HITACHI

SERVICE MANUAL

HEAT PUMP AIR CONDITIONERS

- RASQ SERIES VRF AIR CONDITIONING SYSTEM -

Service Manual

Models

< Outdoor Units >

RAS-8.0HNBCMQ	RAS-38HNBCMQ	RAS-68HNBCMQ
RAS-10HNBCMQ	RAS-40HNBCMQ	RAS-70HNBCMQ
RAS-12HNBCMQ	RAS-42HNBCMQ	RAS-72HNBCMQ
RAS-14HNBCMQ	RAS-44HNBCMQ	RAS-74HNBCMQ
RAS-16HNBCMQ	RAS-46HNBCMQ	RAS-76HNBCMQ
RAS-18HNBCMQ	RAS-48HNBCMQ	RAS-78HNBCMQ
RAS-20HNBCMQ	RAS-50HNBCMQ	RAS-80HNBCMQ
RAS-22HNBCMQ	RAS-52HNBCMQ	RAS-82HNBCMQ
RAS-24HNBCMQ	RAS-54HNBCMQ	RAS-84HNBCMQ
RAS-26HNBCMQ	RAS-56HNBCMQ	RAS-86HNBCMQ
RAS-28HNBCMQ	RAS-58HNBCMQ	RAS-88HNBCMQ
RAS-30HNBCMQ	RAS-60HNBCMQ	RAS-90HNBCMQ
RAS-32HNBCMQ	RAS-62HNBCMQ	RAS-92HNBCMQ
RAS-34HNBCMQ	RAS-64HNBCMQ	RAS-94HNBCMQ
RAS-36HNBCMQ	RAS-66HNBCMQ	RAS-96HNBCMQ

HS2017165B

Contents

1. Troubleshooting

1.1 Initial Troubleshooting

1.1.1 Checking of Electrical Wiring and Power Source

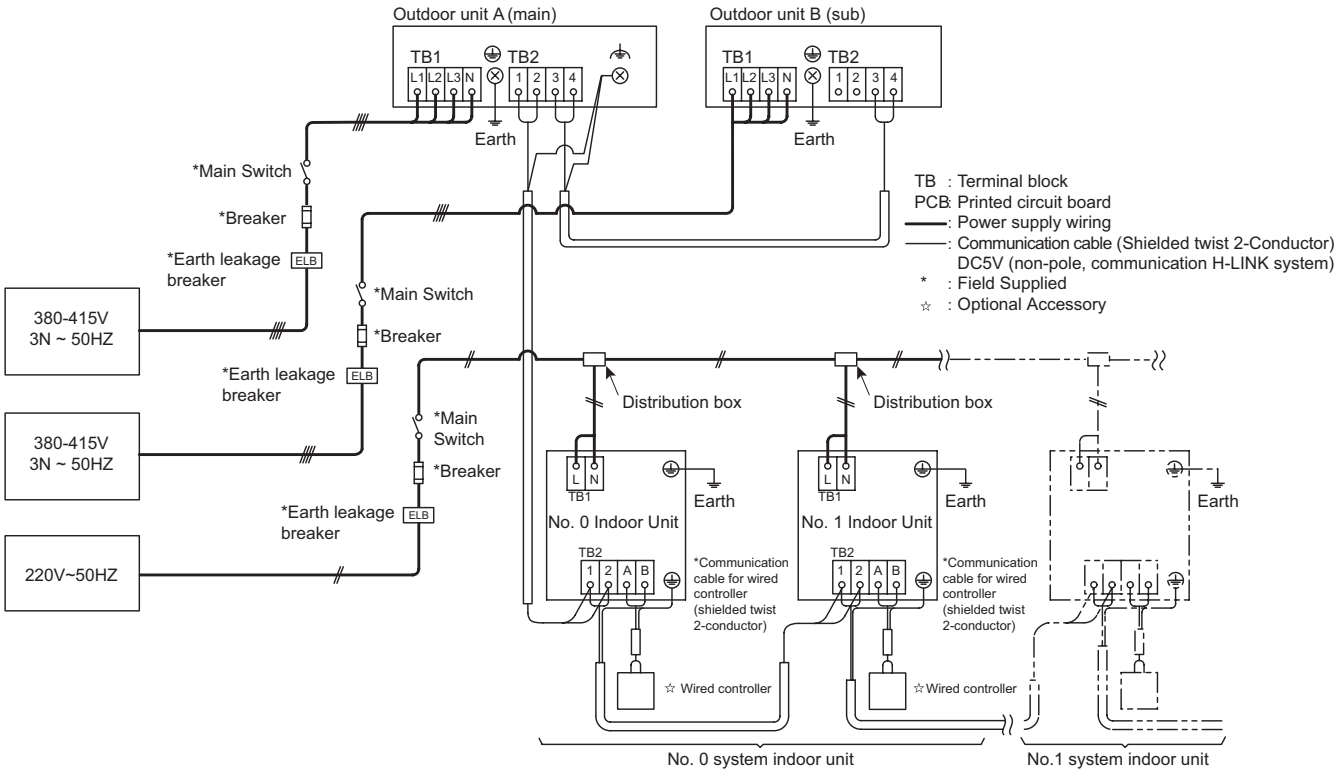
Check the following items if there is any abnormality in the activation of the air conditioner.

No.	Check Item	Check Method
1	Is any power source breaker or fuse blown out?	Check the voltage (secondary side) of the breaker and the continuity of fuse with a tester.
2	Is voltage at the secondary side of the transformer correct?	Disconnect the wires at the secondary side of the transformer and measure voltage with a tester.
3	Is wiring firmly fixed or correctly connected?	Check that the following wiring connections on O.U./I.U. PCBs is not loosened. • The connection for thermistors • The connection for the communication cable • The communication cable connects to a terminal block at the O.U./I.U., not PCB. • Power supply wiring is connected to a terminal block, not PCB. • The connection for transformer • Each connection for power source line Check that the wiring connections on O.U./I.U. PCBs is not loosened or wrongly connected on the site according to “Electrical Wiring Diagram” of the technical catalogue.

NOTE:

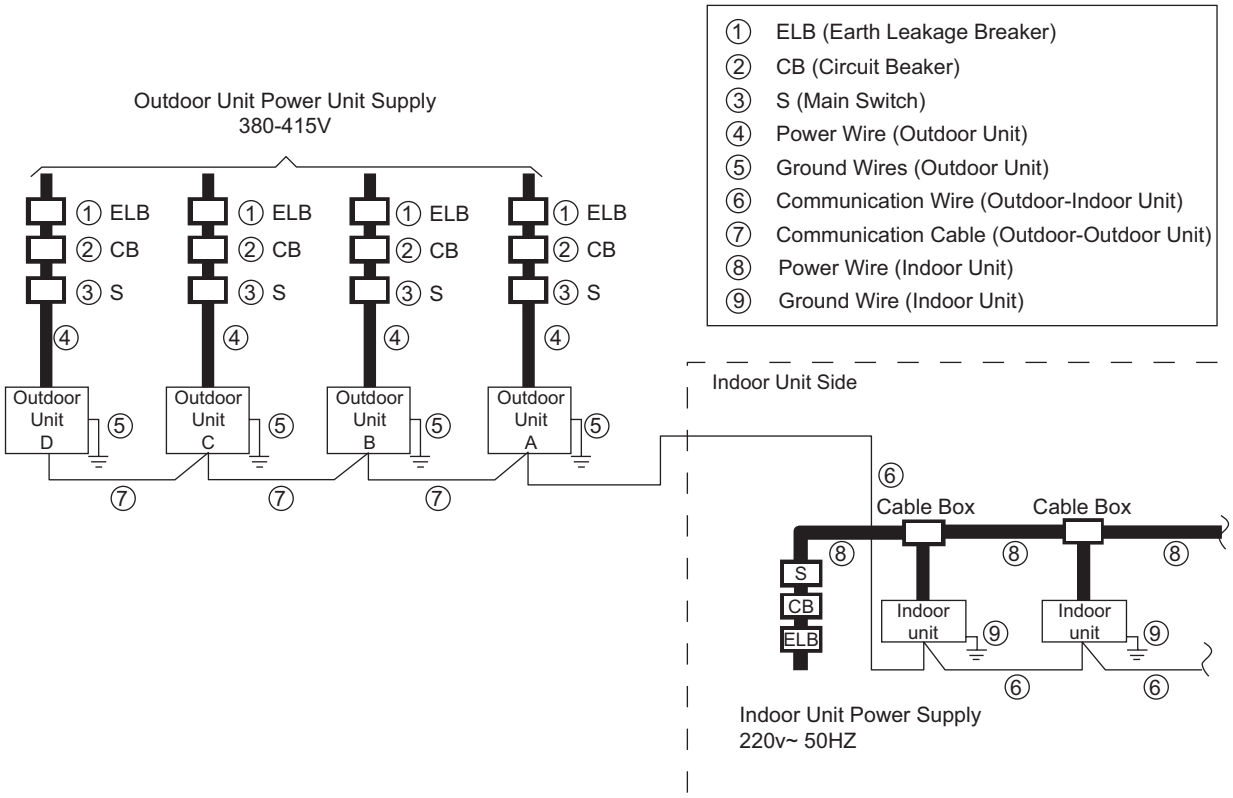
If the fuse(s) on an I.U. PCB is blown, diagnose the cause of overcurrent and replace the fuse(s). In addition, check the power source of optional parts because the fuses may blow out by the power source failure. Turn off power for safety.

Example for Electrical Wiring Connection



● Power Source Wiring

Supply the power sources to each outdoor unit and indoor unit group respectively. Power source wiring is fundamentally according to this method.



● The recommended wiring size and main switch are shown in Table 1.1.

Please refer to the indoor units installation manual for other cables.

● Select the capacity of power transformer according to the maximum running current.

● When the power supply wiring is too long, select the minimum wiring size whose voltage drop is within 2%.

● Power supply voltage should comply with the following requirements.

Supply Voltage: Rated Voltage within ±10%
Starting Voltage: Rated Voltage within -15%
Operating Voltage: Rated Voltage within ±10%
Imbalance between Phases: within 3%

● Calculate short-circuit current from the power transformer and electrical wiring length and size, and select the appropriate rated capacity for ELB (earth leakage breaker).

● Select ELB which can be used for the high harmonic wave.

⚠ WARNING

Do not connect the earth wire to the gas pipe, water pipe or lightening conductor.
Gas Pipe: An explosion and ignition may occur when gas leaks.
Water Pipe: Earth wire becomes ineffective when a hard vinyl pipe is used.
Lightning Conductor: The earth electric potential abnormally increases when a lightening conductor is used.

The recommended wiring, ELB, and the breaker size are shown in Table 1.1.

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

Model	Power Supply	Maximum Operating Current	Power Wire	Communication Wire	ELB		Circuit Breaker
					Rated Current	Current Sensitivity	
		(A)	(mm^2)	(mm^2)	(A)	(mA)	(A)
RAS-8.0HNBCMQ	380-415V 3N~50Hz	17	6	0.75	25	30	25
RAS-10HNBCMQ		23	6	0.75	32	30	32
RAS-12HNBCMQ		27	6	0.75	32	30	32
RAS-14HNBCMQ		31.5	10	0.75	40	30	40
RAS-16HNBCMQ		35.5	10	0.75	50	30	50
RAS-18HNBCMQ		43.5	16	0.75	50	30	50
RAS-20HNBCMQ		45	16	0.75	63	30	63
RAS-22HNBCMQ		52	16	0.75	63	30	63
RAS-24HNBCMQ		61.5	25	0.75	80	30	80

ELB: Earth leakage Breaker

Install main switch and ELB for each system separately. Select the high response type of ELB that acts within 0.1 second.

- Field Minimum Wiring Sizes for Power Source and Transmission

Model	Power Supply	Maximum Running Current (A)	Power Source Cable Size	Transmitting Cable Size	Earth Wiring Size (mm^2)
			(mm^2)	(mm^2)	
RAS-8.0HNBCMQ	380-415V/50Hz	17	6	0.75	6
RAS-10HNBCMQ		23	6	0.75	6
RAS-12HNBCMQ		27	6	0.75	6
RAS-14HNBCMQ		31.5	10	0.75	10
RAS-16HNBCMQ		35.5	10	0.75	10
RAS-18HNBCMQ		43.5	16	0.75	16
RAS-20HNBCMQ		45	16	0.75	16
RAS-22HNBCMQ		52	16	0.75	16
RAS-24HNBCMQ		61.5	25	0.75	16

Refer to the table below for selection of the power source cable size.

NOTE:

1. Follow the local codes and regulations when selecting field wiring.
2. The wiring sizes in the table below are selected at the maximum current of the unit. Use the wiring which are not lighter than the ordinary tough rubber sheathed flexible cord or ordinary polychloroprene sheathed flexible cord.
3. Use a shielded cable for the transmitting circuit and connect it to the ground.

Current (A)	Wire Size (mm^2)
i≤6	2.5
6<i≤10	2.5
10<i≤16	2.5
16<i≤25	4
25<i≤32	6
32<i≤40	10
40<i≤63	16

NOTE:

Use 2-core cable size: 0.75mm^2 to 1.25mm^2 for the control cable between the outdoor unit and the indoor unit.
The total transition wiring length between the indoor unit and the outdoor unit should be less than 1000m and the total transition wiring length between outdoor units should be less than 30m.

⚠ CAUTION

Install a multi-pole main switch with a space of 3.5mm or more between each phase.

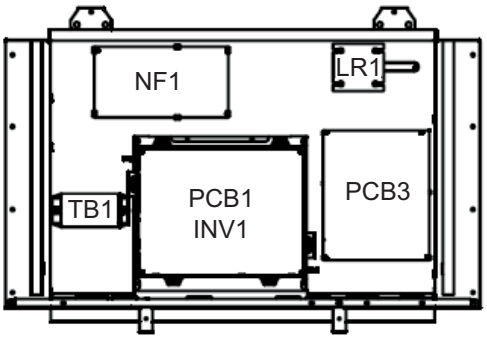
1.1.2 Function of RSW, DSWs and LEDs

Location of Print Circuit Boards (PCBs)

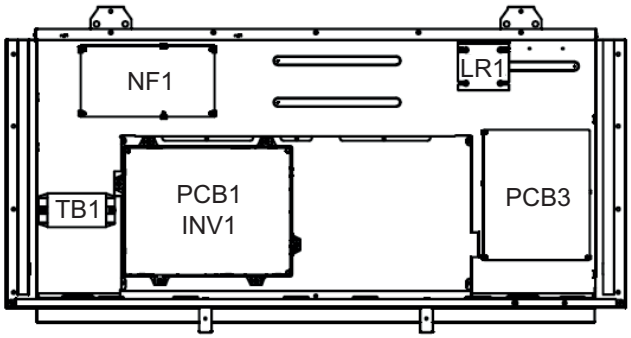
*Electrical Control Box of Outdoor Unit: Front Side

< 380-415V/50Hz >

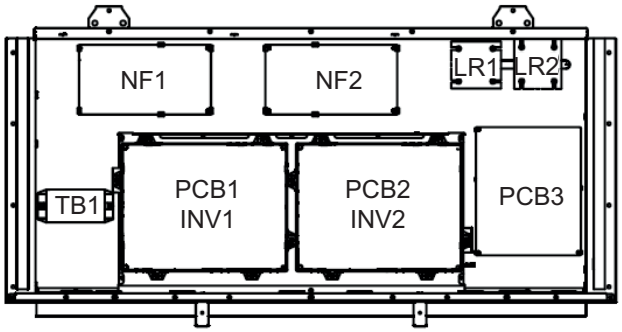
RAS-8.0HNBCMQ – RAS-12HNBCMQ



RAS-14HNBCMQ – RAS-16HNBCMQ



RAS-18HNBCMQ – RAS-24HNBCMQ

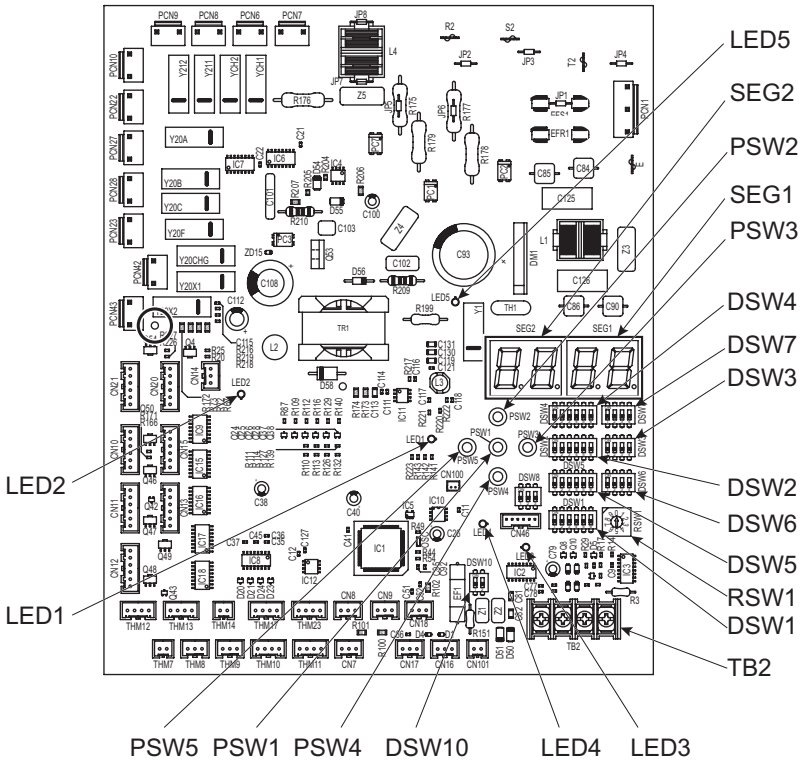


● Purpose

Symbol	PCB	Purpose
PCB3	Outdoor Unit PCB	1. Transmitting between Indoor Unit and Outdoor Unit 2. Processing for Sensor Input 3. Processing for DIP Switch Input 4. Operation Control for Above Items 1 to 3. Compressor Operation Control, Bypass Valve Control, Fan Control and Overcurrent Control 5. 7-Segment Indication 6. Processing of Safety Device Input 7. Processing of Relay Output 8. Reverse Phase Detection for Power Source
INV1, 2 (For 380 - 415V/50Hz)	Inverter PCB	1. Inverter power part is driven by outdoor unit PCB to drive compressor. 2. Overcurrent Control 3. Protection Control for Inverter Part 4. DC Fan Motor Speed Control

a. Control Printed Circuit Board:

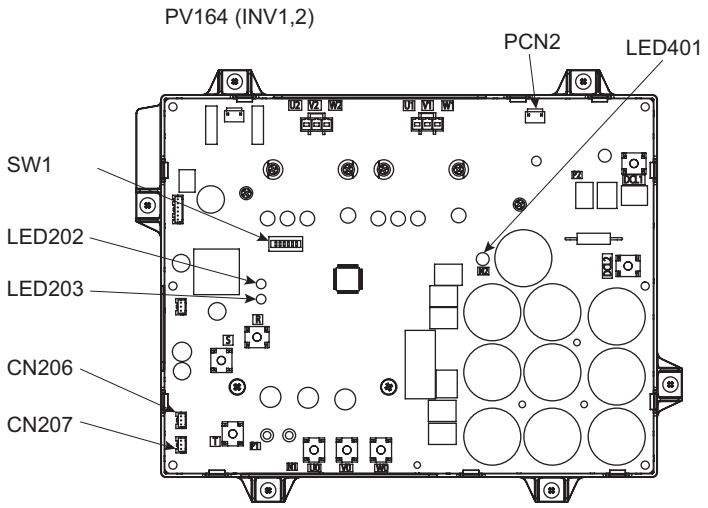
PCB3 (Outdoor Unit PCB)



Part Name		Function Information
LEDs	LED1 (Red)	Power Source Indicator for Outdoor Unit PCB (Low Voltage) Normal Condition: Activated / ON Abnormal Condition: Deactivated / OFF
	LED2 (Green)	This LED2 indicates the communication state between the outdoor unit PCB and inverter PCB. Normal Condition: Flashing Abnormal Condition: Activated / ON or Deactivated / OFF
	LED3 (Yellow)	This LED3 indicates the communication state between the indoor unit and outdoor unit. Normal Condition: Flashing Abnormal Condition: Activated / ON or Deactivated / OFF
	LED4 (Orange)	This LED4 indicates the communication state between the outdoor units. Normal Condition: Flashing Abnormal Condition: Activated / ON or Deactivated / OFF
	LED5 (Red)	Power Source Indicator for Outdoor Unit PCB (High Voltage) Normal Condition: Activated / ON Abnormal Condition: Deactivated / OFF
SEGs	SEG1, SEG2	These indicate: “Alarm”, “Protective Safety Device has Tripped” or “Checking Items”.

b. Inverter Printed Circuit Board

INV1, 2 (Inverter PCB)



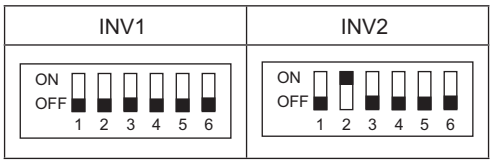
Part Name	Function Information
LED401 (Red)	Power source indicator for inverterPCB Normal Condition: Activated / ON Abnormal Condition: Deactivated / OFF
LED202 (Yellow) LED203 (Green)	This indicates the states of microcomputer Normal Condition: Activated / ON Abnormal Condition: Deactivated / OFF

LED202	LED203	Function
flash	OFF	Compressor stop
OFF	flash	Fan motor 1 stop
flash	flash	Fan motor 2 stop

● SW1

No setting is required for outdoor unit installation. When setting the No. 1 pin to ON, the electric current detection is cancelled.

The No. 1 pin should be set back to OFF after electrical work.



1.1.3 Outdoor Unit Rotary Switch and DIP Switch Setting

Turn off the electrical power supply to all units before setting the DIP switches. Otherwise DIP switch fails to work and the setting becomes invalid.

But the DIP switch DSW4-No. 1, 2, 4 is valid when the power is turned ON under the status of power ON setting.

■ Symbol indicates DIP switch position. Refer to Figure 1 for setting DIP switch settings and positions.

NOTICE

- 10-20 seconds after DIP setting on DSW4, the unit will be start or stop.
- Outdoor unit is numbered to distinguish it from other outdoor unit for repair and maintenance. Ensure to write a number in the box on the right.

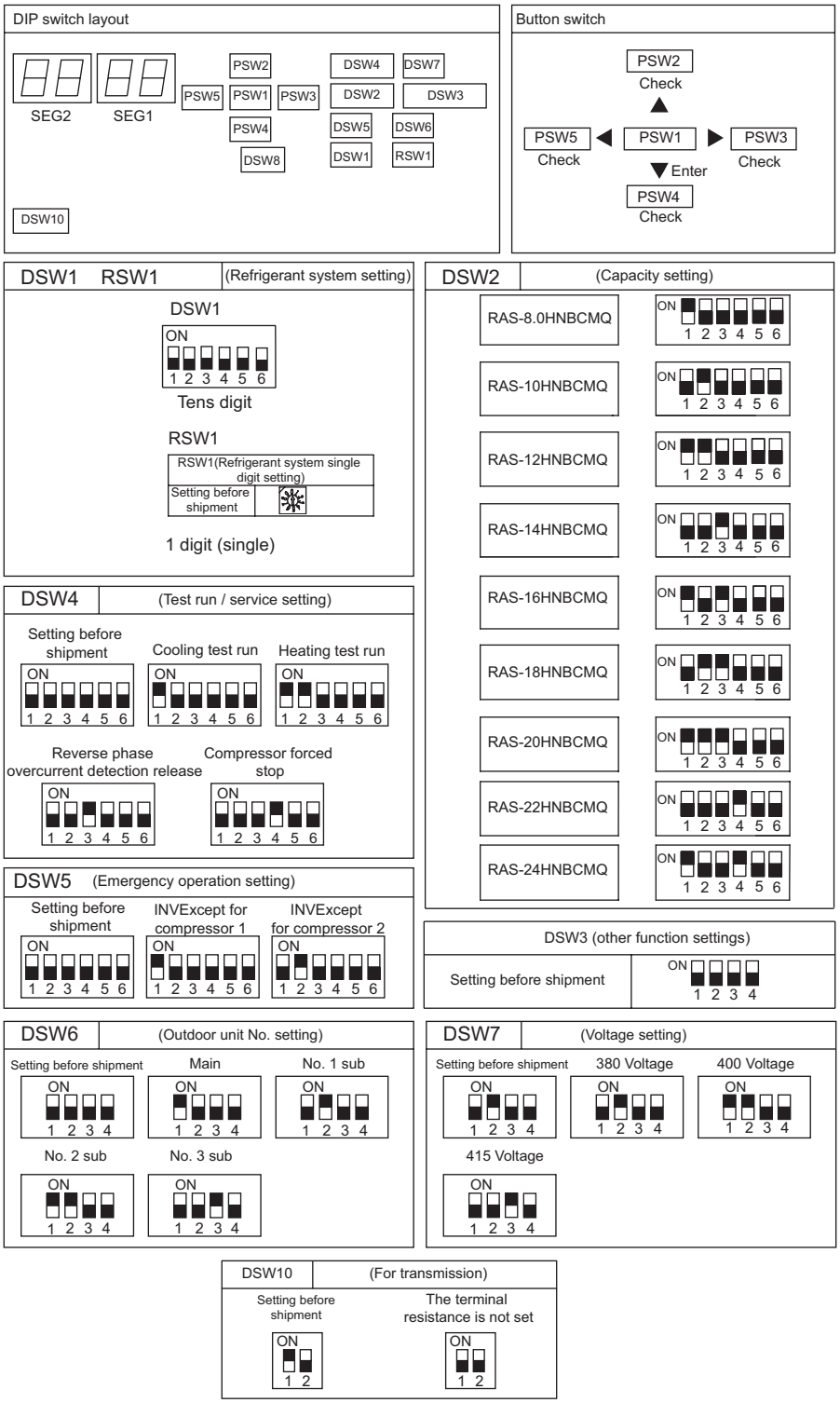


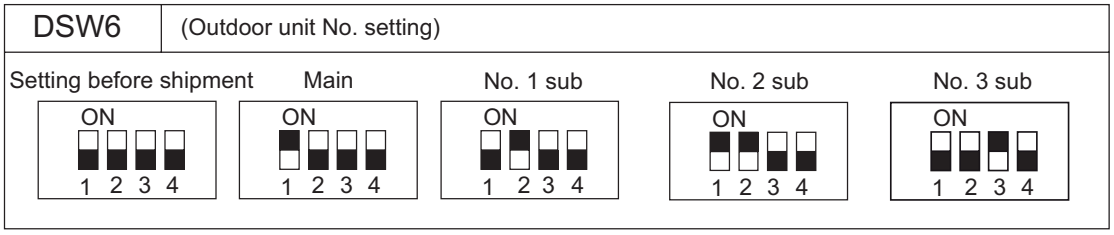
Figure 1 DIP Setting

● Communications settings:

Set the outdoor unit number, the refrigerant system number, and the terminal resistance for the H-LINK or H-LINK II system.

● Outdoor number setting:

When you combine base model module, set the DSW6 as shown below:

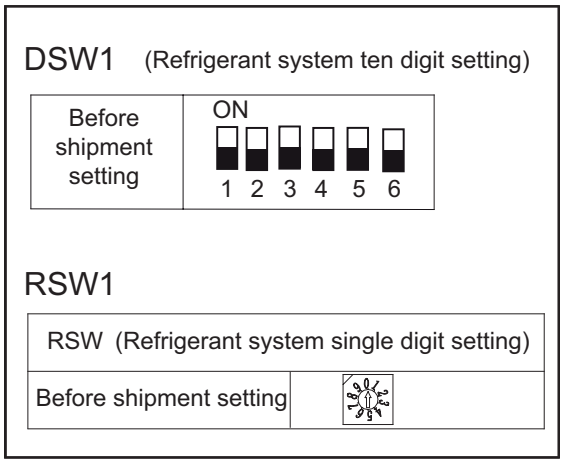


● Refrigerant system setting:

Set the refrigerant system no. for the outdoor unit within the same refrigerant system, as shown in the figure:

NOTE:

Within the same refrigerant system, refrigerant no. for the outdoor unit and indoor unit should be set to the same.

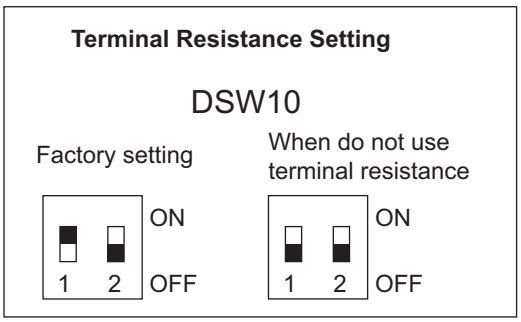


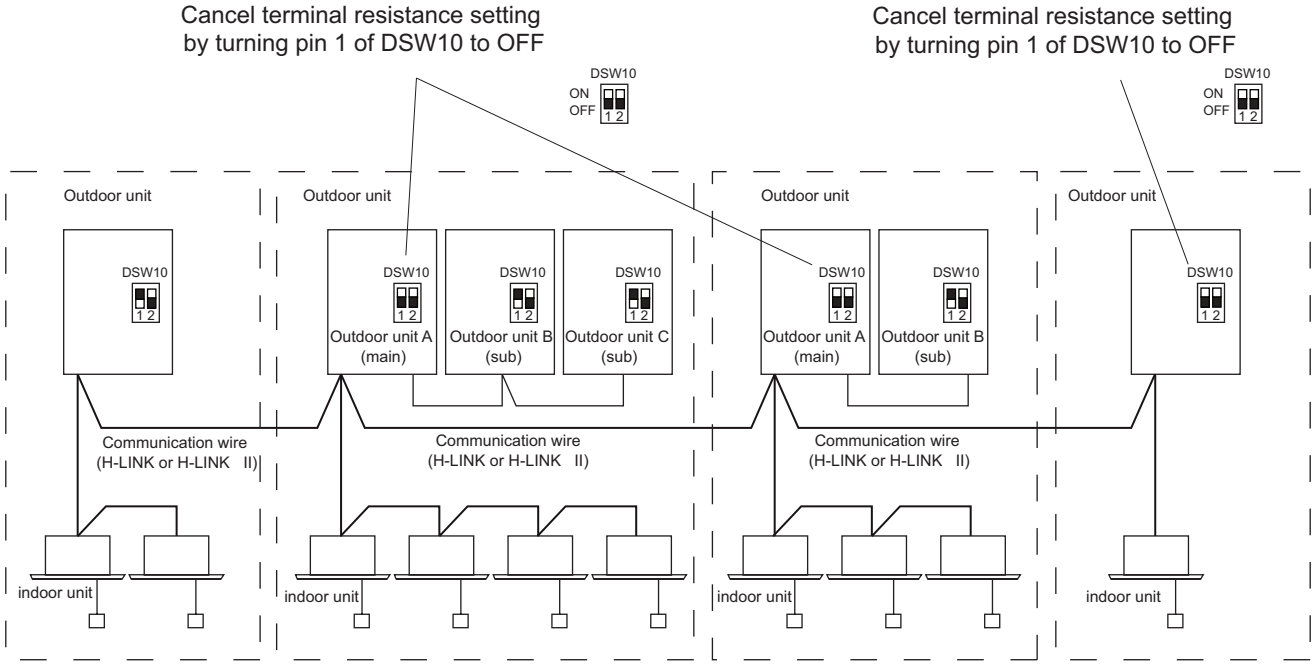
DSW1 and RSW1 factory set to the 0.

The maximum number of refrigerant system is set to 63.

● Terminal resistance setting:

At the factory, position 1 of the DSW10 is set to ON. If the number of outdoor units in the same H-LINK or H-LINK II system is 2 or more, the position 1 of the DSW10 is set to OFF from the outdoor unit of the second refrigerant system. In this case, no need for setting if only one outdoor unit is used.





[External Input/Output Setting]

■ Start of Setting

Turn ON DSW4-No. 4 and turn ON DSW4-No. 6.

■ Exit Setting Mode

Turn OFF DSW4-No. 6 during indicated
External Input/Output Setting Mode.
Then, turn OFF DSW4-No. 4.

External Input/Output and Function Setting:

Press PSW3 (►) and PSW5 (◄) to select function No. PSW4 (▼): forward, PSW2 (▲): backward

	Item	SEG2	SEG1	Set
1	Input setting 1 CN17 [1-2pin]	i 1	1	
2	Input setting 2 CN17 [2-3pin]	i 2	2	
3	Input setting 3 CN18 [1-2pin]	i 3	3	
4	Output setting 1 CN16 [1-2pin]	o 1	1	
5	Output setting 2 CN16 [1-3pin]	o 2	2	

Setting External Input/Output Function:

Function No.	Input	Output
1	Fixed Heating Mode	Operation Signal
2	Fixed Cooling Mode	Alarm Signal
3	Demand Stoppage	Compressor ON Signal
4	Outdoor Fan Motor Start/Stop	Defrost Signal
5	Forced Stoppage	-
6	Demand Current Control 40%	-
7	Demand Current Control 60%	-
8	Demand Current Control 70%	-
9	Demand Current Control 80%	-
10	Demand Current Control 100%	-
11	Low noise setting	-
12	Low noise setting	-
13	Low noise setting	-
0	No Setting	No set

Same input/output function cannot be set to different input/output terminal. Otherwise, the larger function number setting will be invalid.

*When ambient temperature is higher than 44°C low noise setting mode is invalid.

[Function Setting]

(1) Function selection Setting Method

■ Start of Setting

Turn ON DSW4-No. 4 and turn ON DSW4-No. 5.

■ Exit Setting Mode

Turn OFF DSW4-No. 5 during indicated Function Setting Mode.

Then, turn OFF DSW4-No. 4.

(2) Function Setting Option

By pressing the push-switches PSW3 (►) and PSW5 (◄) the setting can be changed.

PSW4 (▼): forward, PSW2 (▲): backward

Refer to the Technical Manual for more details.

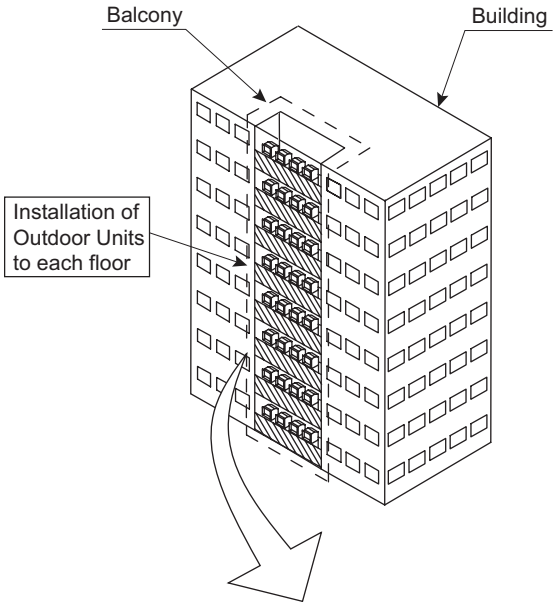
Fill out the selected function No. in the space provided in the following table:

	Item	SEG2	SEG1	SET		Item	SEG2	SEG1	SET
1	Circulator Function at Heating Thermo-Off	FA	0		25	N/A	F1	0	
2	Switch to Night Mode (Low Noise)	n1	0		26	Crankcase Heating Band Control During Stoppage	F2	0	
3	Cancellation of Outdoor Ambient Temperature Limit	CS	0		27	Indoor Fan Warm Start Period Setting	F3	0	
4	Defrost in Cold Area (Change Of Defrost Condition)	Jo	0		28	Intermittent Operation of Outdoor Fan Motor	F4	0	
5	Gentle Fan Speed Defrost Setting	bJ	0		29	Indoor Expansion Valve Target Value Control for Cooling (Only For 4-Way Cassette Type)	F5	0	
6	Cancellation of Outdoor Unit warm Start	Hr	0		30	Indoor Expansion Valve Minimum Opening Limit During Heating Switch-Off	F6	0	
7	Capacity Priority Mode	nU	0		31	N/A	F7	0	
8	Minimum Evaporating Temperature Setting for Cooling	Hc	0		32	Forced Defrosting After Forced Stoppage Of Defrosting Cycle	F8	0	
9	Compressor Frequency Target Value Control for Heating	Hh	0		33	Indoor Expansion Valve Control Change for Stoppage Indoor Unit in Heating Mode	F9	0	
10	Indoor Expansion Valve Target Value Control for Cooling	SC	0		34	Compressor Maximum Frequency Suppression	FC	0	
11	Indoor Expansion Valve Target Value Control for Heating	SH	0		35	Convert Unit in Checking Mode	Fd	0	
12	Indoor Expansion Valve Opening Control During Heating Operation Stoppage	S1	0		36	Indoor Fan ON/OFF Setting during Forced Stoppage	FE	0	
13	Indoor Expansion Valve Opening Control During Heating Thermo-Off	So	0		37	N/A	FF	0	
14	Indoor Expansion Valve Initial Opening Control During Heating Thermo-On	c1	0		38	High difference setting	FG	0	
15	Indoor Expansion Valve Initial Opening Control for Cooling	cb	0		39	N/A	FH	0	
16	Outdoor Expansion Valve Initial Opening Control for Heating	ch	0		40	Oil return control	F1	0	
17	Low Noise Setting*	db	0		41	Performance correction	FJ	0	
18	Demand Function Setting	dE	0		42	Outdoor temperature range	FL	0	
19	Wave Function Setting	UE	0		43	Cooling mode Start control 2 Hz change speed	Fn	0	
20	Protection of Decrease in Outlet Temperature for Cooling	Fb	0		44	Cooling mode Start control 2 Hz change speed	FP	0	
21	Outlet Temperature Control	Ft	0		45	Compressor Maximum Frequency Change during Defrosting Mode	Fr	0	
22	Adjustment of Fan Running (For Multiple Installation)	Fo	0		46	Oil return mode of indoor unit	FU	0	
23	N/A	Lt	0		47	N/A	F9	0	
24	Thermo-Off Setting for Outdoor Unit After Defrosting Operation	dS	0						

*when ambient temperature is higher than 44°C, silence and low noise setting mode is invalid.

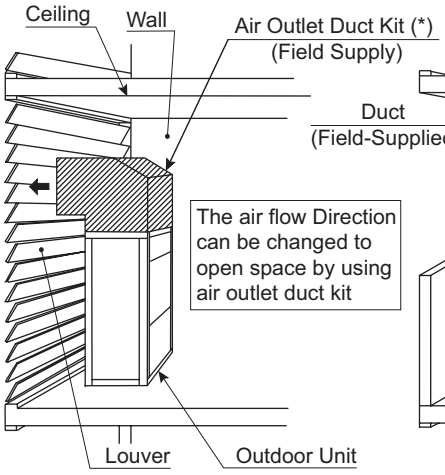
High Static Pressure Setting (DSW8: ON)

For installation spaces such as a balcony or a floor where an external static pressure such as a louver or a duct is required to secure, the 3 steps external static pressure (80Pa, 60Pa and 30Pa) by the DIP switch setting (DSW8) is adopted.

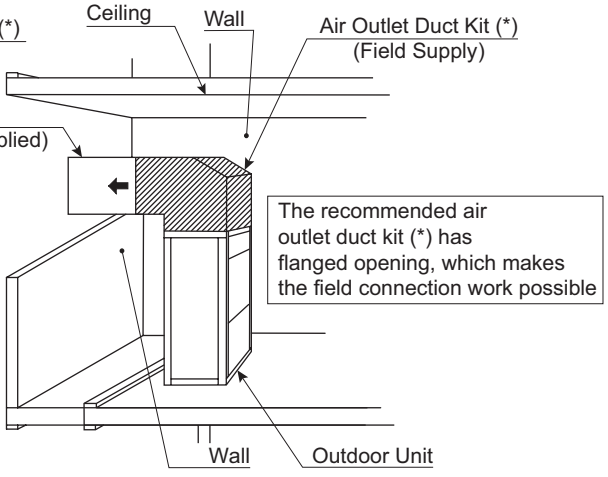


Setting for External Static Pressure	DSW8		
	#1	#2	#3
0Pa	OFF	OFF	OFF
Max 30Pa	ON	OFF	OFF
Max 60Pa	OFF	ON	OFF
Max 80Pa	ON	ON	OFF

Case that Open Space is Louver



Case that Open Space is Wall



NOTE:

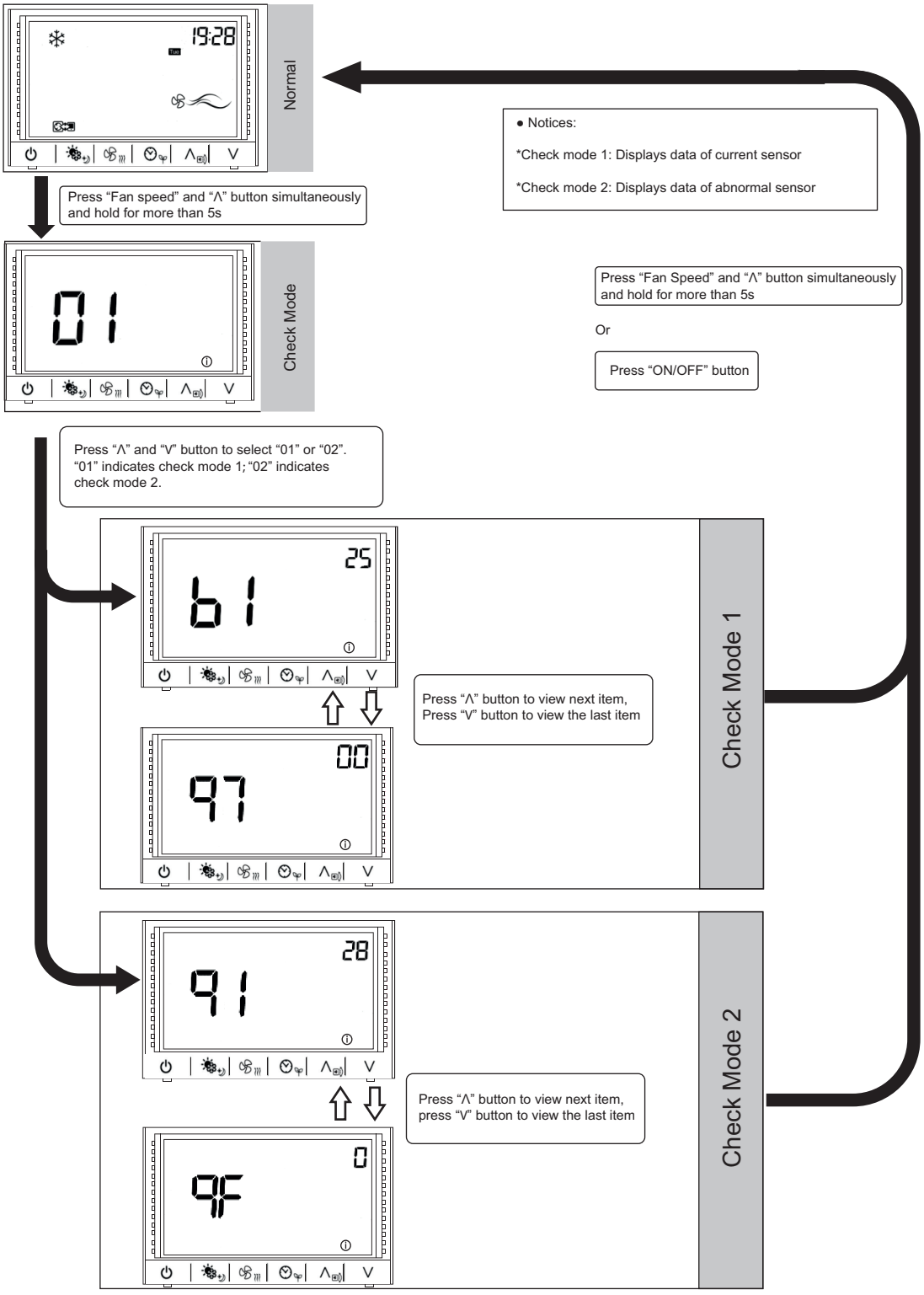
1. Pay attention to the following case at the design and the installation. If the outlet air intakes by short-circuit, the operation range is limited due to increasing high pressure in the cooling operation or decreasing low pressure in the heating operation so that may cause failure of unit.
2. (*): Air outlet duct kit is field supply.

1.1.4 Troubleshooting in Check Mode by Wired Controller

1.1.4.1 Check mode by wired controller with a touch screen

(1) Use wired controller to enter in “Check Mode” under following conditions:

1) On the alarm code interface screen, alarm icon ⚠ flashes.
2) The unit stops after quitting alarm interface (press “Fan Speed” to quit) and restarts for alarm code cause.
3) Enter “Check Mode” (Check 1 or Check 2) under normal operation state or during stoppage.
4) View data such as temperatures of indoor inlet air or out let air, and so on.



Features of Check Mode 1

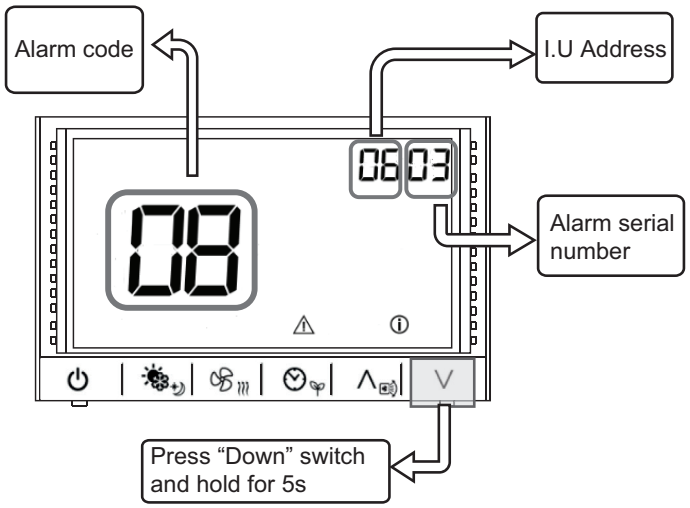
No.	Item	Data Name
1	b1	Set Temperature for I.U. (°C)
2	b2	Inlet Air Temperature for I.U. (°C)
3	b3	Outlet Air Temperature for I.U. (°C)
4	b4	Liquid Pipe Temp. for I.U. (°C)
5	b5	Remote thermistor Temp. (°C)
6	b6	Outdoor ambient air Temp. (°C)
7	b7	Gas Pipe Temp. for I.U. (°C)
8	b8	Evaporating Temp. at Heating for O.U. (°C)
9	b9	Condensing Temp. (°C)
10	bA	Comp. Top Temp. (°C)
11	bb	Wired Controller detected Temp. (°C)
12	bC	Not prepared
13	C1	I.U. control Input / Output status
14	C2	I.U. control Input / Output status
15	d1	Cause Code of Unit Stoppage
16	E1	Times of Abnormality occurrence
17	E2	Times of I.U. instantaneous stoppage
18	E3	Times of Abnormality occurrence of Communication between Wired controller and I.U.
19	E4	Times of Inverter Tripping occurrence
20	F1	Louver Sensor State
21	H1	Discharge Pressure (×0.1Mpa)
22	H2	Suction Pressure (×0.1Mpa)
23	H3	Order frequency (Hz)
24	H4	Operating Frequency (Hz)
25	J1	I.U. Capacity
26	J2	O.U. Model Code
27	J3	Refrigerant System No.
28	J4	Refrigerant System No.
29	L1	I.U. Expansion Valve opening (%)
30	L2	O.U. Expansion Valve opening 1 (%)
31	L3	O.U. Expansion Valve opening 2 (%)
32	L4	O.U. Expansion Valve opening 3 (%)
33	P1	Comp. Operating Current
34	P2	Accumulated Operation Time of Comp.(×10 hours)
35	q1	Motion Sensor Reaction Rate (%)
36	q2	Radiation Sensor Temp.
37	q3	Motion Sensor Reaction Rate1 (%)
38	q4	Motion Sensor Reaction Rate 2 (%)
39	q5	Motion Sensor Reaction Rate 3 (%)
40	q6	Motion Sensor Reaction Rate 4 (%)
41	q7	Setting Temp. Corrected Value (°C)

Features of Check Mode 2

No.	Item	Data Name
1	q1	Inlet Air Temperature for I.U. (°C)
2	q2	Outlet Air Temperature for I.U. (°C)
3	q3	Liquid Pipe (Freezing) emp. for I.U. (°C)
4	q4	Outdoor ambient air Temp. (°C)
5	q5	Gas Pipe Temp. for I.U. (°C)
6	q6	Evaporating Temp. at Heating
7	q7	Condensing Temp. (°C)
8	q8	Comp. Top Temp. (°C)
9	q9	Discharge Pressure (×0.1Mpa)
10	qA	Suction Pressure (×0.1Mpa)
11	qb	Order Frequency (Hz)
12	qC	Operating Frequency (Hz)
13	qd	I.U. Expansion Valve opening (%)
14	qE	O.U. Expansion Valve opening 1 (%)
15	qF	Comp. Operating Current (A)

(2)Alarm History

1) Procedure to display Alarm History



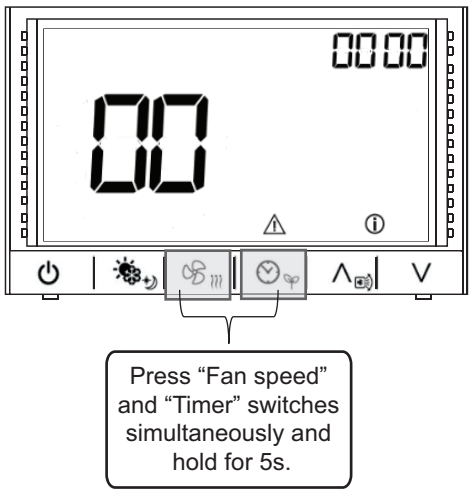
a) Press any switch to light the backlight.

b) Press “Down” switch and hold for 5s to enter “Alarm History Display” mode interface as shown below.

c) Press “Up” switch or “Down” switch once to view the alarm history.

d) Press “ON/OFF” switch once or press “Down” switch and hold for 5s to quit Alarm History Display mode and return to normal interface screen

2) Deleting Alarm History



a) Press any switch to light the backlight.

b) Press “Down” switch and hold for 5s to enter “Alarm History Display” mode interface.

c) Press “Fan Speed” & “Timer” switches simultaneously and hold for 5s to delete all alarm history data. “00” is displayed at “Minute” area when there is no alarm as shown in above figure.

d) Press “ON/OFF” once or press “Down” switch and hold for 5s to quit “Alarm History Display” mode and return to normal interface screen.

NOTE:

- With Alarm History Display on wired controller, maximum of 30 alarm items can be recorded.

1.1.5 Checking Using 7-Segment Display

⚠ DANGER

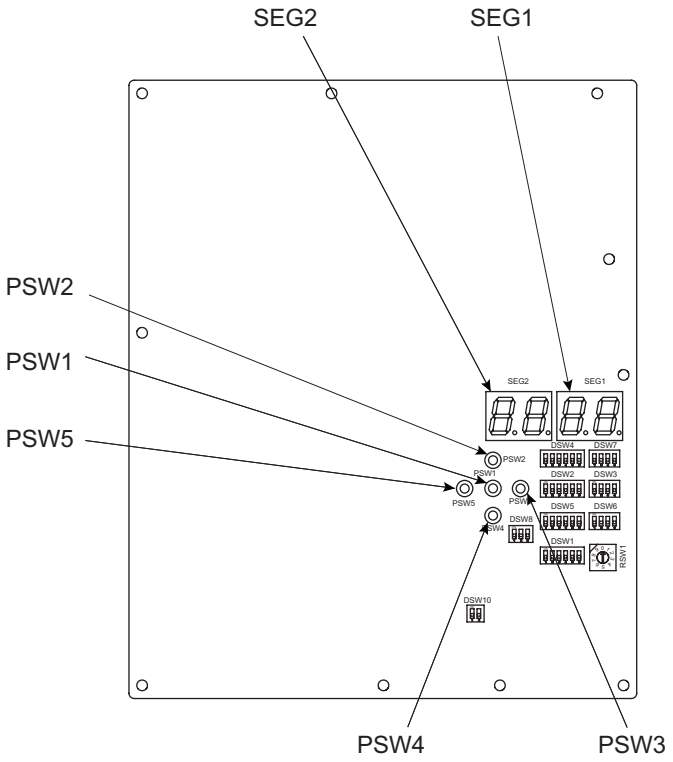
Only an authorized person can check using this method.

● Before Checking

1) Turn ON the main power source. Wait for more than 20 seconds to start checking.
2) Checking Items
   * Connecting Information
   * Outdoor Unit Information
   * Indoor Unit Information
   * Cause of Alarm Code Information
   * Alarm Code History Information
3) Check the locations of 7-segment and push switches.
4) AC380-415V is applied to the PCB and electrical parts. Never touch electrical parts and wiring without appropriate personal protective equipment (PPE) when checking.

● Location of Push Switches and 7-Segment Display

The push switches and 7-segment display are located on the PCB3.



● Simple Checking by 7-Segment Display

1 Turn on All Indoor Units *1)

*1): All the Indoor Units Connected to the Outdoor Unit

2 Turn on the Outdoor Unit

3 Auto-addressing Starts

Outdoor Unit Printed Circuit Board (PCB3)

During auto-addressing, the following items can be checked using the outdoor unit's on-board 7-segment LED display.
(1) Disconnection of power supply to the indoor unit.
(2) Reverse connection of the communication cable between the outdoor and indoor units.
In this case, "03" appears after 30 seconds.
(3) Duplication of indoor unit number. See Alarm Code 35.

Normal Case	(1) The outdoor unit's on-board 7-segment LED display is not indicated.

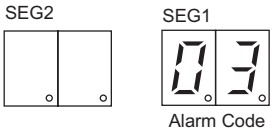
Abnormal Case

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

(A) Alarm code will be displayed on the 7-segment when an alarm is received from an indoor unit in normal mode.
As for the following alarm codes, however, alarm code will be displayed on the 7-segment LED when an alarm is detected by an outdoor unit itself.
• Alarm Code “03” (Abnormal communication between Indoor Unit and Outdoor Unit)
• Alarm Code “35” (Incorrect Indoor and Outdoor Unit No. Setting)

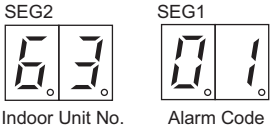
(B) Alarm code of lower number indoor unit address No. will be displayed when alarm is received from multiple indoor units.

(C) The following 7-segment LED is displayed and flashed every 0.5 seconds.



(D) SEG1 and SEG2 are as follows.

7-Segment Display
<In Case of Unit No. 63, Alarm Code “01”> SEG2: Indoor Unit No. (0~63) SEG1: Alarm Code



● Checking Method using Checking Mode

Operating conditions and each part of a system can be checked using the 7-segment display on the PCB3 in the outdoor unit.

NOTE:

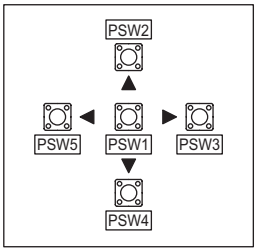
1. Change the Indication Group by pressing PSW5 (◄) and PSW3 (►).
   The first indication of the next or the previous Indication Group will be indicated no matter where the current step is at.
2. The indications compatible for all the outdoor units and indoor units connected will be indicated for the case of Group (B) and Group (C).

(Example)

(0-1) Outdoor Unit (No.0) od 0 →・・・(0-36) Cause Code of Fan Controller Stoppage Code Fr20

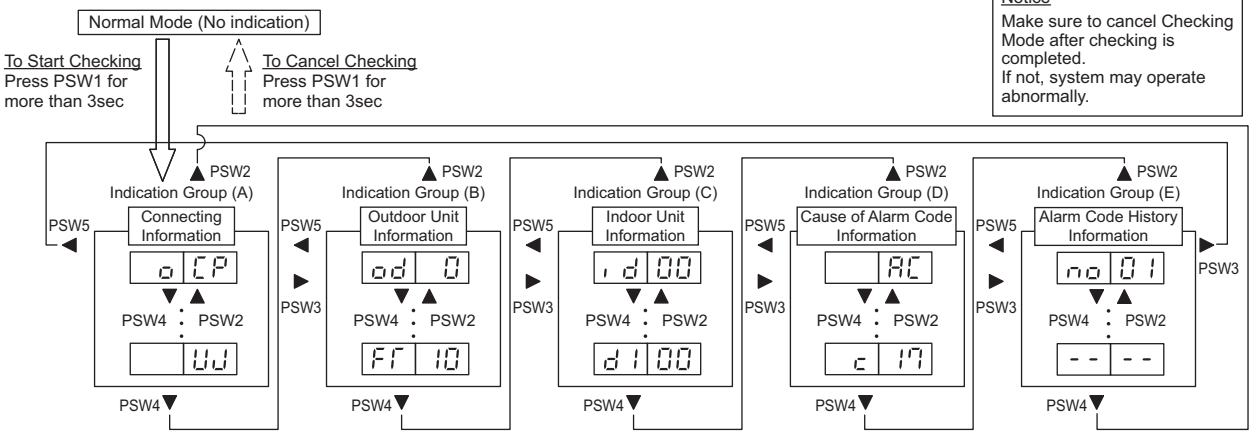
・・・→ (2-1) Outdoor Unit (No.0) od 2 →・・・(2-36) Cause Code of Fan Controller Stoppage Code Fr20

Arrangement of Push Switches



Notice

Make sure to cancel Checking Mode after checking is completed.
If not, system may operate abnormally.



(A) Connecting Information

This information is indicated at the main outdoor unit (Unit A) only.

Press PSW4 (▼) to forward or PSW2 (▲) to backward.

The information will be indicated alternately as “Item” → “Details”.

Details of Indication

	Item	7-Segment Display SEG2	7-Segment Display SEG1	Details
1	Total Capacity of Connected Outdoor Units	o	CP	Total Capacity of O.U. Combination Refer to “Outdoor Unit Capacity Table”.
2	Connected O.U. Number	o	AA	Connected Outdoor Unit Number
3	Total Capacity of Connected Indoor Units	i	CP	Total Capacity of Connected Indoor Units
4	Connected I.U. Number	i	AA	Connected Indoor Unit Number
5	Refrigerant Cycle No.		GA	Refrigerant Cycle No.
6	Total Capacity of Operated I.U.		oP	Total Capacity of Operated Indoor Units Refer to “Indoor Unit Capacity Table”.
7	Total Comp. Frequency		Ht	[Hz]
8	Accumulated Operation Time		UJ	[10 Hour]

Outdoor Unit Capacity Table

Indication	Capacity (kW)	Horsepower (HP)
40	14.0	5.0
48	16.0	6.0
64	22.4	8.0
80	28.0	10.0
96	33.5	12.0
112	40.0	14.0
128	45.0	16.0
144	50.0	18.0
160	56.0	20.0
176	61.5	22.0
192	67.0	24.0

NOTE:

In case of combination unit, the indication of outdoor unit capacity is total capacity of each unit.

< Example >
In case of 432 type

432 type = 144 type x 3
144 x 3 = 432
Indication “432” will be displayed.

Indoor Unit Capacity Table

Indication	Capacity (kW)	Horsepower (HP)	Indication	Capacity (kW)	Horsepower (HP)
3	1.1	0.4	20	7.1	2.8
5	1.8	0.6	22	8.0	3.0
6	2.2	0.8	26	9.0	3.3
7	2.5	0.9	28	10.0	3.6
8	2.8	1.0	32	11.2	4.0
9	3.2	1.2	35	12.5	4.5
10	3.6	1.3	40	14.0	5.0
11	4.0	1.5	48	16.0	6.0
13	4.5	1.8	64	22.4	8.0
14	5.0	2.0	80	28.0	10.0
16	5.6	2.3	128	45.0	16.0
18	6.3	2.5	160	56.0	20.0

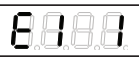
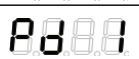
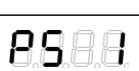
(B) Outdoor Unit Information

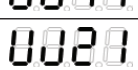
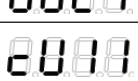
Select the outdoor unit number to be displayed only for the example of Unit A (No.0). Units B and C (Nos.1 and 2) show each unit number only.
When the selection is changed, press PSW3 (►) to forward or PSW5 (◄) to backward.

Unit	Indication
Unit A (No.0)	od 0
Unit B (No.1)	od 1
Unit C (No.2)	od 2
Unit D (No.3)	od 3

Select the outdoor unit number for indication.
Press PSW4 (▼) for detailed information of selected unit number.
Press PSW4 (▼) to move forward or PSW2 (▲) to move backward. The information will be indicated alternately as “Item” → “Details”.
Press PSW3 (►) or PSW5 (◄) to change the Outdoor Combination Unit No. to be indicated or to move other Indication Group.

Details of Indication

No	Item	7 SEG Display SEG2 SEG1	Details
1	Outdoor Unit No.		0~4 (Outdoor Unit No.)
2	Outdoor Unit Capacity		Unit Capacity Indication Refer to "Outdoor Unit Capacity Table"
3	Output State of Outdoor MCU		Output State of Outdoor Micro-Computer Indication
4	Running Frequency of Inverter Compressor MC1		Running Frequency of No.1 Compressor Indication [Hz]
5	Running Frequency of Inverter Compressor MC2		Running Frequency of No.2 Compressor Indication [Hz]
6	Total Number of Running Compressor		Total Number of Running Compressor Indication
7	Outdoor Fan Step		Outdoor Fan Step Indication (0 to 27 [Step])
8	Outdoor Expansion Valve MV1 Opening		0~100%
9	Outdoor Expansion Valve MV2 Opening		0~100%
10	Bypass Expansion Valve MVB Opening		0~100%
11	High (Discharge) Pressure (Pd)		Unit: MPa Indication of Pressure Sensor Open Circuit: 5.62 Indication of Pressure Sensor Short Circuit: -0.62
12	Low (Suction) Pressure (Ps)		Unit: MPa Indication of Pressure Sensor Open Circuit: 2.25 Indication of Pressure Sensor Short Circuit: -0.25
13	Ambient Air Temperature (Ta)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
14	Discharge Gas Temperature on Top of Compressor MC1 (Td1)		Unit: °C Indication of Thermistor Open Circuit: 0 Indication of Thermistor Short Circuit: 255
15	Discharge Gas Temperature on Top of Compressor MC2 (Td2)		Unit: °C Indication of Thermistor Open Circuit: 0 Indication of Thermistor Short Circuit: 255
16	Outdoor Heat Exchanger Liquid Temperature (Te1)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
17	Outdoor Heat Exchanger Liquid Temperature (Te2)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
18	Outdoor Heat Exchanger Gas Temperature (Tg)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
18a	Subcooling Heat Exchanger Temperature (Tg2)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
19	Liquid Stop Valve Temperature (Tchg)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
20	Subcooling Heat Exchanger Temperature (Tsc)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
20a	Subcooling Heat Exchanger outlet Temperature (Ts)		Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
21	Inverter Fin Temperature 1		-40～127°C

22	Inverter Fin Temperature 2		-40～127°C
23	Fan Controller Fin Temperature 1		-40～127°C
24	Fan Controller Fin Temperature 2		-40～127°C
25	Compressor MC1 Current		0～255A
26	Compressor MC2 Current		0～255A
27	Fan Motor MOF1 Current		0～255A
28	Fan Motor MOF2 Current		0～255A
29	Accumulated Operation Time of Compressor MC1		0～9999(×10 Time)
30	Accumulated Operation Time of Compressor MC2		0～9999(×10 Time)
31	Accumulated Operation Time of Compressor MC1 (Resettable)		0～9999(×10 Time)
32	Accumulated Operation Time of Compressor MC2 (Resettable)		0～9999(×10 Time)
33	Cause Code of Inverter Stoppage 1		0～63
34	Cause Code of Inverter Stoppage 2		0～63
35	Cause Code of Fan Controller Stoppage 1		0～63
36	Cause Code of Fan Controller Stoppage 2		0～63

(C) Indoor Unit Information

This information is indicated at the main outdoor unit (Unit A) only.

Select the indoor unit number for the information indication. Press PSW4 (▼) to move forward or PSW2 (▲) to move backward.

The information will be indicated alternately as “Item” → “Details”.

Unit No.	Indication
No.0	
No.1	
↓	↓
No.63	

Details of Indication

Item		7-Segment Display		Details
		SEG2	SEG1 *1)	
1	Indoor Unit No.			Outdoor Unit No. Indication
2	Indoor Unit Capacity			Unit Capacity Indication Refer to "Indoor Unit Capacity Table"
3	Indoor Expansion Valve Opening			[%]
4	Indoor Heat Exchanger Liquid Piping Temperature			°C)
5	Indoor Heat Exchanger Gas Piping Temperature			°C)
6	Air Inlet Temperature			°C)
7	Air Outlet Temperature			°C)
8	Cause Code of Indoor Unit Stoppage			Cause of Indoor Unit Stoppage Refer to "Cause Code of Indoor Unit Stoppage"

*1): The indoor unit No. is indicated on the one digit of "SEG1".

(D) Cause of Alarm Code Information

This information is indicated at the main outdoor unit (Unit A) only.

Press PSW4 (▼) to forward of press PSW2 (▲) for backward.

The information will be indicated alternately as “Item”→“Details”.

Details of Indication

Item		7-Segment Display		Details
		SEG2	SEG1	
1	Alarm Cause Code		AC	Latest O.U. Stoppage Alarm Code Indication Refer to “Alarm Code Table”.
2	Degeneracy Control for Pressure Ratio Decrease Protection	c	11	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
3	Degeneracy Control for High Pressure Increase Protection	c	13	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
4	Degeneracy Control for Inverter Fin Temperature Increase Protection	c	14	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
5	Degeneracy Control for Discharge Gas Temperature Increase Protection	c	15	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
6	Degeneracy Control for TdSH Decrease Protection	c	16	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.
7	Degeneracy Control for Overcurrent Protection	c	17	0 : Degeneracy Control is not Activated. 1 : Degeneracy Control is Activated.

(E) Alarm Code History Information

This information is indicated at the main outdoor unit (Unit A) only.

If a history of abnormality exists, it is indicated up to a maximum of 15 instances in chronological order.

Press PSW4 (▼) to move forward or PSW2 (▲) to move backward.

Press PSW3 (►) for detailed information.

Press PSW4 (▼) to move forward or PSW2 (▲) to move backward.

Press PSW5 (◄) to return to Data No. Selection.

Data No.	7-Segment Display	
	SEG2	SEG1
1 (Latest Data)	no	01
↓	↓	↓
15 (Oldest Data)	no	15

Details of Indication

Item		7-Segment Display		Details
		SEG2	SEG1	
1	Unit Accumulated Operation Time	07	08	O.U. Accumulated Operation Time at Stoppage [10 Hours]
2	Cause of Stoppage	AC		Alarm Stoppage
		d1		Retry Stoppage
		C,		Control Information
3	Alarm Code/ Cause Code of Stoppage	01	48	O.U. No. is indicated on 10 digit of SEG2. Compressor and fan controller No. are indicated on one digit of SEG2. Alarm and Cause Code of Stoppage are indicated on SEG1.
4	Abnormal Data Indication	iF	12	Cause Code of Inverter Stoppage is indicated when it is existing on SEG2.
		FF	12	Cause Code of Fan Controller Stoppage is indicated when it exists on SEG2.
		--	--	Except for the above.

1.1.6 Checking of Alarm Code History

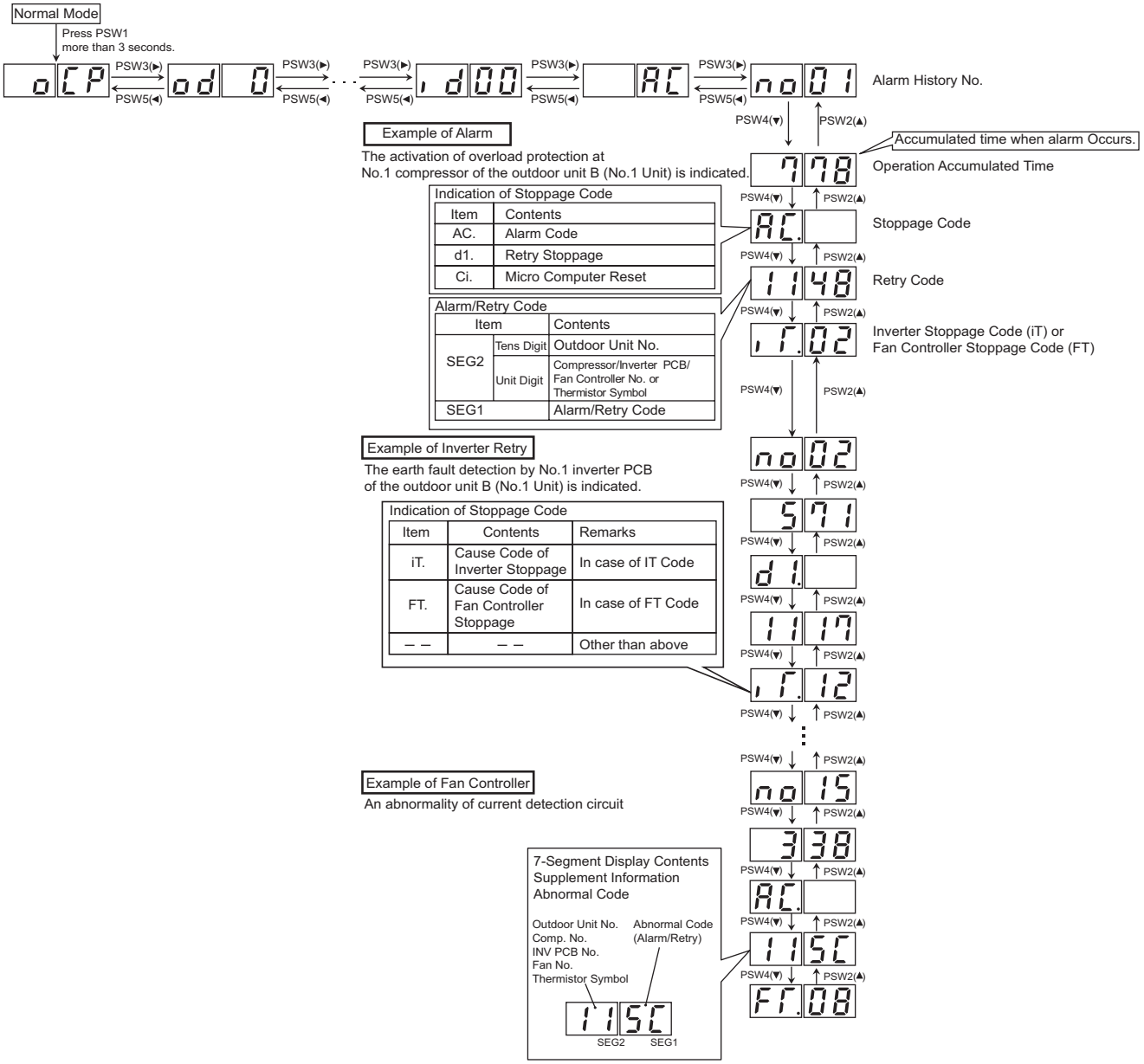
Alarm code history is indicated in the following order while the check mode is displayed.

"no01" (latest) history data ⟷ "no15" (oldest) ⟷ history data

Refer to the figure below as an example.

The alarm code is displayed only on PCB3 of the outdoor unit A.

Alarm code history is displayed up to 15 cases at the maximum in alarm occurrence order.



Applicable Compressors and Fan Motors
During Abnormal Code (Alarm or Retry Code) Occurrence

Example: RAS-54HNBCMQ

	Outdoor Unit A		Outdoor Unit B		Outdoor Unit C	
Constitution of Compressors and Fan Motors	FAN FAN INV Comp.		FAN FAN INV Comp.		FAN FAN INV Comp.	INV Comp.
Unit No.	0		1		2	
Compressor No.	1		1		1	2
Fan No.	1	2	1	2	1	2

(1) Register of Alarm Code History

Cause of Stoppage (Alarm Code or Stoppage Code)	Contents	Indication of Alarm Code History					
		Time	Alarm *1)	Alarm Code			Abnormal Data
				O.U. Unit No.	Comp.No. Inverter PCB No.	Fan No.	
02	Activation of protection device	Accumulated Time	AC.	○	○		--
03	Abnormality transmitting between indoor units and outdoor units	Accumulated Time	AC.				--
04	Abnormality transmitting between inverter PCB and outdoor unit PCB	Accumulated Time	AC.	○	○		--
05	Abnormality of power source phase	Accumulated Time	AC.	○			--
06	Abnormality of inverter voltage	Accumulated Time	AC.	○	○		iTC
d1-18		Accumulated Time	d1.	○	○		iTC
07	Decrease in discharge gas superheat	Accumulated Time	AC.	○			--
d1-16		Accumulated Time	d1.	○			--
08	Increase in discharge gas temperature at the top of compressor	Accumulated Time	AC.	○			--
d1-15		Accumulated Time	d1.	○			--
0A	Abnormality transmitting between outdoor units	Accumulated Time	AC.				--
0b	Incorrect outdoor unit address setting	Accumulated Time	AC.				--
0c	Incorrect outdoor main unit setting	Accumulated Time	AC.				--
21	Abnormality of high pressure sensor	Accumulated Time	AC.	○			--
22	Abnormality of thermistor for outdoor air temperature	Accumulated Time	AC.	○			--
23	Abnormality of thermistor for discharge gas temp. on top of compressor	Accumulated Time	AC.	○	○		--
24	Abnormality of thermistor for outdoor unit heat exchanger liquid pipe (Te/Tchg/Tsc)	Accumulated Time	AC.	○	Thermistor Signal Te1: 1, Te2: 2 Tchg: C, Tsc: S		--
25	Abnormality of thermistor for outdoor unit heat exchanger gas pipe (Tg/Tg2/Ts)	Accumulated Time	AC.	○			--
29	Abnormality of low pressure sensor	Accumulated Time	AC.	○			--
30	Incorrect connection of change-over box	Accumulated Time	AC.				--
31	Incorrect capacity setting of indoor unit and outdoor unit	Accumulated Time	AC.				--
35	Incorrect indoor unit No. setting	Accumulated Time	AC.				--
36	Incorrect indoor unit combination	Accumulated Time	AC.				--
38	Abnormality of picking up circuit for protection in outdoor unit	Accumulated Time	AC.	○			--
3A	Abnormality of outdoor unit capacity	Accumulated Time	AC.				--
3b	Incorrect setting of outdoor unit model combination or voltage	Accumulated Time	AC.				--
3d	Abnormality transmitting between main unit and sub unit(s)	Accumulated Time	AC.				--
3E	Abnormal Combination between Inverter PCB and outdoor unit PCB	Accumulated Time	AC.	○			--

*1): (Details of Alarm)

AC.: Alarm

d1.: Retry

Ci.: Control Information

iTC: Inverter Stoppage Code

FTC: Fan Controller Stoppage Cod

Cause of Stoppage (Alarm Code or Stoppage Code)	Contents	Indication of Alarm Code History					
		Time	*Alarm	Alarm Code			Abnormal Data
				O.U. Unit No.	Comp.No. Inverter PCB No.	Fan No.	
43	Abnormality of low compression ratio	Accumulated Time	AC.	○			--
d1-11		Abnormality of low-pressure increase	AC.	○			--
44	Abnormality of low-pressure increase	Accumulated Time	AC.	○			--
d1-12		Accumulated Time	AC.	○			--
45	Abnormality of high-pressure increase	Accumulated Time	AC.	○			--
d1-13		Accumulated Time	d1.	○			--
47	Activation of low-pressure decrease protection device (Vacuum operation protection)	Accumulated Time	AC.	○			--
d1-15		Accumulated Time	d1.	○			--
48	Activation of inverter overcurrent protection device	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	d1.	○	○		iTC
51	Abnormality of inverter current sensor	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	AC.	○	○		iTC
53	Inverter error signal detection	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	AC.	○	○		iTC
54	Abnormality of inverter fin temperature	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	AC.	○	○		iTC
55	Inverter failure	Accumulated Time	AC.	○	○		iTC
d1-18		Accumulated Time	AC.	○	○		iTC
57	Activation of fan controller protection device	Accumulated Time	AC.	○		○	FTC
5A	Abnormality of fan controller fin temperature	Accumulated Time	AC.	○		○	FTC
5b	Activation of overcurrent protection	Accumulated Time	AC.	○		○	FTC
5C	Abnormality of fan controller sensor	Accumulated Time	AC.	○		○	FTC
A1	Detection of External Abnormality	Accumulated Time	AC.	○			--
b5	Incorrect setting of indoor unit connection number	Accumulated Time	AC.				--
EE	Compressor protection alarm	Accumulated Time	AC.				--
d1-05	Instantaneous power failure	Accumulated Time	AC.				--
d1-18	Abnormality of inverter and other	Accumulated Time	AC.				iTC
d1-26	Abnormality of high pressure decrease	Accumulated Time	AC.				--
d1-32	Retry stoppage by indoor unit auto address setting	Accumulated Time					--
Control Information	Micro-computer reset by abnormality of inverter transmission	Accumulated Time					1
	Micro-computer reset by abnormality of indoor unit transmission	Accumulated Time					3
	Micro-computer reset by abnormality transmitting between outdoor unit and outdoor unit	Accumulated Time					4
	Micro-computer reset for abnormality of control state	Accumulated Time					6

* (Details of Alarm)

AC.: Alarm

d1.: Retry

Ci.: Control Information

iTC: Inverter Stoppage Code

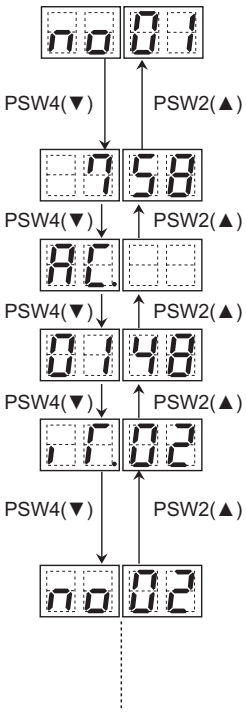
FTC: Fan Controller Stoppage Code

*Thermo-ON: The outdoor unit and some indoor units are running.

Thermo-OFF: The outdoor unit and some indoor units stay on, but do not run.

(2) Deletion of Alarm Code History

Press PSW1 and PSW3 for five seconds to clear the alarm code history while the history data is displayed.
(All history can be deleted.)



To delete all the history,
press PSW1 and PSW3 (►)
for five seconds
while history is displayed.

(3) Protection Control Code on 7-Segment Display

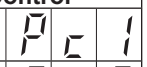
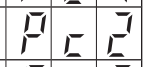
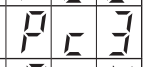
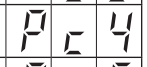
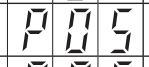
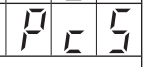
* Protection control code is displayed on 7-segment during operation when a protection control is activated.
* Protection control code is displayed while function is working, and goes out when released.
* When several protection controls are activated, code number with higher priority will be indicated (see below for the priority order).

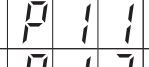
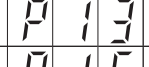
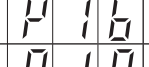
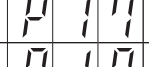
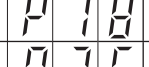
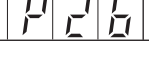
(a) Higher priority is given to the protection control related to frequency control than the others.

<Priority Order>

<1> Pressure Ratio Control
<2> High-Pressure Increase Protection
<3> Current Protection
<4> Inverter Fin Temperature Increase Protection
<5> Discharge Gas Temperature Increase Protection
<6> Low-Pressure Decrease Protection
<7> Demand Current Control (Running Current Limit Control)
<8> Low-Pressure Increase Protection
<9> High-Pressure Decrease Protection

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

Code	Protection Control	Code during Degeneration Control
	Pressure Ratio Protection Control	
	High-Pressure Increase Protection	
	Inverter Current Protection	
	Inverter Fin Temperature Increase Protection	
	Discharge Gas Temperature on Top of Compressor Increase Protection	
	Low-Pressure Decrease Protection	Without
	High-Pressure Decrease Protection	
	Demand Current Protection Control	
	Low-Pressure Increase Protection	

Code	Retry Control	Code during Degeneration Control
	Pressure Ratio Decrease Retry	Without
	Low-Pressure Increase Retry	
	High-Pressure Increase Retry	
	Discharge Gas Temperature Increase Retry/Low-Pressure Decrease Retry	
	Discharge Gas SUPERHEAT Decrease Retry	
	Inverter Abnormality Retry	
	Abnormal Inverter Voltage Retry/Inverter Failure Retry	
	High-Pressure Decrease Retry	

NOTE:

(1) Retry indication continues for 30 minutes unless a protection control is indicated.

(2) Retry indication disappears if the stop signal comes from all rooms.

(3) The protection control code indicated on 7-segment display changes to an alarm code when an abnormal operation occurs. Also, the same alarm code is indicated on the wired controller.

(4) In case that the degeneration control is activated, the indications Pc1 to Pc5 are indicated instead of P01 to P05.

(4) Activating Condition of Protection Retry Control Code

Protection Control or Retry Control is performed to prevent the abnormal operation.
The activating conditions are shown in the table below.

Code	Protection Control	Activating Condition	Remarks
P01	Pressure Ratio Protection Control	Compression Ratio e>8.5 or Compression Ratio e<1.5	e = (Pd[MPa] + 0.1) / (Ps [MPa] + 0.06)
P02	High-Pressure Increase Protection	Discharge Pressure Pd>3.45MPa (at Cooling Mode) Pd>3.35MPa (at Heating Mode)	-
P03	Inverter Current Protection	Inverter Output Current>(Control Value) A	Control Value: Refer to 1-32, 1-33
P04	Inverter Fin Temperature Increase Protection	Inverter Fin Temperature>(Control Value) °C	Control Value: Refer to 1-34
P05	Discharge Gas Temperature Increase Protection	Temperature at the Top of Compressor Td>112°C	-
P06	Low-Pressure Decrease Protection	Suction Pressure Ps<0.1MPa	-
P09	High-Pressure Decrease Protection	Discharge Pressure Pd<1.0MPa	-
P0A	Demand Current Protection Control	Running Current for Compressor>Demand Current Setting Value	Demand Current Setting Value: Upper limit of total running current is set 100%, 80%, 70%, 60% and 40% at normal operation.
P0d	Low-Pressure Increase Protection	Suction Pressure>1.3MPa	-

Code	Protection Control	Activating Condition	Remarks
P11	Pressure Ratio Decrease Retry	Pressure Ratio e<1.5 over 1 minute	When activating 3 times in 30 minutes, “43” alarm is indicated.
P12	Low-Pressure Increase Retry	Ps>1.4MPa over 1 minute	When activating 3 times in 30 minutes, “44” alarm is indicated.
P13	High-Pressure Increase Retry	Pd>3.8MPa over 2 seconds	When activating 3 times in 30 minutes, “45” alarm is indicated.
P15	Discharge Gas Temperature Increase Retry	Discharge Gas Temperature>132°C over 10 minutes or Discharge Gas Temperature>140°C over 5 seconds	When activating 3 times in 60 minutes, “08” alarm is indicated.
	Low-Pressure Decrease Retry	Ps<0.09MPa over 12 minutes	When activating 3 times in 60 minutes, “47” alarm is indicated.
P16	Discharge Gas SUPERHEAT Decrease Retry	Discharge Gas SUPERHEAT<Tc+10 deg. over 30 minutes. Tc: Saturation Temperature	When activating 3 times in 120 minutes, “07” alarm is indicated.
P17	Inverter Abnormality Retry	Instantaneous Overcurrent	When activating 6 times in 30 minutes, “48” alarm is indicated.
		Abnormality of Current Sensor	When activating 3 times in 30 minutes, “51” alarm is indicated.
		IPM Error, Earth Fault, Motor Step-Out	When activating 7 times in 30 minutes, “53” alarm is indicated.
		Fin Temperature>106 to 110°C	When activating 3 times in 30 minutes, “54” alarm is indicated.
P18	Abnormal Inverter Voltage Retry	Insufficient Voltage at Inverter Circuit	When activating 3 times in 30 minutes, “06” alarm is indicated.
		Excessive Voltage at Inverter Circuit	When activating 3 times in 30 minutes, “06” alarm is indicated.
	Inverter Failure Retry	Actual Inverter Frequency continues to be 0Hz for 3 seconds, 3 minutes after Inverter Frequency is output.	When activating 3 times in 30 minutes, “55” alarm is indicated.
P26	High-Pressure Decrease Retry	Pd<Ta/130+0.1MPa over 4 minutes or Pd<1.0MPa over 60 minutes Ta: Ambient Temperature	Without Alarm

Ps: Suction Pressure of Compressor, Pd: Discharge Pressure of Compressor.

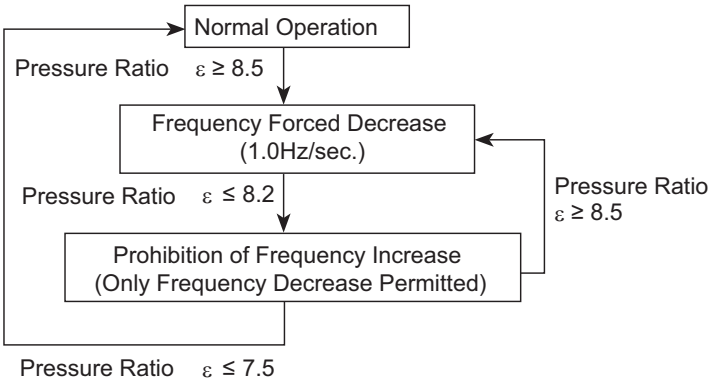
■ Protection Control

(1) P01: Pressure Ratio Protection Control

(a) Pressure Ratio Increase Protection Control

Pressure Ratio Increase Protection Control is performed to protect the compressor from an increase of pressure ratio.

<Details of Control>



NOTE:

1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. The pressure ratio is calculated in each outdoor unit, and this control uses the maximum value.

   ε = (Pd [MPa]+0.1) / (Ps [MPa]+0.06)

   ε = (Pd [psi]+15) / (Ps [psi]+9)

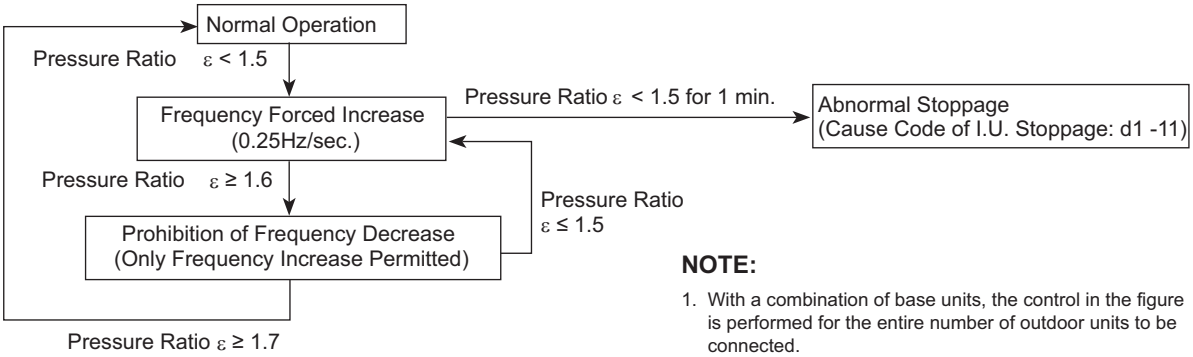
   Pd: Detected Value of High Pressure Sensor [MPa (psi)]

   Ps: Detected Value of Low Pressure Sensor [MPa (psi)]

(b) Low Compression Ratio Protection Function

This function is activated to protect the compressor during occurrences of low compression ratio.

<Details of Control>



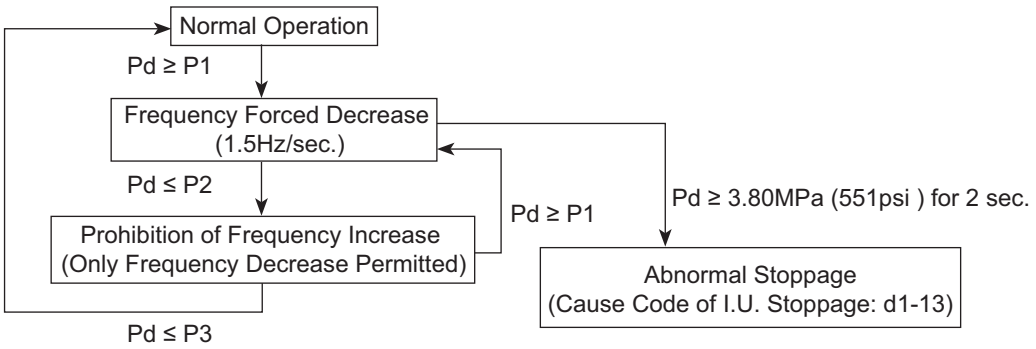
NOTE:

1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. The pressure ratio is calculated in each outdoor unit, and this control uses the minimum value.

(2) P02: High Pressure Increase Protection Control

High Pressure Protection Control is performed to prevent activation of a protection device caused by a high pressure increase during an abnormality and to protect the compressor from an excessive increase of discharge pressure.

<Details of Control>



Control Value [MPa(psi)]

Operation Mode	P1	P2	P3
Cooling	3.45 (500)	3.40 (493)	3.20 (464)
Heating	3.35 (486)	3.30 (479)	3.10 (450)

NOTE:

1. with a combination of base unit, the control in figure is performed for the entire number of outdoor units to be connected.
2. High pressure is detected in each outdoor unit, and this control uses the maximum value.

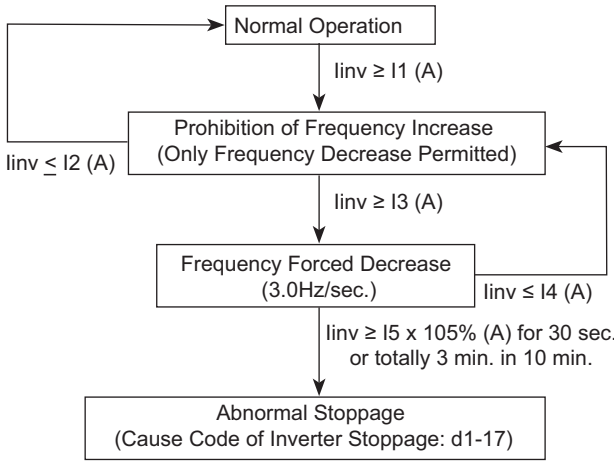
Pd: Detected Value of High Pressure Sensor [MPa(pis)]

(3) P03: Inverter Current Protection Control

Inverter Current Protection Control is performed to prevent an inverter trip caused by an increase of inverter secondary current value.

(a) Inverter Secondary Current Protection

<Details of Control>



Control Value
<380-415V>

Model	I1	I2	I3	I4	I5
RAS-8.0HNBCMQ RAS-10HNBCMQ RAS-18HNBCMQ RAS-20HNBCMQ	22.8	22.3	23.8	23.3	23.8
RAS-12HNBCMQ RAS-14HNBCMQ RAS-16HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ	36.2	35.7	37.2	36.7	37.2

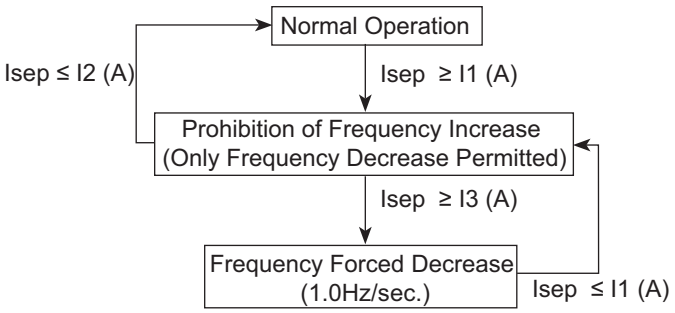
NOTE:

1. With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.
2. In case of two inverter PCB installed in an outdoor unit, the max. current value detected at each inverter PCB is utilized.

Iinv: Detected Value of Inverter Secondary Current Sensor[A]

(b) Primary Current Protection for each Inverter PCB

<Details of Control>



Control Value

<380-415V>

Model	I1	I2	I3	I4
RAS-8.0HNBCMQ RAS-10HNBCMQ RAS-18HNBCMQ RAS-20HNBCMQ	24.7	23.7	25.2	24.7
RAS-12HNBCMQ RAS-14HNBCMQ RAS-16HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ	39.1	38.1	39.6	39.1

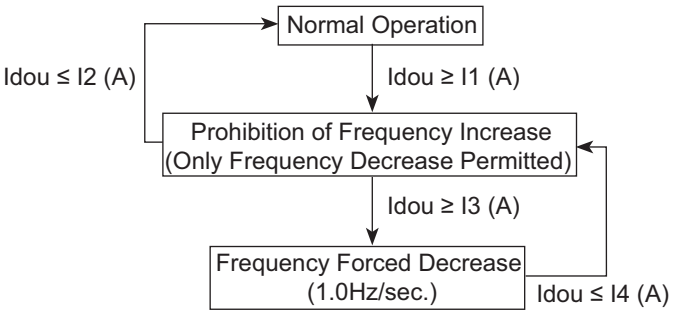
NOTE:

1. With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.
2. In case of two inverter PCB installed in an outdoor unit, the max. current value detected at each inverter PCB is utilized.

   Isep: Inverter Primary Current[A].

(c) Primary Current Protection for each Outdoor Unit

<Details of Control>



Control Value

<380-415V> [A]

Model	I1	I2	I3	I4
RAS-8.0HNBCMQ	14.8	13.8	15.3	14.8
RAS-10HNBCMQ	20.4	19.4	20.9	20.4
RAS-12HNBCMQ	24.4	23.4	24.9	24.4
RAS-14HNBCMQ	28.6	27.6	29.1	28.6
RAS-16HNBCMQ	32.2	31.2	32.7	32.2
RAS-18HNBCMQ	41.6	40.6	42.1	41.6
RAS-20HNBCMQ	41.6	40.6	42.1	41.6
RAS-22HNBCMQ	48.2	47.2	48.7	48.2
RAS-24HNBCMQ	57	56	57.5	57

NOTE:

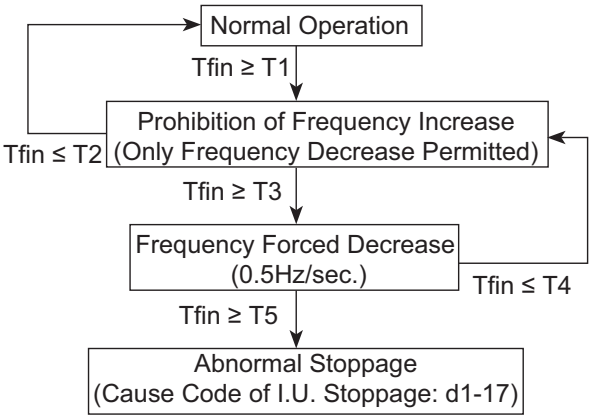
1. With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.

   Idou: Total Value of Primary Current of all the Inverter PCB in an Outdoor Unit[A].

(4) P04: Inverter Fin Temperature Increase Protection Control

Inverter Fin Temperature Increase Protection Control is performed to prevent an inverter trip caused by a temperature increase of the inverter fin.

<Detail of Control>



Control Value

<380-415V> [°C(°F)]

Model	T1	T2	T3	T4	T5
RAS-8.0HNBCMQ RAS-10HNBCMQ RAS-18HNBCMQ RAS-20HNBCMQ	98	96	100	98	103
RAS-12HNBCMQ RAS-14HNBCMQ RAS-16HNBCMQ RAS-22HNBCMQ RAS-24HNBCMQ	103	100	105	103	108

NOTE:

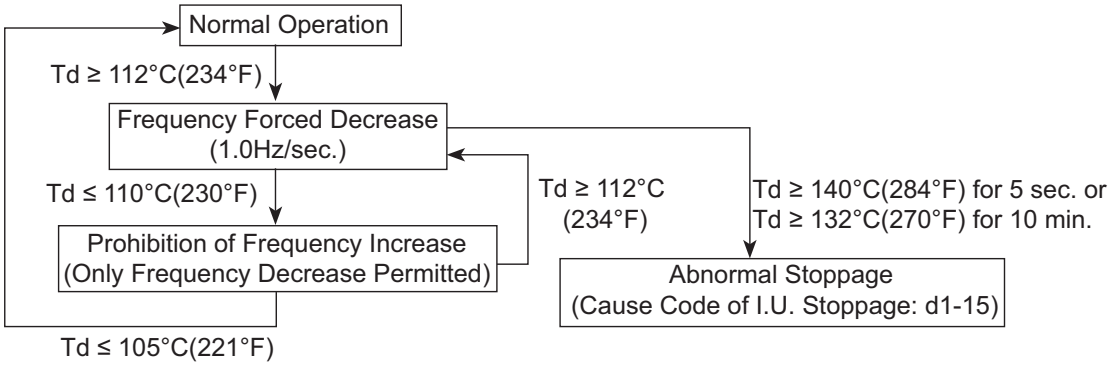
1. In case of combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.
2. In case of two inverter PCB installed in an outdoor unit, the max. temperature detected at each inverter PCB is utilized.

   Tfin: Inverter Fin Temperature Sensor Detected Value [°C].

(5) P05: Discharge Temperature Increase Protection Control

Discharge Temperature Increase Protection Control is performed to protect the compressor motor coil from an increase of discharge temperature during an abnormality.

<Details of Control>



NOTE:

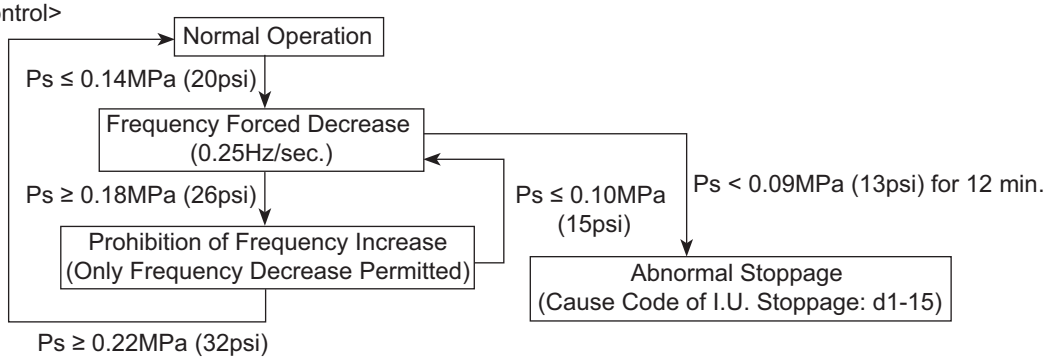
1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. Discharge temperature is detected in each outdoor unit, and this control uses the maximum value.
3. In case of two inverter compressors installed in an outdoor unit, the max. temperature detected at each inverter compressor is utilized.

   Td: Detected Value of Discharge Gas Thermistor [°C].

(6) P06: Low Pressure Decrease Protection Control

Low Pressure Decrease Protection Control is performed to protect the compressor from a transitional decrease of suction pressure.

<Details of Control>



NOTE:

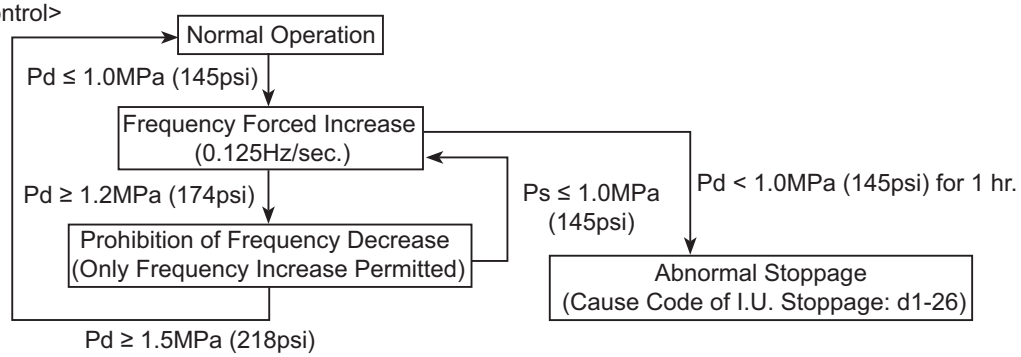
1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. Low pressure is detected in each outdoor unit, and this control uses the minimum value.
   Ps: Detected Value of Low Pressure Sensor [MPa(pis)]

(7) P09: High Pressure Decrease Protection Control

When decreasing high pressure, the compressor operation frequency is controlled by this protection control for the following purposes.

- To prevent insufficient refrigerant supply to indoor units installed at different height locations.
- To keep the refrigerant oil supply in the compressor.

<Details of Control>



NOTE:

1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. High pressure is detected in each outdoor unit, and this control uses the minimum value.
   Pd: Detected Value of High Pressure Sensor [MPa(psi)]

(8) P0A: Demand Current Control

The compressor operation frequency is controlled to set at the setting value of the outdoor unit inverter primary current (40% to 100% of rated current of cooling operation). This function is detailed in the “External Input and Output Setting”. Refer to the Service Manual for details.

Operating Conditions

The demand current control can be performed under the following conditions.

(a) The demand signal is input from the centralized operation controller.

(b) The demand signal is input at the external input terminals of the outdoor unit from external equipment such as a building management system or a utility with a smart meter.

(c) The demand function settings are set from the outdoor unit PCB.

(d) The wave function is set from the outdoor unit PCB.

(e) The demand signal is input from the indoor unit (wired controller).

If the operation current exceeds each setting function value, the compressor operation frequency is controlled.

Cancellation Condition

The input signal is stopped at each condition (a) to (e).

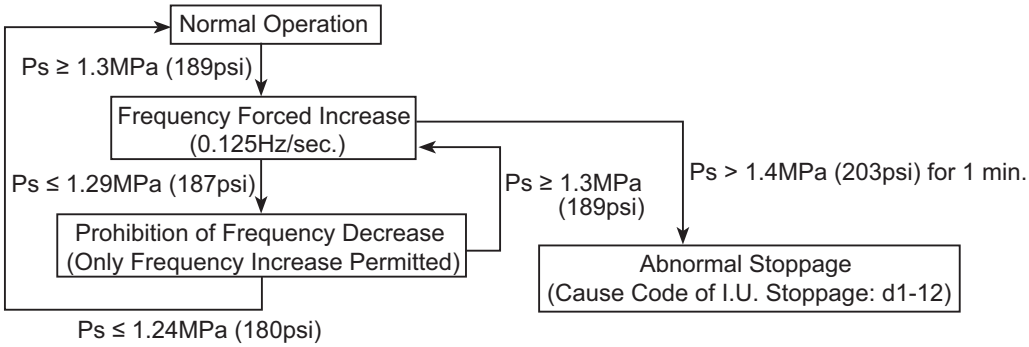
NOTE:

This function is not available when the compressor starts or during a defrosting operation.

(9) P0d: Low Pressure Increase Protection Control

The compressor operation frequency is controlled to protect the compressor from suction pressure transitional increasing.

<Details of Control>



NOTE:

1. With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.
2. Low pressure is detected in each outdoor unit, and this control uses the maximum value.
   Ps: Detected Value of Low Pressure Sensor [MPa(psi)]

(10) Priority of Protection Control

If two or more protection controls meet a condition, the protection controls perform according to the following.

Rank Order.	Indication	Protection Control Performed
1	P01	Pressure Ratio Protection Control
2	P02	High Pressure Increase Protection Control
3	P03	Inverter Current Protection Control
4	P04	Inverter Fin Temperature Increase Protection Control
5	P05	Discharge Temperature Increase Protection Control
6	P06	Low Pressure Decrease Protection Control
7	P0A	Demand Current Control
8	P0d	Low Pressure Increase Protection Control
9	P09	High Pressure Decrease Protection Control

		② Lower Rank Order of Protection Control Function			
		Forced Decrease	**Forced Increase**	**Prohibition of Increase**	**Prohibition of Decrease**
① Higher Rank Order of Protection Control Function	Forced Decrease	①	①	①	①
	Forced Increase	①	①	①	①
	Prohibited Increase	②	①	② *1)	①
	Prohibited Decrease	②	②	②	②

*1): Discharge Temperature Increase Protection Control (P05) is higher than the following protection controls.

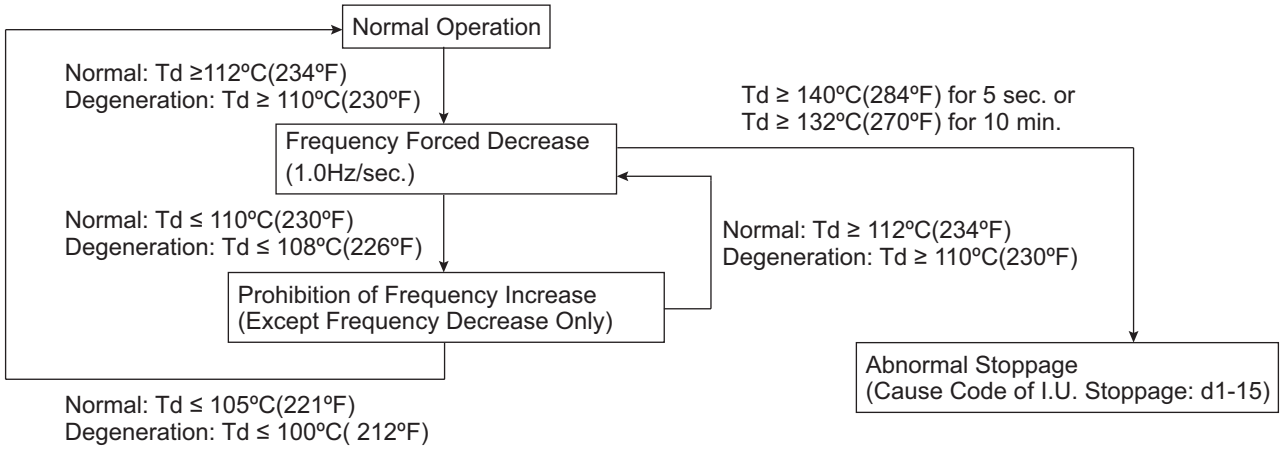
a) Low Pressure Decrease Protection Control (P06)

b) Demand Current Control (P0A)

(11) Degeneration Control

Degeneration Control is performed to change the protection control range.
This control sequence will suppress re-occurring alarms in response to repeated equipment restarts during protection control conditions listed below.

Related Protection Control
(1) Pressure Ratio Decrease Protection Control (P01)
(2) High Pressure Increase Protection Control (P02)
(3) Inverter Current Protection Control (P03)
(4) Inverter Fin Temperature Increase Protection Control (P04)
(5) Discharge Temperature Increase Protection Control (P05)



(12) Oil Return Control

Oil return control is performed to avoid insufficient oil supply to the compressor caused by long time low frequency operation. This control is utilized to return the oil flow out to the indoor unit side from the compressor.

<Activating Condition>
This control function is started the compressor runs below the specified speed for 1 hour continuously (refer to the table below).

<Compressor Speed for Oil Return Control>

[Hz]

Type of Unit	Cooling Operation	Heating Operation
≤ 8HP	32.0	32.0
10HP	38.0	38.0
12HP, 14HP	50.0	54.0
16HP to 24HP	66.0	72.0
26HP to 36HP	96.0	108.0
38HP to 54HP	132.0	156.0
56HP to 72HP	176.0	190.0
74HP to 96HP	240.0	240.0

<Detail of Control>

Compressor:
Increase the compressor speed above the required value to return the oil to the compressor

Expansion Valve:
(In the Case of Cooling Operation) Open the expansion valve of the indoor unit under thermo-ON.
(In the Case of Heating Operation) Open the expansion valve of the outdoor unit.

<Deactivating Condition>
This control function is canceled when the oil return control continues for more than 60 sec. (for cooling operation) /120sec. (for heating operation).

■ Alarm Code Table

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device (Float Switch)	Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drain Pipe, Float Switch, or Drain Pan)
02	Outdoor Unit	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing)
03	Communication	Abnormal Communication between Indoor Units and Outdoor Units	Incorrect Wiring, Loose Terminals, Disconnected Communication Cable, Blowout of Fuse, Indoor Unit Power OFF
04		Abnormal Communication between Inverter PCB and Outdoor PCB	Inverter PCB - Outdoor PCB Communication Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
05	Supply Phase	Abnormality of Power Supply Phases	Incorrect Power Supply, Connection to Reversed Phase, Open-Phase
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Decrease, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Closed Position (Disconnect Connector)
0A	Communication	Abnormal Communication between Outdoor Units	Incorrect Wiring, Breaking Wire, Loose Terminals
0b	Outdoor Unit	Incorrect Outdoor Unit Address Setting	Duplication of Address Setting for Outdoor Units (Sub Units) in Same Refrigerant Cycle Number
0C		Incorrect Outdoor Unit Main Unit Setting	Two (or more) Outdoor Units Set as “Main Unit” Exist in Same Refrigerant Cycle Number
11	Sensor on Indoor Unit	Abnormality of Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
12		Abnormality of Outlet Air Thermistor	
13		Abnormality of Freeze Protection Thermistor	
14		Abnormality of Gas Piping Thermistor	
15		Abnormality of Outdoor Air Thermistor (for EconoFresh)	
16		Abnormality of Remote Sensor (for DOAS*1))	
17		Abnormality of Thermistor Built-in Wireless Controller (for DOAS*1))	
18	Indoor Fan Motor	Abnormality of Indoor Fan System	Abnormality of Indoor Fan Motor (Step-Out), Indoor Fan Controller Failure
19		Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Lockup
1A	Indoor Fan Controller	Abnormality of Fan Controller Fin Temperature	Abnormality of Fin Thermistor or Fan Controller, Heat Exchanger Clogging, Abnormality of Fan Motor
1b		Activation of Overcurrent Protection	Abnormality of Fan Motor
1C		Problem with Current Sensor	Abnormality of Fan Controller Current Sensor
1d		Activation Fan Controller Protection	Driver IC Error Signal Detection, Instantaneous Overcurrent
1E		Abnormality of Indoor Fan Controller Voltage	Power Supply Wiring Indoor Voltage Decrease, Insufficient Capacity of
21	Sensor on Outdoor Unit	Abnormality of High Pressure Sensor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
22		Abnormality of Outdoor Air Thermistor	
23		Abnormality of Discharge Gas Thermistor on Top of Compressor	
24		Abnormality of Heat Exchanger Liquid Pipe Thermistor	
25		Abnormality of Heat Exchanger Gas Pipe Thermistor	
29		Abnormality of Low Pressure Sensor	

*1): Dedicated Outdoor Air System, All Fresh Air Indoor Unit

Code	Category	Content of Abnormality	Leading Cause
30	System	Incorrect Connection of CH-Box	Connection of CH-Box to Heat Pump System, Disconnection of CH-Box to Heat Recovery System
31		Incorrect Capacity Setting of Outdoor Unit and Indoor Unit	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit, Excessive or Insufficient Indoor Unit Total Capacity Code
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. In same Refrigerant Cycle Number
36		Incorrect of Indoor Unit Combination	Indoor Unit is Designed for R22
38		Abnormality of Picking up Circuit for Protection in Outdoor Unit	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
3A	Outdoor Unit	Abnormality of Outdoor Unit Capacity	Outdoor Unit Capacity > 96Hp
3b		Incorrect Setting of Outdoor Unit Models Combination or Voltage	Incorrect Setting of Main and Sub Units(s) Combination or Voltage
3d		Abnormal Communication between Main Unit and Sub Unit(s)	Incorrect Wiring, Disconnect Wire, Breaking Wire, PCB Failure
3E		Abnormal Combination between Inverter PCB (INV1, INV2) and Outdoor PCB (PCB3)	Incorrect Combination between Inverter PCB (INV1, INV2) and Outdoor PCB (PCB3) Incorrect DSW Setting of Inverter PCBs (INV1, INV2)
43	Protection Device	Activation of Pressure Ratio Decrease Protection	Defective Compression (Failure of Compressor or Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection	Overload at Cooling, High Temperature at Heating, Expansion Valve Locking at Open Position (Loose Connector)
45		Activation of High Pressure Increase Protection	Overload Operation (Heat Exchanger Clogging, Short Circuit of Airflow), Piping Clogging, Excessive Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection	Insufficient Refrigerant, Piping Clogging, Expansion Valve Locking at Close Position (Loosen Connector)
48		Activation of Inverter Overcurrent Protection	Overload Operation, Compressor Failure
51	Sensor	Abnormal Inverter Current Sensor	Current Sensor Failure
53	Inverter	Inverter Error Signal Detection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
54		Abnormality of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure
55		Inverter Failure	Inverter PCB Failure
57	Fan Controller	Activation of Fan Controller Protection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
5A		Abnormality of Fan Controller Fin Temperature	Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
5b		Activation of Overcurrent Protection	Fan Motor Failure
5C		Abnormality of Fan Controller Sensor	Failure of Current Sensor (Instantaneous Overcurrent, Increase of Fin Temperature, Voltage Decrease, Grand Fault, Step-Out)
A1	External Input	Detection of External Abnormality	Input Signal by External Abnormality Detection Setting
b0	Indoor Unit	Incorrect Setting of Unit Model Code	Incorrect Setting of Indoor Unit Model
b1		Incorrect Setting of Unit and Refrigerant Cycle Number	64 or More Number is Set for Address or Refrigerant Cycle
b2		Abnormality of EEPROM	EEPROM failure, Incorrect Data of EEPROM
b5		Incorrect Indoor Unit No. Setting	There are 17 or More Non-Corresponding to H-LINK II Units are Connected to One System.
b6		Abnormal Communication between Indoor PCB and Indoor Fan Controller	Communication Failure, Disconnected Communication Cable, Abnormal Connection
C1	CH-Box	Incorrect CH-Box Connection	2 or More CH-Boxes are Connected between Outdoor Unit and Indoor Unit
C2		Incorrect Indoor Unit Connection Number	9 or More Indoor Units Connected to CH-Box
C3		Incorrect Indoor Unit Refrigerant Number Setting	Indoor Units of Different Refrigerant Cycle Number are Connected to CH-Box
EE	Compressor	Compressor Protection Alarm (It cannot be reset from Wired Controller)	This alarm code appears when the following alarms*1) occurs three times within 6 hours. *1): 02, 07, 08, 39, 43 to 45, 47

■ Cause of Indoor Unit Stoppage

Code	Cause	Code	Cause
0	Operation OFF, Power OFF	16	Retry due to Decrease of Discharge Gas Superheat
1	Thermo-OFF	17	Retry due to Inverter Tripping
2	Alarm (Not always indicated)	18	Retry due to Voltage Decrease/ Increase, Other Retry of Inverter
3	Freeze Protection, Overheating Protection	19	Expansion Valve Opening Difference Protection
5	Instantaneous Power Failure at Outdoor Unit	21	Forced Thermo-OFF for Oil Return
6	Instantaneous Power Failure at Indoor Unit	22	Enforced Thermo-OFF for Hot Start Control at Crankcase Heater Preheating
7	Stoppage of Cooling Operation due to High/Low Outdoor Air Temperature Stoppage of Heating Operation due to High Outdoor Air Temperature	26	Retry due to High Pressure Decrease
9	Stoppage of Reversing Valve Switching Control	28	Stoppage due to Outlet Temperature Decrease in Cooling
10	Demand Enforced Stoppage	30	Stoppage of Thermo-OFF due to Compressor Excepting
11	Retry due to Pressure Ratio Decrease	32	Retry due to Abnormal Communication of Outdoor Unit
12	Retry due to Low Pressure Increase	36	Retry after Defrosting Operation
13	Retry due to High Pressure Increase	39	Stoppage of Thermo-OFF due to Power Saving Control
15	Retry due to Discharge Gas Temperature Increase, Retry due to Low Pressure Decrease		

NOTE:

Even if stoppage Alarm, “02” is not always indicated.

Cancellation of Enforced Thermo-OFF Press PSW5 for more than 3 seconds. This function may damage compressor. Use this function only in avoidable condition.

- Thermo-ON: The outdoor unit and some indoor units are running.
- Thermo-OFF: The outdoor unit and some indoor units stay on, but do not run.

■ Cause of Inverter Stoppage

Code	Cause
1	Driver IC Error Signal Detection
2	Instantaneous Overcurrent
3	Inverter Fin Temp. Increase
4	Electronic Thermal Protection (Inverter Overcurrent)
5	Inverter Voltage Decrease
6	Inverter Voltage Increase
8	Abnormal Current Sensor
9	Instantaneous Power Failure Detection
11	Micro Computer Reset
12	Ground Fault Detection
13	Open-Phase Detection
15	Driving Prohibition Area
17	Abnormal Control
18	Forced Stoppage by High Pressure Detection
19	Abnormality of Picking up Circuit for Protection
20	63H Early Recovery
21	Abnormal Compressor Motor (Step-Out)
22	Abnormal Combination of PCB
25	Abnormal Instruction Frequency
26	Pre-Charge Failure

■ Cause of Fan Controller Stoppage

Code	Cause
1	Driver IC Error Signal Detection
2	Instantaneous Overcurrent
3	Fan Controller Fin Temp. Increase
4	Electronic Thermal Protection (Overcurrent)
8	Abnormal Current Sensor
12	Ground Fault Detection
15	Reverse Driving
21	Abnormal Fan Motor (Step-Out)
25	Abnormal Instruction Frequency

1.1.7 Emergency Operation

Emergency Mode Operation from Outdoor Unit PCB for Compressor Failure

1. For Combination of Outdoor Units

(RAS-26HNBCMQ - RAS-96HNBCMQ Only)

<Alarms Corresponding to Inverter Compressor Failure>

04: Abnormal Transmitting between inverter PCB and Outdoor Unit PCB

06: Abnormality of Inverter Voltage

23: Abnormality of Discharge Gas Thermistor

48: Activation of Overcurrent Protection Device

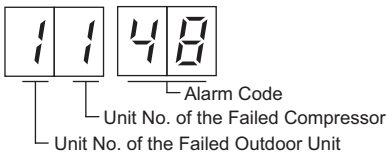
51: Abnormality of Inverter Current Sensor

53: Inverter Error Signal Detection

54: Abnormality of Inverter Fin Temperature

<Alarm Code Indication>

The unit No. of the failed outdoor unit, the unit No. of the failed compressor and the alarm code are displayed on 7-segment of the outdoor unit PCB3.



(a) Emergency Mode Operation Procedure

1. Turn OFF all the main switches of outdoor and indoor units.
2. Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV1 or INV2) terminals according to the following procedure. Be sure insulate the disconnected terminals.

The No. of Failed Compressor	Procedure
Inverter Compressor 1	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV1) terminals.
Inverter Compressor 2	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV2) terminals.

3. Set DSW5 of outdoor unit PCB (PCB3) with the failed compressor according to the following procedure. Fully close the stop valves (for gas and liquid) of the failed outdoor unit.

The No. of Failed Compressor	Procedure
Inverter Compressor 1	Turn ON DSW5-No.1
Inverter Compressor 2	Turn ON DSW5-No.2

4.Turn ON the power supply.

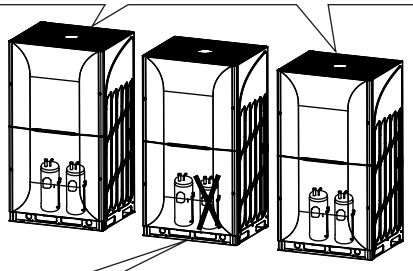
5.Start the operation by wired controller.

NOTE:

- Measure the insulation resistance of inverter compressor. Do not perform the emergency operation when the insulation resistance is 0Ω
- The other compressors may be damaged because there is a possibility that refrigerant oil is oxidized.
- In this emergency operation, compressor frequency cannot be controlled normally.
- Therefore, alarm code “07”, “43”, “44”, “45” or “47” may be indicated on LCD.
- This emergency operation may not provide sufficient cooling and heating capacity.
- This operation is a temporary emergency operation when the inverter compressor is damaged.
- Therefore, replace it with the new one as soon as possible.
- Turn OFF DSW5-No.1, No.2 of outdoor unit PCB after replacing the compressor.
- If this setting is not performed, the inverter compressor will be damaged.

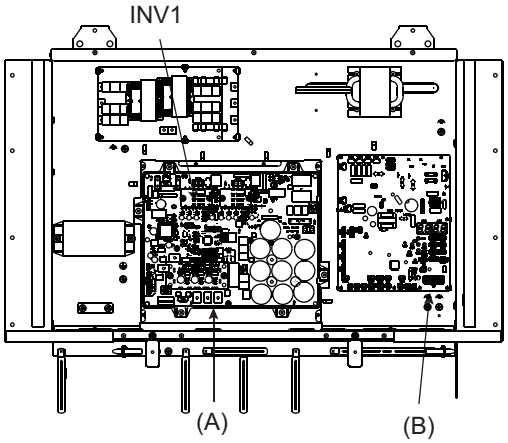
(b) Location of Inverter PCB Terminals for Inverter Compressor Power Supply and DSW5 on Outdoor Unit PCB.

Even if one compressor fails, the others can operate continuosly.

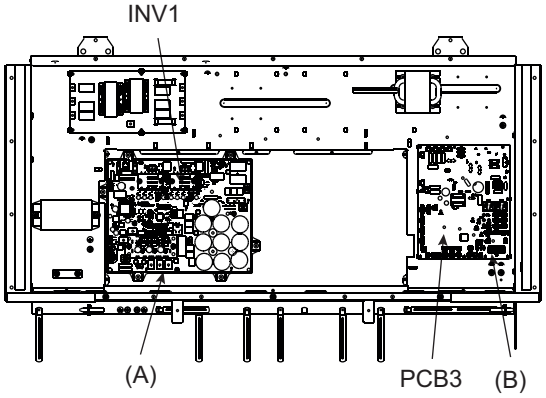


<380-415V/50Hz>

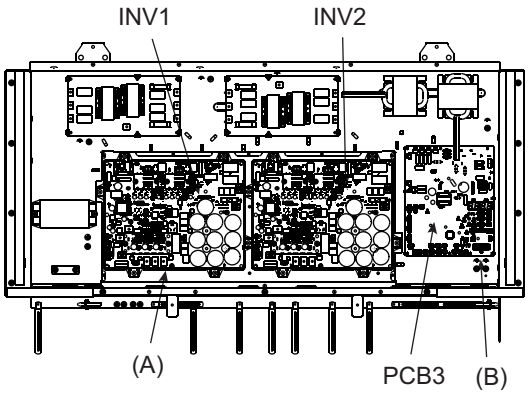
RAS-8.0-12HNBCMQ



RAS-14-16HNBCMQ

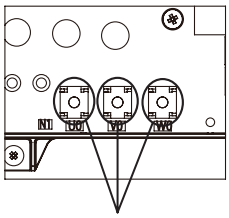


RAS-18-24HNBCMQ



(A) Part

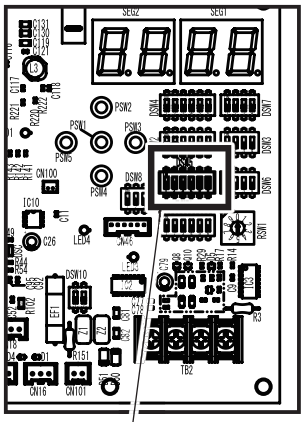
Inverter PCB (INV1 or INV2)



Terminals of Inverter Compressor Wiring (3 pcs.)

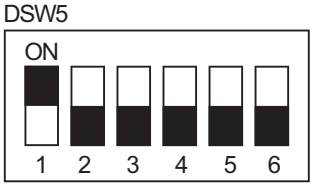
(B) Part

Outdoor Unit PCB (PCB3)



Inverter Compressor 1 Failure

DSW5



Inverter Compressor 2 Failure

DSW5

2. For Outdoor Unit without Combination

[At Inverter Compressor Failure]
(RAS-18HNBCMQ - RAS-24HNBCMQ Only)

<Alarms Corresponding to Inverter Compressor Failure>

04: Abnormal Transmitting between inverter PCB and Outdoor Unit PCB
06: Abnormality of Inverter Voltage
23: Abnormality of Discharge Gas Thermistor
48: Activation of Overcurrent Protection Device
51: Abnormality of Inverter Current Sensor
53: Inverter Error Signal Detection
54: Abnormality of Inverter Fin Temperature

(a) Procedure

1. Turn OFF all the main switches of outdoor and indoor units.
2. Disconnect all the power supply wiring for the inverter compressor from the inverter PCB (INV1 or INV2) terminals according to the following procedure. Be sure to insulate the disconnect terminals.

The No. of Failed Compressor	Procedure
Inverter Compressor 1	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV1) terminals.
Inverter Compressor 2	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV2) terminals.

3. Set DSW5 of the outdoor unit PCB (PCB3) with the failed compressor according to the following procedure. Be sure to insulate the disconnect terminals.

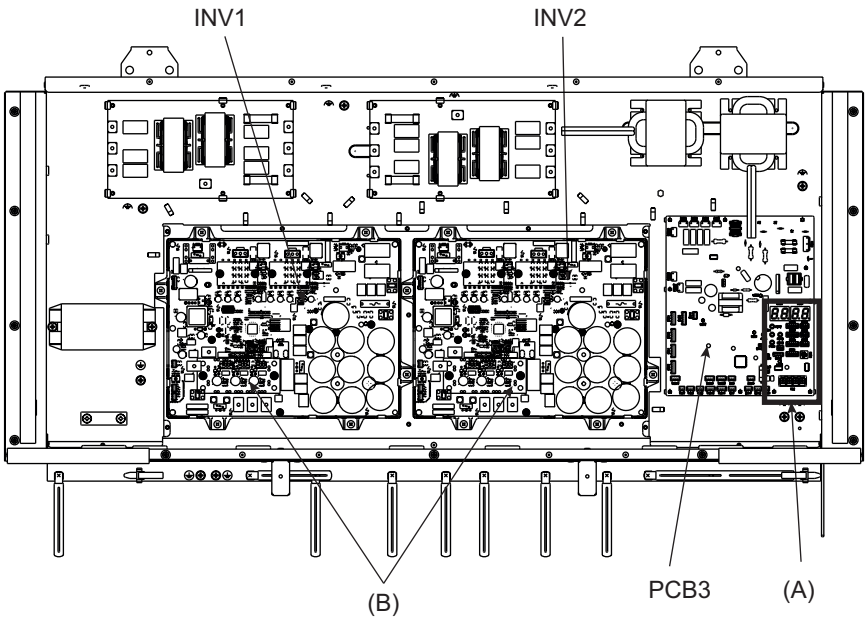
The No. of Failed Compressor	Procedure
Inverter Compressor 1	Turn ON DSW5-No.1
Inverter Compressor 2	Turn ON DSW5-No.2

4. Turn ON the power supply.
5. Start the operation by wired controller.

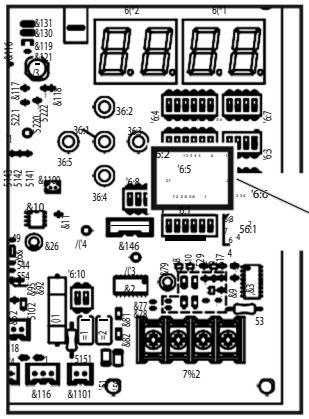
NOTE:

- Not all the compressors in the failed outdoor unit will stop the operation. If two compressors are stopped simultaneously, the stoppage cause is supposed to be d1-30.
- Measure the insulation resistance of inverter compressor.
- Do not perform the emergency operation when the insulation resistance is 0Ω
- The other compressors may be damaged because there is a possibility that refrigerant oil is oxidized.
- In this emergency operation, compressor frequency cannot be controlled normally.
- Therefore, alarm code “07”, “43”, “44”, “45” or “47” may be indicated on LCD.
- This emergency operation may not provide sufficient cooling and heating capacity.
- This operation is a temporary operation when the inverter compressor is damaged.
- Therefore, replace it with the new one as soon as possible.
- Turn OFF DSW5-No.1, No.2 of outdoor unit PCB after replacing the compressor.
- If this setting is not performed, the inverter compressor will be damaged.

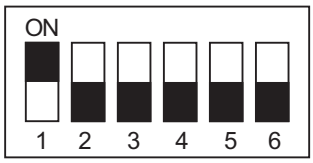
<380-415V/50Hz>



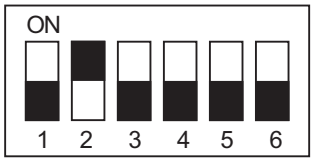
(A) Part
Outdoor Unit (PCB3)



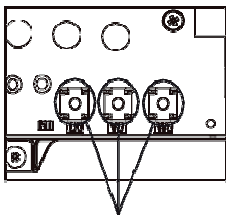
Inverter Compressor 1 Failure
DSW5



Inverter Compressor 2 Failure
DSW5



(B) Part
Inverter PCB (INV1 or INV2)

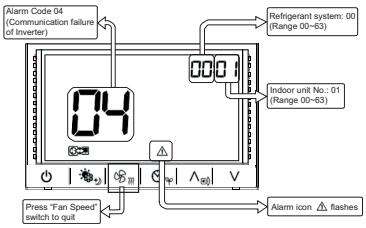


Terminals of Inverter
Compressor Wiring (3 pcs.)

1.2 Troubleshooting Procedure

● Alarm Code Indication of Wired Controller

<HCWA10NEGQ>



1.2.1 Alarm Code Table

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device (Float Switch)	Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drain Pipe, Float Switch, or Drain Pan)
02	Outdoor Unit	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing)
03	Communication	Abnormal Communication between Indoor Units and Outdoor Units	Incorrect Wiring, Loose Terminals, Disconnected Communication Cable, Blowout of Fuse, Indoor Unit Power OFF
04		Abnormal Communication between Inverter PCB and Outdoor PCB	Inverter PCB - Outdoor PCB Communication Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
05	Supply Phase	Abnormality of Power Supply Phases	Incorrect Power Supply, Connection to Reversed Phase, Open-Phase
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Decrease, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Closed Position (Disconnect Connector)
0A	Communication	Abnormal Communication between Outdoor Units	Incorrect Wiring, Breaking Wire, Loose Terminals
0b	Outdoor Unit	Incorrect Outdoor Unit Address Setting	Duplication of Address Setting for Outdoor Units (Sub Units) in Same Refrigerant Cycle Number
0C		Incorrect Outdoor Unit Main Unit Setting	Two (or more) Outdoor Units Set as “Main Unit” Exist in Same Refrigerant Cycle Number
11	Sensor on Indoor Unit	Abnormality of Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
12		Abnormality of Outlet Air Thermistor	
13		Abnormality of Freeze Protection Thermistor	
14		Abnormality of Gas Piping Thermistor	
15		Abnormality of Outdoor Air Thermistor (for EconoFresh)	
16		Abnormality of Remote Sensor (for DOAS*1))	
17		Abnormality of Thermistor Built-in Wireless Controller (for DOAS*1))	
18	Indoor Fan Motor	Abnormality of Indoor Fan System	Abnormality of Indoor Fan Motor (Step-Out), Indoor Fan Controller Failure
19		Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Lockup
1A	Indoor Fan Controller	Abnormality of Fan Controller Fin Temperature	Abnormality of Fin Thermistor or Fan Controller, Heat Exchanger Clogging, Abnormality of Fan Motor
1b		Activation of Overcurrent Protection	Abnormality of Fan Motor
1C		Problem with Current Sensor	Abnormality of Fan Controller Current Sensor
1d		Activation Fan Controller Protection	Driver IC Error Signal Detection, Instantaneous Overcurrent
1E		Abnormality of Indoor Fan Controller Voltage	Power Supply Wiring Indoor Voltage Decrease, Insufficient Capacity of
21	Sensor on Outdoor Unit	Abnormality of High Pressure Sensor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
22		Abnormality of Outdoor Air Thermistor	
23		Abnormality of Discharge Gas Thermistor on Top of Compressor	
24		Abnormality of Heat Exchanger Liquid Pipe Thermistor	
25		Abnormality of Heat Exchanger Gas Pipe Thermistor	
29		Abnormality of Low Pressure Sensor	

Code	Category	Content of Abnormality	Leading Cause
30	System	Incorrect Connection of CH-Box	Connection of CH-Box to Heat Pump System, Disconnection of CH-Box to Heat Recovery System
31		Incorrect Capacity Setting of Outdoor Unit and Indoor Unit	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit, Excessive or Insufficient Indoor Unit Total Capacity Code
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. In same Refrigerant Cycle Number
36		Incorrect of Indoor Unit Combination	Indoor Unit is Designed for R22
38		Abnormality of Picking up Circuit for Protection in Outdoor Unit	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
3A	Outdoor Unit	Abnormality of Outdoor Unit Capacity	Outdoor Unit Capacity > 96Hp
3b		Incorrect Setting of Outdoor Unit Models Combination or Voltage	Incorrect Setting of Main and Sub Units(s) Combination or Voltage
3d		Abnormal Communication between Main Unit and Sub Unit(s)	Incorrect Wiring, Disconnect Wire, Breaking Wire, PCB Failure
3E		Abnormal Combination between Inverter PCB (INV1, INV2) and Outdoor PCB (PCB3)	Incorrect Combination between Inverter PCB (INV1, INV2) and Outdoor PCB (PCB3) Incorrect DSW Setting of Inverter PCBs (INV1, INV2)
43	Protection Device	Activation of Pressure Ratio Decrease Protection	Defective Compression (Failure of Compressor or Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection	Overload at Cooling, High Temperature at Heating, Expansion Valve Locking at Open Position (Loose Connector)
45		Activation of High Pressure Increase Protection	Overload Operation (Heat Exchanger Clogging, Short Circuit of Airflow), Piping Clogging, Excessive Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection	Insufficient Refrigerant, Piping Clogging, Expansion Valve Locking at Close Position (Loosen Connector)
48		Activation of Inverter Overcurrent Protection	Overload Operation, Compressor Failure
51	Sensor	Abnormal Inverter Current Sensor	Current Sensor Failure
53	Inverter	Inverter Error Signal Detection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
54		Abnormality of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure
55		Inverter Failure	Inverter PCB Failure
57	Fan Controller	Activation of Fan Controller Protection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
5A		Abnormality of Fan Controller Fin Temperature	Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
5b		Activation of Overcurrent Protection	Fan Motor Failure
5C		Abnormality of Fan Controller Sensor	Failure of Current Sensor (Instantaneous Overcurrent, Increase of Fin Temperature, Voltage Decrease, Grand Fault, Step-Out)
A1	External Input	Detection of External Abnormality	Input Signal by External Abnormality Detection Setting
b0	Indoor Unit	Incorrect Setting of Unit Model Code	Incorrect Setting of Indoor Unit Model
b1		Incorrect Setting of Unit and Refrigerant Cycle Number	64 or More Number is Set for Address or Refrigerant Cycle
b2		Abnormality of EEPROM	EEPROM failure, Incorrect Data of EEPROM
b5		Incorrect Indoor Unit No. Setting	There are 17 or More Non-Corresponding to H-LINK II Units are Connected to One System.
b6		Abnormal Communication between Indoor PCB and Indoor Fan Controller	Communication Failure, Disconnected Communication Cable, Abnormal Connection
C1	CH-Box	Incorrect CH-Box Connection	2 or More CH-Boxes are Connected between Outdoor Unit and Indoor Unit
C2		Incorrect Indoor Unit Connection Number	9 or More Indoor Units Connected to CH-Box
C3		Incorrect Indoor Unit Refrigerant Number Setting	Indoor Units of Different Refrigerant Cycle Number are Connected to CH-Box
EE	Compressor	Compressor Protection Alarm (It cannot be reset from Wired Controller)	This alarm code appears when the following alarms*1) occurs three times within 6 hours. *1): 02, 07, 08, 39, 43 to 45, 47

*1): Dedicated Outdoor Air System, All Fresh Air Indoor Unit

1.2.2 Failure of Power Supply to Indoor Unit and Wired Controller

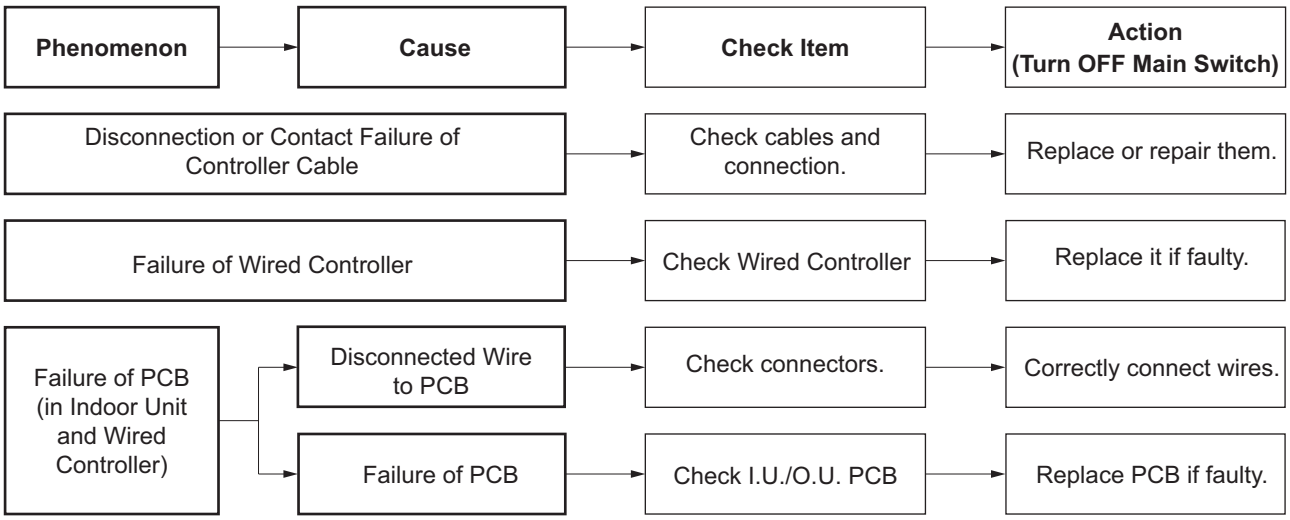
- Lights and LCD on the wired controller are not Indicated.
- Not Operated

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

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Power Failure or Power is Not ON		Measure voltage with voltmeter	Supply power.
Melted Fuse or Activation of Breaker at Power Source	Short Circuit Supplied between Wires	Check for any uncovered part of wires	Remove cause of short circuit and replace fuse.
	Short Circuit of Wires to Earth	Measure insulation resistance	Remove cause of short circuit and replace fuse.
	Failure of Indoor Unit Fan Motor	Measure resistance between wires and insulation resistance	Replace fan motor if faulty.
Melted Fuse for Control Circuit	Short Circuit Supplied between Wires	Check for any uncovered part of wires	Remove cause of short circuit and replace fuse.
	Short Circuit of Wires to Earth	Measure insulation resistance	Remove cause of short circuit and replace fuse.
	Failure of Indoor Unit Fan Motor	Measure resistance between wires and insulation resistance	Replace fan motor or fuse if faulty.
Disconnected Cable of Wired Controller		Connect cable	Replace or repair it.
Contact Failure at Connectors of Wired Controller	Contact Failure or Incorrect Connection of Indoor Unit PCB	Check connectors	Correctly connect them
	Contact Failure or Incorrect Connection of PCB in Wired Controller		
Failure of Wired Controller		Check Wired Controller	Replace wired controller if faulty.
Failure of Each PCB	Disconnected Wire to Each PCB	Check connectors	Correctly connect wires.
	Failure of Each PCB	Check each PCB in I.U./O.U. PCB	Replace PCB if faulty.
Incorrect Wiring Connection		Take action according to the procedure indicated in "TEST RUN CHECK."	

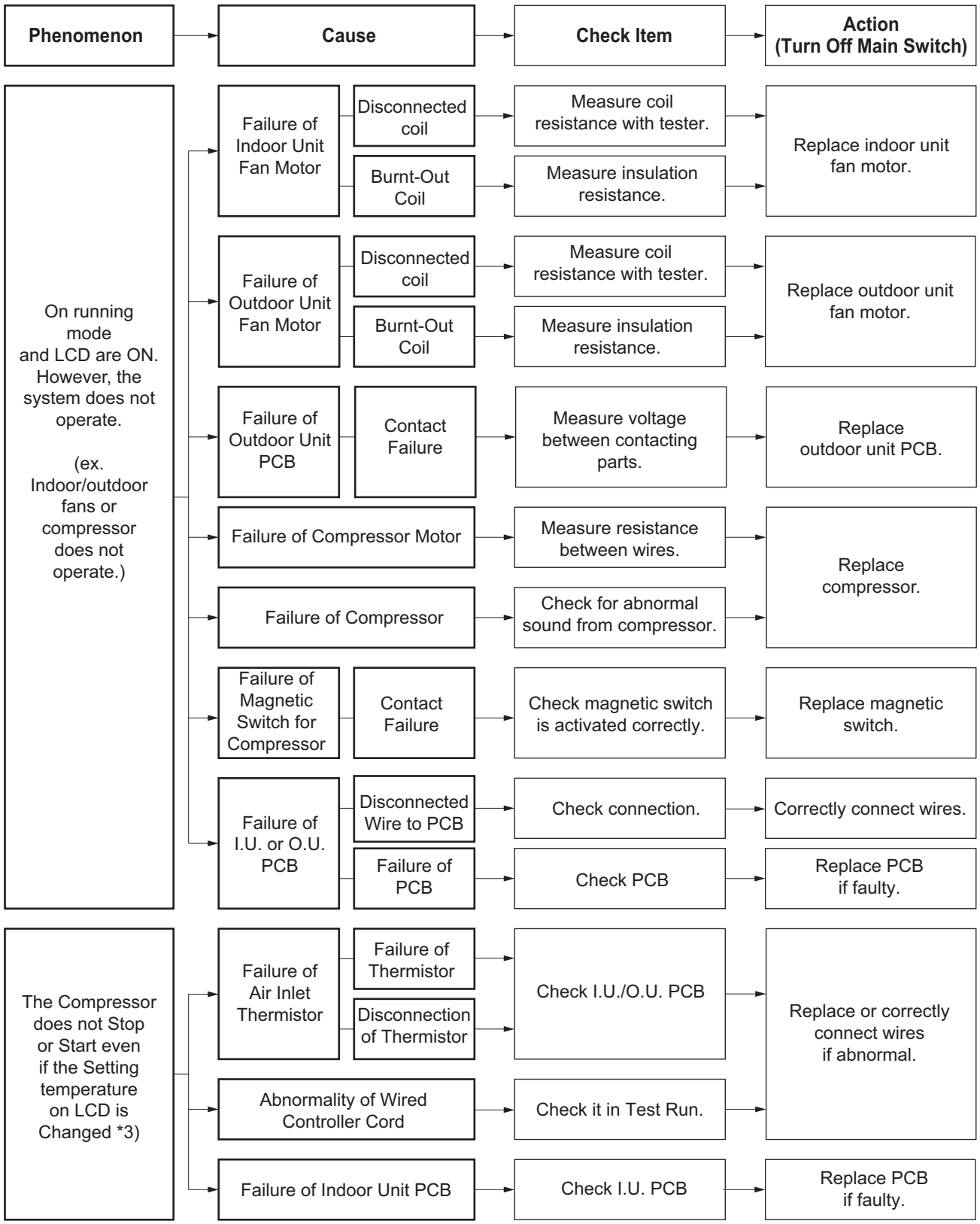
1.2.3 Abnormal Transmission between Wired Controller and Indoor Unit

● Alarm code screen flashes on wired controller

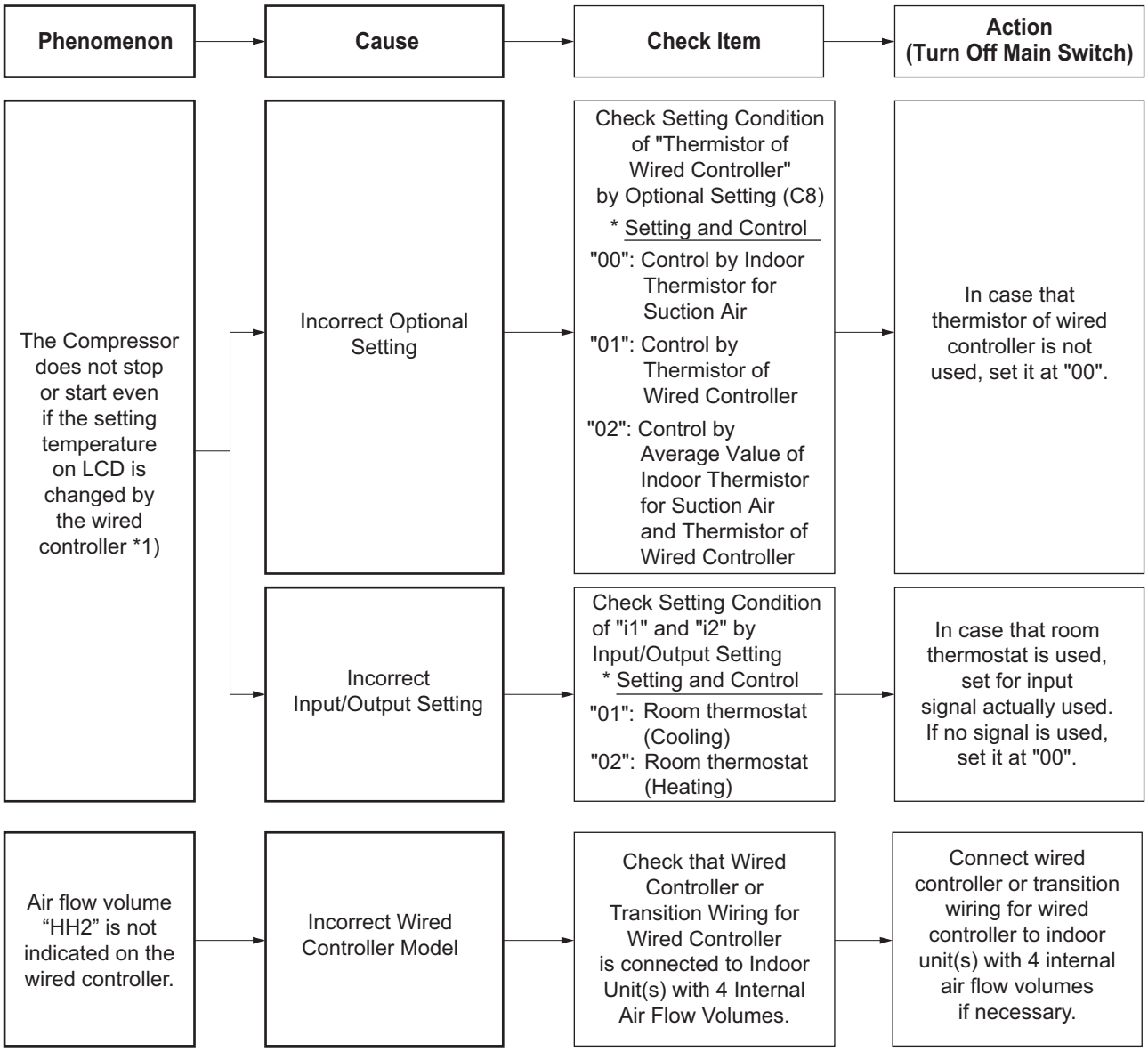


1.2.4 Abnormalities of Devices

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



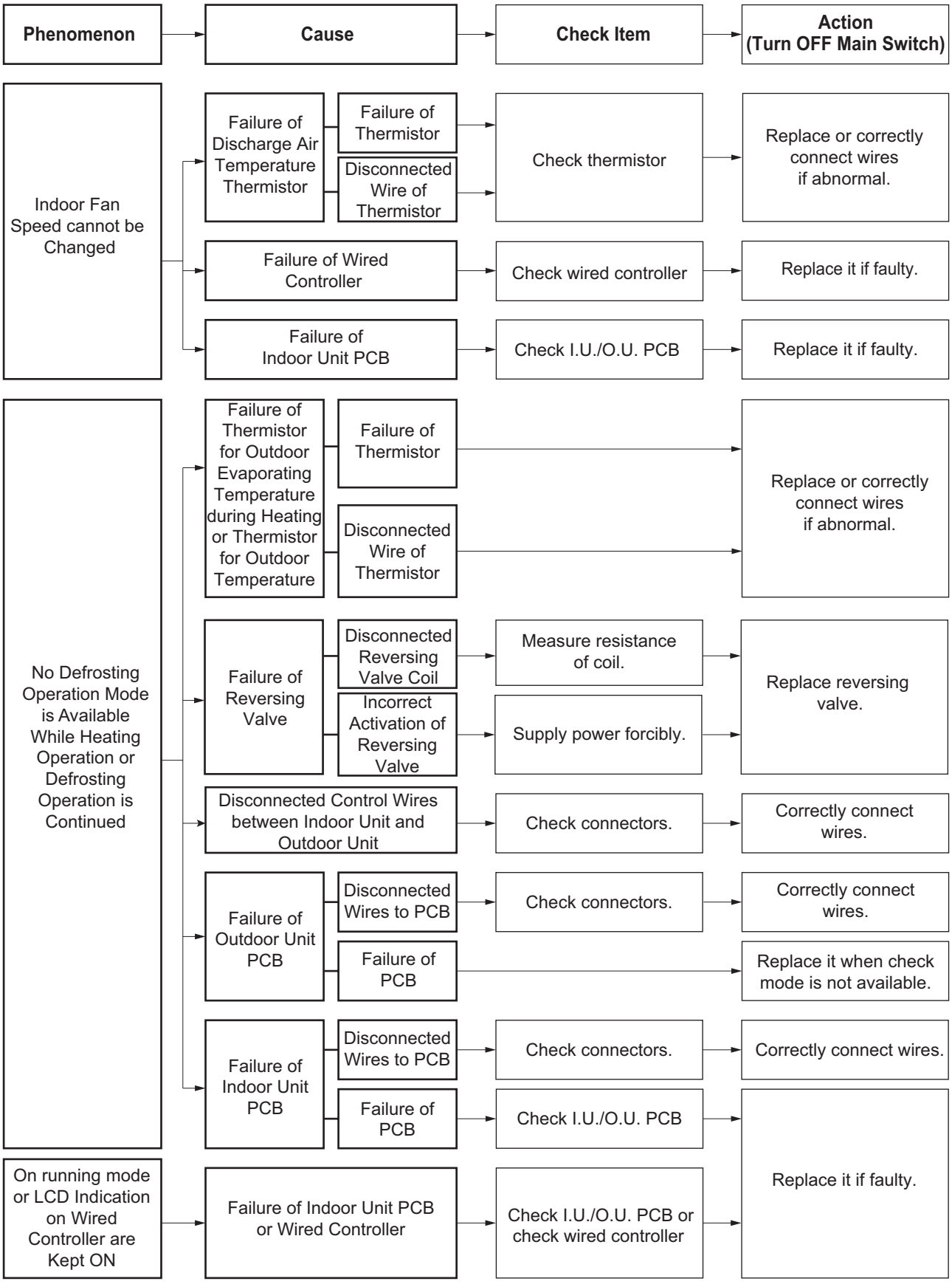
(1.2.4 Abnormalities of Devices)



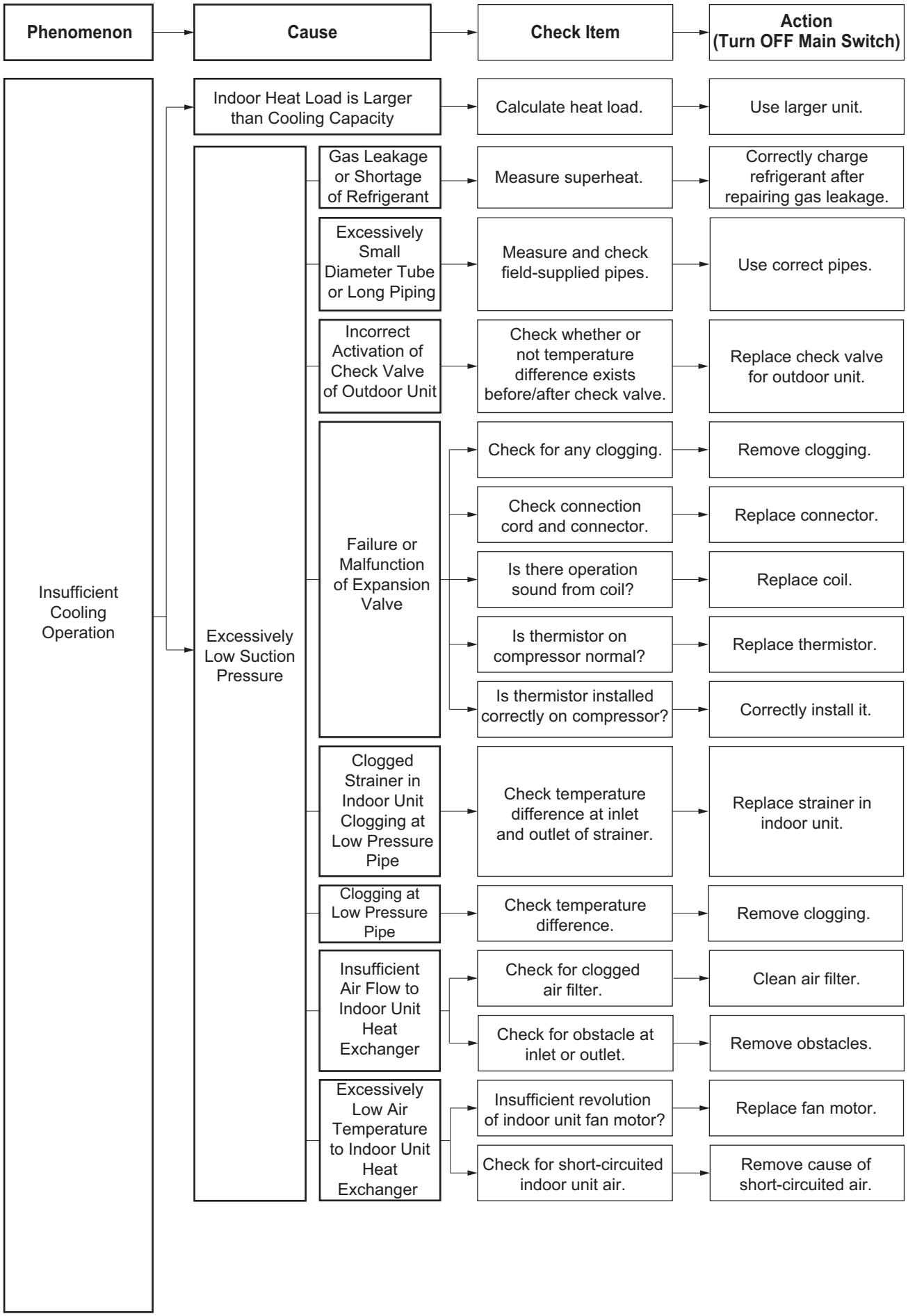
*1): Even if controllers are normal, the compressor does not operate under the following conditions.

* Indoor Air Temp. is lower than 21°C or Outdoor Air Temp. is lower than -5°C during cooling operation.
* Indoor Air Temp. is higher than 30°C or Outdoor Air Temp. is higher than 23°C during heating operation.
* Outdoor Air Temp. is lower than -20°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.

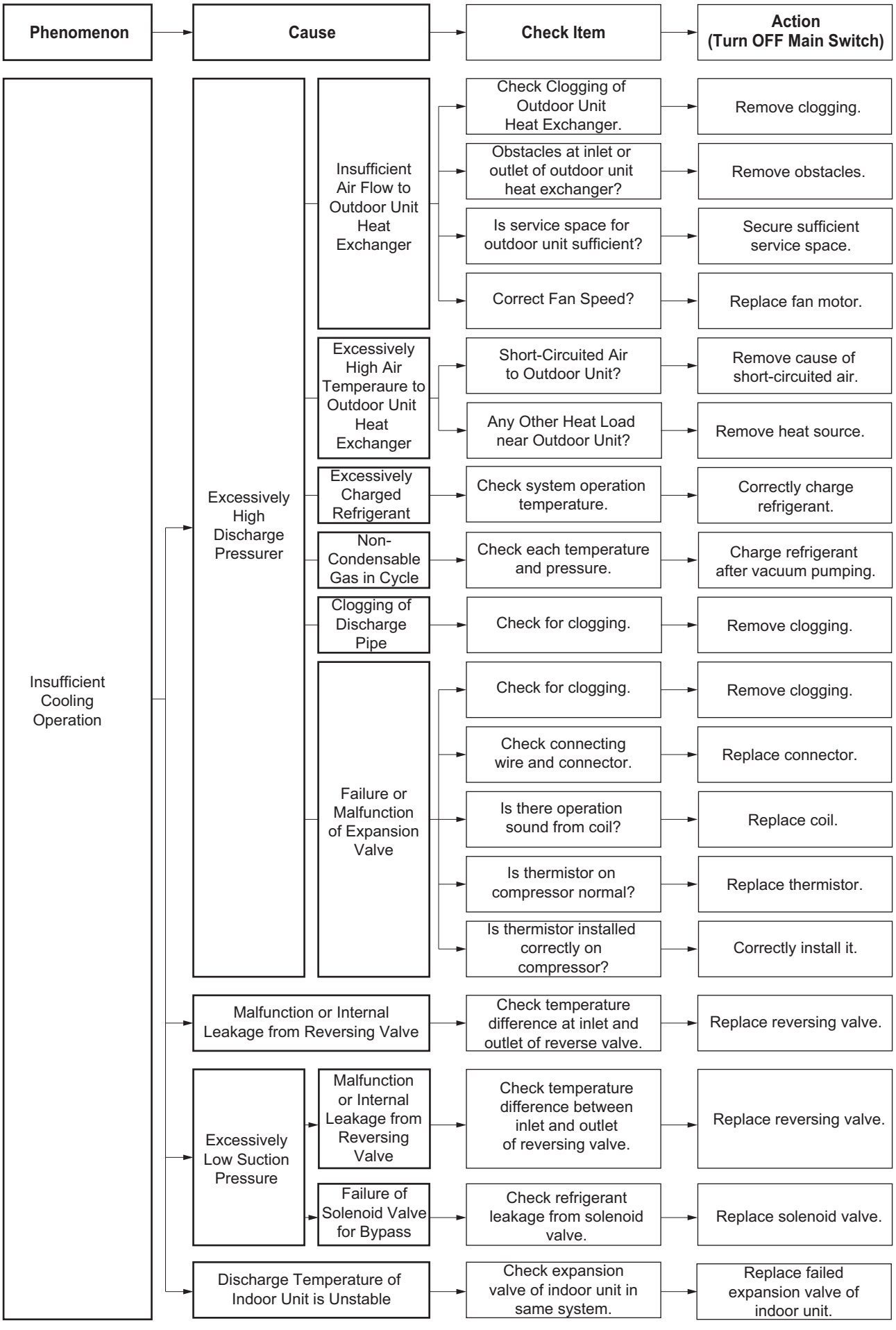
(1.2.4 Abnormalities of Devices)



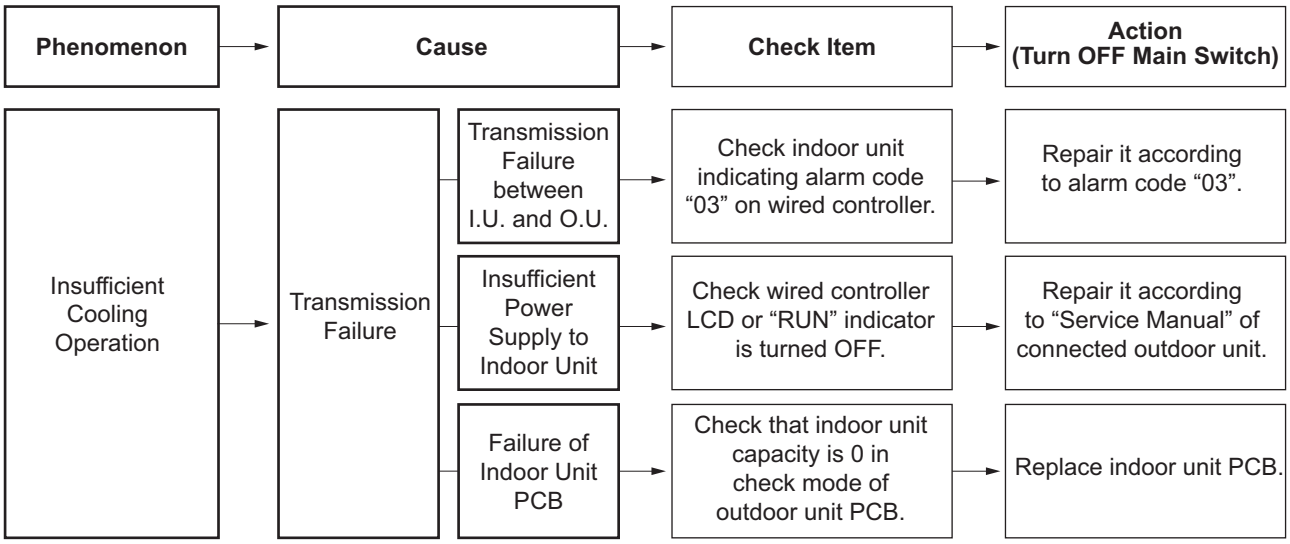
(1.2.4 Abnormalities of Devices)



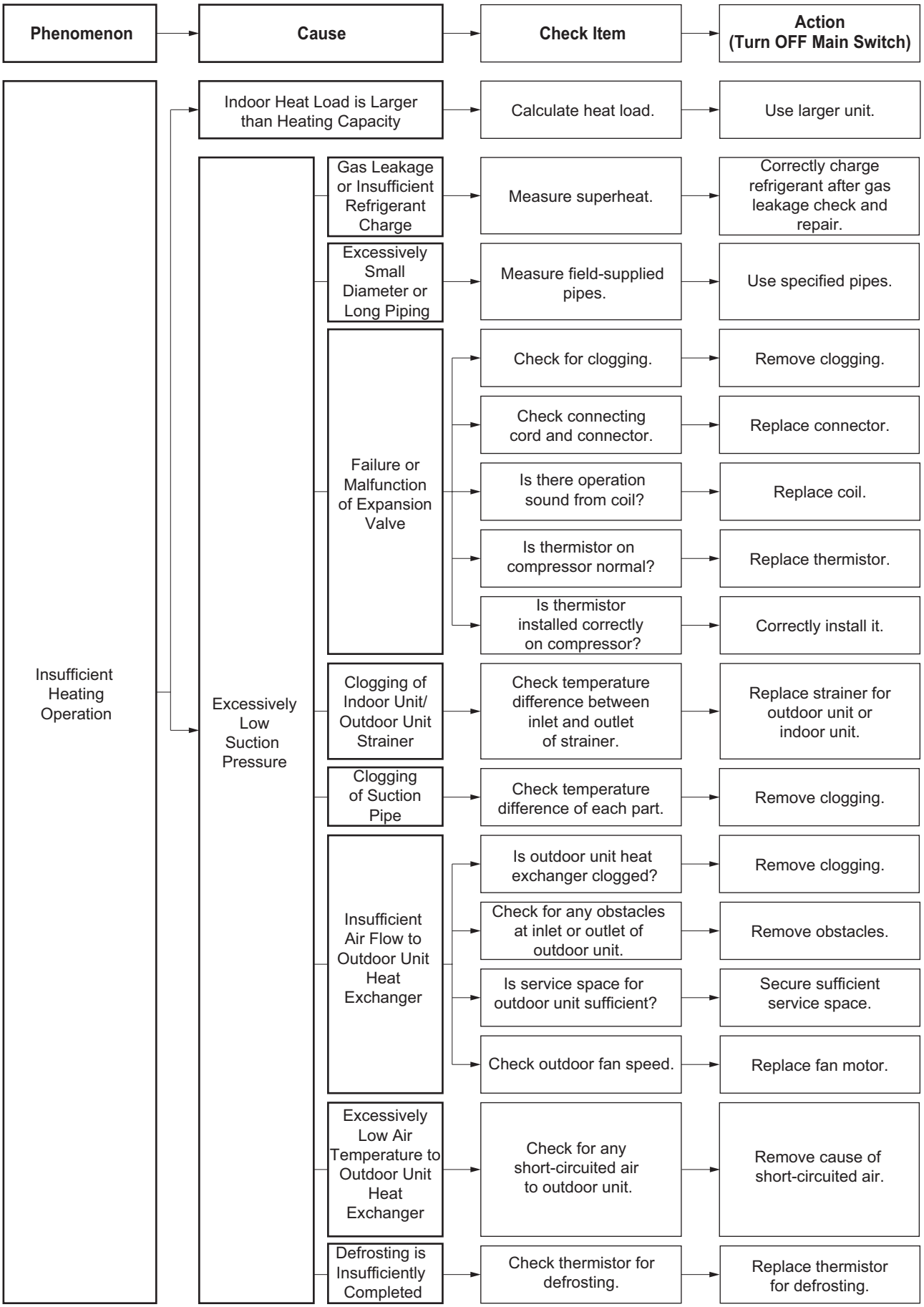
(1.2.4 Abnormalities of Devices)



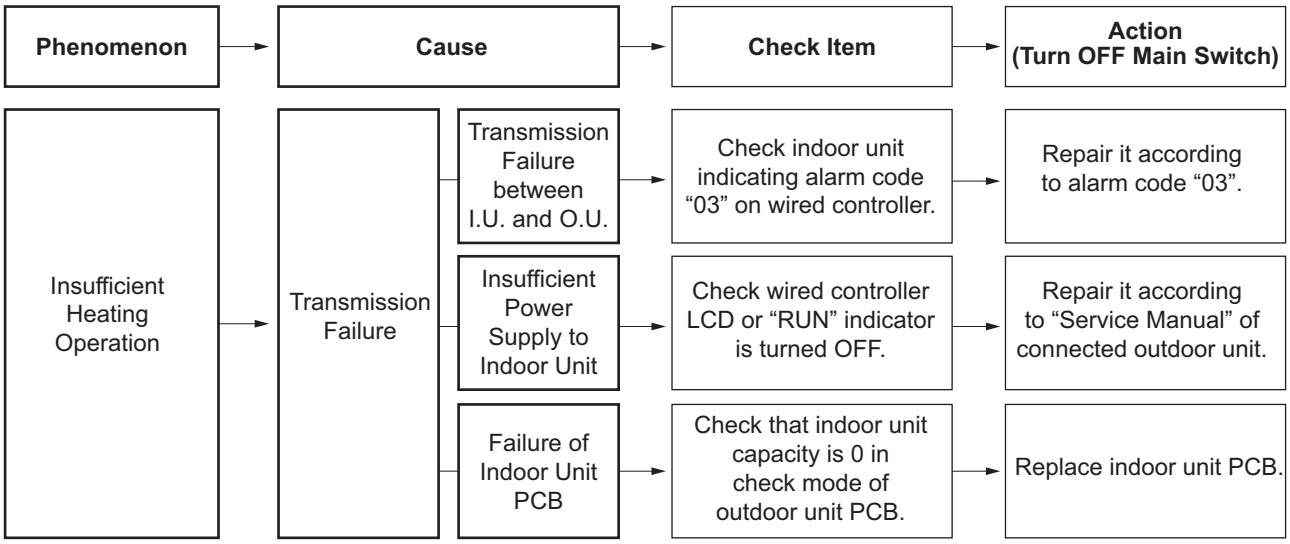
(1.2.4 Abnormalities of Devices)



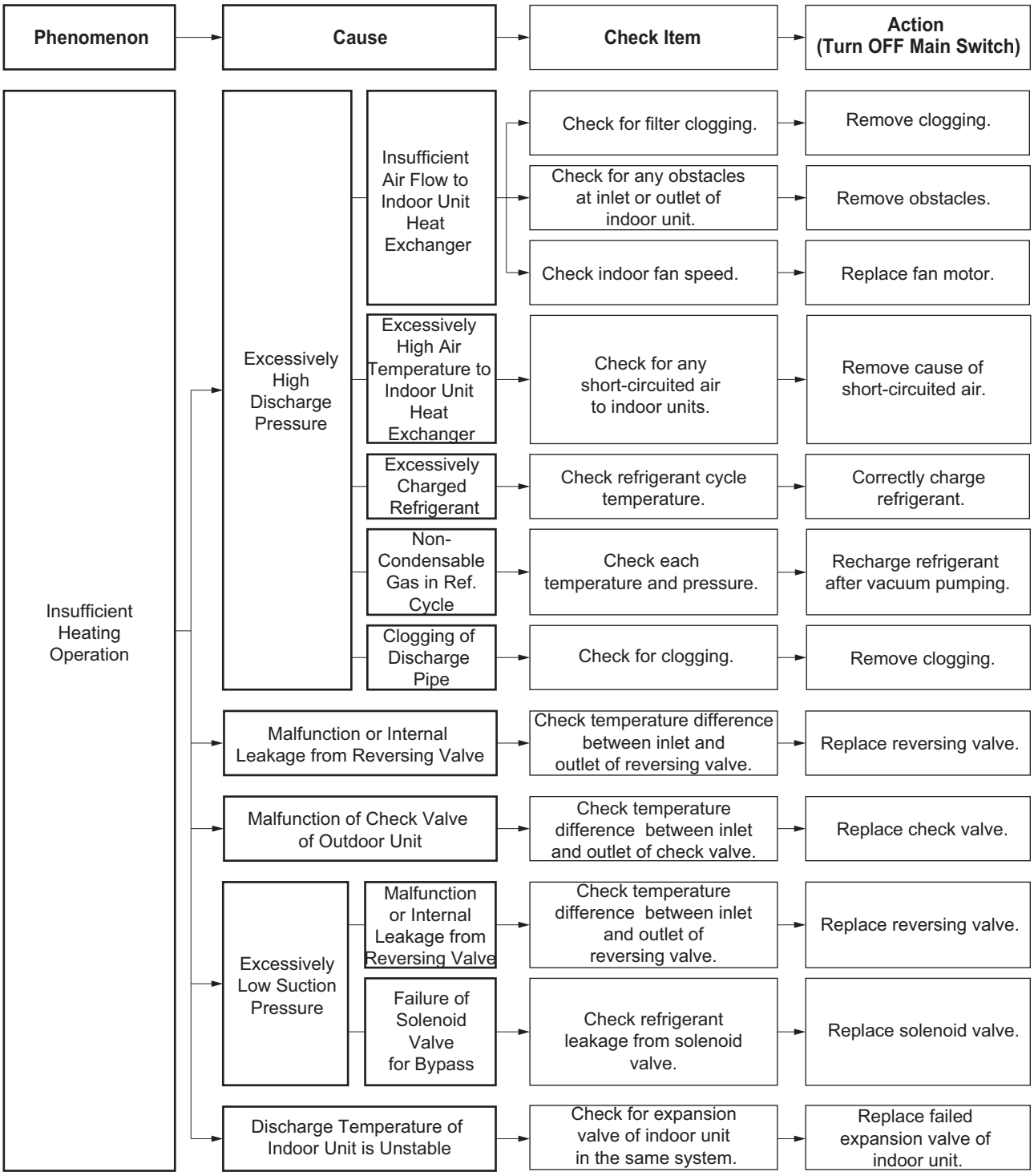
(1.2.4 Abnormalities of Devices)



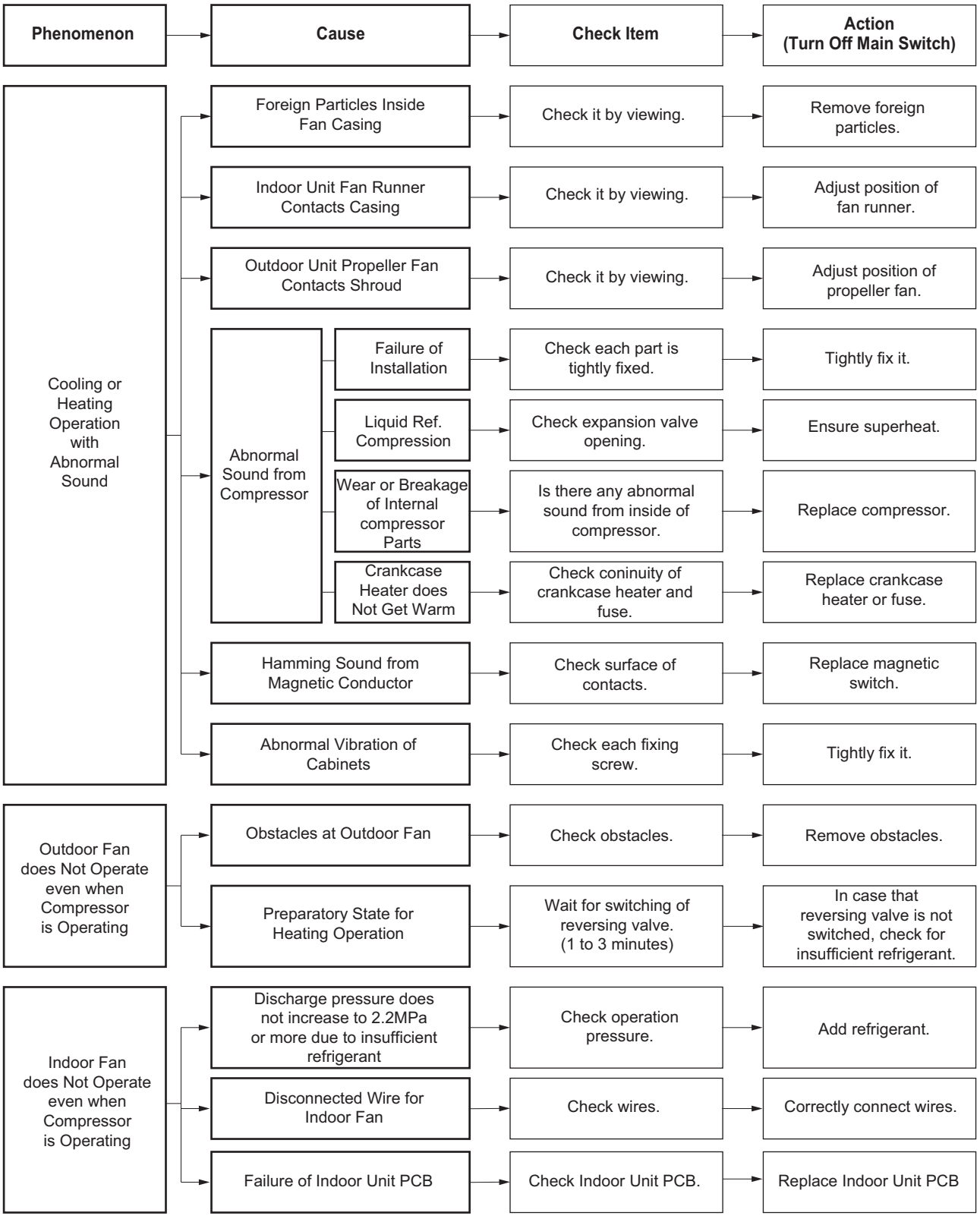
(1.2.4 Abnormalities of Devices)



(1.2.4 Abnormalities of Devices)



(1.2.4 Abnormalities of Devices)

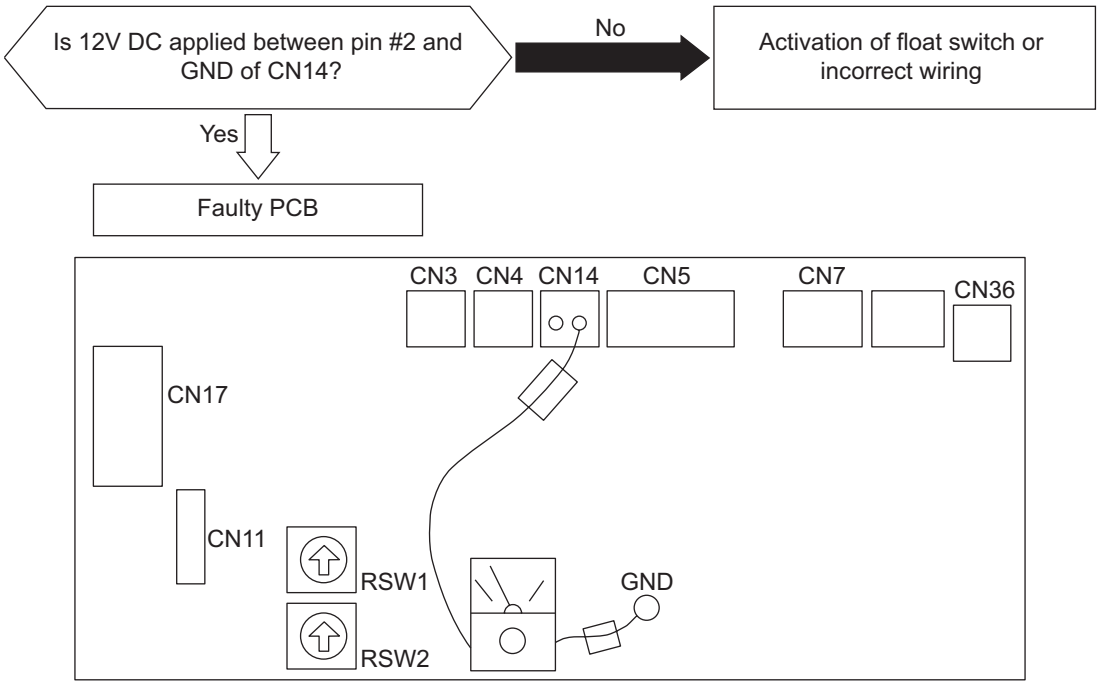


1.2.5 Troubleshooting by Alarm code

Alarm code	Activation of Indoor Unit Protection Device (Float Switch)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when the pin #1 and pin #2 of CN14 on the I.U. PCB are short circuited for more than 120 seconds during the Cooling, Dry, Fan, or Heating operation.



Phenomenon	Cause		Check Items	Actions
Fuse Blown or Activation of Breaker at Power Source	Power Failure or Power is not ON	Short Circuit between Wires	Measure voltage by voltmeter	Supply power
	Check for any Uncovered Part of Wires	Short Circuit Between Wires and Earth	Check for any uncovered part of wires	Fix the short circuit and replace fuse.
		Failure of Indoor Unit Fan Motor	Measure insulation resistance	Fix the short circuit and replace fuse.
		Fix the Short Circuit	Measure resistance between wiring and insulation resistance	Replace fan motor if failed.
Short Circuit Between Wires				Fix the short circuit and replace fuse.

Alarm code 02	Activation of Protection Device in Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the high pressure switch (PSH) is activated during the compressor operation (Y52C is turned ON).

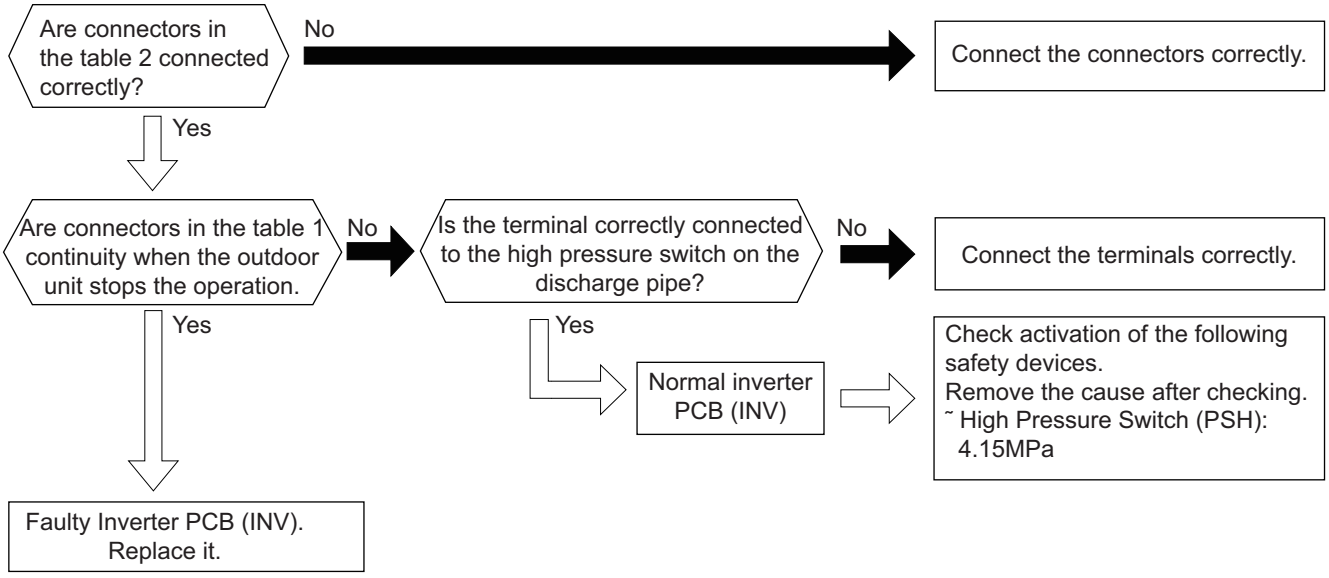


Table 2. Connector Number

PCB	Inverter PCB (INV)
Connector	PCN2
Pin No.	#1, #3

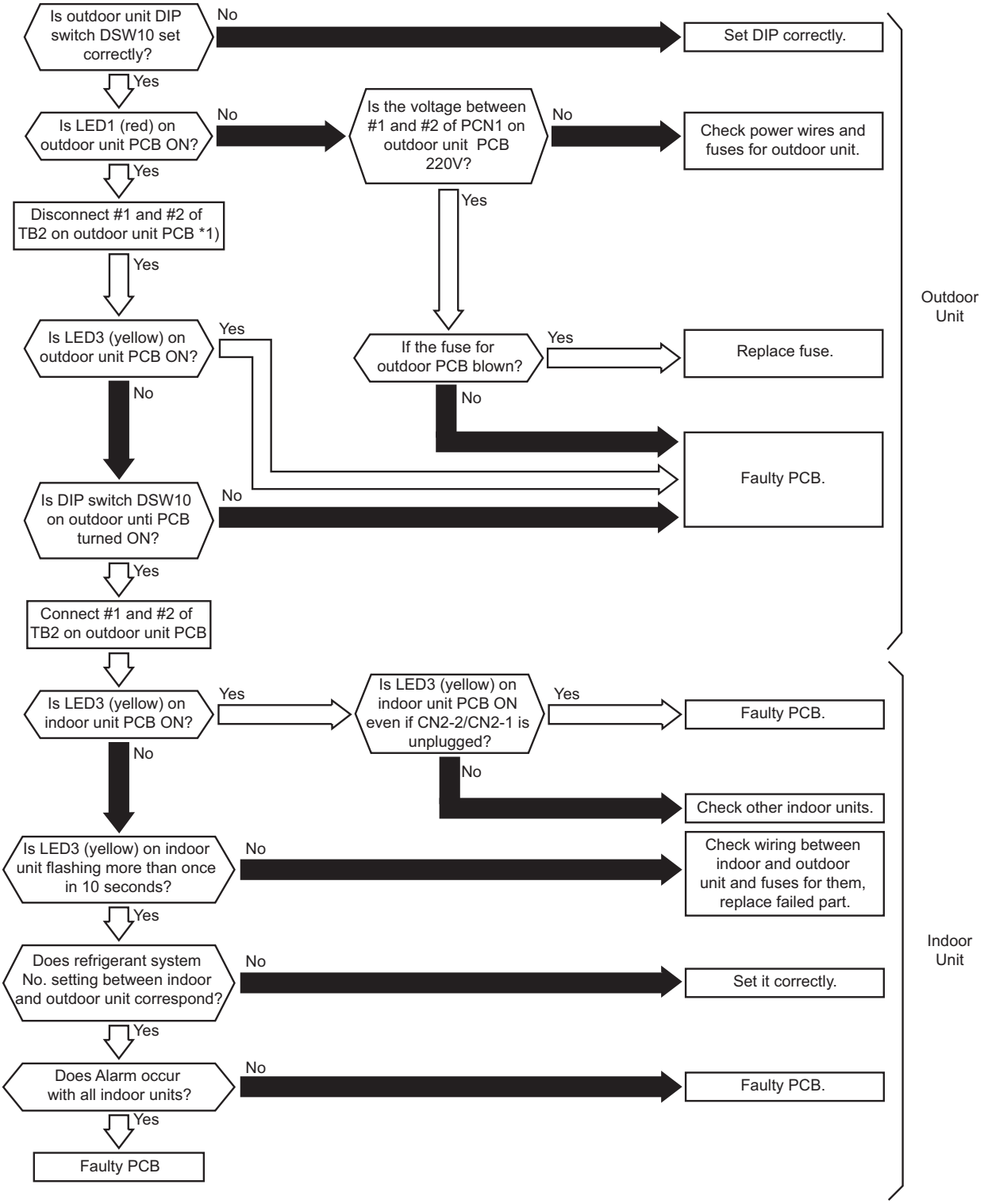
Event	Cause	Check Item	Action (Turn OFF Main Switch)
Activation of High Pressure Switch due to Excessively High Discharge Pressure	Insufficient Airflow to Heat Exchanger(Outdoor Heat Exchanger during Cooling Operation or Indoor Heat Exchanger during Heating Operation)	Clogging of Heat Exchanger?	Remove clogging.
		Check for dust on air filter.	Remove dust.
		Check for any obstacles at inlet or outlet of heat exchanger.	Remove obstacles.
		Check service space is sufficient.	Secure sufficient service space.
		Check fan motor speed. (Outdoor Fan: Cooling Indoor Fan: Heating)	Replace fan motor if faulty.

Alarm code 03	Abnormality of communication between Indoor unit and Outdoor unit (For outdoor unit RAS-8.0~24HNBCMQ, RAS-26~96HNBCMQ)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

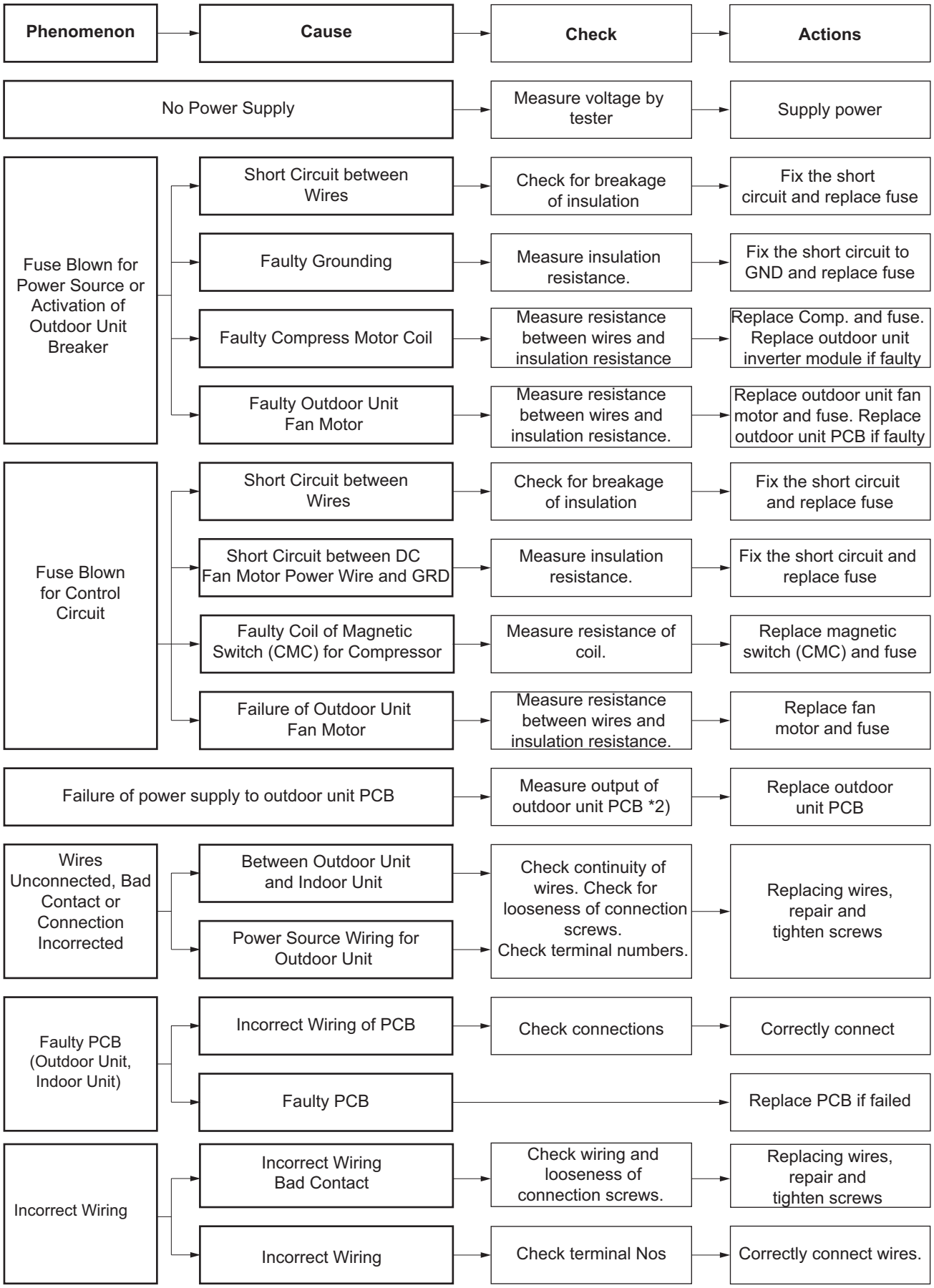
This alarm is indicated when abnormality is maintained for 3 minutes, and when abnormality is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is indicated by the indoor unit when the abnormal communication is maintained for 30 seconds from starting of the outdoor unit.

Investigate the cause of overcurrent and take necessary action when fuses are blown or the breakers for the outdoor unit are activated.



*1): If H-LINK is connected, need to set terminal resistance (DSW10) to OFF. Set the terminal resistance to ON if #1 and #2 of TB2 are not connected and set terminal resistance to OFF if #1 and #2 of TB2 are connected.

TROUBLESHOOTING



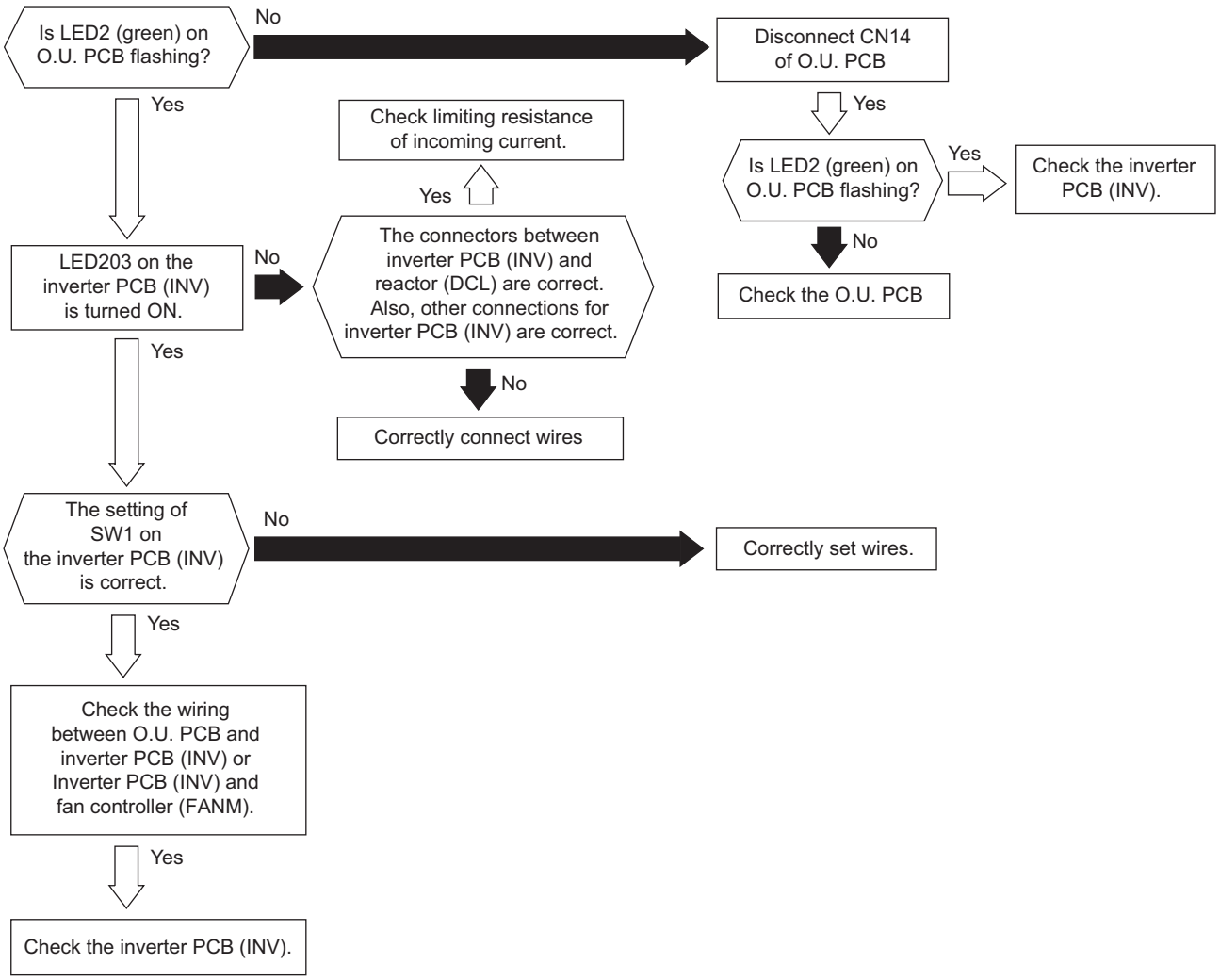
*2): Voltage between GND1—VCC13: 13V DC;
Voltage between GND1—VCC05: 5V DC;
Voltage between VDC-1—VCC15: 15V DC.

Alarm code 04	Abnormal Transmitting between Inverter PCB and Outdoor Unit PCB

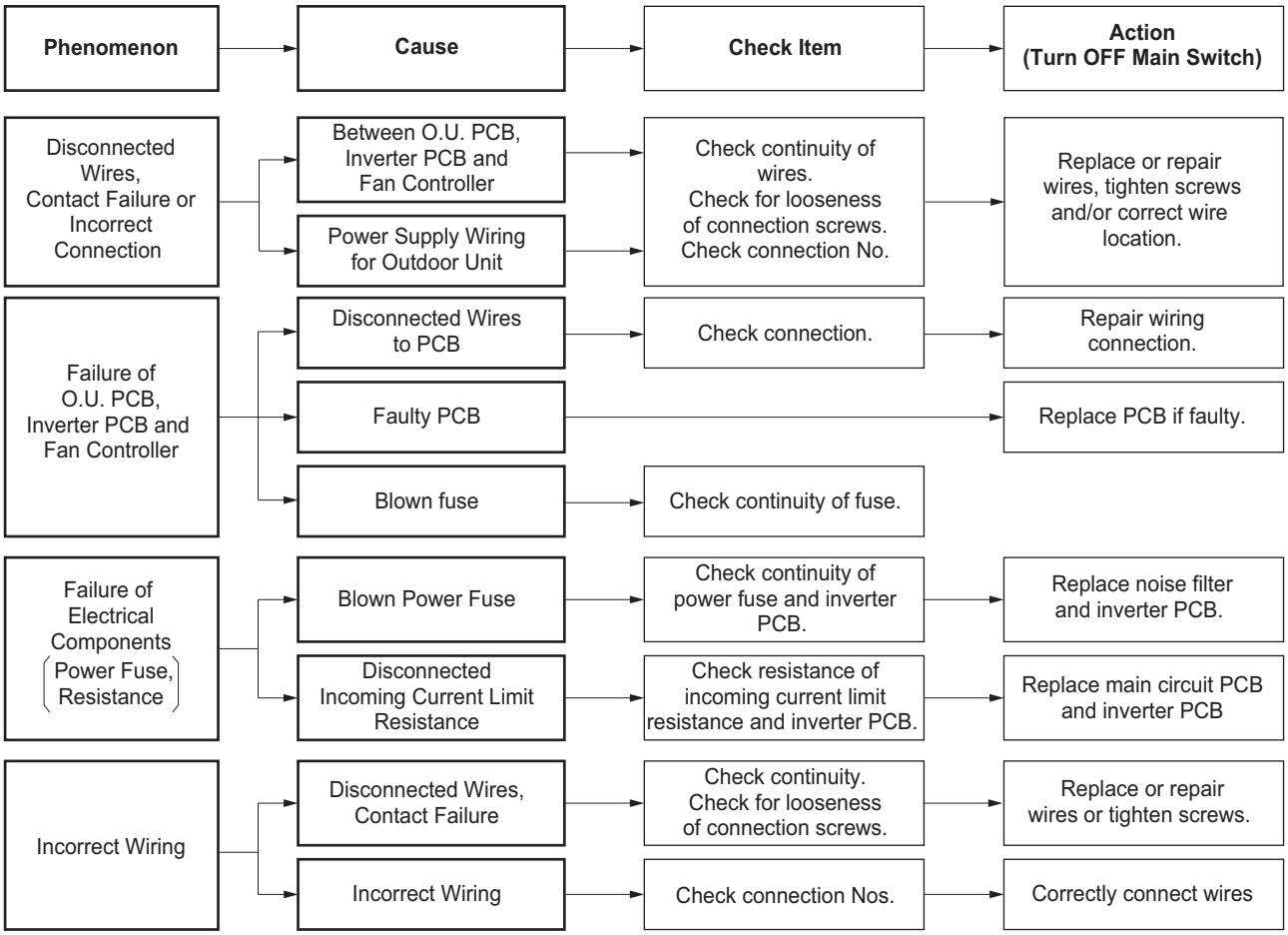
- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when an abnormal condition continues for 30 seconds after normal transmission between the outdoor unit PCB and the inverter PCB, and when the abnormal condition continues for 30 seconds even after the micro-computer is automatically reset. If transmission failure occurs from the beginning, the alarm code is displayed after 30 seconds from start up.

O.U. PCB: Outdoor Unit PCB (PCB3)



TROUBLESHOOTING



NOTE:

1. When replacing or checking for the inverter part, make sure to perform the electric discharge work according to Section 3.2.1. “High Voltage Discharge Work for Replacing Parts”.

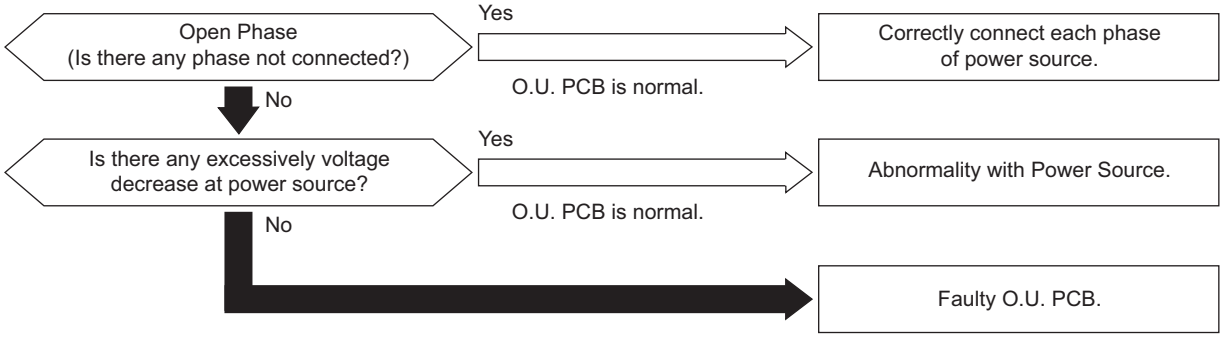
Alarm code 05	Abnormality Power Source Phase

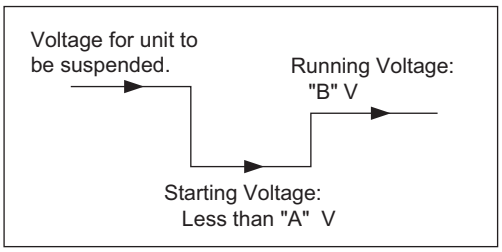
● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when the main power source phase is incorrect, or one phase is not connected.

O.U. PCB: Outdoor Unit PCB (PCB3)





Check Item

Power Supply	"A"	"B"
380-415V/50Hz	323	342 to 456

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Activation of Open Phase Sensor in Outdoor Unit	Open Phase	Check it according to electrical wiring.	Replace wires, repair and tighten screws or correct wiring.
	Faulty O.U. PCB		Replace O.U. PCB if faulty.

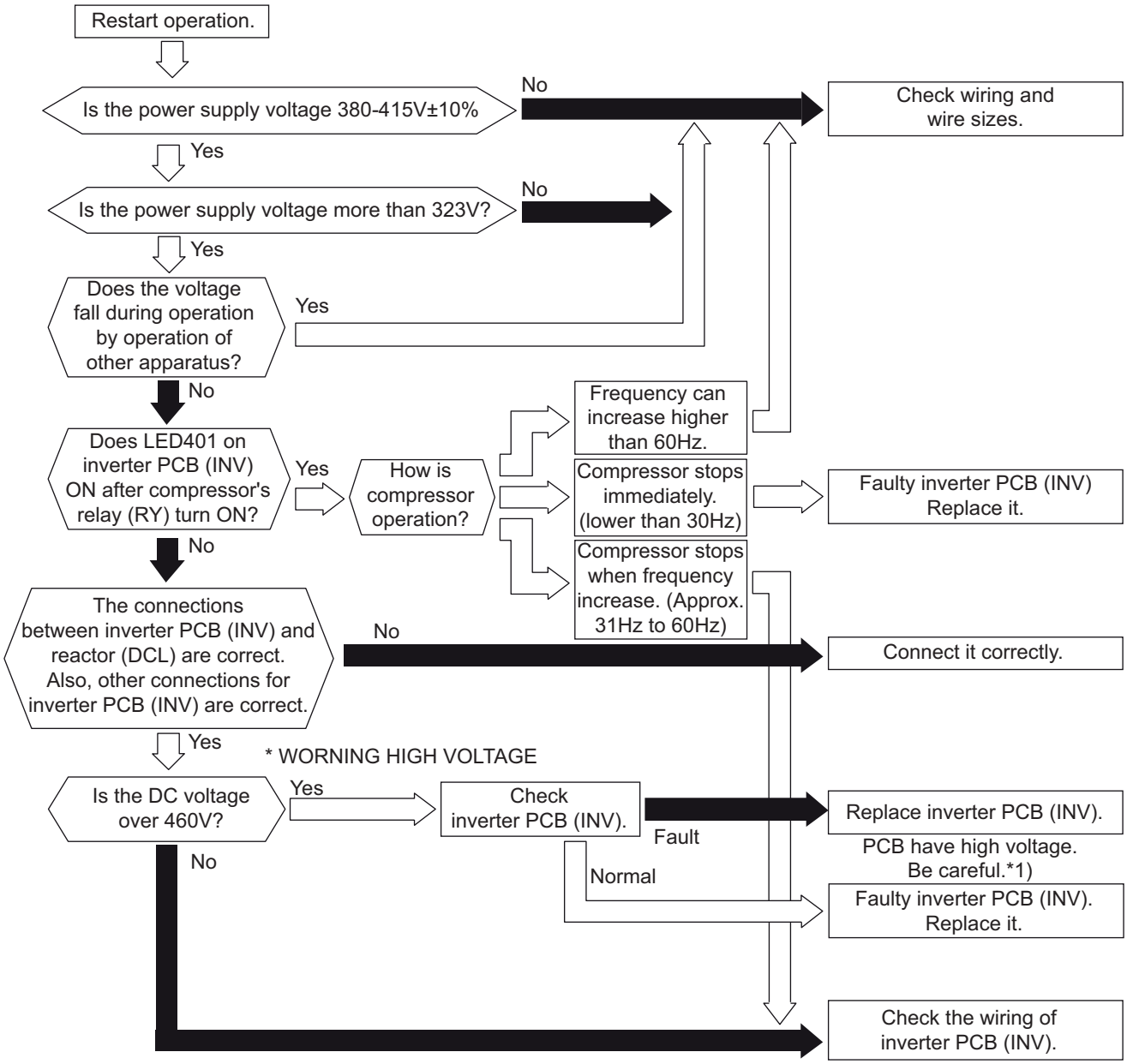
Alarm code 06	Abnormal Inverter Voltage (Insufficient Inverter Voltage or Overvoltage)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

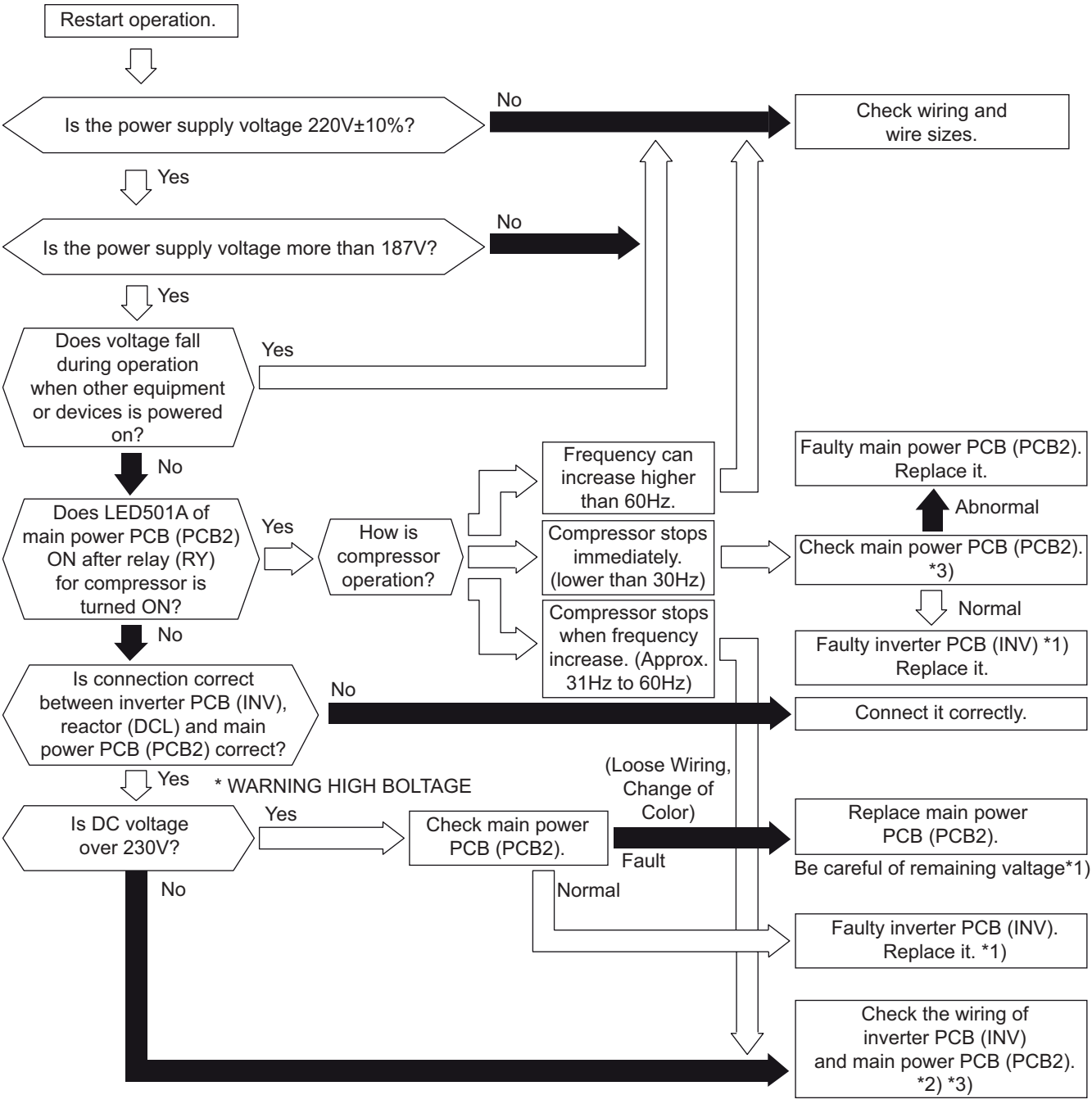
★ When insufficient voltage is detected between the terminals “P” and “N” of the inverter PCB 3 times in 30 minutes, the operation stops and this alarm code is displayed. If this occurs less than 3 times in 30 minutes, the operation is automatically retried.

<Outdoor Unit PCB Display Indication>

Abnormality of Inverter



*1): Refer to the item 3.2.1 for checking procedures of the inverter PCB.
If high voltage remains, perform the high voltage discharge work according to this item.

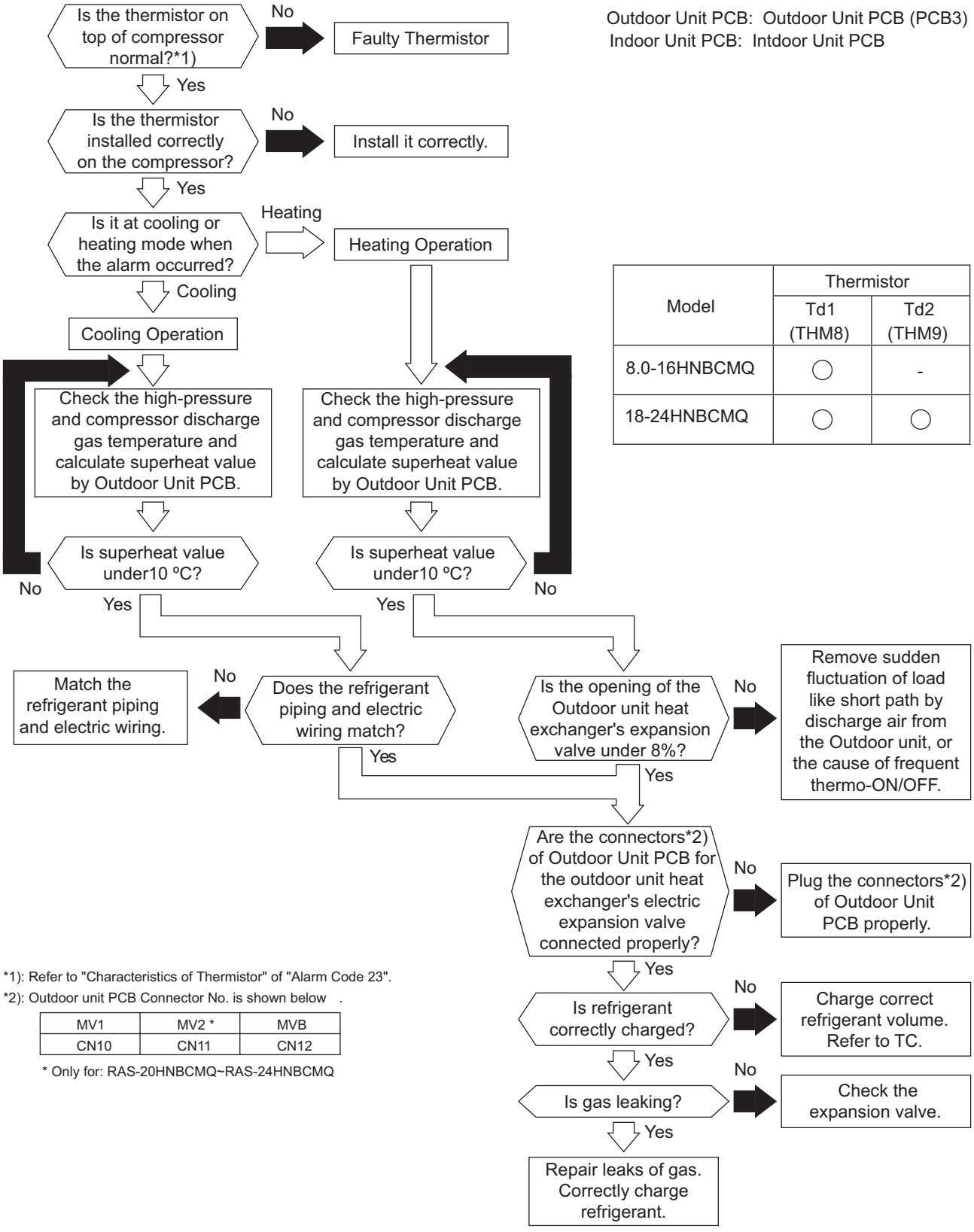

Restart operation.
Is the power supply voltage 220V±10%?
No
Check wiring and wire sizes.
Yes
Is the power supply voltage more than 187V?
No
Yes
Does voltage fall during operation when other equipment or devices is powered on?
Yes
No
Does LED501A of main power PCB (PCB2) ON after relay (RY) for compressor is turned ON?
Yes
How is compressor operation?
Frequency can increase higher than 60Hz.
Compressor stops immediately. (lower than 30Hz)
Compressor stops when frequency increase. (Approx. 31Hz to 60Hz)
Faulty main power PCB (PCB2). Replace it.
Abnormal
Check main power PCB (PCB2). *3)
Normal
Faulty inverter PCB (INV) *1) Replace it.
No
Is connection correct between inverter PCB (INV), reactor (DCL) and main power PCB (PCB2) correct?
No
Connect it correctly.
Yes
* WARNING HIGH BOLTAGE
(Loose Wiring, Change of Color)
Is DC voltage over 230V?
Yes
Check main power PCB (PCB2).
Fault
Replace main power PCB (PCB2).
Be careful of remaining valtage*1)
No
Normal
Faulty inverter PCB (INV). Replace it. *1)
Check the wiring of inverter PCB (INV) and main power PCB (PCB2). *2) *3)

Alarm code 07	Decrease in Discharge Gas Superheat

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ In the case that the discharge gas superheat less than 10 deg. at the top of the compressor continues for 30 minutes, retry operation is performed. However, when the alarm occurs twice within 120 hours, this alarm code is indicated.

Outdoor Unit PCB: Outdoor Unit PCB (PCB3)
Indoor Unit PCB: Intdoor Unit PCB



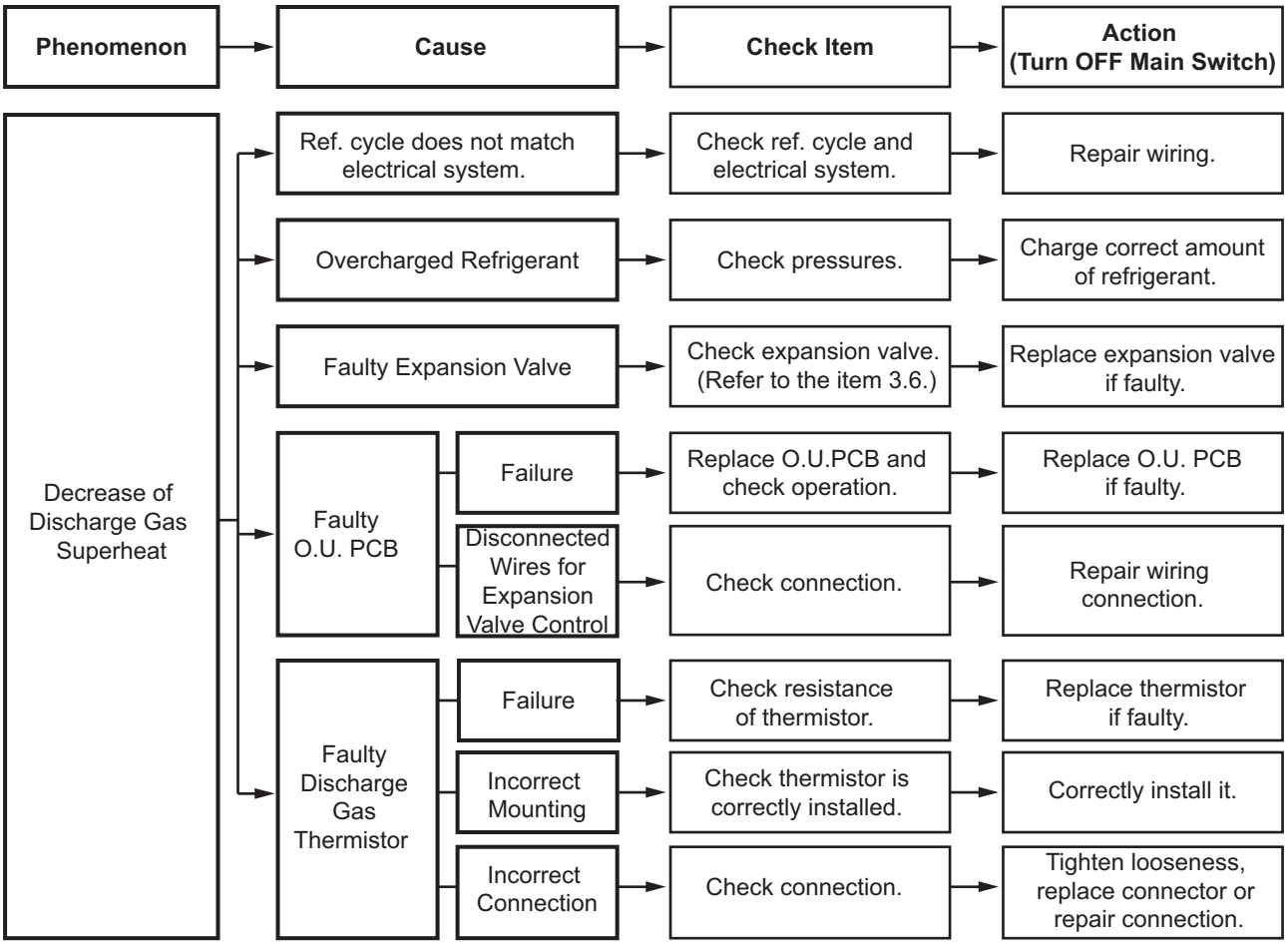
Model	Thermistor	
	Td1 (THM8)	Td2 (THM9)
8.0-16HNBCMQ	○	-
18-24HNBCMQ	○	○

*1): Refer to "Characteristics of Thermistor" of "Alarm Code 23".

*2): Outdoor unit PCB Connector No. is shown below .

MV1	MV2 *	MVB
CN10	CN11	CN12

* Only for: RAS-20HNBCMQ~RAS-24HNBCMQ

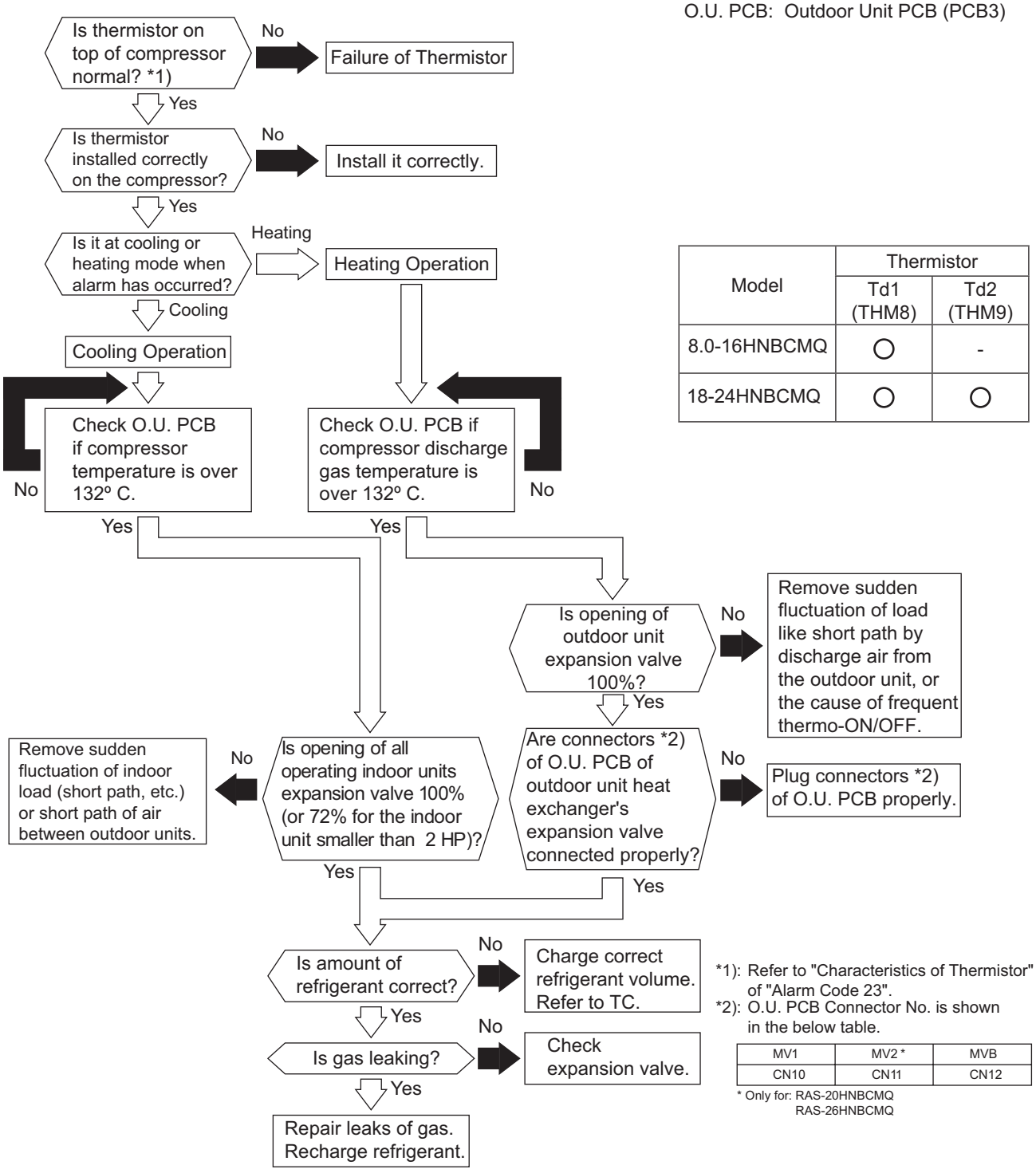

Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Decrease of Discharge Gas Superheat
Ref. cycle does not match electrical system.
Check ref. cycle and electrical system.
Repair wiring.
Overcharged Refrigerant
Check pressures.
Charge correct amount of refrigerant.
Faulty Expansion Valve
Check expansion valve. (Refer to the item 3.6.)
Replace expansion valve if faulty.
Faulty O.U. PCB
Failure
Replace O.U.PCB and check operation.
Replace O.U. PCB if faulty.
Disconnected Wires for Expansion Valve Control
Check connection.
Repair wiring connection.
Faulty Discharge Gas Thermistor
Failure
Check resistance of thermistor.
Replace thermistor if faulty.
Incorrect Mounting
Check thermistor is correctly installed.
Correctly install it.
Incorrect Connection
Check connection.
Tighten looseness, replace connector or repair connection.

Alarm code 08	Increase in Discharge Gas Temperature at the Top of Compressor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ If the temperature at the top of the compressor is above 132°C for 10 minutes or above 140°C for 5 seconds during operation, the compressor stops and then the operation is automatically retried. If this occurs again twice in the next 60 minutes, this alarm code is displayed.

O.U. PCB: Outdoor Unit PCB (PCB3)

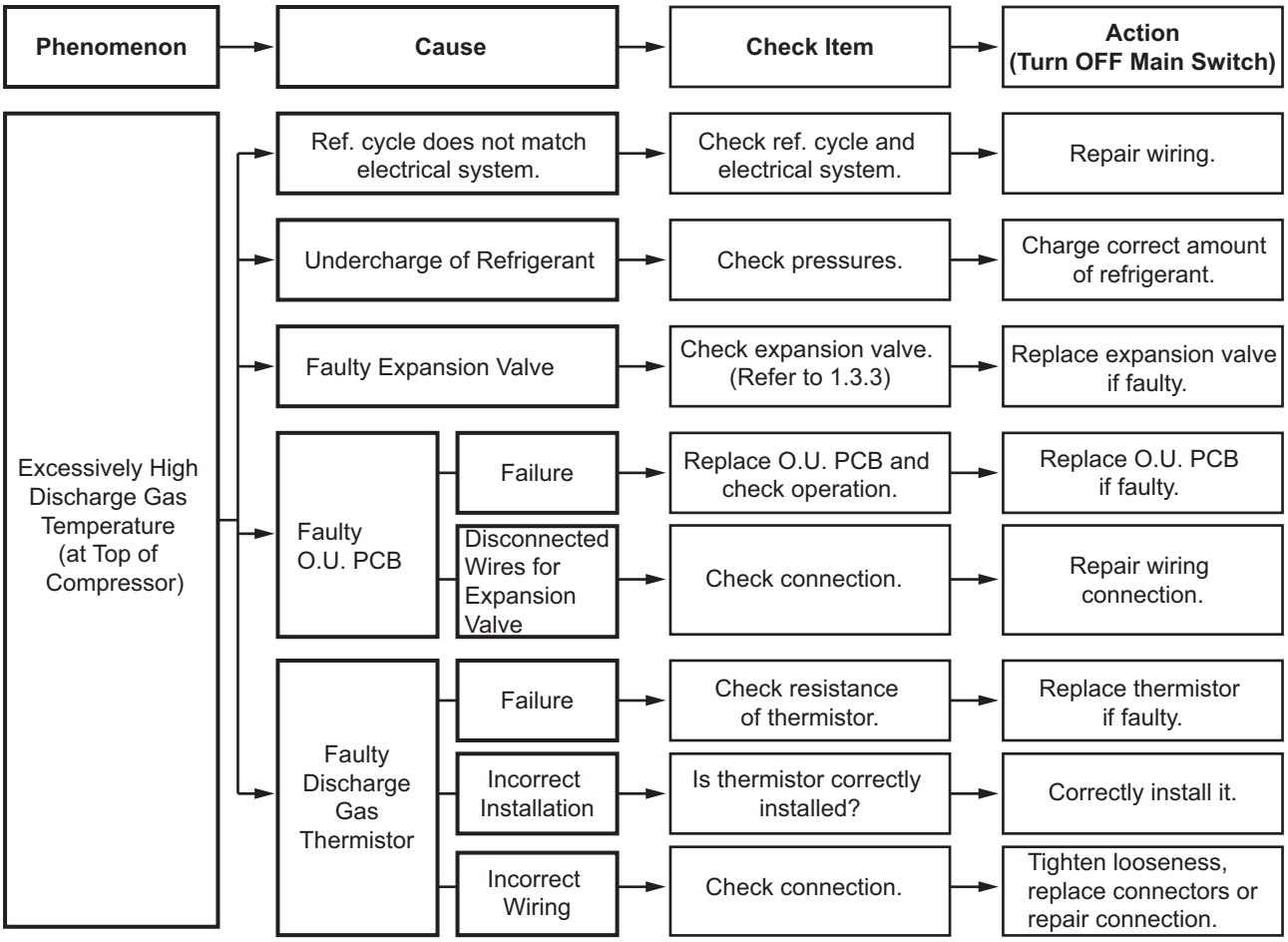


Model	Thermistor	
	Td1 (THM8)	Td2 (THM9)
8.0-16HNBCMQ	○	-
18-24HNBCMQ	○	○

*1): Refer to "Characteristics of Thermistor" of "Alarm Code 23".
*2): O.U. PCB Connector No. is shown in the below table.

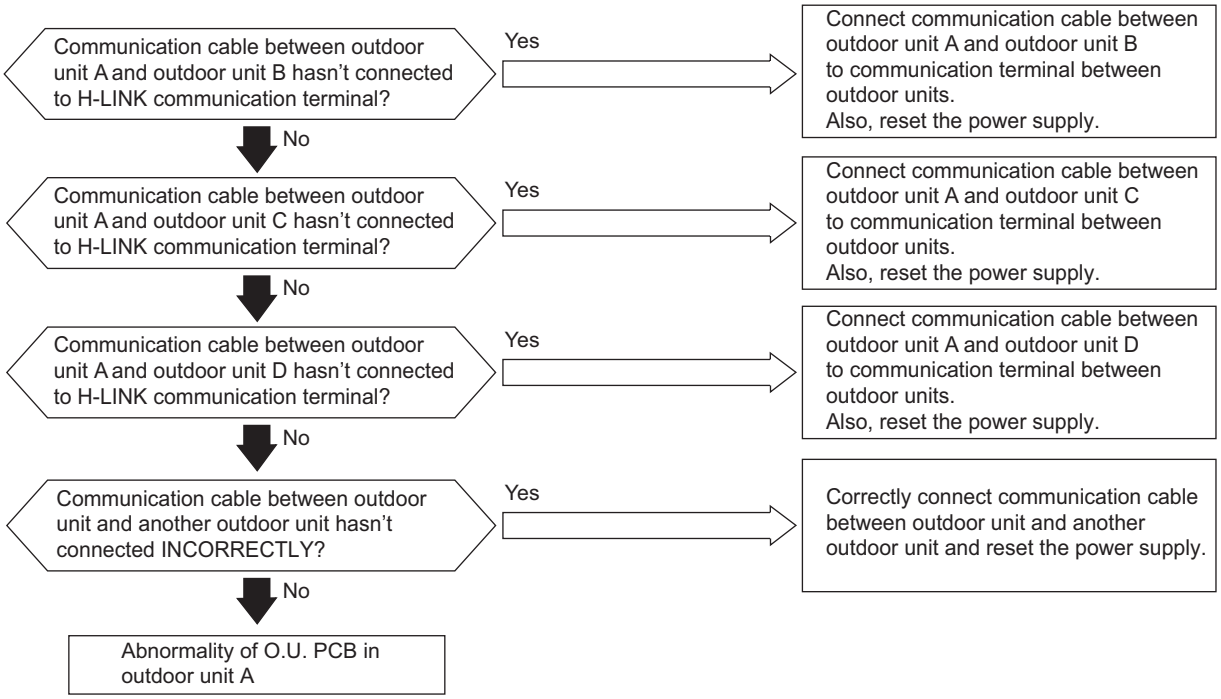
MV1	MV2 *	MVB
CN10	CN11	CN12

* Only for: RAS-20HNBCMQ
RAS-26HNBCMQ

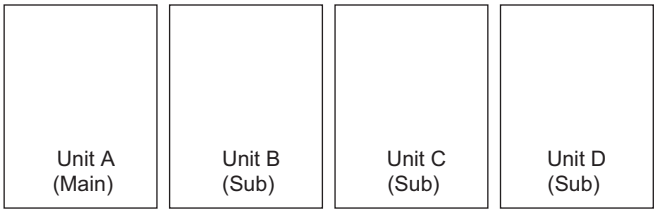

Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Excessively High Discharge Gas Temperature (at Top of Compressor)
Ref. cycle does not match electrical system.
Check ref. cycle and electrical system.
Repair wiring.
Undercharge of Refrigerant
Check pressures.
Charge correct amount of refrigerant.
Faulty Expansion Valve
Check expansion valve. (Refer to 1.3.3)
Replace expansion valve if faulty.
Faulty O.U. PCB
Failure
Replace O.U. PCB and check operation.
Replace O.U. PCB if faulty.
Disconnected Wires for Expansion Valve
Check connection.
Repair wiring connection.
Faulty Discharge Gas Thermistor
Failure
Check resistance of thermistor.
Replace thermistor if faulty.
Incorrect Installation
Is thermistor correctly installed?
Correctly install it.
Incorrect Wiring
Check connection.
Tighten looseness, replace connectors or repair connection.

Alarm code 08	Abnormal Transmitting between Outdoor Units

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

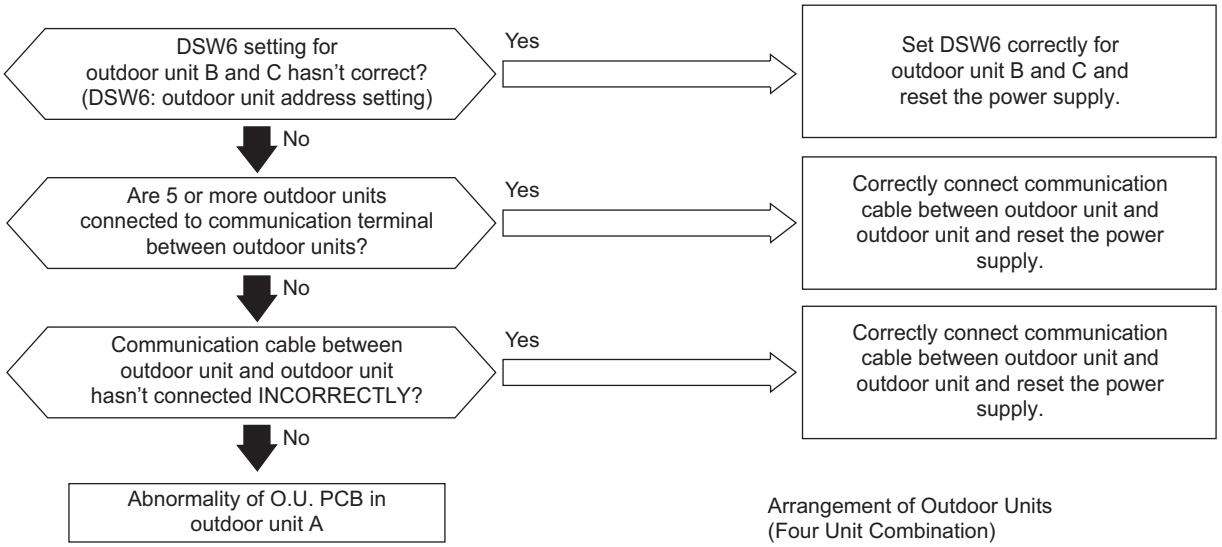


Arrangement of Outdoor Units
(Four Unit Combination)

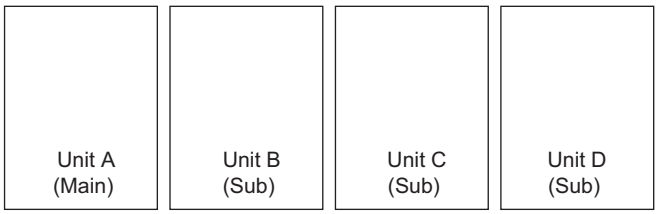


Alarm code	Incorrect Outdoor Unit Address Setting

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

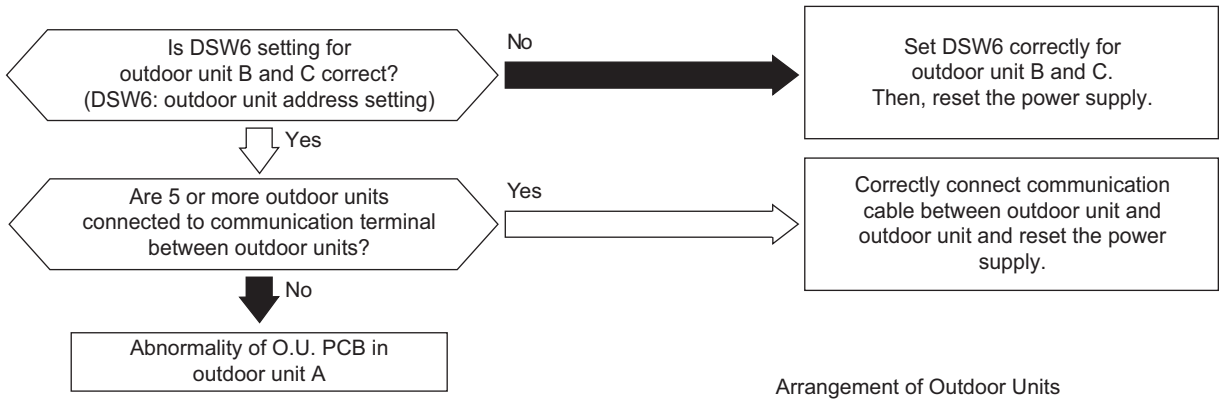


Arrangement of Outdoor Units
(Four Unit Combination)

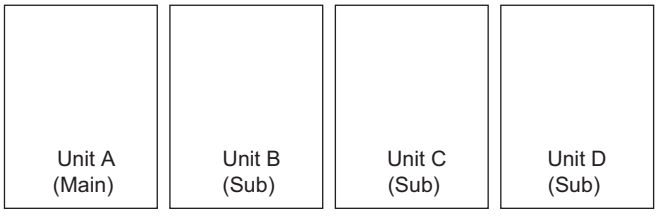


Alarm code	Incorrect Setting of Main Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.



Arrangement of Outdoor Units
(Four Unit Combination)

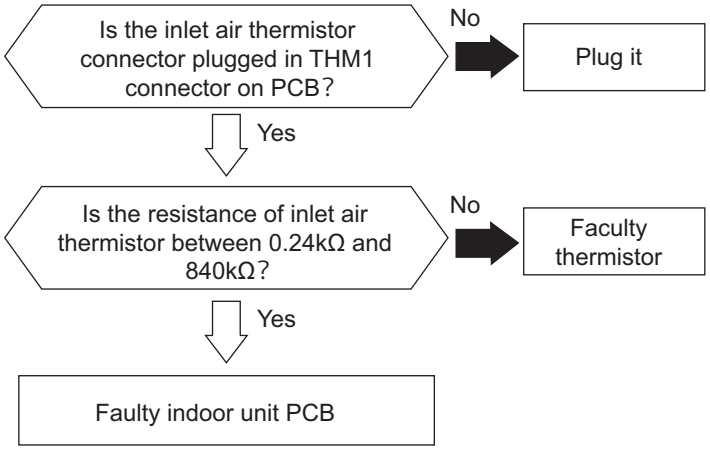


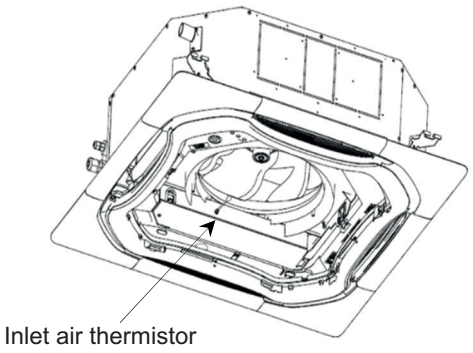
Alarm code	1 1	Abnormal inlet air thermistor for indoor unit

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the indoor unit inlet air thermistor is short-circuited (resistance is less than 0.24 kΩ) or open circuited (resistance is greater than 840 kΩ) during the operation, except “FAN Mode”. The indoor unit will be automatically restarted with the operation state before the failure when the fault is fixed.



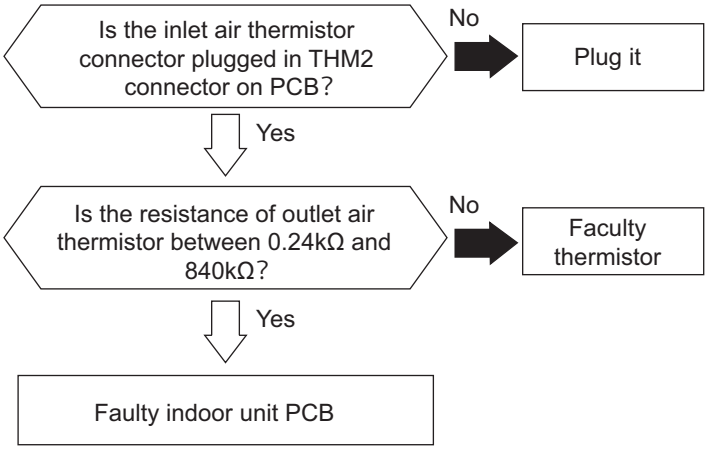


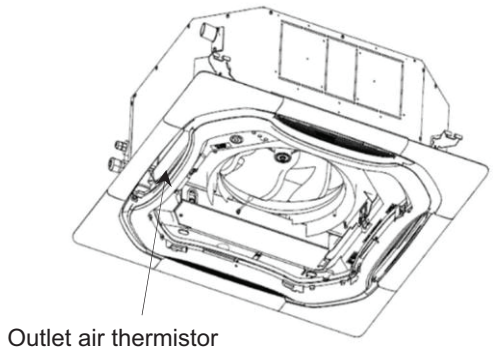
Phenomenon	Cause	Inspection items	Actions
Faulty inlet air thermistor	Failure	Measure resistance	Replace thermistor if failed
	Incorrect connection	Check connection	Connect wiring correctly
Faulty indoor unit PCB		Replace PCB and check operation	Replace PCB if failed

Alarm code 12	Abnormal Outlet Air Thermistor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the indoor unit outlet air thermistor is short-circuited (resistance is less than 0.24 kΩ) or open circuited (resistance is greater than 840 kΩ) during the operation, except “FAN Mode”. The indoor unit will be automatically restarted with the operation state before the failure when the fault is fixed.



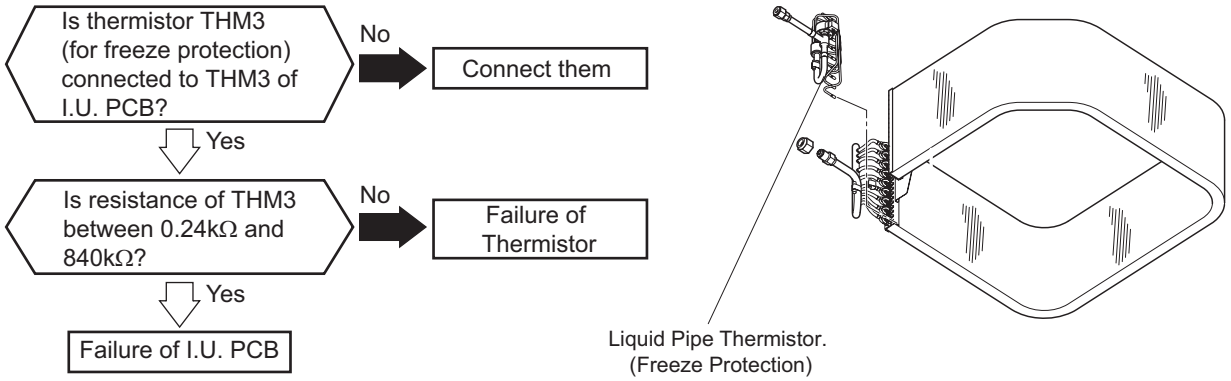


Phenomenon	Cause	Inspection items	Actions
Faulty outlet air thermistor	Failure	Measure resistance	Replace thermistor if failed
	Incorrect connection	Check connection	Connect wiring correctly
Faulty indoor unit PCB		Replace PCB and check operation	Replace PCB if failed

Alarm code	Abnormal Liquid Pipe Thermistor (Freeze Protection Thermistor) for Indoor Unit Heat Exchanger
13	

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the liquid pipe thermistor for indoor unit heat exchanger is short-circuited (resistance is 0.24 kΩ or below) or open circuited (resistance is 840 kΩ or above) during the operation, except “FAN Mode”. The indoor unit will be automatically restarted with the operation state before the failure when the fault is fixed.



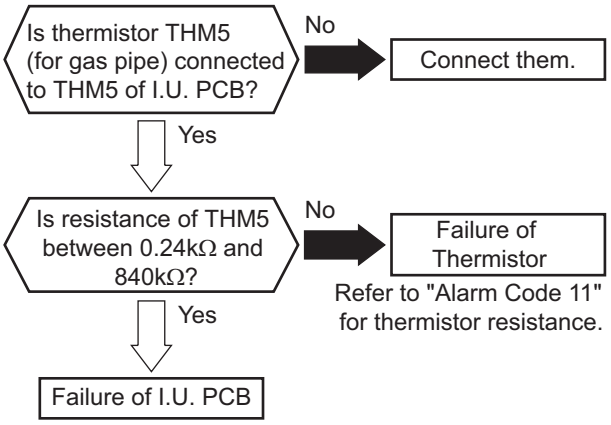
In Case of 4-way Cassette Type

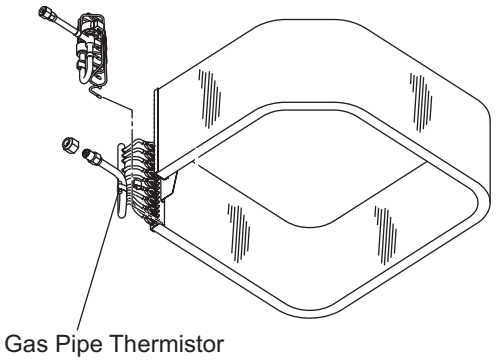
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Freeze Protection Thermistor	Failure	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to I.U. PCB.	Correctly connect wires.
Failure of I.U. PCB		Replace I.U. PCB and check operation.	Replace I.U. PCB if faulty.

Alarm code	14	Abnormal Gas Pipe Thermistor for Indoor Unit Heat Exchanger

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the gas pipe thermistor for indoor unit heat exchanger is short-circuited (resistance is 0.24 kΩ or below) or open circuited (resistance is 840 kΩ or above) during the operation except “FAN Mode”. The indoor unit will be automatically restarted with the operation state before the failure when the fault is fixed.





In Case of 4-way Cassette Type

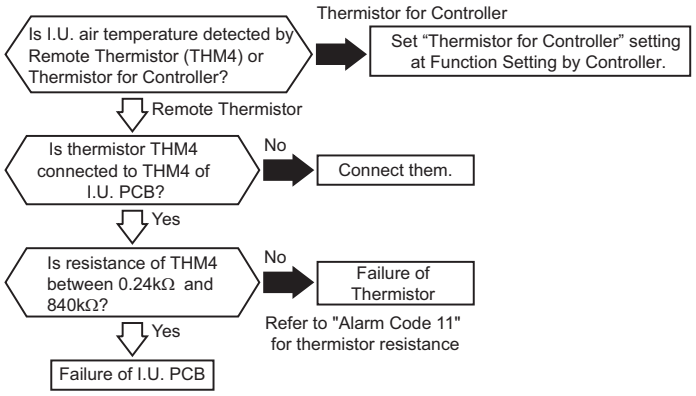
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Thermistor for Indoor Unit Heat Exchanger Gas Pipe Temperature	Failure	Check resistance.	Replace thermistor if faulty
	Incorrect Connection	Check wiring to I.U. PCB.	Correctly connect wires.
Failure of I.U. PCB		Replace I.U. PCB and check operation.	Replace I.U. PCB if faulty.

Alarm code	16	Abnormality of Remote Thermistor (for DOAS*1)

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.24 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during a heating, cooling or fan operation.



Event	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Remote Thermistor	Failure	Check resistance.	Replace remote thermistor if faulty.
	Incorrect Connection	Check wiring to Indoor Unit PCB.	Correctly connect wires.
Failure of Indoor Unit PCB		Replace Indoor Unit PCB and check operation.	Replace Indoor Unit PCB if faulty.

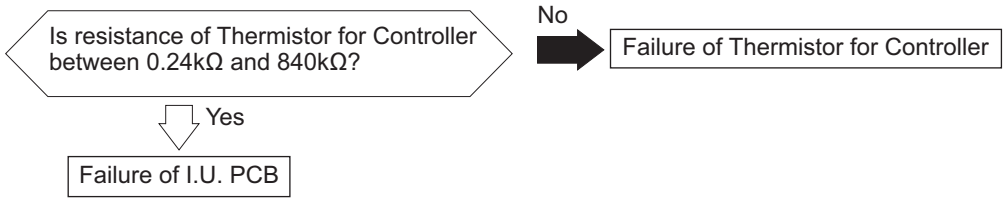
*1): Dedicated Outdoor Air System, All Fresh Air Indoor Unit

Alarm code 17	Abnormality of Thermistor for Controller (for DOAS*1)

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.24 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during a heating, cooling or fan operation.



Event	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Thermistor for Controller	Failure	Check short-circuit and disconnection wiring.	Replace controller if faulty.
Failure of I.U. PCB		Replace I.U. PCB and check operation.	Replace I.U. PCB if faulty.

NOTE:

The DOAS*1) can operate while utilizing the Remote Thermistor and the Controller Thermistor under certain mode.

While operating in this mode:

● If one of the thermistors fail, operation can be continued by using the value measured from the only thermistor working,

● If both of thermistors fail, this alarm code is displayed.

This alarm code will only appear when both thermistors are being used and both have failed.

For checking, follow page 76 “Alarm Code 16”.

*1): Dedicated Outdoor Air System, All Fresh Air Indoor Unit

Alarm code 19	Activation of Protection Device for Indoor Fan Motor, DC Motor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ During operation of indoor fan motor, if the indoor fan motor speed is less than 70rpm for 5s and this case occurs 3 times in 30 minutes, this alarm code will be indicated.

Alarm code"19"

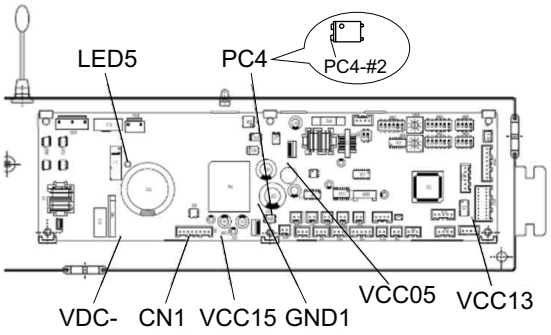
⚠ Caution

- Go through following check procedures after indoor fan is set to "High" speed.
- Electrical part is applied with high voltage, be careful during operation to avoid electric shock.

Check connection of PCN7 and CN1 on PCB

Is 220V applied between terminal L and N of TB 220V?

Note:
Turn off power source before performing inspection of wiring. Otherwise, DC motor failure may occur.



Is LED4 on PCB OFF?(*1)
- Yes → I.U. PCB failure → Replace PCB
  (*1) If no power supplied to PCB, LED4 is OFF.
- No ↓

Is LED5 on PCB OFF? (*2)
- Yes → I.U. PCB failure → Replace PCB
  (*2) Power supply to fan motor is abnormal (Normal DC310V)
- No ↓

Is output voltage of PCB normal ?(*3)
- No → I.U. PCB failure → Replace PCB
  (*3) Measure voltage between VCC15 and VDC - (should be 15V±10%)
- Yes ↓

Is output DC voltage of PCB ? (*4)
- No → I.U. PCB failure → Replace PCB
  (*4) Measure following voltages:
  Between VCC05 and GND: 5V±4%;
  Between VCC13 and GND: 13.1V±10%
- Yes ↓

(*5)
Unplug CN1 and start operation, if the voltage between pin #3 of CN1 and VDC - (Check point) over 1V after 10s, the RPM transmitting by PCB is normal.
Notes:
1. Voltage between pins as stated above should be 0.3 to 0.4V even the operation is stopped.
2. If failure outlined in this section occurs, there will be no voltage between pins as stated above.

Is fan RPM transmitted correctly? (*5)
- Yes ↓

Does fan motor rotate?
- No → Fan motor failure → (*5) → Replace fan motor
- Yes ↓

(*6)
Plug CN1 and start, if there is voltage output between pin #2 of PC4 and VDC-(Check point), it proves this function is normal.

Is feedback pulse of fan speed from motor to PCB correct? (*6)
- Yes → I.U PCB failure → (*6) → Replace PCB
  Note: Detected voltage as stated above should be appx. 0.2V even the operation is stopped.
- No ↓

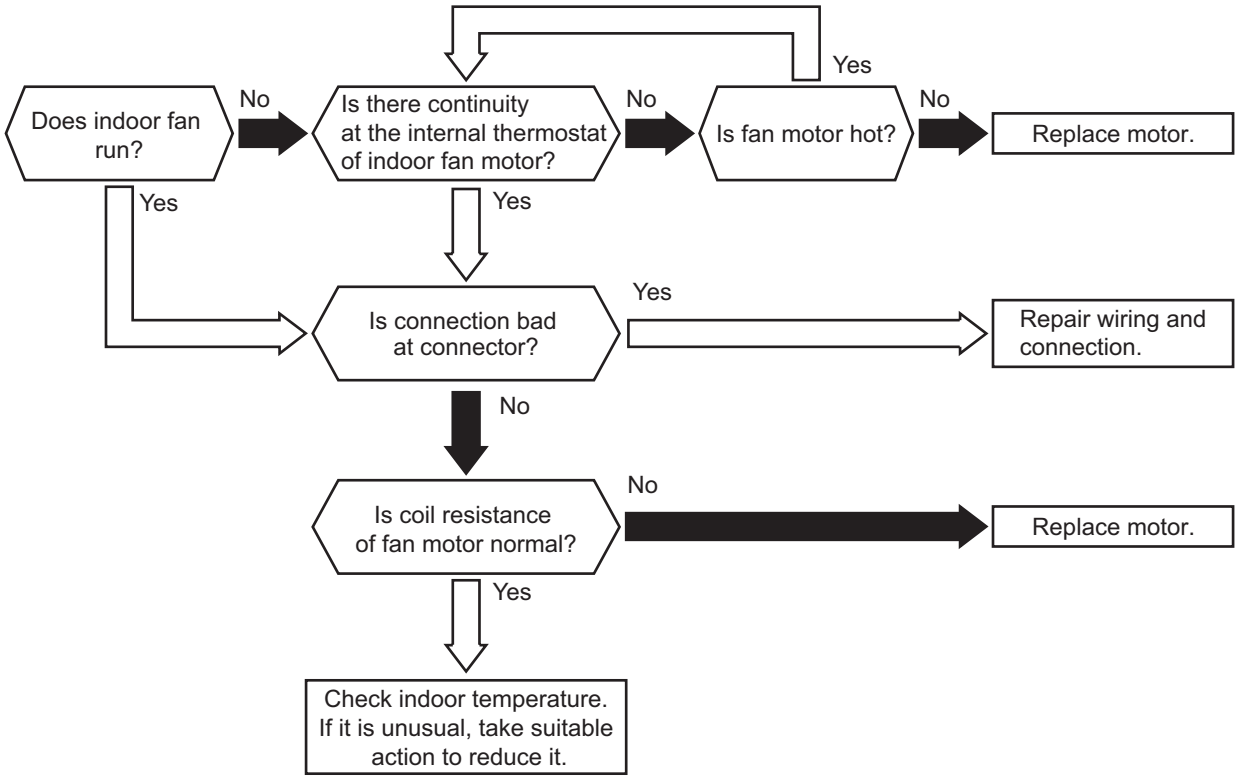
Fan motor failure → Replace fan motor

Indoor unit PCB failure → Replace I.U. PCB

Alarm code	19	Activation of Protection Device for Indoor Fan Motor (Indoor Unit with AC Motor)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when over approximately 1A is applied to the indoor unit fan motor.



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	Failure	Check continuity after fan motor temperature decreases to room temp.	Replace fan motor if no continuity.
		Contact Failure	Measure resistance with a tester.	Correct looseness. Replace connectors.
		Incorrect Connection	Check connection.	Repair connection.

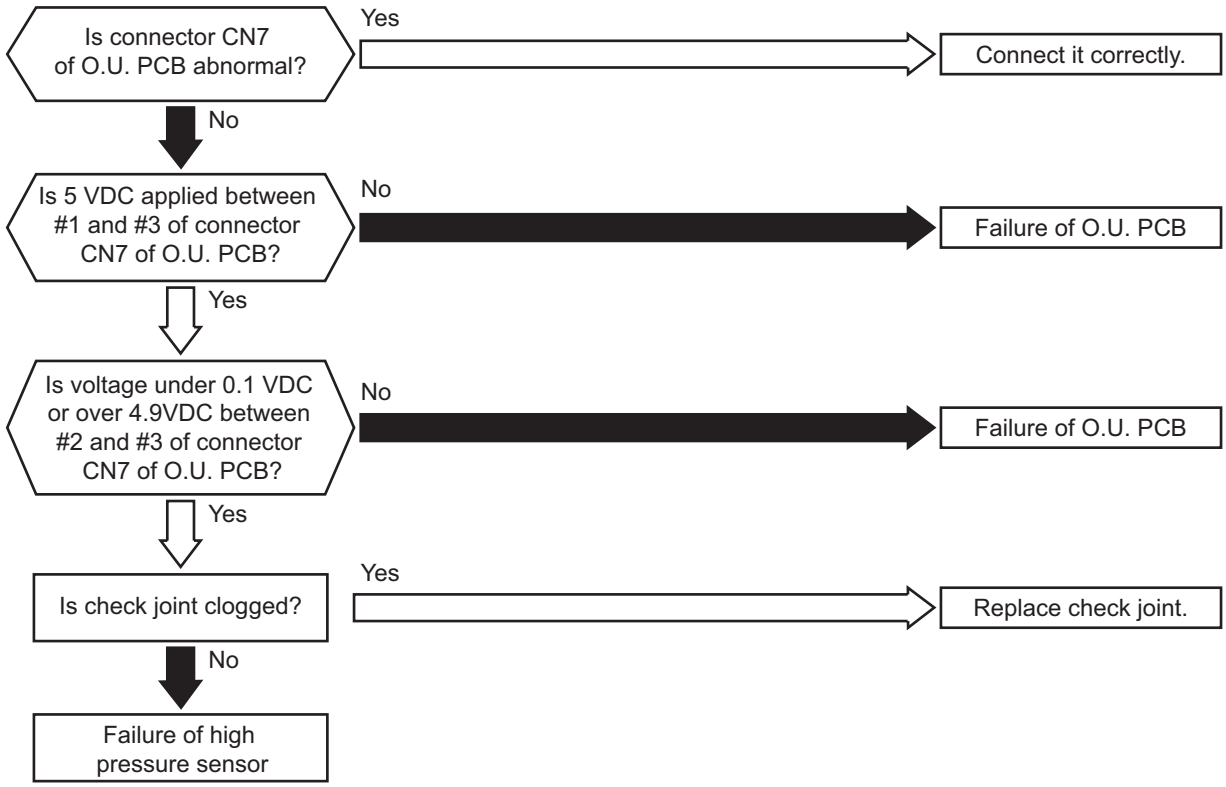
For other items, refer to “Service Manual” of indoor unit.

Alarm code	21	Abnormality of High Pressure Sensor for Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when output voltage of the pressure sensor decreases to 0.1V or less, or increases to 4.9V or more during operation.

O.U. PCB: Outdoor Unit PCB (PCB3)



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of High Pressure Sensor	Failure	Check resistance.	Replace thermistor connection.
	Incorrect Connection	Check wiring to O.U. PCB.	Repair wiring and connection.
Failure of O.U. PCB		Replace O.U. PCB and check operation.	Replace O.U. PCB if faulty.
Indicated Value of Pressure Value is Excessively High or Low	Malfunction of Pressure Sensor due to Faulty Check Joint	Check for clogging of check joint	Replace check joint.

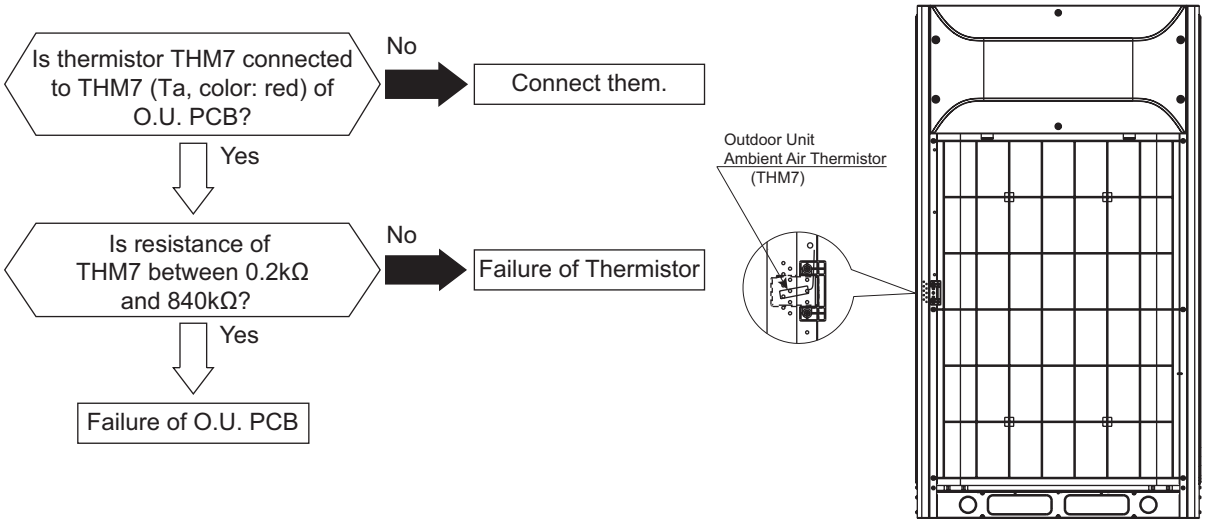
Alarm code	22	Abnormality of Thermistor for Outdoor Air Temperature (Outdoor Unit Ambient Thermistor)

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.2 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during operation.

O.U. PCB: Outdoor Unit PCB (PCB3)

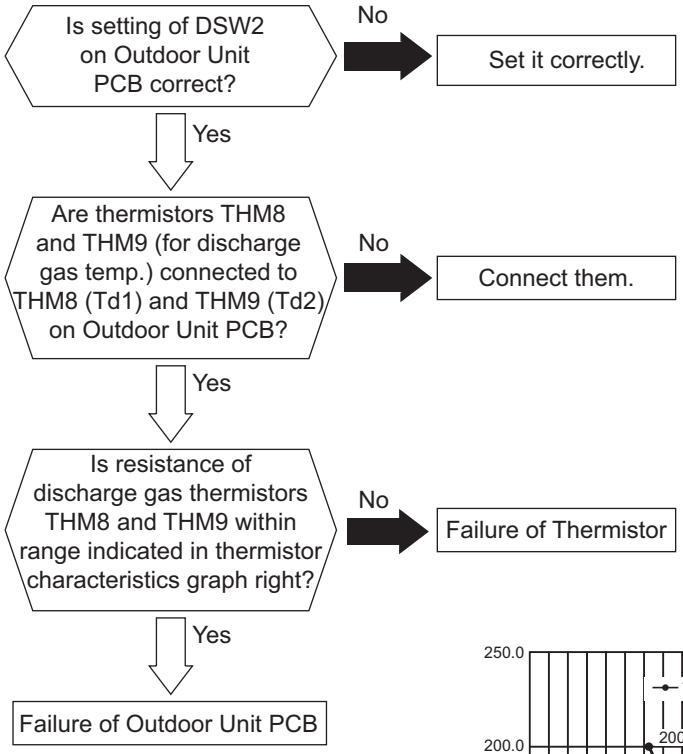


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Thermistor for Outdoor Air Temperature	Failure	Check resistance	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to O.U. PCB	Repair wiring and connection.

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

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.9 kΩ or less) or open sensor (5946 kΩ or more) of the thermistor is detected during operation.



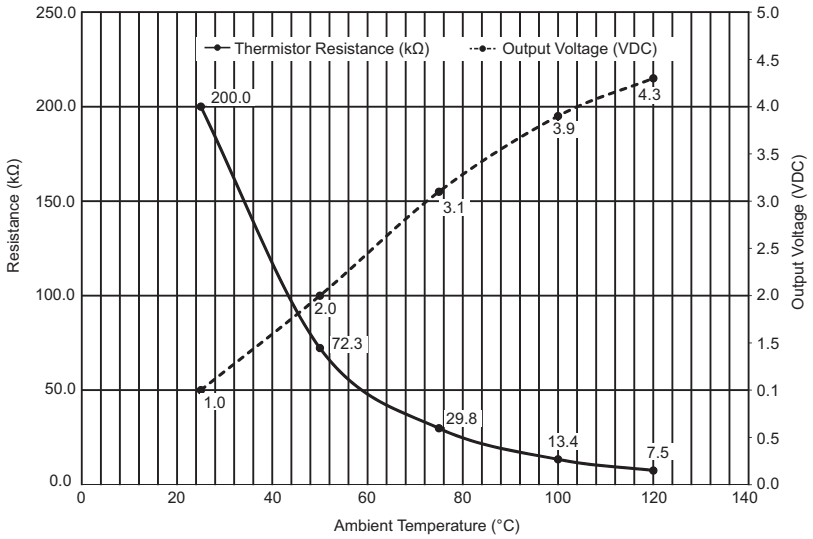
O.U. PCB: Outdoor Unit PCB (PCB3)

Model	Thermistor	
	Td1 (THM8)	Td2 (THM9)
8.0-16HNBCMQ	○	-
18-24HNBCMQ	○	○

In the case of the combination of outdoor units, each outdoor unit detect abnormality.

R25 = 200k°
When T = 25°C, RT = 200k°
B = 3920K

RT = R25 • exp B(1/T[K] - 1-298)



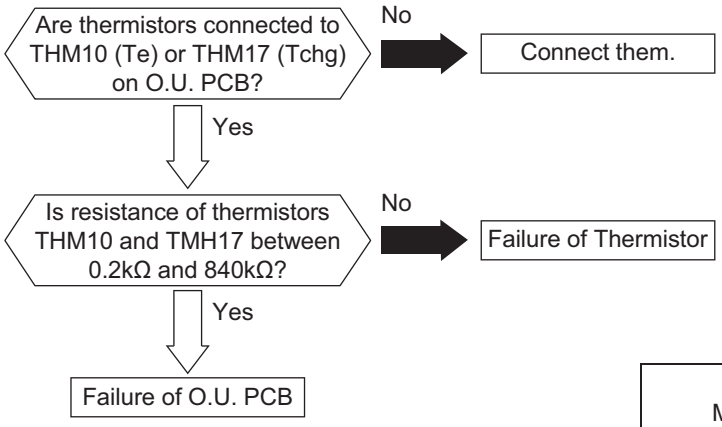
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Discharge Gas Thermistor	Failure	Check resistance	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to Outdoor Unit PCB	Repair wiring and connection.
Faulty Outdoor Unit PCB		Replace Outdoor Unit PCB and check operation	Replace Outdoor Unit PCB if faulty.
Incorrect Setting of DSW2 on Outdoor Unit PCB		Check Setting of DSW2 on Outdoor Unit PCB	Correctly set DSW2 on Outdoor Unit PCB.

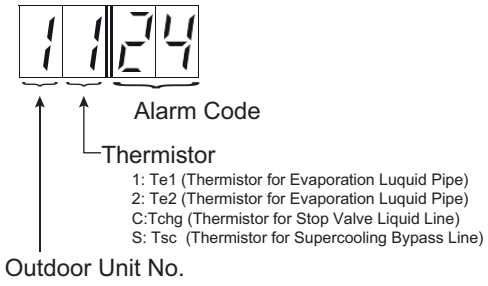
Alarm code	24	Abnormality of Thermistor for Evaporating Temperature during Heating Operation (Outdoor Unit Evaporating Thermistor)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB. (For the combination of outdoor units, the alarm code is displayed on PCB of outdoor unit A.) Additionally for the outdoor unit number and compressor number with abnormal thermistor, check the alarm code history.

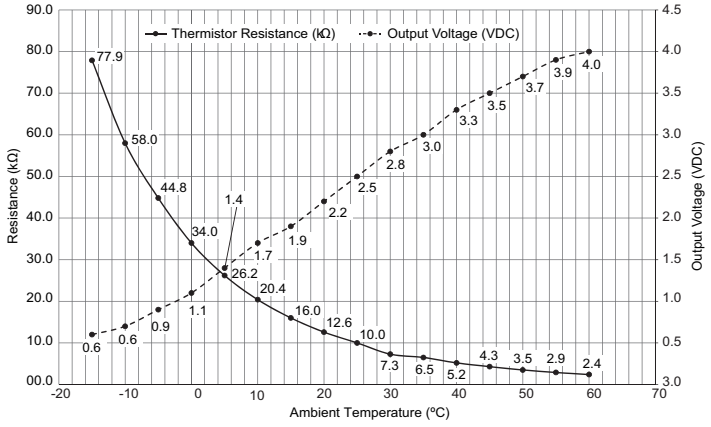
★ This alarm code is displayed when a short circuit (0.2 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during operation.

O.U. PCB: Outdoor Unit PCB (PCB3)





Model	Thermistor			
	Te1 (THM10)	Te2 (THM11)	Tchg (THM17)	Tsc (THM23)
8.0-18HNBCMQ	○	-	○	○
20-24HNBCMQ	○	○	○	○



Note:
This data is applicable to the following thermistors.

1. Ambient Temperature Thermistor (THM7),
2. Evaporation Liquid Line Thermistor (THM10,THM11)
3. Evaporation Gas Line Thermistor (THM12),
4. Stop Valve Liquid Line Thermistor (THM17),
5. Super Cooling Bypass Line Thermistor (THM23)

R_{25} = 200kˇ
When T = 25ºC, RT = 200kˇ
B = 3920K

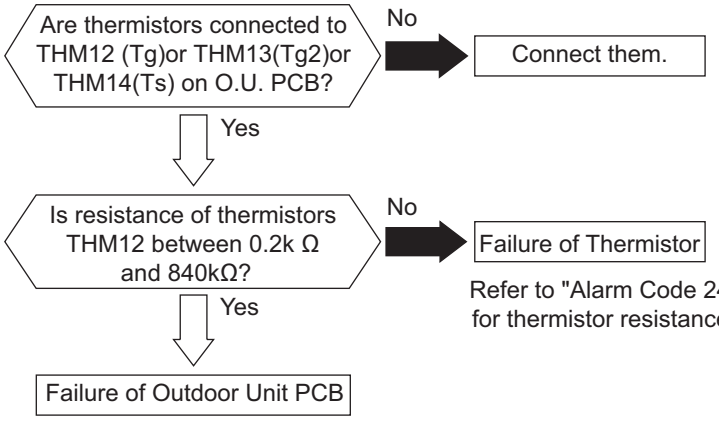
$RT = R_{25} \cdot \exp B(1/T[K] - 1\text{-}298)$

Phenomenon	Cause	Check Item	Action (Turn Off Main Switch)
Failure of Thermistor for Evaporating Temperature during Heating	Failure	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to O.U. PCB.	Repair wiring and connection.
Failure of O.U. PCB		Replace O.U. PCB and check operation.	Replace O.U. PCB if faulty.

Alarm code	25	Abnormality of Thermistor for Outdoor Unit Heat Exchanger Gas Pipe (Tg/Tg2/Ts)

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when a short circuit (0.2 kΩ or less) or open sensor (840 kΩ or more) of the thermistor is detected during operation.



Tg:Thermistor for Evaporation Gas L*Ine
Outdoor Unit PCB: Outdoor Unit PCB (PCB3)

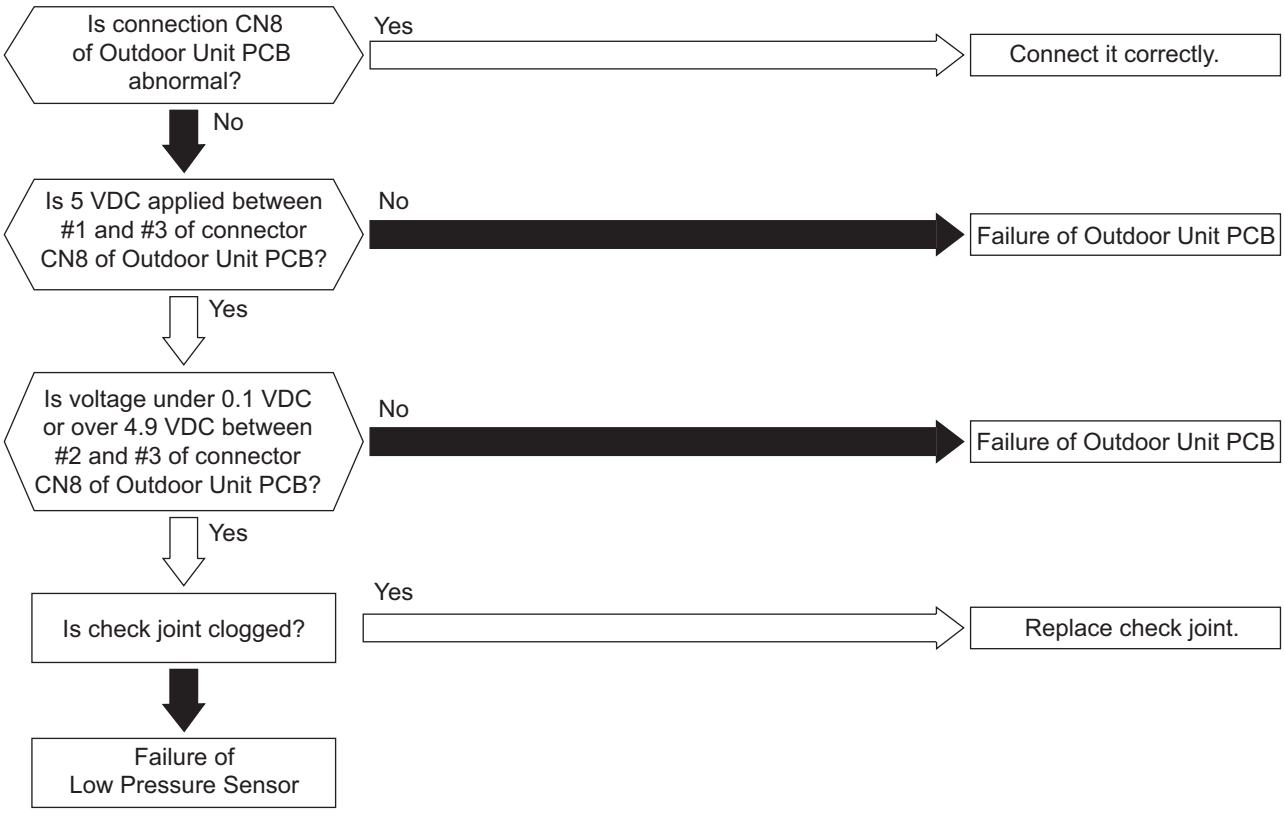
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Failure of Outdoor Unit Gas Pipe Termistor	Failure	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to Outdoor Unit PCB.	Repair wiring and connection.
Failure of Outdoor Unit PCB		Replace Outdoor Unit PCB and check operation.	Replace Outdoor Unit PCB if faulty.

Alarm code 29	Abnormality of Low Pressure Sensor for Outdoor Unit

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when output voltage of the pressure sensor decreases to 0.1V or less or increases to 4.9V or more during running.

Outdoor Unit PCB: Outdoor Unit PCB (PCB3)

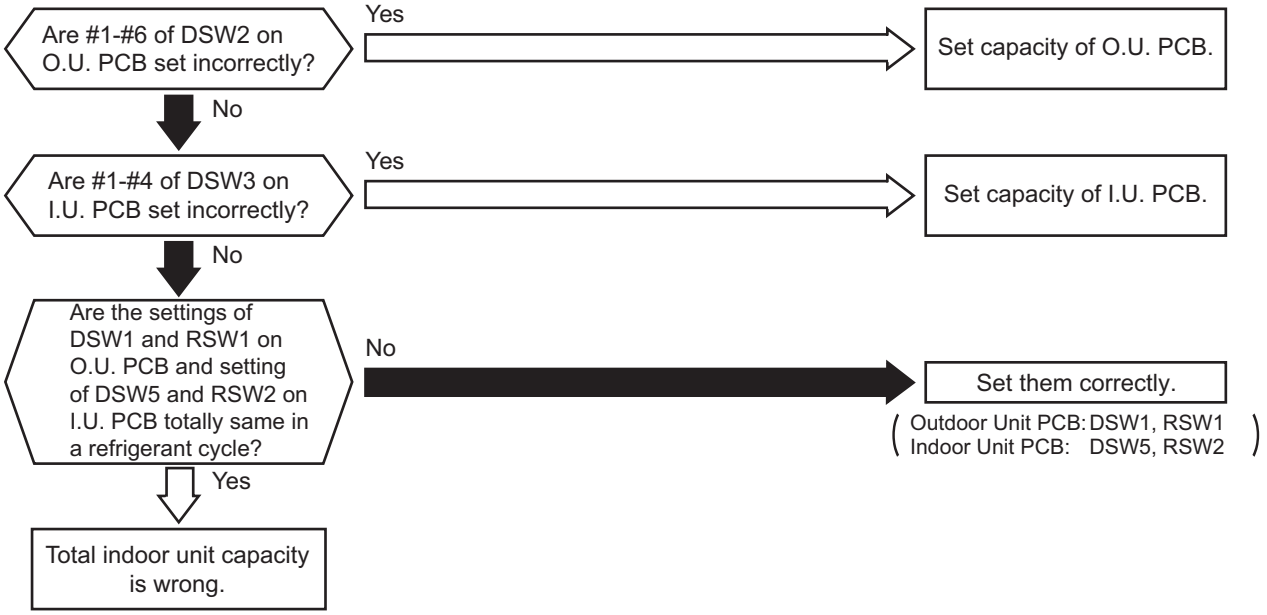


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Low Pressure Sensor	Failure	Check output voltage is correct.	Replace pressure Failure sensor if faulty.
	Incorrect Connection	Check wiring to Outdoor Unit PCB.	Repair wiring and connection.
Faulty Outdoor Unit PCB		Replace Outdoor Unit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

Alarm code	31	Incorrect Capacity Setting of Indoor Unit and Outdoor Unit

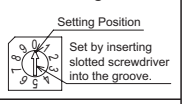
- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.
- ★ This alarm code is indicated when the capacity setting DIP switch, DSW2 on the outdoor unit PCB, is not set (all the settings from #1 to #6 are OFF) or set incorrectly.
- ★ This alarm code is displayed when the total indoor unit capacity is less than 50% or more than A% of the combined outdoor unit capacity.

O.U. PCB: Outdoor Unit PCB (PCB3)
I.U. PCB: Indoor Unit PCB

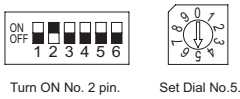


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Incorrect Capacity Setting of Indoor Unit		Check combination of indoor units and capacity setting of I.U. PCB.	Correctly set dip switch, DSW3.
Incorrect Capacity Setting of Outdoor Unit		Check capacity setting of O.U. PCB.	Correctly set dip switch, DSW2.
Total Indoor Unit Capacity Connected to 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 A%.
Refrigeration Cycle Setting of Outdoor Unit and Indoor Unit is Different		Check refrigeration cycle setting of O.U. PCB and I.U. PCB.	Set them correctly.

Refrigerant Cycle No. Setting

	Setting Switch	
	10 digit	1 digit
		
Outdoor Unit	DSW1	RSW1
Indoor Unit (H-LINK II)	DSW5	RSW2

Example of setting Refrigerant Cycle No.25



Turn ON No. 2 pin. Set Dial No.5.

DSW and RSW setting before shipment is 0.
Maximum in setting refrigerant cycle No. is 63.

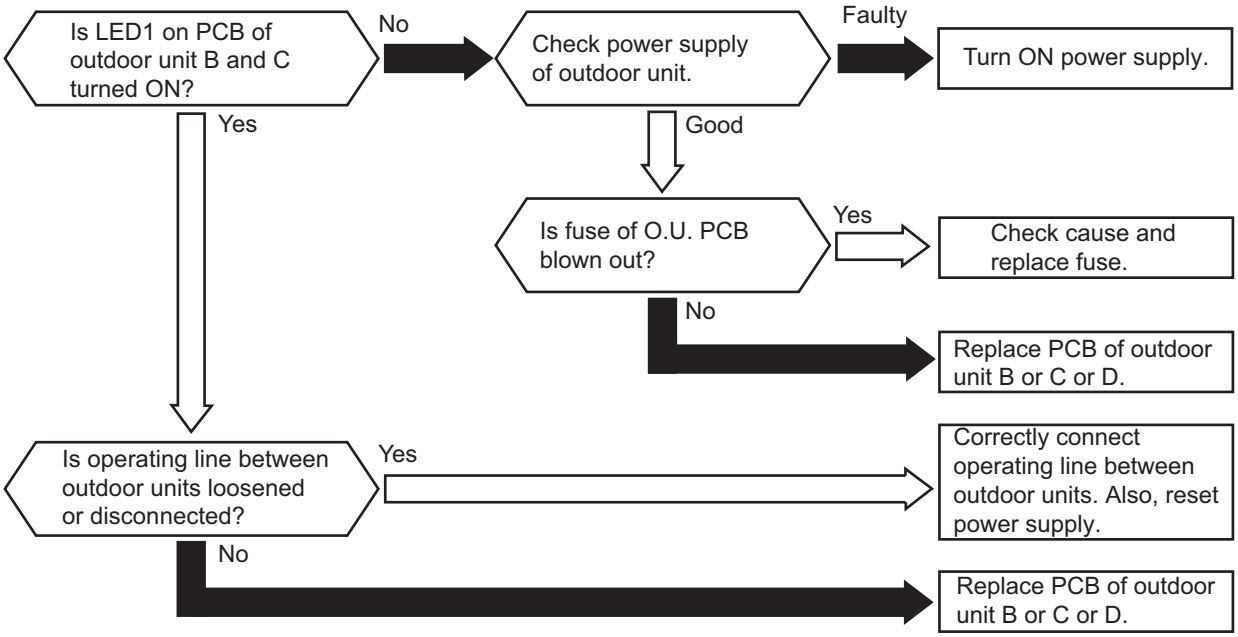
For other items, refer to Sevice Manual of Indoor Unit.

Alarm code 31	Abnormal Transmitting between Outdoor Units

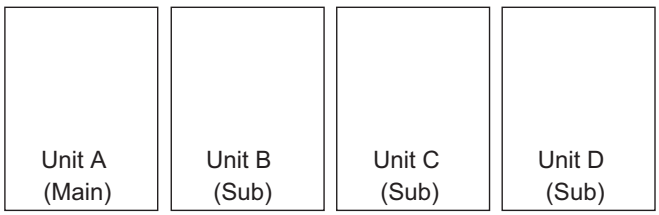
- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when an abnormal condition continues for 30 seconds after normal transmission between outdoor units, also if the abnormal condition continues for 30 seconds even after the micro-computer is automatically reset.

O.U. PCB: Outdoor Unit PCB (PCB3)



Arrangement of Outdoor Units
(Four Unit Combination)



Alarm code 35	Incorrect Indoor Unit No. Setting

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed after 5 minutes power-on of the outdoor unit No. set by RSW6 and RSW2 duplicates in the same refrigerant group.

NOTE:

In case of H-LINK system, this alarm code is displayed when DSW1 and RSW1 of the outdoor unit PCB and DSW5 and RSW1 of the indoor unit PCB are incorrectly set.

In this case, set them correctly after turning OFF the main switch, and again turn ON the main switch. When the refrigerant No. setting of outdoor unit (H-LINK II) and that of outdoor unit (H-LINK) are duplicated, the alarm “35” may go ON and OFF repeatedly.

Alarm code 36	Incorrect Indoor Unit Combination

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

Alarm code	38	Abnormality of Picking up Circuit for Protection in Outdoor Unit

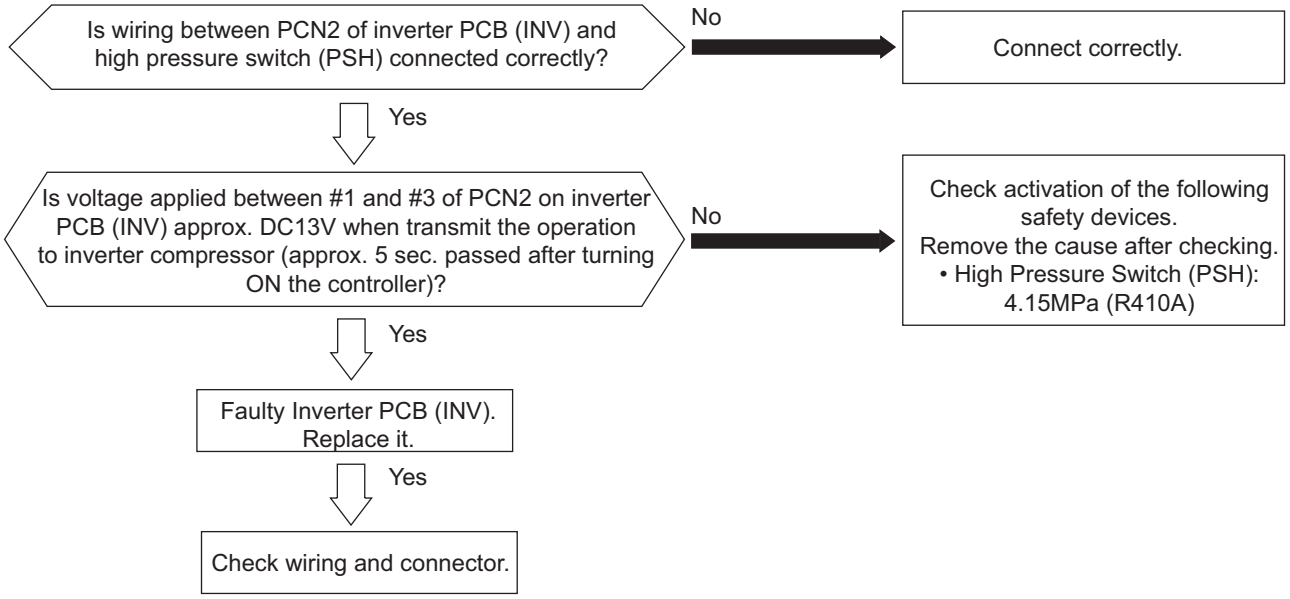
● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

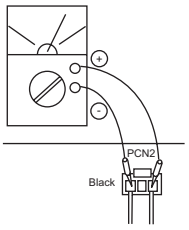
★ This alarm code is displayed when DC13V is applied to the main circuit PCB(s) connector at the time inverter compressor operation command is transmitted to O. U. PCB3 (approximately 5 sec passed after turning ON RUN/STOP switch). For trouble shooting, make sure to connect each wiring to PCN2, CN5, CN5-1 and CN5-2 before use tester. If PCN2 wiring is not connected correctly when using the tester, DC13V is continuously detected and end in checking failure.

<380-415V/50Hz>

O.U. PCB: Outdoor Unit PCB (PCB3)



PCB	Inverter PCB (INV)
Connector	PCN2
Pin No.	#1, #3



NOTE:

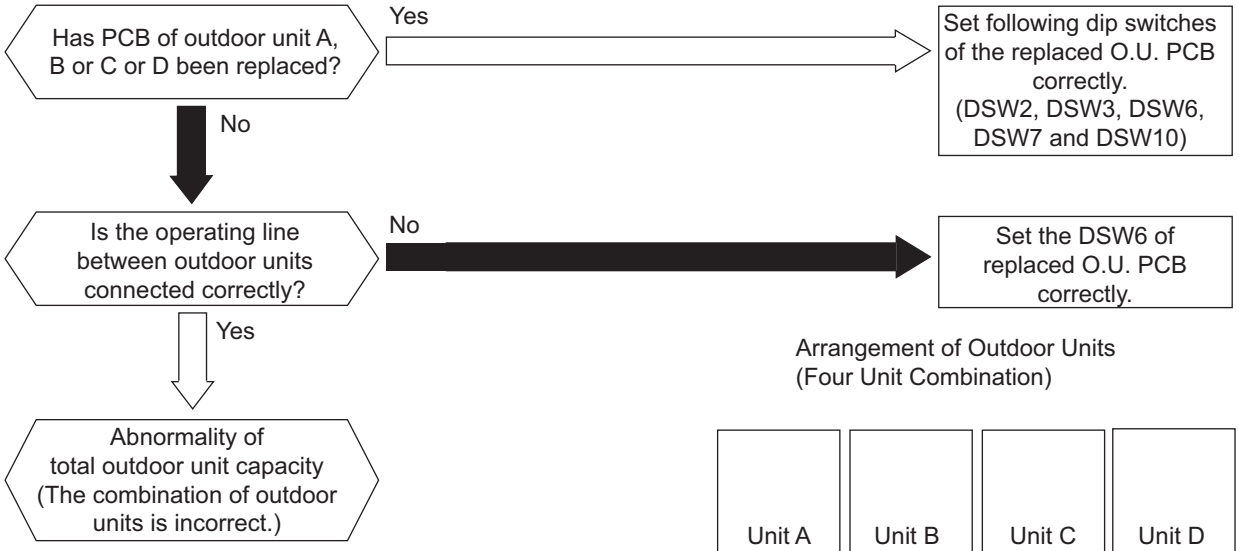
1. For the maintenance or replacement of inverter PCB, perform the high voltage discharge work according to the item 3.2.1.
2. If the high pressure switch (PSH) failure (open phase or disconnecting wiring), this alarm code may occur. Check alarm code 02 trouble shooting too.

Alarm code	Abnormality of Outdoor Unit Capacity

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when the total capacity of outdoor unit connected to the transmission terminal between outdoor units exceeds 96HP for standard outdoor unit;

O.U. PCB: Outdoor Unit PCB (PCB3)



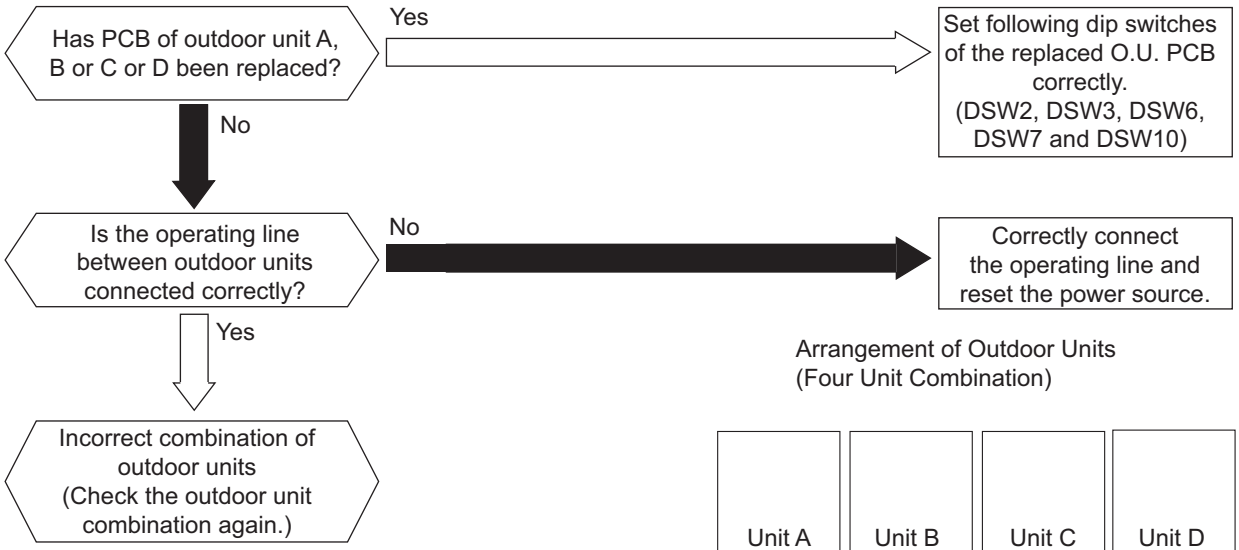
Arrangement of Outdoor Units
(Four Unit Combination)

Alarm code	Incorrect Setting of Outdoor Unit Model Combination or Voltage

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when the model setting for outdoor unit connected to the transmission terminal between outdoor units is incorrect.

O.U. PCB: Outdoor Unit PCB (PCB3)



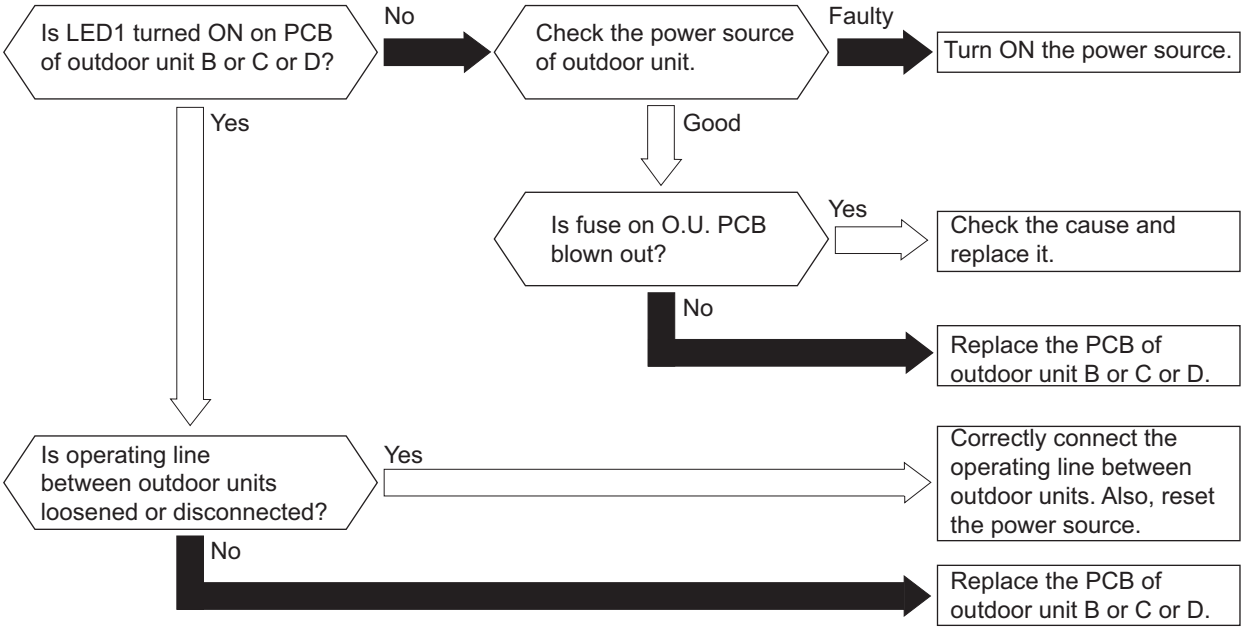
Arrangement of Outdoor Units
(Four Unit Combination)

Alarm code	3d	Transmission Failure between Main Unit and Sub Unit(s)

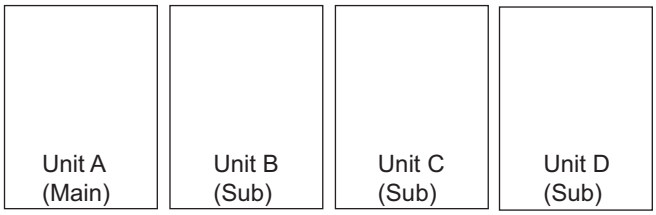
- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ For the combination of outdoor units, this alarm code is displayed when transmission to outdoor unit B, or C is NOT provided for 30 seconds.

(Alarm code “31” will be displayed when transmission to all the outdoor units connected to the transmission terminals between outdoor units is NOT provided.)



Arrangement of Outdoor Units
(Four Unit Combination)

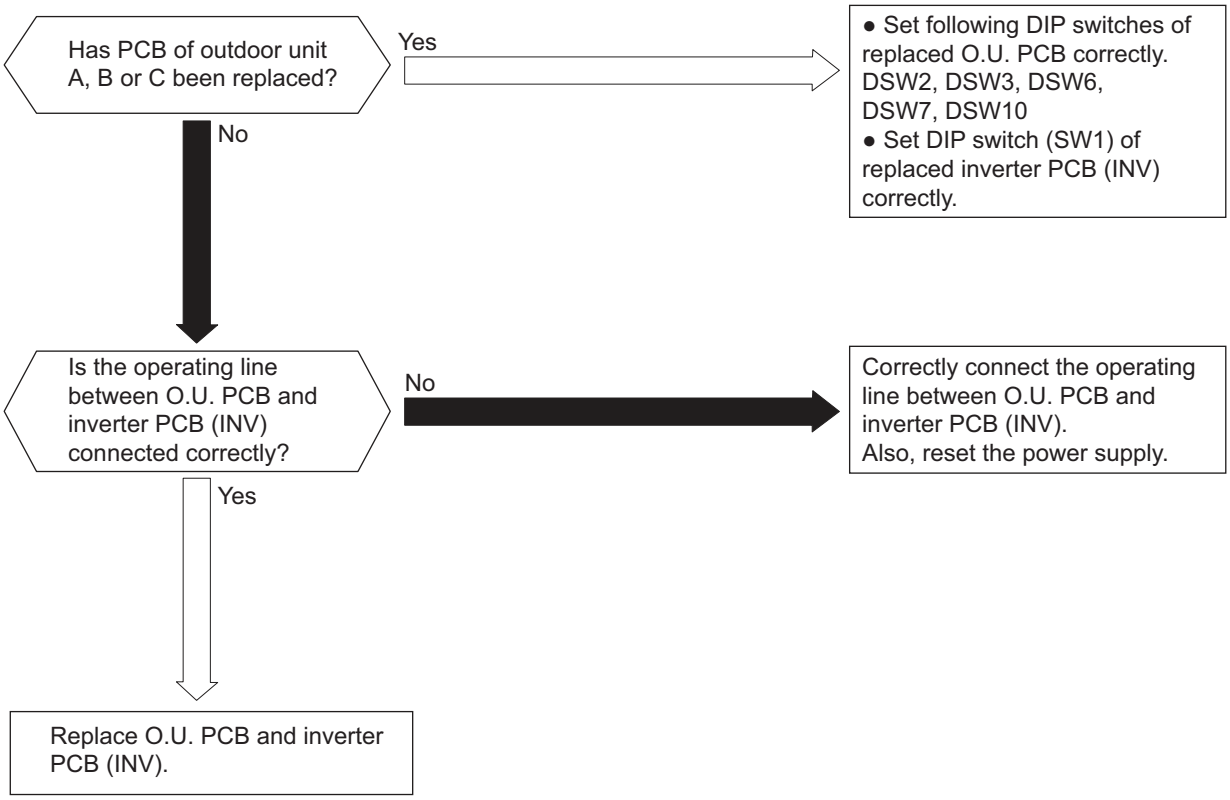


Alarm code	3E	Abnormality of Inverter PCBs Combination of Outdoor Unit

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is indicated when an incorrect model code setting of the outdoor unit is connected to the terminals between the outdoor units' communication terminal (TB2 No. 3 and 4 terminals on the PCB3 for the outdoor unit combination).



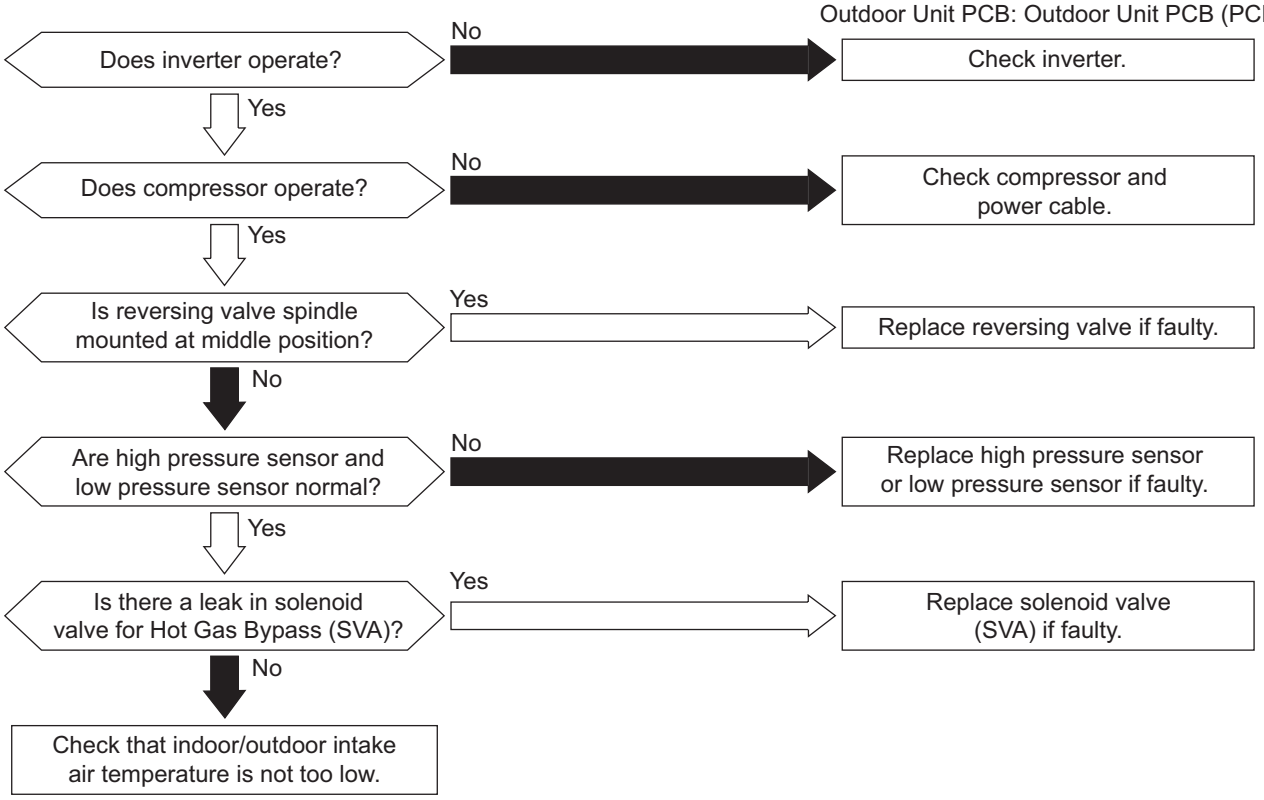
Alarm code 43	Activation of Low Compression Ratio Protection Device

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ The alarm code 43 is displayed when the following condition occurs more than twice in an 30 minutes. If the following condition is continued for one minute, all the compressors may be stopped and the unit automatically retried after 3 minutes.

Compression ratio ε = {(Pd + 0.1) / (Ps + 0.06)}, calculated from a discharge pressure (Pd MPa) and suction pressure (Ps MPa) is lower than 1.5.

Outdoor Unit PCB: Outdoor Unit PCB (PCB3)



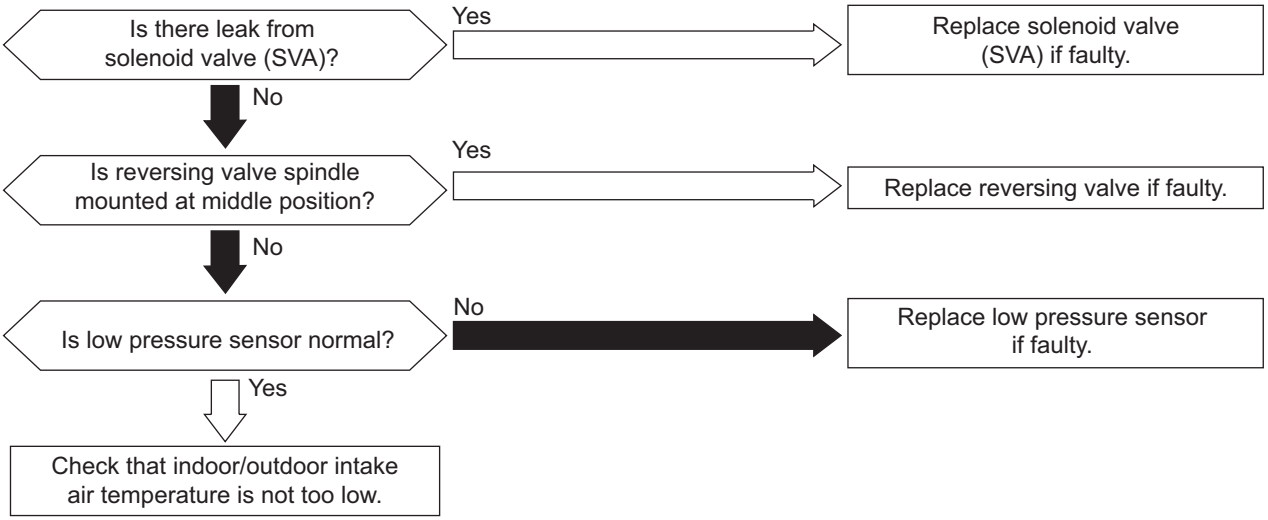
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Comression Ratio	Inverter is not functioning.	Check inverter.	Relace inveretr PCB if faulty.
	Compressor is not Operating.	Check compressor.	Replace compressor if faulty
	Valve Stoppage at Middle Position of Reversing Valve	Measure suction pipe temperature of reversing valve	Replace reversing valve if faulty.
	Abnormality of High or Low Pressure Sensor	Check connector for Outdoor Unit 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)	Check Solenoid Valve.	Replace SVA if there is leakage.

Alarm code 44	Activation of Low Pressure Increase Protection Device

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ IF the suction pressure (Ps) of the compressor is more than P1* for 1 minute, all the compressors stop and then the operation is automatically retried after 3 minutes. If this occurs again twice in the next 30 minutes, this alarm code is displayed.

O.U. PCB: Outdoor Unit PCB (PCB3)



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Suction Pressure	Leakage from Solenoid Valve (SVA)	Check outlet pipe temp. of solenoid valve (SVA).	Check connecting wires. Replace solenoid valve (SVA) if faulty.
	Valve Stoppage at Middle Position of Reversing Valve	Measure suction gas pipe temp. of reversing valve	Replace reversing valve if faulty.
	Abnormal Low Pressure Sensor	Check connectors of O.U. 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.

* P1

Tamin>44°C, 1.80Mpa

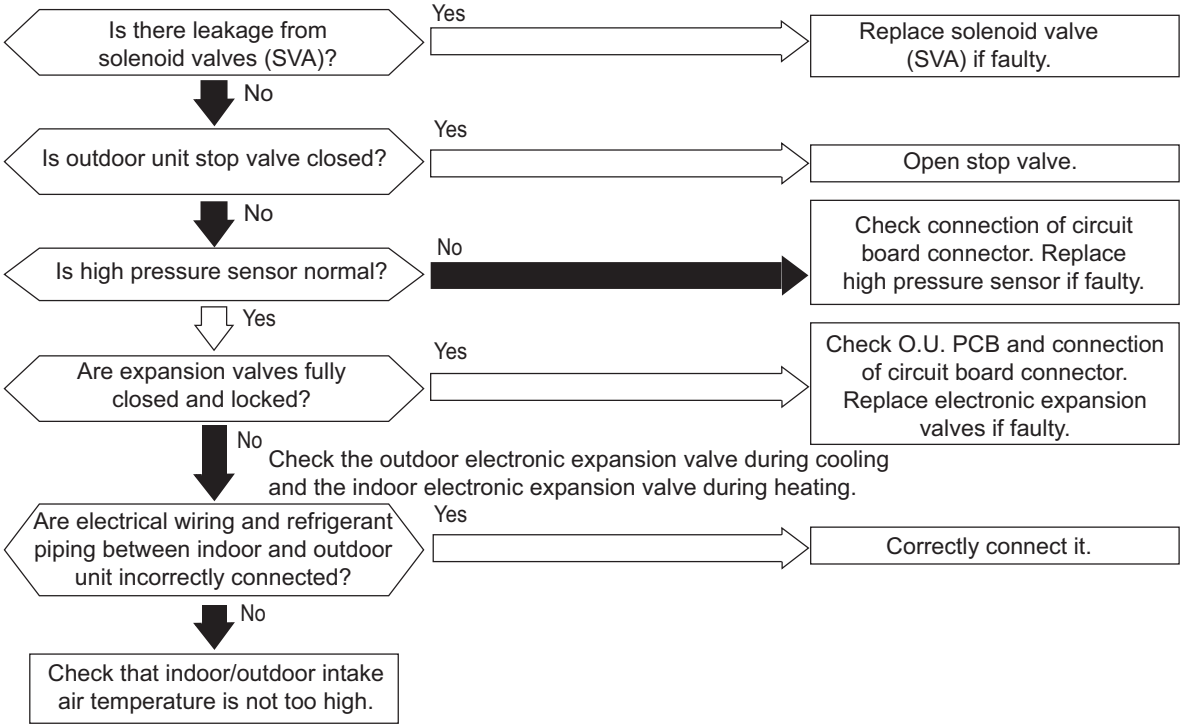
Except stated as above: 1.40Mpa.

Alarm code 45	Activation of High Pressure Increase Protection Device

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ If the discharge pressure (Pd) of the compressor is more than 3.8MPa for 2 seconds, all the compressors stop and then the operation is automatically retried after 3 minutes. If this occurs again twice in the next 30 minutes, this alarm code is displayed.

O.U. PCB: Outdoor Unit PCB (PCB3)
I.U. PCB: Indoor Unit PCB



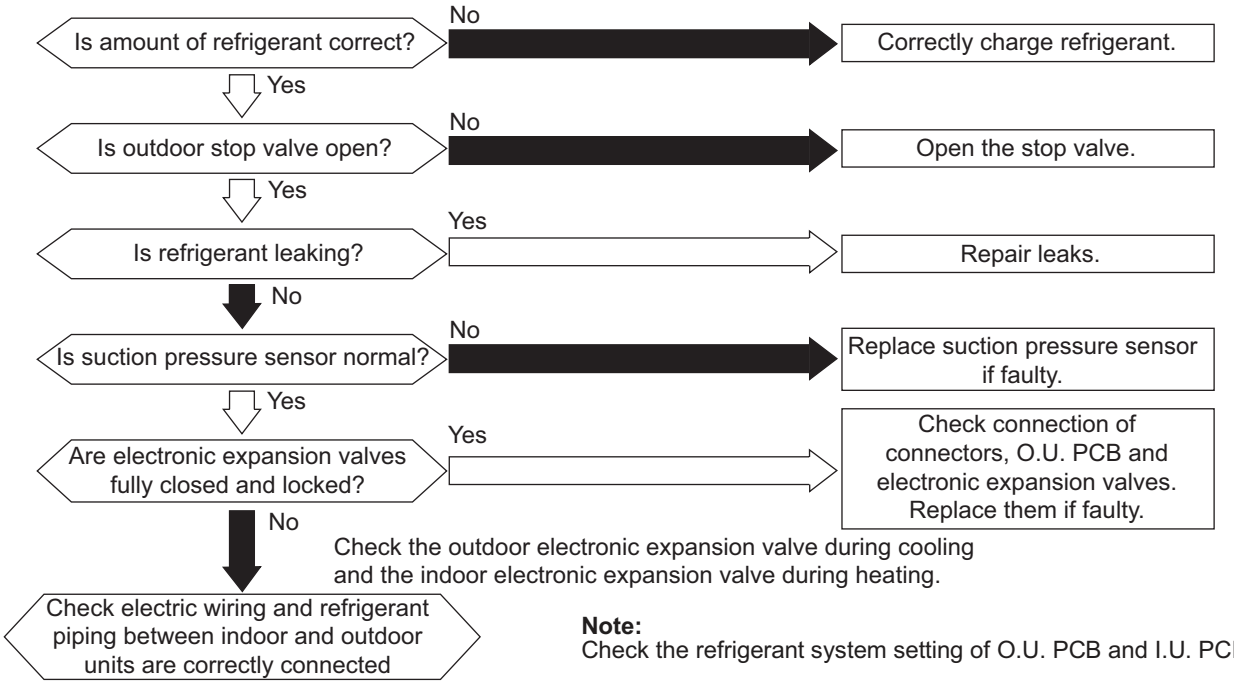
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively High Discharge Pressure	Leakage from Solenoid Valve (SVA)	Check outlet temp. of solenoid valve (SVA).	Check connection. Replace solenoid valve (SVA) if faulty.
	Closed Stop Valve	Check stop valve.	Open stop valve.
	Abnormal High Pressure Sensor	Check connectors for O.U. 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 them.
	Locked Expansion Valve (Fully Closed)	Check connector for O.U. PCB.	Repair connector for O.U. PCB or expansion valve. Replace it if faulty.
Stoppage of Indoor Fan <Wall Type 1.0 to 3.0HP Only>	Melted Fuses	Check continuity of fuses	Replace fuses.
	Faulty I.U. PCB	Replace I.U. PCB and check operation.	Replace I.U. PCB if faulty

Alarm code 47	Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)

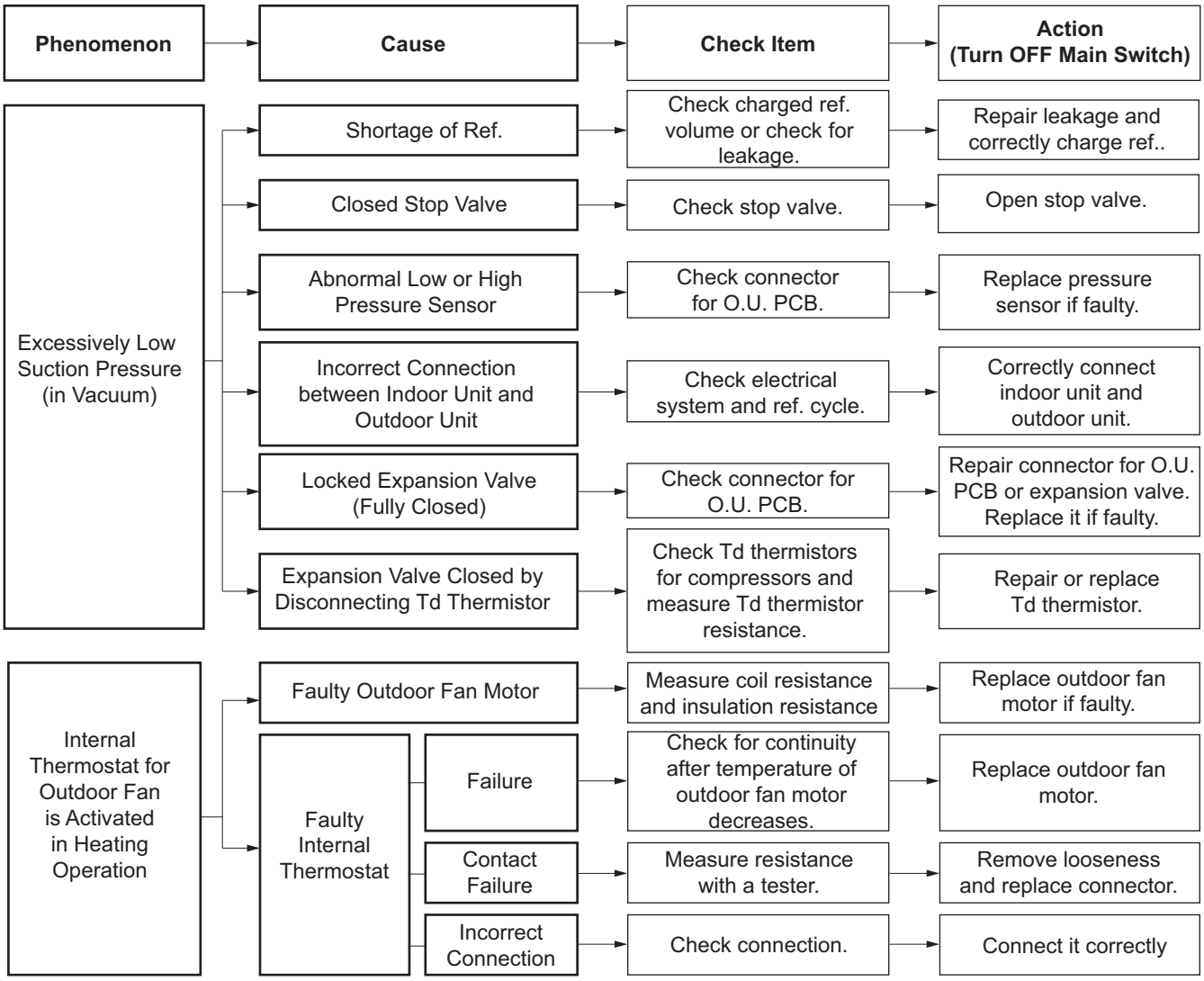
- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ If the suction pressure (Ps) of the compressor is less than 0.09MPa for 12 minutes, the compressor stops. If this occurs again twice in the next 60 minutes, this alarm code is displayed.

O.U. PCB: Outdoor Unit PCB (PCB3)
I.U. PCB: Indoor Unit PCB



Note:
Check the refrigerant system setting of O.U. PCB and I.U. PCB.


Phenomenon
Cause
Check Item
Action (Turn OFF Main Switch)
Excessively Low Suction Pressure (in Vacuum)
Shortage of Ref.
Check charged ref. volume or check for leakage.
Repair leakage and correctly charge ref..
Closed Stop Valve
Check stop valve.
Open stop valve.
Abnormal Low or High Pressure Sensor
Check connector for O.U. PCB.
Replace pressure sensor if faulty.
Incorrect Connection between Indoor Unit and Outdoor Unit
Check electrical system and ref. cycle.
Correctly connect indoor unit and outdoor unit.
Locked Expansion Valve (Fully Closed)
Check connector for O.U. PCB.
Repair connector for O.U. PCB or expansion valve. Replace it if faulty.
Expansion Valve Closed by Disconnecting Td Thermistor
Check Td thermistors for compressors and measure Td thermistor resistance.
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
Failure
Check for continuity after temperature of outdoor fan motor decreases.
Replace outdoor fan motor.
Contact Failure
Measure resistance with a tester.
Remove looseness and replace connector.
Incorrect Connection
Check connection.
Connect it correctly

Alarm code 48	Activation of Inverter Overcurrent Protection Device

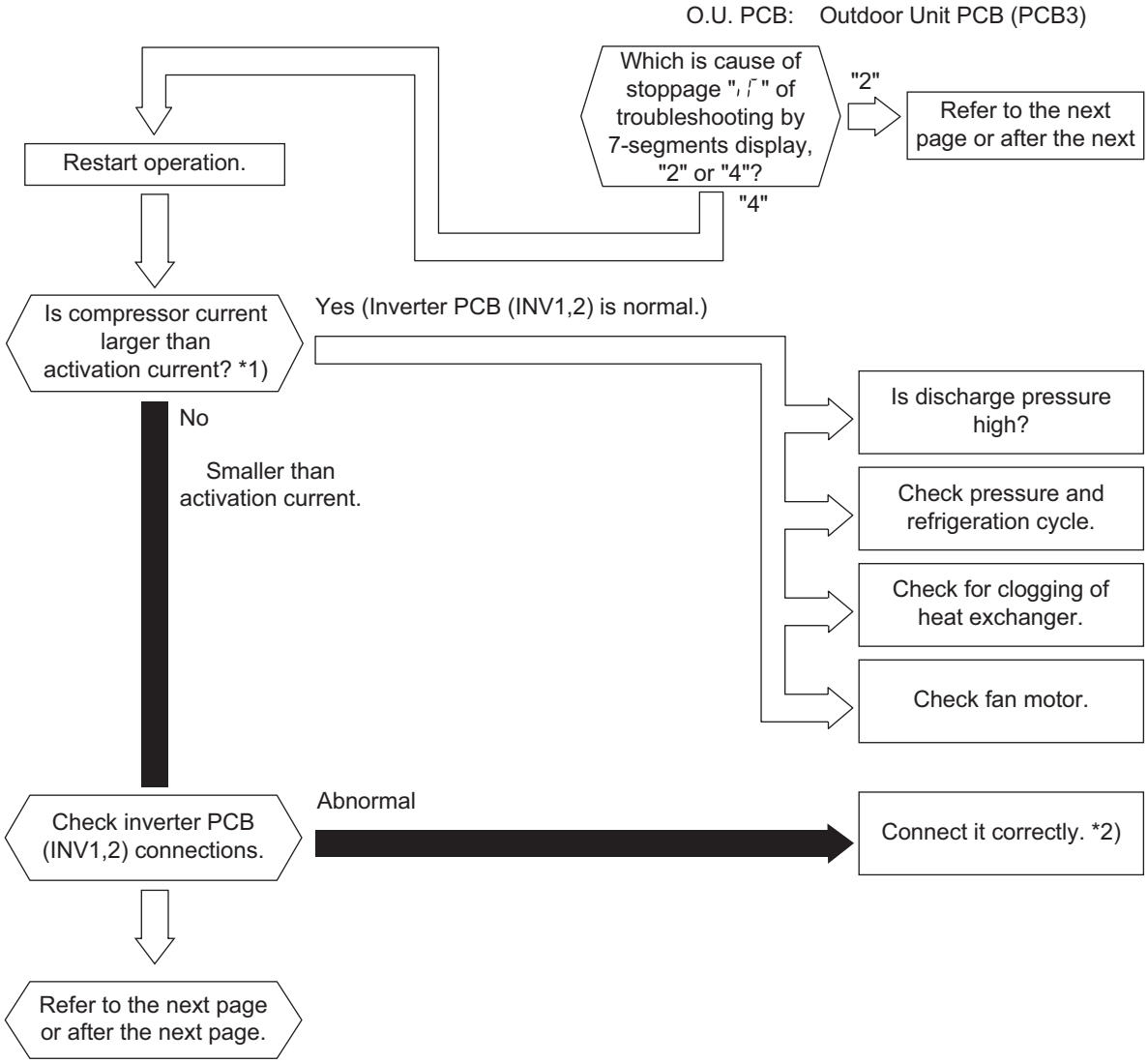
- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ This alarm code is displayed when inverter electronic thermal protection is activated 6 times within 30 minutes. If this occurs less than 6 times in 30 minutes, the operation is automatically retried.

Conditions of Activation:

(1) Inverter current with 105% of the rated current runs for 30 seconds continuously.

(2) Inverter current runs intermittently and the accumulated time reaches up to 3 minutes, in 10 minutes.



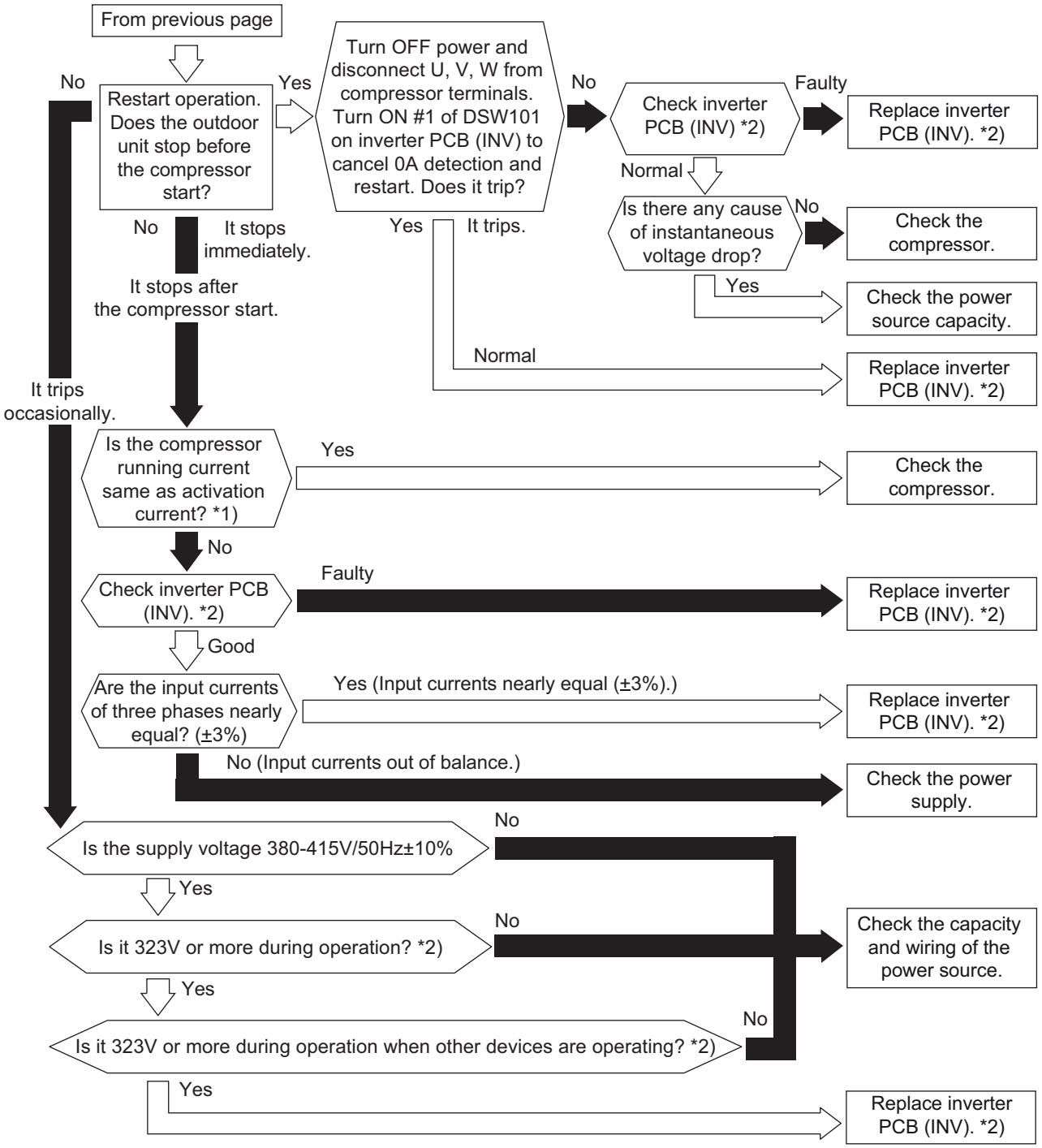
*1): Regarding the setting value of activation current, refer to the item 3.2.1.

*2): Regarding replacing or checking method for inverter parts, refer to the item 3.2.1.

Inverter Stoppage Code

iTC	Cause of Inverter Stoppage
2	Instantaneous Overcurrent
4	Inverter Overcurrent

<380-415V/50Hz>



*1): Regarding the setting value of activation current, refer to the item 3.2.1.

*2): For the maintenance and replacement of inverter PCB, perform the high voltage discharge work according to the item 3.2.1.

Alarm code	51	Abnormality of Current Sensor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

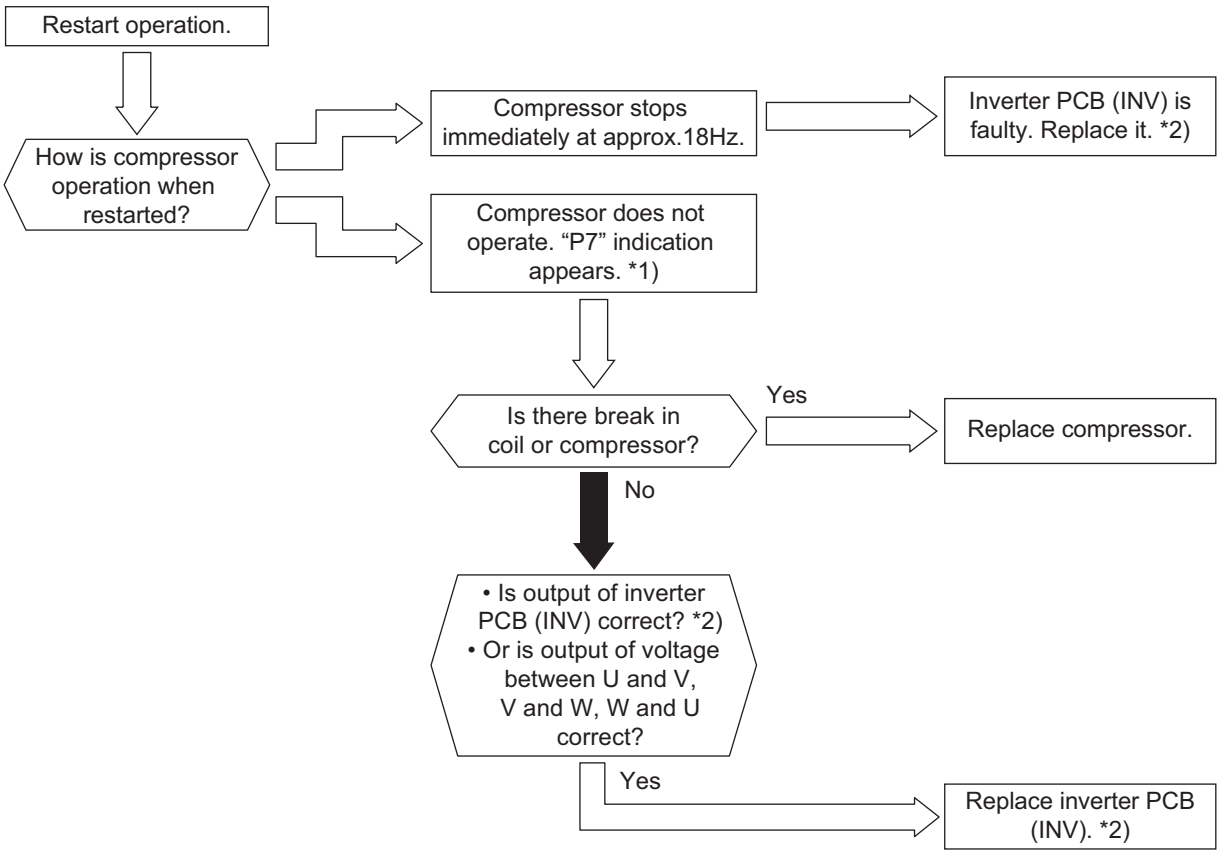
★ In case that the abnormality of current transformer (0A detecting) occurs 3 times within 30 minutes, this alarm code is displayed. If this occurs less than 3 times in 30 minutes, the operation is automatically retried.

Conditions of Activation:

This alarm code is displayed when the following conditions occur.

(1) Before the fan motor operation is started, the fan controller current beyond +60% of the rated current.

(2) After phase positioning is completed, the running current for the phase positioning is lower than criterion value.



*1): “P7” appears on 7-segment on the outdoor unit PCB.

*2): For the maintenance and replacement of inverter PCB, perform the high voltage discharge work according to the item 3.2.1.

Inverter Stoppage Code

iTC	Cause of Inverter Stoppage
1	Activation of Transistor Module Protection
8	Abnormal Current Sensor
12	Ground Fault Detection
21	Out-of-Synchronism Detection

Alarm code 53	Inverter Error Signal Detection

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ The inverter PCB has the abnormality detection function (Inverter Current Sensor). This alarm is displayed when any of the following conditions is met 7 times in 30 minutes. If this occurs less than 7 times in 30 minutes, the operation is automatically retried.

Conditions of Activation:

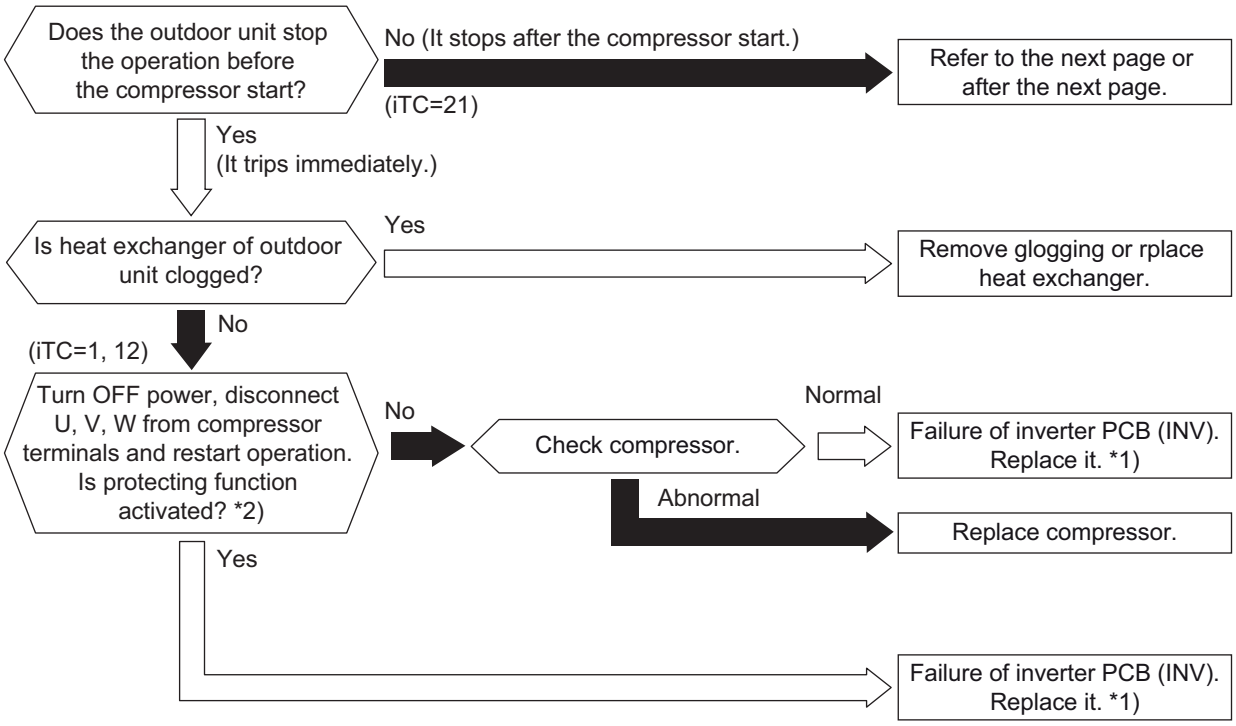
This alarm code is displayed when the following conditions occur.

(1) An abnormal current is applied to the inverter current sensor due to a short circuit, a ground fault or overcurrent.

(2) The temperature at the inverter current sensor increases abnormally.

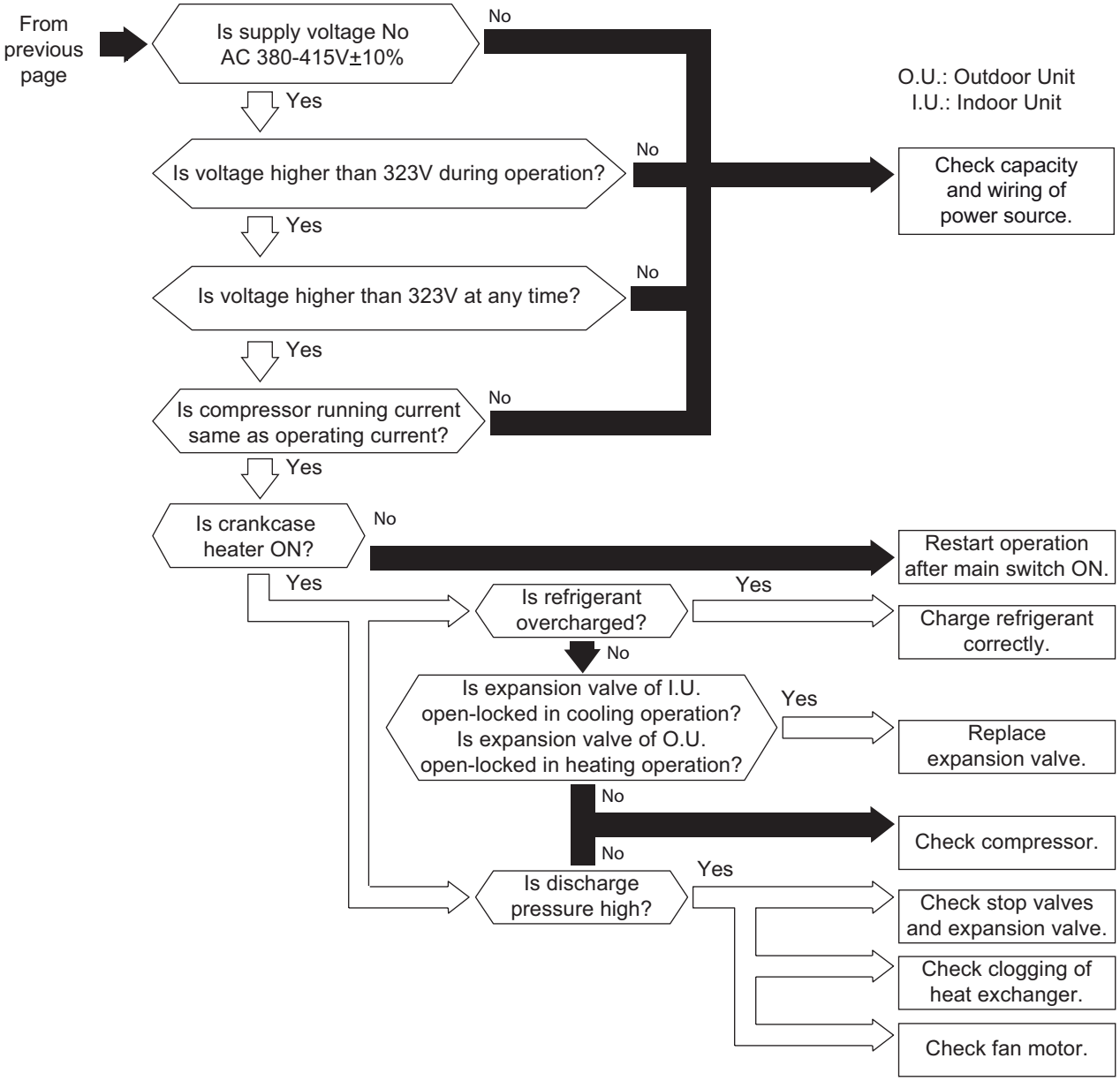
(3) The control voltage decreases.

(4) The angle difference between the shaft in compressor and the shaft in the control program exceeds 60°.



Reference to footnote of 1 and 2, here are on next page.

Inverter Stoppage Code	
iTC	**Cause of Inverter Stoppage**
1	Activation of Transistor Module Protection
12	Ground Fault Detection
21	Out-of-Synchronism Detection



These references are for previous page:

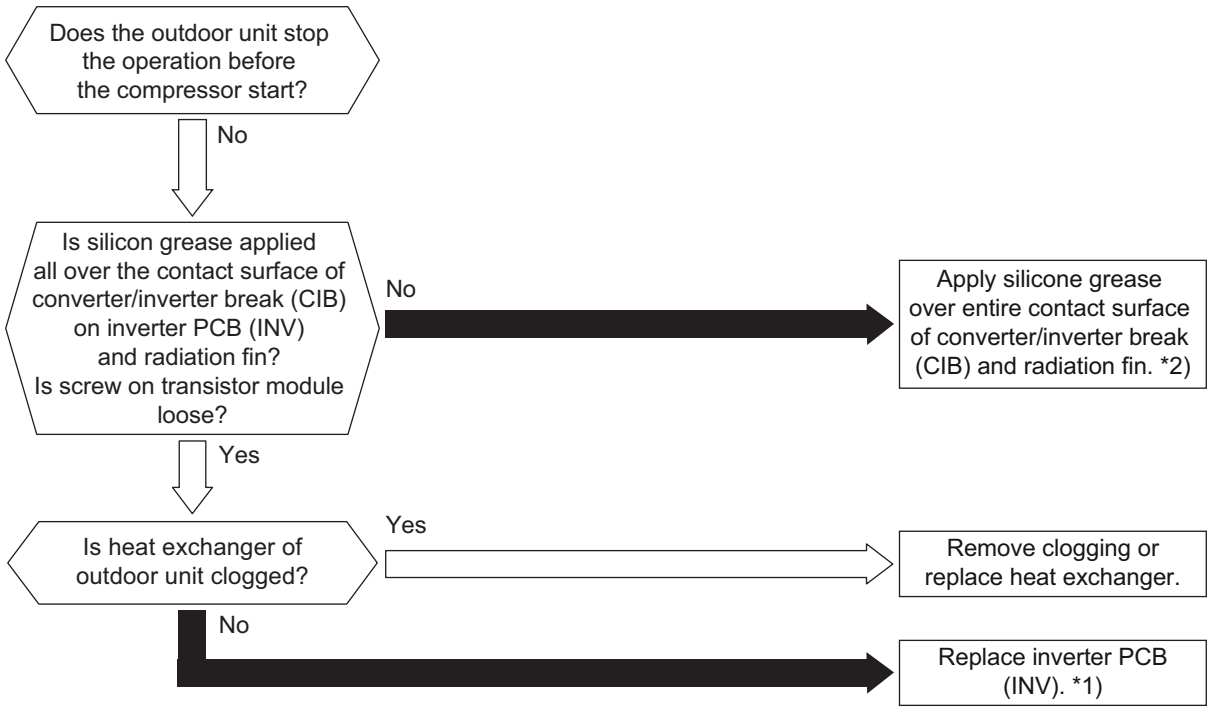
*1): For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to Section 3.2.1

*2): Turn ON the No.1 switch of SW1 on the inverter PCB (INV) when restarting the operation with the terminals of the compressor disconnected. After troubleshooting, turn OFF the No.1 switch of SW1 on inverter PCB (INV).

Alarm code 54	Abnormality of Inverter Fin Temperature

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ If the temperature of the radiation is reached 110°C, 3 times in 30 minutes this alarm code is displayed. The temperature to activate the alarm is depend on the outdoor unit model.



*1): For the maintenance and replacement of inverter PCB (INV), perform the high voltage discharge work according to the item 3.2.1.

*2): Use the silicon grease provided as an accessory.

Inverter Stoppage Code

iTC	Cause of Inverter Stoppage
3	Abnormal Inverter Fin Temperature

Alarm code	55	Inverter Failure

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

★ An abnormality is detected when the actual frequency from the inverter PCB is less than 10Hz after the inverter frequency is output from the outdoor unit PCB to the inverter PCB. This alarm code is displayed when this occurs 3 times in 30 minutes. If it occurs less than 3 times in 30 minutes, the operation is automatically retried.

Conditions of Activation: Inverter PCB does not operate normally.

Inverter Stoppage Code

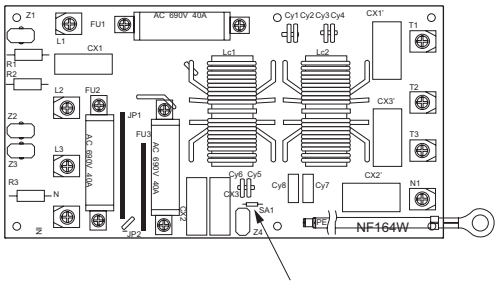
iTC	Cause of Inverter Stoppage
17	Abnormal Control

*1): When an excessive surge current is applied to the unit due to lighting or other causes, this alarm code “55” or the inverter stoppage code (iTC) “11” will be indicated and the unit cannot be operated. In this case, check the surge absorber/surge arrester (SA) on the noise filter (NF1, NF2). The surge absorber may be damaged if the inner surface of the surge absorber is black. In that case, replace the surge absorber.

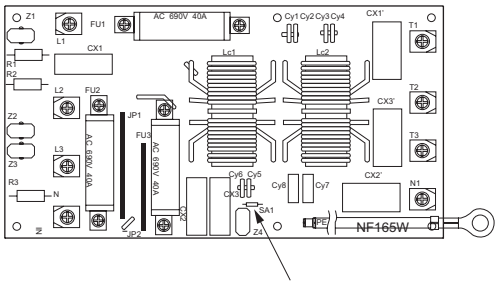
If the inside of the surge absorber is normal, turn OFF the power once and wait for LED401 (red) on the inverter PCB (INV) (400V, 380-415V, 380V) OFF (approximately five minutes) and turn it ON again.

< Position of Surge Absorber >

NF164W



NF165W



Alarm code	57	Activation of Fan Controller Protection

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

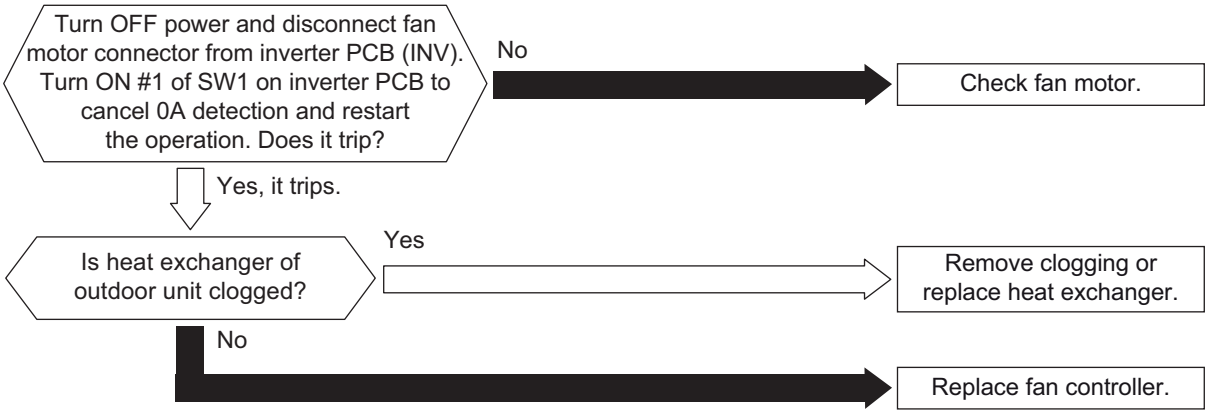
★ Inverter PCB has abnormality-detecting function.

This alarm code is displayed when the abnormality is detected 10 times within 30 minutes. If this occurs less than 10 times in 30 minutes, the operation is automatically retried.

Conditions of Activation:

(1) The conditions creating abnormal current flow such as a short-circuit current, a ground-fault current or the overcurrent occurring at the transistor module.

(2) The control voltage decreases.



Inverter Stoppage Code

iTC	Cause of Inverter Stoppage
1	Drive IC Error Signal Detection
12	Grand Fault Detecting

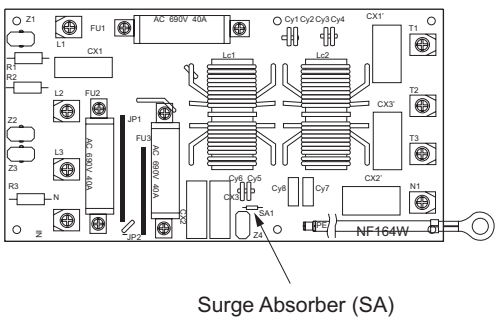
NOTE:

When an excessive surge current is applied to the unit due to lightning or other causes, this alarm code “57” or the inverter stoppage code (iTC) “11” will be indicated and the unit cannot be operated. In this case, check to ensure the surge absorber/surge arrester (SA) on the noise filter (NF1, NF2). The surge absorber may be damaged if the inner surface of the surge absorber is black. In that case, replace the surge absorber.

If the inside of the surge absorber is normal, turn OFF the power once and wait for LED401 (red) on the inverter PCB (INV) OFF (approximately five minutes) and turn it ON again.

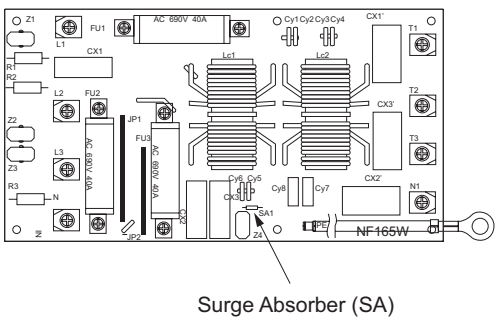
< Position of Surge Absorber >

NF164W



Surge Absorber (SA)

NF165W



Surge Absorber (SA)

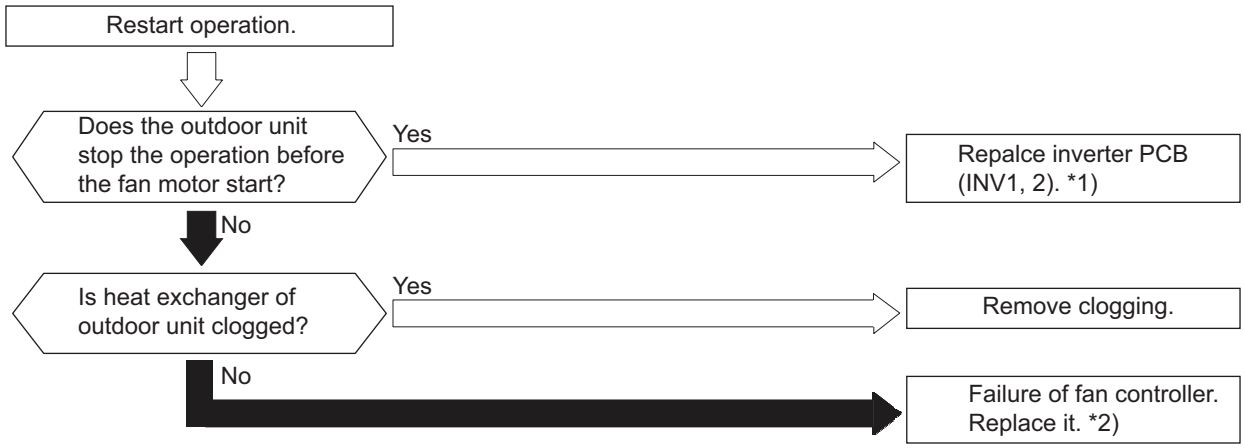
NOTE:

For the maintenance and replacing of the fan controller, perform the high voltage discharge work according to the item 3.2.1.

Alarm code	Abnormality of Fan Controller Fin Temperature

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB. Check the fan controller stoppage code (FTC) when this alarm code is displayed.

★ If the temperature of thermistor inside the CIB exceeds 110°C or IPM exceeds 100°C 10 times in 30 minutes, the operation stops and this alarm code is displayed. If this occurs less than 10 times in 30 minutes, the operation is automatically retried.



Fan Controller Stoppage Code

ftc	Cause of Inverter Stoppage
3	Fin Temperature Increase

*1): For the maintenance and replacement of the inverter PCB (PV164), perform the high voltage discharge work according to item 3.2.1.

*2): For the maintenance and replacement of the fan controller, perform the high voltage discharge work according to item 3.2.1.

Alarm code 56	Activation of Fan Controller Overcurrent Protection Device

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB. *) Check the fan controller stoppage code (FTC) when this alarm code is displayed.

  *): the outdoor unit number of abnormal inverter PCB and abnormal inverter PCB number are displayed.

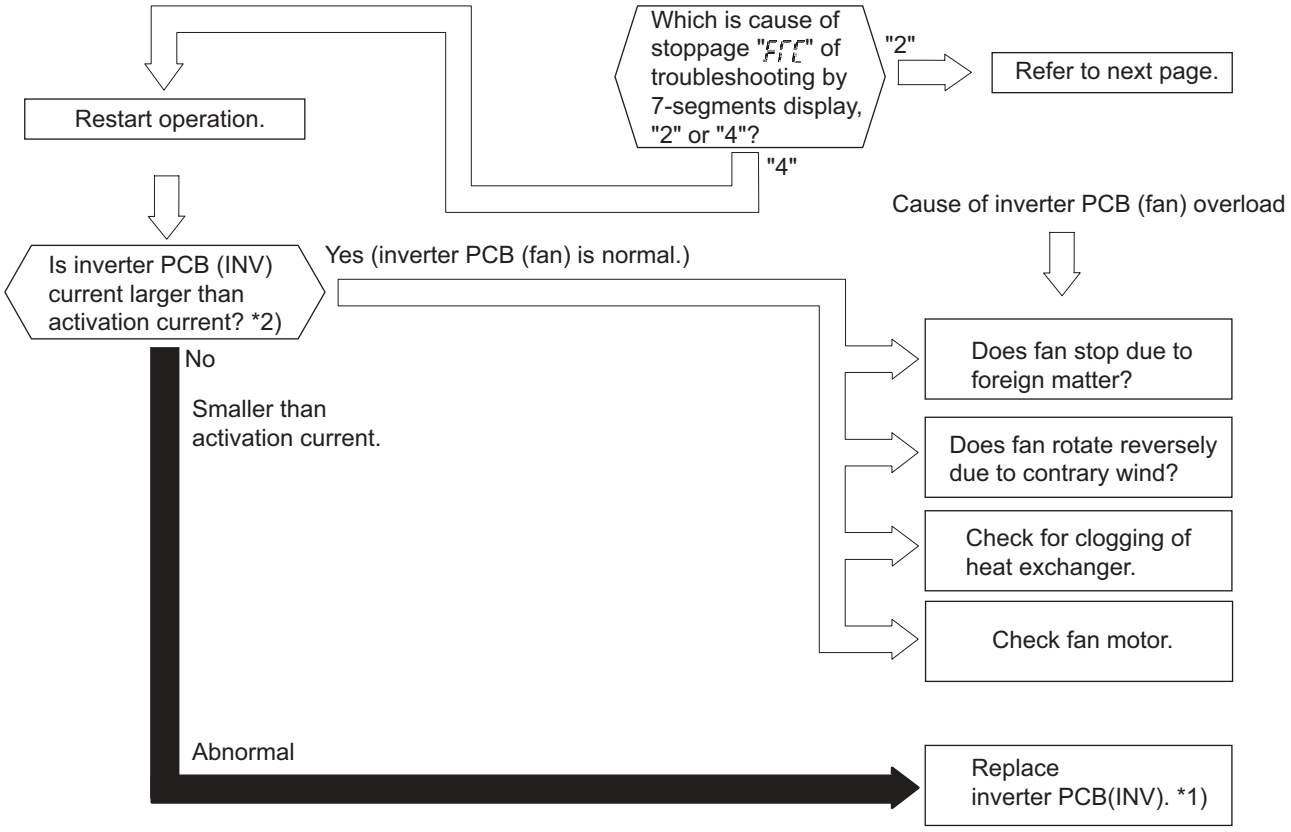
Check the fan controller stoppage code when this alarm code is displayed.

★ This alarm code is displayed when the fan controller electronic thermal protection is activated 10 times within 30 minutes. If this occurs less than 10 times in 30 minutes, the operation automatically restarts.

Conditions of Activation:

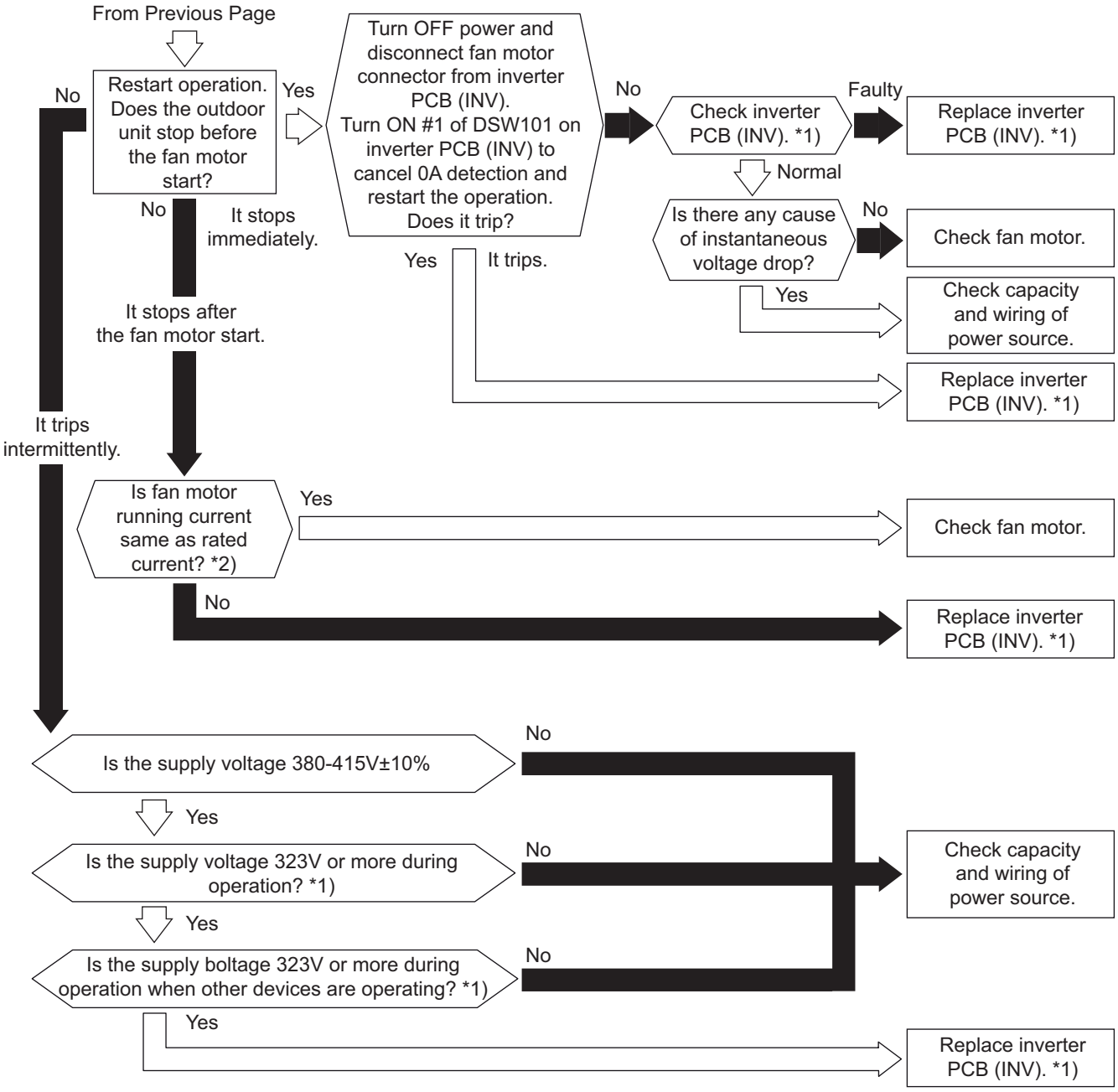
(1) Electric current with 105% of the rated current runs for 30 seconds continuously.

(2) Electric current runs intermittently and the accumulated time reaches up to three minutes, in 10 minutes.



*1): For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to item 3.2.1.

*2): Regarding the setting value of activation current, refer to Section 3.2.1.



*1): For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to item 3.2.1.

*2): Regarding the setting value of activation current, refer to Section 3.2.1.

Alarm code	Abnormality of Fan Controller Sensor

- Alarm code screen flashes on wired controller.
- The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB. *) Check the fan controller stoppage code (FTC) when this alarm code is displayed.

  *): the outdoor unit number of abnormal inverter PCB and abnormal inverter PCB number are displayed.

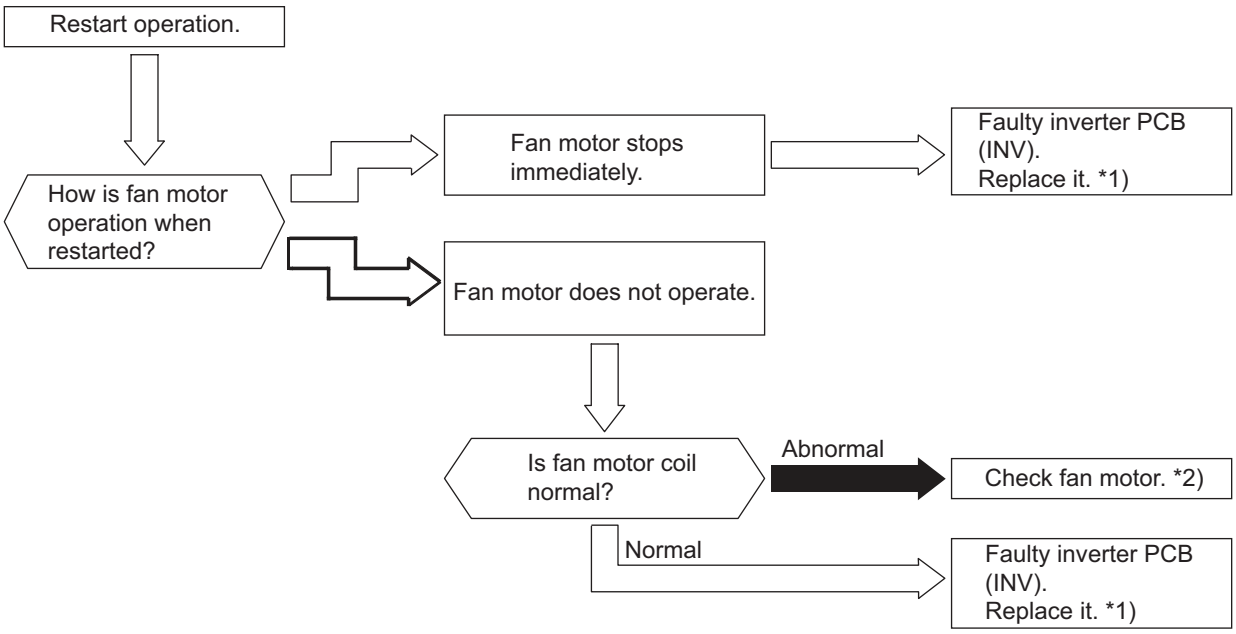
Check the fan controller stoppage code when this alarm code is displayed.

★ This alarm code is displayed when the fan controller electronic thermal protection is activated 10 times within 30 minutes. If this occurs less than 10 times in 30 minutes, the operation automatically restarts.

Conditions of Activation:

(1) Electric current with 105% of the rated current runs for 30 seconds continuously.

(2) Before the fan motor operation is started (at completing the phase positioning), the wave height value of the running current for the phase positioning is less than criterion value.



*1): For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to item 3.2.1.

*2): For checking fan motor, refer to the fan motor specification of Section 3.4.

Alarm code	Compressor Protection

★ This alarm code is displayed when any of the following alarms causing serious compressor damages occurs 3 times in 6 hours. While this alarm is displayed, alarm reset is unavailable.

Alarm Code	Content of Abnormality
02	Activation of Protection Device (High Pressure Cut)
07	Decrease in Discharge Gas Superheat
08	Increase in Discharge Gas Temperature
43	Activation of Low Compression Ratio Protection Device
44	Activation of Low Pressure Increase Protection Device
45	Activation of High Pressure Increase Protection Device
47	Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)

These alarms can 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, great care must be taken before starting, since there is a possibility of causing serious damages to the compressors.**

Alarm code	External Abnormality Detection

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

This alarm code is displayed when the external input is set the control function No.14 is detected an abnormality (input terminals are short-circuited).

Alarm code	External Abnormality Detection

● Alarm code screen flashes on wired controller.

● The indoor unit address, the alarm code, and the number of system are displayed on the LCD, and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

The alarm code displayed on the wired controller is “35”.

Condition	Action
The number of the connected indoor units not supporting H-LINK II is 17 or greater.	The number of the connected indoor units shall be 16 or less.

1.3 Test Run

Turn OFF all the power source switches.

Use a tester and make sure that all the switches are turned OFF.

Before test run, check that the unit is appropriately installed according to Installation & Maintenance Manual. After that, inspect the following items.

Check Item		Contents
1	Damage	Are the unit appearance and inside of the unit damaged?
2	Fan Motor	Is the propeller fan mounted in the center of the fan cover? Is the propeller fan mounted away from the fan cover? (The propeller fan should NOT be touched with the fan cover.)
3	Screw Part	Are the screws loosened due to the vibration during transportation? Check that the fasteners are secured firmly during installation, especially for the electrical wiring.
4	Refrigerant Leakage	Check that there is NO refrigerant leakage. The tightening part of pipe (flare part) may be loosened due to the vibration during transportation.
5	DSW Setting	Check that the DSW setting. (Refer to the item 1.1.2 and 1.1.3.)
6	Insulation Resistance *1)	Measure resistance between electrical component terminal and ground with a tester. It is normal if the resistance is 1MW and over. If 1MW or less, do not perform the operation due to insulation failure of electrical part. Do NOT apply electricity to the terminal board of operating line. (Control PCB may be damaged.)
7	Stop Valve Fully Opening	Prior to test run, check that the stop valve of the outdoor unit is completely open.
8	Power Source Phase	The operation is NOT available with the lacking phase. ● Alarm “03” or “05” will be indicated on the LCD of Wired Controller. ● Alarm “03” or “05” will be indicated on the 7-segment of outdoor unit. Check the power source phase according to the caution label attached close to the outdoor unit terminal block or inside of the service cover.
9	Turn ON Crankcase Heater *2)	After completion of the item checks 1 to 8, turn ON the power supply of the outdoor unit. The electricity is supplied for the crankcase heater to preheat the compressor. The compressor may be damaged without preheating. Apply power to the outdoor unit(s) at least 12 hours prior to operation of system for preheating of the compressor(s).
10	Indoor and Outdoor Temperature	<For Use in both Cooling and Heating Operation> Is indoor temperature DB27°C or less during heating operation? (Heating operation may not be operated due to the activation of the overload operation prevention under the ambient temperature of 19°C or over.) To perform the test run, set the test run mode by the Wired Controller.

*1): Insulation Resistance

- In case that the unit has been turned OFF for long periods, insulation resistance may decrease to 1MW or less because the refrigerant is retained in the compressor. Check the following points.

  (a) Disconnect the cables of the compressor and measure the insulation resistance of the compressor itself. If the resistance is 1MW or less, insulation failure of another electrical charge part has occurred.

  (b) If the resistance is 1MW or less, reconnect the compressor and turn ON the main power supply. The compressor will warm up automatically. Check the insulation resistance again after applying current for at least 3 hours. (Preheating time depends on the air condition, piping length or refrigerant condition.)

- Before the leakage breaker is activated, check the rated capacity.

*2): Stoppage of Compressor Operation

The compressor may NOT be operated for a maximum of 4 hours if the power supply is NOT turned ON in advance.

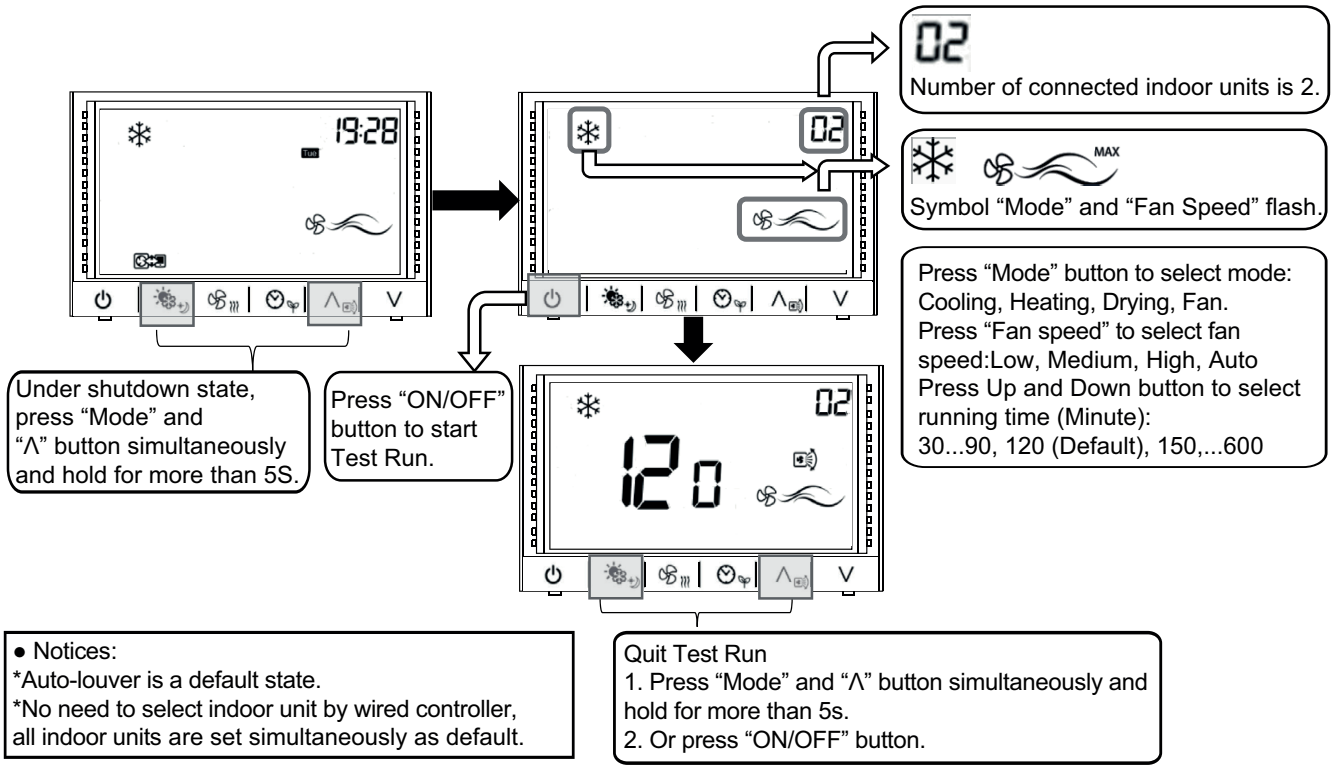
At this time, the stoppage Code (d1-22) is displayed on the LCD of wired controller and the forced Thermo-OFF function starts.

If operating compressor is necessary, turn ON the power supply of outdoor unit, wait for 30 seconds and press PSW5 on the outdoor unit PCB for at least 3 seconds. The forced Thermo-OFF function (d1-22) will be cancelled and the compressor operation will be available.

1.3.1 Perform Test Run by Wired Controller

1) Turn on the power (to Indoor unit and outdoor unit; power on the outdoor unit for more than 12 hours).

2) Operation method to perform “Test Run by Wired Controller”: Under shutdown state, press “Mode” and “Λ”switches simultaneously and hold for more than 5s. Enter “Test Run” mode interface screen. Display and operation are as below:

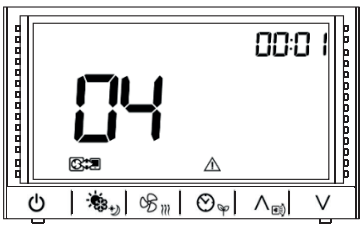


3) Setting of Test Run and Fan Speed: Press ”Mode” switch to select operation mode (Cooling or Heating). Press “Fan Speed” switch to set the fan speed to “High 2”.

4) Press “ON/OFF” switch to start Test Run.

5) Test Run will be ended after two hours of operation or just press “ON/OFF” switch to stop Test Run.

Abnormalities of Test Run:

Indication	Failure	Check Items
No Indication	Indoor unit is not powered on. Incorrect wiring of wired controller. Incorrect wiring of power supply.	1. Check the connection between wires and terminals. 2. Check the connection of wired controller. 3. Check if the connector of wired controller is firmly secured. 4. Check the wiring sequence on the terminal block. Check if the screws are firmly secured
Indicated number of indoor units mismatches with the actual number of indoor units.	Indoor unit is not powered on. Communication wires unconnected. Incorrect wiring between indoor units and wired controller.	5. Check if DIP switch set correctly. 6. Check if the wiring connection of PCB correct. 7. The same as above item 1, 2, and 3.
Alarm code indicated 	Activation of protection device Failure of sensor or other type failures. (refer left figure as an example) Refrigerant system: No. 00 (Range 0~63) Indoor unit No.: No. 01 (Range 0 ~ 63) Alarm code: 04 (Communication failure of Inverter), ⚠ icon flashes.	Refer to “Alarm code table”

1.3.2 Test Run from Outdoor Unit Side

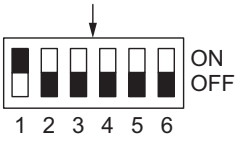
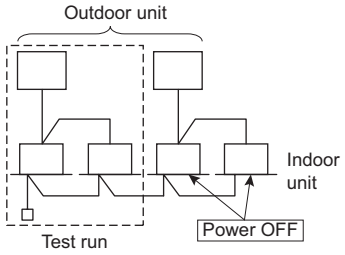
The procedure of test run from the outdoor unit side is indicated below. Setting of this DIP switch is available with the power source ON.

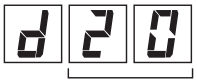
Setting of DIP Switch (Before Shipment)

DSW4
Switch for Setting of Service Operation and Function    1. Test Run 2. COOL/HEAT Setting (ON: Heating Operation) (OFF: Cooling Operation) 3. OFF (Fixed) 4. Manual Compressor OFF 5. Function Selection 6. External Input Signal Selection

⚠ WARNING

- **Do not touch any other electrical part when operating switches on the PCB.**
- **Do not attach or detach service cover when the power source for the outdoor unit is supplied and the outdoor unit is operated.**
- **Turn all the DIP switches of DSW4 OFF when the test run operation is completed.**

	DIP Switch Setting	Operation	Remarks
Test Run	1. Setting of Operation Mode Cooling: Set DSW4-1 ON.  Heating: Set DSW4-1 and DSW4-2 ON.  2. Starting Test Run Set DSW4-1 ON and the operation is started after a few seconds. If heating operation, leave DSW4-2 at ON.  	1. The indoor unit automatically starts operating when the test run of the outdoor unit is set. 2. The ON/OFF operation can be performed from the wired controller or DSW4-1 of the outdoor unit. 3. The operation continues for 2 hours without Thermo-OFF.	* Note that the indoor units operate in conjunction with the test run operation of the outdoor unit. * If the test run is started from the outdoor unit and stopped from the Wired Controller, the test run function of the wired controller is cancelled. However, the test run function of the outdoor unit is not cancelled. Check to ensure that the DSW4-1 of the outdoor unit PCB is turned OFF. * If multiple indoor units are connected with one Wired Controller, perform the test run operation individually for each refrigerant system one by one. Then, make sure to turn the power source OFF for the indoor units in other refrigerant systems not to operate test run.  * The setting of DSW4 is not required for the test run from the Wired Controller.

	DIP Switch Setting	Operation	Remarks
Manual OFF of Comp.	1. Setting *Compressor Manual OFF: Set DSW4-4 ON.  2. Cancelling *Compressor ON: Set DSW4-4 OFF.  	1. When DSW4-4 is ON during compressor operation, the compressor stops operating immediately and the indoor unit is under the condition of Thermo- OFF. Continuous indoor unit fan operations is available by setting the function selection “FE=1”. 2. When DSW4-4 is OFF, the compressor starts operating after the cancellation of 3-minutes guard.	* Do not repeat compressor ON/OFF frequently.
Manual Defrost	1. Manual Defrost Operation Press PSW5 for more than 3 seconds during heating operation, and the defrosting operation starts after 2 minutes. This function is not available within 5 minutes after starting heating operation. 2. Manual Defrost Operation Completion Defrosting operation automatically ends and the heating operation restarts.	1. Defrosting operation is available regardless of frost condition and total time of heating operation. 2. Defrosting operation is not performed when the temperature of outdoor heat exchanger is higher than 10°C, high pressure is higher than 3.2MPa or the unit is Thermo-OFF.	* Do not repeat defrosting operation frequently. * When manual defrosting operation is accepted by PSW5, the time left before starting defrosting operation is indicated on the 7-segment indicator on the PCB.  Time left (Every 4 seconds)

When the test run operation is completed, turn all switches of DSW4 OFF.

(1) If the wired controller is set to a different mode, the test run function will not start. In this case, perform the following actions before the test run.

Wired Controller: STOP

Central Station: STOP and wired controller is available mode.

COOL/HEAT Changeover Switch: Connector (CN17) of outdoor unit PCB is opened.

During the test run mode, do not control the Wired Controller, the central station and cool/heat changeover switch. Otherwise, the operation mode will be changed or the test run will be ended. If necessary, control them after the test run is completed.

(2) If an alarm code is indicated during the test run, reset the system by turning the main power supply OFF then back on. The system should then operate.

1.3.3 Checking at Test Run

(1) Indoor and Outdoor Fan

Check that the indoor fan and outdoor fan rotate correctly and the air flow is smooth.

(2) Power Supply Voltage

Check the power supply.

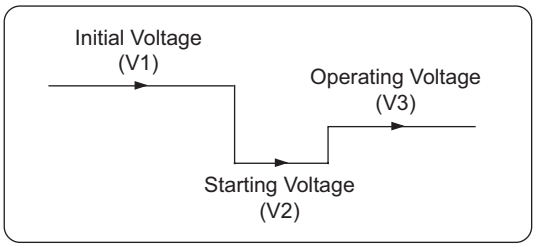
If the power supply is abnormal, contact with electric power company.

Usually, voltage drop will occur when starting the operation as shown in the figure (V2).

In order to protect the device, comply with the following normal range of the power supply voltage.

<Normal Range of Power Supply Voltage>

< Voltage Change >



- Supply Voltage: Rated Voltage < ±10%
- Starting Voltage (V2): Rated Voltage > -15%

Operating Voltage (V3): Rated Voltage < ±10%

Voltage Imbalance between Phase: < 3%

(2) Normal Operating Pressure

Normal operating suction pressure is 0.2 to 1.1MPa and normal operating discharge pressure is 1.0 to 3.5MPa when the refrigerant charge quantity is correct. Check the operation pressure in the test run mode.

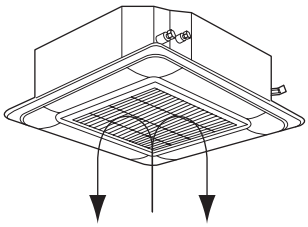
(3) High Pressure Switch

Check the operation pressure of the high pressure switch in the table below:

Refrigerant	Operation Pressure
R410A	4.15MPa

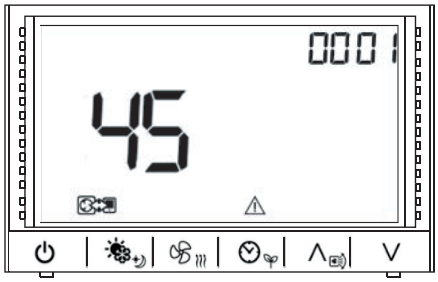
(4) High Pressure Increase Retry (Protection Control)

(a) The high pressure will increase when the following procedure is performed.

Cover the air inlet of outdoor unit during cooling operation.	Cover the air inlet of indoor unit during heating operation.
	

(b) When the high pressure retry control is activated, alarm code "P13" will be indicated on the 7-segment of outdoor unit PCB. If the high pressure retry control occurs 3 times or more within 30 minutes, alarm code "45" will be indicated on the LCD of wired controller or the 7-segment of outdoor unit PCB.

< For HCWA10NEGQ >



NOTE:

The high pressure may not increase until the high pressure switch is activated due to the temperature condition.

1.3.4 Checking List for Refrigerant Cycle

The refrigerant cycle data can be checked on 7-segment of outdoor unit PCB during the test run and the troubleshooting. However, it may take time for the checking because the operation cycle changes depending on the operating condition.

To check the quality of refrigerant cycle, the following check list shall be used at the test run, troubleshooting and emergency check.

(1) Refrigerant Cycle Check

The most important thing in the refrigerant cycle check is to check that each expansion valve opening and the operating frequency is within the specified range. Each item varies in the value depending on the operating frequency, indoor temperature and ambient temperature.

(2) The service system tester, which automatically calculates Td and SH, facilitates the refrigerant cycle check. If possible, record the operating cycle data by the service system tester.

CHECK LIST ON TEST OPERATION

CLIENT: _____ INSTALLER: _____ DATE: _____

O.U. MODEL: _____ O.U. SERIAL NO.: _____ CHECKER: _____

Indoor unit Model								
Indoor unit Serial No.								

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

Piping Length: _____ m Additional Refrigerant Charge: _____ kg

(1) General

No.	Check Item	Result
1	<Combination of Base Units> Is DSW6 setting for outdoor unit No. correct?	
2	Are the power source wiring and the transmitting wiring apart from refrigerant piping?	
3	Is an earth wiring connected?	
4	Is there any short circuit?	
5	Is there any voltage abnormality among each phase? (L1-L2, L2-L3, L3-L1)	

(2) Refrigerant cycle

a. Operation (Cooling/Heating)

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

b. Sampling Data

No.	Check Item	Result
1	After the operation for more than 20 min.	
2	Check Pd and Td. Is Td-SH 15 to 45°C ?	
3	Is Ps 0.15 to 1.3 MPa?	
4	Is Pd 1.0 to 3.6 MPa? (If the outdoor temperature is high, Pd becomes high.)	

NOTE:

The symbol with an underline ___ indicates checking item.

(3) Check Item after Sampling Data

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

No.	Check Item	Standard	Causes	Result
1	Is fan actually running when Fo (Air Flow Rate of O.U. Fan) is not “0”?	-	● Fan Motor Failure ● O.U. PCB Failure ● Condenser Failure	
2	Is TL (Liquid Pipe Temp. of I.U. Heat Exchanger) lower than Ti (Intake Air Temp. of I.U.)?	It is normal when TL-Ti < -5°C.	● TL Thermistor Failure ● I.U. Ex. Valve; Fully Closed ● Short-Circuit	
3	Is TG (Gas Pipe Temp. of I.U. Heat Exchanger) lower than Ti (Intake Air Temp. of I.U.)? (It is applicable when Intake Air Temp. is 3°C. higher than Setting Temp.)	It is normal when TG-Ti < -5°C.	● TG Thermistor Failure ● I.U. Ex. Valve; Fully Closed or Slightly Open ● Short-Circuit	
4	Is there any excessive difference in SH (TG-TL) of I.U. heat exchanger among I.U.s? (It is applicable when Intake Air Temp. is 3°C. higher than Setting Temp.)	It is normal if the difference among units is within 7°C.	● TL/TG Thermistor Failure ● I.U. Ex. Valve; Fully Open, Slightly Open or Fully Closed	
5	Is there any I.U. with the I.U. heat exchanger SH (TG-TL) excessively lower than the other units’ value and is iE (I.U. Ex. Valves Opening) lower than “5”?	of the unit is up to -3°C lower than the other units.	● I.U. Ex. Valve; Locked and Fully Open ● Mismatched Wiring and Piping	
6	Is there any I.U. with the I.U. heat exchanger SH (TG-TL) excessively lower than the other units’ value and is iE (I.U. Ex. Valves Opening) lower than “100”?	It is normal if SH of the unit is up to 3°C higher than the other units.	● I.U. Ex. Valve; Locked and Slightly Open or Closed ● Mismatched between Wiring and Piping	
7	Is the temperature difference between I.U.s* more than 7°C? * The temperature difference between I.U.s means the following; b3 (Discharge Air Temp.) - b2 (Intake Air Temp.) indicated on the wired controller by check mode.	7°C and over	-	

b. Heating Operation (It is applicable when outdoor temperature is higher than 15°C.)

No.	Check Item	Standard	Causes	Result
1	Is TdSH “15 - 45°C”? TdSH = Td - Saturated vapor refrigerant temperature	15 - 45°C	● Low → Excessive Refrigerant ● High → Insufficient Refrigerant ● O.U. Ex. Valve; Locked and Slightly Open or Closed.	
2	Is Pd “1.5” to “3.3”?	1.5 -3.3 (Pd is high when the indoor temperature is high.)	● Low → Solenoid Valve SVA Leakage ● High → Excessive Gas Pipe Pressure Loss	
3	s Ps “0.15” to “1.3”?	0.15 - 1.3	● Low → O.U. Short-circuit Low/High → O.U. Fan ● Motor Failure, Fan Module Failure or Outdoor Ambient Thermistor Failure	
4	Is the temperature difference between I.U.s* more than 10°C when iE (I.U. Ex. Valve) is “100”? * The temperature difference between I.U.s means the following; b3 (Discharge Air Temp.) - b2 (Intake Air Temp.) indicated on the wired controller by check mode. However, this is applicable only when b2 (Intake Air Temp.) - b1 (Setting Temp.) is higher than 3°C.	10°C and over	● Failure in PCB, Wiring, I.U. Ex. Valve and Coil ● Excessive Pipe Pressure Loss ● Thermistor Failure for Discharge Air	

NOTE:

The symbol with an underline ___ indicates checking item and the mark “ ” indicates checking data.

1.3.5 Reset for Accumulated Operation Time of Compressor 1-2 (cU1□ - cU2□)

(□: Outdoor Unit No.)

There are accumulated operation times of the compressor after maintenance and after starting operation. The following procedures show how to reset the accumulated operation time of the compressor after maintenance. Perform it for each outdoor unit.

<Procedure>

Press PSW1 and PSW3 for five seconds while the accumulated operation time of compressor data is displayed. The accumulated operation time of the compressor is reset.

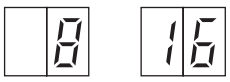
<Example of Outdoor Unit No. 1/Compressor 1>

<Procedure>
Press PSW1 and PSW3 for five seconds while the accumulated operation time of compressor data is displayed. The accumulated operation time of the compressor is reset.

<Example of Outdoor Unit No. 1/Compressor 1>

Press PSW4 to display the accumulated operation time of the compressor 1.
(Press PSW2 to return to the indication “cU11”.)

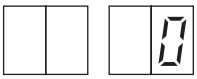
PSW4 ↑↓ PSW2



Press PSW1 and PSW3 for five seconds while the accumulated operation time is displayed.

The indication will be changed to “0”.

(The accumulated operation time of the compressor 1 is reset.)



NOTE:

In the case of 26HP to 96HP, it is required to reset the accumulated operation time for each outdoor units.

2. Servicing

⚠ DANGER

Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. DO NOT charge materials other than R410A into the unit such as hydrocarbon refrigerants (propane or etc.), oxygen, flammable gases (acetylene or so on.) or poisonous gases when installing, maintaining and moving the unit. These flammables are extremely dangerous and may cause an explosion, fire, and injury.

⚠ WARNING

TURN OFF all power source switches.

2.1 Removing Front Service Cover

(1) Removing Service Cover

(a) Remove eight (8) screws fixing the service cover.

(b) Put your hands on the groove at the bottom of the service cover. Then, lift the cover up slightly and draw it frontward. Remove the cover from the hooks on the right and left sides. (Refer to Figure 1)

(2) Removing Front Cover

(a) Remove four (4) screws fixing the front cover.

(b) Hold the upper side of the front cover and lift it obliquely upward. Remove the cover from the hooks on the right and left sides. Then, draw the cover frontward. (Refer to Figure 2)

(3) Removing Front Left or Right Cover (only for RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ)

(a) Remove all the front cover, and Remove seven (7) screws fixing the front left or right cover.

(b) Hold the middle side of the front left or right cover. Then, lift the cover up slightly and draw it frontward.

NOTE:

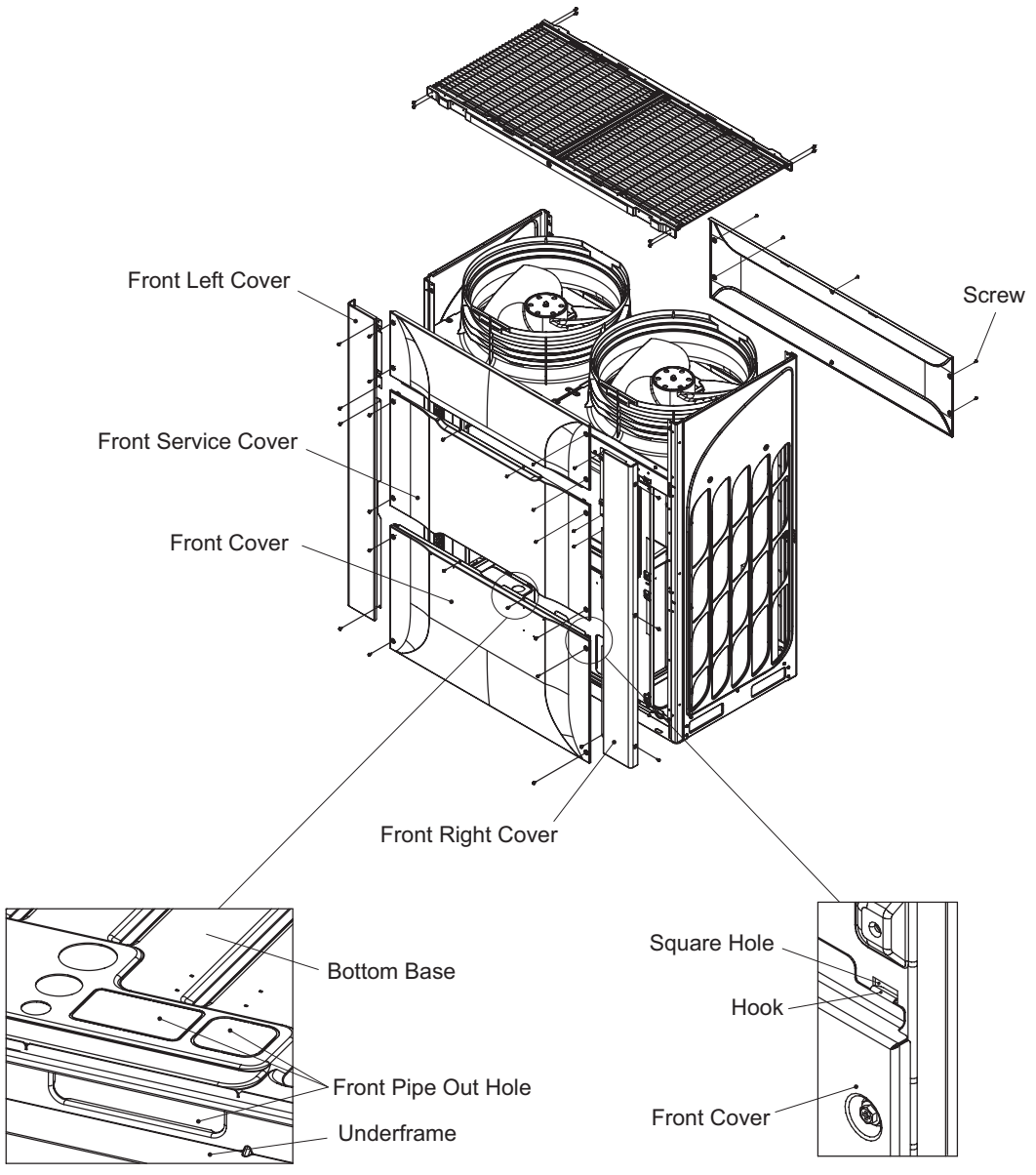
When attaching/removing the front service cover, take special care not to be injured with the plate edges.

⚠ WARNING

TURN OFF all power source switches.

Tool	Adjustable Wrench or Spanner

● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ



WARNING

TURN OFF all power source switches.

2.2 Attaching Front Service Cover

(1) Attaching Front Right Cover (only for RAS-20HNBCMQ, RAS-22HNBCMQ and RAS-24HNBCMQ)

(a) Insert the hooks of the front right cover into the square holes of the side cover.

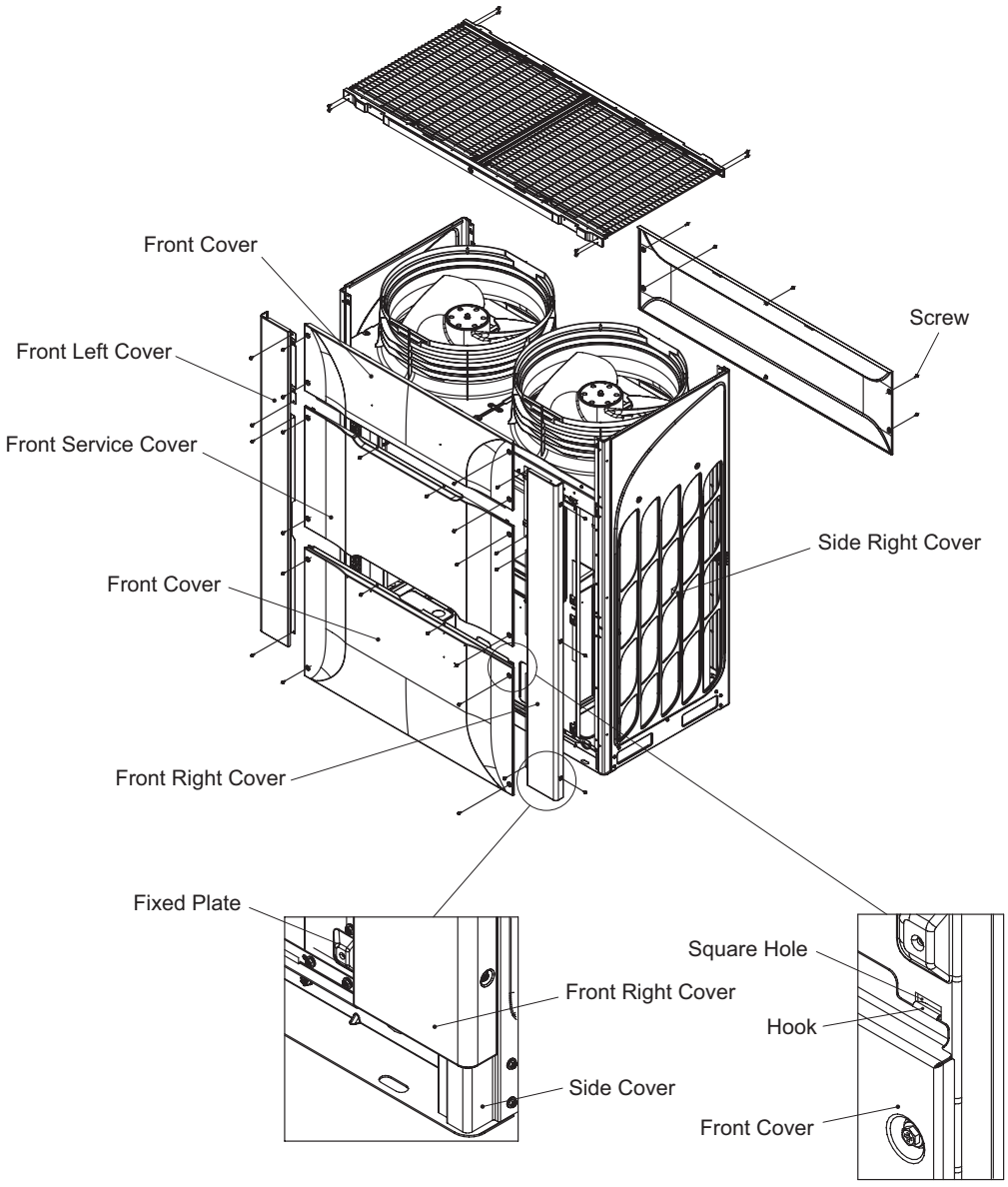
(2) Attaching Front Cover

(a) Insert the hooks of the front cover into the square holes of the side cover.

(b) Fix the front cover with the screws.

Tool	Phillips Screwdriver

● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ



(3) Attaching Service Cover

(a) Service cover shall be attached after attaching the front cover. Insert the hooks of the service cover into the square holes of the side cover.

(b) Fix the front cover with the screws.

NOTE:

When attaching the front cover, insert the hooks into the square holes of the side cover as shown in the figure. DO NOT insert the lower end of the front cover into the inside of the bottom base.

⚠ WARNING

TURN OFF all power source switches.

2.3 Removing Upper Cover

(1) Remove the screws fixing the upper cover.

RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ: 34 screws

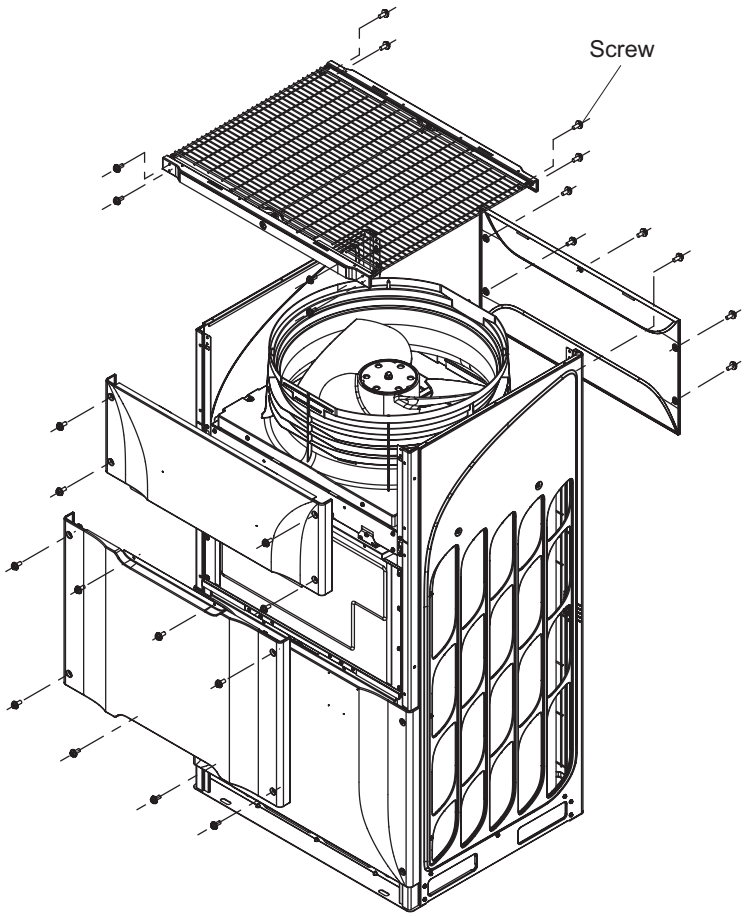
RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ: 42 screws

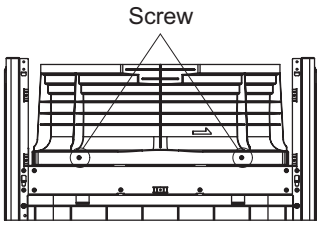
RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ: 60 screws

(2) Lift up the upper cover. When removing the upper cover, make sure that it does not contact the propeller fan.

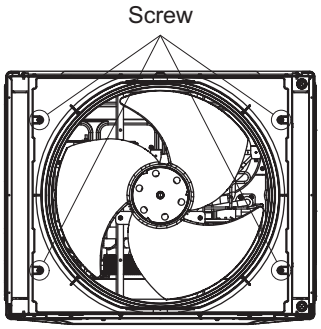
Tool	Phillips Screwdriver

● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ

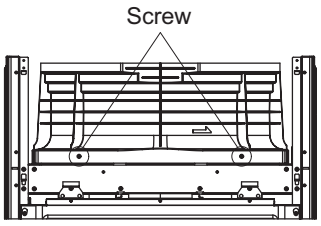




Rear Side



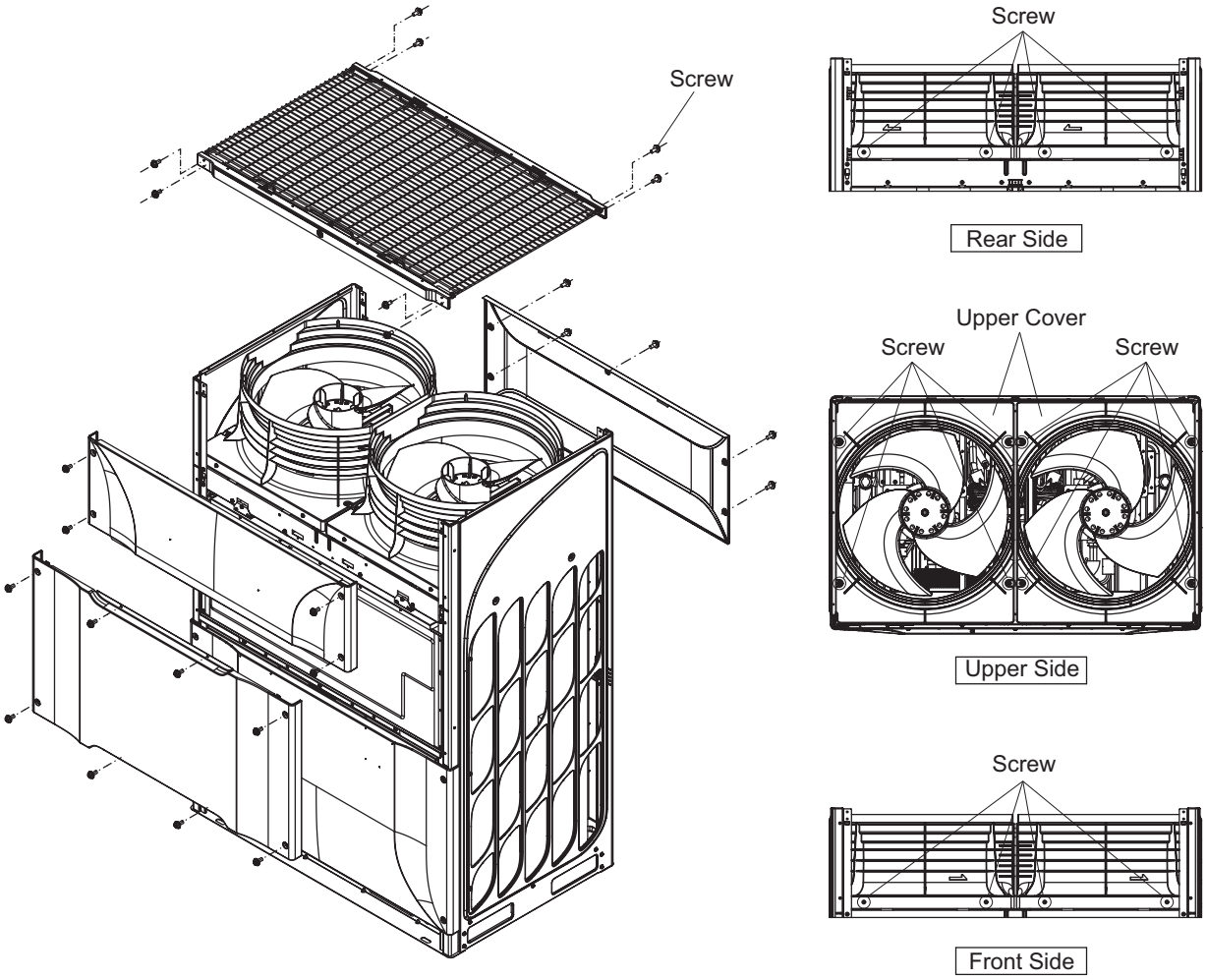
Upper Side



Front Side

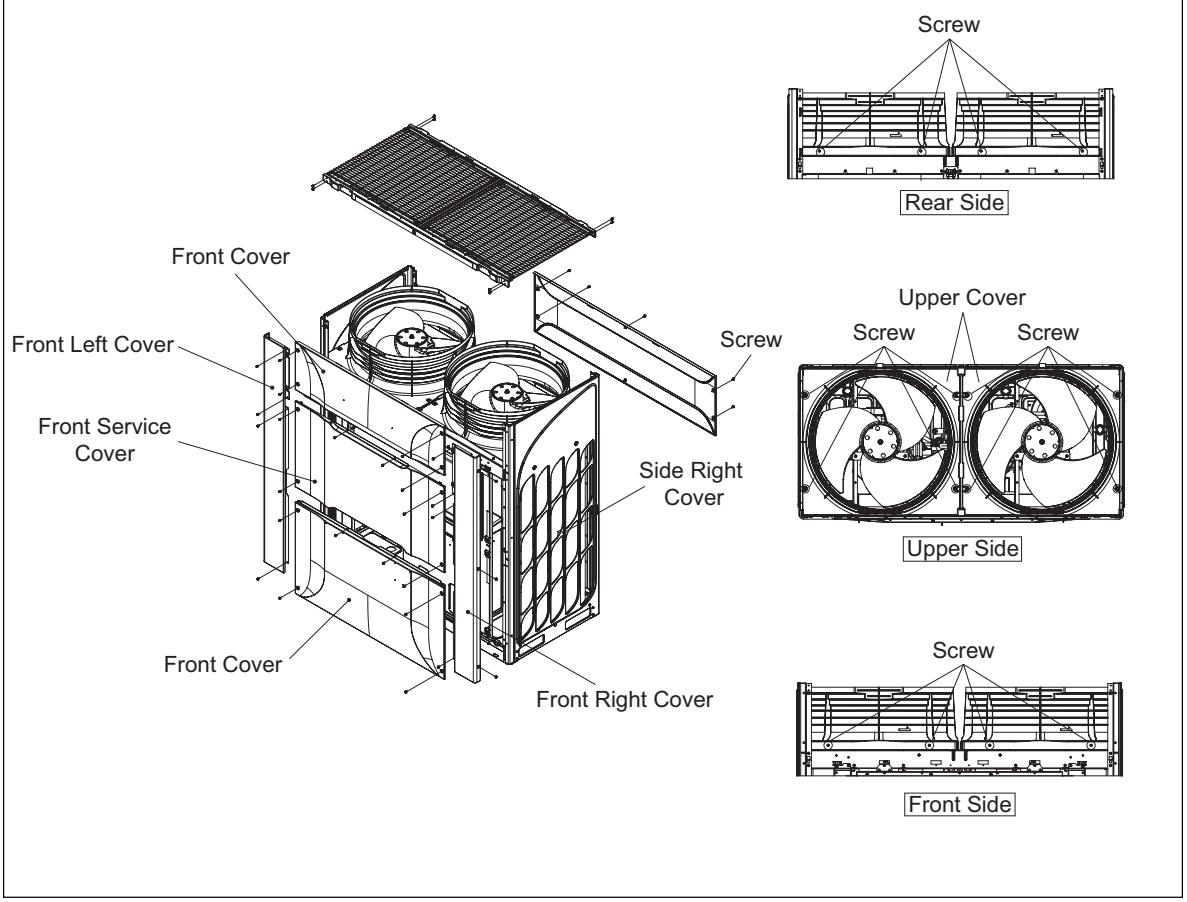
Tool	Phillips Screwdriver

● RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ



Tool	Phillips Screwdriver

● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ



⚠ WARNING

TURN OFF all power source switches.

2.4 Removing Electrical Box Cover

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Remove 5 screws fixing the electrical box cover and loosen the other two (2) fall-prevention Screws.

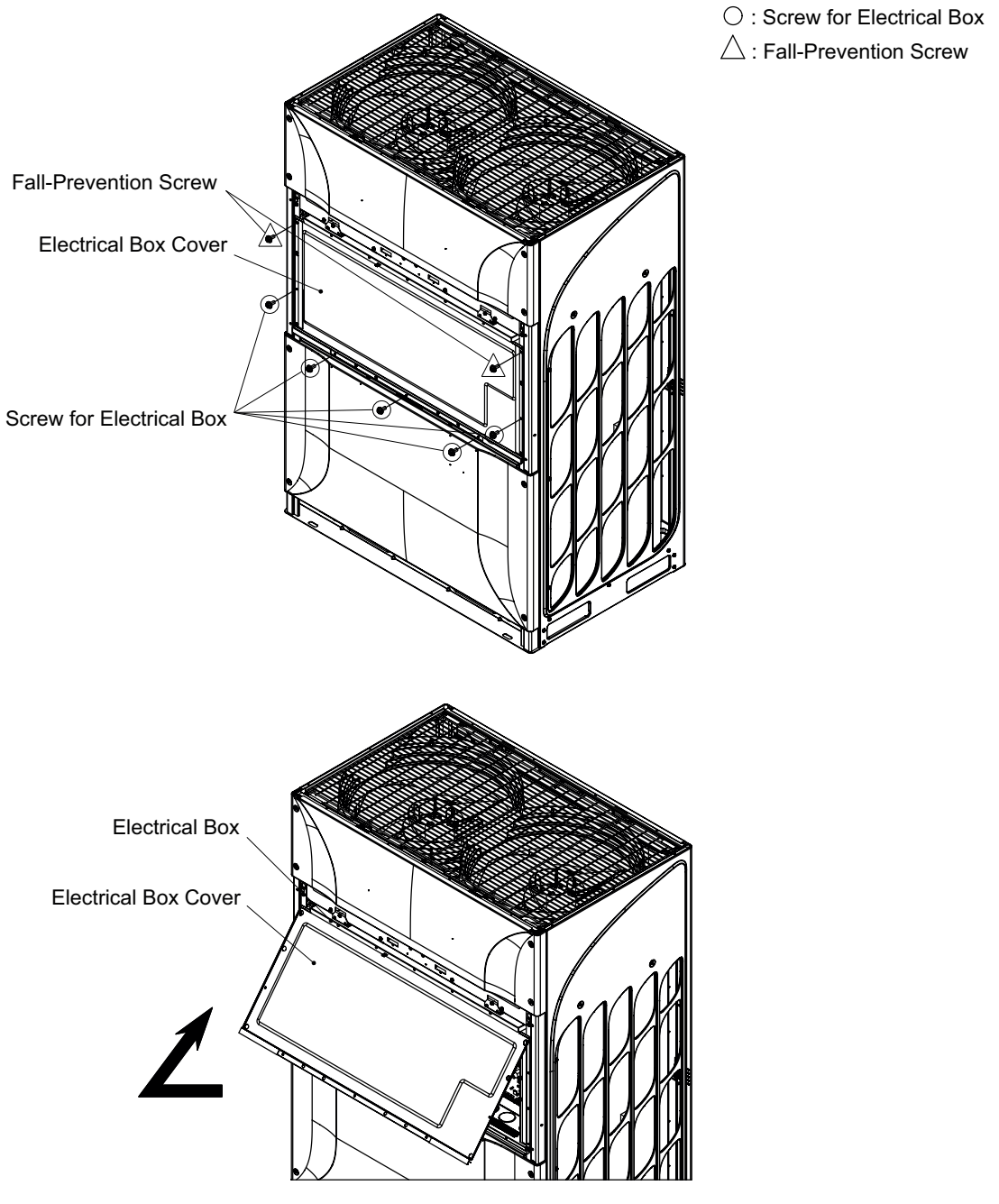
(3) Push the electrical box cover up and draw it frontward from the fall-prevention screws.

NOTE:

1. Before removing the screws fixing the electrical box cover, check that the fall-prevention screws are attached to the cover in order to prevent the electrical box cover from dropping off.
2. Take special care not to be injured with the front cover edges when removing the electrical box cover.

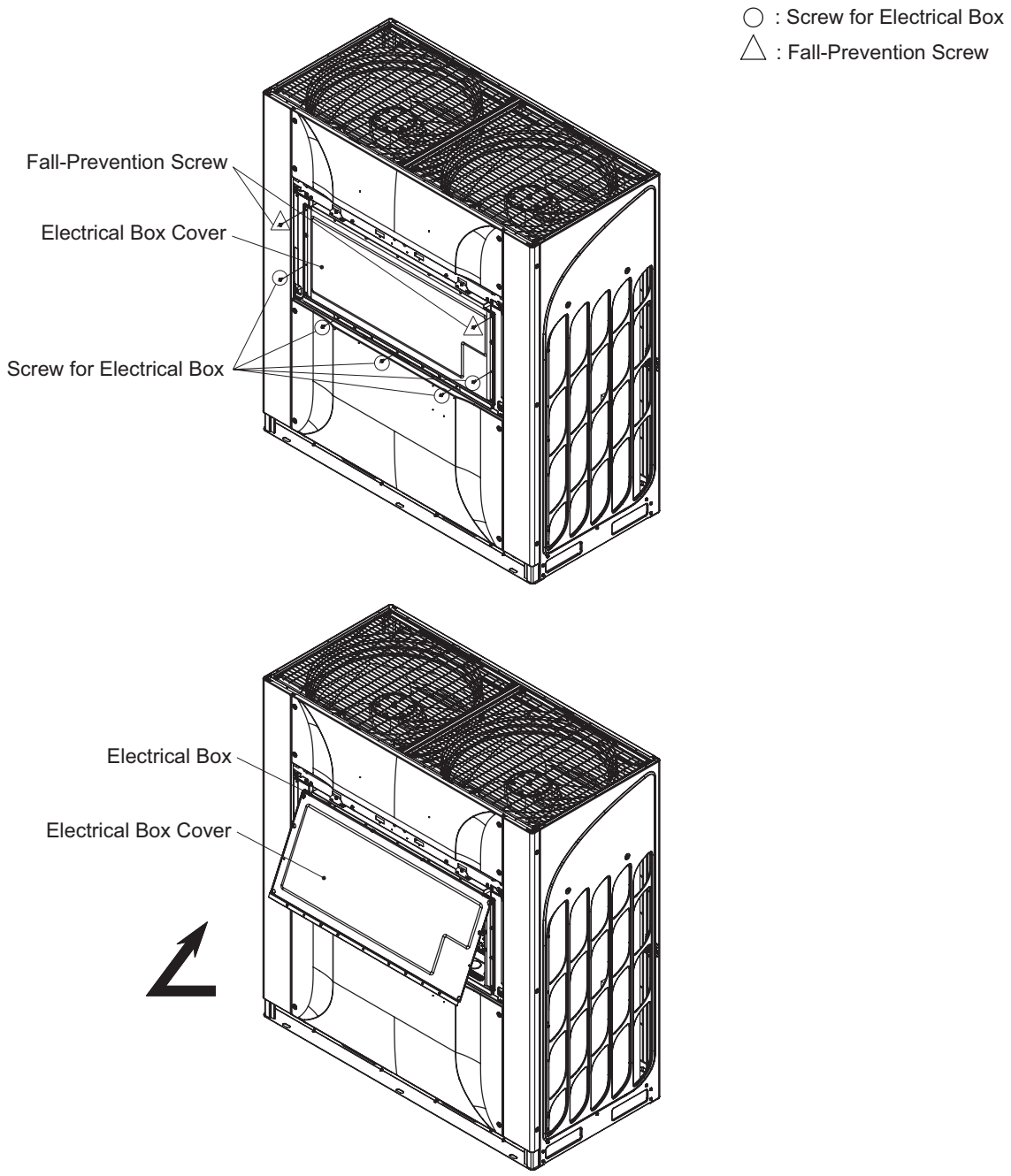
Tool	Phillips Screwdriver

● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ
RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ



Tool	Phillips Screwdriver

● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ



WARNING

TURN OFF all power source switches.

2.5 Removing Electrical Box

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Remove the electrical box cover according to the item 2.4 “Removing Electrical Box Cover”.

(3) Unfix the wiring from the code clamps at the bottom of the electrical box.

(4) Remove the screws fixing the power source wiring, compressor wiring, transmission wiring and earth wiring.

(5) Disconnect the connectors for the fan motor, solenoid valve and crankcase heater.

(6) Disconnect the connectors for each thermistor, the electronic expansion valve and pressure sensor on the outdoor unit PCB (PCB3).

(7) (Disconnect the connector for high pressure switch on the main power PCB (PCB3).

(8) Remove six (6) screws fixing the upper side of the electrical box and remove two (2) fall prevention screws.

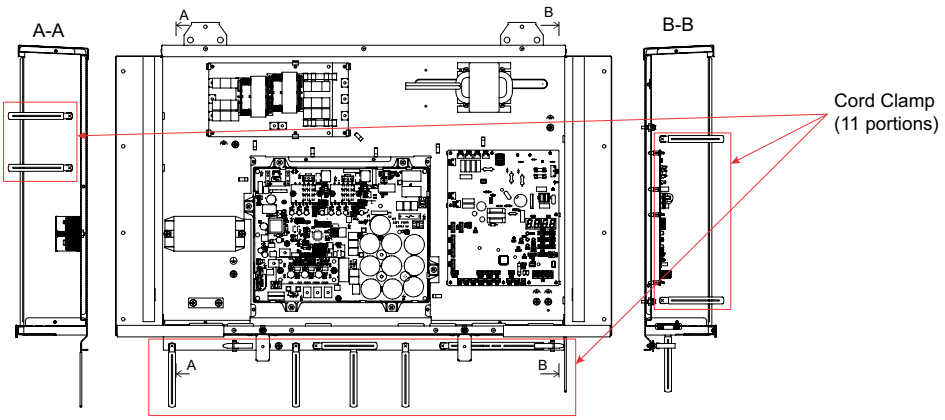
NOTE:

When removing the electrical box from the outdoor unit, hold the bottom side of the hook on the electrical box. DO NOT hold the center of the electrical box. It may cause deformation of the electrical box.

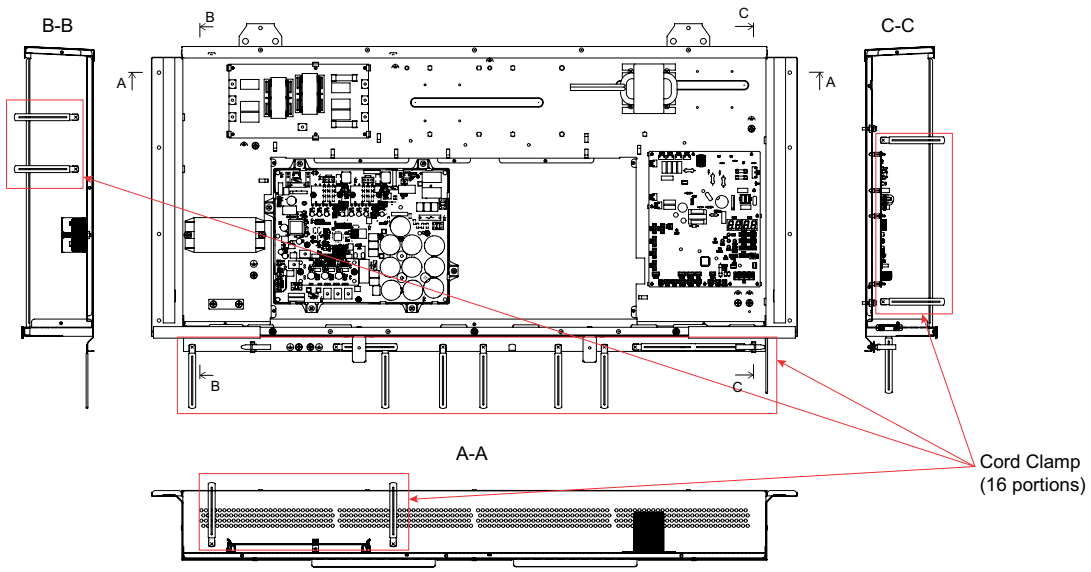
Tool	Phillips Screwdriver

<380-415V/50Hz>

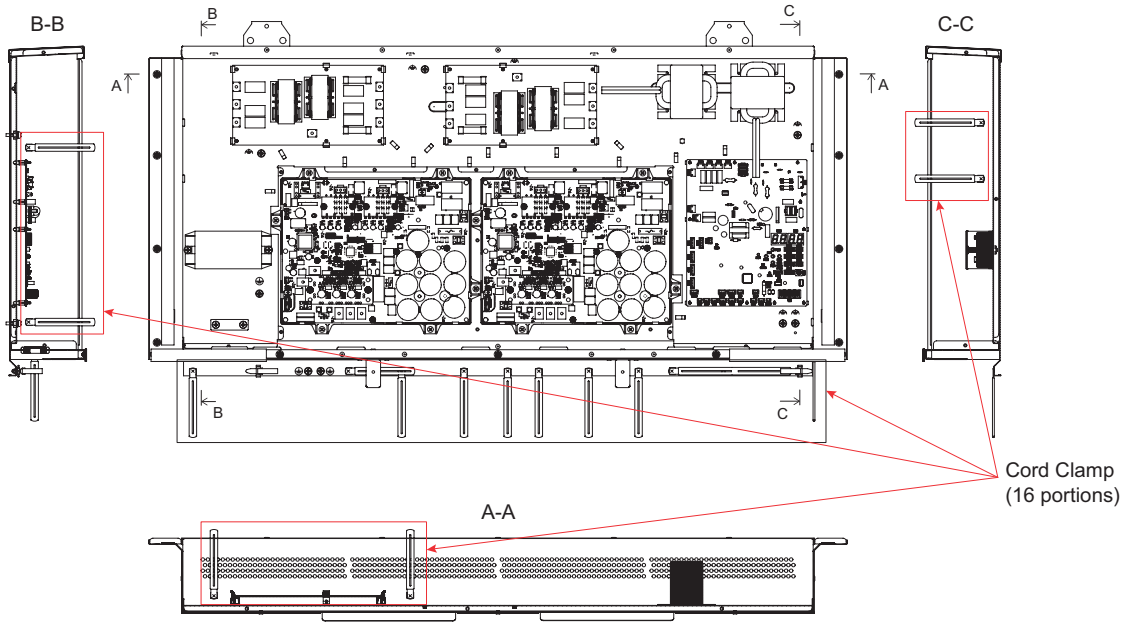
● RAS-8.0-12HNBCMQ



● RAS-14-16HNBCMQ



● RAS-18-24HNBCMQ

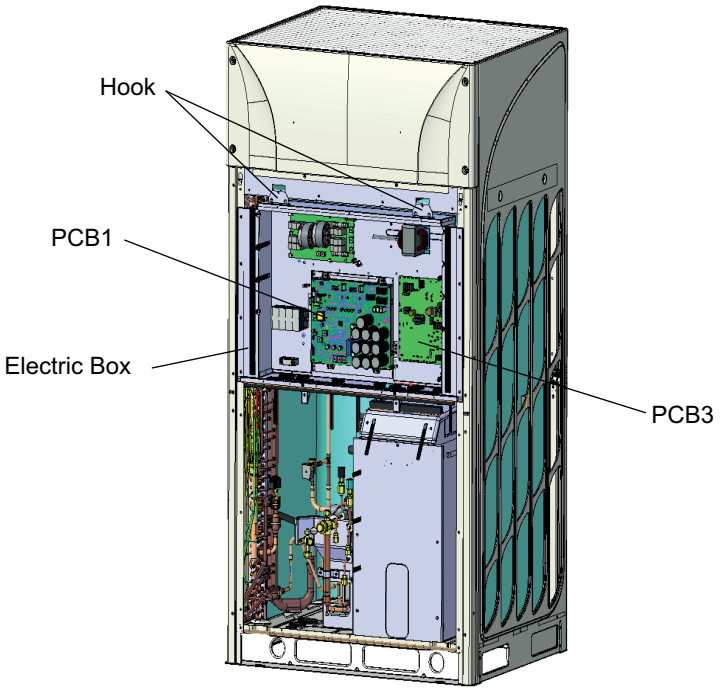


WARNING

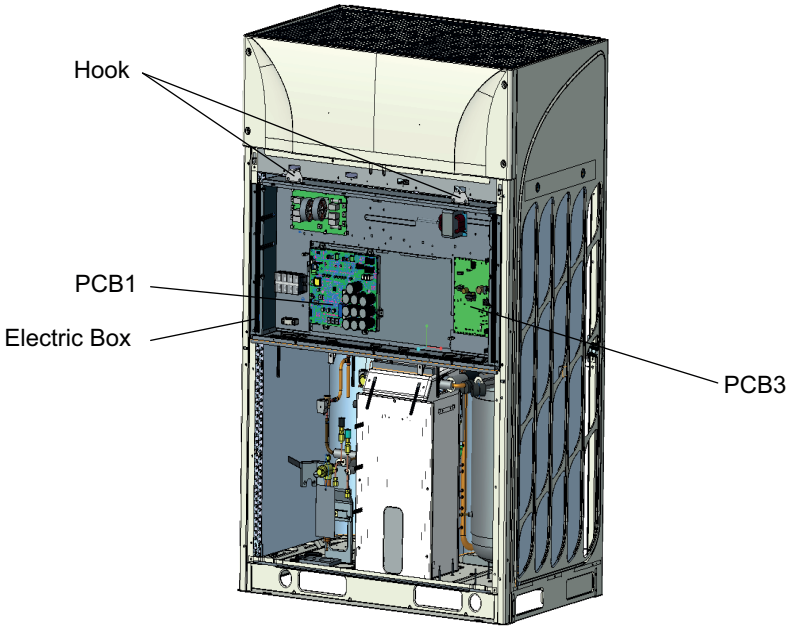
TURN OFF all power source switches.

Tool	Phillips Screwdriver

RAS-8.0-12HNBCMQ



RAS-14-16HNBCMQ

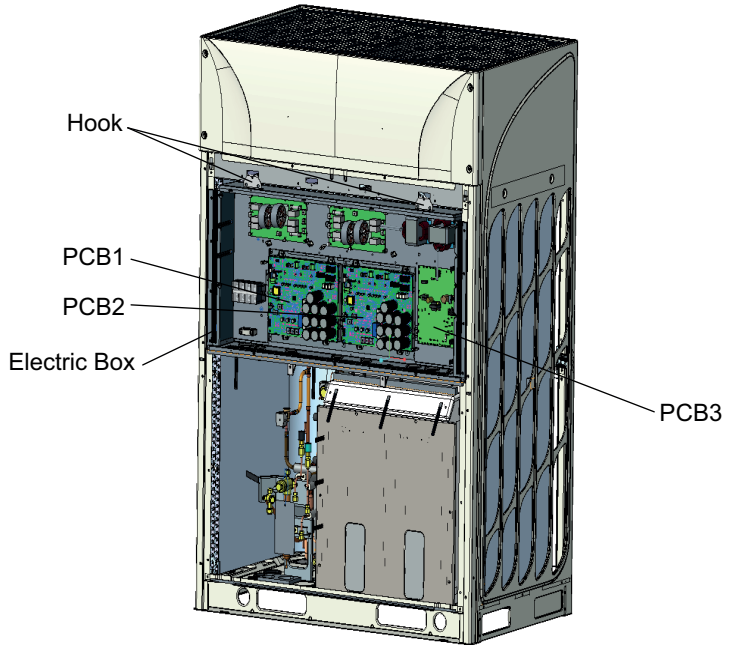


WARNING

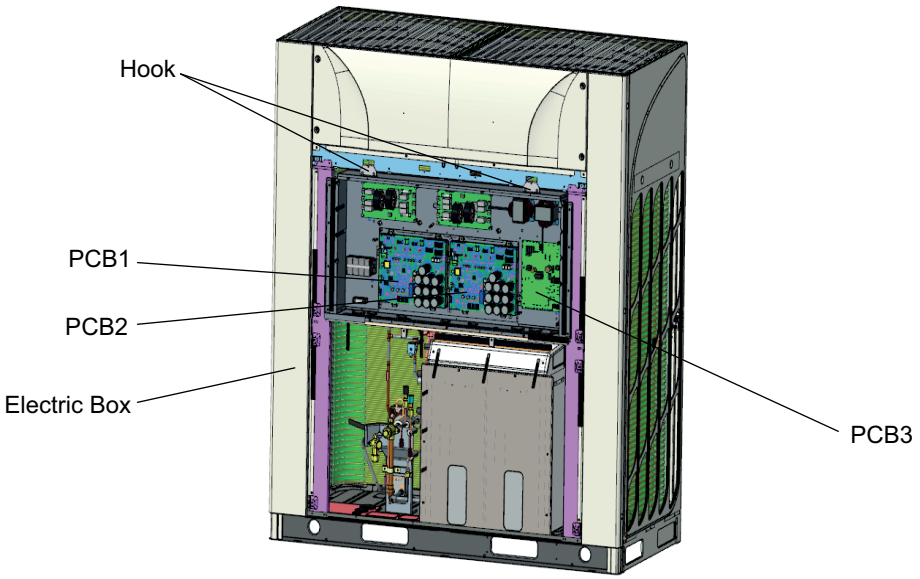
TURN OFF all power source switches.

Tool	Phillips Screwdriver

RAS-18HNBCMQ



RAS-20-24HNBCMQ



⚠ WARNING

TURN OFF all power source switches.

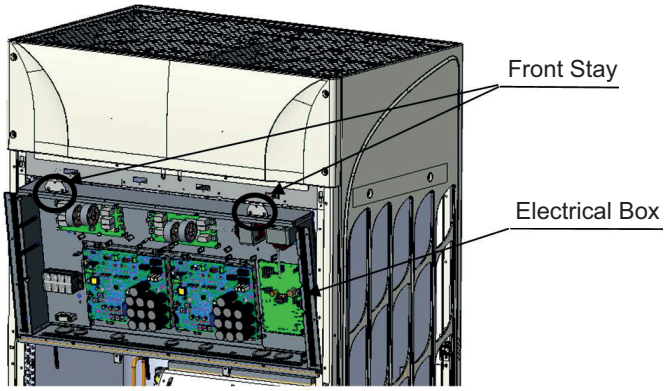
(9) Remove the electrical box from the outdoor unit.

NOTE:

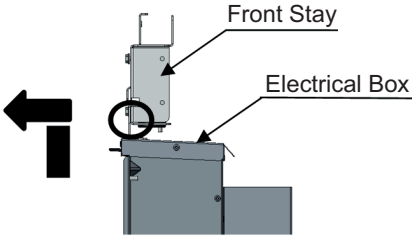
Be sure to wear the protection and take special care not to be injured with the plate edges.

Tool	Phillips Screwdriver

Work in pairs



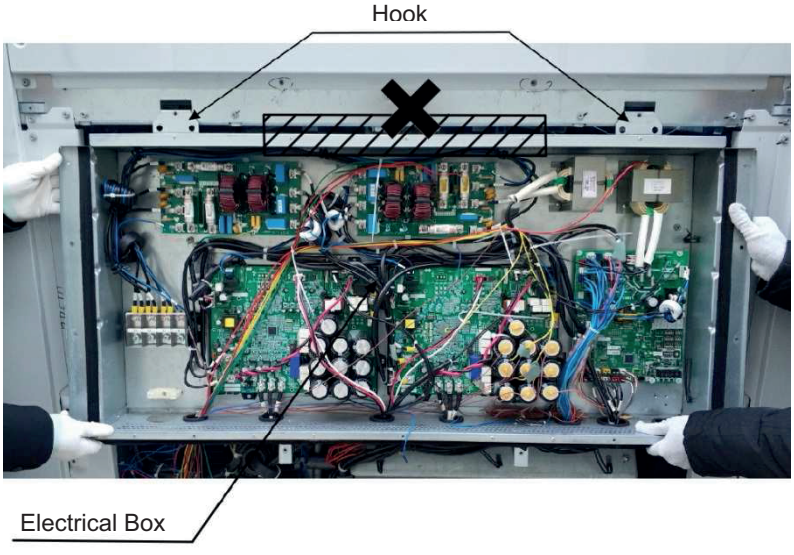
Lift the electrical box up and remove



⚠ CAUTION

When removing the electrical box from the outdoor unit, hold the bottom side of the hook on the electrical box as shown in the figure below.

DO NOT hold the center of the electrical box. It may cause deformation of the electrical box.



⚠ WARNING

TURN OFF all power source switches.

2.6 Removing Air Grille

Remove screws fixing the air grille.

RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ: 6 screws

RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ: 10 screws

RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ: 16 screws

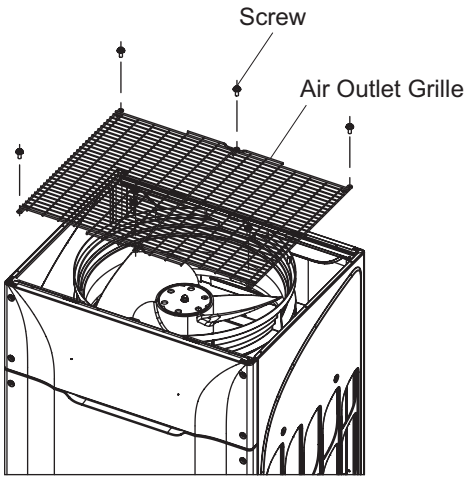
Remove the air grille.

NOTE:

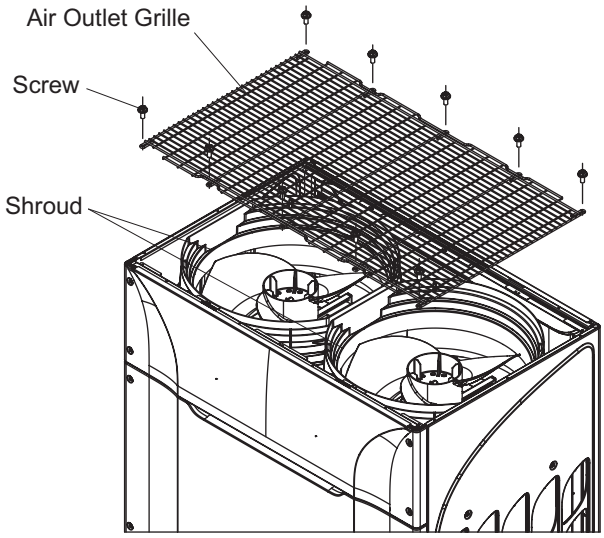
DO NOT apply an excessive force to the shroud (plastic part). Otherwise, deformation and breakage may occur.

Tool	Phillips Screwdriver

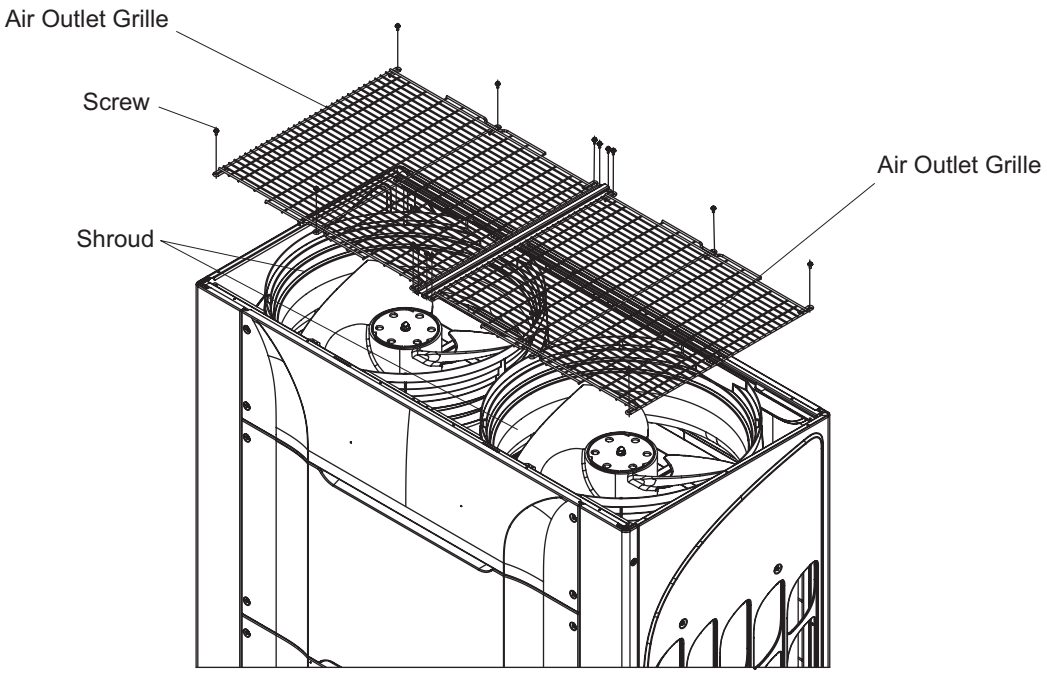
● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ



● RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ



● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ



⚠ WARNING

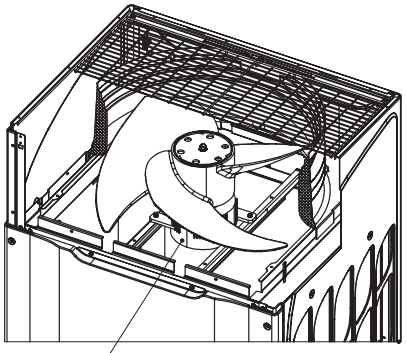
TURN OFF all power source switches.

2.7 Removing Outdoor Fan

(1) Remove the air grille according to the item 2.6 “Removing Air Grille”.

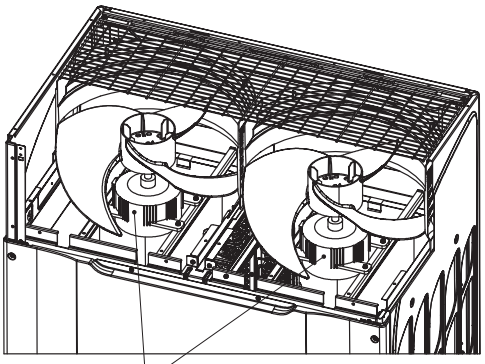
Tool	Adjustable Wrench, Spanner, Puller, Phillips Screwdriver, Nippers, Box Wrench

● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ



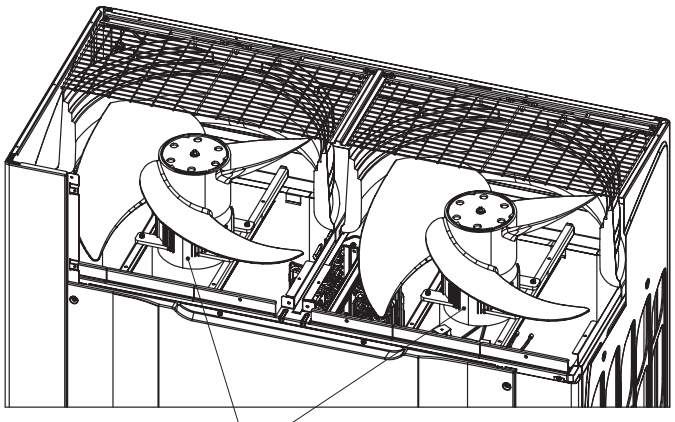
Fan Motor

● RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ



Fan Motor

● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ



Fan Motor

⚠ WARNING

TURN OFF all power source switches.

(2) Remove the closing nut and the flat washer fixing the propeller fan onto the motor shaft with a box wrench.

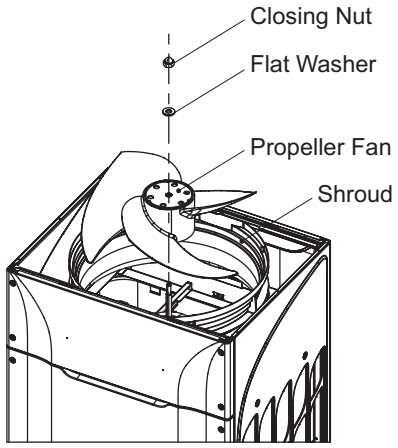
(3) Remove the propeller fan from the motor shaft (Lift the propeller fan up). When attaching the propeller fan to the motor shaft, make the D-Cut at the boss portion connected to the D-Cut of the fan motor shaft.

NOTE:

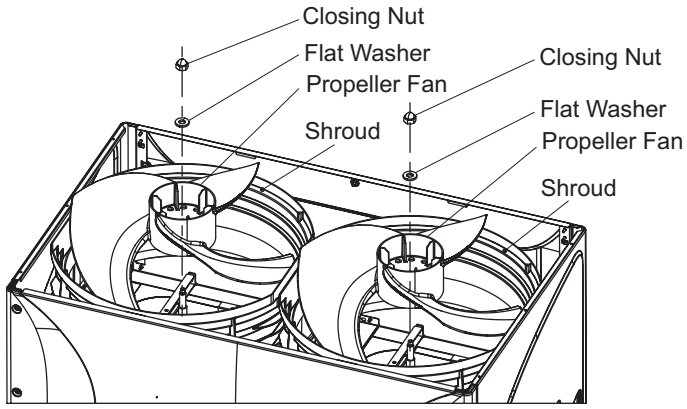
DO NOT apply an excessive force to the shroud (plastic part). Otherwise, deformation and breakage may occur.

Tool	Adjustable Wrench, Spanner, Puller, Phillips Screwdriver, Nippers, Box Wrench

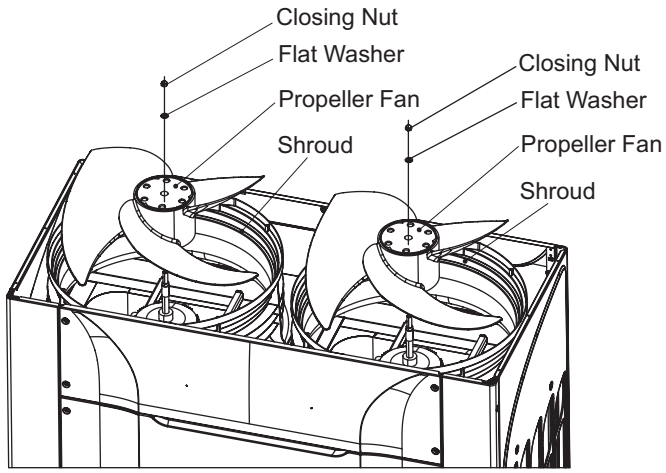
● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ



● RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ



● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ



WARNING

TURN OFF all power source switches.

(4) Removing Fan Motor Wiring

(a) Remove the service cover and the electrical box cover according to the item 2.1 “Removing Front Service Cover” and the item 2.4 “Removing Electrical Box Cover”.

(b) Disconnect the wiring connector for the fan motor in the electrical box.

(c) Unfix the wiring connecting the electrical box and the fan motor. Then cut the plastic tie fixing the piping insulation.

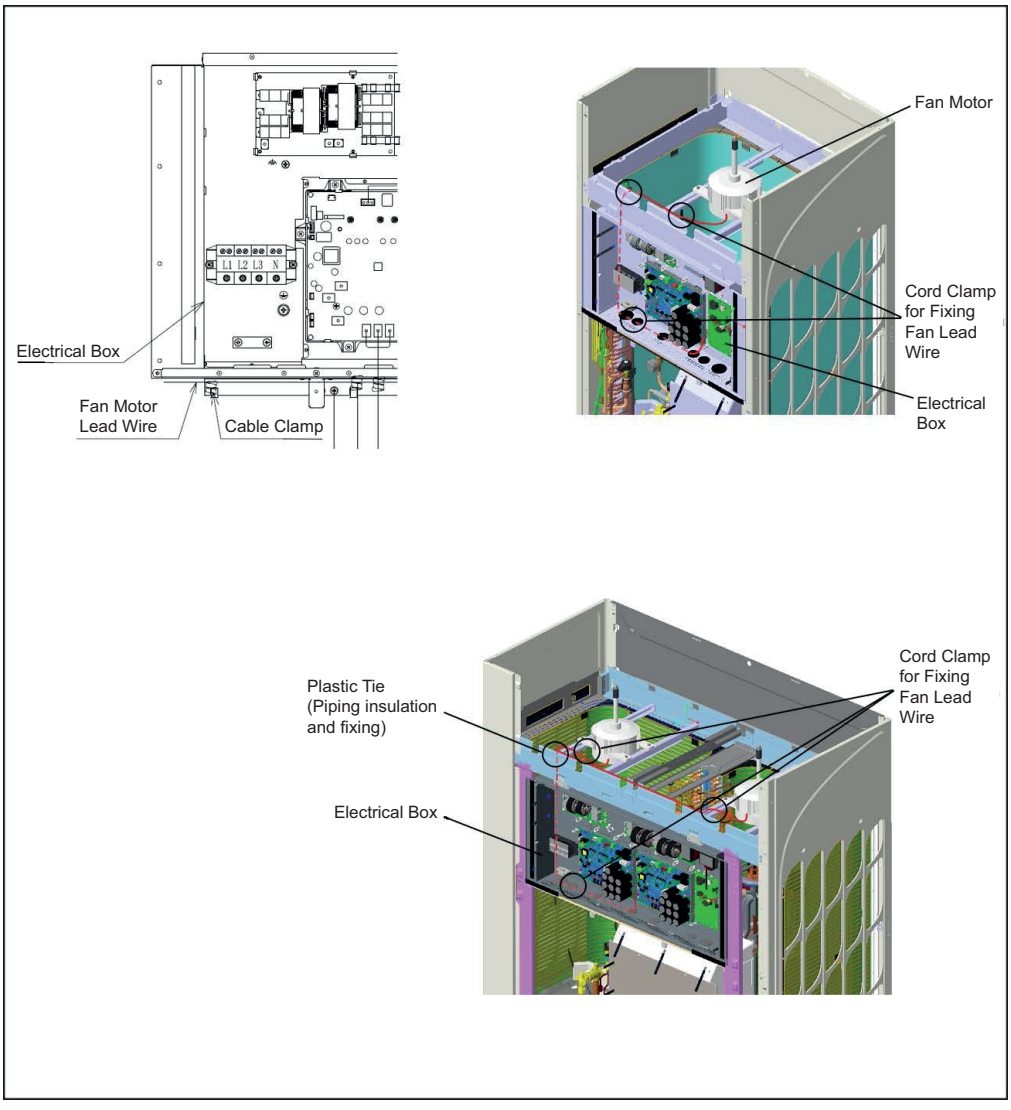
(d) Remove four M6 bolts fixing the fan motor, and remove the fan motor.

RAS-8.0~16HNBCMQ: 4 screws

RAS-18~24HNBCMQ: 8 screws

Adjustable Wrench, Spanner, Puller,
Phillips Screwdriver, Nippers, Box Wrench

<380 - 415V/50Hz>



⚠ WARNING

TURN OFF all power source switches.

(5) When reassembling the outdoor unit fan, perform the procedures for removal in reverse.

NOTE:

1. Put the edge of the protection tube inside the electrical box when mounting the fan motor. (Make a wire trap.)
2. Fix the motor wiring to the motor clamp with a plastic tie to avoid contact with the propeller fan. Fix the piping insulation with plastic tie.
3. When mounting the propeller fan on the motor shaft, make the D-Cut at the boss portion ⊖ mark part) connected to the D-Cut of the fan motor shaft. Firmly fix the propeller fan with 30N•m torque after the head of the fan shaft comes up.

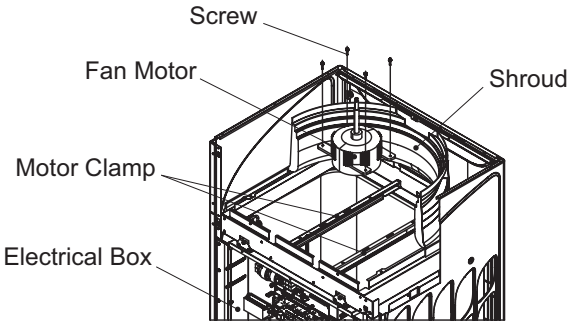
Torque for Tightening Propeller Fan
30N•m

4. Connect the wiring connector for the fan motor with the wiring connector in the electrical box.

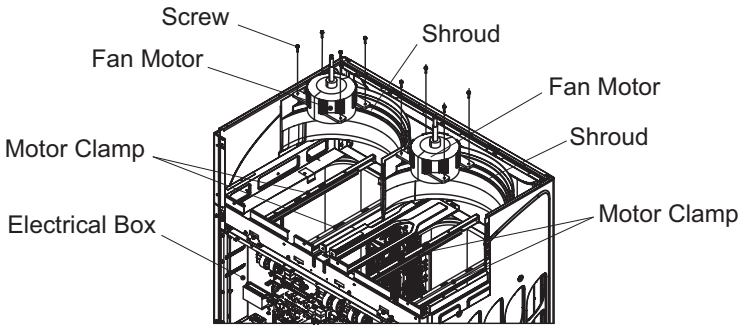
(6) After mounting the fan motor, check from above that gap between the propeller fan and the shroud is even.
Also check that there is no noise caused by contact between the propeller fan and the shroud during the propeller fan operation.

Tool	Adjustable Wrench, Spanner, Puller, Phillips Screwdriver, Nippers, Box Wrench

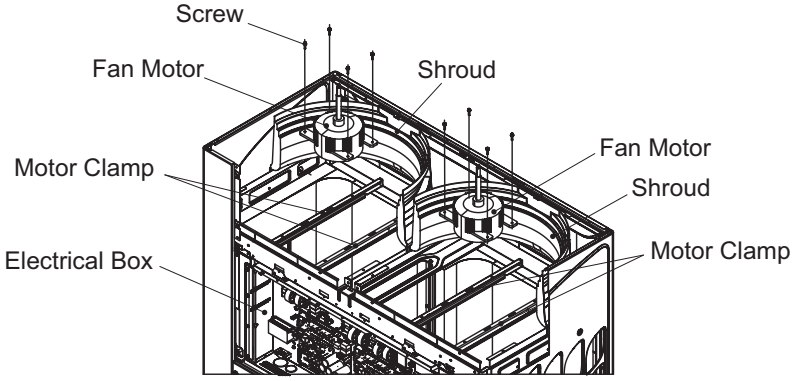
● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ



● RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ



● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ



⚠ WARNING

TURN OFF all power source switches.

2.8 Removing Compressor

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”. In the case that the outdoor unit is installed close to the wall, remove the refrigerant piping and move the outdoor unit away from the wall.

(2) Close the gas stop valve and the liquid stop valve.

(3) Collect the refrigerant in the outdoor unit from the low pressure check joint and the high pressure check joint. Check that the pressure does not increase at this time. If the pressure increase, collect all the refrigerant in the refrigerant cycle.

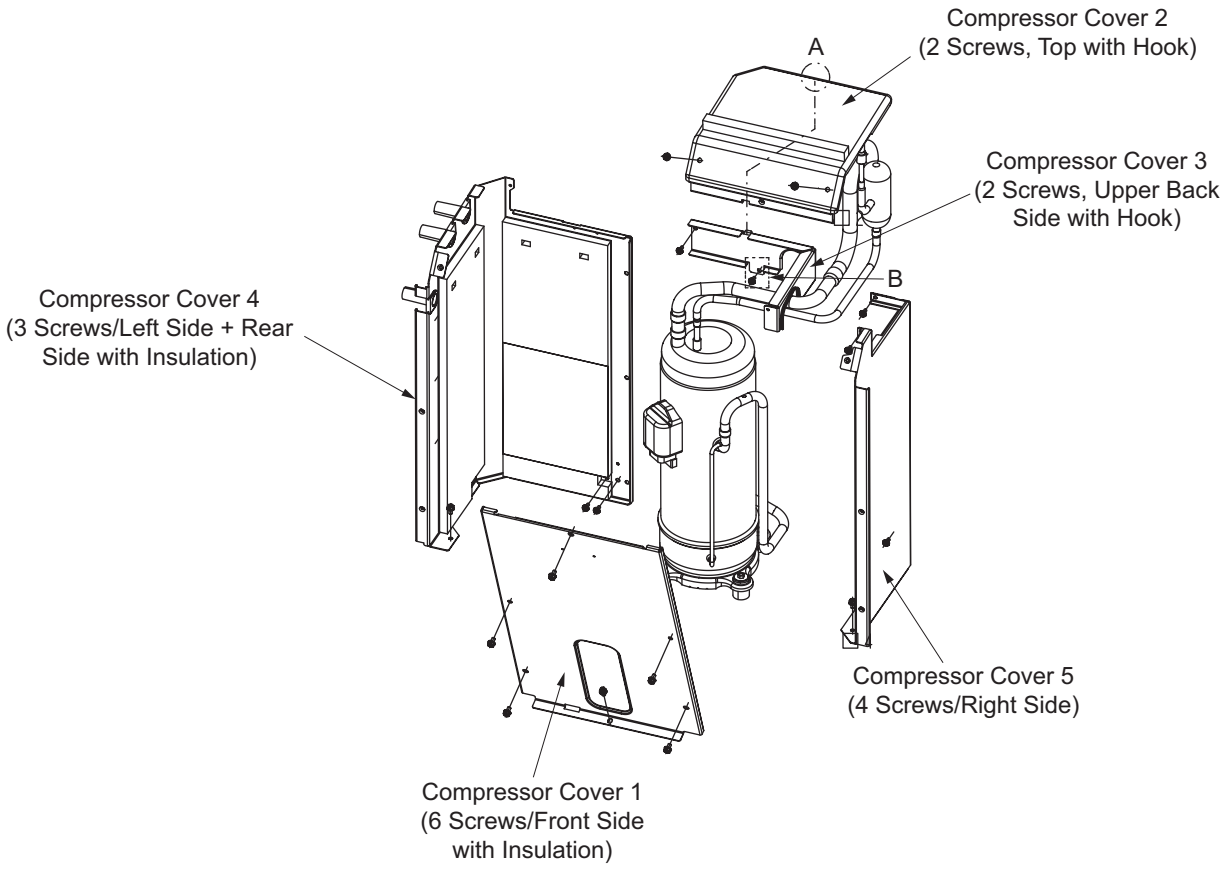
(4) Remove the compressor cover (C-cover) by following the numbers in the figure below.

NOTE:

1. Pay attention not to deform the piping around the compressor when removing the C-cover. It may cause the damage on brazing parts.
2. Be careful not to get injured by the sheet metal edge or heat exchanger fin when removing the Compressor’s cover.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Pilers, Burner(Welder), Pipe Cutter, Nippers

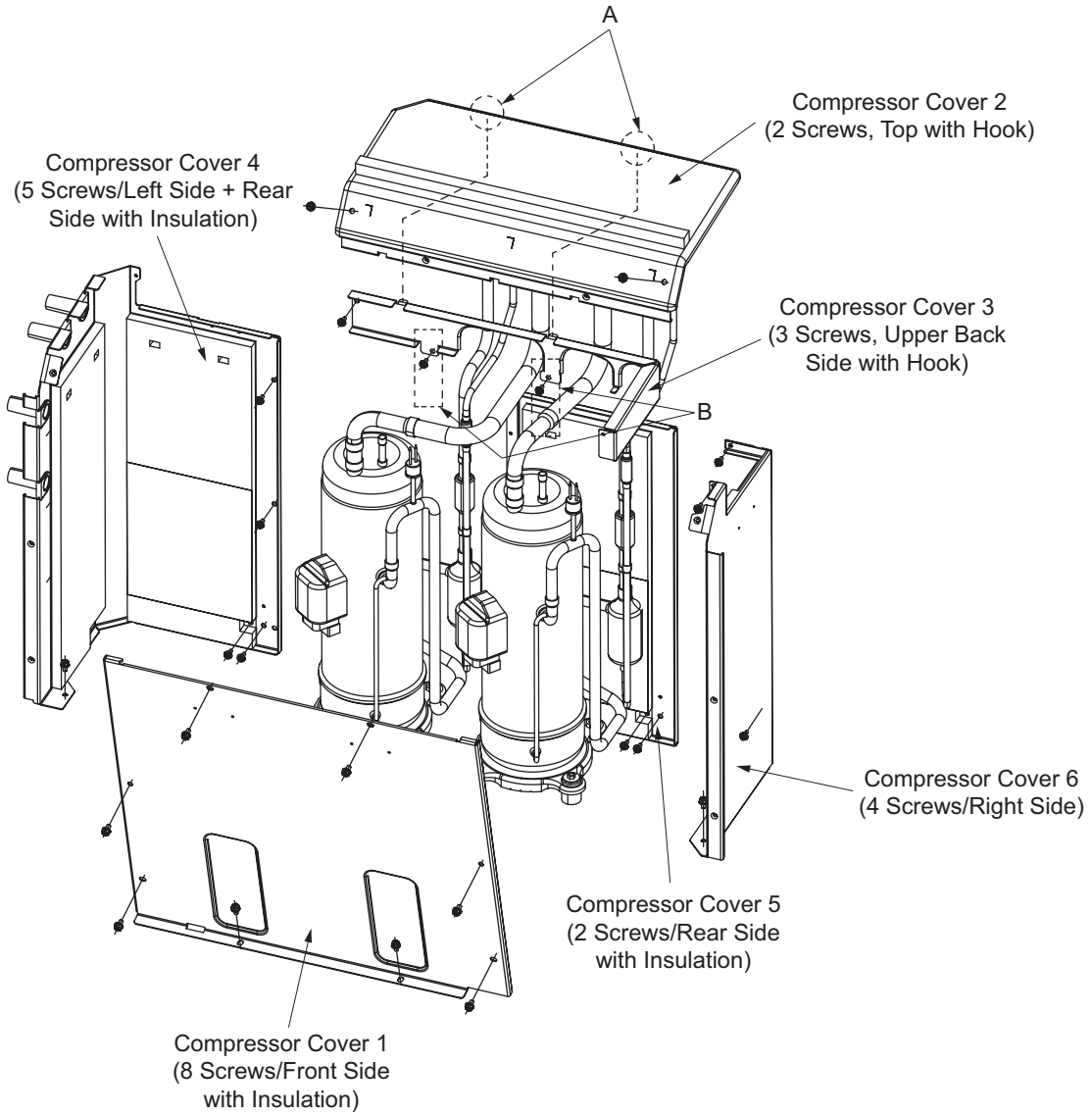
● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ
RAS-14HNBCMQ/RAS-16HNBCMQ



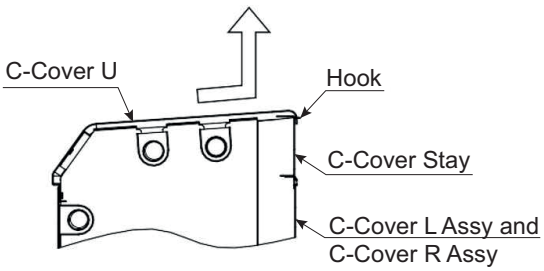
⚠ WARNING

TURN OFF all power source switches.

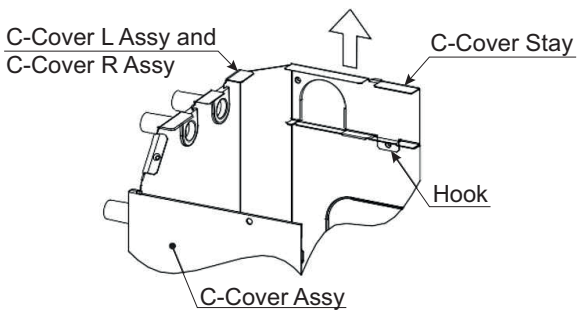
● RAS-18HNBCMQ/RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ



Details of A
Hook of C-Cover Stay is hooked to the square hole of C-Cover U.
Lift up then remove C-Cover U.



Details of B
Hook of C-Cover Stay is inserted into the square hole of C-Cover L Assy and C-Cover R Assy.
Lift up then remove C-Cover Stay.



⚠ WARNING

TURN OFF all power source switches.

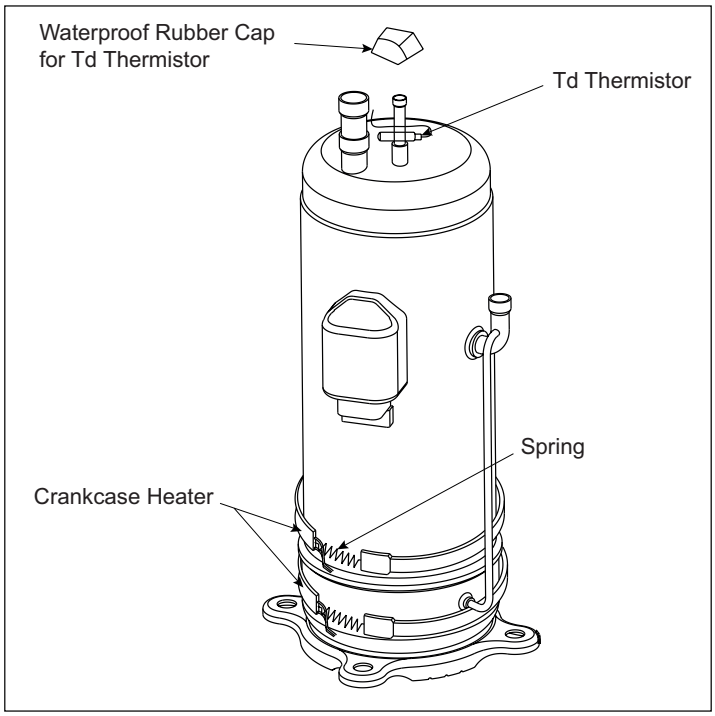
(5) Remove the Td thermistor on the top of the compressor.

(6) Release the spring for the crankcase heater to remove it.

NOTE:

The waterproof rubber cap will be used again when reassembling. Keep them in a container so that the parts are stored correctly.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Pilers, Burner(Welder), Pipe Cutter, Nippers



⚠ WARNING

TURN OFF all power source switches.

(7) Remove the terminal block box cover for the compressor and disconnect the wiring to the compressor terminals. Match the terminal numbers with the mark band numbers when reassembling. If wiring is connected incorrectly, the compressor may be damaged due to reverse rotation.

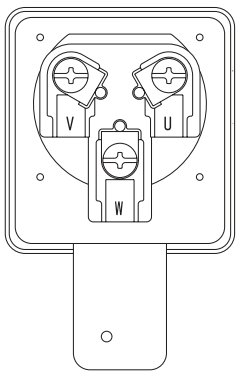
NOTE:

1. When replacing the compressor, check for the ring terminal condition. If the ring terminal is damaged, replace it with a new one.
2. Fix the wiring firmly with plastic ties.
3. Re-tighten the compressor screws after the replacement.

Type	Outdoor Unit Models	Inverter Compressor		
		380-415V/50Hz	AA50PHDG-D1Y2	DC80PHDG-D1Y2
Standard Type	RAS-8.0HNBCMQ		1	
	RAS-10HNBCMQ		1	
	RAS-12HNBCMQ			1
	RAS-14HNBCMQ			1
	RAS-16HNBCMQ			1
	RAS-18HNBCMQ		2	
	RAS-20HNBCMQ		2	
	RAS-22HNBCMQ			2
	RAS-24HNBCMQ			2

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Pilers, Burner(Welder), Pipe Cutter, Nippers

Details of Terminal Block Box



⚠ WARNING

TURN OFF all power source switches.

(8) Disconnect the discharge and suction pipes and the oil discharge pipe from the compressor. Check that the air pressure in the piping is equal to the atmospheric pressure. Then, cut the pipes at the closer position to the compressor from each brazing part. After cutting the pipes, remove the pipes from the brazing parts of the compressor.

NOTE:

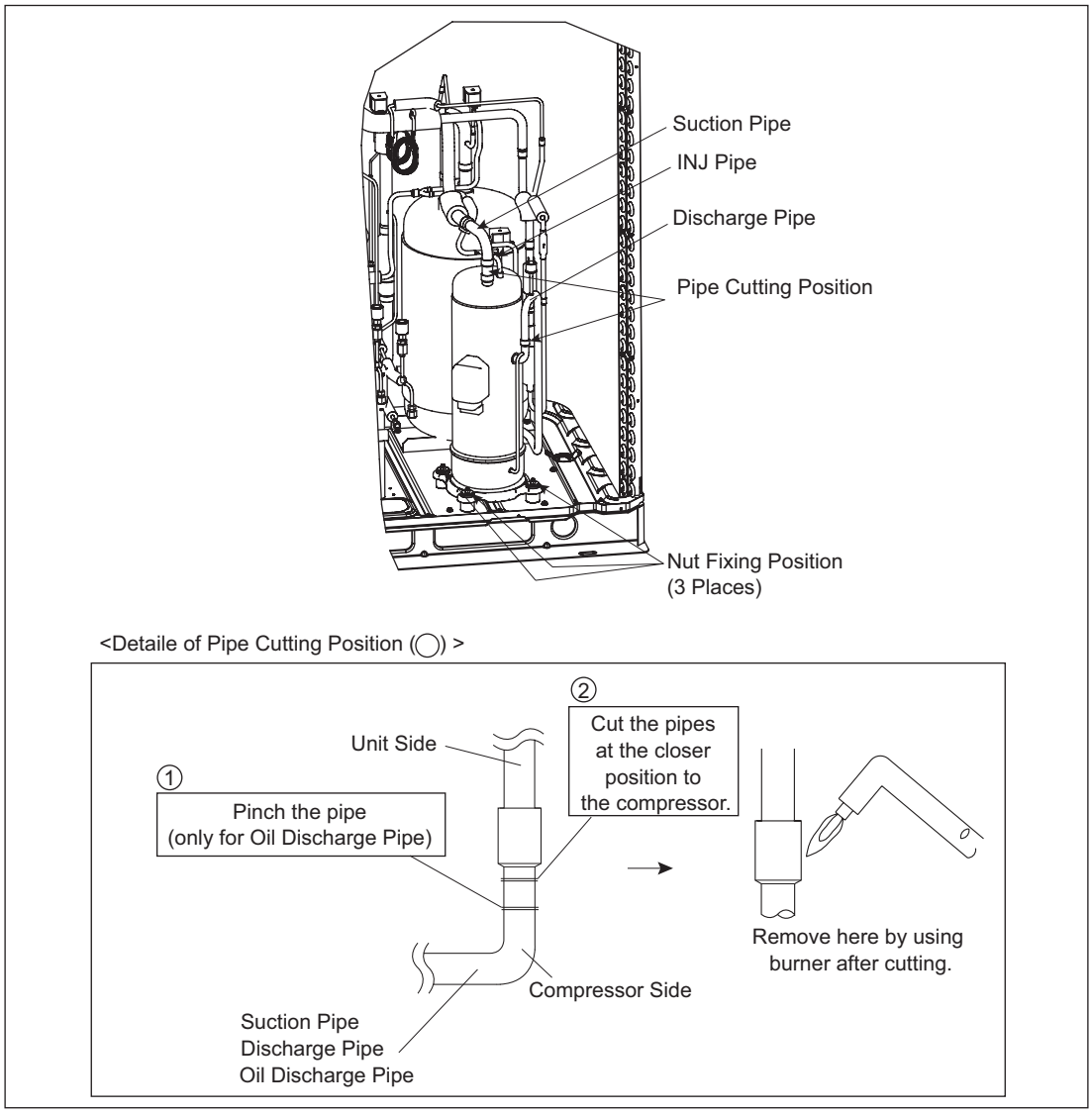
1. All the pipes are connected by brazing. When applying the burner to the pipe connections, the oil adhered inside the pipes may burn. Clear the flammable materials from around the compressor before starting the burner work.
2. Burner work under applying gas pressure is very dangerous. Make sure to cut the pipes first before starting the burner work.

(9) Disconnect the oil discharge pipe from the compressor. Before disconnecting it, pinch and cut the pipe at the closer position to the compressor from the brazing part so that the refrigerant oil remaining inside the compressor does not spill from the oil discharge pipe.

NOTE:

1. If the oil discharge pipe is disconnected without performing the above procedure (for example, applying burner directly to the brazing part), the refrigerant oil may spill from the oil discharge pipe and catch fire. Make sure to follow the procedure for safety.
2. When disconnecting the oil discharge pipe, use an oil pan in case the remaining refrigerant oil spills.
3. DO NOT throw out the oil collected in the oil pan. The oil quantity is measured afterward.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Pilers, Burner(Welder), Pipe Cutter, Nippers



⚠ WARNING

TURN OFF all power source switches.

(10) Remove three (3) nuts fixing the compressor and remove the compressor.

NOTE:

1. When removing the compressor, take special care not to contact with the surrounding pipes. If contacted, the pipes may be deformed.
2. Take special care not to be injured with the sheet metal edges while working.
3. When removing the compressor fixed with the oil discharge pipe, seal the pipe end with tapes so that the refrigerant oil remaining inside the compressor will not spill out from the oil discharge pipe.
4. To prevent water and foreign particles entering the refrigerant cycle, mount the new compressor immediately after removing the old one.
5. When removing the compressor, remove the electrical box located above the compressor to make the work easier. The box wrench (10 mm) is required to remove the nuts fixing the compressor.

(11) Take the remaining refrigerant oil in the compressor from the discharger pipe and measure the oil quantity.

NOTE:

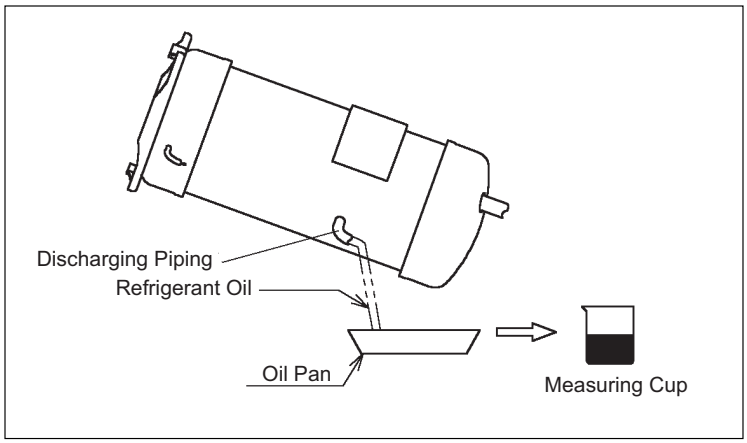
1. Additional refrigerant oil charge is required if remaining refrigerant oil quantity in the old compressor is more than the pre-charged refrigerant oil in the new compressor.
2. No additional oil charge is required if remaining refrigerant oil quantity in the old compressor is less than the pre-charged refrigerant oil in the new compressor.
3. The recharged quantity of the refrigerant oil to the cycle is calculated as follows: (Remaining quantity in the old compressor + Collected quantity + 200cc *1)) - (Initial charged quantity in the compressor for each model)

Compressor	Initial Charged Refrigerant Oil
AA50PHDG-D1Y2	1100cc
DC80PHDG-D1Y2	1100cc

*1): This value (200cc) is considered not to be removed from the chamber.

1. If the refrigerant oil is contaminated, exchange all with new refrigerant oil. (Refer to the item 2.9 for the detail of refrigerant oil replacing procedure).

Tool	Oil Pan, Measure Cup



(12) Mount the new compressor. When attaching the nut at the front side, take care not to deform the oil discharge pipe.

NOTE:

When mounting the new compressor on the base, take special care not to contact with piping. If contacted, piping may be deformed.

⚠ WARNING

TURN OFF all power source switches.

(13) File away brazing material remaining on the end of the refrigerant pipes (refer to the figure 1).

1. Be careful that filed brazing material does not enter the pipes.
2. Insert the pipes fully in to prevent brazing material from entering them (refer to figure 2).
3. Refer to the table 1 for the recommended amount of brazing material. If using more brazing material than the recommended amount, brazing material may drop into the pipes. When brazing the pipes, prevent oxidized scale formation by nitrogen substitution.
4. Perform brazing work according to the following order.
   (a) Oil Discharge Pipe
   (b) Discharge Pipe
   (d) Suction Pipe

NOTE:

1. For piping connection, perform securely non-oxidation brazing with nitrogen substitution. If brazing the pipes without the nitrogen substitution, a large amount of oxidized scale will be generated in the pipes. This oxidized scale may cause clogging in the expansion valve, solenoid valve, accumulator and compressor, which can prevent the unit from operating properly.
2. Do not use field-supplied antioxidant, etc., which may corrode pipes and deteriorate the refrigerant oil.
3. Connect the charging hose with the check joint at the low pressure side to release pressure.
4. When brazing the suction pipe, make sure that the connecting part is firmly inserted into the compressor and piping root is cooled, in order to prevent the brazing material entering the compressor.

Tool	Burner, Wet Cloth, Pliers

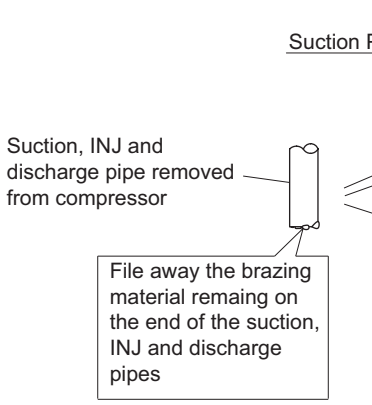


Fig.1 Brazing material Tratment

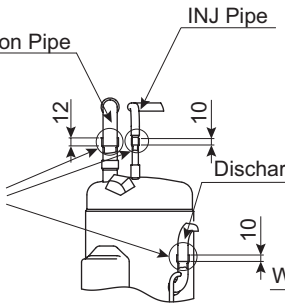


Fig. 2 Dimension of Piping connection

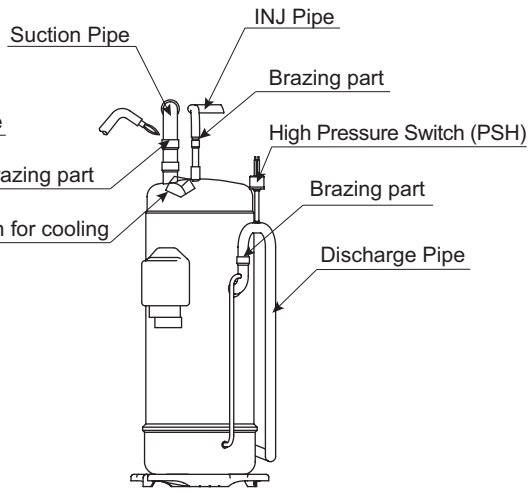


Fig. 3 Welding Portions

Thickness of Brazing Material	Piping Diameter (Refrigerant Cycle Side)						
	ϕ6.4	ϕ9.5	ϕ12.7	ϕ15.9	ϕ19.1	ϕ22.2	ϕ28.2
ϕ1.6mm	25mm	30mm	35mm	75mm	100mm	110mm	225mm
ϕ2.0mm	15mm	15mm	20mm	45mm	55mm	70mm	135mm
ϕ2.4mm	10mm	10mm	15mm	30mm	35mm	45mm	90mm

⚠ WARNING

TURN OFF all power source switches.

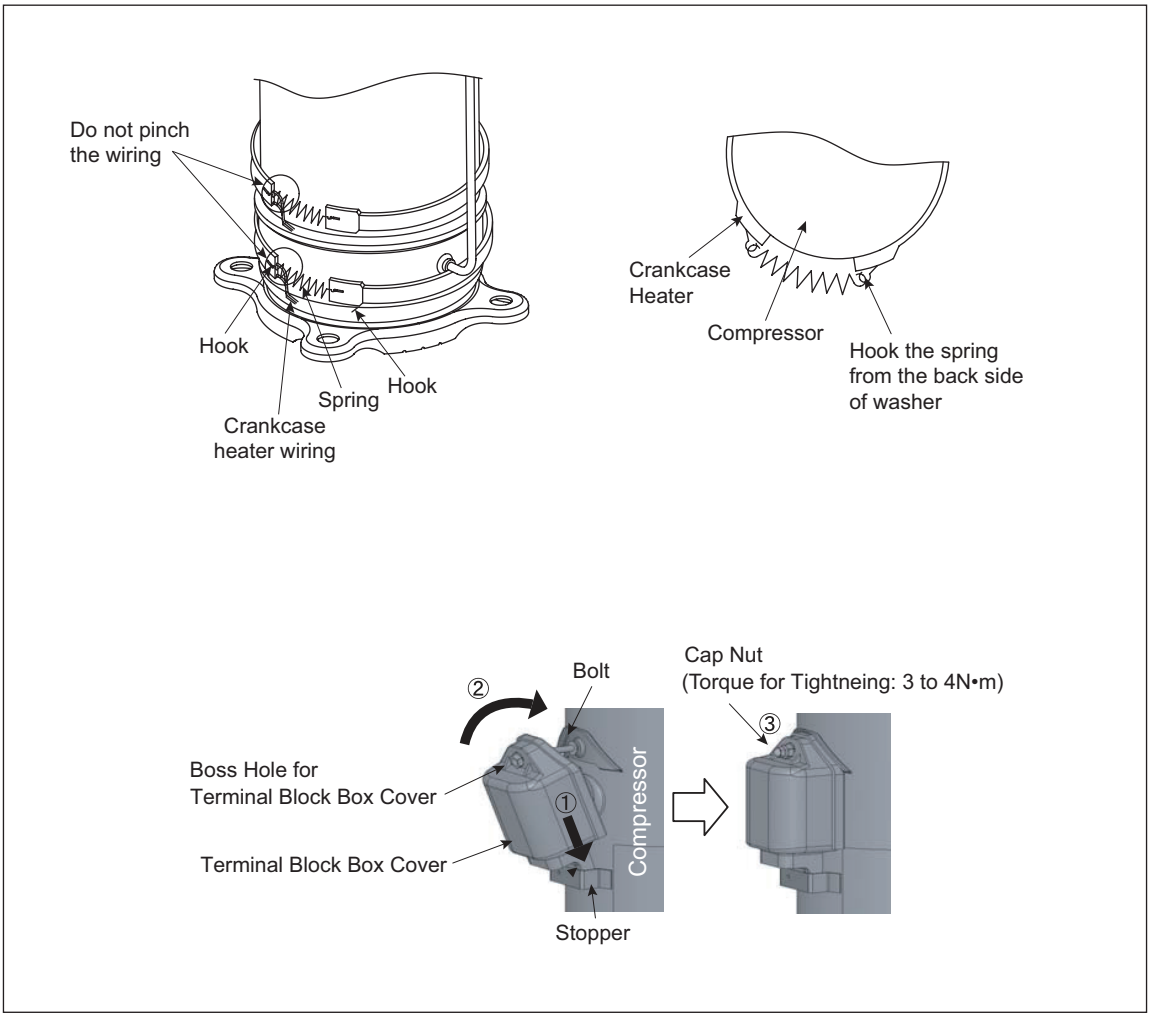
(14) Wind the crankcase heater around the compressor. Each crankcase heater shall be apart approximately 20mm.

(15) Reassemble the compressor cover (C-cover) using reverse procedure of the item 2.8 “Removing Compressor”, (2).

(16) Reconnect all wiring according to the procedure on the following pages.

NOTE:

If power line or the crankcase heater lead line touches a high temperature part such asoil discharge pipe of compressor chamber, the wiring may be cut or fired.
Check that the all wiring not contact with the compressor, pipe and the edge of the sheet metal.
If contact, wiring may be cut or fired.



NOTE:

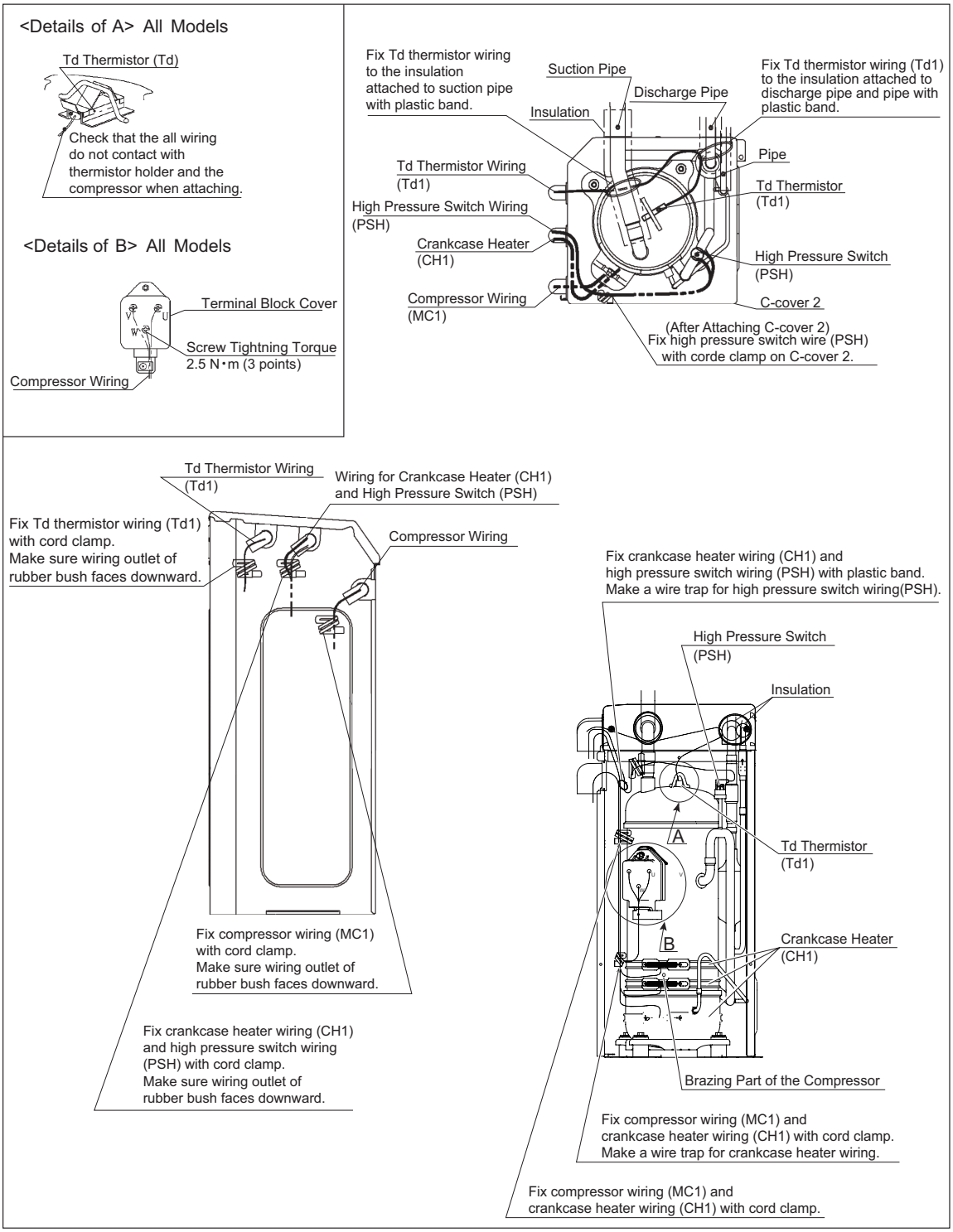
1. Attach the crankcase heater firmly to the compressor and fix it with springs as shown in the figure.
2. If there is clearance between the crankcase heater and the compressor due to wiring overlapping, excessive heat will be generated there. Then crankcase heater may break down due to overheating. When mounting the reassembled crankcase heater, this point should be considered.
3. If the crankcase heater wiring catches on the springs, the wiring may be cut due to vibration. When reassembling the crankcase heater, attention should be paid to the wiring.

⚠ WARNING

TURN OFF all power source switches.

● RAS-8.0~16HNBCMQ

Tool	Adjustable Wrench or Spanner, Burner (Welder), Pipe Cutter

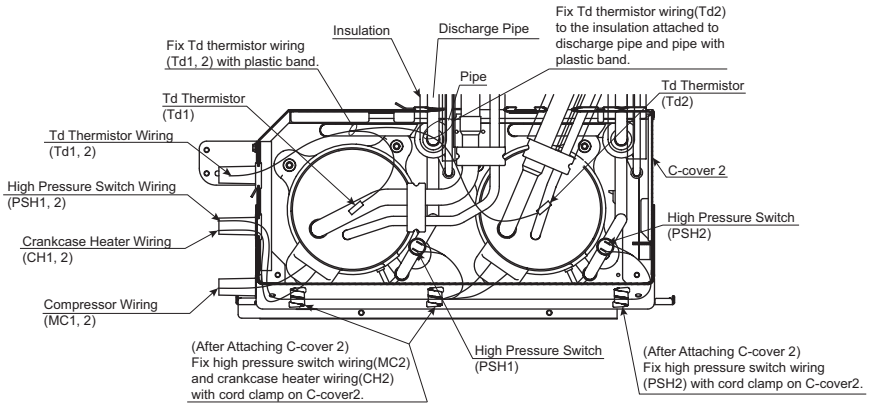


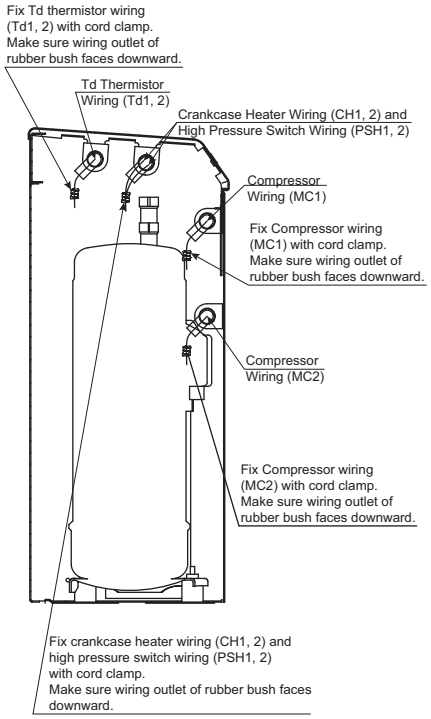
⚠ WARNING

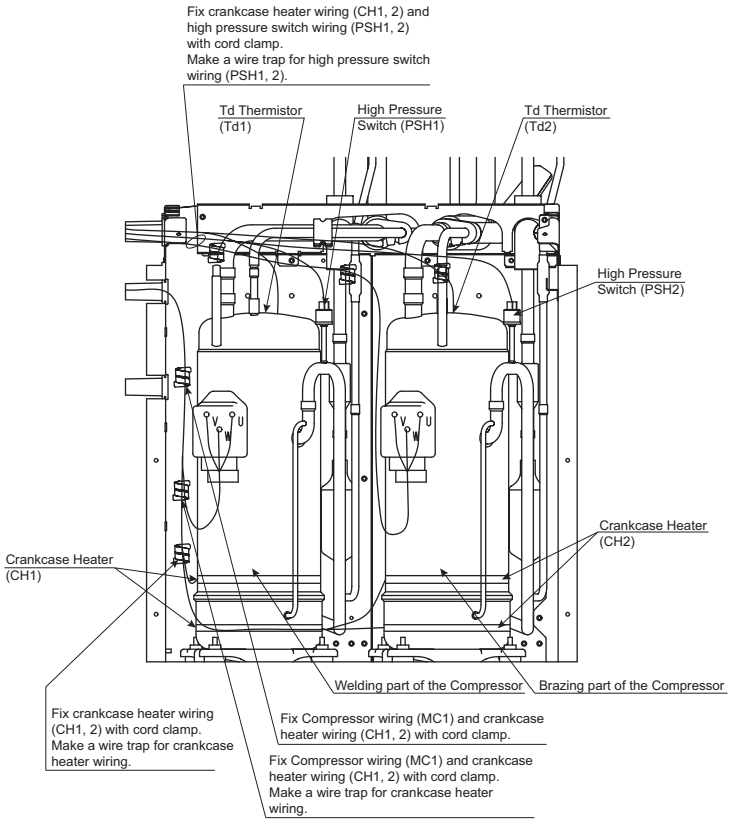
TURN OFF all power source switches.

- RAS-18~24HNBCMQ

Tool	Adjustable Wrench or Spanner, Burner (Welder), Pipe Cutter







⚠ WARNING

TURN OFF all power source switches.

2.9 Replacing Refrigerant Oil

2.9.1 Replacing Refrigerant Oil (No Clogging in Return Oil Circuit)

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Close (A) gas stop valve and (B) liquid stop valve.

(3) Collect the refrigerant in the outdoor unit from (D) low pressure check joint and (E) high pressure check joint. Check that the pressure does not increase at this time.

NOTE:

If the pressure increases, collect all the refrigerant in the refrigerant cycle.

(4) Connect the charge hose (for R410A) to (C) check joint for collecting refrigerant oil.

(5) Charge nitrogen (0.15MPa) from (D) low pressure check joint and collect the refrigerant oil in the accumulator by applying pressure (approximately 20 minutes). The residual refrigerant oil indicated in the figure cannot be collected because of the accumulator structure.

NOTE:

Ensure that the pressure on (E) high pressure check joint is NOT abnormal when nitrogen is charged.

(6) Stop charging nitrogen after the refrigerant oil has been completely collected. Perform vacuuming from (D) low pressure check joint and add the same quantity of oil as the collected refrigerant oil.

NOTE:

When the collected refrigerant oil is 3L or less, clogging may exist in the return oil circuit.

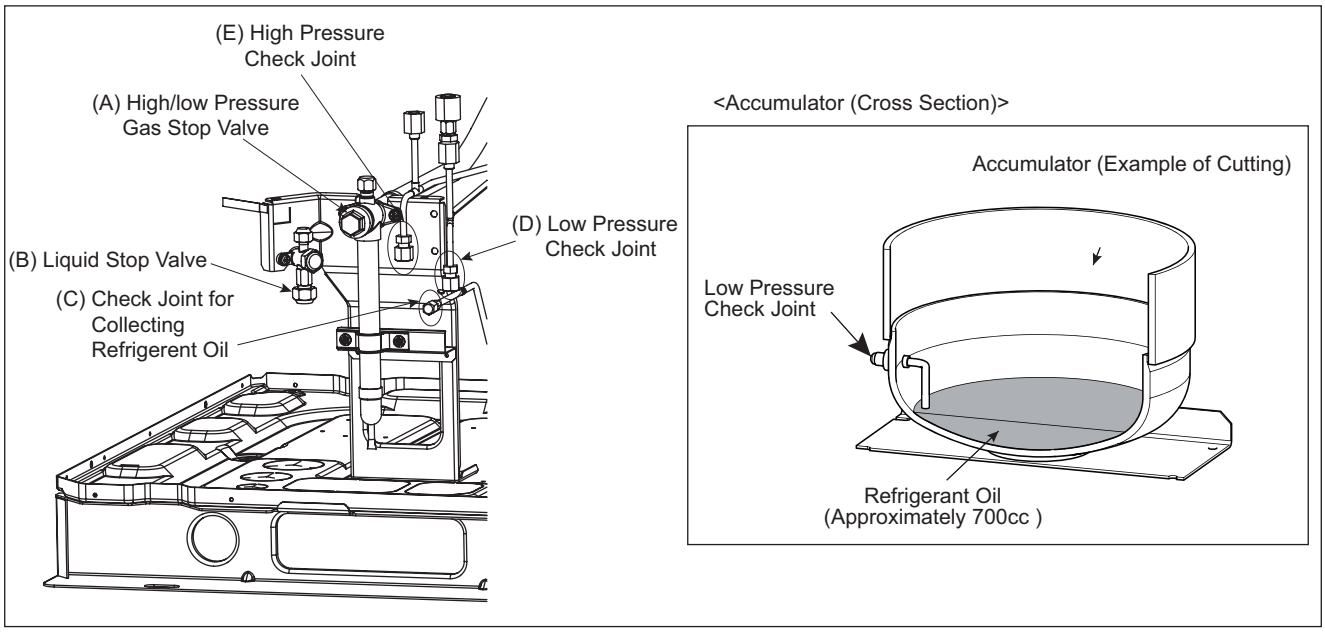
In that case, replace the return oil circuit according to the item 2.9.2 “Replacing Refrigerant Oil (Clogging in Return Oil Circuit) and Replacing Return Oil Circuit”.

(7) When the procedures have been completed, perform vacuuming again from (D) low pressure check joint and recharge the refrigerant. After recharging, open the stop valves.

NOTE:

1. Use a clean charging hose.
2. Charge the refrigerant oil in a short time (within approximately 20 minutes). Use a container with a small opening so that the refrigerant oil does not absorb the moisture in the atmosphere.

Tool	Adjustable Wrench or Spanner



⚠ WARNING

TURN OFF all power source switches.

2.9.2 Replacing Refrigerant Oil (Clogging in Return Oil Circuit) and Replacing Return Oil Circuit

In the case of replacing the return oil circuit only, the procedures (8) and (9) are not required.

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Remove the electrical box, wirings stay according to the item 2.5 “Removing Electrical Box”.

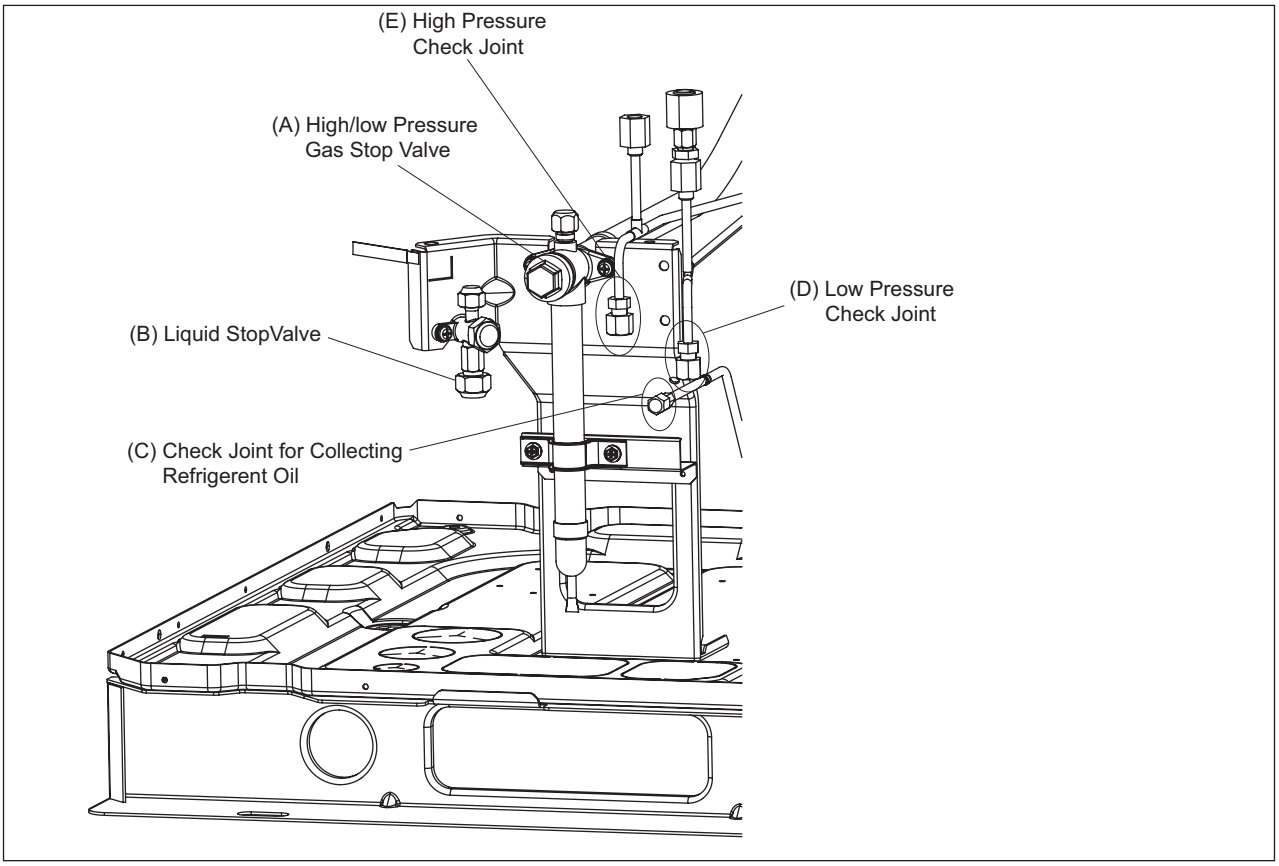
(3) Close (A) gas stop valve and (B) liquid stop valve.

(4) Collect the refrigerant in the outdoor unit from (D) low pressure check joint and (E) high pressure check joint. Check that the pressure does not increase at this time.

NOTE:

If the pressure increases, collect all the refrigerant in the refrigerant cycle. Refer to the item 1.3.6 “Setting of Forced Open Valve Mode”.

Tool	Adjustable Wrench or Spanner



⚠ WARNING

TURN OFF all power source switches.

(5) Cut of (F) return oil circuit with (H) accumulator pipe at the cutting position indicated in the figure.

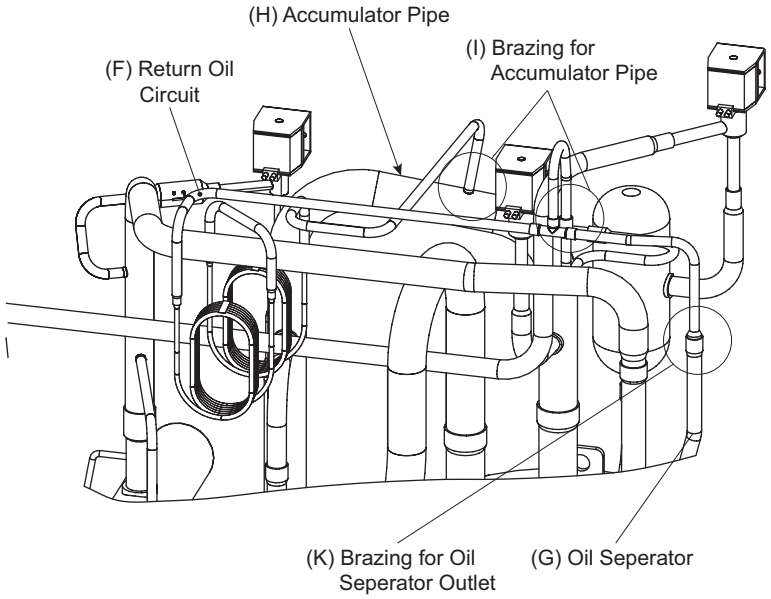
(6) Cut off (F) return oil circuit with (G) oil separator at the point indicated in the figure. Remove (F) return oil circuit from the unit. Then, remove (I) brazing part of accumulator pipe and (K) brazing part of the oil separator outlet port.

NOTE:

1. When cutting (L) return oil circuit pipes off, cut the closer part to (L) return oil circuit to prevent the refrigerant oil remaining in (F) return oil circuit from spilling out.
2. When cutting return oil circuit off, do not use a tool spewing swarf such as a saw.
3. After cutting return oil circuit off, remove the cut-off piping from (L) brazing part of the oil separator outlet port.
4. When removing (I) brazing part of accumulator pipe and (K) brazing part of the oil separator outlet port, refrigerant oil may come out. Prepare the oil pan and such before the work to receive the refrigerant oil.

Tool	Adjustable Wrench or Spanner

● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ



(7) Connect a charging hose to (K) brazing part of oil separator outlet port. Then, charge nitrogen (0.15MPa) from (I) brazing part of accumulator pipe and collect refrigerant oil in (G) oil separator by applying pressure.

NOTE:

In the case that the unit has two (2) return oil circuits and two (2) oil separators (RAS-18HNBCMQ/ RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ), collect the refrigerant oil from one oil separator and then from the other.

(8) Stop charging nitrogen after the refrigerant oil has completely been collected. Perform vacuuming from (D) low pressure check joint and add the same quantity of oil as the collected refrigerant oil from (C) check joint for collecting refrigerant oil.

NOTE:

In the case of replacing the return oil circuit only, the procedures (8) and (9) are not required.

(9) Connect the return oil pipe for replacement. After connecting the pipe, perform the nitrogen pressurization from (D) low pressure check joint. During the work, check that the oil does not spill out from brazing part.

(10) When the procedures have been completed, perform vacuuming again from (D) low pressure check joint and recharge the refrigerant. After recharging, open the stop valves.

NOTE:

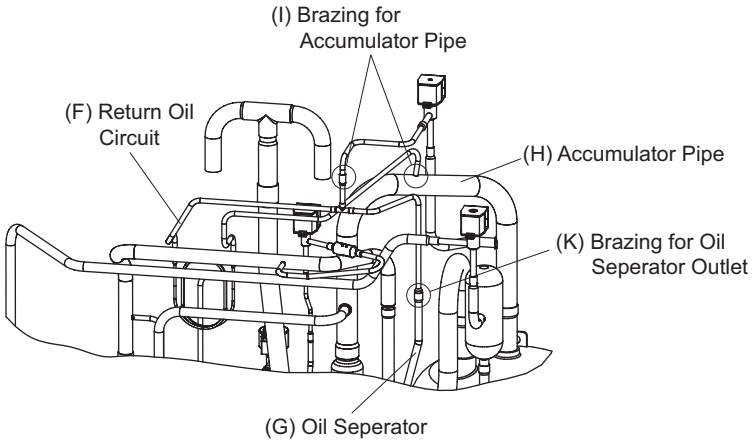
1. Use a clean charging hose.
2. Charge the refrigerant oil in a short time (within approx. 20 minutes). Use a container with a small opening so that the refrigerant oil will not absorb the moisture in the atmosphere.

⚠ WARNING

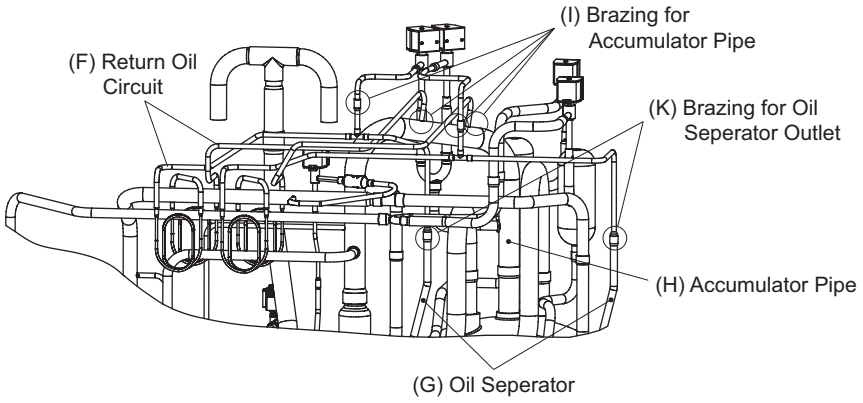
TURN OFF all power source switches.

Tool	Adjustable Wrench or Spanner

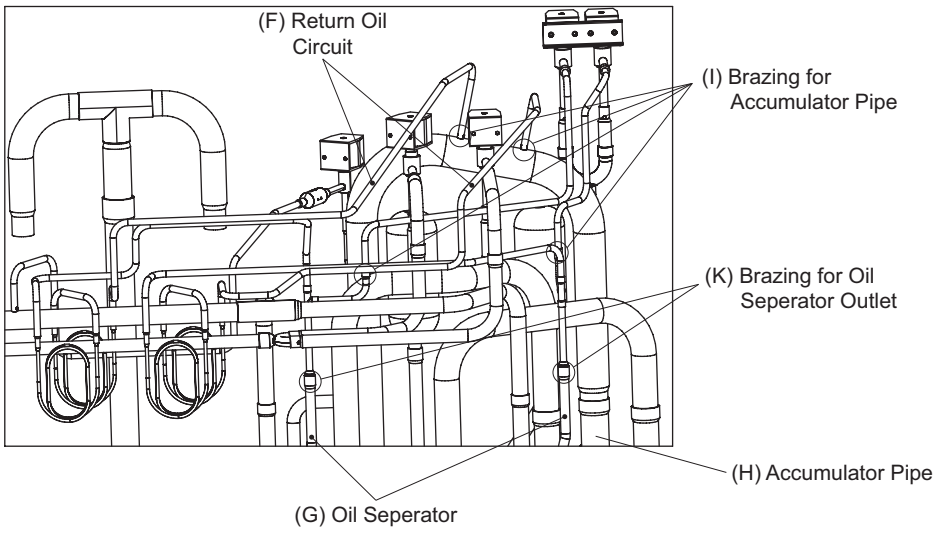
● RAS-14HNBCMQ/RAS-16HNBCMQ



● RAS-18HNBCMQ



● RAS-20HNBCMQ

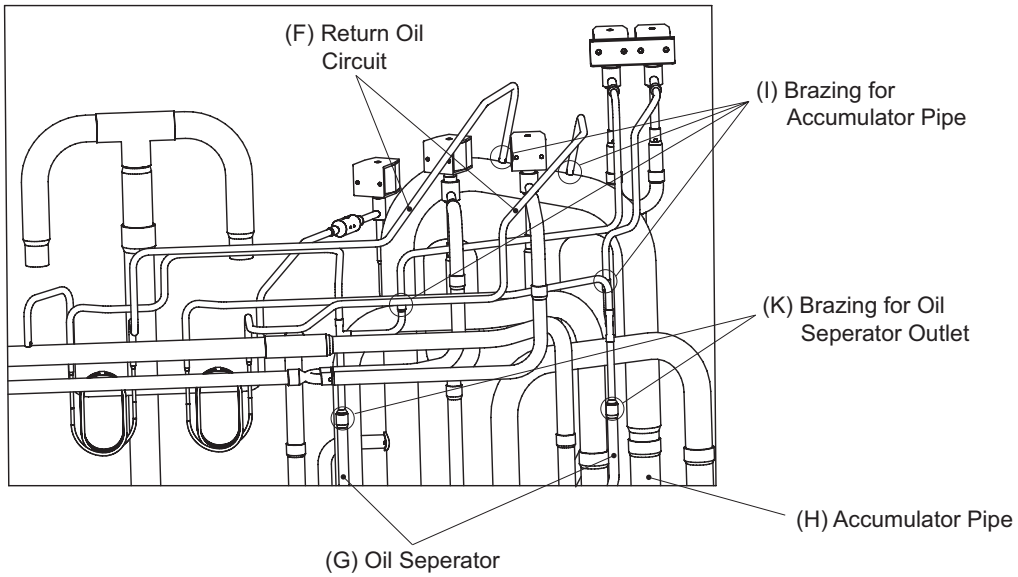


⚠ WARNING

TURN OFF all power source switches.

Tool	Adjustable Wrench or Spanner

● RAS-22HNBCMQ/RAS-24HNBCMQ



⚠ WARNING

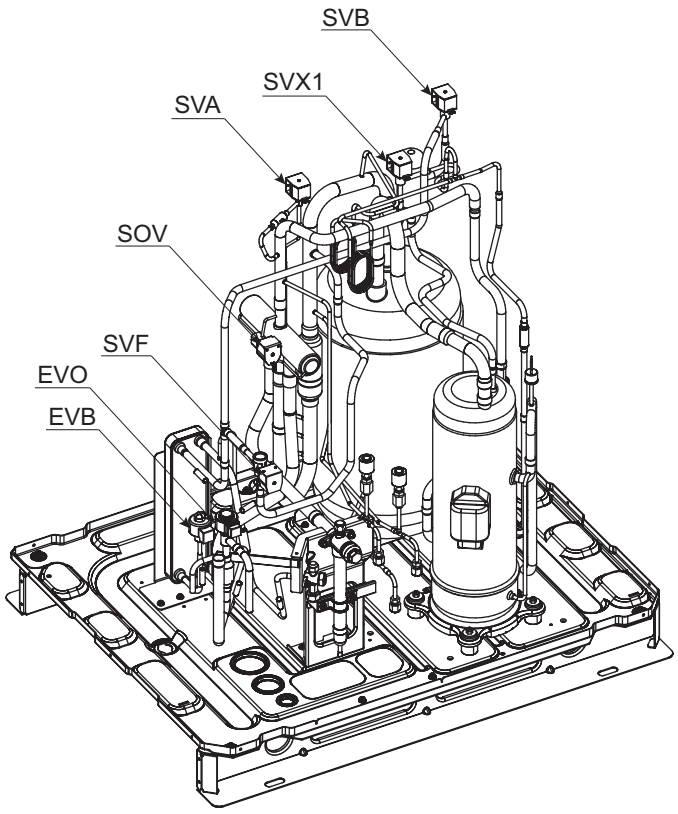
TURN OFF all power source switches.

2.10 Removing Coils

The following figures indicate the position of coils.

● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ

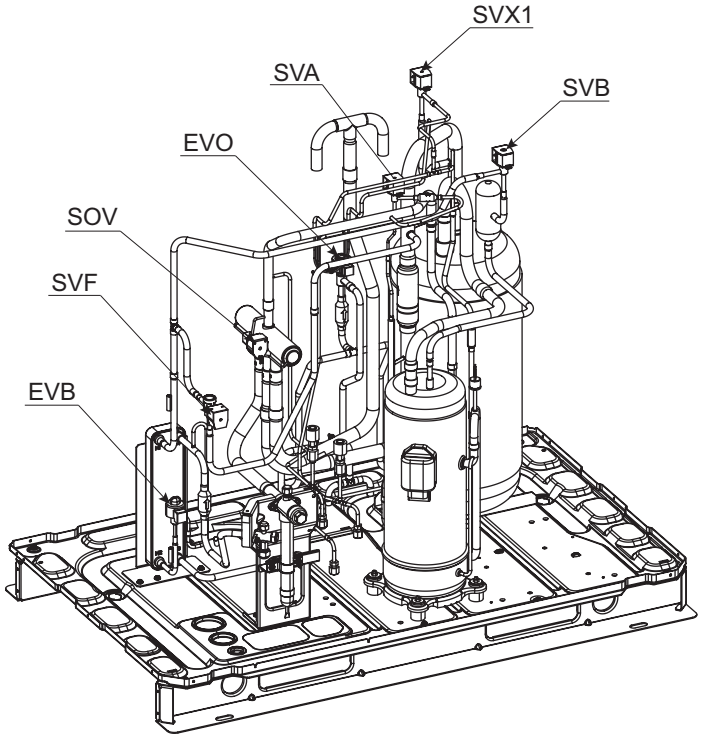
<Coil Position>



SVA : Solenoid Valve Coil
SVB : Solenoid Valve Coil
SVF : Solenoid Valve Coil
SVX1 : Solenoid Valve Coil
SOV : Reversing Valve Coil
EVB : Expansion Valve Coil
EVO : Expansion Valve Coil

● RAS-14HNBCMQ/RAS-16HNBCMQ

<Coil Position>



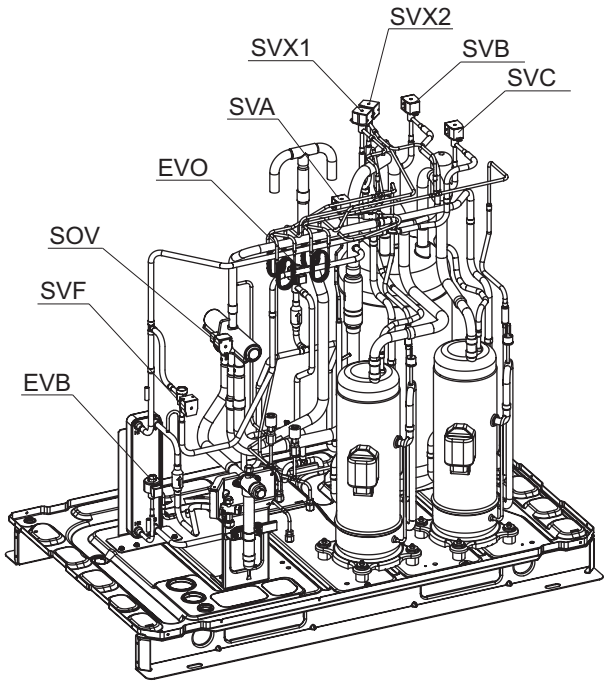
SVA : Solenoid Valve Coil
SVB : Solenoid Valve Coil
SVF : Solenoid Valve Coil
SVX1 : Solenoid Valve Coil
SOV : Reversing Valve Coil
EVB : Expansion Valve Coil
EVO : Expansion Valve Coil

WARNING

TURN OFF all power source switches.

● RAS-18HNBCMQ

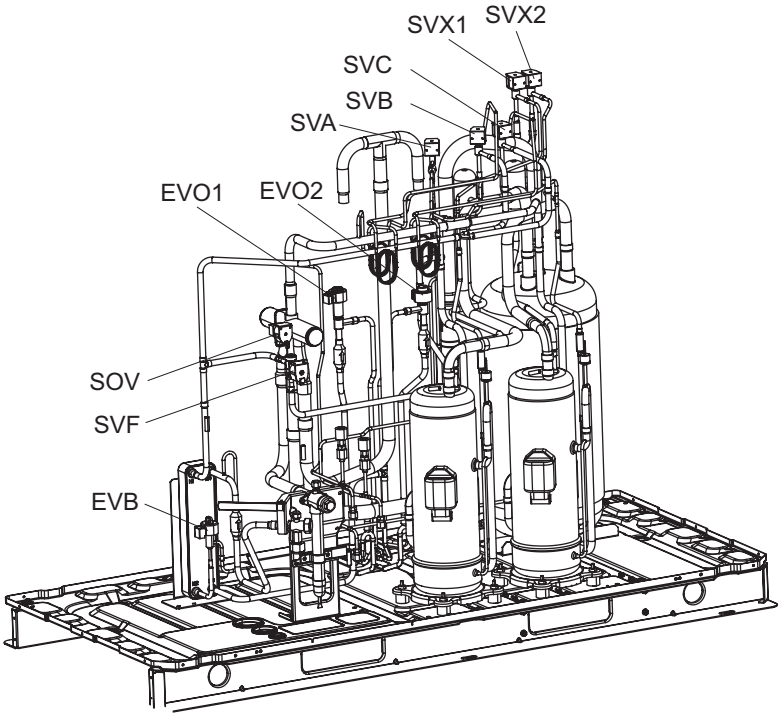
<Coil Position>



SVA : Solenoid Valve Coil
SVB : Solenoid Valve Coil
SVC : Solenoid Valve Coil
SVF : Solenoid Valve Coil
SVX1 : Solenoid Valve Coil
SVX2 : Solenoid Valve Coil
SOV : Reversing Valve Coil
EVB : Expansion Valve Coil
EVO : Expansion Valve Coil

● RAS-20HNBCMQ

<Coil Position>

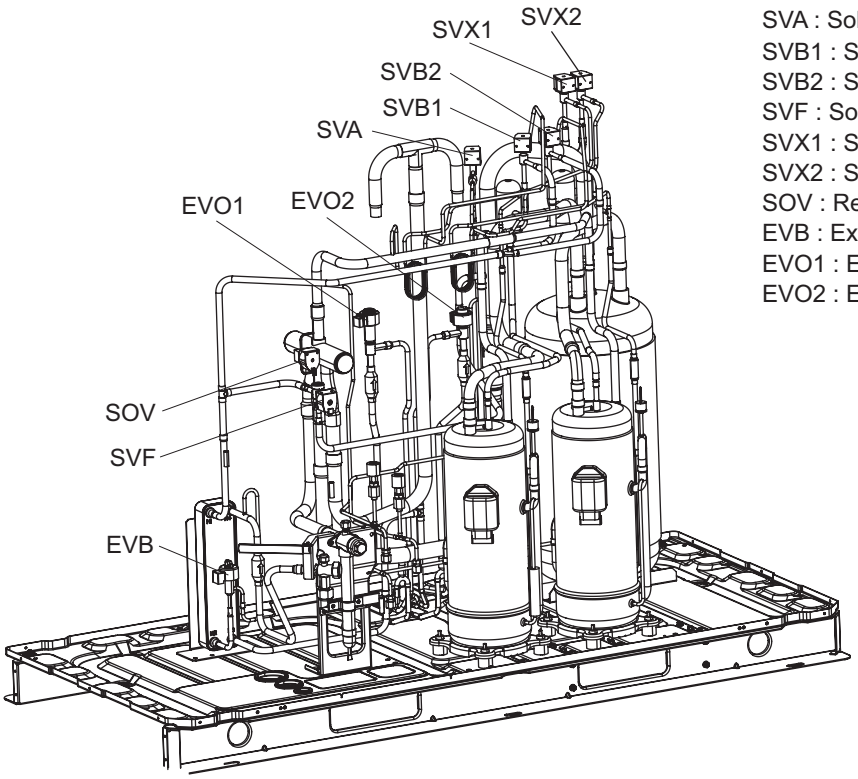


SVA : Solenoid Valve Coil
SVB : Solenoid Valve Coil
SVC : Solenoid Valve Coil
SVF : Solenoid Valve Coil
SVX1 : Solenoid Valve Coil
SVX2 : Solenoid Valve Coil
SOV : Reversing Valve Coil
EVB : Expansion Valve Coil
EVO1 : Expansion Valve Coil
EVO2 : Expansion Valve Coil

⚠ WARNING

TURN OFF all power source switches.

● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ <Coil Position>



SVA : Solenoid Valve Coil
SVB1 : Solenoid Valve Coil
SVB2 : Solenoid Valve Coil
SVF : Solenoid Valve Coil
SVX1 : Solenoid Valve Coil
SVX2 : Solenoid Valve Coil
SOV : Reversing Valve Coil
EVB : Expansion Valve Coil
EVO1 : Expansion Valve Coil
EVO2 : Expansion Valve Coil

⚠ WARNING

TURN OFF all power source switches.

2.10.1 Removing Expansion Valve Coil (MV1, MV2, MVB)

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

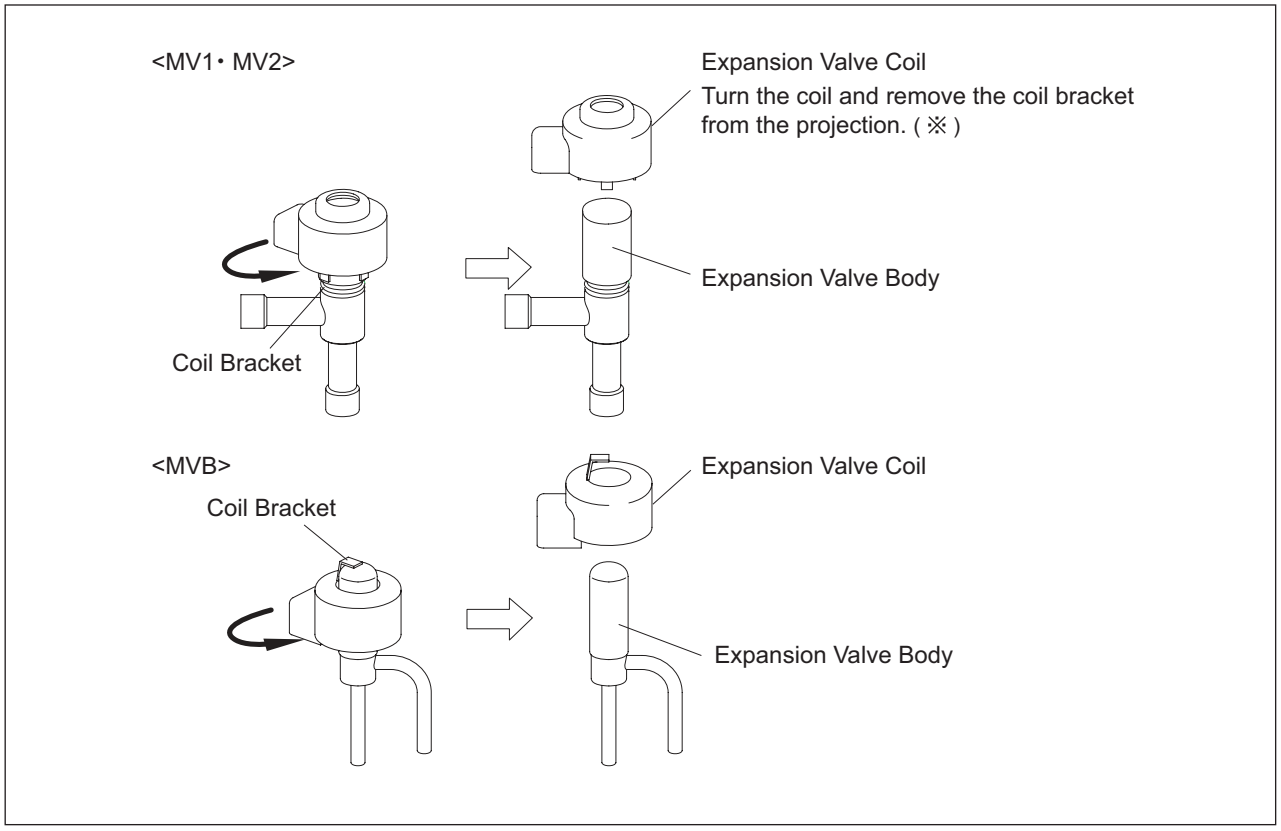
(2) Turn the expansion valve coil in a counter clockwise direction as shown in the figure below.
Remove the expansion valve coil bracket from the expansion valve slot. Then, pull the coil upward.

● Pay attention to the thermistor wiring when removing the expansion valve coils.

NOTE:

Make sure to remove the coil bracket from the coil slot before pulling the coil out. If not, your hand may hit against the piping. Follow the above procedure carefully to avoid any injuries.

Tool	Pliers



⚠ WARNING

TURN OFF all power source switches.

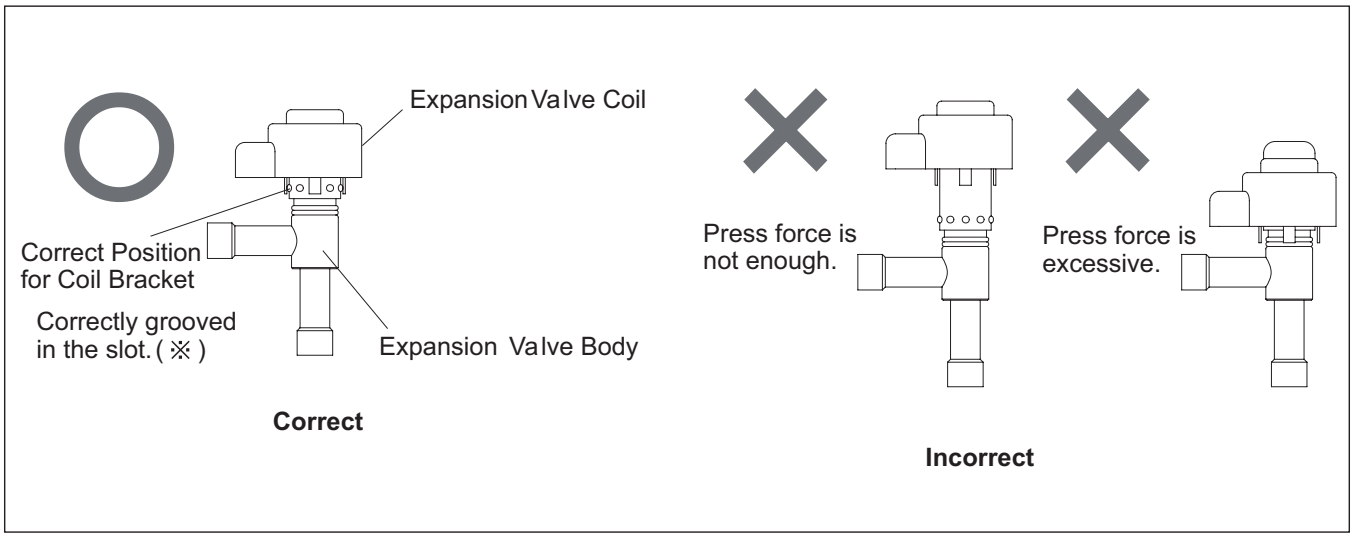
(3) For replacing the expansion valve coils, press the coil into the expansion valve slot by turning the coil. If an excessive force is applied to the coil, the coil bracket may be deformed. As a result, the coil cannot be fixed at the correct position shown in the figure.

● Any slots on the expansion valve inner surface are acceptable to fix.

NOTE:

Do not apply an excessive force to the coil when pressing it into the slot. Otherwise, it may cause damage to the piping.

Tool	Pliers



⚠ WARNING

TURN OFF all power source switches.

2.10.2 Removing Expansion Valve (MV1, MV2, MVB)

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Close the gas stop valve and the liquid stop valve.

(3) Collect the refrigerant in the outdoor unit from the low pressure check joint and the high pressure check joint. Check that the pressure does not increase at this time.

NOTE:

If the pressure increases, collect all the refrigerant in the refrigerant cycle. Refer to the item 1.3.6 “Setting of Forced Open Valve Mode” for details.

(4) Remove the expansion valve coils according to the item 2.10.1 “Removing Expansion Valve Coil”.

(5) Remove the brazing at the position shown in the figure below.

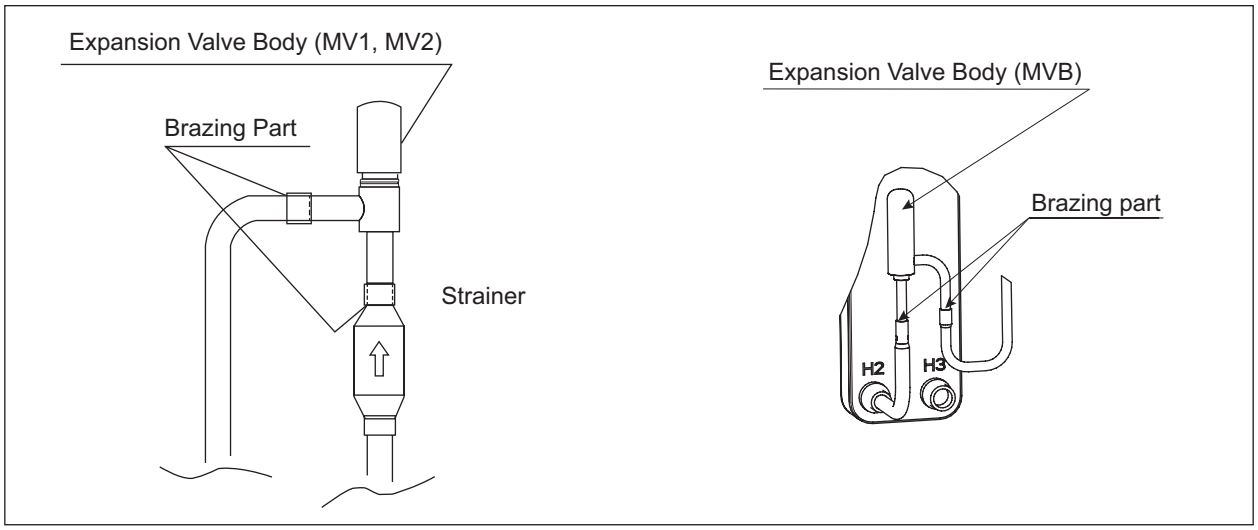
(6) The positions of expansion valves (MV1, MV2, MVB) are shown in the item 2.10 “Removing Coils”.

NOTE:

1. During brazing work, cover the solenoid valves with wet cloth for cooling.
2. Take special care not to burn the connecting wiring and the piping insulation during brazing work.

(7) Reassemble the expansion valves in the reverse procedure.

Tool	Phillips Screwdriver, Charging Hose, Burner, Wet Cloth, Pliers



⚠ WARNING

TURN OFF all power source switches.

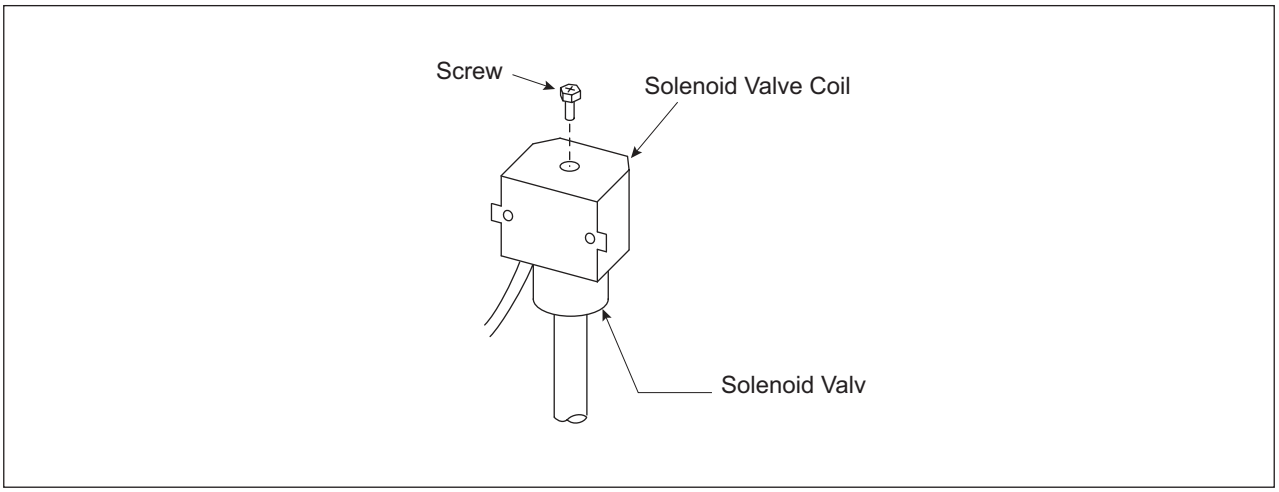
2.10.3 Removing Solenoid Valve Coil (SVA)

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Remove one (1) screw fixing the solenoid valve coil with a Phillips screwdriver. If the screw is difficult to remove, use a spanner or an adjustable wrench.

(3) Remove the solenoid valve coil.

Tool	Phillips Screwdriver



⚠ WARNING

TURN OFF all power source switches.

2.10.4 Removing Solenoid Valve (SVA/SVB/SVC/SVF/SVX1/SVX2)

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Close the gas stop valve and the liquid stop valve.

(3) Collect the refrigerant in the outdoor unit from the low pressure check joint and the high pressure check joint. Check that the pressure does not increase at this time.

NOTE:

If the pressure increases, collect all the refrigerant in the refrigerant cycle. Refer to the item 1.3.6 “Setting of Forced Open Valve Mode” for details.

(4) Remove the solenoid valve coils according to the item 2.10.3 “Removing Solenoid Valve Coil”.

(5) Remove the brazing at the position shown in the figure below.

NOTE:

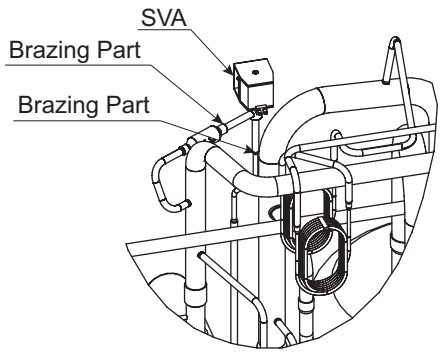
1. During brazing work, cover the solenoid valves with wet cloth for cooling.
2. Take special care not to burn the connecting wiring and the piping insulation during brazing work.

(6) Reassemble the solenoid valves in the reverse procedure.

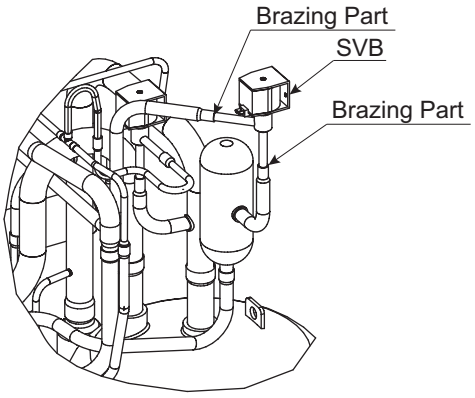
Tool	Phillips Screwdriver, Charging Hose, Burner, Wet Cloth, Pliers

- RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ

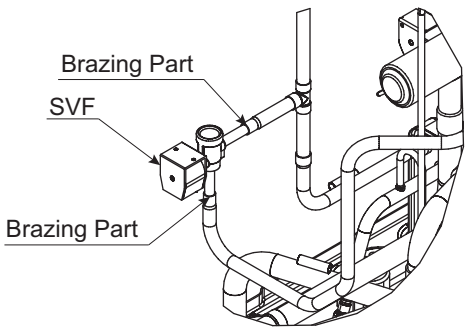
<Removing SVA>



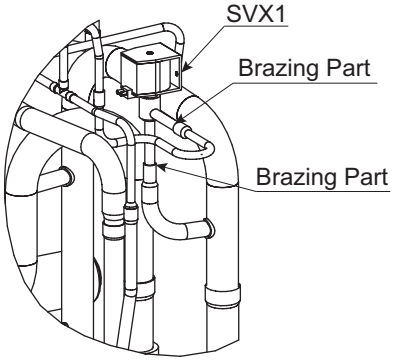
<Removing SVB>



<Removing SVF>



<Removing SVX1>



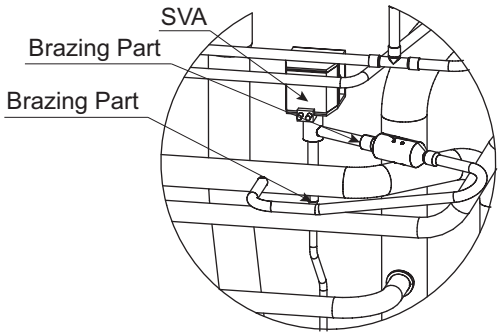
⚠ WARNING

TURN OFF all power source switches.

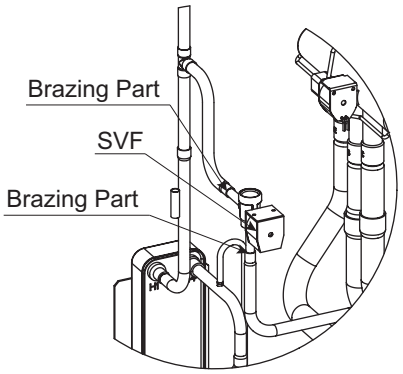
Tool	Phillips Screwdriver, Charging Hose, Burner, Wet Cloth, Pliers

● RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ

<Removing SVA>

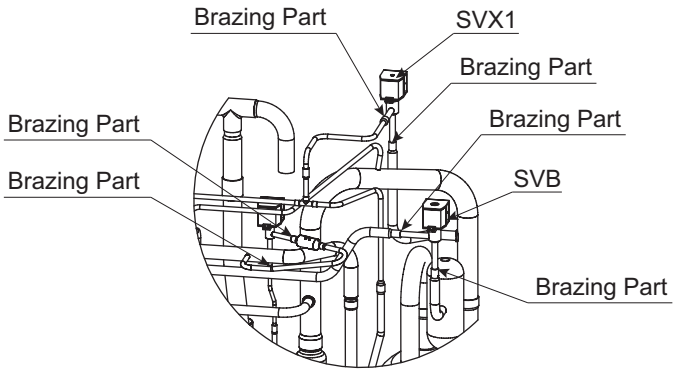


<Removing SVF>



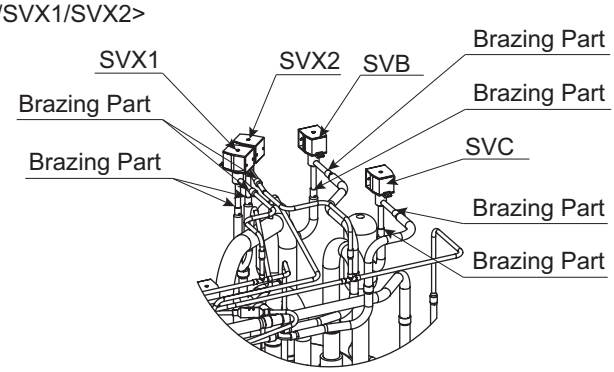
● RAS-14HNBCMQ/RAS-16HNBCMQ

<Removing SVB1/SVX1>



● RAS-18HNBCMQ

<Removing SVB/SVC/SVX1/SVX2>



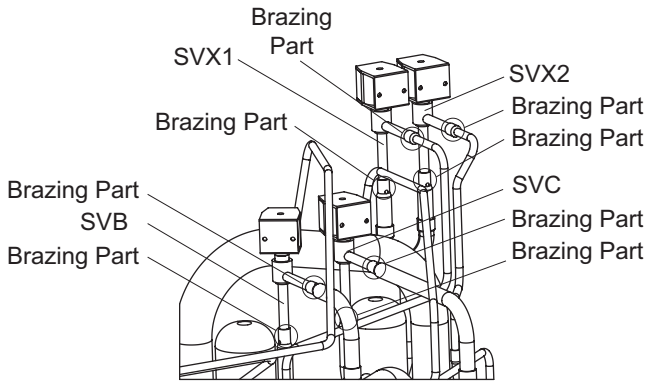
⚠ WARNING

TURN OFF all power source switches.

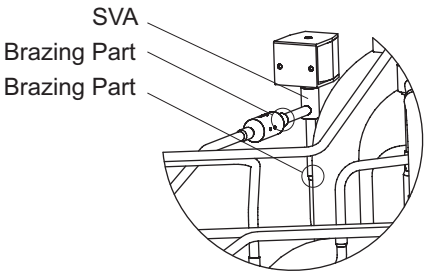
Tool	Phillips Screwdriver, Charging Hose, Burner, Wet Cloth, Pliers

● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ

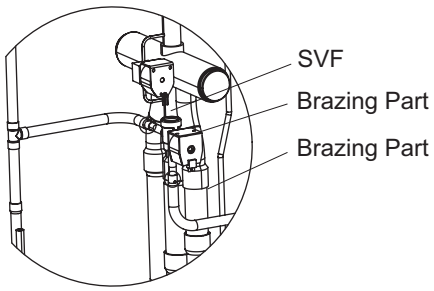
<Removing SVB/SVC/SVX1/SVX2>



<Removing SVA>



<Removing SVF>



⚠ WARNING

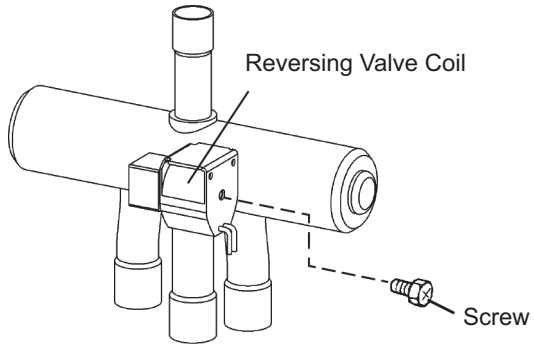
TURN OFF all power source switches.

2.10.5 Removing Reversing Valve Coil (RVR2)

(1) Remove one (1) screw fixing the reversing valve coil with a Phillips screwdriver.
If the screw is difficult to remove, use a spanner or an adjustable wrench.

(2) Remove the reversing valve coils.

Tool	Phillips Screwdriver



View form the Front

2.10.6 Removing Reversing Valve

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Remove the electrical box, wirings and E-box stay according to the item 2.5 “Removing Electrical Box”.

(3) Close the gas stop valve and the liquid stop valve.

(4) Collect the refrigerant in the outdoor unit from the low pressure check joint and the high pressure check joint. Check that the pressure does not increase at this time.
If the pressure increase, correct all the refrigerant in the refrigerant cycle.
Refer to the item 1.3.6 “Setting of Forced Open Valve Mode” for details.

(5) The reversing valves are fixed at the positions shown in the figure.

(6) Remove the reversing valve coils according to the item 2.10.4 “Removing Reversing Valve Coil”.

(7) Remove the brazing portion shown in the figures below by covering the reversing valves and the stop valves with wet cloth for cooling.

NOTE:

1. Make sure to remove the brazing portion at the indicated positions in the figures. If not, leakage may occur when reassembling the valves.
2. Connect the charging hose to the check joint for the low pressure gas stop valve before removing the brazing.

(8) Remove the reversing valve assembly.
Remove the brazing as shown in the figures by covering the reversing valves with wet cloth for cooling.
Remove the brazing in the following order:
(a) Brazing at the right and left branch pipes of the three pipes coming from the reversing valve.
(b) Brazing at the center branch pipe of the three pipes coming from the reversing valve.

(9) Reassemble the reversing valves in the reverse procedure.

NOTE:

During brazing work, cover the reversing valves and the stop valves with wet cloth for cooling.

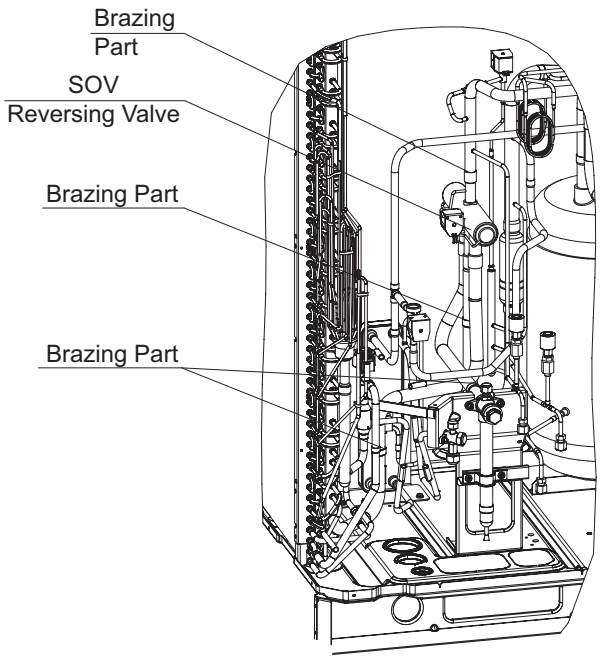
⚠ WARNING

TURN OFF all power source switches.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Burner, Pipe Cutter, Pliers, Pincher, Charging Hose

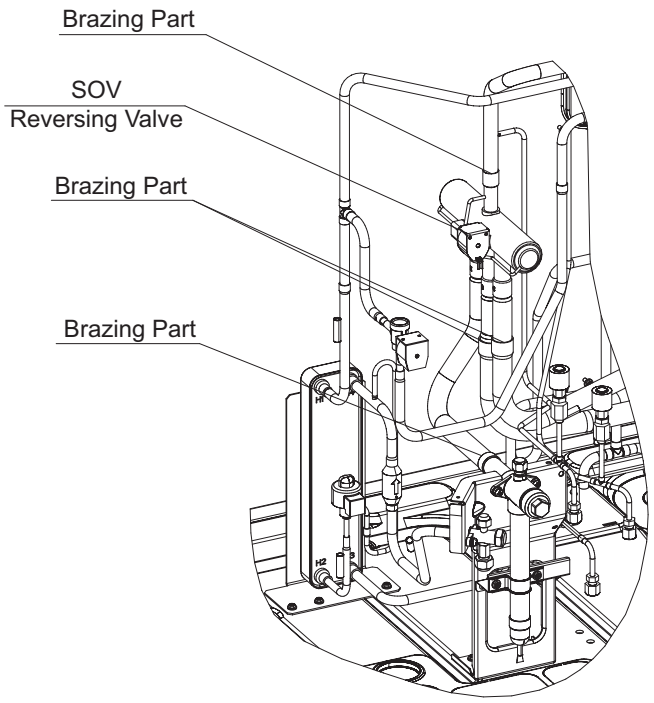
● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ

<Reversing Valve Position>



● RAS-14HNBCMQ/RAS-16HNBCMQ/RAS-18HNBCMQ

<Reversing Valve Position>



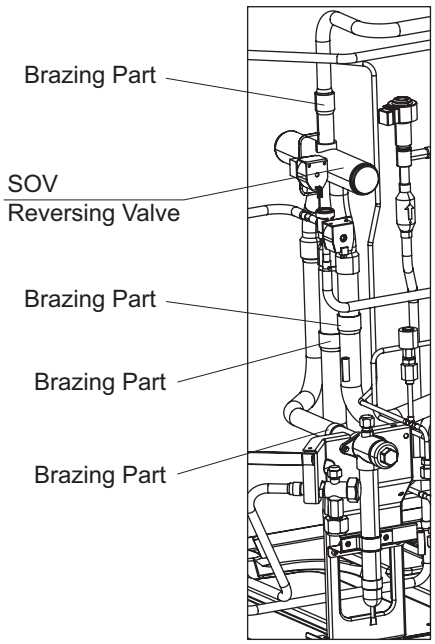
⚠ WARNING

TURN OFF all power source switches.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Burner, Pipe Cutter, Pliers, Pincher, Charging Hose

● RAS-20HNBCMQ/RAS-22HNBCMQ/RAS-24HNBCMQ

<Reversing Valve Position>



⚠ WARNING

TURN OFF all power source switches.

2.11 Removing Stop Valve

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Close the gas stop valve and the liquid stop valve.

(3) Collect the refrigerant in the outdoor unit from the low pressure check joint and the high pressure check joint. Check that the pressure does not increase at this time.
If the pressure increase, correct all the refrigerant in the refrigerant cycle.

(4) When removing (A) gas stop valve, cover the stop valves with wet cloth for cooling and then remove the brazing.

When removing (B) liquid stop valve, remove the brazing of the pipe for the stop valve as shown in the figure.

NOTE:
When removing the brazing for stop valve, be sure to protect heat exchanger by using sheet metal, and so on.

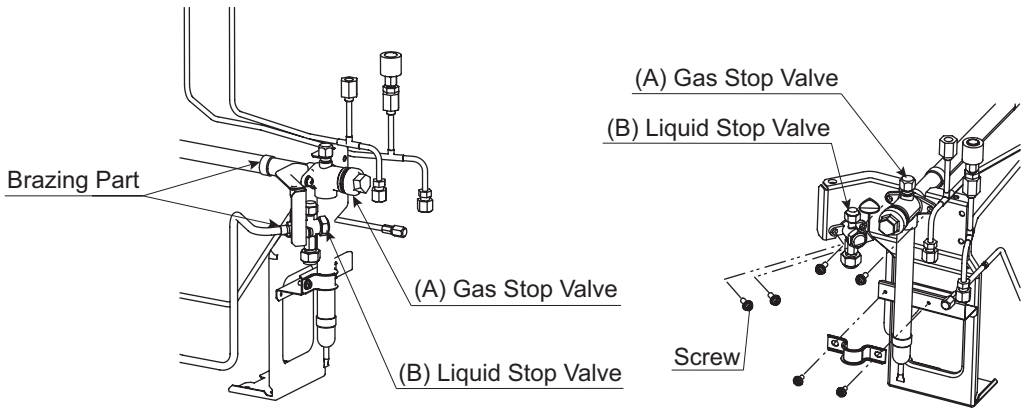
(5) After removing the brazing for the stop valves, remove the screws fixing the plates as shown in the figure and pull out the stop valves and the plates.

(6) Reassemble the stop valves in the reverse procedure.

NOTE:
When brazing the stop valves or removing the brazing, cover the stop valves with wet cloth for cooling. Be sure not to burn the wiring connections and piping insulations.

Tool	Wet Cloth, Burner, Pliers, Phillips Screwdriver

<Stop Valve Position>



⚠ WARNING

TURN OFF all power source switches.

2.12 Removing High Pressure Switch, High Pressure Sensor, Low Pressure Sensor and Thermistor

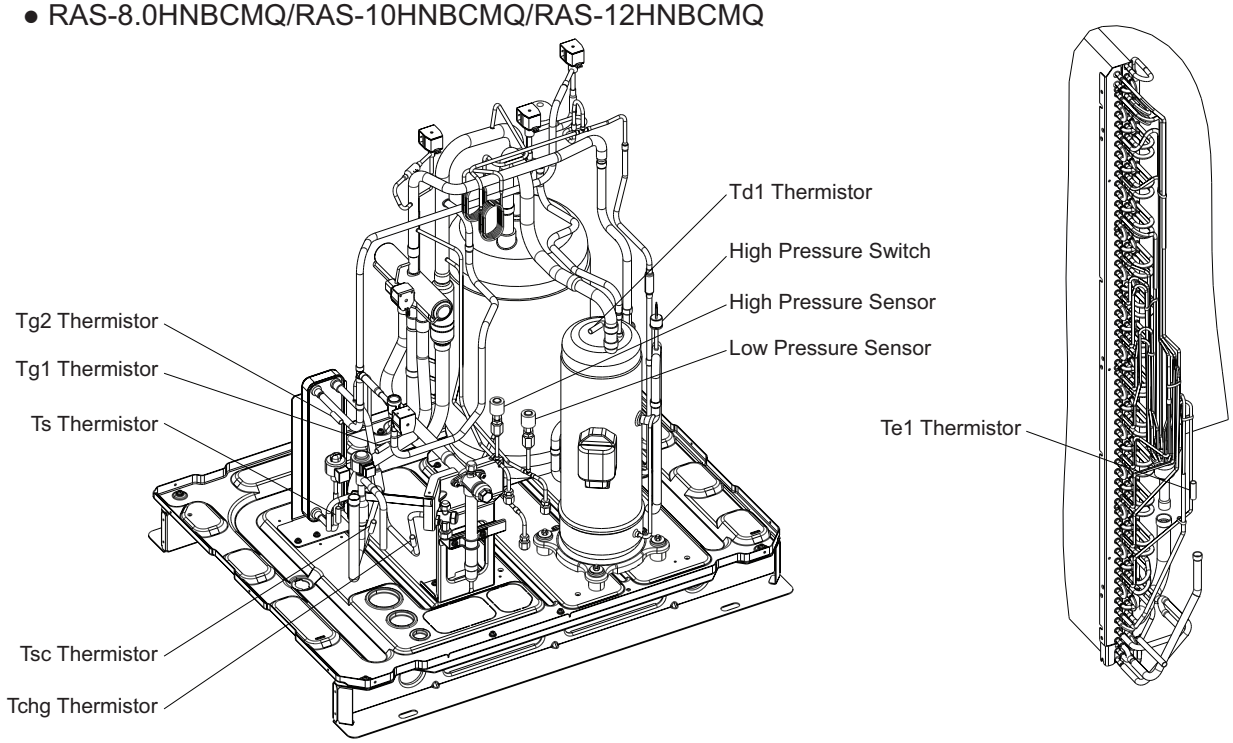
(1) Remove the front service cover according to Item 2.1 “Removing Front Service Cover”.

(2) High Pressure Switch, High Pressure Sensor, Low Pressure Sensor and Thermistor (Td1,Te1,Tg2,Tg1,Tchg,Ts,Tsc) are fixed as shown in the figure below:

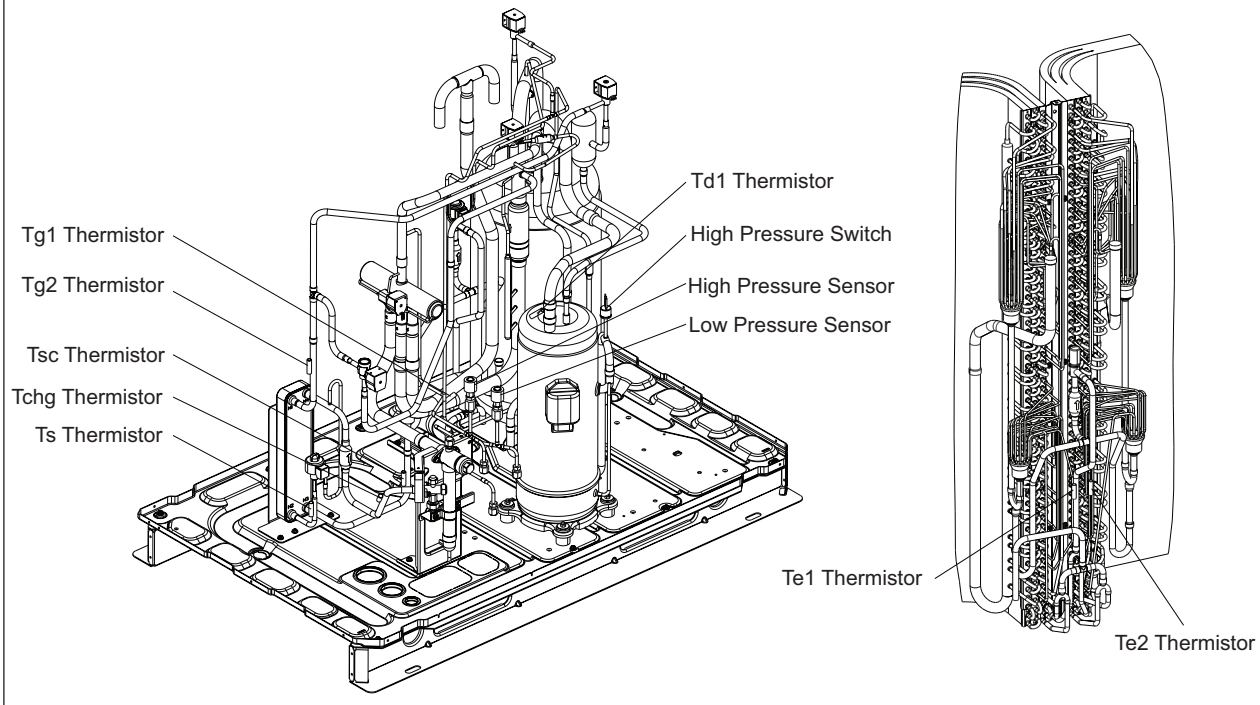
Tool	Adjustable Wrench or Spanner

<High Pressure Switch, High/Low Pressure Sensor Position>

● RAS-8.0HNBCMQ/RAS-10HNBCMQ/RAS-12HNBCMQ



● RAS-14HNBCMQ/RAS-16HNBCMQ

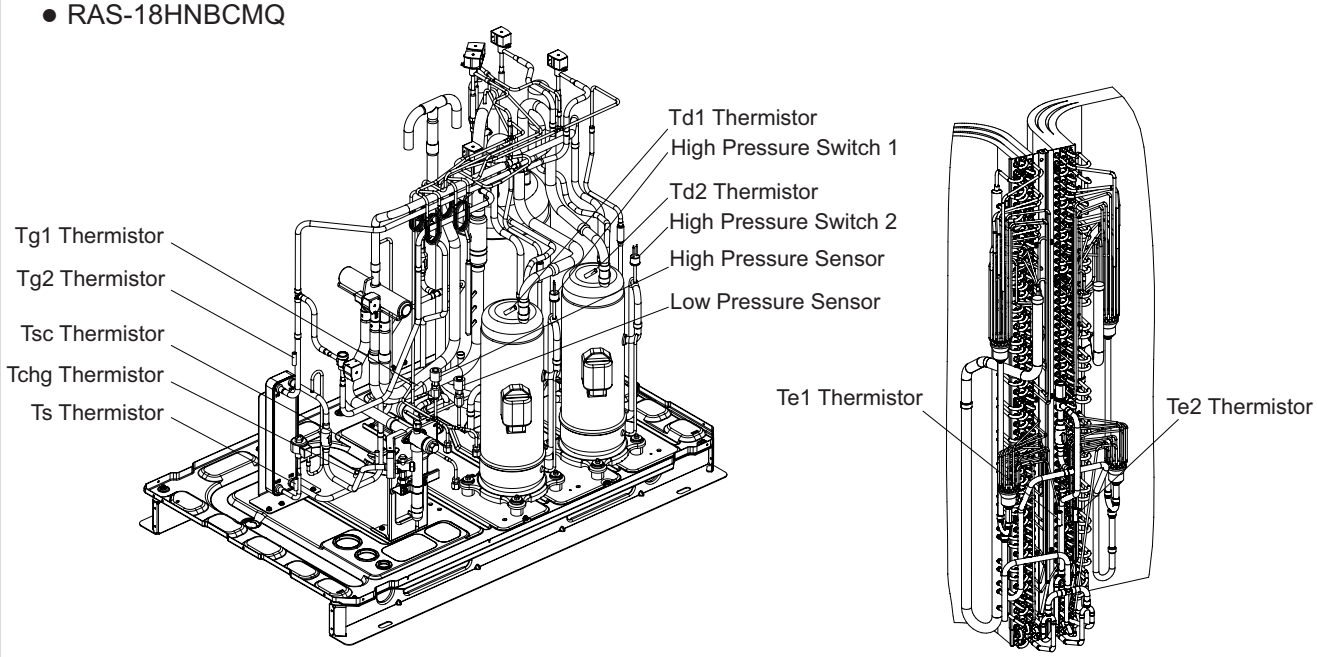


WARNING

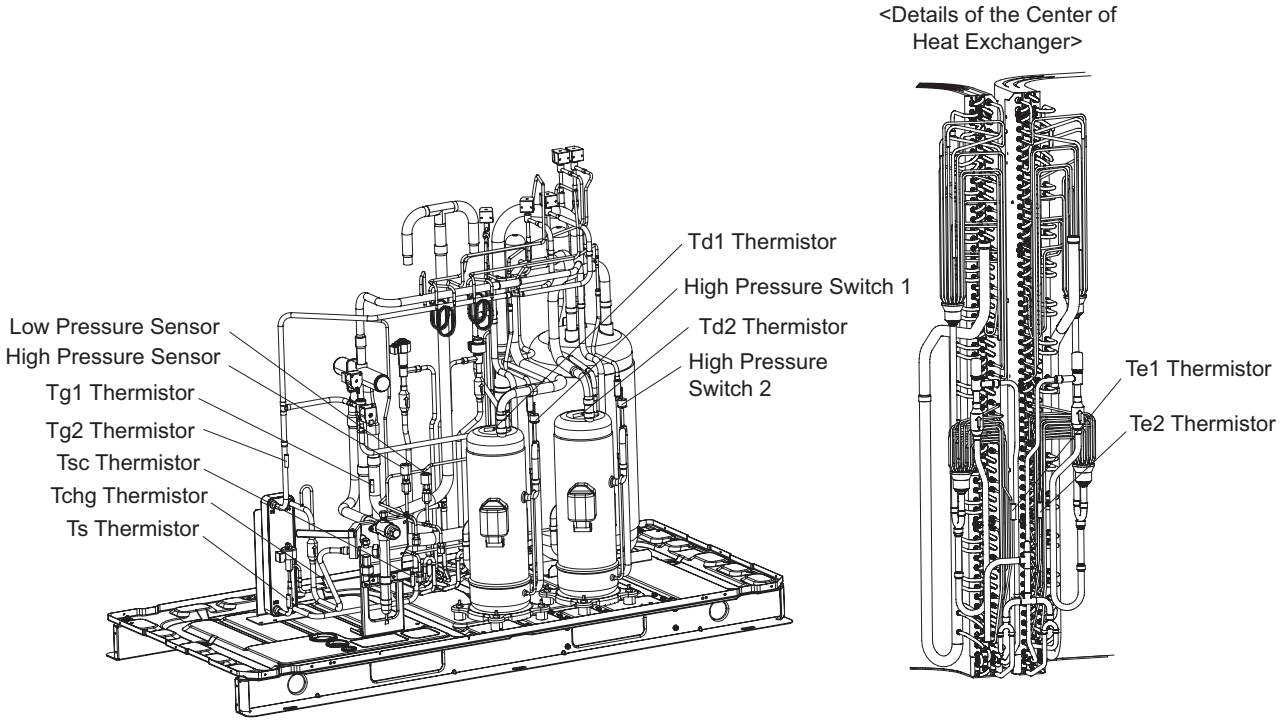
TURN OFF all power source switches.

Tool	Adjustable Wrench or Spanner

● RAS-18HNBCMQ



● RAS-20HNBCMQ



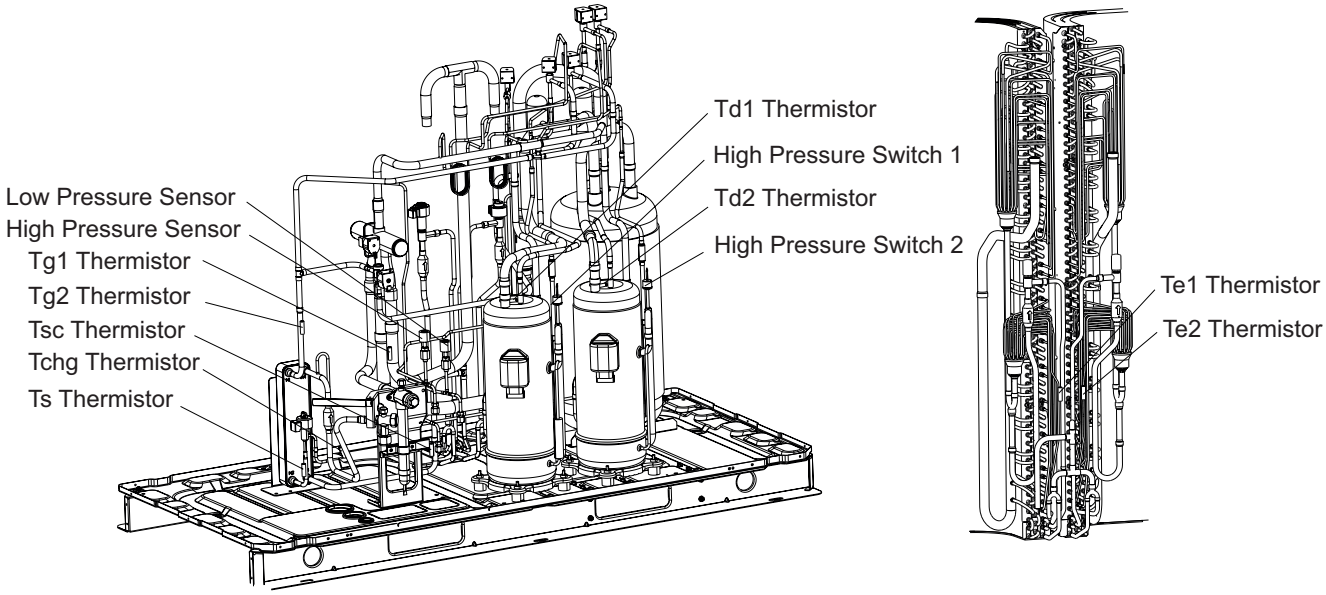
WARNING

TURN OFF all power source switches.

Tool	Adjustable Wrench or Spanner

● RAS-22HNBCMQ/RAS-24HNBCMQ

<Details of the Center of Heat Exchange>



⚠ WARNING

TURN OFF all power source switches.

2.12.1 Removing High Pressure Switch (PSH1 and PSH2)

(1) Close the gas stop valve and the liquid stop valve.

(2) Collect the refrigerant in the outdoor unit from the low pressure check joint and the high pressure check joint. Check that the pressure does not increase at this time.

If the pressure increase, correct all the refrigerant in the refrigerant cycle.

Refer to the item 1.3.6 “Setting of Forced Open Valve Mode” for details.

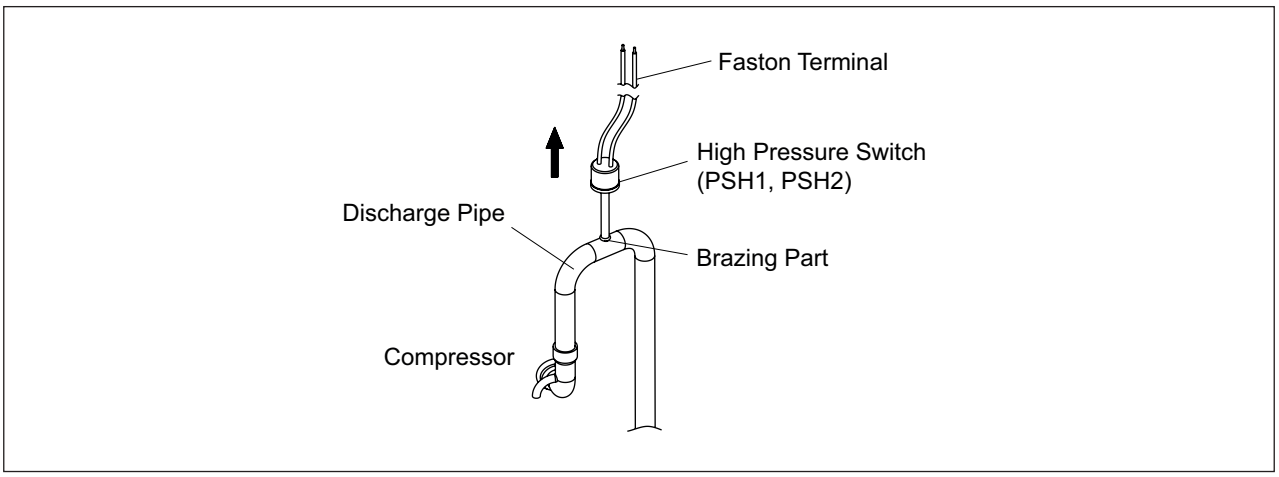
(3) Disconnect the faston terminals.

(4) Remove the high pressure switch from the brazing part of the discharge pipe with a burner.

NOTE:

1. To prevent water and foreign particles from entering the refrigerant cycle, mount the new high pressure switch immediately after removing the old one. If it is not possible, seal the hole with tape.
2. Check that wiring for the high pressure switch does not contact with the piping and sheet metal.
3. Make sure to fix the insulating sleeve of the faston terminals as shown in the figure.

Tool	Burner, Adjustable Wrench or Spanner, Phillips Screwdriver, Pliers



2.12.2 Removing High Pressure Sensor (Pd) and Low Pressure Sensor (Ps)

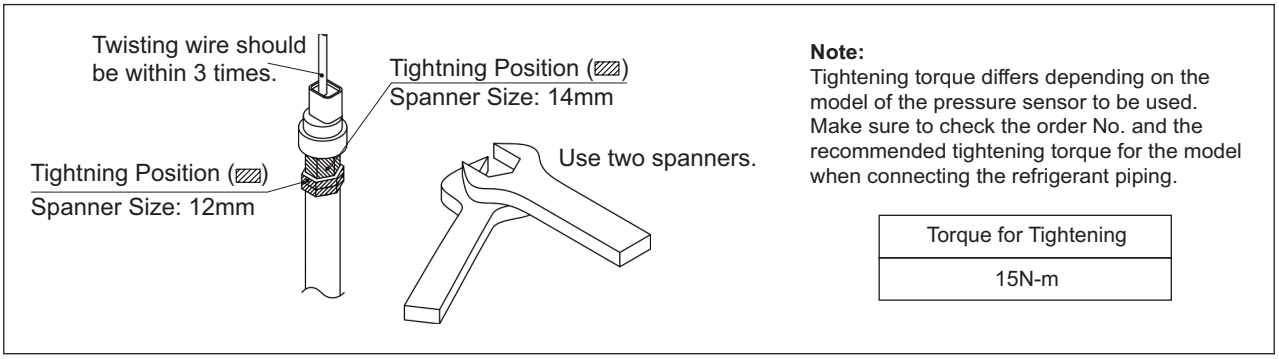
(1) Remove the connector for the pressure sensor wiring from outdoor unit PCB.

NOTE:

First, remove the connector. If not, the wiring may get damaged.

(2) Remove the refrigerant piping for the high pressure sensor or low pressure sensor using two spanners.

Tool	Adjustable Wrench or Spanner, Phillips Screwdriver, Pliers



Note:
Tightening torque differs depending on the model of the pressure sensor to be used. Make sure to check the order No. and the recommended tightening torque for the model when connecting the refrigerant piping.

Torque for Tightening
15N-m

⚠ WARNING

TURN OFF all power source switches.

2.13 Removing Thermistor for Liquid Pipe

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.

(2) Remove the electrical box cover according to the item 2.4 “Removing Electrical Box Cover”.

(3) Remove the butyl sheet. Then, remove the thermistor for the liquid pipe by pulling out the thermo-clip from the pipe.

NOTE:

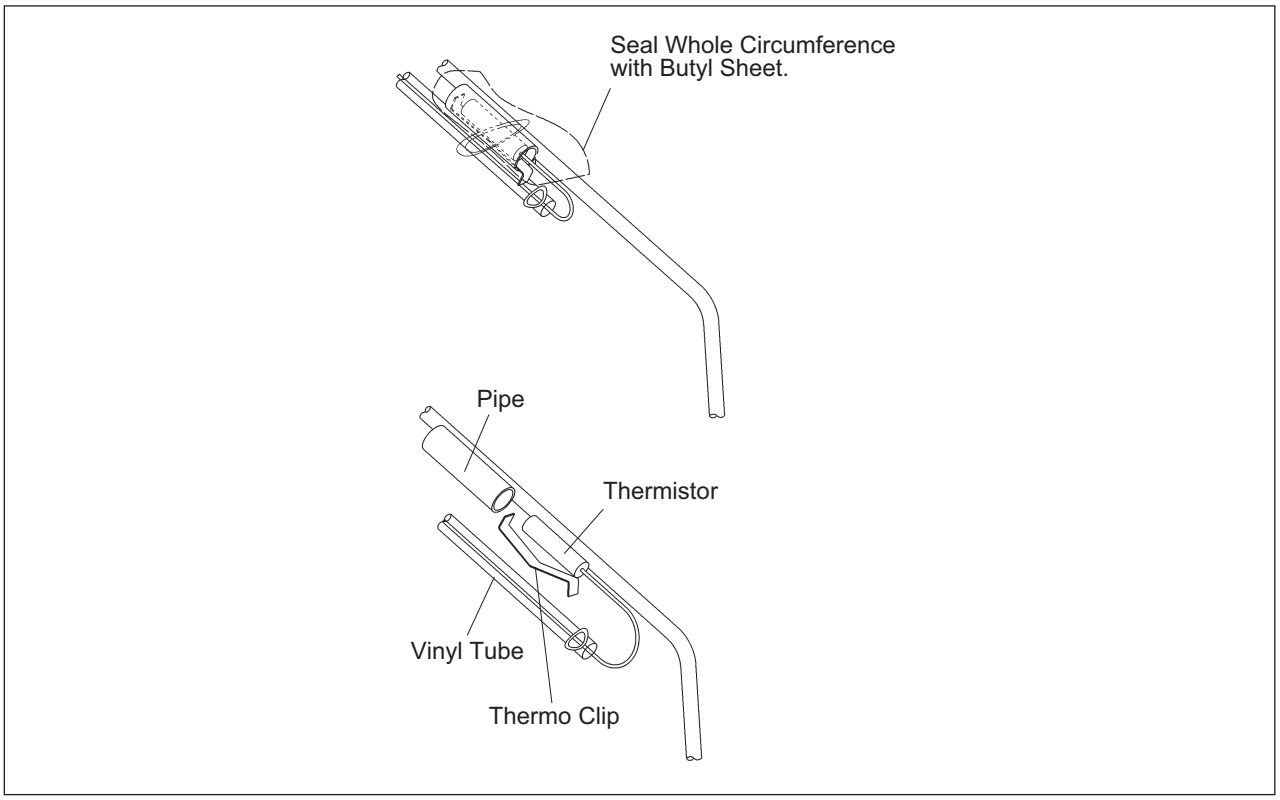
When removing the thermistor for the liquid pipe, take special care not to cause damage to your hands or the thermistor with the valve support fixing the stop valve.

(4) Reassemble the thermistor for liquid pipe in the reverse procedure.

NOTE:

When reassembling the thermistor, fix the thermistor with the vinyl pipe end downwards to prevent water from entering the pipe.

Tool	Wet Cloth, Burner, Pliers, Phillips Screwdriver, Nippers



WARNING

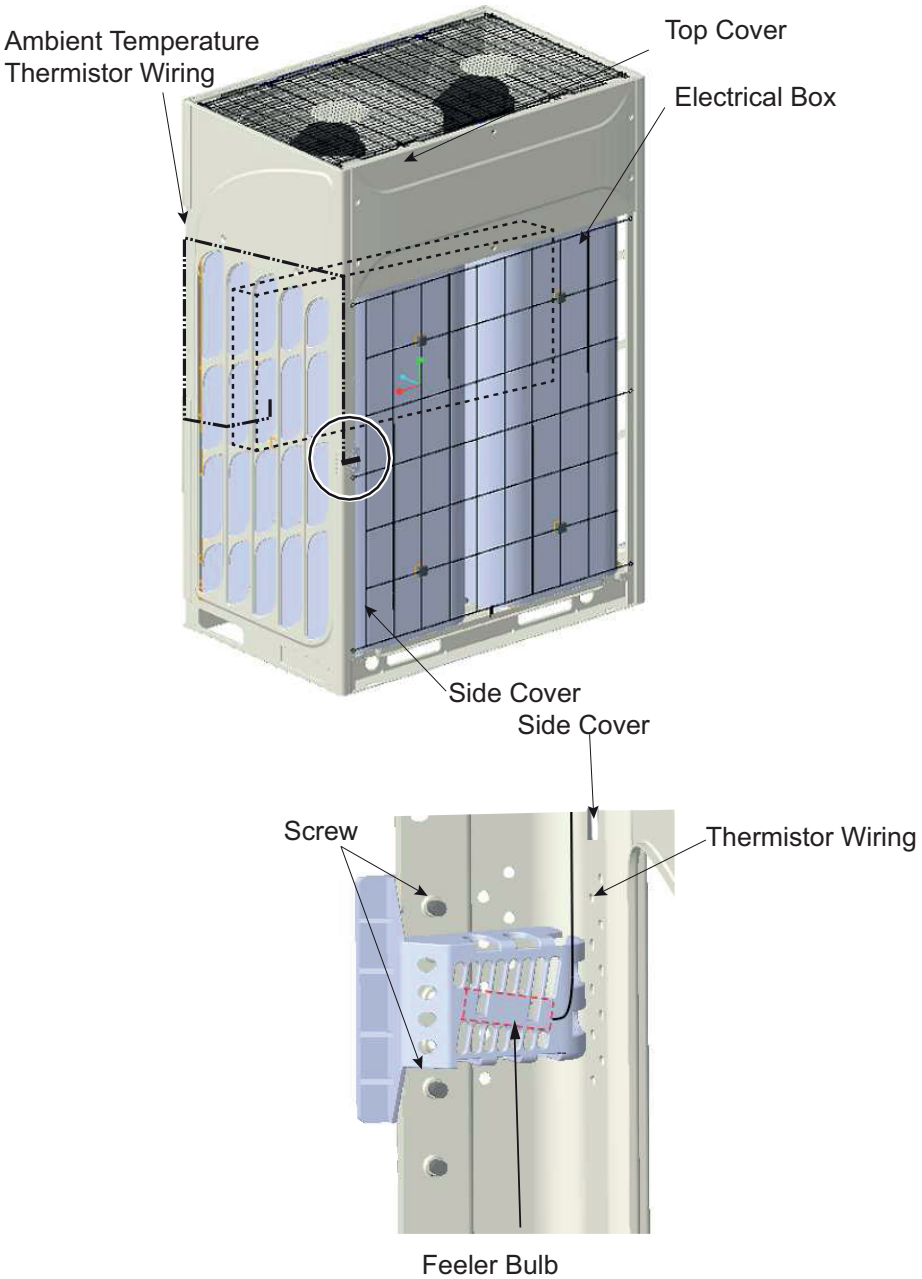
TURN OFF all power source switches.

2.14 Removing Thermistor for Ambient Temperature

(1) Remove the front service cover according to the item 2.1 “Removing Front Service Cover”.
(2) Remove the electrical box cover according to the item 2.4 “Removing Electrical Box Cover”.
(3) Remove the upper cover according to the item 2.3 “Removing Upper Cover”.
(4) Remove the screws fixing the container for the thermistor to the outdoor unit side cover. Hold the container and lift it upward. Remove the container from the hook on the outdoor unit side cover.
(5) Remove the feeler bulb of the thermistor from the container for the thermistor.
(6) Thermistor wiring is fixed at the heat changer, piping’s and such. Remove the fixing clamps for the wiring.
(7) Reassemble the thermistor for ambient temperature in the reverse procedure.

Tool	Phillips Screwdriver, Nippers

<Thermistor Position for Ambient Temperature (Example: RAS-16HNBCMQ)>



⚠ WARNING

TURN OFF all power source switches.

2.15 Removing other electrical components

NOTE:

1. When replacing the components of the radiation fin such as Inverter PCB (INV) and Main Power PCB (PCB2), apply conductive silicon grease slightly over the contact surface of the fin.
2. When reassembling the electrical components, match the terminal numbers with the mark band numbers.
   If incorrectly connected, malfunction may occur or the electrical components may be damaged.
3. When fixing PCBs or sheet metals for outdoor unit PCB, protect the electric wiring from caught on the sheet metals or the electrical components.
4. Make sure to use screws, bushes and collars when fixing inverter PCBs.
   If not, it may cause equipment malfunction.
5. When replacing the outdoor unit PCB and inverter PCB, set the dip switches the same as before replacing the PCBs. An incorrect setting will cause malfunction. Refer to the instruction manual attached to servicing outdoor unit PCB.
6. Do not apply an excessive force to the electrical components on PCBs or PCBs themselves. It may lead to PCBs failure.

2.15.1 Removing Outdoor Unit PCB and Electrical Components for Electrical Box

< Removing Outdoor Unit PCB >

(1) Remove all the connectors for wiring connected to the outdoor unit PCB.

(2) Hold the convex part of the holder fixing the outdoor unit PCB (10 portions) with a long-nose pliers and pull it out to remove.

< Removing Electrical Components >

(1) Remove all the wiring connected with the electrical components.

(2) Remove the screws fixing the electrical components.

NOTE:

Do not touch the electrical components on the outdoor unit PCBs while LED (red) of the PCB is ON to avoid electrical shock.
Do not bend or apply an excessive force to the outdoor unit PCB. Otherwise, it may cause outdoor unit PCB failure.

NOTE:

1. When reassembling the electrical components, match the terminal numbers with the mark band numbers. If incorrectly connected, malfunction may occur or the electrical components may be damaged.
2. When closing the outdoor unit PCB fixing plate for reassembly, protect the cables from catching on the plate edges or electrical components.
3. The capacitor can also be stored with electricity even when the power source is turned off. DO NOT touch the terminals, to avoid an electrical shock.

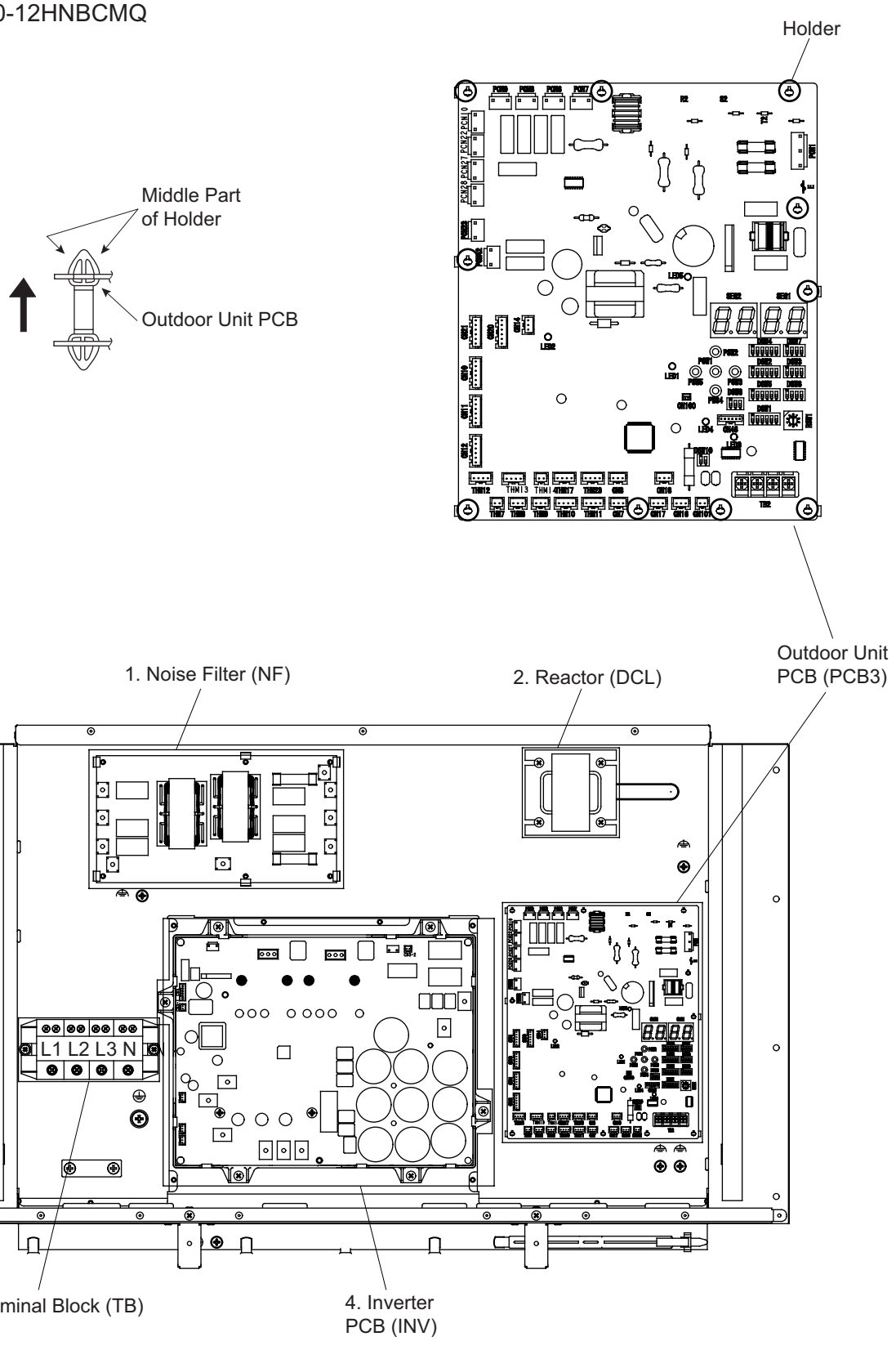
WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

<380 - 415V/50H>

RAS-8.0-12HNBCMQ



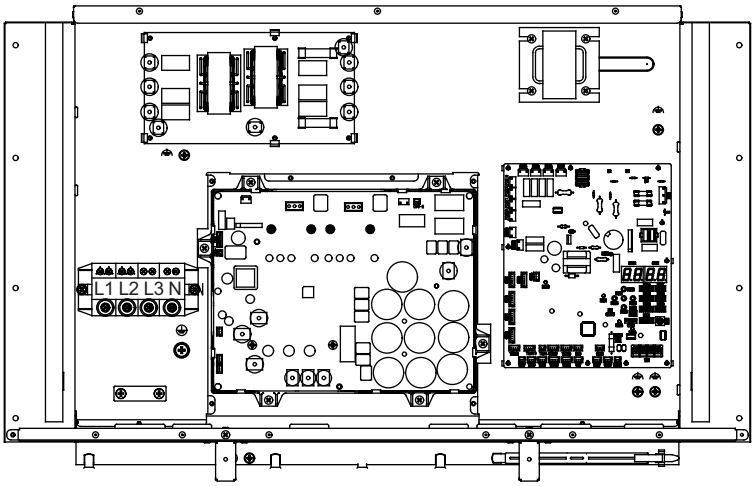
WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

< 380 - 415V/50Hz>

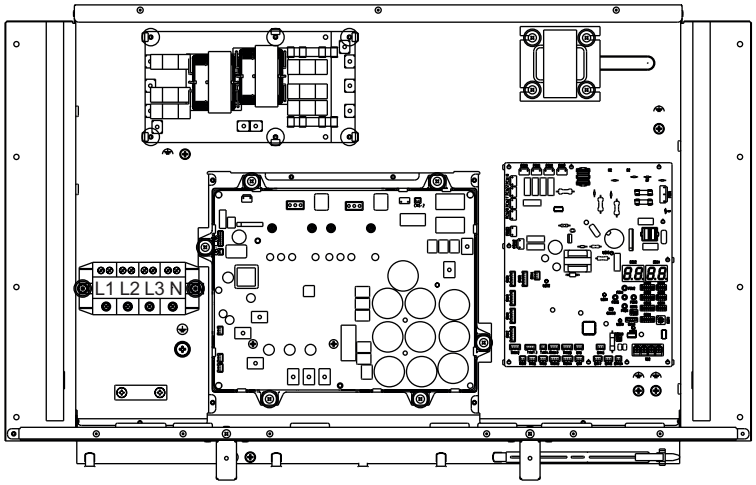
Remove the wiring connected to each electrical component.



○: Fixing Screw for Wire (M4)
△: Fixing Screw for Wire (M5)
O: Fixing Screw for Wire (M8)

1. Noise Filter (NF)
   Fixing Screw (M4) for wire (Nine portions)
3. Terminal Block (TB)
   Fixing Screw (M5) for wire (four portions)
   Fixing Screw (M8) for wire (four portions)
4. Inverter PCB (INV)
   Fixing Screw (M4) for wire (eight portions)

Remove the screws fixing the electrical components to the electrical box.



○: Fixing Holder
O: Fixing screw for part

1. Noise Filter (NF)
   Fixing Holder (six portions)
2. Reactor (DCL)
   Fixing Screw for part (M4) (four portions)
3. Terminal Block (TB)
   Fixing Screw for part (M5) (two portions)
4. Inverter PCB (INV)
   Fixing Screw for part (M4) (six portions)

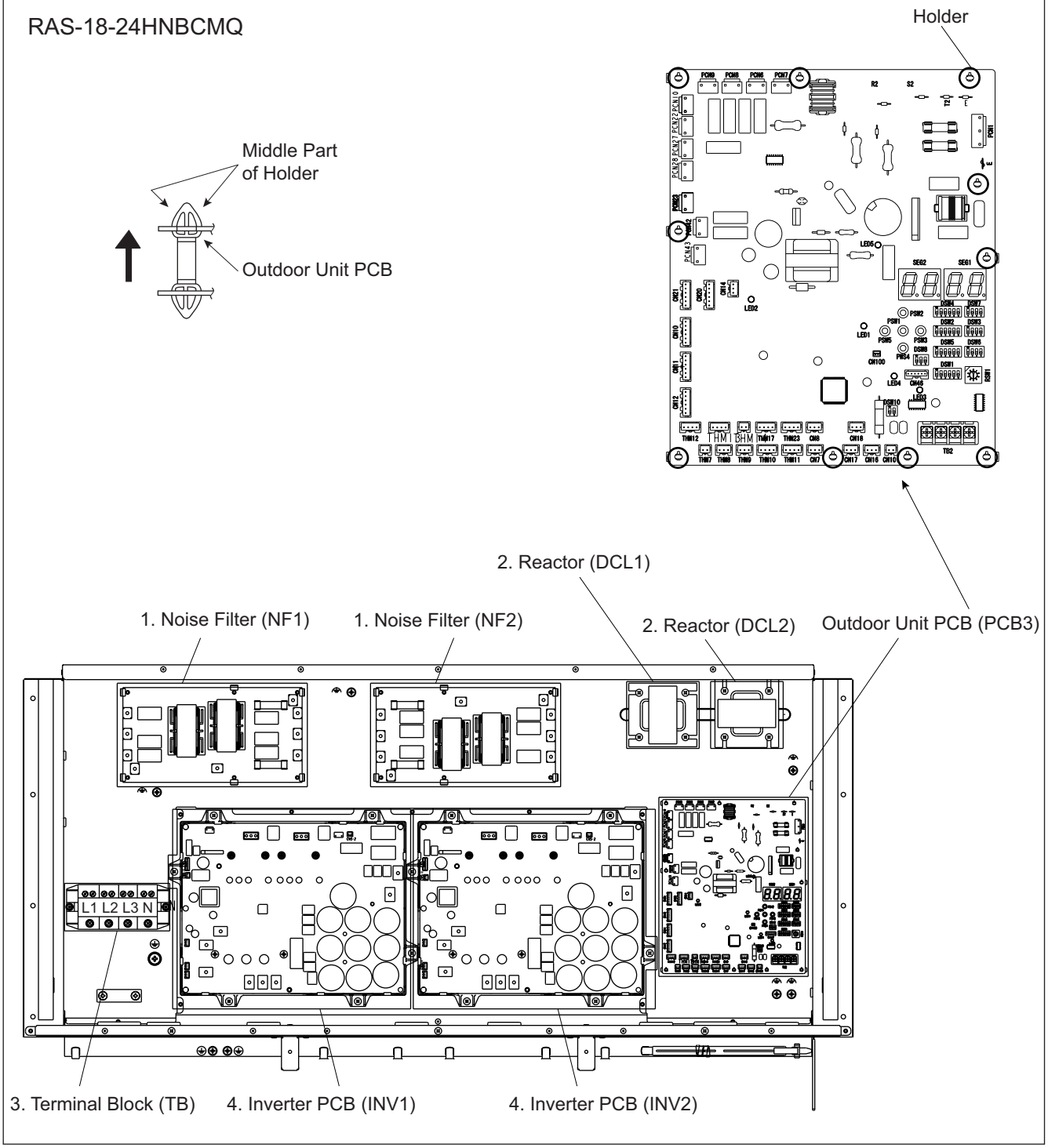
WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

<380 - 415V/50Hz>

RAS-18-24HNBCMQ



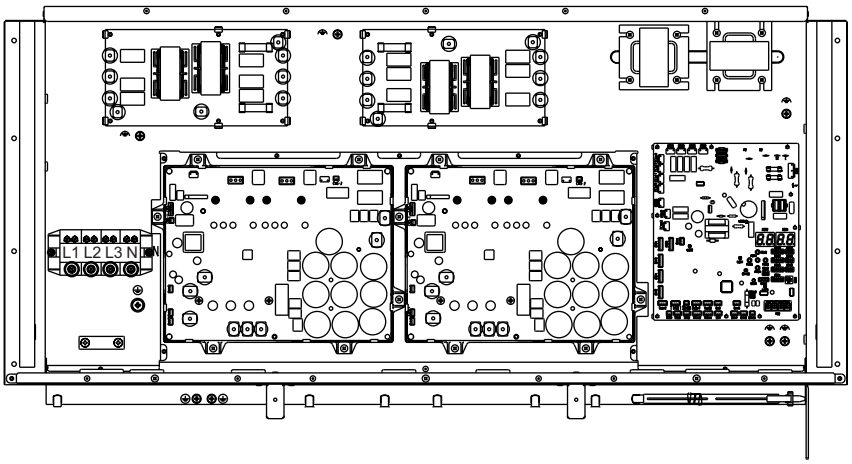
⚠ WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

< 380 - 415V/50Hz>

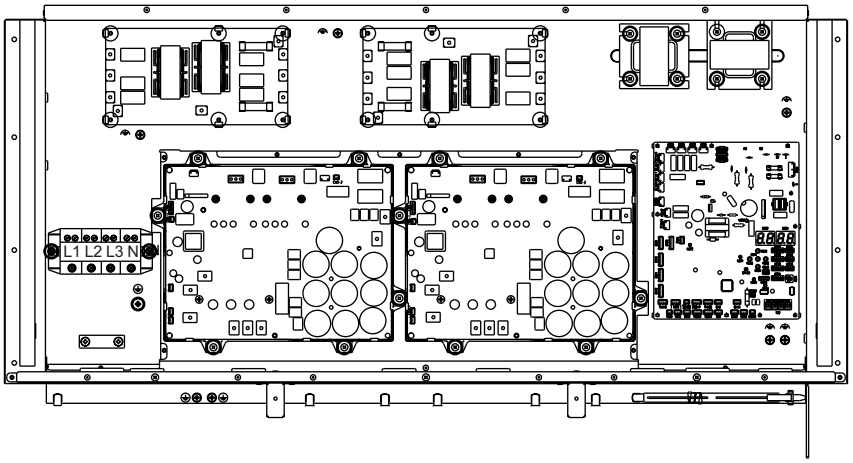
Remove the wiring connected to each electrical component.



○ : fixing screw for wire(M4)
△ : fixing screw for wire(M5)
O : fixing screw for wire(M8)

1. Noise Filter (NF1, 2)
   Fixing Screw (M4) for Wire (18 portions)
3. Terminal Block (TB1)
   Fixing Screw (M5) for Wire (eight portions)
   Fixing Screw (M8) for Wire (four portions)
4. Inverter PCB (INV1,2)
   Fixing Screw (M4) for Wire (16 portions)

Remove the screws fixing the electrical components to the electrical box.



○ : Fixing Holder
O : Fixing Screw for Part

1. Noise Filter (NF1, 2)
   Fixing Holder (12 Portions)
2. Reactor (DCL1, 2)
   Fixing Screw for Part (M4) (eight portions)
3. Terminal Block (TB1)
   Fixing Screw for Part (M5) (two portions)
4. Inverter PCB (INV1, 2)
   Fixing Screw for Part (M4) (12 Portions)

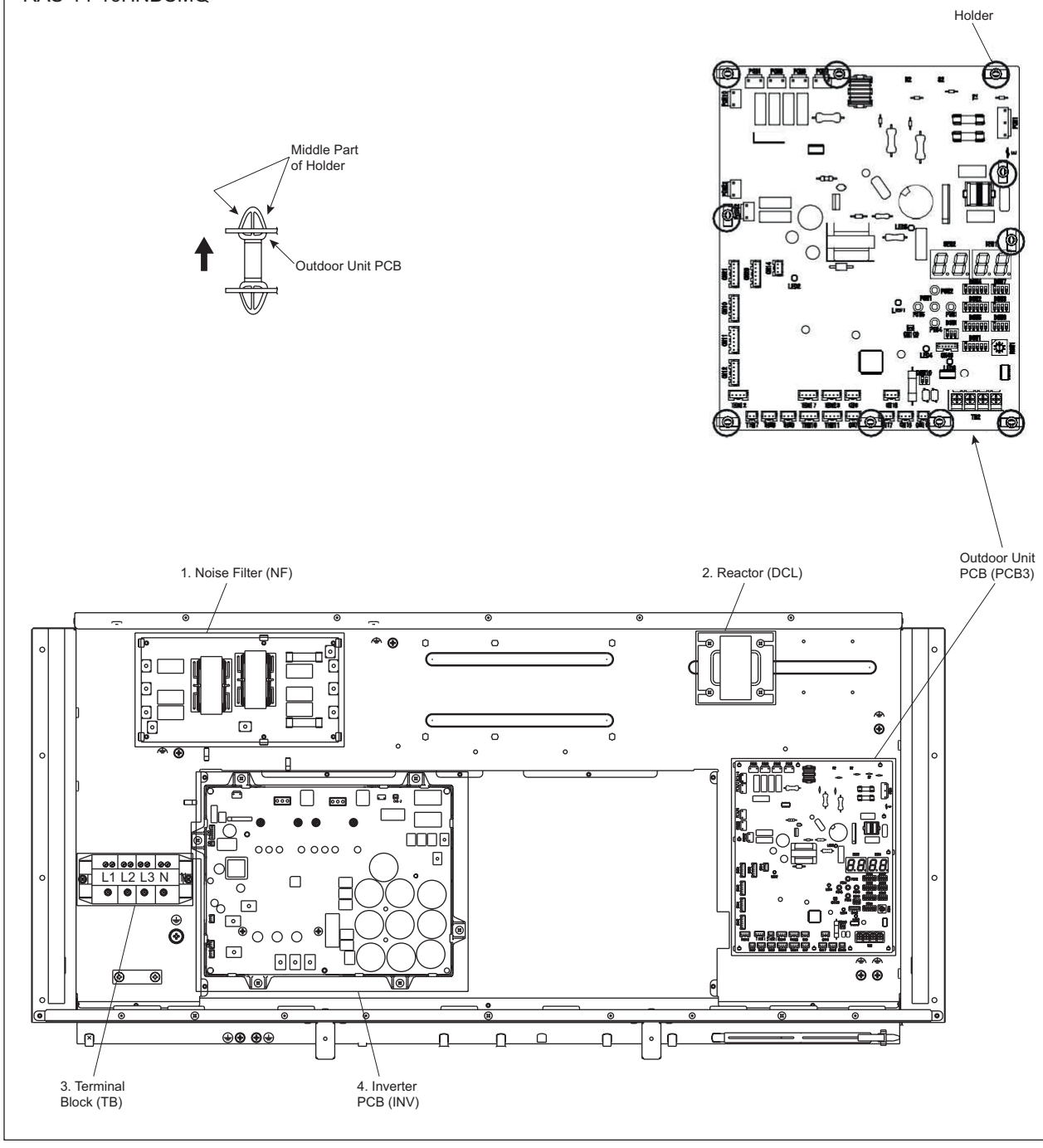
WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

<380 - 415V/50HZ>

RAS-14-16HNBCMQ



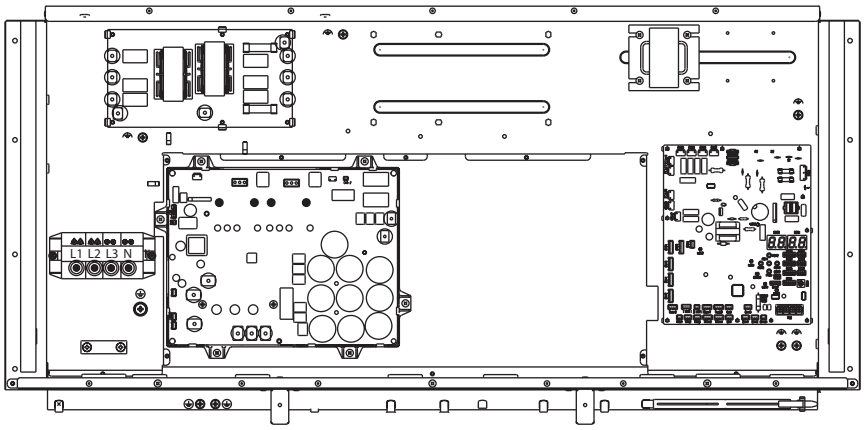
WARNING

TURN OFF all power source switches.

Tool	Phillips Screwdriver, Long-Nose Pliers, Pliers

< 380 - 415V/50Hz>

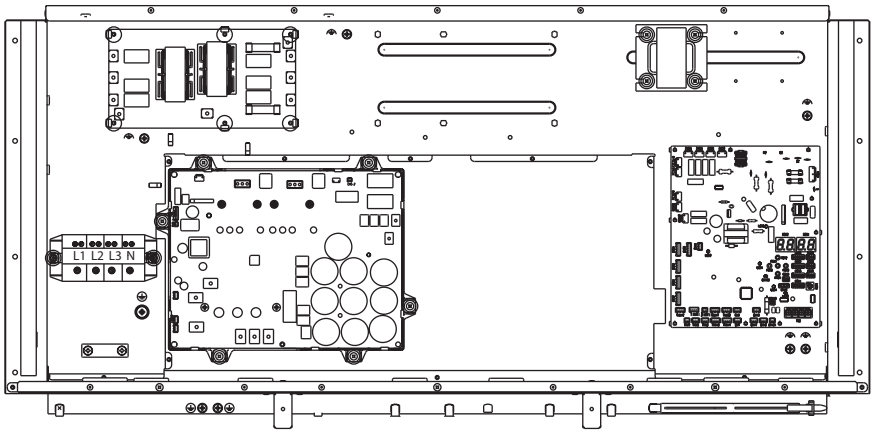
Remove the wiring connected to each electrical component.



○ : Fixing Screw for Wire (M4)
△ : Fixing Screw for Wire (M5)
O : Fixing Screw for Wire (M8)

1. Noise Filter (NF)
   Fixing Screw (M4) for Wire (9 portions)
3. Terminal Block (TB)
   Fixing Screw (M5) for Wire (4 portions)
   Fixing Screw (M8) for Wire (4 portions)
4. Inverter PCB (INV)
   Fixing Screw (M4) for Wire (8 portions)

Remove the screws fixing the electrical components to the electrical box.



○ : Fixing Holder
O : Fixing Screw for Part

1. Noise Filter (NF)
   Fixing Holder (6 portions)
2. Reactor (DCL)
   Fixing Screw for Part (M4) (4 portions)
3. Terminal Block (TB)
   Fixing Screw for Part (M5) (2 portions)
4. Inverter PCB (INV)
   Fixing Screw for Part (M4) (6 portions)

⚠ WARNING

Turn OFF all power source switches.
Do not touch any electrical components while LED401 (Red) on Inverter PCB is ON.
Otherwise, an electric shock will occur.

2.15.2 Removing Inverter PCB

(1) Disconnect all the wiring on the Inverter PCB.

U1, V1, W1, CN206, CN207, CN801, CN901, CN5, PCN2 and PCN331

NOTE:

CN206, CN207, CN5 and PCN2 may not be connected to same models.

(2) Disconnect all the terminal blocks on the Inverter PCB.

DCL1, DCL2, U0,V0,W0, R, S and T

(3) After removing screws (◎) portions, remove the inverter PCB.

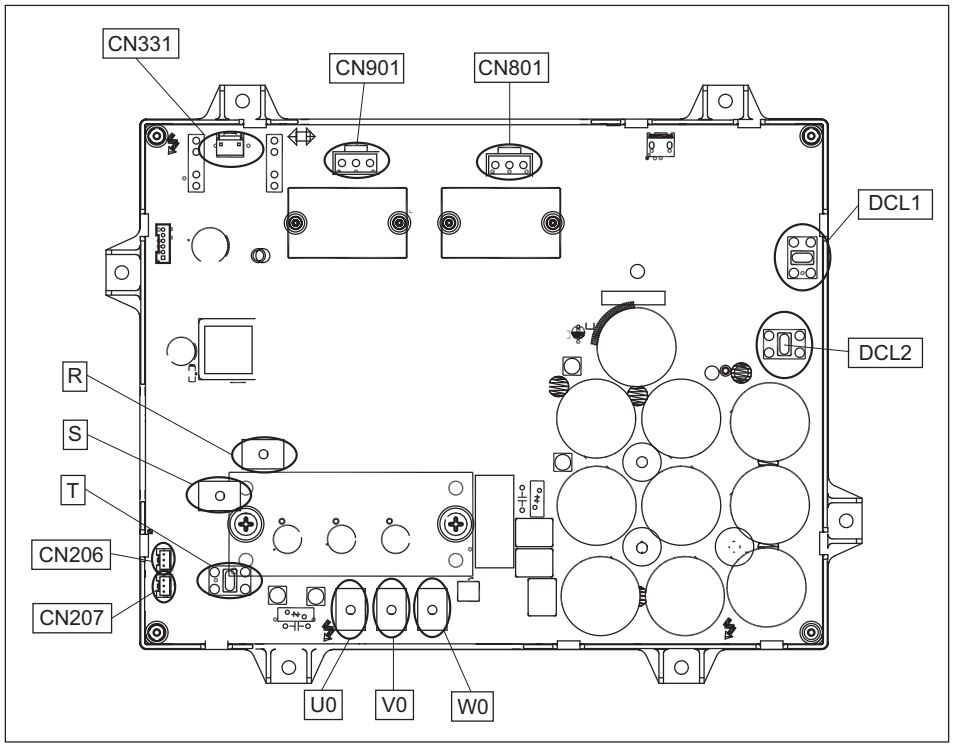
NOTE:

Do not touch any electrical components while LED401 (red) of inverter PCB is ON. Otherwise, it may lead to an electrical shock.

NOTE:

- When reassembling the electrical components, match the terminal numbers with the mark numbers. If incorrectly connected, malfunction may occur or the electrical components may be damaged.
- When closing the outdoor unit PCB fixing plate for reassembly, protect the cables from catching on the plate edges or electrical components.

Tool	Phillips Screwdriver



⚠ WARNING

Turn OFF all power source switches.
Do not touch any electrical components while LED401 (Red) on Inverter PCB is ON.
Otherwise, an electric shock will occur.

2.15.3 Removing Inverter PCB from Radiation Fin

When removing or mounting the inverter PCB from / to radiation fin, refer to the item 3.2.1 “Arrangement of Inverter Power Unit.”

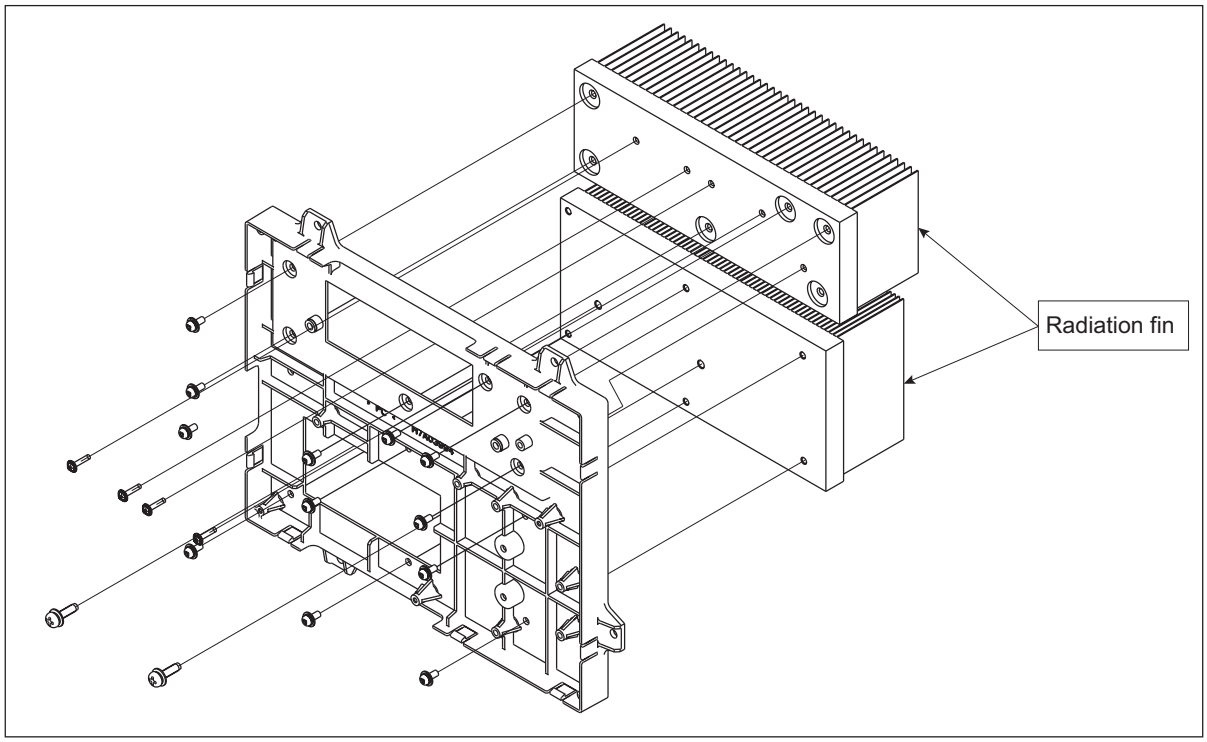
NOTE:

1. Do not touch any electrical components while LED401 (red) of inverter PCB is ON. Otherwise, it may lead to an electrical shock.
2. Turn OFF all power source switches before start checking the electrical components. Make sure to perform the electric discharge work after turning OFF all the power source. Otherwise, electrical shock may occur cause by residual voltage.
3. Refer to the 1.1.3 “Checking of Rotary Switch and Dip Switch Setting” when replacing service parts set the DIP switch the same as before replacing.

NOTE:

1. Make sure to perform the electrical discharge work when checking and replacing the inverter components. Refer to 3.2.1 “High Voltage Discharge Work for Replacing Parts” for details.
2. When reassembling the electrical components, match the terminal No. with the mark band No. If they are incorrectly connected, malfunction may occur or the electrical components may be damaged.
3. When mounting the diode module and transistor module, apply silicon grease evenly over the whole back side of the diode module and the transistor module. Use Silicon grease provided as accessory.

Tool	Phillips Screwdriver



⚠ WARNING

TURN OFF all power source switches.

2.15.4 Removing Electrical Box

< Removing Electrical Box >

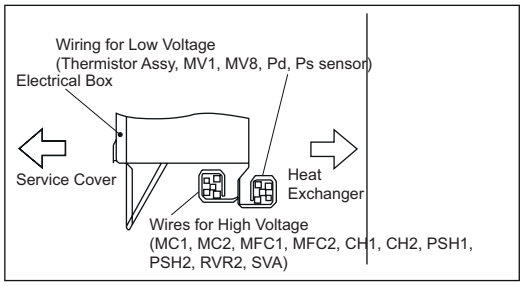
Remove the electrical box according to the item 2.5 “Removing Electrical Box”.

NOTE:

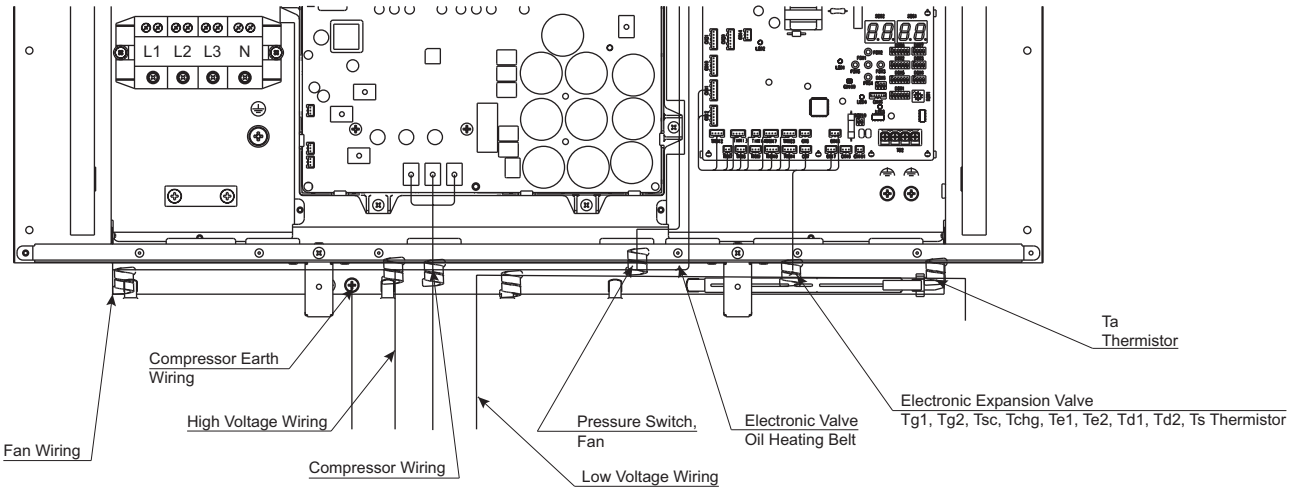
1. Proper handling of removing work must be performed by at least two people to avoid serious injuries.
2. Check that all wiring does not contact the sheet metal or pipes during wiring work. It may cause fire if the film of wiring are deteriorated due to the vibration of the operation.

< 380 - 415V/50Hz>

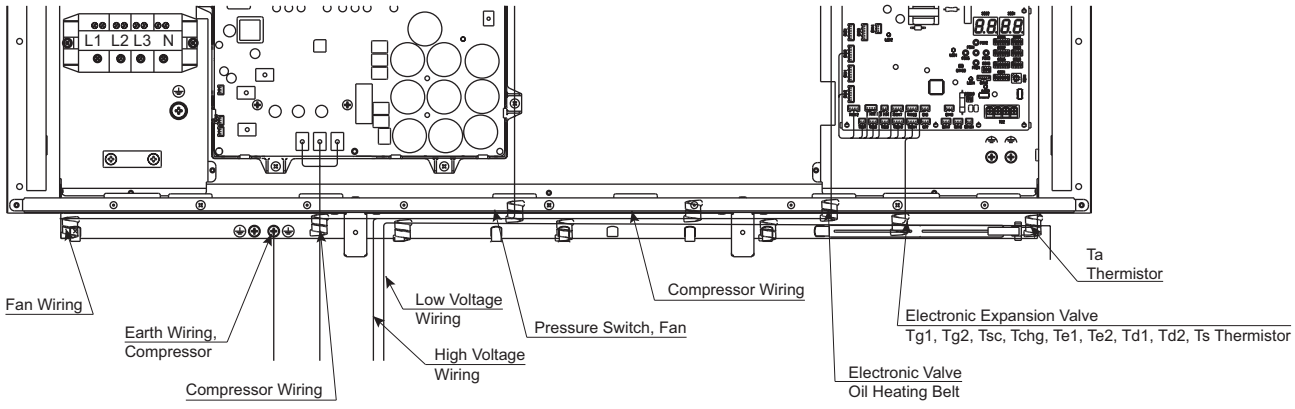
<Wiring Work>
The figure below shows the side view of electrical box. Wiring for high and low voltage is separately bundled.



RAS-8.0-120HNBCMQ



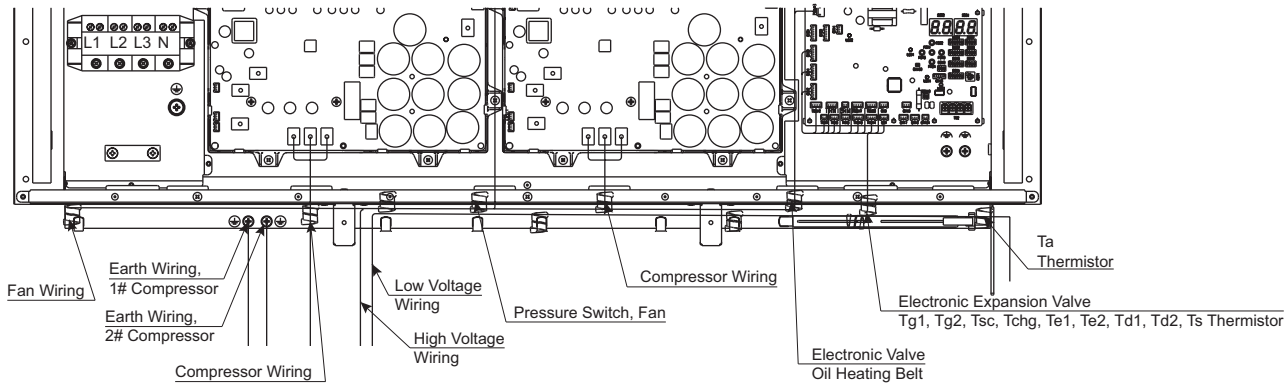
RAS-14-16HNBCMQ



WARNING

TURN OFF all power source switches.

RAS-18-24HNBCMQ



WARNING

TURN OFF all power source switches.

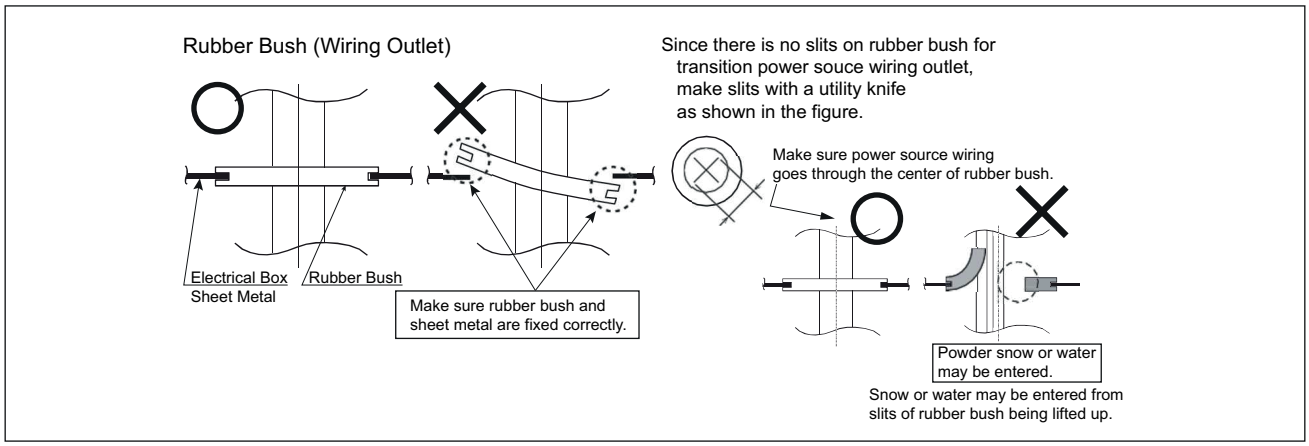
< Reassembling Electrical Box >

Reassemble the electrical box in the reverse procedure.

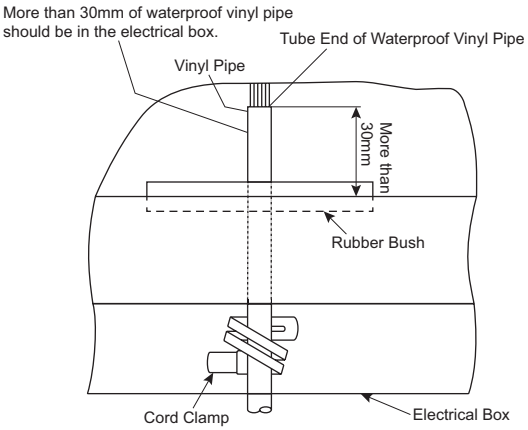
NOTE:

1. Check to ensure that the tube end of waterproof vinyl pipe and the connectors are in the electrical box. Fix them firmly with a cord clamp when wiring as shown in the figure below.
2. Fix the wiring connecting each electrical part and the electrical box with a plastic band to avoid direct contact with the compressor, piping and plate edges.
3. Fix the wiring neatly with a cord clump and make sure that the wiring will not be held down by the electrical box cover. Otherwise, the wiring may be damaged when the cover is closed.
4. Fix the fan motor wiring with a cord clamp as shown in the figure.
5. Make sure rubber bush and sheet metal are fixed correctly. If not, electric components may be damaged by water.

<Details of Cable Installation (Rubber Bush)>



<Details of Fixing the Vinyl Pipe Edge>



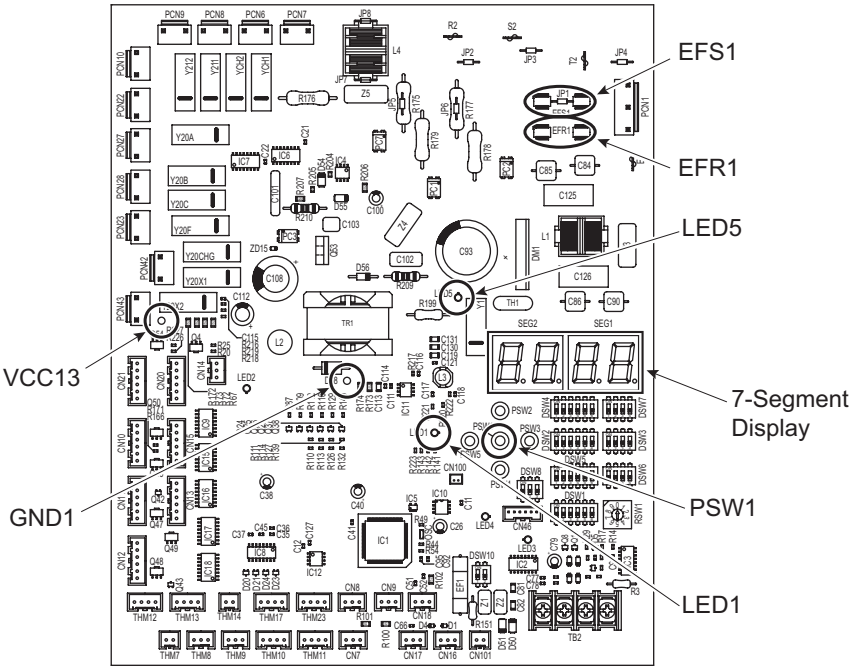
NOTE:

1. When reassembling the electrical component, match the terminal numbers with the mark band numbers. If incorrectly connected, malfunction may occur or the electrical components may be damaged.
2. Settings of DIP switches differ according to the model. When replacing the outdoor unit PCB, refer to “Field Work Installations.”

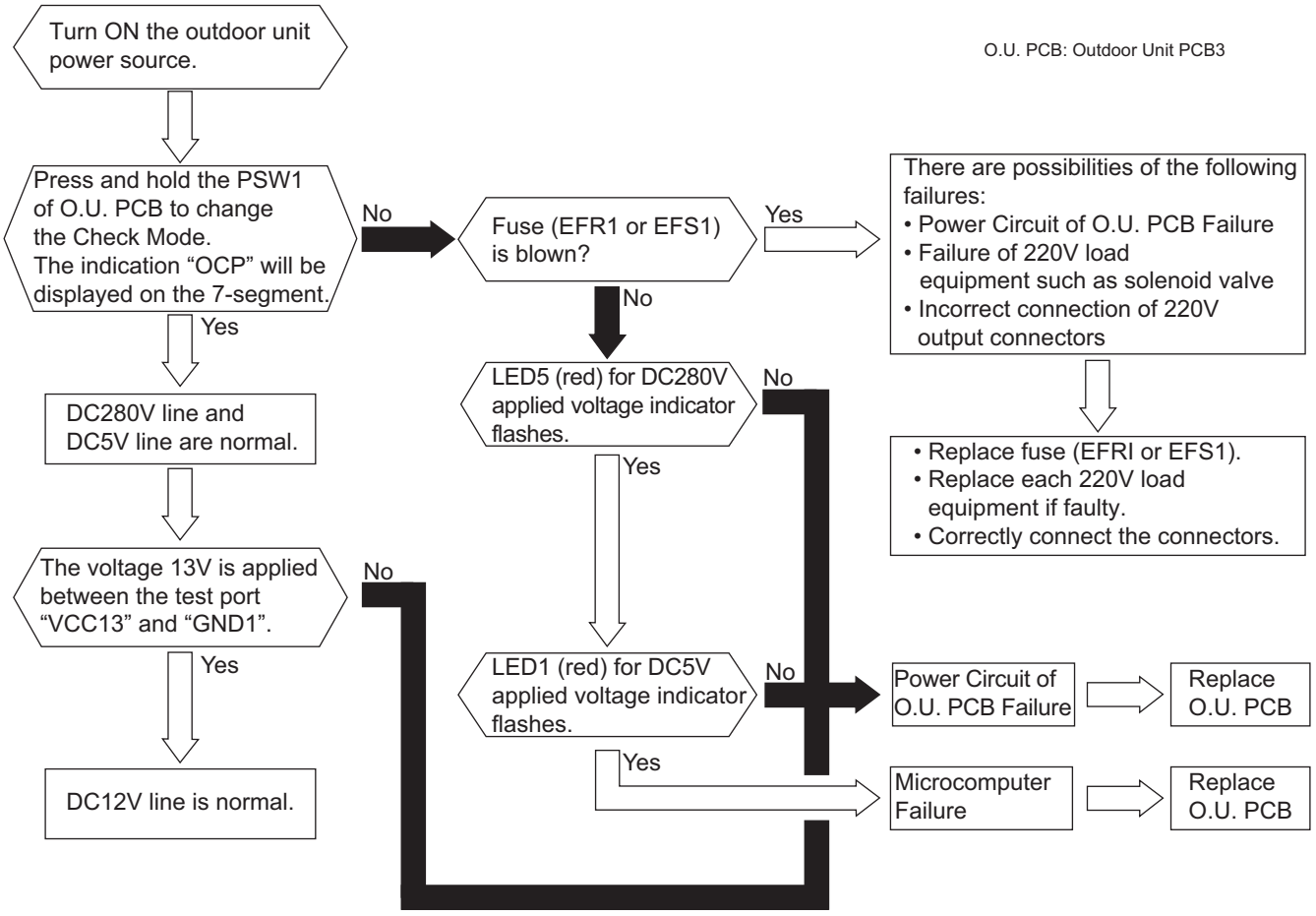
3. Main Parts

3.1 Outdoor Unit PCB (PCB3: PO151W)

● Arrangement of Connectors and Check Points.



● Checking Procedures for Outdoor Unit PCB

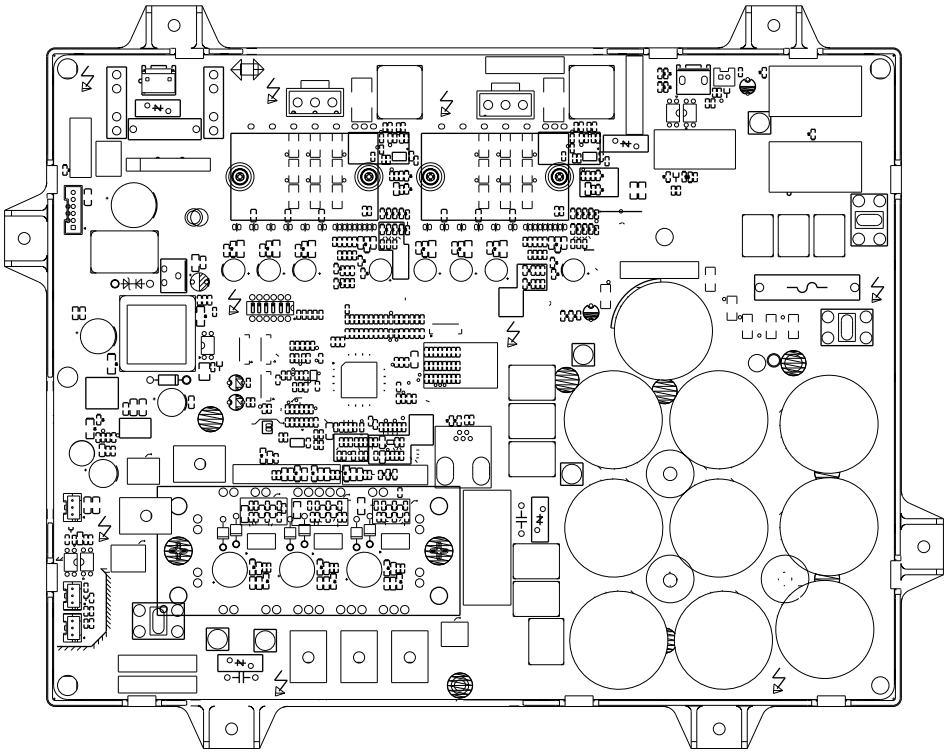


3.2 Inverter (INV1, INV2: PV164)

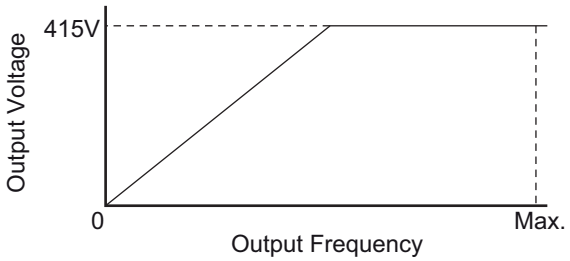
3.2.1 Inverter

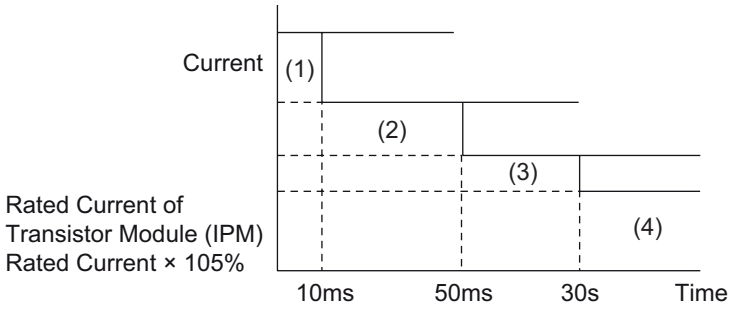
● Arrangement of Inverter Power Unit

Inverter PCB (INV)



● Specification of Inverter

Applicable Model	RASQ Series	RAS-8.0, 10, 18, 20 HNBCMQ	RAS-14, 16 HNBCMQ	RAS-12, 22, 24 HNBCMQ
Applicable Power Source		3 PH (380-415V/50Hz)		
Output Voltage (Maximum)		415V (Depends on Power Source Voltage)		
Output Current (Maximum)	Inverter PCB	24A	38A	
	Fan Controller	3.5A		
Control Method		Vector PWM Control		
Range Output Frequency	Inverter PCB	15Hz to 140Hz	10Hz to 130Hz	10Hz to 130Hz
	Fan Controller	1.8rps to 21.2rps		
Accuracy of Frequency		0.1Hz		
Output / Characteristics				
Speed Rate		0.125rps/s, 0.25rps/s, 0.5rps/s, 1rps/s, 3rps/s (5 Steps)		

Applicable Model	RASQ Series	RAS-8.0~24HNBCMQ
	Power Source	3 PH (380-415V/50Hz)
Protection Function	Excessive High or Low Voltage for Inverter	● Stoppage Code for Inverter (iTC) = 5 ● Excessive Low Voltage at DC Voltage is Lower than 396V ● Stoppage Code for Inverter (iTC) = 6 ● Excessive High Voltage at a DC Voltage is Higher than 844V
	Abnormality of Current Sensor	● Stoppage Code for Inverter (iTC) = 8 ● The wave height value of running current for the phase positioning is less than the determination value before the compressor is started (at completion of the phase positioning).
	Protection Function Overcurrent Protection for Inverter	 ● Stoppage Code for Inverter (iTC) = 1 (1) Short-Circuit Trip of Arm (2) Instantaneous Overcurrent Trip ● Stoppage Code for Inverter (iTC) = 2 (3) Instantaneous Overcurrent Trip When detecting current is more than rated current of Transistor Module, overcurrent is detected. ● Stoppage Code for Inverter (iTC) = 4 (4) Electronic Thermal Trip When the current detected by current sensor exceeds 105% of the rated current continuously for 30 seconds or for 3 minutes in total during a 10-minute period, overcurrent is detected.
	Protection of Power Module (CIB, IPM)	● Stoppage Code for Inverter (iTC) = 1 Power Module (CIB, IPM) has three protection function for self-protection. (1) Some of the output terminals between “U” and “V”, “V and “W”, “W” and “U” have a short-circuit. (2) Running current reaches the maximum rated current. (3) Control voltage decreases abnormally.
	Overload Control	The overload control is controlled as follows. ● Condition of Activation: When the running current is more than 105% of the rated current. ● Condition of Cancellation: When the running current is less than 88% of the rated current.
	Fin Temperature Increase	● Stoppage Code for Inverter (iTC) = 3 The unit is stopped when the temperature of CIB is higher than 110°C and IPM is higher than 100°C.
	Earth Detection	● Stoppage Code for Inverter (iTC) = 12 The unit is stopped when the compressor is grounded.

■ Checking Method for Inverter Parts

● High Voltage Discharge Work for Replacing Parts

⚠ CAUTION

Perform this high voltage discharge work to avoid an electric shock.
Take special care to avoid a short circuit between terminal P and N.

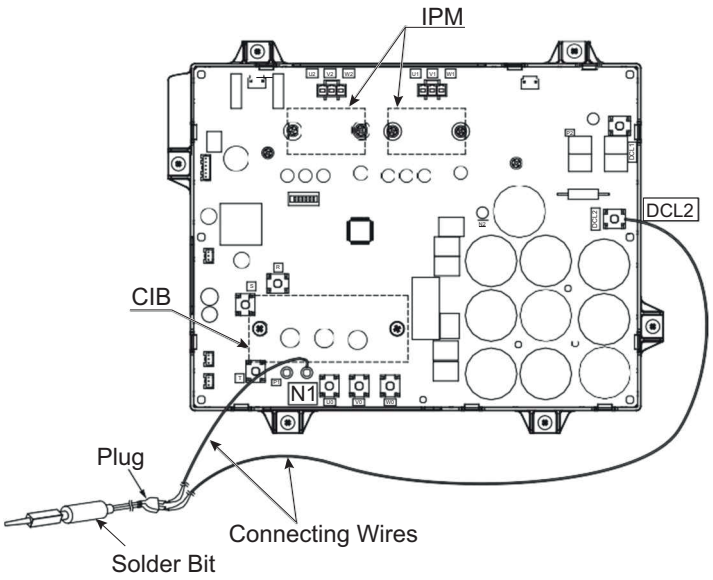
< Procedures >

(a) Turn OFF the main switches and wait for ten minutes. Check to ensure that no high voltage exists. If LED401 on INV is OFF after turning OFF power source, the voltage will decrease to DC50V or less.

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

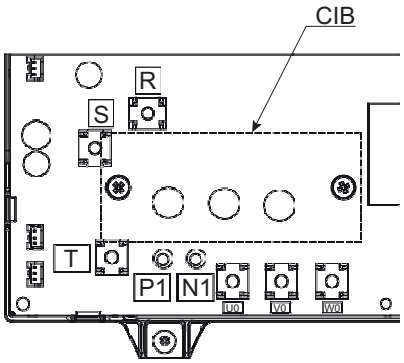
(c) Connect the wires to terminals, N1 and DCL2 on the inverter PCB (INV). => Discharging is started, resulting in hot solder bit.

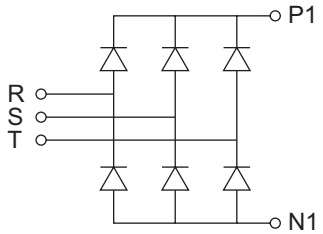
(d) Wait for two or three minutes and measure the voltage again. Check to ensure that no voltage is charged.



● Checking Method of Inverter PCB (INV: PV164)

(1) Outer Appearance and Rectifier Circuit of CIB



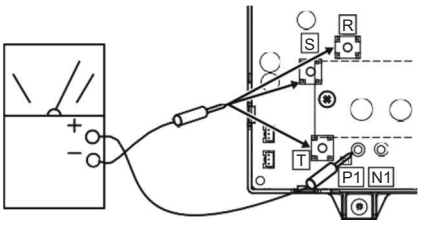


If procedures (a) to (d) are performed and the results are satisfactory, the CIB on the inverter PCB is normal.

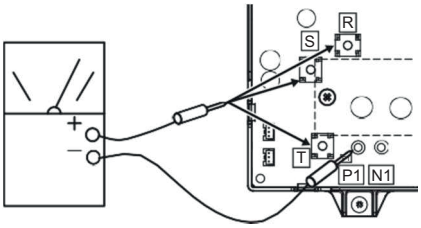
NOTICE

Recommended using an analogue tester.

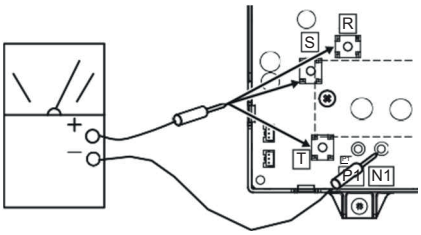
(a) By touching the + side of the tester to the P1 terminal of the inverter PCB and the - side of tester to R, S, and T of the inverter PCB, measure the resistance.



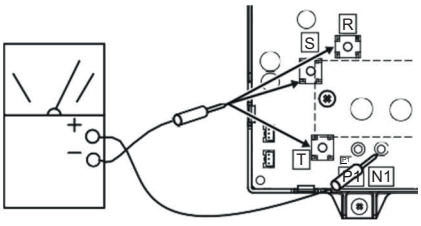
(b) By touching the - side of the tester to the P1 terminal of the inverter PCB and the + side of tester to R, S, and T of the inverter PCB, measure the resistance.



(c) By touching the - side of the tester to the N1 terminal of the inverter PCB and the + side of tester to R, S, and T of the inverter PCB, measure the resistance.

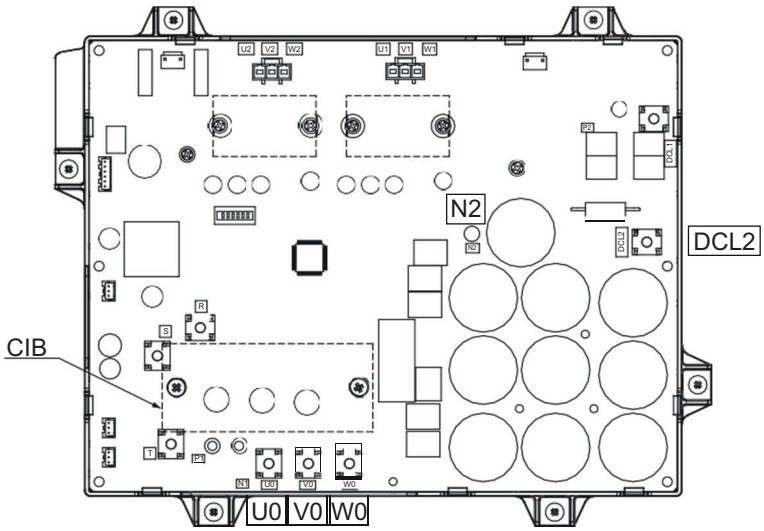


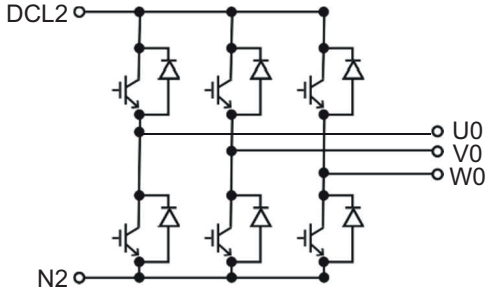
(d) By touching the + side of the tester to the N1 terminal of the inverter PCB and the - side of tester to R, S, and T of the inverter PCB, measure the resistance.



Measurement Point			Criterion	
Item	Tester		Analogue Tester	Digital Tester
	(+)	(-)		
(a)	P1	R/S/T	1kΩ or more (Measured Range: 1kΩ)	Overload
(b)	R/S/T	P1	30kΩ or more (Measured Range: 10kΩ)	1.0V or less
(c)	R/S/T	N1	1kΩ or more (Measured Range: 1kΩ)	Overload
(d)	N1	R/S/T	30kΩ or more (Measured Range: 10kΩ)	1.0V or less

(2) Internal Circuit of CIB Outlet Part



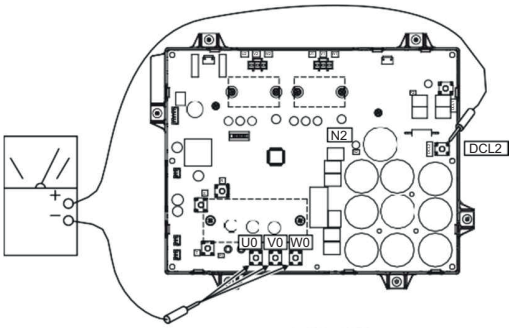


If procedures (a) to (d) are performed and the results are satisfactory, the CIB on the inverter PCB is normal.

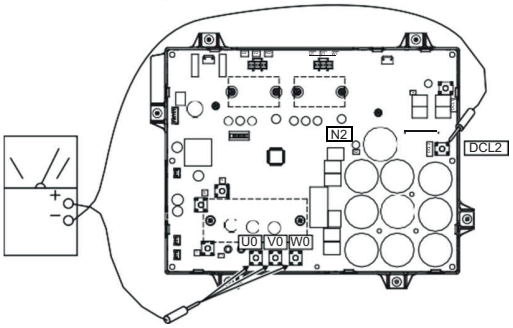
NOTICE

Recommended using an analogue tester.

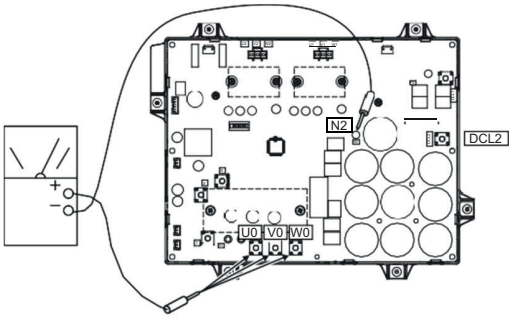
(a) By touching the + side of the tester to the DCL2 terminal of the inverter PCB and the - side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.



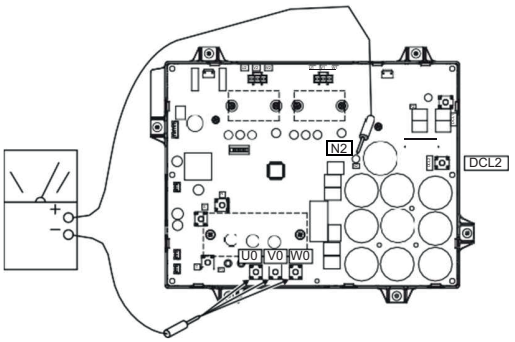
(b) By touching the - side of the tester to the DCL2 terminal of the inverter PCB and the + side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.



(c) By touching the - side of the tester to the N2 terminal of the inverter PCB and the + side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.



(d) By touching the + side of the tester to the N2 terminal of the inverter PCB and the - side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.



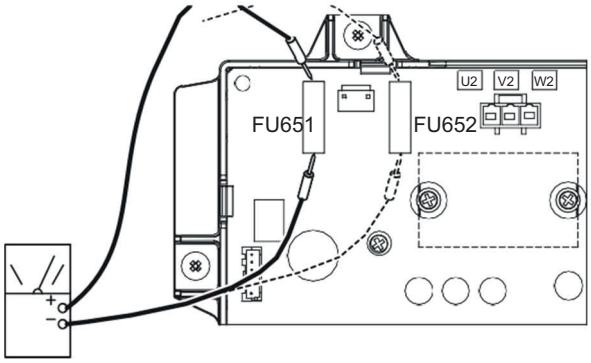
Measurement Point			Criterion	
Item	Tester		Analogue Tester	Digital Tester
	(+)	(-)		
(a)	DCL2	U0/V0/W0	1kΩ or more (Measured Range: 1kΩ)	Overload
(b)	U0/V0/W0	DCL2	20kΩ or more (Measured Range: 10kΩ)	1.0V or less
(c)	U0/V0/W0	N2	1kΩ or more (Measured Range: 1kΩ)	Overload
(d)	N2	U0/V0/W0	20kΩ or more (Measured Range: 10kΩ)	1.0V or less

(3) Testing the Fuse for Inverter Power

By touching the + and - side of the tester on each side of the fuse (FU651, FU652), measure the resistance. If the resistance is 0Ω, it is normal.

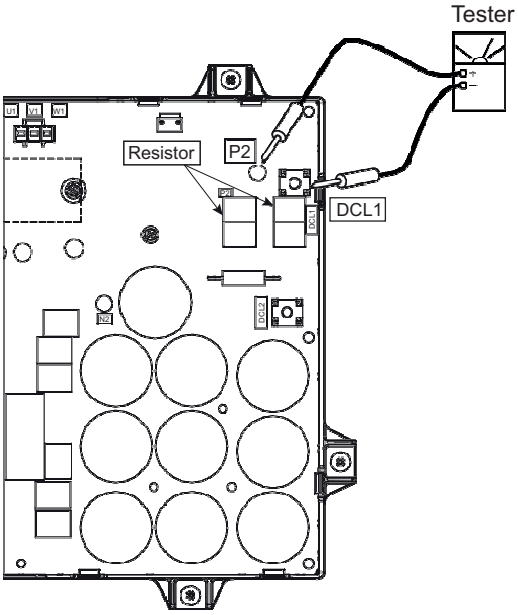
NOTICE:

Set analog, or digital tester at 1kΩ.



(4) Testing the Resistor

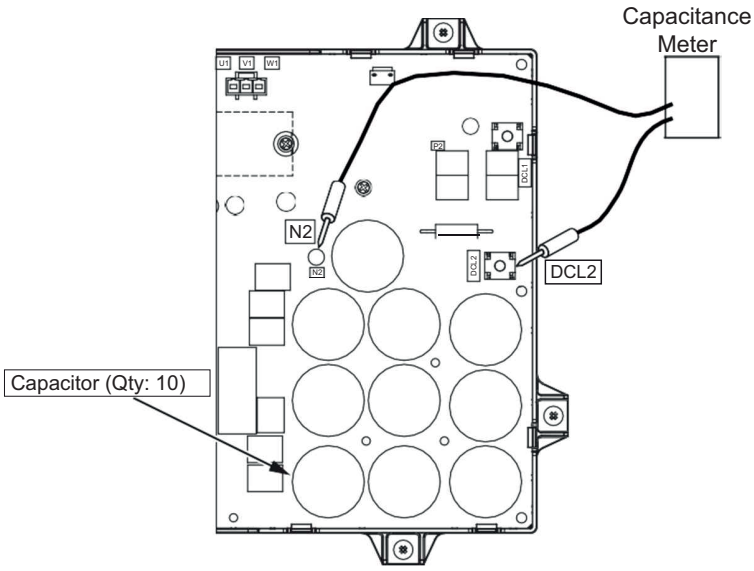
Measure the resistance using the tester between the DCL1 and P2 terminal.
If the resistance is 1kΩ±5%, it is normal. (0Ω or ∞Ω: abnormal)



(5) Testing the Capacitor

(a) Check that the capacitor does not show signs of burns or it is not swollen.

(b) Measure the capacitance using the capacitance meter between the DCL2 and N2 terminal. If the capacitance is 2000μF±10%, it is normal.



(6) Testing the IPM for Fan Motor

⚠ CAUTION

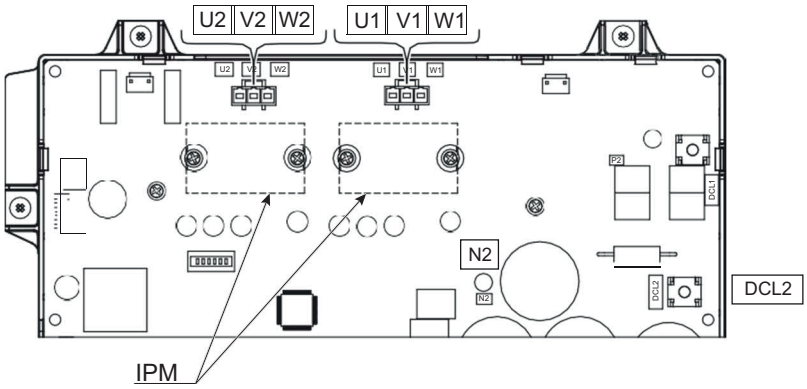
Perform this high voltage discharge work to avoid an electric shock.

NOTICE

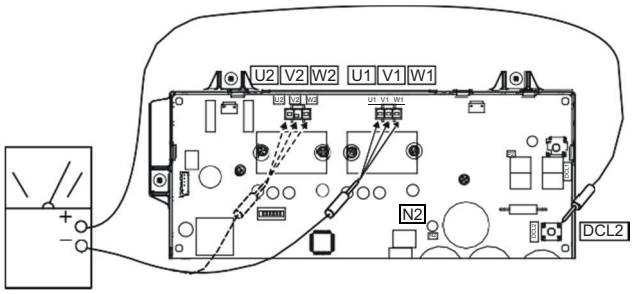
Recommended to use an analogue tester.

(a) Turn OFF the main source before this work.
Ensure that LED401 on the inverter (INV) is turned OFF.
If LED401 on INV is turned ON, an electrical shock may occur from residual voltage over DC 50V to the inverter PCB (INV).

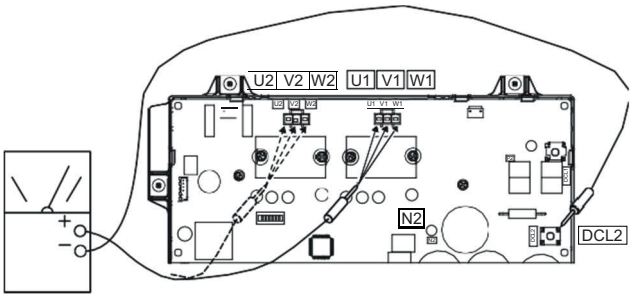
(b) Disconnect all the wirings connected to the inverter PCB (INV).



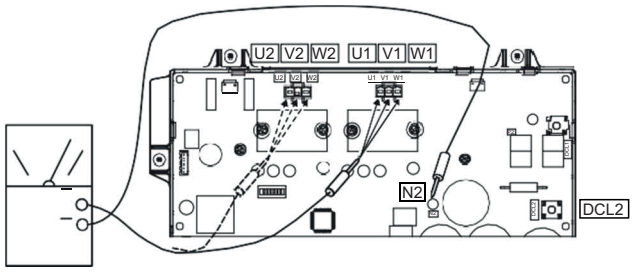
(c) By touching the + side of the tester to the DCL2 terminal of fan controller and the - side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



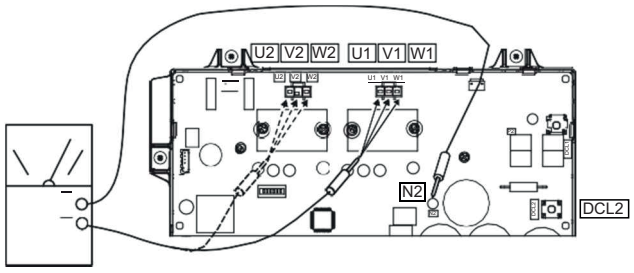
(d) By touching the - side of the tester to the DCL2 terminal of fan controller and the + side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



(e) By touching the - side of the tester to the N2 terminal of fan controller and the + side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



(f) By touching the + side of the tester to the N2 terminal of fan controller and the - side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



NOTICE:

In case of the outdoor unit is RAS-14, 16HNBCMQ, additional test will be required by replacing “U1/V1/W1” with “U2/V2/W2”.

Measurement Point			Criterion	
Item	Tester		Analogue Tester	Digital Tester
	(+)	(-)		
(c)	DCL2	U1/V1/W1 (U2/V2/W2)	1kΩ or more (Measured Range: 1kΩ)	Overload
(d)	U1/V1/W1 (U2/V2/W2)	DCL2	20kΩ or more (Measured Range: 10kΩ)	1.0V or less
(e)	U1/V1/W1 (U2/V2/W2)	N2	1kΩ or more (Measured Range: 1kΩ)	Overload
(f)	N2	U1/V1/W1 (U2/V2/W2)	20kΩ or more (Measured Range: 10kΩ)	1.0V or less

3.2.2 Protective Function

(1) Excessive High or Low Voltage for Inverter

(a) Level of Detection

When the voltage of direct current is greater than 844V, abnormalities are detected.

When the voltage of direct current is smaller than 396V, abnormalities are detected.

(b) Function

When abnormalities are detected, the inverter compressor is stopped and transmits the signal code of stoppage cause to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage cause is cancelled when wired controller is off or main power source is cut off.

(2) Abnormality of Current Sensor

(a) Level of Detection

The wave height value of running current for the phase positioning is less than the determination value before the compressor is started (at completion of the phase positioning).

(b) Function

When abnormalities are detected, the inverter compressor is stopped, and transmits the signal code for the cause of the stoppage to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage cause is cancelled when wired controller is off or main power source is cut off.

(3) Overcurrent Protection for Inverter

(a) Level of Detection

① When the compressor current detected by current sensor exceeds the rated current of power module (CIB, IPM), overcurrent is detected. (Instantaneous Overcurrent)

② When the current detected by current sensor exceeds 105% of the rated current continuously for 30 seconds or for 3 minutes in total during a 10-minute period, overcurrent is detected. (Electric Thermal Relay)

(b) Function

When abnormalities are detected, the inverter compressor is stopped and transmits the signal code for the cause of the stoppage to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage cause is cancelled when wired controller is off or main power source is cut off.

(4) Protection of Power Module (CIB, IPM)

(a) Level of Detection

① When some of the output terminals between “U” and “V”, “V” and “W”, “W” and “U” of power module (CIB, IPM) are short-circuited, an abnormality is detected.

② When the running current of power module (IPM) reaches the maximum rated current, an abnormality is detected.

③ When the control voltage of power module (IPM) abnormally decreases, an abnormality is detected.

(b) Function

When abnormalities are detected, the inverter compressor is stopped and the signal code for the cause of the stoppage is transmitted to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal the cause of the stoppage cause is cancelled when wired controller is off or main power source is cut off.

(5) Fin Temperature Increase

(a) Level of Detection

When the temperature of internal CIB exceeds 110°C or IPM exceeds 100°C, an abnormality is detected.

(b) Function

When abnormalities are detected, the inverter compressor is stopped and the signal code for the

cause of the stoppage is transmitted to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage is cancelled when wired controller is off or main power source is cut off.

(6) Earth Detection

(a) Level of Detection

① When the terminal U, V, W and earth of the compressor are short-circuited before compressor activation, abnormalities are detected.

② When the output terminals (U, V, W) of power module (CIB, IPM) are short-circuited, abnormalities are detected.

(b) Function

When abnormalities are detected, the inverter compressor is stopped and the signal code for the cause of the stoppage is transmitted to outdoor unit PCB.

(c) Cancellation of Protection Function

Communication signal for the cause of the stoppage is cancelled when wired controller is off or main power source is cut off.

3.2.3 Overload Protection Control

(a) Level of Detection

When the output current exceeds 105% of the maximum output current, an abnormality is detected.

(b) Function

An overload signal is transmitted to the outdoor unit PCB when output current exceeds 105% of the maximum output current, and the frequency decreases.

For 10 seconds after the output current decreases lower than 88% of the rated current, the compressor maximum frequency is limited to the specified value.

However, if the frequency order is smaller than the maximum value, the operation is performed according to the order.

(c) Cancellation of Protection Function

After the operation described in the above item (b) is performed for 10 seconds, this control gets cancelled.

3.3 Scroll Compressor

- Reliable Mechanism for Low Vibration and Low Sound
  (1) The rotating direction is definite.
  (2) The pressure inside the chamber is high and the surface temperature of the chamber is 60°C to 110°C.
- Principle of Compression

(1) Gas enters the compressor from top at the suction inlet.

⇩

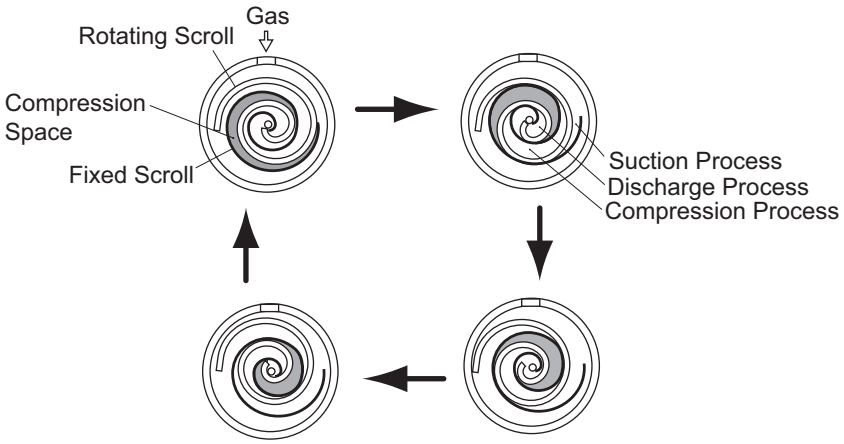
(2) Hot gas leaves the compressor from the side mounted discharge gas outlet.

⇩

(3) Compressor starts at the beginning of the scroll at a lower pressure, and continues to the outer edge of the scroll where the pressure is greatest and discharged through the side discharge gas port at the center of the compressor.

⇩

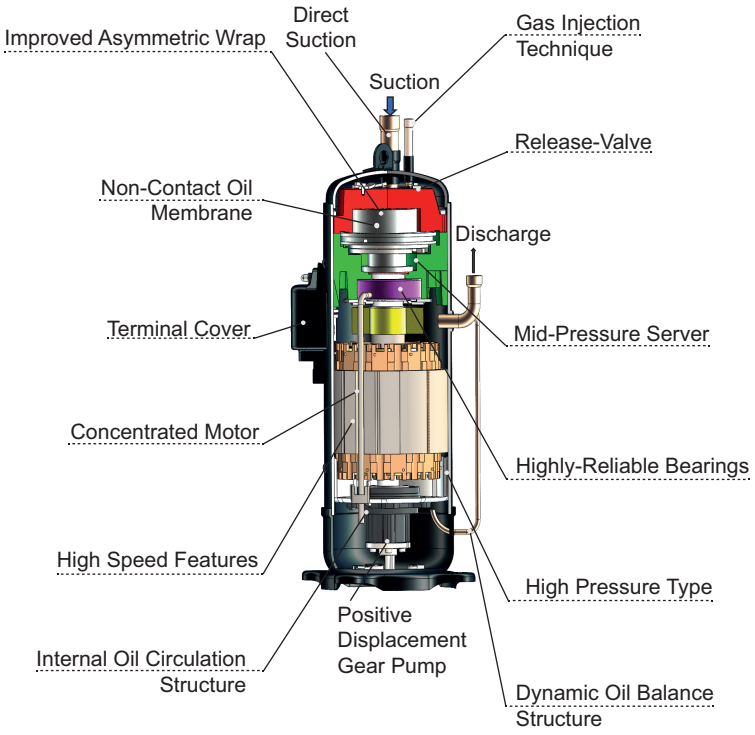
(4) The above procedures (Suction → Compression → Discharge) are repeated continuously.



● Structure

The compressor has the structure for oil supply from the outer oil separator.

The inside of the oil separator is at high pressure, and the surface temperature of the oil separator is as high (60°C to 110°C) as the compressor.



● Compressor Type

Model	Voltage	Inverter Compressor 1	Inverter Compressor 2	Total Quantity
RAS-8.0, 10HNBCMQ	380-450V/50Hz	AA50PHDG-D1Y2	-	1
RAS-12, 14, 16HNBCMQ		DC80PHDG-D1Y2	-	1
RAS-18, 20HNBCMQ		AA50PHDG-D1Y2	AA50PHDG-D1Y2	2
RAS-22, 24HNBCMQ		DC80PHDG-D1Y2	DC80PHDG-D1Y2	2

● Checking of Compressor Motor

Inverter Compressor	Resistance between terminals Rs(Ω): at 20°C
AA50PHDG-D1Y2	0.197
DC80PHDG-D1Y2	0.124

● Checking of Compressor

CHECK LIST ON COMPRESSOR

CLIENT: MODEL: DATE:

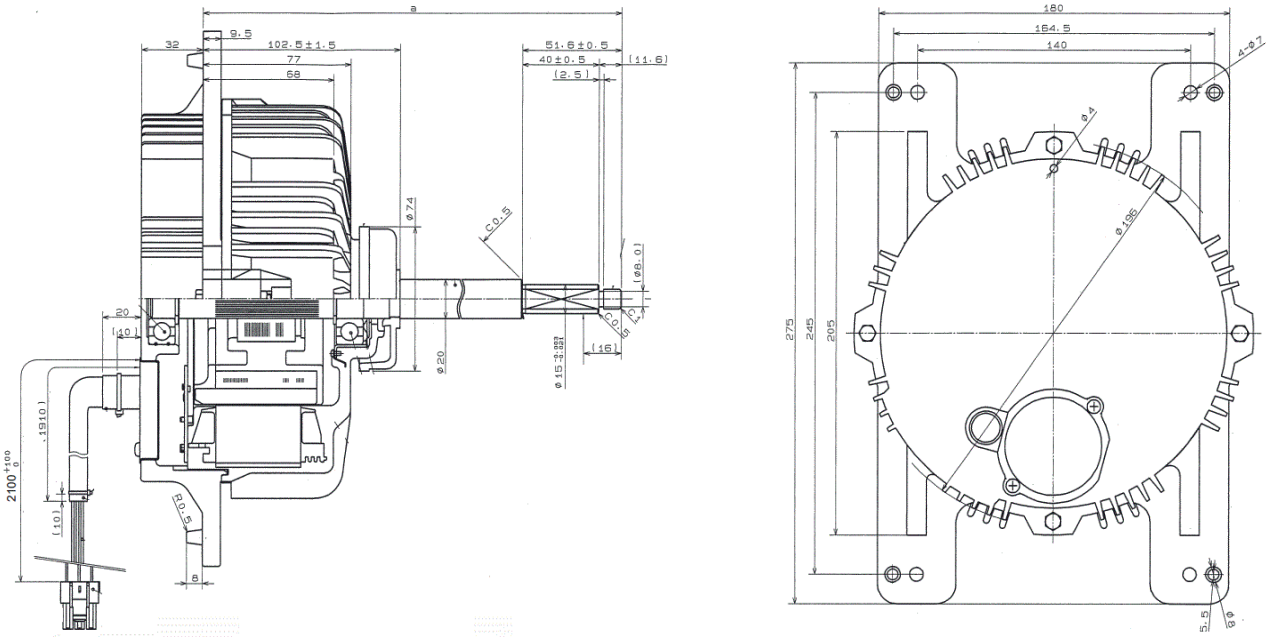
Serial No.: Production Date: Checker:

No.	Check Item	Check Method	Result	Remarks
1	Are THM8 and THM9 correctly connected? THM8 and THM9: Discharge Gas Thermistor	(1) Are wires of each thermistor correctly connected by viewing? (2) Check to ensure that 7-segment indication of Td1 is higher than Td2 when No.1 comp. is operating. Td1: Temperature of THM8 Td2: Temperature of THM9		
2	Are thermistor, THM8 and THM9 disconnected?	(1) Check to ensure that thermistor on the top of comp. is correctly installed. (2) Check to ensure that actually measured temp. are greatly different from the indication (Td1, Td2) during check mode.		
3	Is current sensing part on inverter PCB (INV) faulty?	(1) Check to ensure that 7-segment indication A1 and A2 are 0 during compressor stopping. (2) Check to ensure that indication A1 and A2 are not 0 during compressor running. (However, A2 is 0 during stopping of No.2 comp.)		
4	Are expansion valves (MV1, MV2 and MVB) correctly connected?	Check to ensure that MV1 to CN10, MV2 to CN11 and MVB to CN12 are correctly connected.		
5	Are expansion valve coils (MV1, MV2 and MVB) correctly installed?	Check to ensure that each coil is correctly installed on the valve.		
6	Are the refrigeration system and electrical wiring system incorrectly connected?	Check to ensure that refrigerant is flowing into indoor units by operating one system only from the outdoor unit.		
7	Is opening of expansion valve completely closed (locked)?	Check the following using the check mode of outdoor units. (1) Liquid Pipe Temp. (TL) < Air Intake Temp. (Ti) during Cooling Operation (2) Liquid Pipe Temp. (TL) > Air Intake Temp. (Ti) during Heating Operation		
8	Is opening of expansion valve fully opened (locked)?	Check to ensure that liquid pipe temp. is lower than air intake temp. of stopped indoor unit when the other indoor units are operating under cooling operation.		
9	Are the relay on the main power PCB (PCB2) faulty?	Check the main power PCB (PCB2).		
10	Is there any voltage abnormality among L1-L2, L2-L3 and L3-L1?	Check to ensure that voltage imbalance is smaller than 3%. Please note that power source voltage must be within 220V or 400V/380 - 415V/ 380V±10%.		
11	Is the comp. oil acidified during compressor motor burning?	Check to ensure that the oil color is not black.		

Additional Information for “CHECK LIST ON COMPRESSOR”

Check Item	Additional Information (Mechanism of Compressor Failure)
1, 2	The liquid refrigerant return volume to the compressor is controlled by the discharge gas temperature Td1 when only No.1 compressor is operating. If Td1 and Td2 are reversely connected, the liquid refrigerant return volume will become smaller by detecting the temperatures even if the actual discharge gas temperature is high. Therefore, this abnormal overheating operation will result in insulation failure of the motor winding.
3	Overcurrent control (operating frequency control) is performed by detecting current by the current sensor. In this case, winding insulation failure will occur, since control is not available in spite of actually high current.
4, 5	During a cooling operation, Pd is controlled by fan revolution of outdoor unit, and Td and SH are controlled by MV of each indoor unit. During a heating operation, Td and SH are controlled by MV1 and MV2. If expansion valves are incorrectly connected, correct control is not available, resulting in compressor failure depending on liquid refrigerant returning conditions or motor winding insulation failure depending on overheating conditions.
6	If the refrigeration system and electrical system are incorrectly connected, abnormally low suction pressure operation is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
7	For additional information, refer to page 199 in this document.
8	The compressor may be locked due to the liquid return operation during the cooling operation.
9	If the contacting resistance increases, voltage imbalance among each phase will cause abnormal overcurrent.
10	In this case, overcurrent will occur, efficiency will decrease or the motor winding will be excessively heated.
11	In this case, it will result in motor burning or a failed compressor.

3.4 Fan Motor



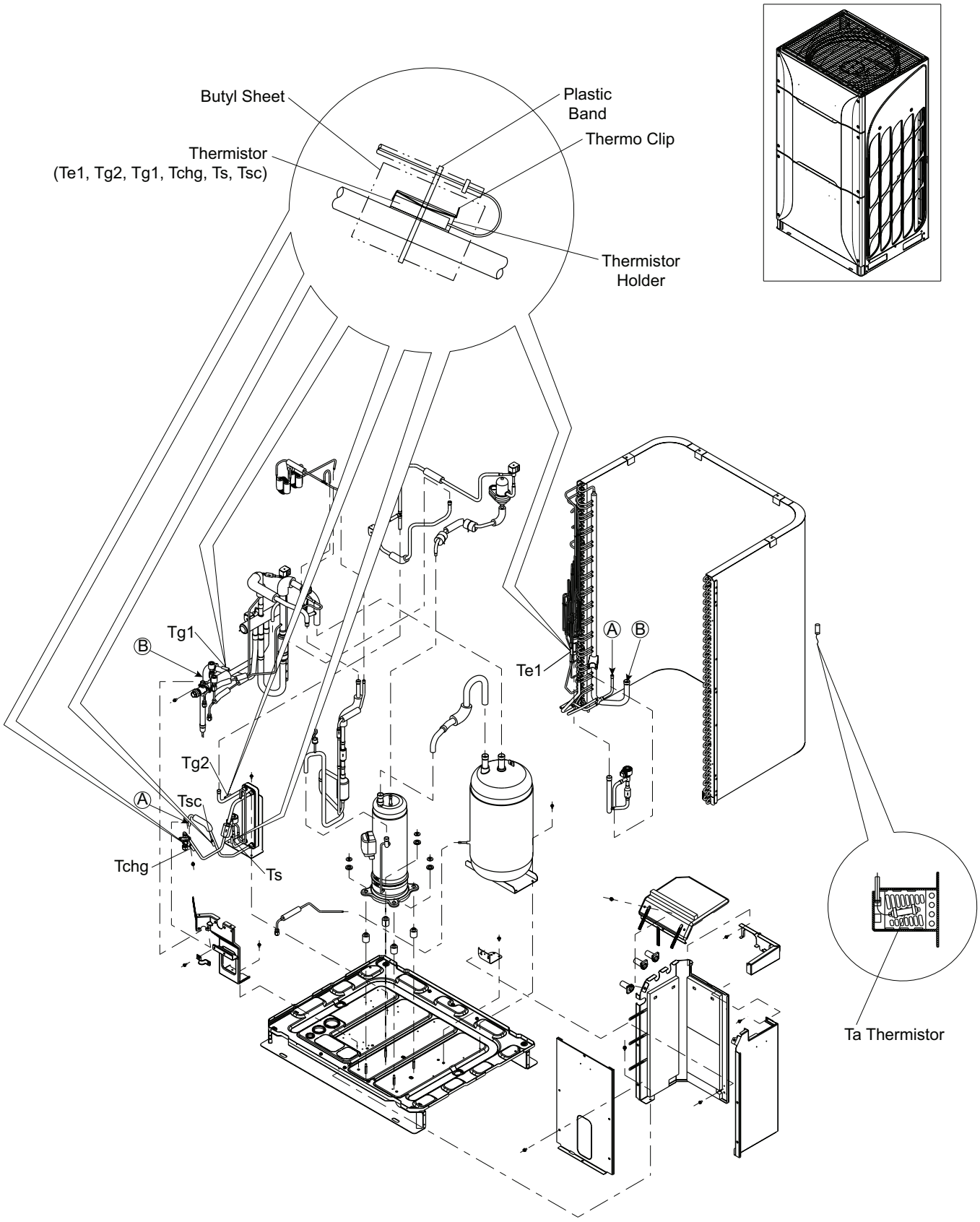
Unit: mm

Model	a	Resistance
8HP/10HP/12HP/20HP/22HP/24HP	268.5 ±1.5	9.2+1Ω at 20°C
14HP/16HP/18HP	227.0 ±1.5	9.2+1Ω at 20°C

3.5 Thermistor

(1) Position of Thermistor

<Example: RAS-8.0HNBCMQ>

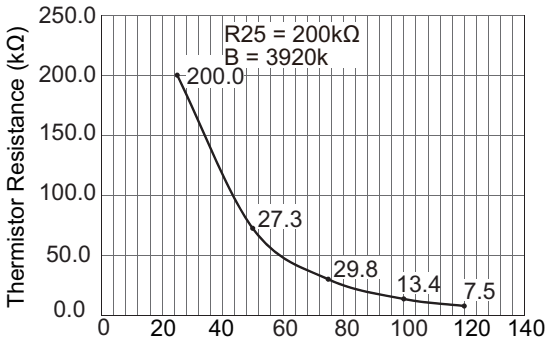


(2) Thermistor for Upper Part Temperature of Compressor

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. When discharge gas temperature increases excessively, compressor temperature increases. In extreme cases, compressor motor winding burns 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 outdoor units is (are) opened to return the liquid refrigerant to the compressor through the accumulator, decreasing compressor temperature.
- If the compressor's upper part temperature increases exceeding 132°C even if an electronic expansion valve opens, the compressor stops, 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's 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

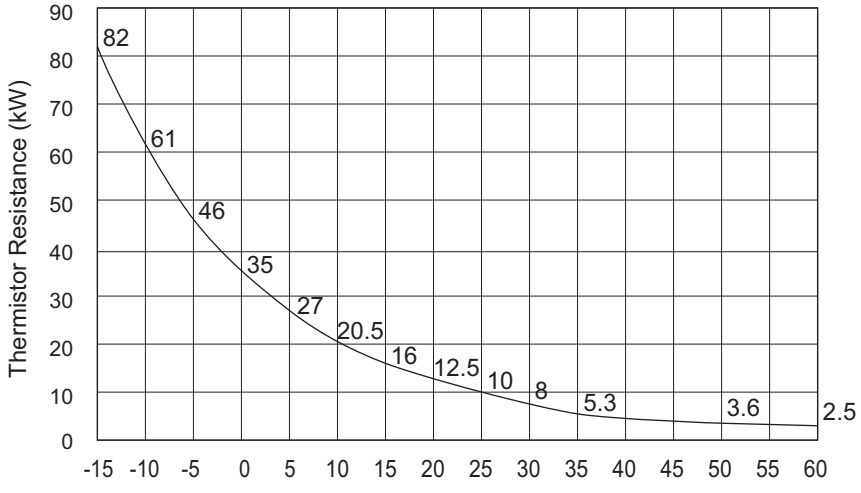
The thermistor resistance characteristics are shown in the figure below.

(4) Thermistor for Evaporating Temperature of Outdoor Unit in Heating Operation (For Defrosting)

The characteristics for the thermistor are the same as those of outdoor ambient temperature thermistor shown in the figure below.

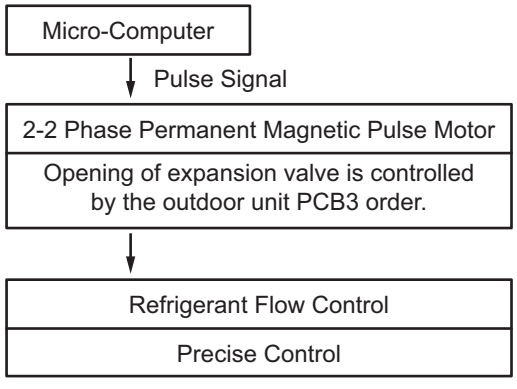
(5) Thermistor for Super Cooling Bypass and Main Line Temperature of Outdoor Unit

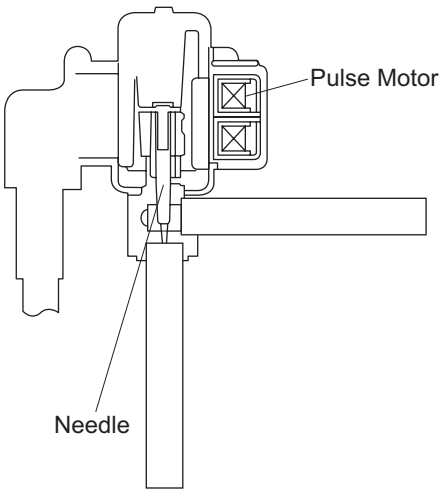
The characteristics for the thermistor are the same as those of outdoor ambient temperature thermistor shown in the figure below.



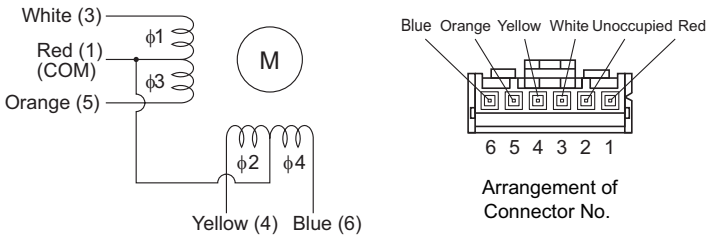
Thermistor Characteristics

3.6 Electronic Expansion Valve (MV, MVB)

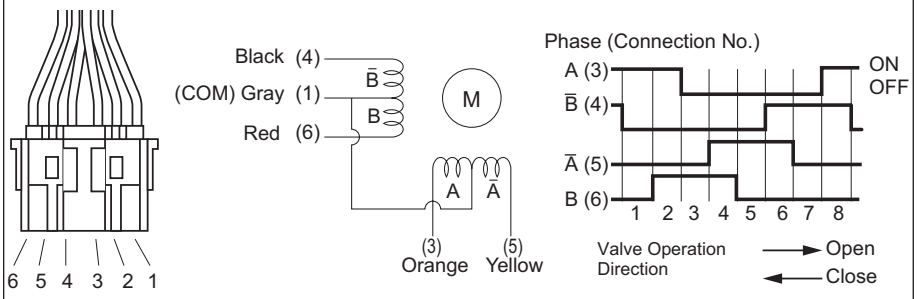




● Specifications for MV1 and MV2

Model	PAM-BBOYGHS-1 (MV)
Working Temperature Range	-30°C to 70°C
Refrigerant Used	R410A
Insulation Resistance	Min. 100MΩ (at 500VDC Megger)
Withstand Voltage	500VAC for 1 Minute or 600VAC for 1 Second
Rated Voltage	DC12V±1.2V
Drive Condition	100 - 200 PPS 2-2 Phase Excitation
Coil Resistance	100Ω (at 20°C)
Insulation Class	Class E
Wiring Diagram, Drive Circuit and Activation Mode	 Phase 1: ϕ1 ON, ϕ2 ON, ϕ3 OFF, ϕ4 OFF Phase 2: ϕ1 OFF, ϕ2 ON, ϕ3 ON, ϕ4 OFF Phase 3: ϕ1 OFF, ϕ2 OFF, ϕ3 ON, ϕ4 ON Phase 4: ϕ1 ON, ϕ2 OFF, ϕ3 OFF, ϕ4 ON OPEN: 4 → 3 → 2 → 1 → 4 CLOSE: 1 → 2 → 3 → 4 → 1 < Checking Method > Measure the coil resistances between Red (common) and each phase. The measured resistance value is normal if approximately 100Ω[*1]). [*1]: Ambient Temperature 20°C

● Specifications for MVB

Model	UKV-025D174
Working Temperature Range	-30°C to 70°C
Refrigerant Used	R410A
Insulation Resistance	Min. 100MΩ (at 500VDC Megohmmeter)
Withstand Voltage	1800VAC for 1 Second
Rated Voltage	DC12V±1.2V
Drive Condition	83±5 PPS 1-2 Phase Excitation
Coil Resistance	46±3Ω (at 20°C)
Insulation Class	Class E
Wiring Diagram, Drive Circuit and Activation Mode	

Order of Excitation (1-2 Phase Excitation)

Connector No.	Color of Lead Wire	Phase
1	Grey	Common (+)
2	-	-
3	Orange	A
4	Black	$\overline{B}$
5	Yellow	$\overline{A}$
6	Red	B

< Checking Method >

Measure the coil resistances between connector No.1 (common) and each phase.

The measured resistance value is normal if approximately 46Ω*.

(* Ambient Temperature 20°C)

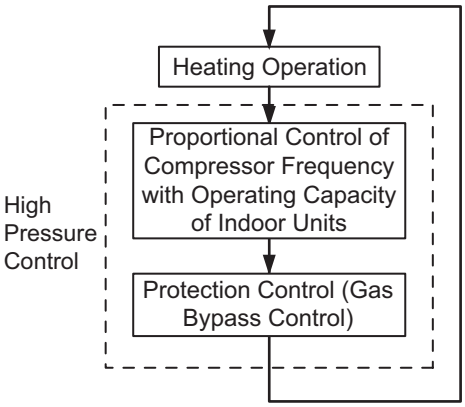
● Checking Method of Electronic Expansion Valve

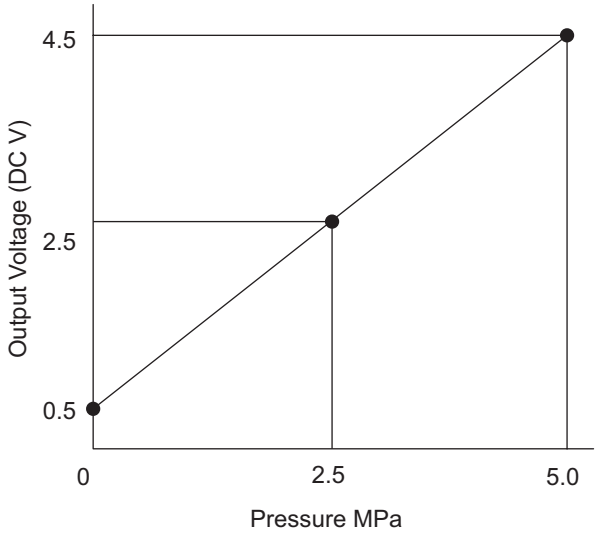
	Outdoor Unit Electronic Expansion Valve
Locked (Fully Closed)	It is abnormal if the liquid pipe pressure does not increase during cooling operation.
Locked (Slightly Open)	It is abnormal if the liquid pipe pressure does not increase and the outlet temperature of the expansion valve decreases after the cooling operation is started.
Locked (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 fault such as excessive charge of refrigerant.

3.7 Pressure Sensor (Pd)

(1) High Pressure Control

The high pressure during 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 heating operation performs protective control; gas by-pass control.



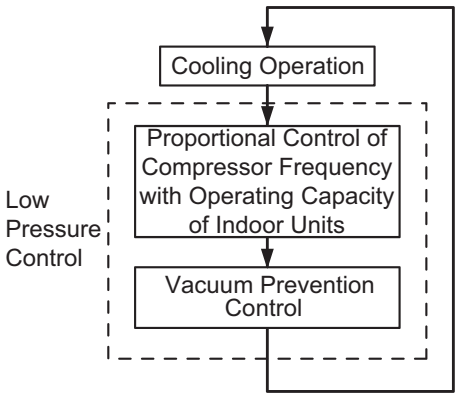


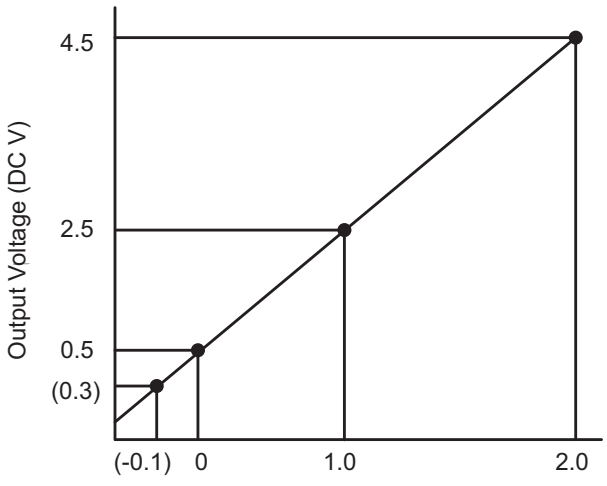
Output Characteristics of High Pressure Sensor

(2) Low Pressure Control (Ps)

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



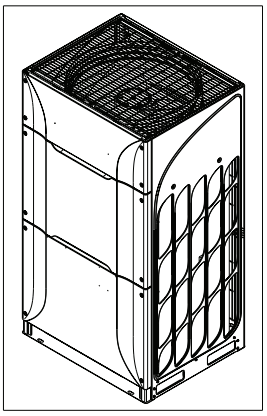


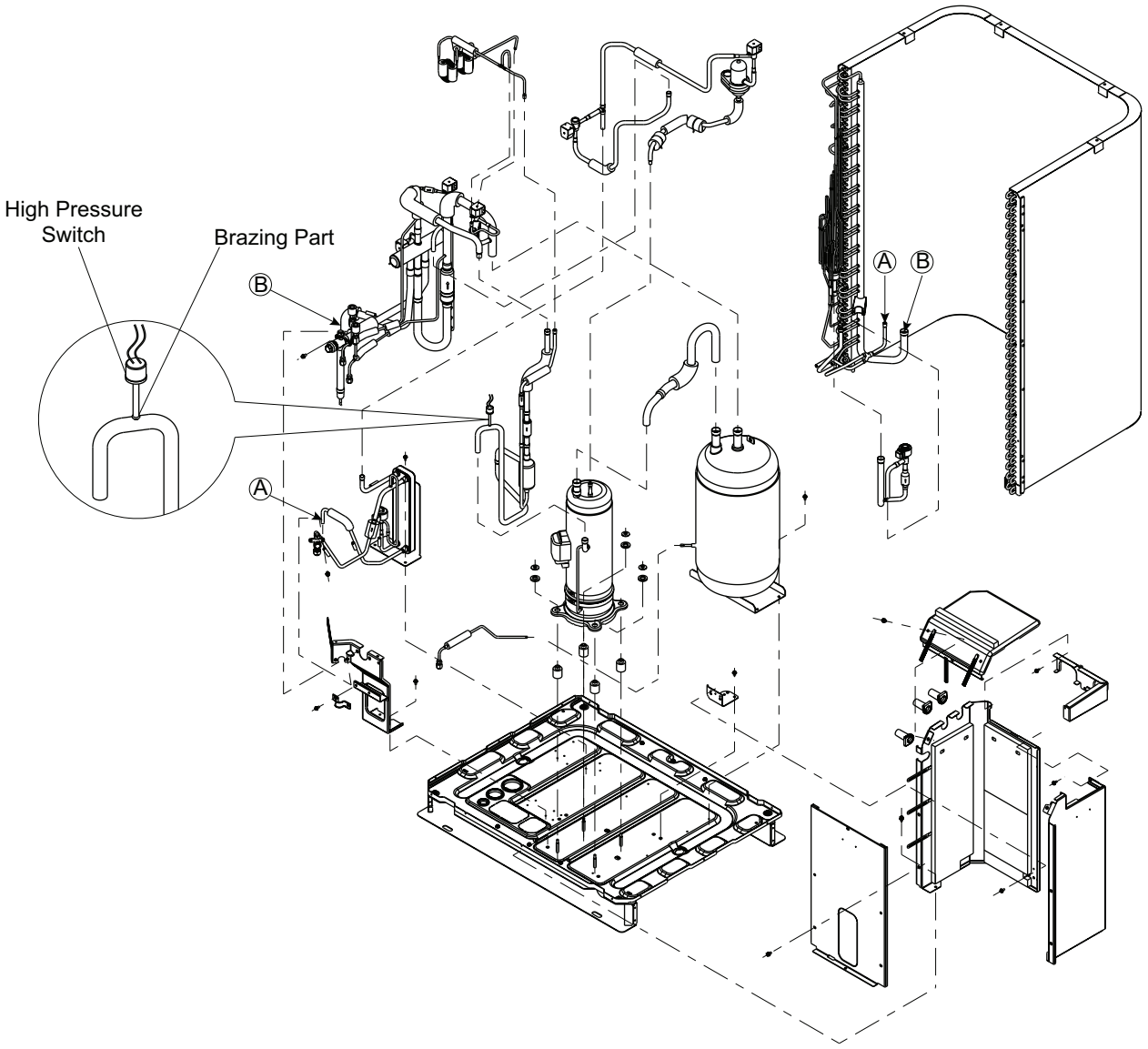
Output Characteristics of Low Pressure Sensor

3.8 High Pressure Protection Device

If the discharge pressure is excessively high, the compressor and the component parts of the refrigeration cycle can be damaged. Therefore, in case that the discharge pressure is higher than 4.15MPa (R410A), the protection control is activated and the compressor is stopped.

<Example: RAS-8.0HNBCMQ>

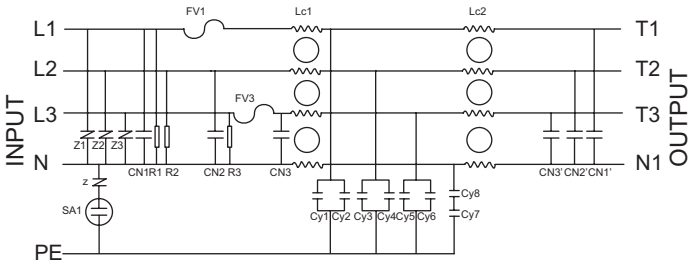




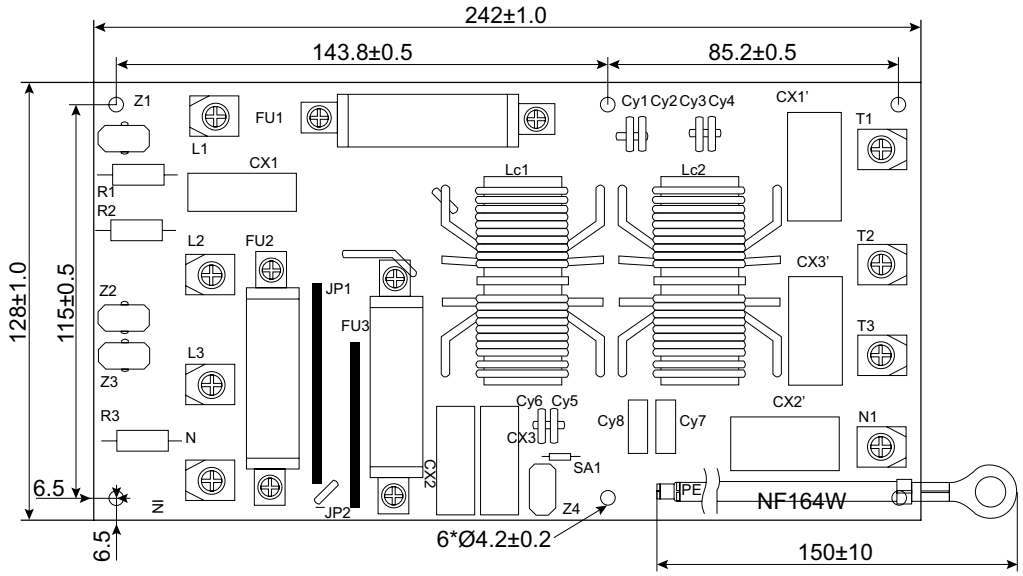
3.9 Noise Filter (NF1, NF2)

The noise filter decreases the leakage of noise made by the inverter to the power supply side. . Terminals indicated with “T1”, “T2”, “T3” are connected to the inverter side and terminals indicated with “L1”, “L2”, “L3” to the power supply side.

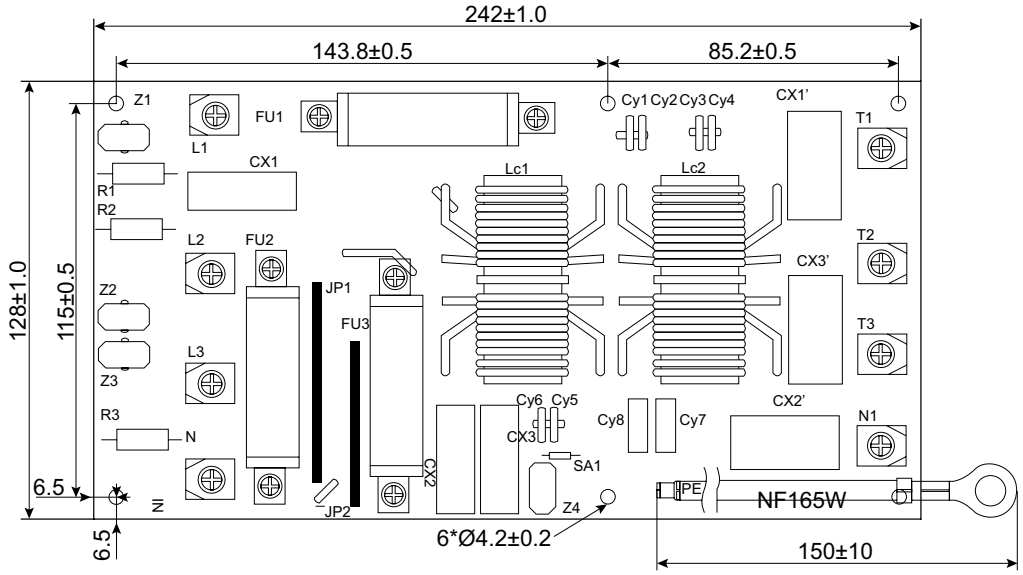
(1) Noise Filter

Item	Specification	
Model	NF164W (PV164AW)	NF165W (PV164BW,PV164CW)
Rated voltage	AC 400V, 380-415V, 380V	
Rated current	30A	40A
Circuit diagram		

NF164W
Unit : mm



NF165W
Unit : mm



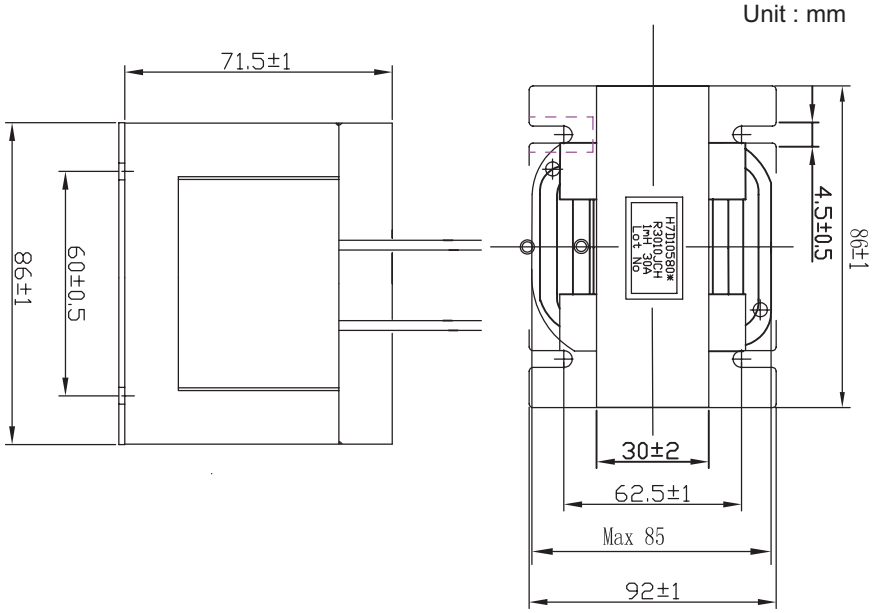
3.10 Reactor (DCL1, DCL2)

This part is used for changing the alternative current to the direct current for the inverter.

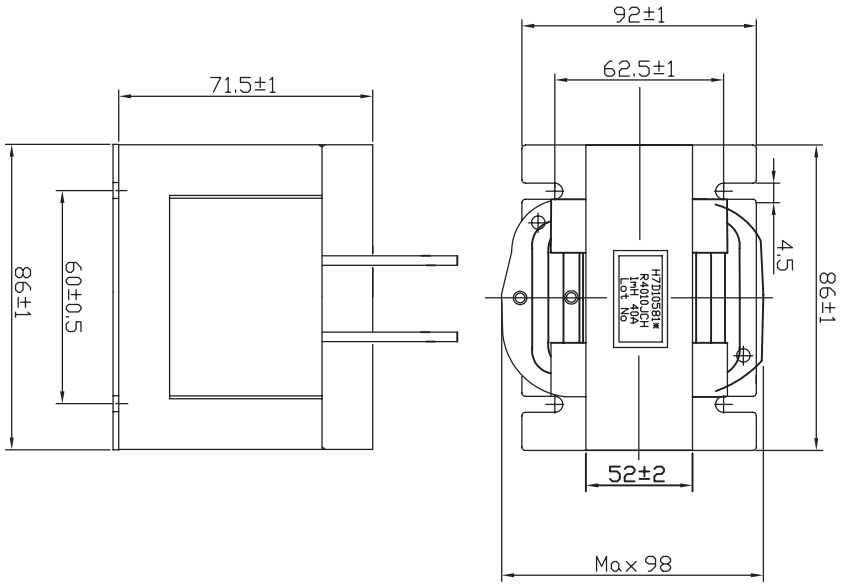
(1) Reactor

Items	Specifications	
Applicable Model	R3010JCH(A)/R3010JCH(B)	R4010JCH(A)/R4010JCH(B)
Character	1mH±10% (1kHz)	
Rated Current	30A	40A
Direct Current Resistance	(A)23.6mΩ±20% (B)21.7mΩ±20%	(A)14.2mΩ±20% (B)13.2mΩ±20%

R3010JCH
Unit : mm



R4010JCH
Unit : mm



4. Optional Function

4.1 Setting Method

Setting DSW4 on the outdoor unit Printed Circuit Board (PCB3) is required for “External Input and Output Setting” and “Function Setting”. As for a combination of outdoor units, this must be set from DSW4 in main outdoor unit (setting from DSW4 in sub outdoor units is invalid.)

< Transition Method >

[External Input/Output Setting]

■ Start of Setting

Turn ON DSW4-No.4 and
turn ON DSW4-No.6.

■ Exit Setting Mode

Turn OFF DSW4-No.6 during indicated
External Input/Output Setting Mode.
Then, turn OFF DSW4-No.4.

[Function Setting]

■ Start of Setting

Turn ON DSW4-No.4 and
turn ON DSW4-No.5.

■ Exit Setting Mode

Turn OFF DSW4-No.5 during indicated
Function Setting Mode.
Then, turn OFF DSW4-No.4.

After setting, confirm DSW4 setting is the same as the factory setting.

4.2 External Input and Output Setting

On the outdoor unit Printed Circuit Board (PCB3), there are three input terminals (CN17, CN18 as shown below) to receive external signals and two output terminals (CN16) to send signals out. Control functions shown in these tables are available when setting input and output terminals.

<Input>

Control Function No.	Setting Function for Input
1	Fixing Heating Operation Mode
2	Fixing Cooling Operation Mode
3	Demand Stoppage
4	Outdoor Fan Motor Start/Stop
5	Forced Stoppage
6	Demand Current Control 40%
7	Demand Current Control 60%
8	Demand Current Control 70%
9	Demand Current Control 80%
10	Demand Current Control 100%
11	Low Noise Setting 1
12	Low Noise Setting 2
13	Low Noise Setting 3
0	No Setting

<Output>

Control Function No.	Setting Function for Output
1	Operation Signal
2	Alarm Signal
3	Compressor ON Signal
4	Defrosting Signal
0	No Setting

The following functions have been already set before shipment.

<Input Terminal>

Input Terminal Name	Connector (Pin No.)	Setting Function	Control Function No.
Input 1	CN17 (1-2)	Fixed Heating Operation Mode	1
Input 2	CN17 (2-3)	Fixed Cooling Operation Mode	2
Input 3	CN18 (1-2)	Demand Stoppage	3

<Output Terminal>

Output Terminal Name	Connector (Pin No.)	Setting Function	Control Function No.
Output 1	CN16 (1-2)	Operation Signal	1
Output 2	CN16 (1-3)	Alarm Signal	2

OPTIONAL FUNCTION

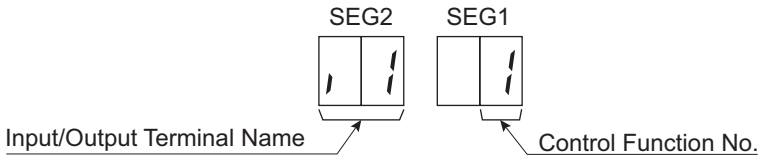
(Operation from Outdoor Unit PCB3)

● Setting of External Input and Output

If an alternative setting is required at a site, perform the following procedures.

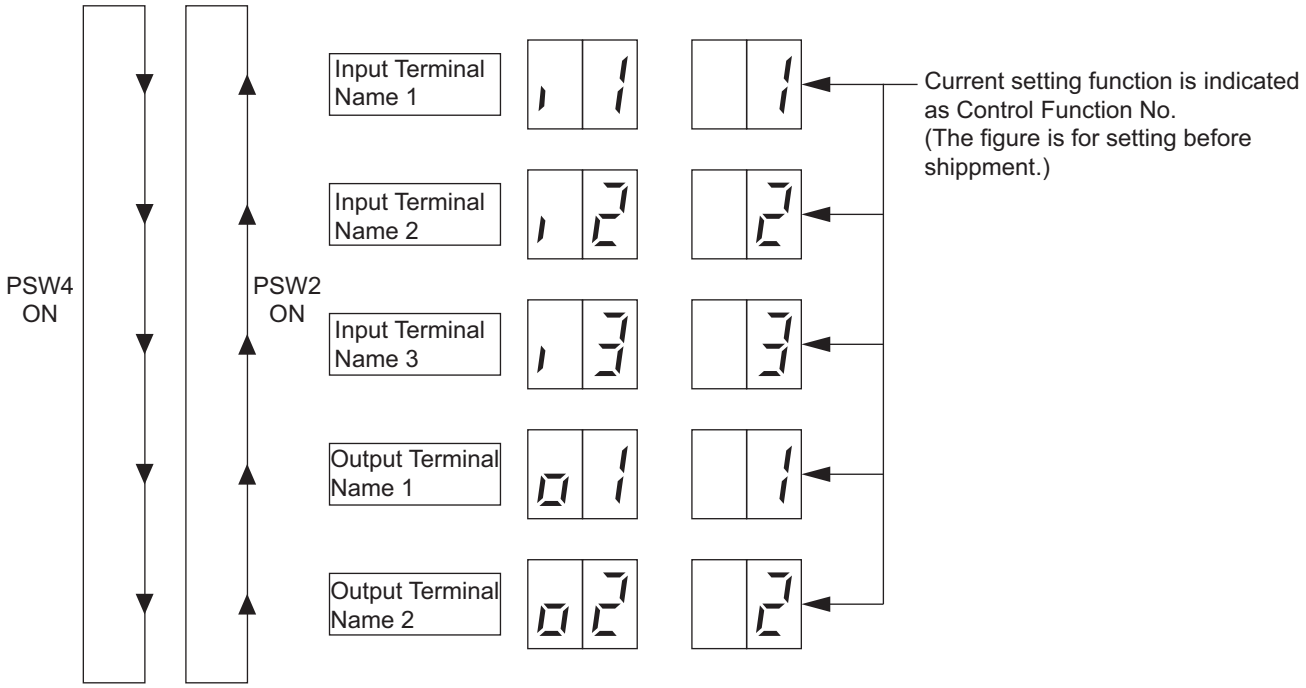
For a combination of outdoor units, perform the setting for main outdoor unit.

(1) By selecting “External Input and Output Setting”, the following appears on the 7-segment display. (The setting should be performed during an outdoor unit stoppage. Also, set DSW4-No.6 of the outdoor unit PCB3 to the “ON” side before performing the setting in order to prevent the compressor activation.)

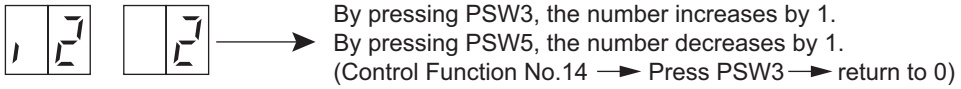


This display indicates that the control function No. 1 (Fixed Heating Operation Mode) is set at input 1.

(2) By pressing PSW2 or PSW4, input/output terminal name is changed.
The following shows the display changes when PSW2 or PSW4 are pushed.



(3) After selecting Input/Output Terminal Name, press PSW3 or PSW5, and then choose Control Function No.



(4) After selecting the Control Function No., turn OFF DSW4-No.6. The display will be back to the normal operation. Then turn OFF the DSW4-No.4. Confirm if the DSW4 is set to factory settings. The selected data is stored in the outdoor unit PCB3 and the “External Input and Output Setting” is completed. The stored data is maintained even when the power source is cut OFF.

● External Input Function Setting

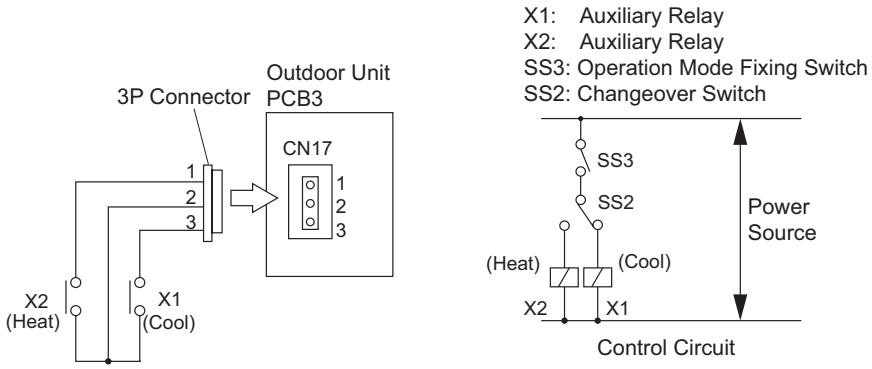
The following signals can be received by the outdoor unit PCB3. Refer to the table 4.1 for the required main parts.

4.2.1 Input Fixing Heating Operation Mode (Control Function No. 1), Input Fixing Cooling Operation Mode (Control Function No. 2)

When the input terminals for fixing operation mode on the outdoor unit PCB3 are short-circuited, the operation mode can be fixed at the cooling or heating mode:
Short Circuit between Terminals 1 and 2 of CN17: Fixed Heating Operation Mode
Short Circuit between Terminals 2 and 3 of CN17: Fixed Cooling Operation Mode

During this fixed heating (or cooling) mode, no cooling (or heating) operation is available. The indoor units under the cooling or dry operation (or heating operation) will be changed to the Thermo-OFF condition during this mode, and stoppage code No. “20” is given.

• Setting Example
Fixing Heating Operation at Input 1 (between 1 and 2 pins of CN17)
Fixing Cooling Operation at Input 2 (between 3 and 2 pins of CN17)



Wiring Diagram Example of Fixing Operation Mode

● Setting of External Input and Output

4.2.2 Input Demand Stoppage (Control Function No. 3), Input Forced Stoppage (Control Function No. 5)

When the input terminals for Demand Stoppage or Forced Stoppage on the outdoor unit PCB3 are short-circuited while running, the compressor(s) is stopped. The fan motor of indoor unit(s) is operated as shown below.

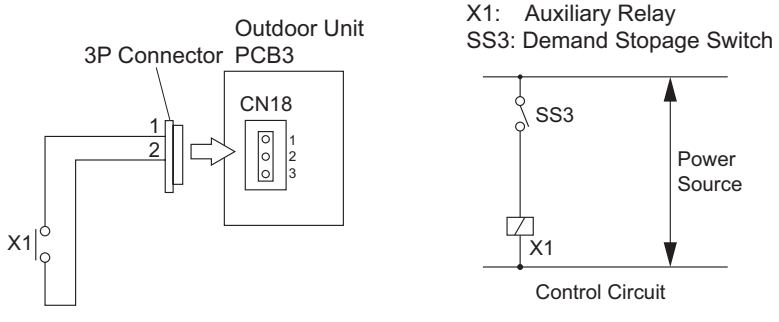
Demand Stoppage (Control Function No.3)		Cooling: Airflow Setting, Heating Lo Setting
Forced Stoppage (Control Function No. 5)	Function Setting “FE”=0	Stop
	Function Setting “FE”=1	Cooling: Airflow Setting, Heating Lo Setting

The stoppage code No. “10” is given. In this case, if the input terminals are opened, operation is resumed.

NOTE:

When demand control (ON/OFF) is performed, it is recommended that the control (ON/OFF) time is set appropriately according to the heat load. Also, set the demand control time approximately once in 15 minutes at the minimum in consideration for saving energy.

• Setting Example
Demand Stopage at Input 3 (between 1 and 2 pins of CN18)
Forced Stopage at Input 3 (between 1 and 2 pins of CN18)



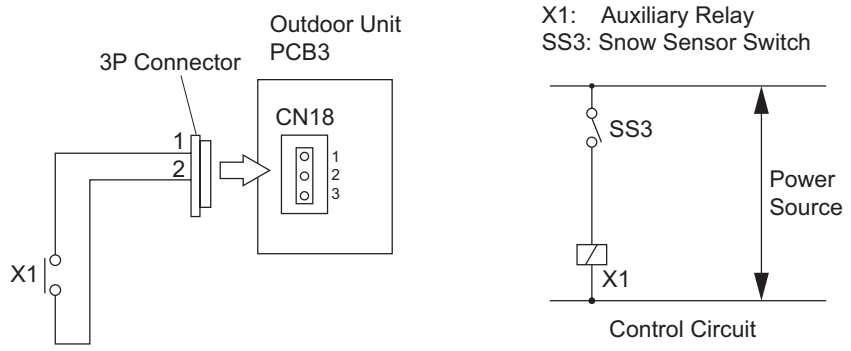
Wiring Diagram Example of Demand Stoppage or Forced Stoppage

4.2.3 Input Outdoor Fan Motor Start/Stop (Control Function No. 4)

This is an auxiliary function to protect the outdoor unit from snow. When the input terminals for Outdoor Fan Motor Start/Stop on the outdoor unit PCB3 are short-circuited during the compressor stoppage, all the outdoor fan motors start operating. If the compressor restarts operating, the outdoor fan motors will be restored to normal operation. If the input terminals of Outdoor Fan Motor Start/Stop are opened during the outdoor fan motor operation following the short circuit of these terminals, the outdoor fan motor will stop. This function is possible only during the compressor stoppage (during Switch-OFF or Thermo-OFF of the Switch-ON). Therefore, this function will not be possible even if the input signal is sent during the normal cooling or heating operation.

An example of basic wiring when the Outdoor Fan Motor Start/Stop (Input 2) is set to 2 and 3 pins of CN18 by an external signal is shown below.

• Setting Example
Outdoor Fan Motor Start/Stop at Input 2 (between 2 and 3 pins of CN18)



Wiring Diagram Example of Outdoor Fan Motor Start/Stop

NOTE:

1. This is an auxiliary function to protect the unit from snow. In snowy regions, make sure to protect the unit with a snow-prevention roof, fence (Field-Supplied) or snow-prevention hood (optional), etc..Otherwise, abnormal vibrations will be caused due to imbalanced propeller fan.
2. If the fan motor or fan controller fail during the outdoor fan motor start/stop operation, stop all the outdoor fan motor to suspend the operation. Check the alarm code and deal properly with the failure next time the compressor is operated.
3. When setting the snow sensor switch for Outdoor Fan Motor Start/Stop, make sure that the continuous operation time is 30 seconds or more. Also the outdoor fan motor start/stop intervals shall be at least 10 minutes. Otherwise, outdoor fan motors malfunction will be caused by frequent start/stop.

⚠ WARNING

Because of this setting, the outdoor fan can operate even while the outdoor unit (compressor) stops. Display a notice to that effect on a readily visible part of the unit body, in order to avoid injuries caused by an unintended outdoor fan operation.

4.2.4 Input Demand Current Control 40, 60, 70, 80, 100% (Control Function No. 6 to 10)

When the input terminals for Demand Current Control on the outdoor unit PCB3 are short-circuited, the compressor frequency is controlled so that the maximum limit of the outdoor running current is set to 100%, 80%, 70%, 60% or 40% of the reference power consumption.

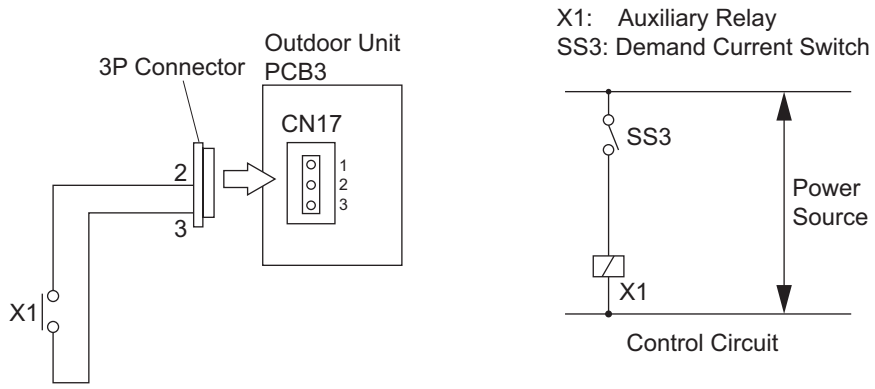
If the outdoor unit running current exceeds the maximum limit for twenty minutes, the indoor unit is put under Thermo-OFF condition. In this case, the stoppage code No. “10” is given. When the input terminal is opened during the demand current control, its control is released.

NOTE:

Thermo-ON: The outdoor unit and some indoor units are running.

Thermo-OFF: The outdoor unit and some indoor units stay on, but do not run.

- Setting Example
  Demand Current Control at Input 2 (between 2 and 3 pins of CN17), Control Function No. 6 to 10



Wiring Diagram Example of Demand Current Control

NOTE:

1. The Demand Current Control (%) is value criterion. The value used for this control is calculated from the current, and therefore is different from the value indicated by a wattmeter. If it is required that the maximum power consumption is managed precisely, a field-supplied demand controller should be used.
2. The actual value may temporarily be higher than the indicated value (by 40% to 100%) depending on the operating control conditions such as protection control.

OPTIONAL FUNCTION

(Operation from Outdoor Unit PCB3)

4.2.5 Input Low Noise Setting 1, 2, 3 (Control Function No. 11 to 13)

When the input terminals for low noise setting on the outdoor unit PCB3 are short-circuited, the compressor frequency and outdoor fan rotation frequency are controlled and the operating sound of the outdoor unit will be given as shown in the table below.

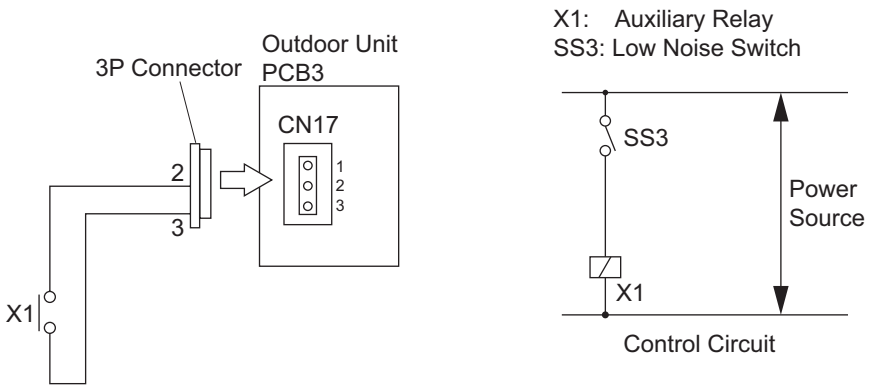
The operating sound can be set by selecting the control function No.

NOTE:

(a) The outdoor unit capacity will decrease because the compressor frequency and outdoor fan motor frequency decrease forcibly. The operating range will also be restricted.

• Setting Example

Low Noise Setting at Input 2 (between 2 and 3 pins of CN17), Control Function No. 12



Wiring Diagram Example of Low Noise Setting

Table 4.1 Specifications of Required Main Part

Parts		Specification	Remarks
Auxiliary Relay (X1, X2)		Mini-Power Relay, (Model: MY1F or MY2F) made by OMRON	220V/240V
Change-Over Switch (SS2, SS3)		Manual Switch	220V/240V
3 Pin Connector Cord		Model: PCC-1A (Connected to JST Connector, XARP-3)	Five Cords with Connectors as One Set
Electric Wiring (Inside of Unit)	Low Voltage	0.3mm^2	Lower than 24V
	220/240V	0.5 to 0.75mm^2	
Electric Wiring (Outside of Unit)	Low Voltage	0.5 to 0.75mm^2	Lower than 24V
	220/240V	2mm^2	

NOTE:

1. Make the wiring to the terminals as short as possible.
2. Do not run the wirings too closely to the high voltage cable. Keep at least 30cm distance between the wiring and the high voltage cable. (Crossing cables is okay.)

   If it is necessary to run the wirings closer than 30cm to the high voltage cable, insert the low voltage cable(s) into a metal tube and ground it at one end. If sealed wirings are used at the low voltage wiring side, ground it at one end of the shielded wirings.
3. The maximum length should be within 70m.

● External Output Function Setting

The following signals can be picked up from the outdoor unit PCB3.

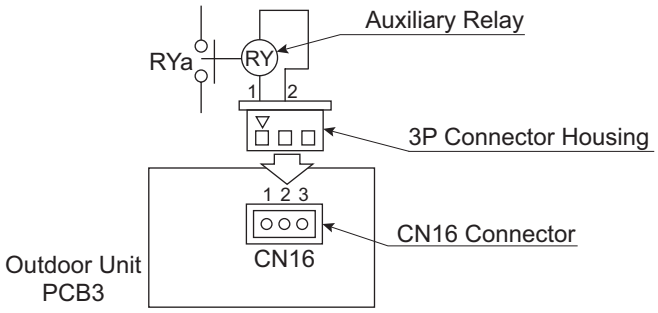
Refer to the table 4.2 for the required main parts.

4.2.6 Output Operation Signal (Control Function No. 1)

This function is utilized to receive the operation signal.

Auxiliary relay contacting (RYa) is closed during the operation. Operation signal will be sent to output terminals when the indoor units are operating. (Even when one (1) indoor unit is operating, the signal will be sent.) This function can be used for circulator or humidifier operation.

- Setting Example
  Operation Signal at Output 1 (between 1 and 2 pins of CN16)



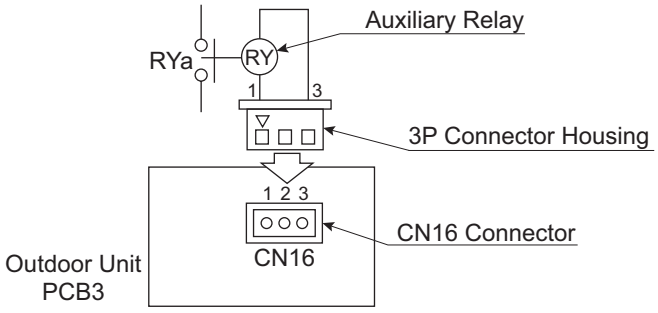
Wiring Diagram Example of Operation Signal

4.2.7 Output Alarm Signal (Control Function No. 2)

This function is utilized to receive the alarm signal.

Auxiliary relay contacting (RYa) is closed when the alarm occurs. Alarm signal will be sent to output terminals when the alarm occurs from the indoor units. (The signal will be sent even when the alarm occurs from one (1) indoor unit.)

- Setting Example
  Alarm Signal at Output 2 (between 1 and 3 pins of CN16)



Wiring Diagram Example of Alarm Signal

OPTIONAL FUNCTION

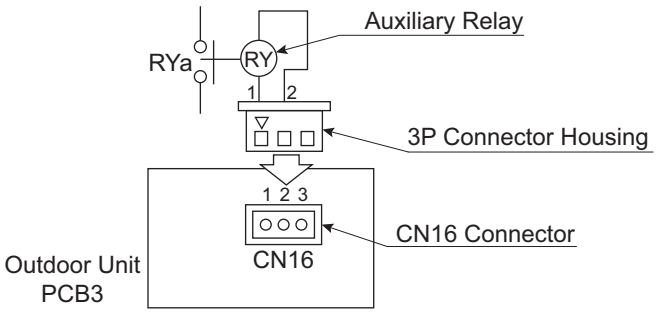
(Operation from Outdoor Unit PCB3)

4.2.8 Output Compressor ON Signal (Control Function No. 3)

This function is utilized to receive the compressor operation signal.

Auxiliary relay contacting (RYa) is closed during the compressor operation.

- Setting Example
  Compressor ON Signal at Output 2 (between 1 and 3 pins of CN16)



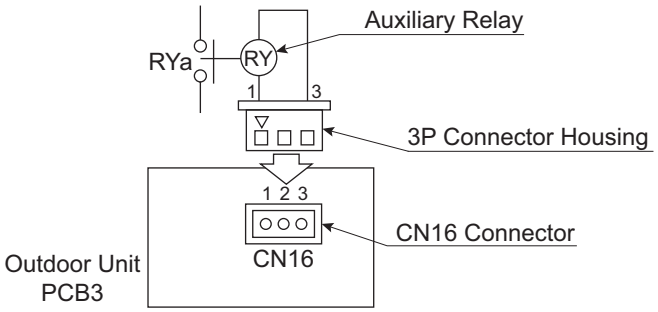
Wiring Diagram Example of Compressor ON Signal

4.2.9 Output Defrosting Signal (Control Function No. 4)

This function is utilized to receive the defrosting signal.

Auxiliary relay contacting (RYa) is closed during the defrosting.

- Setting Example
  Defrosting Stoppage at Output 2 (between 1 and 3 pins of CN16)



Wiring Diagram Example of Defrosting Signal

Table 4.2 Specifications of Required Main Part

Parts	Specification
Auxiliary Relay *	High-Power Relay, LY2F 12V DC made by OMRON

* Do not use the relay with diode built-in.

* Refer to the table 4.1 at page 213 for the connector parts.

4.3 Function Setting

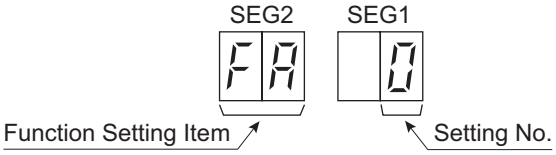
● Refer to Section 4.1 “Setting Method” for mode transition functions.

NOTE:
The setting should be performed during the outdoor unit stoppage.

For a combination of outdoor units, set it to the main outdoor unit. (The setting cannot be performed to sub outdoor units.) The main outdoor unit is the unit to which the communication cable between the outdoor unit and indoor unit is connected.

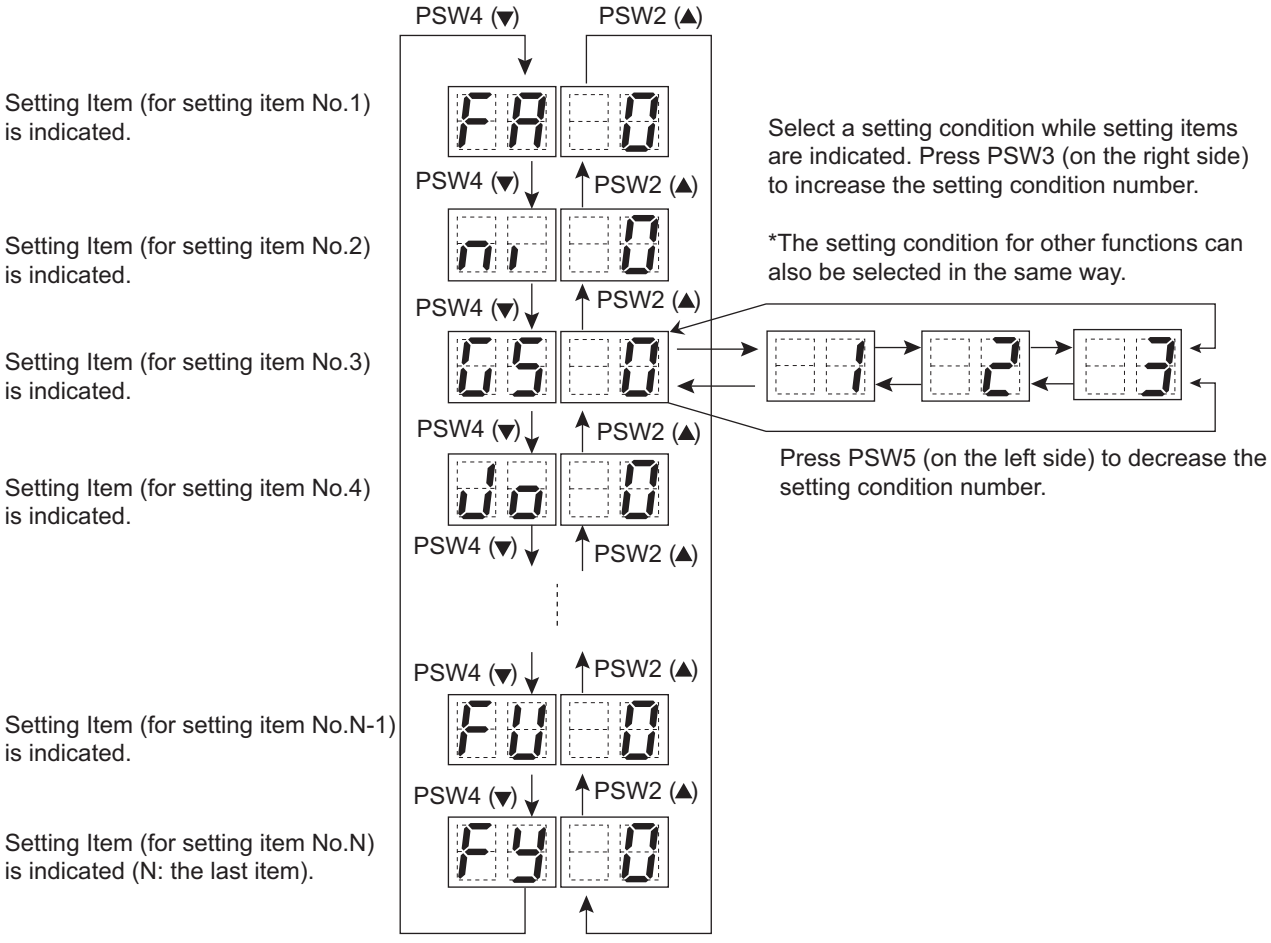
(1) By selecting “Function Setting”, the following appears on the 7-segment display.

(The setting should be performed during an outdoor unit stoppage. Also, set DSW4-No. 4 and No. 5 of the outdoor unit PCB3 to the “ON” side before performing the setting in order to prevent the compressor activation.)



(2) By pressing PSW2 or PSW4, the function setting item is changed.

After selecting the Function Setting Item, press PSW3 or PSW5, and then choose the Setting No. The following figure shows the display changes when PSW is pushed.



(3) After selecting the Function Setting, turn OFF DSW4-No.5. The display will be back to the normal operation. Then turn OFF DSW4-No.4. Confirm if DSW4 is set to factory settings.

The selected data is stored in the outdoor unit PCB3 and the “Function Setting” is completed. The stored data is maintained even when the power source is cut OFF.

OPTIONAL FUNCTION

(Operation from Outdoor Unit PCB3)

4.3.1 Function Setting

No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
1	Circulator Function at Heating Thermo-OFF	FA	00	No setting
			01	Indoor unit fan forced ON and OFF (2 min. ON / 6 min. OFF)
			02	Indoor unit fan forced ON and OFF (2 min. ON / 13 min. OFF)
			03	Indoor unit fan forced ON and OFF (2 min. ON / 28 min. OFF)
			04	Indoor unit fan stop
2	Night-Shift	ni	00	No setting
			01	Setting of night-shift 1 (for Cooling / Heating)
			02	Setting of night-shift 2 (for Cooling only)
3	Cancellation of Outdoor Ambient Temperature Limit	CS	00	No setting
			01	For heating
			02	For cooling
			03	For cooling/heating
4	Defrost for Cold Area (Change of Defrost Condition)	do	00	No setting
			01	Condition 2 of defrost operation
			02	Not used
5	SLo (Fan Speed) Defrost Setting	bJ	00	Indoor unit fan stop when heating operation is activated/during defrost operation
			01	Indoor unit fan SLo operation during defrost operation
			02	Indoor unit fan SLo operation when heating operation is activated
			03	Fan operation when heating operation is activated/ Indoor fan SLo operation during defrost operation
			04	Indoor unit fan SLo operation when heating operation is activated (including Start Up after Defrost)
6	Cancellation of Hot Start	HF	00	Hot start control is available
			01	Cancellation of hot start
			02	α = 15ºC
			03	α = 10ºC
7	Priority Capacity Mode	nU	00	No setting
			01	Change of frequency maximum limit value
			02	Change of current limit value
			03	Change of frequency maximum limit value, current limit value and fan speed limit
8	Minimum Evaporating Temperature Setting for Cooling	Hc	00	Minimum 6ºC
			01	Minimum 7ºC
			02	Minimum 8ºC
			03	Minimum 9ºC
			04	Minimum 10ºC
			05	Minimum 11ºC
			06	Minimum 12ºC
			07	Minimum 13ºC
			08	Minimum 14 ºC
			09	Minimum 2ºC
			10	Minimum 3ºC
			11	Minimum 4ºC
			12	Minimum 5ºC
9	Compressor Frequency Control Target Pd Correction Value for Heating	Hh	00	Initial setting (Pd targeted value 0.00(MPa))
			01	Pd Targeted value -0.15(MPa)
			02	Pd Targeted value -0.10(MPa)
			03	Pd Targeted value -0.05(MPa)
			04	Pd Targeted value -0.03(MPa)
			05	Pd Targeted value +0.03(MPa)
			06	Pd Targeted value +0.05(MPa)
			07	Pd Targeted value +0.10(MPa)
10	Indoor Expansion Valve Control Target SH Correction Value for Cooling	SC	00	Initial setting (SH targeted value +0ºC)
			01	SH Targeted value -2ºC
			02	SH Targeted value -1ºC
			03	SH Targeted value +1ºC
			04	SH Targeted value +2ºC
11	Indoor Expansion Valve Control Target SC Correction Value for Heating	SH	00	Initial setting (SC targeted value +0ºC)
			01	SC Targeted value -6ºC
			02	SC Targeted value -3ºC
			03	SC Targeted value +3ºC
			04	SC Targeted value +6ºC

No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
12	Indoor Expansion Valve Opening Change for Stoppage Indoor Unit in Heating Mode	5,	00	Initial setting (stoppage unit expansion valve opening) 0.8~2.0HP: 100~300 pulse, 2.5HP or over: 200~400 pulse
			01	Expansion valve opening: 150~325 pulse
			02	Expansion valve opening 0.8~2.0HP: 175 pulse, 2.5HP or over: 300 pulse
			03	Expansion valve opening 0.8~2.0HP: 100 pulse, 2.5HP or over: 150 pulse
			04	Expansion valve opening 0.8~2.0HP: 90 pulse, 2.5HP or over: 100 pulse
			05	Expansion valve opening 0.8~2.0HP: 40 pulse, 2.5HP or over: 40 pulse
13	Indoor Expansion Valve Opening Change for Thermo-OFF Indoor Unit in Heating Mode	5o	00	Thermo-OFF unit expansion valve opening (150~325 pulse)
			01	Expansion valve opening 0.8~2.0HP: 175 pulse, 2.5HP or over: 300 pulse
			02	Expansion valve opening 0.8~2.0HP: 100 pulse, 2.5HP or over: 150 pulse
			03	Expansion valve opening 0.8~2.0HP: 40 pulse, 2.5HP or over: 40 pulse
14	Indoor Expansion Valve Initial Opening of Thermo-ON Indoor Unit in Heating Mode	c,	00	Initial setting (600~1300 pulse)
			01	Expansion Valve Opening 600~1300 pulse
			02	Expansion Valve Opening 600~650 Pulse
			03	Expansion Valve Opening 0.8~2.0HP: 950 Pulse 2.5 and 3HP or greater: 1500 Pulse
			04	Expansion Valve Opening 0.8~2.0HP: 1440 Pulse 2.5 and 3HP or greater: 2000 Pulse
15	Fine Adjustment of Indoor Expansion Valve Initial Opening in Cooling Mode	cb	00	Initial setting
			01	Cooling operation initial opening -5%
			02	Cooling operation initial opening +3%
			03	Cooling operation initial opening +5%
			04	Cooling operation initial opening +10%
16	Fine Adjustment of Indoor Expansion Valve Initial Opening in Heating Mode	ch	00	Initial setting
			01	Heating operation initial opening -5%
			02	Heating operation initial opening +3%
			03	Heating operation initial opening +5%
			04	Heating operation initial opening +10%
17	Low Noise Setting (In the case of low noise setting, cooling/heating operation range will be restricted.)	db	00	Initial setting
			01	Fan rotation maximum limit 1
			02	Fan rotation maximum limit 2
			03	Fan rotation maximum limit 3
			04	Frequency limit 1
			05	Frequency limit 2
			06	Frequency limit 3
			07	Operation sound value Setting, Target 55dB
			08	Operation sound value Setting, Target 50dB
			09	Operation sound value Setting, Target 45dB
18	Demand Function Setting	dE	00	No demand control
			01	Demand control 40%
			02	Demand control 60%
			03	Demand control 70%
			04	Demand control 80%
			05	Demand control 100%
19	Wave Function Setting	UE	00	No Wave function
			01	Minimum limit 40%
			02	Minimum limit 60%
			03	Minimum limit 70%
			04	Minimum limit 80%
20	Cold Draft Protection (Protection in Decrease in IndoorTemperature for Cooling)	Fb	00	Initial setting
			01	Indoor unit outlet temperature ≥ 10ºC
			02	Indoor unit outlet temperature ≥ 12ºC
			03	Indoor unit outlet temperature ≥ 14ºC

OPTIONAL FUNCTION

(Function Setting from Outdoor Unit PCB3)

No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
21	Outlet Air Temperature Control for DOAS*1)	Fr	00	Initial Setting
			01	Performance suppression mode
			02	Outlet air temperature control mode
22	Adjustment of Fan Rotation (To avoid a whining sound for the multiple installation.)	Fo	00	Initial Setting
			01	Change of fan rotation -15rpm
			02	Change of fan rotation -30rpm
23	Not Prepared	Lr	00	-
24	Thermo-OFF Setting for Outdoor Unit After Defrosting Operation	dS	00	No setting
			01	Thermo-OFF stoppage setting for outdoor unit after defrosting operation
25	Not Prepared	F1	00	-
26	Crankcase Heater Control during Turning OFF Operation Switch	F2	00	No setting
			01	Optional Switch OFF for 20 Days
			02	Optional Switch OFF for 15 Days
			03	Optional Switch OFF for 10 Days
			04	Optional Switch OFF for 5 Days
			05	Optional Switch OFF for 3 Days
			06	Optional Switch OFF for 2 Days
27	Changing of OFF Time for Indoor Unit Fan during Turning ON Heating Operation Switch	F3	00	Initial Setting (Max. 12minutes)
			01	Max. 3 minutes
			02	Max. 6 minutes
			03	Max. 9 minutes
			04	Max. 15 minutes
			05	Max. 30 minutes
			06	Max. 60 minutes
28	Intermittent Operation of Outdoor Fan Motor	F4	00	No intermittent operation
			01	Set outdoor temperature ≤ 3ºC
			02	Set outdoor temperature ≤ 0ºC
			03	Set outdoor temperature ≤ 1ºC
			04	Set outdoor temperature ≤ 2ºC
			05	Set outdoor temperature ≤ 4ºC
			06	Set outdoor temperature ≤ 5ºC
29	Indoor Heat Exchanger SH Target Value Control for Cooling (Only for RCI Series)	F5	00	Initial setting (Heat Exchange target value +0ºC)
			01	Heat Exchange SH target value +1ºC
			02	Heat Exchange SH target value +2ºC
			03	Heat Exchange SH target value +3ºC
			04	Heat Exchange SH target value +4ºC
30	Indoor Expansion Valve Opening Minimum Limitation Change for Stoppage Indoor Unit in Heating Mode	F6	00	Initial Setting (Stoppage Unit Expansion Valve Opening) 0.8HP~2.0HP: 90 Pulse, 2.5~3.0HP or greater: 90 Pulse
			01	Expansion Valve Opening 150~325 Pulse
			02	Expansion Valve Opening 0.8HP~2.0HP: 175 Pulse 2.5HP or greater: 300 Pulse
			03	Expansion Valve Opening 0.8HP~2.0HP: 100 Pulse 2.5HP or greater: 150 Pulse
			04	Expansion Valve Opening 0.8HP~2.0HP: 90 Pulse 2.5HP or greater: 100 Pulse
			05	Expansion Valve Opening 0.8HP~2.0HP: 40 Pulse 2.5HP or greater: 40 Pulse
31	Not Prepared	F7	00	-
32	Forced Defrosting during Stoppage	F8	00	Initial Setting (OFF)
			01	This function is ON.
33	Indoor Expansion Valve Control Change for Stoppage Indoor Unit in Heating Mode	F9	00	SC Control for Stoppage Unit
			01	40 Pulse
			02	SC Control for Operation Unit

*1): Dedicated Outdoor Air System, All Fresh Air Unit

No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
34	Compressor Maximum Frequency Suppression	FC	00	Initial Setting (Maximum Frequency: 130Hz)
			01	Maximum Frequency: 110Hz
35	Convert Unit in Checking Mode	Fd	00	Initial Setting (Temp: ºF, Pressure: psi)
			01	Temp: ºC, Pressure: MPa
36	Indoor Fan ON/OFF Setting during Forced Stoppage	FE	00	Initial Setting (Indoor Unit Fan: OFF)
			01	Indoor Unit Fan: ON
37	Not Prepared	FF	00	-
38	High difference setting	FG	00	100m
			01	90m
			02	80m
			03	70m
			04	60m
			05	-
39	Not Prepared	FH	00	-
40	Oil return control	F1	00	Initial Setting
			01	Oil return control avoided valid
41	Performance correction	FJ	00	Initial Setting
			01	Capacity correction by long pipe
42	Outdoor temperature range	FL	00	Initial Setting
			01	Outdoor temperature range change under cooling mode
43	Cooling mode Start control 2 Hz change speed	Fn	00	3.0Hz/s
			01	2.0Hz/s
			02	1.0Hz/s
			03	0.5Hz/s
			04	0.25Hz/s
			05	0.125Hz/s
44	Cooling mode Start control 2 Hz change speed	FP	00	3.0Hz/s
			01	2.0Hz/s
			02	1.0Hz/s
			03	0.5Hz/s
			04	0.25Hz/s
			05	0.125Hz/s
45	Compressor Maximum Frequency Change during Defrosting Mode	Fr	00	Initial Setting
			01	Maximum Frequency Setting 1
			02	Maximum Frequency Setting 2
			03	Maximum Frequency Setting 3
46	Oil return mode of indoor unit	FU	00	Initial Setting
			01	Oil return mode of indoor unit invalid
47	Not Prepared	FY	00	-

NOTE:

Contact your distributor or dealer for details on the items “29,” “30,” “32,” “33,” “34,” and “45.”

(Function Setting from Outdoor Unit PCB3)

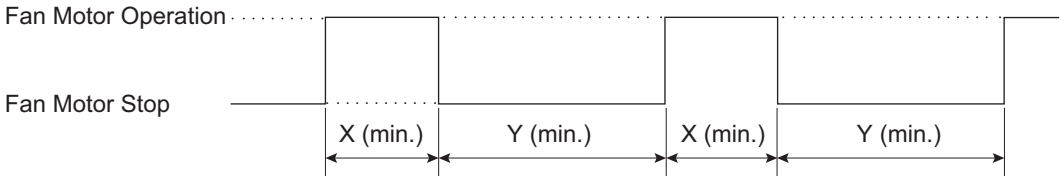
4.3.2 Circulator Function at Heating Thermo-OFF (Function Setting FA)

Press “PSW3” and select the setting conditions “0” to “4” in Circulator Function at Heating Thermo-OFF “FA”. Normally, the fan speed is changed to “LOW” at heating Thermo-OFF. (It is possible for the room temperature to be too high at the heating Thermo-OFF.) However, the indoor fan motor is operated at “LOW” and stopped repeatedly by setting this function.

NOTE:

When the compressor is stopped, the indoor fan motor operates at “LOW” speed continuously.

The action when the indoor fan motor operates at the circulator function is indicated as follows.



Contents of Function Setting Item “FA”

	Contents of Function Setting Item “FA”				
	0	**1**	**2**	**3**	**4**
Indoor Fan Motor “LOW” Operation Time X (min.)	(Continuous Operation)	2	2	2	0
Indoor Fan Motor Stop Time Y (min.)	0	6	13	28	Stopped

NOTE:

In case of using the function setting No.2 to 4, install the remote sensor (THM-R2A: Optional). Because the time period of stopping the indoor fan becomes longer, the detected value of the suction air thermistor for indoor unit becomes high, and it may take time to Thermo-ON.

*In this section, Thermo-ON/Thermo-OFF mean for the indoor unit.

Thermo-ON: The indoor unit is running.

Thermo-OFF: The indoor unit stays on, but does not run.

4.3.3 Night-Shift (Low Noise) (Function Setting “ni”)

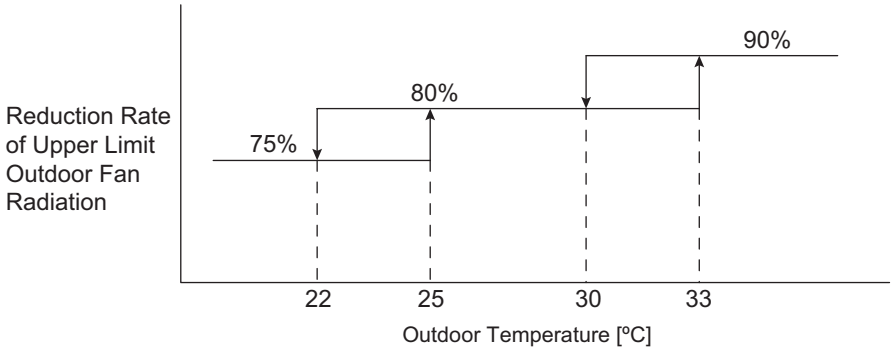
Press “PSW3” and select the setting condition “1” or “2” for the Night Shift (Low Noise) “ni”. Then, this function can be set. “ni”=1 reduces the upper limit of the outdoor fan rotation and the compressor frequency as shown below in any operation. “ni”=2 is adapted only for cooling operation. In heating operation, “ni”=2 is same as “ni”=0.

The Night Shift operation should be used if the capacity has the margin to be allowed for the capacity decrease and the low sound operation is required especially in the night time.

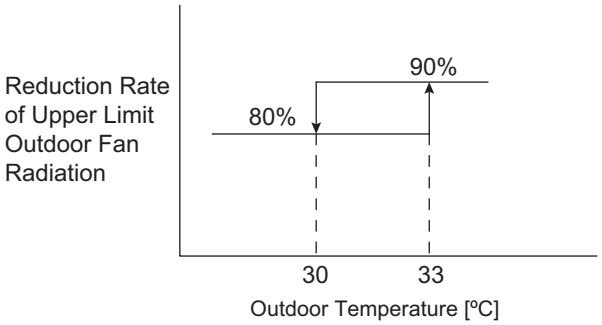
< Night Shift >

“ni” Setting Condition	Operation	Reduction Rate of Maximum			
		Outdoor Fan Rotation		Compressor Frequency	
		Cooling (Including Dry Operation)	Heating	Cooling (Including Dry Operation)	Heating
0	No Effect (Default Setting)	Not Changed (=100%)	Not Changed (=100%)	Not Changed (=100%)	Not Changed (=100%)
1	Night Shift1	Shown as below	Shown as below	60%	60%
2	Night Shift2 (only for Cooling)	Shown as below	Not Changed	60%	Not Changed

at Cooling Operation



at Heating Operation



NOTE:

1. Reduction rates are approximate, these may vary slightly depending on the outdoor unit model.
2. This function setting is not possible to set the Priority Capacity Mode “nU” and the Low Noise Setting “db” at the same time.
3. When outdoor temperature is higher than 44°C, Night shift and low noise mode setting is invalid.

OPTIONAL FUNCTION

(Function Setting from Outdoor Unit PCB3)

4.3.4 Cancellation of Outdoor Ambient Temperature Limit (Function Setting “GS”)

Press “PSW3” and select the setting condition “0” to “3” at Cancellation of Outdoor Ambient Temperature Limit of “GS”. Then, this function can be set.

The heating operation is continued even under a high outdoor temperature or the cooling operation is continued even under a low temperature.

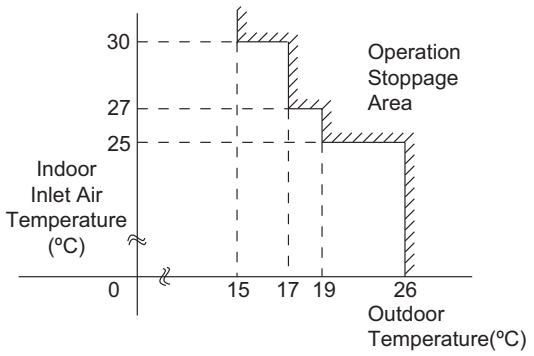
Setting Condition	Operation Mode for Cancellation
0	Not Available (Default Setting)
1	Heating
2	Cooling
3	Heating/Cooling

Heating Operation

The limitation of the permissible outdoor temperature area in heating operation (factory setting) shown in the figure at the right is cancelled.

NOTE:

When the outdoor ambient temperature limit for heating operation is cancelled, the operation may stop due to increasing high pressure since the protection control is not cancelled.

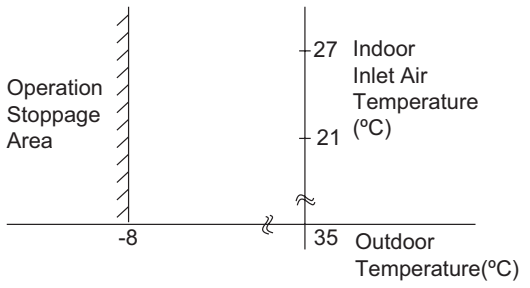


Cooling Operation

The limitation of the permissible outdoor temperature area in cooling operation (factory setting) shown in the figure at the right is cancelled.

NOTE:

When the outdoor ambient temperature limit for cooling operation is cancelled, the operation may stop due to decreasing low pressure since the protection control is not cancelled.



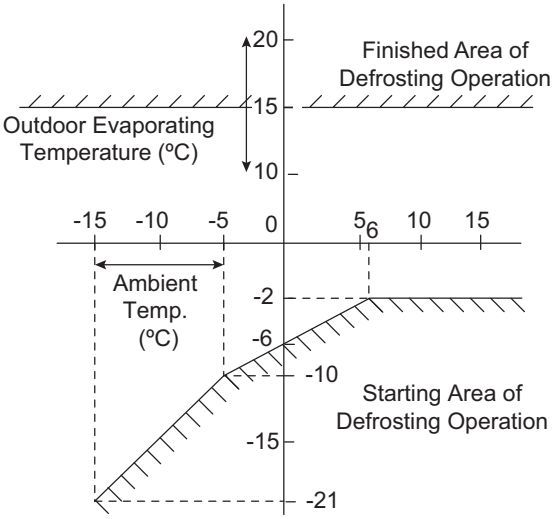
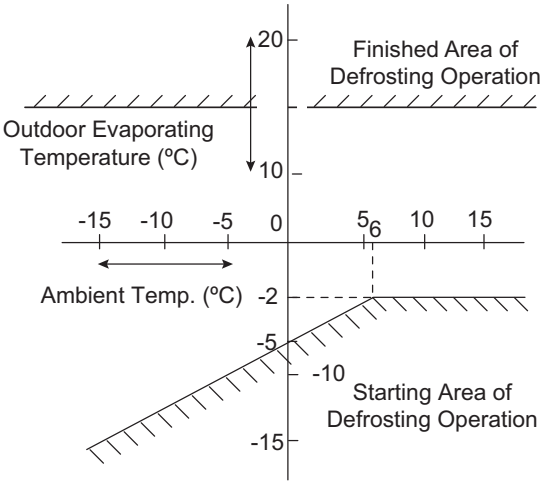
NOTE:

If this function is set and the outdoor unit operates in the operation stoppage area shown in the above figure for a long time, some alarm codes by abnormal operation may occur and the outdoor unit may be damaged since outdoor ambient temperature limit control is cancelled.

If the alarm codes occur frequently, contact your distributor or dealer.

4.3.5 Defrost for Cold Area (Function Setting “Jo”)

Press “PSW3” and select the setting condition “1” at the Defrost for Cold Area “Jo” to change the temperature condition for starting defrost operation.

Setting Condition	Standard Specifications	Cold Area Specifications
	“Jo = 0”	“Jo = 1”
Temperature Conditions under Defrosting Operation		

4.3.6 SLo Defrost Setting (Function Setting “bJ”)

Press “PSW3” and select the setting condition “0” to “4” at SLo Defrost Setting “bJ”.

Indoor fan operation is stopped during the defrost operation, after the defrost operation and at the start of the heating operation. However, this function allows indoor fan to operate at SLo speed during the defrost operation, after the defrost operation or at the start of the heating operation.

“bJ” Setting Condition	Indoor Fan Operation		
	At Start of Compressor Operation in Heating Operation	During Defrost Operation	After Defrost Operation
0	STOP	STOP	STOP
1	STOP	SLo Speed	SLo Speed
2	SLo Speed	STOP	STOP
3	SLo Speed	SLo Speed	SLo Speed
4	SLo Speed	STOP	SLo Speed

NOTE:

The indoor fan may operate at other speed depending on outlet air temperature of the indoor unit.

(Function Setting from Outdoor Unit PCB3)

4.3.7 Capacity-Focused Mode Setting (Function Setting “nU”)

If the unit capacity seems insufficient during the normal operation, press “PSW3” and select the setting condition “0” to “3” Capacity-Focused Mode Setting “nU”. By setting this function, the maximum frequency, current limit of the compressor and the maximum indoor fan motor step are set higher.

NOTE:

1.Do not use the setting condition “2” and “3” unless the power supply wiring is of sufficient ampacity, because the target frequency and current limit of the compressor during the operation are set higher.

“nU” Setting Condition	Compressor Frequency and Current Operation
0	Not Available (Default Setting)
1	Compressor Frequency Limit is Set Higher
2	Compressor Frequency Limit and Current Limit are Set Higher
3	Compressor Frequency Limit, Current Limit and Fan Speed Limit are Set Higher

4.3.8 Low Noise Setting (Function Setting “dB”)

Press “PSW3” and select the setting condition “0” to “9” at the Low Noise Setting “dB” to reduce the upper limit of the compressor frequency and the outdoor fan rotation.

NOTE:

1. By setting this function, the compressor frequency and the outdoor fan motor rotation frequency are forcibly reduced and so the outdoor unit capacity decreases and the unit operation range is limited.
2. The operating noise values for a single unit are shown below. These are targeted values and so the actual values can temporarily be higher depending on operation conditions. The operating noise values for combination units are higher than the values below.

Setting Condition	Compressor Frequency Limit	Outdoor Fan Motor Step Limit		Operating Noise (Target Value)	Outdoor Unit Capacity (to Specification)
		≤18HP	≥20HP		
0	Not Changed	Not Changed		Target Value	100%
1	Not Changed	20 Steps	20 Steps	-	-
2	Not Changed	18 Steps	17Steps	-	-
3	Not Changed	16 Steps	15 Steps	-	-
4	80%	Not Changed		-	-
5	60%	Not Changed		-	-
6	40%	Not Changed		-	-
7	80%	20 Steps	20 Steps	-	80%
8	60%	18 Steps	17 Steps	-	60%
9	40%	16 Steps	15 Steps	-	40%

4.3.9 Demand Function Setting (Function Setting “dE”)

Press “PSW3” and select the setting condition “0” to “5”, so that Demand Function Setting “dE” can be set. This function is available by setting to “1” for the demand current control without inputting the signal to the external input terminal on the outdoor unit PCB3. The table below is shown for the limit of the operating current for this function.

NOTE:

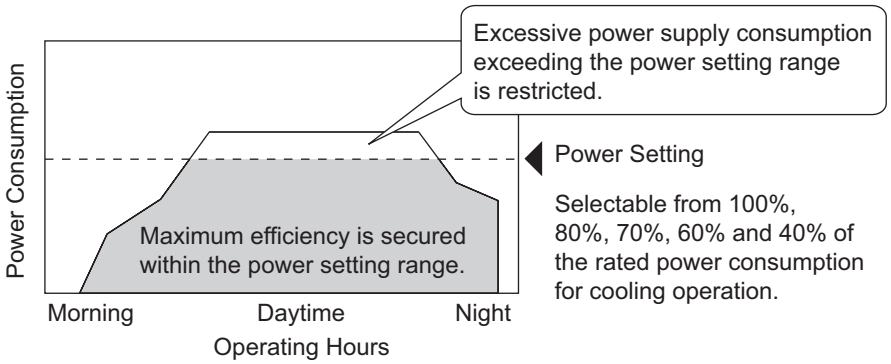
If the outdoor unit running current exceeds the maximum limit for twenty minutes, the indoor unit is put under Thermo-OFF condition. In this case, the stoppage code No. “10” is given.

If Demand Current Control by External Input Function is set and the external input signal is available, this function is not performed during Demand Current Control by External Input Function is performed.

Setting Condition	Demand Running Current Control
0	Not Available (Default Setting)
1	40%
2	60%
3	70%
4	80%
5	100%

● Demand Control

Adopting self-demand function, which drastically decreases power consumption, has largely improved energy saving.



< Notes at Facility Design >

1. The demand current control (%) is value criterion. The value used for this control is calculated from the current, and therefore is different from the value indicated by a wattmeter. If it is required that the maximum power consumption is managed precisely, a field-supplied demand controller should be used.
2. The actual value may temporarily be higher than the indicated value shown above depending on the operating control conditions such as protection control.

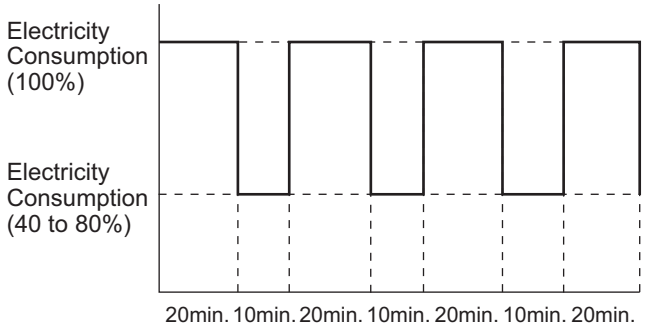
4.3.10 Wave Function Setting (Function Setting “UE”)

Press “PSW3” and select the setting condition “0” to “4”, so that Wave Function Setting “UE” can be set. While this function is activated, the maximum limit of running current is changed from 40% to 80% as shown in the figure.

NOTE:

In the case that the demand current control by external input is set and the external input signal is available, this function is not available even when the demand current control by external input signal is performed.

Setting Condition	Running Current Lower Limit Setting
0	Not Available (Default Setting)
1	40%
2	60%
3	70%
4	80%



NOTE:

The current limit value is targeted value. The actual current value may temporarily be higher than the value shown in the table above depending on the operating control condition.

When the scheduled operation of “Demand Function Setting” is set from the centralized controller, refer to “Technical Catalogue” and “Installation & Maintenance Manual” of the centralized controller.

4.3.11 Protection of Decrease in Outlet Temperature for Cooling (Function Setting “Fb”)

Press “PSW3” and select the setting condition “0” to “3” at Cold Draft Protection “Fb”, so the Cold Draft Protection can be set. When the indoor unit discharge air temperature falls down at cooling operation, outdoor fan stops and compressor frequency forcibly decreases to prevent a drop in discharge air temperature. If the outlet temperature decreases and the temperature is less than Thermo-OFF condition even after the compressor frequency decreases, the indoor unit enters Thermo-OFF condition. (When Thermo-OFF is activated under this condition, the operation will be restarted after 3 minutes.)

*In this section, Thermo-ON/Thermo-OFF mean for the indoor unit.

Thermo-ON: The indoor unit is running.

Thermo-OFF: The indoor unit stays on, but does not run.

Setting Condition	Outlet Temperature	
	Target Value	At Thermo-OFF
0	-	-
1	10°C	7°C
2	12°C	9°C
3	14°C	11°C

4.3.12 Adjustment of Fan Rotation (Function Setting "Fo")

Press "PSW3" and select the setting condition "0" to "2" at Adjustment of Fan Rotation "Fo", so Adjustment of Fan Rotation can be set. If the outdoor unit fans make a whining sound in the case of the multiple installation, set this function to the relevant outdoor units.

Setting Condition	Adjustment of Fan Rotation
0	Not Available (Default Setting)
1	-15 rpm
2	-30 rpm

NOTE:

By setting this function, the outdoor fan rotation is slightly reduced, so the outdoor unit capacity may decrease and the operation range may be limited.

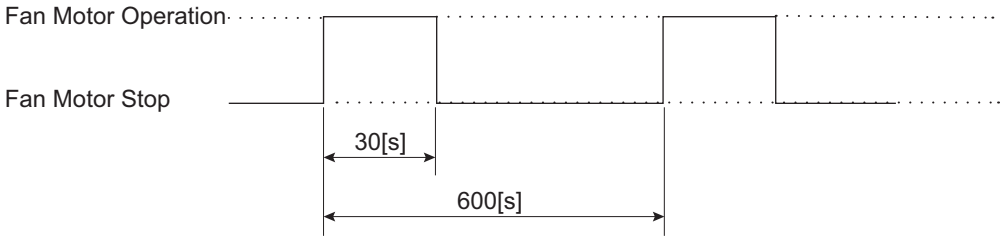
4.3.13 Intermittent Operation of Outdoor Fan Motor (Function Setting "F4")

Press "PSW3" and set Outdoor Fan Motor Intermittent Operation Setting "F4" (auxiliary function) to protect the outdoor fan motor from snow.

Set this function to the outdoor unit PCB3 set as the main outdoor unit.

When the outdoor temperature (selectable from 3°C, 0°C, 1°C, 2°C, 4°C and 5°C) reaches the setting temperature, all the outdoor fan motors start intermittent operation. When the outdoor temperature is at least 5°C higher than the setting temperature, the outdoor fan motors stop operating.

If the compressor restarts operating, the outdoor fan motors will be restored to normal operation.



NOTE:

1. This is an auxiliary function to protect the unit from snow. In snowy regions, make sure to protect the unit with a snow-prevention roof, fence or snow-prevention hood (Field-Supplied), etc.. Otherwise, abnormal vibrations will be caused due to imbalanced propeller fan.
2. If abnormal condition and alarm occurs during the outdoor fan motor start/stop operation, stop all the outdoor fan motor to suspend the operation. Check the alarm code and deal properly with the failure next time the compressor is operated.

⚠ WARNING

Because of this setting, the outdoor fan can operate even while the outdoor unit (compressor) stops. Display a notice to that effect on a readily visible part of the unit body, in order to avoid injuries caused by an unintended outdoor fan operation.

5. Field Work Instruction

Refer to Chapter 1 “Troubleshooting” when dealing with troubles.

If the trouble cannot be solved, contact your dealer.

5.1 Caution for Refrigerant Leakage

In the room where the packaged air conditioner is installed, the refrigerant gas should be controlled not to exceed the concentration limit in case of the refrigerant leakage.

The incombustible and non-toxic refrigerant R410A is used in this unit. By chance the refrigerant gas leaks and fills the room, suffocation may occur.

Especially the RASQ series outdoor unit is multi-type air conditioner connecting multiple indoor units with long distance piping. Accordingly, the refrigerant charge quantity is more than general individual unit.

Before the indoor unit installation, confirm that the room can keep the gas concentration lower than the limit value in order to take the emergency countermeasures when the gas leakage occurs.

● Calculation of Refrigerant Concentration

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

(2) Calculate the room Volume V (m^3) of each room.

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

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

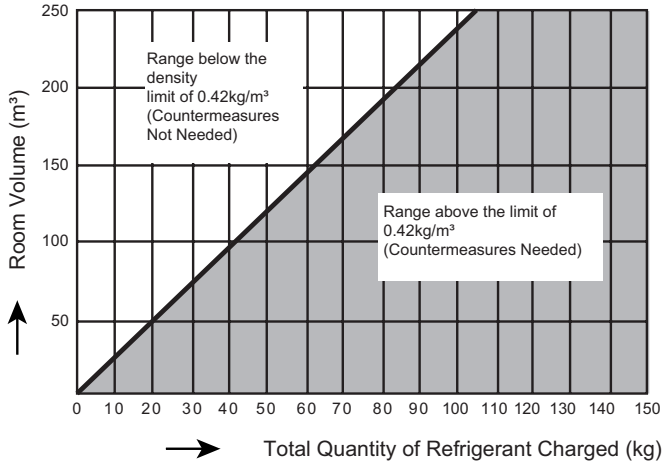
≤ 0.42 (kg/m^3) for R410A

⚠ WARNING

The refrigerant R410A is non-toxic and inflammable in its original state.

However, in consideration of a state where the refrigerant leaks into the room, measures against refrigerant leaks must be taken in small rooms where the tolerable level could be exceeded.

Take countermeasures by installing ventilation devices, etc.



5.2 Maintenance Work

(1) For Outdoor Unit and Indoor Unit

(a) Fan and Fan Motor

- Lubrication - All fan motors are pre-lubricated and sealed at the factory. Therefore, no lubrication maintenance is required.
- Sound and Vibration - Inspect for abnormal sounds or vibration.
- Rotation - Check that the fan rotates counter clockwise and inspect the rotating speed.
- Insulation - Inspect for electrical insulation resistance.

(b) Heat Exchanger

- Clogging - Inspect for any accumulated dirt and dust and remove at regular intervals. As for an outdoor unit, other obstacles such as growing grass and pieces of paper, which might obstruct air flow, should also be removed.

(c) Piping Connection

- Leakage - Inspect for refrigerant leakage at piping connections.

(d) Cabinet

- Stain and Lubricant - Inspect for any stain or lubricant and remove it, if any.
- Securing Screw - Inspect for loose or missing screws and secure or replace as required.
- Insulation - Inspect for peeling thermal insulation material on the cabinet and repair it, if any.

(e) Electrical Equipment

- Activation - Inspect for abnormal activation of the magnetic contactor, auxiliary relay, or printed circuit board (PCB).
- 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 change the setting in the field.

(2) For Outdoor Unit Only

(a) Compressor

- Sound and Vibration - Inspect for abnormal sounds or vibration.
- Activation - Check that the voltage drop of the power supply line is within 16% at start and within 2% during operation.

(b) Reversing Valve

- Activation - Inspect for any abnormal activating sound.

(c) Strainer

- Clogging - Check that there is no temperature difference between the ends.

(d) Ground Wiring

- Ground Line - Inspect for continuity to the earth ground.

(e) Crankcase Heater

- Activation - Supply power to the outdoor unit(s) at least 12 hours prior to operation of the system for preheating of the compressor oil.

(3) For Indoor Unit Only

(a) Air Filter

- Cleaning - Check and remove, any accumulated dirt and dust and remove according to the “Engineering Manual”.

(b) Drain Pan, Condensate Mechanism and Condensate Pipe

- Drain Line - Inspect and clean the condensate 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.

5.3 Service and Maintenance Record by 7-Segment Display

Customer's Name _____ DATE: - -

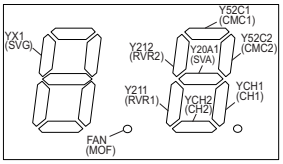
(1) Information of Connected Outdoor/Indoor Unit Capacity

(1) Test Run Start Time			
(2) Data Collect Start Time			
Checking Mode	Total Capacity of Outdoor Unit Connected	oCP	
	Connected Outdoor Unit Number	oAA	
	Total Capacity of Indoor Unit Connected	iCP	
	Connected Indoor Unit Number	iAA	
	Refrigerant Address	GA	
	Total Capacity of Operating Indoor Unit	oP	
	Total Frequency of Compressor	Ht	
	Accumulated Operating Time of Compressor	UJ	

NOTE:

Refer to Section 1.1.5 (B) and (C) "Details of Indication" for items of checking mode.

(2) Information of Outdoor Unit

				Outdoor Unit A			Outdoor Unit B			Outdoor Unit C		
Outdoor Unit Model				(Serial No.)			(Serial No.)			(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												
(5) Protection Control Code												
Checking Mode	Input/Output State of Outdoor Micro-Computer SEG1  *: for Heat Recovery		SC	CMC1	CMC2	MOF	CMC1	CMC2	MOF	CMC1	CMC2	MOF
				CH1	CH2		CH1	CH2		CH1	CH2	
				RVR2	*RVR1		RVR2	*RVR1		RVR2	*RVR1	
				SVA	*SVG		SVA	*SVG		SVA	*SVG	
	Inverter Frequency	Compressor 1	H1									
		Compressor 2	H2									
	Quantity of Compressor		CC									
	Outdoor Fan Step		Fo									
	Outdoor Expansion Valve Opening	Expansion Valve 1	E1									
		Expansion Valve 2	E2									
	Outdoor Bypass Expansion Valve Opening		Eb									
	High Pressure (Discharge Pressure)		Pd									
	Low Pressure (Suction Pressure)		Ps									
	Ambient Air Temperature		To									
	Discharge Temperature (Top of Compressor)	Compressor 1	Td1									
		Compressor 2	Td2									
	Evaporating Temperature (Liquid Pipe)	Liquid Pipe 1	TE1									
		Liquid Pipe 2	TE2									
	Outdoor Gas Pipe Temperature		TG									
	Liquid Stop Valve Temperature		TCH									
	Sub-cooling Temperature		TSC									
	EVI Inlet Temperature		Ts									
	EVI Outlet Temperature		Tg2									
	Inverter Fin Temperature	Inverter 1	TF1									
		Inverter 2	TF2									
	Fan Controller Fin Temperature	Fan Controller 1	TF-1									
		Fan Controller 2	TF-2									
	Primary Current of Compressor	Compressor 1	A1									
		Compressor 2	A2									
	Secondary Current of DC Fan	DC Fan 1	AF1									
		DC Fan 2	AF2									
	Accumulated Operating Time of Compressor	Compressor 1	UJ1									
		Compressor 2	UJ2									
	Accumulated Operating Time of Compressor (After Reset)	Compressor 1	cU1									
		Compressor 2	cU2									
	Cause Code of Inverter Stoppage	Compressor 1	iT1									
		Compressor 2	iT2									
		DC Fan 1	FT1									
		DC Fan 2	FT2									

NOTE:

Refer to Section 1.1.5 (B) “Details of Indication” for items of checking mode.

(3) Information of Indoor Unit

Indoor Unit No.						
Indoor Unit Model			(Serial No.)	(Serial No.)	(Serial No.)	(Serial No.)
(1) Test Run Start Time						
(2) Data Collect Start Time						
Checking Mode	Indoor Unit Capacity	CA				
	Indoor Expansion Valve Opening	iE				
	Liquid Pipe Temperature of Indoor Unit	TL				
	Gas Pipe Temperature of Indoor Unit	TG				
	Indoor Unit Inlet Air Temperature	Ti				
	Indoor Unit Outlet Air Temperature	To				
	Cause Code of Indoor Unit Stoppage	d1				

Indoor Unit No.						
Indoor Unit Model			(Serial No.)	(Serial No.)	(Serial No.)	(Serial No.)
(1) Test Run Start Time						
(2) Data Collect Start Time						
Checking Mode	Indoor Unit Capacity	CA				
	Indoor Expansion Valve Opening	iE				
	Liquid Pipe Temperature of Indoor Unit	TL				
	Gas Pipe Temperature of Indoor Unit	TG				
	Indoor Unit Inlet Air Temperature	Ti				
	Indoor Unit Outlet Air Temperature	To				
	Cause Code of Indoor Unit Stoppage	d1				

Indoor Unit No.						
Indoor Unit Model			(Serial No.)	(Serial No.)	(Serial No.)	(Serial No.)
(1) Test Run Start Time						
(2) Data Collect Start Time						
Checking Mode	Indoor Unit Capacity	CA				
	Indoor Expansion Valve Opening	iE				
	Liquid Pipe Temperature of Indoor Unit	TL				
	Gas Pipe Temperature of Indoor Unit	TG				
	Indoor Unit Inlet Air Temperature	Ti				
	Indoor Unit Outlet Air Temperature	To				
	Cause Code of Indoor Unit Stoppage	d1				

Indoor Unit No.						
Indoor Unit Model			(Serial No.)	(Serial No.)	(Serial No.)	(Serial No.)
(1) Test Run Start Time						
(2) Data Collect Start Time						
Checking Mode	Indoor Unit Capacity	CA				
	Indoor Expansion Valve Opening	iE				
	Liquid Pipe Temperature of Indoor Unit	TL				
	Gas Pipe Temperature of Indoor Unit	TG				
	Indoor Unit Inlet Air Temperature	Ti				
	Indoor Unit Outlet Air Temperature	To				
	Cause Code of Indoor Unit Stoppage	d1				

NOTE:

Refer to Section 1.1.5 (C) “Details of Indication” for items of checking mode.

(4) Information of Cause Code of Alarm

(1) Test Run Start Time						
(2) Data Collect Start Time						
Checking Mode	Alarm Cause Code	AC				
	Degeneracy Control for Pressure Ratio Decrease Protection	c11				
	Degeneracy Control for High Pressure Increase Protection	c13				
	Degeneracy Control for Inverter Fin Temperature Increase Protection	c14				
	Degeneracy Control for Discharge Gas Temperature Increase Protection	c15				
	Degeneracy Control for TdSH Decrease Protection	c16				
	Degeneracy Control for Overcurrent Protection	c17				

(5) Information of Cause Code of Alarm

	No.1	No.2	No.3	No.4	No.5
(1) Unit Accumulated					
(2) Cause of Stoppage					
(3) Alarm Code / Cause Code of Stoppage					
(4) Abnormal Data Indication					

	No.6	No.7	No.8	No.9	No.10
(1) Unit Accumulated					
(2) Cause of Stoppage					
(3) Alarm Code / Cause Code of Stoppage					
(4) Abnormal Data Indication					

	No.11	No.12	No.13	No.14	No.15
(1) Unit Accumulated					
(2) Cause of Stoppage					
(3) Alarm Code / Cause Code of Stoppage					
(4) Abnormal Data Indication					

NOTE:

Refer to Section 1.1.5 (E) “Details of Indication” for items of checking mode.

5.4 Service and Maintenance Record by Wired Controller

Data Sheet for Checking by Wired Controller

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
B	Temp. Indication							
	Set Temp.	b1	- -					
	Inlet Air Temp.	b2	q1					
	Discharge Air Temp.	b3	q2					
	Liquid Pipe Temp.	b4	q3					
	Remote Thermistor Temp.	b5	- -					
	Outdoor Air Temp.	b6	q4					
	Gas Pipe Temp.	b7	q5					
	Evaporating Temp. at Heating	b8	q6					
	Condensing Temp. at Cooling	b9	q7					
	Comp. Top Temp.	bA	q8					
	Thermo Temp. of Wired Controller	bb	- -					
	Not Prepared	bC	- -					
C	Micro-Computer State Indication							
	I.U. Micro-Computer	C1	- -					
	O.U. Micro-Computer	C2	- -					
D	Stopping Cause State Indication							
	Cause Code of Indoor Unit Stoppage	d1	- -					
E	Alarm Occurrence							
	Times of Abnormality	E1	- -					
	Times of Power Failure	E2	- -					
	Times of Abnormal Communication	E3	- -					
	Times of Inverter Tripping	E4	- -					
F	Automatic Louver State							
	Louver Sensor State	F1	- -					
H	Pressure, Frequency State Indication							
	Discharge Pressure	H1	q9					
	Suction Pressure	H2	qA					
	Control Information	H3	qb					
	Operating Frequency	H4	qC					
J	I.U. Capacity Indication							
	I.U. Capacity	J1	- -					
	O.U. Code	J2	- -					
	Refrigerant System Number	J3	- -					
	Refrigerant System Number	J4	- -					
L	Opening of Expansion Valve							
	I.U. Expansion Valve	L1	qd					
	O.U. Expansion Valve 1	L2	qE					
	O.U. Expansion Valve 2	L3	- -					
	O.U. Expansion Valve B	L4	- -					

NOTE:

Refer to Section 1.1.4 “Troubleshooting in Check Mode by Wired Controller” for items of check mode.

P	Compressor Condition Indication (Reference)							
	Comp. Current	P1	qF					
	Accumulated Operation Time of Comp.	P2	- -					
g	Sensor Condition Indication							
	Motion Sensor Response Rate	q1	- -					
	Radiation Sensor Temp.	q2	- -					
	Motion Sensor1 Response Rate	q3	- -					
	Motion Sensor2 Response Rate	q4	- -					
	Motion Sensor3 Response Rate	q5	- -					
	Motion Sensor4 Response Rate	q6	- -					
	Setting Temp. Collected Value	q7	- -					

Client:

Installation Date:

System No.:

Date Checked:

Checked by:

Result	

NOTE:

Refer to Section 1.1.4 “Troubleshooting in Check Mode by Wired Controller” for items of check mode.

5.5 Service and Maintenance Record

Service and Maintenance Record

No.	Check Item	Action	Judgment
1	Is service space sufficient?		YES or NO
2	Short Circuit of Discharged Air?		YES or NO
3	Any Heat Influence?		YES or NO
4	Is ground wiring connected?		YES or NO
5	Refrigeration Piping		GOOD or NOT GOOD
6	Fixing of Units		GOOD or NOT GOOD
7	Any Damage on External or Internal Surface?		YES or NO
8	Checking of Screws and Bolts	Tighten them if they are loosened.	TIGHTENED or NOT TIGHTENED
9	Tightening of Terminal Screws	Tighten all terminal screws with a Phillips screwdriver.	TIGHTENED or NOT TIGHTENED
10	Are compressor terminals tightly fixed?	Check all compressor terminals are tightly fixed.	GOOD or NOT GOOD
11	Insulation Resistance	Measure insulation resistance with insulation resistance-meter. Comp. and Fan Motor Fan Motor: greater than 100MΩ Others: greater than 1MΩ	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 reversing valve.	ditto	GOOD or NOT GOOD
17	Check for leakage at check valve.	ditto	GOOD or NOT GOOD
18	Check for leakage at accumulator.	ditto	GOOD or NOT GOOD
19	Check for leakage at strainer.	ditto	GOOD or NOT GOOD
20	Check for leakage at electronic expansion 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 Airflow Volume	GOOD or NOT GOOD
23	Voltage among each phase.	Check the voltage is within the specified range.	GOOD or NOT GOOD
24	Vibration and Sound	Check fan, compressor, piping.	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-up 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 Sensor		psi(G)
33	Low Pressure Sensor		psi(G)
34	Operating Voltage		V
35	Operating Current		A
36	Instruction for 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

5.6 Reference of Normal Operating Pressure

Models: RAS-8.0HNBCMQ

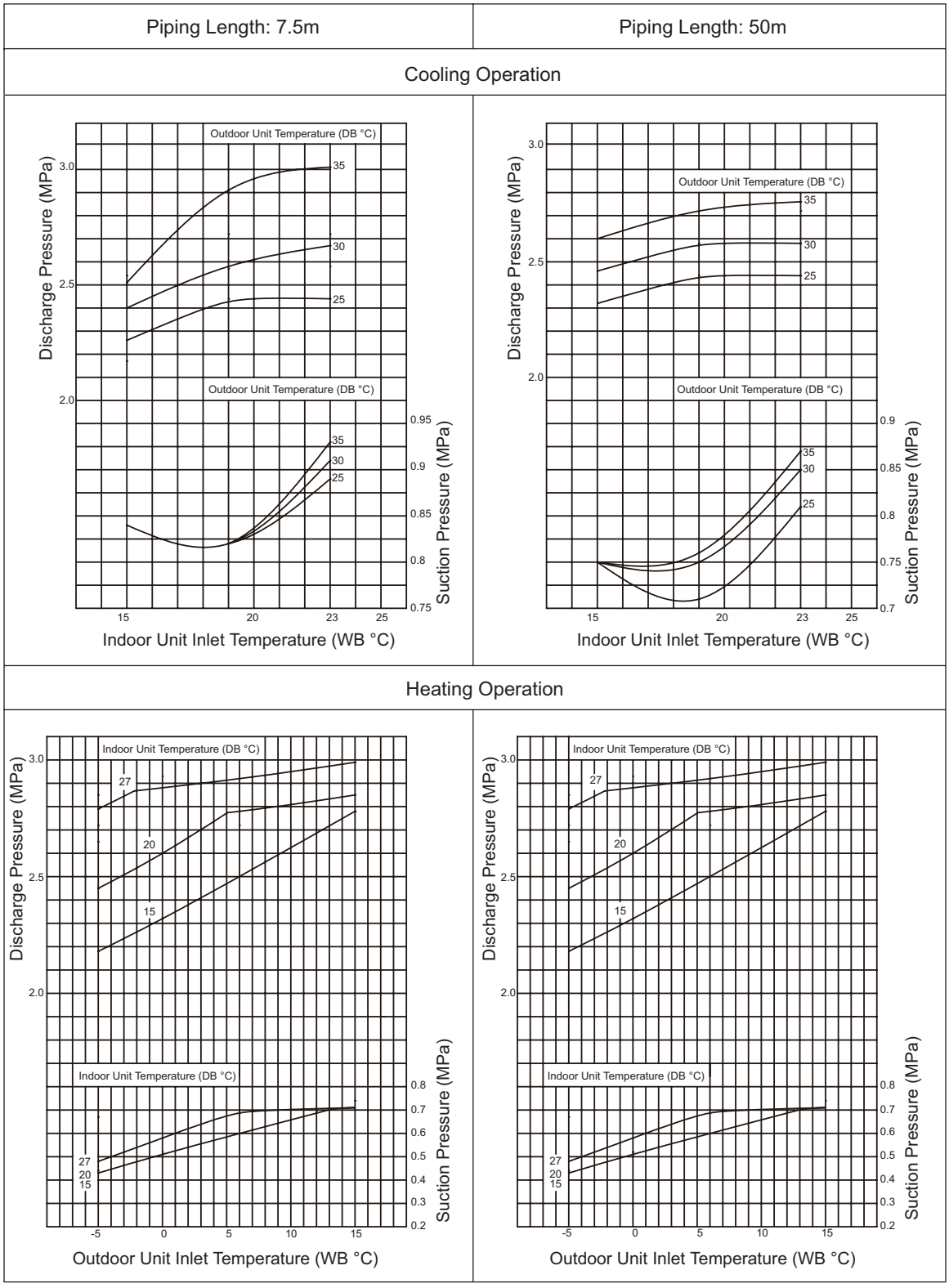


Fig. 5.1 Normal Operating Pressure

NOTE

1. The above curves indicate pressure under the following conditions.
   a) Indoor Unit Type: Ducted Model b) Indoor Unit Fan Tap: HIGH2
   c) Total Capacity of Indoor Unit: 100% d) Height Difference: 0m
2. Do not use the above data for the refrigerant charge procedure.
   These data should be used as a reference for checking operating conditions.

Models: RAS-10HNBCMQ

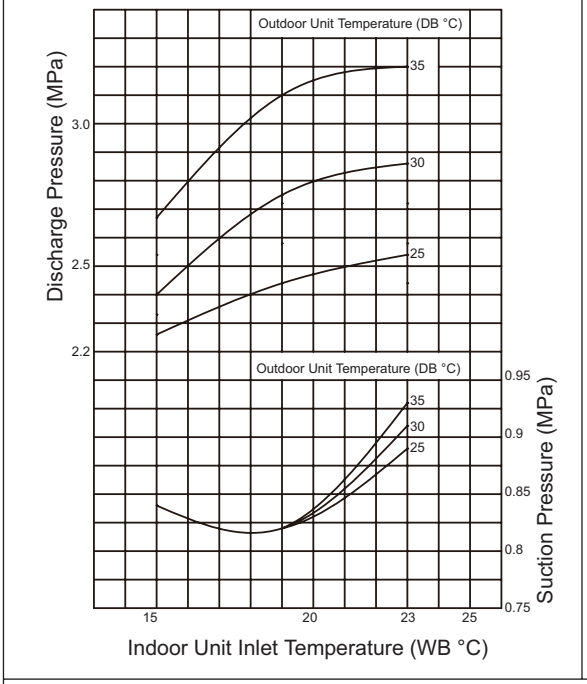
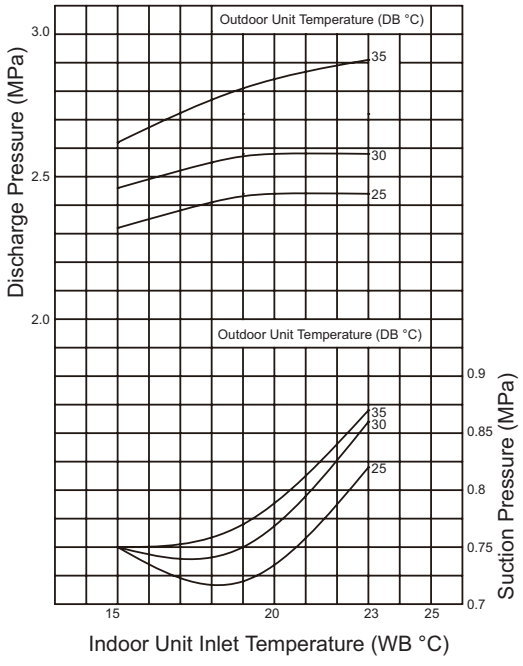
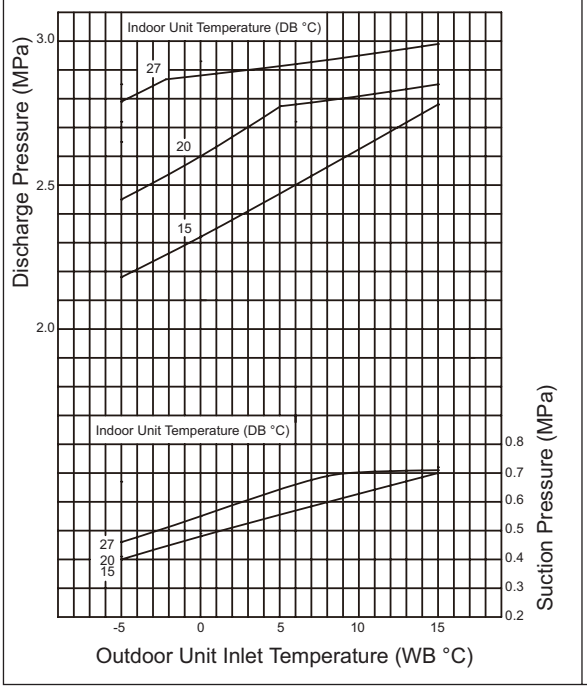
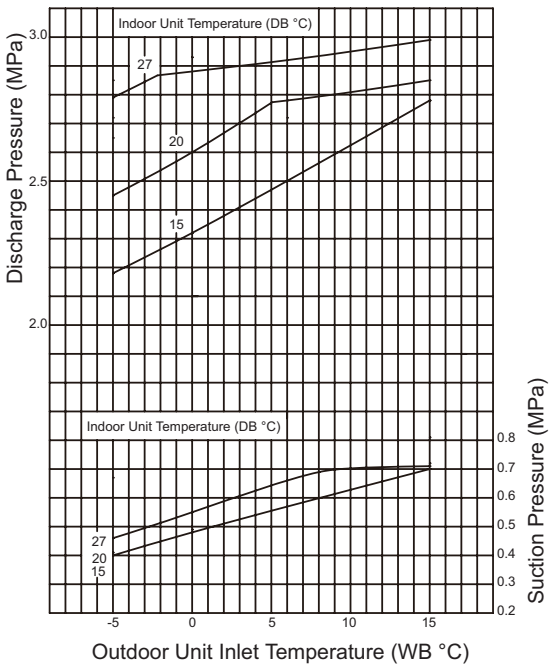
Piping Length: 7.5m	Piping Length: 50m
Cooling Operation	
	
Heating Operation	
	

Fig. 5.2 Normal Operating Pressure

NOTE

1. The above curves indicate pressure under the following conditions.
   a) Indoor Unit Type: Ducted Model b) Indoor Unit Fan Tap: HIGH2
   c) Total Capacity of Indoor Unit: 100% d) Height Difference: 0m
2. Do not use the above data for the refrigerant charge procedure.
   These data should be used as a reference for checking operating conditions.

Models: RAS-12HNBCMQ

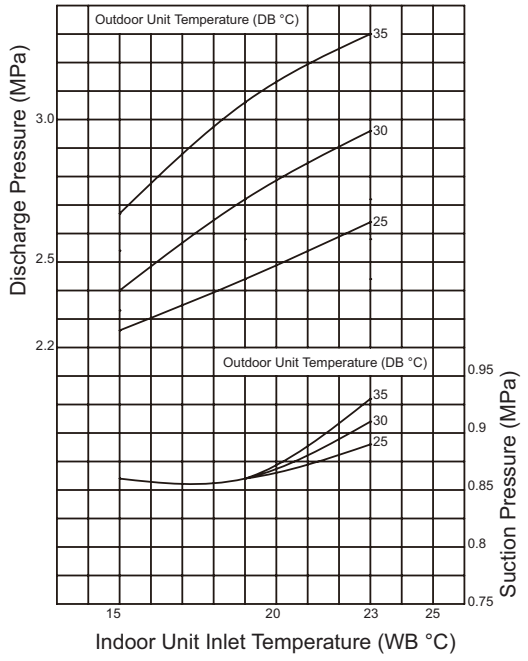
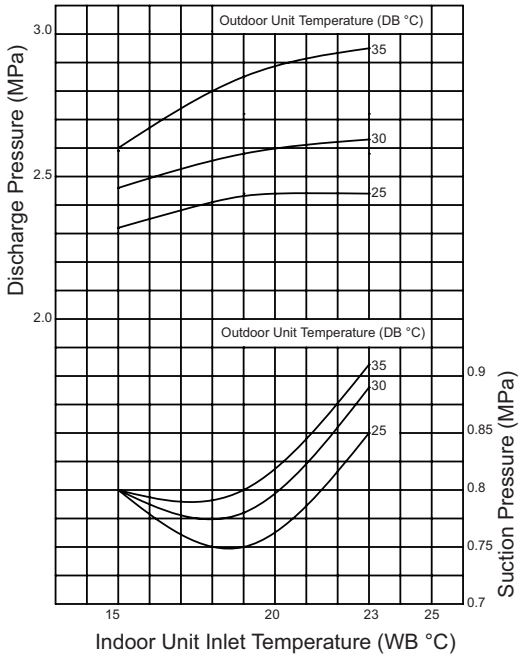
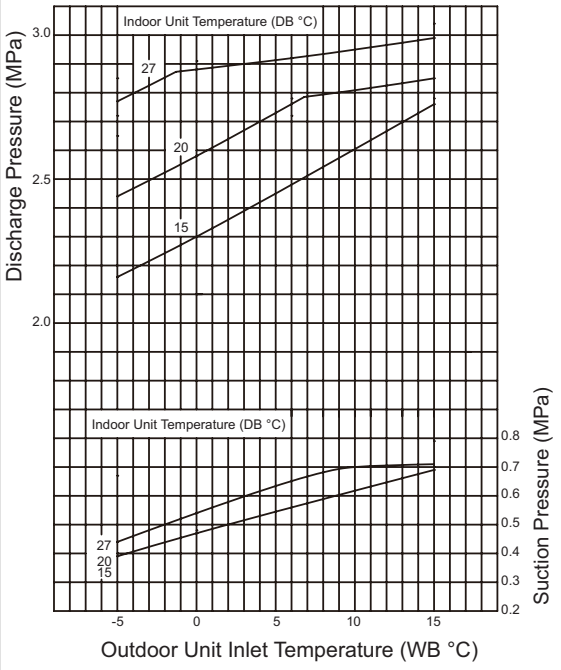
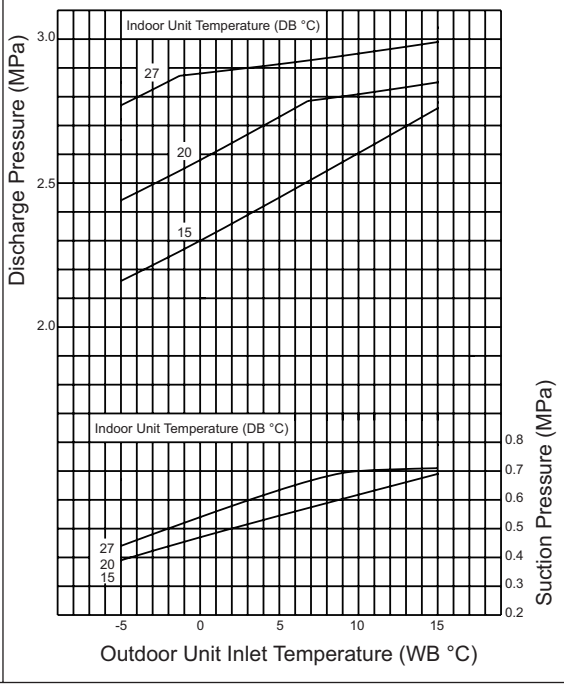
Piping Length: 7.5m	Piping Length: 50m
Cooling Operation	
	
Heating Operation	
	

Fig. 5.3 Normal Operating Pressure

NOTE

1. The above curves indicate pressure under the following conditions.
   a) Indoor Unit Type: Ducted Model b) Indoor Unit Fan Tap: HIGH2
   c) Total Capacity of Indoor Unit: 100% d) Height Difference: 0m
2. Do not use the above data for the refrigerant charge procedure.
   These data should be used as a reference for checking operating conditions.

Models: RAS-14HNBCMQ

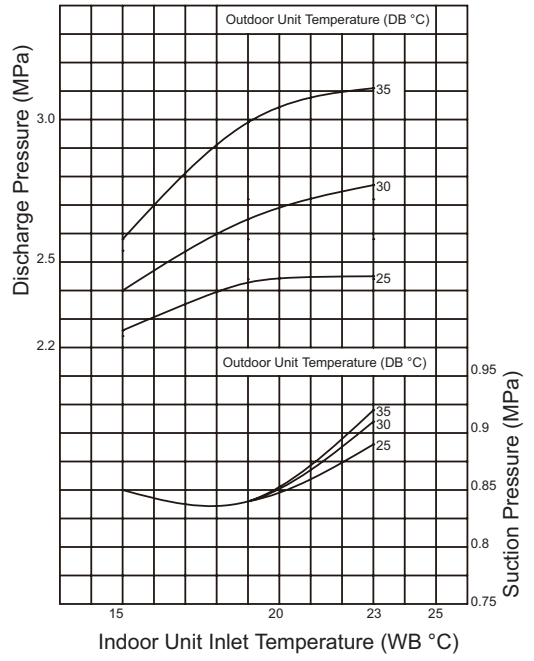
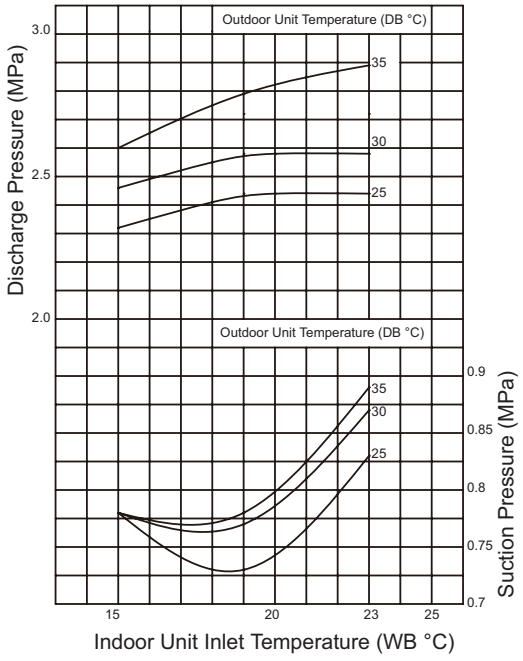
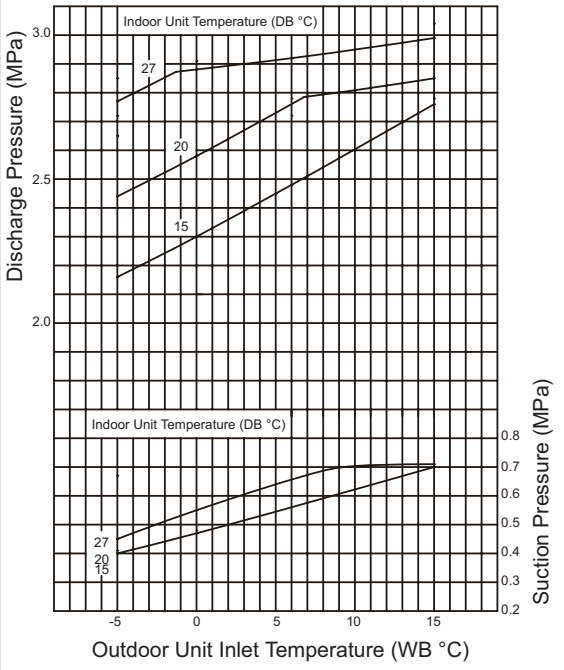
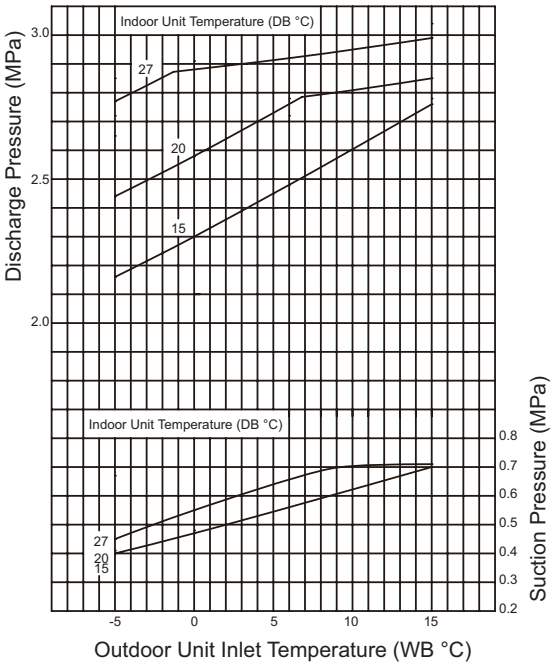
Piping Length: 7.5m	Piping Length: 50m
Cooling Operation	
	
Heating Operation	
	

Fig. 5.4 Normal Operating Pressure

NOTE

1. The above curves indicate pressure under the following conditions.
   a) Indoor Unit Type: Ducted Model b) Indoor Unit Fan Tap: HIGH2
   c) Total Capacity of Indoor Unit: 100% d) Height Difference: 0m
2. Do not use the above data for the refrigerant charge procedure.
   These data should be used as a reference for checking operating conditions.

Models: RAS-16HNBCMQ

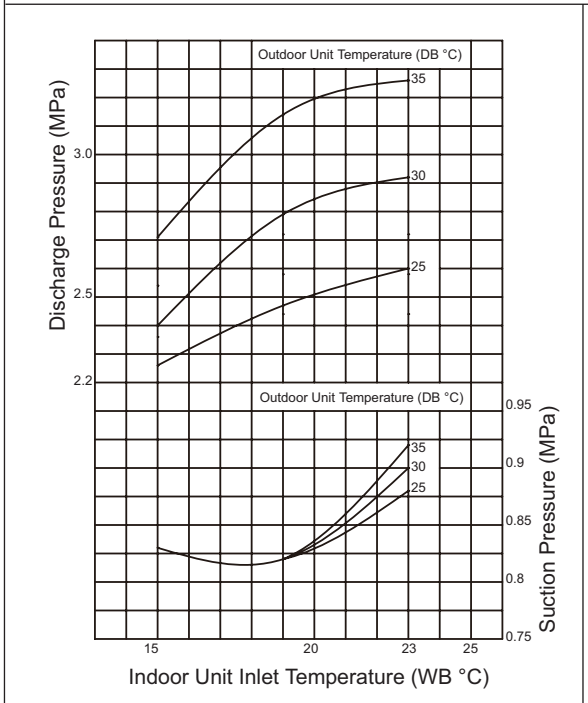
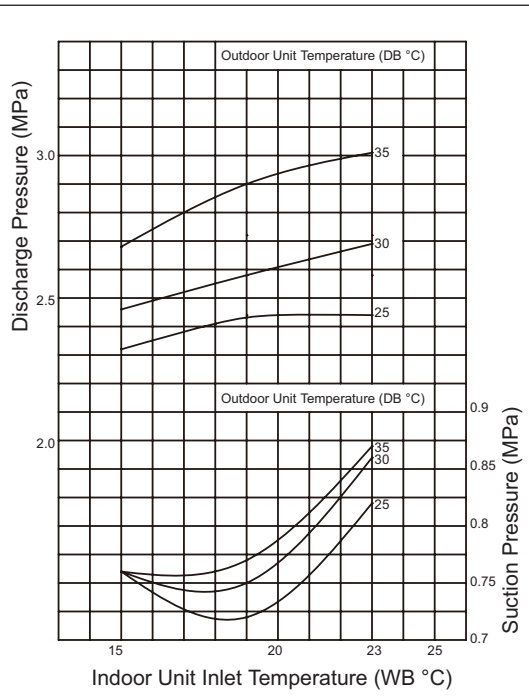
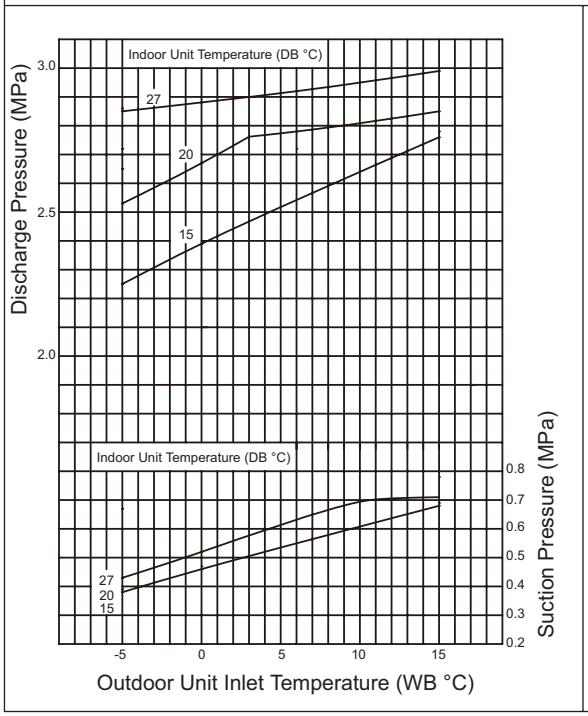
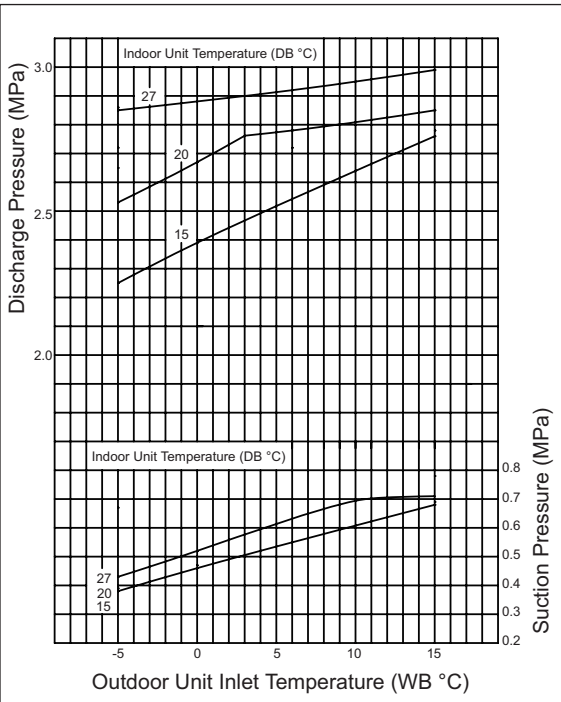
Piping Length: 7.5m	Piping Length: 50m
Cooling Operation	
	
Heating Operation	
	

Fig. 5.5 Normal Operating Pressure

NOTE

1. The above curves indicate pressure under the following conditions.
   a) Indoor Unit Type: Ducted Model b) Indoor Unit Fan Tap: HIGH2
   c) Total Capacity of Indoor Unit: 100% d) Height Difference: 0m
2. Do not use the above data for the refrigerant charge procedure.
   These data should be used as a reference for checking operating conditions.

Models: RAS-18HNBCMQ

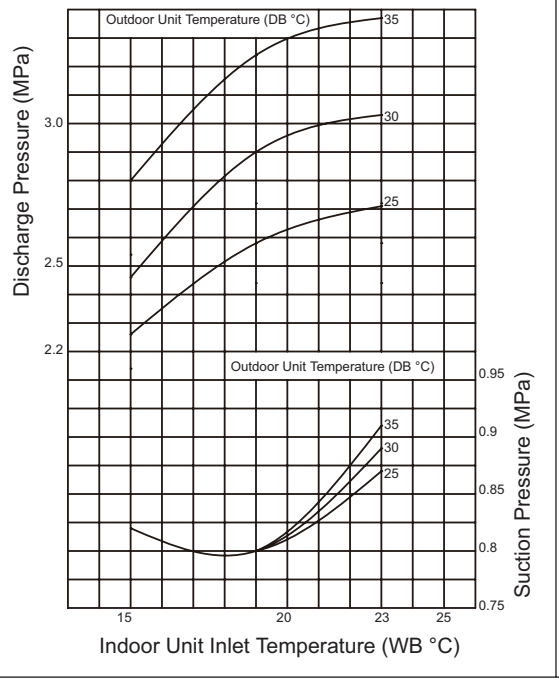
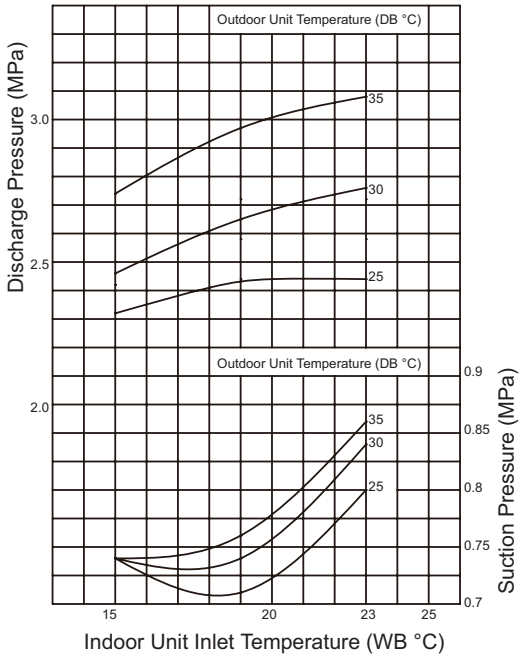
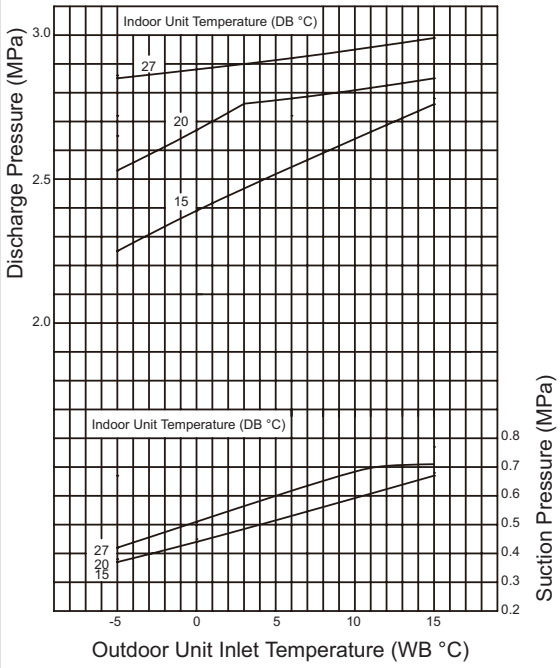
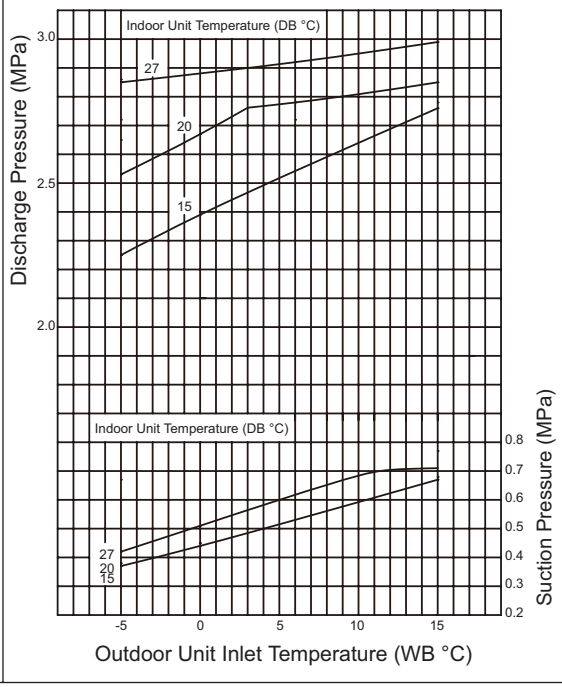
Piping Length: 7.5m	Piping Length: 50m
Cooling Operation	
	
Heating Operation	
	

Fig. 5.6 Normal Operating Pressure

NOTE

1. The above curves indicate pressure under the following conditions.
   a) Indoor Unit Type: Ducted Model b) Indoor Unit Fan Tap: HIGH2
   c) Total Capacity of Indoor Unit: 100% d) Height Difference: 0m
2. Do not use the above data for the refrigerant charge procedure.
   These data should be used as a reference for checking operating conditions.

Models: RAS-20HNBCMQ

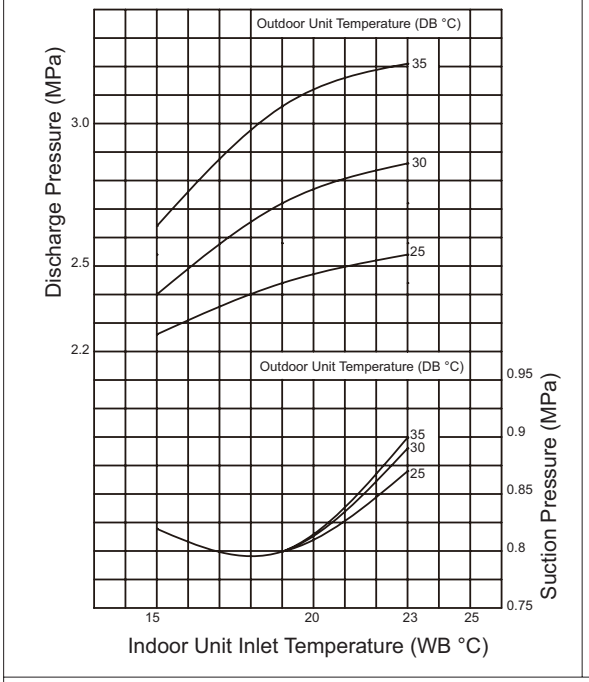
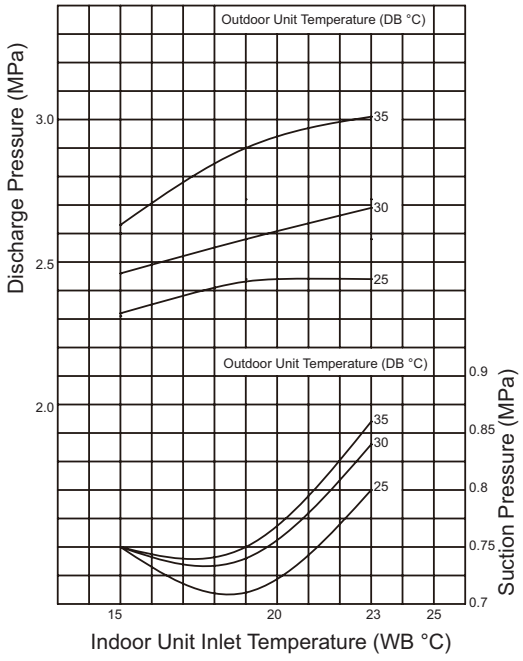
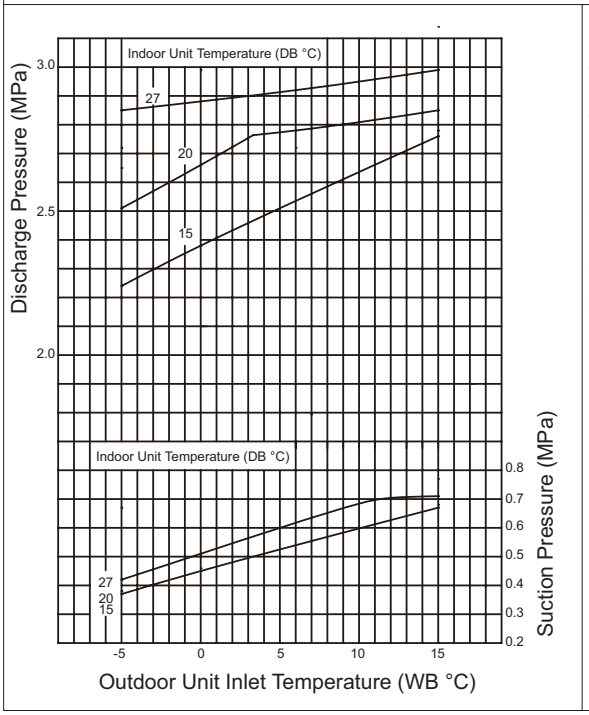
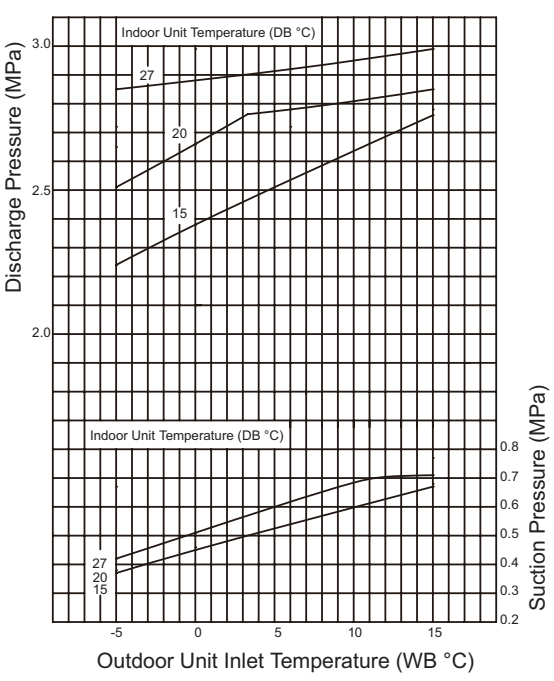
Piping Length: 7.5m	Piping Length: 50m
Cooling Operation	
	
Heating Operation	
	

Fig. 5.7 Normal Operating Pressure

NOTE

1. The above curves indicate pressure under the following conditions.
   a) Indoor Unit Type: Ducted Model b) Indoor Unit Fan Tap: HIGH2
   c) Total Capacity of Indoor Unit: 100% d) Height Difference: 0m
2. Do not use the above data for the refrigerant charge procedure.
   These data should be used as a reference for checking operating conditions.

Models: RAS-22HNBCMQ

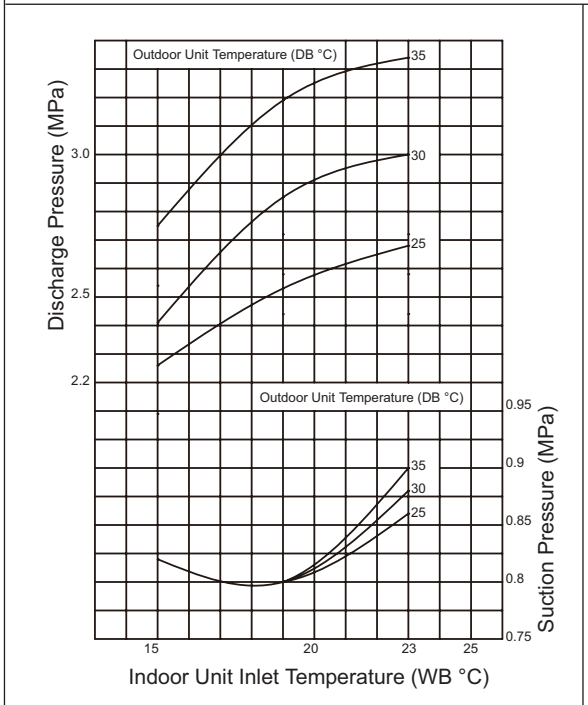
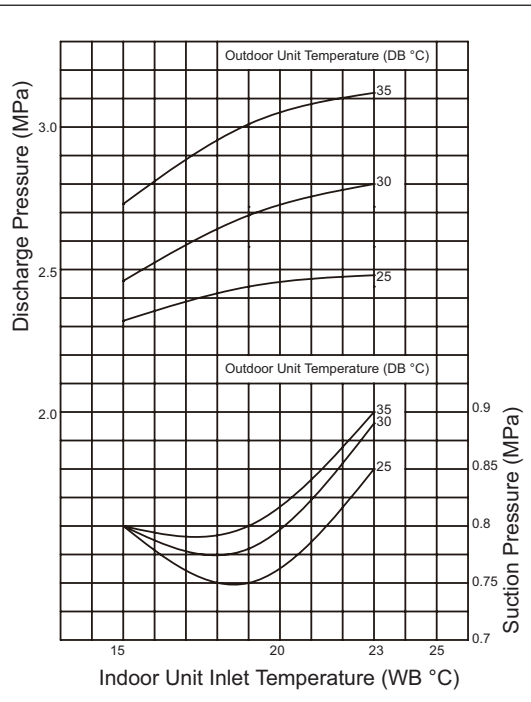
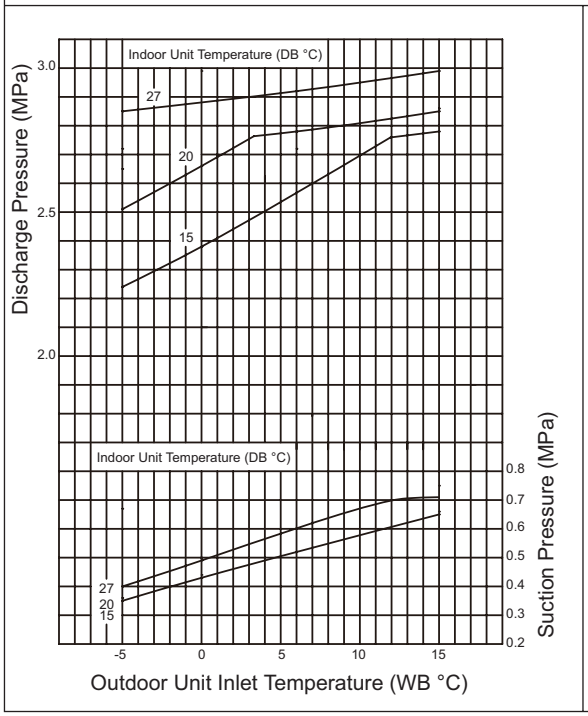
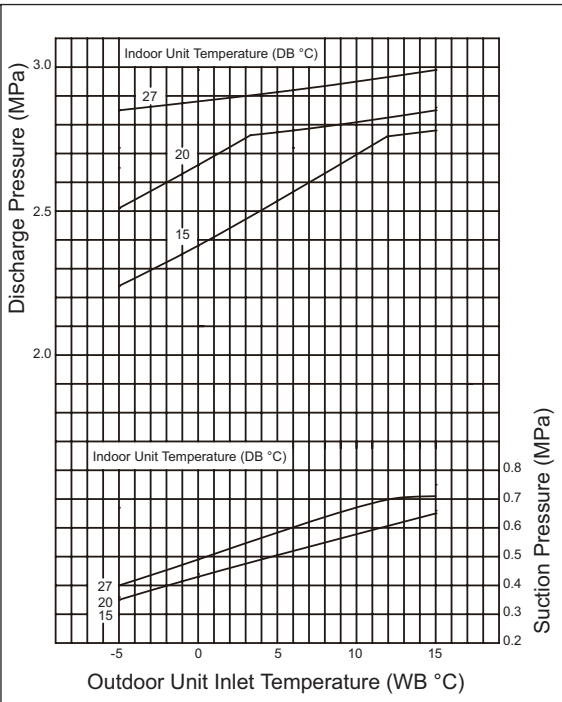
Piping Length: 7.5m	Piping Length: 50m
Cooling Operation	
	
Heating Operation	
	

Fig. 5.8 Normal Operating Pressure

NOTE

1. The above curves indicate pressure under the following conditions.
   a) Indoor Unit Type: Ducted Model b) Indoor Unit Fan Tap: HIGH2
   c) Total Capacity of Indoor Unit: 100% d) Height Difference: 0m
2. Do not use the above data for the refrigerant charge procedure.
   These data should be used as a reference for checking operating conditions.

Models: RAS-24HNBCMQ

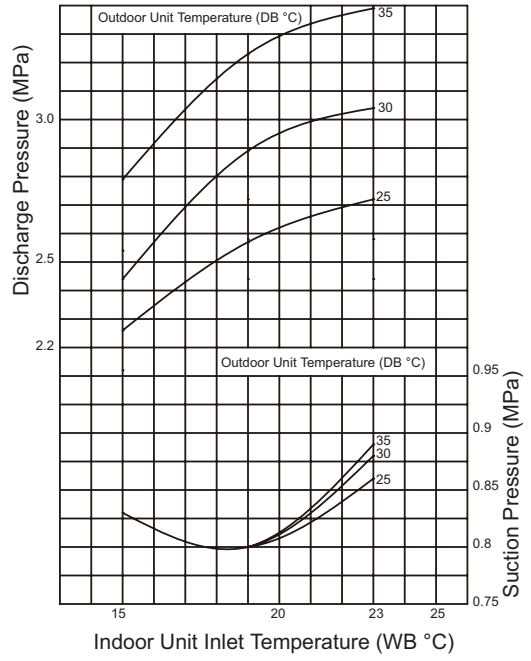
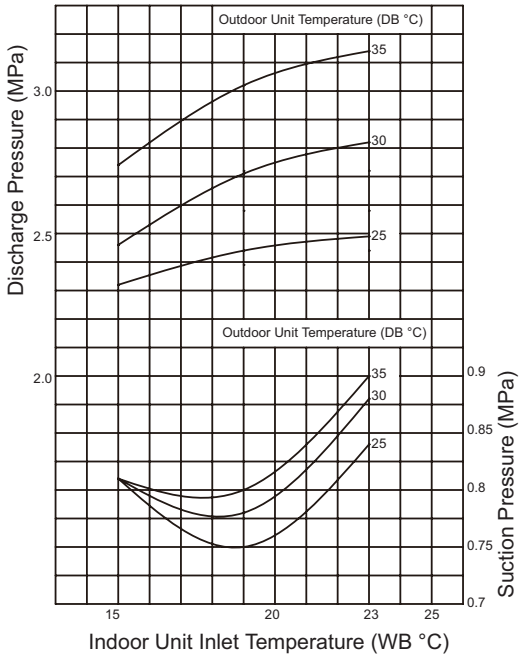
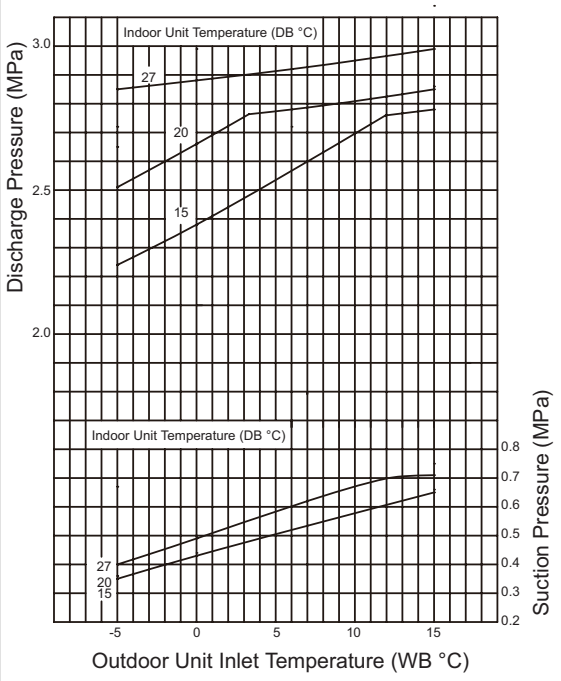
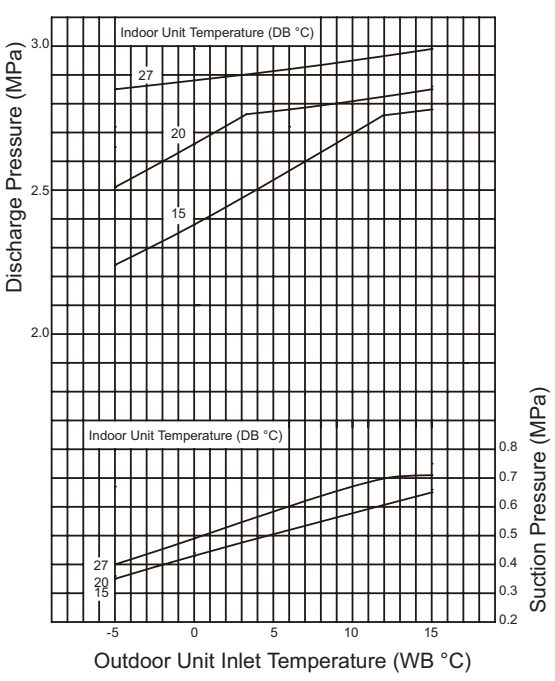
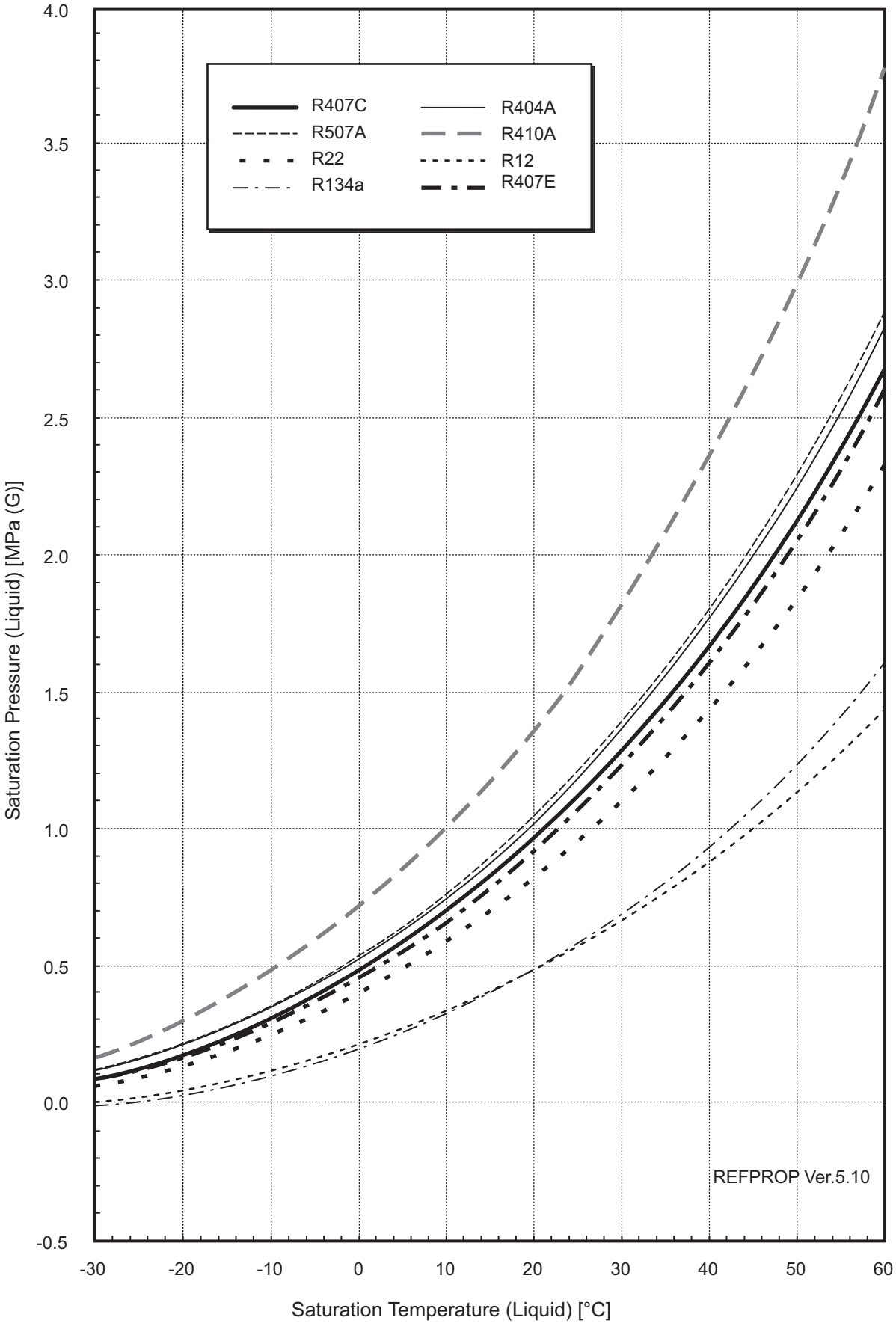
Piping Length: 7.5m	Piping Length: 50m
Cooling Operation	
	
Heating Operation	
	

Fig. 5.9 Normal Operating Pressure

NOTE

1. The above curves indicate pressure under the following conditions.
   a) Indoor Unit Type: Ducted Model b) Indoor Unit Fan Tap: HIGH2
   c) Total Capacity of Indoor Unit: 100% d) Height Difference: 0m
2. Do not use the above data for the refrigerant charge procedure.
   These data should be used as a reference for checking operating conditions.

5.7 Saturation Curve for Refrigerant



5.8 Mollier Chart for R410A