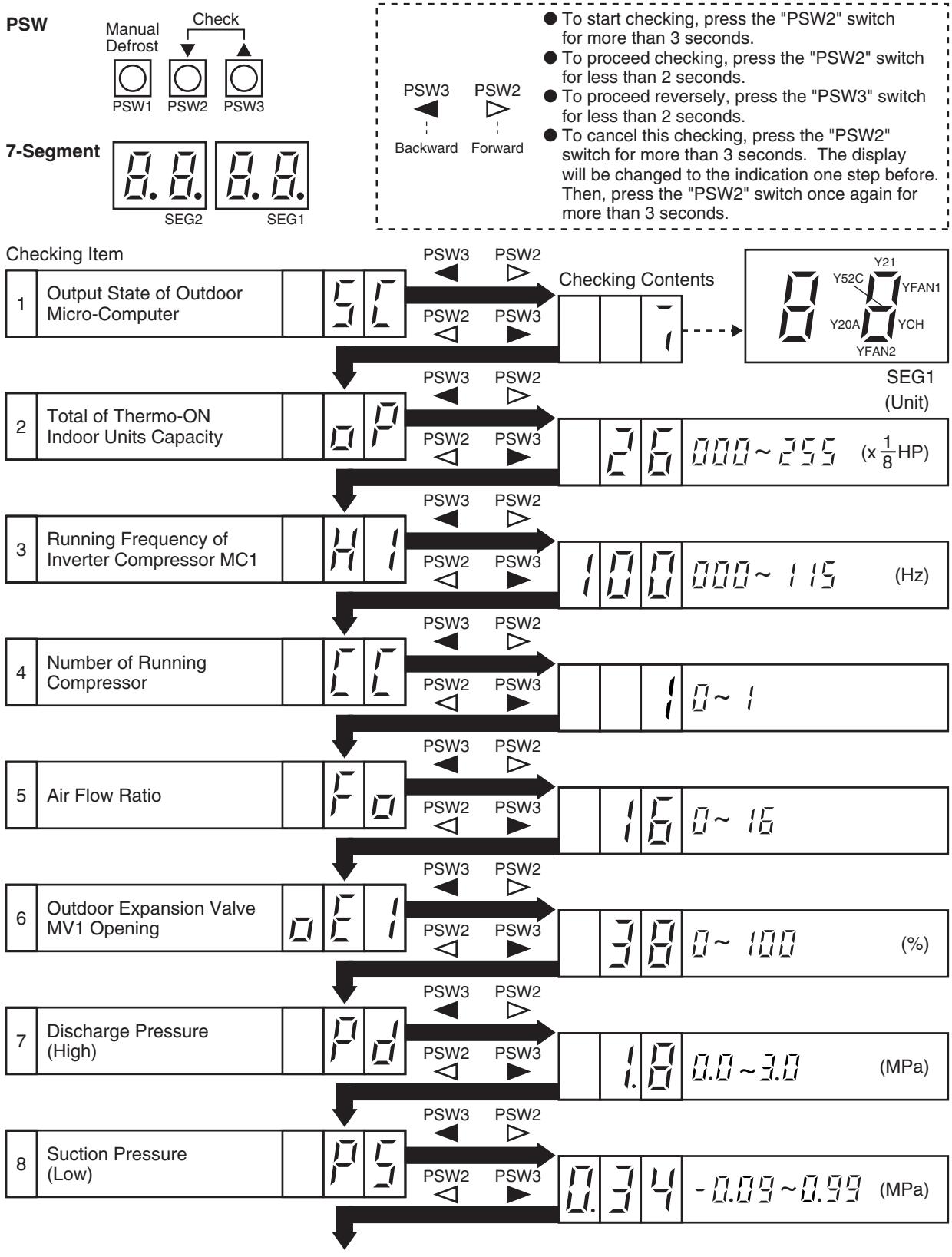
1.2.3 Troubleshooting in Check Mode by Remote Control Switch

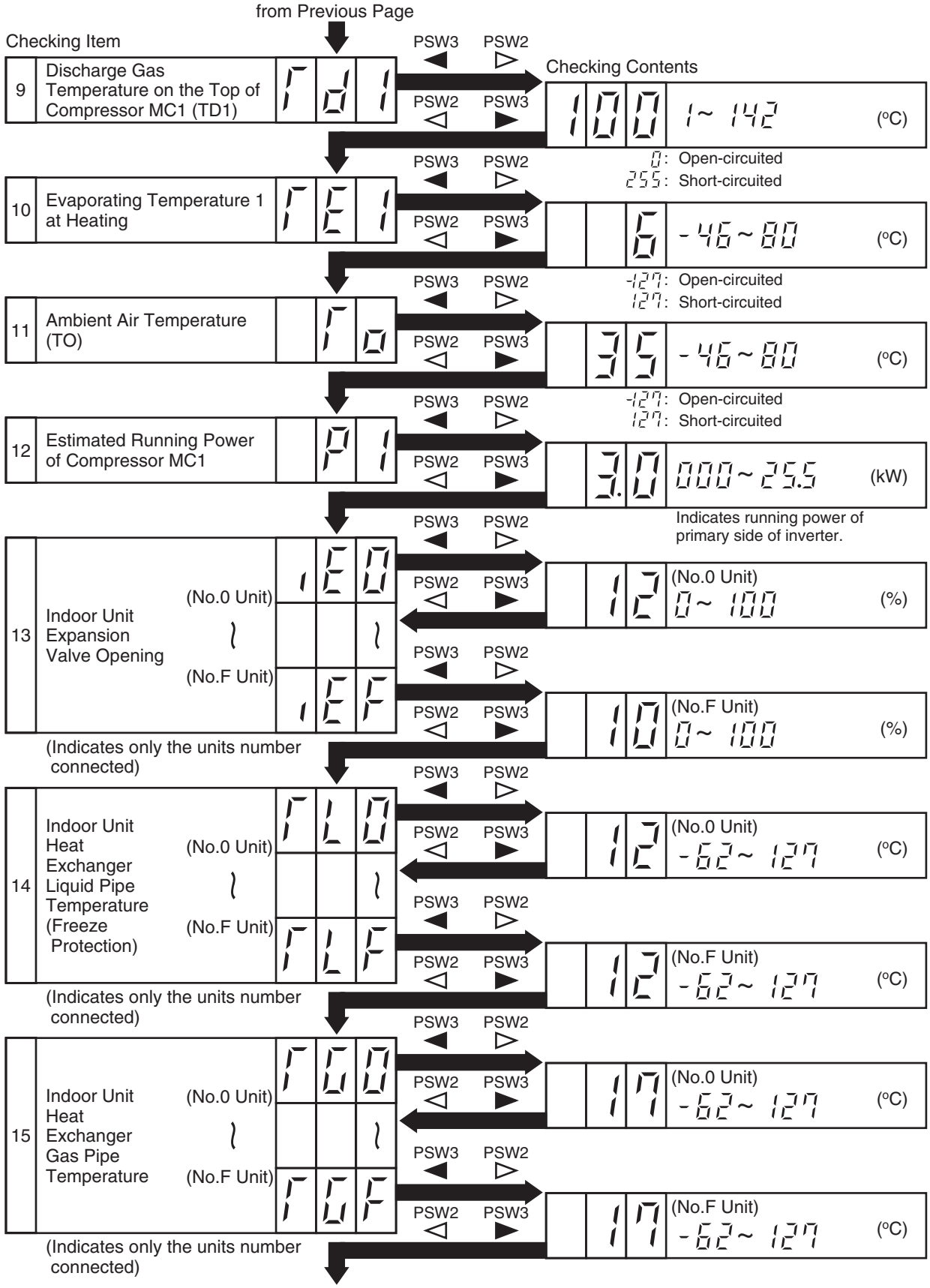
Refer to the Service Manual, P5413553.

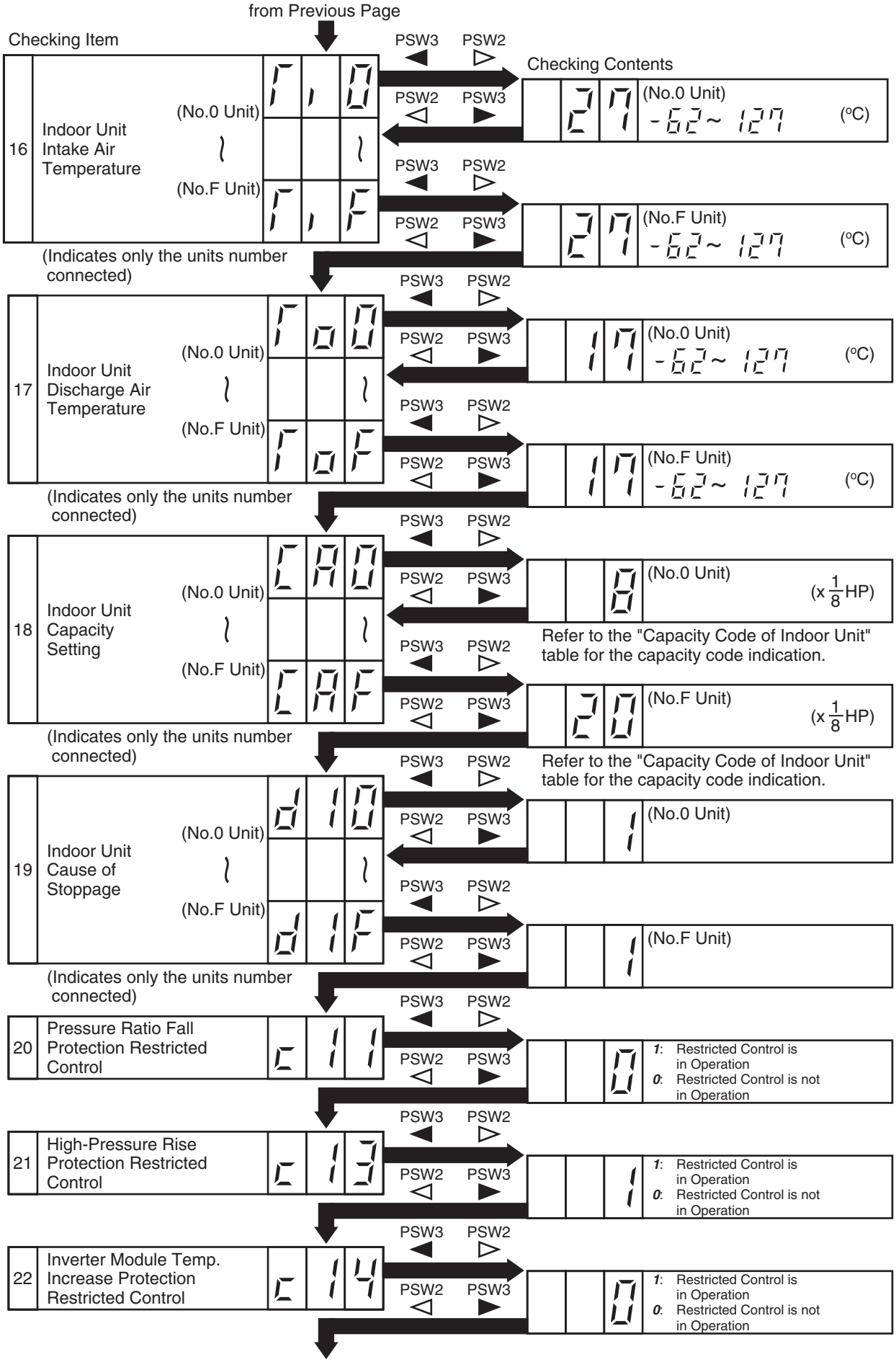
1.2.4 Troubleshooting by 7-Segment Display

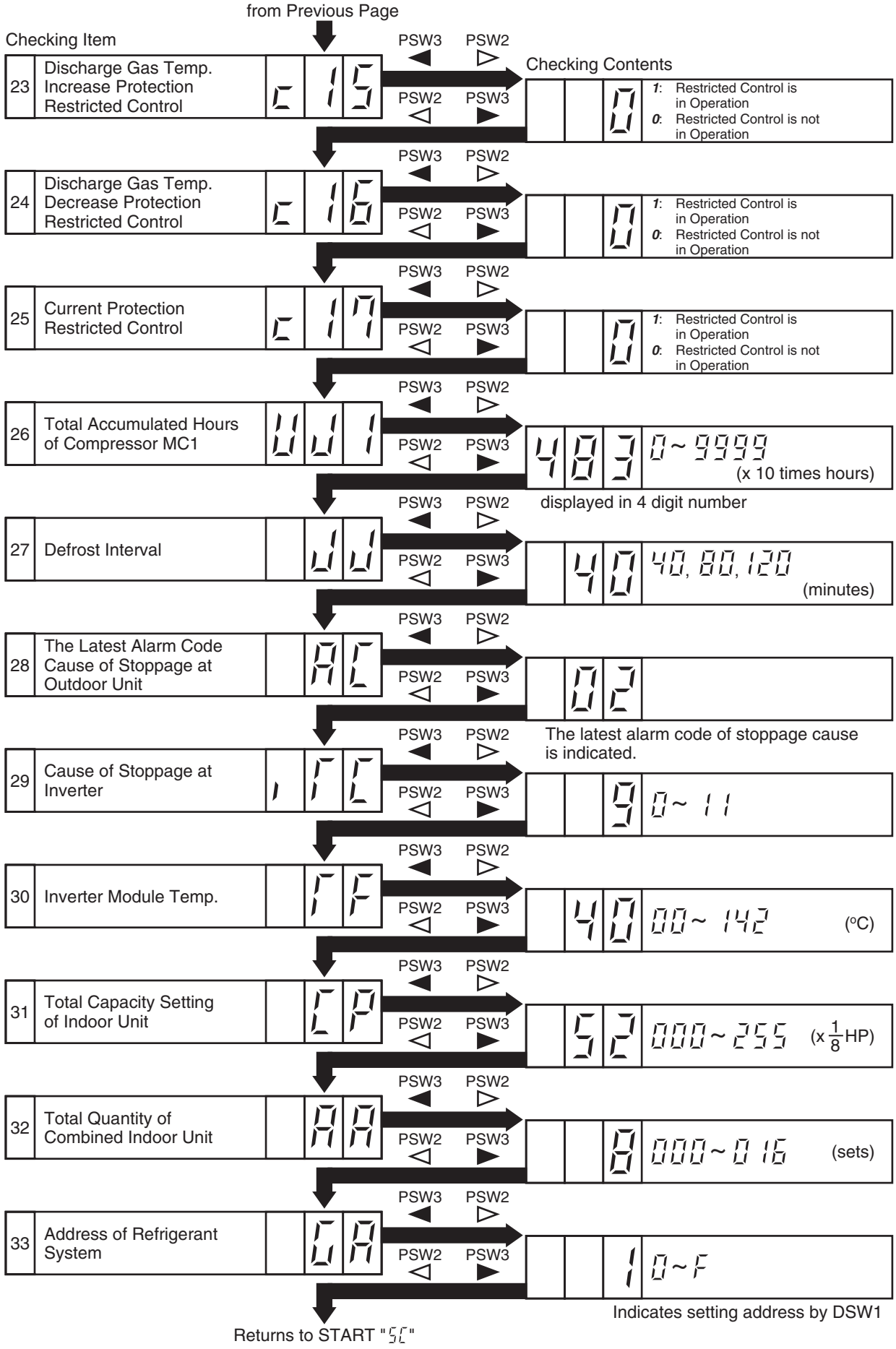
(1) Checking Method by 7-Segment Display

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



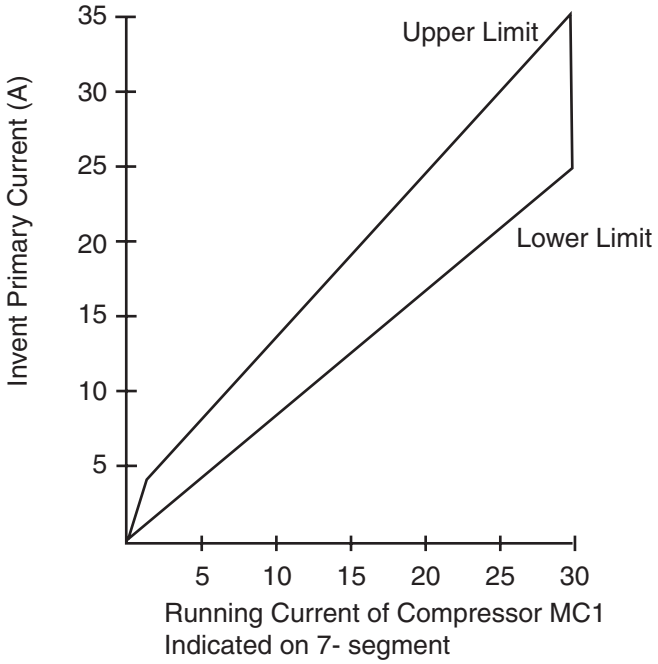

from Previous Page
Checking Item
Checking Contents
PSW3 PSW2
PSW2 PSW3
9 Discharge Gas Temperature on the Top of Compressor MC1 (TD1)
rd1
100
1~142
(ºC)
0: Open-circuited
255: Short-circuited
10 Evaporating Temperature 1 at Heating
rE1
6
-46~80
(ºC)
-127: Open-circuited
127: Short-circuited
11 Ambient Air Temperature (TO)
rto
35
-46~80
(ºC)
-127: Open-circuited
127: Short-circuited
12 Estimated Running Power of Compressor MC1
rP1
3.0
000~25.5
(kW)
Indicates running power of primary side of inverter.
13 Indoor Unit Expansion Valve Opening
(No.0 Unit)
(No.F Unit)
(Indicates only the units number connected)
1E0
1EF
12
(No.0 Unit)
0~100
(%)
10
(No.F Unit)
0~100
(%)
14 Indoor Unit Heat Exchanger Liquid Pipe Temperature (Freeze Protection)
(No.0 Unit)
(No.F Unit)
(Indicates only the units number connected)
rL0
rLF
12
(No.0 Unit)
-62~127
(ºC)
12
(No.F Unit)
-62~127
(ºC)
15 Indoor Unit Heat Exchanger Gas Pipe Temperature
(No.0 Unit)
(No.F Unit)
(Indicates only the units number connected)
rG0
rGF
17
(No.0 Unit)
-62~127
(ºC)
17
(No.F Unit)
-62~127
(ºC)


from Previous Page
Checking Item
Checking Contents
PSW3
PSW2
16
Indoor Unit Intake Air Temperature
(No.0 Unit)
(No.F Unit)
r,0
r,F
27
(No.0 Unit)
(No.F Unit)
-62~ 127
(°C)
(Indicates only the units number connected)
17
Indoor Unit Discharge Air Temperature
r.0
r.F
17
18
Indoor Unit Capacity Setting
CA0
CAF
8
(No.0 Unit)
(x 1/8HP)
Refer to the "Capacity Code of Indoor Unit" table for the capacity code indication.
20
(No.F Unit)
19
Indoor Unit Cause of Stoppage
d10
d1F
1
(No.0 Unit)
(No.F Unit)
20
Pressure Ratio Fall Protection Restricted Control
c11
0
1: Restricted Control is in Operation
0: Restricted Control is not in Operation
21
High-Pressure Rise Protection Restricted Control
c13
22
Inverter Module Temp. Increase Protection Restricted Control
c14


from Previous Page
Checking Item
Checking Contents
PSW3 PSW2
PSW2 PSW3
23 Discharge Gas Temp. Increase Protection Restricted Control
c15
0
1: Restricted Control is in Operation
0: Restricted Control is not in Operation
24 Discharge Gas Temp. Decrease Protection Restricted Control
c16
0
1: Restricted Control is in Operation
0: Restricted Control is not in Operation
25 Current Protection Restricted Control
c17
0
1: Restricted Control is in Operation
0: Restricted Control is not in Operation
26 Total Accumulated Hours of Compressor MC1
uu1
483
0~9999
(x 10 times hours)
displayed in 4 digit number
27 Defrost Interval
dd
40
40, 80, 120
(minutes)
28 The Latest Alarm Code Cause of Stoppage at Outdoor Unit
AC
02
The latest alarm code of stoppage cause is indicated.
29 Cause of Stoppage at Inverter
,rC
9
0~11
30 Inverter Module Temp.
rF
40
00~142
(ºC)
31 Total Capacity Setting of Indoor Unit
CP
52
000~255
(x 1/8 HP)
32 Total Quantity of Combined Indoor Unit
AA
8
000~016
(sets)
33 Address of Refrigerant System
cA
1
0~F
Indicates setting address by DSW1
Returns to START "SC"

(2) Running Current of Compressor

● Inverter Primary Current
The inverter primary current is estimated from the running current of the compressor MC1 indicated on 7-segments, as chart below.



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	-

● Protection Control Code on 7-Segment Display

(a) The protection control indication can be seen on 7-segments when a protection control is activated.
(b) The 7-segment continues ON while function is working, and goes out when released.
(c) When several protection controls are activated, code number with higher priority will be indicated (see below for the priority order).

- Higher priority is given to protection control related to frequency control than the other.
  <Priority Order>
  * Pressure Ratio Control
  * High-Pressure Rise Protection
  * Current Protection
  * Inverter Module Temperature Increase Protection
  * Discharge Gas Temperature Rise Protection
  * Low-Pressure Fall Protection
  * Reversing Valve Switching Control
  * High-Pressure Decrease Protection
  * Oil Return Control
- In relation to retry control, the latest retrial will be indicated unless a protection control related to frequency control is indicated.

Code	Protection Control
P01	Pressure Ratio Control (*)
P02	High-Pressure Increase Protection (*)
P03	Current Protection (*)
P04	Inverter Fin Temperature Increase Protection
P05	Discharge Gas Temperature Increase Protection (*)
P06	Low-Pressure Decrease Protection
P08	Oil Return Control
P09	High-Pressure Decrease Protection

Code	Protection Control
P11	Pressure Ratio Decrease Retry
P12	Low-Pressure Increase Retry
P13	High-Pressure Increase Retry
P15	Vacuum/Discharge Gas Temperature Increase Retry
P16	Discharge Gas SUPERHEAT Decrease Retry
P17	Inverter Trip Retry
P18	Insufficient Voltage/ Excessive Voltage Retry

In the case that restricted control is activated, ***c*** is indicated in stead of ***0***. (*mark)

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

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.

■ Activating Condition of Protection Control Code

For following the conditions as the temperature change, etc., the control of frequency, etc. is performed to prevent the abnormal conditions by the protection control.
The activating conditions of protection control are shown in the table below.

Code	Protection Control	Activating Condition	Remarks
P01	Pressure Ratio Control	Compression Ratio≧9 => Frequency Decrease (Pd/(Ps+1.3))≦2.2 => Frequency Increase	-
P02	High-Pressure Increase Protection	Pd≧2.6MPa => Frequency Decrease	-
P03	Current Protection	Inverter Output Current≧16.8A (3HP), 28.7A (4, 5HP) => Frequency Decrease	-
P04	Inverter Fin Temperature Increase Protection	Inverter Fin Temperature≧94°C => Frequency Decrease	-
P05	Discharge Gas Temperature Increase Protection	Temperature at the Top of Compressor is High => Frequency Decrease (Maximum temperature is different depending on the frequency.)	-
P06	Low-Pressure Decrease Protection	Low-Pressure is Excessively Low => Frequency Decrease	-
P08	Oil Return Control	Frequency less than 30Hz is maintained for more than 1 hour. => Frequency≧40Hz	-
P09	High-Pressure Decrease Protection	Pd≦0.69MPa => Frequency Increase (When Cooling Operation) Pd≦1.57MPa => Frequency Increase (When Heating Operation)	-
P11	Pressure Ratio Decrease Retry	Compression Ratio (Pd/(Ps+1.3)<1.8)	When activating 3 times in an hour, "43" alarm is indicated.
P12	Low-Pressure Increase Retry	Ps>0.9MPa	When activating 3 times in an hour, "44" alarm is indicated.
P13	High-Pressure Increase Retry	Pd≧2.85MPa	When activating 3 times in an hour, "45" alarm is indicated.
P15	Vacuum/Discharge Gas Temperature Increase Retry	In Case of Ps<0.02MPa over 12 minutes, Discharge Gas Temperature≧132°C over 10 minutes or Discharge Gas Temperature≧140°C over 5 seconds	When activating 3 times in 30 minutes, "47"(Ps) or "08" (Discharge Gas) alarm is indicated.
P16	Discharge Gas SUPERHEAT Decrease Retry	Discharge Gas SUPERHEAT less than (398/16･Pd+15)-Tc deg. is maintained for 30 minutes.	When activating 2 times in an hour, "07" alarm is indicated.
P17	Inverter Trip Retry	Automatic Stoppage of Transistor Module, Activation of Electronic Thermal or Abnormal Current Sensor	When activating 3 times in 30 minutes, "51", "52" and "53" alarm is indicated.
P18	Insufficient Voltage /Excessive Voltage Retry	Insufficient/Excessive Voltage at Inverter Circuit or CB Connector Part	When activating 3 times in 30 minutes, "06" alarm is indicated.

Pd: Discharge Pressure of Compressor
Ps: Suction Pressure of Compressor
Tc: Saturated Gas Temperature

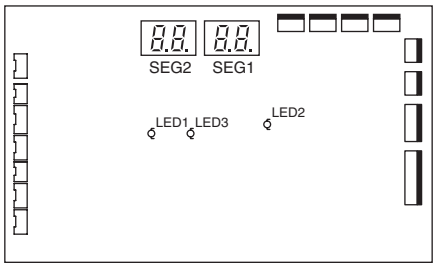
NOTES:
1. During protection control (except during alarm stoppage), the protection control code is indicated.
2. The protection control code is indicated during protection control and turns off when canceling the protection control.
3. After retry control, the condition of monitoring is continued for 30 minutes.

1.2.5 Function of LEDs

(1) Printed Circuit Board in Indoor Unit
Refer to the Service Manual, P5413553.

(2) Printed Circuit Board in Outdoor Unit

PCB for Outdoor Unit

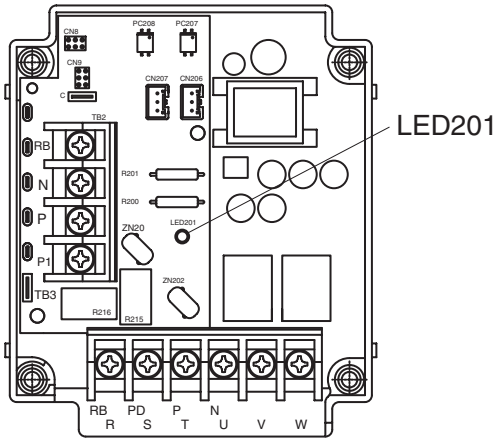


■ Dip Switches and LED Functions on Outdoor Unit Printed Circuit Boards

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: Flashing Abnormal Condition: Activated or Deactivated
	16	LED3 (Yellow)	This LED3 indicates the transmission state between the indoor unit and outdoor unit. Normal Condition: Flashing Abnormal Condition: Activated or Deactivated
	18	SEG1, 2	This SEG1, 2 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

Refer to the Service Manual, P5413553.

1.3.2 Self-Checking of Remote Control Switch

Refer to the Service Manual, P5413553.

1.3.3 Self-Checking of Indoor Unit PCB

Refer to the Service Manual, P5413553.

1.3.4 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.>

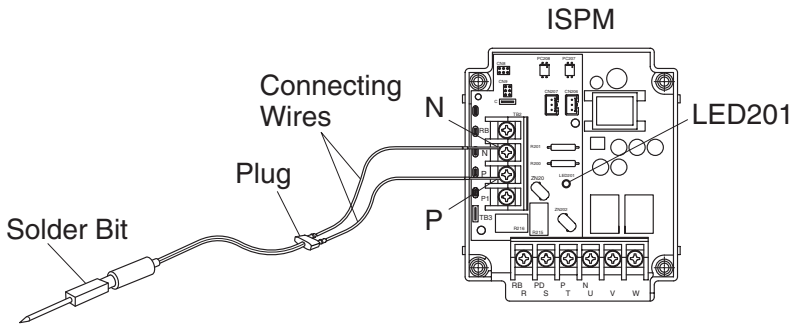
[Procedure]

(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.

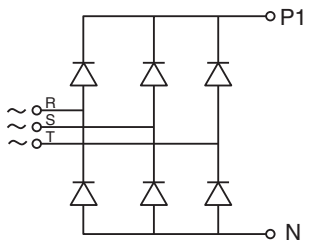


⚠WARNING

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)

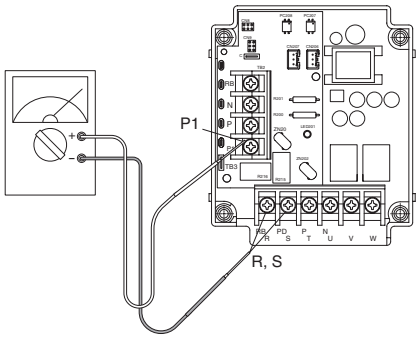


Remove all the terminals of the ISPM before check.
If items (a) to (h) are performed and the results are satisfactory, ISPM is normal. Measure it under 1 kΩ range of a tester.

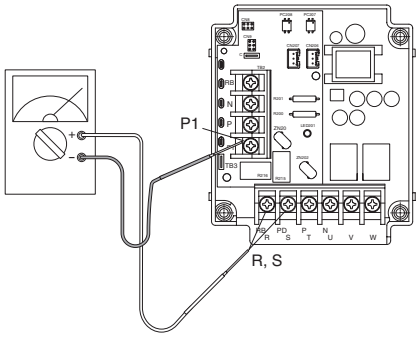
⚠CAUTION

Do not use a digital tester.

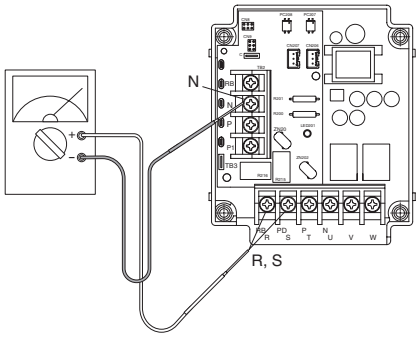
(a) By touching the + side of the tester to the P1 terminal of ISPM and the - side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



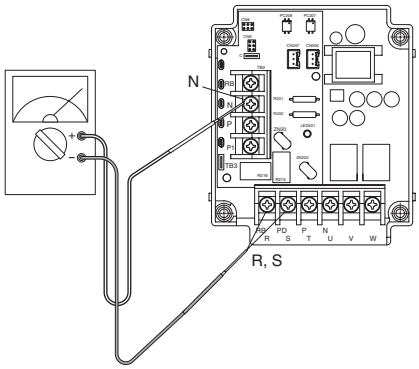
(b) By touching the - side of the tester to the P1 terminal of ISPM and the + side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.

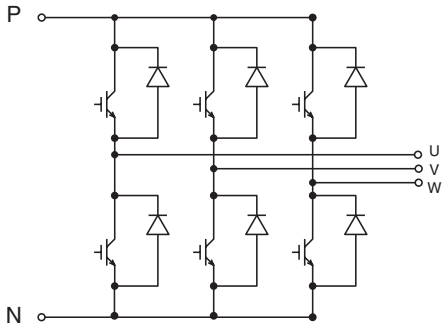


(c) By touching the - side of the tester to the N terminal of ISPM and the + side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.

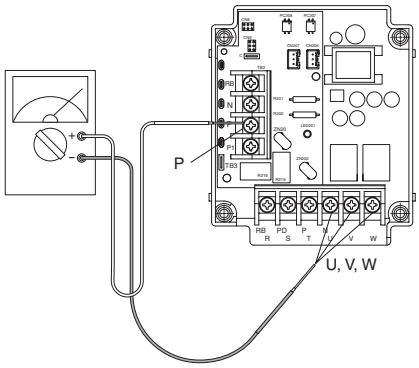


(d) By touching the + side of the tester to the N terminal of ISPM and the - side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.

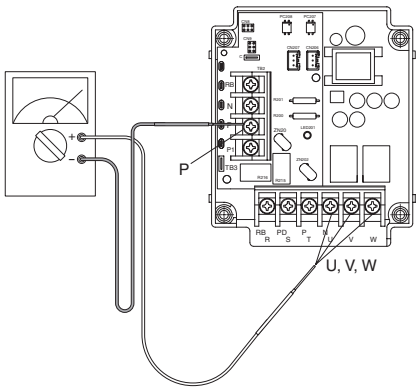




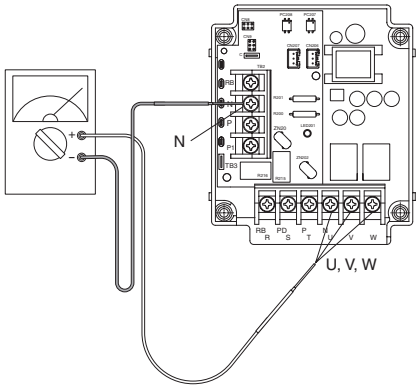
(e) By touching the + side of the tester to the P terminal of ISPM and the - side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



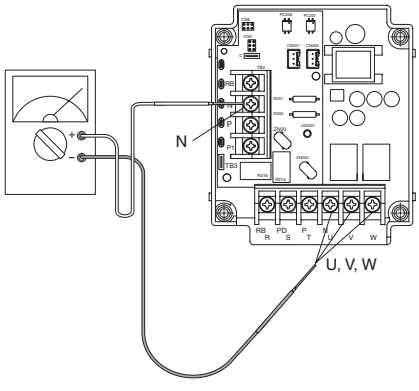
(f) By touching the - side of the tester to the P terminal of ISPM and the + side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



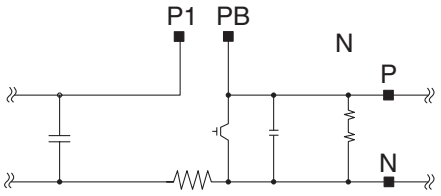
(g) By touching the - side of the tester to the N terminal of ISPM and the + side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



(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.



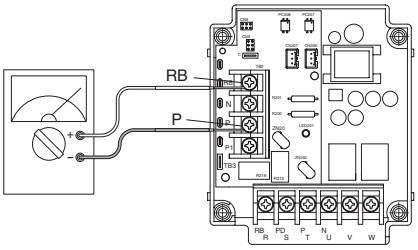
Active Parts of Internal Circuit of ISPM (for 3HP)



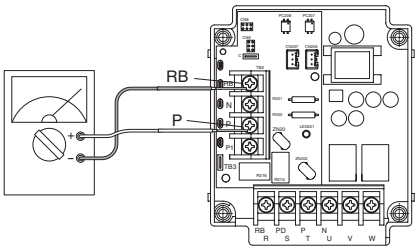
If item (i) to (m) are performed and the results are satisfactory, ISPM is normal.
Measure it under 1 kΩ range of a tester.
Do not use a digital tester.

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

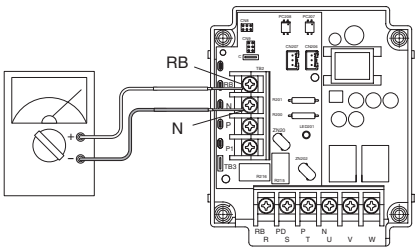
(j) By touching the + side of the tester to the RB terminal of ISPM and the - side of the tester to P terminal of ISPM. If the resistance is more than 1 kΩ, it is normal.



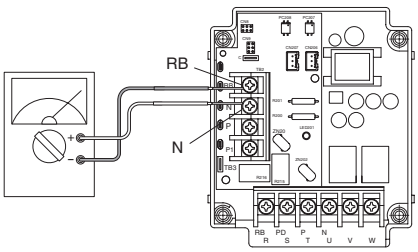
(k) By touching the - side of the tester to the RB terminal of ISPM and the + side of the tester to P terminal of ISPM. If the resistance is more than 100 kΩ, it is normal.



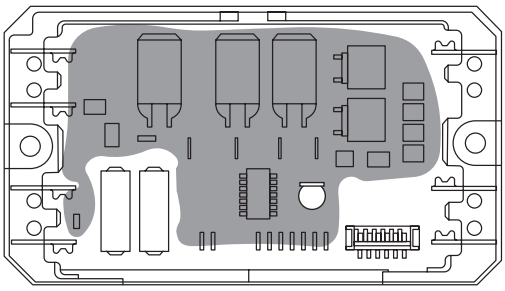
(l) By touching the + side of the tester to the RB terminal of ISPM and the - side of the tester to N terminal of ISPM. If the resistance is more than 90 kΩ, it is normal.

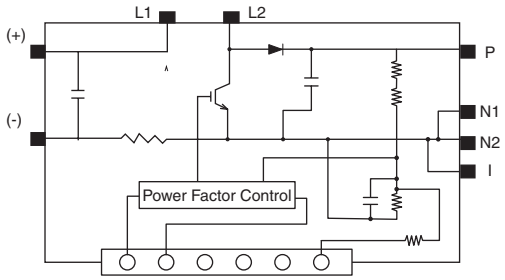


(m) By touching the - side of the tester to the RB terminal of ISPM and the + side of the tester to N terminal of ISPM. If the resistance is more than 90 kΩ, it is normal.



(3) Checking Procedures ACT Module (for 4HP and 5HP only)
Outer Appearance and Internal Circuit of ACT Module

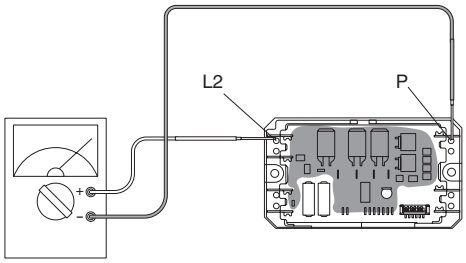




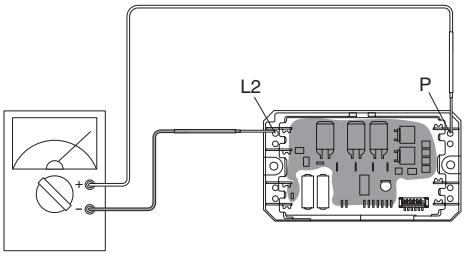
Remove all the terminals of the ACT module before check.
If items (a) to (f) are performed and the results are satisfactory, the ACT module is normal.
Measure it under 1 kΩ range of a tester. Do not use a digital tester.

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

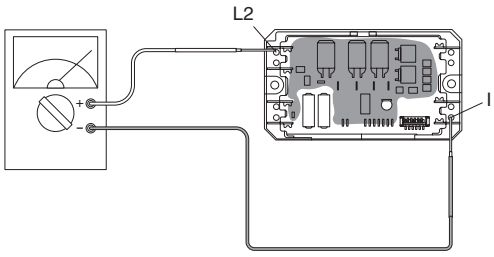
(b) By touching the + side of the tester to the L2 terminal of ACT module and the - side of the tester to the P terminal of ACT module, measure the resistance.
If all the resistances are greater than 100 kΩ, it is normal.



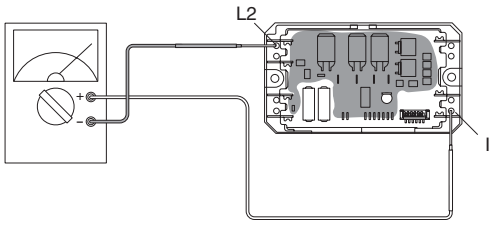
(c) By touching the - side of the tester to the L2 terminal of ACT module and the + side of the tester to the P terminal of ACT module, measure the resistance.
If all the resistances are from 1 to 5 kΩ, it is normal.



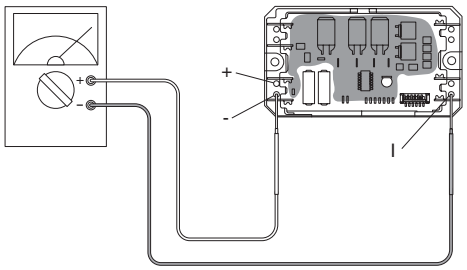
(d) By touching the + side of the tester to the L2 terminal of ACT module and the - side of the tester to the I terminal of ACT module, measure the resistance.
If all the resistances are from 50 to 200 kΩ, it is normal.



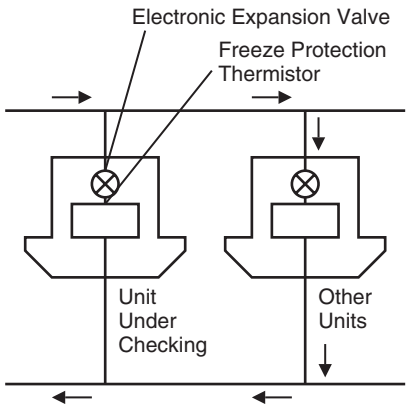
(e) By touching the - side of the tester to the L2 terminal of ACT module and the + side of the tester to the I terminal of ACT module, measure the resistance. If all the resistances are greater than 100 kΩ, it is normal.



(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

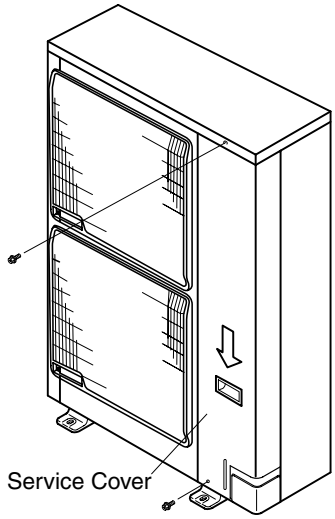
TURN OFF all power source switches.

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.

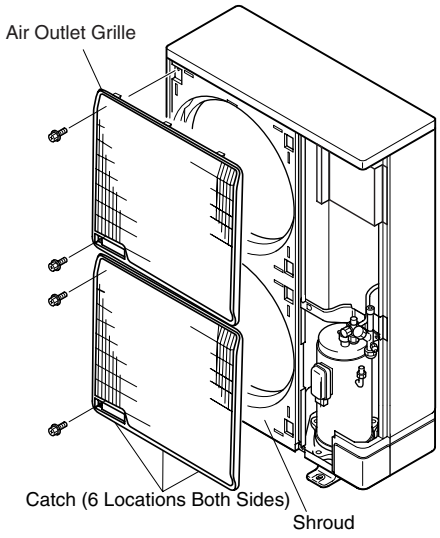
Tool	Phillips Screwdriver



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

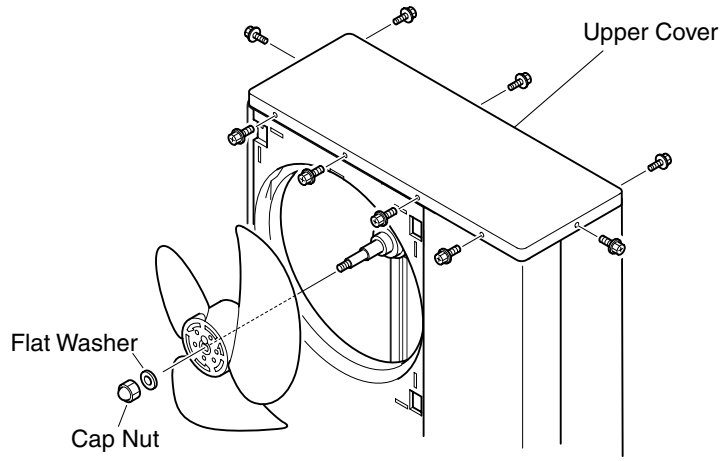
(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".**

(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



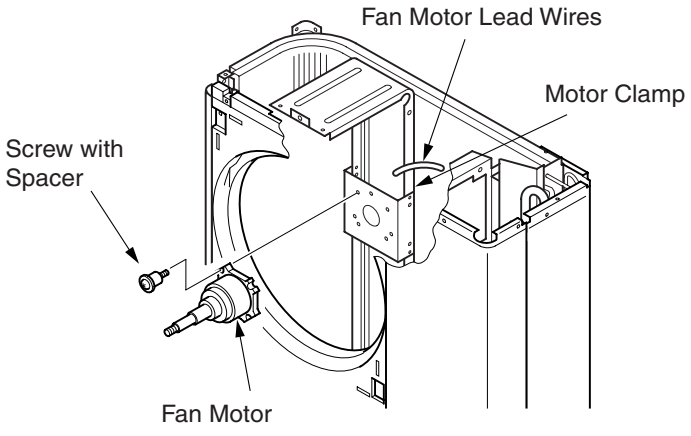
2.1.4 Removing Outdoor Fan Motor

(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.

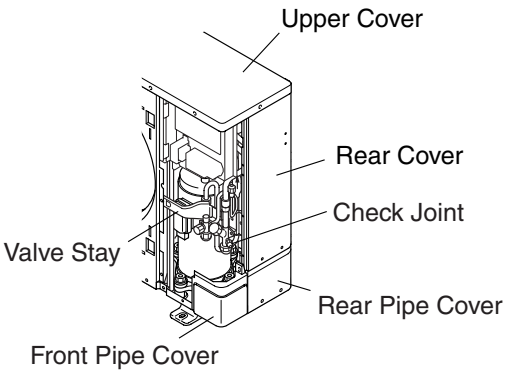
(3) Remove the valve stay.

(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.

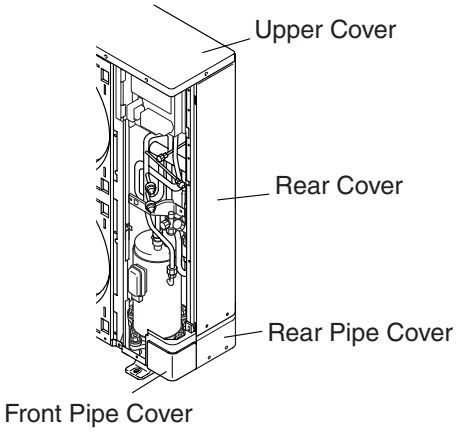
(5) Remove the soundproof cover, thermistor holder on the compressor and thermistor.

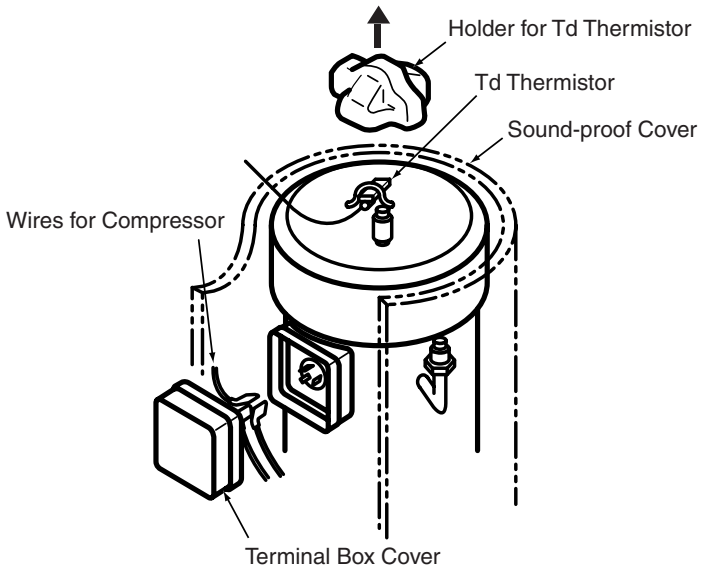
Tool	Phillips Screwdriver, Charge Hose, Adjustable Wrench (2)

● RAS-3FSVG



● RAS-4FSVG and 5FSVG





⚠ WARNING

TURN OFF all power source switches.

(6) Disconnect the suction pipe from the compressor.

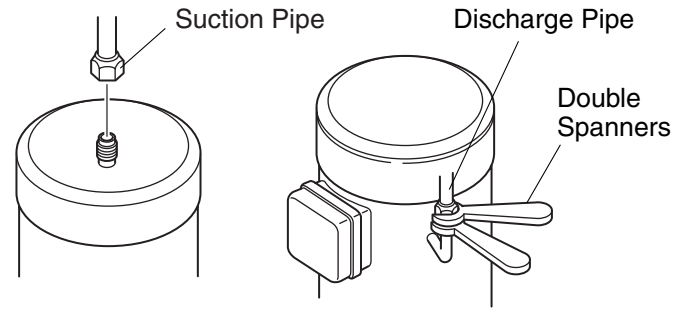
(7) Disconnect the discharge pipe from the compressor by using two spanners.

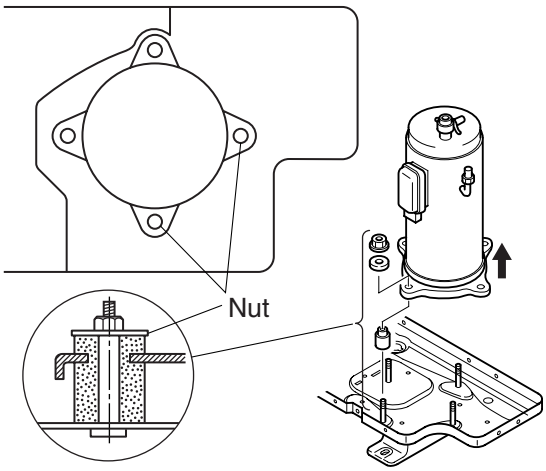
(8) Remove the two (2) nuts fixing the compressor and remove the compressor by lifting.

(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.

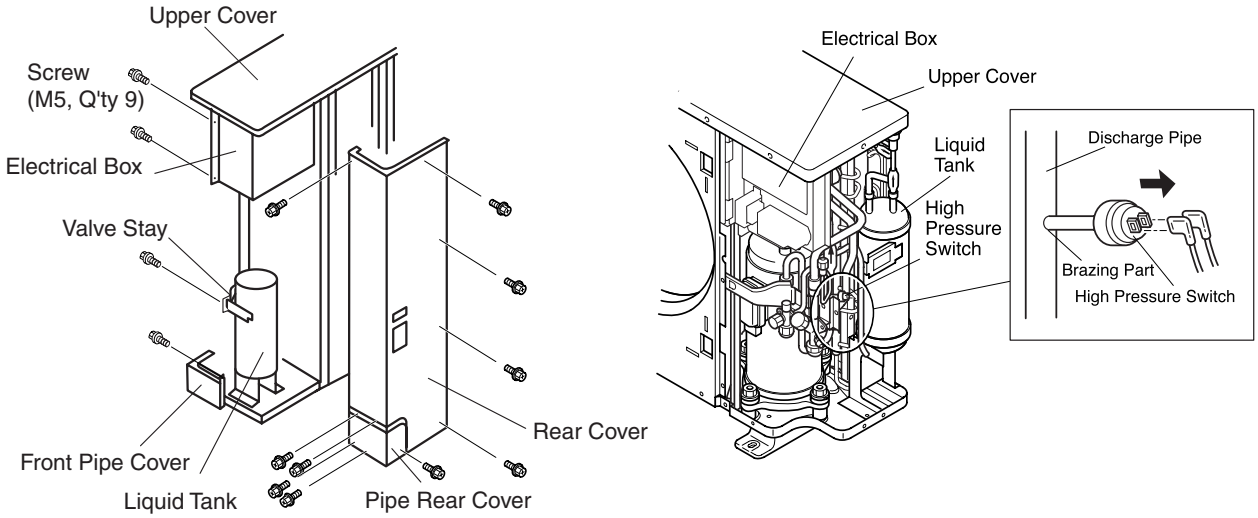
(3) Collect the refrigerant from the check joint according to the item **2.1.5 "Removing Compressor".**

(a) Disconnect the fasten terminals.

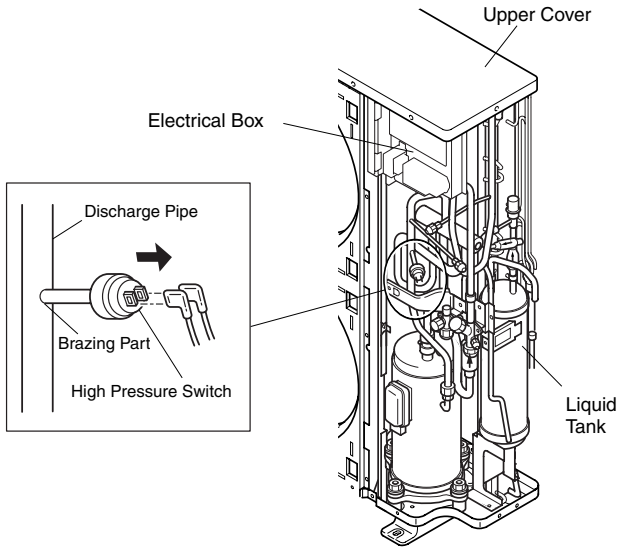
(b) Remove the high pressure switch and pressure switch for control from the brazing part by a burner.

Tool	Phillips Screwdriver, Charge Hose, Burner

● RAS-3FSVG



● RAS-4FSVG and 5FSVG



⚠ 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-3FSVG

(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-4FSVG and 5FSVG

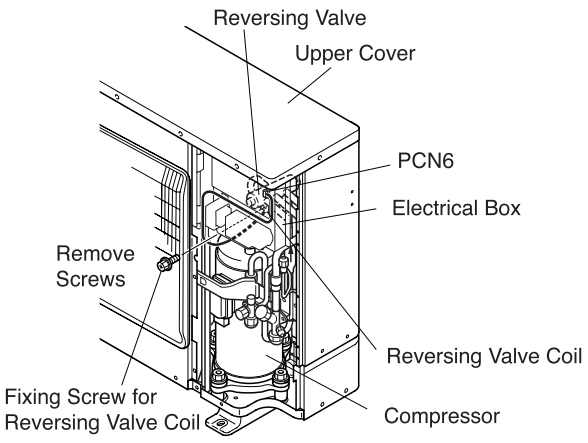
(a) Remove three (3) screws fixing the power plate and turn the one toward the front side.
NOTE:
Check to ensure that LED201 (Red) is OFF when turning the power plate.

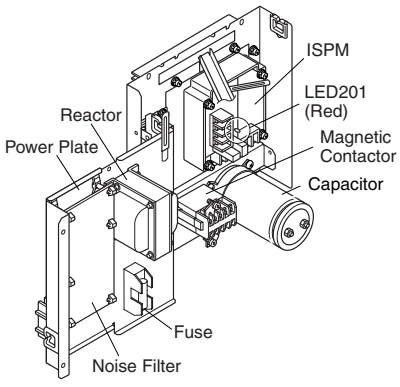
(b) Disconnect the PCN6 connector on the PCB1 of the electrical box.

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

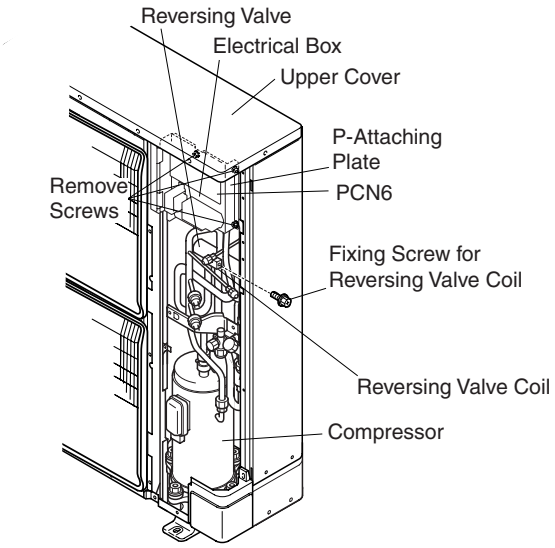
Tool	Phillips Screwdriver

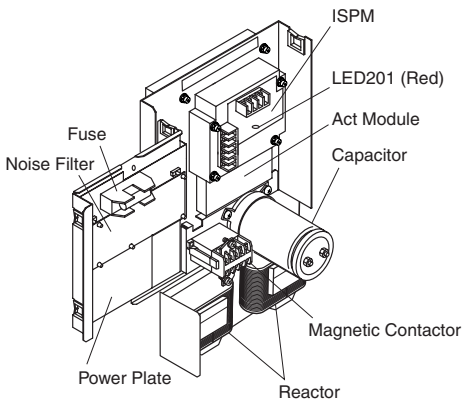
● RAS-3FSVG





● RAS-4FSVG and 5FSVG





⚠ 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.

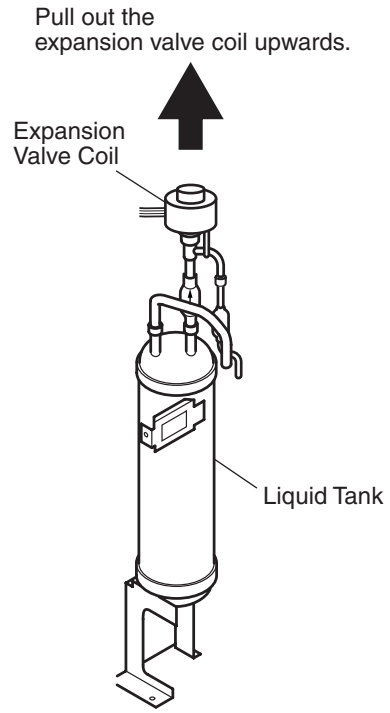
(1) Remove the service cover according to the item **2.1.1 "Removing Service Cover".**

(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.

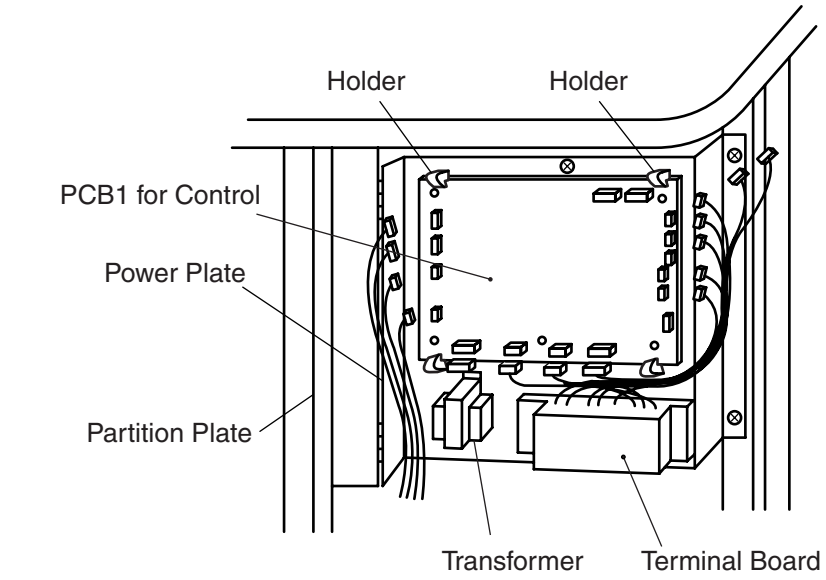
2.1.9 Removing Printed Circuit Board (PCB1)

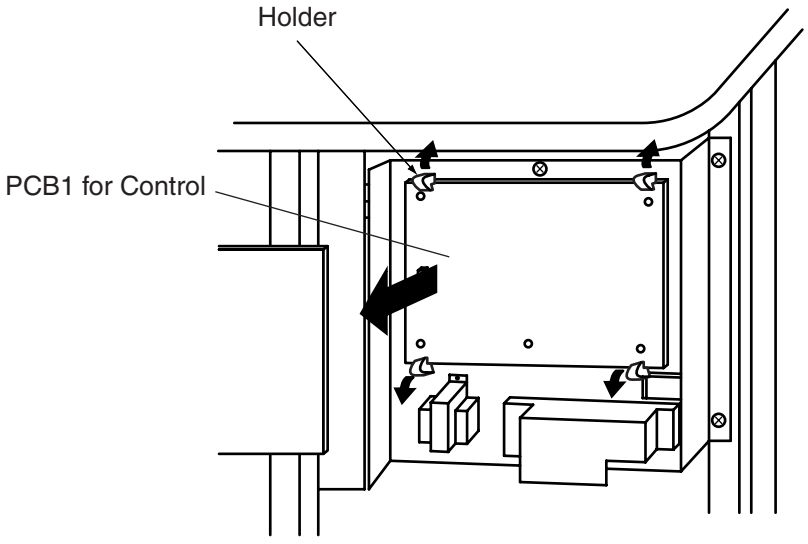
⚠ DANGER

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

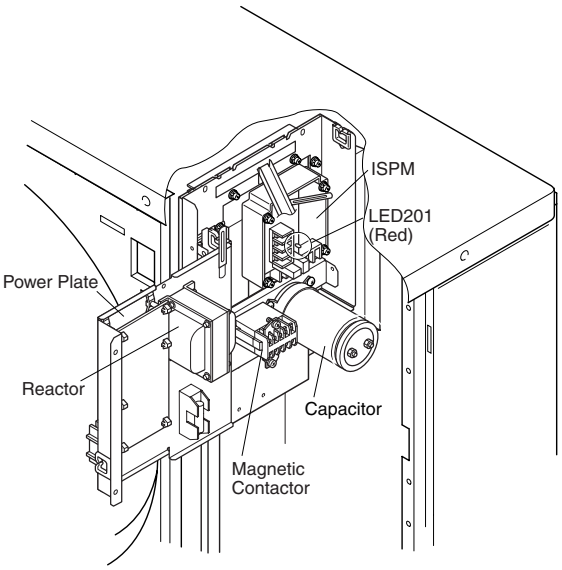
Do not touch the electrical parts when LED201 (Red) on the ISPM is lit to prevent from an electrical shock.

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

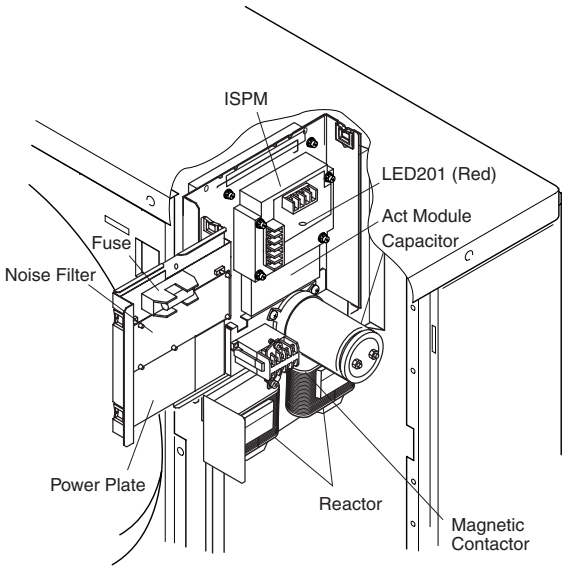
(2) Remove the three (3) screws fixing the electrical box and turn the power plate toward the front side.
NOTE:
Check to ensure that LED201 (Red) is OFF when turning the power plate.

Tool	Phillips Screwdriver, Spanner

● RAS-3FSVG



● RAS-4FSVG and 5FSVG



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 (5FSVG 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.

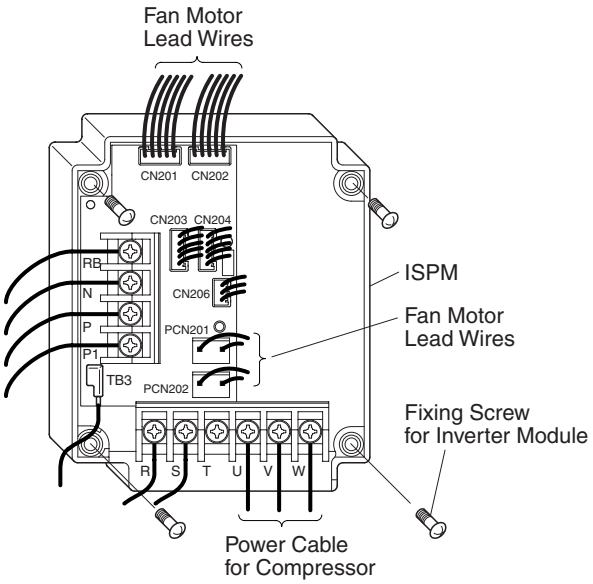
(5) Disconnect all wires connecting to the ACT module.
- Disconnect CN101
- Disconnect the faston terminal L1, L2, P, N1, + and - of ACT module.

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

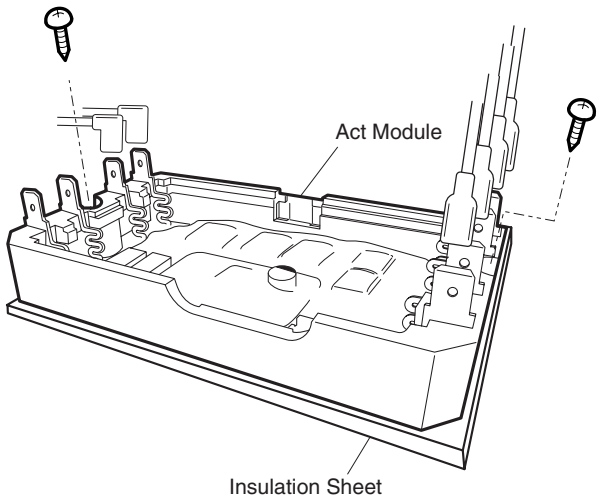
NOTES:
1. Do not remove the insulation part from the screw after removing the screws.
2. Do not lose the insulation sheet between ACT module and fin.

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..

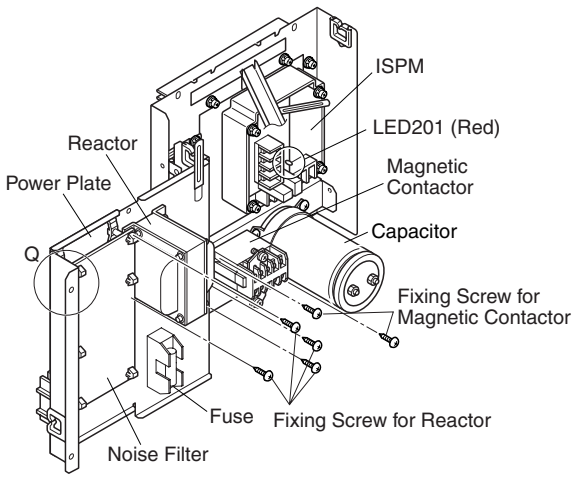
(b) Disconnect the wire connecting to the magnetic contactor.
Remove the magnetic contactor by removing two (2) screws.

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

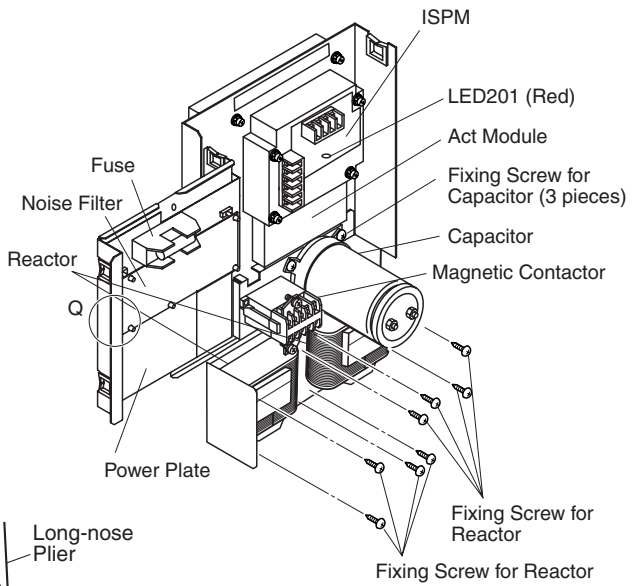
(d) Disconnect the wire connecting to the noise filter.
Remove the noise filter by holding the expanded part of the holders (6 pcs.) with long-nose pliers.
NOTE:
When reassembling, identify terminal Nos.
with the mark band Nos.

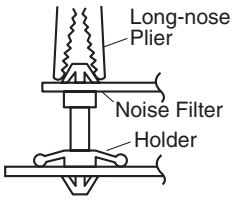
Tool	Phillips Screwdriver, Long-Nose Pliers

● RAS-3FSVG



● RAS-4FSVG and 5FSVG





Details of Q

2.2 Indoor Unit

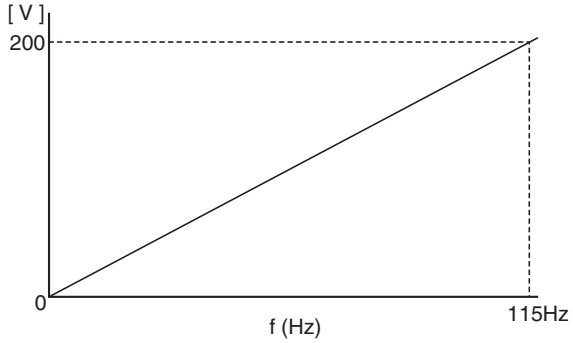
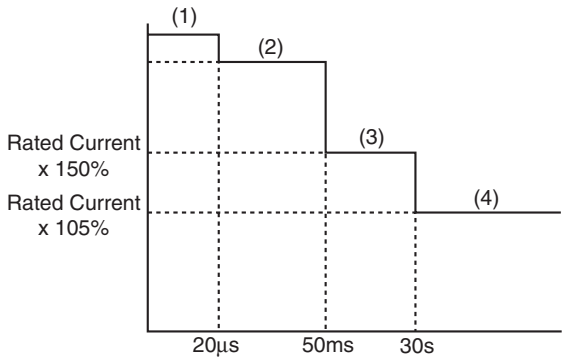
Refer to the Service Manual, P5413553.

HITACHI

3. MAIN PARTS

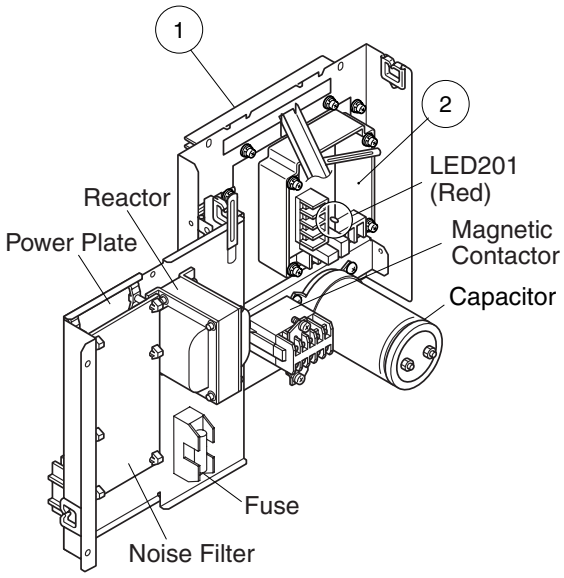
3.1 Inverter

3.1.1 Specifications of Inverter

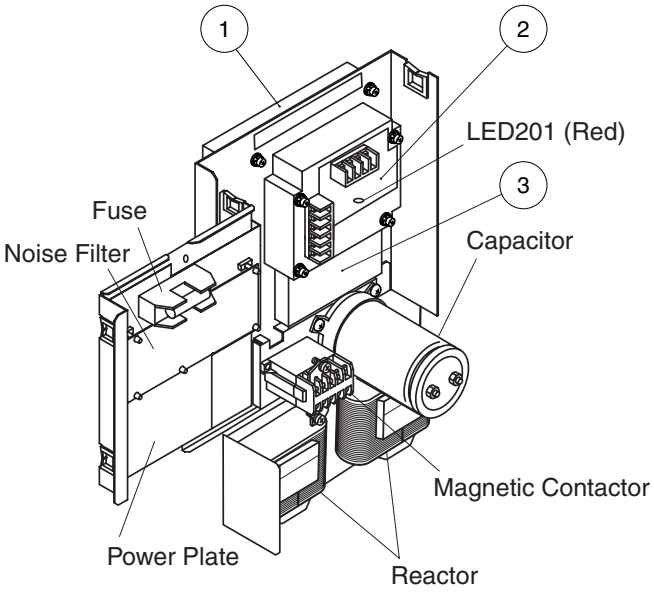
Applicable Model	RAS-3FSVG, RAS-4FSVG, RAS-5FSVG
Applicable Power Source	1 Phase, 220V, 240V 50Hz/220V 60 Hz
Output Voltage (Maximum)	200V, 3 Phase
Output Current (Maximum)	14.5/16/24.5 (3FSVG/4FSVG/5FSVG)
Control Method	Vector Control
Range Output Frequency	30 to 115Hz
Accuracy of Frequency	0.01Hz at 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-3FSVG



RAS-4FSVG and RAS-5FSVG



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

3.2 AC Chopper for Indoor Unit

Refer to the Service Manual, P5413553.

3.3 Auto-Louver Mechanism for Indoor Unit

Refer to the Service Manual, P5413553.

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.

↓

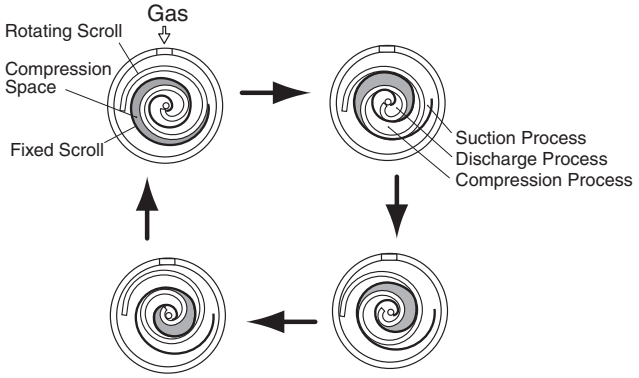
(2) The gas inside of the compression space is compressed toward the center of the scroll.

↓

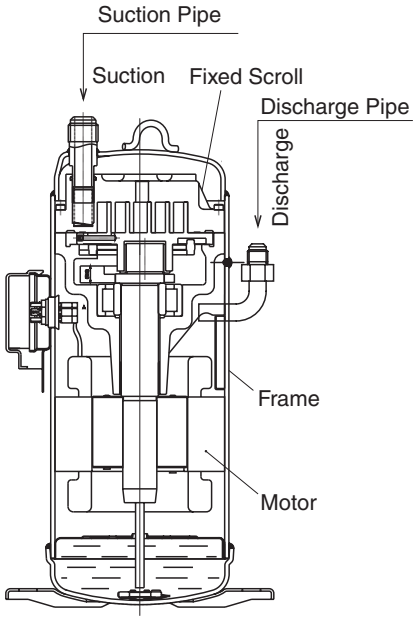
(3) The compression space is minimum at the center of the scroll, and the gas compressed at the maximum is discharged from the outlet port of at the center of the scroll.

↓

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



3.4.3 Structure



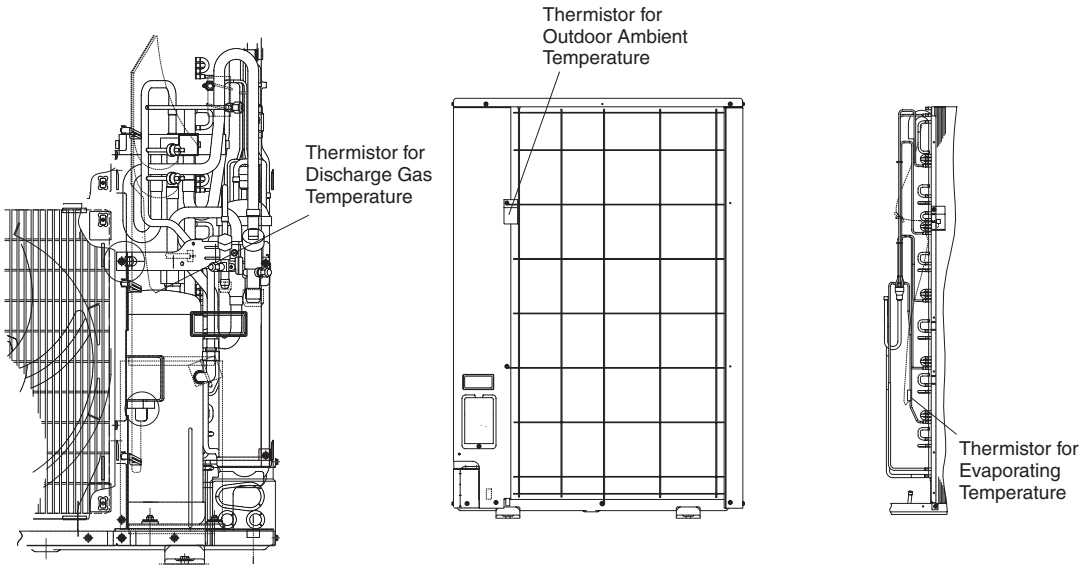
3.5 Thermistor

3.5.1 Thermistor for Indoor Unit

Refer to the Service Manual, P5413553.

3.5.2 Thermistor for Outdoor Unit

(1) Position of Thermistor

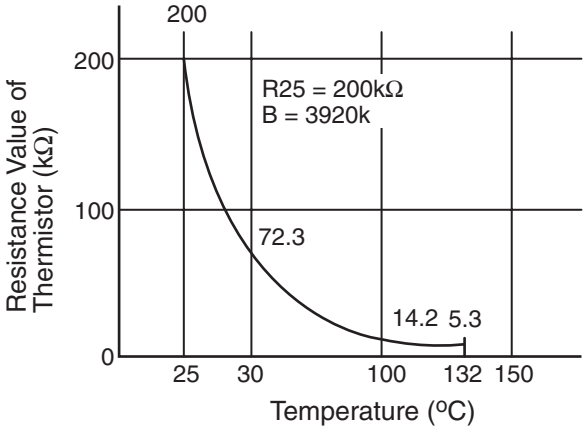


(2) Thermistor for Upper Part Temperature of Compressor
(For Prevention of Discharge Gas Overheating)

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

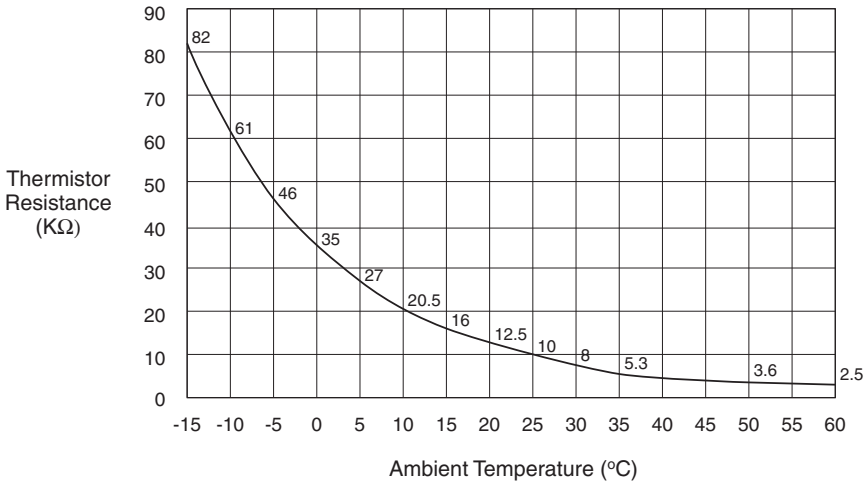
- An electronic expansion valve of indoor units and high pressure refrigerant is returned to the compressor through the accumulator, decreasing compressor temperature.
- If the compressor upper part temperature increases exceeding 132°C even if an electronic expansion valve opens, the compressor is stopped, 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 132°C	10 minutes (Continuously)
	Over 140°C	5 seconds (Continuously)
Heating	Over 132°C	10 minutes (Continuously)
	Over 140°C	5 seconds (Continuously)
Defrosting	Over 132°C	5 seconds (Continuously)

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

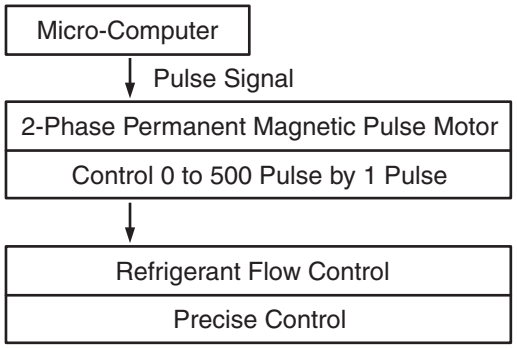
(4) Thermistor for Evaporating Temperature of Outdoor Unit in Heating Operation (For Defrosting)
The characteristics for the thermistor is the same with the value of outdoor ambient temperature thermistor as shown in the figure below.

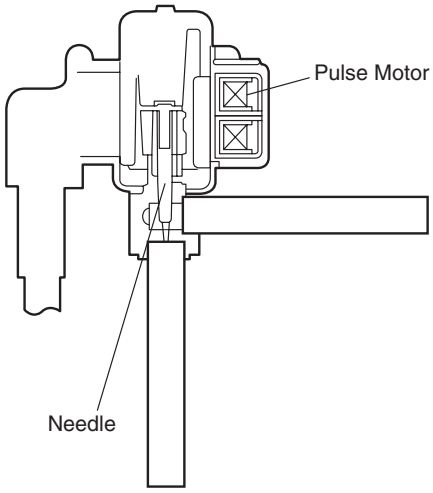


Thermistor Characteristics

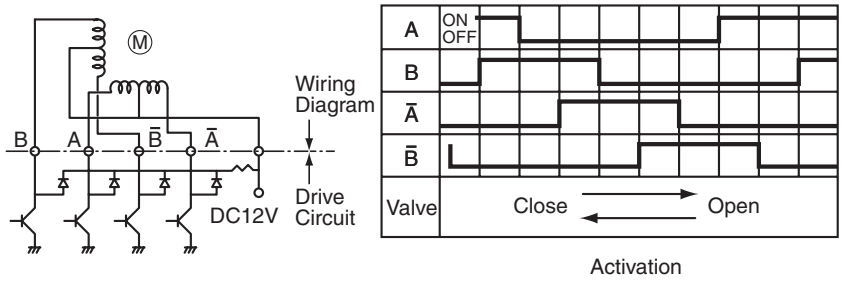
3.6 Electronic Expansion Valve

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	

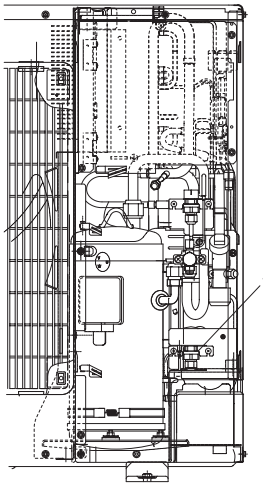
3.6.2 Electronic Expansion Valve for Indoor Units

Refer to the Service Manual, P5413553.

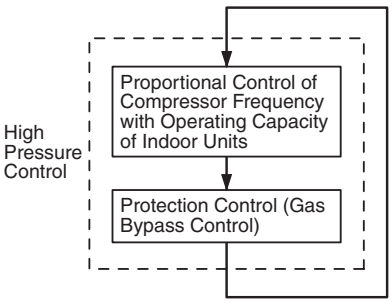
3.7 Pressure Sensor

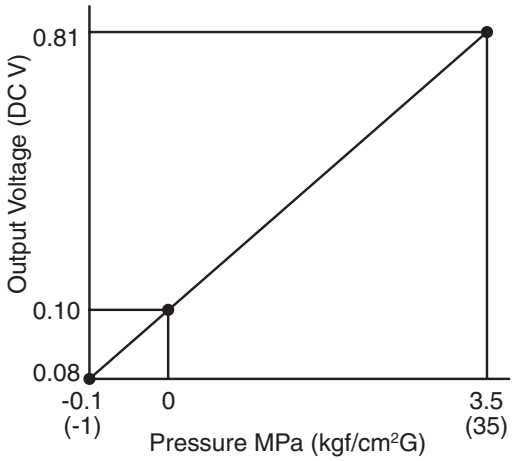
(1) High Pressure Control

The high pressure during cooling or heating operation is detected by a high pressure sensor, and compressor frequencies are controlled by the proportional controlling method with operating capacity of indoor units (or PID Control for Compressor Frequency) so that the high pressure is controlled in an appropriate range. The output of the high pressure sensor during operation performs protective control; gas by-pass control.



RAS-3FSVG



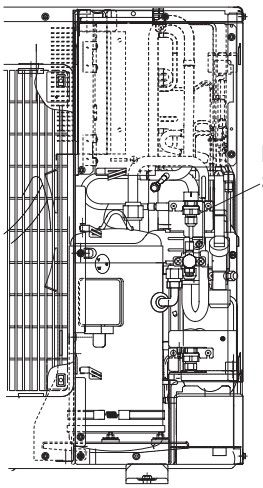


Output Characteristics of High Pressure Sensor

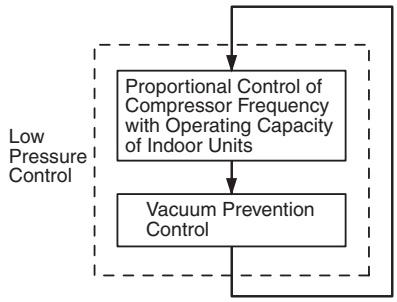
(2) Low Pressure Control

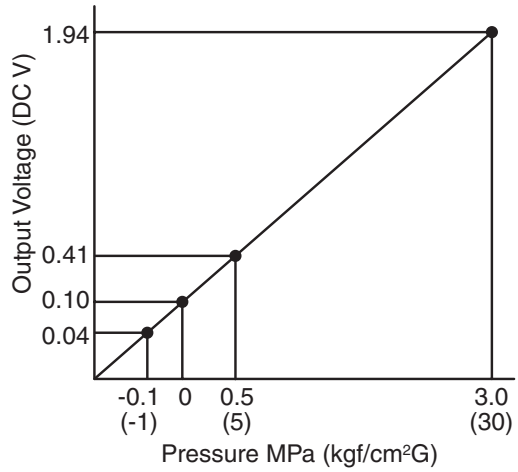
The suction pressure during cooling or heating operation is detected by a low pressure sensor, and compressor frequencies are controlled by the proportional controlling method with operating capacity of indoor units (or PID Control for Compressor Frequency) so that the suction pressure is controlled in an appropriate range.

If the suction pressure reaches excessively low, the capacity can be insufficient and parts composing the refrigeration cycle can be damaged. For this reason, if the output of the low pressure sensor indicates vacuum and the value is maintained 12 minutes or longer, the compressor is stopped for the purpose of protection.



RAS-3FSVG





Output Characteristics of Low Pressure Sensor

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4. OPTIONAL FUNCTION

4.1 Indoor Unit

Refer to the Service Manual, P5413553.

4.2 Remote Control Switch

Refer to the Service Manual, P5413553.

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5. FIELD WORK INSTRUCTION

5.1 Insufficient Cooling Performance When A Long Piping Is Applied

Question and Answer for Field Work

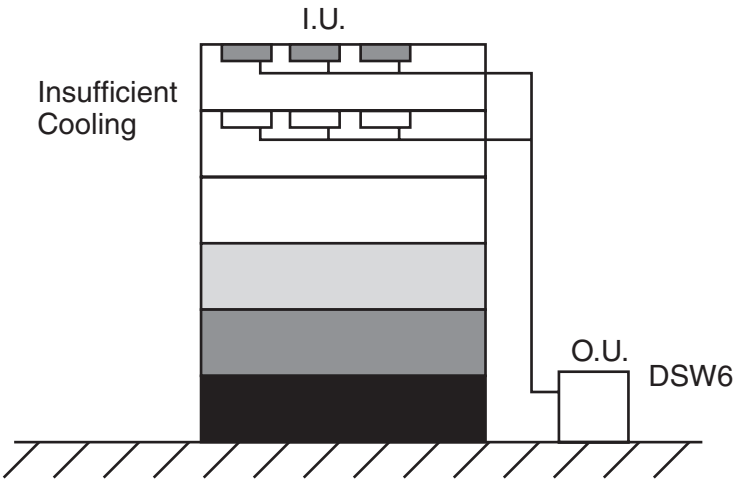
Example 1: Insufficient Cooling Performance When A Long Piping Is Applied

[Phenomenon]

Sufficient cooling was not available for an indoor unit which located at the farthest position.

[Cause]

In the case that an outdoor unit is located 20 meters lower than indoor units, resetting of the dip switch, DSW6 is required.
However, no setting was performed. Therefore, the target discharge pressure was not increased, resulting in insufficient cooling performance for the indoor.



[Countermeasure]

Setting for DSW6 was changed.

[Remarks]

Pay a special attention to the liquid pipe size if the lift between the indoor units and outdoor unit is higher than 20 meters. For details, see the “Electrical Wiring” in TCII.

5.2 Abnormally High Operating Sound [In-the-Ceiling Type Indoor Unit]

Question and Answer for Field Work

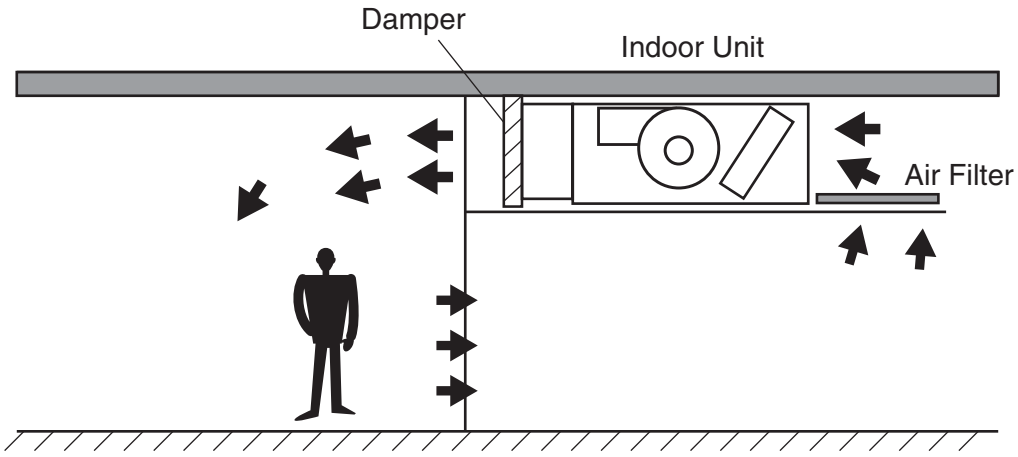
Example 2: Abnormally High Operating Sound [In-the-Ceiling Type Indoor Unit]

[Phenomenon]

Operating sound during “Hi” speed was abnormally high.

[Cause]

The indoor units was installed without ducts of inlet side and outlet side. Due to almost no external static pressure, abnormally big air volume was supplied, resulting in higher air speed through the heat exchanger.



[Countermeasure]

In order to reduce air flow, a plate as a damper at the discharge side was added.
Another solution is at inlet side and outlet side.

[Remarks]

Please note that running current is increased when no external pressure is given to the indoor unit, resulting in overheating.

5.3 Alarm Code “31”

Question and Answer for Field Work

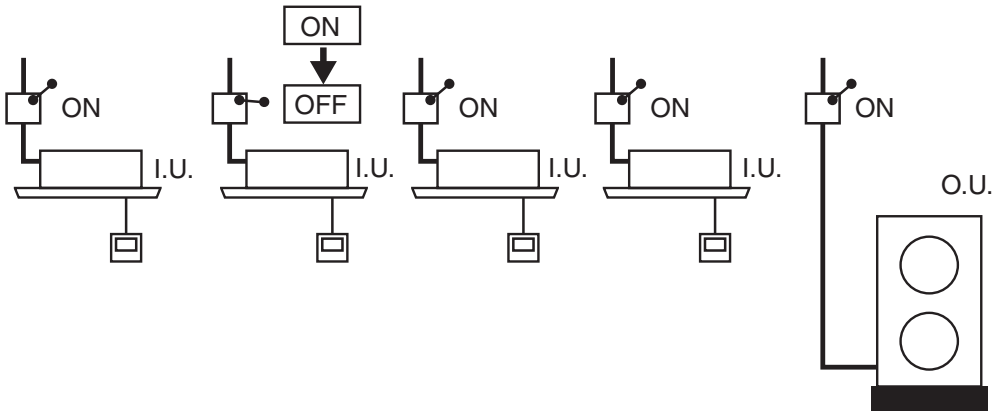
Example 3: Alarm Code “31”

[Phenomenon]

Alarm code “31” sometimes occurred and the system was stopped.

[Cause]

Combination of the indoor and outdoor unit was as follows.



This system was used in a tenant building.
One of tenant’s customers cut out the power switch for the indoor unit while other indoor units are running, resulting in different total indoor unit capacity setting in the same refrigerant cycle.

[Countermeasure]

All the main power switches for the indoor units were always ON.

5.4 Not Cooling Well due to Insufficient Installation Space for Outdoor Unit

Question and Answer for Field Work

Example 4: Not Cooling Well due to Insufficient Installation Space for Outdoor Unit

[Phenomenon]

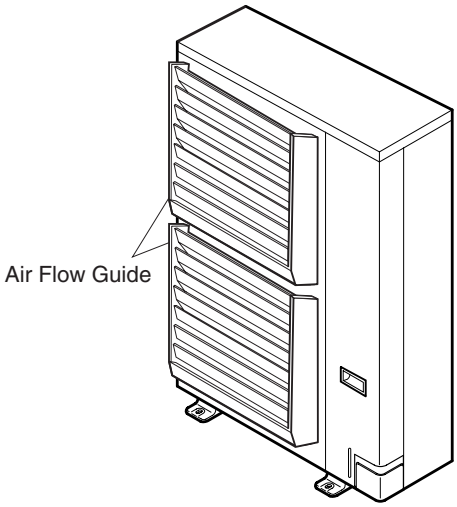
Cooling operation was well performed through the intermediate season. However, the cooling operation was not well available when the outdoor temperature was higher than 35°C.

[Cause]

As the outdoor units were installed without a sufficient installation space, the hot discharge air from other outdoor units was circulated.
In this case, though the outdoor temperature was 35°C, the actual suction air temperature was nearly 50°C and Protection System from Excessively High Discharge Pressure was activated, the frequency of the compressor was decreased and the cooling capacity was also decreased accordingly.
As the outdoor units in-line were installed back to back with a distance of 600mm between each outdoor unit's back, the hot discharged air from other outdoor units was circulated.

[Countermeasure]

To protect the unit from a short circuit, air flow guides were mounted at the discharge air side as shown below.



5.5 Select Guide of Drain Pipe for Indoor Unit

Refer to the Service Manual, P5413553.

5.6 Caution on Refrigerant Leakage

(1) Maximum Permissible Concentration of HCFC Gas
The refrigerant R407C, charged in the SET-FREE mini system, is an incombustible and non-toxic gas. However, if leakage occurs and gas fills a room, it may cause suffocation.
The maximum permissible concentration of HCFC gas, R407C in air is *0.31 kg/m^3, according to the refrigeration and air conditioning facility standard (KHK S 0010) by the KHK (High Pressure Gas Protection Association) Japan.
Therefore, some effective measure must be taken to lower the R407C concentration in air below *0.31 kg/m^3, in case of leakage.

(2) Calculation of Refrigerant Concentration

(a) Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of rooms to be air conditioned.

(b) Calculate the room volume V (m^3) of each objective room.

(c) Calculate the refrigerant concentration C (kg/m^3) of the room according to the following equation.

$$\frac{\text{R: Total Quantity of Charged Refrigerant (kg)}}{\text{V: Room Volume } (m^3)} = \text{C: Refrigerant Concentration} \leqq 0.31\ (kg/m^3)$$

(3) Countermeasure for Refrigerant Leakage According to KHK Standards
The facility shall be arranged as follows referring to the KHK standards, so that the refrigerant concentration will be below *0.31 kg/m^3.

(a) Provide a shutterless opening which will allow fresh air to circulate into the room.

(b) Provide a doorless opening of 0.15% or more size to the floor area.

(c) Provide a ventilator, linked with a gas leak detector, of 0.4 m^3/min. or more ventilating capacity per Japanese Refrigeration Ton (= compressor displacement m^3/h / 9.8) of the air conditioning system utilizing refrigerant R407C.

RAS-3FSVG	1.10 ton
RAS-4FSVG	1.38 ton
RAS-5FSVG	1.89 ton

(4) Pay a special attention to the place, such as a basement, etc., where refrigerant can stay, since refrigerant is heavier than air.

*: Use this value for a reference only, since this value is not fixed yet. Follow upon local regulations.

If local codes or regulations are specified, follow them.

<Example>
British Standard BS4434 1989
R22 Commercial Office Building Class D Occupancy
MR = C x V
MR: Maximum Charge or Leakage of Refrigerant (kg)
C: Maximum Allowable Concentration = 0.17 (kg/m^3)
V: Volume of Space (m^3)

5.7 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 “10. 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> 1.2 Filter Cleaning” of “SP2-P01”.

(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.

5.8 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 Mode						
(2) Test Run Start Time						
(3) Data Collect Start Time						
(4) Read Out Data from 7-Segment in Outdoor Unit						
Protection Control Code						
Outdoor Microcomputer Output	SC	52C RS 20A 21_1 CH FAN1 FAN2	52C RS 20A 21_1 CH FAN1 FAN2	52C RS 20A 21_1 CH FAN1 FAN2	52C RS 20A 21_1 CH FAN1 FAN2	52C RS 20A 21_1 CH FAN1 FAN2
Indoor Total Operating Capacity	oP					
Inverter Frequency	H1					
Compressor Running Quantity	CC					
Outdoor Fan Step	Fo					
Outdoor Unit Expansion Valve Opening	oE1					
Discharge Pressure	Pd					
Suction Pressure	Ps					
Discharge Gas Temperature	Td1					
Heat Exchanger Liquid Pipe Temperature	TE1					
Outdoor Temperature	To					
Compressor Running Power	P1					
Indoor Unit (Unit No.)						
Expansion Valve Opening	iE					
Heat Exchanger Liquid Temp.	TL					
Heat Exchanger Gas Temp.	TG					
Intake Air Temp.	Ti					
Outlet Air Temp.	To					
Capacity (×1/8HP)	CA					
Indoor Unit Stoppage Cause Code	d1					
Restricted Control for Prevention of Compression Ratio Decrease	c11					
Restricted Control for Prevention of High Pressure Increase	c13					
Restricted Control for Prevention of Inverter Module Temp. Increase	c14					
Restricted Control for Prevention of Discharge Gas Temp. Increase	c15					
Restricted Control for Prevention of TdSH Decrease	c16					
Restricted Control for Prevention of Overcurrent	c17					
Accumulated Operation Time of Comp. 1	UJ1					
Defrost Interval	JJ					
Outdoor Alarm Code	AC					
Inverter Stoppage Cause Code	iTC					
Inverter Module Temp.	TF					
Total Indoor Unit Capacity (×1/8HP)	CP					
Total Indoor Unit Quantity	AA					
Refrigerant System Address	GA					

R.C.Sw: Remote Control Switch, O.U.: Outdoor Unit, I.U.: Indoor Unit
52C: CMC, RS: Relay for Starting
20A: Solenoid Valve (SVA), 21_1: Four Way Valve (RVR), CH: Oil Heater
FAN1: Upper Fan, FAN2: Lower Fan (4, 5HP only)
*: Multiply 1/8 by the code on the 7-segment.

5.9 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	

5.10 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	High Pressure Switch		kg/cm^2G
33	Low Pressure Switch		kg/cm^2G
34	Operating Voltage		V
35	Operating Current		A
36	Instruction Cleaning of Air Filter to Client		DONE or NOT YET
37	Instruction for Cleaning Method to Client		DONE or NOT YET
38	Instruction for Operation to Client		DONE or NOT YET

Specifications in this catalog are subject to change without notice, in order that HITACHI may bring the latest innovations to their customers.

Hitachi Air Conditioning Systems Co., Ltd.

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