HITACHI
Inspire the Next

SET-FREE FSN SERIES

Service Manual

Outdoor Units: 5 ~ 30 HP
Indoor Units Type:

- 4-Way Cassette
- 2-Way Cassette
- Ceiling
- In-the-Ceiling
- Wall
- Floor
- Floor Concealed

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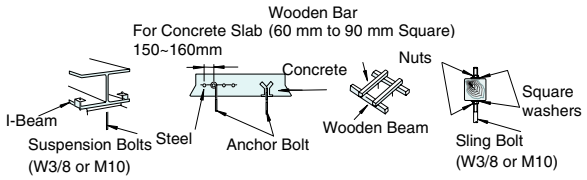
1 UNITS INSTALLATION

CONTENTS

WARNING:

- *Check to ensure that the accessories are packed with the indoor unit.*
- *Do not install the indoor units outdoors. If installed outdoors, an electric hazard or electric leakage will occur.*
- *Consider the air distribution from each indoor unit to the space of the room, and select a suitable location so that uniform air temperature in the room can be obtained. It is recommended that the indoor units be installed 2.3 to 3 meters from the floor level. If the unit is installed higher than 3 meters, it is also recommended that a fan be utilized to obtain uniform air temperature in the room.*
- *Avoid obstacles that may hamper the air intake or the air discharge flow.*
- *Pay attention to the following points when the indoor units are installed in a hospital or other places where there are electronic waves from medical equipment, etc.*
- *Do not install the indoor units where electromagnetic wave is directly radiated to the electrical box, remote control cable or remote control switch.*
- *Install the indoor units and components as far as practical or at least 3 meters from the electromagnetic wave radiator.*
- *Prepare a steel box and install the remote control switch in it. Prepare a steel conduit tube and wire the remote control cable in it. Then connect the ground wire with the box and tube.*
- *Install a noise filter when the power supply emits harmful noises.*
- *This unit is exclusive non-electrical heater type indoor unit. It is prohibited to install an electrical heater in the field.*
- *Mount suspension bolts using M10 (W3/8) as size, as shown below:*



CAUTION:

- *Do not install the indoor units in a flammable environment to avoid a fire or an explosion.*
- *Check to ensure that the ceiling slab is strong enough. If it is not strong enough, the indoor unit may fall down on you.*
- *Do not install the indoor units, outdoor unit, remote control switch and cable within approximately 3 meters of strong electromagnetic wave radiators such as medical equipment.*
- *Do not install the indoor units in a machinery shop or kitchen where vapor from oil or mist flows to the indoor units. The oil will deposit on the heat exchanger, thereby reducing the indoor unit performance, and it may deform. In the worst case, the oil damages the plastic parts of the indoor unit.*
- *To avoid any corrosive action to the heat exchangers, do not install the indoor units in an acid or alkaline environment.*

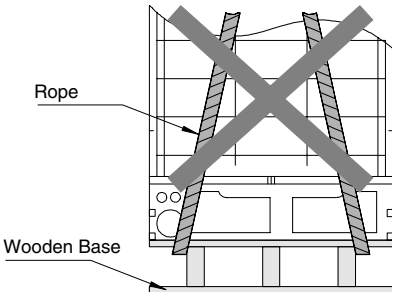
1.1. TRANSPORTATION OF OUTDOOR UNIT

1. Hanging method

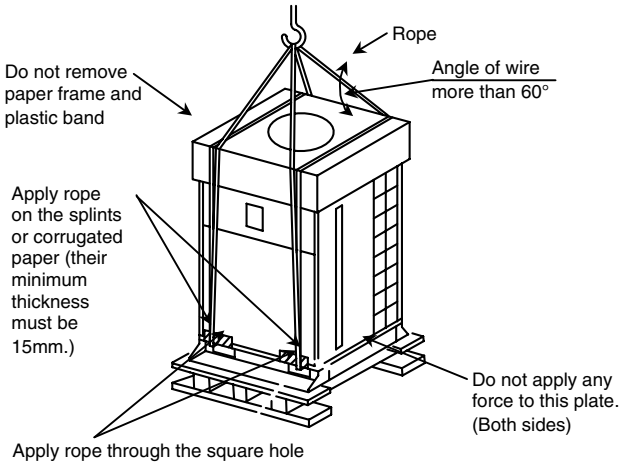
When hanging the unit, ensure a balance of the unit, check safety and lift up smoothly.

- For transportation
  - Do not remove any packing materials.
  - Hang the unit without removing the packaging with ropes through each square hole and apply the splints or corrugated paper for unit protection.

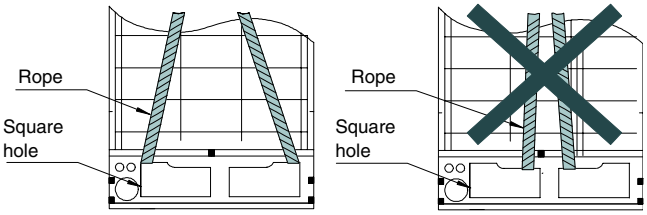
DANGER:
Do not tie ropes at the wooden base.



- For installation (5~16 HP)
  - Remove the wooden base.
  - Apply two (2) ropes on the splints or corrugated paper to protect the unit, and hang the unit as shown below.



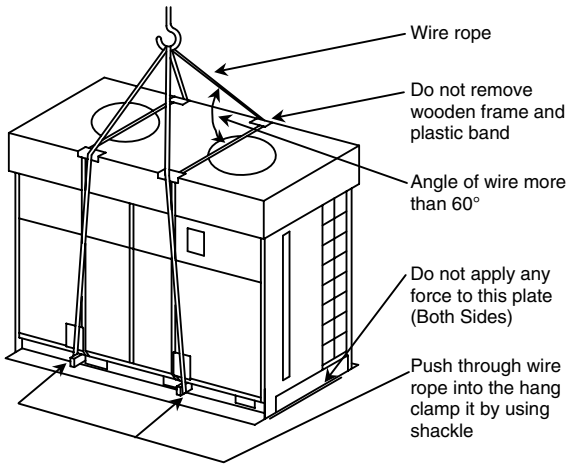
(Rope position)



CORRECT INCORRECT

- For installation (20~30 HP)

Hang the unit without removing the packaging with four (4) ropes. Push through the wire ropes into the hang hole and clamp the wires by using shackle as shown below.



2. Before installation

Before installation work, check the availability of the following parts that are packed inside the outdoor unit:

Accessory	Qty	Purpose
Compressed sheet	1	Connection for refrigerant gas piping with RAS-10~30FSN
Pipe flange for refrigerant gas piping	1	
Pipe with flare nut for refrigerant gas piping	1	Connection for refrigerant gas piping with RAS-8FSN
Pipe with flare nut for refrigerant liquid piping	1	Connection for refrigerant liquid piping with RAS-30FSN
Rubber bush	4	For connection hole of operation wiring
	3	For connection hole of power source wiring with RAS-5~20FSN
Screw	3	Spare

NOTE:
If any of these accessories are not packed with the unit, please contact your dealer.

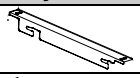
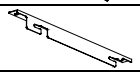
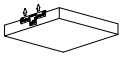
1.2. RCI (4-WAY CASSETTE TYPE)

1.2.1. FACTORY-SUPPLIED ACCESSORIES

(Models: RCI-1.0~5.0)

■ Make sure that the following accessories are packed with the unit.

NOTE:
If any of these accessories are not packed with the unit, please contact your dealer.

Accessory	Quantity	Purpose
Suspension bracket (1) 	1	For unit suspension
Suspension bracket (2) 	1	
Flat washer 	4	
Spring washer 	4	
Nut 	4	
Wire clamp 	1	For drain hose connection
Cord clamp 	2	For fixing remote control switch cable and louver sensor cable
Pattern paper for installation 	1	Installation for indoor unit
Screw 	4	For fixing pattern paper
Ring core 	2	

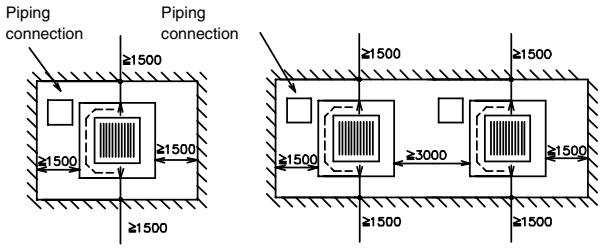
▪ Applicable air panel (option)

Indoor unit	Applicable air panel (option)			
	For wired remote control switch		For wireless remote control switch	
	Without heater	With heater	Without heater	With heater
RCI-1.0	P-G12WA2E	–	P-G12WAH2E	–
RCI-1.5 RCI-2.0 RCI-2.5 RCI-3.0	P-G23WA2E	P-G23WA2E1	P-G23WAH2E	P-G23WAH2E1
RCI-4.0 RCI-5.0	P-G46WA2E	P-G46WA2E1	P-G46WAH2E	P-G46WAH2E1

1.2.2. INITIAL CHECK

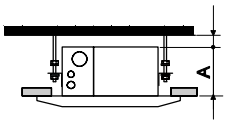
▪ Install the indoor unit with a proper clearance around it for operation and maintenance working space, as shown below (Space around indoor unit).

▪ Provide a service access door near the unit piping connection area on the ceiling.



Distance from wall side

- Check space between ceiling and false ceiling is enough as indicated below.
- Check the ceiling surface is flat for the air panel installation work.



Clearance 10-20 mm unit high in false ceiling

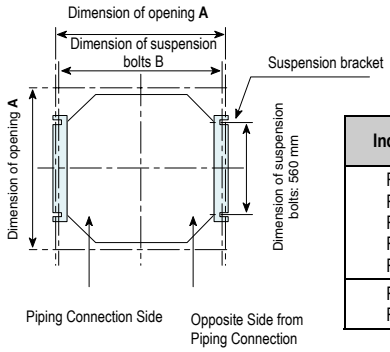
Unit HP	A(mm)
RCI-1.0~3.0HP	298
RCI-4.0/5.0HP	348

- Check down slope pitch of drain piping is following the specifications indicated in chapter "Drain Piping".

NOTE:
Unit model RCI-1.0 has only two air outlets. One is at the piping connection side and the other is at the opposite side. Confirm the position of air outlets before installing the unit.

1.2.3. OPENING OF FALSE CEILING AND SUSPENSION BOLT

Cut out the area for the indoor unit in the false ceiling and install suspension bolts, as shown below.



Indoor unit	A (mm)	B (mm)
RCI-1.0 RCI-1.5 RCI-2.0 RCI-2.5 RCI-3.0	910	875
RCI-4.0 RCI-5.0	1230	1195

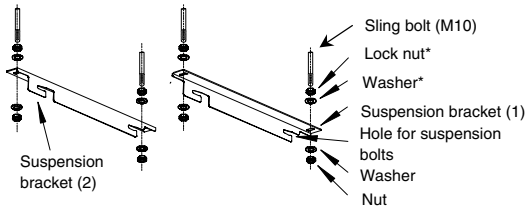
Make sure that the ceiling is horizontal, otherwise water cannot flow.

Strengthen the opening parts of the false ceiling.

1.2.4. INSTALLATION

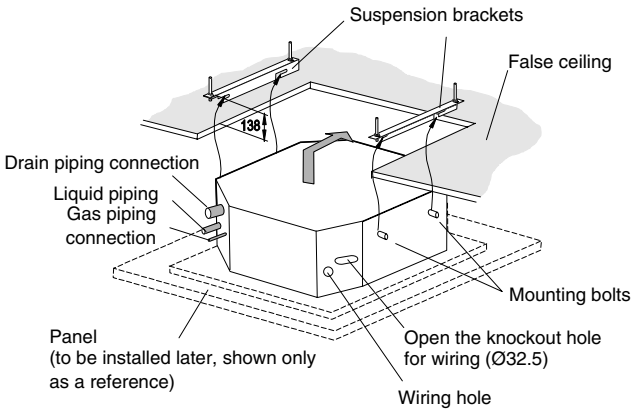
■ Mounting suspension brackets (factory-supplied)

Mount the suspension brackets to the sling bolts and secure them with nuts (*field-supplied) as shown below.



■ Mounting the indoor unit

Lift the indoor unit by hoist, and do not put any force on the drain pan.
Consider piping connection side before lift indoor unit.
Hook the indoor unit on the suspension brackets, by setting the mounting bolts on the notches of the bracket, as shown below.



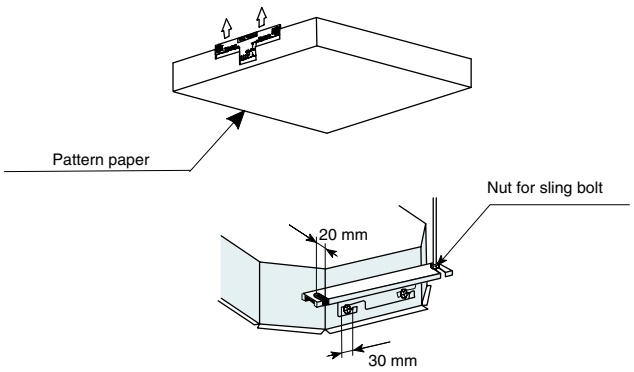
NOTE:

If a false ceiling has already been installed, complete all piping and wiring work inside the ceiling before hooking-up the indoor unit.

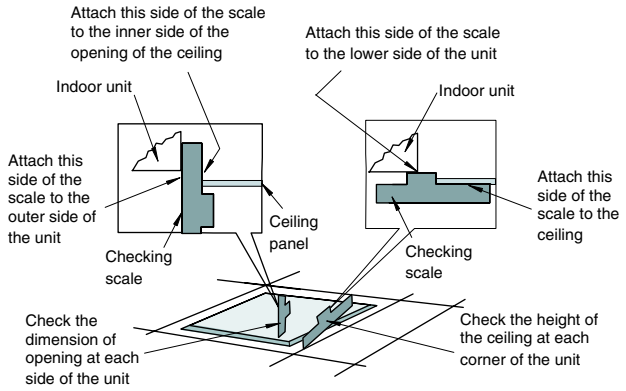
Secure the indoor unit using the nuts, flat washers and spring washers. (These nuts and washers are supplied, 4 pieces each).

■ Adjusting space between indoor units and false ceiling opening

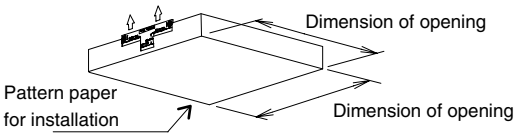
- Check the level of the drain pan by a water level to avoid incorrect operation of the drain discharge mechanism in the indoor unit.
- Tighten the nuts of the suspension brackets after the adjustment is completed. Special plastic paint must be applied to the bolts and nuts in order to prevent them from loosening. If not done, abnormal noises or sounds may occur and the indoor unit may come loose.
- Adjust the indoor unit to the correct position while checking with the pattern for installation.

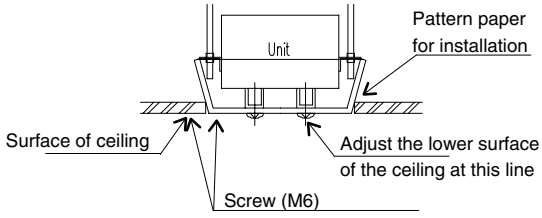


1. For ceiling already completed with panels.



2. Ceiling not completed with panels yet.





1.2.5. AIR PANELS FOR INSTALLATION

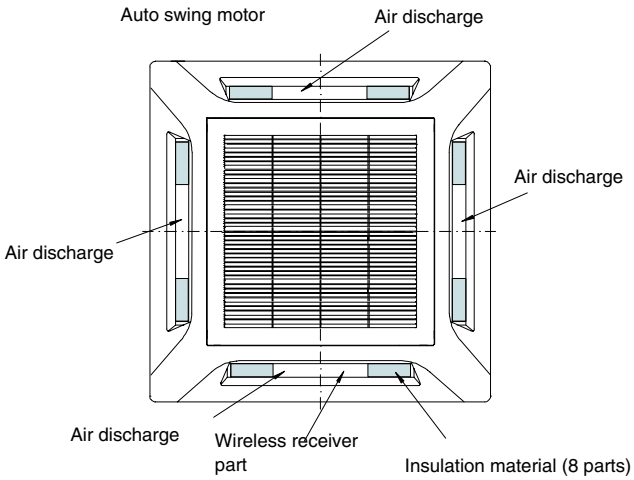
P-G13WA(H)2E(1) P-G23WA(H)2E(1), P-G46WA(H)2E(1)

CAUTION:
When the air panel is unpacked, place it on insulation material, etc. to protect the sealing insulation from scratches.

■ **Factory-supplied accessories**

Make sure that the following accessories are packed with the air panel.

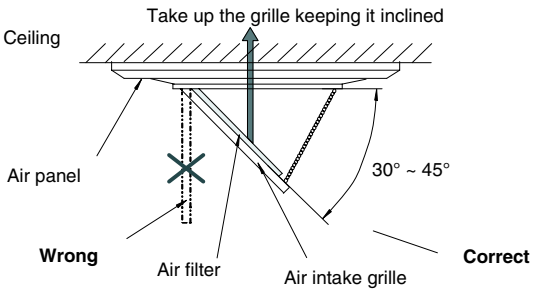
Accessory	Quantity	Purpose
Long screw (M6×30)	4	For fixing panel



Make sure that the suspension brackets (field-supplied) of the indoor unit are located approximately 138 mm higher than the false ceiling.

■ **Remove air intake grille from air panel following the next steps:**

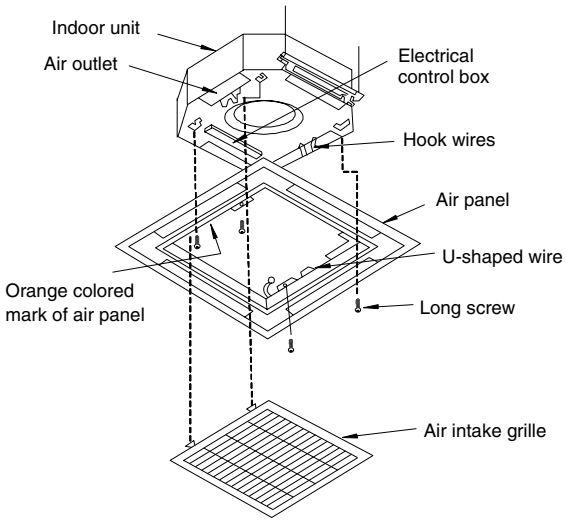
1. Open the air intake grille to an angle of 30° to 45° from the surface of the air panel.

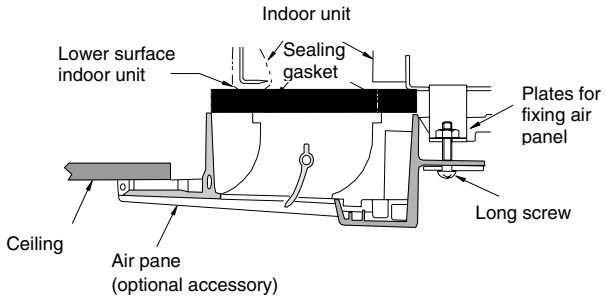


2. Lift the grille keeping it inclined.
3. Draw the grille towards the open space after lifting.

■ **Installing air panel following the next steps:**

1. Hang the air panel from the indoor unit by hooking the U-shaped wires of the air panel into the hook wires of the indoor unit.
2. Make sure that the location of the orange colored mark of the indoor unit coincides with the location of the same colored mark of the air panel.
3. Raise up the air panel onto the indoor unit, then fix the air panel by using factory-supplied long screws.

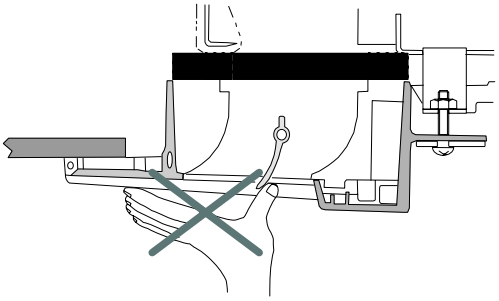




4. Make sure that there is no gap around the contacting surface between the indoor unit and the air panel. Any gap may cause air leakage or dewing.

NOTE:
To protect the panel from being damaged, the long screws for securing the air panel have stoppers so that tightening is stopped at the setting position. If the air panel does not reach the surface of the ceiling or air leakage from the contacting surface occurs, readjust the indoor unit installation to make sure that the air panel is perfectly adjusted to the contacting surface.

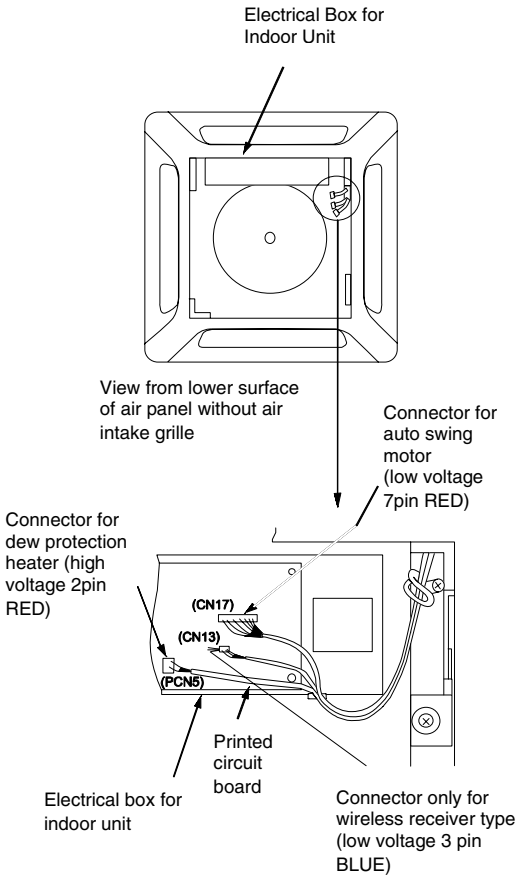
CAUTION:
Do not turn the air louver by hand. If moved, the louver mechanism will be damaged.



5. Wiring connection for air panel.

CAUTION:
Before connecting connectors, first turn OFF power source. If the connectors are connected without turning OFF the power source, the auto-swing louver cannot function.

Connect the following connectors that are used with the air panel.



If you connect CN13, you must modify the settings of the DIP switches. For detailed information, refer to page 12 on chapter 3.

1.3. RCD (2-WAY CASSETTE TYPE)

1.3.1. FACTORY-SUPPLIED ACCESSORIES

(Models: RCD-1.0~5.0)

- Make sure that the following accessories are packed with the unit.

NOTE:
If any of these accessories are not packed with the unit, please contact your dealer.

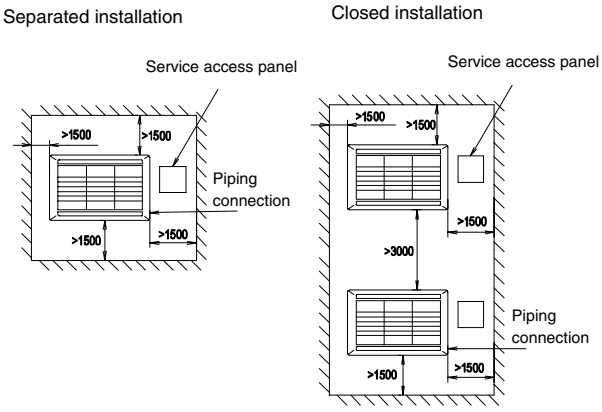
Accessory	Quantity	Purpose
Paper pattern (carton board)	1	For adjusting space of false ceiling opening and position of the unit
Level scaler (take out of paper pattern)	1	
Cross recessed head screws (M6)	6	For fitting paper pattern
Flat washer	8	For unit suspension
Wire clamp	1	For drain hose connection
Insulation (26IDx100mm)	1	For refrigerant piping connection
Insulation (28IDx85mm)	1	
Cord band	8	For fixing remote control switch wiring and insulation of piping
Packing (5Tx50x200)	1	For covering wiring connection

Applicable air panel (option)

Indoor unit	Applicable air panel (option)
	For wired remote control switch
RCD-1.0~2.5	P-G23DWA1
RCD-3.0~5.0	P-G46DWA1

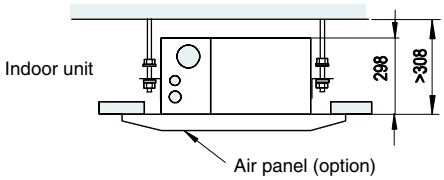
1.3.2. INITIAL CHECK

- Install the indoor unit with a proper clearance around it for operation and maintenance working space, as shown in next page.
- Provide a service access door or panel near the unit piping connection and the electrical control box on the ceiling.



Distance from wall side

- Check space between ceiling and false ceiling is enough as indicated below.
- Check the ceiling surface is flat for the air panel installation work.

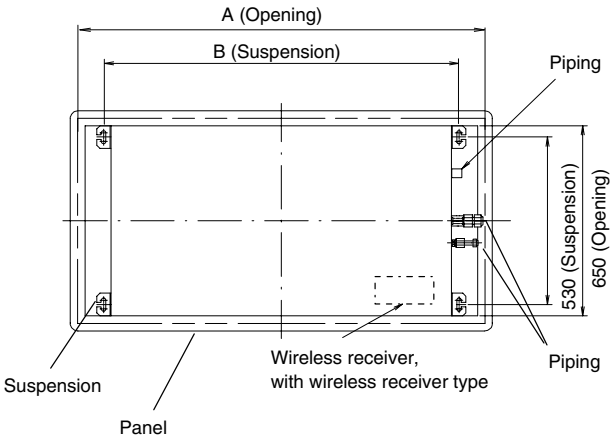


- Check down slope pitch of drain piping is following the specifications indicated in chapter "Drain Piping".

CAUTION:
The minimum distance between the wall and panel edge must be 1500 mm to prevent short-circuiting.

1.3.3. OPENING OF FALSE CEILING AND SUSPENSION BOLT

Cut out the area for the indoor unit in the false ceiling and install suspension bolts, as shown below.



View from top

Model	**A** (mm)	**B** (mm)
RCD-1.0 RCD-1.5 RCD-2.0 RCD-2.5 RCD-3.0	1060	889
RCD-4.0 RCD-5.0	1620	1450

Make sure that the ceiling is horizontal, otherwise drain water cannot flow away.

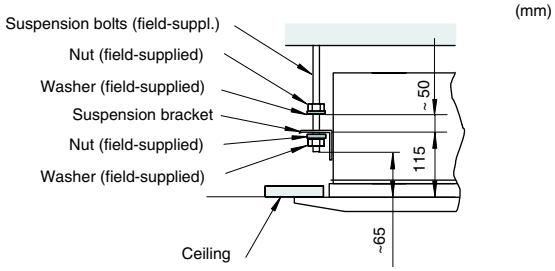
Strengthen the opening parts of the false ceiling.

1.3.4. INSTALLATION

■ Mounting suspension brackets (factory-supplied)

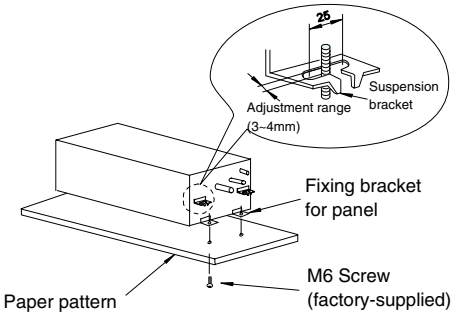
Mount the suspension brackets to the suspension bolts and fix them with nuts (factory -supplied), as shown below.

(mm)



■ Mounting the indoor unit

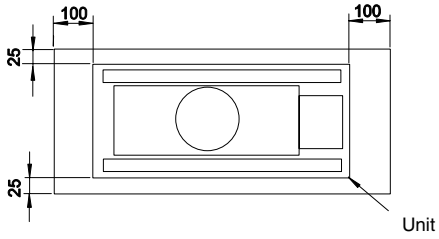
- Lift the indoor unit by hoist, and do not apply any force on the drain pan.
- Hook the indoor unit on the suspension brackets.
- Fix the unit using the nuts, flat washers and spring washers (These nuts and washers are supplied (4 pieces each)).

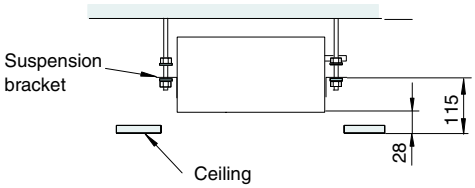


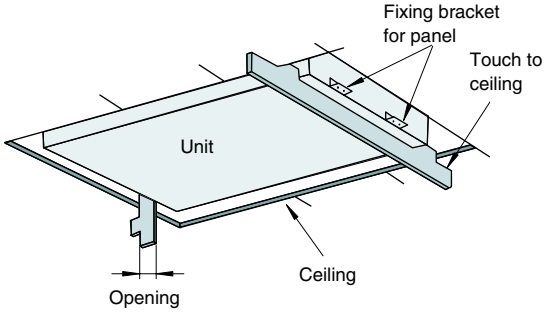
■ Adjusting space between indoor unit and false ceiling opening

Adjust the indoor unit to the correct position while checking with the installation pattern and gauge (factory-supplied) as shown below.

(mm)

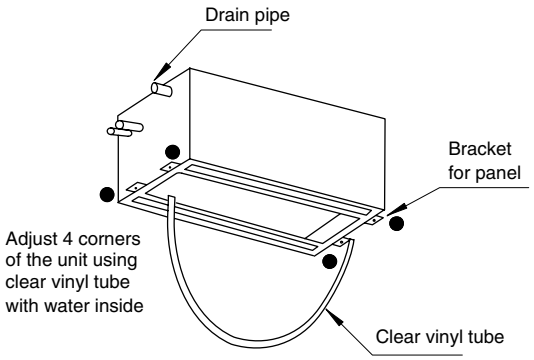






CAUTION:
Check the level of the unit using a water level or transparent plastic tube containing water, as shown below, to avoid incorrect operation of the drain discharge mechanism in the indoor unit. The drain piping side of the indoor unit must be approximately 5 mm lower than the other parts.
Tighten the nuts of the suspension brackets after adjustment is completed. Apply LOCK-TIGHT paint to the bolts and nuts in order to prevent them from loosening. If not done, abnormal noises or sounds may occur and the indoor unit may fall down.*

- Adjust the indoor unit to the correct position while checking with the checking scales (factory-supplied).



1.3.5. AIR PANELS FOR INSTALLATION

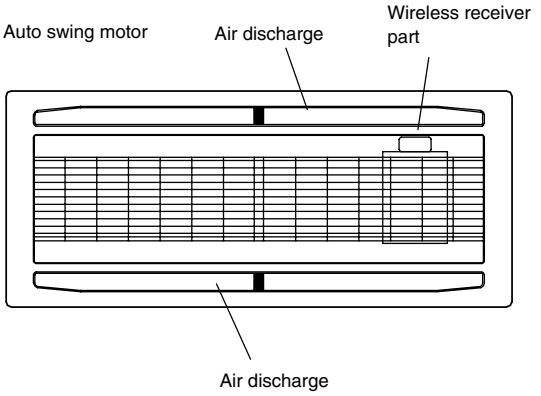
P-G23DWA1, P-G46DWA1

CAUTION:
When the air panel is unpacked, place it on insulation material, etc. to protect the sealing insulation from scratches.

■ **Factory-supplied accessories**

Make sure that the following accessories are packed with the air panel.

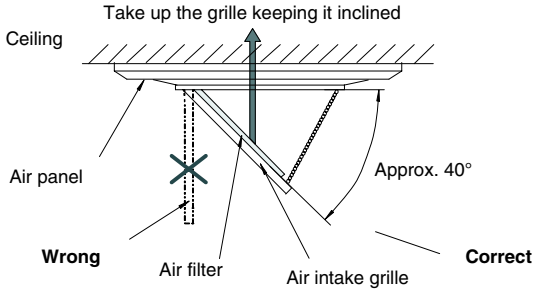
Accessory		Quantity	Purpose
Long screw (M6×50)		4	For fixing panel
Long screw (M6×30)		2	For fixing panel (only for P-G46)



Make sure that the suspension brackets (field-supplied) of the indoor unit are located approximately 175 mm higher than the false ceiling.

■ **Remove air intake grille from air panel following the next steps:**

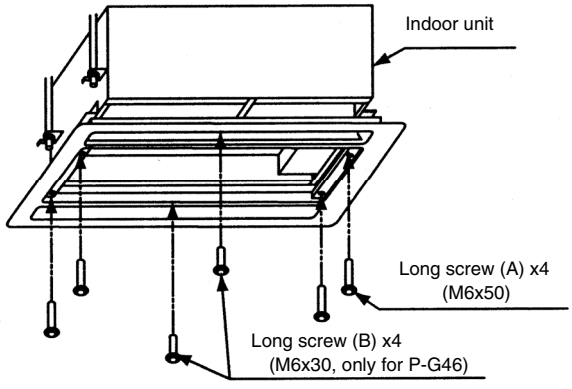
1. Open the air intake grille to an angle of approx. 40° from the surface of the air panel.



2. Lift the grille keeping it inclined.
3. Draw the grille towards the open space after lifting.

■ **Installing air panel following the next steps:**

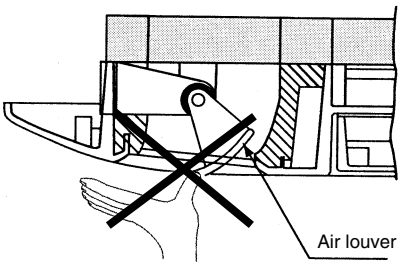
1. Hang the air panel from the indoor unit by hooking the U-shaped wires of the air panel into the hook wires of the indoor unit.
2. Make sure that the location of the electrical box of the Indoor unit coincides with the location of the wiring outlet of the air panel.
3. Raise up the air panel onto the indoor unit, then fix the air panel by using factory-supplied long screws.



4. Make sure that there is no gap around the contacting surface between the indoor unit and the air panel. Any gap may cause air leakage or dewing.

To protect the panel from being damaged, the long screws for securing the air panel have stoppers so that tightening is stopped at the setting position. If the air panel does not reach the surface of the ceiling or air leakage from the contacting surface occurs, readjust the installation height level of the indoor unit.

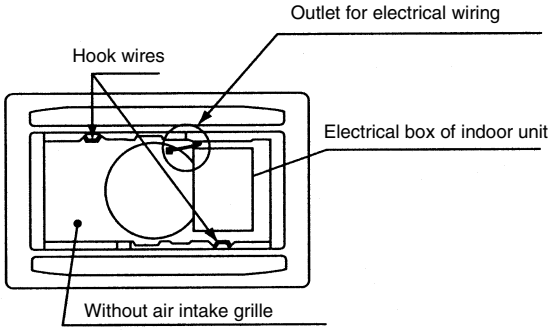
CAUTION:
Do not turn the air louver by hand. If moved, the louver mechanism will be damaged.

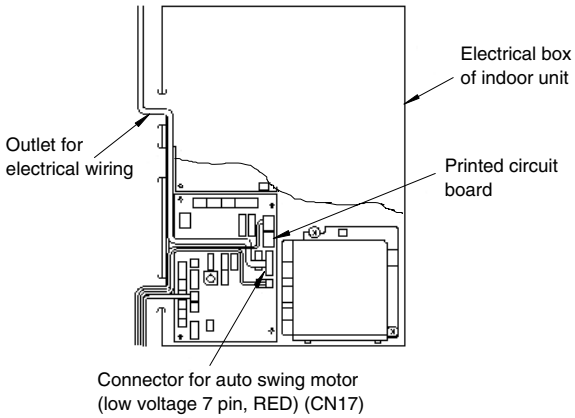


5. Wiring connection for air panel.

CAUTION:
Before connecting connectors, firstly turn OFF power source. If the connectors are connected without turning OFF the power source, the auto-swing louver cannot function.

Connect the following connectors that are used with the air panel.





1.4. RPC (CEILING TYPE)

1.4.1. FACTORY SUPPLIED ACCESSORIES

(Models: RPC-2.0~5.0)

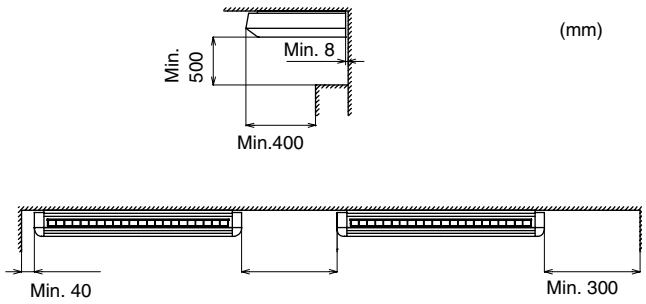
■ Make sure that the following accessories are packed with the unit.

NOTE:
If any of these accessories are not packed with the unit, please contact your dealer.

Accessory	Qty	Purpose
Suspension bracket 	2	For unit suspension
Fixing screw (M4 x 10mm)	2	
Drain hose 	1	
Wire clamp 	2	For connecting drain hose and drain pipe
Insulation material (5Tx200x200 m) 	1	For drain pipe connection
Sealing plate (0.8Tx118x42 mm) 	1	For sealing knockout hole
Ring core 	2	

1.4.2. INITIAL CHECK

▪ Install the indoor unit with proper clearance around it for operation and maintenance working space, as shown below.

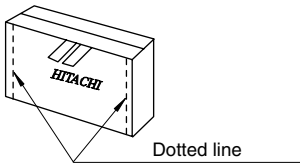


Check down slope pitch of drain piping follows the specification indicated in chapter "Drain Piping".

1.4.3. INSTALLATION

■ **Mounting suspension bracket (factory-supplied)**

▪ When installing the indoor unit, use the installation pattern printed on the inner side of the carton box, cutting the carton box along dotted lines when unpacking is performed.

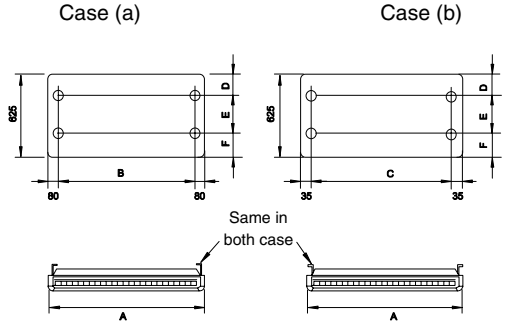


▪ Installation pattern is giving the following information:

Pitch of sling bolt for case (a) and case (b) showed below.

- Hole positions of refrigerant piping.
- Hole positions of drain piping.

▪ Suspension bracket has the following two (2) possible positions:

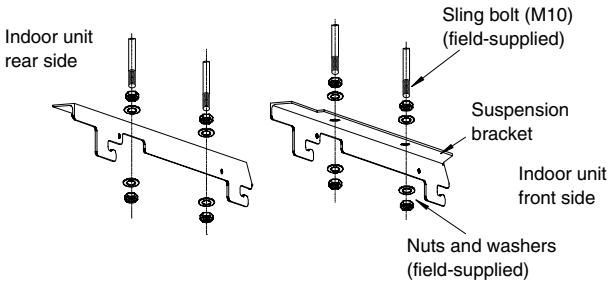


(mm)

Model	A	B	C	D	E	F
RPC-2.0	1094	920	1010	150	220	255
RPC-2.5 RPC-3.0	1314	1140	1230	150	220	255
RPC-4.0	1314	1140	1230	110	280	235
RPC-5.0	1574	1400	1490	110	280	235

▪ Select the suspension bracket system depending of your needs; for semi-concealed installation Case (a) is recommended.

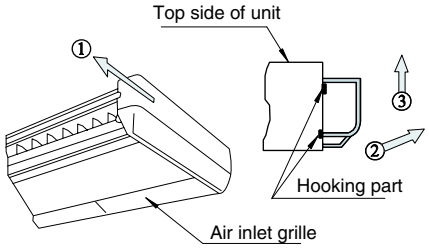
▪ Mount the suspension brackets to the slings bolts or anchor bolt and secure them with nuts (field-supplied), as shown below.



NOTE:
Tighten the nuts of the sling bolts or anchor bolts with the suspension brackets after the adjustment is completed. Apply Lock-Tight paint to the bolts and nuts in order to prevent them from loosening.

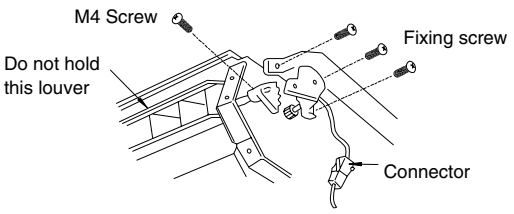
■ Mounting the indoor unit

- Remove side covers of the unit.
- To avoid damage to the resin side covers, before lifting or moving the indoor unit, remove the resin side covers as indicated in the following procedure.



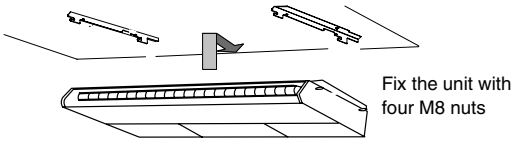
1. Slide the resin side covers forward approximately 15 mm.
2. Carefully pull the bottom of the side covers away from the indoor unit approximately 10 mm.
3. Remove the resin side covers upward.

CAUTION:
The mechanism of the automatic swing louver is utilized. Do not move the swing louver by hand or other objects. This can damage the mechanism of the automatic swing louver.



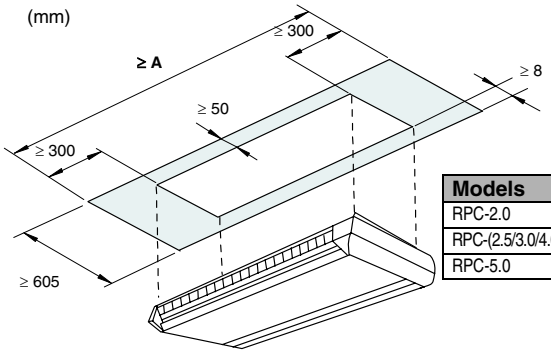
■ For hanging type installation.

- Hook the indoor units on the suspension brackets, by setting the mounting bolts on the units with the notches of the bracket, as shown below. Fix the units with the nuts, flat washers and spring washers. (Each four nuts and washers are supplied.)



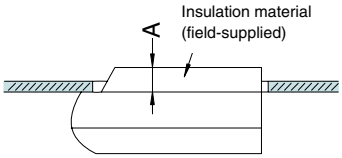
■ For semi-concealed installation.

- Open a hole in the false ceiling.



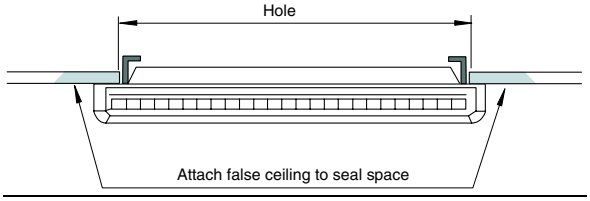
Models	A
RPC-2.0	1560
RPC-(2.5/3.0/4.0)	1780
RPC-5.0	2040

- When installing the indoor unit as shown in the following figure, insulate the top part of the cabinet which will be concealed in the ceiling because dew may occur under cooling operation.



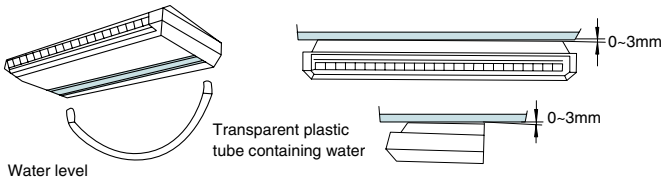
Models	A
RPC-(2.0/2.5/3.0)	13
RPC-(4.0/5.0)	75

- Secure the indoor unit with the suspension bolts. Position the false ceiling panels along the indoor unit.



■ Drain pan level

- The level of the drain pan has to be checked by a water level of a transparent plastic tube containing water, as shown below so as to avoid the incorrect position of the drain discharge.



- The unit should be installed so that the rear side of the unit is slightly (approximately 3 mm) lower than the front side, in order to avoid the incorrect position of the drain discharge.
- Tighten the nuts of the suspension bolts with the suspension brackets after adjustment is completed. Special plastic paint must be applied to the bolts in order to prevent them from loosening.

NOTE:
When the false ceiling has been already installed, all piping work inside the ceiling has to be completed before the indoor unit is hooked.

1.5. RPI (IN-THE-CEILING)

1.5.1. FACTORY-SUPPLIED ACCESSORIES

(Models: RPI-(0.8~5.0)

■ Make sure that the following accessories are packed with the unit.

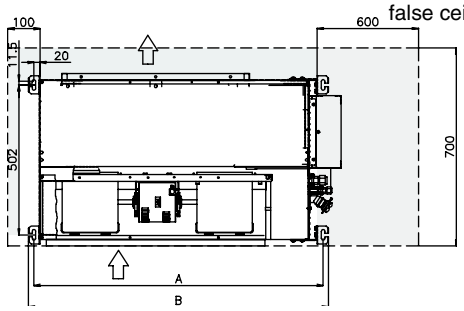
NOTE:
If any of these accessories are not packed with the unit, please contact your dealer.

Accessory		Qty	Purpose
Wire clamp		1	For drain connection
Ring core		2	

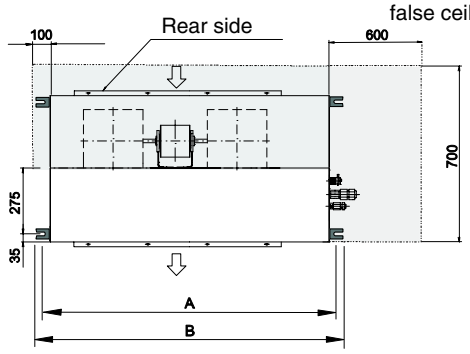
1.5.2. INITIAL CHECK

▪ Install the indoor unit with a proper clearance around it for operation and maintenance working space, as shown below.

RPI-0.8/1.5



RPI-2.0~5.0



Bottom view

Operation and maintenance space

Models	**A** (mm)	**B** (mm)
RPI-0.8~1.5	969	1005
RPI-2.0~3.0	1113	1163
RPI-4.0~5.0	1503	1553

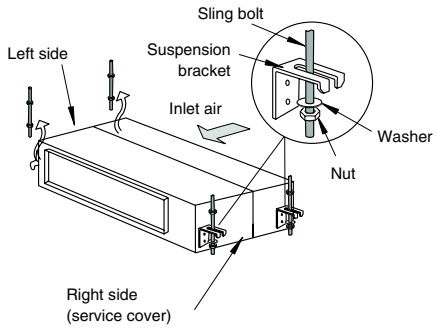
1.5.3. INSTALLATION

■ **Mounting sling bolts and hanging the indoor unit**

Using the aforementioned dimension select the final location and installation direction of the indoor unit paying careful attention to the space for the piping, wiring and maintenance.

Install the sling bolts, M10 or greater are recommended, and suspend the indoor unit using the following steps:

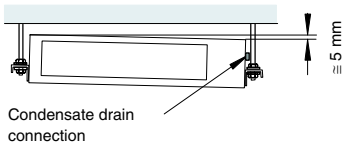
1. Hook suspension bracket to the nut and washer of each sling bolt, as shown, starting from one side.
2. After check the nut and washer are correctly fixed by the retainers of the suspension bracket, hook the suspension bracket of the other side to nut and washer.



■ **Drain pan level**

Make sure that the foundation is flat, taking into account the maximum foundation gradient.

Front view



The unit should be installed so that one side of the unit is slightly (approximately 5mm) lower than the other side, in order to avoid the incorrect position of the drain discharge.

Tighten the nuts of the suspension bolts with the suspension brackets after adjustment is completed. Special plastic paint must be applied to the bolts and nuts in order to prevent them from loosening.

NOTE:
Keep the unit as well as relevant equipment covered with the vinyl cover during installation work.

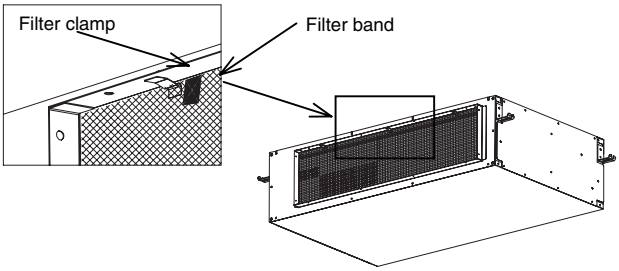
1.5.4. CONNECTING SUPPLY AIR DUCT

The supply air duct should be connected with the indoor unit through flexible duct, in order to avoid abnormal sound vibration. The unit is equipped with supply and return air duct flanges for this purpose

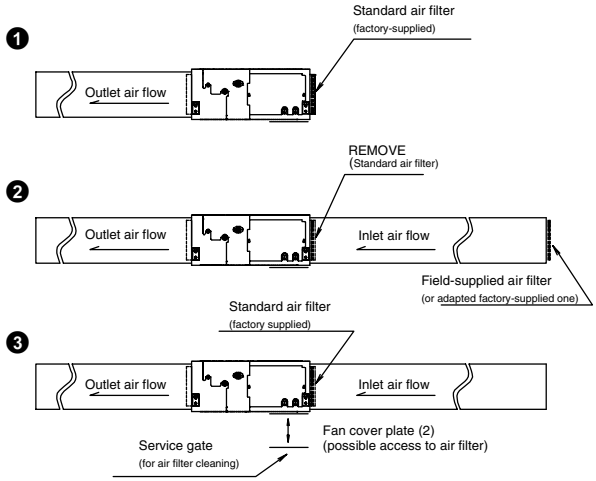
1.5.5. FIX FLEXIBLE DUCT TO EXTERNAL FACES OF FLANGES

- Suction filter

1. The factory-supplied filter must be fixed using the 6 clamps on internal faces of flanges for this purpose.

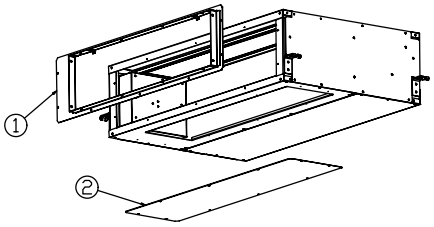


2. When the unit is installed, the filter should be fixed, installed and uninstalled through the fan cover access.



1.5.6. AIR SUCTION DIRECTION CHANGE

- Air suction direction could be modified changing back cover (2) for fan cover (1). Each cover uses 10 fixing screws.

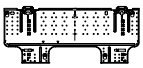
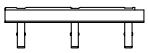
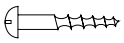
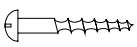
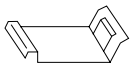
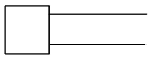


1.6. RPK (WALL TYPE)

1.6.1. FACTORY-SUPPLIED ACCESSORIES

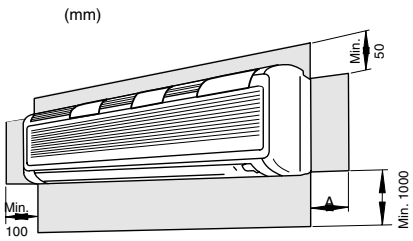
- Make sure that the following accessories are packed with the unit.

NOTE:
If any of these accessories are not packed with the unit, please contact your dealer.

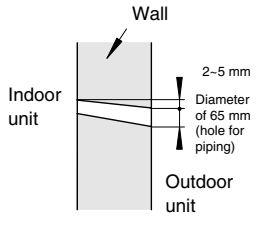
Accessory	Qty (S)	Qty (SBF)	Purpose
Mounting bracket 	1	-	For mounting indoor unit
Mounting bracket 	-	1	
Screw (Ø4.1×25mm) 	6	8	For mounting bracket
Screw (Ø4.1×40mm) 	2	4	
Plate 	1	-	For drain hose setting
Insulation pipe 	1	1	For pipe
Insulation 	1	1	For pipe
Harness with connector 	1	1	Cable for PC-P1HE
Connector 	2	2	

1.6.2. INITIAL CHECK

- Install the indoor unit with a proper clearance around it for operation and maintenance working space as shown below.



(Operation and installation space)



(Hole for piping on the wall)

(mm)

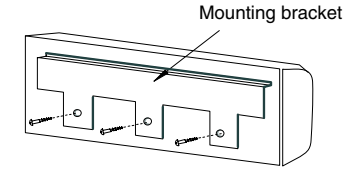
HP	A
RPK-0.8~2.0	100
RPK-2.5~4.0	200

- Consider the air distribution from the indoor unit to the space of the room, and select a suitable location so that uniform air temperature in the room can be obtained.

1.6.3. INSTALLATION

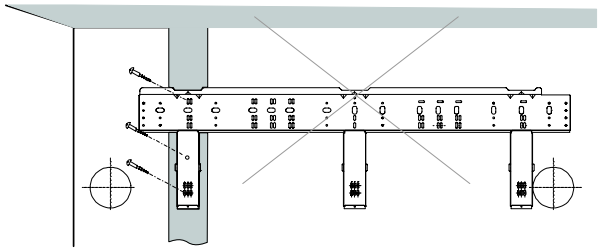
Although the illustrations used for some examples belong to RPK-2.5~4.0 models, the information supplied applies to all the wall type models.

1. Before Installation:
   Remove the mounting bracket after removing three (3) fixing screws for installation as shown in the next figure:



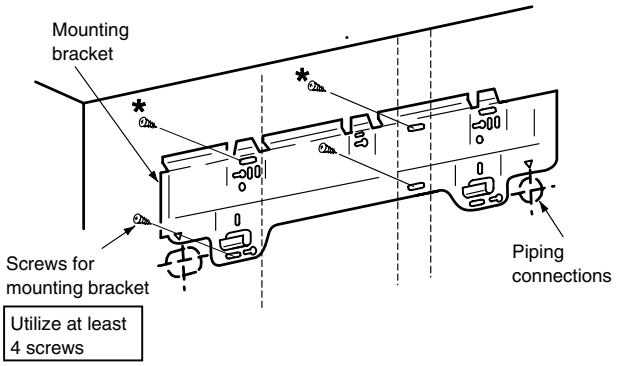
2. Mounting bracket onto wall
   When the mounting bracket is directly attached to a wood wall or a concrete wall, make sure that the wall is strong enough to support a weight of 200 kg.

3. Mounting the unit between pillars
   - Screws for wood market with * should be tightened utilizing the upper hole.
   - Do not fix the mounting bracket onto one pillar as shown below.



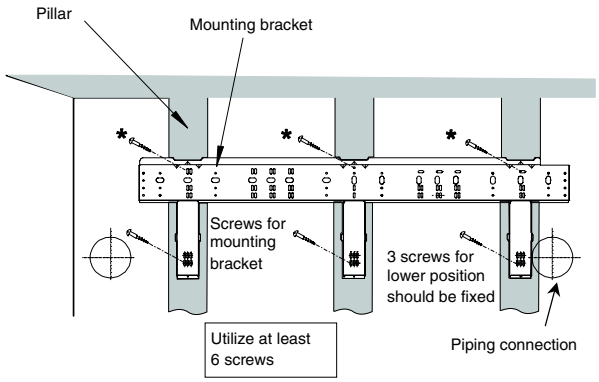
- The location where the indoor unit is to be installed should be so selected that an unbalanced weight distribution is avoided.
- The mounting bracket should be installed so that the side of drain piping connected is slightly (about 3 mm) lower than the other side, in order to avoid the incorrect position of the drain discharge. (Drain piping connection can be performed both right side and left side of the unit.)

■ RPK-0.8 ~ 2.0

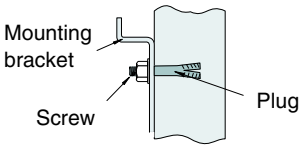


■ RPK-2.5 ~ 4.0

Screws marked with * should be tightened utilizing upper holes



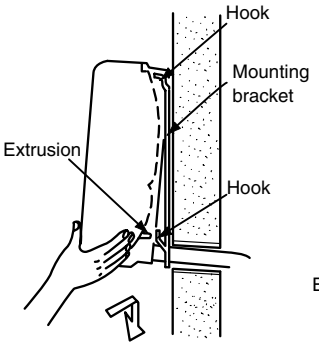
4. Mounting on a concrete wall or a concrete block wall.
   Attach the mounting bracket to the wall with anchor bolts as shown below.



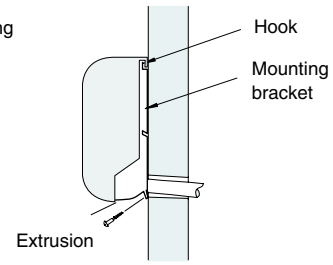
Utilize at least six-anchor bolts (M5).

5. Mounting the indoor units
   Hook the indoor unit to the mounting bracket, maintaining the indoor unit upright. Fix the bottom cover and the mounting bracket by three screws.

■ RPK-0.8 ~ 2.0



■ RPK-2.5 ~ 4.0



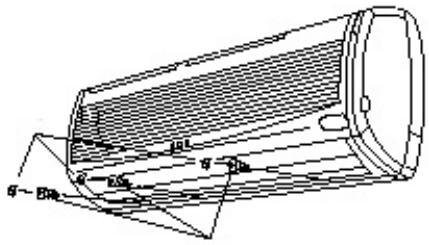
6. Make sure that the unit is completely hooked onto the mounting bracket. If not, it may drop from the bracket, resulting in a serious accident.

■ Removing the front panel

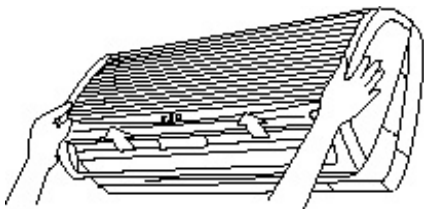
Although the illustrations used for some examples belong to RPK-0.8~2.0 models, the information supplied applies to all the wall type models.

In order to connect the refrigerant piping, the wiring and to check the drain water flow, it is necessary to remove the front panel. Perform this work according to the following instructions. Be careful not to scratch the resin components.

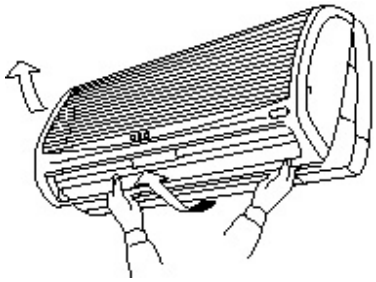
1. Remove three bushings as shown and remove the screws as shown below.



2. Slowly pull the lower side of the front panel at your side. The air outlet must not touch the outlet grille.



3. Slightly lift the front panel upward in order to release the three hooks of upper side of the front panel.

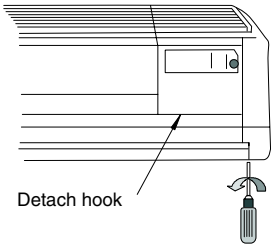


■ Putting back the front panel

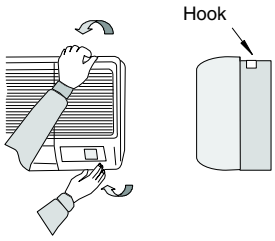
1. First put back the lower side of the front panel, and then attach the three hooks at the upper side of the front panel.
2. There are three stoppers inside the front panel. Make sure that there is no gap between the front panel, the drain pan and the unit body.

■ Removing the right side cover (RPK-2.5 ~ 4.0)

1. In order to connect the refrigerant piping, wiring and to check drain water flow, removing the right side cover is needed. Perform this work according to the following instructions. Pay an attention to the resin components not to scratch.



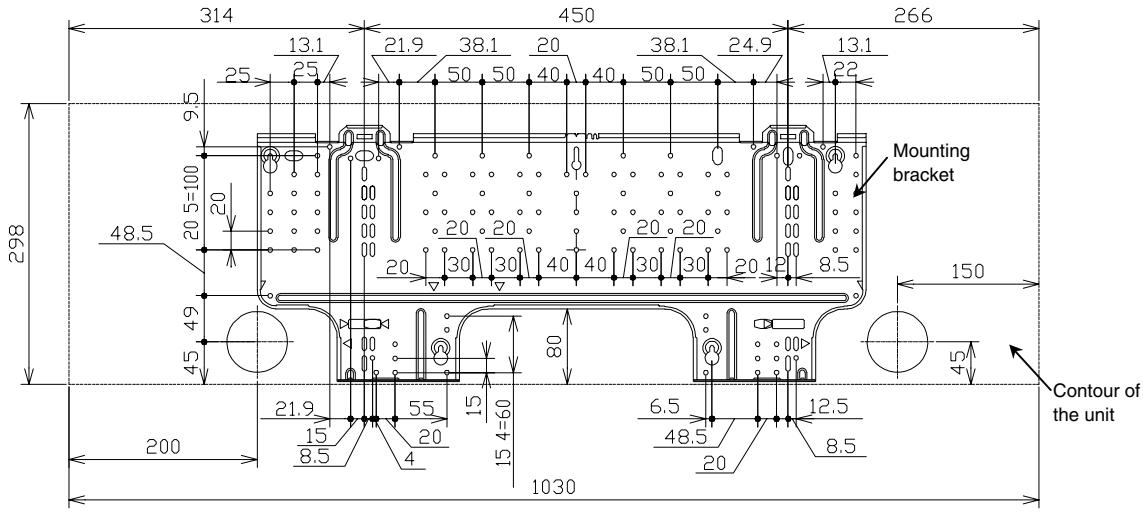
2. Slowly pull the lower side of the right side cover and detach the upper hook.



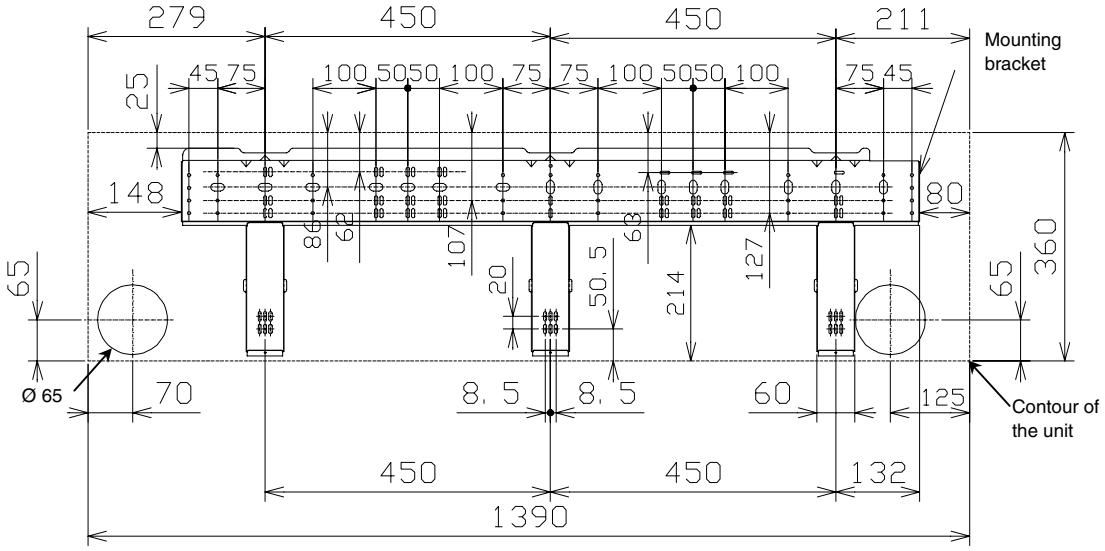
CAUTION:
Any gap may cause air leakage or dewing.

1.6.4. DIMENSIONS OF THE MOUNTING BRACKET

■ RPK-0.8 ~ 2.0



■ RPK-2.5 ~ 4.0



1.7. RPF (FLOOR TYPE)/ RPFI (FLOOR-CONCEALED TYPE)

1.7.1. FACTORY-SUPPLIED ACCESSORIES

(Models: RPF(I)1.0/2.5)

- Make sure that the following accessories are packed with the unit.

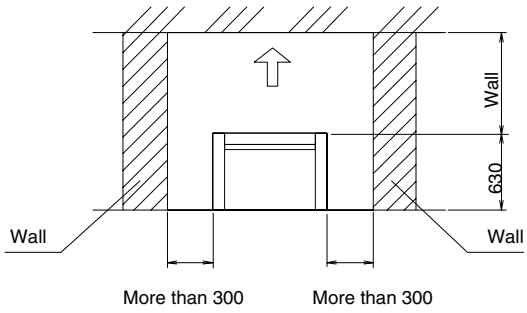
NOTE:
If any of these accessories are not packed with the unit, please contact your dealer.

Accessory	Qty	Purpose
Adjustment bolt for installation 	4	For adjusting the flat level of the unit
Ring core 	2	
Screw	2	PC-P1HE

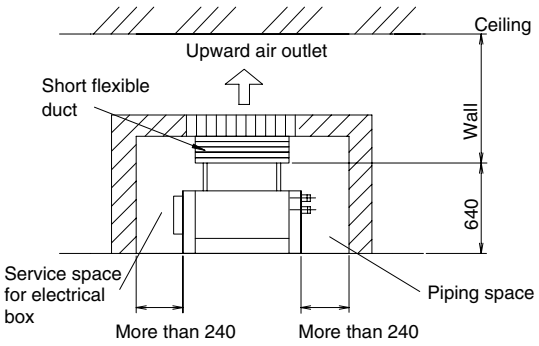
1.7.2. INITIAL CHECK

- Install the indoor unit with a proper clearance around it for operation and maintenance as shown in Service Access panel.

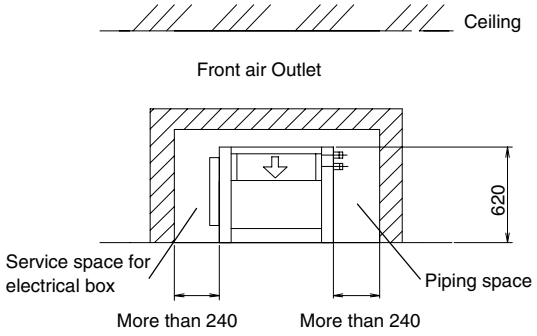
RPF



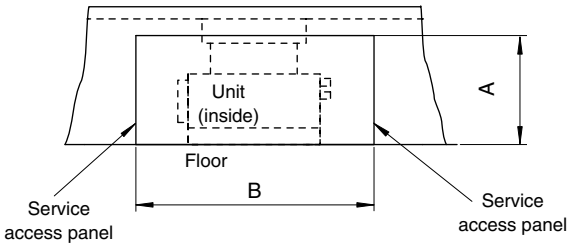
RPFI



Provide a space so that air can flow smoothly.



- Service access panel
  Provide a service access door or panel as shown below.



(Space around indoor unit)

Model	Size	
	A	B
RPFI-1.0	620	1260
RPFI-1.5		1380
RPFI-2.0		1634
RPFI-2.5		

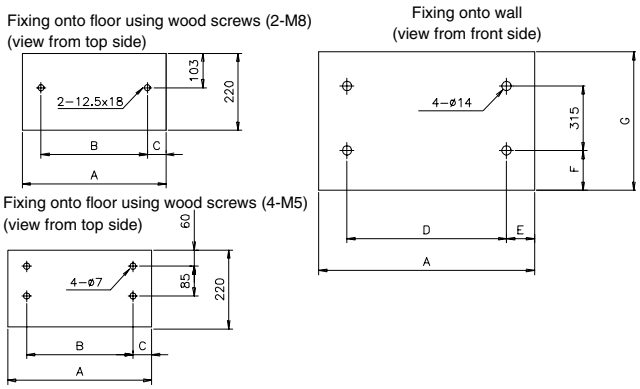
Consider the air distribution from the indoor unit to the space of the room, and select a suitable location so that uniform air temperature in the room can be obtained.

Make sure that the foundation is flat, level and sufficiently strong.

It is recommended that a service access panel for floor concealed type indoor units be provided. The access panel must be fixed with screw(s) so that service engineer(s) only is accessible.

1.7.3. INSTALLATION

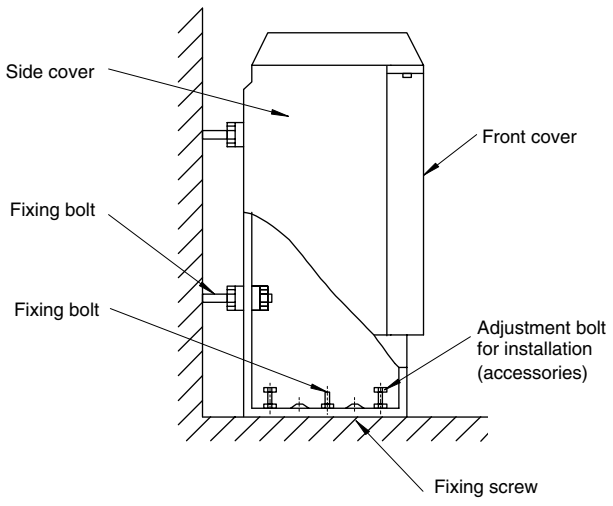
1. Make sure that the fixing position of the unit is as shown below.



(mm)

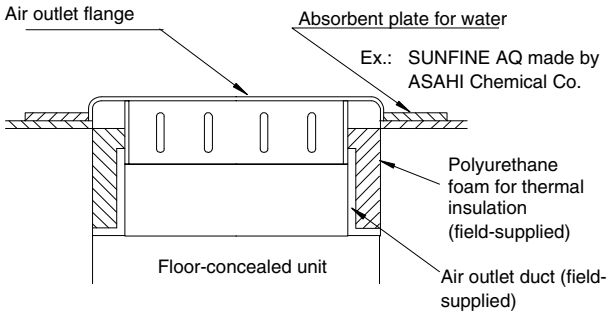
Model	A	B	C	D	E	F	G
RPFI-1.0	848	704	72	732	50	139	620
RPFI-1.5	973	829		857			
RPFI-2.0	1223	1079	72	1107	50	139	620
RPFI-2.5							

2. Adjust the flat level of the unit by loosening or tightening the bolts for installation that are attached in the unit. Make the drain pipe side lower than the opposite side for smooth drain.
3. Fix the base plate and back plate of the unit with field-supplied fixing bolts and screws. When attaching the adjusting bolts for installation, remove the electrical wiring box.
4. In case of the RPF unit, perform the above work after removing the front cover and side cover of the unit.



(Installation unit)

5. Install the optional air outlet grille of the RPFI unit as shown in the following figure. If installed in a comparatively high humid place, condensation may occur. Therefore, attach a plate that can absorb water, like SUNKEN AQ made by ASAHI Chemical Co., around the grille.



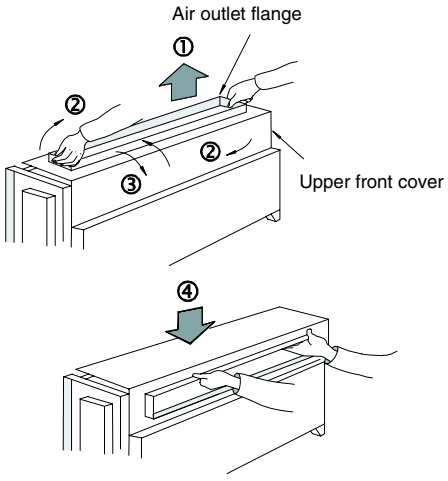
WARNING:
Provide a service access cover that is fixed by screws so that the fan runner is not directly touched (Only RPFI model).

CAUTION:
The optional air outlet grille of the RPFI unit cannot be used in a highly humid place like a kitchen, because condensation may occur on the grille surface.

Air outlet direction change (RPFI)

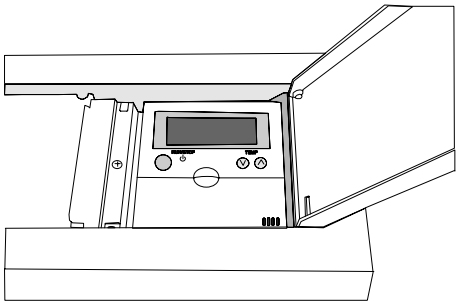
In case of changing the RPFI units air outlet direction from upward to front, follow the procedures below:

1. Remove the fixing screws of the air outlet flange and the upper front cover. Then, remove the flange and the cover.
2. Reverse the side of the flange right and left.
3. Put the cover on the top of the unit, and put the flange on the front side of the unit.
4. Fix the flange and the cover.



Optional location for PC-P1HE (RPF)

In case of RPF Unit, it is possible to install the PC-P1HE under the plastic cover as shown in the figure below:



1.8. COMPLEMENTARY SYSTEMS

In order to install the complementary systems, transport the product as close to the installation location as possible before unpacking it.

WARNING:

Do not put any foreign material into the unit and make sure that none exists in the unit before the installation and test run. Otherwise, a fire or failure, etc. may occur.

Make sure that the ceiling is strong enough.

Do not install the unit outdoors. If installed outdoors, there is risk of an electrical hazard or electrical leakage.

CAUTION:

Be careful not to damage on insulation materials of unit's surface when lifting it.

DANGER:

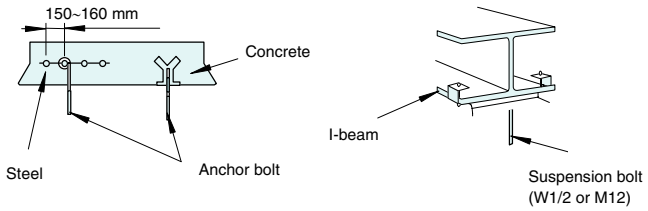
Do not install the indoor unit in a flammable environment to avoid fire or an explosion.

Mounting the unit

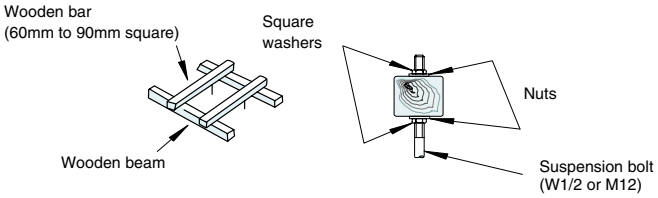
1. Select final location and installation direction of the unit paying careful attention to the space for the piping, wiring and maintenance.

2. Mount suspension bolts, as shown in the next figures:

   - For Concrete Slab and Steel Beam



   - For wooden beam suspension



3. Hang the unit:
   - Hang the suspension bracket on the anchor bolts and adjust in such a way that the unit is installed horizontally.
   - Tighten up securely using double nuts in order to prevent looseness.

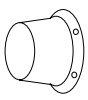
1.8.1. KPI (TOTAL HEAT EXCHANGER)

Factory-supplied accessories

- Make sure that the following accessories are packed with the unit.

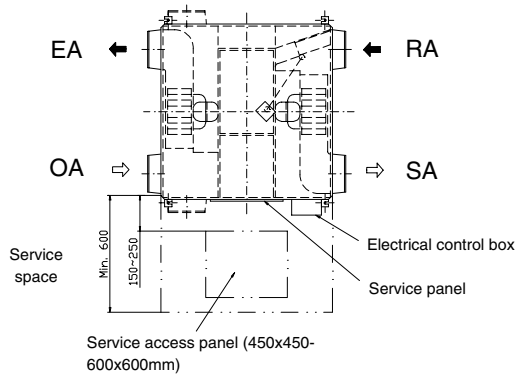
NOTE:

If any of these accessories are not packed with the unit, please contact your dealer.

Accessory	Appearance	Qty
Flange		4 (double-flanges at supply air (SA) and exhaust air (EA) sides)
Screw (M4X8)		16

Initial check

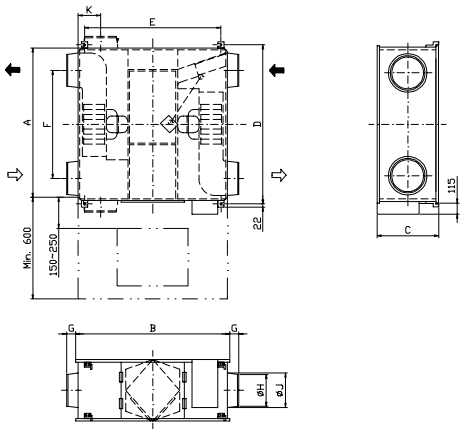
- Install the unit with a proper clearance around it for operation and maintenance working space, as shown in the next figure:



- Consider the air distribution from the unit to the space of the room, and select a suitable location so that uniform air temperature in the room can be obtained.

Marking the positions of the sling bolts and piping connections

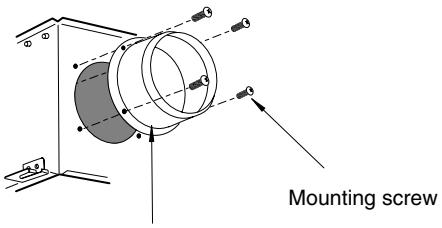
1. Mark the positions of the sling bolts, refrigerant piping connections and drain connection.
2. Installation dimensions are shown in the next figure.



Models	Outer dimension			For suspension bolt		Duct		Duct diameter		Duct (dir. change)
	A	B	C	D	E	F	G	H	J	K
KPI-2521	735	780	275	765	700	530	63	142	160	102
KPI-5021	1016	888	317	1048	790	745	79	192	208	124
KPI-8021	1004	1164	398	1036	1030	690	79	242	258	149
KPI-10021	1231	1164	398	1263	1030	920	79	242	258	149

Attaching the duct connecting flanges

- Use the screws supplied to secure the duct connecting flanges to the unit.

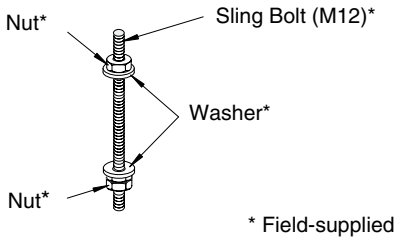


CAUTION:

Before attaching the duct connecting flanges, check that no foreign matter (scraps of paper, vinyl, etc.) has found its way inside the main unit.
Attach the duct connecting flanges with the packing at the SA and RA sides.

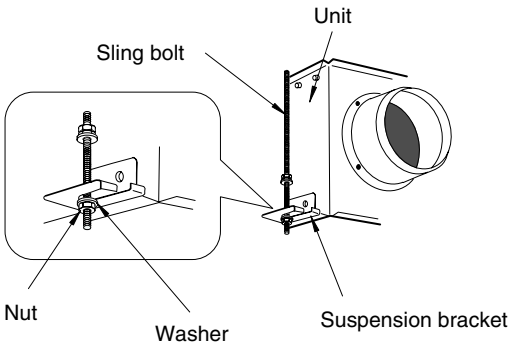
Mounting the indoor unit

1. Preparing the sling bolts.



2. Hanging the unit.

- Hang the suspension bracket on the anchor bolts and adjust in such a way that the unit is installed horizontally.
- Tighten up securely using double nuts in order to prevent looseness.



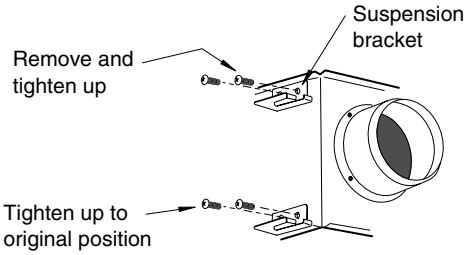
CAUTION:

When suspending the main unit from the ceiling, do not handle it in such a way that force will be applied to the control box.

NOTE:

In case of that the sling bolts are too short, re-attach the suspension bracket in an alternative position.

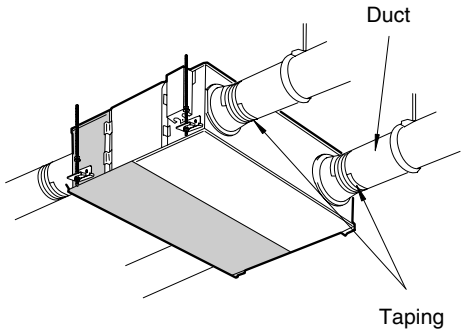
1. *Remove the screws at the top mounting position.*
2. *Remove the suspension brackets and attach them at a higher mounting position.*
3. *Tighten up the screws in the screw hole where the suspension brackets were removed in order to prevent air leaks.*

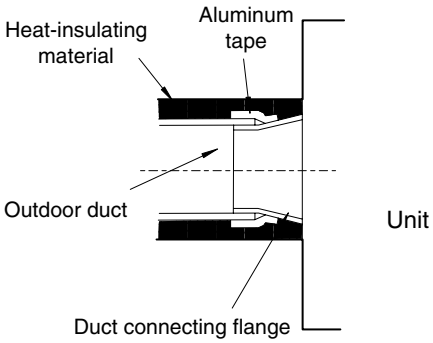


Connecting the supply duct

The supply duct should be connected with the unit through flexible duct, in order to avoid abnormal sounds and vibration. The unit is equipped with a pre-drilled duct flange for the supply duct connection.

1. Fit the ducts securely into the duct connecting flanges, and wind aluminum tape (field-supplied) around them to prevent air leaks.
2. Suspend the ducts from the ceiling so that their weight will not be applied to the unit.
3. The two outdoor ducts must be covered with heat-insulating material in order to prevent condensation from forming.

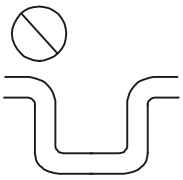
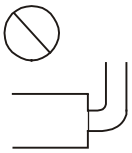
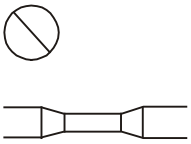




CAUTION:
Before connecting the ducts, check that no sawdust or any other foreign matter (scraps of paper, vinyl, etc.) has found its way inside the ducts.

Do not touch the damper plate inside the main unit when connecting the ducts.

Do not install the ducts in the ways illustrated below. Doing so will reduce the air volume and give rise to abnormal sounds.

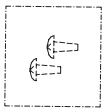
Extremely sharp bends	Multiple bends
	
Bends right next to the outlet	**Extreme reduction in the diameter of the connected ducts**
	

1.8.2. ECONOFRESH KIT

Factory-supplied accessories

- Make sure that the following accessories are packed with the unit.

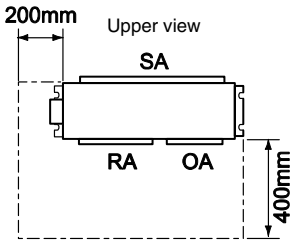
NOTE:
If any of these accessories are not packed with the unit, contact your dealer.

Accessory		Qty
Cord AS		1
Outdoor thermistor (8m)		1
Screw *(for RPI and Econo-Fresh flanges connection)*		12

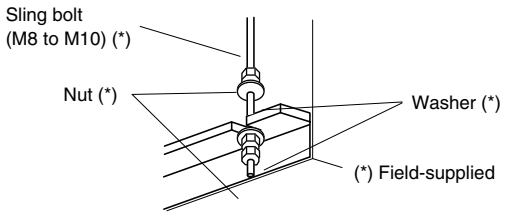
Initial check

Before performing the Econo-Fresh kit installation, refer to the indoor unit's Installation and Operation Manual.

Install the indoor unit with a proper clearance around it for operation and maintenance working space, as shown below.



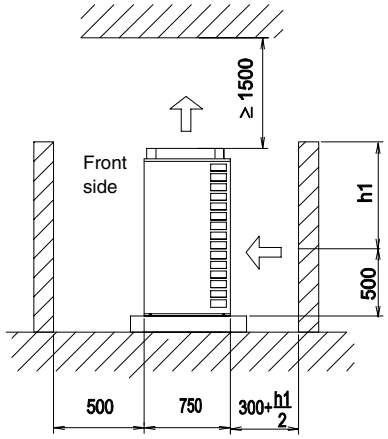
CAUTION:
When suspending the main unit from the ceiling, do not handle it in such a way that a force will be applied to the control box.



1.9. RAS (OUTDOOR UNIT)

1.9.1. INSTALLATION LOCATION (5 TO 10 HP)

- Installation place
  - Install the outdoor unit in a place where there is adequate space around the unit for operating and maintenance as shown below.



* Add the half of dimension h2 to 1500 for air intake space of front side when the wall front side is higher than 1500 mm

  - Install the outdoor unit where there is good ventilation.
  - Install the outdoor unit where it is in the shade or it will not be exposed to direct sunshine or direct radiation from high temperature heat source.
  - Install the outdoor unit where the falling ice from the unit will not create a hazard, as in the case of installation on top of a building where ice may fall down on the pedestrians.
  - Install the outdoor unit where the sound or discharge air from the outdoor unit does not affect neighbors or environment.
  - Make sure that the foundation is flat and sufficiently strong.
  - Do not install the outdoor unit where dust or other contamination could block the outdoor heat exchanger.
  - When installing the outdoor unit in snow-covered areas, mount the field-supplied hoods on the top of the outdoor unit and the inlet side of the heat exchanger.
  - Do not install the outdoor unit where there are high-levels of oil mist, salty air or aggressive gases such as sulfur.
  - Do not install the outdoor unit where electromagnetic waves are directly radiated to the electrical box and inverter components.
  - Install the outdoor unit as far as practical at least 3 meters from the electromagnetic wave radiation, as electronic noise can cause miss-operation of the unit.

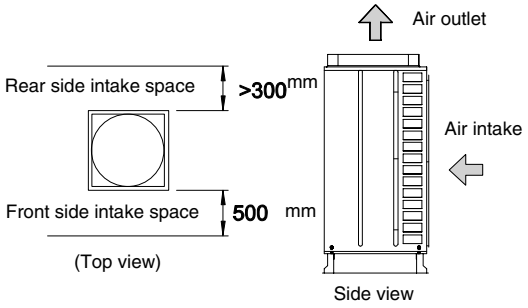
NOTE:
In certain cases, a fuse may be blown and the system may stop in high electro-magnetic turbulence environment.

In certain cases, the system can get an alarm in high electro-magnetic turbulence environment. In such case, stop and start the system to clear the alarm.

Install the outdoor unit on a roof or in an area where people, except service engineers, cannot touch the outdoor unit.

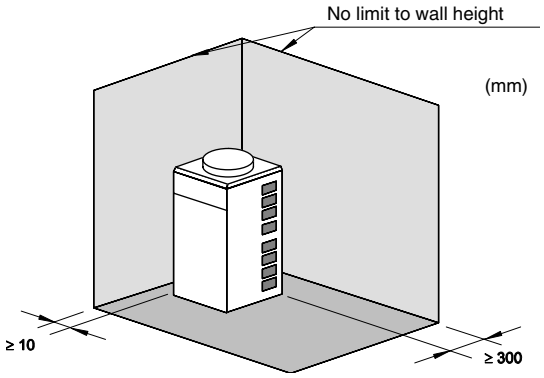
CAUTION:
Aluminum fins have very sharp edges. Pay attention to the fins in order to avoid any injury.

- Basic space

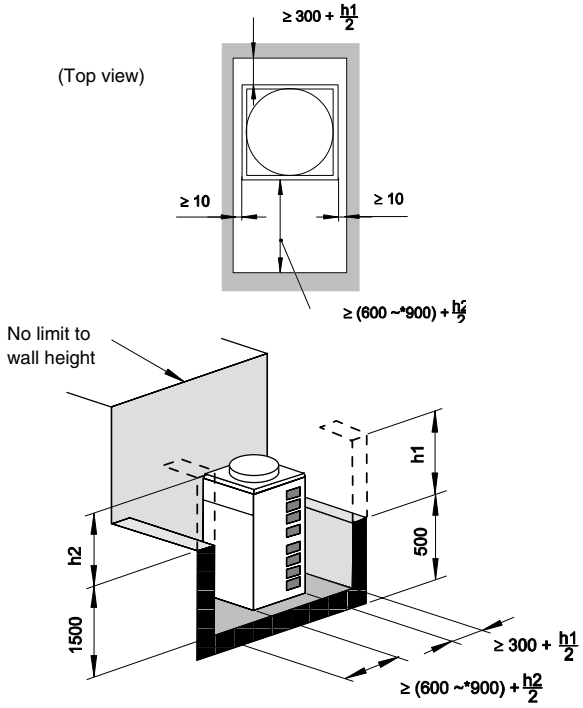


1.9.2. INSTALLATION SPACE FOR SINGLE UNIT

- In case that the front side and either of the sides are open.

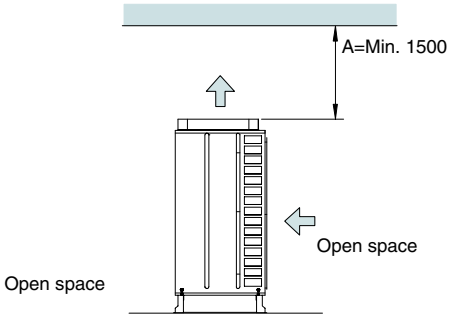


- In case that there is a surrounding wall.



* A space of 900 mm is recommended for easier service work

- In case that there is an obstacle above the unit.



The surrounding space front, rear, left and right side, should be open

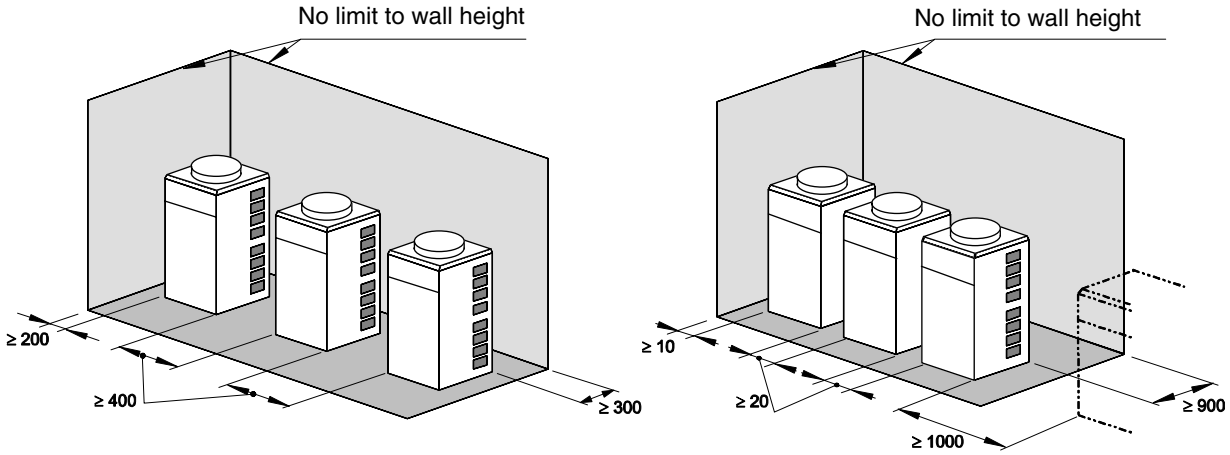
NOTE:

– *In case that dimension A is shorter than 1500 mm or the surrounding space of the unit is not open, provide the air outlet duct to prevent the air short-circuiting.*

– *The above instructions and measurements are applicable to all outdoor units (RAS) of Set Free Series: 8, 10, 16, 20, 24 and 30 HP models.*

1.9.3. SERIAL UNITS INSTALLATION

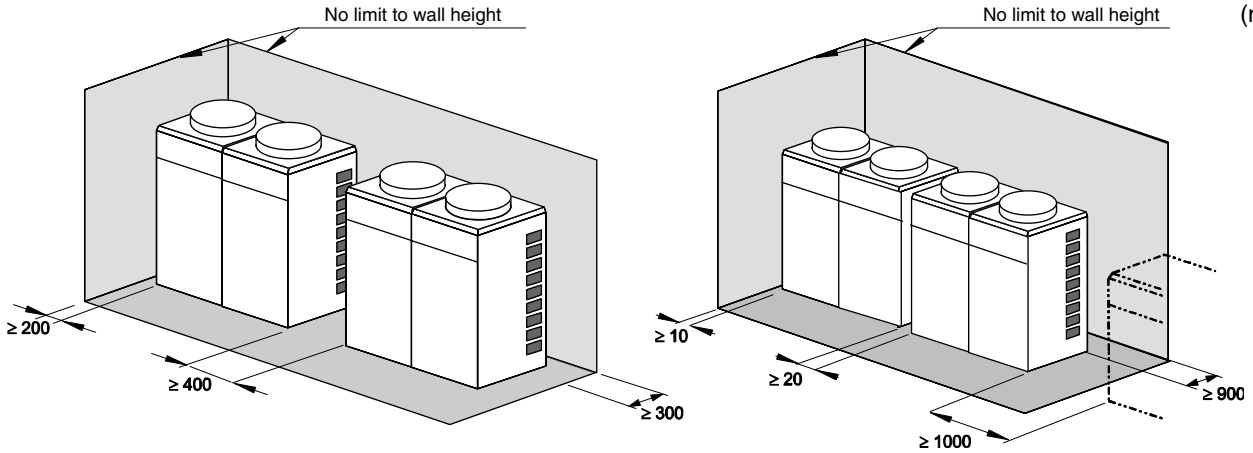
A1. In case that the front and either of the sides are open. RAS 5/8/10/16 HP



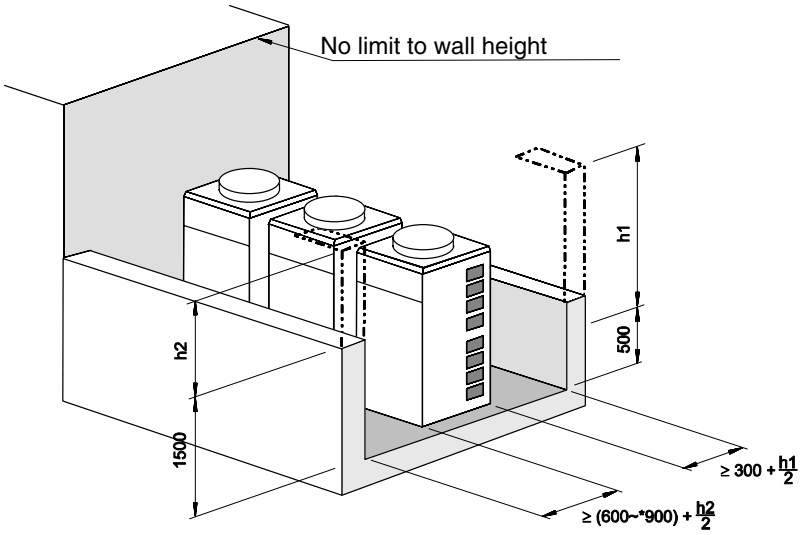
* A space of 900 mm is recommended for easier service work

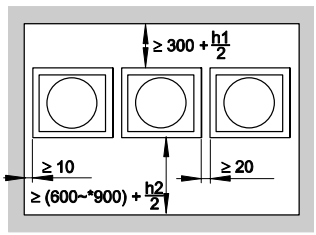
A2. In case that the front and either of the sides are open. RAS 20/24/30 HP

(mm)



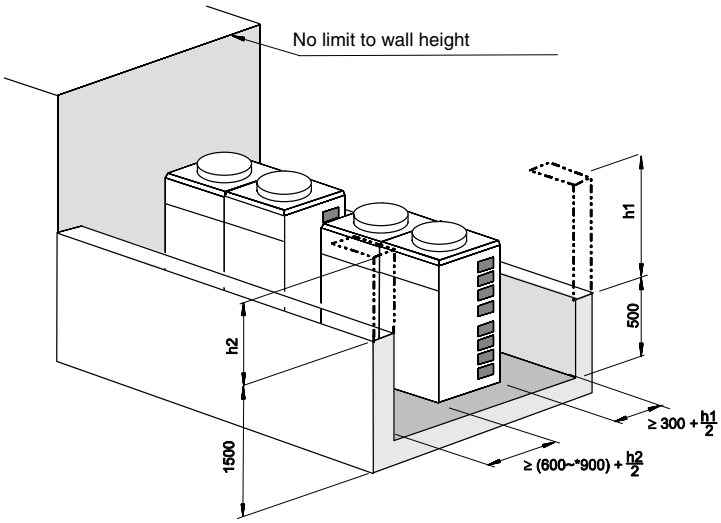
B1. Rear to rear installation RAS 5/8/10 /16 HP

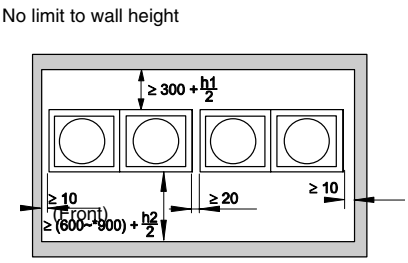




* A space of 900 mm is recommended for easier service work

B2. Rear to rear installation RAS 20/24/30 HP





(Top view)

* A space of 900 mm is recommended for easier service work

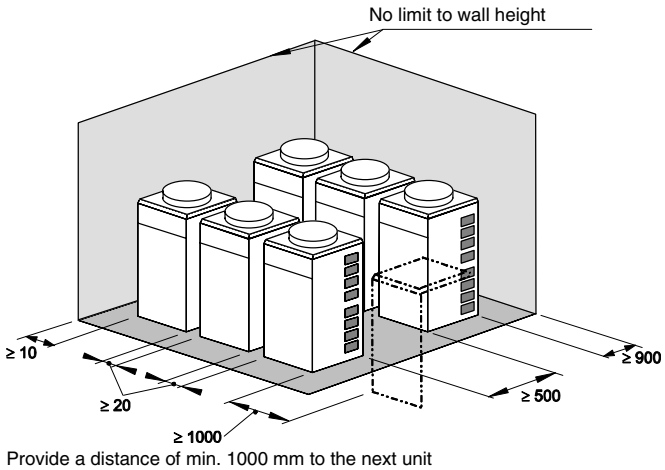
1.9.4. MULTIPLE INSTALLATION SPACE

In case of RAS 5/8/10/16 HP

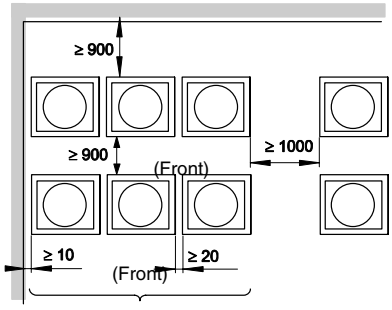
Keep the upper side open to prevent air short-circuiting.

- In case that the front and either of the sides are open.
  - Installation in the same direction

(mm)



Provide a distance of min. 1000 mm to the next unit

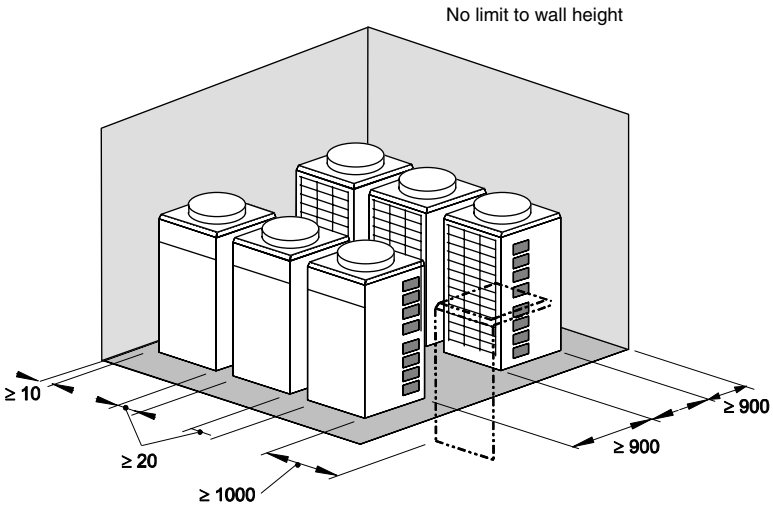


(Max. 3 units in a row)

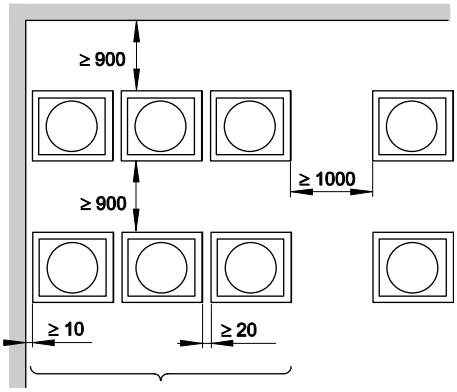
(Top view)

- Refer to rear installation

(mm)



Provide a distance of min. 1000 mm to the next unit

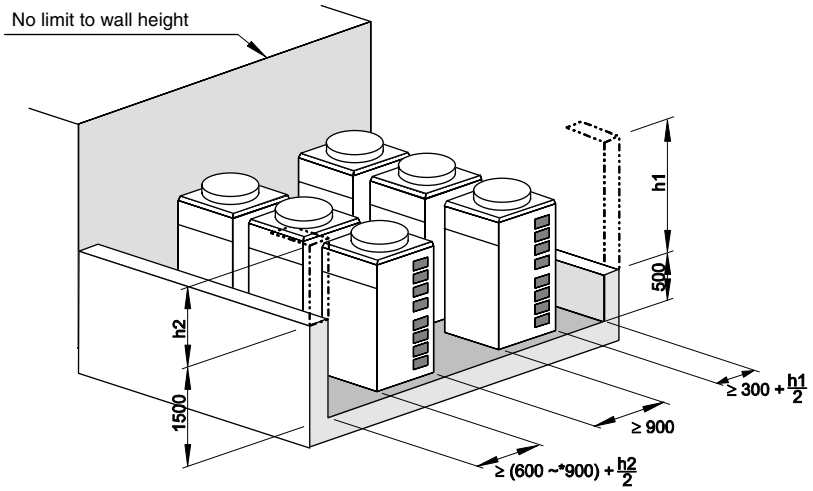


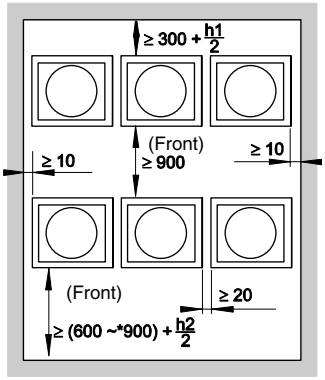
(Max. 3 units in a row)

(Top view)

- In case that there is a surrounding wall.
  - Installation in the same direction

(mm)



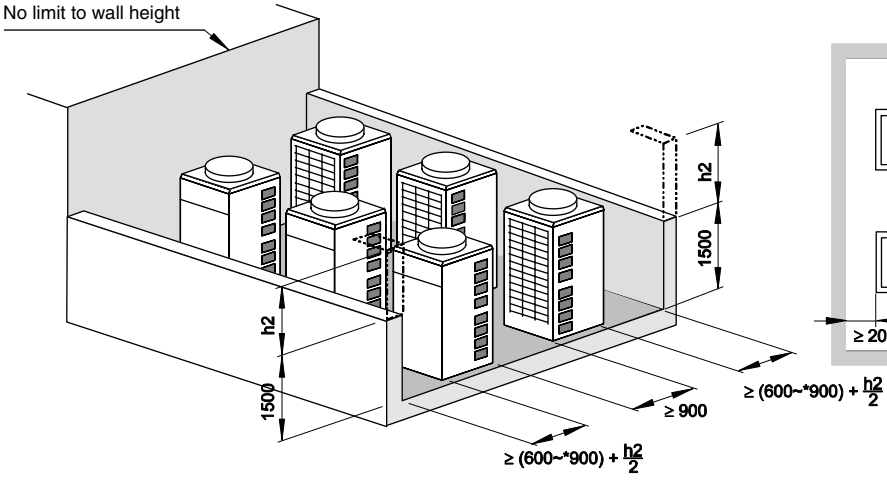


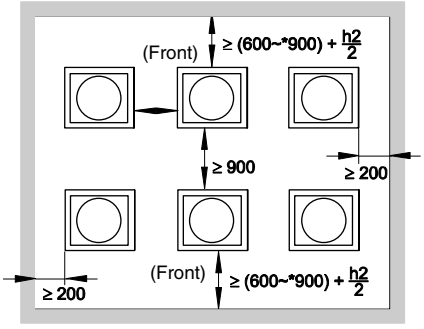
(Top view)

* A space of 900 mm is recommended for easier service work

- Rear to rear installation (case 1)

(mm)



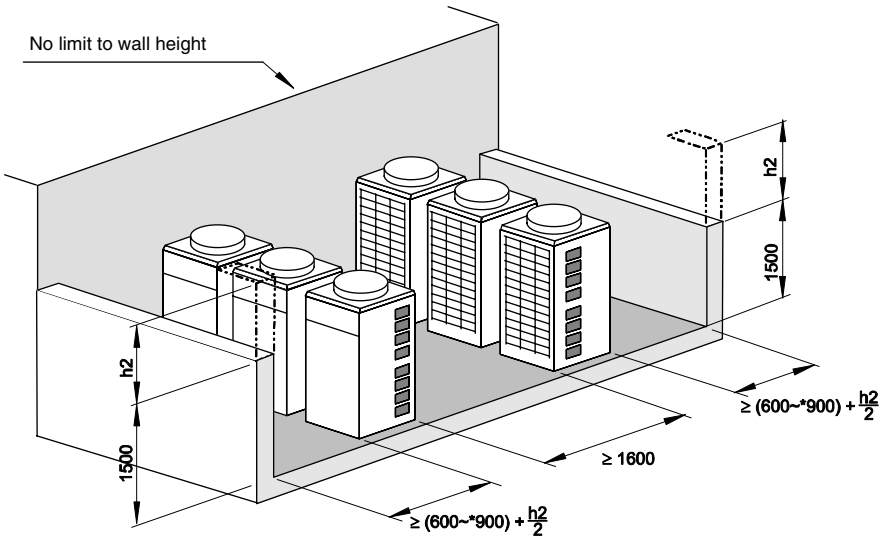


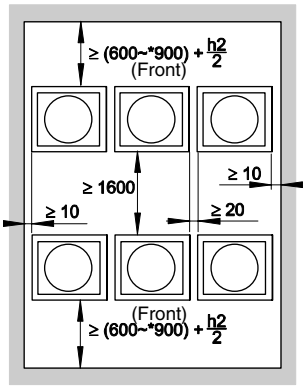
(Top view)

* A space of 900 mm is recommended for easier service work

- Rear to rear installation (case 2)

(mm)

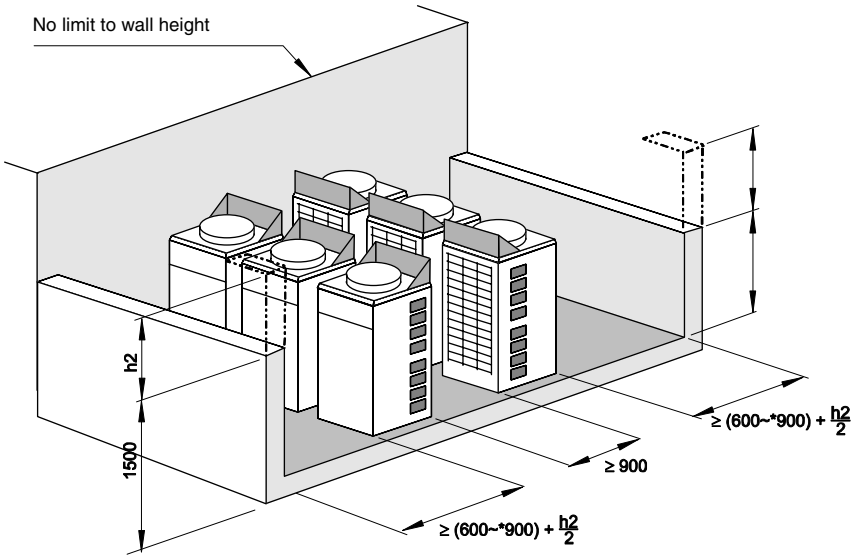


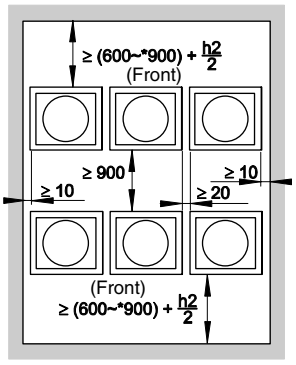


* A space of 900 mm is recommended for easier service work

- Rear to rear installation (case 3)

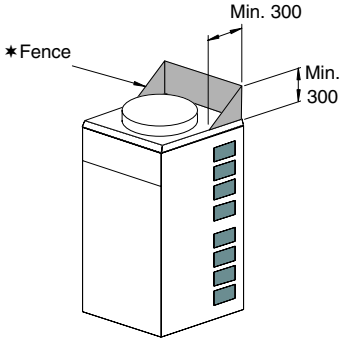
(mm)





(Top view)

* A space of 900 mm is recommended for easier service work

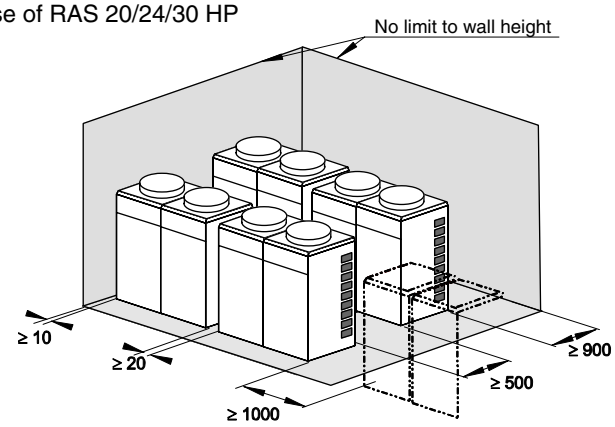


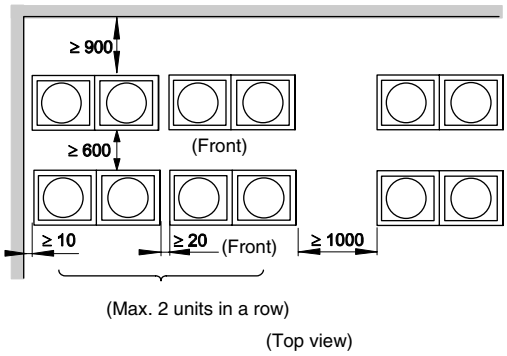
✶ In case that the rear space is less than 1600 mm and the side space is less than 400 mm, apply a field-supplied fence for each unit.

NOTE:

✶ In case of 20,24,and 30HP there are two air outlets

■ In case of RAS 20/24/30 HP



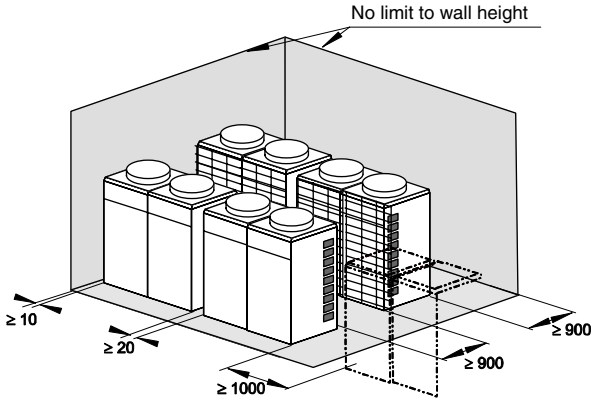


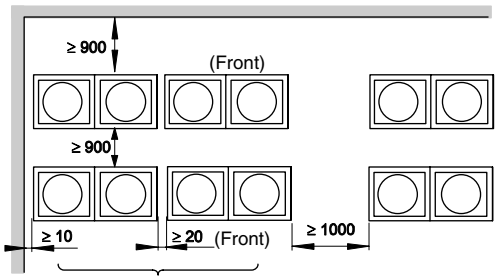
(Top view)

Provide a distance of min. 1000 mm to the next unit

- Refer to rear installation

(mm)





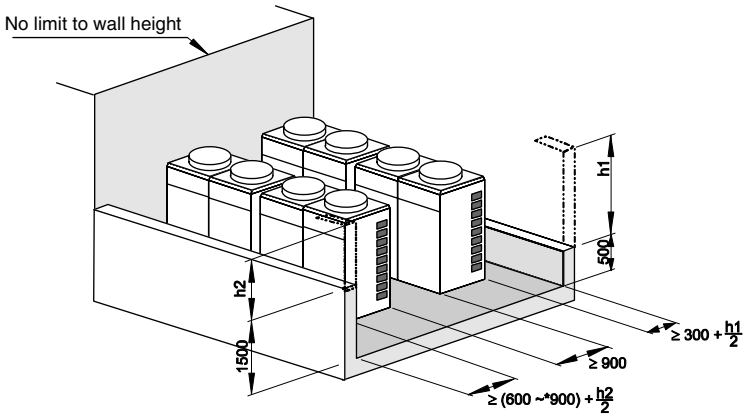
(Top view)

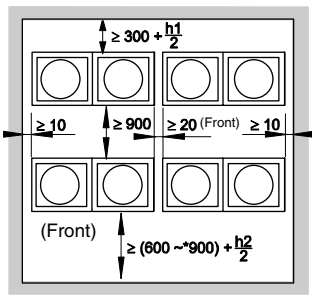
Provide a distance of min. 1000 mm to the next unit

▪ In case that there is a surrounding wall.

- Installation in the same direction

(mm)



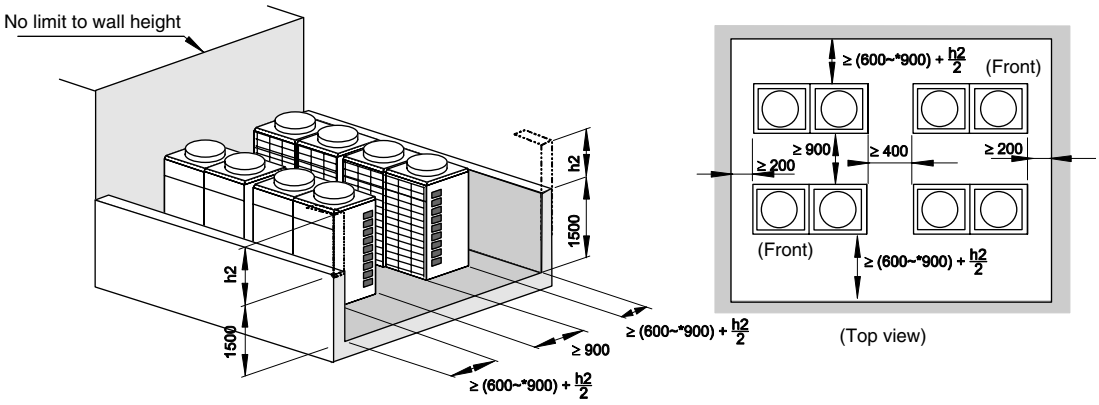


(Top view)

* A space of 900 mm is recommended for easier service work

- Rear to rear installation (case 1)

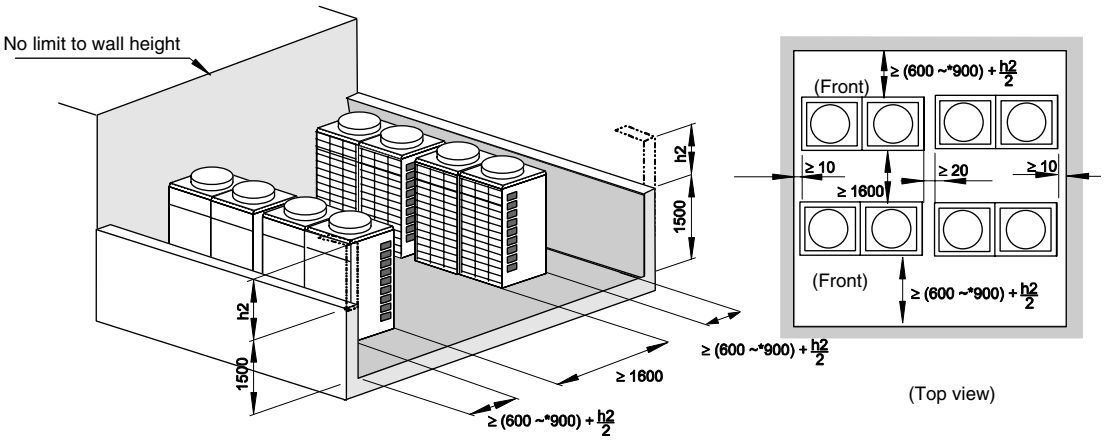
(mm)



* A space of 900 mm is recommended for easier service work

- Rear to rear installation (case 2)

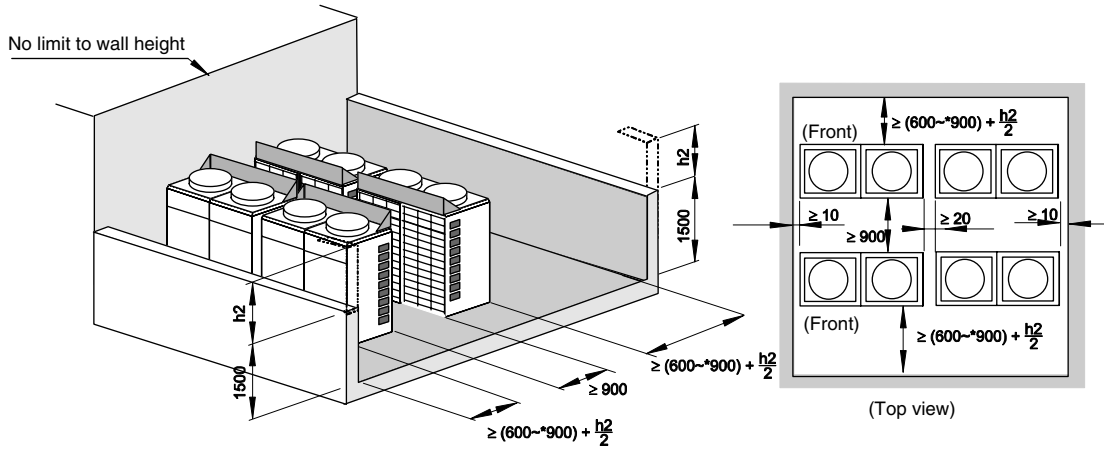
(mm)



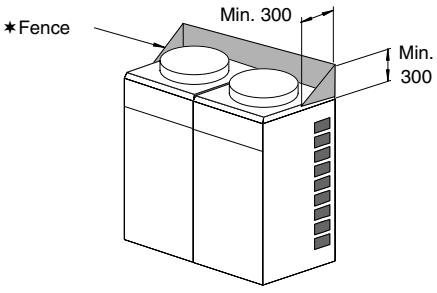
* A space of 900 mm is recommended for easier service work

- Rear to rear installation (case 3)

(mm)



* A space of 900 mm is recommended for easier service work



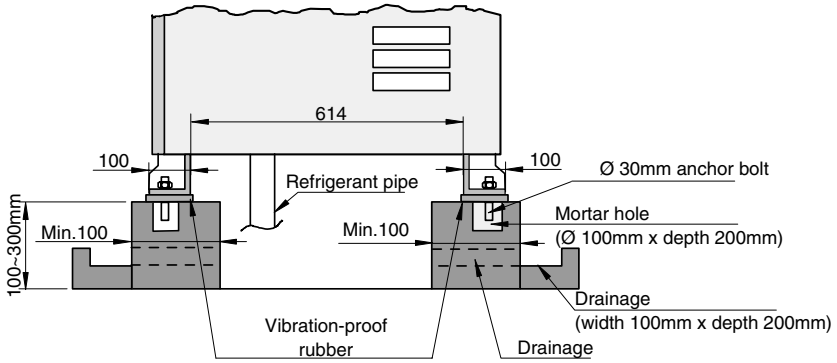
✶ In case that the rear space is less than 1600mm and the side space is less than 400mm, apply a field-supplied fence for each unit.

1.9.5. FOUNDATION PROVISION

- Concrete foundations
  - The height of the foundation should be 100~300 mm higher than the ground level.
  - Install drainage around the foundation for smooth drain.
  - When installing the outdoor unit, fix the unit by anchor bolts.
  - Secure the outdoor unit with the anchor bolts.

– When installing the unit on a roof or a veranda, drain water sometimes turns to ice on a cold morning. Therefore, avoid draining in an area that people often use because it is slippery.

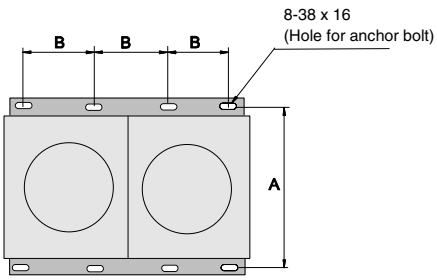
Foundations



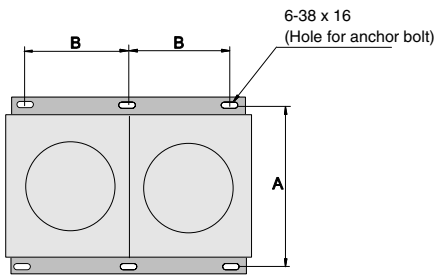
MODEL	A	B
RAS-5FSN	760	368
RAS-8FSN		688
RAS-10FSN		
RAS-16FSN		948
RAS-20FSN		824
RAS-24FSN		723
RAS-30FSN		

Position of anchor bolts

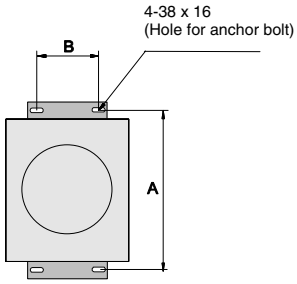
RAS-24 / 30FSN

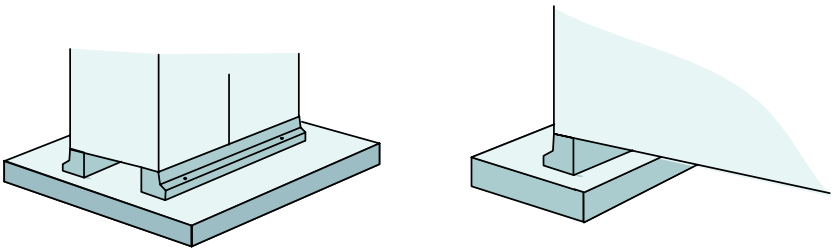


RAS-20FSN

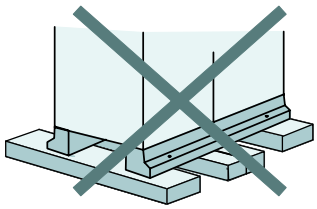


RAS-5~16FSN





Correct foundation



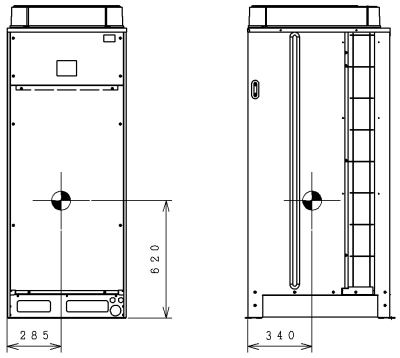
Incorrect foundation

NOTE:
Design the foundation as shown above and make sure that all the feet of the unit fall within the foundation boundaries.

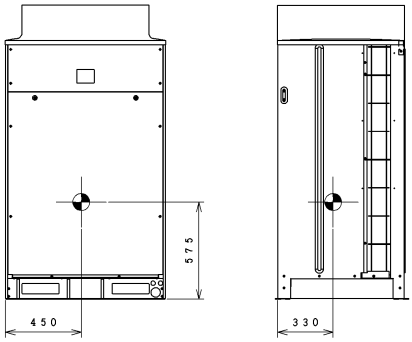
1.9.6. CENTER OF GRAVITY

■ **Center of gravity**

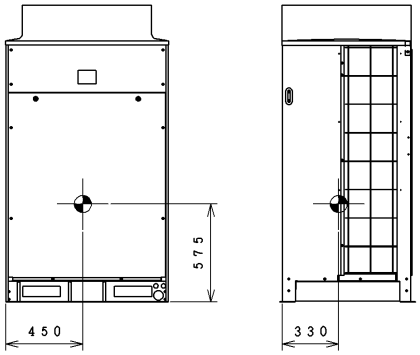
Models: RAS-5FSN



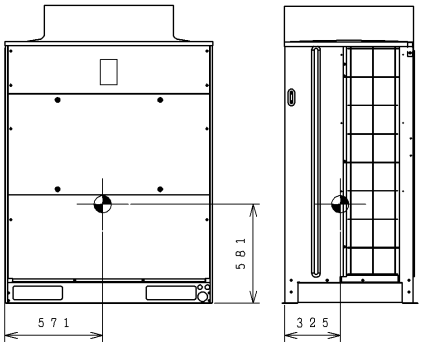
Models: RAS-8FSN



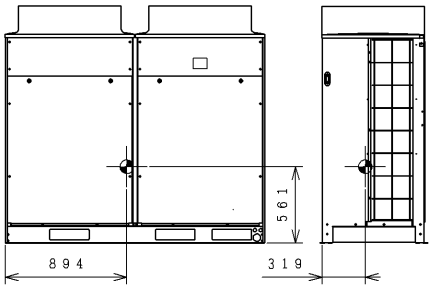
Models: RAS-10FSN



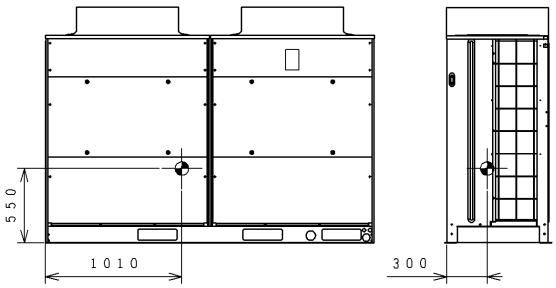
Models: RAS-16FSN



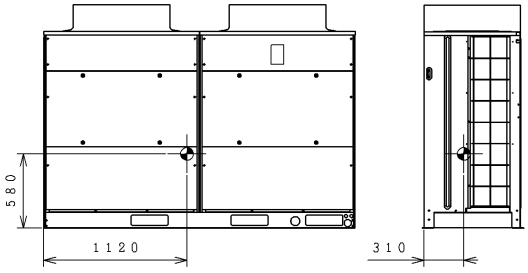
Models: RAS-20FSN



Models: RAS-24FSN



Models: RAS-30FSN



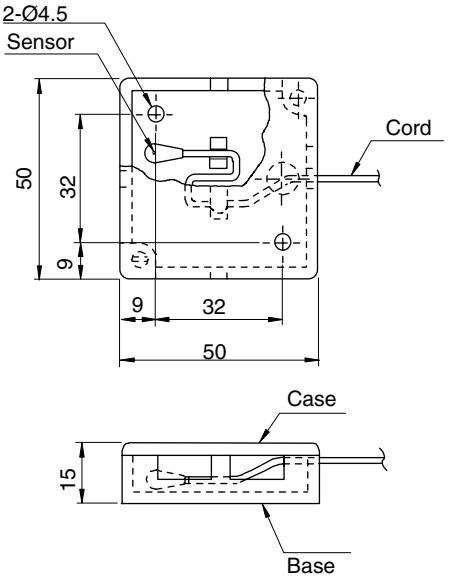
1.10. OPTIONAL ACCESSORIES

1.10.1. REMOTE SENSOR (THM-R2AE)

When the room temperature sensing thermistor (Remote sensor) is attached to the auxiliary connector, the unit is controlled by average air temperature at the indoor inlet and Remote Sensor point.

Specifications

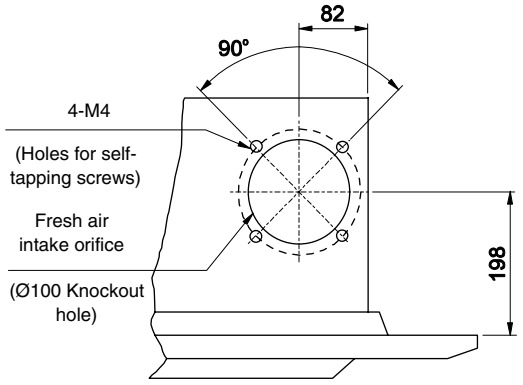
Item		Specification
Model		THM-R2AE
Case	Material	ABS resin
	Color	Spring white
Base	Material	ABS resin
	Color	Spring white
Sensor	Part name	Thermistor
	Cord length	approx. 8m



NOTE:
This optional accessory is not available for RPK-M Model.

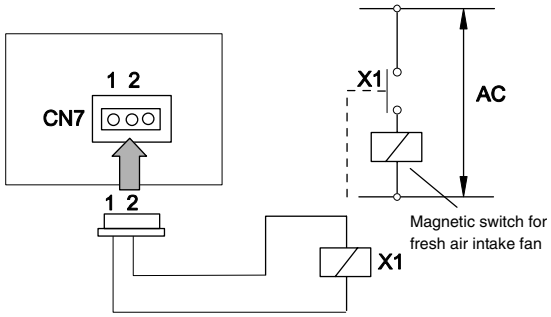
1.10.2. FRESH AIR INTAKE FOR 4-WAY CASSETTE INDOOR UNITS

1. Connection position of fresh air intake duct. Fresh air can be taken in by connecting the duct to the position shown in the next drawing.
2. This unit cannot draw in fresh air by itself. It must be connected to a duct containing a fan and control damper.



Connection position of fresh air intake duct

3. Control the duct fan so that it will operate only when the main unit is operating. In following figure, an electrical control example is shown (more details in chapter 6.1.7).



NOTE:
Use a 3P connector Cable (PCC-1A) for CN7 of indoor printed circuit board. For further information, refer to Chapter 9.6.3 in document TCGB0031.

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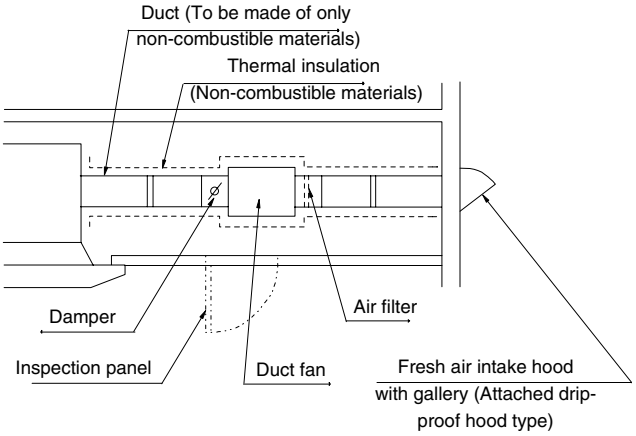
4. The maximum amount of fresh air intake is as shown in the table below. In the case that fresh air that exceeds this amount is taken in, there is risk of water condensing on the lower surface of the drain-pan (Air Intake Orifice), and in certain cases troubles such as dew formation will occur. Always limit to the values shown in the table.

Model	Limit amount of fresh air intake (m^3/min)
RCI-1.0 RCI-2.0 RCI-2.5 RCI-3.0	1.0
RCI-4.0 RCI-5.0	2.0

5. Attach an air filter on the air suction side of the duct for fresh air intake at a position where servicing may be carried out easily. (Air passing through the duct does not pass through the filter of the main unit.)
6. Insulate the duct and the duct connection portion. In addition, use only non-combustible materials for the duct and insulation.

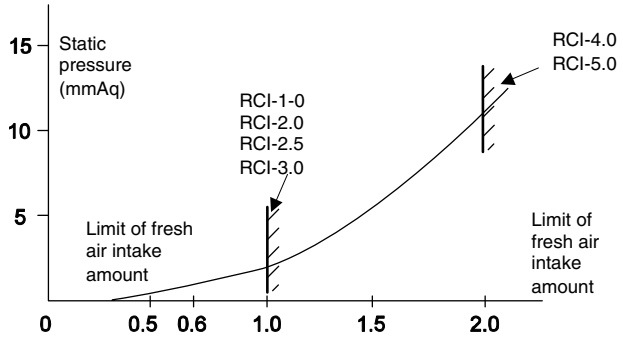


(Duct fan attachment drawing)

NOTE:
All parts of the above figure are field-supplied.

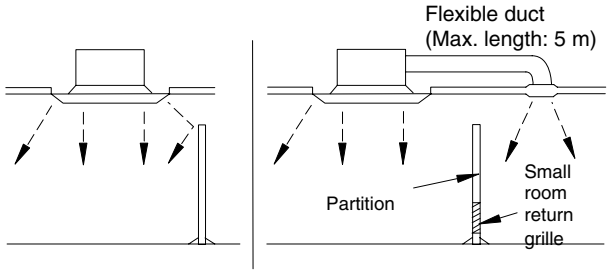
7. The duct resistance of the fresh air intake portion will be as shown in the figure below. Use this as a guideline for selecting the duct fan.
8. In the case that a duct fan larger than the limit of fresh air intake amount shown in the above figure is selected, always use a damper and adjust the quantity of air.
9. Install an inspection panel below the duct fan for servicing the air filter and the damper.

Duct resistance of fresh air intake portion



1.10.3. BRANCH DISCHARGE

If there are obstacles, such as partitions, inside a room and they prevent air from circulating well, you can install branched ducts to provide uniform temperature air conditioning. You must install the required return air grilles, depending on the amount of return air. If an adjoining room is air-conditioned, install always a return grille.



(Example of branched duct)

■ Fitting the branched duct

1. The branched duct connections are shown in the Fig. A. There are knockout holes. After cutting the insulation material of the outside surface in a circular shape by aligning the notches of the four corners, use a screwdriver or the similar and remove it.
   As for the connection duct, a flexible duct with a diameter of Ø150 is standard, and the connection flange used in this case shall be prepared at the site by referring to the dimensions shown in Fig. B. After attaching the connection flange to the indoor unit Knockout hole portion, it must be thermally insulated by insulation material the dimensions of which are shown in Fig. C.

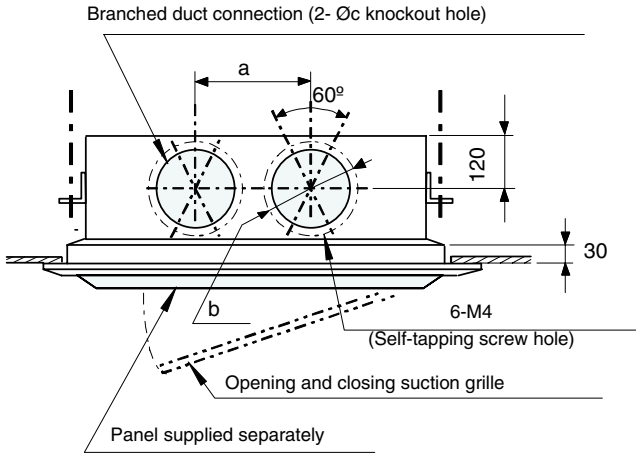


Fig. A. Dimensions of duct connection

Model	a	b	c
RCI-1.0 RCI-2.0 RCI-2.5 RCI-3.0	280	180	150
RCI-4.0 RCI-5.0	300	235	200

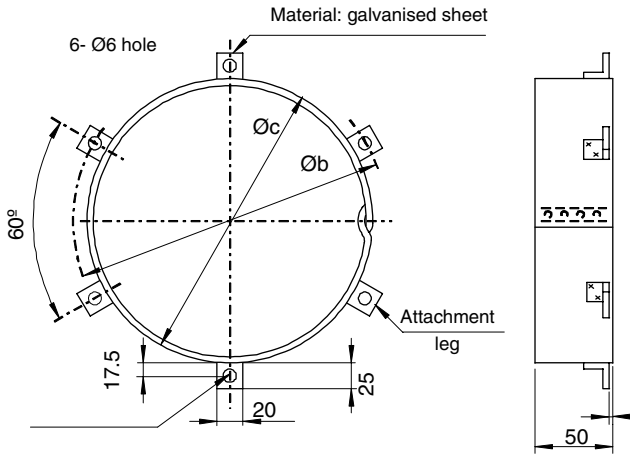


Fig. B. Dimension example of connection flange

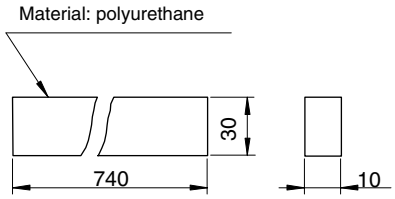
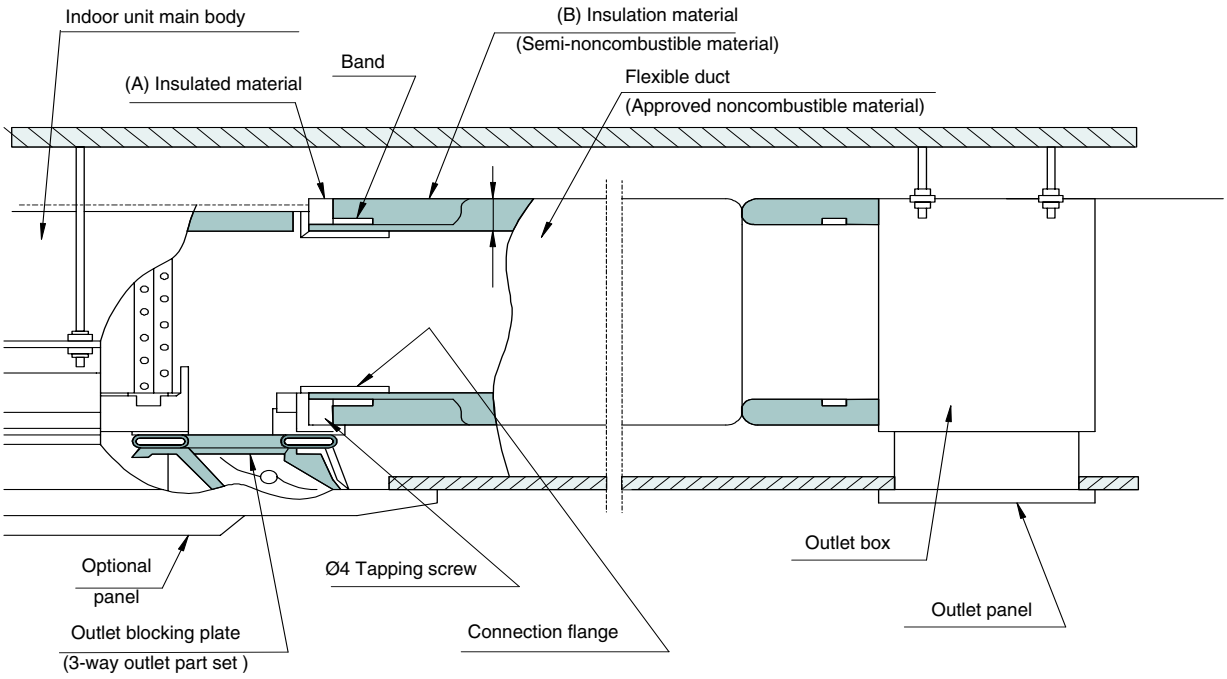


Fig. C. Insulation material (A)

2. The outline of connection is shown in the figure below.



(Example of branched duct connection)

3. Perform sufficient insulation treatment for the attachment portion between the connection flange and the indoor unit main body as well as the attachment portion between the duct and the connection flange.
   Use a 3-Way Outlet Part set (Optional parts) and completely block the air outlet of the branched duct side of the panel. (For prevention of condensation and divert the air to the branched duct.)

3-way outlet parts set

Model	Unit model	Remarks
PI-23LS3	RCI-2.0~5.0	To be attached to the outlet of the panel. See Chapter 1.9.4 for details

The following flexible duct, outlet box, and outlet panel are available as optional parts. (Refer to the table below.)

Optional parts for cassette type air conditioners

Name of item	Model	Remarks
Flexible duct	FD-1B	Length 1 m 1 piece
	FD-2B	Length 2 m 1 piece
Outlet box	PDB-15W	1 piece
Outlet panel		1 piece

Attach supports to the flexible duct and fix it in position so that it will not bend. (Minimum radius 500 mm or above.)

4. Air quantity ratio of branched duct side is shown as a ratio of the unit air quantity in the table below. If 2 branch ducts are connected to the unit, as shown by the*, the branch duct side air quantity will become greater, and the air velocity of the 3-way outlet side will drop. Consequently the warm air throw distance will become shorter.

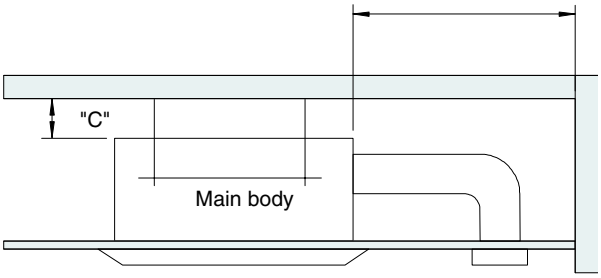
Air quantity ratio of branch duct side

Model	Number of ducts attached	
	One FD-2B (duct side resistance approx. 1.0mmAq)	Two FD-2B (duct side resistance approx. 1.0mmAq)
RCI-1.0~5-0	About 25%	* (About 40%)

CAUTION:
These precautions for planning or installing the ducts should also be applied to chapter 1.9.4 if fresh air is taken in.

1. In the case that the branch duct is installed from the standpoint of prevention against accidents, keep the dimensions shown in the following drawing.
2. Use non-combustible materials for the duct.
3. Install sufficient thermal insulation for the duct. (This is to prevent condensation).

4. Follow the local code in the field, or use the dimensions shown in the next figure, if no code is applicable.



(Space between the unit and the wall)

Material of walls and pillars

Space	Material of walls and pillars	
	Combustible materials	Non-combustible materials
"C"	100 cm or above	10 cm or above
"D"	60 cm or above	5 cm or above

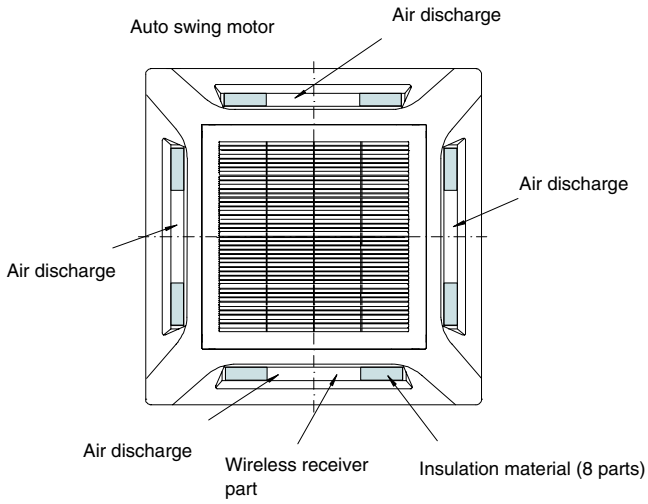
1.10.4. DIRECTION AIR FLOW FOR 4-WAY CASSETTE TYPE INDOOR UNITS

In the event that only three outlets are required, utilize the 3-way outlet parts set shown in the table below.

Model	Contents of parts	Unit model
PI-23LS3	Blocking plate B·R 1 piece (for panel) Blocking plate F·L 2 pieces (for short outlet portion)	RCI-1.0~5.0

NOTE:
The blocking plates must be fitted as shown on the drawing.

Only one of the 4 outlets can be blocked as shown below.



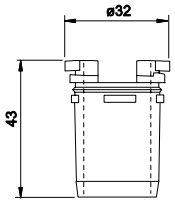
(Attachable position of 3-way outlet parts set)

CAUTION:
In case 3 outlets are used, the decrease in air quantity will be about 3 to 5%, and within the operation range of the unit, there will be no major difference in particular, in comparison with the 4-way outlet. However, the noise will increase by about 1 to 2 dB.

1.10.5. OUTDOOR UNIT DRAIN-KIT (DBS-26)

If drain water from the heat exchanger of the outdoor unit is required to be collected, use the Drain Kit. However, it is not recommended to use it in a snowfall area. If the drain water is required to be collected completely, provide a field-supplied drain pan under the outdoor unit.

Model	Drain kit quantity (units)
RAS-5HP	3
RAS-8/10/16HP	4
RAS-20/24/30HP	8



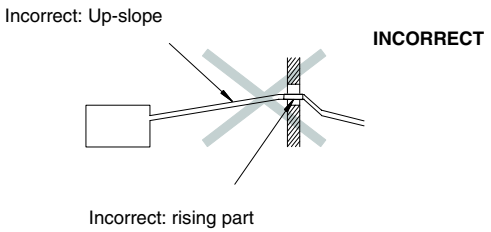
2 DRAIN PIPING

CONTENTS

2.1. GENERAL

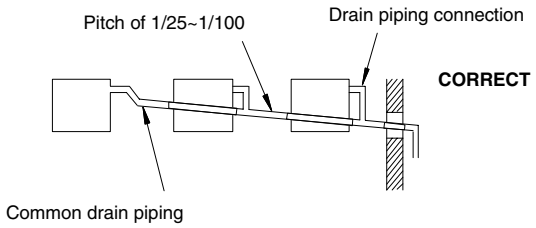
CAUTION:

– *Do not create an up-slope for the drain pipe. If you do so, the drain water will flow back to the unit. Then, leakage to the room will occur when the unit operation is stopped.*



– *Do not connect the drain pipe with the sanitary piping, the sewage piping or any other drainage piping.*

– *When the common drain piping is connected with other indoor units, the connected position of each indoor unit must be higher than the position of the common drain piping. The pipe size of the common drain pipe must be large enough according to the unit size and the unit number.*



– *The drain pipe will require insulation if it is installed in a location where condensation may form on the outside of drain pipe. This condensation may drop and cause damage.*
The insulation for the drain pipe must be selected in order to ensure that the vapor is sealed and in order to prevent the condensation from forming.

– *The drain trap should be installed next to the indoor unit. The drain trap must be designed according to good practice. The drain trap must be also checked with charged water in order to test the correct flow. Do not tie the drain pipe and the refrigerant pipe together. Do not clamp the drain pipe and the refrigerant pipe together.*

NOTE:
Install the drainage in accordance with national codes and local codes.

After installing the drain piping and the electrical wiring, make sure that the water flows smoothly as the following procedure explains.

■ Checking the unit without the drain-up mechanism

– Pour approximately 1.8 liters of water into the drain pan.

– Make sure that the water flows smoothly and that no water leakage occurs. If you cannot find water at the end of the drain pipe, once again pour approximately 1.8 liters of water into the drain pan.

■ Checking the unit with the drain-up mechanism and the float switch

– Turn on the power supply.

– Pour approximately 1.8 liters of water into the drain pan. Then, the float switch will be activated. The drain pump will start working automatically.

– Make sure that the water flows smoothly and that no water leakage occurs. If you cannot find water at the end of the drain pipe, once again pour approximately 1.8 liters of water into the drain pan.

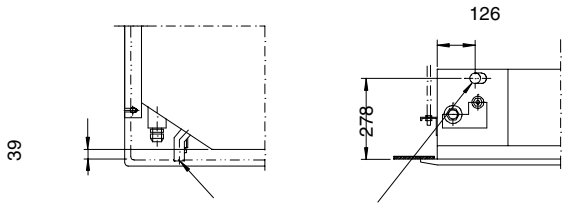
– Turn off the power supply.

NOTE:
Pay attention to the thickness of the insulation material when the left-side piping is installed. If the insulation material is too thick, you cannot install the piping in the unit.

2.2. INDOOR UNITS

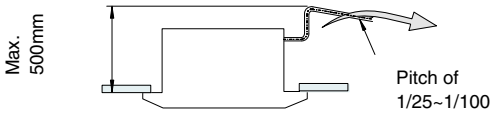
2.2.1. RCI (4-WAY CASSETTE)

1. The position of the drain pipe connection is shown below.



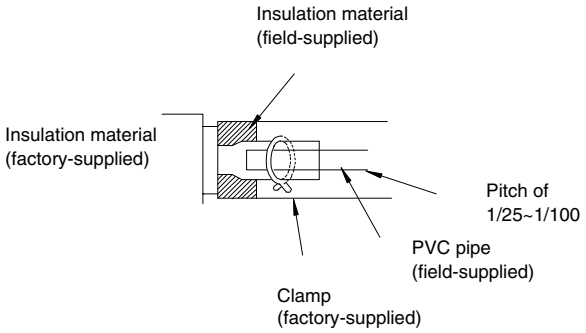
Drain pipe connection

2. Prepare a PVC pipe with an outer diameter of 32mm.
3. Fasten the pipe to the drain hose with an adhesive and with the factory-supplied clamp. The drain piping must be installed with a pitch of 1/25 to 1/100.



Gradient of drain piping

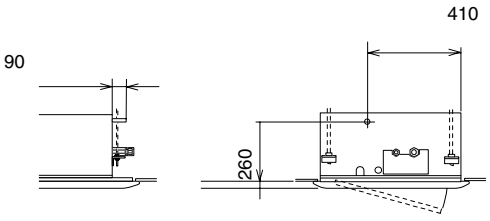
4. Insulate the drain pipe after connecting the drain hose.



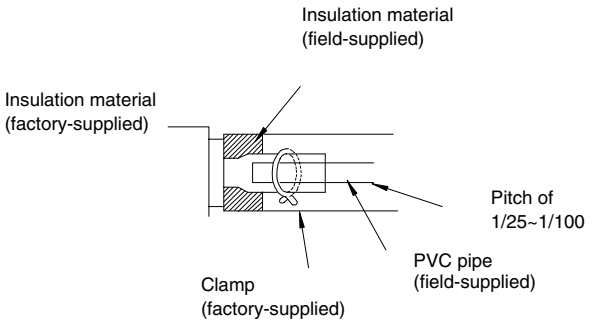
Drain piping

2.2.2. RCD (2-WAY CASSETTE)

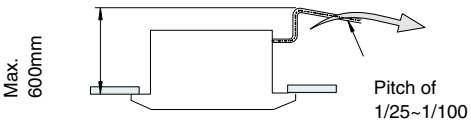
1. The position of the drain piping connection is shown below.



2. Prepare a PVC pipe with an outer diameter of 32mm.
3. Fasten the pipe to the drain hose with an adhesive and with the factory-supplied clamp. The drain piping must be installed with a pitch of 1/25 to 1/100.



Drain piping



Gradient of drain piping

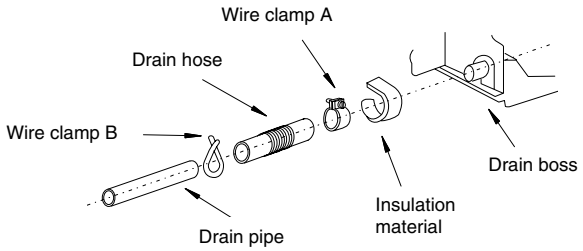
4. Insulate the drain pipe after connecting the drain hose.

2.2.3. RPC (CEILING TYPE)

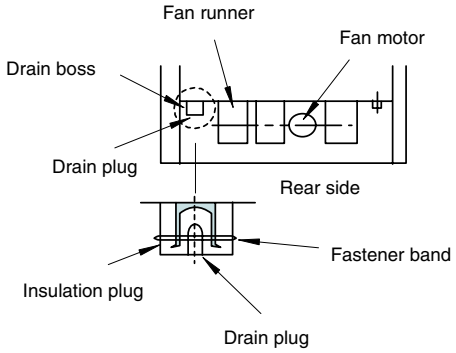
The standard direction of drain pipe connection is to the right side looking at the unit from the discharge grilles. However, the pipe connection can be performed from the left side if this is required due to the building construction.

■ For the right-side connection

- Insert the hose into the wire clamp.
- Push the drain hose onto the drain boss until the hose reaches the end of the drain pan.
- Tighten the screw for the wire clamp in order to hold the hose around the drain connection without any leakage of drain water as shown below.
- Insulate the drain hose around the wire clamp in order to prevent any condensation from forming as shown below.

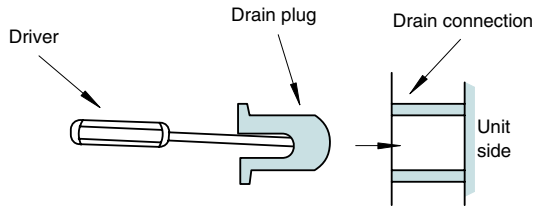


■ For the left-side connection

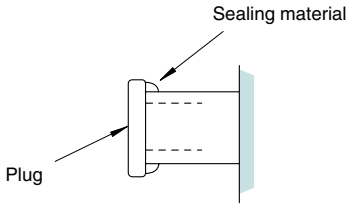


Remove the drain plug of the drain boss on the left side as the following procedure explains.

1. Cut the fastener.
2. Remove the insulation material.
3. Remove the drain plug.
4. Insert the drain plug into the drain boss on the right side by using a driver as shown below.



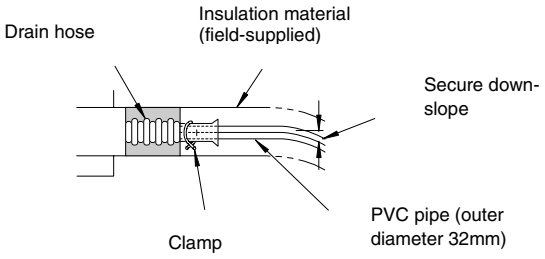
5. After inserting the drain plug into the drain boss on the right side, seal the jointed part by using a waterproof chloride-type sealing material and secure the jointed part with a fastener.



6. Wrap the insulation material around the drain connection.
7. Connect the drain hose to the drain connection on the left side according to the same procedure for the drain connection on the right side.

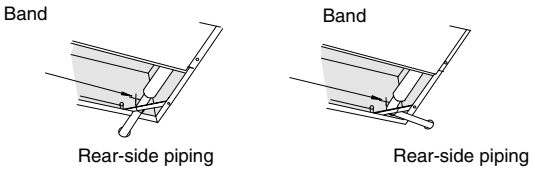
■ Connecting a drain piping

1. Prepare a PVC pipe with an outer diameter of 25mm. (VP20).
2. Pay attention to the position of the drain pipe. Keep a down-slope pitch of 1/25 to 1/100. Do not create an up-slope for the drain piping.
3. Seal the connecting part of the drain pipe by using the waterproof chloride-type sealing material.
4. Wrap the insulation material around the connecting part perfectly.
5. Fasten the drain pipe to the connecting part with the factory-supplied clamp.



Wrapping the insulation material

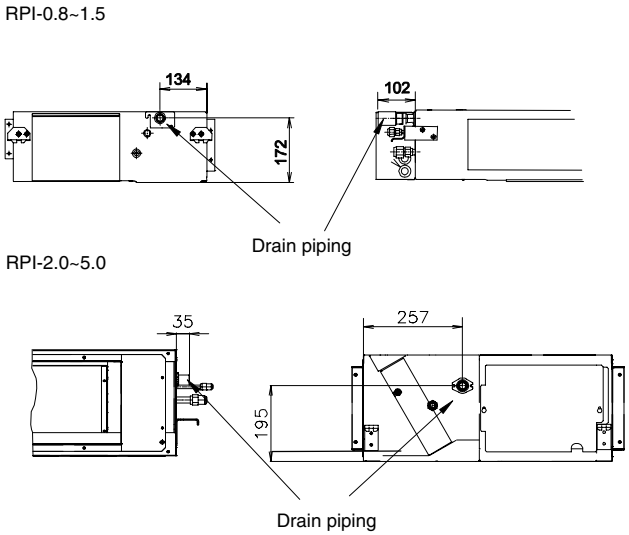
6. Do not connect the drain pipe with the sanitary piping, the sewage piping or any other drainage piping.
7. When you are installing the pipe, do not tie the drain pipe and the refrigerant pipe together. Tie the drain pipe as shown below.



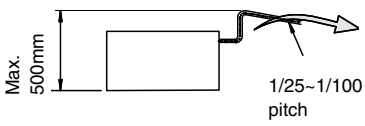
8. After completing the installation of the drain pipe, pour water into the drain pan and make sure that the water flows smoothly as explained in section 2.1.

2.2.4. RPI (IN-THE-CEILING TYPE)

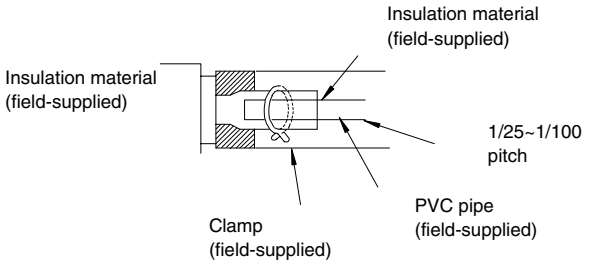
1. The position of the drain pipe connection is shown in the next figure.



2. Prepare a polyvinyl chloride pipe with an outer diameter of 32mm.
3. Fasten the pipe to the drain hose with an adhesive and with the factory-supplied clamp. The drain piping must be installed with a down-slope pitch of 1/25 to 1/100.

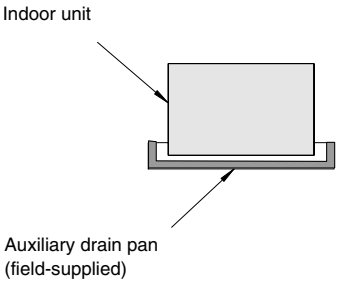


4. Insulate the drain pipe after connecting the drain hose.



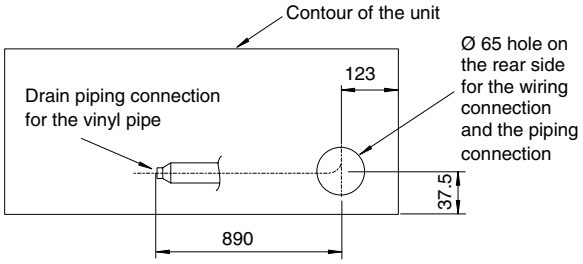
(Drain piping)

NOTE:
When the relative humidity of the inlet or the ambient air exceeds 80%, place an auxiliary drain pan, which is field-supplied, beneath the indoor unit as shown below.

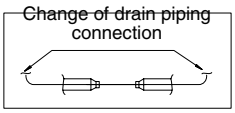


2.2.5. RPK (WALL TYPE)

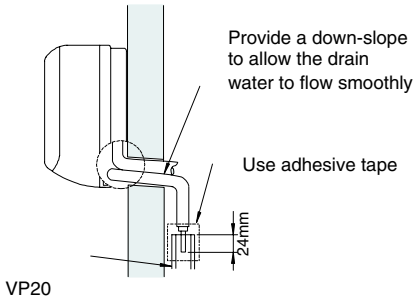
1. The standard direction of drain piping connection is to the right side when the unit is viewed from the discharge grilles. However, the connection can be performed from the left side or the rear side.



2. When the drain piping connection is performed on the left side, remove the cap of left-side drain pipe. Then, attach this cap to the right-side drain pipe in order to change the drain piping connection from the right side to the left side.



3. Prepare a PVC pipe with an outer diameter of 25mm (VP20).
4. Connect a drain piping according to the figure below.

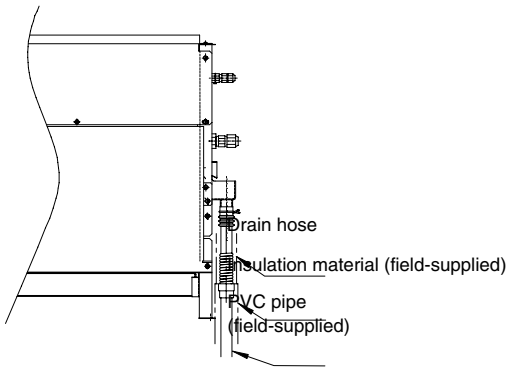


- Do not create an up-slope from the unit.
- Use chloride-type adhesive for connecting the drain pipe.

5. Tightly squeeze the drain hose with the wire clamp after inserting the drain pipe into the drain hose completely.
6. Pour water onto the drain pan and make sure that the water flows smoothly.

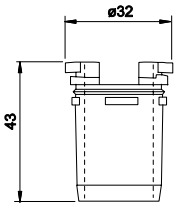
2.2.6. RPF AND RPFI (FLOOR TYPE AND FLOOR-CONCEALED TYPE)

1. The position of the drain pipe connection is shown in the figure.
2. Prepare a PVC pipe with an outer diameter of 18.5mm.
3. Fasten the pipe to the drain hose with an adhesive.
4. Insulate the drain pipe after connecting the drain hose as shown.



2.3. DRAIN KIT FOR OUTDOOR UNITS (DBS-26)

If you need to collect the drain water from the heat exchanger of the outdoor unit, use the drain kit. However, it is not recommended to use the drain kit in snowfall areas. If you need to collect the drain water completely, place a field-supplied drain pan under the outdoor unit.



Model	Drain kit quantity (units)
RAS-5HP	3
RAS-8/10/16HP	4
RAS-20/24/30HP	8

3 ELECTRICAL WIRING

CONTENTS

3.1. GENERAL CHECK

ATTENTION:

- *Before installing the electrical wiring or before performing a periodical check, turn OFF the main switch to the indoor unit and the outdoor unit.*
- *Before installing the electrical wiring or before performing a periodical check, make sure that the indoor fan and the outdoor fan have stopped.*
- *Protect the wires, the drain pipe, the electrical components and any other parts from rats or other small animals. If all these parts are not protected, rats or other small animals may gnaw at these parts. In the worst case, a fire may occur.*
- *Prevent the wires from touching the refrigerant pipes, the plate edges and the electrical components inside the unit. Otherwise, the wires will be damaged. In the worst case, a fire may occur.*

CAUTION:

Tightly secure the wires with the cord clamp inside the indoor unit.

NOTE:

Fix the rubber bushes with adhesive when the conduit tubes to the outdoor unit are not used.

1. Make sure that the field-selected electrical components (main switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical specifications in this service manual. Make sure that the electrical components comply with the National Electrical Code (NEC).
2. Make sure that the power supply voltage is within ±10% of the rated voltage.
3. Check the capacity of the electrical wires. If the power source capacity is too low, you cannot start the system due to the voltage drop.
4. Make sure that the ground wire is connected.
5. Main Switch
   Install a multi-pole main switch with a distance of 3.5mm or more between each phase.

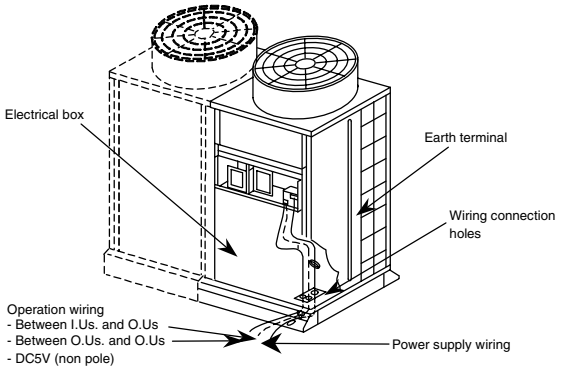
3.2. ELECTRICAL WIRING FOR THE OUTDOOR UNIT

3.2.1. ELECTRICAL WIRING CONNECTION

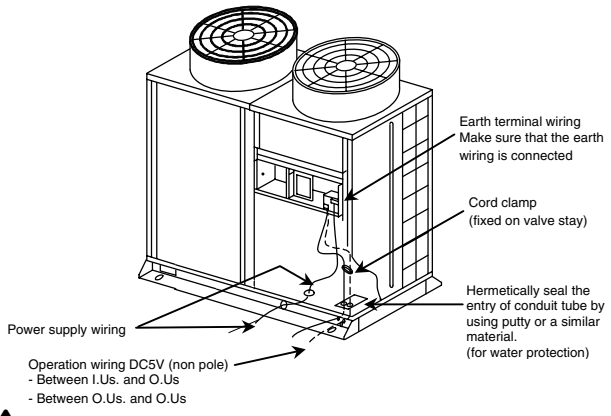
The electrical wiring connection for the outdoor unit is shown below.

1. Connect the power supply wires to L1, L2, L3 and N (for 380-415V\\50Hz) for the three-phase power source on the terminal board. Connect the ground wires to the terminals in the electrical box.
2. Connect the wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board.
3. Do not run the wires in front of the fixing screw of the service access panel. If you do so, you cannot remove the fixing screw.

RAS-5~20HP



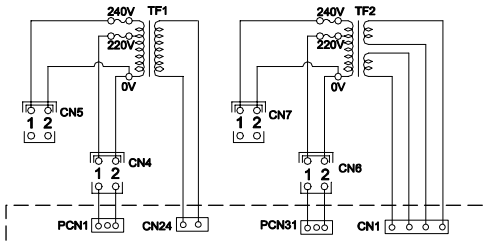
RAS-24~30 HP



CAUTION:

Fix the shielded operation wires between the indoor unit and outdoor unit with a cord band at only one point. You must connect the shielded operation wires to the earth of the indoor unit only.

4. Before turning ON the main switch, check the item below. If the nominal voltage for the outdoor unit is 415V, change the connectors CN4 & CN6 to CN5 & CN7 of the transformers TF1 & TF2 in the electrical box as shown in the figure below.

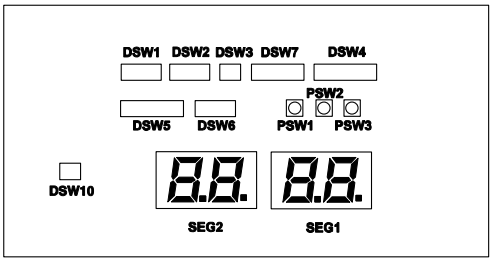


3.2.2. SETTING THE DIP SWITCHES FOR THE OUTDOOR UNIT

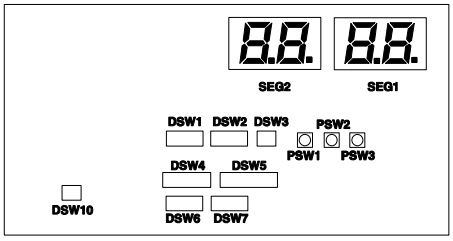
- Quantity and position of the DIP switches

The PCB in the outdoor unit is operated with eight types of DIP switches and three types of push switches.

Position of the DIP switches for 5~20 HP:



Position of the DIP switches for 24~30 HP:



NOTE:
The mark "■" indicates the position of the DIP switches. The figures show the settings before the shipment or after the selection.
If you use the DSW4 and the DSW5, you can start or stop the unit 10 to 20 seconds after pressing the switch.

CAUTION:
Before setting the DIP switches, first turn off the power source and set the position of the DIP switches. If you do not turn off the power source and you set the DIP switches, the contents of the setting are invalid.

■ DSW1: Setting the refrigerant cycle number

If the H-LINK is used, setting the refrigerant cycle number is required. Before the shipment, all the setting positions are OFF. (The refrigerant cycle number is 0).
In the same refrigerant cycle, set the same refrigerant cycle number for the outdoor unit and for the indoor units as shown below.

Cycle No.	0	1	2	3
Setting Position				
Cycle No.	**4**	**5**	**6**	**7**
Setting Position				
Cycle No.	**8**	**9**	**10**	**11**
Setting Position				
Cycle No.	**12**	**13**	**14**	**15**
Setting Position				

■ DSW2: Capacity setting

No setting is required. Before the shipment, each outdoor unit is set as shown below.

Model	Setting Position	Model	Setting Position
RAS-5FSN		RAS-8FSN	
RAS-10FSN		RAS-16FSN	
RAS-20FSN		RAS-24FSN	
RAS-30FSN			

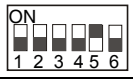
■ DSW3: Height difference setting

The height difference setting is required.

The location of the outdoor unit is higher than the location of the indoor unit (0~50m) The location of the outdoor unit is lower than the location of the indoor unit (0~20m)	
The location of the outdoor unit is lower than the location of the indoor unit (20~40m)	

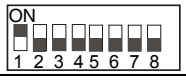
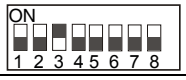
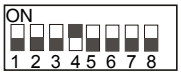
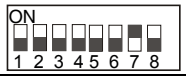
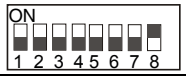
■ DSW4: Setting for the test operation and service

The setting for the test operation and service is required. This DIP switch is used for servicing.

Setting before the shipment	
Test the cooling process	
Test the heating process	
Enforced compressor stoppage	
Combination of more than 16 indoor units	
Operation for Exchange Compressor	

■ DSW5: Setting for the emergency operation of the compressor

The setting for the emergency operation of the compressor is not required. All compressors are running except the selected compressor.

Setting before the shipment	
Except compressor Nº1	
Except compressor Nº2	
Except compressor Nº3	
Except compressor Nº4	
Except compressor Nº5	
Except compressor Nº6	
Selection of the input signal	
Function setting	

■ DSW6: Piping length setting

Setting before the shipment and total length < 25m	
25m ≤ Total length < 50m	
50m ≤ Total length < 75m	
75m ≤ Total length	

■ DSW7: Power supply setting

Setting before the shipment (380V)	
220V	
415V	

■ DSW10: Setting for transmitting

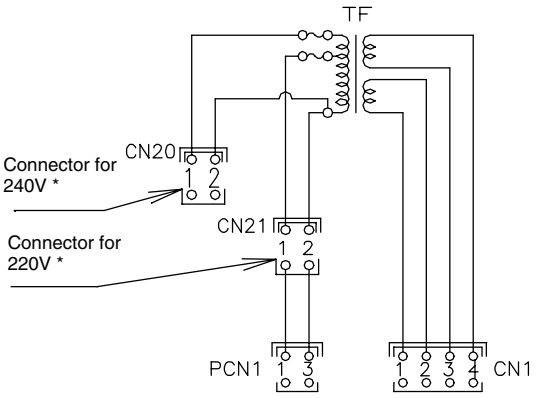
The setting for transmitting is required for the cancellation of end terminal resistance.

Before the shipment, the No.1 pin of DSW10 is set at the ON side.	
If the quantity of indoor units in the same H-LINK is two or more, set the No.1 pin of DSW10 in the 2nd unit to OFF. If only one outdoor unit is used, no setting is required.	
If you apply high voltage to the terminals 1 and 2 of the TB1, the fuse on the PCB is blown out. If that is the case, first connect the wiring to the TB1. Then, turn on #2.	

3.3. ELECTRICAL WIRING FOR THE INDOOR UNIT AND THE COMPLEMENTARY SYSTEMS

ATTENTION:

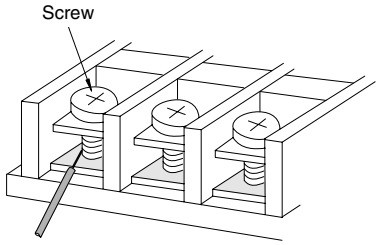
– *Before turning ON the main switch, check the item below. If the nominal voltage for the indoor unit is 240V, change the connector CN21 to CN20 of the transformers TF in the electrical box as shown in the figure below.*



*) For RCD, RPK and KPI: change the connector CN27 instead of the connector CN20. Also, change the connector CN28 instead of the connector CN21.

ATTENTION:

– *To prevent the screws from falling, you cannot remove the screws from the terminal box. When you are fastening the terminal, make sure that you fasten the screw through the hole of the terminal.*



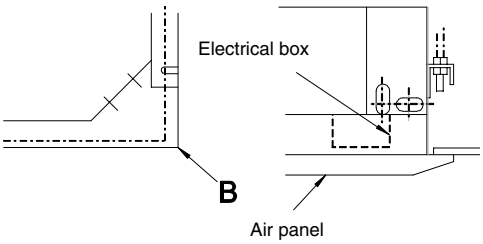
– *Make sure that you apply the terminal specification to the following screws of the terminal box: M4 screw for the power supply and M3.5 screw for the operating line.*

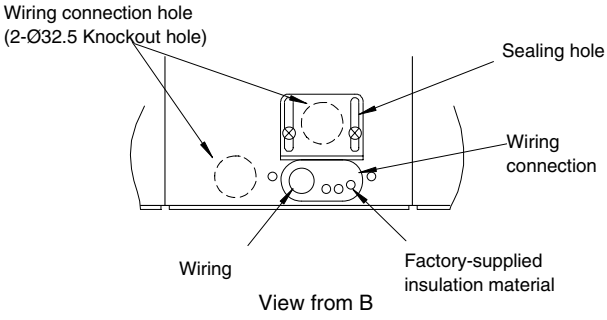
3.3.1. ELECTRICAL WIRING CONNECTION

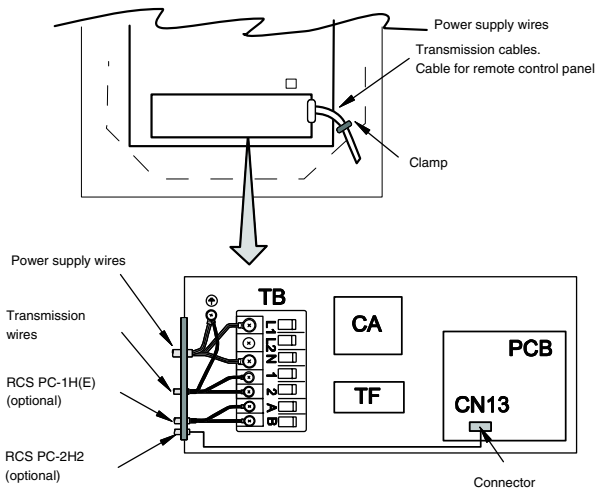
RCI units

The electrical wiring connection for the indoor unit is shown in the following figures. For the intermediate connection between the indoor unit and the air panel, refer to chapter 1.2.

1. Through the wiring connection hole in the cabinet, connect the cable of the remote control switch or an optional extension cable to the connectors on the printed circuit board inside the electrical box.
2. Connect the power supply wires and the ground wire to the terminals in the electrical box.
3. Connect the wires between the indoor unit and the outdoor unit to the terminals in the electrical box.





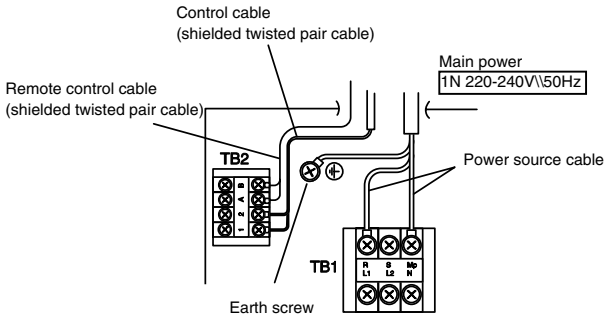


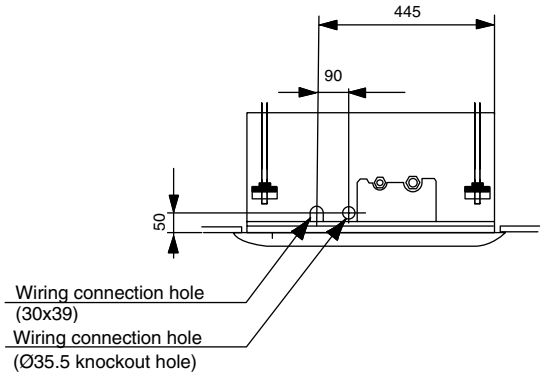
RCD units

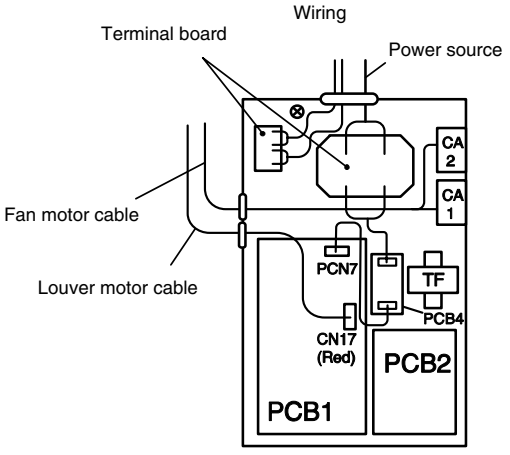
The electrical wiring connection for the indoor unit is shown in the following figures. For the intermediate connection between the indoor unit and the air panel, refer to chapter 1.3.

1. Through the wiring connection hole in the cabinet, connect the cable of the remote control switch or an optional extension cable to the connectors on the printed circuit board inside the electrical box.
2. Connect the power supply wires and the ground wire to the terminals in the electrical box.
3. Connect the wires between the indoor unit and the outdoor unit to the terminals in the electrical box as shown below.

Phase connection



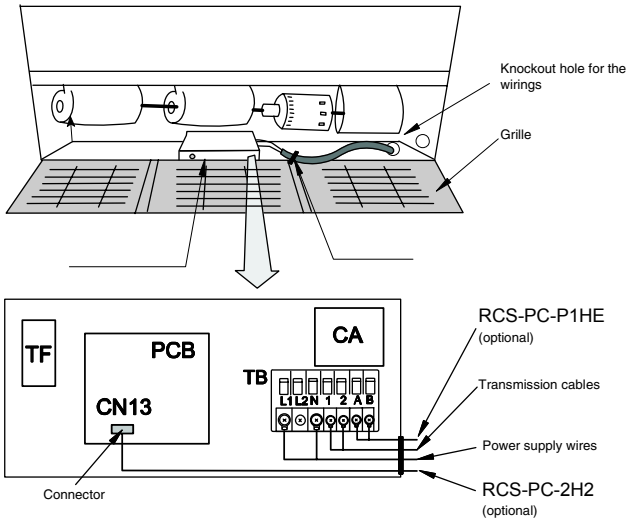




RPC units

The electrical wiring connection for the indoor unit is shown in the following figures.

1. Through the wiring connection hole in the cabinet, connect the cable of the remote control switch or an optional extension cable to the connectors on the printed circuit board inside the electrical box.
2. Connect the power supply wires and the ground wire to the terminals in the electrical box.
3. Connect the wires between the indoor unit and the outdoor unit to the terminals in the electrical box.

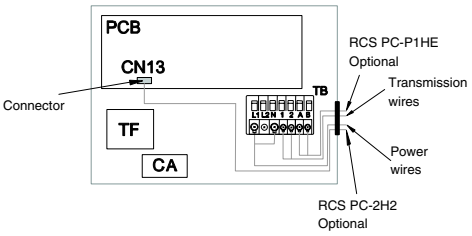


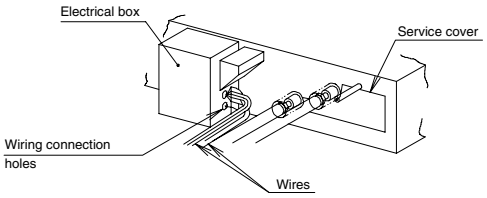
RPI units

The electrical wiring connection for the indoor unit is shown in the following figures.

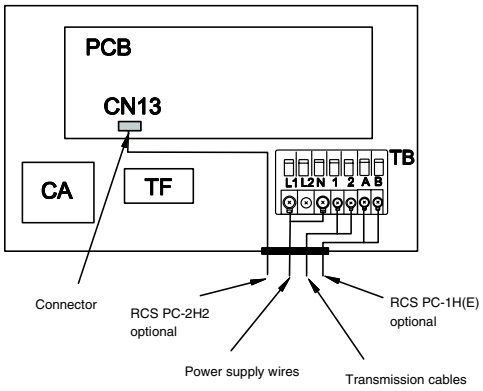
1. Open the service access panel.
2. Cut out the center of the rubber bushing in the wiring connection hole as shown in the next figures.
3. Through the wiring connection hole in the cabinet, connect the cable of an optional remote control switch or an optional extension cable to the connectors on the printed circuit board inside the electrical box.
4. Connect the power supply wires and the ground wire to terminals 1 and 2 in the electrical box.
5. Connect the wires between the indoor unit and the outdoor unit to the terminals in the electrical box.
6. Connect the wires of the remote control switch to terminals A and B in the electrical box.
7. Tightly clamp the wires with the cord clamp inside the electrical box.
8. To protect the unit from the condensate water and the insects, run the cables with the sealing material (cover plate). Then, seal the wiring connection hole.

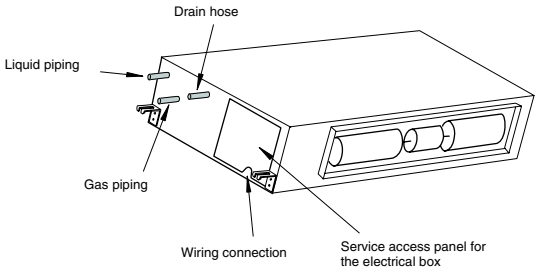
RPI-0.8~1.5





RPI-2.0~5.0





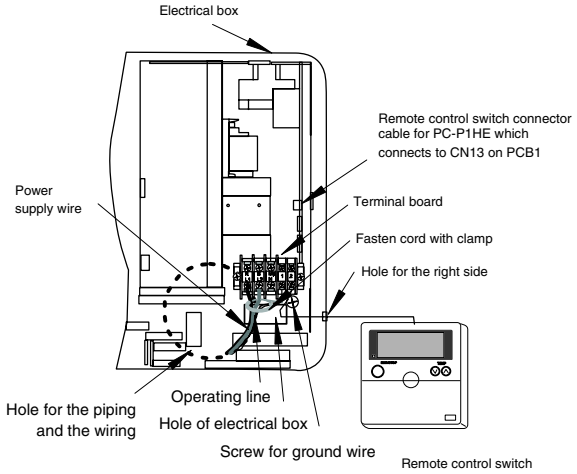
RPK units

The electrical wiring connection for the indoor unit is shown in the following figures.

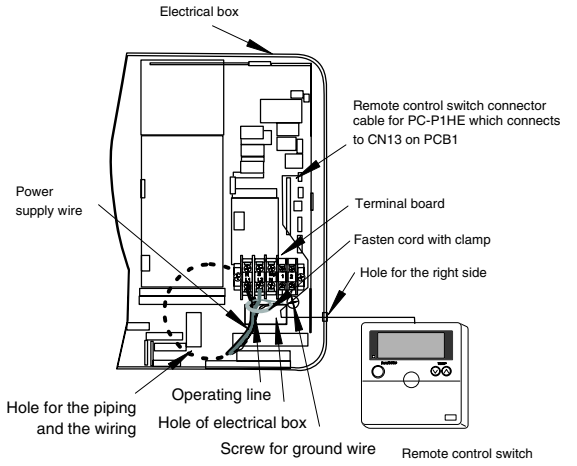
1. Through the wiring connection hole in the cabinet, connect the cable of an optional remote control switch or an optional extension cable to the connectors on the printed circuit board inside the electrical box.
2. Connect the power supply wires and the ground wire to the terminals in the electrical box.
3. Connect the wires between the indoor unit and the outdoor unit to the terminals in the electrical box.

NOTE:
If you are using PC-P1HE or PC-RLH11, remove the wiring of the connector CN25 for RPK-0.8~2.0 or CN25 & CN12 for RPK-2.5~4.0. Otherwise, the system cannot function.

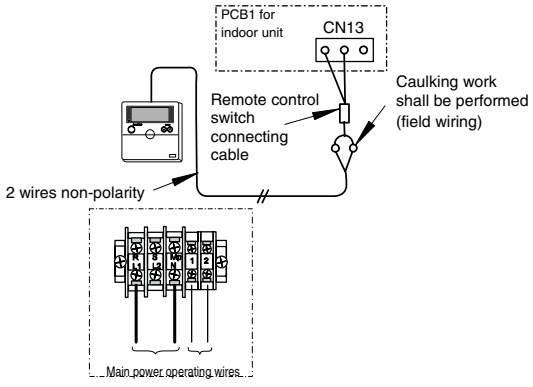
■ RPK-0.8~2.0



■ RPK-2.5~4.0



The following figure provides further details of the wiring connection for RPK-0.8~2.0 and RPK-2.5~4.0 units:

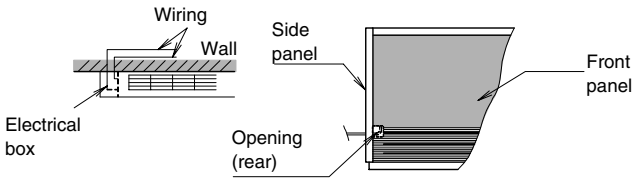


Terminal board (TB) for wiring connections

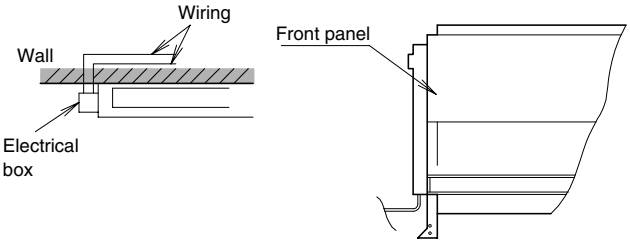
RPF\\RPFI units

Remove the front panel and the side panel.

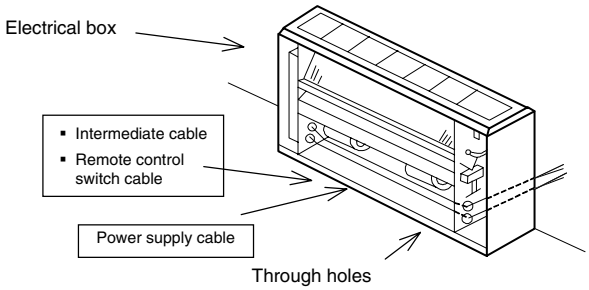
1. The wiring from the left-rear side to the RPF is shown below.



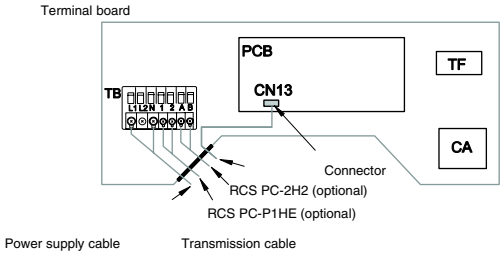
2. The wiring from the left-rear side to the RPFI is shown below.



3. The wiring from the right-rear side is shown below.



4. The wiring connection is shown below.

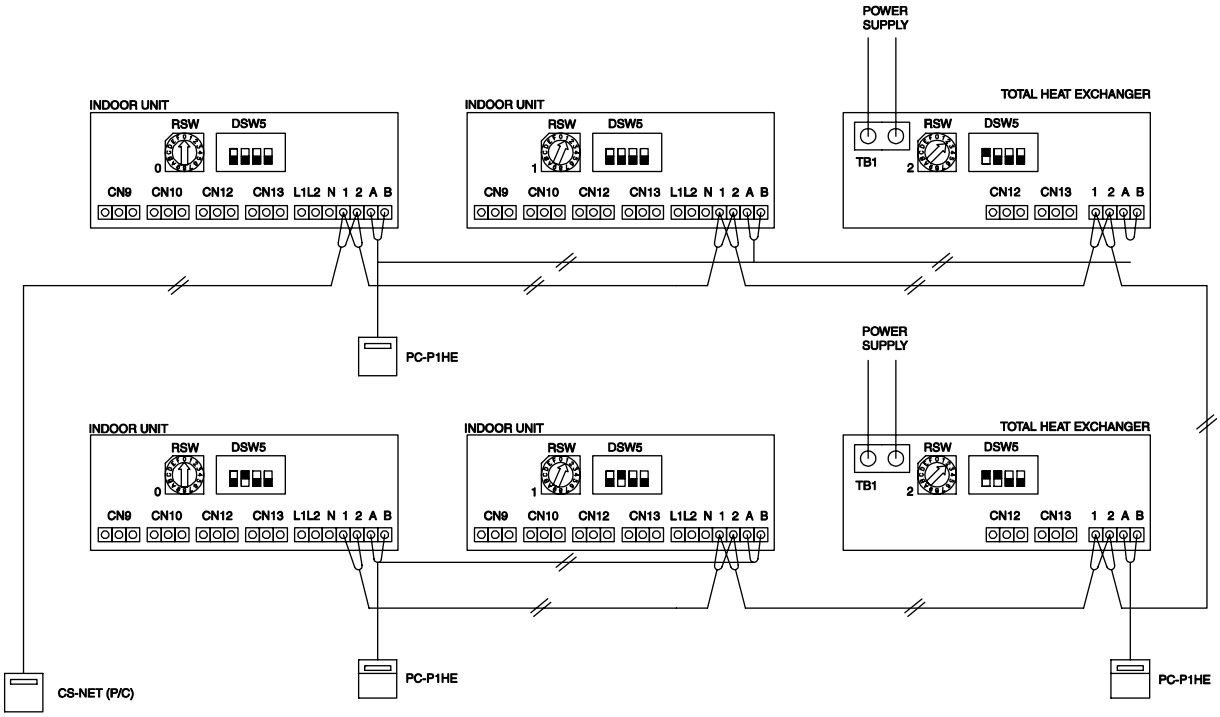


KPI units (Total Heat Exchanger)

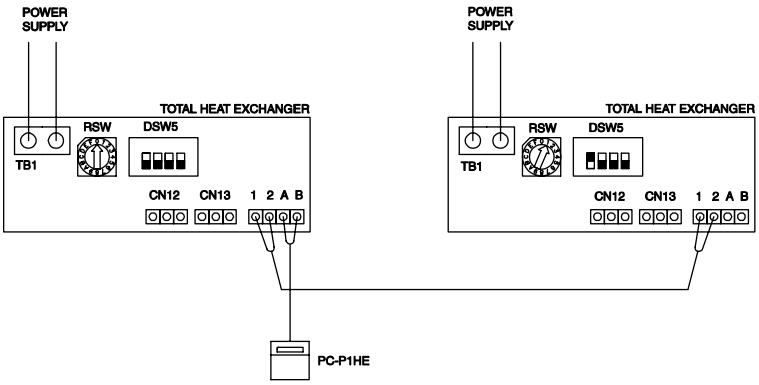
The electrical wiring connection for the KPI unit is shown below.

1. Through the wiring connection hole in the cabinet, connect the cable of the remote control switch or an optional extension cable to the connectors on the printed circuit board inside the electrical box.
2. Connect the power supply wires and the ground wire to the terminals in the electrical box.
3. Connect the wires between the KPI unit and the indoor unit to the terminals in the electrical box.

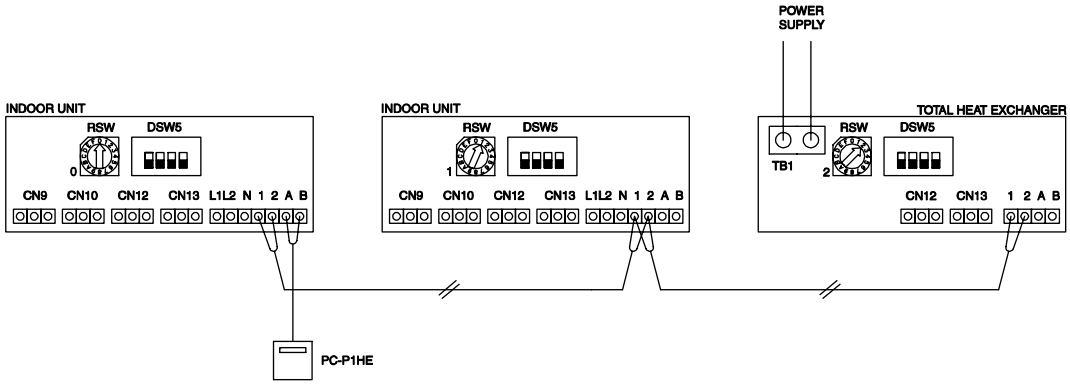
Controlled network system (CS-Net, H-Link)



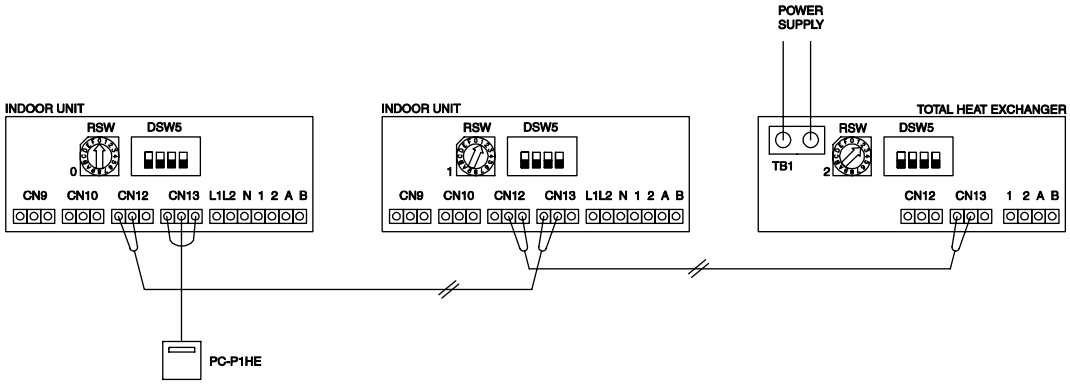
Total Heat Exchanger + PC-P1HE



Simultaneous operation (Set-Free + Total Heat Exchanger)



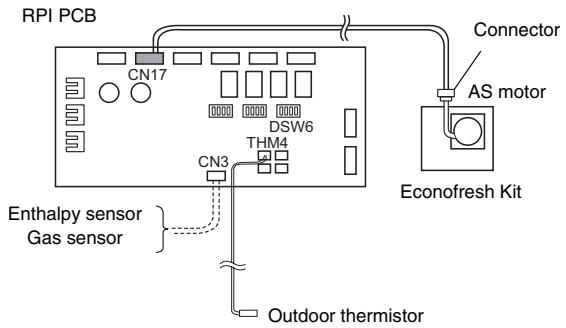
Simultaneous operation (Set-Free + Total Heat Exchanger)
Example for PC-2H2



NOTE
Setting of the number orf total Heat Exchanger should be larger than the number of the Indoor Unit

ECONOFRESH KIT

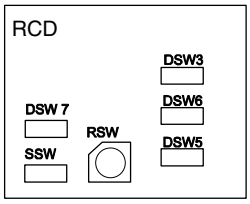
The electrical wiring connection for the unit is shown below.
Mount the outdoor thermistor at a position near the outdoor air inlet.
Pay attention to the place of the outdoor thermistor. The outdoor thermistor must not be in contact with direct sunshine or rainwater.

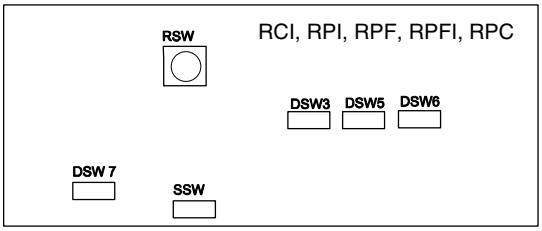


3.3.2. SETTING THE DIP SWITCHES FOR THE INDOOR UNIT

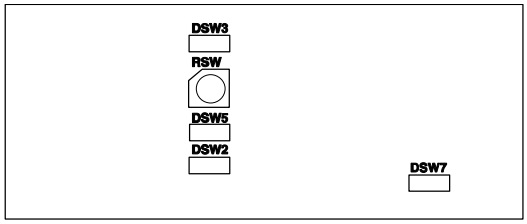
Quantity and position of the DIP switches.
The PCB in the indoor unit operates with five types of DIP switches and rotary switches.
The position of the DIP switches is the following:

Indoor unit PCB

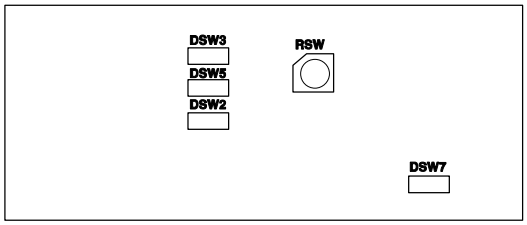




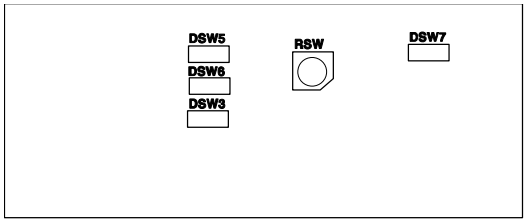
RPK-0.8~2.0



RPK-2.5~4.0



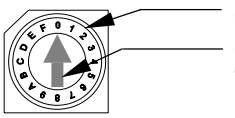
KPI



NOTE:
The mark "■" indicates the position of the DIP switches. The figures show the settings before the shipment.

CAUTION:
Before setting the DIP switches, first turn off the power source and set the position of the DIP switches. If you do not turn off the power source and you set the DIP switches, the contents of the setting are invalid.

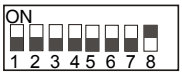
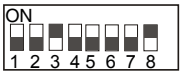
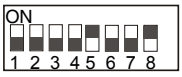
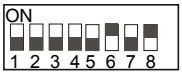
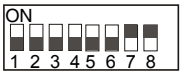
RSW: unit number setting
The unit number setting is required. Set the unit number of all the indoor units respectively and serially, according to the setting position that is shown in chapter 9 Numbers must start from "0" for every outdoor unit.



Master unit	1st unit	2nd unit	3rd unit	4th unit	5th unit	6th unit	7th unit
							
8th unit	9th unit	10th unit	11th unit	12th unit	13th unit	14th unit	15th unit
							

DSW2: optional functions setting (only RPK)

No setting is required. Use this switch for setting the optional functions as shown below.

Factory setting	
Self-inspection function	
Room thermostat is used	
Automatic operation when power supply is ON	
Remote On\\Off control which uses pulse signal is available	
Automatic restart after power failure	

DSW3: capacity code setting

No setting is required because the DIP switch was set before the shipment. Use this DIP switch for setting the capacity code that corresponds to the horsepower of the indoor unit.

HP	0.8	1.0	1.3	1.5
Setting position				
HP	**1.8**	**2.0**	**2.3**	**2.5**
Setting position				
HP	**2.8**	**3.0**	**4.0**	**5.0**
Setting position				

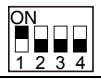
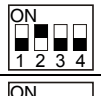
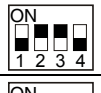
DSW5: setting the refrigerant cycle number

Setting the refrigerant cycle number is required. Before the shipment, all the setting positions are OFF.
(The refrigerant cycle number is 0).

Cycle No.	0	1	2	3
Setting position				
Cycle No.	**4**	**5**	**6**	**7**
Setting position				
Cycle No.	**8**	**9**	**10**	**11**
Setting position				
Cycle No.	**12**	**13**	**14**	**15**
Setting position				

DSW6: setting the unit model code (Not available for RPK)

No setting is required. Use this switch for setting the model code which corresponds to the indoor unit type.

Indoor unit model code	DSW6 setting
RCI-1.0~5.0	
RCD-1.0~5.0	
RPC-2.0~5.0	
RPI-0.8~1.5	
RPI-2.0~5.0	
RPF(I)-1.0~2.5	

DSW7: setting the fuse recover and the remote control selection

No setting is required. Before the shipment, all the setting positions are OFF. PC-P1HE: Remote control switch selected.		
If you apply high voltage to the terminals 1 and 2 of the TB1, the fuse on the PCB1(M) is blown out. If that is the case, first correct the wiring to the TB1. Then, set the ON pin as shown beside.	Except RPK 	Only RPK 
PC-2H2: Remote control switch selected (except RPK). (See also SSW)		

SSW: remote control system

	New	Old
PC-P1HE Before shipment.	■□	
PC2H2 (Refer to the DSW7 settings)	□■	

KPI

DSW2, DSW4 and DSW6 do not have any function.

ECONOFRESH KIT

You need to set the DIP switches at the RPI PCB.

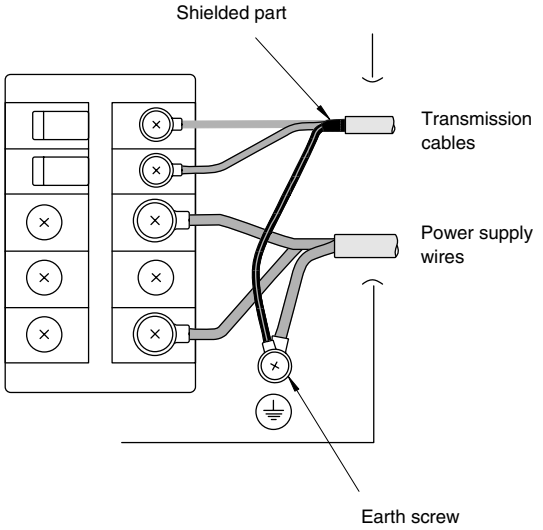
	RPI-5HP DIP switch factory setting	RPI-5HP + Econofresh kit installation DIP switch setting
DSW6		

3.4. COMMON WIRING

3.4.1. ELECTRICAL WIRING BETWEEN THE INDOOR UNIT AND THE OUTDOOR UNIT

CAUTION:

– *Use the shielded twisted pair cable or the shielded pair cable for the transmission cables between the indoor unit and the outdoor unit. Connect the shielded part to the earth screw in the electrical box of the indoor unit as shown below.*



– *Connect the electrical cables between the indoor unit and the outdoor unit as shown in the wiring diagram.*

– *Make sure that the terminals for the power supply wiring and the terminals for the intermediate wires between the indoor unit and the outdoor unit coincide correctly. For AC 380-415V, the terminals for the power supply wiring are "L1" to "L1", "L2" to "L2", "L3" to "L3" and "N" to "N" of each terminal board. For AC 220-240V, the terminals for the power supply wiring are "L1" to "L1" and "N" to "N". For the operating line, the terminals for the intermediate wires are "1 and 2" to "1 and 2" of each terminal board for DC 5V. Otherwise, you may damage some components.*

– *When you are installing the electrical wiring, follow the local codes and the local regulations.*

– *Connect the operation wiring to the units in the same refrigerant cycle. (You should connect the refrigerant piping and the control wiring to the same indoor units). If you connect the refrigerant piping and the control wiring to the units in the different refrigerant cycle, an abnormal operation may occur.*

– *Use the shielded twisted pair cable or the shielded pair cable (more than 0.75mm²) between the outdoor unit and the indoor unit. Also use these cables for the operation wiring between one indoor unit and another indoor unit (H-LINK connection).*

– *You must connect the shielded part to earth only in one cable side.*

– *Do not use more than three cores for the operation wiring (H-LINK). Select the core sizes according to the national regulations.*

– *Connect the operating line to the units in the same refrigerant cycle. (You must connect the refrigerant line to the indoor units that have the refrigerant piping connected to the same outdoor unit). If you connect each refrigerant piping and the operating line to the units of different refrigerant cycle, an abnormal operation may occur.*

– *If there are multiple outdoor units that are connected to one power supply wire, open a hole near the connection hole for the power supply wiring.*

– *The recommended breaker sizes are shown in the table of electrical data and recommended wiring, breaker size\\1 O.U.*

– *If a conduit tube for the field wiring is not used, fix the rubber bushes on the panel with adhesive.*

– *All the field wiring and the equipment must comply with the local codes and the international codes.*

– *Make sure that the power source voltage is correct.*

– *An incorrect wiring may cause a breakdown of the transformer PSC-5HR or the units*

– *Especially, DO NOT connect the power source to the terminal board for transmission.*

– *DO NOT install the H-LINK wires along the power supply wire, other signal wires, and others. If you install the H-LINK wires along those wires, there may be a malfunction due to the electrical noise. If you need to install the H-LINK wires near those wires, provide a distance of 15cm or more. Or alternatively, insert the wires into the steel pipe and ground one end of the pipe.*

Unit	Name of DIP switch	Mark	Setting before the shipment	Function
Outdoor unit	Refrigerant cycle	DSW1		For setting the refrigerant cycle address of the outdoor unit. Make sure that the setting of the DSW1 does not overlap the setting of other outdoor units in the same H-Link system.
	End terminal resistance	DSW10-1P		For matching the impedance of the transmission circuit. Set the DSW10 according to the quantity of the outdoor units in the H-Link system. Setting of the end terminal resistance. Before the shipment, the No.1 pin of DSW10 is set at the ON side. If the quantity of indoor units in the same H-LINK is two or more, set the No.1 pin of DSW10 in the second unit to OFF. If only one outdoor unit is used, no setting is required.
Indoor unit	Refrigerant cycle	DSW5		For setting the refrigerant cycle address of the indoor unit. Set the DSW5 according to the address of the outdoor unit in the same refrigerant cycle.
	Address of indoor unit	RSW		For setting the address of the indoor unit. Make sure that the setting of the RSW does not overlap the setting of other indoor units in the same refrigerant cycle. (If you do not set the RSW, the automatic address function is performed).

ATTENTION:

Pay attention to the connection of the operating line. An incorrect connection may cause the failure of the PCB.

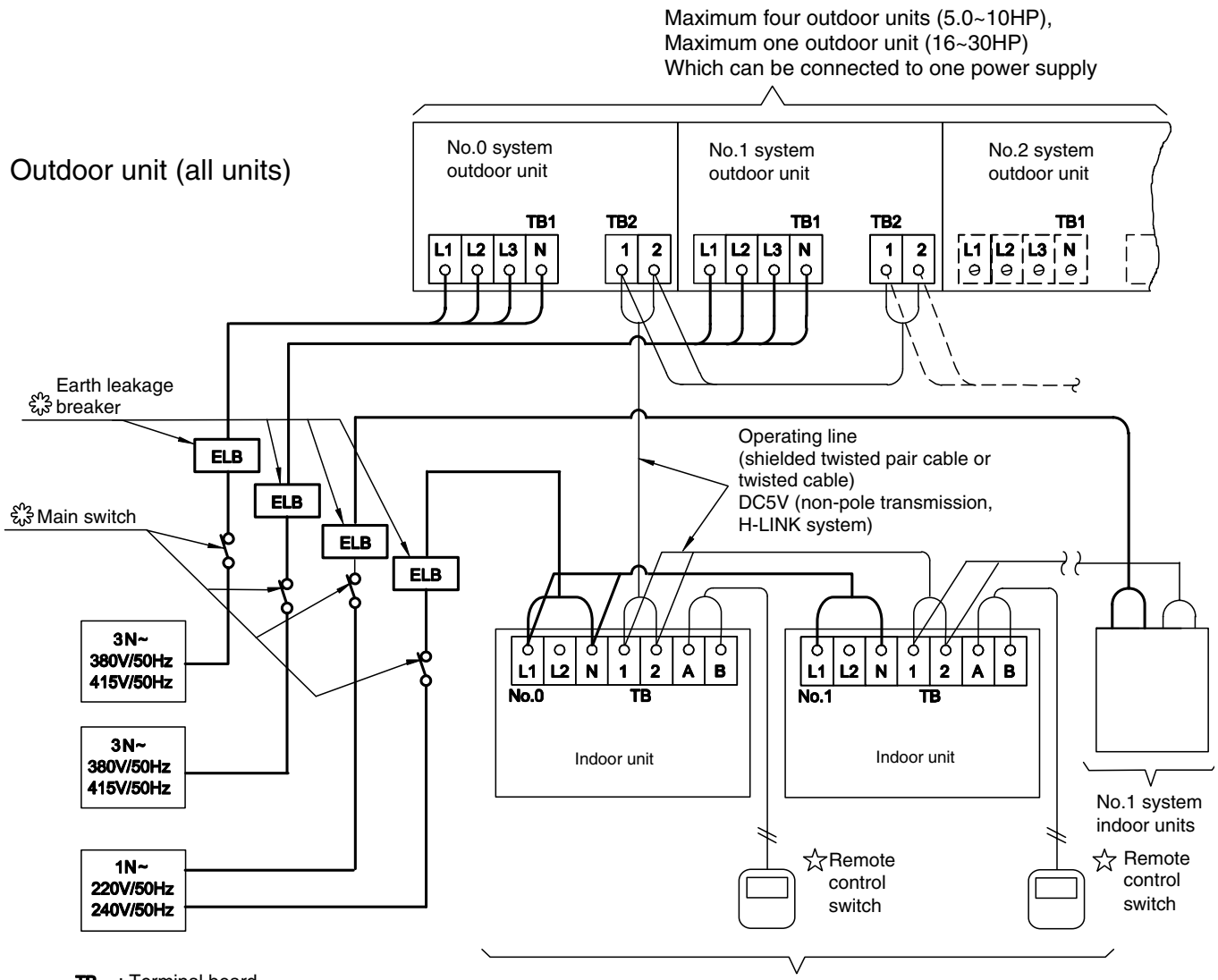


Table for the connection of terminals

Wiring	[Connection (connection of terminals)]
Power supply	[O.U.-O.U.(L1-L1, L2-L2, L3-L3, N-N)]
	[I.U.-I.U.(L1-L1, N-N)]
Operating	[O.U.-I.U., I.U.-I.U.(1-1, 2-2)]
Remote control switch	R, CS-IV, IV-IV, A-A. B-B

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

NOTE:
Make sure that the unit is grounded before connecting the power source. If the unit is not grounded, the fan stops and the system issues alarm 02 after turning the main switch on.

Electrical data and recommended wiring, breaker size\\1 outdoor unit

Model	Power source	Maximum current	Size of power source cable		Size of transmission cable	
			EN60 335-1 É	MLFC Ê	EN60 335-1 É	MLFC Ê
All indoor units	220-240V\\1ϕ\\50Hz	5A	0.75mm²	0.5mm²	0.75mm²	0.5mm²
RAS-5FSN	380-415V\\3ϕ\\50Hz	8A	2.5mm²	0.75mm²	0.75mm²	0.5mm²
RAS-8FSN		14A	2.5mm²	0.75mm²	0.75mm²	0.5mm²
RAS-10FSN		17A	2.5mm²	1.25mm²	0.75mm²	0.5mm²
RAS-16FSN		31A	6mm²	3.5mm²	0.75mm²	0.5mm²
RAS-20FSN		34A	-	3.5mm²	0.75mm²	0.5mm²
RAS-24FSN		46A	-	5.5mm²	0.75mm²	0.5mm²
RAS-30FSN		64A	-	8mm²	0.75mm²	0.5mm²

ELB: earth leakage breaker: Apply low sensibility type.
MLFC: flame-retardant polyflex wire.

3.4.2. H-LINK SYSTEM

NOTE:
The H-LINK system cannot be applied to the cycle with the old unit models or with the units that have an old transmission.

1. Application

The new H-LINK wiring system requires only two transmission cables that connect each indoor unit and the outdoor unit for up to 16 refrigerant cycles. This new wiring system also requires the connect wires for all the indoor units and all the outdoor units in series. You can apply this H-LINK system to the following models.

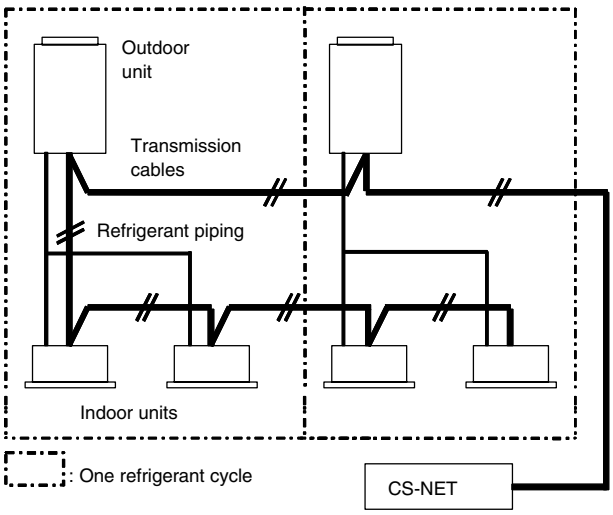
Indoor unit	Outdoor unit
RCI RCD RPI RPK RPF RPFI RPC	RAS-5~30FSN

2. Features

The H-LINK system has the following features and specifications:

- Features:
  - Only one connection is required for the wiring between the indoor unit and the outdoor unit.
  - The wiring connection to the central control devices is easy.

Example of H-LINK System:



- Specifications:
  - Transmission cable: 2-Wire.
  - Polarity of transmission cable: non-polar wire.
  - Maximum quantity of outdoor units that can be connected: 16 units per H-LINK system.
  - Maximum quantity of indoor units that can be connected: 16 units per cycle and 128 units per H-LINK system.
  - Maximum wiring length: total 1000m (including CS-NET).
  - It is possible to increase the maximum wiring length up to 5000m by using up to four units PSC-5HR. (Refer to section 3.4.3).
  - Recommended cable: shielded twisted pair cable, over 0.75mm^2 (equivalent to KPEV-S).
  - Voltage: DC5V.

NOTE:
For the H-LINK system, you must use only the shielded twisted pair cables.

3. Example of H-LINK system

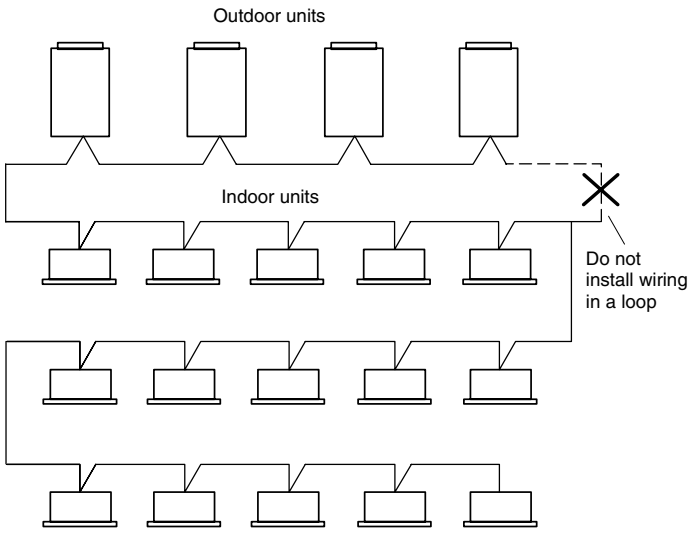
- Using the H-LINK system for the air conditioning systems only

There are two typical uses of the H-LINK system:

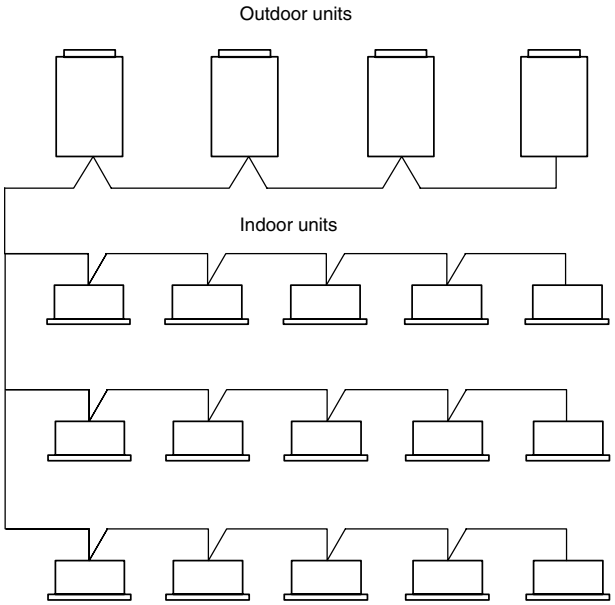
(1) Using the H-LINK system for the air conditioning systems only, and

(2) Using the H-LINK system for the air conditioning systems that have a central control device.
The examples of H-LINK system are shown below.

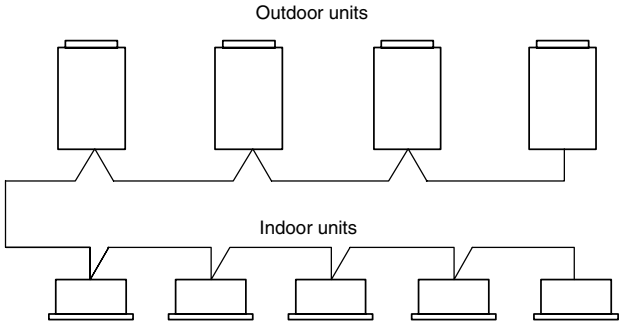
- Line connection with all the units



- Line connection for each floor

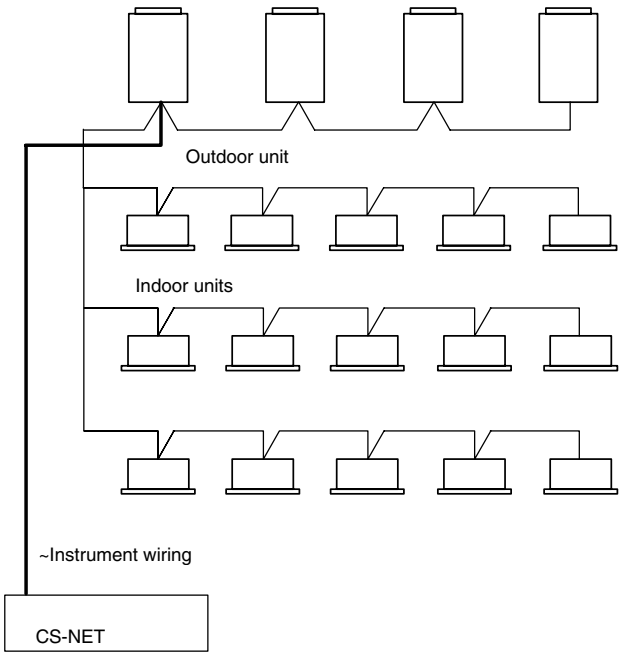


- Connection with one main line and with the branch lines for the units

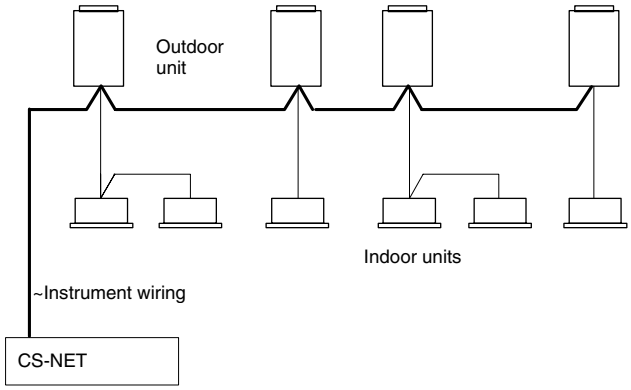


▪ Using the H-LINK system for the air conditioning systems which have a central control device

- In case that you apply the H-LINK when you are installing the electrical wiring



- In case that you do not apply the H-LINK when you are installing the electrical wiring



NOTE:

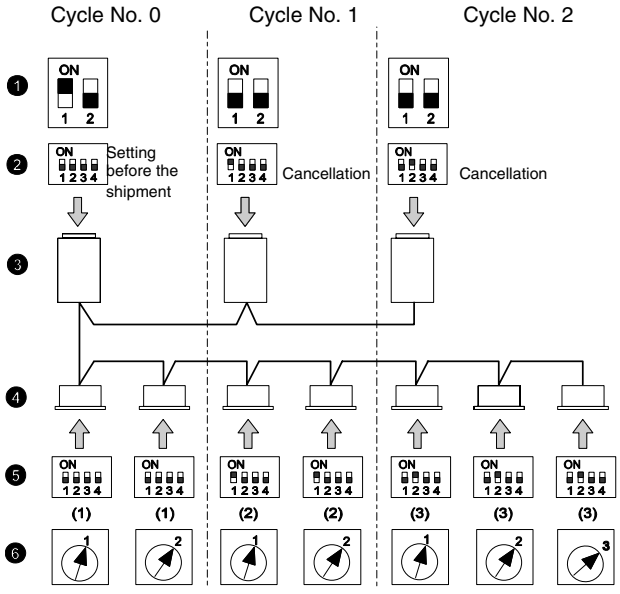
You can connect a maximum quantity of 16 outdoor units and 128 indoor units.

Do not install the wiring in a loop.

If you do not apply the H-LINK system after installing the electrical wiring as shown above, apply the H-LINK system after completing the instrument wiring. Therefore, you must set the DIP switches according to "Setting the DIP switches on the PCB".

4. Setting the DIP switches of the indoor PCB and the outdoor PCB
   You must set the DIP switches of every indoor unit and every outdoor unit.

▪ Example of the settings of the DIP switches

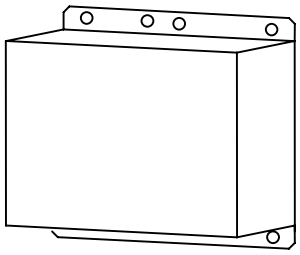


Mark	Description
É	DSW10 (end terminal resistance)
Ê	DSW1 (refrigerant cycle)
Ë	Outdoor unit
Ì	Indoor units
Í	DSW5 (refrigerant cycle)
Î	RSW (address of indoor unit)

3.4.3. PSC-5HR

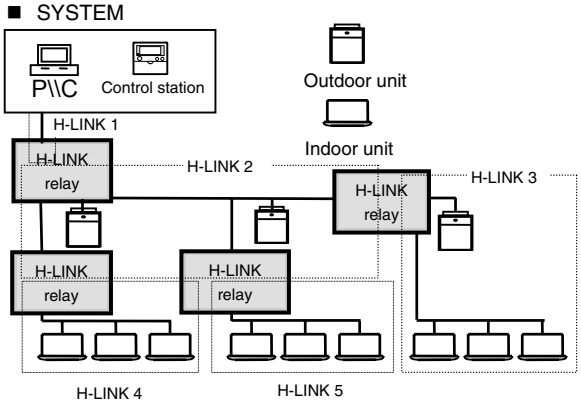
1. Installation of PSC-5HR

   Refer to "Installation & Operation Manual of PSC-5HR (PMML 0094A)" for details concerning the safety summary and the installation work.



2. Electrical wiring

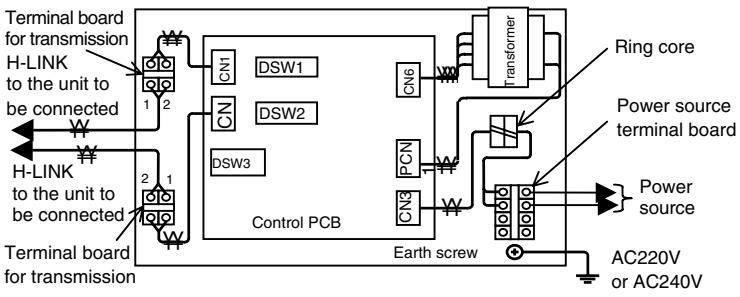
■ SYSTEM



NOTE:

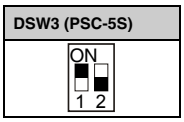
- *You can install a maximum of Four H-LINK relays in one system.*
- *Make sure that the quantity of connections is the following:*
  - *Ref. System Quantity: within 16*
  - *Indoor Unit Quantity: within 128*
    Total Length of each divided H-LINK: up to 1000m
- *If the H-LINK is divided into five blocks as shown beside, set the end terminal resistance in each H-LINK relay.(For details, refer to the item 4 "Setting the DIP switches").*

3. Internal layout

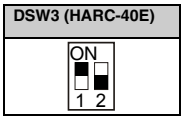


4. Setting the DIP switches

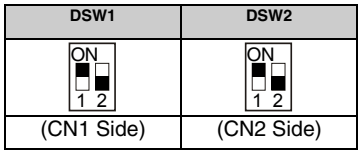
   1. If there is an outdoor unit in the drived H-LINK, set the end terminal resistance at one of the outdoor units.
   2. If there is a HARC-40E system, set the end terminal resistance at the HARC-40E.



   3. If there is a central control device (PSC-5S), set the end terminal resistance at the PSC-5S.



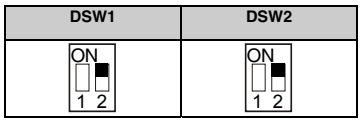
   4. If there are only indoor units, set the end terminal resistance at the H-LINK relay. If the H-LINK relay is connected to CN1, set the No.1 pin of DSW1 at the ON side. If the H-LINK relay is connected to CN2, set the No.1 pin of DSW2 at the ON side.



   5. If the H-LINK relays are directly connected to each other, set the end terminal resistance at one of the H-LINK relays. If the H-LINK relay is connected to CN1, set the No.1 pin of DSW1 at the ON side. If the H-LINK relay is connected to CN2, set the No.1 pin of DSW2 at the ON side.

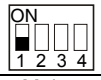
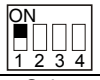
■ Fuse recovery setting

If the fuse is blown out, you can recover by setting the No. 2 pin of DSW1 (at CN1 side) at the ON side or by setting the No. 2 pin of DSW2 (at CN2 side) at the ON side.



■ **Setting the main\\sub relays**

- Set the main\\sub relays by means of the No.1 pin of DSW3 on the control PCB as shown below. (The No.2 pin, the No.3 pin and the No.4 pin are not used).
- The setting of the main\\sub relays depends on the number of H-LINK relays. Set the main\\sub relays as follows:
  1. If the number of H-LINK relays is only one, then choose Main. (No setting is required).
  2. If the number of H-LINK relays is more than one, then choose Main for one H-LINK relay and choose Sub for the other H-LINK relays.

DSW3	DSW3
	
Main	Sub

ATTENTION:
If you do not set this pin correctly, there may appear communication alarms.

5. Test run

After completing the installation of the H-LINK, you need to perform the test run of the PSC-5HR. Check the following items:

1. Connection conditions of the air conditioning systems:
   - Check the model code and the quantity of connected units by means of the remote control switch.
   - If control equipment is used, perform the connection check at the central control device.
2. Transmission alarm:
   - Perform the RUN\\STOP procedure by means of the central control device or the remote control switch.
   - Make sure that no transmission alarm, such as alarm numbers 03, 32, 35, 60, 61 and 256, occurs. The alarm numbers 60, 61 and 256 correspond only to the central control device.
3. Activation state:
   - Monitor the activation state of the LED on the Control PCB.
   - Make sure that the LED1 does not stay ON due to the continuous collision. The LED can stay ON due to the following causes: Incorrect setting of the master H-LINK relay, incorrect setting of the slave H-LINK relay, incorrect setting of the end terminal resistance, presence of wiring loops, and others. Make sure that setting is correctly performed. Also, make sure that the wiring is correctly installed.
   - Make sure that the LED2, the LED3 and the LED4 are flickering. If those LED are not flickering, check the transmission state on the LED of the PCB in the other unit. If the above LED on the H-LINK relay is not flickering despite the sending signal from the other unit, check the wiring connection, the setting of the end terminal resistance, the types of wires and the wiring length. If the fuse in the transmission circuit is blown out due to the incorrect wiring, refer to "Fuse Recovery Setting" in item 4.

3.5. WIRING SIZES

NOTE:
- *When you are selecting the field wiring, follow the local codes and the local regulations.*
- *If you connect the power cables in series, select the maximum current and the wire sizes of each unit as shown in the table.*
- *The size of the earth cable must comply with the local code IEC 245, No. 571.*

Selection according to EN60 335-1		Selection according to MLFC (at cable temp. of 60°C)	
Current i (A)	**Wire size (mm²)**	**Current i (A)**	**Wire size (mm²)**
I ≤ 6	0.75	I ≤ 15	0.5
6 < i ≤ 10	1	I <≤ 15	0.75
10 < i ≤ 16	1.5	i <≤ 15	1.25
16 < i ≤ 25	2.5	i <≤ 15	2
25 < i ≤ 32	4	i <≤ 15	3.5
32 < i ≤ 40	6	i <≤ 15	5.5
40 < i ≤ 63	10	i <≤ 15	8
63 < i 63	Ë	i < 15 ≤ 112	14
		i <≤ 15	22

Ë *If the current exceeds 63A, do not connect the cables in series.*

4 INSTALLATION OF THE OPTIONAL REMOTE CONTROL SWITCH

CONTENTS

DANGER:

– *DO NOT pour water into the remote control switch. These products are equipped with electrical components. If you pour water into these products, you may cause a serious electrical shock.*

– *If your hands are wet, DO NOT operate the switches. You may cause an electrical shock.*

– *If the protection devices function often or if the operation switches do not function well, turn OFF the main power source. Then, contact your HITACHI distributor or your HITACHI dealer.*

– *If you find any other abnormal operations, stop the system and turn OFF the main power source. Then, contact your HITACHI distributor or your HITACHI dealer.*

WARNING:

– *DO NOT perform the installation work and the electrical wiring connection.*

– *If the repair work, the maintenance work or other service work is required, contact your HITACHI distributor or your HITACHI dealer.*

– *DO NOT modify the electrical wiring. You may cause serious accidents.*

CAUTION:

– *DO NOT install the remote control switch and the cable in the following places:*

  ▪ *Places where there is oil vapor and the oil is dispersed.*

  ▪ *Places that are near hot springs (in a sulfuric environment).*

  ▪ *Places where the generation of flammable gas, the flowing of flammable gas, the leaking of flammable gas or the existence of flammable gas is detected.*

  ▪ *Places that are near the sea (in a salty environment).*

  ▪ *Places in an acid environment or an alkaline environment.*

  ▪ *Places within the reach of children.*

  ▪ *Places where the air from the air conditioning system is directly discharged.*

– *DO NOT install the indoor unit, the outdoor unit, the remote control switch and the cable within approximately three meters from strong electromagnetic radiators, such as those that are used in medical equipments.*

– *If you install the remote control switch in a place where there is electromagnetic radiation, shield the remote control switch and the cable as follows: cover the remote control switch and the cable with the steel box; also, run the cable through the metal conduit tube.*

– *If there is electric noise at the power source of the indoor unit, provide a noise filter.*

CAUTION:

– *DO NOT use the multi-core wire for the electrical wiring. If you use the multi-core wire, some signals of one system will transfer to the other system and the signals will interfere with each other. This will cause a malfunction.*

– *DO NOT use thin-shielded cable such as the CPEVS. These cables have a high electrostatic capacity and can make the transmission signal dull. Also, if you use long cables, transmission errors may occur.*

– *DO NOT run any transmission cable and any signal cable along the power supply wire (220-240V, 380-415V).*

– *DO NOT run any transmission cable and any signal cable along other transmission cables and other signal cables.*
If you need to run all these cables along, keep a distance of more than 30cm between each cable. Alternatively, insert the cables for each transmission system into the metal conduit tube and ground one end of the conduit tube.

■ Location of the remote control switch

1. With the customer's acceptance, select a suitable handling place and determine the installation place for the remote control switch.
2. If the installation includes a remote control thermostat, select the installation place according to the following considerations:
   - A place where the average room temperature can be detected.
   - A place that is out of the reach of children.
   - A place where the thermostat is not directly exposed to the sun.
   - A place where there are no heat sources nearby.
   - A place where the outdoor air that is caused by the opening and the closing of doors does not affect the thermostat.
   - A place where the air from the air conditioning system is not directly discharged.
   - If you are installing the wireless remote control onto the wall, keep a distance of more than 30cm from the power supply wire.

NOTE:

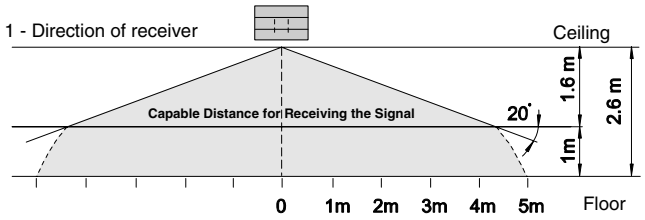
To extend the 2-core connector cable between the units for the simultaneous operation of multiple units, use the field-supplied control cable or the optional extension cable.

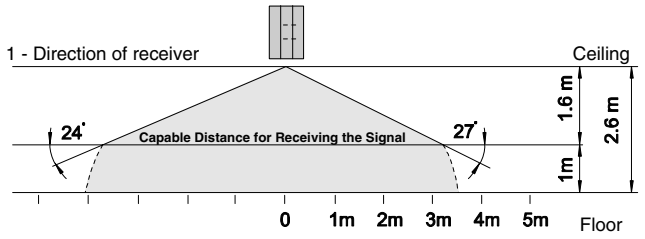
To connect the wires, cut the remote control cable in the middle. Then, solder the wires and insulate the wires.

For one remote control switch, the maximum total cable length (including the signal cable between the units) is the following: if you are using a cable that is 0.3mm² thick, 30m; if you are using a cable which is thicker than 0.75mm², 500m.

Standard capable distance for receiving the air panel signal for the wireless control.
(Example with the 4-way cassette)

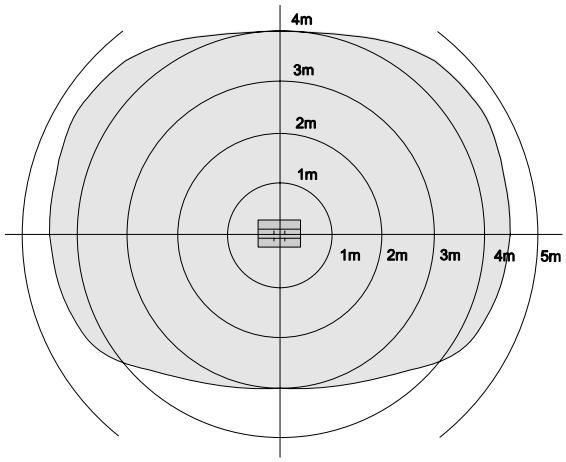
Conditions:
- Typical office room.
- No electronic lamp within 1m around the receiver part of the panel or the receiver kit.





Standard efficient distance for receiving the air panel signal for the wireless control.
(View from above)
(Example with the 4-way cassette)

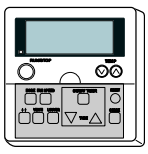
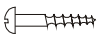
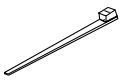
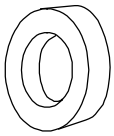
Conditions:
- Operation of the wireless remote control from the following position: 2.6m from the ceiling level and 1m from the floor level.
- Typical office room.
- No electronic lamp within 1m around the receiver part of the panel or the receiver kit.



4.1. INSTALLATION OF THE REMOTE CONTROL SWITCH <PC-P1HE>

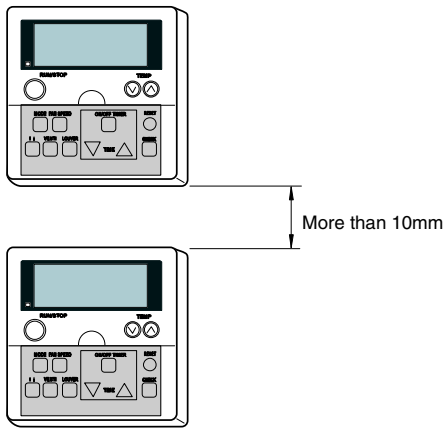
4.1.1. BEFORE THE INSTALLATION

Check the contents and the number of accessories in the packing.

			
Remote control switch for the operation control	Two screws Ø4x16L for fixing the holding bracket onto the Wall	One band for fixing the cable to the ring core	Ring core

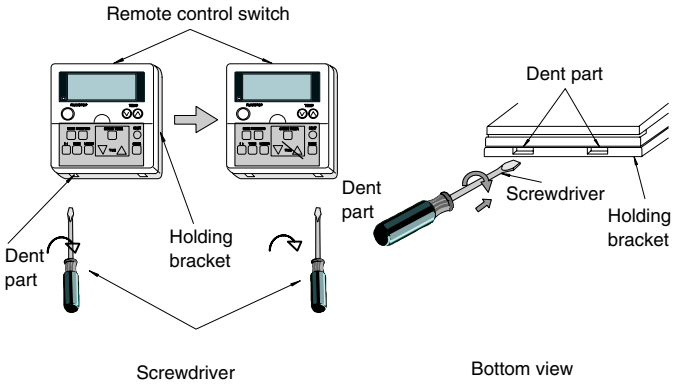
4.1.2. INSTALLATION AREA

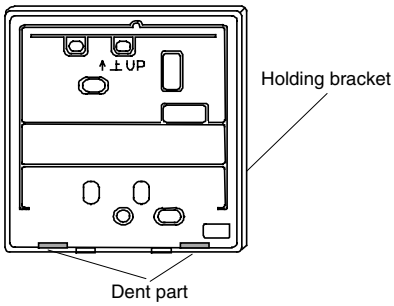
If you are installing the remote control switches vertically, keep a distance of more than 10mm between the remote control switches. If the distance is shorter than 10mm, the front panel of the remote control switch cannot open wide enough.



4.1.3. INSTALLATION PROCEDURE

1. Insert the edge of the flat-headed screwdriver into the dent parts at the bottom of the holding bracket. Next, push and turn the screwdriver. Then, remove the remote control switch from the holding bracket as shown in the figure below.

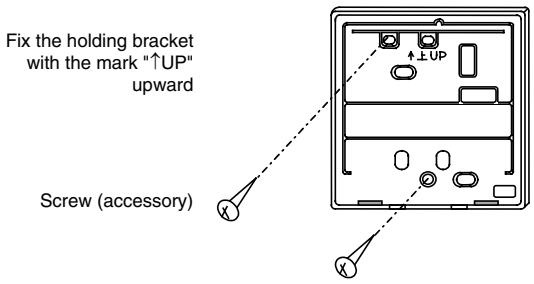




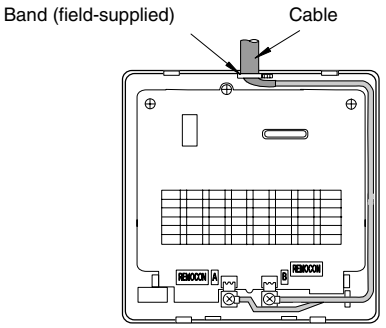
2. Attach the remote control switch to the holding bracket as follows.

■ **If you are exposing the remote control cable**

1. Fix the holding bracket onto the wall as shown in the figure below.



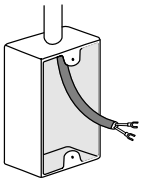
2. Attach the stopper to the cable inside the draw-out hole.



3. Peel the sheath of the cable and lead the cable through the groove.
4. Peel back the insulation material from the end of the cable and clamp the M3 solderless terminals.

■ **If you are using the switch box**

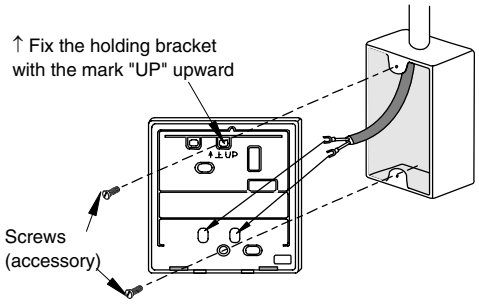
1. Field-supplied JIS Box (JIS 8336-1998).



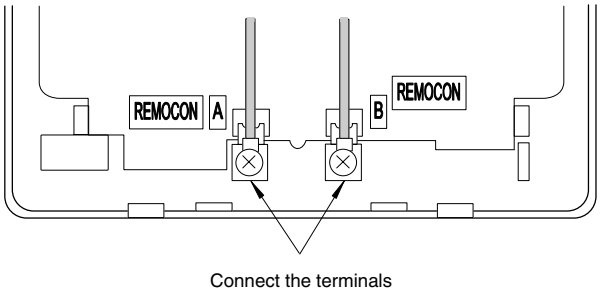
The following five types are available:
1. Switch box for one remote control switch (without panel)
2. Switch box for two remote control switches (without panel)
3. Switch box for one remote control switch (with panel)
4. Switch box for two remote control switches (with panel)
5. Outlet box (with panel)

Run the cable through the conduit tube in the wall.

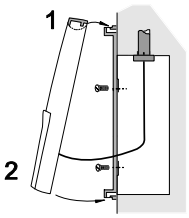
2. Fix the holding bracket to the switch box.



3. Peel back the insulation material from the end of the cable and clamp the M3 solderless terminals.



4. Mounting procedures.

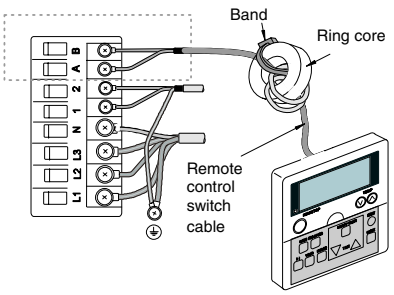


1. Insert the hooks of the remote control switch into the holes at the top of the holding bracket.
2. Push the lower part toward the holding bracket.
3. When you hear a clicking sound, the remote control switch is already attached to the holding bracket. You have finished the mounting work.

CAUTION:
Make sure that the cable is not slack. If the cable is slack as shown in the above figure, the cable cord (especially the naked part) may be clamped at the hole. This may cause a faulty operation.

4.1.4. ELECTRICAL WIRING

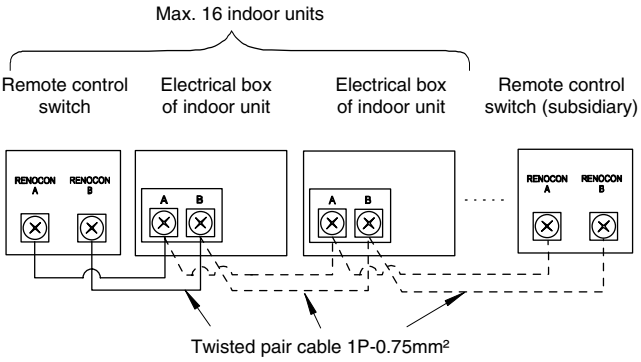
■ Standard wiring



ATTENTION:
- *When you are installing the unit, attach the black ring core (accessory).*
- *Before connecting the cable of the remote control switch to the terminal board, insert this cable into the ring core with two turns as shown in the figure above. If the wiring is 0.75mm², you need to peel off the outside cover.*
- *Fix the cable with the band (accessory).*

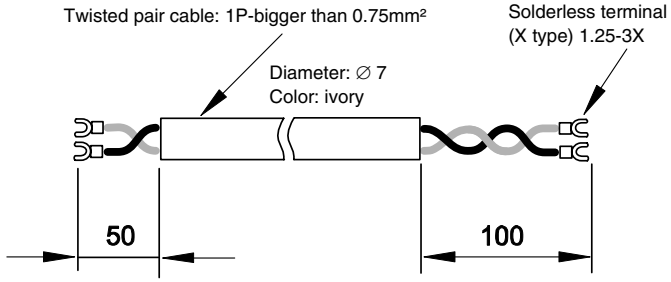
■ Electrical wiring for multiple units

This remote control switch can control up to a maximum of sixteen units.
If you are going to modify the electrical wiring, perform the wiring connection and other works as the following procedures explain.
(Wiring connection for the control circuit).
You can connect two remote control switches in the same unit or the same unit groups. The second remote control is the subsidiary remote control switch as shown below. Refer to chapter 6 "Available optional functions" for details.

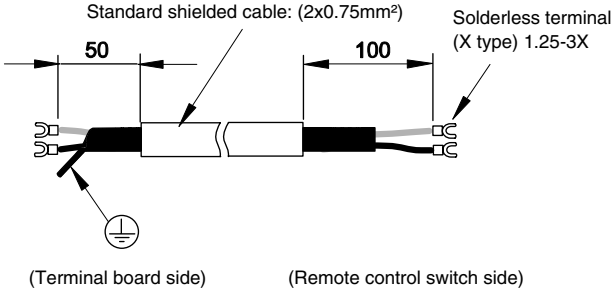


There are optional cables of 0.75mm² wire. The cables have different lengths. The cables are also fitted with connectors.

Remote control cable (optional)



To connect the shielded part to earth at the side of the electrical box, you can also use the standard shielded cable (2×0.75mm²). The maximum total length is 500m.



Cable model	PRC-10E1	PRC-15E1	PRC-20E1	PRC-30E1
Length (m)	10	15	20	30

CAUTION:
- *To prevent a malfunction, use the twisted pair cable (1P-0.75mm²) as a transmission cable. The maximum total length is 500m.*
  If the total cable length is within 30m, you can use cables that are bigger than 0.3mm².
- *Keep a distance of more than 30cm between the remote control cable and the transmission cable of the indoor units.*
- *If multiple indoor units are controlled simultaneously, set the refrigerant cycle number and the address of the indoor units as shown below.*

Address of the indoor units:

Master unit	1st unit	2nd unit	3rd unit
			
4th unit	5th unit	6th unit	7th unit
			

8th unit	9th unit	10th unit	11th unit
			
12th unit	13th unit	14th unit	15th unit
			

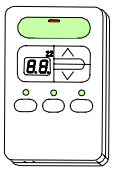
4.2. INSTALLATION OF THE REMOTE CONTROL SWITCH (CORE-FUNCTION) <PC-P5H>

4.2.1. SELECTING THE INSTALLATION PLACE

- With the customer's acceptance, select a suitable handling place and determine the installation place for the remote control switch.
- Do not install the remote control switch in the following places:
  - Places that are within the reach of children;
  - Places where the air from the air conditioning system is directly discharged.

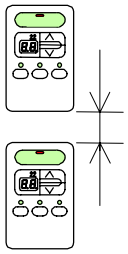
4.2.2. BEFORE THE INSTALLATION

Check the contents and the number of accessories in the packing.

				
Remote control switch for the operation control	Two screws ø4x16l for fixing the holding bracket onto the wall	Ring core1	Band for fixing the cable to the ring core	Cable (20cm)

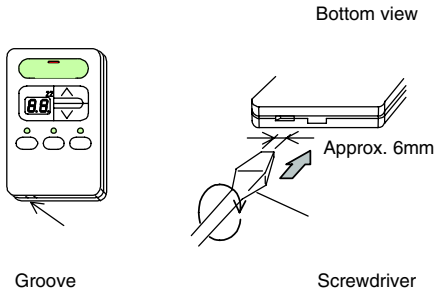
4.2.3. INSTALLATION AREA

- If you are installing the remote control switches vertically, keep a distance of more than 50mm between the remote control switches.
  If the distance is shorter than 50mm, the front panel of the remote control switch cannot open wide enough.



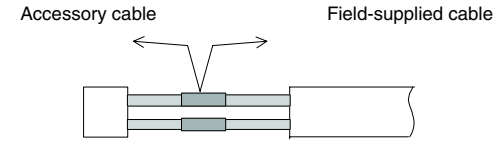
4.2.4. INSTALLATION PROCEDURES

1. Insert the edge of the screwdriver into the grooves at the bottom of the holding bracket. Next, push and turn the screwdriver. Then, remove the remote control switch from the holding bracket.



2. Connecting the cables

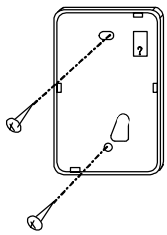
   Connect the accessory cable to the field-supplied cable by soldering the accessory cable.



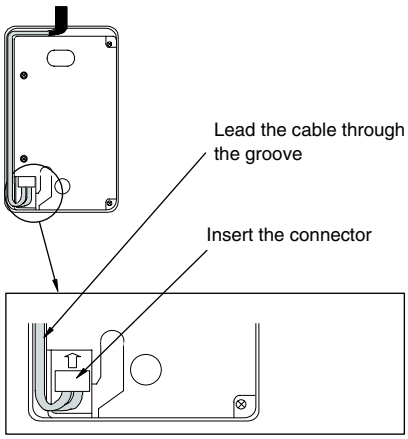
(Insulate the connecting end with the chloride-type adhesive)

3. Attach the remote control switch to the holding bracket and connect the cable as follows.

   If you are exposing the remote control cable:

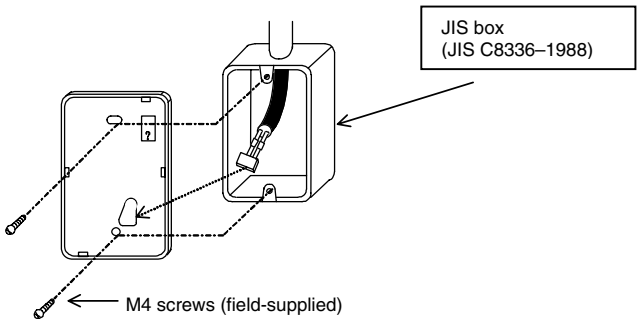


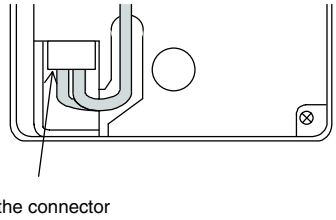
Fix the holding bracket onto the wall with screws (accessory)



If you are using the switch box:

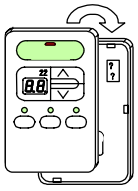
Prepare the field-supplied JIS Box (JIS C8336-1988).





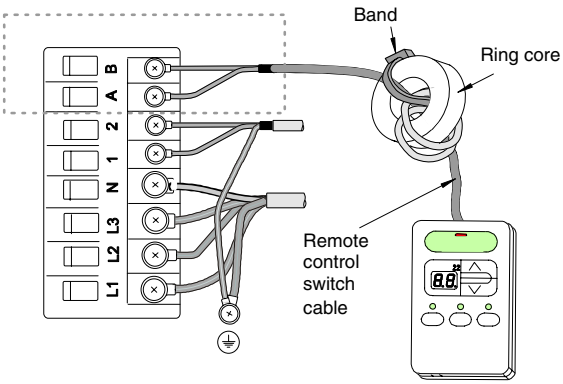
4. Attach the remote control switch to the holding bracket.

First, attach the upper side. Then, attach the lower side.



4.2.5. ELECTRICAL WIRING

■ Standard wiring



ATTENTION:

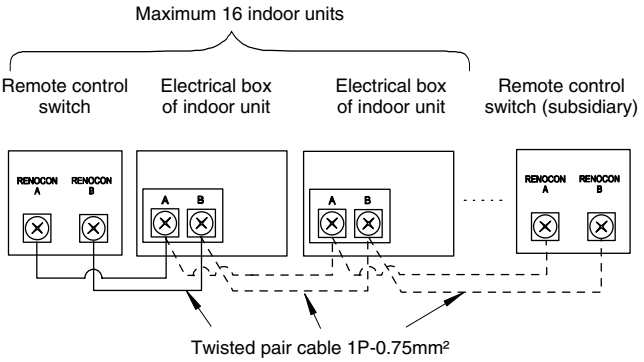
- *When you are installing the unit, attach the black ring core (accessory.*
- *Before connecting the cable of the remote control switch to the terminal board, insert this cable into the ring core with two turns as shown in the figure above. If the wiring is 0.75 mm², you need to peel off the outside cover.*
- *Fix the cable with the band (accessory).*

■ Electrical wiring for multiple units

This remote control switch can control up to a maximum of sixteen units.

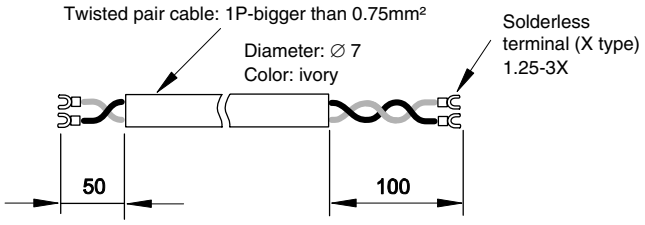
If you are going to modify the electrical wiring, perform the wiring connection and other works as the following procedures explain.

You can connect two remote controls in the same unit or the same unit groups. The second remote control is the subsidiary remote control switch as shown below.

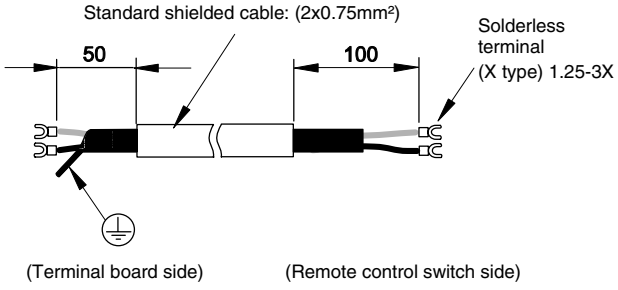


■ Comunication cable (field-supplied)

- You must use a twisted paired cable (2x0.75mm^2). The maximum total length is 200m.



- To connect the shielded part to earth at the side of the electrical box, you can also use the standard shielded cable (2 x 0.75 mm^2). The maximum total length is 200m.



Cable model	PRC-10E1	PRC-15E1	PRC-20E1	PRC-30E1
Length (m)	10	15	20	30

CAUTION:

There are optional cables of 2x0.75mm^2 twisted wire. The cables have different lengths. The cables are also fitted with connectors.

To prevent a malfunction, use the shielded twisted pair cable (2x0.75mm²) as a transmission cable. The maximum total length is 200m. If the total cable length is within 30m, you can use cables that are bigger than 0.3mm².

Keep a distance of more than 30cm between the remote control cable and the transmission cable of the indoor units.

CAUTION:

If multiple indoor units are controlled simultaneously, set the refrigerant cycle number and the address of the indoor units as shown below.

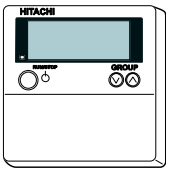
Address of the indoor units:

Master unit	1st unit	2nd unit	3rd unit
			
4th unit	**5th unit**	**6th unit**	**7th unit**
			
8th unit	**9th unit**	**10th unit**	**11th unit**
			
12th unit	**13th unit**	**14th unit**	**15th unit**
			

4.3. INSTALLATION OF THE CENTRAL STATION <PSC-5S>

4.3.1. ACCESSORIES

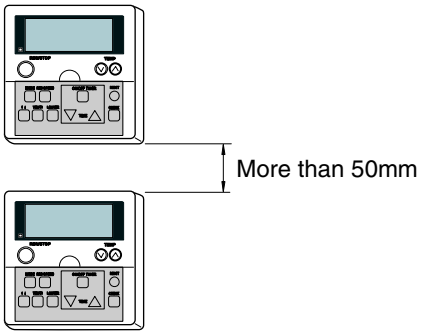
Check the contents and the number of accessories in the packing.

	
Central station	Two screws M4x16L. for fixing the holding bracket onto the wall

NOTE:
The central station is divided into two parts: the linked control part and the power supply part.

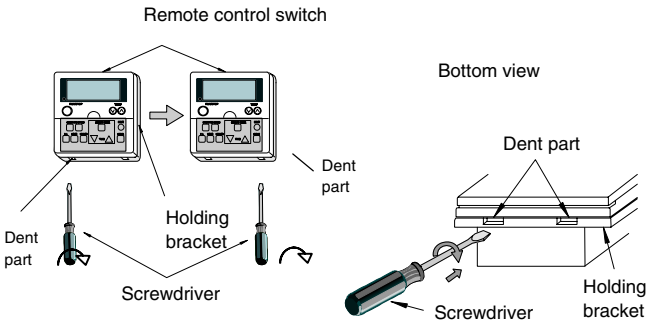
4.3.2. INSTALLATION AREA

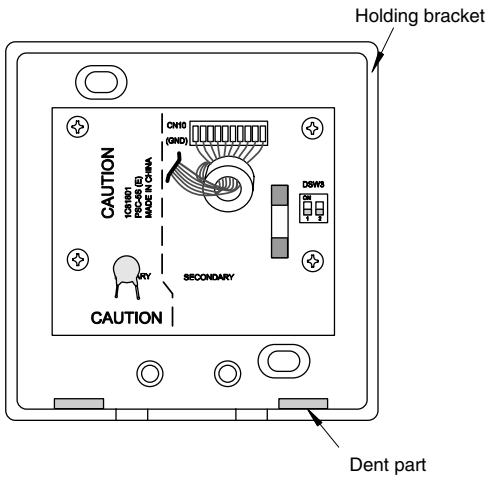
If you are installing the remote control switches vertically, keep a distance of more than 50mm between the remote control switches. If the distance is shorter than 50mm, the front panel of the remote control switch cannot open wide enough.



4.3.3. INSTALLATION PROCEDURE

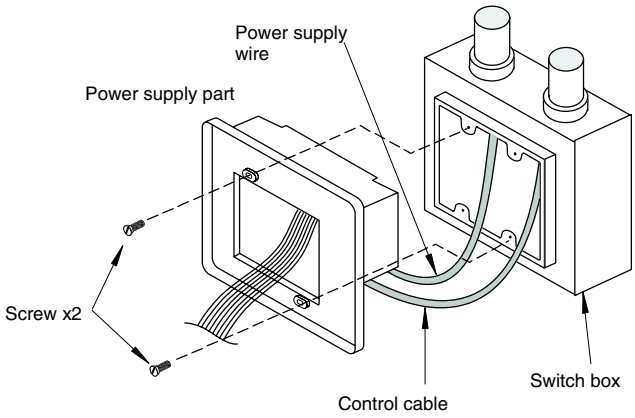
1. Insert the edge of the flat-headed screwdriver into the dent parts at the bottom of the holding bracket. Next, push and turn the screwdriver. Then, remove the linked control part from the power supply part as shown in the next figure.



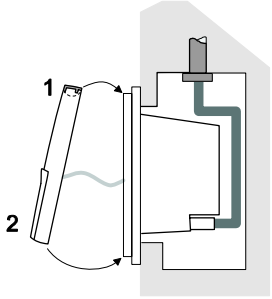


2. Attach the power supply part to the switch box.

NOTE:
Do not run the power supply wire and the control cable through the same conduit tube.



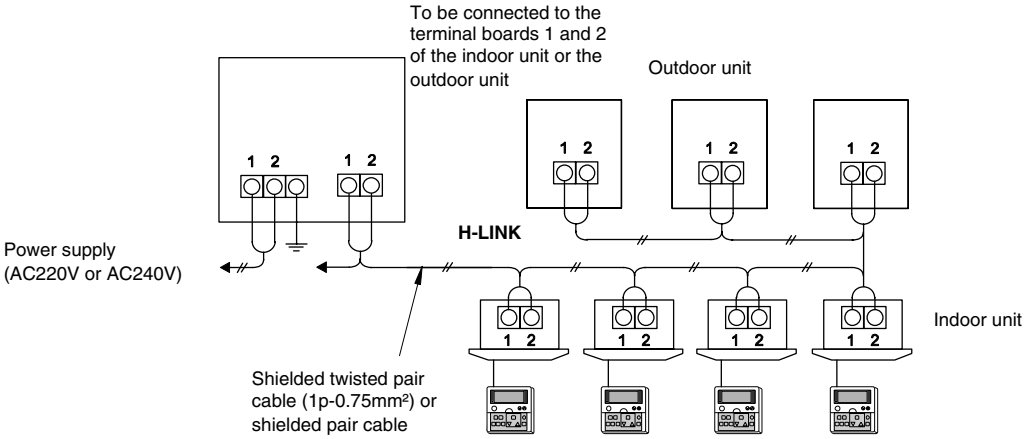
3. Attach the linked control part to the power supply part. First, attach the upper side. Then, attach the lower side.



4.3.4. ELECTRICAL WIRING

■ Wiring connection

You can connect up to eight central stations to the H-LINK.



■ Setting the DIP switch

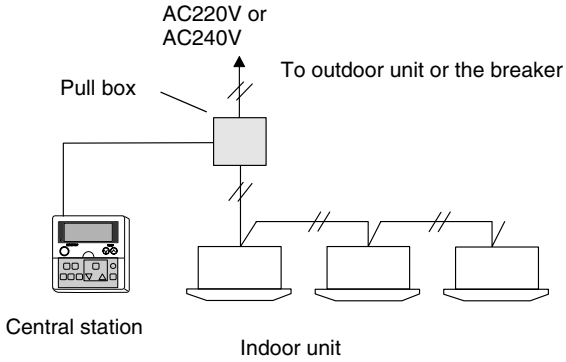
Set the DSW1 as shown below.
When you connect more than one central station (maximum eight units) to the H-LINK, the address setting is required.

NOTE:
Before the shipment, all the setting positions of the DIP switches are OFF.

■ Address setting of the DSW1

Address 1	Address 2	Address 3	Address 4
ON 1 2 3 4	ON 1 2 3 4	ON 1 2 3 4	ON 1 2 3 4
Address 5	**Address 6**	**Address 7**	**Address 8**
ON 1 2 3 4	ON 1 2 3 4	ON 1 2 3 4	ON 1 2 3 4

Divide the power supply wire for the central station from the main power supply wire with a pull box as shown in the next figure.



CAUTION:
Make sure that the wiring is correct. An incorrect wiring may cause a malfunction of the central station.

Before installing the wiring, turn OFF the power supply of the air conditioning system and the central station. If you install the wiring while the power supply of the central station is being supplied, you may cause a malfunction of the central station.

Do not run the transmission cable for the central station along the power supply wire and other transmission cables. If you do so, you may cause a malfunction due to the electrical noise. If you need to run the transmission cable for the central station along the power supply wire and other transmission cables, keep the cable at a distance of more than 30cm away from other cables. Alternatively, run the cable through a metal conduit tube and ground one end of the conduit tube.

If you apply high voltage to the TB2, you may blow out the fuse on the PCB. If that is the case, first correct the wiring to the TB1. Then, set the No.2 pin to ON.

■ System layout

Each central station can control up to 16 indoor units or 16 groups of indoor units. (One group of indoor units is all the units that are controlled by the same remote control switch).

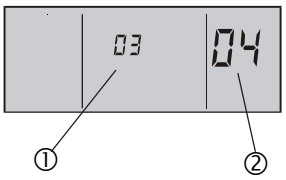
Master unit: The indoor unit that defines a group. The central station sends the orders for one group only to the master unit of that group. You can set as the master unit only one unit from the group of units that are controlled by the same remote control switch.

Slave unit: The indoor unit that is controlled by the same remote control switch that controls the master unit. You must set in the same group number all the units that are controlled by the same remote control switch. The central station will not send any order to the slave units. Instead, the central station will send orders to the master unit, which will then forward the orders to the other units. You should not set as slave units the units that have a unique remote control switch or the units that do not have a remote control switch.

■ Automatic group configuration

When you first power ON the unit and when you need to initialize, the automatic group configuration is performed. (Refer to the procedure in section 16.3.7).

During the automatic configuration, the LCD (Liquid Crystal Display) of the central station is the following:



① Refrigerant cycle on the connection check

② Number of checked indoor units that are connected in the refrigerant cycle on the connection check

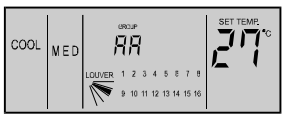
The instructions for the automatic group configuration from group 1 to group 16 are the following:

1 For the group 1, check all the units whose address of indoor unit is 0. The unit that has the lowest refrigerant cycle address is set as the master unit.

2 Repeat the step 1 for all the groups until the group 16.

The automatic group configuration can last several minutes because the central station is checking all the possible units.

If all the units have unique addresses of indoor unit and all the units are controlled by different remote control switches, no additional group setting is required. If that is the case, the display after the automatic group configuration is the following:



Otherwise, the display is the following:

1. Changing to the group setting mode

- Press the CHECK switch for three seconds. During this time the units of all groups are stopped. Then, the central station changes to the check mode, the CHECK indication is turned ON, and "1" (mode for setting the master unit) is displayed at the 7-segment display for checking.
- Press the CHECK switch. Then, "1" changes to "2" (mode for setting the subgroup unit) at the 7-segment display for checking.
- Press the RESET switch. Then, the check mode changes to the normal mode.

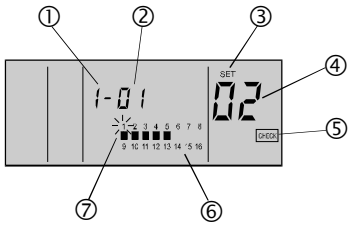
ATTENTION:

- *If there is a group in operation, you cannot change the central station to the check mode.*
- *When you perform the group setting, use the check table for the group setting. You can also write down the group number on the surface inside of the switch cover.*

2. Setting the master unit

▪ Display of the mode for setting the master unit

When the central station changes to the mode for setting the master unit, the LCD of the central station is the following. The number of the group that you need to set is flickering ⑦. The refrigerant cycle number ② and the address of indoor unit ④ indicate the address of the indoor unit that is set as the master unit of the group that you need to set. If the master unit of the group is already set, the group number indicator "■" flickers. When the SET indication appears ③, the indoor unit that is displayed on the LCD is set as the master unit. If the master unit is not set, the indicator "--" is displayed at the refrigerant cycle number ② and the address of indoor unit ④. Also, the SET indication ③ does not appear.



① "1" means the mode for setting the master unit.

② The refrigerant cycle number of the indoor unit which you need to set. (You can change the number by pressing the "▽" TEMP switch).

③ When the SET indication appears, the indoor unit that is displayed on the LCD is set as the master unit. (When the SET indication does not appear, the master unit is not set).

④ The address of the indoor unit which you need to set. (You can change the address by pressing the "△" TEMP switch).

⑤ When the CHECK indication appears, the central station is in the check mode.

⑥ The condition of the master unit setting for each group: (■ is ON: The master unit is set; ▮ is OFF: The master unit is not set).

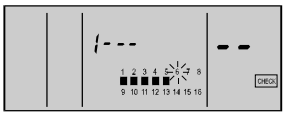
⑦ The group number which you need to set.

▪ Instructions for setting the master unit

Set the master unit for each group as follows:

a. Selection of the group that you need to set

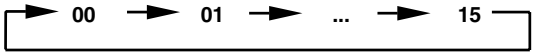
Select the group that you need to set by pressing the GROUP switch. Every time you press the GROUP switch, you move the flickering group number indicator.

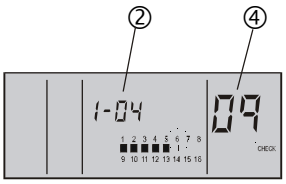


The flickering group number indicator moves, for example when you are selecting the group number 6.

b. Selection of the indoor unit that you need to set

Change the refrigerant cycle number ② by pressing the "∇" TEMP switch. Change the address of indoor unit ④ by pressing the "Δ" TEMP switch and select the indoor unit which you need to set. The indication changes in the order that is shown below:



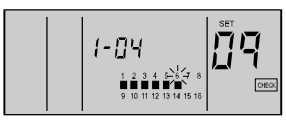


ATTENTION:

- *When the indicator of the refrigerant cycle number ② is "--", the indicator of the address of indoor unit ④ is also "--". In such a case, you cannot change the address of indoor unit although you press the "Δ" TEMP switch.*
- *The following items are not displayed: the refrigerant cycle number that does not have an indoor unit connected; the address of indoor units that are not connected.*
- *The indoor unit that is already set as the master unit is not displayed.*

c. Setting procedure

After selecting the indoor unit, press the RUN/STOP switch. The displayed unit is set as the master unit. The indicator "■" and the SET indication appear.
(Every time you press the RUN/STOP switch, the master unit is set and cancelled alternately.)



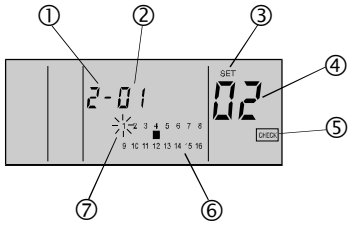
CAUTION:

- *You can set only one indoor unit as the master unit in one group. If the master unit is already set, you cannot set another indoor unit as the master unit for the group. In order to set the present master unit as the master unit for another group, cancel the present master unit setting and perform the setting for another group.*
- *If there are indoor units with the auto-louver and indoor units without the auto-louver in the same group, set the indoor unit with the auto-louver as the master unit. If you set the indoor unit without the auto-louver as the master unit, the auto-louver setting will not be available for all the units of the group.*

3. Setting the slave unit

▪ Display of the mode for setting the slave unit

When the central station changes to the mode for setting the slave unit, the LCD of the central station is the following. The number of the group that you need to set is flickering ⑦. The refrigerant cycle number ② and the address of indoor unit ④ indicate the address of the indoor unit that has the smallest address among the slave units of the group that you need to set. If the slave units of the group are already set, the group number indicator "■" flickers. If the slave unit is not set, the indicator "--" is displayed at the refrigerant cycle number ② and the address of indoor unit. ④



① "2" means the mode for setting the slave unit.

② The refrigerant cycle number of the indoor unit that you need to set. (You can change the number by pressing the "∇" TEMP switch).

③ When the SET indication appears, the indoor unit that is displayed on the LCD is set as the slave unit. (When the SET indication does not appear, the slave unit is not set).

④ The address of the indoor unit which you need to set. (You can change the address by pressing the "Δ" TEMP switch).

⑤ When the CHECK indication appears, the central station is in the check mode.

⑥ "■" means the group with indoor units which you need to set. (The above figure shows that the indoor unit with the refrigerant cycle number 1 and with the address of indoor unit 2 is set as the slave unit of the group number 4).

⑦ Only the group which has the master unit already set is displayed. The group that you need to set is flickering.

▪ Instructions for setting the slave unit

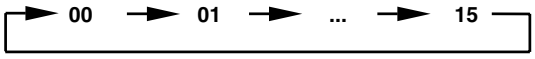
Set the slave unit for each group as follows.

a. Selection of the group that you need to set

Select the group that you need to set by pressing the GROUP switch. Every time you press the GROUP switch, the flickering group number indicator changes to the next group. You cannot select the group that does not have the master unit setting.

b. Selection of the indoor unit that you need to set

Change the refrigerant cycle number by pressing the "∇" TEMP switch. Change the address of indoor unit by pressing the "Δ" TEMP switch and select the indoor unit which you need to set. The indication changes in the order that is shown below:



ATTENTION:

- *The following items are not displayed: the refrigerant cycle number that does not have an indoor unit connected; the address of indoor units that are not connected.*
- *When the selected unit is already set as the slave unit, the group number indicator "■" of the unit and the SET indication appear.*
- *The indoor unit that is already set as the master unit is not displayed.*

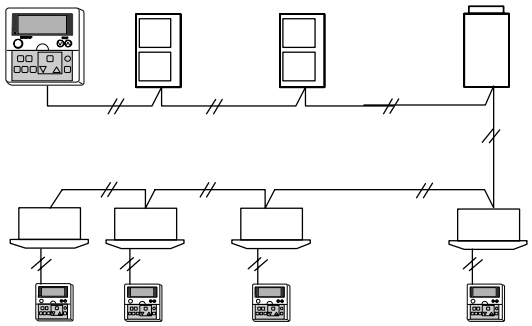
c. Setting procedure

After selecting the indoor unit, press the RUN/STOP switch. The displayed unit is set as the slave unit. The indicator "■" and the SET indication appear.
(Every time you press the RUN/STOP switch, the slave unit is set and cancelled alternately.)

CAUTION:

- *You can set up to 15 slave units in one group. (The maximum in one group is 16 units, including the master unit).*
- *In order to change the setting of a slave unit to another group, cancel the present slave unit setting and perform the setting for another group.*
- *If all the units are set as master units, you cannot change the central station to the slave unit setting.*

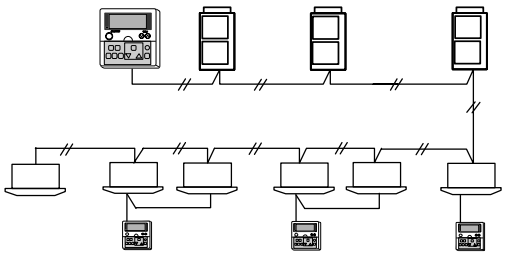
Example A:
A system where all the units have a unique address of indoor unit and all the units are controlled by different remote control switches. The result is the following:



Setting of I.U. Rotary Switch:	0	1	2	3
Group Number:	1	2	3	4

You do not need to perform additional group settings.

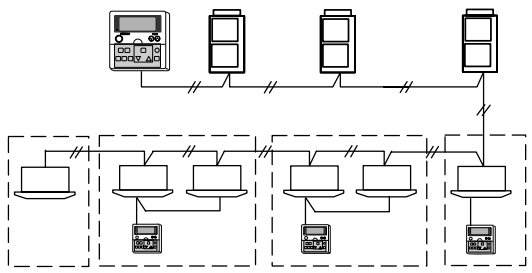
Example B:
A system where the units have a repeated address of indoor unit and some units are controlled by the same remote control switch.



Refrigerant System:	0	1	1	2	2	3
Setting of I.U. Rotary Switch:	0	0	1	0	1	0
Group Number:	1	X	2	X	X	X

You need to perform additional settings in order to include units that are not set in the automatic group configuration. You also need to perform additional settings in order to set the indoor units that are controlled by the same remote control switch in the same group.

In the manual group setting, you can set the system as follows:



Refrigerant system:	0	1	1	2	2	3
Setting of I.U. rotary switch:	0	0	1	0	1	0
Group number:	1	2	2	3	3	4

4.3.5. INPUT/OUTPUT FUNCTION

The central station has two input functions and two output functions as shown below.

Input setting mode, output setting mode and connector.

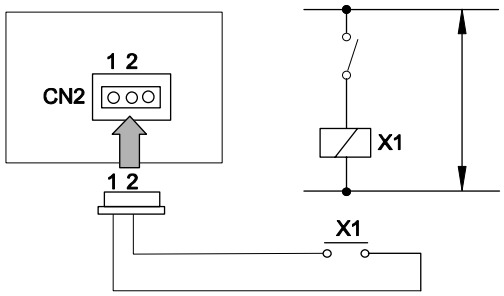
Mode	Port	Setting of the DSW2		
		ON 1 2 3 4	ON 1 2 3 4	ON 1 2 3 4
Input 1	CN2 1-2	Simultaneous operation / stoppage level signal		Simultaneous operation, pulse signal
Input 2	CN2 2-3	Demand	Emergency stoppage	Simultaneous stoppage, pulse signal
Output 1	CN3 1-2	Simultaneous operation output		
Output 2	CN3 1-3	Simultaneous alarm output		

Specifications of the required components:

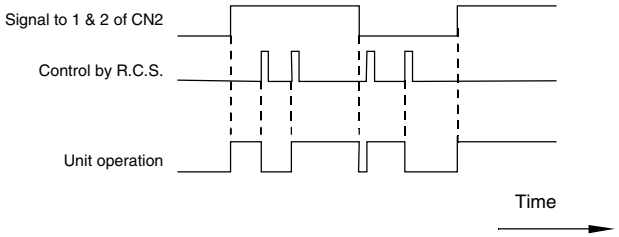
- DC12V non-Voltage A connection
- OMRON MY relay
- PCC-1A

1. Simultaneous operation / stoppage level signal

This is a remote ON/OFF function that uses the level signal (ON/OFF).
The basic wiring and the time chart are shown below.

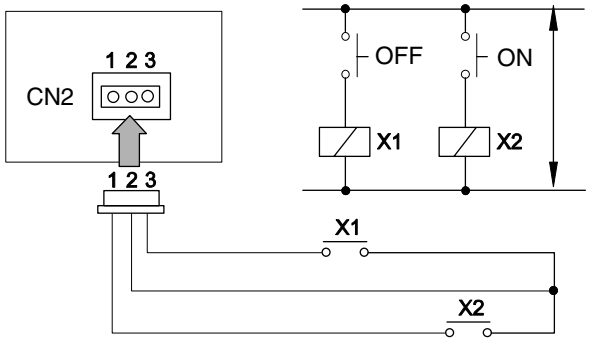


■ Time chart

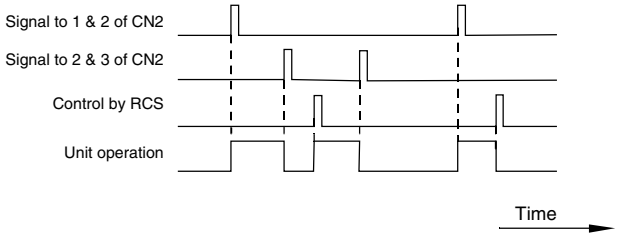


2. Simultaneous operation, pulse signal; simultaneous stoppage, pulse signal

This is a remote ON/OFF function that uses the pulse signal.
The basic wiring and the time chart are shown below.

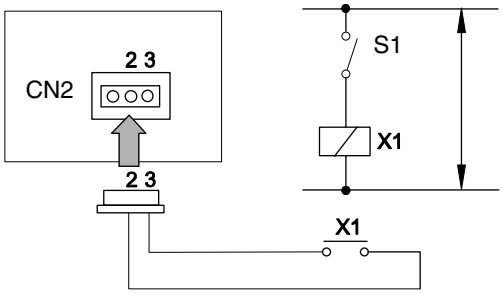


■ Time chart

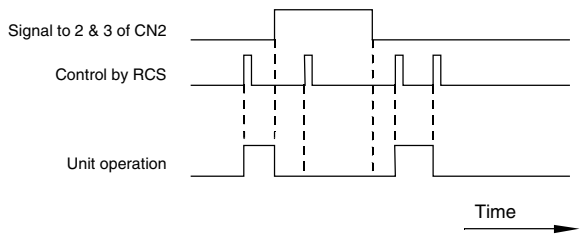


3. Emergency stoppage

This is a remote emergency OFF function that uses the pulse signal. All units that are controlled by the central station are forced to stop. Then, further setting with RCS is not enabled until the remote emergency OFF function is removed.
The basic wiring and the time chart are shown below.

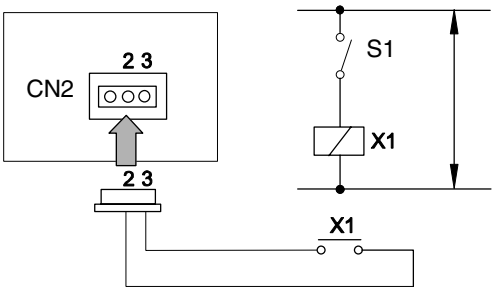


■ Time chart

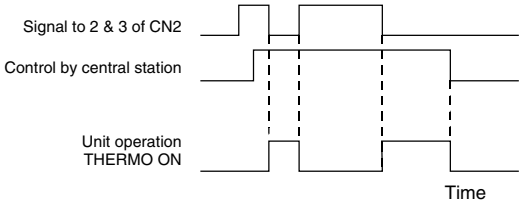


Demand

This is a remote thermostat signal for the selected units. Only the units with the DEMAND indication will follow this order. Refer to the section "Demand setting procedure" below.
The basic wiring and the time chart are shown below.



■ Time chart



NOTE:
The units with the DEMAND indication are always controlled by the central station.

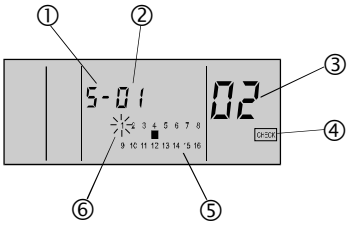
■ Demand setting procedure

1. Changing to the change mode

Press the CHECK switch for more than 3 seconds. The central station changes to the check mode.

2. Changing to the demand setting mode

Press the CHECK switch. Then, "5" (demand setting mode) is displayed at the 7-segment display for checking. The LCD of the central station is the following.



① "5" means the demand setting mode.

② The refrigerant cycle number of the indoor unit that is set as the master unit of the group that you need to set.

③ The address of the indoor unit that is set as the master unit of the group that you need to set.

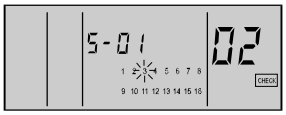
④ When the CHECK indication appears, the central station is in the check mode.

⑤ The group that is already set with the demand control is displayed: (■ is ON: the demand is set; ■ is OFF: the demand is not set).

⑥ Only the group which has the master unit already set is displayed. The group that you need to set is flickering.

3. Selection of the group that you need to set

Select the group that you need to set by pressing any of the GROUP switches. Every time you press the GROUP switch, you move the flickering group number indicator.



The flickering group number indicator moves, for example when you are selecting the group number.

The indicator "■" and DEMAND indication: ON. (The demand control is set).

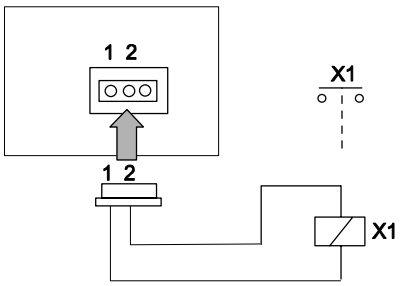
The following is displayed: the refrigerant cycle number and the address of the indoor unit which is set as the master unit of the selected group which you need to set. The indicator "■" appears at the group which is already set with the demand control. The DEMAND indication also appears.

4. Setting procedure

Press the RUN/STOP switch. The selected group is set with the demand control. The indicator "■" and the DEMAND indication appear.
(Every time you press the RUN/STOP switch, the demand control is set and cancelled alternately.)

5. Simultaneous operation output

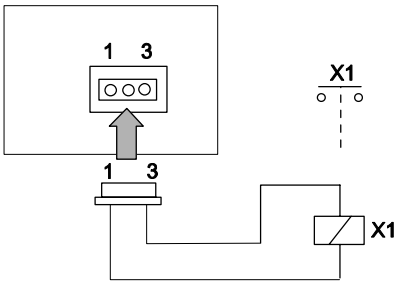
You use this function in order to check the operation status of the units that are controlled by the central station. If any unit is turned ON, the simultaneous operation output will be ON.
The basic wiring is shown below.



6. Simultaneous alarm output

You use this function in order to check the alarm status of the units that are controlled by the central station. If any unit is under alarm status, this output will be ON.

The basic wiring is shown below.



4.3.6. OPTION SETTING

1. Changing to the option setting mode

a. Press the CHECK switch for three seconds. During this time the units of all groups are stopped. The central station changes to the option setting mode. Then, the CHECK indication is turned ON and the "1" (mode for setting the master unit) is displayed at the 7-segment display for checking.

ATTENTION:

If there is a group in operation, you cannot change the central station to the check mode.

b. Press the CHECK switch and change the display of the 7-segment display.

7–Segment	Function
A	Fixing the operation mode
b	Fixing the setting temperature
c	Fixing the cooling only
d	Fixing the air volume
E	Automatic cooling/heating operation

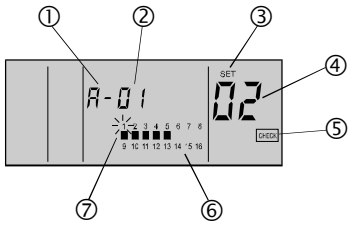
c. Press the RESET switch. Then, the central station changes to the normal mode.

NOTE:

Refer to section 6.3.2. for a description of the option setting.

2. Display of the option setting mode

When the central station changes to the option setting mode, the LCD of the central station is the following. The number of the group that you need to set is flickering. The refrigerant cycle number and the address of indoor unit indicate the address of the indoor unit that is set as the master unit of the group that you need to set. If the option setting is already done, the group number indicator "■" flickers. When the SET indication appears, the indoor unit that is displayed on the LCD is already set as the optional function.



① "A" means the option setting mode.

② The refrigerant cycle number of the indoor unit that is set as the master unit of the group that you need to set.

③ When the SET indication appears, the indoor unit that is displayed on the LCD is set with the optional function.

④ The address of the indoor unit that is set as the master unit of the group that you need to set.

⑤ When the CHECK indication appears, the central station is in the check mode.

⑥ The condition of the option setting for each group: ("■" is ON: the option is set; "■" is OFF: the option is not set).

⑦ The group number that you need to set.

2. Setting procedure

a. Press the CHECK switch and select the options A - E.

b. Select the group that you need to set by pressing the GROUP switch.

c. Press the RUN/STOP switch. The option setting is done. Then, the indicator "■" appears. The SET indication also appears. (Every time you press the RUN/STOP switch, the optional function is set and cancelled alternately).

CAUTION:

– *If the optional functions are set by the central station, you need to set the same optional functions for the group controlled by means of the remote control switch.*

– *If the optional functions, which are the setting items A - E as shown above, are set by the remote control switch, you need to set the same optional functions for the group controlled by means of the central station.*

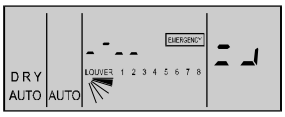
4.3.7. INITIALIZATION OF THE CENTRAL STATION

The instructions for initializing the group setting and the optional setting are as follows.

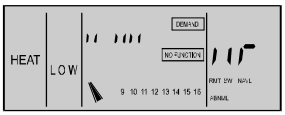
1. Changing to the self-check mode

Press the GROUP (∨ and ∧) switch and the MODE switch simultaneously. Then, the central station changes to the self-check mode. If there is a group in operation, the NO FUNCTION indication appears and you cannot change the central station to the self-check mode.
When the central station changes to the self-check mode, the LCD changes from (i) to (vii) as shown below.
Before the LCD changes to (vii), press the GROUP (∨ and ∧) switch and the MODE switch simultaneously again. Keep the switches pressed until the initialization starts. Then, the central station changes to the initialization mode.

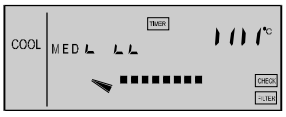
(i)



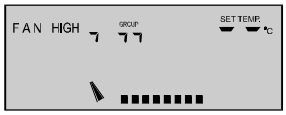
(ii)



(iii)



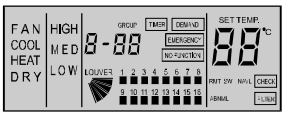
(iv)



(v)

(All indications: OFF)

(vi)



(All indications: ON)

(vii)

(All indications: OFF)

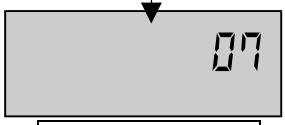
NOTE:
If you do not press the GROUP (∨ and ∧) switch and the MODE switch again, the self-check operation continues.

2. Initialization

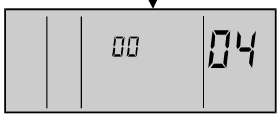
When the central station changes to the initialization mode, the LCD of the central station is as shown below. In this condition, press the RESET switch. The flickering 06 indication changes to ON. Then, the initialization is performed.
(If the initialization is not required, press the CHECK switch. Then, the LCD automatically changes as shown below).

"06" flickers. Press RESET switch and "06" changes to ON. In case of EEPROM initialization, it takes approximately 30 - 60 seconds

Press RESET switch or CHECK switch



To connection check



Group setting table of central station

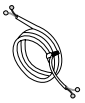
RSW of indoor unit	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Indication of PSC-5S	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
00																
01																
02																
03																
04																
05																
06																
07																
08																
09																
10																
11																
12																
13																
14																
15																

Fill the gap number (1-16) in the above table.
Circle the unit number of the master unit.

4.4. INSTALLATION OF THE 7-DAY TIMER <PSC-5T>

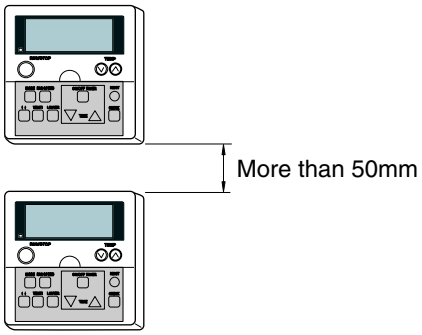
4.4.1. ACCESSORIES

The packing contains the following items:

		
Control timer	Two screws M4x16L. for fixing the holding bracket onto the wall.	Cable (1m)

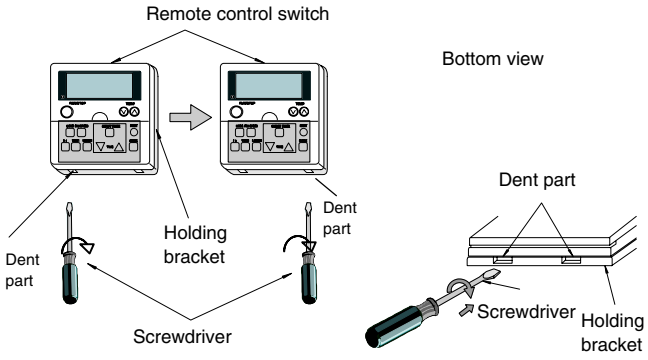
4.4.2. INSTALLATION AREA

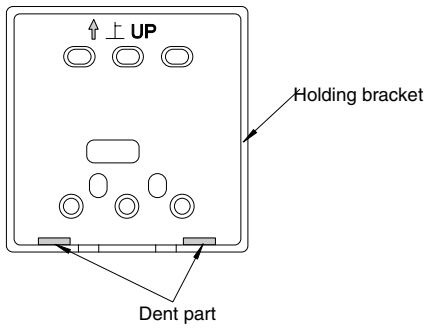
If you are installing the remote control switches vertically, keep a distance of more than 50mm between the remote control switches. If the distance is shorter than 50mm, the front panel of the remote control switch cannot open wide enough.



4.4.3. INSTALLATION PROCEDURE

1. Insert the edge of the flat-headed screwdriver into the dent parts at the bottom of the holding bracket. Next, push and turn the screwdriver. Then, remove the remote control switch from the holding bracket as shown in the next figure.

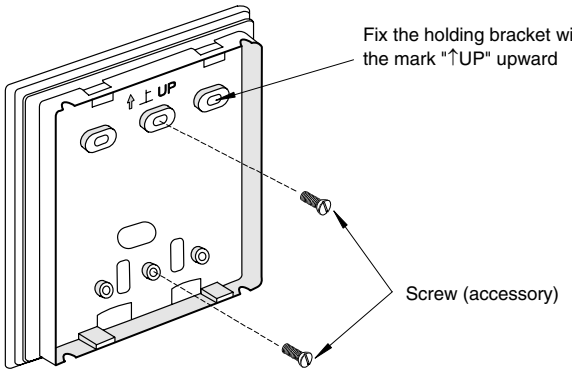




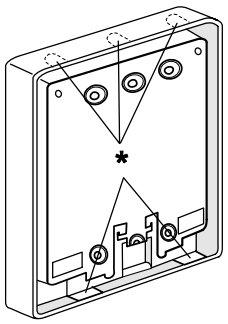
2. Attach the timer to the holding bracket and connect the cable as follows.

■ **If you are exposing the remote control cable**

1. Fix the holding bracket onto the wall as shown in the figure below.

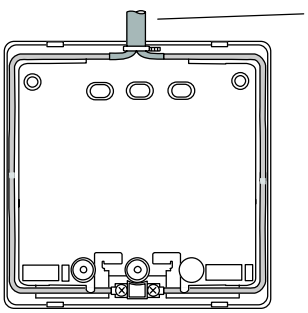


2. Select and cut the knockout hole according to the direction for drawing out the cable.

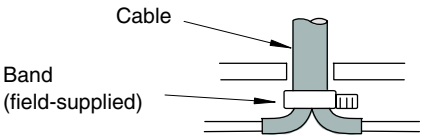


According to the cable arrangement, determine the direction for drawing out the cable and cut the knockout hole. (The knockout hole is one of the positions that is marked with * in the left figure).
If you are using an accessory cable, draw out the cable from one of the knockout holes at the lower side.

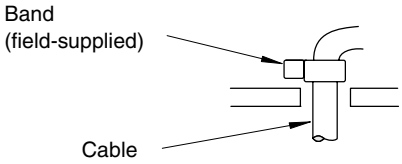
3. Lead the cable through the groove.



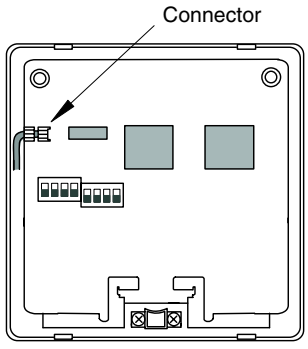
Twisted pair cable

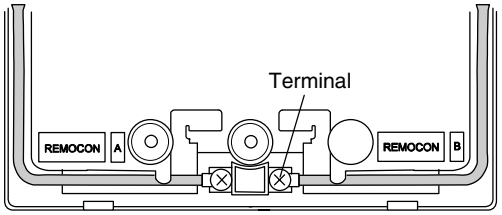


Accessory cable

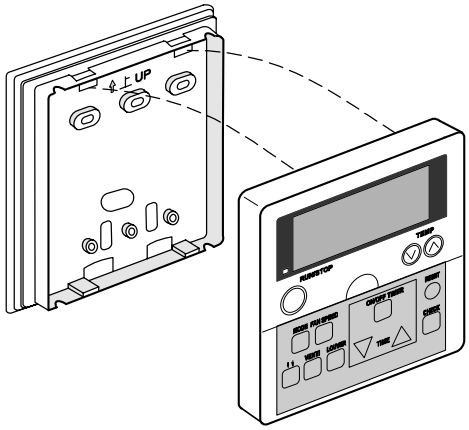


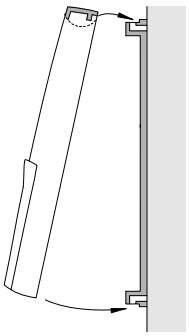
If you are connecting the accessory cable to the connector, remove the protection case.





4. Attach the timer onto the holding bracket.





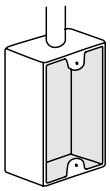
Step 1:
Insert the hooks of the timer to the holes at the top side of the holding bracket.

Step 2:
Push the lower part of the timer toward the holding bracket.

Step 3:
When you hear a clicking sound, the timer is already attached to the holding bracket. You have finished the mounting work. Make sure that four hooks at the position * are correctly inserted.

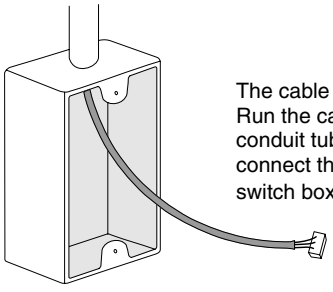
■ If you are using the switch box

1. Field-supplied JIS box (JIS 8336-1998).



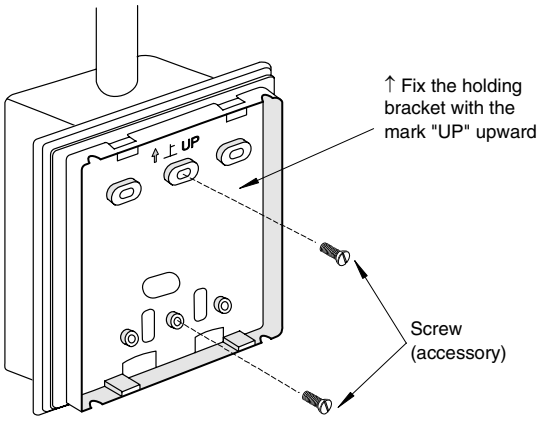
The following five types are available:
1. Switch box for one remote control switch (without panel)
2. Switch box for two remote control switches (without panel)
3. Switch box for one remote control switch (with panel)
4. Switch box for two remote control switches (with panel)
5. Outlet box (with panel)

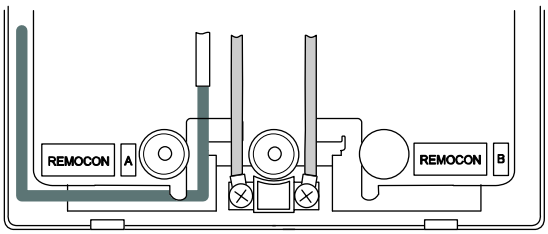
2. Run the cable through the conduit tube in the wall.



The cable is not exposed. Run the cable through the conduit tube in the wall and connect the cable inside the switch box.

3. Attach the holding bracket onto the switch box.





4.4.4. ELECTRICAL WIRING

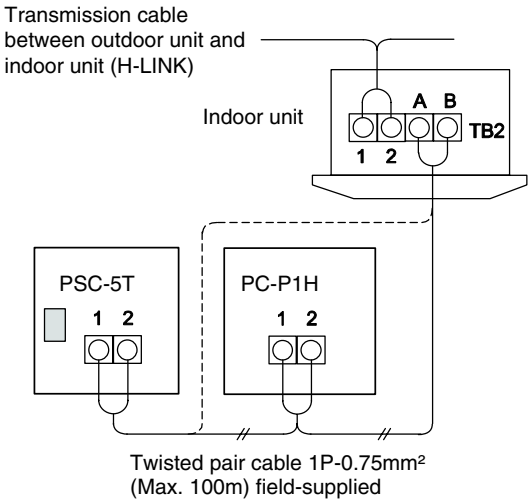
Use this timer with the remote control switch or the central station.

CAUTION:

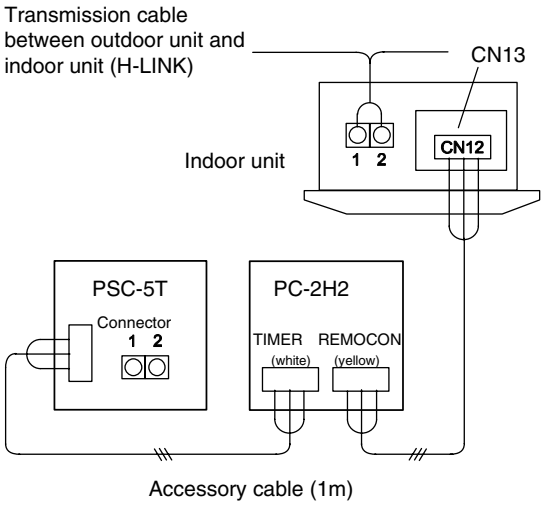
To prevent a malfunction, use the twisted pair cable (1P-0.75mm²) as a transmission cable.

Keep a distance of more than 30cm between the remote control cable and the transmission cable of the indoor units.

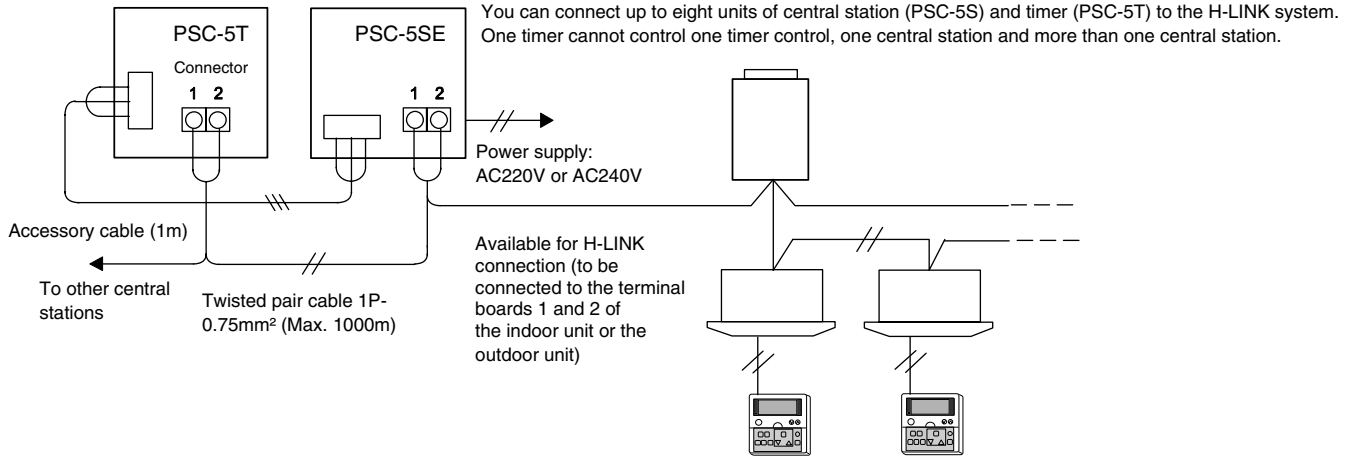
1. If you are using a timer with PC-P1HE:



2. If you are using a timer with PC-2H2:

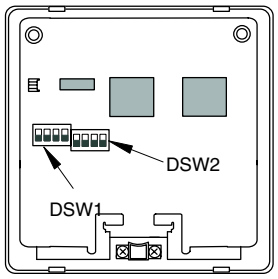


3. If you are using a timer with PSC-5SE (central station):



4.4.5. SETTING THE DIP SWITCHES

Set the two DIP switches on the PCB as follows. (The factory settings of the DSW1 and the DSW2 are all OFF).



Setting of the DSW1 (For the address setting)

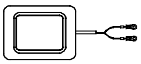
Address	0	1	2	3
Setting of the DSW1				
Address	**4**	**5**	**6**	**7**
Setting of the DSW1				

Settings of the DIP switches

	Pin No.	Contents of the settings	Settings of the DSW		Remarks
			OFF	ON	
DSW1	1	For the address setting	Refer to the table above		Setting is required only when the central station (PSC-5S) is used together. Set the address of the central station to be controlled.
	2				
	3				
	4	For the remote control switch used together	Except for PC-P1HE	PC-P1HE	When the remote control switch PC-P1HE is used together, set the No.4 pin to ON.
DSW2	1	Setting for prohibition of the remote control operation after stopping at OFF TIME	Setting is not available	Setting is available	Remote control operation is not available after stopping at OFF TIME. Remote control operation is available again at ON TIME while the unit is stopped. (This setting is available only when the remote control switch (PC-P1HE) or the central station (PSC-5S) is used together).
	2	For the remote control switch used together	PSC-5S	Except for PSC-5S	Set the No.2 pin according to the other remote control switch used together.
	3	Not used	-	-	Do not change the setting. (No.3 pin set to OFF).
	4	Not used	-	-	Do not change the setting. (No.4 pin set to OFF).

4.5. INSTALLATION OF THE RECEIVER KIT <PC-RLH4>

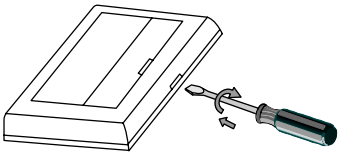
The packing contains the following items. Check the contents and the number of items in the packing.

PC-RLH4	Receiver kit 	1	With the connector cable
	Band 	1	For fixing the cable
	Screw 	4	For fixing the receiver kit
	Screw 	2	For fixing the clamp
	Clamp 	2	For fixing the cable

4.5.1. INSTALLATION OF THE WIRELESS RECEIVER KIT

NOTE:
Install the receiver kit onto the wall or the ceiling near the indoor unit.

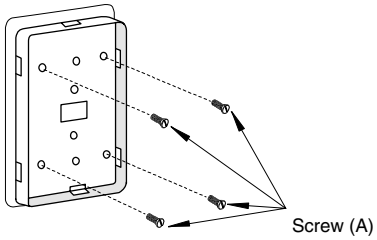
1. Install the wireless receiver kit and the indoor unit at the same time.
2. If you install the wireless receiver kit after installing the indoor unit, turn off the power source of the indoor unit.
3. Make sure that the distance between the wireless receiver kit and the indoor unit is less than 5m.
4. Remove the panel by using a screwdriver.



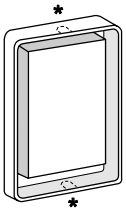
5. Install the wireless receiver kit onto the wall or the ceiling as follows.

   A. If you are exposing the cable

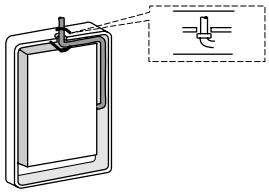
   ❶ Fix the fixing bracket of the wireless receiver kit by means of the screw (A) at the four locations.



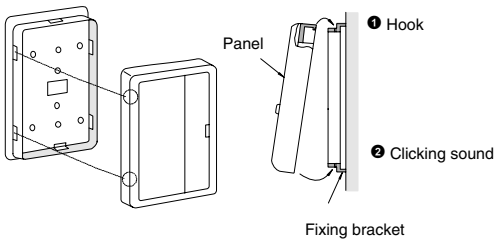
❷ Cut one of the knockout holes at the panel.



❸ Lead the cable through the groove and draw out the cable from the knockout hole.

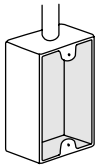


❹ Attach the panel. Do not clamp the cable when you are attaching the panel.



B. If you are concealing the cable

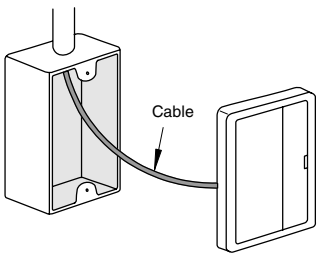
❶ Prepare the following field-supplied box.



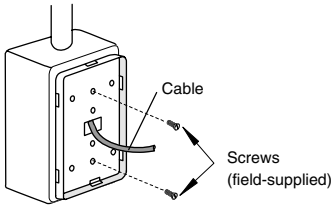
JIS box (JIS C8336-1991)
1. Switch box for one remote control switch (without panel)
2. Small switch box for one remote control switch (without panel)
3. Switch box for one remote control switch (with panel)

- Rigid metal conduit tube (more than Ø20)
- M4 screw (field-supplied)

❷ Insert the cable into the rigid metal conduit tube.



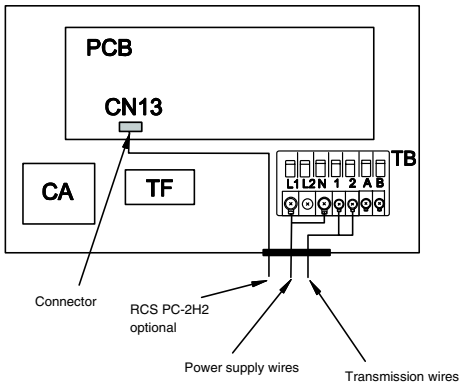
❸ Fix the fixing bracket of the wireless receiver kit by means of the field-supplied screws.



This figure shows the case of the switch box for one remote control switch.

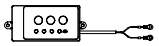
❹ Attach the panel in the same way as A❹.

6. Remove the panel of the electrical box of the indoor unit. Then, connect the cable to the connector CN13 of the PCB.



4.6. INSTALLATION OF THE RECEIVER KIT <PC-RLH9>

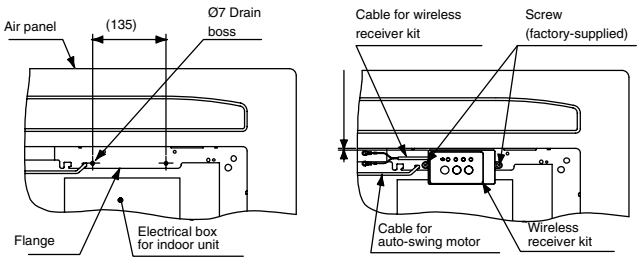
The packing contains the following items. Check the contents and the number of items in the packing.

Mod.	Name	Qty	Remarks
PC-RLH9	Receiver kit 	1	With the connector cable
	Screw 	2	For fixing the receiver kit
	Band 	2	For fixing the cable

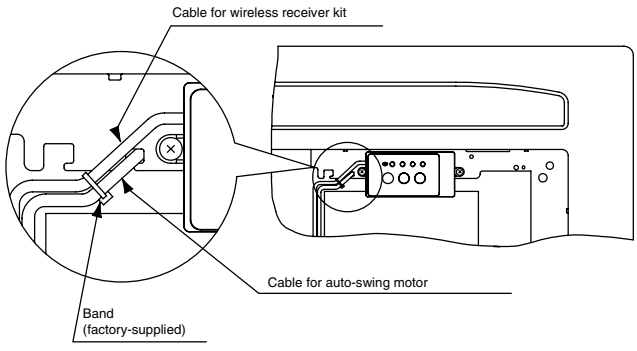
4.6.1. INSTALLATION OF THE WIRELESS RECEIVER KIT

NOTE:
Install the wireless receiver kit into the indoor unit.

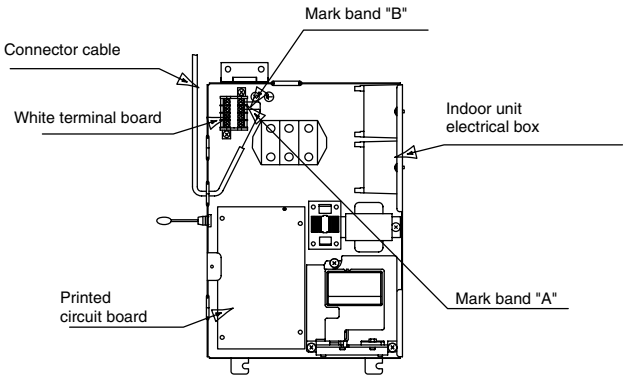
1. Install the wireless receiver kit, the indoor unit and the air panel at the same time.
2. If you install the wireless receiver kit after installing the indoor unit, turn off the power source of the indoor unit. Then, remove the air inlet grille.
3. Fix the wireless receiver kit to the air panel by means of the screws. (The tightening torque must be 0.8Nm).



4. Lead the cable along the cable for the auto-swing motor. Then, tie the cables with the band.

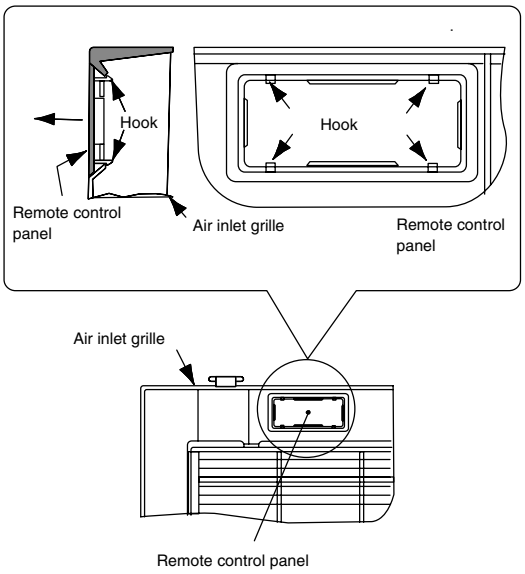


5. Remove the panel of the electrical box of the indoor unit. Then, connect the cable to the terminals A and B of the white terminal board.

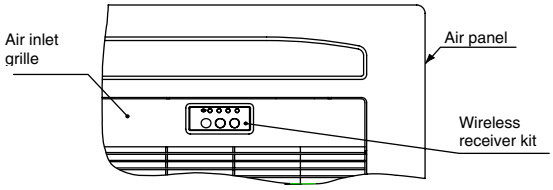


NOTE:
After connecting the cable, tie the remaining cable length with the factory-supplied band. Then, place the cables in the electrical box.

6. Remove the remote control panel of the air inlet grille.
   - Press the hooks of the remote control panel by hand.

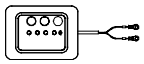
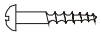
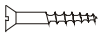


7. After fixing the air panel, attach the air inlet grille to the air panel.
   - Make sure that the location of the square hole of the air inlet grille coincides with the location of the wireless receiver kit of the air panel.
   - Make sure that the square hole of the air inlet grille does not clamp the cable of the wireless receiver kit.



4.7. INSTALLATION OF THE RECEIVER KIT <PC-RLH11>

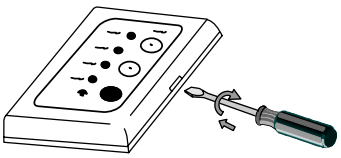
The packing contains the following items. Check the contents and the number of items in the packing.

Mod.	Name	Qty	Remarks
PC-RLH11	Receiver kit 	1	With the connector cable
	Band 	1	For fixing the cable
	Screw 	4	For fixing the receiver kit
	Screw 	2	For fixing the clamp
	Clamp 	2	For fixing the cable

4.7.1. INSTALLATION OF THE WIRELESS RECEIVER KIT

NOTE:
Install the receiver kit onto the wall or the ceiling near the indoor unit.

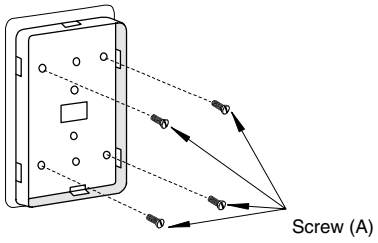
1. Install the wireless receiver kit and the indoor unit at the same time.
2. If you install the wireless receiver kit after installing the indoor unit, turn off the power source of the indoor unit.
3. Make sure that the distance between the wireless receiver kit and the indoor unit is less than 5m.
4. Remove the panel by using a minus screwdriver.



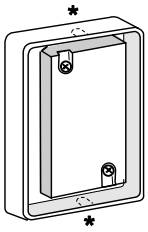
5. Install the wireless receiver kit onto the wall or the ceiling as follows:

A. If you are exposing the cable

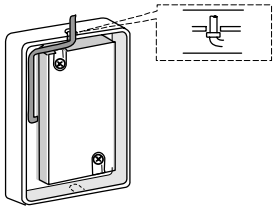
❶ Fix the fixing bracket of the wireless receiver kit by means of the screw (A) at the four locations.



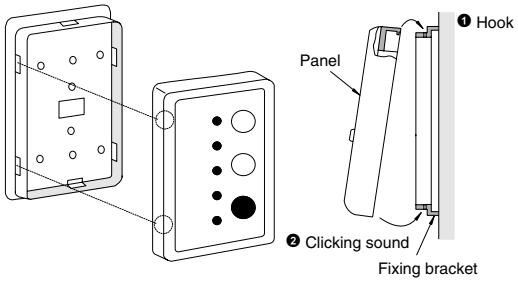
❷ Cut one of the knockout holes (*) at the panel.



❸ Lead the cable through the groove and draw out the cable from the knockout hole.

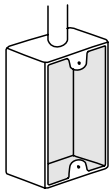


❹ Attach the panel. Do not clamp the cable when you are attaching the panel.



B. If you are concealing the cable

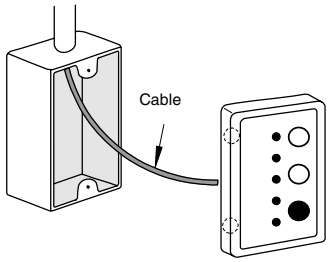
❶ Prepare the following field-supplied box.



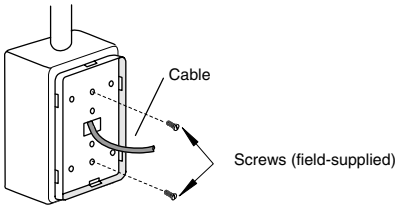
JIS box (JIS C8336-1991)
1. Switch box for one remote control switch (without panel)
2. Small switch box for one remote control switch (without panel)
3. Switch box for one remote control switch (with panel)

- Rigid metal conduit tube (more than ø20)
- M4 screw (field-supplied)

❷ Insert the cable into the rigid metal conduit tube.



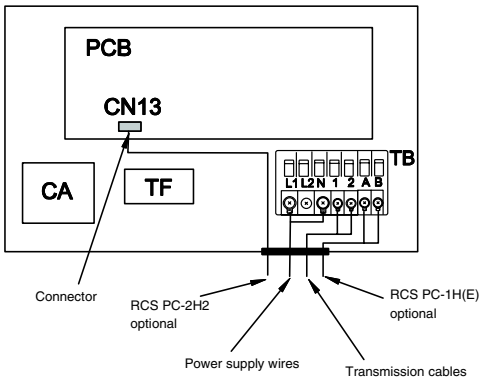
❸ Fix the fixing bracket of the wireless receiver kit by means of the field-supplied screws.



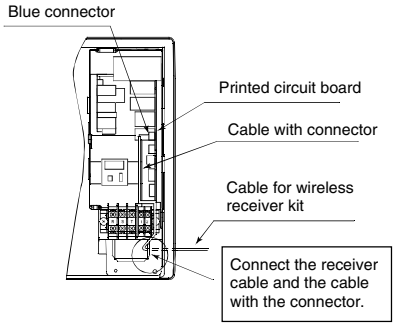
This figure shows the case of the switch box for one remote control switch.

❹ Attach the panel that is the same as A ❹.

6. Remove the panel of the electrical box of the indoor unit. Then, connect the cable to the terminals A and B of the white terminal board.



Example: RPI-3.0

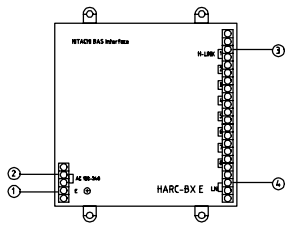


Example: RPK

4.8. HARC

4.8.1. PART NAMES

Each part name of the HARC-BX E is shown in the next figure.



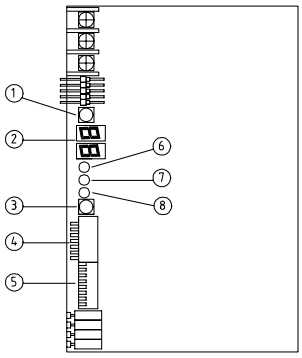
① Power source terminal to be connected to the AC220V~AC240V power source.

② Earth terminal to be grounded.

③ Terminal board for the unit transmission to connect the H-LINK.

④ Terminal board for the upper monitoring system to connect the transmission line for the upper monitoring system.

■ **Board**



① **PSW1 (MCLR)**: the push switch for checking the quantity of connected units.

② **7-Segment Display(*)**: the present state of the HARC-BX E.

③ **PSW2 (LON-SERV)**: the push switch for the transmission neuron ID. (Service pin).

④ **8P DSW1 (S201) (**)**: the DIP switch for setting the system of the HARC-BX E.

⑤ **8P DSW2 (S202) (***)**: the DIP switch for setting the functions of the HARC-BX E.

⑥ **LED of the power source (PWR)**: the LED is ON when the power is supplied.

⑦ **LED of the transmission (H-L)**: the transmission status with the H-LINK.

⑧ **LED of the transmission for the upper monitoring system (LON)**: the transmission status with the upper monitoring system.

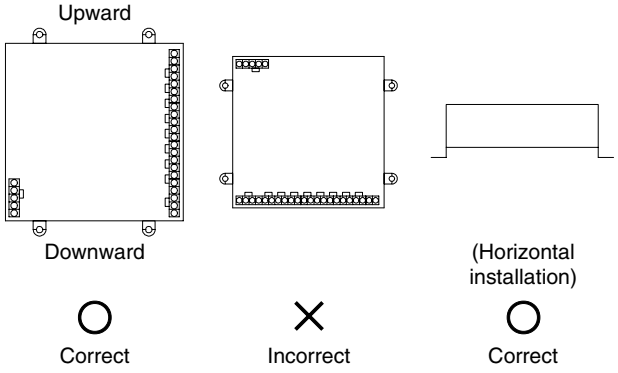
(*) 7-segment display:
Read 4.8.5 "Test run" and 4.8.6 "Maintenance and service" for the details of 7-segment display.

(**) 8P DSW No.1 S201:
Refer to "Setting the DIP switch" in section 4.8.5 for details and the functions of the HARC-BX E.

(***) 8P DSW2 (S202):
Refer to "Setting the DIP switch" in section 4.8.5: (8P DSW1 and 8P DSW2).

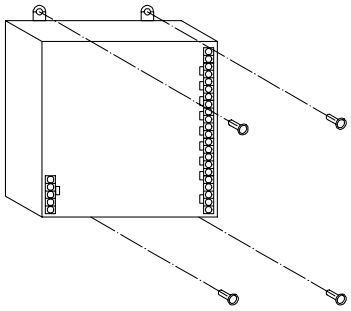
4.8.2. INSTALLATION PROCEDURE

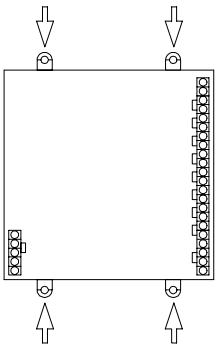
1. Install the HARC-BX E by keeping the screw terminal board at the lower side.



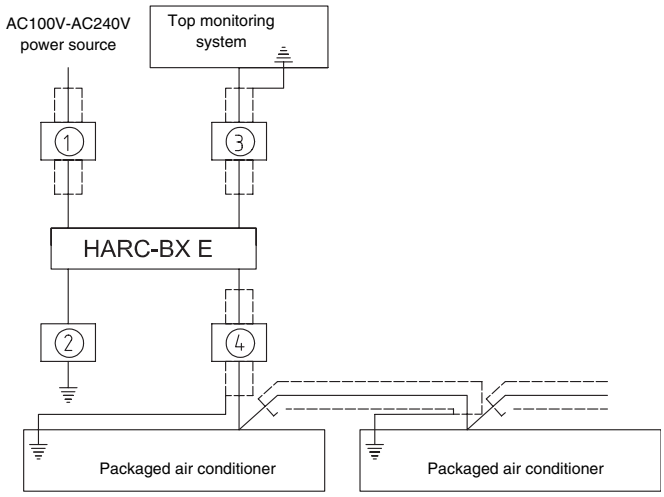
2. Fixing method by means of the M4 screws (field-supplied).

   Fix the HARC-BX E onto the wall by means of the M4 screws at the four locations.





1. You need to install the power supply wiring for the HARC-BX E, the transmission cable between the packaged air conditioners, and the transmission cable between the upper monitoring systems.
2. Wiring method.



No.	Connecting equipment	Specifications of the wiring
①	Power supply wiring for the HARC-BX E	AC100V, 2mm^2, 2 cores, shielded
②	Ground cable	Follow the local standards
③	Upper monitoring system	Follow the instructions of the management personnel (**)
④	Transmission line for the packaged air conditioners	1P-0.75mm^2 twisted pair cable (*)

(*) Make sure that you apply the twisted cables.

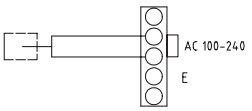
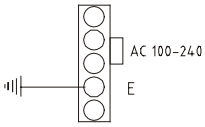
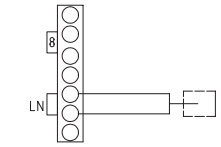
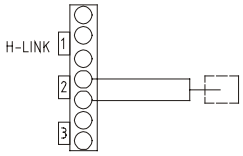
Recommended types of cables:

	Japan Cable Industrial Associations	Hitachi Cable Co., Ltd.	Japan Cable Co., Ltd.	Integral power consumption
Non-shielded	JKEV	KPEV	KNPEV	KPEV
Shielded (copper foil)	JKEV-S	KPEV-S	KNPEV-S	KPEV-S
Shielded (twisted)	JKEV-SB	KPEV-SB	KNPEV-SB	KPEV-SB

4.8.3. ELECTRICAL WIRING

1. To install the wiring, turn OFF the main switch that is connected to the wire of the HARC-BX E and the surrounding equipment.
2. You should install the wiring according to the table below. The "No." in the table indicates the wire in the section "Wiring method".

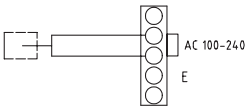
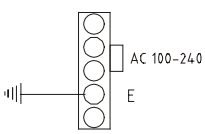
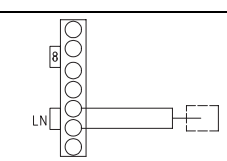
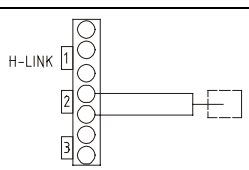
■ Electrical wiring

Section		No.	Wiring method	Remarks
Power supply wire	1~220V/240 V power source HARC-BX E	①		
	Ground wire	②		
Control circuit	Upper monitoring system HARC-BX E	③		Non-polar
	HARC-BX E Packaged air conditioner	④		Non-polar

4.8.4. INSTALLATION OF THE PCB AND THE H-LINK TERMINALS

1. To install the wiring, turn OFF the main switch that is connected to the wire of the HARC-BX E and the surrounding equipment.
2. You should install the wiring according to the table below. The "No." in the table indicates the wire in the section "Wiring method".

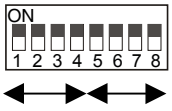
■ ELECTRICAL WIRING

Section		No.	Wiring method	Remarks
Power supply wire	1~220V/240 V power source HARC-BX E	①		
	Ground wire	②		
Control circuit	Upper monitoring system HARC-BX E	③		Non-polar
	HARC-BX E Packaged air conditioner	④		Non-polar

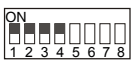
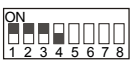
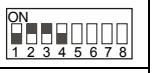
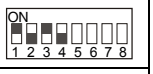
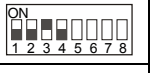
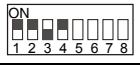
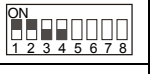
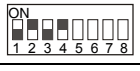
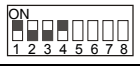
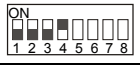
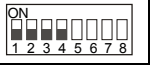
4.8.5. TEST RUN

■ **Setting the DIP switch**

1. Set the DIP switch before turning on the power supply.
2. Remove the front board in order to set the DIP switch.
3. The setting of the DIP switches for each PCB is different.
4. Setting the 8-pin DIP switch (S201)
   The settings of the 8-pin DIP switch (S201) depend on the system numbers and the unit numbers of the applicable indoor units that the PCB controls. The setting procedures for the system number and the unit number are shown in the table below.

Setting of the 8-pin DIP switch (S201)	Description
 System No. Unit No.	The settings of the 8-pin DIP switch (S201) depend on the system numbers and the unit numbers of the applicable indoor units that the PCB controls. In case of the standard specification and the specification of the option A, the PCB will control eight units from the system numbers and unit numbers that you have set. For example, if you set the system No.1 along with the unit No.1, the relevant PCB will control the units No.1 to No.8 from the system No.1. You should set the unit number from either No.1 or No.9. In case of the specification of the option B, the PCB will control four units from the system numbers and unit numbers that you have set. For example, if you set the system No.1 along with the unit No.1, the relevant PCB will control the units No.1 to No.4 from the system No.1. You should set the unit number from No.1, No.5, No.9 or No.13.

The details are outlined below.
The settings for the required system numbers are shown in the table below.

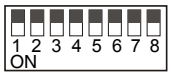
System No.	Setting pin No.1 to No.4	System No.	Setting pin No.1 to No.4
1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	
8		16	

4.8.6. MAINTENANCE AND SERVICE

■ Self-Inspection of the HARC-BX E
In order to identify the abnormal operation of the HARC-BX E, perform the self-inspection according to the following instructions.

1. Set all the pins of DSW S201 and DSW S202 to OFF.

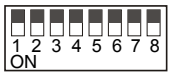
8-Pin DSW (S201)



8-Pin DSW (S202)

2. Turn ON the power supply.
   "8" is displayed on the 7-segment display and OFF is lit.
3. Set to ON only the No.1 pin of DSW S201.

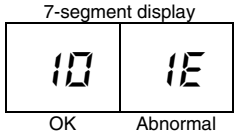
8-Pin DSW (S201)



8-Pin DSW (S202)

With this setting, the communication between the HARC PCB and the LONWORKS network is performed.

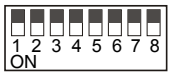
The results are the following:



In case of abnormal operation, either there is some problem with the LONWORKS network or the HARC PCB is damaged.

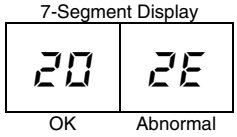
4. Set the No.1 pin of the 8-pin DSW S201 to OFF. Then, set to ON only the No.2 pin.

8-Pin DSW (S201)



8-Pin DSW (S202)

The results are the following:



In case of abnormal operation, either the HARC PCB is damaged or there is some problem with the H-LINK line, for example an incorrect wiring or an incorrect setting of the end terminal resistance.

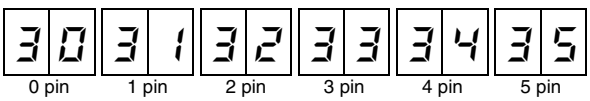
5. Set the No.2 pin of the 8-pin DSW S201 to OFF. Then, set to ON only the No.3 pin.

8-pin DSW (S201)

8-pin DSW (S202)

With this setting, you perform the checking procedure of the No.1 pin, the No.2 pin, the No.3 pin, the No.4 pin and the No.5 pin of DSW S202. The number below shows the number of pins that are set to ON.

The results are the following:



In case of abnormal operation, the HARC PCB is damaged.

4.9. CS-NET INTERFACE (HARC40) CONNECTION

■ HARC40 with the USB connection

Since the ISA Board connections have been phased out in the computer design, an **external interface** with a **USB** connection has been developed for the H-LINK connection to the CS-NET system. This external interface also makes the application more flexible because the external interface can be connected to a portable computer. A service engineer can then use the portable computer in order to monitor the systems that are not connected to a CS-NET system.
You must perform the installation as shown below.

NOTE:
All the cables must be shielded and must have a cross-section of at least 0.75mm². The maximum total length is 1000m.

■ Installation

Before starting the HARC installation, install the CS-NET program.
Turn off the computer.
Connect the HARC40 interface to the computer by means of the USB connector cable.
Turn on the computer. Windows will automatically detect that the interface is connected and that the device "HARCUSB" is available at the CD/CDROM. Windows will automatically complete the installation of the device.
Connect the CS-NET cable of the interface to the H-LINK connection on any of the indoor units or any of the outdoor units.

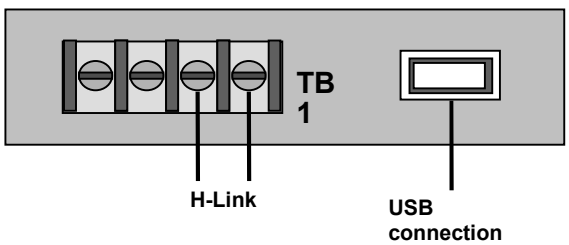
■ Interface connections

The available interface connections are the following:
Terminal board **TB1.** (Refer to the opposite diagram).

1. Main H-LINK connection for the 2-core cable to the system.
2. USB connection to the USB port on the computer.

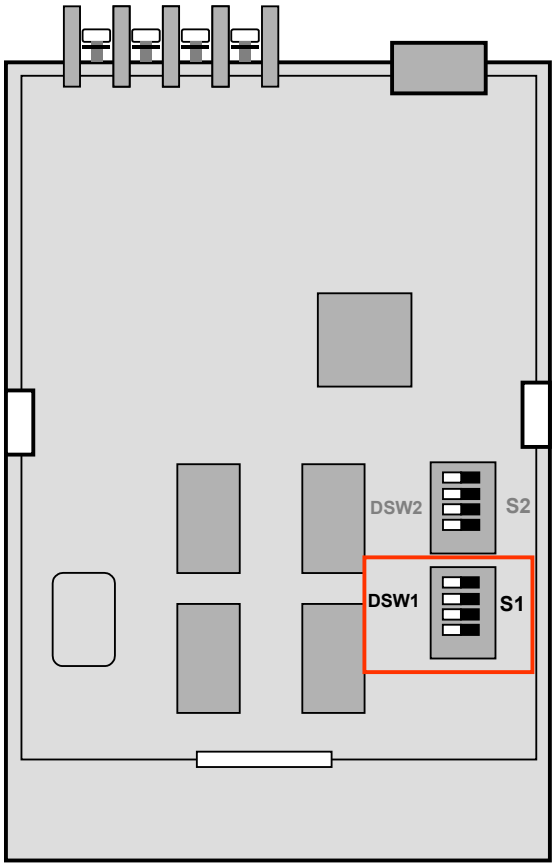
The power supply for the HARC40 is provided by the USB connection. Therefore, you do not need any external power supply.

Rear view of the HARC40 interface



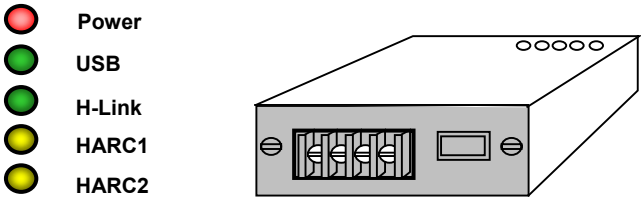
■ Layout of the HARC40 interface

On the opposite side you can see the layout of the printed circuit board of the HARC40 interface. The layout, which is a bottom view, includes the positions of the DIP switches and the connections.
If you install more than one interface, you must set the DIP switch **DSW1**. Refer to page 24 in TCGB0028 to get further details.
You must not change the **DSW2**.



■ LED indicators

POWER	When the power from the computer is applied, POWER is continuously lit.
USB	When the transmission between the computer and the interface is available, USB blinks.
H-Link	When the transmission between the interface and the system is available, H-Link blinks.
HARC1	Communication status (not used).
HARC2	Communication status (not used).



5. CONTROL SYSTEM

CONTENTS

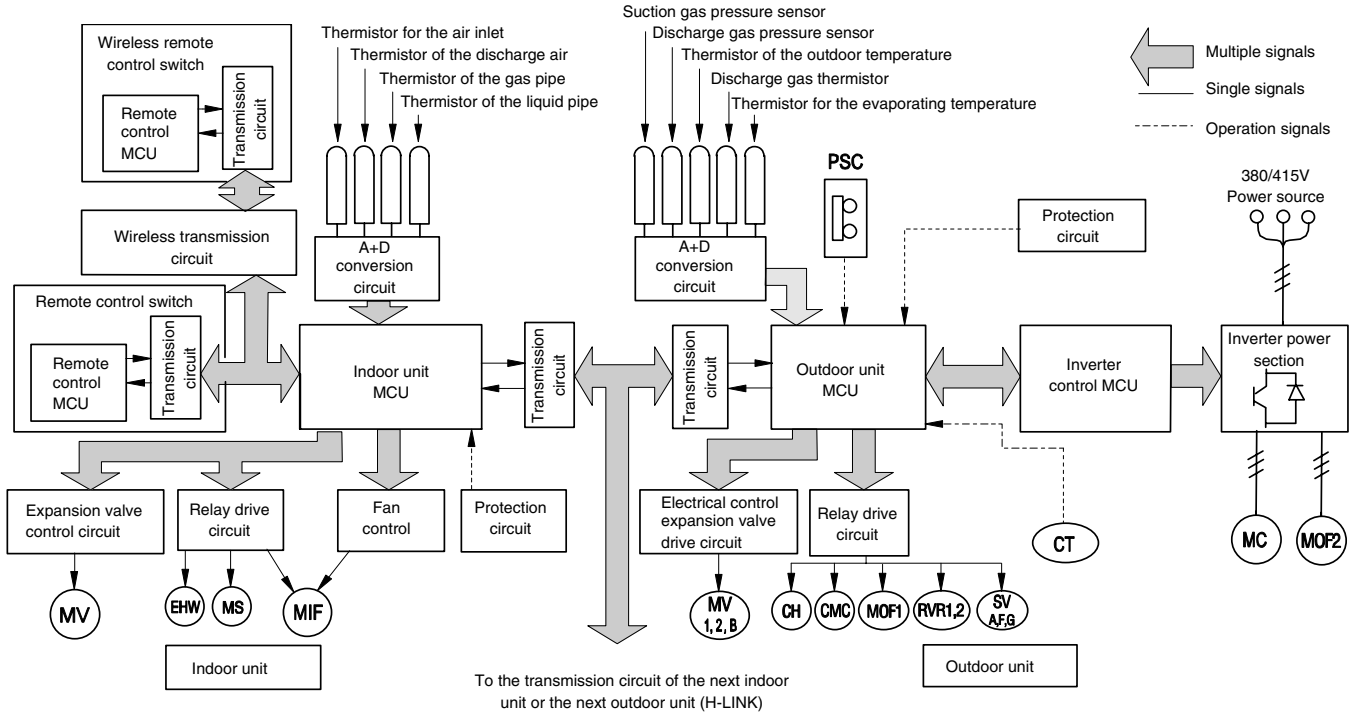
5.1. DEVICE CONTROL SYSTEM

5.1.1. RAS 5-30 FSN. REFRIGERANT CYCLE CONTROL

Control subject	Cooling process		Heating process		Defrost operation
	Purpose	Contents	Purpose	Contents	Contents
Inverter frequency of the compressor	1. Total operation capacity of the indoor unit 2. Connection according to piping length 3. Pd	1. 15 Hz/HP 2. 18 Hz/HP (when you are setting the optional function) 3. Pd≥ 1.0 MPa	1. Total operation capacity of the indoor unit 2. Collection according to piping length 3. Pd	1. 15 Hz/HP 2. 18 Hz/HP (when you are setting the optional function) 3. Pd≥ 2.1 MPa	All compressors while they are running
Change of the running compressor number	1. Capacity control 2. Changeover of total indoor unit capacity	5. Define the number of the running compressor according to the required frequency when you are changing	1. Capacity control 2. Changeover of total indoor unit capacity	5. Define the Number of the Running compressor according to the required frequency when you are changing	-
Expansion valve for the outdoor heat exchanger	1. Capacity control 2. Changeover of total indoor unit capacity	Fully open (unused heat exchanger: fully close)	TdSH	Td0 = Tc + 30 ≤ 90	Fully open
Expansion valve for the plate heat exchanger (only 10-30 fsn)	1. TdSH (when you are using the plate heat exchanger) 2. For comp. protection	1. Td0=Tc+40≤95 2. Td>100°C and EVI>1500 pls and over 5 minutes	1. For comp. Protection	Td>100°C and EVO>430 pls continues for 5 min.	Control
Expansion valve for the indoor heat exchanger	1. TdSH 2. For controlling the temperature difference between the gas pipe and the liquid pipe of the indoor heat exchanger 3. For balancing the temperature differences between the gas pipe and the liquid pipe of each indoor unit	1. Td0=Tc+40≤95 2. Temperature difference between the gas pipe and the liquid pipe of each indoor unit = 4 deg	1. Temperature difference between the air outlet and the air inlet of the indoor unit 2. For balancing the temperature between indoor units	1. For controlling the temperature difference between the air outlet and the air inlet of the indoor unit 2. For balancing the temperature differences between the gas pipe and the liquid pipe of each indoor unit	Opening fixed

Control subject	Cooling process		Heating process		Defrost operation
	Purpose	Contents	Purpose	Contents	Contents
Outdoor fan	Pd	1. 2.3≤Pd≤2.7 (MPa) PWM control by DC motor + constant speed fan	1. Fix according to the outdoor temperature and the operation capacity	1. PWM control by DC motor outdoor Temp. + constant speed fan	Stoppage
Equalized pressure valve (SVA)	1. For equalizing the pressure of the inverter compressor during the stop	1. When you are turning on the power supply, the inverter compressor run → stop	1. For equalizing the pressure of the inverter compressor during the stop	1. When you are turning on the power supply, the inverter compressor run → stop	-
SVF (solenoid valve for the oil return)	1. For controlling the oil circulation volume from the oil separator to each compressor	1. SVF ON at run/ OFF at stop	1. For controlling the oil circulation volume from the oil separator to each compressor	1. SVF ON at run/ OFF at stop	Same as cooling/heating
High-pressure/ low-pressure shut-off Valve (only 20-30 HP)	1. For shutting off the high-pressure part and the low-pressure part in the cycle during the stop	1. SVG ON at run/ OFF at stop	1. For shutting off the high-pressure part and the low-pressure part in the cycle during the stop	1. SVG ON at run/ OFF at stop	OFF

The figure below shows the outline of the control system.



Symbol	Name
MC	Motor (for the compressor)
MIF	Motor (for the indoor fan)
MOF 1, 2	Motor (for the outdoor fan)
MS	Motor (for the auto-louver)
MV 1, 2, B	Electronic expansion valve
EHW	Electrical heater

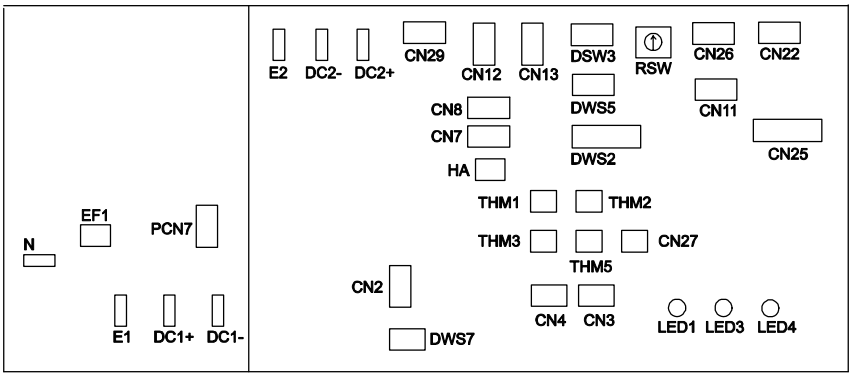
Symbol	Name
CMC	Magnetic contactor
RVR 1, 2	4-way valve
SV A, F, G	Solenoid valve (for the gas bypass)
PSC	Pressure switch
CT	Current transformer
CH	Crankcase heater

5.2. INDOOR UNIT PCB

5.2.1. LAYOUT OF THE PRINTED CIRCUIT BOARD (EXCEPT RPK)

■ **PCB drawing**

The PCB in the indoor unit operates with five types of DIP switches, one sliding switch, one rotary switch and one push switch. The location is as follows:



LED INDICATION		
LED1	Red	This LED indicates the transmission status between the indoor unit and the RCS
LED3	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED4	Red	Power source for the PCB

CONNECTOR INDICATION	
PCN1	Transformer 220V
PCN7	Power source (1-R, 3-S)
THM1	Air inlet
THM2	Air outlet
THM3	Liquid pipe
THM5	Gas pipe
CN1	Transformer (pin 1-2: 17.3V / pin 3-4: 20.8V
CN2	Control circuit for the outdoor unit H-LINK
CN3	Input optional functions
CN4	Input optional functions
CN7	Output optional functions
CN8	Output optional functions
CN11	Expansion valve control
CN12	Remote control bridge connector for multiple units
CN13	Remote control SW
CN17	Swing louver motor 1

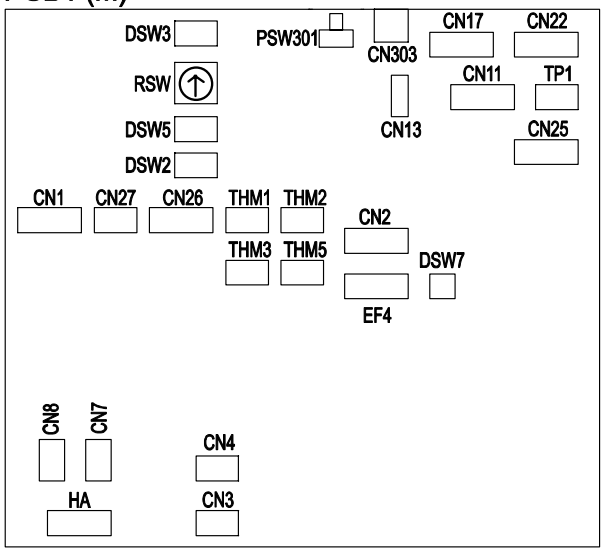
CONNECTOR INDICATION	
CN22	Internal thermostat for indoor fan motor
CN25	PCB2 wireless receiver part connection
CN26	PCB1 (P) connection
CN27	Not used
CN28	PCB1 (M) connection
CN29	Fan motor
CN201	PCB1 wireless receiver part connection
CN303	Not used
HA	Not used
SWITCH INDICATION	
PSW301	Switch for the emergency operation
DSW2	Optional functions
DSW3	Capacity code
DSW5	Ref. cycle N°
DSW6	Model code
DSW7	Fuse recovery
RSW	Setting of the indoor unit number

5.2.2. LAYOUT OF THE PRINTED CIRCUIT BOARD (ONLY RPK)

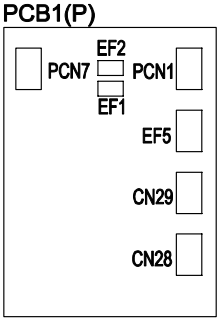
■ **PCB drawing**

The PCB in the indoor unit operates with five types of DIP switches, one sliding switch, one rotary switch and one push switch. The location is as follows:

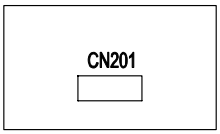
PCB1 (M)



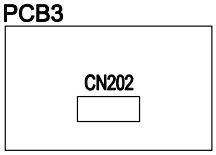
PCB1(P)



PCB2



PCB3



LED INDICATION		
LED1	Red	This LED indicates the transmission status between the indoor unit and the RCS
LED3	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED4	Red	Power source for the PCB

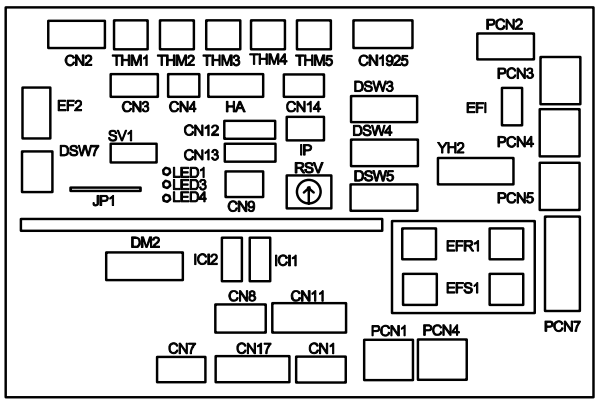
CONNECTOR INDICATION	
PCN1	Transformer 220V
PCN7	Power source (1-R, 3-S)
THM1	Air inlet
THM2	Air outlet
THM3	Liquid pipe
THM5	Gas pipe
CN1	Transformer (pin 1-2: 17.3V / pin 3-4: 20.8V
CN2	Control circuit for the outdoor unit H-LINK
CN3	Input optional functions
CN4	Input optional functions
CN7	Output optional functions
CN8	Output optional functions
CN11	Expansion valve control
CN13	Remote control SW
CN17	Swing louver motor 1

CONNECTOR INDICATION	
CN22	Swing louver motor 2
CN25	PCB2 wireless receiver part connection
CN26	PCB1 (P) connection
CN27	Not used
CN28	PCB1 (M) connection
CN29	Fan motor
CN201	PCB1 wireless receiver part connection
CN202	LEDs checking control
CN303	Not used
HA	Not used
SWITCH INDICATION	
PSW301	Switch for the emergency operation
DSW2	Optional functions
DSW3	Capacity code
DSW5	Ref. cycle N°
DSW6	Model code
DSW7	Fuse recovery
RSW	Setting of the indoor unit number

5.3. COMPLEMENTARY SYSTEM

5.3.1. KPI

■ **PCB drawing**



LED INDICATION		
LED1	Green	Power source for the PCB
LED2	Yellow	This LED indicates the transmission status between the indoor unit and the RCS
LED3	Red	This LED indicates the transmission status between the indoor unit and the outdoor unit

CONNECTOR INDICATION	
PCN1	Transformer (220V)
PCN2	Internal thermostat for the indoor fan motor
PCN3	Electrical heater
PCN5	Electrical heater for the dew prevention ((SR heater) RPC & panel)
PCN6	Drain pump motor (RCI/RPI)
PCN7	Power source (1-R, 2-S, 3-N, 4-E)
PCN8	Capacitor
PCN10	Fan motor power
PCN11	Fan motor speed control
THM1	Air inlet
THM2	Outlet air
THM3	Liquid pipe
THM4	Remote thermistor (THM-R2 AE)
THM5	Gas pipe

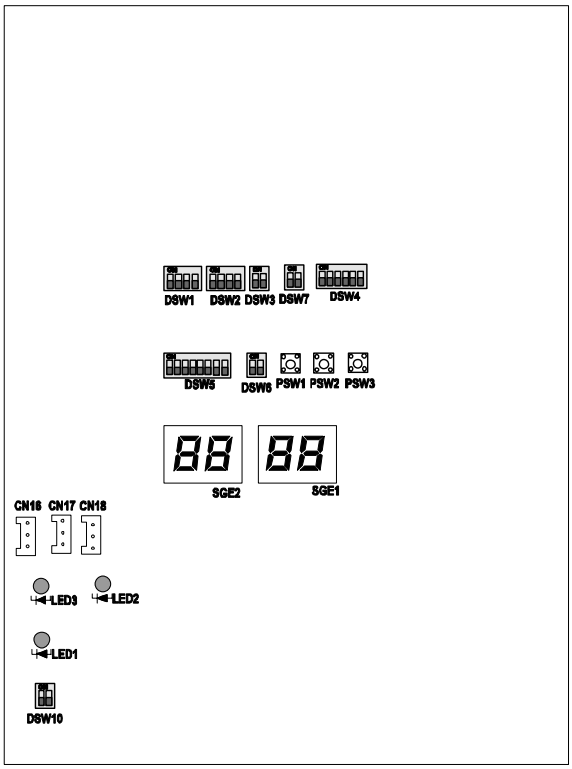
CONNECTOR INDICATION	
CN1	Transformer (pin 1-2: 17.3V / pin 3-4: 20.8V
CN2	Control circuit for the outdoor unit H-LINK
CN3	Input optional functions (only two)
CN4	Input optional functions
CN7	Output optional functions (only two)
CN8	Output optional functions (#1 #2, only one)
CN11	Expansion valve control
CN12	Remote control bridge connector for multiple units
CN13	Remote control SW
CN14	Float switch (RCI/RPI)
CN17	Swing louver motor
SWITCH INDICATION	
DSW3	Capacity code
DSW5	Ref. cycle N°
DSW6	Model code
DSW7	Fuse recovery and remote control selector
RSW	Setting of the indoor unit number
SSW	Selector SW (PC-2H2/PC-P1HE)

5.4. OUTDOOR UNITS PCB

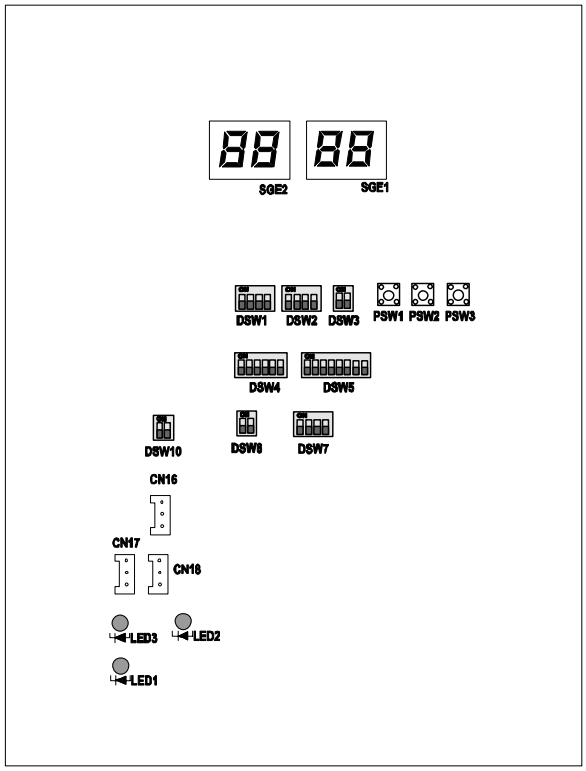
■ PCB drawing

The PCB in the outdoor unit is operating:

5-20HP-FSN



24-30HP-FSN



DIP SWITCH INDICATION	
DSW1	Setting of the outdoor unit number
DSW2	Setting of the capacity code Outdoor unit capacity is set according to the nominal capacity (HP)
DSW3	Setting of the height difference The height difference between the outdoor unit and the indoor unit
DSW4	A. Test run for the cooling or the heating an outdoor unit can be run for testing. When you have finished the testing, reset the function B. Enforced stoppage compressor When you are performing the test run or the inspection, you can force the compressors to stop in order to ensure your safety
DSW5	Emergency operation of the compressor
DSW6	Piping length
DSW7	Power supply setting
DSW10	Transmission setting

SWITCH INDICATION	
PSW1	Manual defrost operation switch The defrost operation is manually available under the forced defrost area
PSW2 PSW3	Available optional function Settings can be selected by means of the 7-segment display
LED INDICATION	
LED1 (red)	Power source for PCB1 Normal condition: activated Abnormal condition: deactivated
LED2 (green)	This LED2 indicates the transmission status between PCB1 and PCB3 Normal condition: flickering Abnormal condition: activated or deactivated
LED3 (yellow)	This LED3 indicates the transmission status between the indoor unit and the outdoor unit Normal condition: flickering Abnormal condition: activated or deactivated
CONNECTOR INDICATION	
CN16	Output setting of the outdoor unit
CN17 CN18	Input setting of the outdoor unit

5.5. PROTECTION AND SAFETY CONTROL

Compressor protection
The following devices and their combinations protect the compressor:

High-Pressure switch	This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.
Oil heater	This band heater protects against the oil carry-over during the cold starting, as the band heater is energized while the compressor is stopped.
Fan motor protection	Internal thermostat that is embedded in the fan motor winding: this internal thermostat cuts out the operation of the fan motor when the temperature of the fan motor winding exceeds the setting.

5.6. SAFETY AND CONTROL DEVICE SETTING

Safety and control device setting for the indoor units

Model		RCI	RCD	RPC	RPI	R/PK	RPF	RPFI	Remarks
For the evaporator fan motor: Internal thermostat	°C								Automatic reset, non-adjustable (each one for each motor)
Cut-Out	°C	145±5	130±5	135±5	140±5	130±5	130±5	130±5	
Cut-In		90±15	83±15	90±15	90±15	83±15	83±15	83±15	
For the control circuit: fuse capacity	A	5							
Freeze protection thermostat:									
Cut-out	°C	0							
Cut-in	°C	14							
Thermostat differential	°C	2							

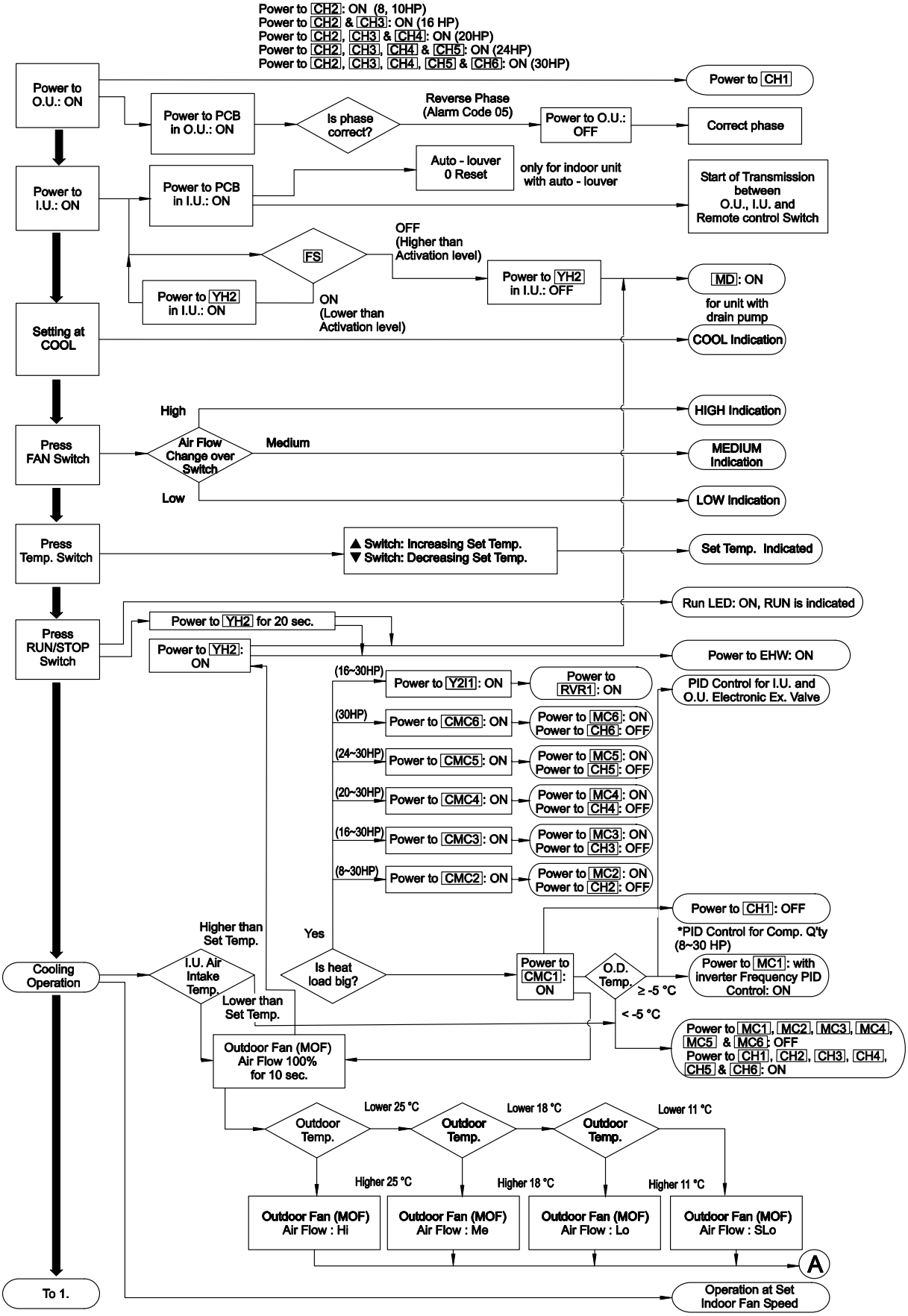
Safety and control device setting for the outdoor units

Model		RAS-5FSN	RAS-8FSN	RAS-10FSN	RAS-16FSN	RAS-20FSN	RAS-24FSN	RAS-30FSN
For the compressor pressure switches		Automatic reset, non-adjustable (each one for each compressor)						
High Cut-out	MPa	$4.15\ ^{-0.05}_{-0.15}$						
Cut-in	MPa	3.20 ± 0.15						
Fuse capacity 3~, 380/415, 50Hz	A	20 x 2	20 x 4	20 x 4	20 x 6	20 x 8	20 x 10	20 x 12
Oil heater capacity	W	40	40x2	40x2	40x3	40x4	40x5	40x6
CCP timer		Non-adjustable						
Setting time	min	3	3	3	3	3	3	3
For the condenser fan motor		Automatic reset, non-adjustable (each one for each compressor)						
Internal thermostat								
Cut-out	°C	130±5	130±5	130±5	130±5	130±5	130±5	130±5
Cut-in	°C	83±15	83±15	83±15	83±15	83±15	83±15	83±15
For the DC fan module Fuse capacity	A	10	10	10	10	10	10	10

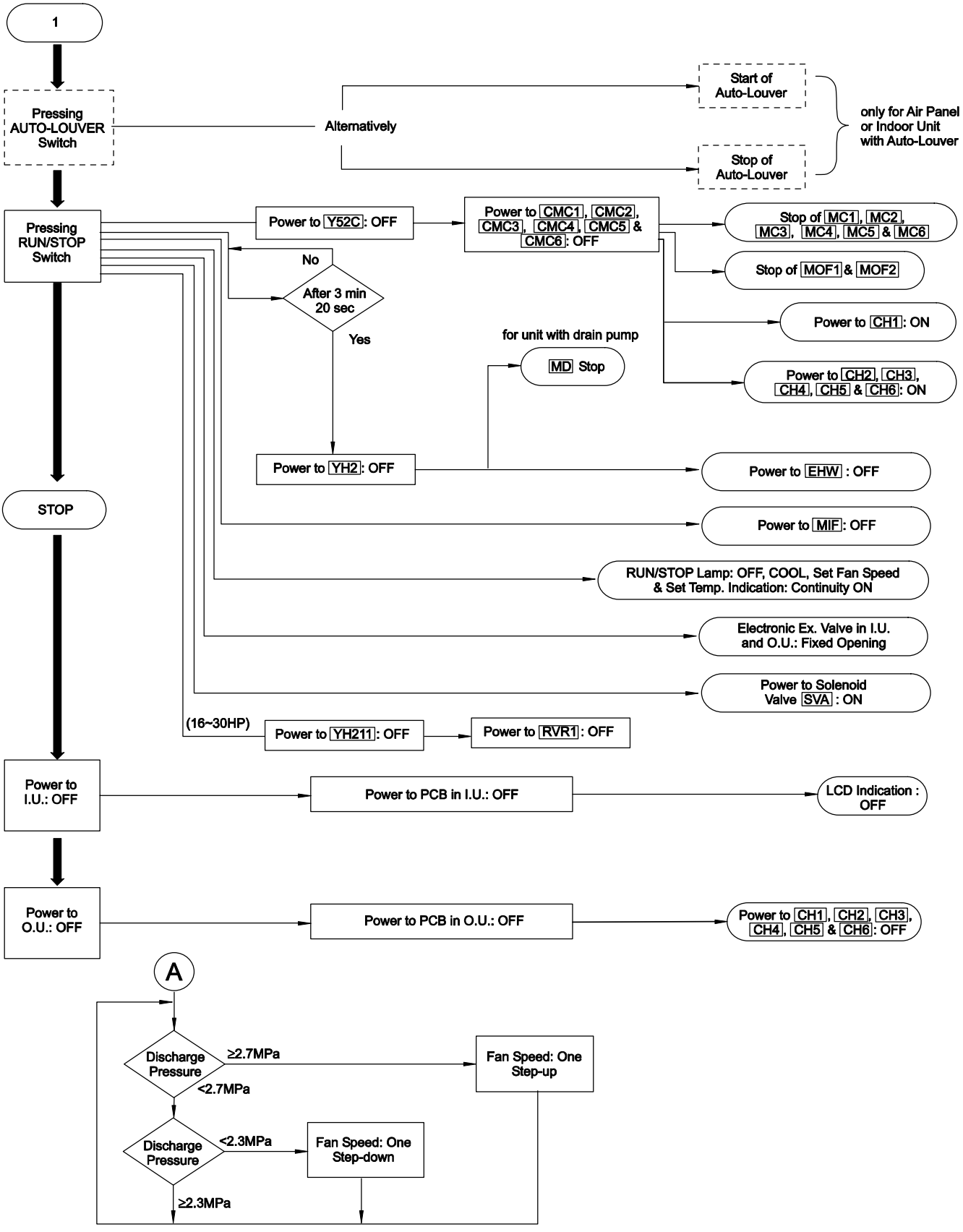
5.7. STANDARD OPERATION SEQUENCE

5.7.1. COOLING PROCESS (FSN)

I.U.: Indoor unit
O.U.: Outdoor unit

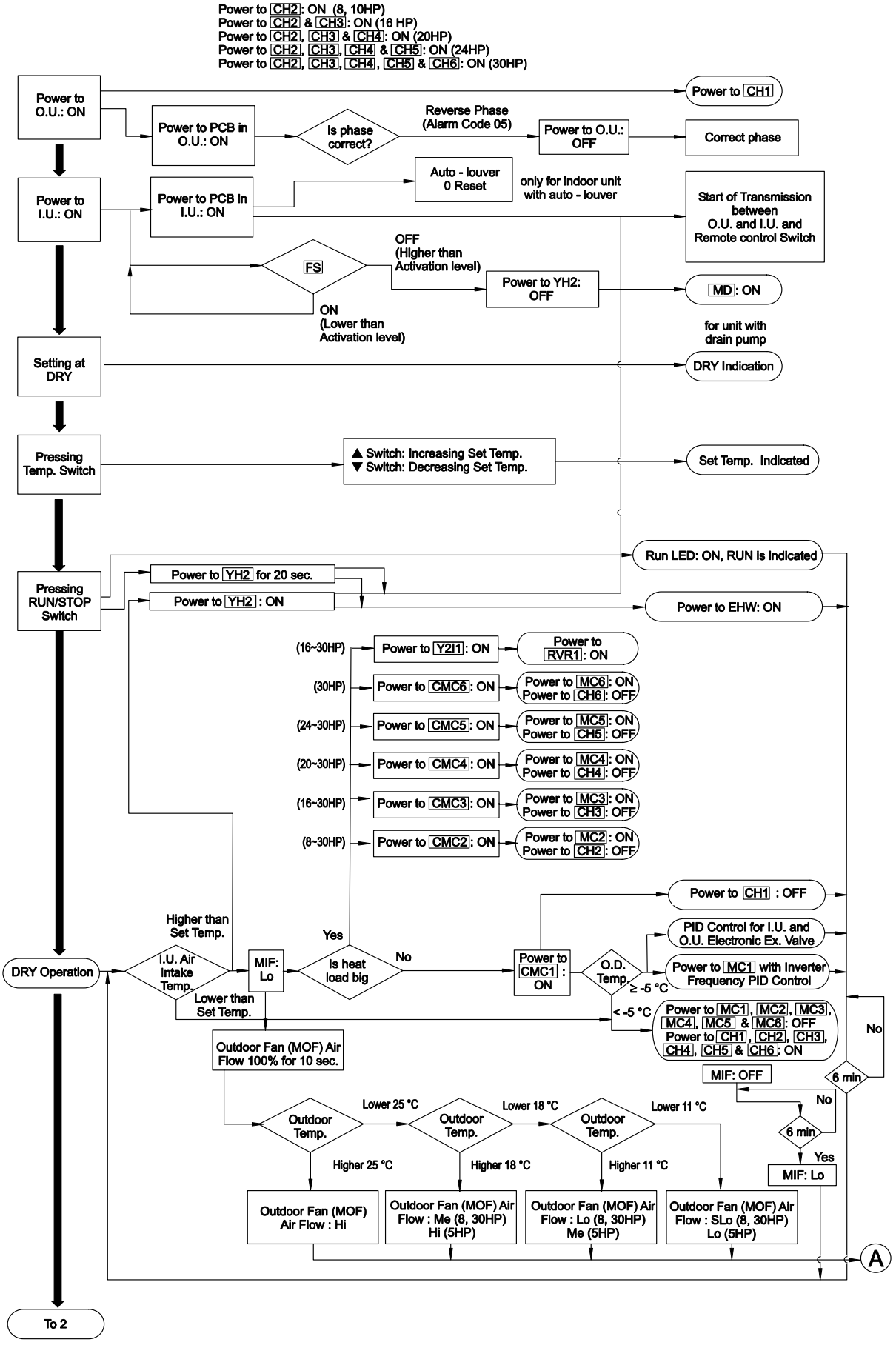


■ Cooling process (FSN, cont.)

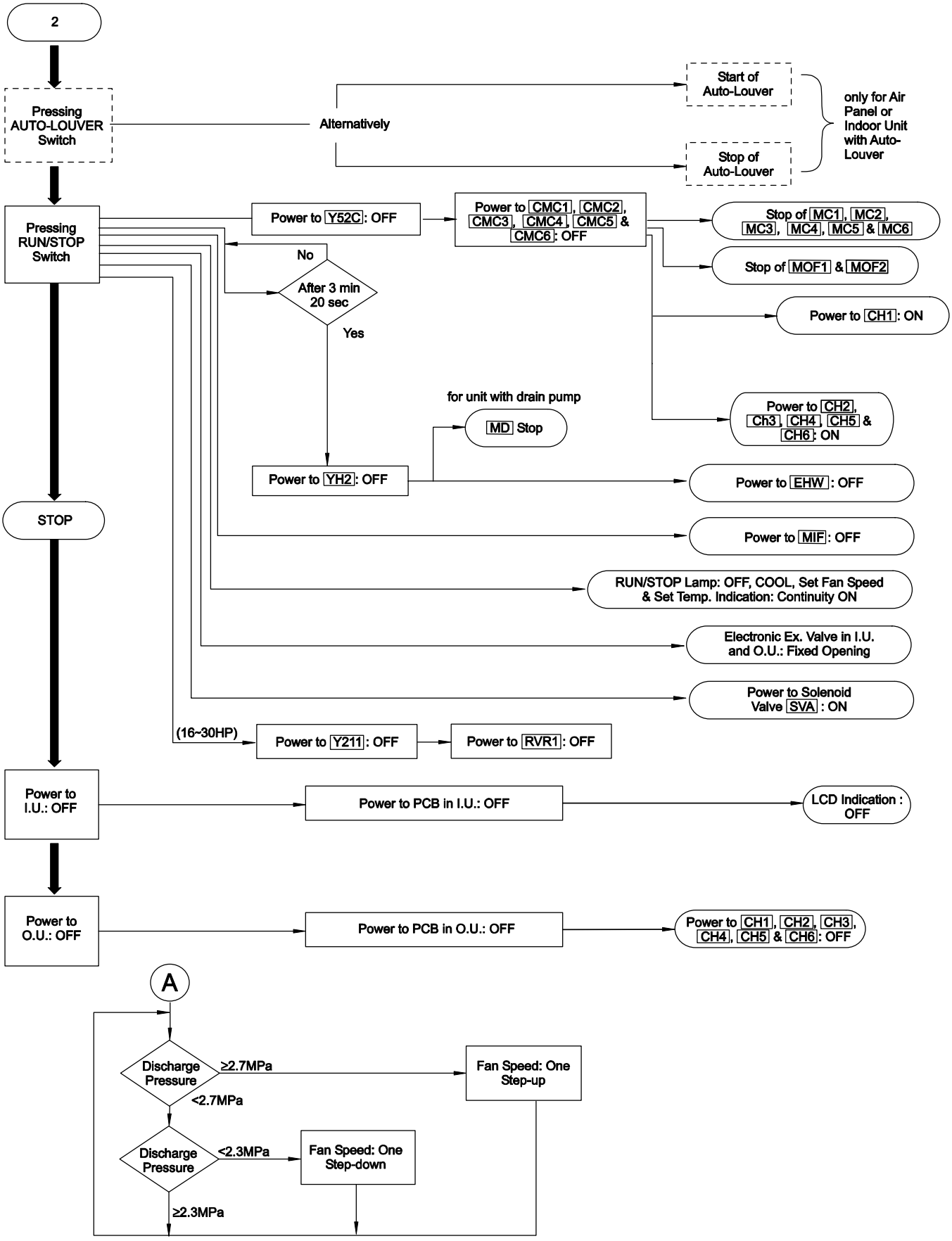


5.7.2. DRY OPERATION (FSN)

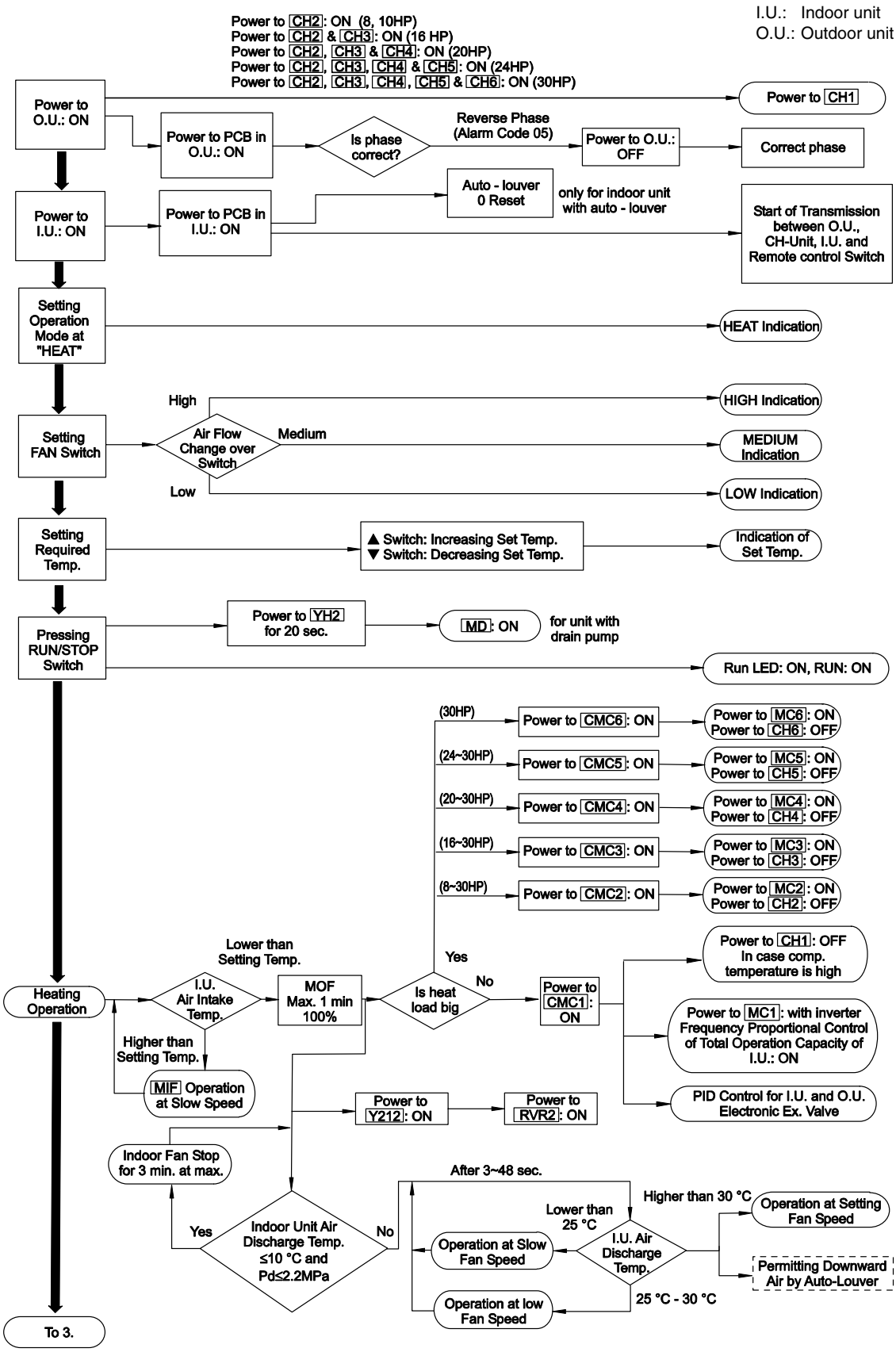
I.U.: Indoor unit
O.U.: Outdoor unit



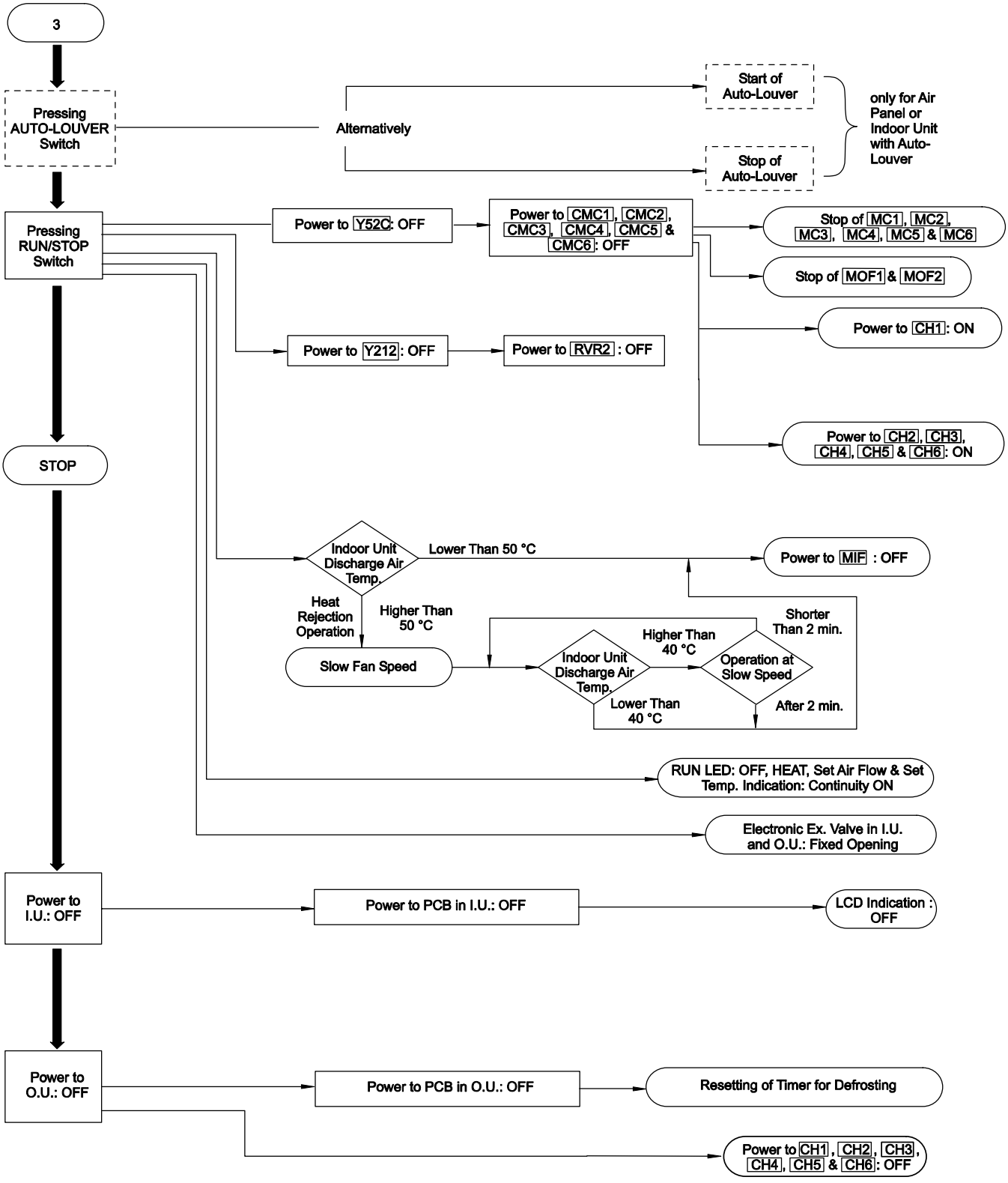
■ Dry operation (FSN, cont.)



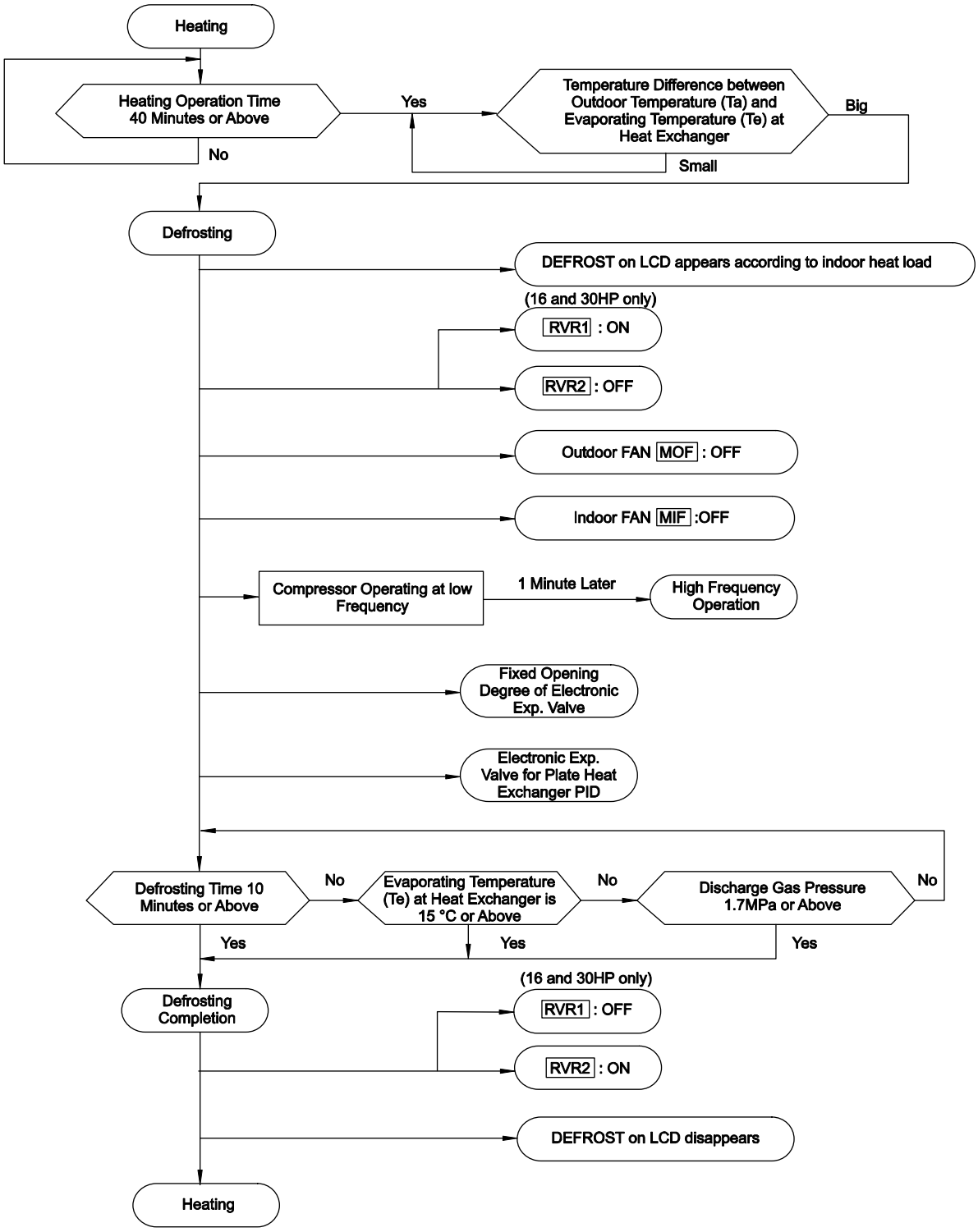
5.7.3. HEATING PROCESS (FSN)



■ Heating process (FSN, cont.)

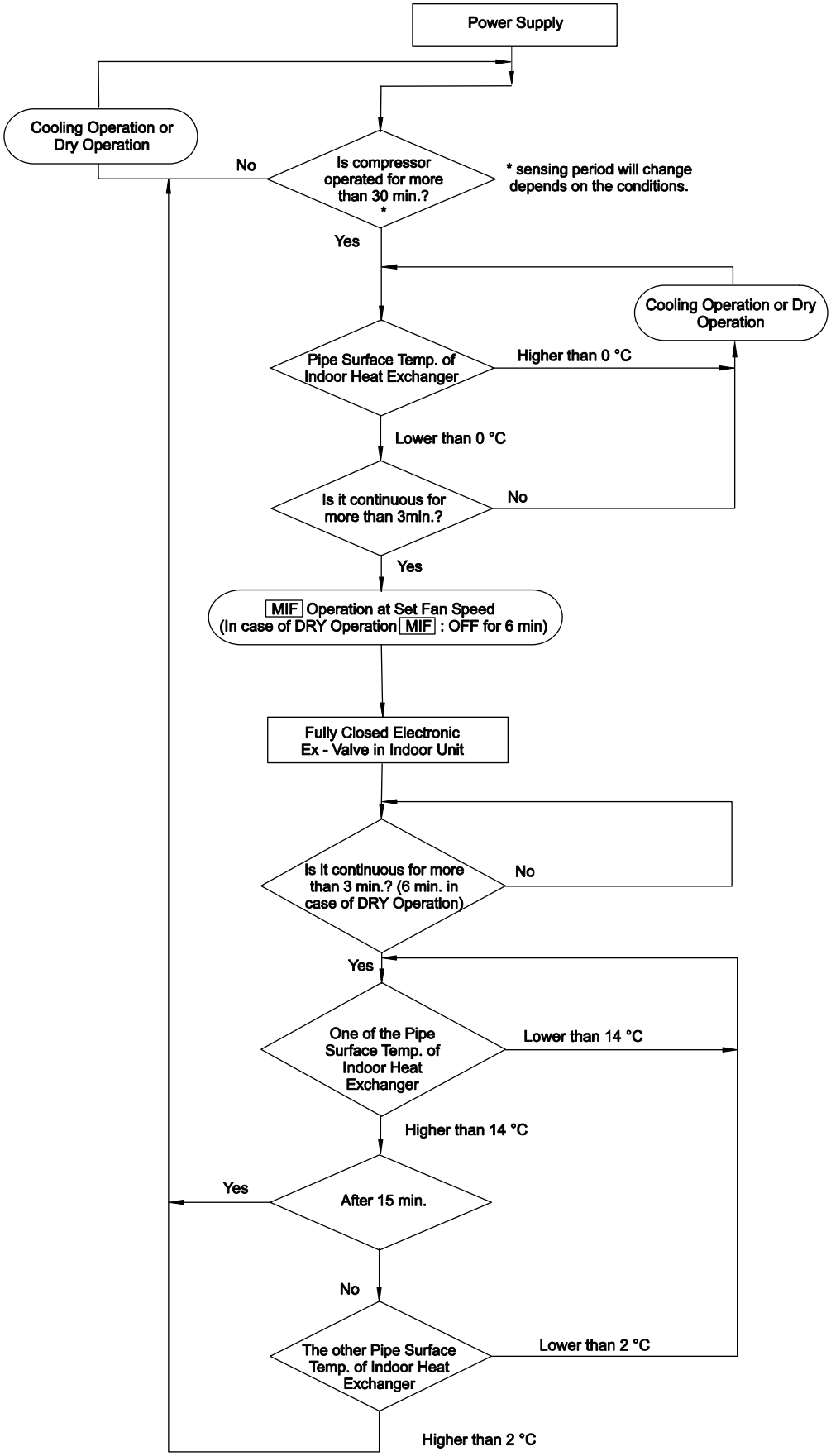


5.7.4. DEFROST OPERATION CONTROL

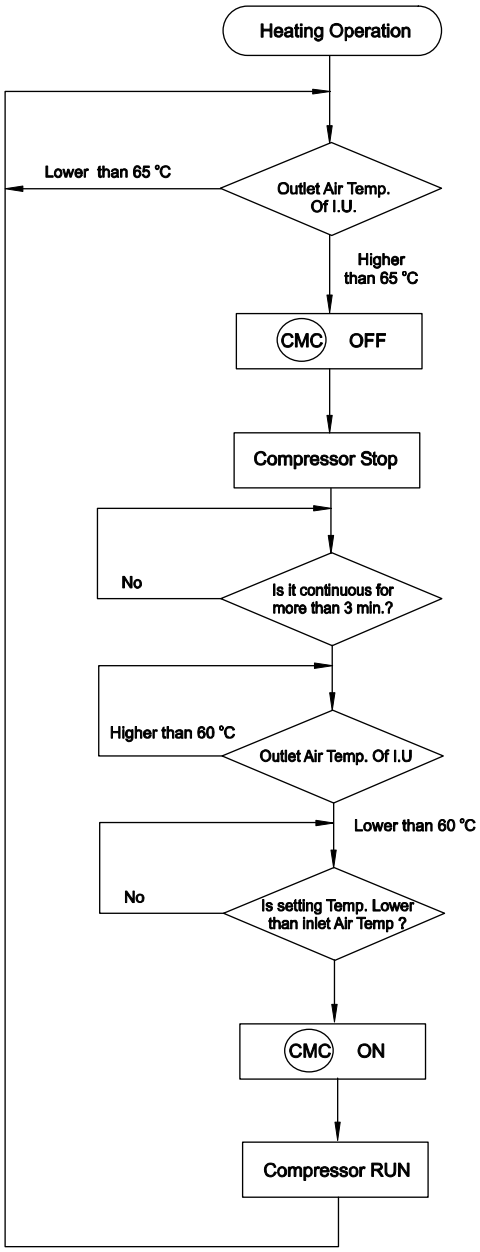


5.8. STANDARD CONTROL FUNCTIONS

5.8.1. FREEZING PROTECTION CONTROL DURING THE COOLING PROCESS OR THE DRY OPERATION

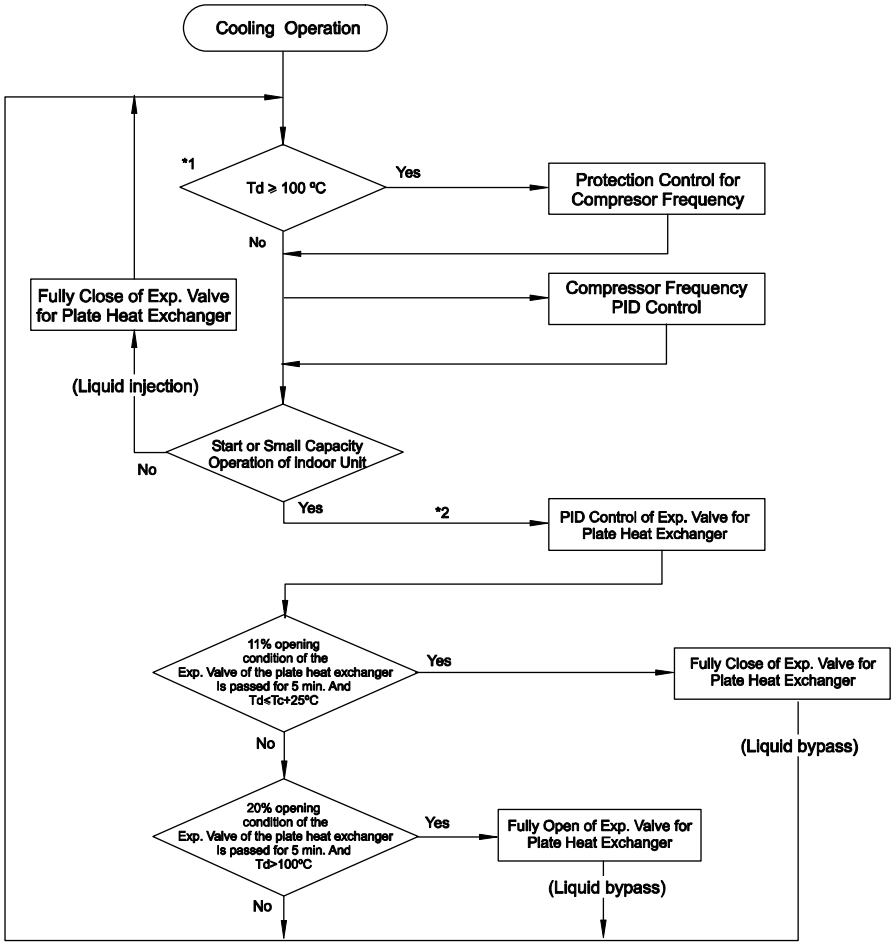


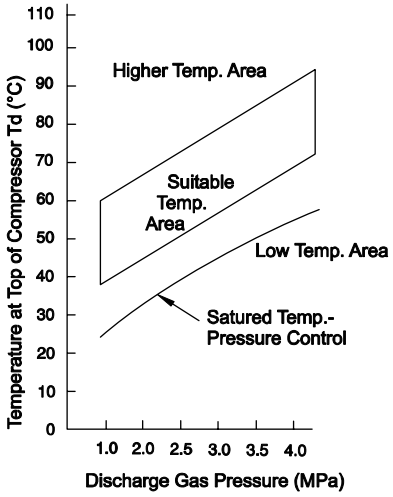
5.8.2. OVERHEATING PROTECTION CONTROL OF THE OUTLET TEMPERATURE



5.8.3. CONTROL OF THE EXPANSION VALVE FOR THE PLATE HEAT EXCHANGER

For 10HP to 30HP FSN



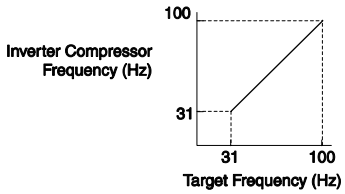


NOTE:

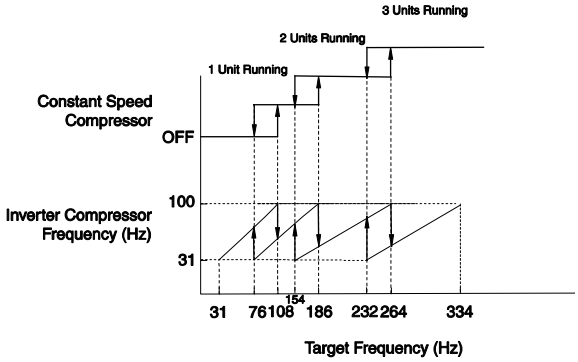
1. *Td. (*1): temperature at the top of the compressor.*
2. *TD (*2): Td entered the suitable temperature area by means of PID control of expansion valve for plate heat exchanger as shown in the graph.*

5.8.4. COMPRESSOR OPERATION CONTROL

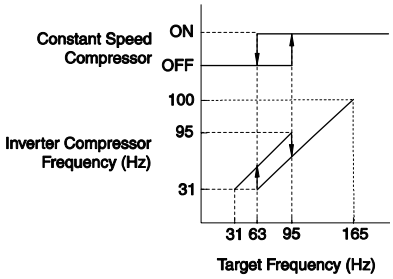
RAS 5FSN



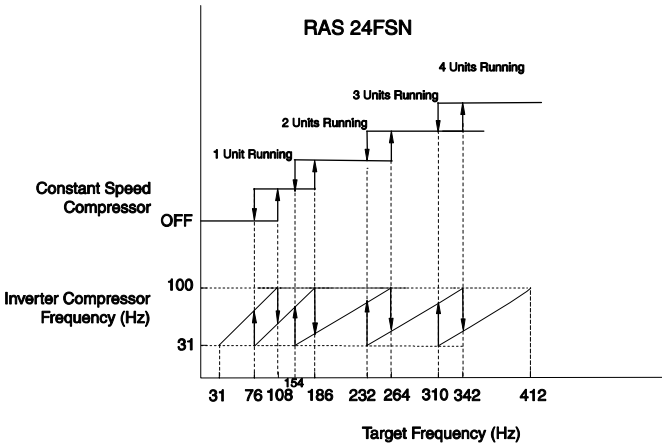
RAS 20FSN



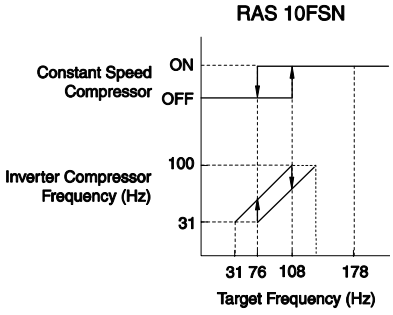
RAS 8FSN



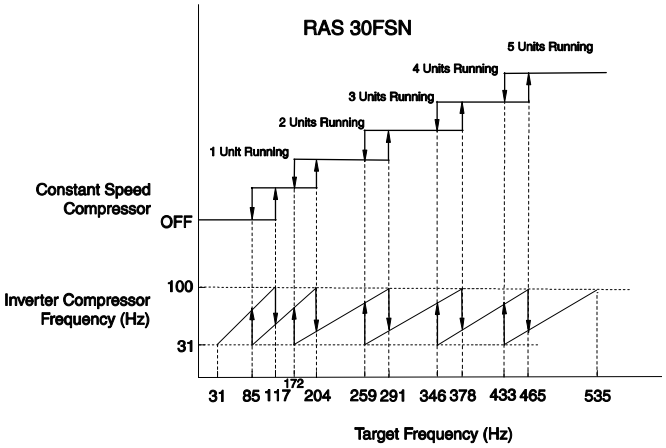
RAS 24FSN



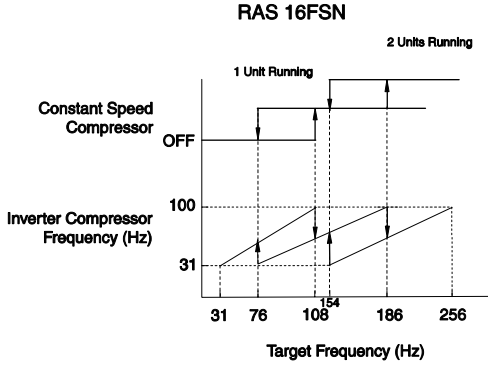
RAS 10FSN



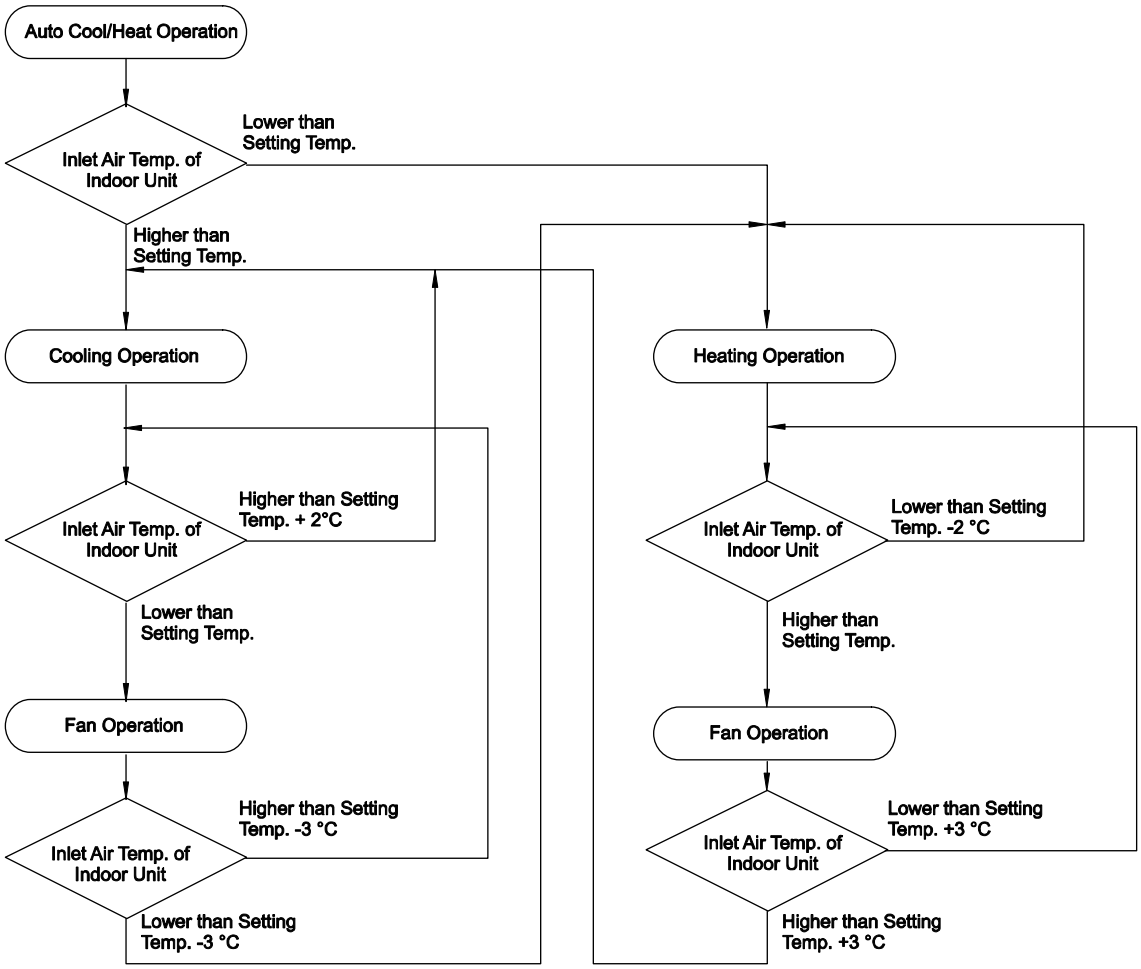
RAS 30FSN



RAS 16FSN



5.8.5. CONTROL FOR THE AUTOMATIC COOLING/HEATING PROCESS



5.8.6. STANDARD CONTROL FUNCTIONS FOR THE KPI SYSTEM

■ Automatic ventilation mode

① Fan mode total heat exchanger ventilation mode
② Other than fan mode (cooling/dry/heating)

a. Total heat exchange ventilation mode ➔Normal ventilation mode
If i) or ii) is met

i) All the following three conditions should be met
A. Indoor temperature ≥ Outdoor temperature +4°C
B. Indoor temperature ≥ Setting temperature +5°C
C. Outdoor temperature ≥ 8+2°C

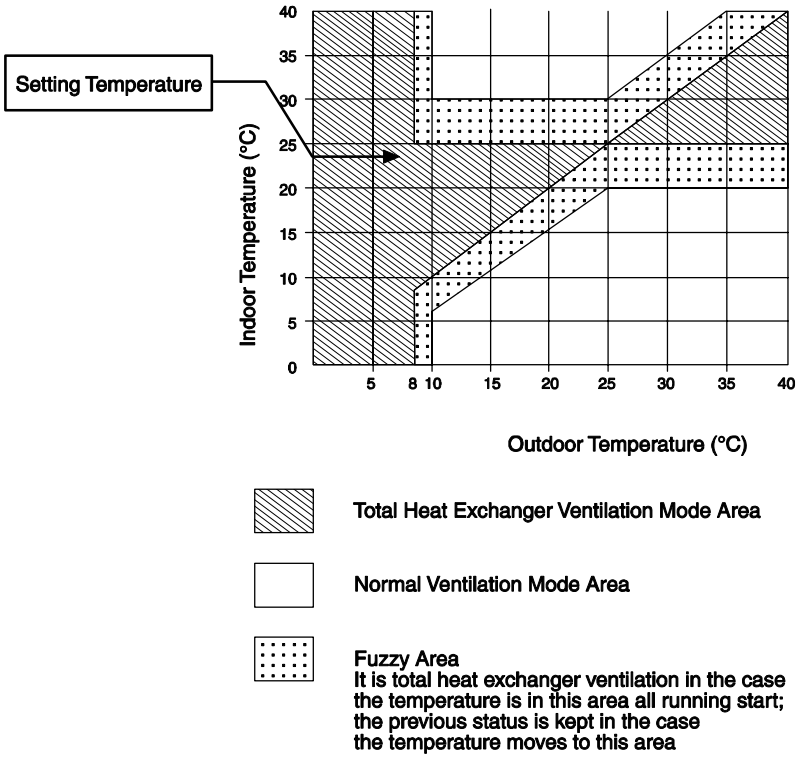
ii) All the following three conditions should be met
A. Outdoor temperature ≥ Indoor temperature +4°C
B. Unit setting temperature ≥ Indoor temperature +5°C
C. Outdoor temperature ≥ 8+2°C

b. Normal ventilation mode ➔ Total heat exchanger ventilation mode
If i) or ii) or iii) is met

i) The following two conditions should be met
A. Indoor temperature ≤ Setting temperature
B. Indoor temperature ≥ Outdoor temperature

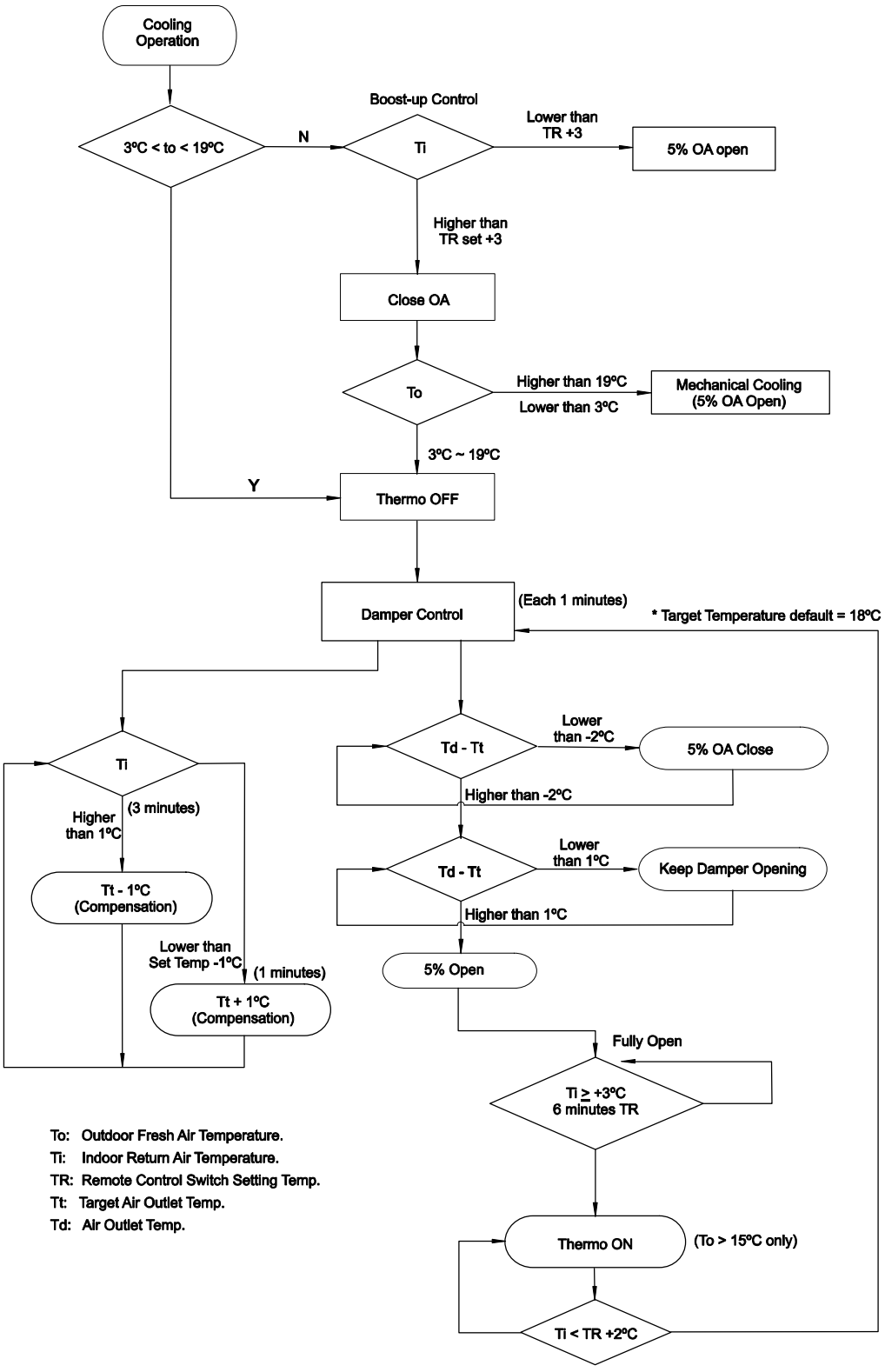
ii) The following two conditions should be met
A. Indoor temperature > Setting temperature
B. Indoor temperature ≤ Outdoor temperature

iii) Outdoor temperature < 8 °C

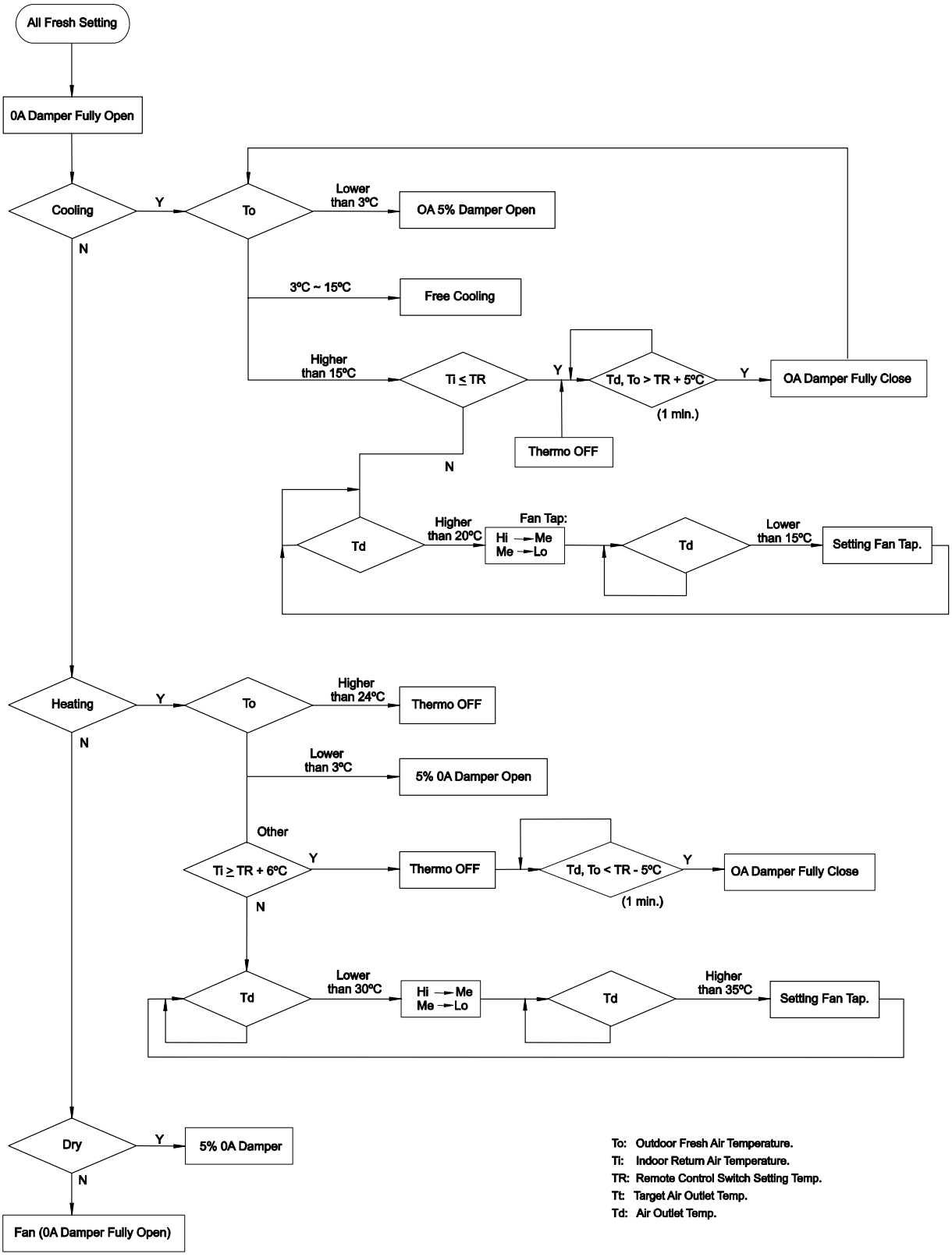


5.8.7. STANDARD CONTROL FUNCTIONS FOR ECONOFRESH

■ Standard cooling process (economizer)

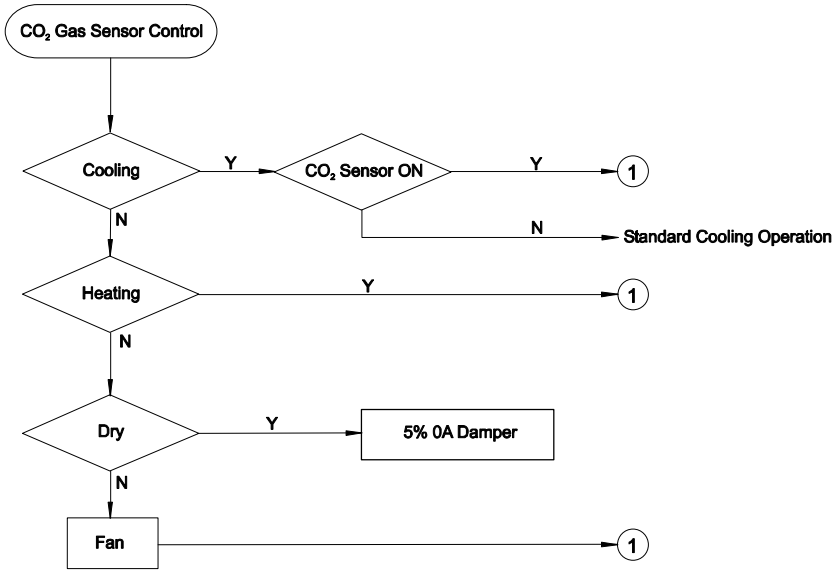


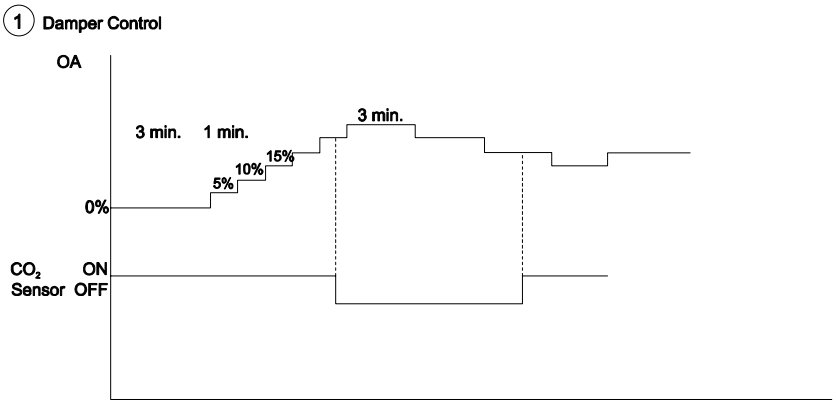
■ All fresh control



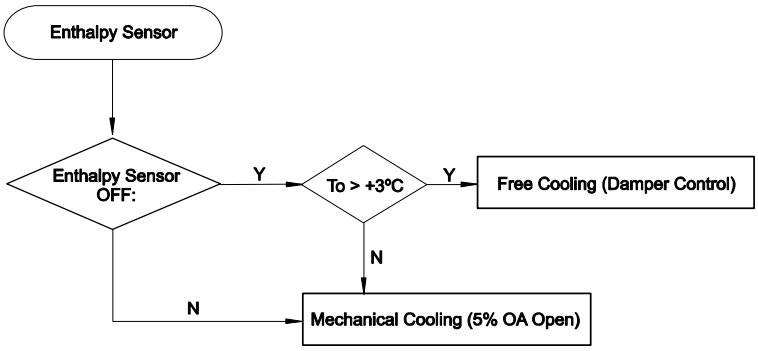
To: Outdoor Fresh Air Temperature.
Ti: Indoor Return Air Temperature.
TR: Remote Control Switch Setting Temp.
Tt: Target Air Outlet Temp.
Td: Air Outlet Temp.

■ CO_2 gas sensor control





■ Enthalpy sensor control



To: Outdoor Fresh Air Temperature.

5.9. RESTRICTED CONTROL FOR OUTDOOR UNITS

1. Purpose

   Minimize the frequency of the operation stoppage because of an alarm.

2. Procedure

   Modify the protection control after the retry operation. (Activate the protection control quickly).
   Restricted control

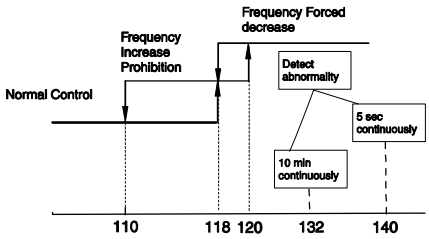
3. Applicable case

   (1) Decrease in the discharge gas superheat
   (2) Increase in the discharge gas temperature
   (3) Pressure ratio decrease
   (4) Discharge pressure increase
   (5) Inverter overcurrent

4. Example

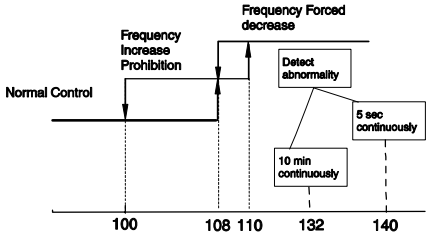
4.1 Discharge Gas Temp. Increase Protection Control

Normal Conditions



Temp. At the top of Inverter Compressor Td1 (ºC)

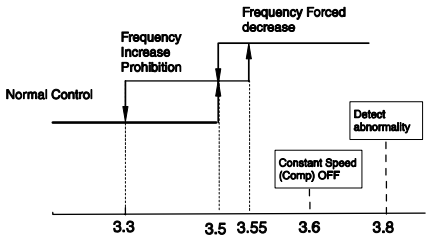
Restricted Control (After Retry)



Temp. At the top of Inverter Compressor Td1 (ºC)

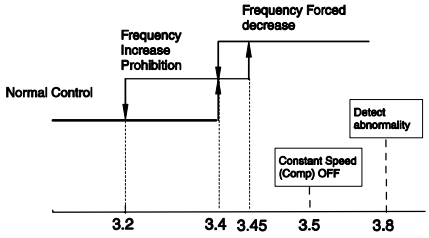
4.2 Discharge Pressure Increase Protection Control

Normal Conditions



Discharge Pressure Pd (Mpa)

Restricted Control (After Retry)



Discharge Pressure Pd (Mpa)

6 AVAILABLE OPTIONAL FUNCTIONS

CONTENTS

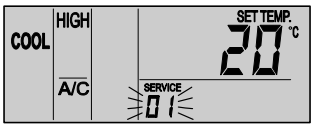
6.1. INDOOR UNIT (EXCEPT RPK)

6.1.1. INPUT SETTING AND OUTPUT SETTING OF THE CONNECTOR OF THE INDOOR UNIT PCB

For the external input signal and the external output signal, there are two input ports (CN3) and three output ports (CN7, CN8) on the indoor unit PCB.
If you are changing the factory setting, perform the following instructions by means of the PC-P1HE remote control.

- **Field setting mode**

  Make sure that the unit stops. Then, press the CHECK switch and the RESET switch on the remote control switch simultaneously for more than three seconds. Then, the remote control switch changes to the field setting mode. When the remote control switch is in the field setting mode, the SERVICE indication is displayed and "01" flickers below the SERVICE indication.



- **Input setting mode and output setting mode**

  In the field setting mode, which is described in the above item, press the TEMP ⓥ switch or the TEMP ⓒ switch. Then, the flickering number below the SERVICE indication changes (01 <=> 02).
  Set the flickering number at "02". Leave this condition for seven seconds or press the CHECK switch. Then, the remote control switch changes to the input setting mode or the output setting mode of the indoor unit.

- **Selection of the indoor unit**

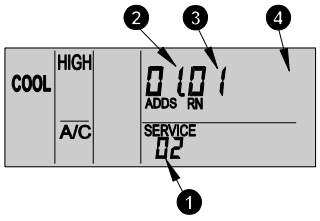
a. At the input setting mode and the output setting mode, the indication on the remote control switch changes as shown in the figure below.

❶ The 02 indication is turned ON.

❷ The address of the indoor unit, for which you need to set an optional function, is displayed at the segments of the time indication of the timer setting. The ADDS indication is displayed below.

❸ The refrigerant cycle number of the indoor unit for the input setting and the output setting is displayed at the segments of the time indication of the timer setting. The RN indication is displayed below.

❹ The setting temperature indication is turned OFF.



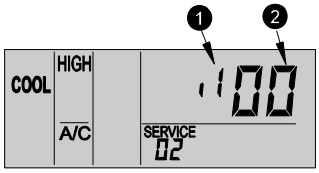
b. At the condition of the above item (a), press the TEMP ⓥ switch or the TEMP ⓒ switch of the remote control switch. Then, you can change the indoor unit for the input setting and the output setting.

NOTE:
You can select the indoor unit among the indoor units that are connected to the remote control switch.
If both the indication of the address and the indication of the refrigerant cycle number is AA, all the indoor units that are connected to the remote control switch are selected. In this case, you cannot perform the individual setting for each indoor unit.

c. After selecting the indoor unit, leave the condition for seven seconds or press the CHECK switch. Then, the remote control switch changes to the input setting mode and the output setting mode.

- **Setting procedures**

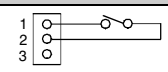
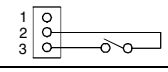
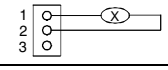
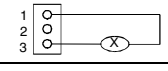
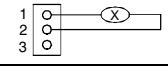
a. At the input setting mode and the output setting mode, the indication on the remote control switch changes as shown in the figure below.



❶ The allocated port for the input signal and the output signal is displayed at the segments of the time indication of the timer setting.
Refer to the table below for the displayed port and the connector of the indoor unit PCB.

❷ The codes of the input signal and the output signal are displayed at the segments for the setting temperature indication.
Refer to the table below for the displayed code, the input signal and the output signal.

Indications and settings of the ports

Indication	Settings of the port	Remarks
i1	1-2 of CN3 on the indoor unit PCB	
i2	2-3 of CN3 on the indoor unit PCB	
o1	1-2 of CN7 on the indoor unit PCB	
o2	1-3 of CN7 on the indoor unit PCB	
o3	1-2 of CN8 on the indoor unit PCB	

Indications, the input signals and the output signals

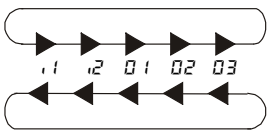
Indication	Input signal	Output signal
00	Not set	Not set
01	Control by means of the field-supplied room thermostat (cooling)	Operation signal
02	Control by means of the field-supplied room thermostat (heating)	Alarm signal
03	ON/OFF function 1 of the remote control	Cooling signal
04	ON/OFF function 2 of the remote control (operation)	Thermo-ON signal during the cooling
05	ON/OFF function 2 of the remote control (stop)	Heating signal
06	Cancellation of the commands from the remote control switch after the enforced stoppage	Thermo-ON signal during the heating
07	Setting of the cooling mode or the heating mode	Total operation signal of the heat exchanger
08	Input signal for the UP/DOWN grille (not available)	Output signal for the UP/DOWN grille (not available)

Factory setting

	Connector No.	Pin No. of connector	Function	Setting before the shipment
Input signal	CN3	#1-#2	03	ON/OFF function 1 of the remote control
		#2-#3	06	Cancellation of the commands from the remote control switch after the enforced stoppage
Output signal	CN7	#1-#2	01	Operation signal
		#1-#3	02	Alarm signal
	CN8	#1-#2	06	Thermo-ON signal during the heating

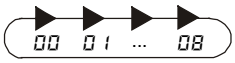
b. Press the Time ∇ switch or the Time Δ switch. Then, the port indication at the segments for time indication of the timer setting changes as shown below.
Select the port for allocating the input signal and the output signal.

When you are pressing the TIME Δ switch
When you are pressing the TIME ∇ switch



c. Press the CHECK switch. Then, the input signal code and the output signal code at the segments for the setting temperature indication changes as shown below.
Select the input signal and the output signal that you need to allocate to the port.

When you are pressing the CHECK switch



- **Selection of other indoor unit**

  At the optional setting mode, press the TEMP ⊙ switch or the TEMP ⊙ switch. Then, the condition of the remote control switch changes and you can select the indoor unit for the input setting and the output setting that is described in "Selection of the Indoor Unit".

- **Return from the input setting mode and the output setting mode**

  Press the RESET switch. The input setting and the output setting are memorized and the mode returns to the normal condition.

- **Specifications of the required components**

Component		Manufacturer or specifications	Remarks
Auxiliary relay (X1, X2)		OMRON Mini Power Relay Model: MY1F or equivalent	Voltage AC220V or AC240V
Changeover switch (SS2, SS3)		Manual type	
3-Pin connector cord		Optional part PCC-1A (capable of connecting the JST Connector XHP-3)	Five cords with connectors as one set
Cord (inside the unit)	Low voltage	0.3mm²	Less than 12V
	AC220V/AC240V class	0.5mm²	
Cord (outside the unit)	Low voltage	0.5mm²	Less than 12V
	AC220V/AC240V class	0.5mm²	

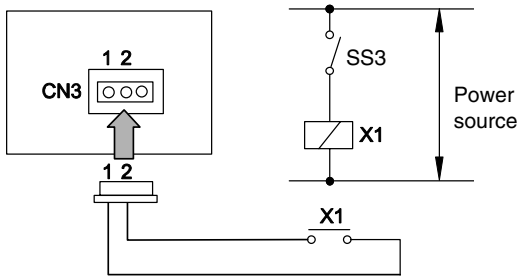
NOTE:
Make the CN3 wires as short as possible. Do not install the wires along the power supply wire of AC230V-AC400V. Install the wires separately at a distance of more than 30cm. (You can intersect the wires). If you install the wires along the power supply wire, insert the wires in a metal conduit tube and ground one end of a wire. The maximum wiring length is 70m. If you use this function, it is recommended that you use safety devices such as an electrical leakage breaker or a smoke detector.

6.1.2. ON/OFF FUNCTION OF THE REMOTE CONTROL

This function provides a control to stop the system and to start the system from a remote place. There are two methods that use each signal from a BMS (Building Management System).

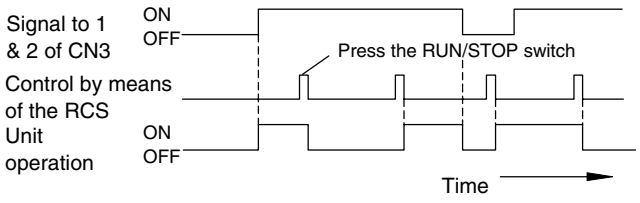
- **ON/OFF function 1 of the remote control (level signal input) 03**

  This is a remote ON/OFF function that uses the level signal (ON/OFF). The basic wiring and the time chart are shown below.
  You should set the function input 03 according to the section 6.1.1.
  (In case of "Remote Control 1", the signal input to #1 and #2 of CN3).



NOTE:
When you start the unit by means of the remote ON/OFF switch, the fan speed is subject to the mode that is memorized in the remote control switch.

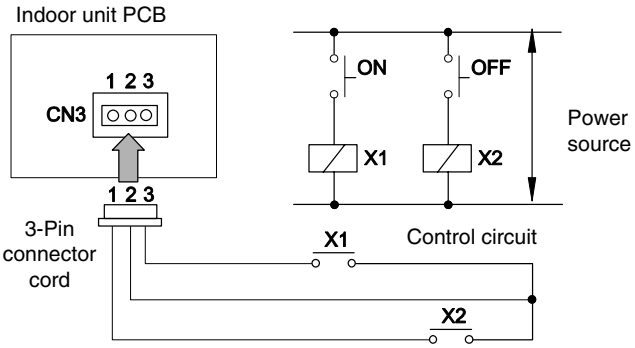
Time chart:



NOTE:
Operation priority is given to the remote ON/OFF signal or the signal the remote control switch that is given last.
Due to the initialization of the components, picking up the signal within ten seconds after turning ON the main switch is not available.

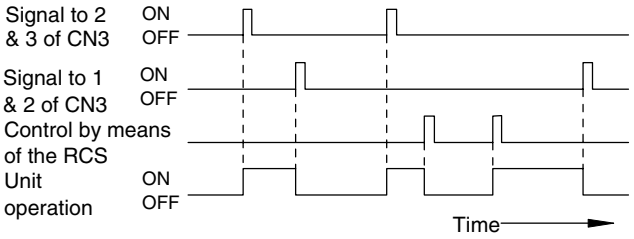
- **ON/OFF function 2 of the remote control operation 04 / stop 05 (pulse signal input)**

  This is a remote ON/OFF function that uses the pulse signal. The basic wiring and the time chart are shown below.
  You should set the function input 04 and the function input 05 according to the section 6.1.1.
  (In case of ON, the signal input to #2 and #3 of CN3; in case of OFF, the signal input to #1 and #2 of CN3).



NOTE:
The pulse width must be wider than 200ms.

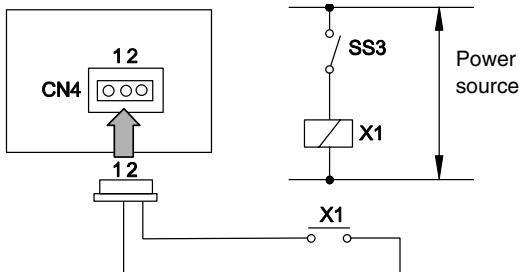
Time chart:



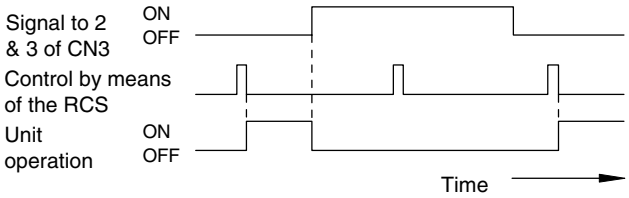
NOTE:
Due to the initialization of the components, picking up the signal within ten seconds after turning ON the main switch is not available.

6.1.3. CANCELLATION OF THE COMMANDS FROM THE REMOTE CONTROL SWITCH AFTER THE ENFORCED STOPPAGE 06

You can stop the air conditioning systems by means of the signal from a building management system. Then, the individual commands from the remote control switch are cancelled.
The basic wiring and the time chart are shown below.
The required parts are shown in section 6.1.1.
(In case of "Cancellation of the Commands from the Remote Control Switch after Enforced Stoppage Function 06", the signal input to #2 and #3 of CN3).



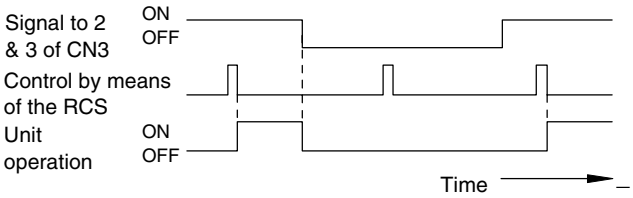
Time chart:



NOTE:
Due to the initialization of the components, picking up the signal within ten seconds after turning ON the main switch is not available.

At this function, you can use the B contact by means of the optional setting of the remote control switch. The time chart, which provides the information about when you can use the B contact, is shown below.

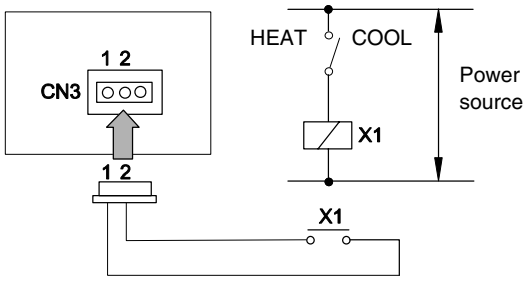
Refer to section 6.4 "Optional Function of RCS "Cb" for more details about the contact A and the contact B.



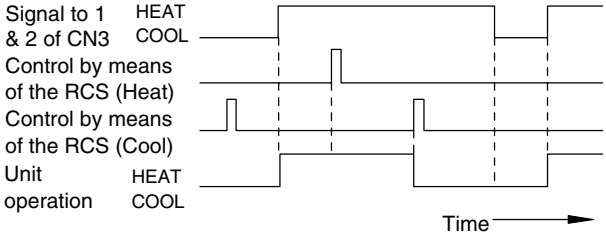
NOTE:
Due to the initialization of the components, picking up the signal within ten seconds after turning ON the main switch is not available.

6.1.4. SETTING THE COOLING MODE OR THE HEATING MODE 07

By means of this function, you can change the cooling mode or the heating mode by giving a contact signal from the outside to the unit. The operation mode is followed by the field-supplied switch or the remote control switch, which is used last.
(In case of "Cooling or Heating Operation mode Setting Change by External Input", the signal input to #1 and #2 of CN3.

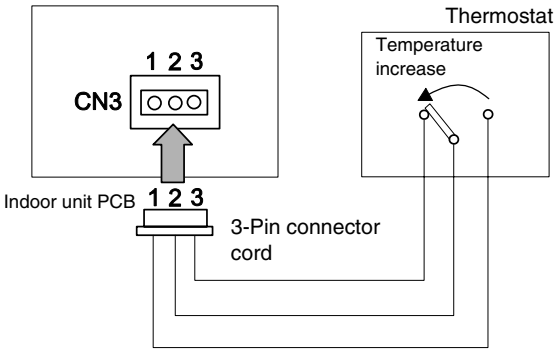


Time chart:



6.1.5. CONTROL BY MEANS OF A FIELD-SUPPLIED ROOM THERMOSTAT (0 1/02)

If you use a field-supplied room thermostat instead of the air inlet thermistor of the indoor unit, connect the wires as shown below. The required parts are shown in item 10.1.1. (In case of "Room Thermostat (Cooling) Function 01", the signal input to #2 and #3 of CN3; in case of "Room Thermostat (Heating) Function 02", the signal input to #1 and #2 of CN3).



Cooling process:	Compressor is ON by closing the terminal 2 and the terminal 3 at CN3. Compressor is OFF by closing the terminal 2 and the terminal 3 at CN3.
Heating process:	Compressor is ON by closing the terminal 1 and the terminal 2 at CN3. Compressor is OFF by closing the terminal 1 and the terminal 2 at CN3.

Component	Manufacturer or specifications
Thermostat	Equivalent to YAMAKATE R7031P005, R7031Q005

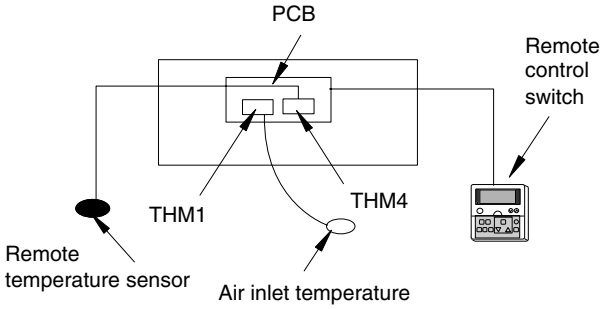
NOTE:

- *When you use a field-supplied room thermostat, select the specified thermostat as explained below:*
  Contactor load: DC12V
  Differential: more than 1.5 degrees
- *Do not use a thermostat that uses mercury.*
- *The remote control switch must remain connected to the unit. When the power supply is restored, you must start the unit by pressing the RUN button. The compressor will then operate under the control of the field-supplied thermostat. All other functions are controlled by the remote control in the usual way.*

6.1.6. CONTROL BY MEANS OF A REMOTE TEMPERATURE SENSOR

By using an optional remote temperature sensor, the following functionalities are available:

1. The unit is controlled by the average temperature of the air inlet thermistor and the remote temperature sensor.
2. If the discharge air temperature exceeds 60°C, the fan speed increases from Medium to High or from Low to Medium.



NOTE:

1. *You cannot use the remote temperature sensor together with the remote control thermistor. (Refer to section 6.4.2).*
2. *During the heating process, the function "Heating Temperature Calibration" is automatically cancelled. (Refer to section 6.4.2).*
3. *If you are using this remote sensor, select the location for installing the remote sensor according to the following requirements:*
   - *A location where the average room temperature can be detected.*
   - *A location where the thermistor (sensor) is not directly exposed to the sunlight.*
   - *A location where a heat source is not near the thermistor.*
   - *A location where the outdoor air that is caused by opening and closing the doors does not affect the room temperature.*

6.1.7. PICKING UP THE SIGNALS

By means of this function, you can pick up the signals that are displayed. These signals provide information about how the unit is working so that you can activate the necessary additional devices.

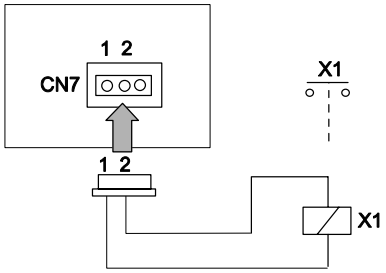
Required Parts for the Modification

Part name	Specifications / Model
Auxiliary relay*	OMRON High Power Relay Model LY2F DC12V
Connector cable	PCC-1A (3P connector cable)

*: Do not use the relay with the diode.

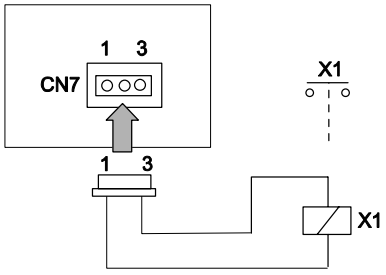
1. Picking up the operation signal (01)

You use this function in order to pick up the operation signal. By means of this function, you can check the operation signal at a remote place. You can also interlock the operation at the motor of the fresh-air intake fan. Connect the wires as shown below. Note that the contact of the auxiliary relay X1 is closed when this operation signal is given.
(If you are giving the operation signal to 1# and 2# of CN7).



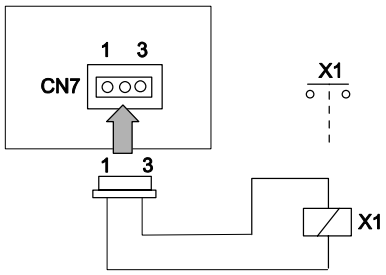
2. Picking up the alarm signal (02)

You use this signal in order to pick up the activation of safety devices. The signal is normally displayed on the remote control switch. However, this function is not available under abnormal transmission conditions. Connect the wires as shown below. Note that the contact of the auxiliary relay X1 is closed when one of the safety devices is activated.
(If you are giving the operation signal to 1# and 3# of CN7).



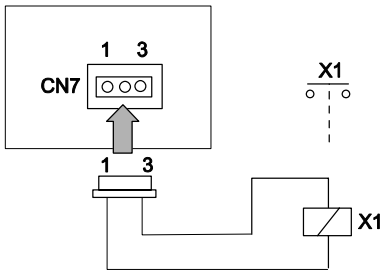
3. Picking up the cooling process signal (03)

You use this function in order to pick up the cooling process signal. The contact of the auxiliary relay X1 is closed when the cooling process signal is ON despite the Thermo-ON signal or the Thermo-OFF signal. Connect the wires as shown below.
(If you are giving the cooling process signal to 1# and 3# of CN7).



4. Picking up the Thermo-ON signal during the cooling process (04)

You use this function in order to pick up the Thermo-ON signal of the running compressor during the cooling process. Connect the wires as shown below.
The contact of the auxiliary relay X1 is closed when the THERMOSTAT indication is ON during the cooling mode.
(If you are giving the Thermo-ON signal to 1# and 3# of CN7 during the cooling process).

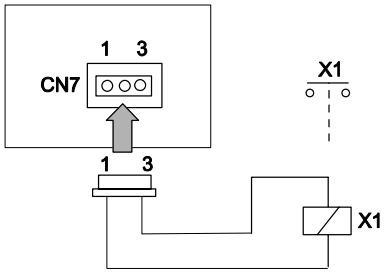


NOTE:

- *Thermo-ON indicates the microcomputer control function where the THERMOSTAT indication is ON as a thermostat.*
- *Refer to the item regarding the setting of the remote control switch for the wiring and the output signal.*

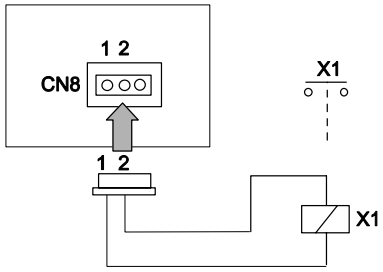
5. Picking up the heating process signal (05)

You use this function in order to pick up the heating process signal. The contact of the auxiliary relay X1 is closed when the heating process signal is ON despite the Thermo-ON signal or the Thermo-OFF signal. Connect the wires as shown below.
(If you are giving the heating process signal to 1# and 3# of CN7).



6. Picking up the Thermo-ON signal during the heating process (06)

You use this function in order to pick up the Thermo-ON signal of the running compressor during the heating process. You use this function in order to control a circulator or a humidifier. Connect the wires as shown below.
The contact of the auxiliary relay X1 is closed when the THERMOSTAT indication is ON during the heating mode.
(If you are giving the Thermo-ON signal to 1# and 2# of CN8 during the heating process).



NOTE:
– *Thermo-ON indicates the microcomputer control function where the THERMOSTAT indication is ON as a thermostat.*

6.2. INDOOR UNIT (RPK ONLY)

The following table shows the available input signals and the available output signals:

		Setting option	Connector No.	Wireless		PC-P1HE optional function
				Pin No.	DSW2	
Inputs	1	Remote control 1 (level signal input)	CN4	2-3	ON 1 2 3 4 5 6 7 8	–
	2	Remote control 2 (pulse signal input)	CN4	1-2-3	ON 1 2 3 4 5 6 7 8	–
	3	Cancellation of commands RCS enforced stoppage	CN4	1-2	CUT JP2	–
	4	Remote cooling/heating mode changeover	CN4	1-2	–	–
	5	Operation when power supply is ON	–	–	ON 1 2 3 4 5 6 7 8	d1
	6	Restart function after the power failure	–	–	ON 1 2 3 4 5 6 7 8	d3
	7	Control by means of the field-supplied room thermostat	CN3	1-2-3	ON 1 2 3 4 5 6 7 8	–
Outputs	8	Picking up the operation signal	CN7	1-2	–	–
	9	Picking up the alarm signal	CN7	1-3	–	–

NOTE:
When the PC-P1HE is used, the power ON/OFF functions (5 and 6) are only available by means of the configuration (d1 and d3) of the remote control switch. The DSW2 is cancelled for this function.

All the other functions are set by the DSW2. The service 2 of PC-P1HE is not available for the RPK units.

6.2.1. REMOTE ON/OFF OPERATION (1/2)

This function provides a control to stop the system and to start the system from a remote place. There are two methods that use each signal from a BMS (Building Management System).

NOTE:
Operation priority is given to the remote ON/OFF signal or the signal of the remote control switch that is given last.

Due to the initialization of the components, picking up the signal within ten seconds after turning ON the main switch is not available.

When the remote device is controlling the unit, the operation mode is subject to the setting that is memorized in the remote control switch.

CAUTION:
Turn OFF the main switch before setting the DIP switches.

The specifications of the required components are the following:

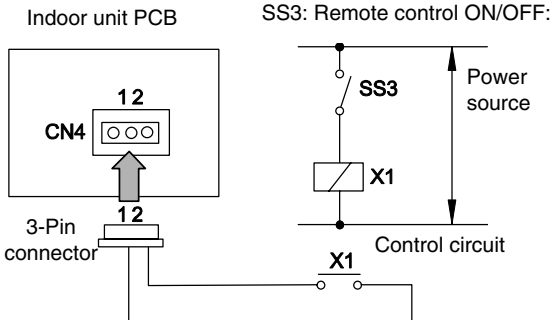
Component		Manufacturer or specifications	Remarks
Auxiliary relay (X1, X2)		OMRON Mini Power Relay Model: MY1F or equivalent	Voltage AC220V or AC240V
Changeover switch (SS2, SS3)		Manual type	
3-Pin connector cord		Optional part PCC-1A (capable of connecting the JST connector XHP-3)	Five cords with connectors as one set
Cord (inside the unit)	Low voltage	0.5mm²	Less than 12V
	AC220V/AC240V class	~0.5mm²	
Cord (outside the unit)	Low voltage	~0.5mm²	Less than 12V
	AC220V/AC240V class	0.5mm²	

NOTE:
Make the CN4 wires as short as possible. Do not install the wires along the power supply wire of AC230V-AC400V. Install the wires separately at a distance of more than 30cm. (You can intersect the wires). If you install the wires along the power supply wire, insert the wires in a metal conduit tube and ground one end of a wire. The maximum wiring length is 70m. If you use this function, it is recommended that you use safety devices such as an electrical leakage breaker or a smoke detector.

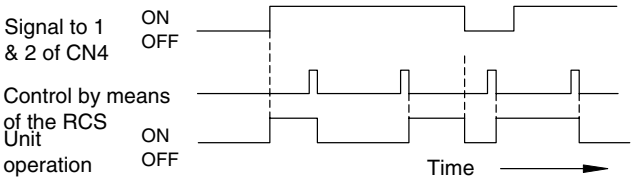
▪ Remote control 1 (level signal input) (1)

This is a remote ON/OFF function that uses the level signal (ON/OFF). The basic wiring and the time chart are shown below.

Example of Wiring Diagram of the Remote Control 1:



Time chart:

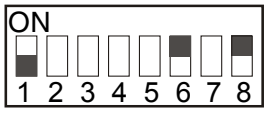


NOTE:
Due to the initialization of the components, picking up the signal within ten seconds after turning ON the main switch is not available.

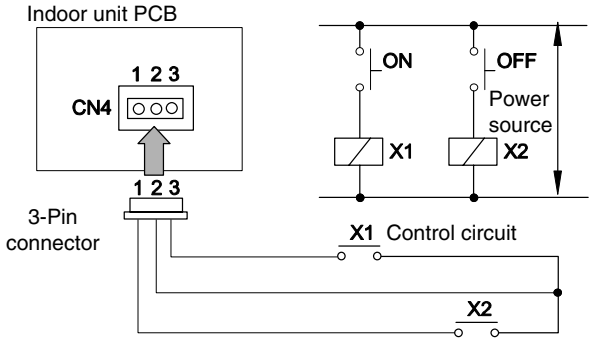
▪ Remote control 2 (pulse signal input) (2)

This is a remote ON/OFF function that uses the pulse signal. The basic wiring and the time chart are shown below.
Turn OFF the main switch before setting the DIP switch as shown below.

DSW2

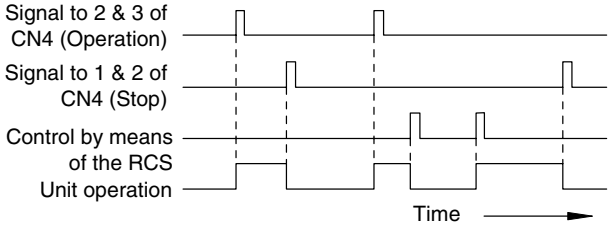


Example of wiring diagram of the remote control 2:



NOTE:
The pulse width must be wider than 200ms.

Time chart:



NOTE:
Due to the initialization of the components, picking up the signal within ten seconds after turning ON the main switch is not available.

6.2.2. CANCELLATION OF THE COMMANDS FROM THE REMOTE CONTROL SWITCH AFTER THE ENFORCED STOPPAGE (3)

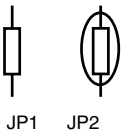
This function, which uses the level signal, provides a control to stop the system and to lock the remote control switch automatically from a remote place.

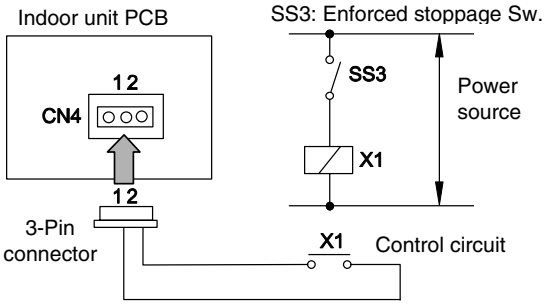
NOTE:
The specifications of the required components that are explained in the above section are applicable to this device too.

You cannot use this option with the function "Remote Control 1" and the function "Remote Cooling/Heating Mode ChangeOver".

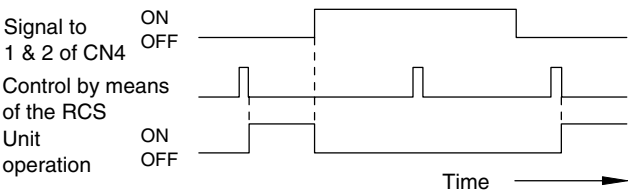
After setting #1 and #2 of CN4 to OFF, the unit remains stopped and the remote control switch is available.

The basic wiring and the time chart are shown below.
Turn OFF the main switch before cutting the jumper JP2 of the indoor unit PCB.





Time chart:



NOTE:
Due to the initialization of the components, picking up the signal within ten seconds after turning ON the main switch is not available.

6.2.3. REMOTE COOLING / HEATING MODE CHANGEOVER (4)

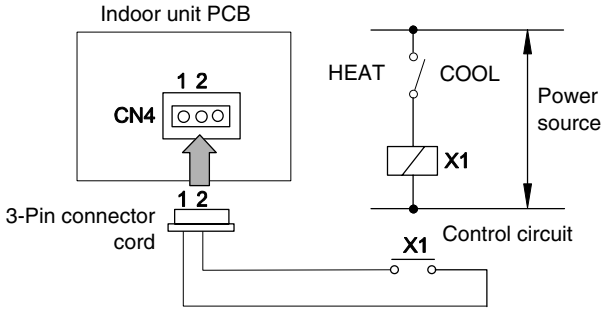
By means of a remote position, you can change the operation mode of the unit from the heating mode to the cooling mode and vice versa.
The operation mode is followed by the field-supplied switch or the remote control switch, which is used last.

NOTE:
This option is only available for the heat pump models.

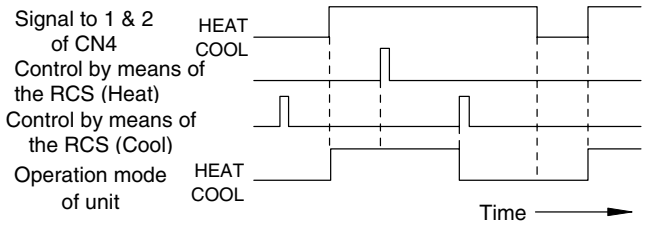
The specifications of the required components that are explained in the above section are applicable to this device too.

You cannot use this function together with the function "Remote Control 2" and the function "Cancellation of the Commands from the Remote Control Switch after the Enforced Stoppage".

Example of wiring diagram of the remote control 3:



Time chart:

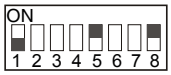


NOTE:
Due to the initialization of the components, picking up the signal within ten seconds after turning ON the main switch is not available.

6.2.4. AUTOMATIC OPERATION WHEN POWER SUPPLY IS ON (5)

If the power supply is interrupted for short periods of time (up to two seconds), the remote control switch will retain the settings. The unit will restart when the power supply is restored.

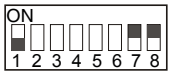
If the power supply is interrupted for periods of time that are longer than two seconds, the automatic restart is required. You can set the automatic restart by changing the setting of the DIP switches as shown below.



NOTE:
All the settings of the other DIP switches must correspond to the factory settings for the particular indoor unit.
The unit will start even if you turned OFF the unit before the power failure.

6.2.5. RESTART FUNCTION AFTER THE POWER FAILURE (6)

If the power supply is interrupted for short periods of time (up to two seconds), the remote control switch will retain the settings. The unit will restart when the power supply is restored. If the power supply is interrupted for periods of time that are longer than two seconds, the automatic restart is required. You can set the automatic restart by changing the setting of the DIP switches as shown below.



6.2.6. CONTROL BY MEANS OF THE FIELD-SUPPLIED ROOM THERMOSTAT (7)

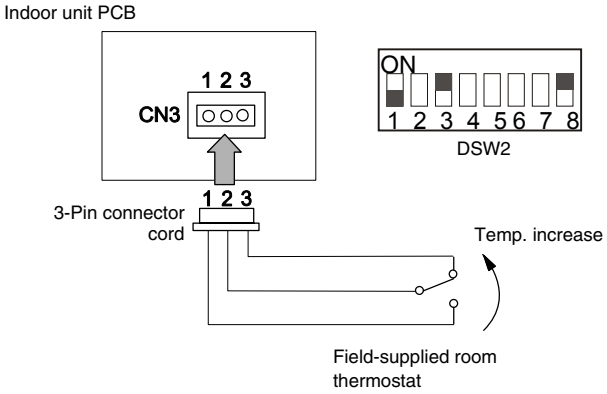
When you are operating the unit with a field-supplied room thermostat instead of the air inlet thermistor of the indoor unit, you should make the connections as shown below:

Heating:	Use the connections 1 & 2. (Only the heat pump models).
Cooling:	Use the connections 2 & 3.

- When you are setting the DSW2, first turn OFF the main switch. Then, set the DIP switch. If you do not turn OFF the main switch and you set the DIP switch, the DIP switch will not function.
- The remote control switch must remain connected to the unit. When the power supply is restored, you must start the unit by pressing the RUN button. The compressor will then operate under the control of the field-supplied thermostat. All other functions are controlled by the remote control in the usual way.

Component	Manufacturer or specifications
Thermostat	Equivalent to YAMAKATE R7031P005, R7031Q005

NOTE:
– *When you use a field-supplied room thermostat, select the specified thermostat as explained below:*
Contactor load: DC12V
Differential: more than 1.5 degrees
– *Do not use a thermostat that uses mercury.*



6.2.7. PICKING UP THE SIGNALS

By means of this function, you can pick up the signals that are displayed. These signals provide information about how the unit is working so that you can activate the necessary additional devices.

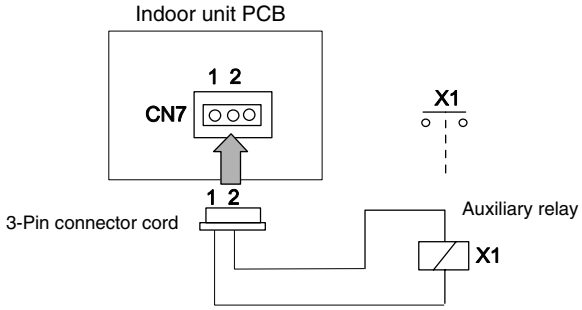
Required Parts for the Modification

Part name	Specifications / Model
Auxiliary relay*	OMRON High Power Relay Model LY2F DC12V
Connector cable	PCC-1A (3P connector cable)

*: Do not use the relay with the diode.

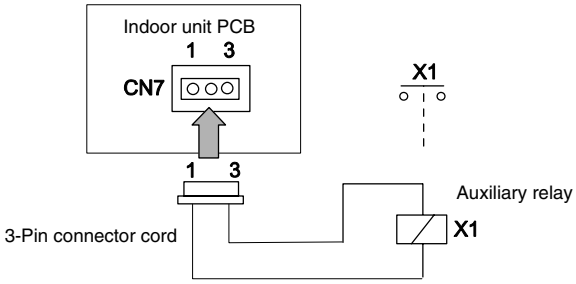
▪ Picking up the operation signal (8)

You use this function in order to pick up the operation signal. By means of this function, you can check the operation signal at a remote place. You can also interlock the operation at the motor of the fresh-air intake fan. When you turn on the unit, the auxiliary relay RY is energized by closing the contacts RYa.



▪ Picking up the alarm signal (9)

You use this option to provide a remote indication of a fault on the unit, in addition to the LED on the standard remote control. (RUN LED flickers 5 times/5 seconds). When a fault occurs, the auxiliary relay RY is energized and remains energized until you clear the fault and you reset the unit by means of the standard remote control. The details of the wiring are shown below.

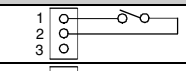
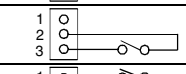
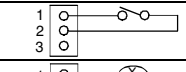
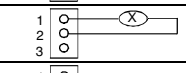
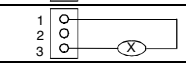


6.3. OUTDOOR UNITS

6.3.1. INPUT SETTING AND OUTPUT SETTING OF THE OUTDOOR UNIT CONNECTOR

On the printed circuit board of the outdoor unit, there are three input ports (CN17, CN18), which receive the external signals, and two output ports (CN16), which send out the signals.

- Indications and settings of the ports on the outdoor unit PCB

	Indication in 7-segment	Settings of the port	Remarks
Input signal	i1	1-2 of CN17	
	i2	2-3 of CN17	
	i3	1-2 of CN18	
Output signal	o1	1-2 of CN16	
	o2	1-3 of CN16	

- Indications of the input signal and the output signal

Function No.	Input signal	Output signal
1	Fixing heating mode	Operation signal
2	Fixing cooling mode	Alarm signal
3	Demand	Compressor ON signal
4	Snow sensor	Defrost operation signal
5	Enforced stoppage	--
6	Demand current control 60%	--
7	Demand current control 70%	--
8	Demand current control 80%	--
9	Demand current control 100%	--

- Factory setting

	Connector No.	Pin No. of connector	Function No.	Setting before the shipment
Input signal	CN17	#1-#2	1	Fixed heating mode
		#2-#3	2	Fixed cooling mode
	CN18	#1-#2	3	Demand
Output signal	CN16	#1-#2	1	Operation
		#1-#3	2	Alarm code

- Specifications of the required components

Part names		Specifications	Remarks
Auxiliary relay (X1, X2)		OMRON Mini Power Relay Model: MY1F (or 2F)	AC220V/AC240V
Changeover switch (SS2, SS3)		Manual switch	
3-Pin connector cord		PCC-1A (connected to the JST connector, XARP-3)	Five cords with connectors as one set
Cord (inside the unit)	Low volt.	0.3mm^2	Lower than 24V
	AC220V/AC 240V	0.5 to 0.75mm^2	
Cord (outside the unit)	Low volt.	0.5 to 0.75mm^2	Lower than 24V
	AC220V/AC 240V	2mm^2	

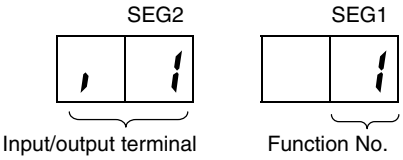
NOTE:

1. *Make the wire to the terminals as short as possible.*
2. *Do not run the wires along the high-voltage cable. (You can intersect the wires).*
   If you need to run the wires along the high-voltage cable, insert the low-voltage cable(s) into a metal conduit tube and ground one end of the conduit tube.
   If sealed wires are used on the low-voltage wire side, ground the conduit tube at one end of the shielded cables. The maximum total length should be 70m.

▪ Selection of the input signal

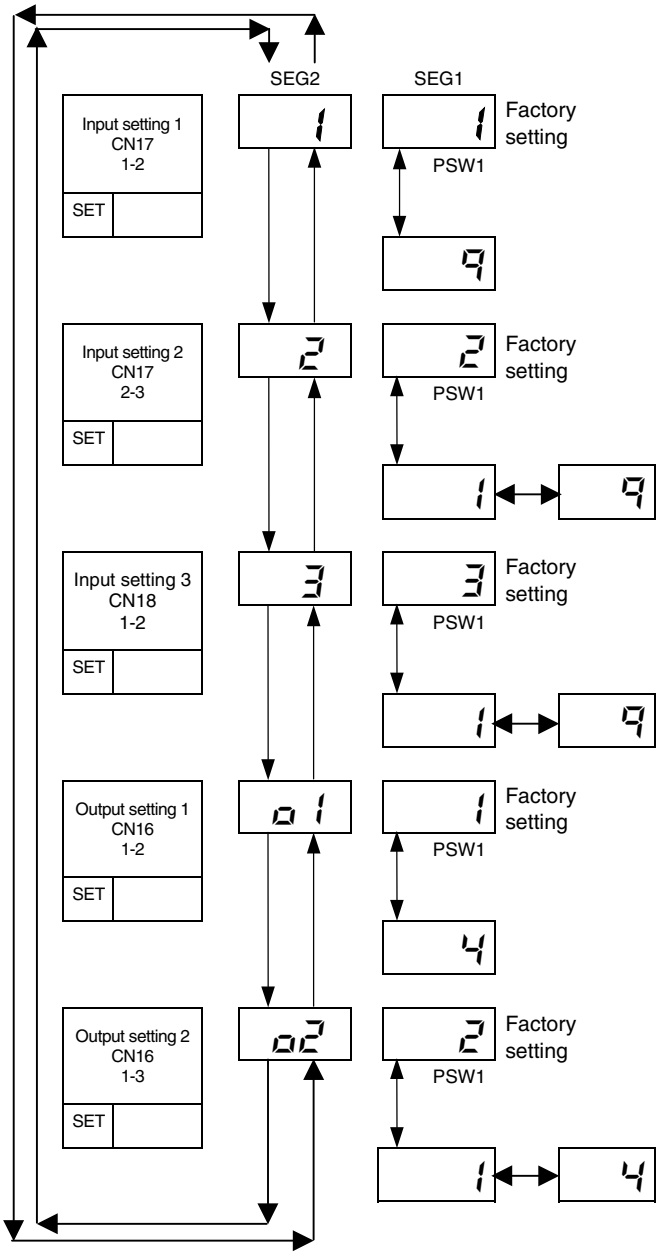
If the below setting change is required on-site, perform the following instructions:

1. While the outdoor unit is ON, set the following DIP switches on the printed circuit board of the outdoor unit as follows: set the No.4 pin of DSW4 to ON; set the No.7 pin of DSW5 to ON. Because of these settings, the function selection mode becomes available and the following indication appears on the 7-segment display.

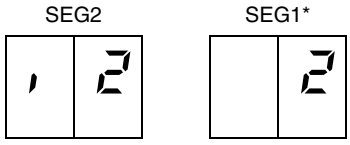


This indication means that the function No.1 (fixed heating mode) is set at the input 1.

2. By pressing the push switches PSW2 and PSW3, you change the input/output terminal name. The following chart shows the indication changes on the 7-segment display when you press the PSW2 and PSW3.



3. After selecting the input/output terminal name, select your required function by pushing the PSW1.



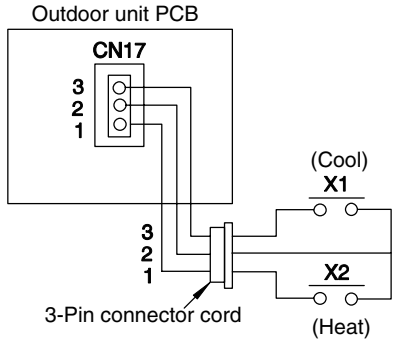
*) This number is increased by 1 by pushing the PSW2 while you are pushing the PSW1. This number is decreased by 1 by pressing the PSW3 while you are pressing the PSW1.

4. After setting the No.4 pin of DSW4 and the No.7 pin of DSW5 to OFF, the selected contents are memorized in the printed circuit board of the outdoor unit. Then, the function selection mode is disabled. The memorized data is maintained even when the power supply wires are disconnected. The connection details of each function and the required parts are described below.

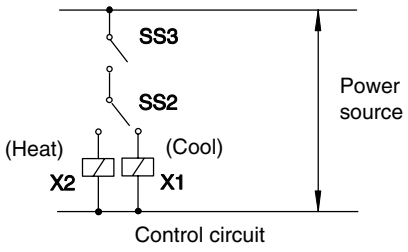
6.3.2. FIXING THE OPERATION MODE (HEATING / COOLING)

If the fixing input terminals of the operation mode on the outdoor unit PCB are short-circuited, you can fix the operation mode at the cooling mode or the heating mode.
Short circuit between the terminals 1 and 2 of CN17: fixed heating mode.
Short circuit between the terminals 2 and 3 of CN17: fixed cooling mode.
This fixed mode will be shared in the remote control switch.
During this fixed heating mode or this fixed cooling mode, no heating process or cooling process is available. If you select the cooling mode or the heating mode, the indoor units that are under the cooling process, the dry operation or the heating process will change to the Thermo-OFF condition during this mode. Then, the alarm code "20" will appear.
The stoppage cause code "d1" will be "20".

Example of wiring diagram of fixing the operation mode:



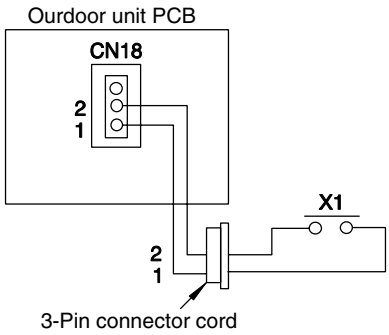
SS3: Fixing operation mode SW.
SS2: Changeover SW.

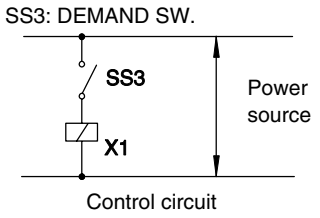


6.3.3. DEMAND (3)

If the demand input terminals on the printed circuit board of the outdoor unit are short-circuited, the compressor(s) will stop. (If this is the case, the indoor unit(s) changes to the thermo-OFF condition). The stoppage cause code "10" will appear. If you disconnect the demand switch contact, the restart function becomes available. The following diagram shows an example of demand control at the input 3 (between the pin No.1 and the pin No.2 of CN18).

Example of wiring diagram of the demand control

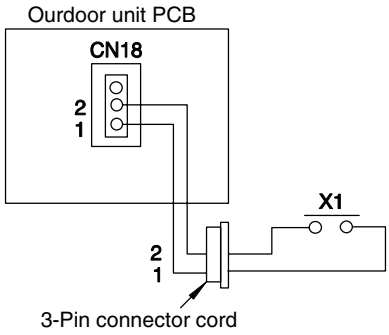


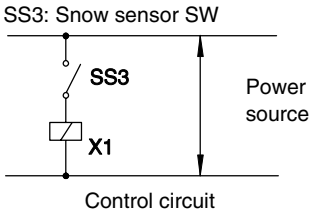


6.3.4. SNOW SENSOR (4)

If the input terminals of the snow sensor are short-circuited during the compressor stoppage, all the outdoor fan motors operate at the full speed. However, if the compressor starts operating, the fan operation changes to the normal operation. If the input terminal is opened, the fan(s) will stop. This function protects the outdoor units from the snow.

Example of wiring diagram of the snow sensor

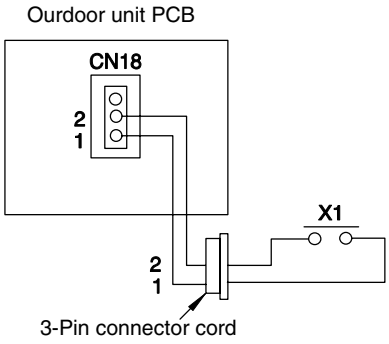


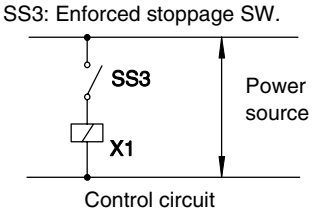


6.3.5. ENFORCED STOPPAGE (5)

If the enforced stoppage input terminals (#1 and #2 of CN18) on the outdoor unit PCB are short-circuited during the operation, the compressor and the indoor fan motor will stop. However, the display of the remote control switch remains in the same mode and the stoppage cause code "d1" will be "10". If this is the case, the operation will resume if the input terminals are opened.

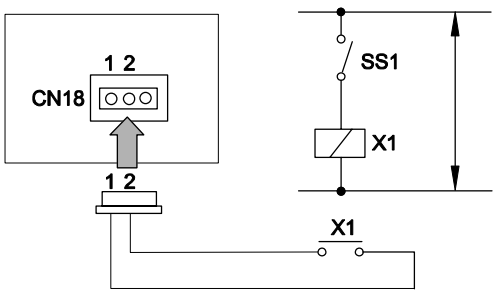
Example of wiring diagram of the enforced stoppage:





6.3.6. DEMAND CURRENT CONTROL (6/7/8/9)

If the demand input terminals on the outdoor unit PCB are short-circuited, the compressor frequency is controlled so that the maximum limit of the running current of the outdoor unit is set to 60%, 70% and 80%. (You can select the maximum limit of the running current of the outdoor unit according to the section 6.3.1.
If the running current of the outdoor unit decreases beyond the maximum limit, the indoor unit changes to the Thermo-OFF condition. The stoppage cause code "10" will appear. When the input terminal is opened during the demand current control, the control of the input terminal is reset.

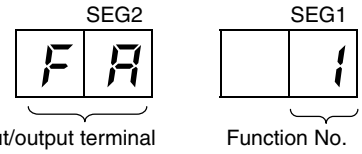


6.3.7. AVAILABLE OPTIONAL FUNCTIONS BY PRESSURE SWITCHES

- **Function setting**

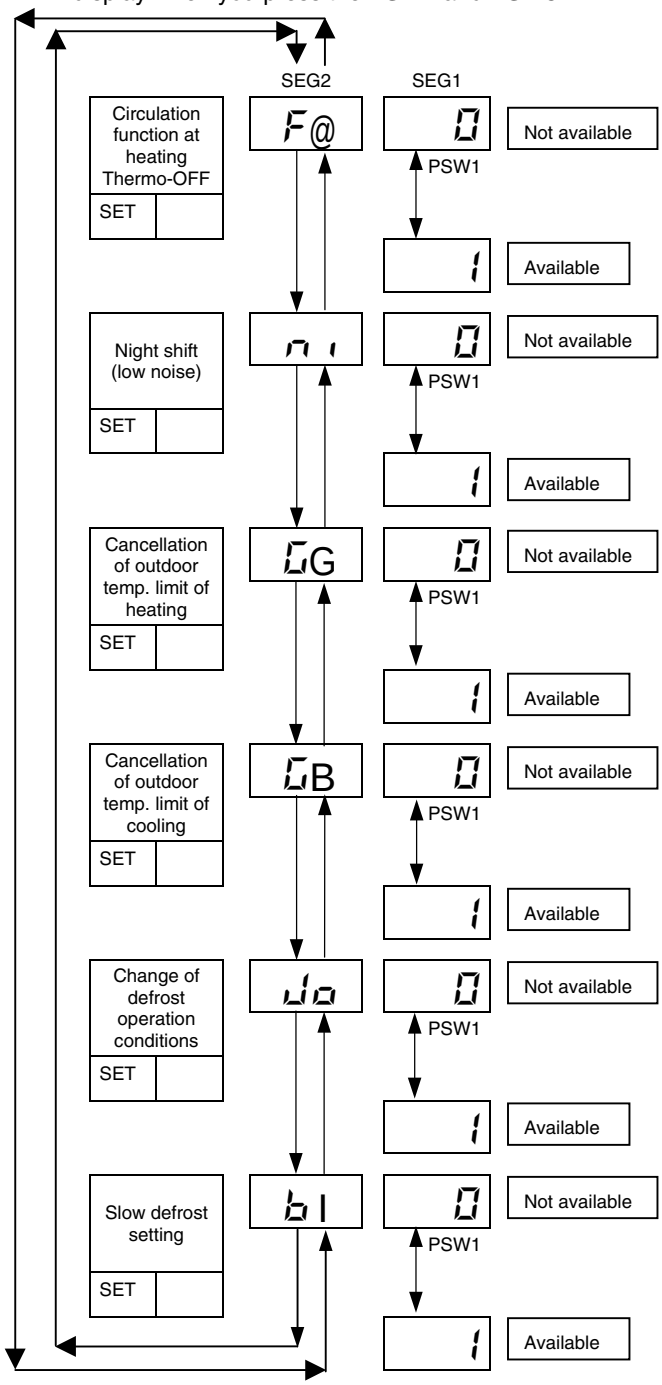
If the above setting change is required on-site, perform the following instructions.

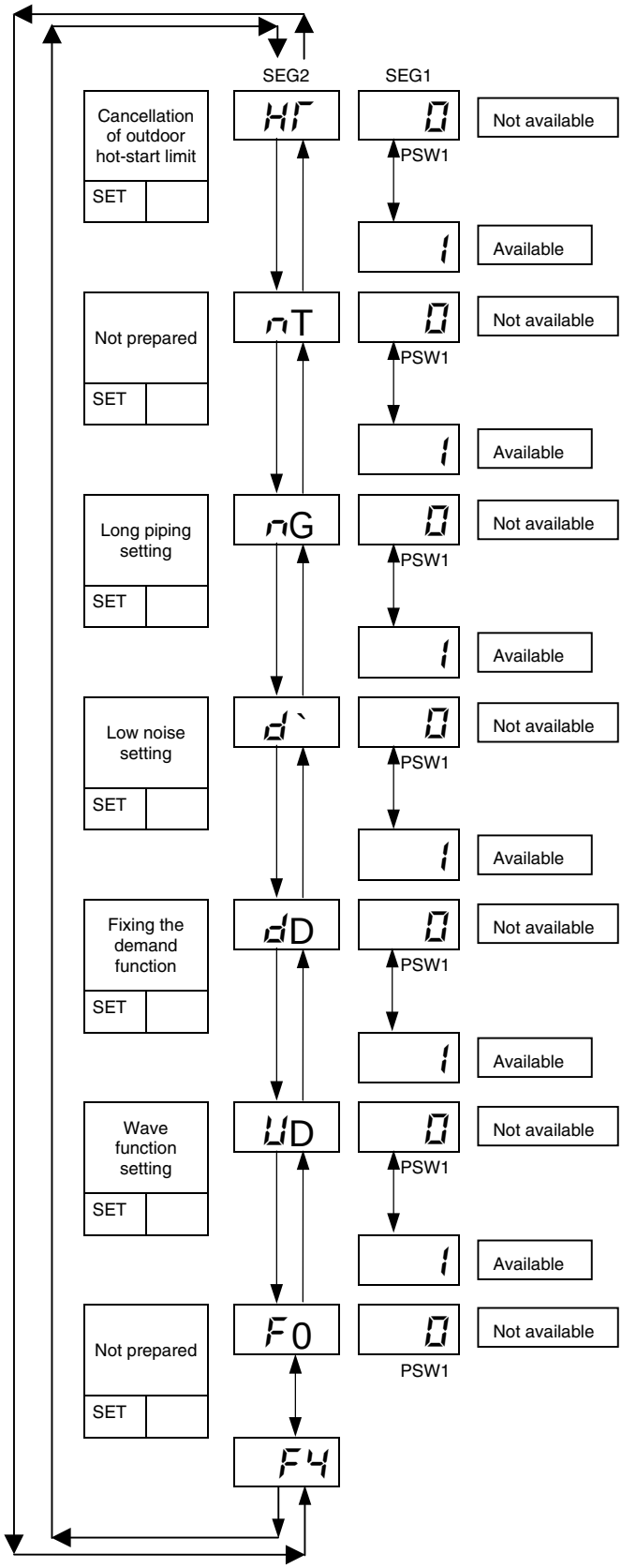
1. While the outdoor unit is ON, set the following DIP switches on the printed circuit board of the outdoor unit as follows: set the No.4 pin of DSW4 to ON; set the No.8 pin of DSW5 to ON. Because of these settings, the function selection mode becomes available and the following indication appears on the 7-segment display.



This indication means that the function "Circulation function at heating Thermo-OFF" is available.

2. By pressing the push switches PSW2 and PSW3, you change the input/output terminal name. The following chart shows the indication changes on the 7-segment display when you press the PSW2 and PSW3.



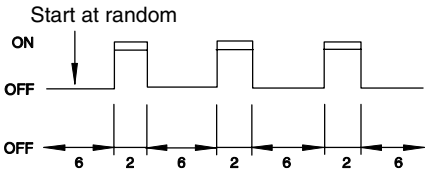


3. After selecting the terminal of the function setting, select the availability function by pressing the PSW1.
4. After setting the No.4 pin of DSW4 and the No.8 pin of DSW5 to OFF, the selected contents are memorized in the printed circuit board of the outdoor unit. Then, the function selection mode is disabled.
   The memorized data is maintained even when the power supply wires are disconnected. The connection details of each function and the required parts are described below.

6.3.8. CIRCULATION FUNCTION AT HEATING THERMO-OFF

The indoor fan operates for two minutes and stops for six minutes as a cycle when the activation conditions are satisfied.

DSW5 Pin No. 1is set at OFF before the shipment. Turn OFF the main switch and set the DIP switch.

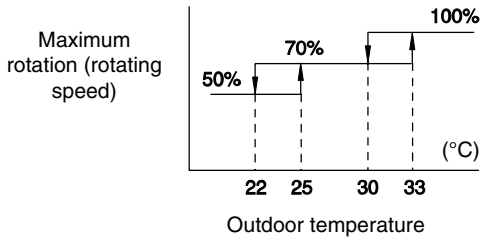
Operation conditions	Operation
Under compressor operation except defrost operation.	When the indoor unit is at thermo-OFF condition during the heating process, the indoor fan operates for two minutes and stops for six minutes within cycles. 

NOTE:
When the indoor fan is stopped by another control, the operation of the indoor fans is not available.

6.3.9. NIGHT SHIFT (LOW NOISE)

When you set the night shift (low noise) operation mode, which is required especially during the nighttime, the cooling capacity is decreased down to 60%. You should use the night shift operation only when the remaining cooling capacity can supply the requested temperature.

- **Outdoor fan**



NOTE:
The maximum rotation (rotating speed) is always 100% for the standard unit. (No limitation of the outdoor temperature).

- **Frequency range**

	Outdoor unit capacity (HP)	Minimum frequency	Maximum frequency	Conditions
When night shift is not set	5	30Hz	82Hz	Except for the conditions below
	8		132Hz	
	10		165Hz	
	16		256Hz	
	20		330Hz	
	24		396Hz	
	30		510Hz	
When night shift is set	5	30Hz	50Hz	1. Night shift operation 2. Cooling process 3. Outdoor fan: below 70%
	8		80Hz	
	10		100Hz	
	16		160Hz	
	20		200Hz	
	24		240Hz	
	30		300Hz	

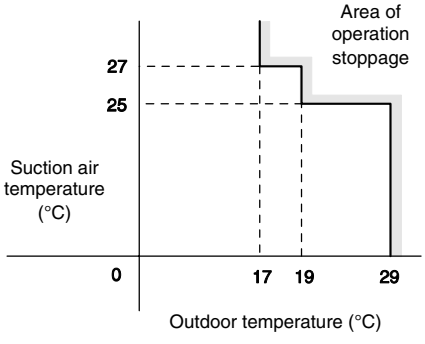
Converter frequency of the constant speed compressor

Outdoor unit capacity (HP)	Power supply frequency	
	50Hz	
8	65Hz	
10	78Hz	
16	78×2Hz	
20	78×3Hz	
24	78×4Hz	
30	78×5Hz	

NOTE:
The maximum frequency for the 8~30 HP outdoor unit is the following: inverter frequency + converter frequency of the constant speed compressor.

6.3.10. CANCELLATION OF OUTDOOR TEMPERATURE LIMIT OF HEATING

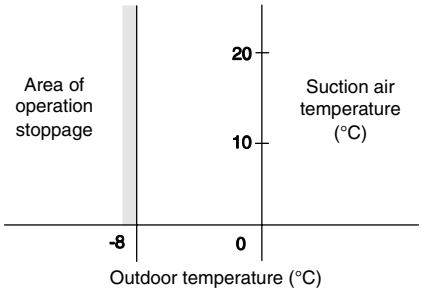
The heating process will continue at a high outdoor temperature.

Operation	
The factory-set limitation of the range of permissible outdoor temperature in the heating process, which is shown in the right figure, is cancelled.	

NOTE:
Due to the protection control against the high outdoor temperature, the operation may be OFF because the protection control is not cancelled.

6.3.11. CANCELLATION OF OUTDOOR TEMPERATURE LIMIT OF COOLING

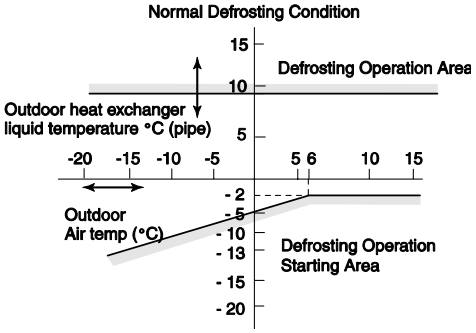
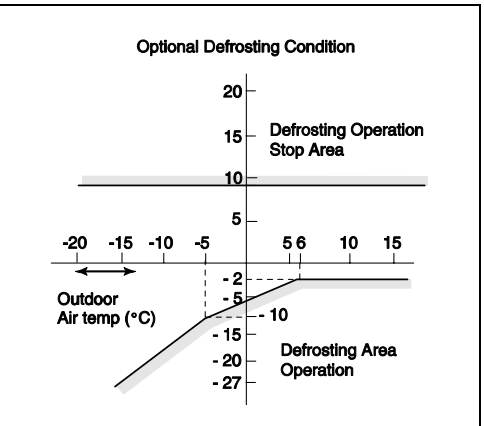
The cooling process will continue at a low outdoor temperature.

Operation	
The factory-set limitation of the range of permissible outdoor temperature in the heating process, which is shown in the right figure, is cancelled.	

NOTE:
Due to the protection control against the high outdoor temperature, the operation may be OFF because the protection control is not cancelled.

6.3.12. CHANGE OF DEFROST OPERATION CONDITIONS

Defrost operation conditions can change as shown in the following pictures:

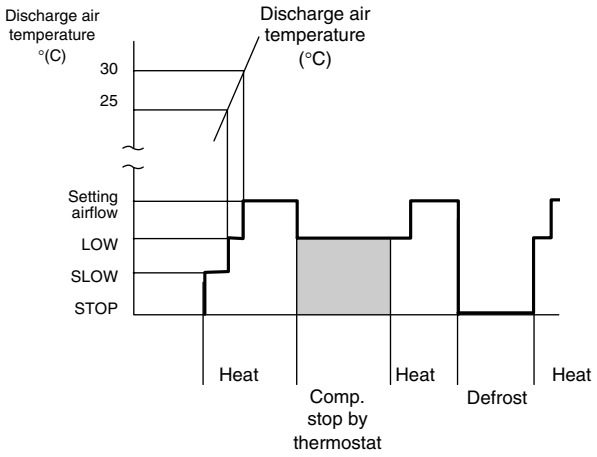
Temperature conditions under defrost operation	
Temperature conditions under defrost operation	

6.3.13. SLOW DEFROST SETTING

By means of this option, you can select the speed of the indoor unit fan during the defrost period.

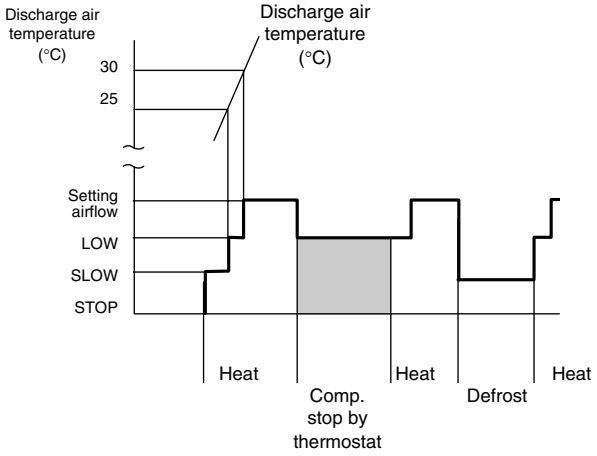
The standard situation is the following:

- Stoppage of the indoor unit fan during the defrost



This option provides:

- Speed of the indoor unit fan at slow mode during the defrost



6.3.14. CANCELLATION OF OUTDOOR HOT-START LIMIT

By means of this function, you do not need to wait for the compressor temperature to rise above 40°C in order to start the outdoor unit.

6.3.15. LONG PIPING SETTING

This function tells the unit the distance between the outdoor unit and the farthest indoor unit (higher than 100m).

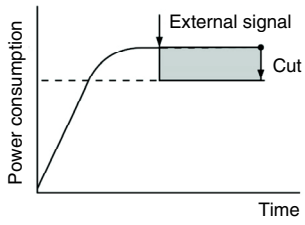
6.3.16. LOW NOISE SETTING

This function reduces the maximum speed of the fan motor. Therefore, the noise level is reduced. There are 14 steps for the regulation.

6.3.17. FIXING THE DEMAND FUNCTION

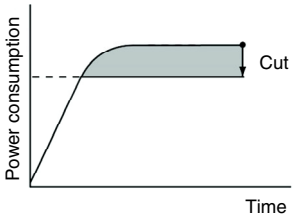
This function regulates the running current of the outdoor unit. If the demanded current is above the set current, the indoor unit capacity is reduced. The running current can be regulated both from an external signal or an internal signal. The capacity regulation is between 60% and 100%.

External signal



The external signal can be generated with different switches, such as a timer switch.

Internal input

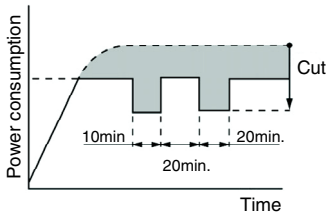


The PCB can control the internal input.

6.3.18. WAVE FUNCTION SETTING

This function regulates the running current of the outdoor unit. If the demanded current is above the set current, the indoor unit capacity is reduced. The running current control is not a fixed value. The running current control varies between a maximum control value and a minimum control value. The changes depend on a timer. The running current control usually works for ten minutes in the normal capacity and for 20 minutes in the control wave.

Wave demand control



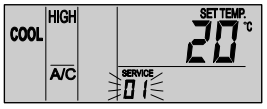
6.4. OPTIONAL FUNCTIONS AVAILABLE THROUGH REMOTE CONTROL SWITCH

6.4.1. OPTIONAL FUNCTIONS SETTING

The remote control switch is changed to the optional setting mode by the following procedures.

- **Field setting mode**

  Check to ensure that the unit is stopped, press the "CHECK" switch and the "RESET" switch on the remote control switch simultaneously more than 3 seconds, and the remote control switch is changed to the field setting mode. When the remote control switch is at the field setting mode, the "SERVICE" is indicated and the "01" flickers below the "SERVICE" indication.

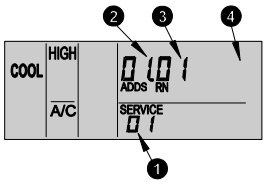


- **Optional setting mode**

  At the field setting mode as described in the above item, press the "TEMP ⌃" switch or the "TEMP ⌄ " switch and the number flickering below the "SERVICE" indication is changed (01 <=> 02). Set the flickering number at "01", leave this condition for 7 seconds or press the "CHECK" switch, and the remote control switch is changed to the optional setting mode.

- **Selection of indoor unit**

  a. At the optional setting mode, the indication on the remote control switch is changed as shown in the figure below.



❶ The indication of "01" is turned ON.

❷ The address of the indoor unit which the optional function is to be set, is indicated at the segments for timer setting time indication, and the "ADDS" is indicated below.

❸ The refrigerant cycle number of the outdoor unit for which the optional function is to be set is indicated at the segments for timer setting time indication and the "RN" is indicated below.

❹ The indication of the setting temperature is turned OFF.

b. At the condition of the above item (a), press the "TEMP ⊙" switch or the "TEMP ⊙" switch of the remote control switch and the indoor unit for which the optional function is to be set, can be changed.

NOTE:

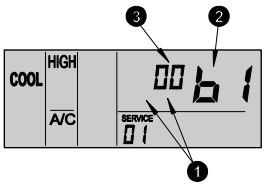
– *The indoor unit can be selected among the indoor units connected to the remote control switch.*

– *In case that both the indications of the address and the refrigerant cycle number is "AA", the settings of all the indoor units is same.*

c. After selecting the indoor unit, leave the condition for 7 seconds or press the "CHECK" switch, the remote control switch is changed to the optional setting mode.

▪ Changing the optional functions and setting conditions

a. At the optional setting mode, the indication on the remote control switch is changed as shown below.



❶ The indications of "ADDS" and "RN" are turned OFF.

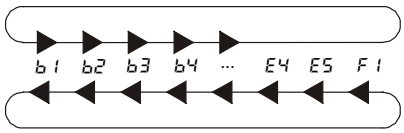
❷ The item number of the optional function is indicated at the segment for the setting temperature indication.

❸ The setting condition of the optional function item is indicated at the segments for timer setting time indication.

b. Press the "TIME ▽" switch or the "TIME △" switch; the optional function item is changed as shown below.

When pressing the "TIME △" switch

When pressing the "TIME ▽" switch



c. Press the "CHECK" switch, and the setting condition of the optional function is changed as shown below.

When pressing the "CHECK" switch

▪ Selection of other indoor unit

At the optional setting mode, press the "TEMP ▽" switch or the "TEMP △", the condition of the remote control switch is changed so that the Indoor Unit can be selected to set the optional function described before.

▪ Return from optional function setting mode

Press the "RESET" switch, the optional function setting is memorized and the mode is returned to the normal condition.

Setting items of optional functions

Items	Optional functions	Setting condition	Contents	Description
b1	Removal of heating temperature calibration	00 01	Not available Available	This function is used to eliminate the 4-ºC shift.
b2	Circulation function at heating Thermo-OFF	00 01	Not available Available	This function is to avoid the stratification of air.
b3	Enforced 3 minutes minimum operation time of compressor	00 01	Not available Available	This function is used to guard the compressor when it frequently starts and stops.
b4	Change of filter cleaning time	00 01 02 03 04	Standard 100 hours 1200 hours 2500 hours Not indication	With this function is possible to change the time when the remote controller advise about when is necessary to change the air filter.
b5	Fixing the operation mode	00 01	Not available Available	This function eliminates the possibility of changing operation mode.
b6	Fixing the setting temperature	00 01	Not available Available	This function eliminates the possibility of changing setting temperature.
b7	Fixing the operation as exclusive cooling unit	00 01	Not available Available	This function eliminates Heating mode.
b8	Automatic COOL/HEAT operation	00 01	Not available Available	This function changes automatically from cool to heat.
b9	Fixing the air volume	00 01	Not available Available	This function eliminates the possibility of changing fan speed.
C1	Not prepared			
C2	Not prepared			
C3	Not prepared			
C4	Drain pump in heating	00 01	Not available Available	This function is used to activate the drain pump in heating mode.
C5	Static pressure selection	00 01 02	Medium static pressure (factory setting) High static pressure Low static pressure	This function is used to change the static pressure levels from the remote controller on the RPI units.
	Increasing fan speed (RCD)	00 01 02	Normal Increasing speed 1 Increasing speed 2	This function is used to change the fan speed due to the high ceiling.
C6	High speed at heating Thermo-OFF	00 01	Not available Available	This function is used to increase the fan speed when Thermo-OFF.
C7	Canceling the "Enforced 3 minutes minimum operation time of compressor"	00 01	Not available Available	This function is used to cancel the "Enforced 3 minutes minimum operation time of compressor".
C8	Thermistor of remote control switch	00 01 02	Control by indoor suction thermistor Control by thermistor of remote control switch Control by average value of indoor suction thermistor and thermistor of remote control switch	This function is used to control the unit with the thermistor of remote control.
C9	Not prepared			
CA	Not prepared			
Cb	Selection of forced stoppage logic	00 01	Forced stoppage input A contact Forced stoppage input B contact	With this function we select the forced stoppage logic.
CC	Not prepared			
d1	Power supply ON/OFF 1	00 01	Not available Available	This function retains the settings of the unit if power supply is interrupted. The unit will start when power is restored.
d2	Not prepared			

Items	Optional functions	Setting condition	Contents	Description
d3	Power supply ON/OFF 2	00 01	Not available Available	This function retains the settings of the unit if power supply is interrupted. The unit will restart when power is restored if the unit was ON before the power failure.
E1	(Econofresh) all fresh operation	00 01, 02	Not available Available	This function is able to open the outdoor air damper.
	(KPI) ventilation mode	00 01 02	Automatic ventilation Ventilation by total heat exchanger Bypass ventilation (no total heat exchanger)	This function is used to set the ventilation mode of the total heat exchanger.
E2	(Econofresh) enthalpy sensor	00 01	Not available Available	This function can set the enthalpy sensor input.
	(KPI) increasing supply air volume	00 01	Not available Available	This function is used to make the room pressure higher than the surrounded room.
E3	Not prepared			
E4	(Econofresh) gas sensor	00 01, 02	Not available Available	This function can set the gas sensor input.
	(KPI) precooling/preheating period	00 01 02	Standard 30 minutes 60 minutes	This function delays the start up of the total heat exchanger operation.
E5	Not prepared			
F1	Automatic setting for OFF timer	00 01 02 ~ 23 24	No function OFF timer by 1 hour OFF timer by 2 hours OFF timer by 23 hours OFF timer by 24 hours	This function is used to set the OFF timer function automatically when the unit is started by the remote control switch.
F2	Remote control main-sub setting	00 01	Main Sub	This function is used when to remote control are installed in one system.

NOTE:

- *As for the optional functions with "X" at the individual setting, only when the "All Rooms" is selected to set the optional function, the setting condition can be changed.*
- *The items "C1" and "C3" are not available. Do not change the setting condition "00".*

6.4.2. OPTIONAL FUNCTIONS OF REMOTE CONTROL SWITCH

1. Removal of heating temperature calibration (b1)

This function is utilized when the temperature settings of the remote control switch and the suction air temperature of the indoor unit are required to be equal.

In standard heating operation, the suction air temperature is higher than the room temperature, therefore the suction air temperature is calibrated -4°C.

(Indicated Setting Temperature = Suction Air Temperature -4°C → Return to 0 °C).

This is useful when the thermistor at the suction side of an Indoor Unit is removed and installed into another place.

The following table presents the indicated setting temperature and the suction air temperature after removal of heating temperature calibration.

Activation temperature			Set temperature on remote controller (°C)						
			18	20	22	24	26	28	30
Cooling		ON	–	22	24	26	28	30	32
		OFF	–	20	22	24	26	28	30
Heating	b1=00 Standard	ON	22	24	26	28	30	30	30
		OFF	24	26	28	30	32	32	32
	b1=01 After removal	ON	18	20	22	24	26	28	30
		OFF	20	22	24	26	28	30	32

2. Circulator function at heating thermo-off (b2)

In case that the fan speed is changed to "LOW" tap at heating Thermo-OFF, there is a case that the room air is stratified because warm air stagnates near the ceiling. In this case, it is recommended that the circulator function explained below be utilized.

<Circulator Function>

The function keeps the fan speed at Thermo-OFF at the same level as thermo-ON. In this case, air movement in the room will be kept on the same level as Thermo-ON, ensuring a homogenous air distribution. In the case that an Auto Louver is equipped, this operation will be also held on when the heating is turned Thermo-OFF.

NOTE:

Perceptions of coolness, heat and airflow are subject to personal tastes and behaviors. It is therefore recommended to discuss this with customers thoroughly and then to set the unit accordingly.

3. Enforced 3 minutes minimum operation time of compressor (b3)

When a compressor frequently starts and stops in short intervals, this function should be used to guard the compressor. By setting this function, the mode of a minimum 3 minutes operation will be added. (The mode of a minimum 3 minutes stoppage is standard.)
In case of SET-FREE, this function is standard even when setting is not available.

NOTE:
When the safety device is activated or the "ON/OFF" switch is pressed, the compressor is stopped immediately.

4. Change of filter cleaning time (b4)

The period for filter sign indication is set for each indoor unit model when shipping. The filter sign is indicated according to the filter cleaning time (Factory-Setting). However, this filter cleaning time can be changed depending on the condition of the filter as shown in the next table.

	Period for filter sign indication			
	Approx. 100 hrs	Approx. 1,200 hrs	Approx. 2,500 hrs	No indication
In case of 4-way cassette type	○	○	⊙	○
Liquid crystal display on remote control switch	01 b4	02 b4	03 b4 or 00 b4 ❖	04 b4

⊙: Factory-setting
○: Changed setting period
❖: In the case of RPK model, the factory setting is 200 hrs.

5. Fixing the operation mode (b5)

This function is utilized when changes in operation modes are not required. When this function is valid, the operation mode that has been set cannot be changed.

6. Fixing the setting temperature (b6)

This function is utilized when changes in setting temperature are not required. When this function is valid, the setting temperature that has been set cannot be changed.

7. Fixing the operation as exclusive cooling unit (b7)

This function is utilized when exclusive cooling operation is required. This function invalidates the heating operation and the automatic COOL/HEAT operation, as the operation of exclusive cooling unit.

8. Automatic COOL/HEAT operation (b8)

This function is utilized to operate the unit with changing cooling and heating operation automatically.
This function is invalid when the outdoor unit is cooling only model or the function of "Fixing Operation as Exclusive Cooling Unit" is valid.

– AS for FXG/FX3 series, cooling and heating operation mode can be changed individually for each indoor unit in same refrigerant cycle

9. Fixing the fan speed (b9)

This function is utilized to fix the fan speed. When this function is valid, the fan speed is not changes by the remote control switch.

10. Not prepared (C1)

11. Not prepared (C2)

12. Not prepared (C3)

13. Drain pump in heating (when the humidifier is installed) (C4)

This function is utilized to operate the drain pump in heating operation. However, in case of SET-FREE the indoor units do not have humidifier.

Do not change the setting condition "00" of the item "C4".

14. High speed (C5)

This function is utilized to increase the fan speed due to the high ceiling. (Only available for RCD Units)

15. High speed at heating Thermo-off (C6)

This function is utilized to increase the fan speed when thermo-OFF in heating operation with the function (14). (The fan speed is not increased when thermo-OFF in heating operation at the function (14) setting). (Only available for RCD Units)

16. Canceling the enforced 3 minutes minimum operation time of compressor (C7)

In case of SET-FREE, "Enforced 3 Minutes Minimum Operation Time of Compressor" described in the item (3) is the standard function.

This function is utilized to cancel the "Enforced 3 Minutes Minimum Operation Time of Compressor" function.

17. Thermistor of remote control switch (C8)

This function is utilized to control the unit by the built-in thermistor of the remote control switch (remote control thermistor) instead of the thermistor for suction air.

Set this function at "01" or "02" when utilizing this function.

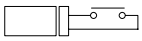
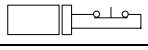
However, even when this function is set at "01" or "02", the detecting temperature is abnormal due to the failure of the remote control thermistor. etc., the thermistor to be used is changed to the thermistor for such air of the indoor unit automatically.

18. Not prepared

19. Not prepared

20. Selection of forced stoppage logic (Cb)

This function is utilized to select the logic of the contact for forced stoppage signal input. The setting condition and the logic of the contact are as shown below.

Setting condition	Logic of contact	Sequence	Activation	
			Contact "Open"	Contact "Close"
00	A Contact		Normal	Forced stoppage
01	B Contact		Forced stoppage	Normal

21. Not prepared

22. Power supply ON/OFF 1 (d1)

This function is utilized to start and stop the unit according to the power supply ON/OFF. When this function is utilized in the condition that there is no person to operate the unit, make the system with monitoring for disaster prevention.

NOTE:
The unit is started and stopped according to the power supply ON/OFF due to the power failure. When the power failure is occurred during stoppage by the remote control switch operation, the unit is started again automatically after the power supply is recovered.

23. Not prepared

24. Power supply ON/OFF 2 (d3)

This function is utilized to start the unit operation again automatically when the power supply is recovered after the power failure over 2 seconds.

The standard unit is started operation again automatically with all the same operating conditions such as operation mode, etc. in case of the power failure within 2 seconds.

(The compressor unit is started operation again after three minutes guard in addition to 2 seconds power failure as a maximum.)

NOTE:
In case of power failure during the unit stoppage, the unit is stopped after recovering the power supply.

25. Ventilation mode (KPI) (E1)

This function is utilized to set the ventilation mode of the total heat exchanger.

The setting condition and the ventilation mode are as shown below.

Setting condition	Ventilation mode	Contents
00	Automatic ventilation	Selecting effective ventilation mode (total heat exchanging ventilation or bypass ventilation) for energy saving by detecting the temperature difference between the outdoor temperature and the room temperature.
01	Total heat exchanging ventilation	The heat exchanging is performed continuously when the total heat exchanger is operated.
02	Bypass ventilation	The heat exchanging is not performed continuously when the total heat exchanger is operated.

(All fresh operation) (E1)

This function is utilized to open the outdoor air damper.

The setting condition is shown below.

Setting condition	All fresh operation	Contents
00	Not available	The outdoor damper is fully closed
01	Available	The outdoor damper is fully open
02	Available	The outdoor damper is fully open

26. Increasing supply air volume (KPI) (E2)

This function is utilized to increase the supply air volume with the one-step high tap of the fan motor for supply air during operation of the total heat exchanger, make the room pressure higher than the surrounded room with the increased supply air volume and prevent polluted air and smell from entering into the room.

The setting air flow model by remote control switch and the actual air flow of the total heat exchanger when setting this function are as shown below.

Setting air flow mode by remote control switch	Air flow of total heat exchanger
LOW	MED
MED	HIGH
HIGH	HIGH

(Enthalpy sensor) (E2)

This function is utilized to set the enthalpy sensor input.

The setting condition is showing below.

Setting condition	Enthalpy sensor	Contents
00	Not available	The enthalpy sensor is not available
01	Available	The enthalpy sensor is available

NOTE:
In case that the setting airflow mode by the remote control switch is "HIGH", the airflow of the total heat exchanger is "HIGH" even when this function is set.

27. With humidifier (only indication) (KPI) (E3)

This function is utilized to control the total heat exchanger with the humidifier. However, in case of the total heat exchanger of SET-FREE, the humidifier is not attached. Do not set this function. When this function is not set, the control of the humidifier is not performed.

28. Precooling/preheating period (KPI) (E4)

This function is utilized to delay the start-up of the total heat exchanger operation.

The setting condition and the delay period of operation start-up are as shown below.

Setting condition	Delaying period of operation start-up
00	0 minutes
01	30 minutes
02	60 minutes

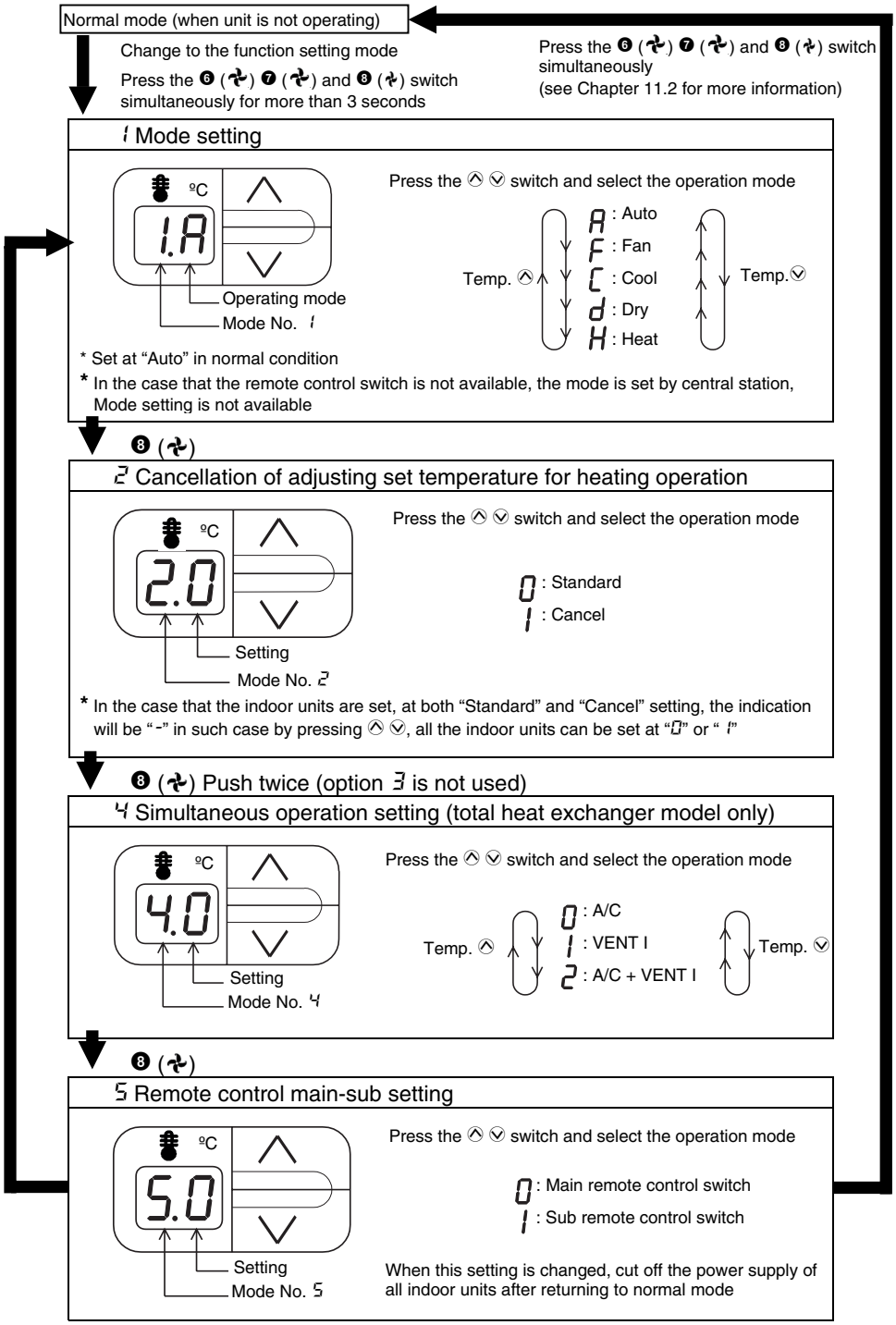
(Gas sensor) (E4)

This function is utilized to set the gas sensor input.

The setting condition is shown below.

Setting condition	Gas sensor	Contents
00	Not available	The gas sensor input is not available
01	Available	The gas sensor input is available
02	Available	The gas sensor input is available

6.5. OPTIONAL FUNCTIONS AVAILABLE THROUGH REMOTE CONTROL SWITCH (PC-P5H)



6.6. OPTIONAL FUNCTIONS AVAILABLE THROUGH WIRELESS REMOTE CONTROL SWITCH (PC-LH3A + RECEIVER)

6.6.1. OPTIONAL FUNCTIONS

The following optional functions can be set by the DIP switches of the receiver part.

- **PC-RLH4**

Optional Function		DIP Switch							
		1	2	3	4	5	6	7	8
Filter option	Standard	×	×	×	-	-	-	-	-
	100 hours	○	×	×	-	-	-	-	-
	1200 hours	×	○	×	-	-	-	-	-
	2500 hours	○	○	×	-	-	-	-	-
	No indication	○	○	○	-	-	-	-	-
Muffing buzzer sound		-	-	-	○	-	-	-	-
Removal of heating temperature calibration		-	-	-	-	○	-	-	-
Circulator function at heating Thermo-OFF		-	-	-	-	-	○	-	-
Setting of sub receiver part		-	-	-	-	-		○	-

○ : ON × : OFF - :ON or OFF both available

- **PC-RLH9/11**

Optional function	DIP switch			
	1	2	3	4
Setting of sub receiver part	○	-	-	-

CAUTION:
Turn OFF all the power sources before setting the DIP switches.

6.6.2. OPTIONAL FUNCTION DESCRIPTION

- **Change of filter cleaning time**

  The filter sign (LED; Yellow) of the receiver part is set to turn ON after the total operation period is over 1,200 hours approximately (Factory-Setting). (In case of the RPK model, the factory setting is 200 hrs.) However, this filter cleaning time can be changed depending on the condition of the filter.

- **Removal of heating temperature calibration**

  Refer to 6.4.2 (1) for the details.

- **Circulator function at heating Thermo-OFF**

  Refer to 6.4.2 (2) for the details.

- **Setting the optional functions PC-RLH9/11**

  The following optional functions can be set by the DIP switches of the receiver part.

  1 Setting the main and sub receiver part

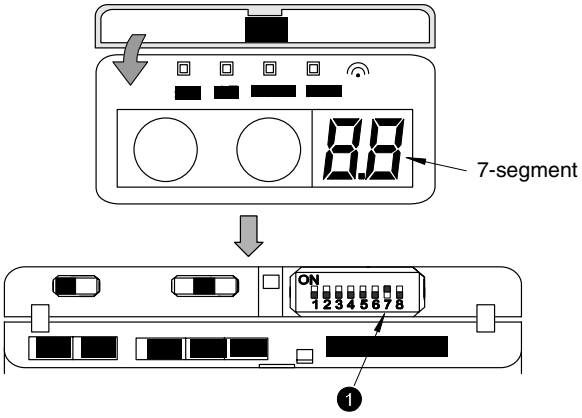
  2 Identifying the indoor units installed side by side

- **Setting of sub-receiver part**

For this optional function set pin marked with ❶ to ON.

PC-RLH4

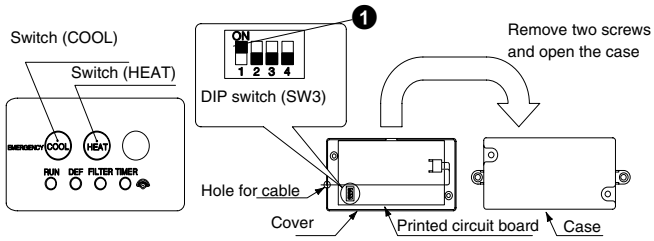
a. Open the cover of the receiver part as indicated below.



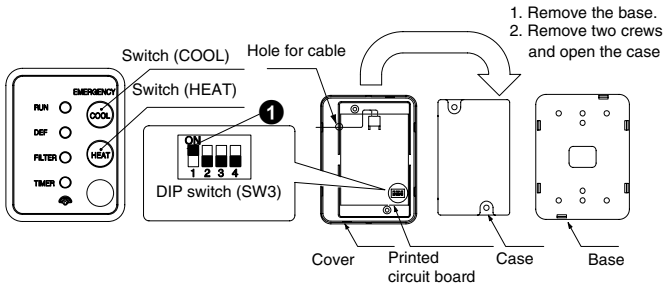
PC-RLH9/11

Open the lid of case by removing two screws so that the following functions are available.

- **PC-RLH9**



- **PC-RLH11**



7 TEST RUN

CONTENTS

When you have finished the installation, perform the test run according to the following procedure. After performing the test run, hand over the system to the customer. Perform the test run of the indoor units one by one in order. Make sure that the electrical wiring and the refrigerant piping are correctly connected.

Start the indoor units one by one in order to make sure that the indoor units are correctly numbered.

You should perform the test run according to the "7.2 Test Run Procedure" on the next page.

WARNING:

- *Do not operate the system until all the check points have been cleared.*
  a. *Measure the resistance between the ground and the terminal of the electrical components. Make sure that the electrical resistance is more than 1 MΩ. Otherwise, do not operate the system until you find the electrical leakage and you repair the electrical leakage. Do not impress the voltage on the terminals for transmission 1 and 2.*
  b. *Make sure that the stop valves of the outdoor unit are fully open. Then, start the system.*
  c. *Make sure that the switch on the main power source has been ON for more than twelve hours in order to warm the compressor oil by means of the oil heater.*
- *Pay attention to the following items while the system is running.*
  a. *Do not touch any of the parts at the discharge gas side with your hands because the compressor chamber and the pipes at the discharge gas side are hot at a temperature that is higher than 90°C.*
  b. *DO NOT PUSH THE BUTTON OF THE MAGNETIC SWITCH(ES). If you do, you will cause a serious accident.*
- *Do not touch any electrical components for more than three minutes after turning OFF the main switch.*

7.1. CHECKING PROCEDURE BEFORE THE TEST RUN

1. Make sure that the stop valve of the gas line and the stop valve of the liquid line are fully open.
2. Make sure that there is no refrigerant leakage. The flare nuts sometimes loosen because of the vibration during the transportation.
3. Make sure that the refrigerant piping and the electrical wiring belong to the same system. Make sure that the setting of unit number of the DSW1 for the indoor units corresponds to the system.
4. Make sure that the setting of the DIP switches on the printed circuit board of the indoor units and the outdoor units are correct. Especially, pay attention to the setting of the lift between the indoor units and the outdoor units. Refer to chapter 3 "Electrical Wiring" for details.
5. Make sure that the switch on the main power source has been ON for more than twelve hours in order to warm the compressor oil by means of the oil heater.
6. Check whether or not the electrical wiring of the indoor units and the outdoor units are connected as shown in chapter 3 "Electrical Wiring".
7. Make sure that each wire terminal (L1, L2, L3 and N) is correctly connected at the power source.

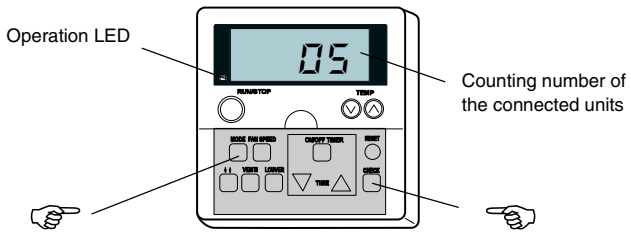
NOTE:

1. *Make sure that the field-supplied electrical components (main switch fuse, fuse-free breaker, earth leakage breaker, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data in the technical catalog of the unit. Also, make sure that the field-supplied electrical components comply with the national codes and the local codes.*
2. *Use the shielded cables for the field wiring in order to avoid the electrical noise. (The length of the shielded cable should be less than 1000m. The size of shielded cable should comply with the local codes.)*
3. *Make sure that the terminals for the power supply wiring ("L1" to "L1" and "N" to "N" of each terminal board for AC380-415V. "R" to "R" and "T" to "T" of each terminal board for AC220V) and the terminals for the intermediate wires between the indoor unit and the outdoor unit (Operating Line: terminals of each terminal board for DC12V) coincide correctly. Otherwise, you may damage some components*
4. *If the KPI is connected to the same remote control switch as an indoor unit, the indoor unit will not perform the test run. You need to disconnect the KPI from the installation.*

7.2. TEST RUN PROCEDURE BY MEANS OF THE REMOTE CONTROL SWITCH

É Turn ON the power source of the indoor units and the outdoor units.

❷ Set the TEST RUN mode by means of the remote control switch.
Press the MODE switch and the CHECK switch simultaneously for more than three seconds.
a) If the TEST RUN indication and the counting number of the connected units to the remote control switch (for example "01") are displayed on the remote control switch, the connection of remote control cable is correct. Go to ❹.
b) If no indication or " / 0" appears or if the number of the units that is displayed is smaller than the actual number of the units, there is some abnormal operation. Go to Ë.



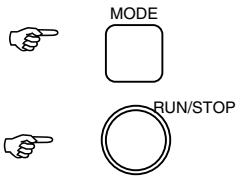
❸

Remote control switch indication	Fault	Inspection points after the power source is OFF
No indication.	▪ The power source is not turned ON. ▪ The connection of the remote control cable is incorrect. ▪ The connect wires of the power supply line are incorrect or loosened.	1. The connection between the connector and the wires: Red wire-No.1, Black wire-No.2, White wire-No.3. 2. Connecting points of the remote control cable. 3. The contact of the connectors of the remote control cable. 4. The connection order of each terminal board. 5. The screw fastening of each terminal board.
The counting number of the connected units is incorrect.	▪ The setting of the unit number is incorrect. ▪ The connection of the control cables between each indoor unit is incorrect. (When multiple units are controlled by one remote control switch).	6. Setting of the DIP switches on the printed circuit board. 7. Wire connection order of the bridge cable. 8. Connecting points of the bridge cable. 9. The contact of the connectors of the bridge cable.

Back to ❶ after the checking.

❹ Select the TEST RUN mode by pressing the MODE switch (COOL OR HEAT).

❺ Press the RUN/STOP switch.
a) The TEST RUN operation will start. (The TEST RUN operation will be finish after two hours. You can also finish the TEST RUN operation by pressing the RUN/STOP switch again).
b) If the unit does not start or if the operation LED on the remote control switch is flickering, there is some abnormal operation. Go to ❻.



❻

Remote control switch indication	Unit condition	Fault	Inspection points after the power source is OFF
The operation LED flickers. (1 time/ 1 sec.) And the unit number and the alarm code "03" flicker.	The unit does not start.	The connect wires of the operating line are incorrect or loosened.	1. The connection order of each terminal board. The fuse on the PCB may have blown out due to an incorrect wiring. (The fuse can be recovered only once by the DSW on the PCB). (Go to ❼). 2. The screw fastening of each terminal board. 3. The connection order of the power supply wire between the indoor units and the outdoor units.
The operation LED flickers. (1 time/2 sec.)	The unit does not start.	The connection of the remote control cable is incorrect.	This is the same as the item ❸ 1, 2, and 3.
The flickering indicator is different from the one above.	The unit does not start. The unit starts once and then the unit stops.	The connection of the thermistor or other connectors is incorrect. There is tripping of the protector.	Check the alarm code table in the service manual. (Service personnel should do the checking).
Normal.	The outdoor fans rotate in the reverse order.	The connection order of the power supply line is incorrect.	The connection order of the terminal board: TB1 in the outdoor unit.
	The outdoor fans do not start.	Some wires of the power supply line are disconnected.	The connecting point of the power supply line. The contact of the motor connector of the outdoor fan.

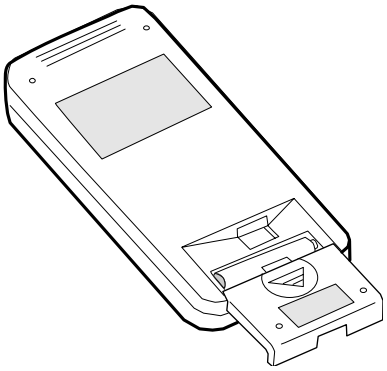
Back to ❶ after the checking.

❼ Instructions for the recovery when the fuse of the transmission circuit is blown out:
1. Correct the wiring of the terminal board.
2. Set the pin of DSW7 on the indoor unit PCB to ON.
3. Set the 2nd pin of DSW10 on the outdoor unit PCB to ON.

Except RPK	Only RPK	Outdoor unit
		

7.3. TEST RUN PROCEDURE BY MEANS OF THE WIRELESS REMOTE CONTROL (PC-LH3A)

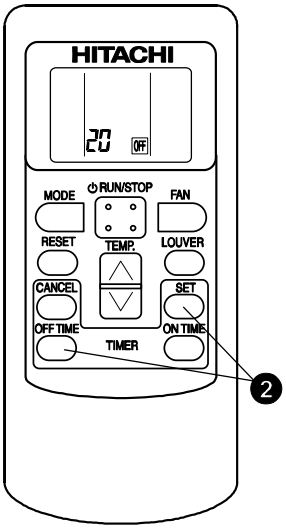
ATTENTION:
If the wired remote control switch is used or if multiple units (SET-FREE, DC INVERTER and UTOPIA Series) are operating simultaneously, you cannot perform the test run by means of the remote control switch. If that is the case, perform the test run by means of the wired remote control switch.



1) Perform the test run after completing the installation.
   a) Set the batteries for the remote control switch.
   b) Turn ON the power source of the indoor units and the outdoor units.
   c) The yellow '((' LED on the receiver of the indoor unit flickers (0.25 seconds ON ⇔ 0.25 seconds OFF). Then, the yellow LED turns OFF. While the LED is flickering, the unit will not operate because the unit is initializing.

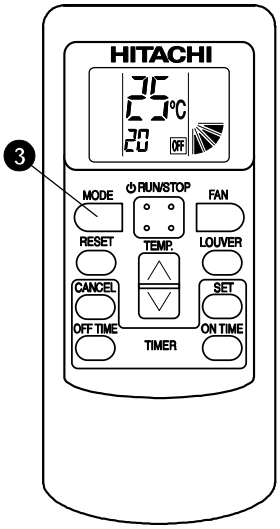
2) Set the TEST RUN mode by pressing the SET switch and the OFF TIME switch simultaneously for more than three seconds. The LCD should look like the LCD on the right figure.

   The TEST RUN mode is not operating.



3) Set the operation mode by pressing the MODE switch.

   The TEST RUN mode is operating.



4) Operate the test run by pointing the transmitter towards the receiver of the indoor unit. Then, press the RUN/STOP switch. When the indoor unit receives the commands, the yellow '((' LED of the receiver will turn on briefly.
   Make sure that the commands are received well and the selected mode 3) is set correctly.
   In the TEST RUN mode, the red RUN LED of the receiver is turned ON and the green TIMER LED flickers (0.5 seconds ON ⇔ 0.5 seconds OFF) (*2).
   Then, the timer switches off for two hours.

NOTE:
1. *If the yellow '((' LED does not turn ON, the commands from the remote control switch may not have reached the receiver. Send the commands again.*
2. *(*2) In the case of the RPK model, the TIMER LED is turned OFF.*

5) Adjust the angle of the air grille as follows.
   The air louver has a mechanism for the auto-swing function.
   Do not move the louver by hand forcefully.
   a) Select the FAN mode by pressing the MODE switch.
   b) Set the louver angle by pressing the LOUVER switch.

6) Stop the test run (normal)
   a) The test run stops automatically after two hours.
   b) You stop the test run by pressing the RUN/STOP switch again.
   After the test run has finished, check that the red RUN LED and the green TIMER LED turn OFF.

7) Stop the test run (abnormal) for the PC-RLH 9/11.

If you cannot use the PC-LH3A because of battery shortage or any other reason, perform the emergency operation as follows.

(1) COOL switch: Press the COOL switch in order to start the cooling process.

Press the COOL switch again in order to stop the cooling process.

(2) HEAT switch: Press the HEAT switch in order to start the heating process.

Press the HEAT switch again in order to stop the heating process.

NOTE:
During the emergency operation, the yellow LED blinks (0.5 seconds ON / 0.5 seconds OFF).

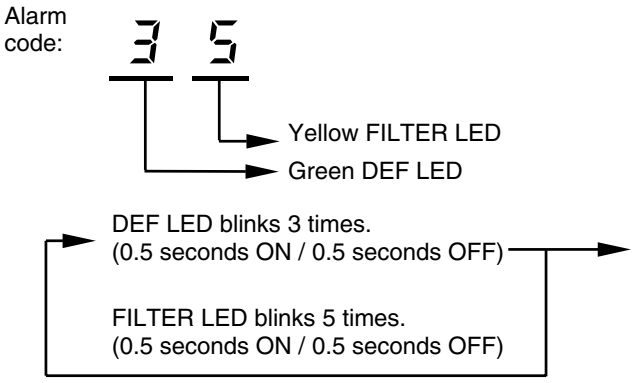
(3) Alarm code display

- If some malfunction occurs because of the activation of a safety device or any other reason, the red RUN LED blinks (0.5 seconds ON / 0.5 seconds OFF).
- Refer to the installation manual of the outdoor unit for the alarm code table.
- The alarm code displays the number of blinks of the green DEF LED and the yellow FILTER LED as shown bellow:

  Green DEF LED: Digit 2 of the alarm code blinks.

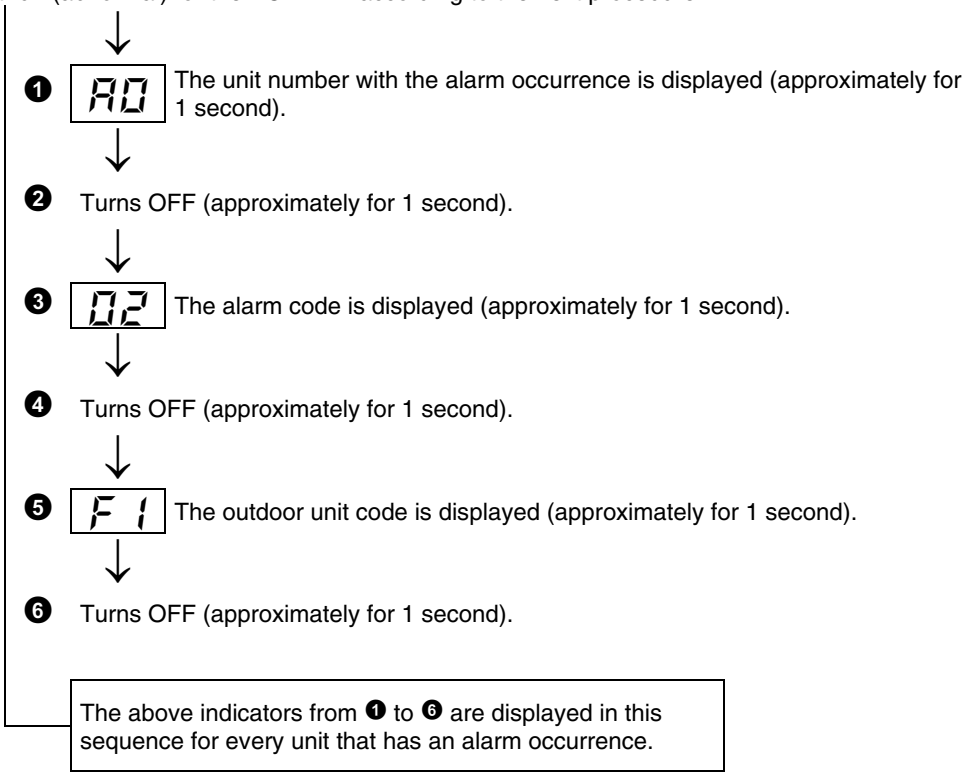
  Yellow FILTER LED: Digit 1 of the alarm code blinks. (Alphabet Code: A=10 blinks, B=11 blinks, C=12 blinks, etc.).

Example:



- The red RUN LED (1 second ON / 1 second OFF) means that there is an abnormal transmission between the indoor units and the outdoor units.

8) Stop the test run (abnormal) for the PC-RLH4 according to the next procedure.



■ Test run and maintenance record

MODEL: **SERIAL NO.** **COMPRESSOR MFG. No.**

CUSTOMER'S NAME AND ADDRESS: **DATE:**

1. Is the rotating direction of the indoor coil fan correct?
2. Is the rotating direction of the outdoor coil fan correct?
3. Is there any abnormal compressor sound?
4. Has the unit been operating for at least twenty (20) minutes?
5. Check the room temperature:
   - Inlet: No.1 DB /WB °C, No.2 DB /WB °C, No.3 DB /WB °C, No.4 DB /WB °C
   - Outlet: DB /WB °C, DB /WB °C, DB /WB °C, DB /WB °C
   - Inlet: No.5 DB /WB °C, No.6 DB /WB °C, No.7 DB /WB °C, No.8 DB /WB °C
   - Outlet: DB /WB °C, DB /WB °C, DB /WB °C, DB /WB °C
6. Check the outdoor temperature:
   - Inlet: DB °C, WB °C
   - Outlet: DB °C, WB °C
7. Check the refrigerant temperature: Operation mode (cool or heat)
   - Discharge gas temperature: Td= °C
   - Liquid pipe temperature: Te= °C
8. Check the pressure:
   - Discharge pressure: Pd= kg/cm^2G
   - Suction pressure: Ps= kg/cm^2G
9. Check the voltage:
   - Rated voltage V
   - Operating voltage: L1-L2 V, L1-L3 V, L2-L3 V
   - Starting voltage: V
   - Phase imbalance: $1-\frac{V}{Vm}=$
10. Check the compressor input running current
    - Input: kW
    - Running current: A
11. Is the refrigerant charge adequate?
12. Do the operation control devices operate correctly?
13. Do the safety devices operate correctly?
14. Has the unit been checked for refrigerant leakage?
15. Is the unit clean inside and outside?
16. Are all the cabinet panels fixed?
17. Are all the cabinet panels free from rattles?
18. Is the filter clean?
19. Is the heat exchanger clean?
20. Are the stop valves open?
21. Does the drain water flow smoothly from the drain pipe?

NOTE:
Refer to chapter 8.2.1 for the alarm code table.

7.4. TEST RUN PROCEDURE FROM THE OUTDOOR UNIT SIDE

The test run procedure from the outdoor unit side is shown below. You can set this DIP switch while the power source is ON.

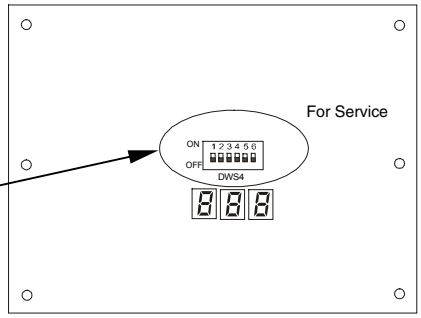
⚠ *WARNING:*

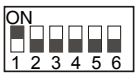
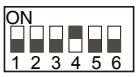
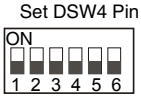
- *Do not touch any other electrical components while you are setting the switches on the PCB.*
- *Do not attach or detach the service access panel when the power source for the outdoor unit is ON and the outdoor unit is operating.*
- *Set all the DIP switches of DSW4 to OFF after completing the test run.*

Setting of the DIP switch (before the shipment)

DSW4
Switch for setting the service operation and function 1. Test run 2. COOL/HEAT setting (ON: heating process) 3. OFF (fixed) 4. Manual compressor OFF 5. ON: if the number of indoor units is more than 16 6. Setting of the indoor unit is also necessary 7. OFF (fixed at test run)

Printed circuit board of the outdoor unit (PWB1)



	Setting of the DIP switches	Operation	Remarks
Test run	❶ Setting of the operation mode Cooling: Set DSW4 Pin No. 2 at OFF.  Heating: Set DSW4 Pin No. 2 at ON.  ❷ Starting the test run Set DSW4 Pin No. 1 at ON. The operation starts after a few 20 seconds. In case of the heating process, leave DSW4 Pin No. 2 at ON. ↓ 	❶ The indoor unit automatically starts to operate when the test run of the outdoor unit is set. ❷ You can perform the ON/OFF operation from the remote control switch or the DSW4-1 of the outdoor unit. ❸ Continuous operation during two hours is performed without the Thermo-OFF condition.	▪ Make sure that the indoor units start to operate in accord with the test run of the outdoor unit. ▪ If you start the test run from the outdoor unit and you stop the test run from the remote control switch, the test run function of the remote control switch is cancelled. However, the test run function of the outdoor unit is not cancelled. ▪ If the more than one indoor unit is connected with one remote control switch, all the units start the test run at the same time. Therefore, turn OFF the power source so that the indoor units do not perform the test run. If this is the case, the SET RUN indication of the remote control switch may flicker. This is not abnormal. ▪ The setting of DSW4 is not required for the test run from the remote control switch.
Manual compressor OFF	❶ Setting of the - manual compressor OFF: Set DSW4 Pin No. 4 at ON.  - Compressor ON: Set DSW4 Pin No. 4 at OFF. 	❶ When DSW4 Pin No. 4 is at ON during the compressor operation, the compressor stops operating immediately and the indoor unit is under the Thermo-OFF condition. ❷ When DSW4 Pin No. 4 is at OFF, the compressor starts to operate after the cancellation of the 3-minute guard.	▪ Do not turn ON and OFF the compressor frequently.
Manual defrost	❶ Manual defrost operation starts Press the PSW1 for more than three seconds during the heating process. The defrost operation starts after two minutes. This function is available once the heating process has been running for five minutes. ❷ Manual defrost operation finishes The defrost operation automatically finishes and the heating process starts.	❶ The defrost operation is available regardless of the frosting conditions and the total time of the heating process. ❷ The defrost operation is not performed when the temperature of the outdoor heat exchanger is higher than 10°C, the high pressure is higher than 3.3 Mpa (20kgf/cm^{2}G) or under the Thermo-OFF condition.	▪ Do not repeat the defrost operation frequently. ▪ When the PSW1 accepts the manual defrost operation, the remaining time before starting the defrost operation is displayed at the 7-segment display on the PCB. b 1 / Remaining time (every 4 seconds)

7.5. CHECK LIST

■ CHECK LIST ON TEST RUN

Client:			**Installer:**			**Date:**		
Outdoor unit model:			**Outdoor unit serial No.:**			**Checker:**		
Indoor unit model								
Indoor unit serial No.								

Piping length (m)	
Additional refrigerant charge (kg)	

1. General

No.	Check item	Result
1	Was the DIP switch DSW6 for the piping length in the outdoor unit set?	
2	Was the DIP switch DSW3 for the piping lift in the outdoor unit set?	
3	Are the power supply wires of the transmission cable making contacts on the piping?	
4	Was a ground wire connected?	
5	Is there any short circuit?	
6	Is there any voltage malfunction among the different phases (L1-L2, L2-L3, L3-L1, L1-N)?	

2. Refrigerant cycle

a. Cooling/heating process

No.	Check item	Result
1	Operate all the indoor units. (TEST RUN mode).	
2	Operate all the indoor units at the「HIGH」speed.	
3	If you turn ON and OFF the constant speed compressor repeatedly, stop one indoor unit (an indoor unit with a small capacity).	

b. Sampling data (cooling/heating process: if the indoor temperature is between 21°C and 30°C)

No.	Check Item	Result
1	After operating for more than 20 minutes.	
2	Check Pd. and Td. Is TdSH 15 to 45 degrees?	
3	Is Ps 0.2 to 1.1?	
4	Is Pd 1.0 to 3.5? (If the outdoor temperature is high, the Pd. becomes high.)	

3. Check Item after the sampling data

a. Cooling process (If the outdoor temperature is higher than 15°C)

No.	Check item	Standard	Causes	Result
1	Is H1 (compressor frequency) + (CC (number of running compressors)-1) X (❖) abnormally low or high? (It is applicable when the inlet air temperature is three degrees higher than the setting temperature).	Running horsepower of the indoor units X 15Hz.	Low: excessive refrigerant; High: insufficient refrigerant; DSW for capacity of indoor units: Incorrect setting.	
2	Is the fan actually running when Fo (airflow rate of fan) is other than "0"?	–	Failure of the fan motor; Failure of the PCB; Failure of the condenser.	
3	Is the Td1 higher than the Td2 when only the compressor No.1 is running (when CC (number of running compressors) is「1」)?	–	Incorrect connection or incorrect mounting of the Td thermistor.	
4	Is the total of iE (indoor expansion valves opening) abnormally low or high?	Total % of iE: horsepower of the outdoor unit X (5~30).	Low: excessive refrigerant; High: insufficient refrigerant, excessive pipe resistance.	
5	Is TL (liquid pipe temperature of the heat exchanger of the indoor unit) lower than Ti (air inlet temperature of the indoor unit)?	It is normal when TL-Ti < -5.	Failure of the TL thermistor; Fully closed expansion valve; Short circuit.	
6	Is TG (gas pipe temperature of the heat exchanger of the indoor unit) lower than Ti (air inlet temperature of the indoor unit.)? (it is applicable when the inlet air temperature is three degrees higher than the setting temperature.)	It is normal when TG-Ti < -5.	Failure of the TG thermistor; Fully closed expansion valve or slightly open expansion valve; Short circuit.	
7	Is there any excessive difference among indoor units at SHTG-TL of the heat exchanger of the indoor units? (It is applicable when the inlet air temperature is three degrees higher than the setting temperature.)	It is normal if the difference among units is within seven degrees.	Failure of the TL/TG thermistor; Fully open expansion valve, slightly open expansion valve or fully closed expansion valve.	
8	Is there any excessive different among indoor units at SHTG-TL of the heat exchanger of the indoor units and is iE lower than「7」?	It is normal if SH is within three degrees lower than other units.	Expansion valve locked in fully open position; The refrigerant cycle number does not match.	
9	Is there any indoor unit with SH excessively lower than the value of other units, under the condition of IE (indoor unit expansion valve)「100」?	It is normal if SH is within three degrees higher than other units.	Expansion valve locked in slightly open position or closed expansion valve; The refrigerant cycle number does not match.	
10	Is the difference between the discharge air temperature and the inlet air temperature more than seven degrees?	–	–	

NOTES:

1. *The symbol with an underline indicates a check item. The mark「 」indicates the checking data.*
2. *Regarding the mark (❖), you should apply the following values.*

Mark ❖		
8HP	**10, 16, 20, 24HP**	**30HP**
65	78	87

b. Heating process (if the outdoor temperature is higher than 0°C)

No.	Check item	Standard	Causes	Result
1	Is oE1,oE2 (outdoor unit expansion valves opening) abnormally low or high when TdSH is 15 to 45 degrees? (The higher the operating frequency, the higher the oE1).	oE1 = 30~80% oE2 = 0 or 30~80%	Low: excessive refrigerant; High: insufficient refrigerant.	
2	Is Pd 1.6 to ⌈⌈3.5⌋⌋? (Pd is high when the indoor temperature is high).	–	Low: leakage of the SVA (solenoid valve); High: excessive gas pipe resistance.	
3	Is H1 (compressor frequency) + (CC (number of running compressors)-1) (❖) abnormally low or high? (The lower the room temperature and the outdoor temperature, the higher the above value).	–	Low: excessive refrigerant; High: insufficient refrigerant, excessive pipe resistance.	
4	Is Ps ⌈0.2⌋ to ⌈1.1⌋? (Only under the condition that the electrical expansion valve (SVA) is OFF).	–	Low: short circuit of the indoor unit; Low/High: failure of the following components: outdoor fan, motor, fan module, DC remote control or outdoor air sensor.	
5	Is the temperature difference among the indoor units* more than 15 degrees when iE (indoor unit expansion valve) is 100? *The temperature difference among the indoor units means the following: b3 (Discharge Gas Temperature) - b2 (air inlet temperature) that is displayed on the remote control switch by means of the check mode. However, this is applicable only when b2 (Air Inlet Temperature) - b1 (setting temperature) is higher than three degrees.	–	Failure of components such as the PCB, the wiring, the coil, the valve; Excessive pipe resistance; Failure of the thermistor for the discharge air temperature.	

NOTES:

1. *The symbol with an underline indicates a check item. The mark⌈ ⌋ indicates the checking data.*
2. *Regarding the mark (❖), you should apply the following values.*

Power supply	Mark ❖		
	8HP	10, 16, 20, 24HP	30HP
380-415V 50Hz	65	78	87

7.6. CHECKING THE REFRIGERANT QUANTITY

You can check the excess or the deficiency of the refrigerant by means of the data that is provided by the check mode of the 7-segment display. The following checking procedure is useful during the test run and the maintenance.

■ Before the checking procedure:

1. Operate all the indoor units at the TEST RUN mode and operate all the indoor units at the HIGH speed.
2. Check the following items in order to make sure that the refrigerant cycle is stable.
   1) The continuous operation lasts more than 20 minutes.
   2) Td · SH is 15 to 45 degrees.
   3) Ps is 2.0 to 1.1 Mpa.
   4) Pd is 1.0 to 3.5 Mpa.

   [Td · SH: Discharge gas temperature superheat]

   [Ps: Suction pressure] [Pd: Discharge pressure]
3. Collect the checking data that is provided by the check mode of the 7-segment display.
4. Perform the checking according to the following procedure.

   Applicable air temperatures for the checking procedure:

[Cooling]	Room temperature: 20°C~30°C (DB)
	Outdoor temperature: 15°C~40°C (DB)
[Heating]	Room temperature: 20°C~30°C (DB)
	Outdoor temperature: 0°C~15°C (DB)

■ Checking procedures:

Cooling process

1. Calculate iE (indoor unit expansion valve opening) with the conversion value (❶) that is shown below.
2. Sum up the converted values of iE.
3. Compare the total of iE with the normal value.

Normal value:	Outdoor unit capacity (HP) X 6 to Outdoor unit capacity (HP) X 27
Tendency:	If the room temperature is high within the above normal value, the value of iE will be large.
Judgement:	Total of iE>normal value ··· This means insufficient refrigerant. Total of iE<normal value ··· This means excessive refrigerant.

Heating process

1. Detect oE1 and oE2 (outdoor unit expansion valve opening).
2. Compare oE1 and oE2 with the normal value.

Normal value:	20 to 75. (Refer to the next page for details).
Tendency:	When oE1 and oE2 are within the above range and 1) If the room temperature is high within the above normal value, the value of oE1 to oE2 will be small. 2) If the outdoor temperature is high, the value of oE1 to oE2 will be large.
Judgement:	oE1, oE2>normal value ··· This means insufficient refrigerant. oE1, oE2<normal value ··· This means excessive refrigerant.

❶ Conversion value at cooling

Indoor unit capacity	Display at check mode	0 ≤ iE < 50%	50% ≤ iE < 100%
0.8 to 2.0	06~16	1.0 x iE	1.0 x iE
2.5 to 4.0	18~32	0.7 x iE	2.0 x iE
5.0	40~48	0.7 x iE	2.7 x iE - 100

Example:

■ Cooling process

Indoor unit		1.0	2.5	2.5	4.0
iE (%) (from the checking data)		20	30	55	40
Converted value of iE		20 (1.0 X 20)	21 (0.7 X 30)	50 (2 X 55-60)	28 (0.7 X 40)
Sum of converted value of iE	(A)	119 (= 20+21+50+28)			
Normal value	(B)	78 to 351 (13 x 6 – 13 x 27)			
Judgement		OK [(A) is within the range (B).]			

■ Heating process

Indoor unit		1.0	2.5	2.5	4.0	RAS-10FSG
Ti (indoor suction temperature)		26	27	23	23	-
Average of Ti		24 (To be added depending on the indoor unit capacity)				
To (outdoor temperature) (°C)						10
oE1 + oE2 (%)	(A)					74 (37+37)
Normal value (*1)	(B)					72
Judgement		OK [(A) is within the range (B) ±15]				

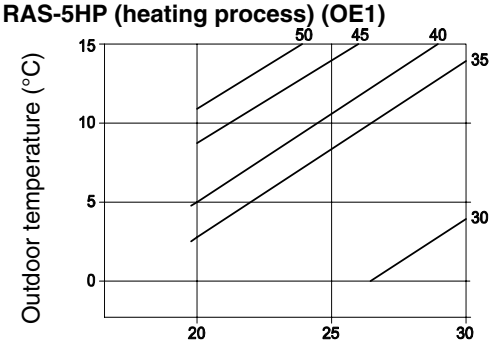
■ Cases where this checking procedure is not applicable:

This checking procedure is not applicable under the conditions that are shown below.
In such cases, remove the causes of the conditions before performing the checking procedure.

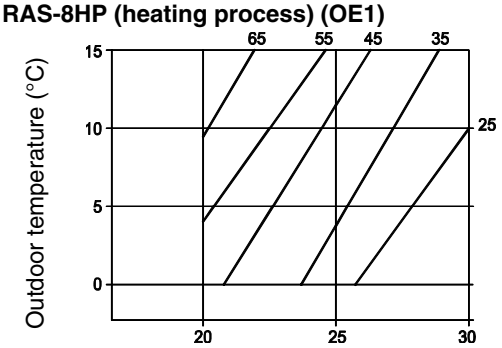
No.	Conditions		Tendency of indoor / outdoor expansion valve opening	
			Cooling	Heating
1	Short-circuited air at the indoor unit		Tends to be excessively open	–
2	Short-circuited air at the outdoor unit		Tends to be excessively open	Tends to be excessively closed
3	Resistance of the connecting pipe is big (due to a smashed pipe or a small liquid pipe)		Tends to be excessively open	Tends to be excessively open
4	Failure of the expansion valve of the indoor unit	Locked (fully open)	Tends to be excessively closed	–
		Locked (fully closed)	Tends to be excessively open	–
5	Failure of the expansion valve of the outdoor unit	Locked (fully open)	–	Tends to be excessively closed
		Locked (fully closed)	Tends to be excessively open	Tends to be excessively open

■ Expansion valve opening

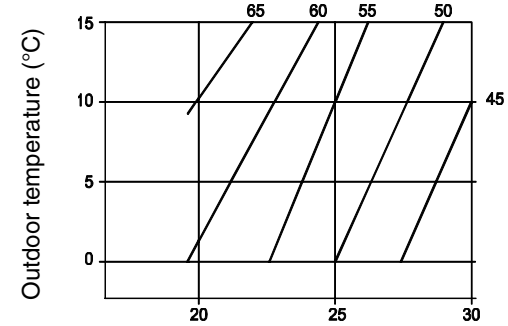
RAS-5HP (heating process) (OE1)



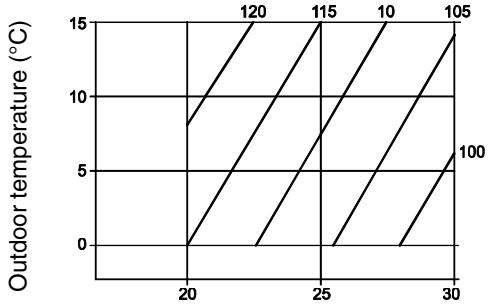
RAS-8HP (heating process) (OE1)



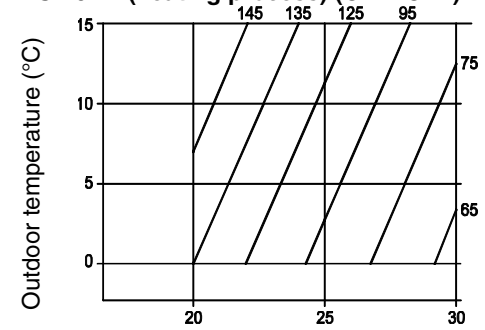
RAS-10HP (heating process) (OE1)



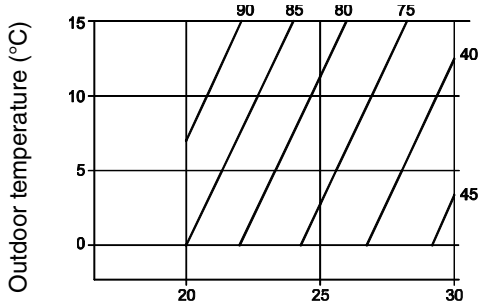
RAS-16HP (heating process) (OE1)



RAS-20HP (heating process) (OE1+OE2)



RAS-24, 30HP (heating process) (OE1+OE2)



OE: Outside expansion valve temperature

NOTE:

1. *Use these curves when you collect the checking data that is provided by the CHECK mode.*
2. *If the data provided by the CHECK mode is within ±15%, the refrigerant charging amount is appropriate.*

8 TROUBLESHOOTING

CONTENTS

8.1. INITIAL TROUBLESHOOTING

8.1.1. CHECKING BY MEANS OF THE 7-SEGMENT DISPLAY

■ **Simple checking procedure by means of the 7-segment display**

1	❖Turn on all the indoor units
2	Turn on the outdoor unit
3	Turn auto-addressing starts

❖ All the indoor units which are connected to the outdoor unit.

During the auto-addressing, you can check the following items by means of the 7-segment display of the outdoor unit.

1. Disconnection of the power supply to the Indoor Unit.
2. Duplication of the Indoor Unit number.

Outdoor unit printed circuit board PCB 1

Normal case	The 7-segment display of the outdoor unit is not indicated.

Abnormal case	If there is something wrong, the 7-segment display of the outdoor unit displays the following indications: a. The indoor units are not supplied with power. ➡ [ ][/][2] continues to flash after 30 seconds. b. Disconnection of the operating line between the outdoor units and the indoor units. ➡ [ ][/][2] continues to flash after 30 seconds. c. Duplicated settings of the indoor unit number on the rotary switch RSW (Refer to the section 8.2.2, "Troubleshooting by means of the Alarm Code" for the description of the alarm code "35").

8.1.2. EMERGENCY OPERATION WHEN THE INVERTER COMPRESSOR IS DAMAGED

■ Failure of the inverter compressor

a. Contents of the operation (applicable to the models: RAS-8FSN, 10FSN, 16FSN, 20FSN, 24FSN, 30FSN)

1. This operation is an emergency operation by means of a constant speed compressor, when the inverter compressor fails.
2. By setting the No.1 pin of DSW5 on PCB1 to ON and the No.1 pin of DSW1 on PCB to ON, the emergency operation starts.
3. The control of the emergency operation is the same with the normal control except that the inverter compressor is stopped.

b. Operation condition

The constant speed compressor is forced to stop for the compressor protection under the condition below:

Total Capacity of Thermo-ON Indoor Units
< 50% of Outdoor Unit Capacity

In case of the above condition, the compressor operates and stops repeatedly. This may cause the compressor failure. Therefore, the compressor is forced to stop in order to protect the compressor.

NOTE:
If the printed circuit board for the inverter (ISPM) is damaged, this is not available.

c. Method of emergency operation

Checking procedure before the emergency operation.

1. Measure the insulation resistance of the inverter compressor.
   Do not perform the emergency operation when the insulation resistance is 0 Ω.
   There is a possibility that the refrigerant oil may be oxidized. If the emergency operation is performed, the other compressor may be damaged.
2. If the total capacity of the Thermo-ON indoor units is more than 50% of the outdoor unit capacity, the emergency operation is available.
3. In this emergency operation, the frequency of the compressor is not controlled at each 1Hz.
   Therefore, the alarm codes "07", "43", "44", "45" or "47" may be displayed on the LCD. Details of alarm codes are shown in the alarm code table (page 8-14).
4. This emergency operation does not provide the sufficient cooling capacity and the sufficient heating capacity.
5. This method is a temporary emergency operation when the inverter compressor is damaged. Therefore, replace the inverter compressor as soon as possible.
6. Set the No.1 pin of DSW7 to OFF and the No.1 pin of DSW1 to OFF after installing the new compressor. If you do not perform this setting, the inverter compressor will be damaged.

d. Emergency operation

1. Turn OFF all the main switches.
2. Disconnect the wiring from the inverter compressor. Insulate the fasten terminals for the inverter compressor wires by means of the insulation tape.
3. Set the No.1 pin of DSW5 and the No.1 pin of DSW1 to ON.
4. Turn ON all the main switches.
5. Operate the system by means of the remote control switches.
6. The system is stopped by turning OFF all the remote control switches or by turning OFF all the main switches.

■ Failure of the constant speed compressor

a. Contents of the operation (applicable to the models: RAS8 FSN, 10FSN, 16FSN, 20FSN, 24FSN, 30FSN)

1. This operation is an emergency operation by means of the inverter compressor, when the constant speed compressor fails.
2. This operation is controlled by a normal control.

b. Operation condition

1. Set the No.2 pin of DSW5 to ON.
2. If you set the DSW5, the temperatures of THM2, THM3 and THM4 on the top of compressors are not ignored.

   If the thermistor is short-circuited or cut, this operation is available.

8.1.3. FAILURE OF THE POWER SUPPLY TO THE INDOOR UNIT AND THE REMOTE CONTROL SWITCH

- The LED and the LCD are not indicated.
- Not operated

  If the fuses are blown out or a breaker is activated, investigate the cause of the overcurrent and take the necessary action.

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Power failure or power is not ON		Measure the voltage by means of the voltmeter	Supply the power
Blown out fuse or activation of the breaker at the power source	Short circuit supplied between the wires	Check for any uncovered part of the wires	Remove the cause of the short circuit and replace the fuse
	Short circuit of the wires to earth	Measure the insulation resistance	Remove the cause of the short circuit and replace the fuse
Blown out fuse at the control circuit	Short circuit supplied between the wires	Check for any uncovered part of the wires	Remove the cause of the short circuit and replace the fuse
	Short circuit of the control circuit to earth	Measure the insulation resistance	Remove the cause of the short circuit and replace the fuse
Failure of the transformer at the indoor unit side		Measure the voltage at the secondary side	Replace the transformer
Disconnected cable of the remote control switch		Connect the cable	Replace the cable or repair the cable
Insufficient contacting at the connectors of the remote control switch	Insufficient connection or incorrect connection of the indoor unit PCB	Check the connectors	Correctly connect the connector
	Insufficient connection or incorrect connection of the indoor unit PCB in the remote control switch		
Failure of the remote control switch		Check the remote control switch by means of the self-check mode *1)	Replace the remote control switch if it failed
Failure of PCB	Unconnected wires to PCB	Check the connectors	Correctly connect the wires
	Failure of PCB	Check PCB by means of the self-check mode *2)	Replace PCB if it failed
Incorrect wiring connection		Take action according to the procedure that is displayed in "TEST RUN"	

*1): Refer to section 8.3.2.
*2): Refer to section 8.3.1.

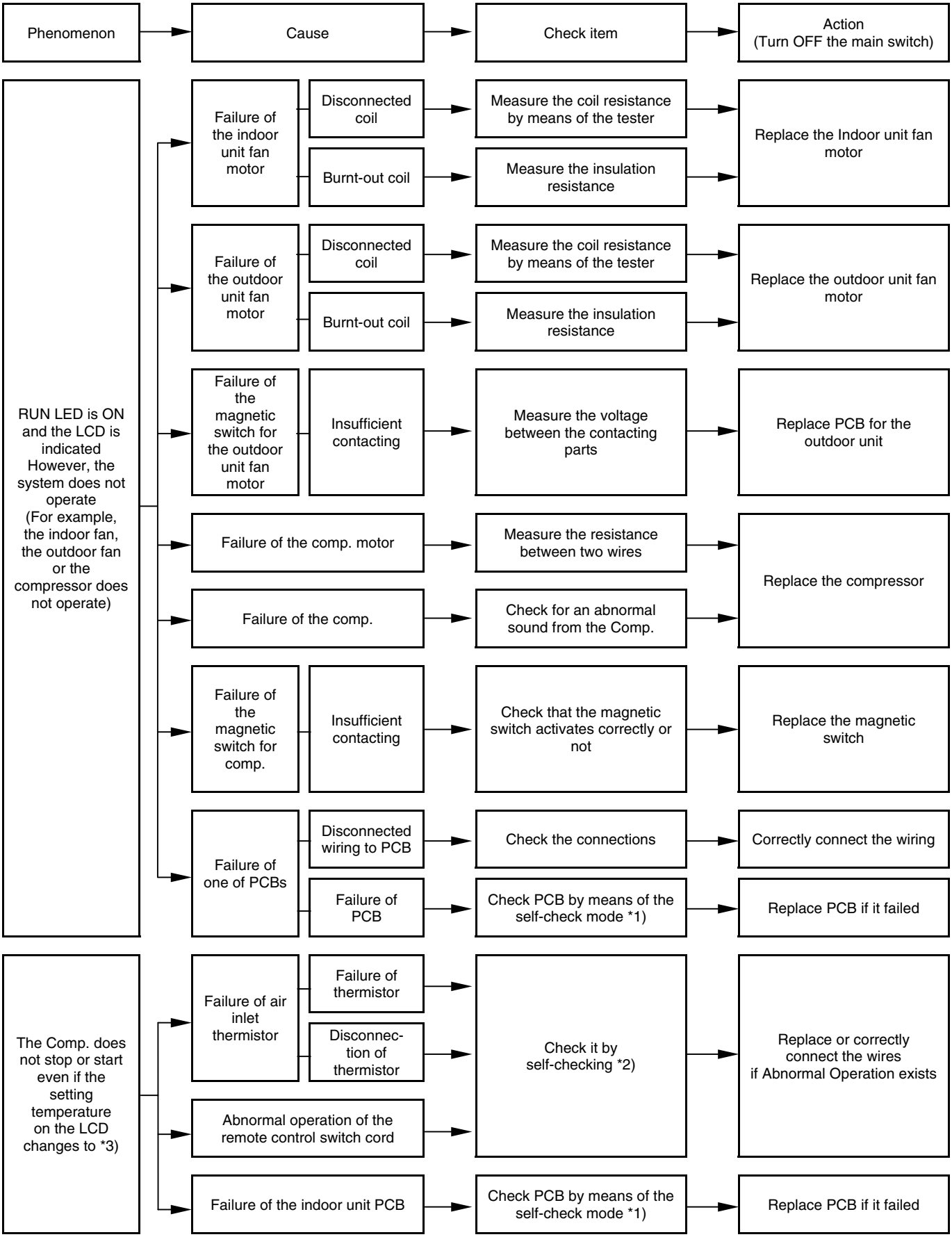
8.1.4. ABNORMAL TRANSMISSION BETWEEN THE REMOTE CONTROL SWITCH AND THE INDOOR UNIT

■ RUN LED on the remote control switch:
Flickering every 2 seconds.

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Disconnection or insufficient contacting of the remote control cable		Check the cable and the connections	Repair the cable or connect the cable
Incorrect wiring connection (incorrect polarity)		Check the wiring and the connections	Repairing
Failure of the remote control switch		Check the remote control switch by means of the self-check mode *1)	Replace the remote control switch if the remote control switch is faulty
Failure of PCB (in the indoor unit and the remote control switch)	Disconnected wire to PCB	Check the connectors	Correctly connect the wires
	Failure of PCB	Check PCB by means of the self-check mode *2)	Replace PCB if it failed

*1): Refer to section 8.3.2.
*2): Refer to section 8.3.1.
*3): This phenomenon occurs when the system is newly installed and the system is started within five minutes after power supply, since the automatic setting of the unit number is performed during this period.

8.1.5. ABNORMAL OPERATIONS OF THE DEVICES

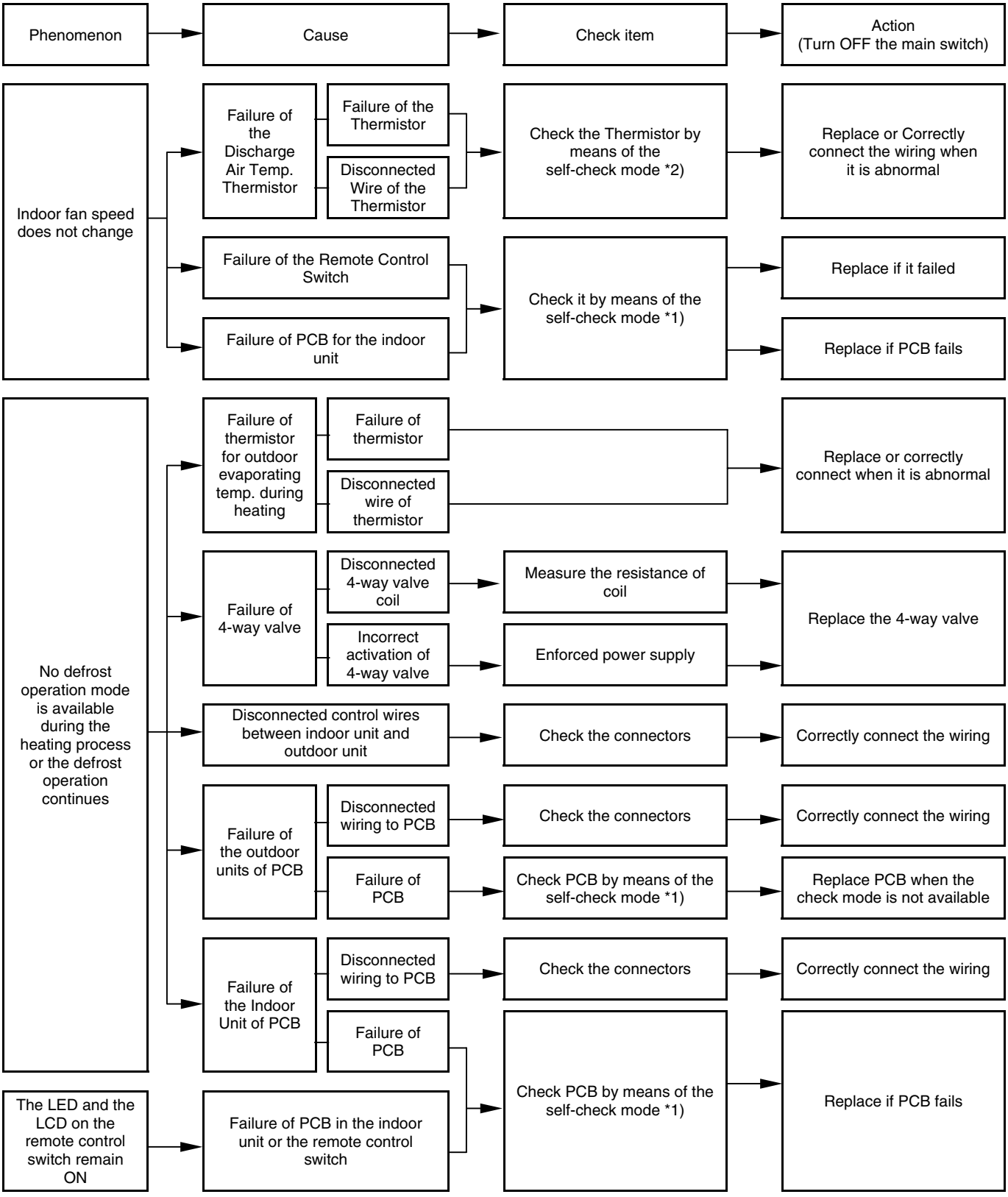


ABNORMAL OPERATIONS OF THE DEVICES (Cont.)

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
The Comp. does not stop or start even if the setting temperature on LCD changes to *3)	Incorrect optional setting	Check the setting condition of "remote control thermostat" by means of the optional setting Setting and control: "00": Control by means of the indoor thermistor for the suction air "01": Control by means of the thermostat of the remote control switch "02": Control by means of the average value of the indoor thermistor for the suction air and the thermostat of the remote control switch	If the thermostat of the remote control switch is not used, set at "00"

*1): Refer to section 8.3.1~8.3.4.
*2): Refer to section 8.3.1.
*3): Even if the remote control switches are normal, the compressor does not operate under the following conditions:
1. Indoor temp. is lower than 21°C or outdoor temp. Is lower than -5°C during the cooling process (DB).
2. Indoor temp. is higher than 27°C (DB) or outdoor temp. is higher than 15°C (WB) during the heating process.
3. When a cooling (or heating) process signal is given to the outdoor unit and a different mode as heating (or cooling) process signal is given to the indoor units.
4. When an emergency stop signal is given to outdoor unit.

ABNORMAL OPERATIONS OF DEVICES (Cont.)

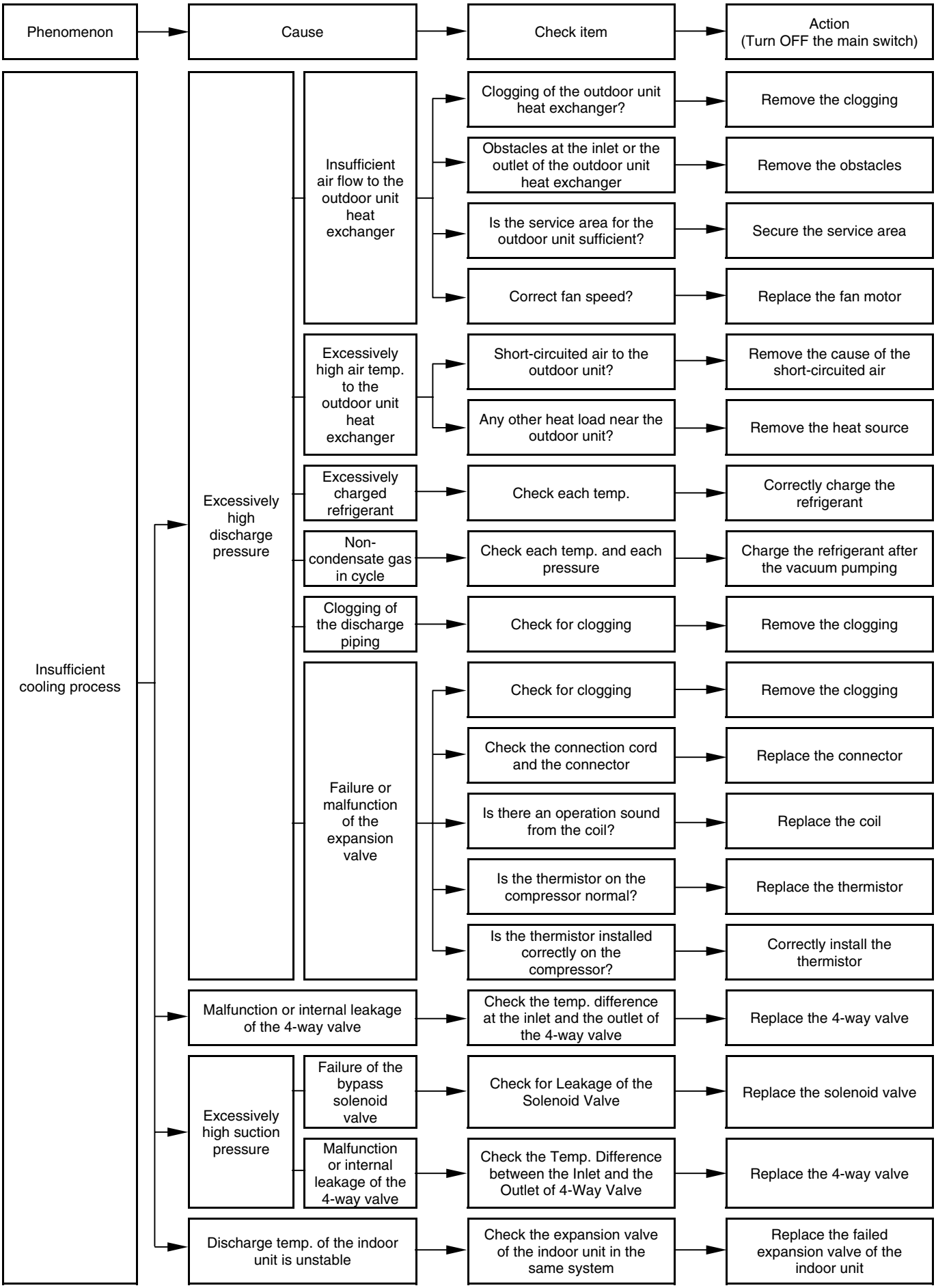


*1): Refer to section 8.3.1~8.3.4.
*2): Refer to section 8.3.1.

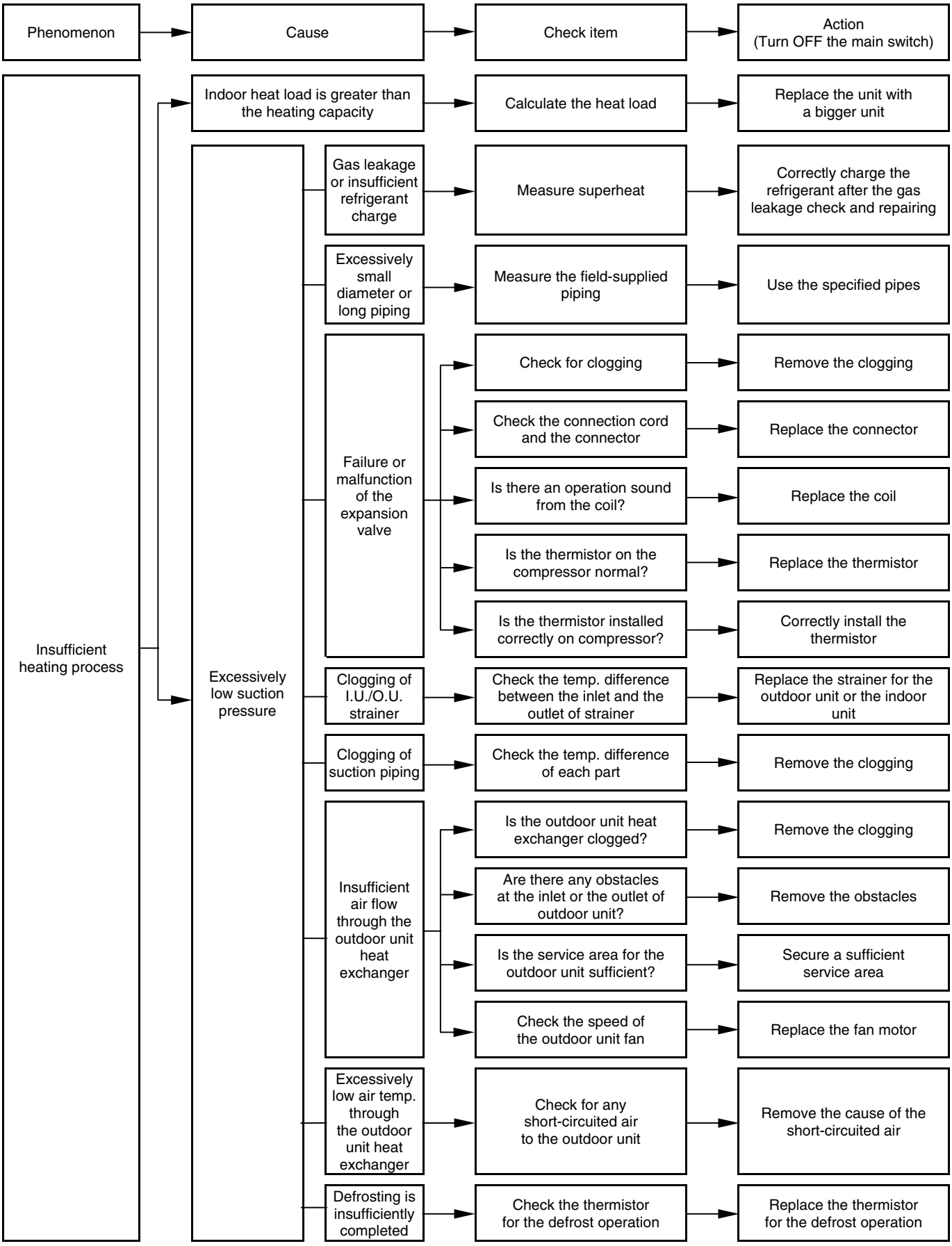
ABNORMAL OPERATIONS OF THE DEVICES (Cont.)

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Insufficient cooling process	Indoor cool load is greater than the cooling capacity		Calculate the cool load	Use a bigger unit
	Excessively low suction pressure	Gas leakage or shortage of refrigerant	Measure superheat	Correctly charge the refrigerant after repairing the gas leakage
		Excessively small diameter tube or long piping	Measure and check the field-supplied pipes	Use the correct pipes
		Incorrect activation of the check valve of the outdoor unit	Check whether or not the temp. difference exists before/after the check valve	Replace the check valve for the outdoor unit
		Failure or malfunction of the expansion valve	Check for clogging	Remove the clogging
			Check the connection cord and the connector	Replace the connector
			Is there an operation sound from the coil?	Replace the coil
			Is the thermistor on the compressor normal?	Replace the thermistor
			Is the thermistor installed correctly on compressor?	Correctly install the thermistor
		Clogged capillary tube in the indoor unit	Is there dewing after the capillary tube?	Replace the capillary tube in the indoor unit
		Clogged strainer in the indoor unit; clogging at the low pressure piping	Check the temp. difference at the inlet and the outlet of the strainer	Replace the strainer in the indoor unit
		Clogging at the low pressure piping	Check the temp. difference	Remove the clogging
		Insufficient air flow to the indoor unit heat exchanger	Check for clogged air filter	Clean the air filter
			Check for an obstacle at the inlet or the outlet	Remove the obstacles
		Excessively low air temp. to the indoor unit heat exchanger	Insufficient speed of the indoor unit fan motor?	Replace the fan motor
			Short-circuited indoor unit air?	Remove the cause of the short-circuited air

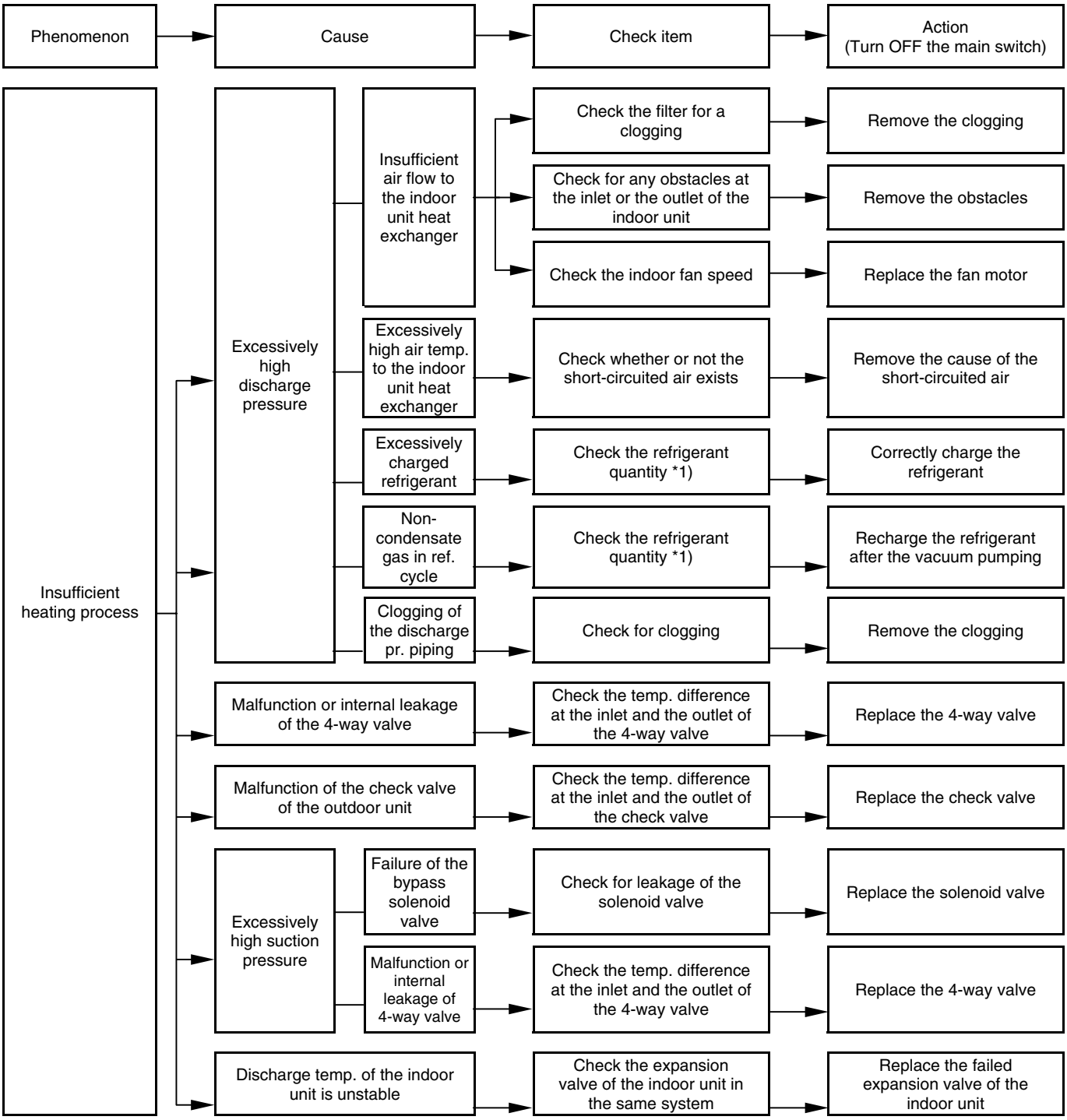
ABNORMAL OPERATIONS OF THE DEVICES (Cont.)



ABNORMAL OPERATIONS OF THE DEVICES (Cont.)

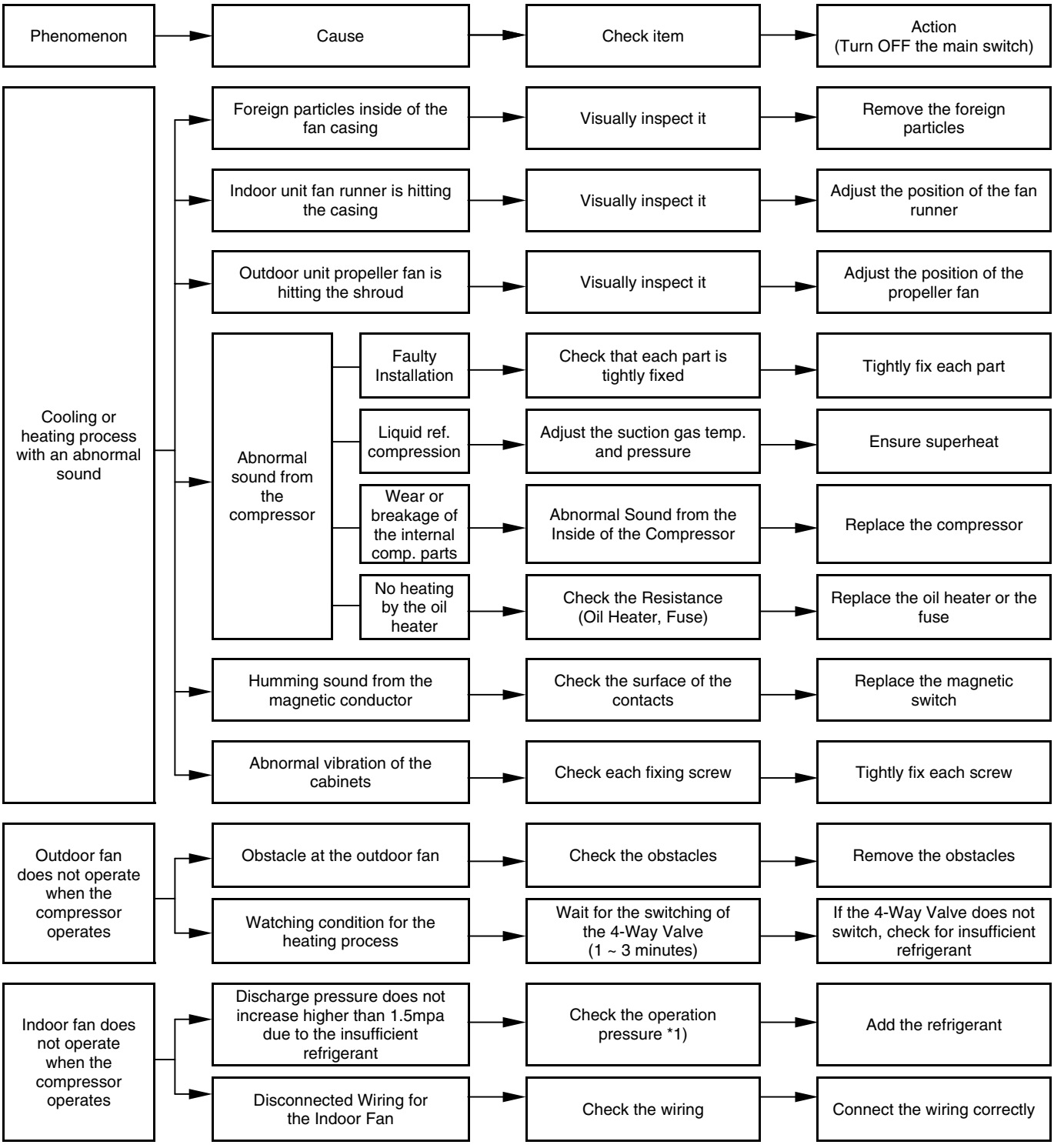


ABNORMAL OPERATIONS OF THE DEVICES (Cont.)



*1): Refer to chapter 10 of TC.

ABNORMAL OPERATIONS OF THE DEVICES (Cont.)



*1): Refer to chapter 10 of TC.

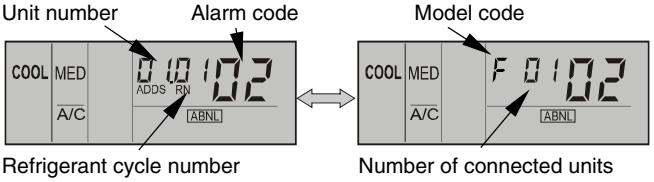
8.2. TROUBLESHOOTING PROCEDURE

8.2.1. ALARM CODE TABLE

If the RUN LED flickers for 2 seconds, there is a failure in the transmission between the Indoor Unit and the Remote Control Switch. Possible causes are:

Broken remote cable
Contact failure in the remote control cable
Defective IC or defective microcomputer
In any case, ask your retailer for service

If the RUN LED flickers 5 times (5 seconds) with the unit number and the alarm code displayed, make a note of the alarm code (refer to the table below) and ask your retailer for service.

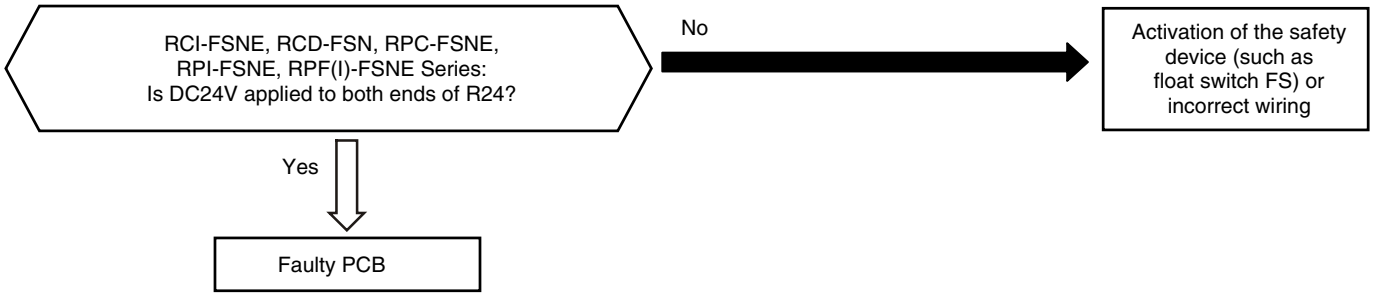


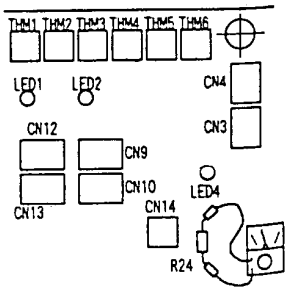
Code No.	Category	Content of abnormal operation	Leading cause
01	Indoor unit	Tripping of the protection device	Failure of the fan motor, the drain discharge, PCB, the relay
02	Outdoor unit	Tripping of the protection device	Activation of PSH
03	Transmission	Abnormal operation between the indoor (or the outdoor) and the outdoor (or the indoor)	Incorrect wiring. Failure of PCB. Tripping of fuse Power supply OFF
04	Inverter	Abnormal operation between the inverter and the control PCB	Transmission failure in fan controller
05	Transmission	Abnormal operation of the power source wiring	Reverse phase incorrect wiring
06	Voltage drop	Voltage drop by excessively low or high voltage to the outdoor unit	Voltage drop of the power supply. Incorrect wiring or insufficient capacity of the power supply wiring
07	Cycle	Decrease in the discharge gas superheat	Excessive refrigerant charge. Expansion valve open lock
08		Increase in the discharge gas temperature	Insufficient refrigerant. Ref. leakage, clogging or expansion valve close lock
09	Outdoor unit	Tripping of the protection device	Failure of the fan motor
11	Sensor on the indoor unit	Air inlet thermistor	Failure of the thermistor, the sensor, the connection
12		Air outlet thermistor	
13		Freeze protection thermistor	
14		Gas piping thermistor	
15		Fresh outdoor air thermistor (Econofresh)	
19		Tripping of the protection device for the fan motor	Failure of the fan motor
21	Sensor on the Outdoor Unit	High-pressure sensor	Failure of the thermistor, the sensor, the connection
22		Outdoor thermistor	
23		Discharge gas thermistor on comp.	
24		Evaporating thermistor	
29		Low-pressure sensor	
31		Incorrect setting of outdoor and indoor unit	Incorrect setting capacity code
32		Abnormal transmission of other indoor unit	Failure of the power supply, PCB in other indoor unit Failure of other indoor unit of the same refrigerant cycle
35		Incorrect setting in the indoor unit no.	Existence of the same indoor unit No. in the same refrigerant cycle
36		Incorrect indoor unit type	Indoor unit is not for R410A
38		Abnormal operation of the protective circuit in the outdoor unit	Failure of the indoor unit PCB. Incorrect wiring. Connection to PCB in the indoor unit
39		Abnormal operation of the running current at the constant speed compressor	Overcurrent, blown fuse or failure of the current sensor
43	Pressure	Pressure ratio decrease protection activating	Failure of the compressor, the inverter
44		Low-pressure increase protection activating	Overload to the indoor in the cooling. High temperature of the outdoor air in the heating. Expansion valve open lock
45		High-pressure increase protection activating	Overload operation. Excessive refrigerant. Clogging of the heat exchanger
47		Low-pressure decrease protection activating	Insufficient refrigerant
51	Inverter	Abnormal operation of the current sensor for the inverter	Failure of the sensor on the inverter PCB
52		Overcurrent protection activating	Overload, overcurrent, locking to the compressor
53		ISPM protection activating	Automatic stoppage of transmission module (overcurrent, low voltage or overheating)
54		Increase in the inverter fan temperature	Abnormal inverter fan thermistor Abnormal outdoor fan
56	Outdoor Fan	Abnormal operation of the detection for the fan motor position	Transmission failure in fan motor
57		Fan controller protection activating	Overcurrent
58		Abnormal operation of the fan controller	Abnormal fan speed, microprocessor reset
96	Sensor on KPI Unit	Room temperature thermistor	Failure of thermistor sensor connection
97		Outdoor temperature thermistor	
EE	Inverter	Compressor protection	Three occurrences of the alarm giving damage to the compressor within 6 hours

8.2.2. TROUBLESHOOTING BY ALARM CODE

Alarm code	
/ 0	**Activation of the safety device in the indoor unit**

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the contact between #1 and #2 of CN14 is not closed over 120 seconds during the cooling process, the heating process or the fan operation.



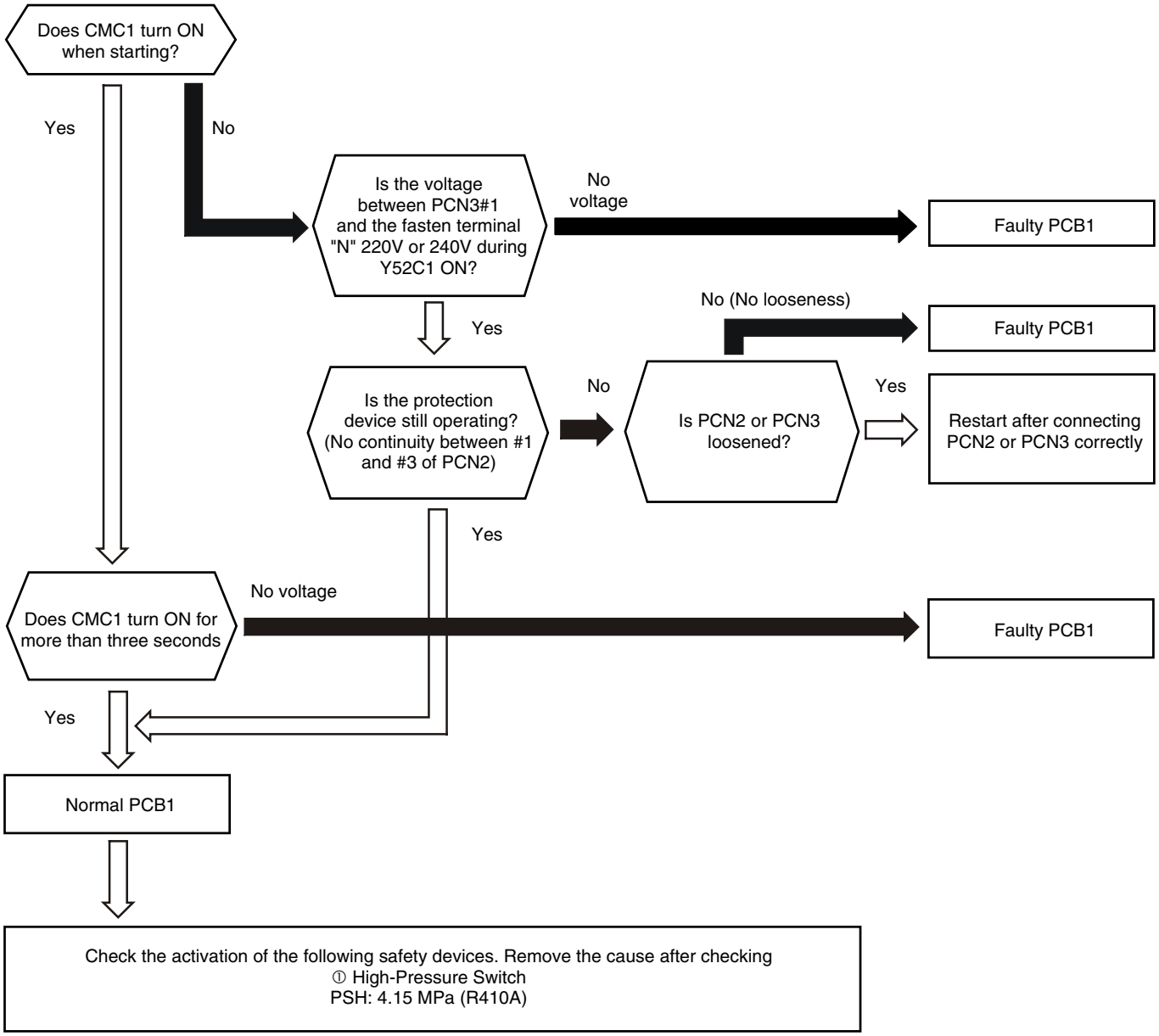


Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Activation of the float switch	High Drain Level	Clogging of the drainage	Check the drain pan	Remove the clogged foreign particles
	Faulty float switch	Fault	Check the continuity when the drain level is low	Replace the float switch if faulty
		Faulty contacting	Measure the resistance by means of the tester	Fix the looseness and Replace the connector
		Faulty connection	Check the connections	Repair the connection
Faulty indoor unit PCB			Check PCB by means of the self-check mode *1)	Replace PCB if faulty

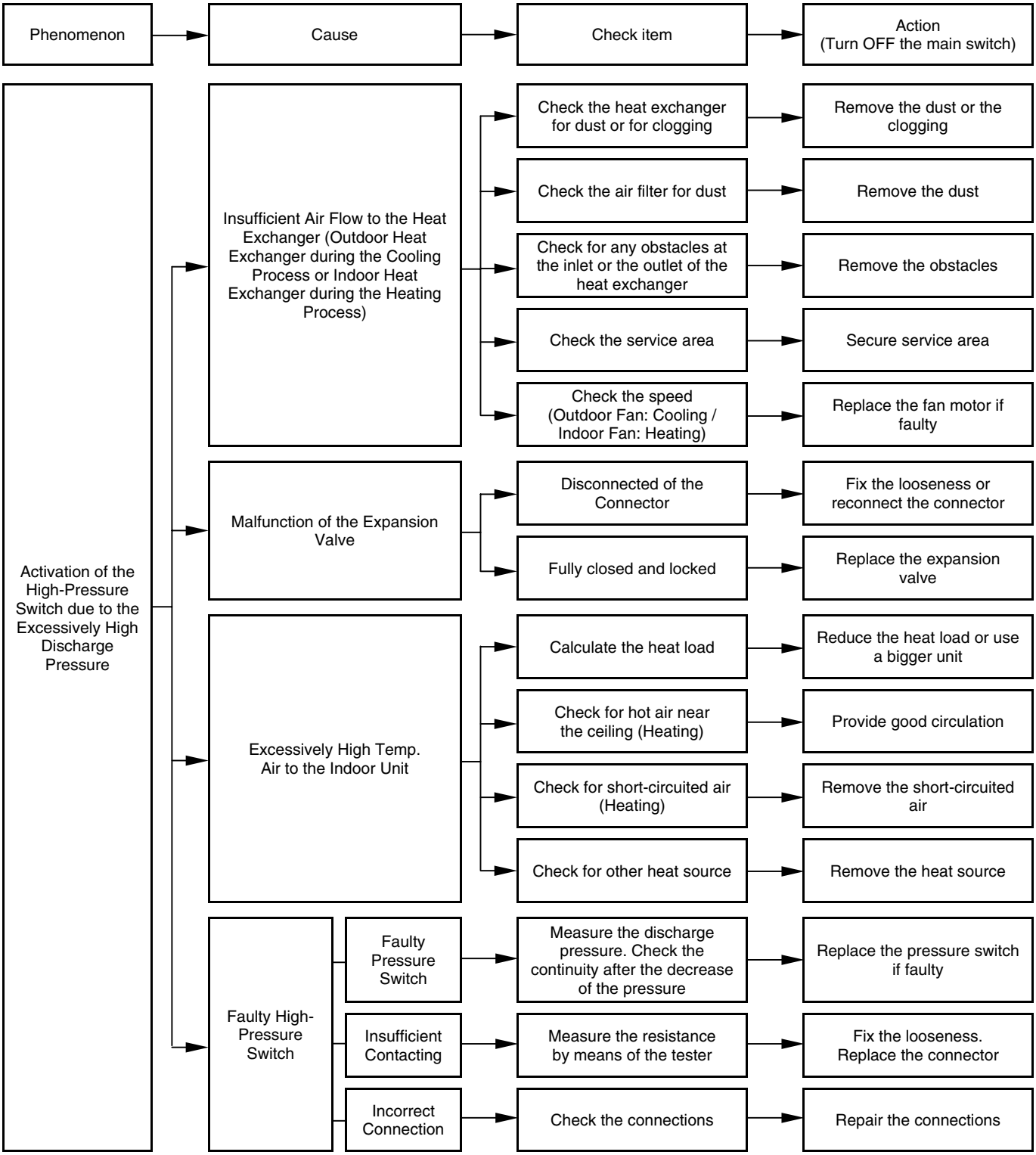
*1): Refer to section 8.3.1 and 8.3.3.
Alarm code "01" is not displayed at the RPK series.

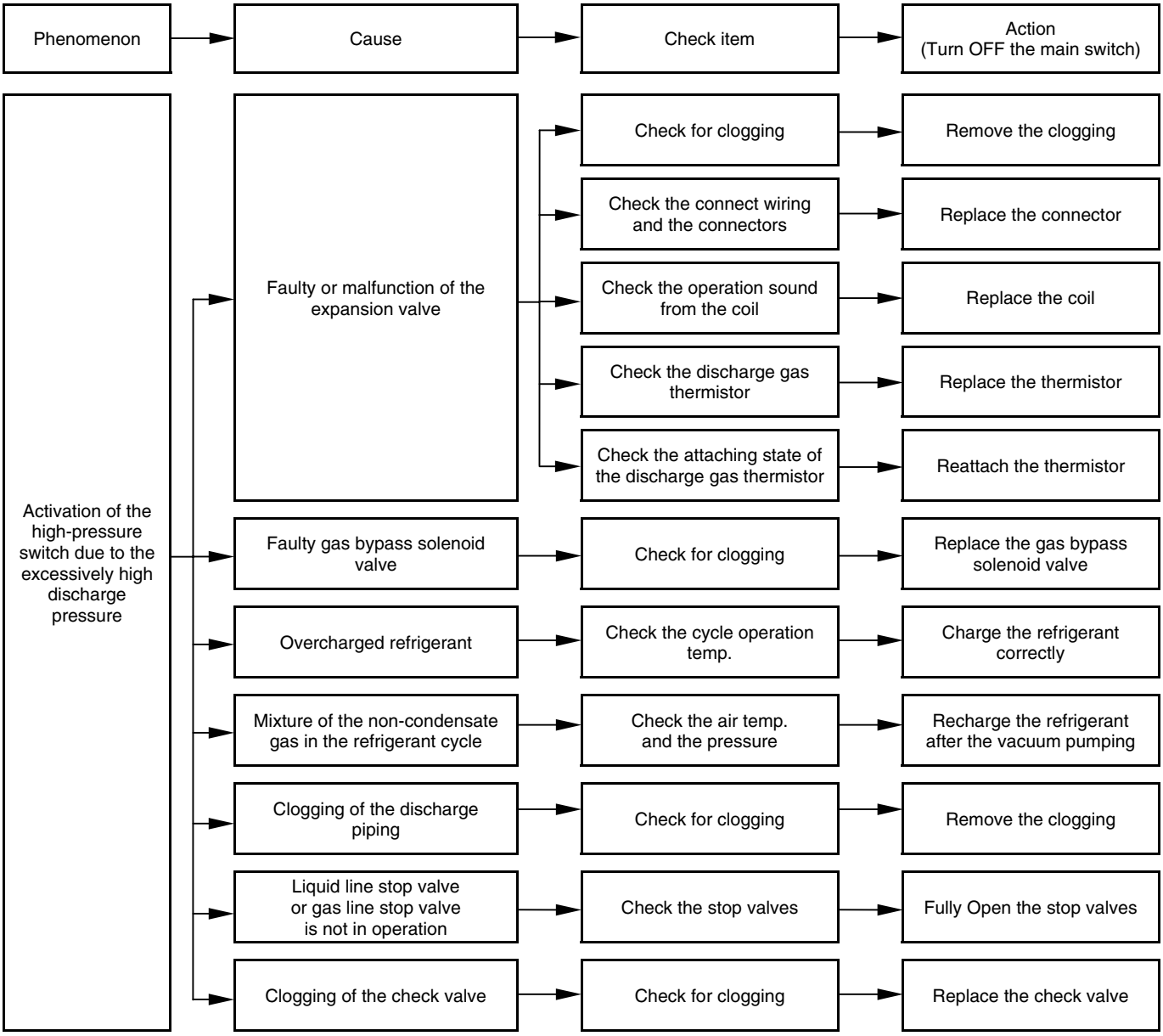
Alarm code	
/ 1	**Activation of the safety device in the outdoor unit**

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  ✶ This alarm is displayed when one of the safety devices is activated during the compressor operation.



Check item		
Connector for CMC1	Fasten terminal	Connector for the protection device
PCN3	N	PCN2, PCN16, PCN17,PCN18, PCN19 and PCN33


Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Activation of the High-Pressure Switch due to the Excessively High Discharge Pressure
Insufficient Air Flow to the Heat Exchanger (Outdoor Heat Exchanger during the Cooling Process or Indoor Heat Exchanger during the Heating Process)
Check the heat exchanger for dust or for clogging
Remove the dust or the clogging
Check the air filter for dust
Remove the dust
Check for any obstacles at the inlet or the outlet of the heat exchanger
Remove the obstacles
Check the service area
Secure service area
Check the speed (Outdoor Fan: Cooling / Indoor Fan: Heating)
Replace the fan motor if faulty
Malfunction of the Expansion Valve
Disconnected of the Connector
Fix the looseness or reconnect the connector
Fully closed and locked
Replace the expansion valve
Excessively High Temp. Air to the Indoor Unit
Calculate the heat load
Reduce the heat load or use a bigger unit
Check for hot air near the ceiling (Heating)
Provide good circulation
Check for short-circuited air (Heating)
Remove the short-circuited air
Check for other heat source
Remove the heat source
Faulty High-Pressure Switch
Faulty Pressure Switch
Measure the discharge pressure. Check the continuity after the decrease of the pressure
Replace the pressure switch if faulty
Insufficient Contacting
Measure the resistance by means of the tester
Fix the looseness. Replace the connector
Incorrect Connection
Check the connections
Repair the connections


Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Activation of the high-pressure switch due to the excessively high discharge pressure
Faulty or malfunction of the expansion valve
Check for clogging
Remove the clogging
Check the connect wiring and the connectors
Replace the connector
Check the operation sound from the coil
Replace the coil
Check the discharge gas thermistor
Replace the thermistor
Check the attaching state of the discharge gas thermistor
Reattach the thermistor
Faulty gas bypass solenoid valve
Check for clogging
Replace the gas bypass solenoid valve
Overcharged refrigerant
Check the cycle operation temp.
Charge the refrigerant correctly
Mixture of the non-condensate gas in the refrigerant cycle
Check the air temp. and the pressure
Recharge the refrigerant after the vacuum pumping
Clogging of the discharge piping
Check for clogging
Remove the clogging
Liquid line stop valve or gas line stop valve is not in operation
Check the stop valves
Fully Open the stop valves
Clogging of the check valve
Check for clogging
Replace the check valve

Alarm code	Abnormal transmission between the indoor units and the outdoor unit
/ 2	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm is displayed when an abnormal operation is maintained for three minutes after the normal transmission between the indoor units and the outdoor unit. Also, an abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset.
    The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.
  - ✶ Investigate the cause of the overcurrent and take the necessary action when the fuses are blown out or the breaker for the outdoor unit is activated.

(Refer to the next page)

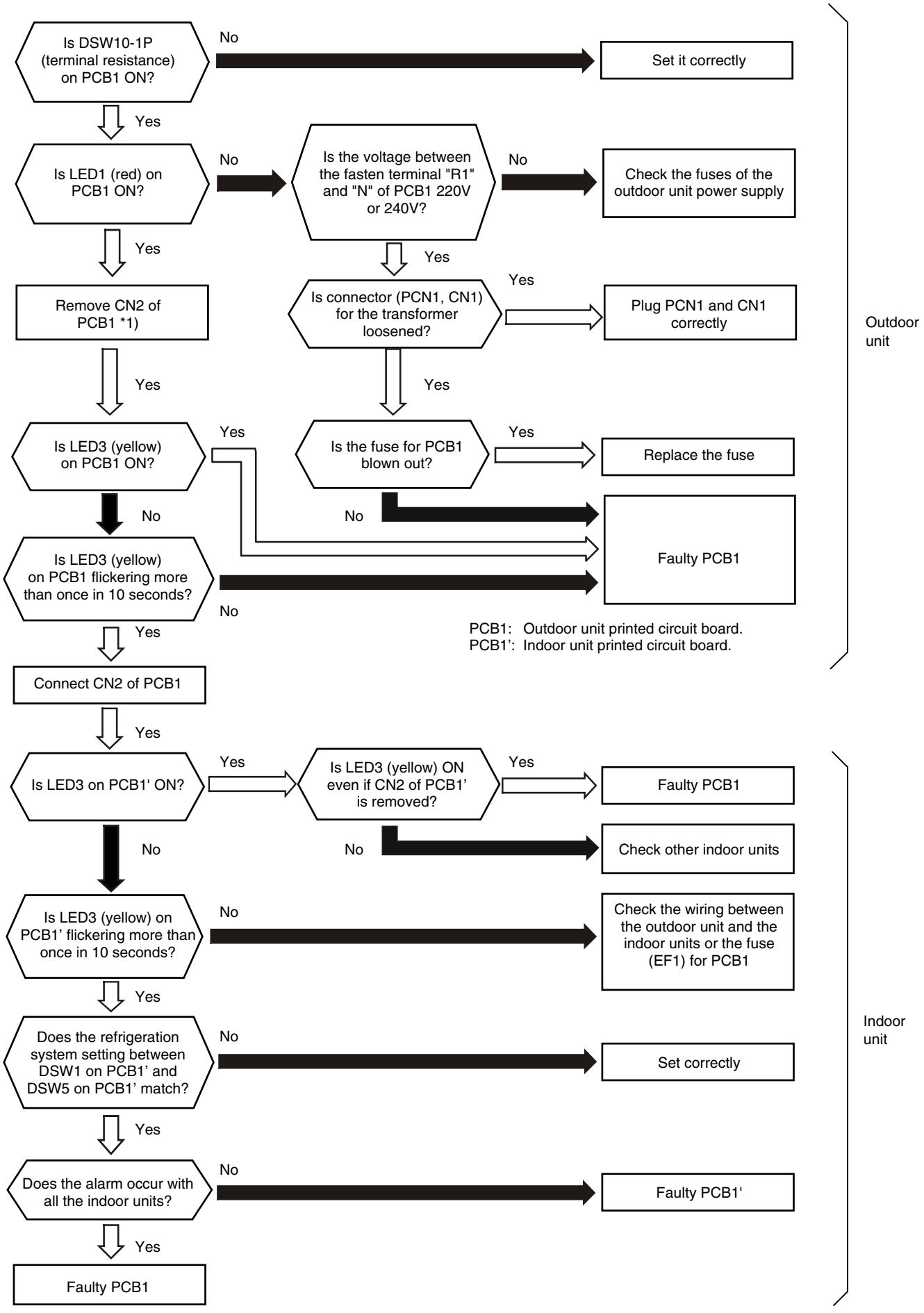
Note from next page:

*1) In case that the terminal resistance (DSW10-1P) is OFF when the H-Link Connection is performed.
Set the terminal resistance to ON when CN2 is removed.
Set the terminal resistance to OFF when CN2 is reconnected.

Check item	
Power supply	Fasten terminal
380-415V 50Hz	Between R1 and N

*2) Factory setting of PCB1 for non-pole transmission

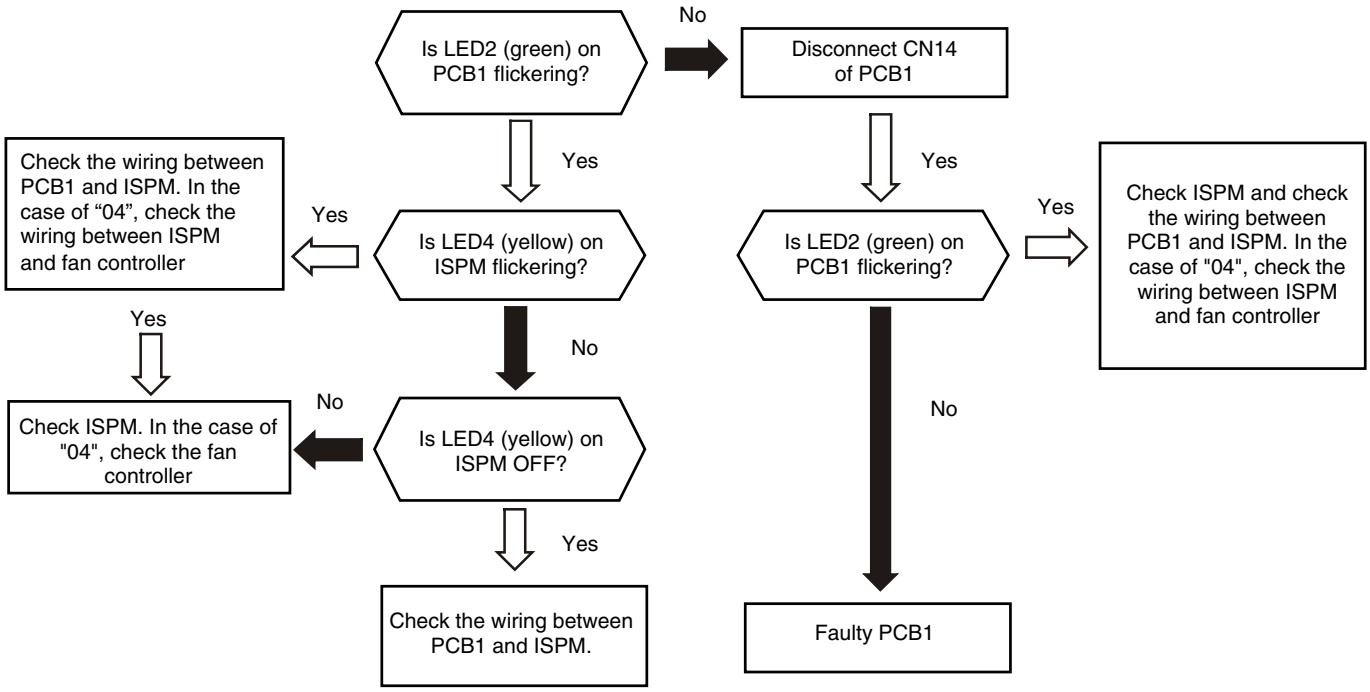
Item	Setting position
SW1	Left side (New transmission side)
JP1	Short circuit
CN2	Transmission wire connector
CN18	Non-occupied


Is DSW10-1P (terminal resistance) on PCB1 ON?
No
Set it correctly
Yes
Is LED1 (red) on PCB1 ON?
No
Is the voltage between the fasten terminal "R1" and "N" of PCB1 220V or 240V?
No
Check the fuses of the outdoor unit power supply
Yes
Yes
Remove CN2 of PCB1 *1)
Is connector (PCN1, CN1) for the transformer loosened?
Yes
Plug PCN1 and CN1 correctly
Yes
Yes
Is LED3 (yellow) on PCB1 ON?
Yes
Is the fuse for PCB1 blown out?
Yes
Replace the fuse
No
No
Is LED3 (yellow) on PCB1 flickering more than once in 10 seconds?
Faulty PCB1
No
Yes
PCB1: Outdoor unit printed circuit board.
PCB1': Indoor unit printed circuit board.
Connect CN2 of PCB1
Yes
Is LED3 on PCB1' ON?
Yes
Is LED3 (yellow) ON even if CN2 of PCB1' is removed?
Yes
Faulty PCB1
No
No
Check other indoor units
Is LED3 (yellow) on PCB1' flickering more than once in 10 seconds?
No
Check the wiring between the outdoor unit and the indoor units or the fuse (EF1) for PCB1
Yes
Does the refrigeration system setting between DSW1 on PCB1' and DSW5 on PCB1' match?
No
Set correctly
Yes
Does the alarm occur with all the indoor units?
No
Faulty PCB1'
Yes
Faulty PCB1
Outdoor unit
Indoor unit

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Power failure or no power supply		Measure the voltage by means of the tester	Supply the power
Blown out fuse for the power source or activation of the outdoor unit breaker	Short circuit between wires	Check the insulation material for breaks	Remove the short circuit and replace the fuse
	Short-circuited wire to ground	Measure the insulation resistance	Remove the short circuit to ground and replace the fuse
	Faulty comp. motor	Measure the resistance between the wires and the insulation resistance	Replace the comp. and the fuse
	Faulty outdoor unit fan motor	Measure the resistance between the wires and the insulation resistance	Replace the outdoor unit fan motor and the fuse
Blown out fuse for control circuit or activation of outdoor unit breaker	Short circuit between wires	Check the insulation material for breaks	Remove the short circuit and replace the fuse
	Short circuit of the control circuit (to ground)	Measure the insulation resistance	Remove the short circuit and replace the fuse
	Faulty solenoid coil for the magnetic switch for the comp. motor	Measure the resistance of coil	Replace the magnetic switch and the fuse
	Failure of the outdoor unit fan motor	Measure the resistance between the wires and the insulation resistance	Replace the outdoor unit fan motor and fuse
Disconnected wires insufficient contacting or incorrect connection	Between outdoor unit and indoor unit	Check the continuity of the wires. Check for looseness of the connection screws. Check the terminal Nos.	Replacing wires repairing and tightening the screws and the correct wiring
	Power source wiring for the outdoor unit		
Faulty PCB (outdoor unit, indoor unit)	Disconnected wires to PCB	Check the connections	Correctly connect the wires
	Faulty PCB		Replace PCB if faulty
Incorrect wiring	Disconnected wire; insufficient contacting	Check the continuity and the looseness of connection screws	Replacing wires, repairing and tightening the screws
	Incorrect wiring	Check the terminal Nos.	Correctly connect the wires

Alarm code	
/ 3	**Abnormal transmission between the inverter and the outdoor PCB1 and ISPM**

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB1.
  - ✶ This alarm is displayed when the abnormal operation is maintained for 30 seconds after the normal transmission between the outdoor unit PCB1 and ISPM. Also, the abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.
  - ✶ The alarm code "04." is displayed when the abnormal transmision is maintained between ISPM and fan controller.

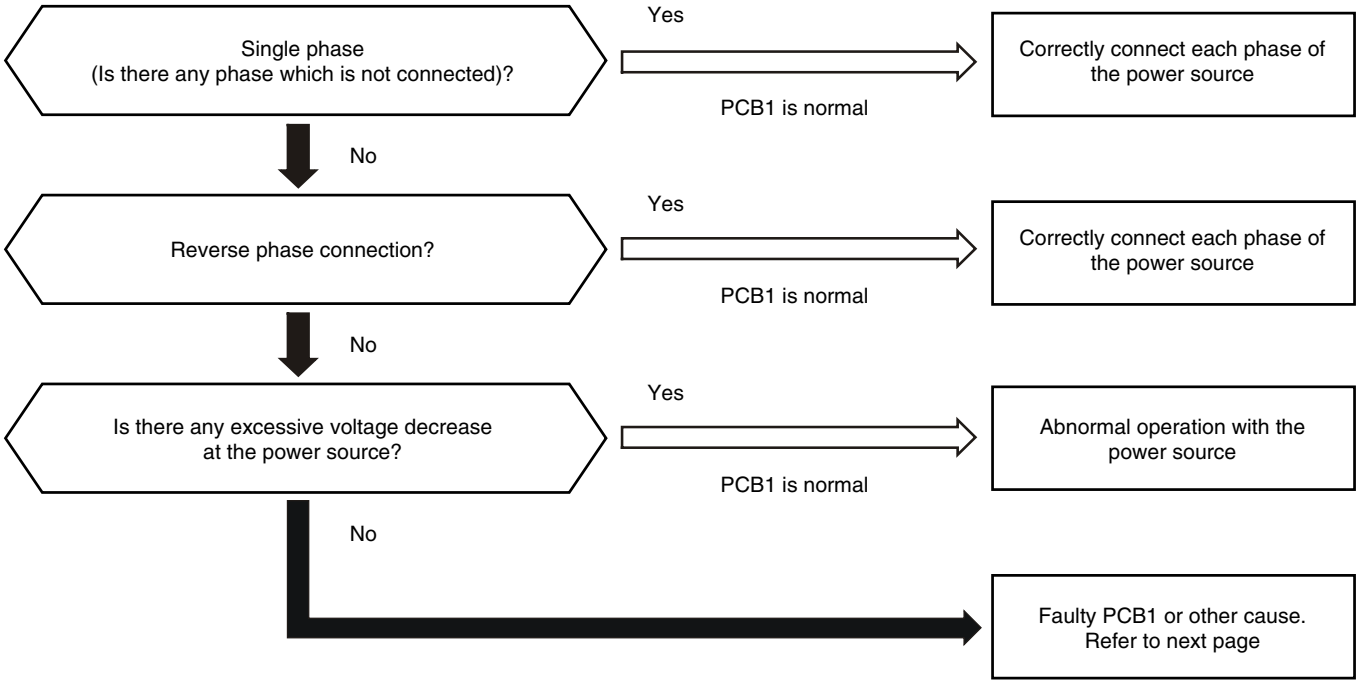


PCB1: Control PCB in the outdoor unit
ISPM: Inverter system power module
FANM: Inverter fan controller

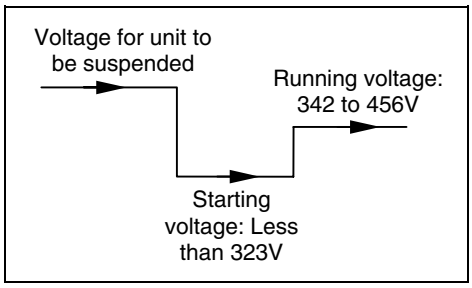
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Disconnected wires, insufficient contacting or incorrect connection	Between control PCB, ISPM and fan controller	Check the continuity of wires. Check for looseness of the connection screws. Check the connection No.	Replacing wires, repairing, tightening screws and incorrect wiring
	Power source wiring for the outdoor unit		
Faulty PCB (PCB1 for the control, PCB3 for the inverter)	Disconnected wires to PCB	Check the connections	Repair the wiring connections
	Faulty PCB		Replace PCB if faulty
Incorrect wiring	Disconnected wires; insufficient contacting	Check the continuity. Check for looseness of connection screws	Replacing wires, repairing, tightening screws
	Incorrect wiring	Check the connection Nos.	Correctly connect the wires

Alarm code	Code abnormal operation of picking up phase signal
/ 4	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm is displayed when the main power source phase is reversely connected or one phase is not connected.



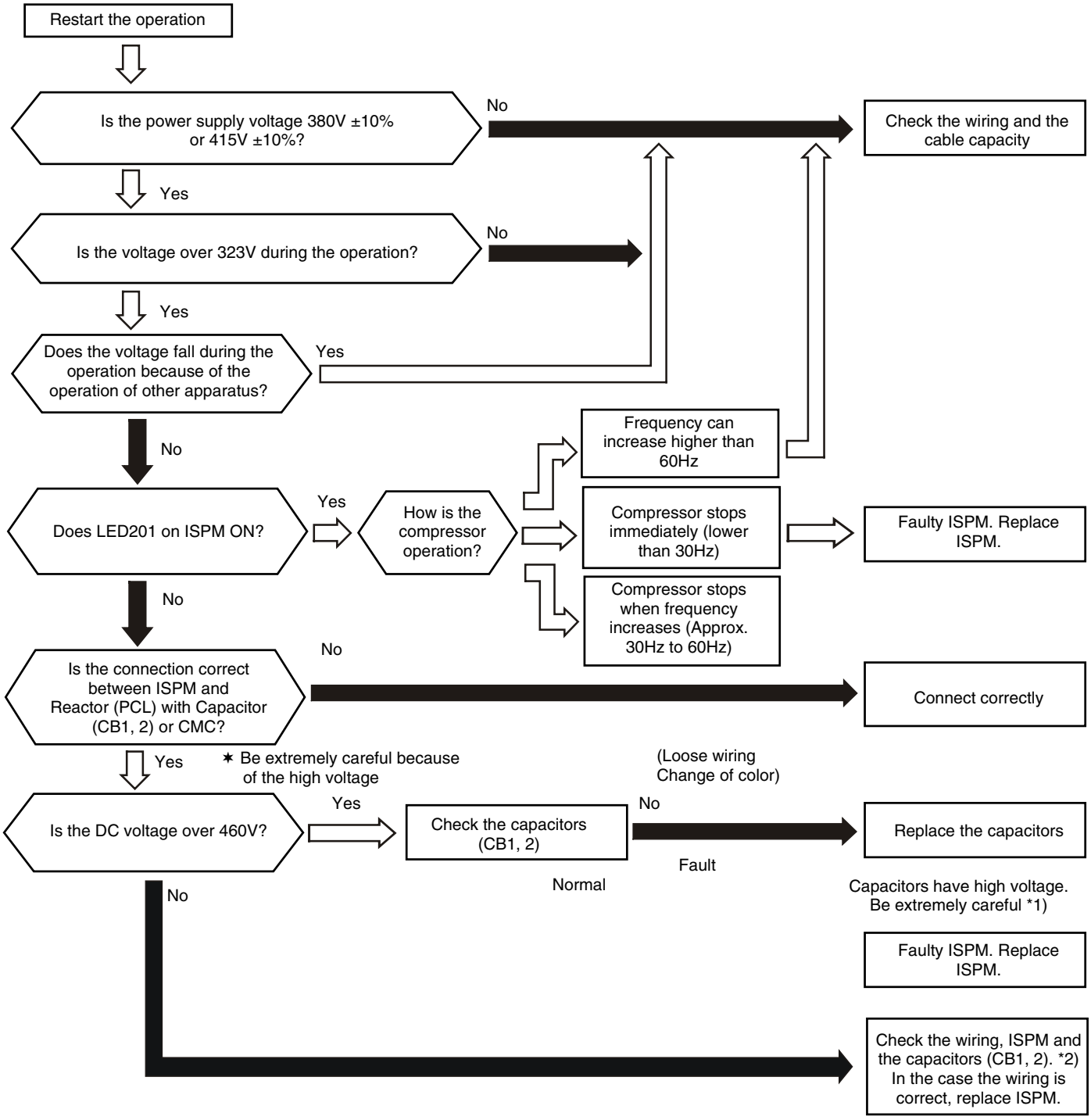
NOTE:
PCB1: Outdoor unit printed circuit board.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Activation of reverse phase sensor in the outdoor unit	Reverse or single phase	Check it according to the electrical wiring	Replacing wires, repair, tightening screws or correct wiring
	Faulty outdoor unit PCB		Replace PCB if faulty

Alarm code	Excessively low voltage or excessively high voltage for the inverter
/ 5	

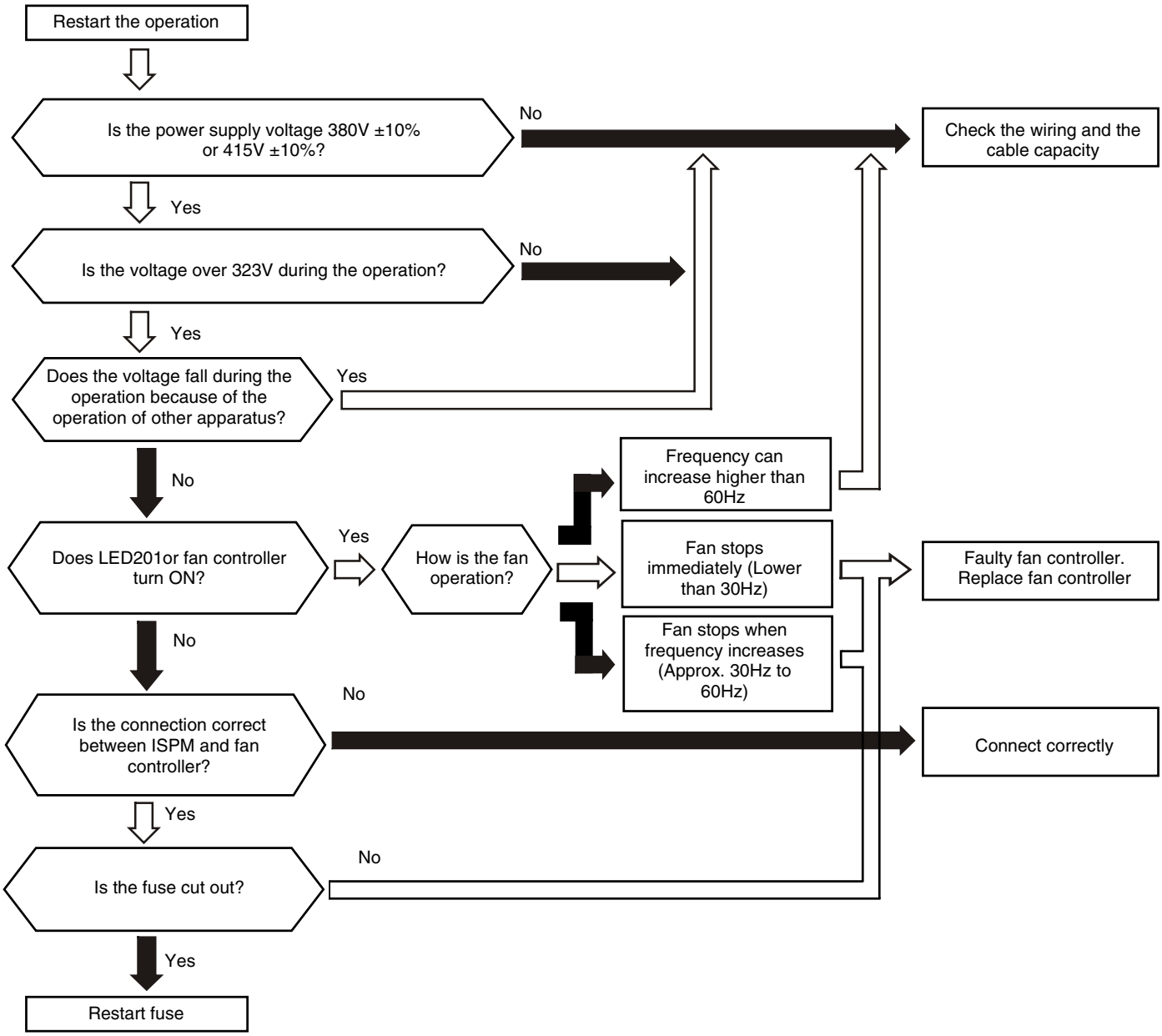
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the voltage between terminal "P" and "N" of ISPM is insufficient and the alarm has three occurrences in 30 minutes. If the number of occurrences is smaller than two, the retry operation is performed. The alarm code "06" means fan controller Abnormal Operation.



*1): If the capacitor has a high voltage, perform the high-voltage discharge procedure. Refer to section 8.3.4.
*2): Checking procedures of the diode module are displayed in item 8.3.4.
*3): DC voltage measuring position:
ISPM "P" Terminal to "+" Terminal of Tester, "N" Terminal to "–" Terminal of Tester Measuring Position: DC 1000V.

Alarm code	
/ 5 *	**Excessively Low or Excessively High Inverter Fan Module**

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the voltage between terminal "P" and "N" of Fan Controller is insufficient and the alarm has three occurrences in 30 minutes. If the number of occurrences is smaller than two, the retry operation is performed.



*1): If the capacitor has a high voltage, perform the high-voltage discharge procedure as described later
*2): Checking procedures of the diode module are displayed later

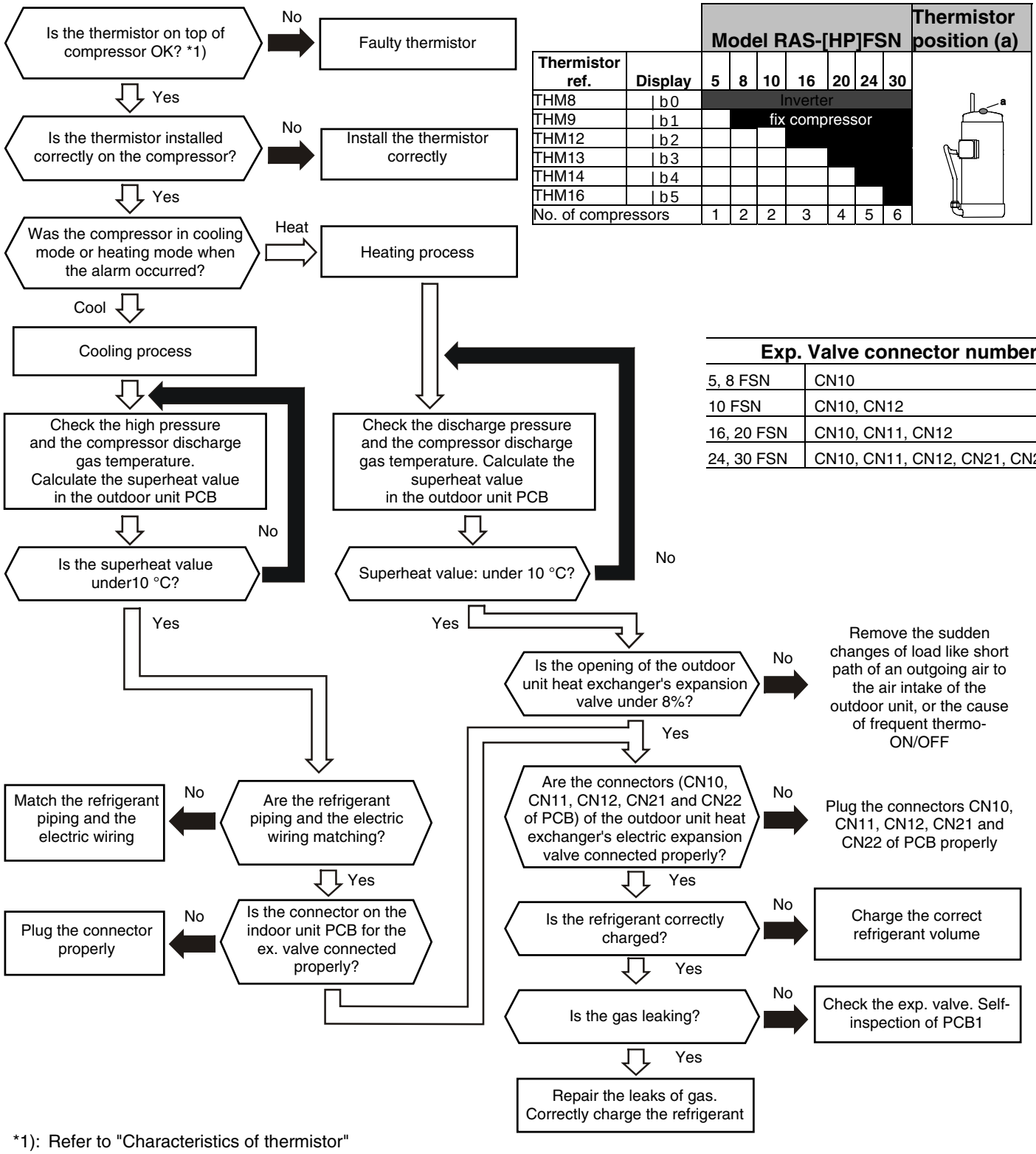
Alarm code	Decrease of the discharge gas superheat
/ 6	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ If the discharge gas superheat is below 10 deg. at the top of the compressor for 30 minutes, the retry operation is performed. However, if the alarm occurs twice in addition to the first occurrence within two hours, this alarm code is displayed.

Position of the Thermistor

Thermistor ref.	Display	Model RAS-[HP]FSN 5	8	10	16	20	24	30	Thermistor position (a)
THM8	ǀ b0	Inverter							
THM9	ǀ b1		fix compressor						
THM12	ǀ b2								
THM13	ǀ b3								
THM14	ǀ b4								
THM16	ǀ b5								
No. of compressors		1	2	2	3	4	5	6	

Exp. Valve connector number	
5, 8 FSN	CN10
10 FSN	CN10, CN12
16, 20 FSN	CN10, CN11, CN12
24, 30 FSN	CN10, CN11, CN12, CN21, CN22



*1): Refer to "Characteristics of thermistor"

Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Decrease of the discharge gas superheat	Ref. cycle is different from the electrical system		Check the ref. cycle and the electrical system	Repair the wiring
	Overcharged refrigerant		Measure the pressure. (Refer to Figure in "Test Run of TC".)	Correctly charge the refrigerant
	Faulty Ex. valve		Refer to 8.3.6.	Replace the ex. valve if faulty
	Faulty PCB	Fault	Replace PCB and check the operation	Replace PCB if faulty
		Disconnected wires for the Ex. valve control	Check the connections	Repair the wiring connection
	Faulty discharge gas thermistor	Fault	Measure the resistance	Replace the thermistor if faulty
		Incorrect mounting	Check the mounting state	Correctly mount the thermistor
		Incorrect connection	Check the connections	Remove looseness, Replace the connector or Repair the connections

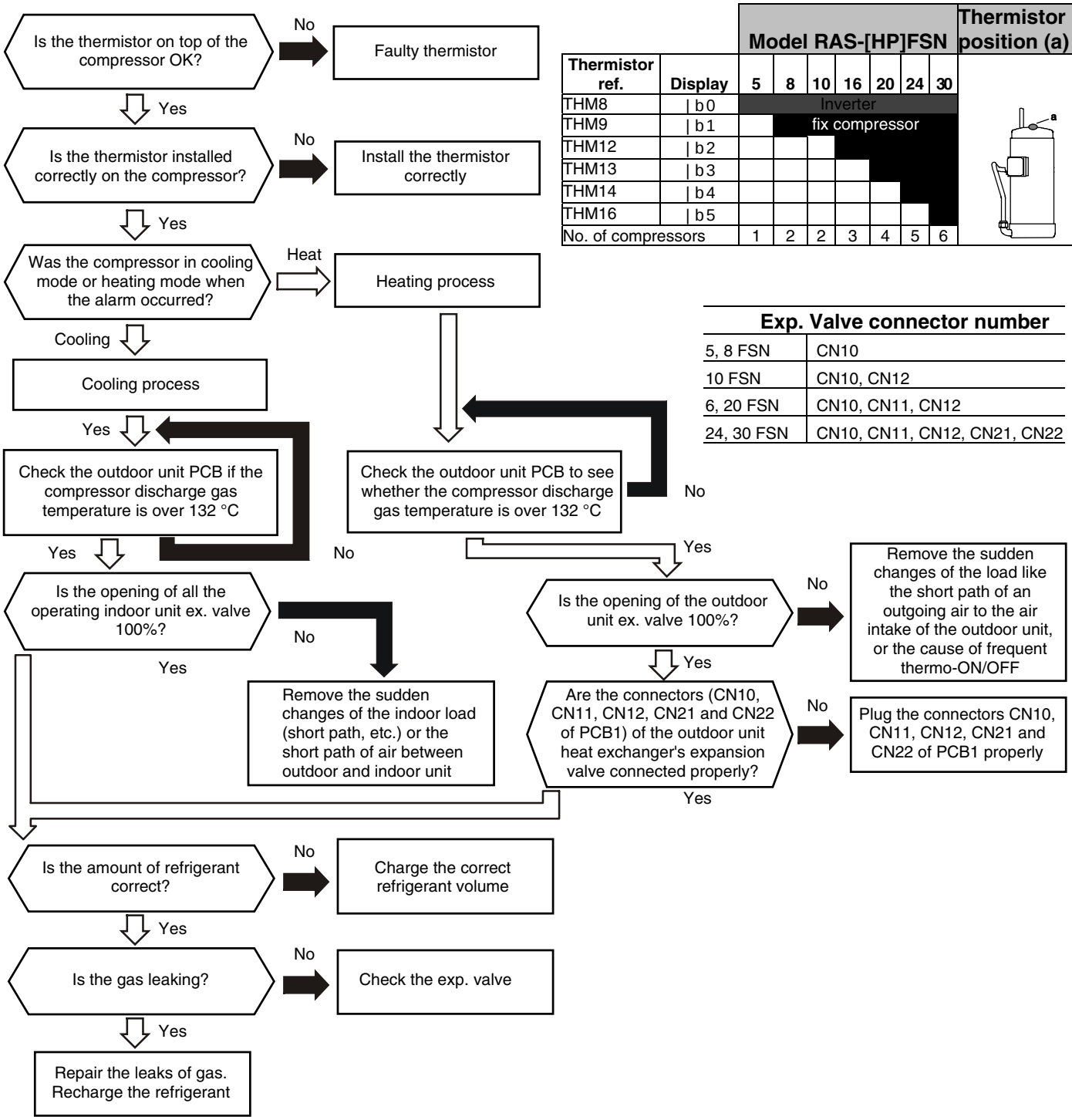
Alarm code	
/ 7	**Excessively high discharge gas temperature at the top of the compressor chamber**

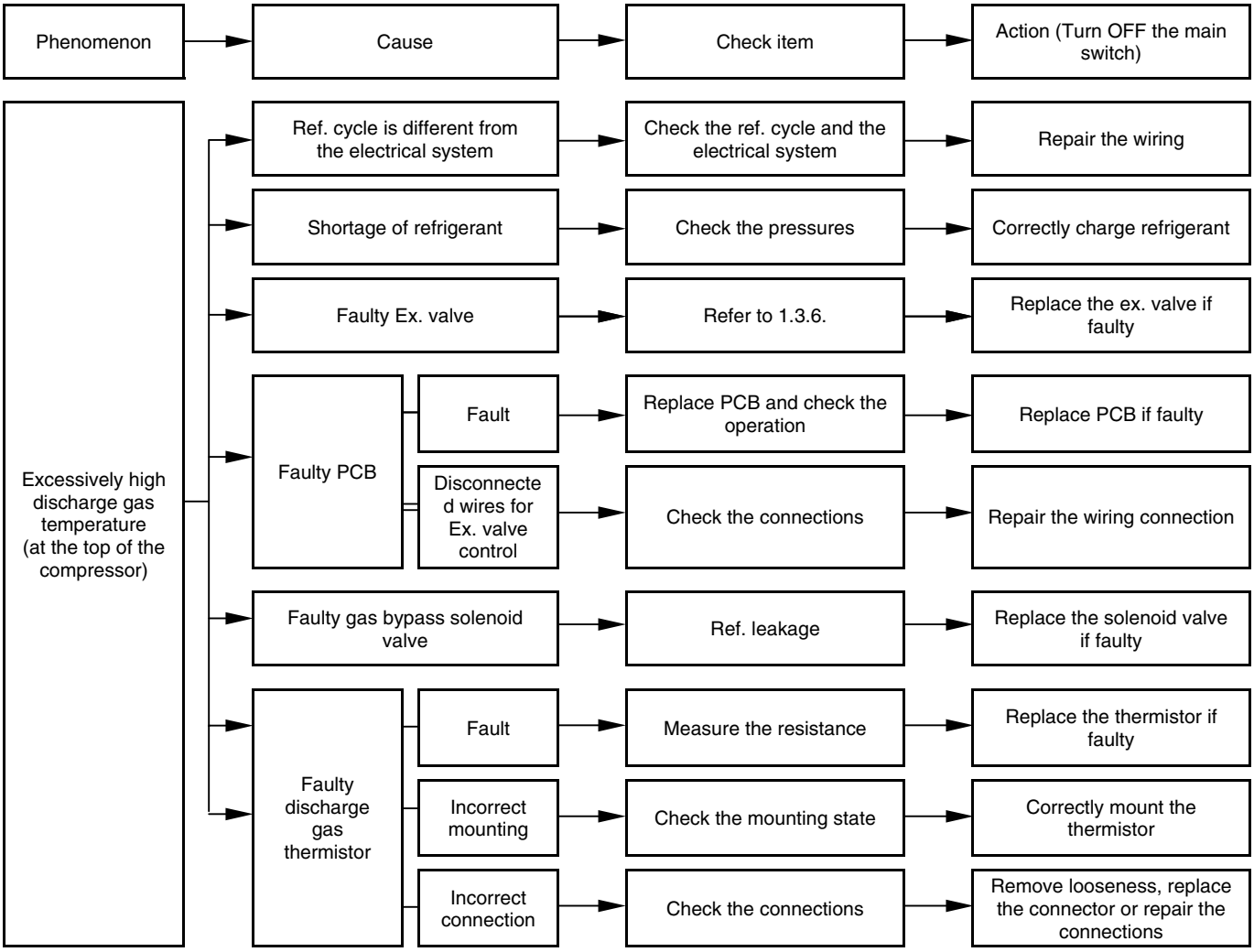
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm is displayed when the following conditions occur three times within one hour:
    (1) The temperature of the thermistor on the top of the compressor is maintained higher than 132 °C for ten minutes;
    (2) The temperature of the thermistor on the top of the compressor is maintained higher than 140 °C for five seconds.

Position of the Thermistor

Thermistor ref.	Display	Model RAS-[HP]FSN 5	8	10	16	20	24	30	Thermistor position (a)
THM8	| b0	Inverter							
THM9	| b1		fix compressor						
THM12	| b2								
THM13	| b3								
THM14	| b4								
THM16	| b5								
No. of compressors		1	2	2	3	4	5	6	

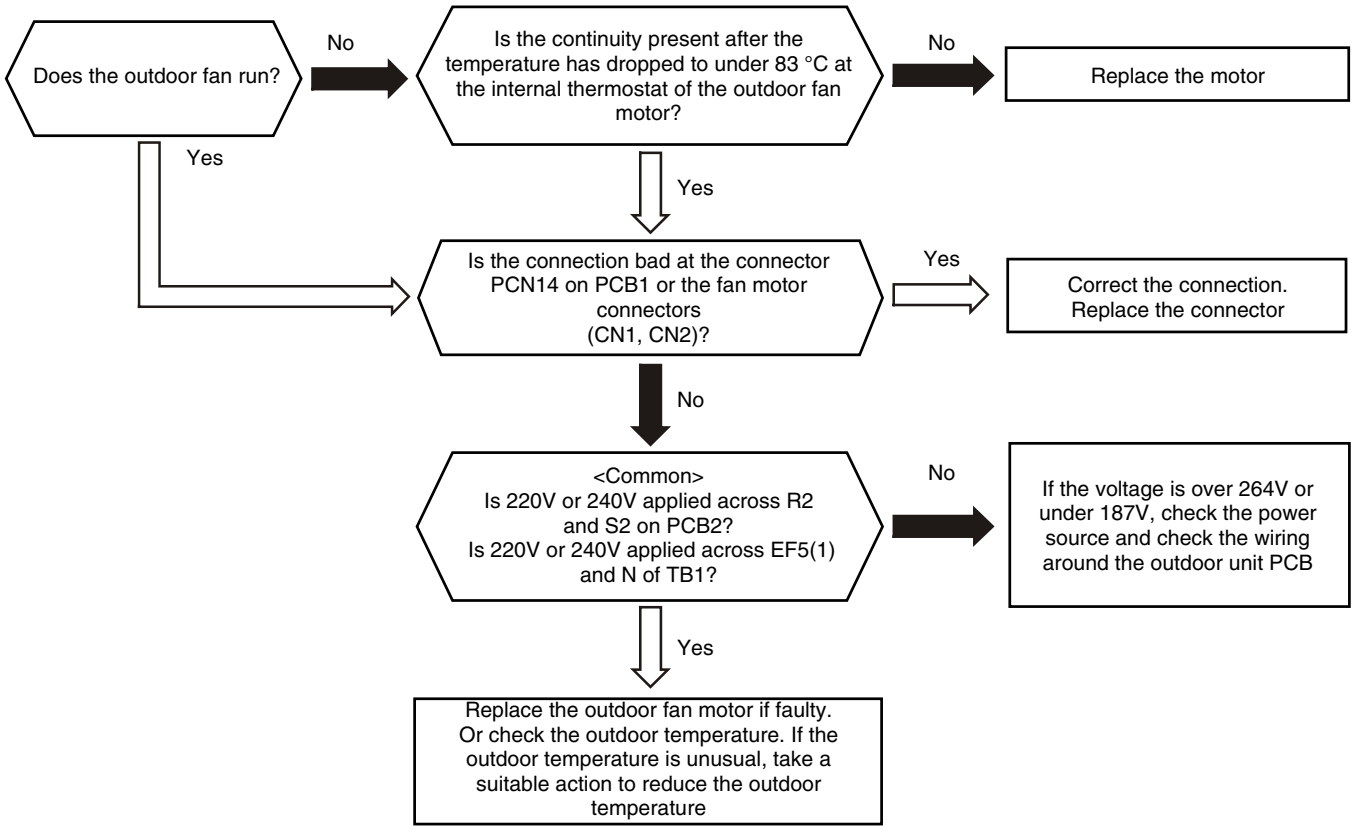
Exp. Valve connector number	
5, 8 FSN	CN10
10 FSN	CN10, CN12
6, 20 FSN	CN10, CN11, CN12
24, 30 FSN	CN10, CN11, CN12, CN21, CN22




Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Excessively high discharge gas temperature (at the top of the compressor)
Ref. cycle is different from the electrical system
Check the ref. cycle and the electrical system
Repair the wiring
Shortage of refrigerant
Check the pressures
Correctly charge refrigerant
Faulty Ex. valve
Refer to 1.3.6.
Replace the ex. valve if faulty
Faulty PCB
Fault
Replace PCB and check the operation
Replace PCB if faulty
Disconnected wires for Ex. valve control
Check the connections
Repair the wiring connection
Faulty gas bypass solenoid valve
Ref. leakage
Replace the solenoid valve if faulty
Faulty discharge gas thermistor
Fault
Measure the resistance
Replace the thermistor if faulty
Incorrect mounting
Check the mounting state
Correctly mount the thermistor
Incorrect connection
Check the connections
Remove looseness, replace the connector or repair the connections

Alarm code	Activation of the protection device for the outdoor fan motor
/ 8	

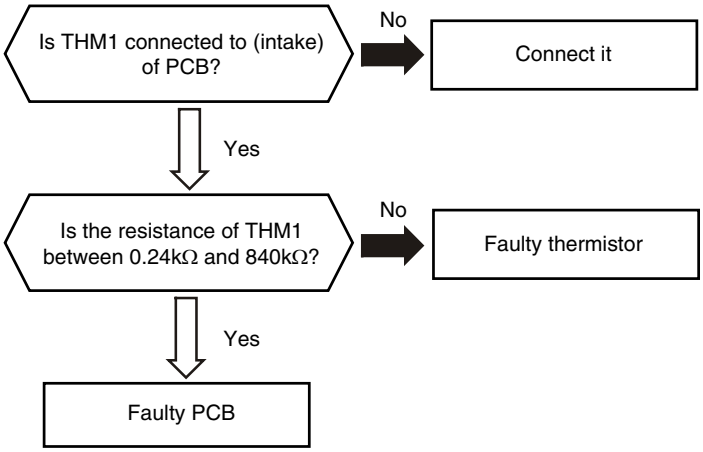
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the temperature of the internal thermostat (ITO1, 2) for the outdoor fan motor is higher than 130 °C.

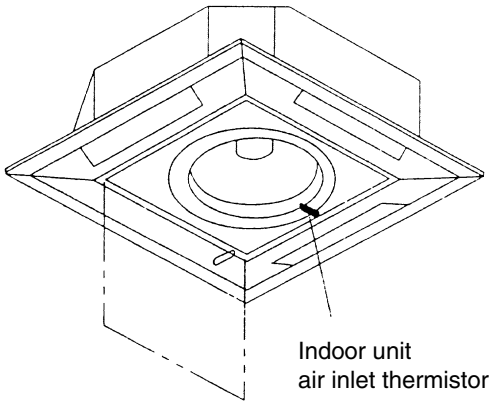


Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Activation of the internal thermostat for the outdoor unit fan motor	Faulty Outdoor Unit Fan Motor		Measure the coil resistance and the insulation resistance	Replace the motor if faulty
	Faulty internal thermostat	Fault	Check the continuity after the fan motor temperature decreases to the room temp.	Replace the fan motor if no continuity of the internal thermostat under 83 °C
		Insufficient contacting	Measure the resistance by means of the tester	Correct Looseness. Replace the connectors
		Incorrect connection	Check the connections	Repair the connections

Alarm code	Abnormal operation of thermistor for the indoor unit air inlet temperature (air inlet thermistor)
00	

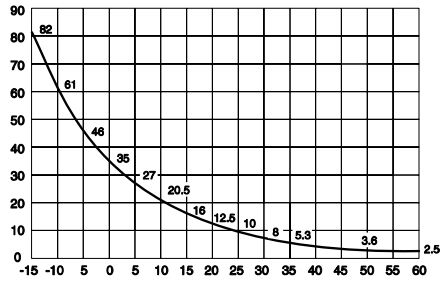
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling process or the heating process. The system is automatically restarted when the fault is removed.





In case of 4-Way Cassette

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty air inlet thermistor	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect connection	Check the connection	Repair the wiring and the connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty

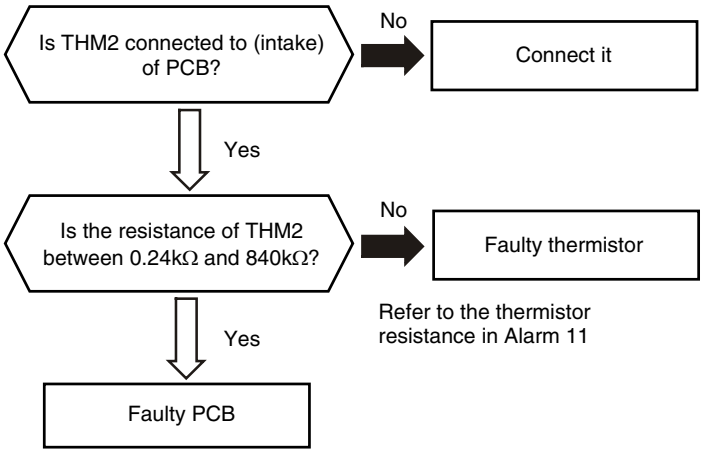


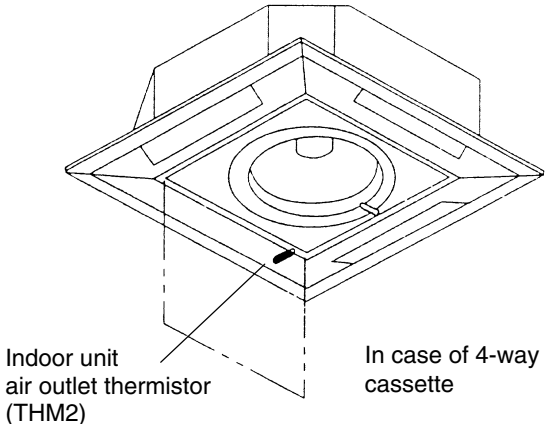
Thermistor characteristics

NOTE:
This data is applicable to the following thermistors:
1. *Indoor unit discharge air temperature,*
2. *Indoor unit liquid refrigerant temperature*
3. *Indoor unit air inlet temperature*
4. *Outdoor temperature*
5. *Outdoor unit evaporating temperature*
6. *Indoor unit gas piping*

Alarm code	Abnormal operation of the thermistor for the indoor discharge air temperature (air outlet thermistor)
01	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling process or the heating process. The system is automatically restarted when the fault is removed.

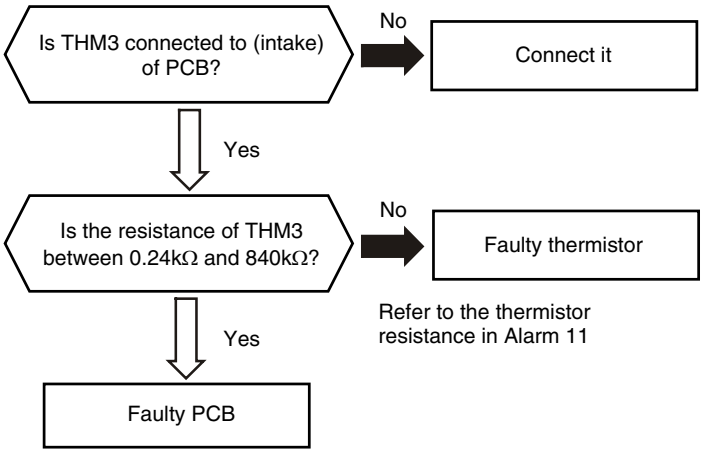


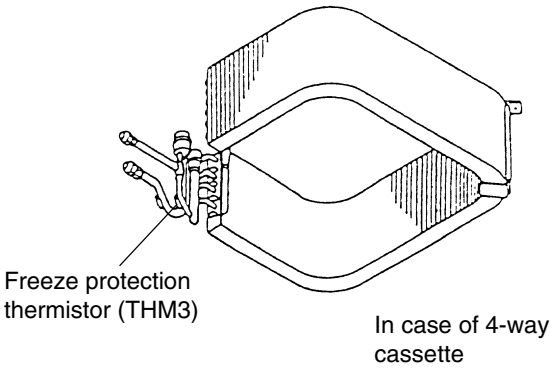


Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty air outlet thermistor	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect connection	Check the connection	Repair the wiring and connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty

Alarm code	Abnormal operation of the thermistor for the indoor unit heat exchanger liquid pipe temperature (freeze protection thermistor)
02	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling process or the heating process. The system is automatically restarted when the fault is removed.

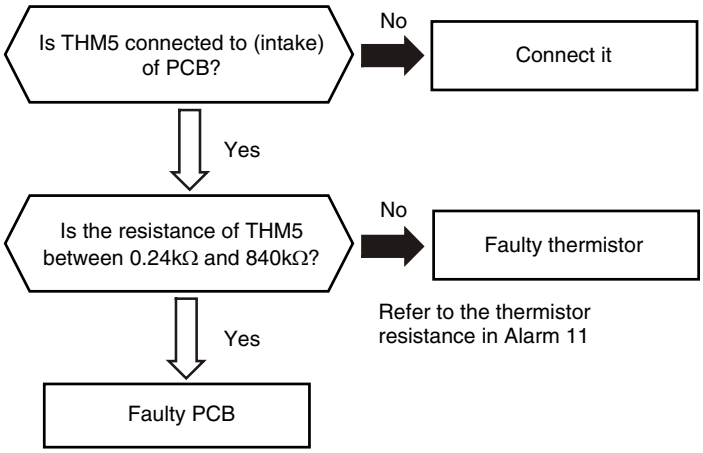


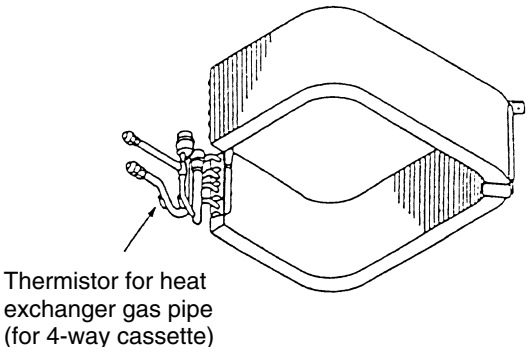


Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty I.U. gas pipe air inlet thermistor	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect connection	Check the connection	Repair the wiring and connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty

Alarm code	Abnormal operation of the thermistor for the indoor unit heat exchanger gas pipe temperature (gas piping thermistor)
03	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling process or the heating process. The system is automatically restarted when the fault is removed.

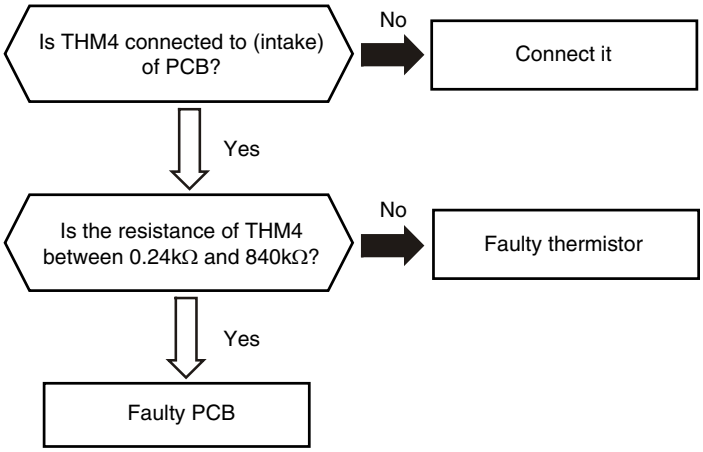


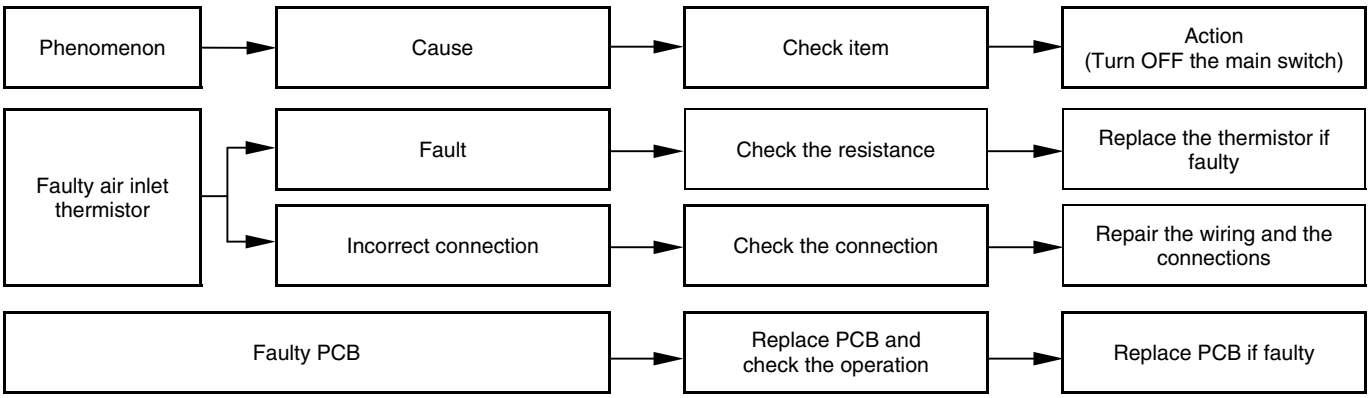


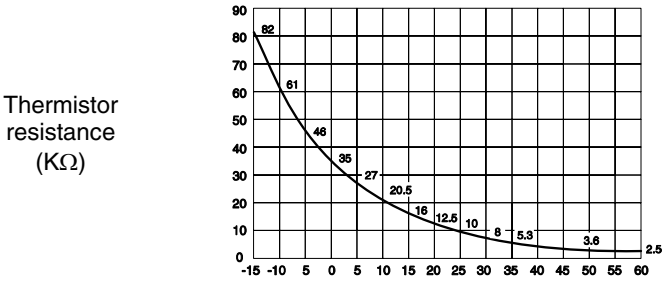
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty air inlet thermistor	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect connection	Check the connection	Repair the wiring and the connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty

Alarm code	Abnormal operation of thermistor for fresh outdoor air (Econofresh)
04	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling process or the heating process. The system is automatically restarted when the fault is removed.





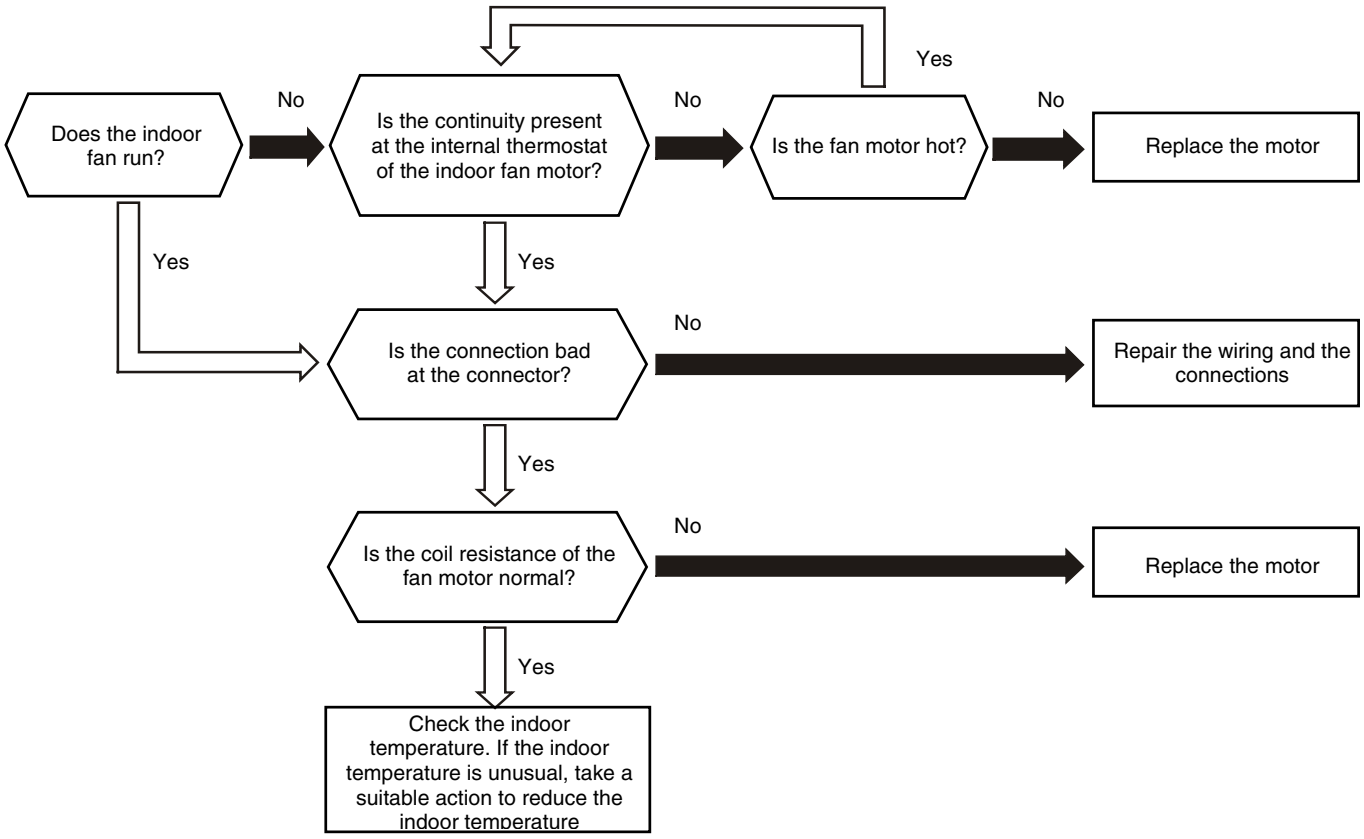


Thermistor characteristics

NOTE:
This data is applicable to the following thermistors:
1. *Indoor unit discharge air temperature,*
2. *Indoor unit liquid refrigerant temperature*
3. *Indoor unit air inlet temperature*
4. *Outdoor temperature*
5. *Outdoor unit evaporating temperature*
6. *Indoor unit gas piping*

Alarm code	Activation of the protection device for the indoor fan motor (except RPK-Model 0.8-2.0 HP)
08	

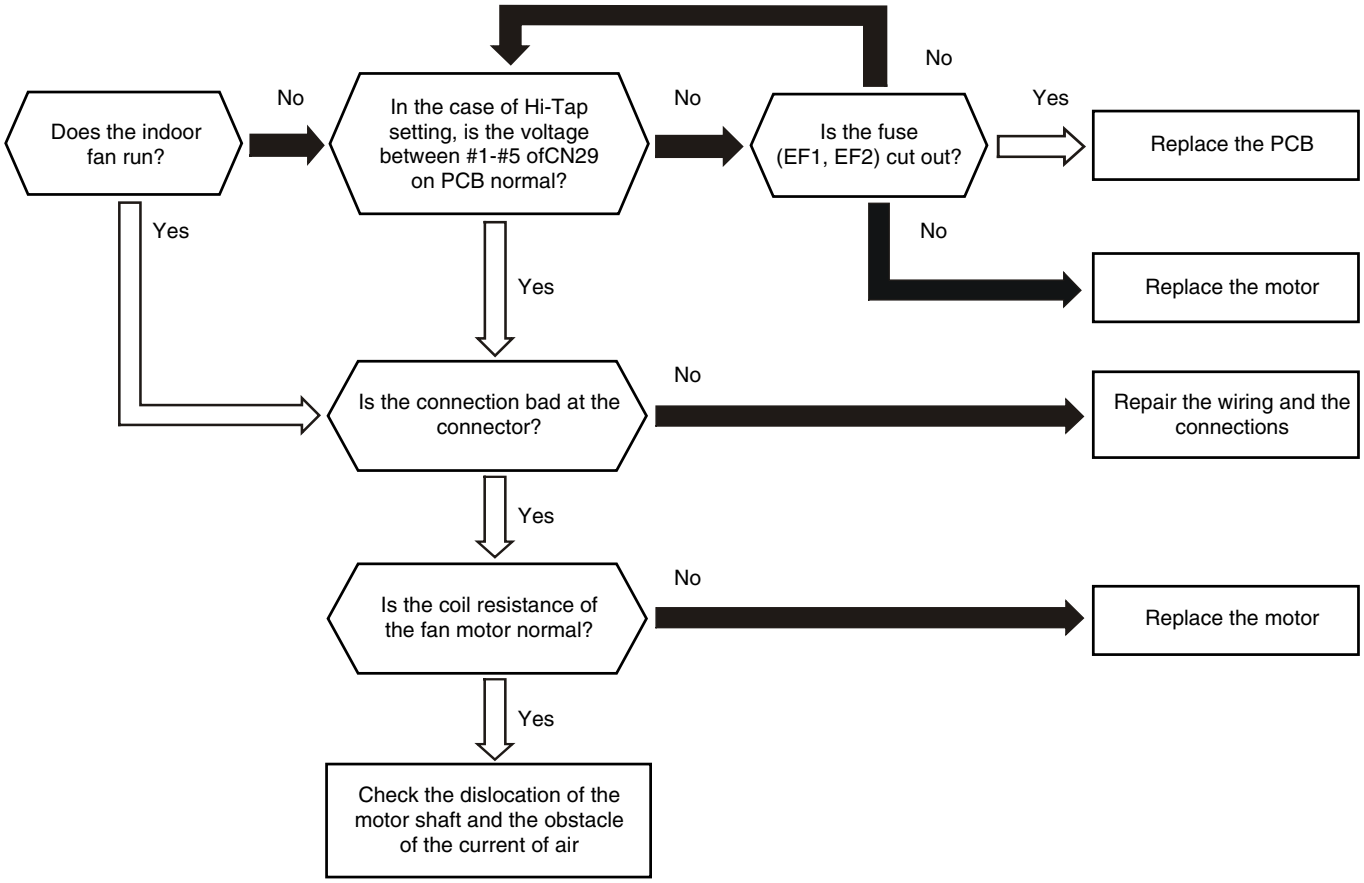
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the temperature of the internal thermostat for the indoor fan motor is higher than 130 °C.



Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Activation of the internal thermostat for the indoor unit fan motor	Faulty indoor unit fan motor		Measure the coil resistance and the insulation resistance	Replace the motor if faulty
	Faulty internal thermostat	Fault	Check the continuity after the fan motor temperature decreases to room temp	Replace the fan motor if there is no continuity
		Insufficient contacting	Measure the resistance by means of the tester	Correct looseness. Replace the connectors
		Incorrect connection	Check the connections	Repair the connections

Alarm code	Activation of protection device for indoor fan motor (RPK-Model)
08	

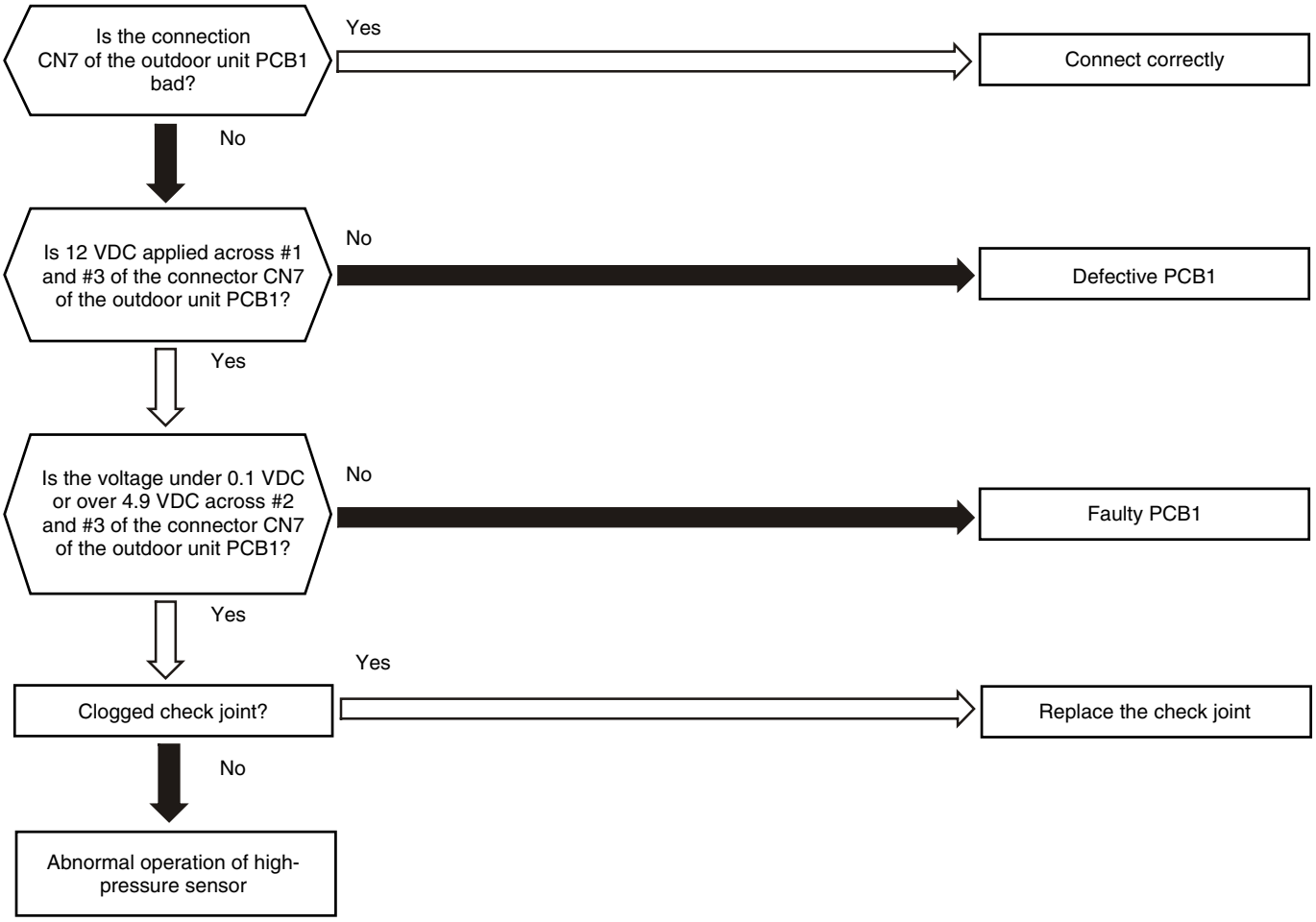
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  ✶ This alarm code is displayed when the running current of the indoor fan motor is higher than 1A.



Phenomenon	Cause		Check item	Action (Turn OFF the main switch)
Activation of the overcurrent protection device for the indoor fan motor	Faulty indoor unit fan motor		Measure the coil resistance and the insulation resistance	Replace the motor if faulty
	Faulty PCB	Fault	Check the output voltage and the fuse in the case of Hi-Tap setting	Replace the fan motor if there is no continuity
		Insufficient contacting	Measure the resistance by means of the tester	Correct looseness. Replace the connectors
		Incorrect connection	Check the connections	Repair the connections

Alarm code	Abnormal operation of the high-pressure sensor for the outdoor unit
10	

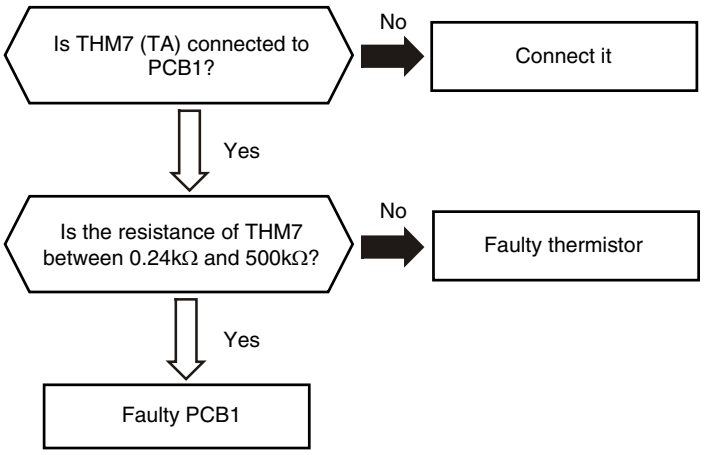
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the pressure sensor voltage decreases lower than 0.1 V or increases higher than 4.9V during the operation.

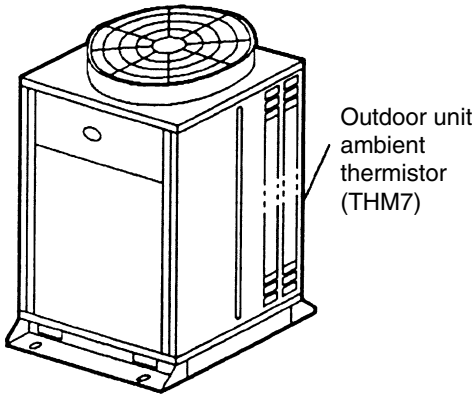


Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty high-pressure sensor	Fault	Check that the output voltage is correct	Replace the pressure sensor if faulty
	Incorrect connection	Check the connections	Repair the wiring and the connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty
Indicated pressure value is excessively high or low	Malfunction of the pressure sensor due to a faulty check joint	Check the check joint for clogging	Replace the check joint

Alarm code	Abnormal operation of the thermistor for the outdoor temperature (outdoor unit ambient thermistor)
11	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the thermistor is short-circuited (less than 0.2 kΩ) or cut (greater than 500 kΩ) during the operation. However, this alarm occurs during the test run mode only. In the case that the thermistor is abnormal during the operation, the operation continues based on the assumption that the outdoor temperature is 35 °C (Cooling) / 6 °C (Heating).

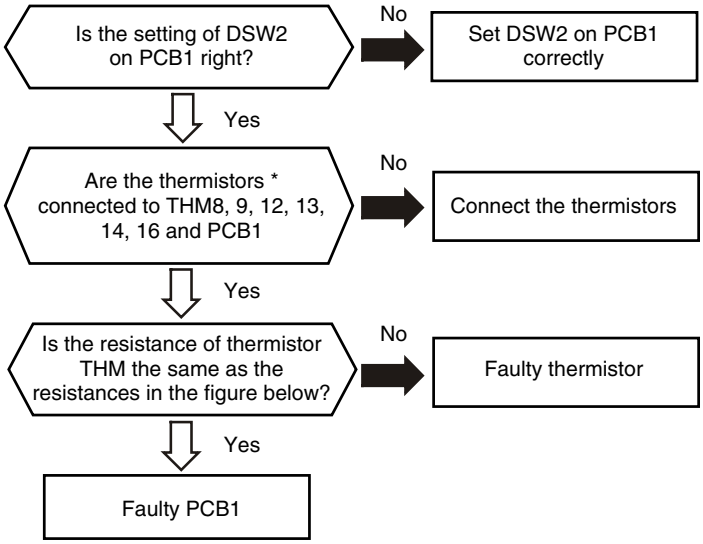




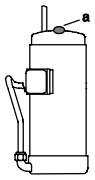
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty thermistor for the outdoor unit ambient	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect connection	Check the wiring to PCB	Repair the wiring and the connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty

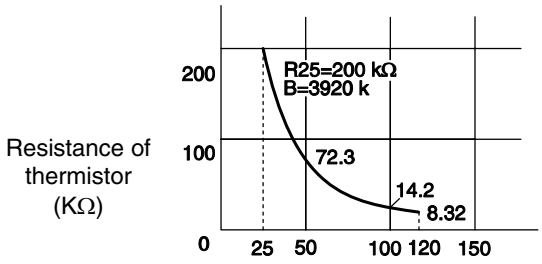
Alarm code	Abnormal operation of thermistor for discharge gas temperature on the top of compressor chamber
12	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB. (*1)
  If you find an abnormal operation of the thermistor, check all the thermistors as shown below.
  ✶ This alarm code is displayed when the thermistor is short-circuited (less than 0.9 kΩ) for one second or cut (greater than 5946 kΩ) during the operation.



Position of the Thermistor

Thermistor ref.	Display	Model RAS-[HP]FSN 5	8	10	16	20	24	30	Thermistor position (a)
THM8	b0	Inverter							
THM9	b1		fix compressor						
THM12	b2								
THM13	b3								
THM14	b4								
THM16	b5								
No. of compressors		1	2	2	3	4	5	6	



0	1	2	Faulty Td1
1	1	2	Faulty Td2
2	1	2	Faulty Td3
3	1	2	Faulty Td4
4	1	2	Faulty Td5
5	1	2	Faulty Td6

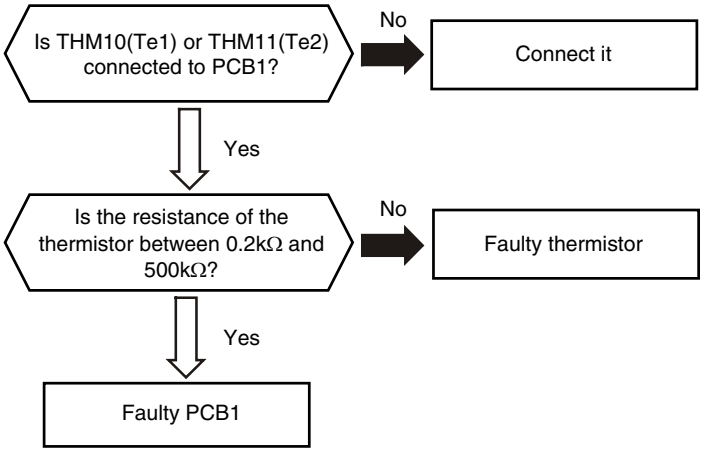
Characteristics of Thermistor

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

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty discharge gas thermistor	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect connection	Check the wiring to PCB	Repair the wiring and the connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty
Incorrect setting of DSW2 on PCB1		Check the setting of DSW2 on PCB1	Correctly set DSW2 on PCB1

Alarm code	Abnormal operation of the thermistor for the evaporating temperature during the heating process (outdoor unit)
13	

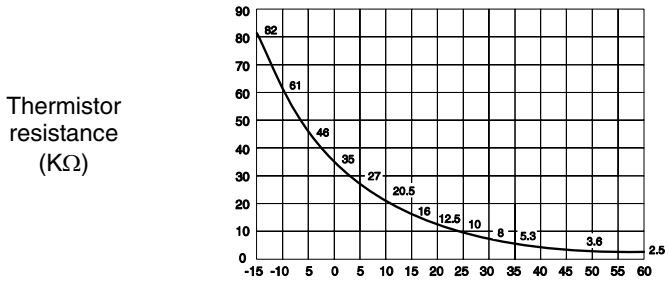
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB. (*1)
  If you find an abnormal operation of the thermistor, check all the thermistors as shown below.
  ✶ The evaporating thermistor during the heating process is attached to the heat exchanger as shown in the figure below.
  If thIs the thermistor is faulty, such as short-circuit (less than 0,2kΩ) or cut (more than 840kΩ) during eight minutes continuously, this alarm is displayed. The position is indicated below.



0 1 3	Faulty Te1
1 1 3	Faulty Te2

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

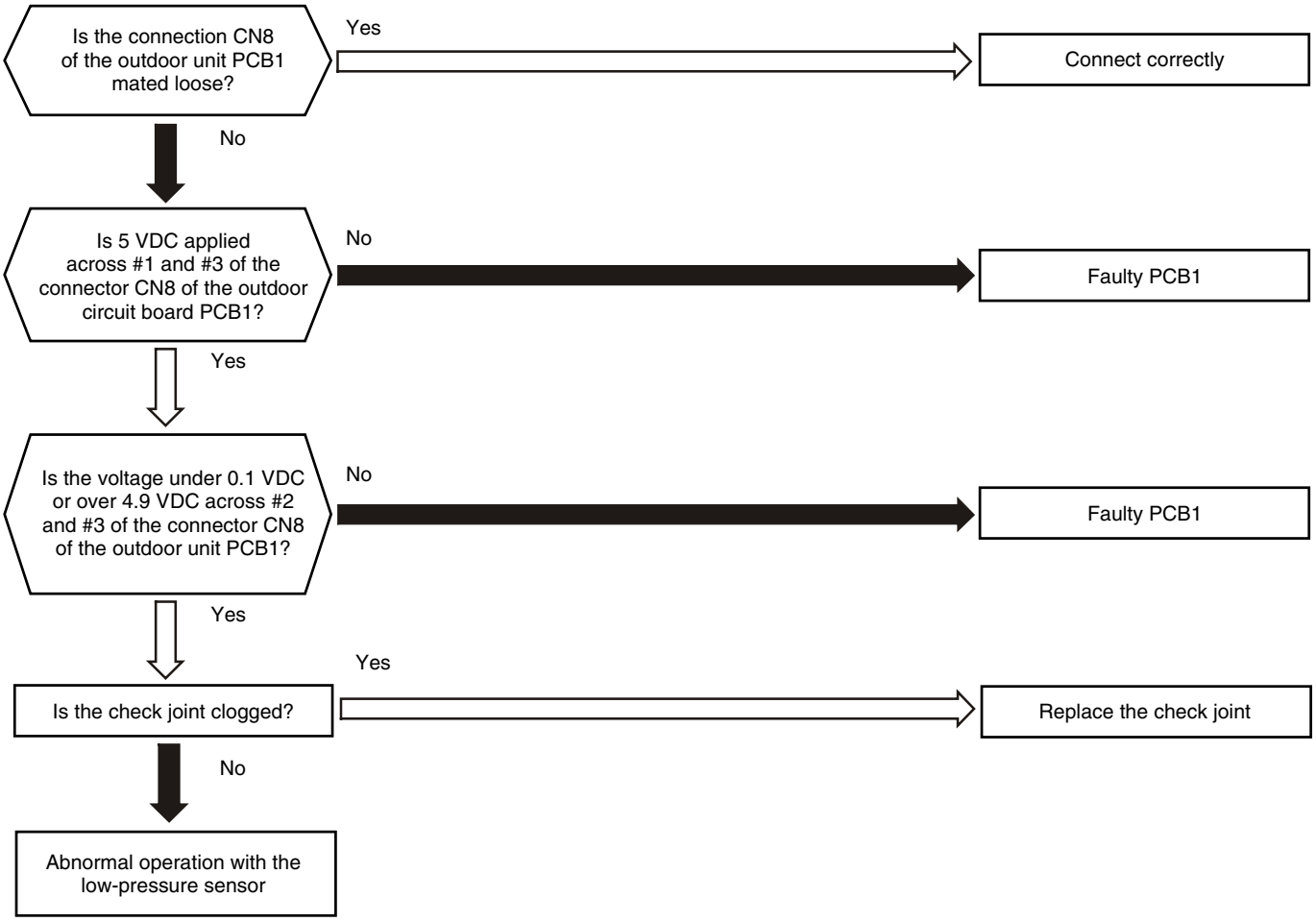
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty thermistor for the evaporating temperature during heating	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect Connection	Check the wiring to PCB	Repair the wiring and the connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty



Thermistor characteristics

Alarm code	
18	**Abnormal operation of the low-pressure sensor for the outdoor unit**

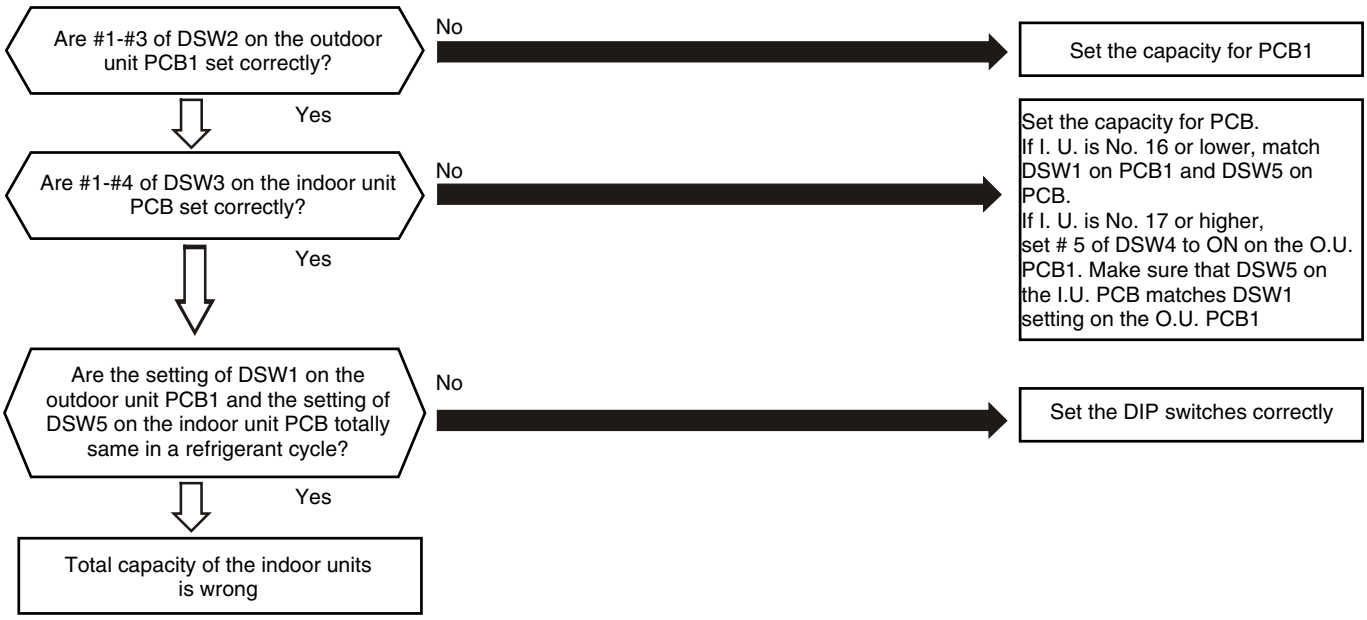
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the pressure sensor voltage decreases lower than 0.1 V or increases higher than 4.9V during the operation.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty high-pressure sensor	Fault	Check that the output voltage is correct	Replace the pressure sensor if faulty
	Incorrect connection	Check the connections	Repair the wiring and the connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty
Indicated pressure value is excessively high or low	Malfunction of the pressure sensor due to a faulty check joint	Check the check joint for clogging	Replace the check joint

Alarm code	Incorrect capacity setting or combined capacity between the indoor units and the outdoor unit
20	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the DSW2 (DIP switch for the capacity setting) on the outdoor unit PCB1 is not set (all the settings from #1 to #3 are at the OFF side) or when the DSW2 has not been correctly set.
  - ✶ This alarm code is displayed when the total indoor unit capacity is smaller than 50% or greater than 150% of the combined outdoor unit capacity.



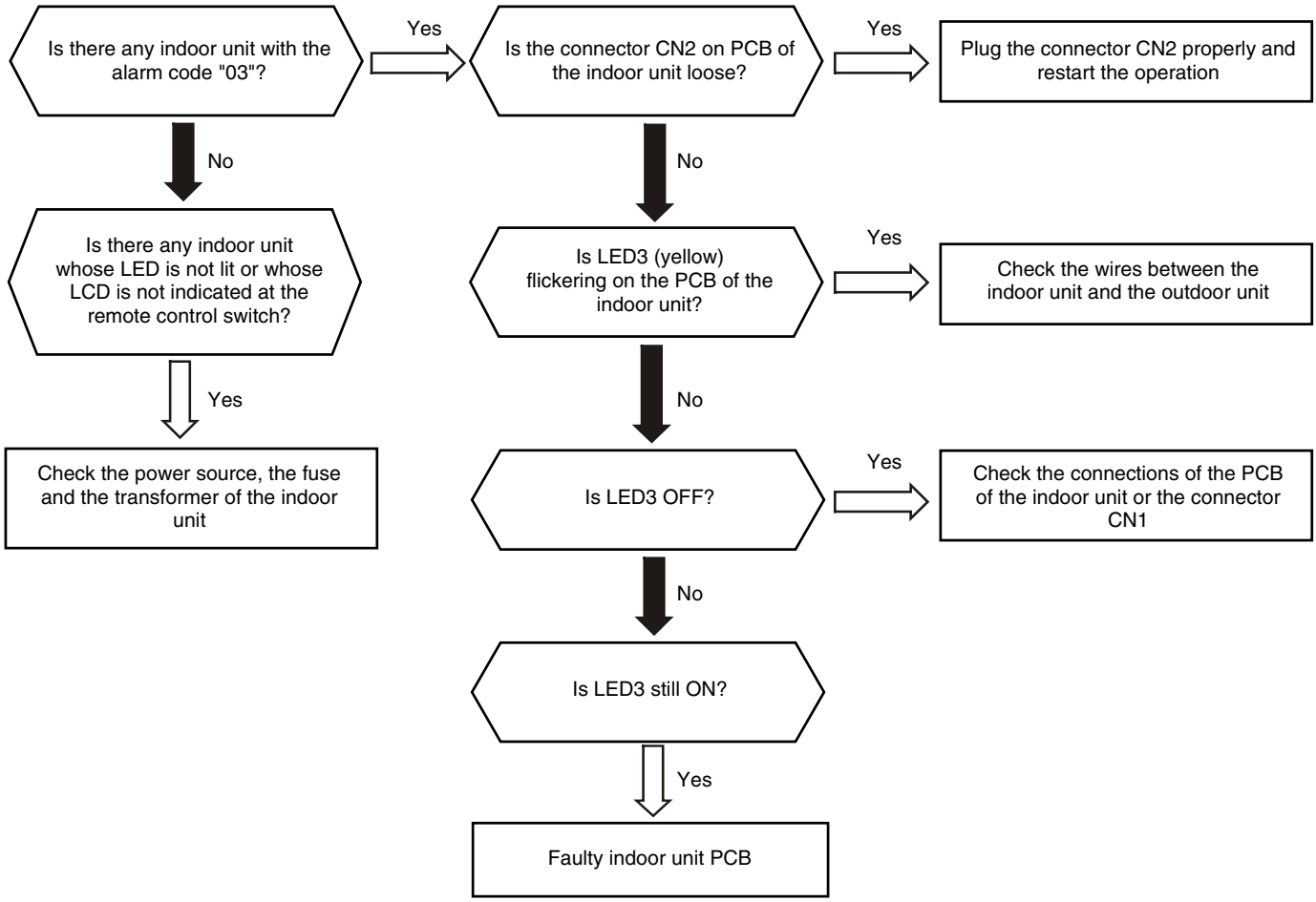
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Incorrect capacity setting of the indoor unit		Check the combination of the indoor units and the capacity setting on PCB	Correctly set the DIP switch DSW3
Incorrect capacity setting of the outdoor unit		Check the capacity setting on the outdoor unit PCB	Correctly set the DIP switch DSW2
Total indoor unit capacity that is connected to the outdoor unit is beyond the permissible range		Check the outdoor unit model by calculating the total indoor unit capacity	Make sure that the total indoor unit capacity is from 50% to 130%
Refrigerant cycle setting of the outdoor unit and the indoor unit is different		Check the refrigerant cycle setting on outdoor unit PCB and indoor unit PCB	Set them correctly. Match DSW1 on outdoor PCB and DSW5 on indoor PCB

Combination

Outdoor unit model	Combined indoor unit		Notes
	Total quantity *1)	Total capacity (HP)	
RAS-5FSN	1~8	2.5-6.5	*1): If the capacity of one indoor unit is the same as the capacity of the outdoor unit, the system can operate.
RAS-8FSN	2~13	4.0-10.4	
RAS-10FSN	2~16	5.0-13.0	
RAS-16FSN	2~20	8.0-20.8	
RAS-20FSN	2~20	10.0-26.0	
RAS-24FSN	2~27	12.0-31.2	
RAS-30 FSN	2~32	15.0-39.0	

Alarm code	Abnormal operation in the transmission of other indoor units
21	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed on the remote control switch of other indoor unit when no transmission data is issued from a malfunctioning indoor unit for more than 60 minutes after receiving the transmission data from the indoor unit.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Abnormal transmission from other units	Abnormal Transmission Indoor unit→Outdoor unit Outdoor unit→Indoor unit	Check the indoor unit with the alarm code "03"	Take action according to the information on pages 8-19 to 8-21
	Incorrect power supply (to the indoor unit) *1)	Check the indoor unit with no light ON on the remote control switch	Take action according to the information on pages 8-5 to 8-6
	Faulty indoor unit PCB	If all the indoor units display alarm code "32", check PCB by means of the self-check mode for all indoor units	Replace PCB if faulty

*1): This abnormal operation is displayed on an indoor unit which is normal, since the malfunction is due to an abnormal operation of the transmission of the indoor units or due to an abnormal operation of the power source in the same refrigerant cycle and electrical system. If the power source is abnormal, the abnormal operation cannot be displayed on its indoor unit. Therefore, this alarm code is displayed on the remote control switch of other normal indoor unit.

Alarm code	
24	**Incorrect indoor unit number setting**

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed five minutes after the power is supplied to the outdoor unit when the indoor unit number which is connected to the outdoor unit is duplicated by the setting of the RSW.

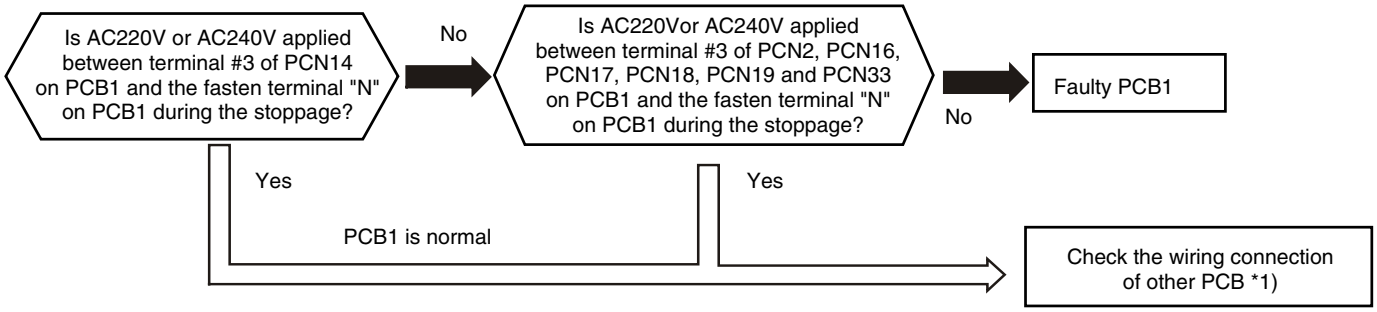
In the case of H-LINK System, this alarm code is displayed when the DSW1 or DSW4 of the outdoor unit PCB and the DSW5 of the indoor unit PCB are incorrectly set.
In this case, correctly set DSW1 or DSW4 on the outdoor unit PCB and DSW5 on the indoor unit PCB after turning off the main switch.

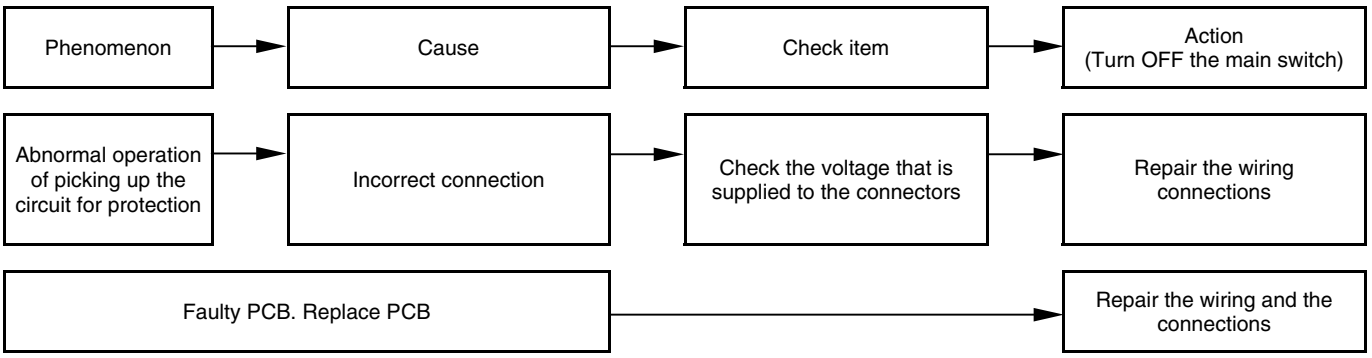
Alarm code	
25	**Incorrect combination of the indoor unit**

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the outdoor unit is connected with another type of indoor unit.

Alarm code	
27	**Abnormal operation of picking up the circuit for the protection (outdoor unit)**

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when AC220V or AC240V is supplied to the voltage between the terminal #3 of PCN14 on PCB1 and the fasten terminal N on PCB1 in the outdoor unit during the inverter compressor stoppage. This alarm code is displayed when no signal is detected for five seconds when the outdoor fan stops.





*1): Check the wiring system that connects to PCN14, PCN2, PCN16, PCN17, PCN18, PCN19 and PCN33 on PCB1.

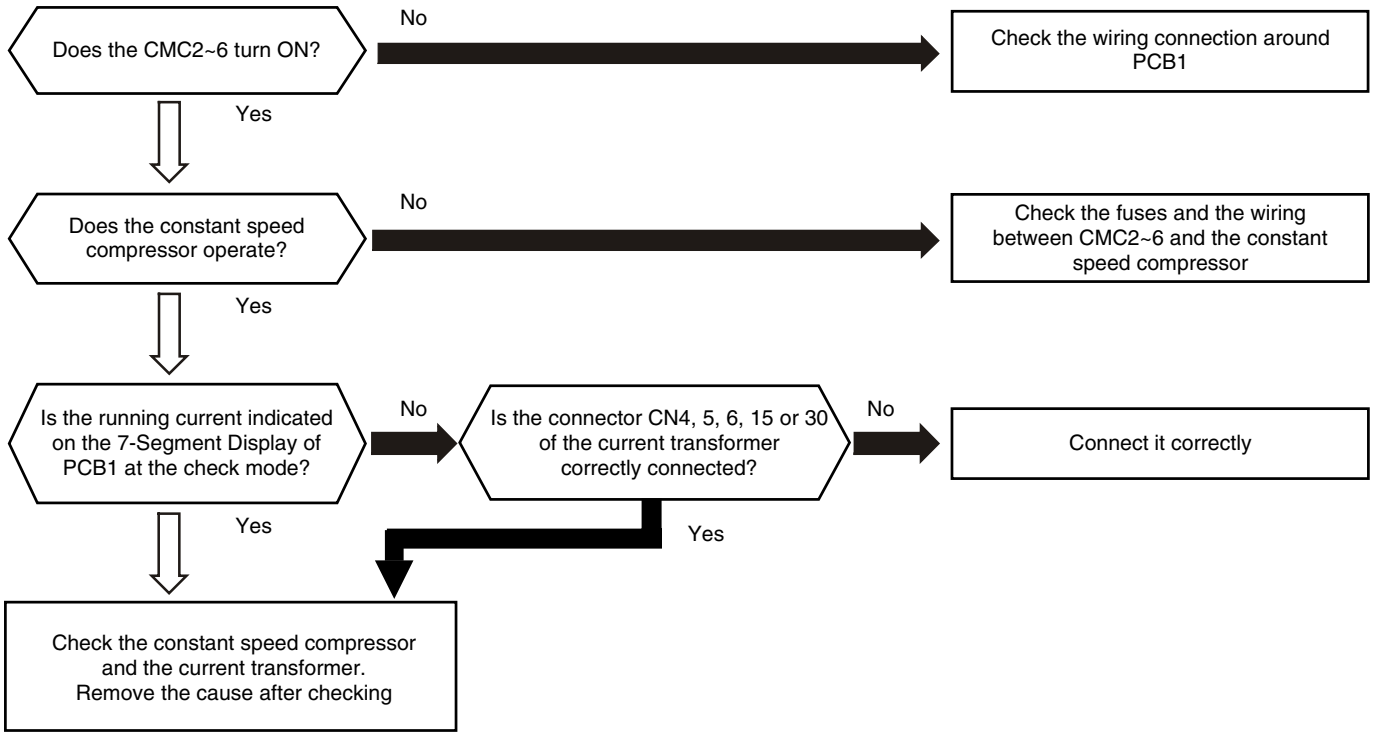
Alarm code	Abnormal operation of the running current at the constant speed compressor
28	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section.
  The unit number and the alarm code are displayed on the display of the outdoor unit PCB.

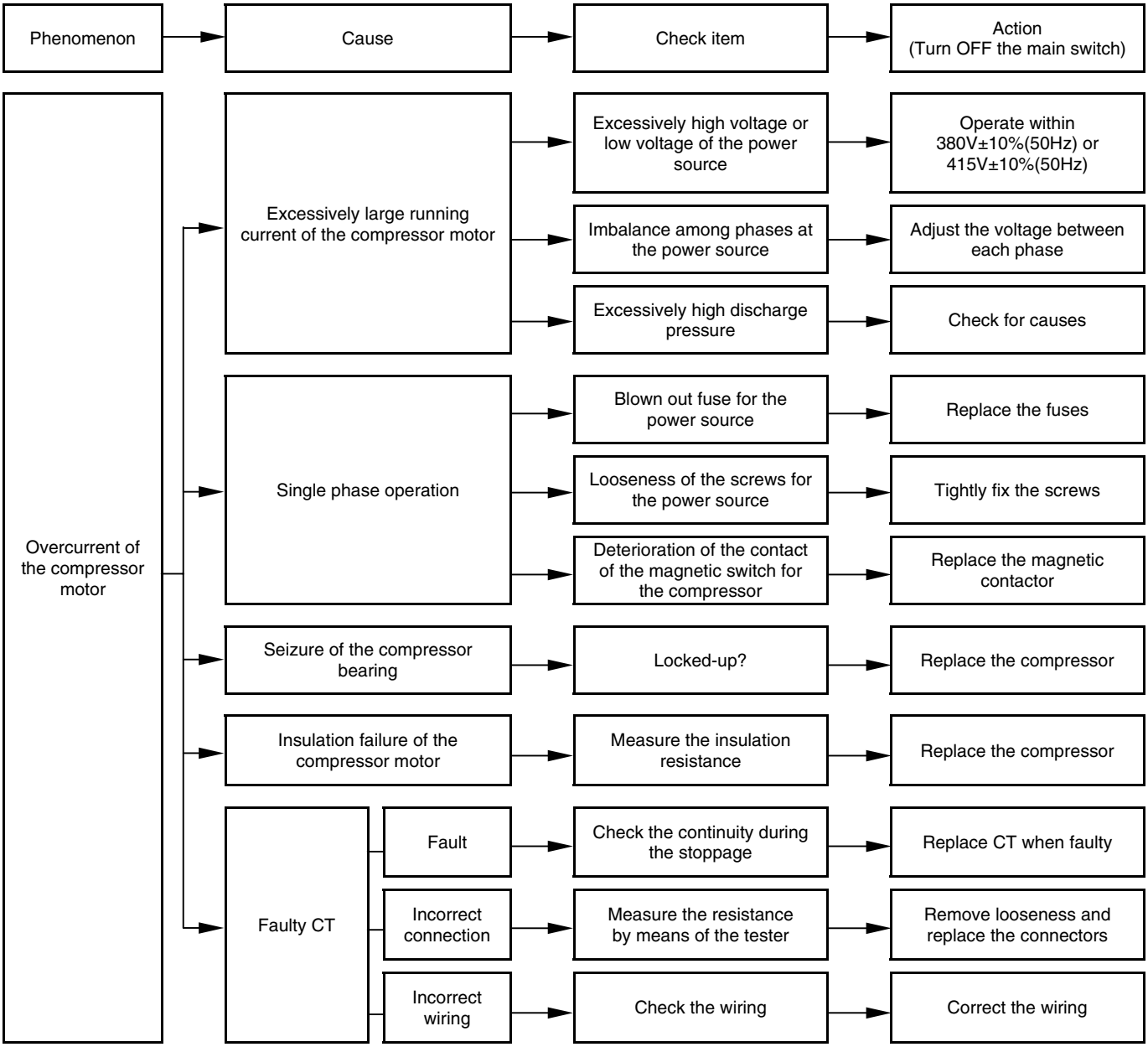
This alarm code is displayed when the following conditions occurs:

The running current of the constant speed compressor exceeds the value of the overcurrent limitation during the operation.

The running current of the constant speed compressor detected is 0A, this value is the same 3 minutes after stopping all the compressors and this phenomenon occurs three times within 30 minutes.

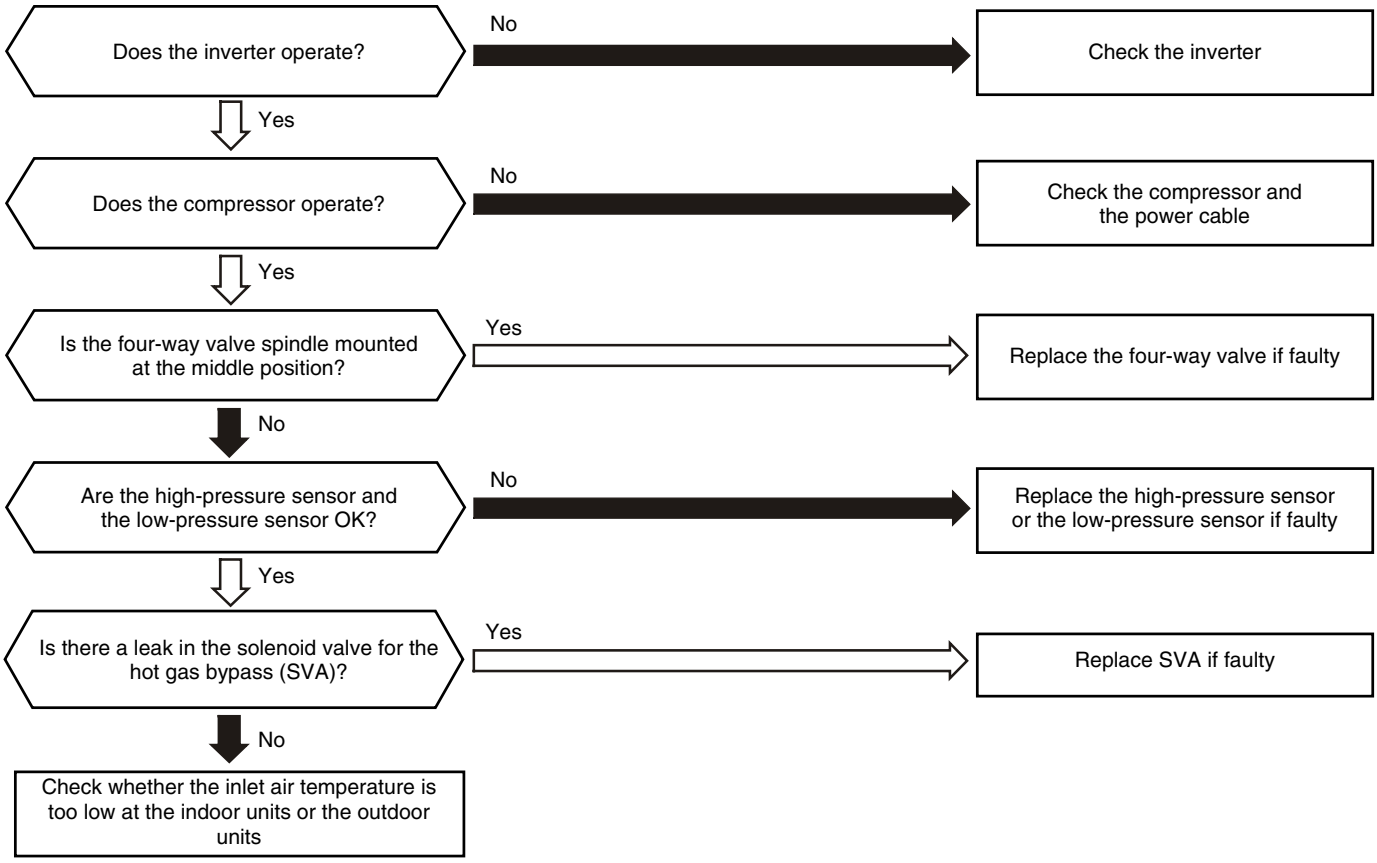


Indication of the 7-segment display	Abnormal operation of the constant speed compressor
128	MC2
228	MC3
328	MC4
428	MC5
528	MC6


Phenomenon
Cause
Check item
Action
(Turn OFF the main switch)
Overcurrent of the compressor motor
Excessively large running current of the compressor motor
Excessively high voltage or low voltage of the power source
Operate within 380V±10%(50Hz) or 415V±10%(50Hz)
Imbalance among phases at the power source
Adjust the voltage between each phase
Excessively high discharge pressure
Check for causes
Single phase operation
Blown out fuse for the power source
Replace the fuses
Looseness of the screws for the power source
Tightly fix the screws
Deterioration of the contact of the magnetic switch for the compressor
Replace the magnetic contactor
Seizure of the compressor bearing
Locked-up?
Replace the compressor
Insulation failure of the compressor motor
Measure the insulation resistance
Replace the compressor
Faulty CT
Fault
Check the continuity during the stoppage
Replace CT when faulty
Incorrect connection
Measure the resistance by means of the tester
Remove looseness and replace the connectors
Incorrect wiring
Check the wiring
Correct the wiring

Alarm code	Activation for protecting the system from the low compression ratio
32	

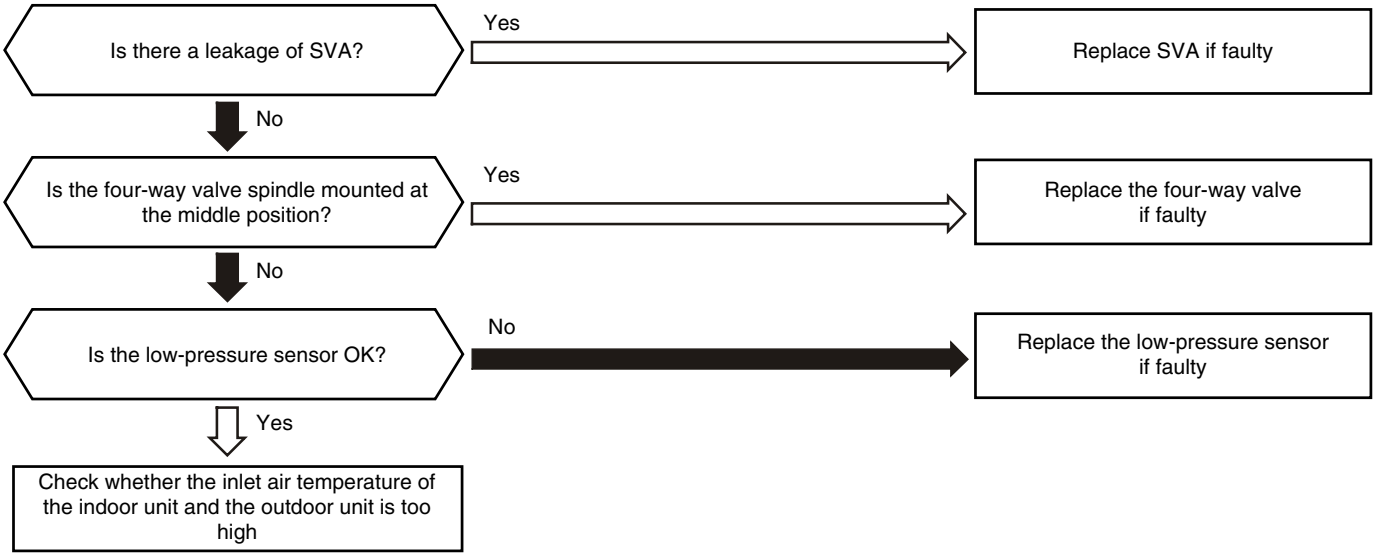
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section, The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when a compression ratio , $\varepsilon=\{(Pd + 0.1) /(Ps + 0.1)\}$ is calculated from a discharge pressure (MPa) and a suction pressure (MPa), and the condition which is lower than $\varepsilon= 1.8$ occurs three or more than three times in 30 minutes.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Excessively low compression ratio	Inverter is not functioning	Check the inverter	Repair the faulty part
	Compressor is not operating	Check the compressor	Replace the comp. if faulty
	Valve stoppage at medium position of 4-way valve	Measure the suction pipe temp. of the 4-way valve	Replace the 4-way valve if faulty
	Abnormal operation of the high-pressure sensor or the low-pressure sensor	Check the connector for PCB, the power source and the pressure indication	Replace the sensor if faulty
	Excessively low air inlet temperature of the indoor unit	Check the indoor unit and the outdoor unit air temp. thermistor	Replace the thermistor if faulty
	Leakage of the solenoid valve (outdoor unit)	Check the solenoid valve	Replace SVA if leaking

Alarm code	
33	**Activation for protecting the system from excessively high suction pressure**

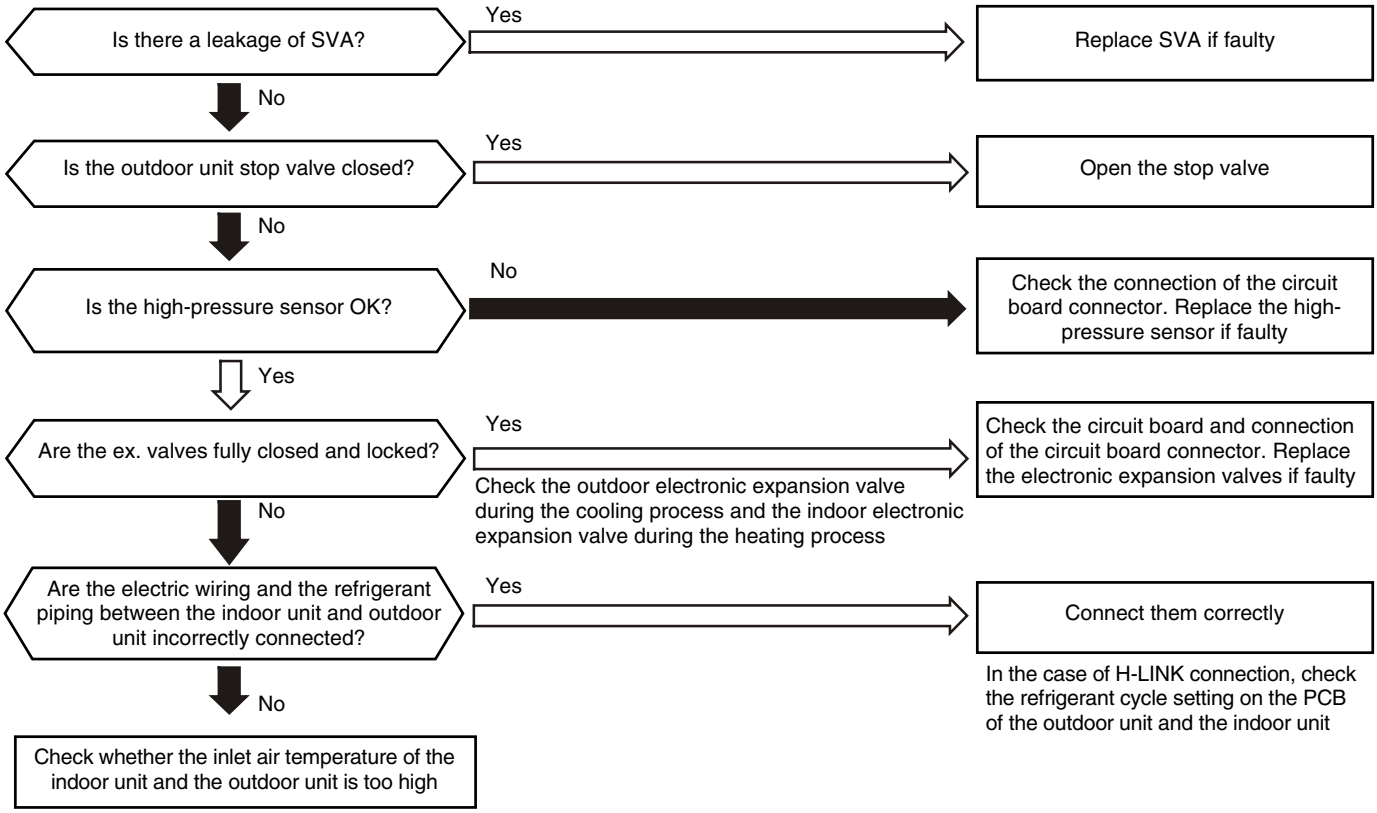
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the compressor is operated under the conditions which are higher than 1.5 MPa of the suction pressure and the alarm has two or more than two occurrences in 30 minutes.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Excessively high suction pressure	Leakage of SVA	Check the outlet pipe temp. of SVA	Check the connect wires. Replace SVA if faulty
	Valve stoppage at the medium position of the 4-way valve	Measure the suction gas temp. of 4-way valve	Replace the 4-way valve if faulty
	Abnormal suction pressure sensor	Check the connectors of PCB and the power source	Replace the sensor if faulty
	Excessively high indoor unit and outdoor unit suction air temperature	Check the indoor unit and the outdoor unit suction air temp. thermistor	Replace the thermistor if faulty

Alarm code	Activation for protecting the system from excessively high discharge pressure
34	

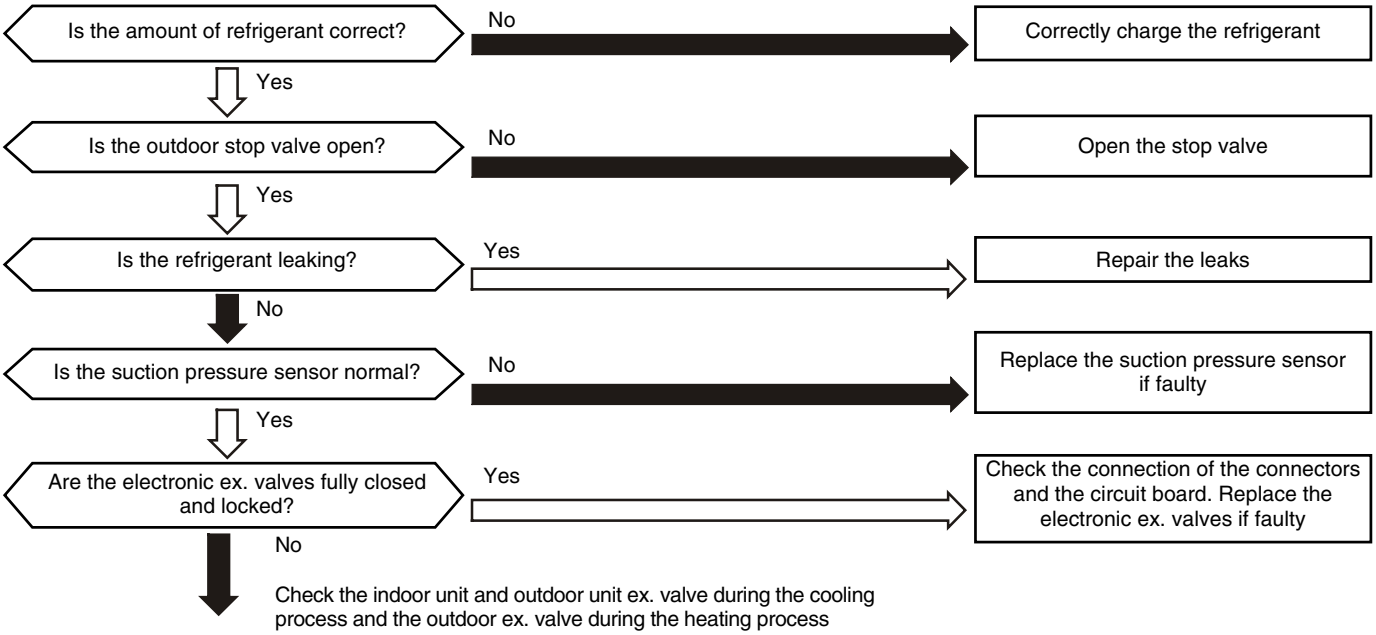
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the compressor is operated under the conditions which are higher than 3.8 MPa of the discharge pressure and the alarm has three or more than three occurrences in 30 minutes.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Excessively high discharge pressure	Leakage of SVA (outdoor unit)	Check the outlet temp. of SVA	Check the connection. Replace SVA if faulty
	Closed stop valve	Check the stop valve	Open the stop valve
	Abnormal high-pressure sensor	Check the connectors for PCB	Replace the pressure sensor if faulty
	Excessively high air inlet temp. of the indoor unit and the outdoor unit	Check the thermistor for inlet air temp. of the indoor unit and the outdoor unit	Replace the thermistor if faulty
	Incorrect connection between indoor unit and outdoor unit	Check electrical system and ref. cycle	Correctly connect
	Locked Ex. valve with fully closed opening	Check the connector for PCB	Repair connector for PCB or ex. valve. Replace it if faulty
Stoppage of the indoor fan <wall type only>	Blown out fuses	Check the continuity of fuses	Replace the fuses
	Faulty PCB	Replace PCB and check the operation	Replace PCB if faulty

Alarm code	Activation for protecting the system from excessively low suction pressure (protection from the vacuum operation)
36	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when a suction pressure is lower than 0.09 MPa (0.9 kg/cm²G) for over 12 minutes and the alarm has three or more than three occurrences in one hour.



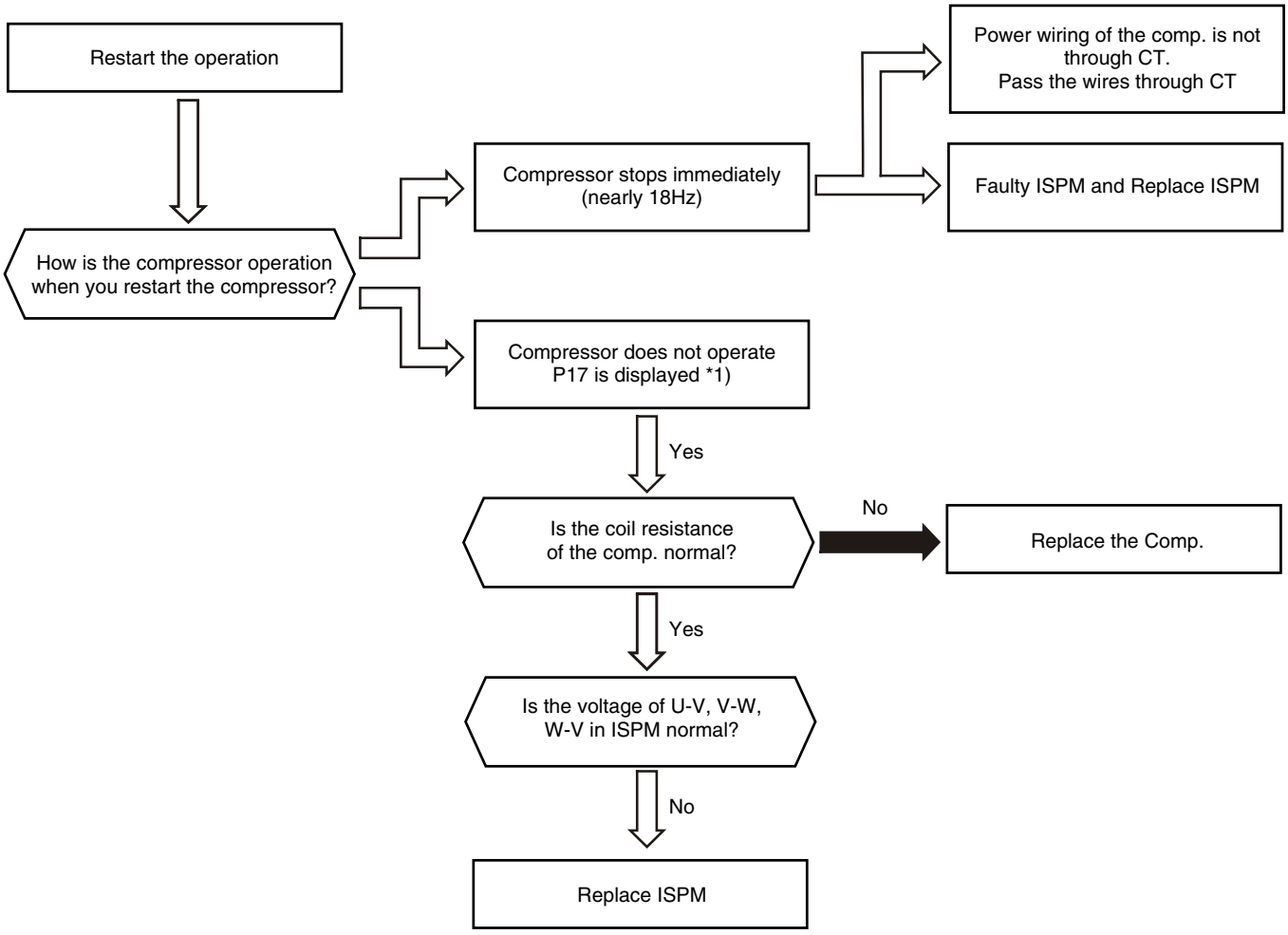
NOTE:
In the case of H-LINK system, check the refrigerant system setting of the outdoor PCB and the indoor PCB.

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Excessively low suction pressure (in vacuum)	Shortage of ref.	Check the volume of charged ref. or check for leakage	Repair the leakage and correctly charge
	Closed stop valve	Check the stop valve	Open the stop valve
	Abnormal low or high-pressure sensor	Check the connector for PCB	Replace the pressure sensor if faulty
	Incorrect connection between the indoor unit and the outdoor unit	Check the electrical system and the ref. cycle	Correctly connect between the indoor unit and the outdoor unit
	Locked Ex. valve	Check the connector for PCB	Repair or replace the connector of PCB or the ex. valve
Internal Thermostat for Outdoor Fan is Activated in Heating process	Faulty outdoor fan motor	Measure the coil resistance and the insulation resistance	Replace the outdoor fan motor if faulty
	Faulty internal thermostat: Fault	Check for the conduction after the temperature of the outdoor fan motor is decreased	Replace the outdoor fan motor
	Faulty internal thermostat: Incorrect contact	Measure the resistance by means of the tester	Remove looseness and Replace the connector
	Faulty internal thermostat: Incorrect connection	Check the connection	Connect correctly

Alarm code	Abnormal operation of the current transformer (0a detection)
40	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the current transformer is abnormal (0A detection or 5A alarm condition) and the alarm has more than three occurrences in 30 minutes.

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



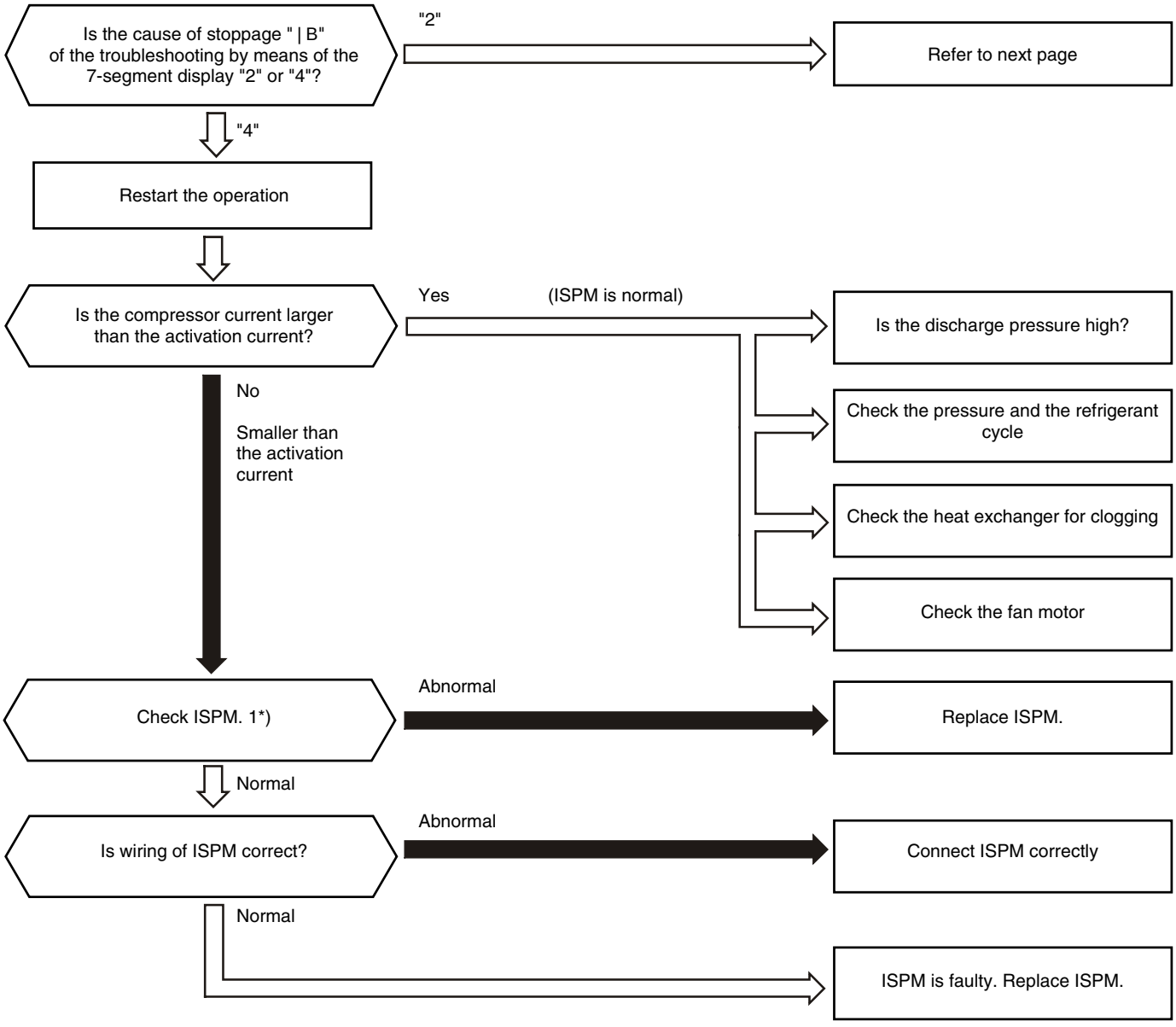
*1): P17 is displayed on the 7-segment display on the outdoor unit PCB.

Alarm code	
41	**Activation for protecting the inverter against the instantaneous overcurrent (1)**

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the electronic thermal relay for the inverter is activated six or more than six times in 30 minutes. The retry operation is performed five times.
  - ✶ This alarm code is displayed when the electronic thermal relay for the inverter is activated 6 times in 30 minutes. Two retries are performed.
    Conditions: The inverter current with 105% of the rated current ① runs continuously for 30 seconds or ② runs intermittently and the accumulated time reaches up to three minutes, in ten minutes.

Current values appear in the next table:

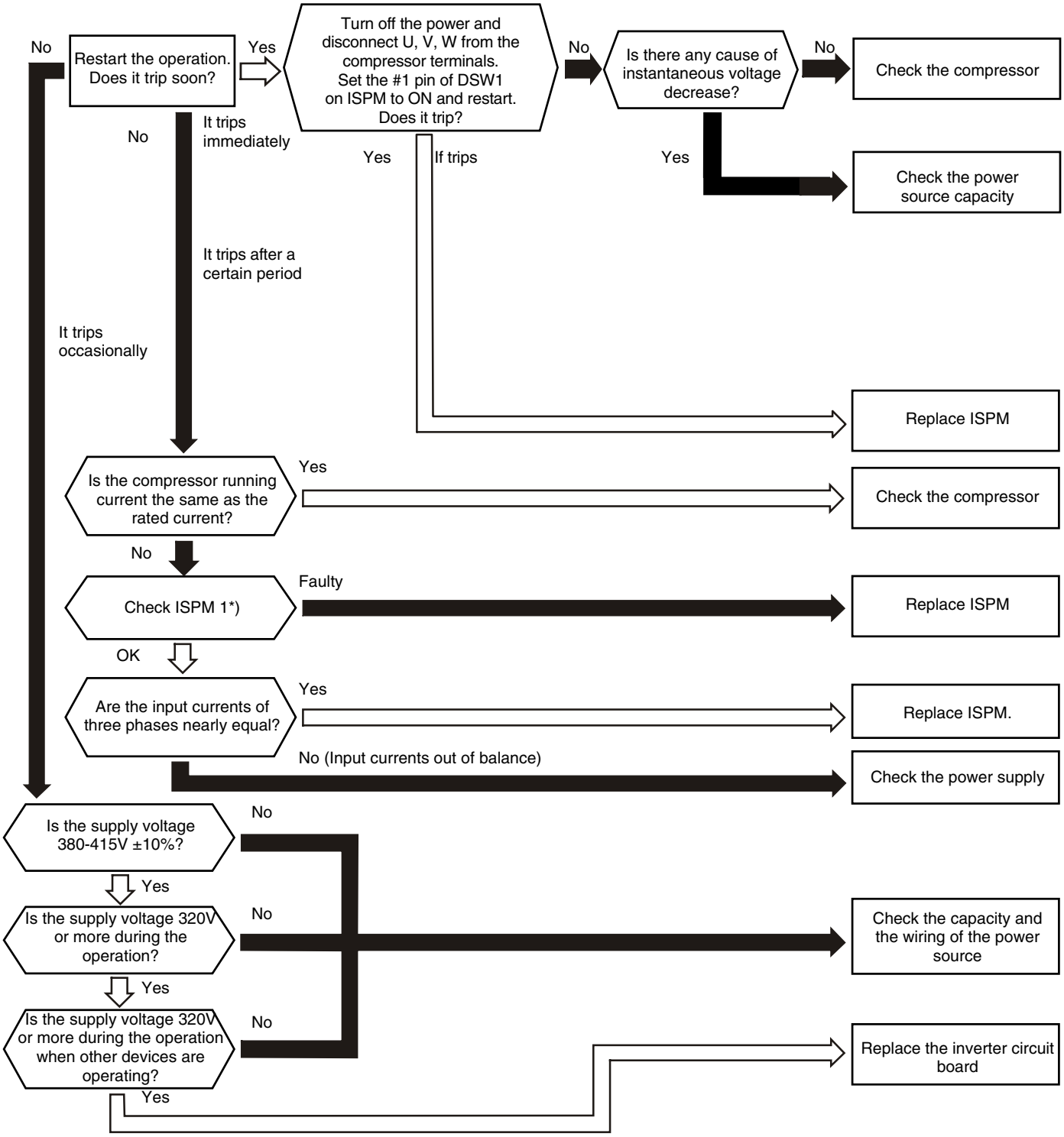
Model	Rated current
	380-415V 50Hz
RAS-5FSN	12.5A
RAS-8-30FSN	13.5A



*1): Regarding the checking of inverter components, refer to item 8.3.4.

Alarm code	Activation for protecting the inverter against the instantaneous overcurrent (2)
41	

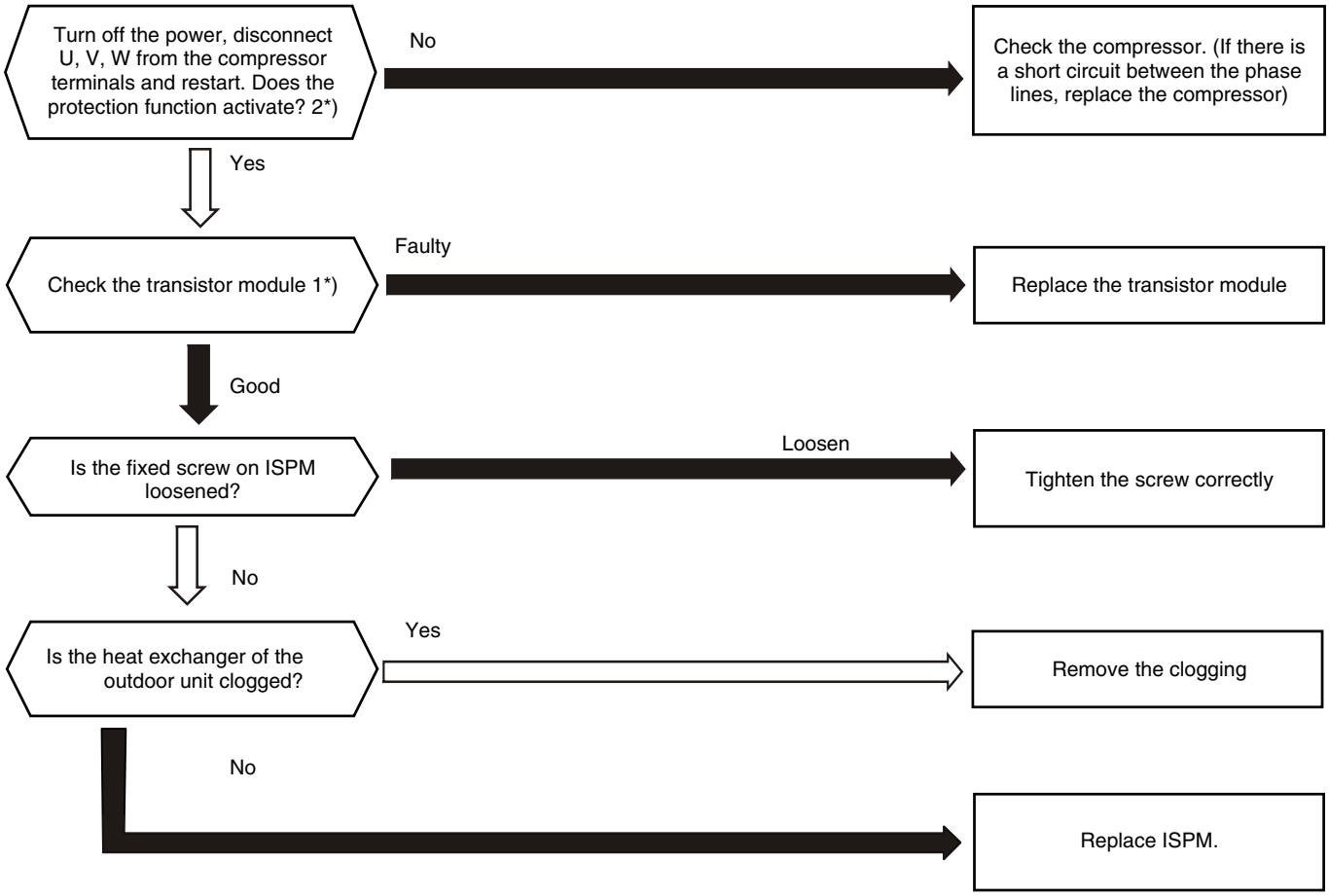
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the instantaneous overcurrent tripping occurs six times or more than six times in 30 minutes. The retry operation is performed twice.
  - ✶ This alarm code is displayed when the electronic thermal relay for the inverter is activated 6 times in 30 minutes. Two retries are performed.
    Conditions: the inverter current is 105% of the rated current during 30 seconds continuously or intermittently, and the accumulated time is more than three minutes during ten minutes. The inverter current is 150% or greater of the rated current.



1*): Regarding the checking of inverter components, refer to item 8.3.4.

Alarm code	Activation for protecting the ISPM
42	

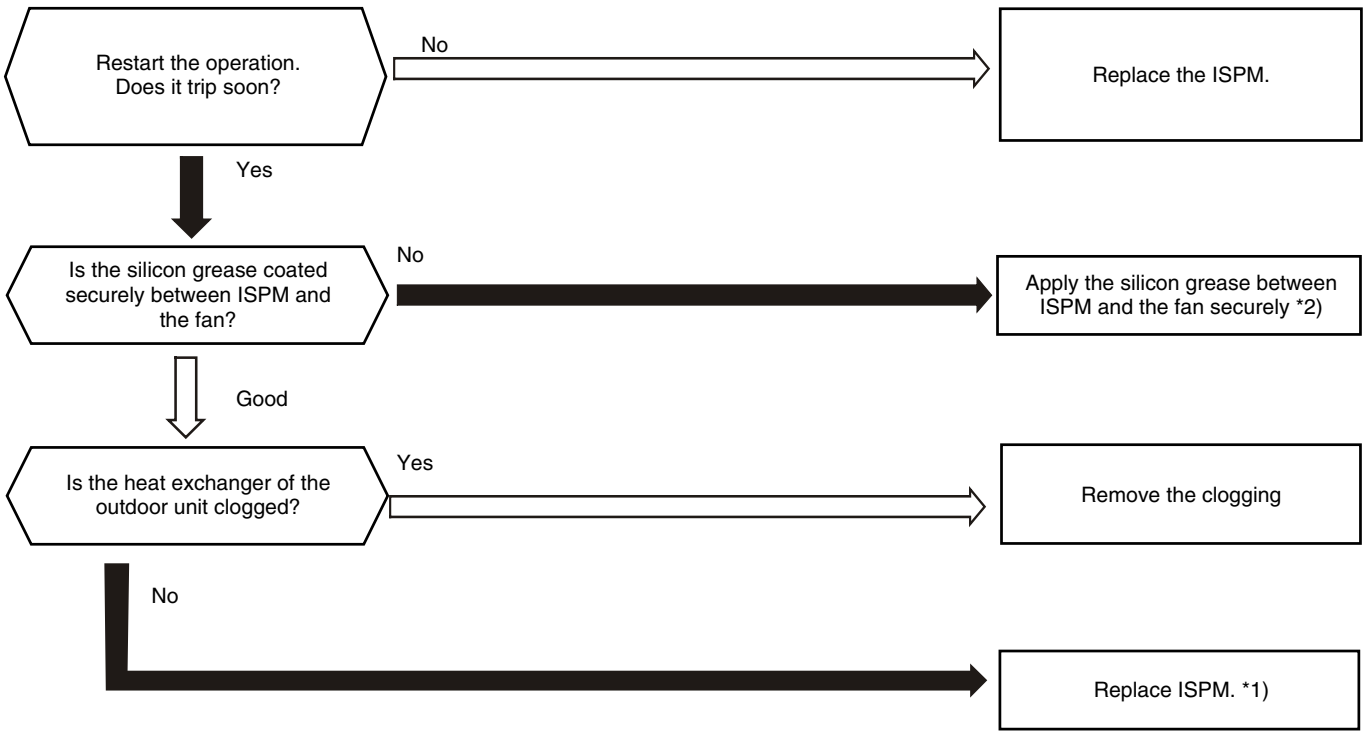
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ ISPM has a detection function of the abnormal operation. This alarm is displayed when the ISPM module detects the abnormal operation 7 times or more than 7 times in 30 minutes. The retry operation is performed six times.
    Conditions: the abnormal current to the ISPM, such as short-circuited, grounded, overcurrent or control voltage decrease.



1*): Regarding replacing or checking method for the ISPM refer to item 8.3.4.
2*): Set the #1 pin of DIP switch DSW1 on ISPM to ON when you are restarting with the terminals of the compressor disconnected. After the troubleshooting, set the #1 pin of DIP switch DSW1 on ISPM to OFF.

Alarm code	Increase in the inverter fan temperature
43	

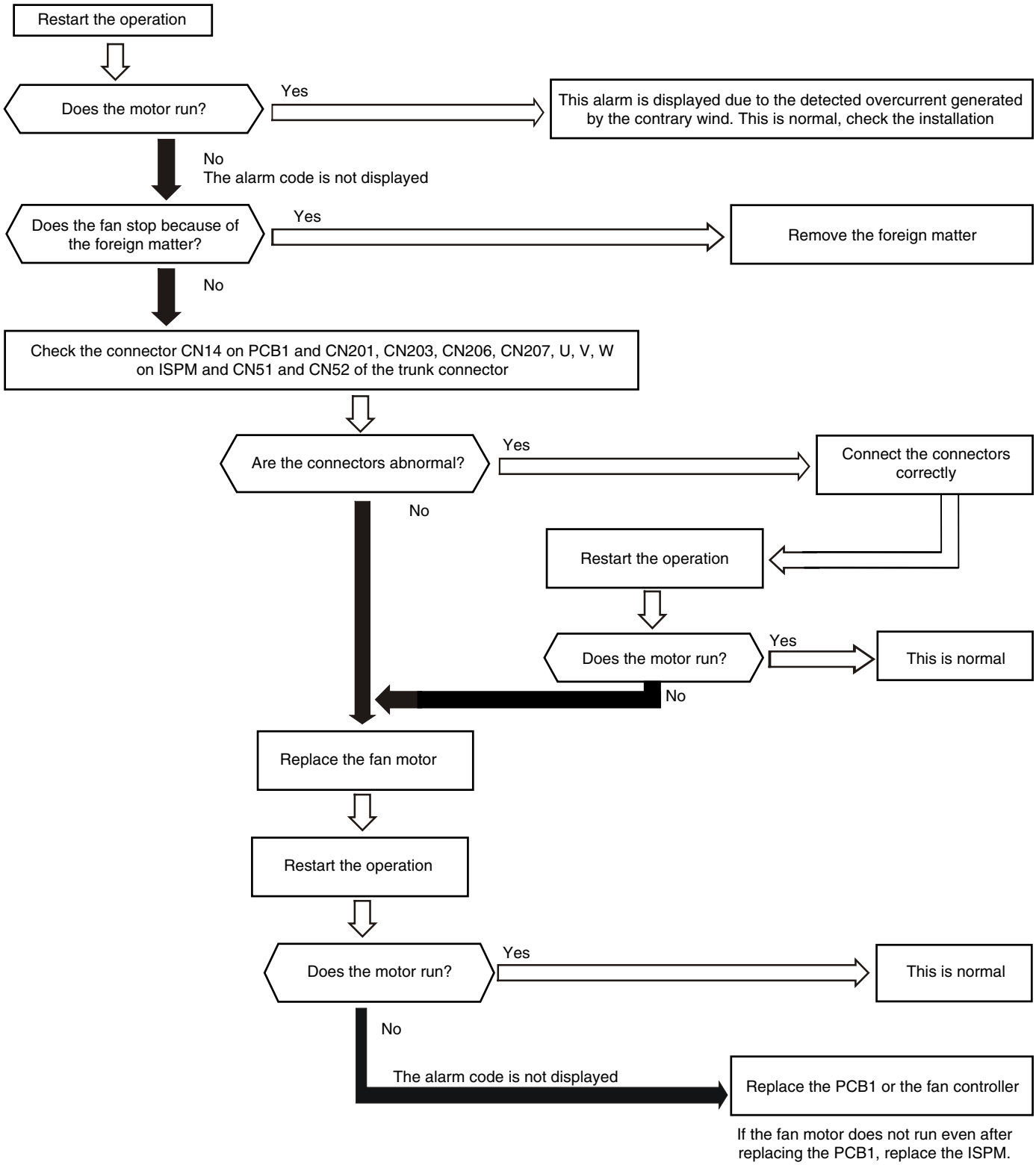
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ If the alarm code "51" or "54" occurs three times within 30 minutes, the alarm code which occurred for the third time is displayed. The retry operation is performed twice.
    Conditions: This alarm is displayed when the temperature of the internal themostat for ISPM is higher than 100ºC.



1*): Refer to page 8-81 for the replacing procedure and the checking procedure for the ISPM.
2*): Use the silicon grease that is provided as an accessory.

Alarm code	Abnormal operation of fan motor protection
45 46 47	

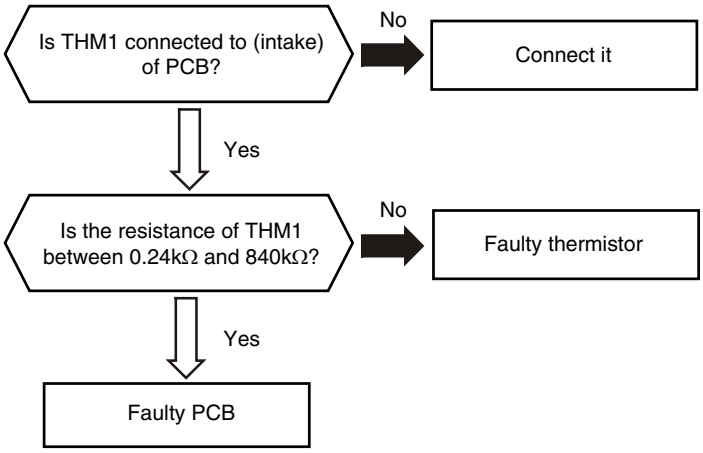
- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm is displayed when the revolution pulse output from the fan motor is 10rpm or less and the reverse revolution signal is detected. The fan motor stops once. After ten seconds, the fan motor restarts. If this occurs more than ten times in 30 minutes, this alarm is displayed. The abnormal operation occurs when the fan motor stops and clogs.



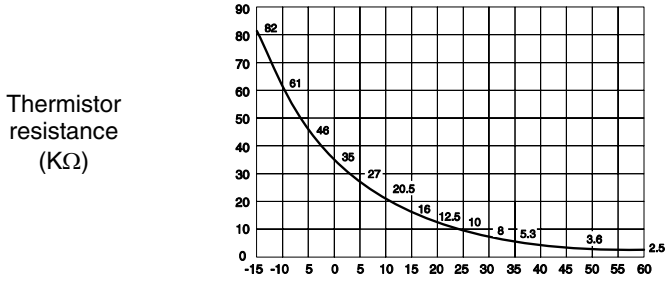
If the fan motor does not run even after replacing the PCB1, replace the ISPM.

Alarm code	Abnormal operation of thermistor for the KPI (room temperature thermistor)
85	

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the thermistor is short-circuited or cut during the KPI operation. The system is automatically restarted when the fault is removed.



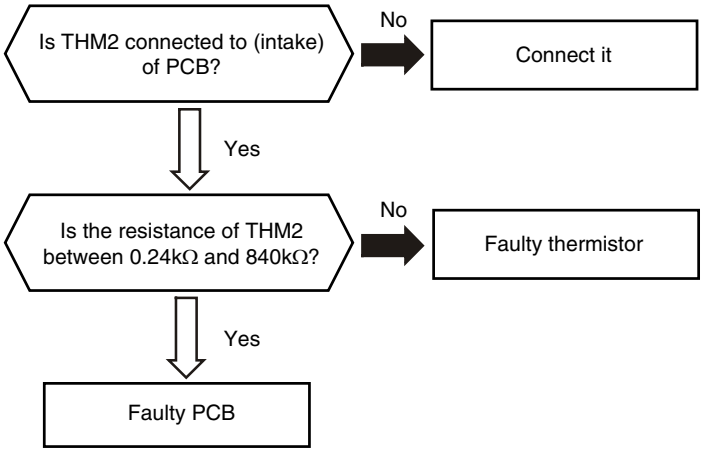
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty air inlet thermistor	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect connection	Check the connection	Repair the wiring and the connections
Faulty PCB		Replace PCB and check the operation	Replace PCB if faulty



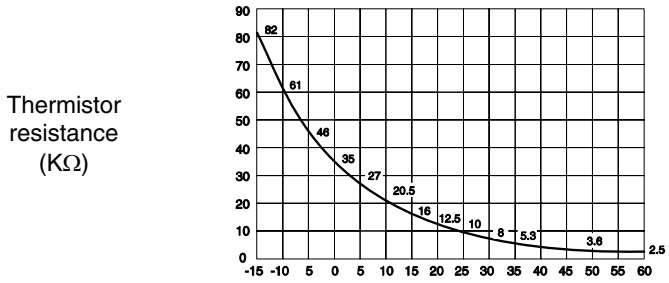
Thermistor characteristics

Alarm code	
86	**Abnormal operation of thermistor for KPI (outdoor temperature thermistor)**

- The RUN LED flickers and "ALARM" is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is displayed when the thermistor is short-circuited or cut during the KPI operation. The system is automatically restarted when the fault is removed.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty air inlet thermistor	Fault	Check the resistance	Replace the thermistor if faulty
	Incorrect connection	Check the connection	Repair the wiring and the connections
Faulty PCB		Replace PCB and Check the operation	Replace PCB if faulty



Thermistor characteristics

Alarm code	Compressor protection
DD	

✶ This alarm code is displayed when one of the following alarms occurs three times within six hours. If the outdoor unit operates continuously without removing the cause of the alarm, the compressor may be seriously damaged.

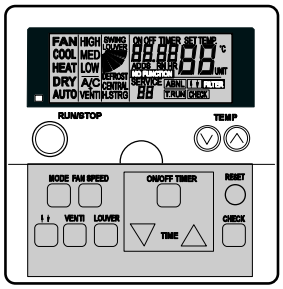
Alarm code:	Content of abnormal operation
/ 1	Tripping of the protection device in the outdoor unit
/ 6	Decrease in the discharge gas superheat
/ 7	Increase in the discharge gas temperature
28	Abnormal operation of the running current at the constant speed compressor
32	Pressure ratio decrease protection activating
33	Low pressure increase protection activating
34	High pressure increase protection activating
35	High pressure decrease protection activating
36	Low pressure decrease protection activating

You can check these alarms by means of the check mode 1. Follow the action that is indicated in each alarm chart. You can clear these alarms only by turning OFF the main switch to the system. **However, you must pay careful attention before starting, because there is a possibility of causing serious damages to the compressors.**

8.2.3. TROUBLESHOOTING IN CHECK MODE

Use the CHECK switch of the remote control in the following cases:

1. When the RUN LED is flickering.
2. To trace back the cause of the malfunction after restarting from the stoppage while the RUN LED is flickering.
3. To check during the normal operation or during the stoppage.
4. To monitor the inlet air temperature and the discharge air temperature.



Check mode

- Check mode 1: Current data will be displayed
- Check mode 2: The data which was held immediately before the failure will be displayed

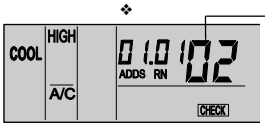
Normal mode

CHECK

Press for more than three seconds

- The indication will delay as the transmission between the remote control switch and the indoor unit takes about ten seconds.
- All the data may be displayed as "EE" or " , 0" or "255". These transient data, which are produced temporarily by the software, do not affect the device functions at all. (The alarm code may also be displayed as "EE".)

Unit number and alarm code displayed



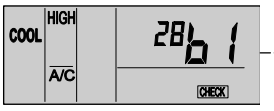
The alarm code that identifies the last fault that has occurred in the displayed unit.
The unit number of the connected unit or the unit number for which the checking mode was selected previously.

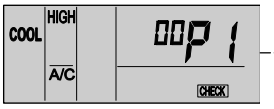
ADDS: Number of the Indoor Unit in No. ** Cycle
RN: No. ** Refrigerant Cycle

After seven seconds ← (A)

Within seven seconds to check another unit

Check mode 1





Forward:	Press the "⌃" switch to increase from 00 to 01 to 02 ···
Backward:	Press the "⌄" switch to decrease from 15 to 14 to 13 ···

Press "⌄" to see the previous indication
Press "⌃" to see the next indication

CHECK

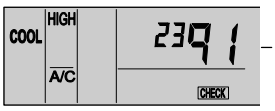
Press for more than three seconds

Unit number and alarm code displayed

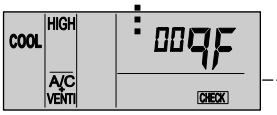
Press "⌃" to see the next data
Press "⌄" to see the previous data

After seven seconds ← See (A)

Check mode 2
(Refer to "Check mode 1" for details)



Press "⌃"



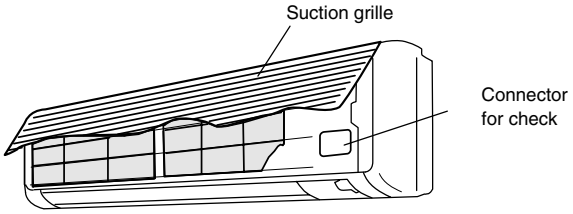
- In the Check mode 2, the data of the first three units that are connected serially to a remote control switch are available.
- You can press the CHECK switch to disable the Check mode 2.
  Check mode 1 cannot be disabled even if you press the CHECK switch.

Check mode disabled

CHECK

Press for more than three seconds

Although the wireless controller is used for the wall type indoor unit with the built-in receiver part, you can check the alarm code by connecting the PC-P1HE.



NOTE:

1. *The unit does not operate by pressing the operation switch.*
2. *The above function is available only when the alarm occurs.*
3. *The PCB check by means of the remote control switch is not available.*
4. *The indication is the data when you are connecting PC-P1HE. The indication is not the data before the alarm occurs.*

Contents of the Check mode 1

The next indication is shown if you press the part "▲" of the TEMP switch. If you press the part "▼" of the TEMP switch, the previous indication is shown.

Temperature indication

Indication of the category code
Indication of the temperature, etc

1	Indoor unit temp. setting (°C)	`0 11
2	Indoor unit air inlet temp. at thermistor (°C)	`1 1/
3	Indoor unit discharge air temp. at thermistor (°C)	`2 44
4	Indoor unit heat exchanger liquid pipe temp °C	`3 1/
5	Temperature at remote sensor (°C)	`4 14
6	Outdoor unit ambient temp. (°C)	`5 0/
7	Indoor unit heat exchanger gas pipe temp. (°C)	`6 14
8	Outdoor unit evaporating temp. during heating (°C)	`7 /1
9	Control information	`8 ,,
10	Discharge gas temp. at the top of the comp. chamber (°C)	`@ 30

to next page

Normal . . . Temperature displayed

Abnormal
- – – (Thermistor is open-circuited or PCB is defective)
- or
- 129 (Temp. for top of comp.)
- FF (Thermistor is short-circuited or PCB is defective)
- or
- 255
- or
- 127 (Temp. for top of comp.)

Refer to section 8.3.1 “Self-Checking Procedure of PCB by means of the Remote Control Switch"

During the transient periods such as starting time and other, the indicators "--" or "00" may be displayed for a limited time.

This is indicated only when a remote sensor is connected.
The indicator "--" is normally displayed.
RPK series cannot connect a remote sensor.
Therefore, the indicator is "--".

This indicates the internal information for the remote control switch.
In case of SET-FREE, this indication shows the number of running compressors.

(Ex.) During the operation of several compressors, the average temperature of two compressors is indicated.

If the temperature is higher than 126°C, "015".

11	Thermo temp. of the remote control switch	``	12

↓

Indication on micro-computer input /output

12	Micro-computer input/output in indoor unit	B0	Y

↓

13	Micro-computer input/output in outdoor unit	B1	,

↓

Indication of unit stoppage cause

14	Cause of stoppage	b0	/ 0

↓

Abnormal operation occurrence counter

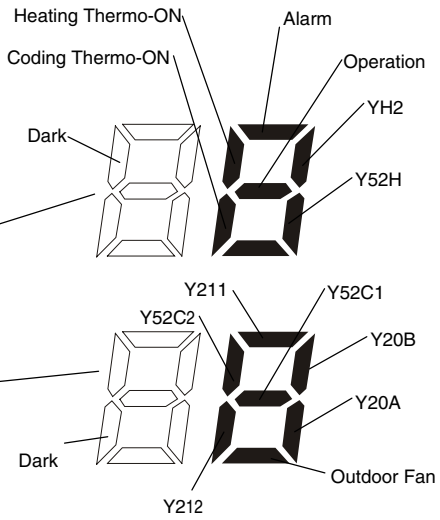
15	Abnormal operation occurrence counter	D0	/ 0
16	Instantaneous power failure occurrence counter in indoor unit	D1	/ /
17	Transmission error occurrence counter between remote control switch and indoor unit	D2	/ /
18	Abnormal operation occurrence counter on inverter	D3	/ /

↓

Indication of automatic louver condition

19	Louver sensor	E0	/ /

↓to next page



PCB relay	Part name
YH2	Relay for drain pump (MD) and/or dew heater (EHW)
Y52H	Relay for electric heater (CEH)
Y211	Relay for 4-way valve
Y212	
Y52C1	Relay for compressor
Y52C2	
Y20A	Relay for solenoid valve
Y20B	

Symbols with a letter Y are relays of PCB

/ /	Operation OFF, Power OFF
/ 0	Thermo - OFF (Note 1)
/ 1	Alarm (Note 2)
/ 2	Freeze protection, overheating protection
/ 4	Instantaneous power failure at outdoor unit, reset (Note 3)
/ 5	Instantaneous power failure at indoor unit, reset (Note 4)
/ 6	Stoppage of cooling process due to low outdoor temperature, stoppage of heating process due to high outdoor temperature
/ 7	Compressor quantity changeover, stoppage (HP≥8)
/ 8	Demand of 4-way valve changeover stoppage (FX only)
0 /	Demand, enforced stoppage
0 0	Retry due to pressure ratio decrease
0 1	Retry due to low pressure increase
0 2	Retry due to high pressure increase
0 3	Retry due to abnormal current of constant speed compressor (HP≥8)
0 4	Retry due to abnormal high temperature of discharge gas, excessive low suction pressure
0 5	Retry due to decrease of discharge gas superheat
0 6	Retry due to inverter tripping
0 7	Retry due to voltage decrease
0 8	Expansion valve opening change protection
1 /	Operation mode changeover of indoor unit (Note 5)

NOTE:

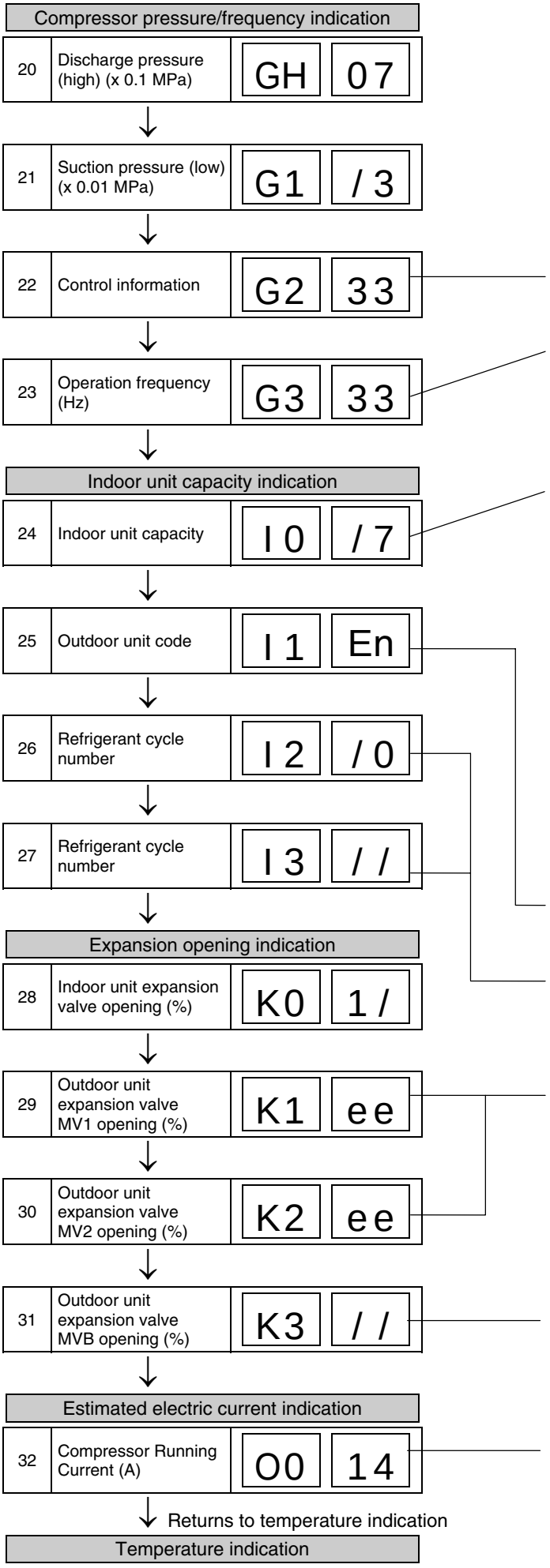
1. *Explanation of Terms*
   Thermo-ON: A condition where an indoor unit is requesting the compressor to operate.
   Thermo-OFF: A condition where an indoor unit is not requesting the compressor to operate.
2. *Even if stoppage is caused by "Alarm", "02" is not always displayed.*
3. *If the transmission between the inverter printed circuit board and the control printed circuit board is not performed during 30 seconds, the stoppage cause is d1-05 and the alarm code "04" may be displayed.*
4. *If the transmission between the indoor unit and the outdoor unit is not performed during three minutes, the Indoor Units are stopped. In this case, the stoppage cause is d1-06 and the alarm code "03" may be displayed.*

Countable up to 99.
Over 99 times, "99" is always displayed.

NOTE:

1. *If a transmission error continues for three minutes, one is added to the occurrence counter.*
2. *The memorized data can be cancelled by the method which is explained in section 8.3.1 "Self-checking Procedure of PCB by means of the Remote Control Switch".*

/ / : Normal
EE : Abnormal



This is an indication for internal information for the remote control switch. This does not have any specific meaning.

The total frequency is displayed when several compressors are running.

The capacity of the Indoor Unit is displayed as shown in the table below.

Capacity code of indoor unit

Indication code	Equivalent capacity (HP)
06	0.8
08	1.0
10	1.3
13	1.5
14	1.8
16	2.0
18	2.3
20	2.5
22	2.8
26	3.0
32	4.0
40	5.0

"n" indicates the total number of Indoor Units;

n= 0 ~ 8, @, `, B, b, D, E, T
(10) (11) (12) (13) (14) (15) (16)

J3: 01 ~ 16 (01: when shipment (DSW5),
Decimal indication
J4: 00 ~ 0F (00: when shipment (DSW5),
Indication with 16 numbers

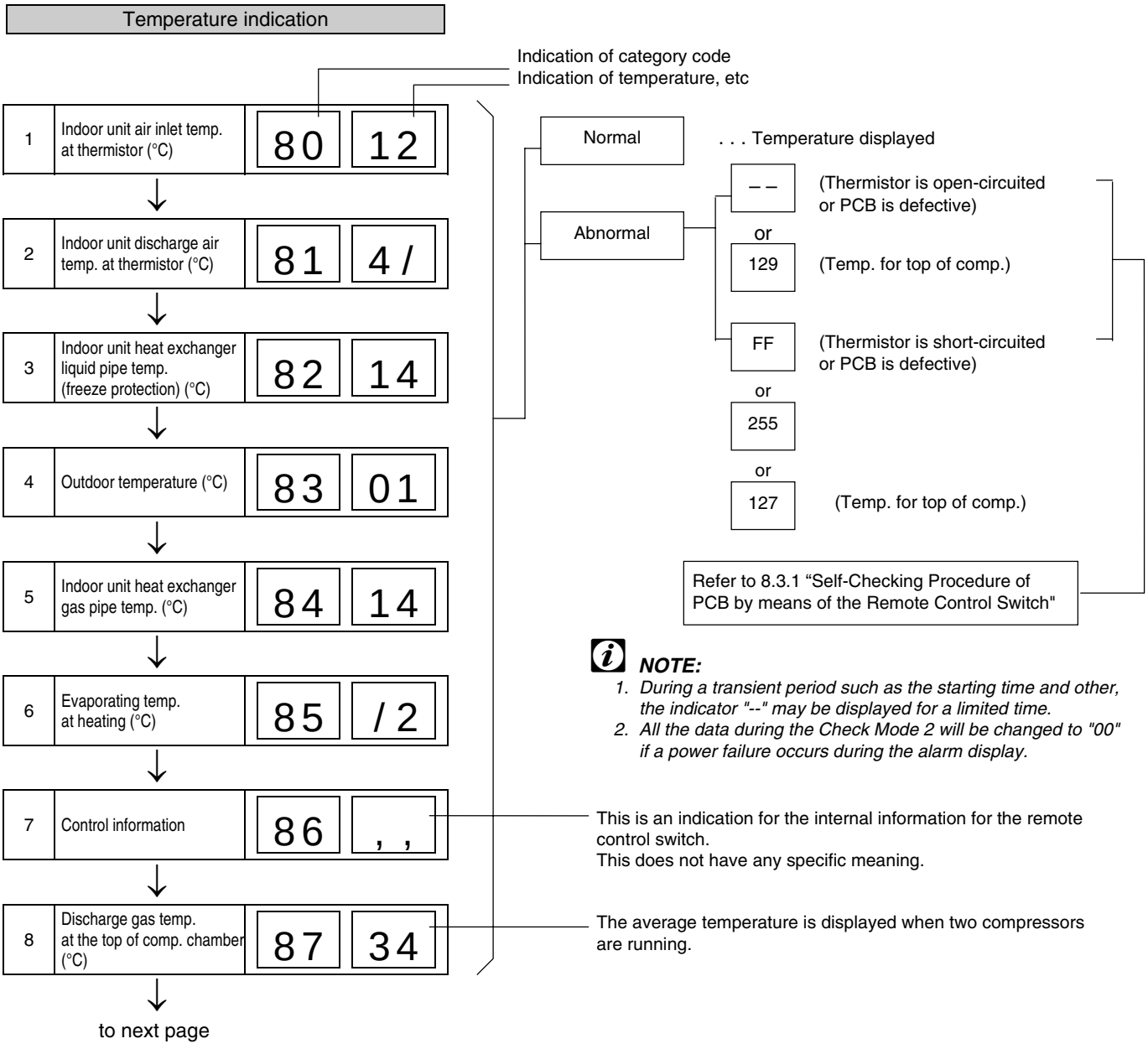
In case of models without the expansion valve (MV2), the same figure is displayed.

FXN only

The total current is displayed when several compressors are running.
In case of the inverter compressor, the running current of the primary side of the inverter is displayed.

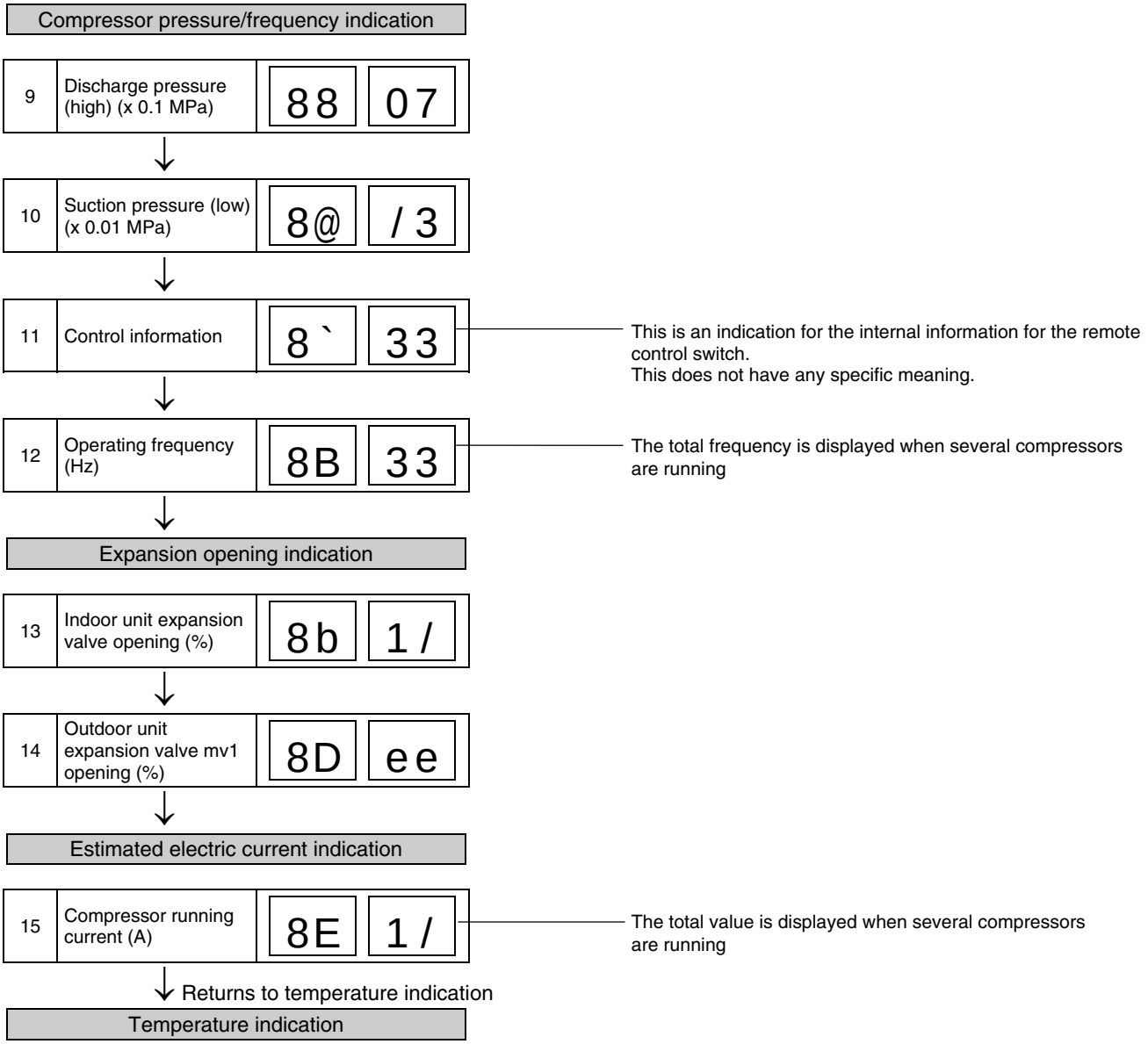
Contents of the Check mode 2

When more than three indoor units are connected to one remote control switch, the latest data of only the first three indoor units that are connected serially are displayed.
If you press the part "⌃" of the TEMP switch, the next display appears. If you press the part "⌄" of the TEMP switch, the previous display appears.



NOTE:

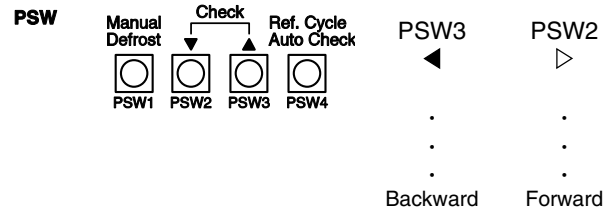
1. *During a transient period such as the starting time and other, the indicator "--" may be displayed for a limited time.*
2. *All the data during the Check Mode 2 will be changed to "00" if a power failure occurs during the alarm display.*


Compressor pressure/frequency indication
9
Discharge pressure (high) (x 0.1 MPa)
88
07
10
Suction pressure (low) (x 0.01 MPa)
8@
/3
11
Control information
8`
33
This is an indication for the internal information for the remote control switch.
This does not have any specific meaning.
12
Operating frequency (Hz)
8B
33
The total frequency is displayed when several compressors are running
Expansion opening indication
13
Indoor unit expansion valve opening (%)
8b
1/
14
Outdoor unit expansion valve mv1 opening (%)
8D
ee
Estimated electric current indication
15
Compressor running current (A)
8E
1/
The total value is displayed when several compressors are running
Returns to temperature indication
Temperature indication

8.2.4. TROUBLESHOOTING BY MEANS OF THE 7-SEGMENT DISPLAY

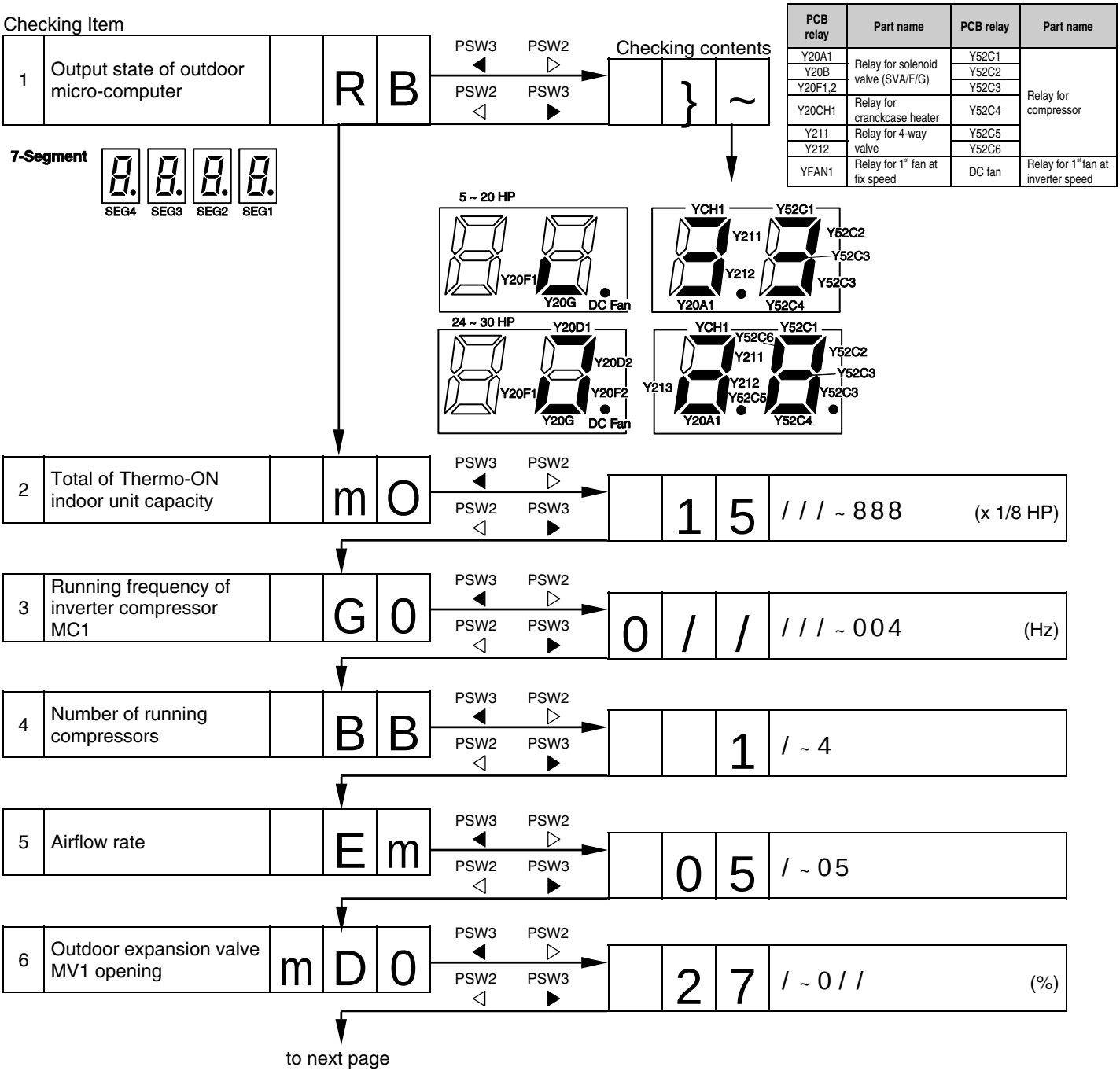
Checking method by means of the 7-segment display

By means of the 7-segment display and the check switch (PSW) on the PCB1 in the outdoor unit, you can check the total quantity of the combined indoor units, the 7-segment display operation conditions and each part of the refrigerant cycle.

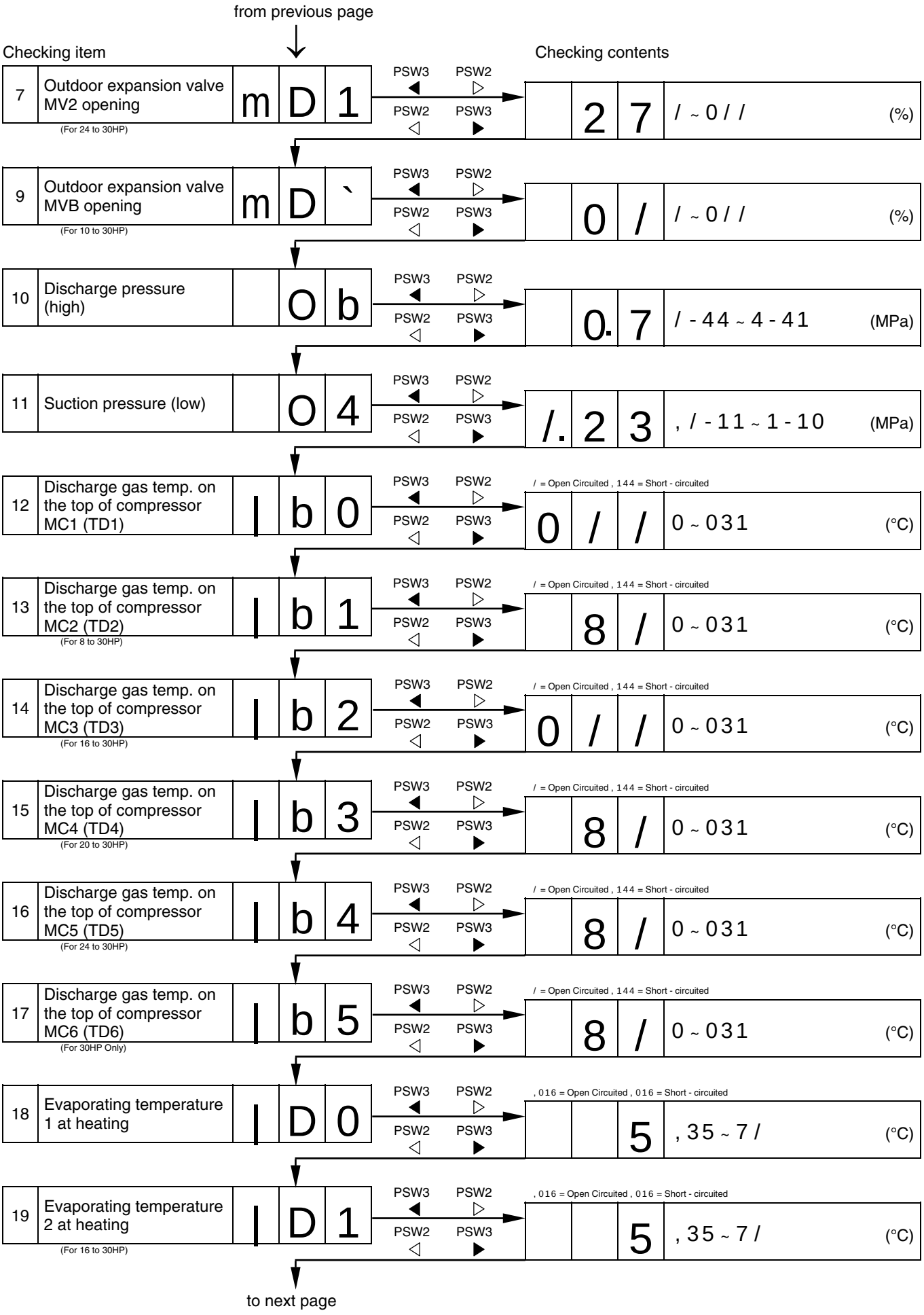


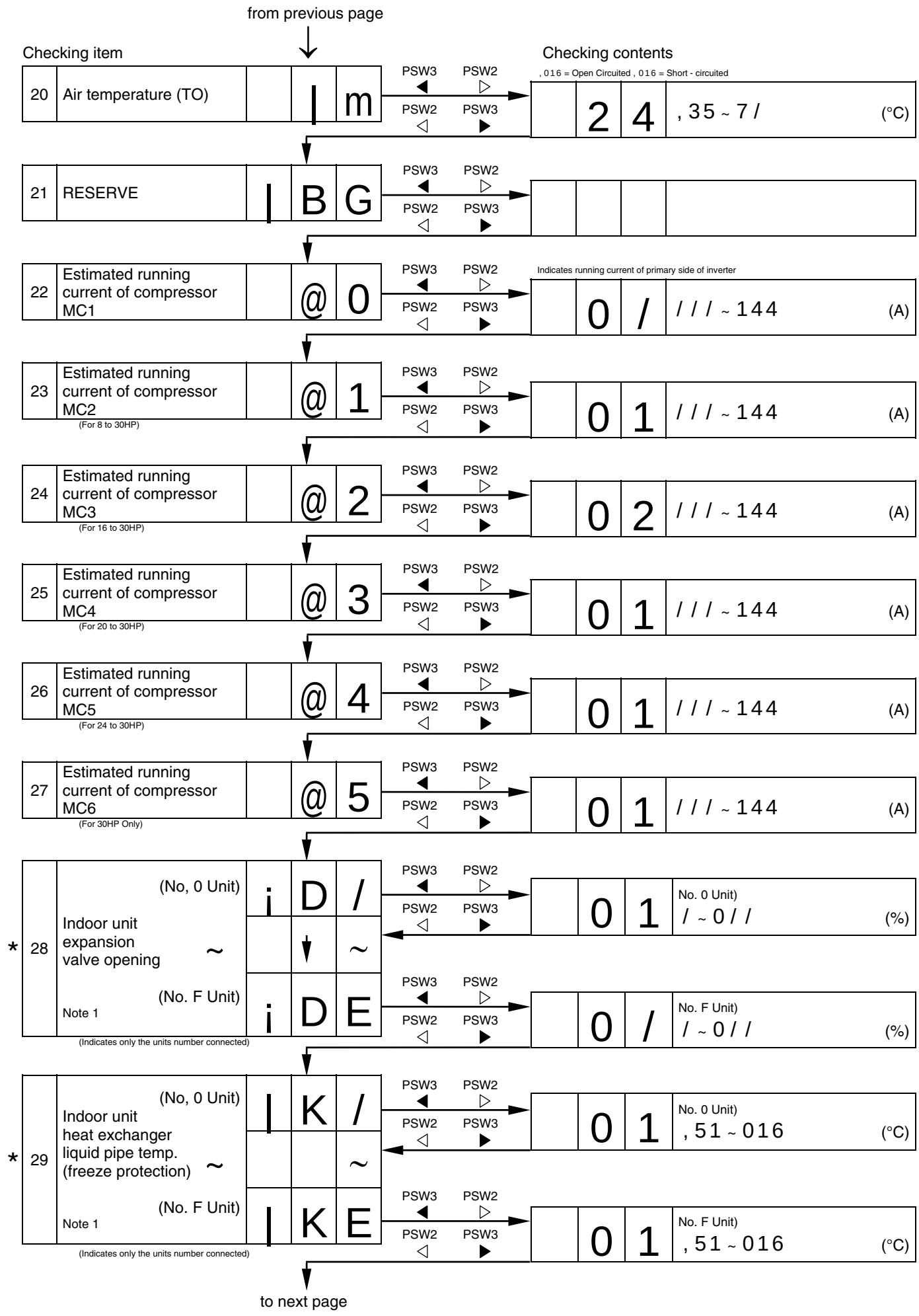
- To start checking, press the PSW2 switch for more than three seconds.
- To proceed checking, press the PSW2 switch for less than two seconds.
- To proceed in the reverse order, press the PSW3 for less than two seconds.
- ✶ To cancel this checking, press the PSW2 switch for more than three seconds. The display will change to the indication one step before. Then, press the PSW2 switch once again for more than three seconds.
- ✶ Note: Make sure that the checking mode is cancelled after the checking. Otherwise, you may cause a malfunction.

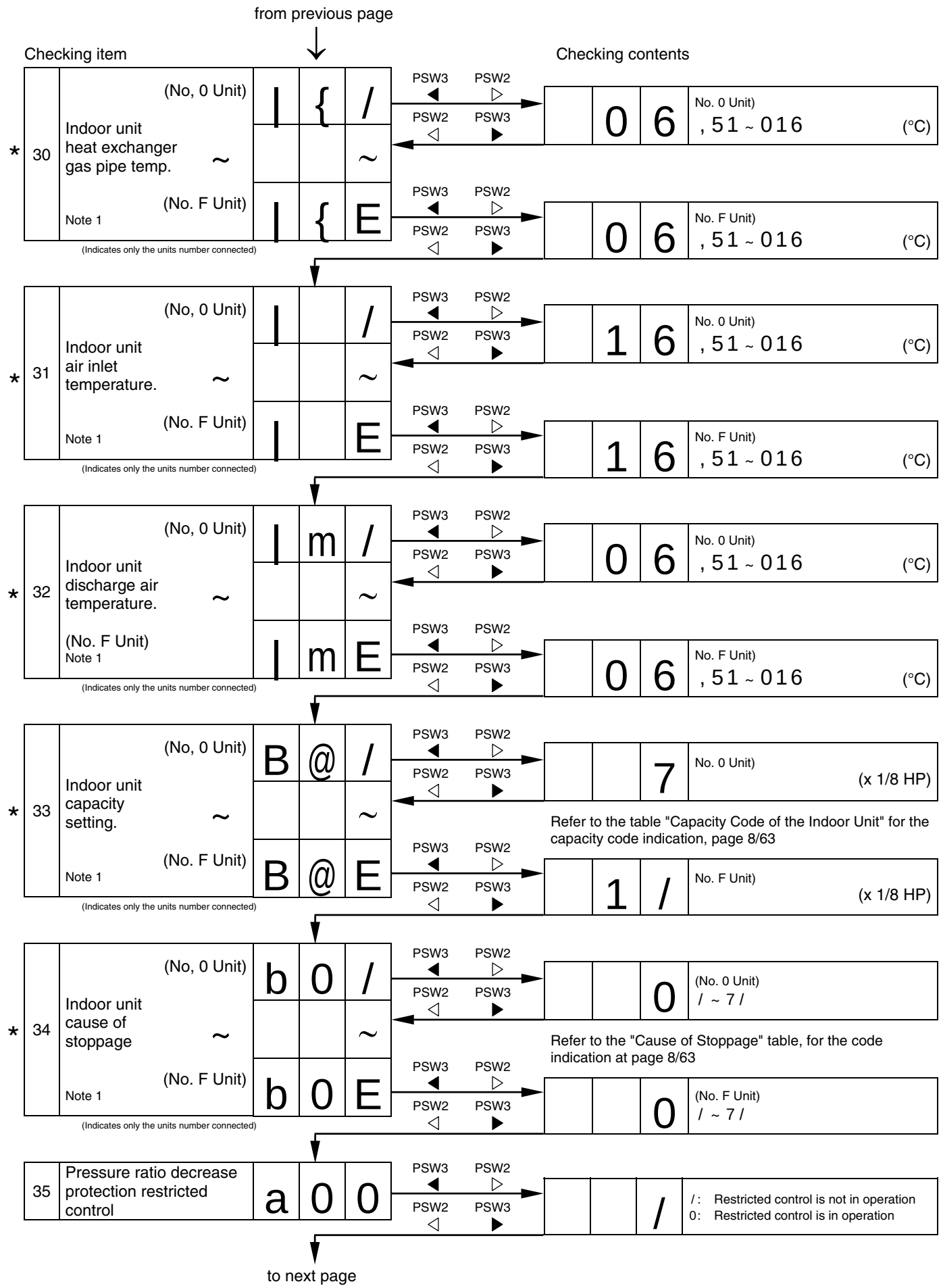
PCB relay	Part name	PCB relay	Part name
Y20A1	Relay for solenoid valve (SVA/F/G)	Y52C1	Relay for compressor
Y20B		Y52C2	
Y20F1,2		Y52C3	
Y20CH1	Relay for cranckcase heater	Y52C4	
Y211	Relay for 4-way valve	Y52C5	
Y212		Y52C6	
YFAN1	Relay for 1st fan at fix speed	DC fan	Relay for 1st fan at inverter speed

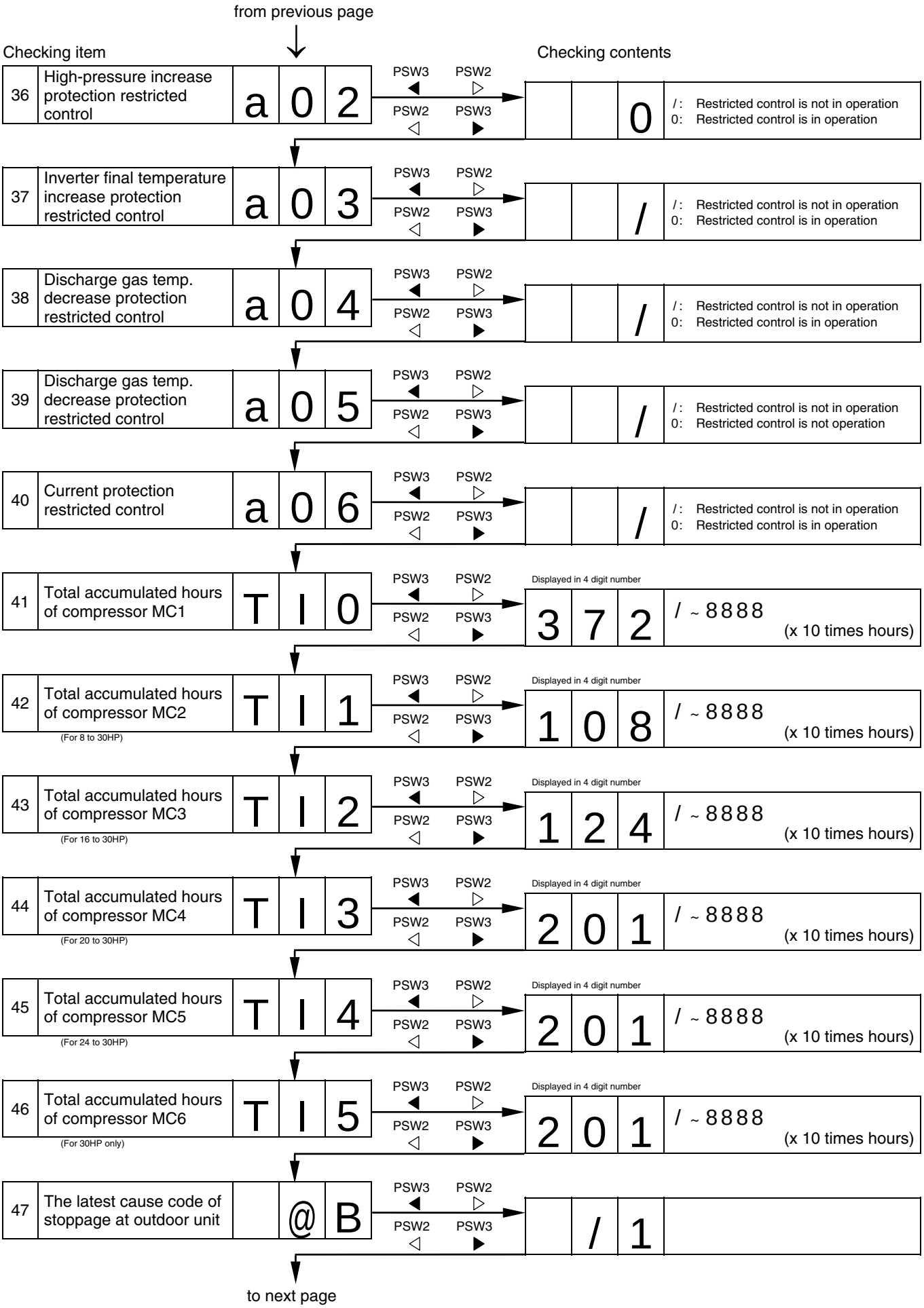


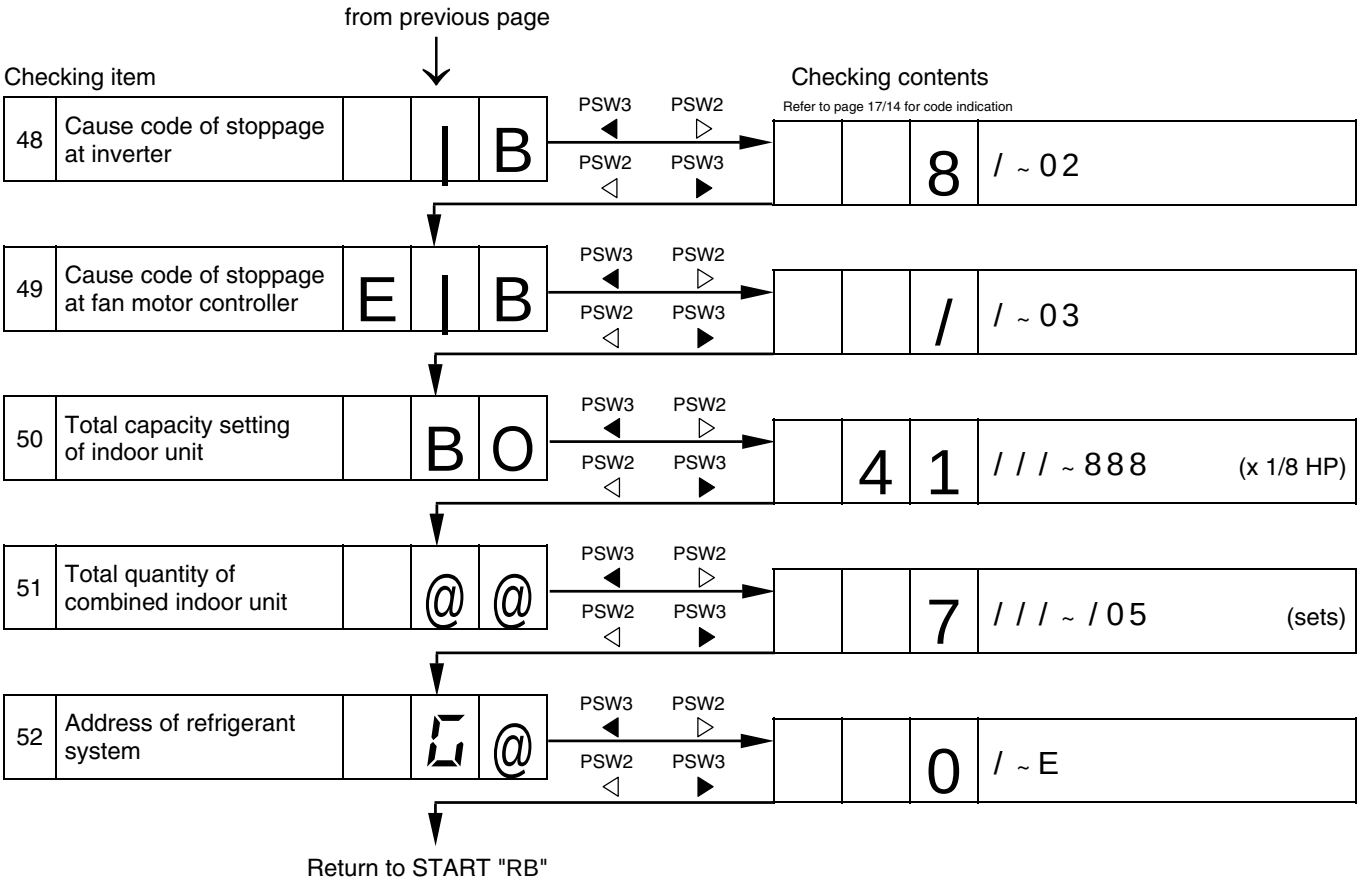
to next page


from previous page
Checking item
Checking contents
7 Outdoor expansion valve MV2 opening (For 24 to 30HP) m D 1 → 2 7 / ~ 0 / / (%)
9 Outdoor expansion valve MVB opening (For 10 to 30HP) m D ` → 0 / / ~ 0 / / (%)
10 Discharge pressure (high) O b → 0. 7 / - 44 ~ 4 - 41 (MPa)
11 Suction pressure (low) O 4 → /. 2 3 , / - 11 ~ 1 - 10 (MPa)
12 Discharge gas temp. on the top of compressor MC1 (TD1) b 0 → 0 / / 0 ~ 031 (°C)
13 Discharge gas temp. on the top of compressor MC2 (TD2) (For 8 to 30HP) b 1 → 8 / 0 ~ 031 (°C)
14 Discharge gas temp. on the top of compressor MC3 (TD3) (For 16 to 30HP) b 2 → 0 / / 0 ~ 031 (°C)
15 Discharge gas temp. on the top of compressor MC4 (TD4) (For 20 to 30HP) b 3 → 8 / 0 ~ 031 (°C)
16 Discharge gas temp. on the top of compressor MC5 (TD5) (For 24 to 30HP) b 4 → 8 / 0 ~ 031 (°C)
17 Discharge gas temp. on the top of compressor MC6 (TD6) (For 30HP Only) b 5 → 8 / 0 ~ 031 (°C)
/ = Open Circuited , 144 = Short - circuited
18 Evaporating temperature 1 at heating D 0 → 5 , 35 ~ 7 / (°C)
19 Evaporating temperature 2 at heating (For 16 to 30HP) D 1 → 5 , 35 ~ 7 / (°C)
, 016 = Open Circuited , 016 = Short - circuited
PSW3 PSW2 PSW2 PSW3
to next page


from previous page
Checking item
Checking contents
, 016 = Open Circuited , 016 = Short - circuited
20 Air temperature (TO)
| m
PSW3 PSW2 PSW2 PSW3
2 4 , 35 ~ 7 / (°C)
21 RESERVE
| B G
PSW3 PSW2 PSW2 PSW3
22 Estimated running current of compressor MC1
@ 0
Indicates running current of primary side of inverter
0 / / / / ~ 144 (A)
23 Estimated running current of compressor MC2
(For 8 to 30HP)
@ 1
0 1 / / / ~ 144 (A)
24 Estimated running current of compressor MC3
(For 16 to 30HP)
@ 2
0 2 / / / ~ 144 (A)
25 Estimated running current of compressor MC4
(For 20 to 30HP)
@ 3
0 1 / / / ~ 144 (A)
26 Estimated running current of compressor MC5
(For 24 to 30HP)
@ 4
0 1 / / / ~ 144 (A)
27 Estimated running current of compressor MC6
(For 30HP Only)
@ 5
0 1 / / / ~ 144 (A)
* 28 Indoor unit expansion valve opening ~
(No, 0 Unit)
¡ D /
(No. F Unit)
Note 1
¡ D E
0 1 No. 0 Unit) / ~ 0 / / (%)
0 / No. F Unit) / ~ 0 / / (%)
(Indicates only the units number connected)
* 29 Indoor unit heat exchanger liquid pipe temp. (freeze protection) ~
(No, 0 Unit)
| K /
(No. F Unit)
Note 1
| K E
0 1 No. 0 Unit) , 51 ~ 016 (°C)
0 1 No. F Unit) , 51 ~ 016 (°C)
(Indicates only the units number connected)
to next page


from previous page
Checking item
Checking contents
* 30 Indoor unit heat exchanger gas pipe temp. ~
(No, 0 Unit) I { /
(No. F Unit) I { E
Note 1
(Indicates only the units number connected)
PSW3 PSW2 PSW2 PSW3
0 6
No. 0 Unit) , 51 ~ 016 (°C)
No. F Unit) , 51 ~ 016 (°C)
* 31 Indoor unit air inlet temperature. ~
(No, 0 Unit) I /
(No. F Unit) I E
1 6
* 32 Indoor unit discharge air temperature. ~
(No, 0 Unit) I m /
(No. F Unit) I m E
* 33 Indoor unit capacity setting. ~
(No, 0 Unit) B @ /
(No. F Unit) B @ E
7
No. 0 Unit) (x 1/8 HP)
1 /
No. F Unit) (x 1/8 HP)
Refer to the table "Capacity Code of the Indoor Unit" for the capacity code indication, page 8/63
* 34 Indoor unit cause of stoppage ~
(No, 0 Unit) b 0 /
(No. F Unit) b 0 E
0
(No. 0 Unit) / ~ 7 /
(No. F Unit) / ~ 7 /
Refer to the "Cause of Stoppage" table, for the code indication at page 8/63
35 Pressure ratio decrease protection restricted control
a 0 0
/
/ : Restricted control is not in operation
0: Restricted control is in operation
to next page

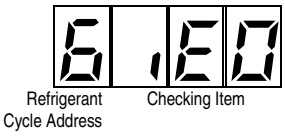

from previous page
Checking item
Checking contents
36 High-pressure increase protection restricted control
a 0 2
0
/ : Restricted control is not in operation
0: Restricted control is in operation
37 Inverter final temperature increase protection restricted control
a 0 3
/
/ : Restricted control is not in operation
0: Restricted control is in operation
38 Discharge gas temp. decrease protection restricted control
a 0 4
/
/ : Restricted control is not in operation
0: Restricted control is in operation
39 Discharge gas temp. decrease protection restricted control
a 0 5
/
/ : Restricted control is not in operation
0: Restricted control is not operation
40 Current protection restricted control
a 0 6
/
/ : Restricted control is not in operation
0: Restricted control is in operation
41 Total accumulated hours of compressor MC1
T I 0
Displayed in 4 digit number
3 7 2
/ ~ 8888 (x 10 times hours)
42 Total accumulated hours of compressor MC2
(For 8 to 30HP)
T I 1
Displayed in 4 digit number
1 0 8
/ ~ 8888 (x 10 times hours)
43 Total accumulated hours of compressor MC3
(For 16 to 30HP)
T I 2
Displayed in 4 digit number
1 2 4
/ ~ 8888 (x 10 times hours)
44 Total accumulated hours of compressor MC4
(For 20 to 30HP)
T I 3
Displayed in 4 digit number
2 0 1
/ ~ 8888 (x 10 times hours)
45 Total accumulated hours of compressor MC5
(For 24 to 30HP)
T I 4
Displayed in 4 digit number
2 0 1
/ ~ 8888 (x 10 times hours)
46 Total accumulated hours of compressor MC6
(For 30HP only)
T I 5
Displayed in 4 digit number
2 0 1
/ ~ 8888 (x 10 times hours)
47 The latest cause code of stoppage at outdoor unit
@ B
/ 1
PSW3 PSW2
PSW2 PSW3
to next page



NOTE 1:

– *The 7-segment information for all the indoor Unit data has been added one number before data, as shown beside.*

Example: Indoor unit expansion valve opening of ref. cycle No. 6 indoor unit No. 0

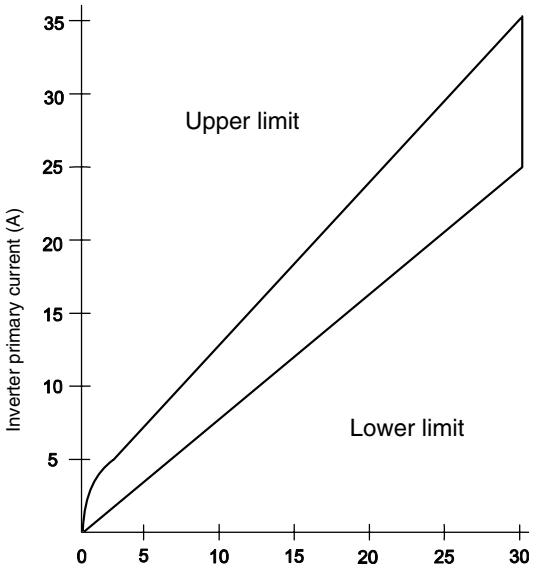


Regarding the mark *, the indoor unit refrigerant cycle number is displayed on the left hand. If more than 16 indoor units are connected, the indoor wires of next refrigerant cycle number will be displayed subsequently.

8.2.5. RUNNING CURRENT OF THE COMPRESSOR

■ **Inverter primary current**

The inverter primary current is estimated from the running current of the compressor MC1 displayed on the 7-segment display, as shown on the right chart.



Running current of compressor MC1 indicated on 7-segment

■ **Displayed running current of the compressor MC2, MC3, MC4, MC5, MC6**

The running current of the compressor MC2, MC3, MC4, MC5, MC6 is detected by the current sensor. (CT2 ~ CT6)

■ **Cause code of stoppage for the inverter (content of check item "¡ | B")**

Code	Cause	Cause of stoppage for corresponding unit	Remark	
			Indication during retry	Alarm code
0	Automatic stoppage of the transistor module (IPM Error) (overcurrent, decrease voltage, increase temperature)	06	O06	42
1	Instantaneous overcurrent	06	O06	41
2	Abnormal inverter fan thermistor	06	O06	43
3	Electronic thermal activation	06	O06	41
4	Inverter voltage decrease	07	O07	/5
5	Voltage increase	07	O07	/5
6	Abnormal transmission	07	,	/3
7	Abnormal current sensor	06	O06	40
8	Instantaneous power failure detection	07	,	,
00	Reset of micro-computer for inverter	07	,	,
01	Earth fault detection for compressor (only starting)	06	O06	42
02	Abnormal power source phase	07	,	,

8.2.6. PROTECTION CONTROL CODE ON THE 7-SEGMENT DISPLAY

1. When a protection control is activated, you can see the protection control indication on the 7-segment display.
2. The 7-segment display remains ON while the function is working. The 7-segment display turns off when the function is disabled.
3. When several protection controls are activated, the code number with higher priority will be displayed. (See below for the priority order).

- Higher priority is given to protection control related to frequency control than to other protection controls.

  Priority Order:

  a) Pressure ratio control
  b) High-pressure rise protection
  c) Current protection
  d) Inverter fan temperature rise protection
  e) Discharge gas temperature rise protection
  f) Low-pressure fall protection
  g) 4-way valve switching control
  h) Low-pressure rise protection
  I) Demand current control
  J) High-pressure fall protection
  K) Oil return control
  L) TdSH fall protection

- Regarding the retry control, the latest retrial will be displayed unless a protection control that is related to the frequency control is displayed.

Code	Protection control
P01	Pressure ratio control (*)
P02	High-pressure rise protection (*)
P03	Current protection (*)
P04	Inverter fan temp rise protection
P05	Discharge gas temperature rise protection (*)
P06	Low-pressure fall protection
P07	4-way valve switching control (for 20, 24 and 30HP) (at cooling process)
P08	Oil return control (frequency)
P09	High-pressure fall protection
P0A	Demand current control
P0C	TdSH fall protection
P00	Low-pressure rise protection
P 11	Pressure ratio falling protection retry
P 12	Low-pressure rising retry
P 13	High-pressure rising retry
P 14	Overcurrent retry of constant speed compressor
P 15	Vacuum/discharge gas temperature rising protection retry
P 16	Discharge gas SUPERHEAT falling retry
P 17	Inverter trip retry
P 18	Insufficient voltage/excessive voltage retry
P04.	Fan motor controller fan temp. rise protection
P 17.	Fan motor controller trip retry

If the restricted control is activated, c is displayed instead of 0 (*mark)

- The retry indication continues for 30 minutes unless a protection control is displayed.
- The retry indication disappears if the stop signal comes from all the rooms.
- The Protection Control is activated quicker than the normal situation during the Restricted Control.

NOTE:
The protection control code that is displayed on the 7-segment display changes to an alarm code when the abnormal operation occurs. Also, the same alarm code is displayed on the remote control switch.

8.2.7. ACTIVATING CONDITION OF THE PROTECTION CONTROL CODE

To monitor the conditions such as the temperature change and others, the control of the frequency and other controls are performed by the protection control in order to prevent the abnormal operations.

The activating conditions of the protection control are shown in the table below.

Code	Protection control	Activating condition	Remarks
P01	Pressure ratio control	Compression ratio ≥ 9 → Frequency decrease (Pd/(Ps+0.3)) ≤ 2.2 → Frequency increase	Ps: Suction pressure of compressor [Mpa]
P02	High-pressure increase protection	Pd ≥ 3.6 Mpa (36kgf/cm^{2}G)→ Frequency decrease	Pd: Discharge pressure of compressor [Mpa]
P03	Current protection	Inverter output current ≥ 12.5 A (5HP) 13.5 A (8-30 HP) → Frequency decrease	-
P04	Inverter fan temp. increase protection	Inverter fan temp. ≥ 89°C → Frequency decrease	-
P05	Discharge gas temperature increase protection	Temperature at the top of compressor is high → Frequency decrease (Maximum temperature is different depending on the frequency)	-
P06	Low-pressure decrease protection	Low-pressure is excessively low → Frequency decrease (minimum pressure is different depending on the ambient temperature)	-
P07	4-way valve switching control	When switching, ΔP<1.0Mpa a → Frequency increase ΔP>1.3MPa → Frequency decrease	ΔP = Pd - Ps
P08	Oil return control frequency	Frequency less than 135Hz for cooling/ 50Hz for heating → Frequency ≥ 135Hz cooling/ 150Hz heating (20~30HP)	5-8HP =44 Hz 10HP = 56Hz 16HP = 60Hz
P09	High-pressure fall protection	Pd decreases → Frequency increase	Pd: Discharge pressure of compressor
P0A	Demand current control	Compressor run current ≥ Demand setting value → Frequency decrease	Demand setting value: Upper limit of the compressor total current can be set by external input (80%, 70%, 60% at normal situation)
P11	Pressure ratio falling retry	Compression ratio (Pd/(Ps+0.13)<1.8)	When it activates three times in 30 minutes, the alarm code "43" is displayed
P12	Low-pressure rising retry	Ps>1.5Mpa (15 kgf/cm^{2}G)	When it activates three times in 30 minutes, the alarm code "44" is displayed
P13	High-pressure rising retry	Pd>3.8Mpa (38 kgf/cm^{2}G) (In case of 20 ~ 30Hz: Pd>2.5Mpa)	When it activates three times in 30 minutes, the alarm code "45" is displayed
P14	Overcurrent retry of constant speed compressor	Current ≥ Maximum value (*1), or Current<1.0A	When it activates three times in 30 minutes, the alarm code "39" is displayed
P15	Vacuum/discharge gas temperature rising retry	In Case of Ps<0.09 MPa (0.9kgf/cm^{2}G) for over 12 minutes, or discharge gas temperature ≥ 132°C for over ten minutes or discharge gas temperature ≥ 140 °C for over five seconds	When it activates three times in one hour, the alarm codes "47" (Ps) or "08" (Discharge gas) are displayed
P16	Discharge gas SUPERHEAT falling retry	Discharge gas SUPERHEAT less than ten degrees is maintained for 30 minutes	When it activates three times in two hours, the alarm code "07" is displayed
P17	Fan motor controller fin temp increase protection	Automatic stoppage of the transistor module, activation of the electronic thermal or abnormal current sensor	When it activates three times or six times in 30 minutes, the alarm codes "51", "52" and "53" are displayed
P18	Insufficient voltage/excessive voltage retry	Insufficient/excessive voltage at the inverter circuit or CB connector part	When it activates three times in 30 minutes, the alarm code "06" is displayed

NOTE:

During the protection control (except during the alarm stoppage), the protection control code is displayed.

The protection control code is displayed during the protection control and turns off when you are canceling the protection control.

After the retry control, the condition of monitoring continues for 30 minutes.

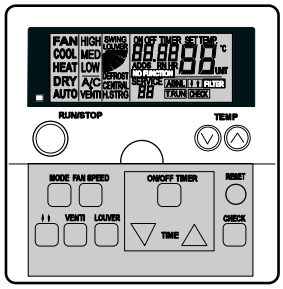
*The maximum value (*1) is the following:*

Model	380-415V 50 Hz
8HP	14.0
10HP	14.0
16HP	14.0
20HP	14.0
24HP	14.0
30HP	15.5

8.3. PROCEDURE FOR CHECKING EACH MAIN PART

8.3.1. SELF-CHECKING PROCEDURE OF PCB BY MEANS OF THE REMOTE CONTROL SWITCH

Use the following troubleshooting procedure for testing the PCB in the indoor unit and the outdoor unit



Stop operation

Press RUN/STOP

PCB check mode

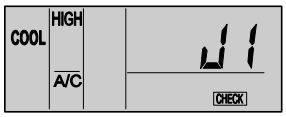
Press both switches for three seconds TEMP CHECK

Indication of unit number

(ex.) indication of Unit No. " / "

After seven seconds

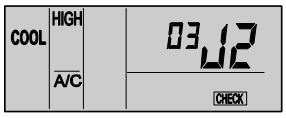
Operating automatic PCB check



Result

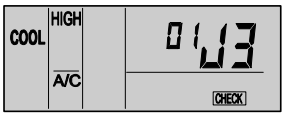
After approx. five seconds (max. 30 seconds in case of a transmission failure between the indoor unit and the outdoor unit) Max. three types of ABNORMAL OPERATIONS indicated.

Abnormal operation (1)



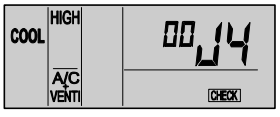
After 1 sec. ↓

Abnormal operation (2)



After 1 sec. ↓

Abnormal operation (3)



Contents

After one second

To next page

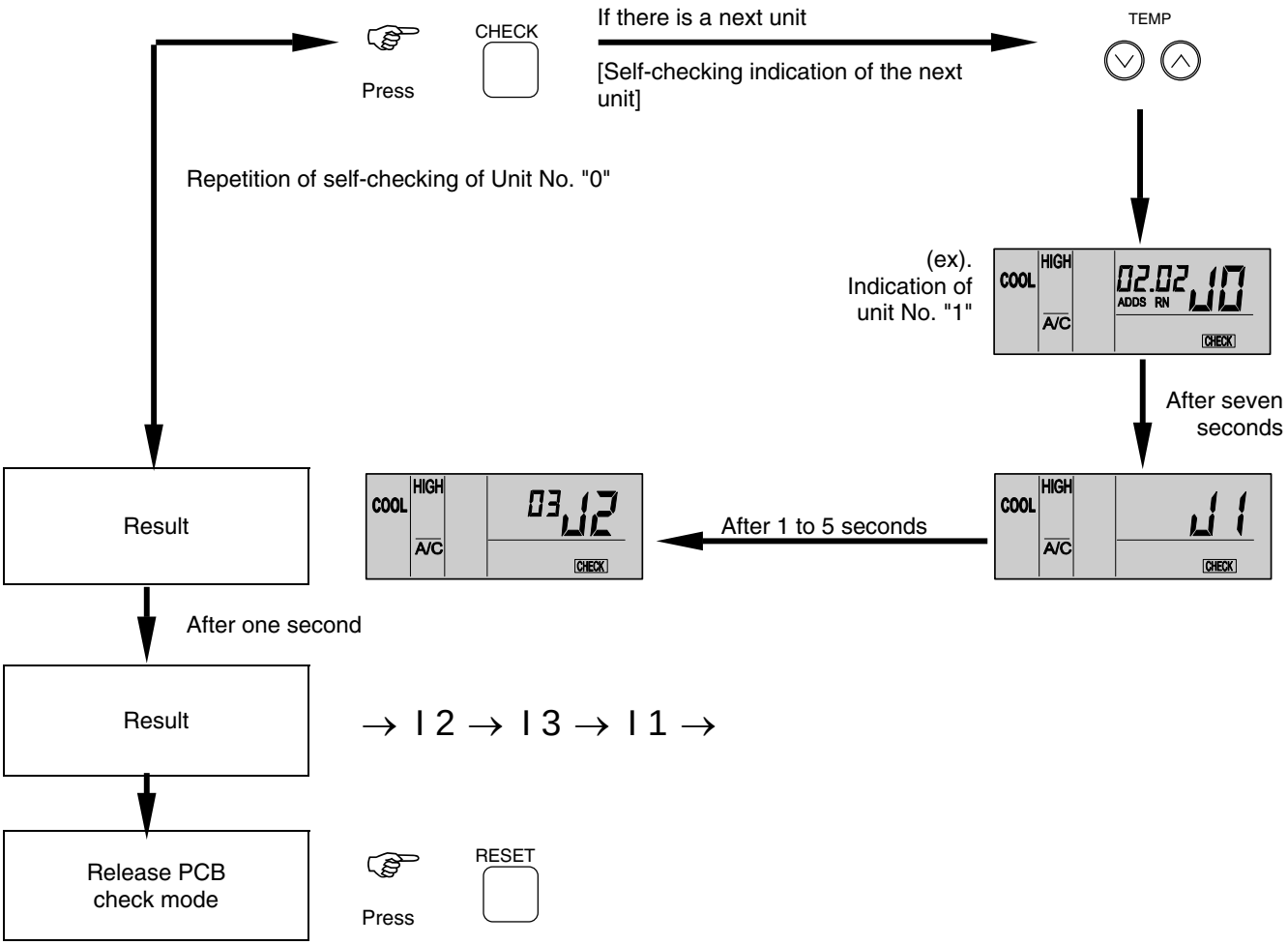
Indication	Contents	
/ /	Normal	
	Abnormality (open-circuit, short-circuit, etc.) in circuit for:	
/ 0	Air inlet temp. thermistor	Indoor unit PCB
/ 1	Discharge air. temp. thermistor	
/ 2	Liquid pipe temp. thermistor	
/ 3	Remote thermistor abnormality	
/ 4	Gas pipe temp. thermistor	
/ 5	Remote sensor	
/ 7	Transmission of central station	
/ @	EEPROM	
N `	Zero cross input failure	
DD	Transmission of indoor units during this checking operation	
/ 6	Transmission of outdoor unit	Outdoor unit PCB
E 3	ITO input failure	
E 4	PSH input failure	
E 5	Protection signal detection circuit	
E 6	Phase detection	
E 7	Transmission of inverter	
E @	High-pressure sensor	
E `	Comp. discharge gas temp. thermistor	
EB	Low-pressure sensor	
Eb	Heat exchanger evaporation temp. thermistor	
EE	Ambient air temp. thermistor	

If you are using a wireless remote control switch with the built-in receiver part of the wall-type indoor unit and you need to perform the above checking, perform the following procedure:

1. *Turn OFF the power supply.*
2. *Disconnect the connector (CN25) on PWB(M).*
3. *Connect the PC-P1HE.*
4. *Turn ON the power supply.*

After finishing the checking, turn OFF the power supply again and reconnect the connectors according to the previous situation before the checking.

From previous page



NOTE:

1. *If this indication continues and the alarm code " I 0" is not displayed, this means that each one of indoor unit is not connected to the remote control switch.*
   Check the wiring between the remote control switch and the indoor unit.

2. *In this troubleshooting procedure, checking of the following parts of the PCB is not available.*

   PCB in Indoor Unit: Relay circuit, DIP switch, option circuit, fan circuit, protection circuit.
   PCB in Outdoor Unit: Relay circuit, DIP switch, option circuit.

3. *If this troubleshooting is performed in the system by means of the central station, the indication of the central station may change during this procedure. However, this is not abnormal.*
4. *After this troubleshooting, the memory of the abnormal operation occurrence counter, which was described before, will be deleted.*

8.3.2. SELF-CHECKING PROCEDURE OF THE REMOTE CONTROL SWITCH

Cases where the CHECK switch is used.
1. If the remote control switch displays a malfunction.
2. For the regular maintenance check.

1 Turn ON the power source

↓

2 Simultaneously press the following three switches. (During the operation, you can press the switches.)

TEMP MODE

↓

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

Only for the cancellation of EEPROM, press the following three switches simultaneously during the changes of the LCD.

TEMP

MODE

↓

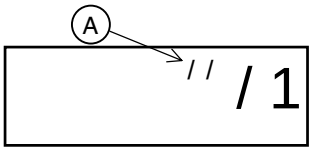
To 11

↓

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

↓

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



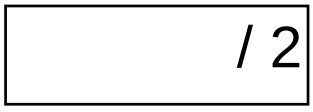
→ Unless all the switches are pressed, the checking does not proceed to the next item.

NOTES:
You can press the switches in any order.

Pressing two or more switches simultaneously is invalid and not counted.

↓

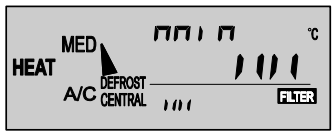
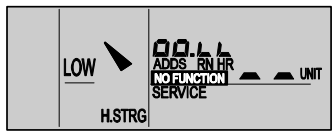
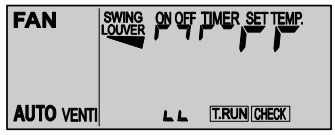
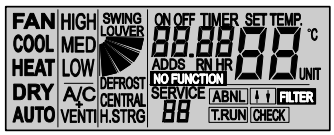
6 The LCD changes as shown below. The remote control switch automatically starts to check the transmission circuit.



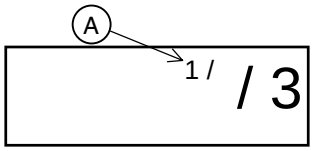
→ In case that the transmission circuit is abnormal, the LCD remains as shown in the left figure and the checking does not proceed to the next item.

↓

To the next page

No.	LCD indication	Indicating period (sec.)
1 ↓		For one second
2 ↓		For one second
3 ↓		For one second
4 ↓		For one second
5		For three seconds

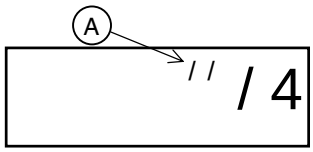
7 The LCD changes as shown below. The detected temperature of the remote control thermostat is displayed at the (A) part in the figure below.



If the indicators " , , " or "EE" are displayed at the "A" part, the remote control thermostat is abnormal.

8 The LCD changes as shown below.

If you press the RESET switch or you leave the switches for 15 seconds, the data of EEPROM (storage cell inside of the remote control switch) is cleared.
At this time, the number is displayed at the (A) part, which is shown in the figure below. When the number "88" is displayed, EEPROM is abnormal.



If the number which is displayed at the (A) part is "88", the checking does not proceed to the next item.

9 The LCD changes as shown below.

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

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

NOTE:

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

Cancellation of EEPROM

3

11 The LCD changes as shown below and the remote control switch automatically cancels the EEPROM.

12 The LCD changes as shown below

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

8.3.3. SELF-CHECKING PROCEDURE OF THE INDOOR UNIT PCB (ONLY FOR RPK)

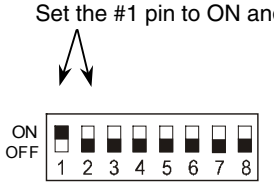
■ Self-checking procedure by means of the relays on the indoor unit PCB

- To check the abnormal operation on the indoor unit PCB due to a malfunction.
- To check the abnormal operation on the indoor unit PCB according to the results of the checking procedure by means of the CHECK switch on the remote control switch and the self-checking function.

■ *Procedure*

É Turn OFF the main power switch.

Ê Disconnect the connectors CN7 and CN8. Set the DIP switch DSW2 as shown below.
Set the #1 pin to ON and the #2 pin to OFF.



DIP Switch DSW2

Ë Turn ON the main power switch.
Check Mode starts. (Refer to the next page.)

A Analog Test
B Relay Test

Ì After finishing the self-checking procedure, turn OFF the power and reset the DIP switch as before.

■ Self-checking procedures in the check mode for RPK-FSNM

Check item	State of mode	Confirmation method
(A) Initialize Exp. valve and auto-louver	Exp. Valve fully open → fully closed Auto-louver is horizontally stopped.	
(B) Analog test	If the thermistors for the inlet air temperature, for the discharge air temperature and for the freeze protection are normal, proceed to the next step.	
(C) Each relay test Perform repeatedly	52H1, 2, 3 Fan (Low) Wireless receiver part (Red) Wireless receiver part (Green) Wireless receiver part (Yellow)	Check the ON/OFF sound of the relays and the LED.
Termination	Turn OFF and reset all the DIP switches as before.	

8.3.4. PROCEDURE FOR CHECKING OTHER MAIN PARTS

■ **High-voltage discharge procedure for replacing the parts**

DANGER:
Perform this high-voltage discharge procedure in order to avoid an electrical shock.

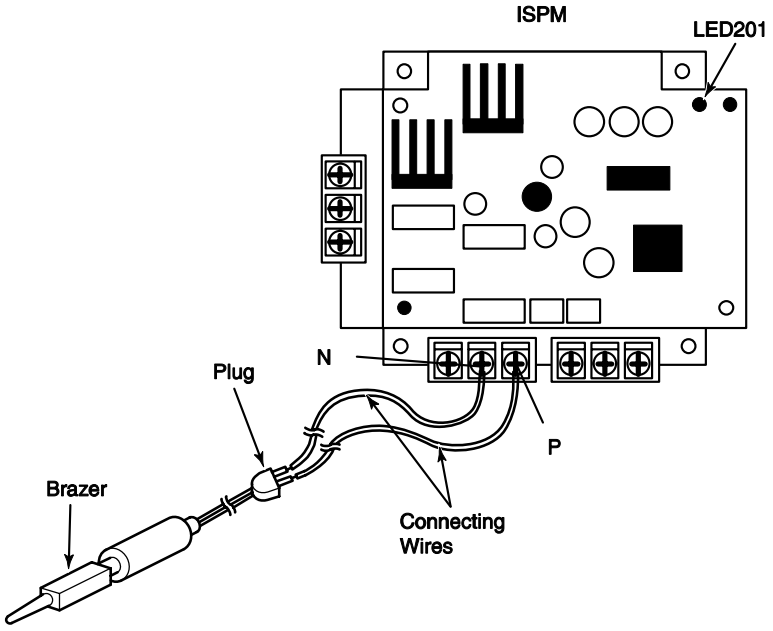
Procedure:

a. Turn OFF the main switches and wait for three minutes. Make sure that no high voltage exists. If LED201 is ON after the start and LED201 is OFF after turning OFF the power source, the voltage will decrease to lower than DC50V.

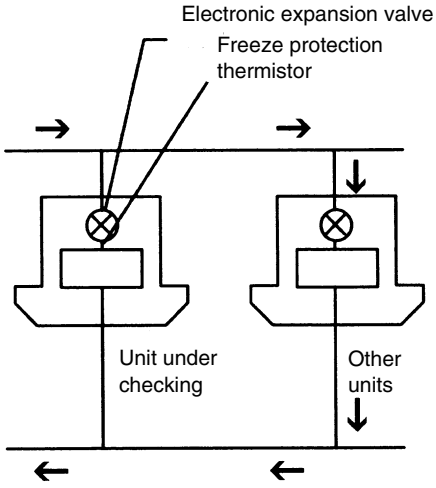
b. Connect the connect wires to an electrical brazer. The discharging starts and this results in a hot brazer. Pay attention not to short-circuit between the terminal P and N.

c. Connect the wires to terminals, P and N on ISPM.

d. Wait for two or three minutes and measure the voltage once again. Make sure that no voltage is charged.

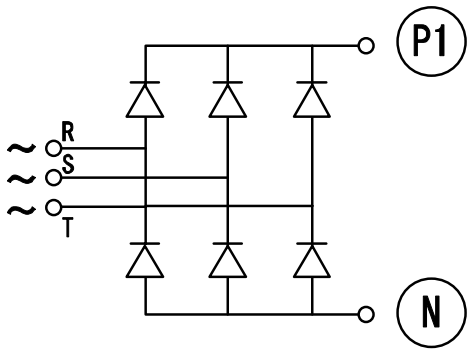


■ Checking procedure for the electronic expansion valve

	Indoor unit electronic expansion valve	Outdoor unit electronic expansion valve
Locked with fully closed	Check the liquid pipe temperature during the heating process. It is abnormal if the temperature does not increase.	It is abnormal if the liquid pipe pressure does not increase during the cooling process.
Locked with slightly open	It is abnormal under the following conditions: the temperature of the freeze protection thermistor becomes lower than the suction air temperature when the unit which is under checking stops and the other units are under the cooling process.	It is abnormal if the liquid pipe pressure does not increase and the outlet temperature of the expansion valve decreases after the cooling process starts.
Locked with fully open		It is abnormal under the following conditions: after the heating process for more than 30 minutes, the discharge gas temperature of the compressor is not 10°C higher than the condensing temperature and there is no other faults, such as an excessive charge of refrigerant and others.

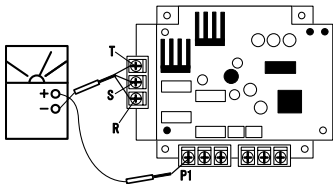
■ Checking procedures for the ISPM

Internal circuit of the ISPM

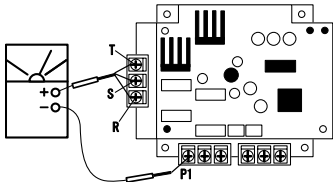


Remove all the terminals of the ISPM before checking. If you perform steps (a) to (h) and the results are satisfactory, the ISPM is normal. Measure the ISPM under 1kΩ range of a tester. Do not use a digital tester.

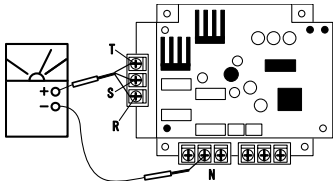
a. By touching the + side of the tester to the P1 terminal of the ISPM and the - side of tester to R, S and T of the ISPM, measure the resistance. If all the resistances are more than 1 kΩ, the resistance is normal.



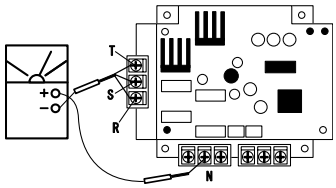
b. By touching the - side of the tester to the P1 terminal of the ISPM and the + side of tester R, S and T of the ISPM, measure the resistance. If all the resistances are more than 100 kΩ, the resistance is normal.



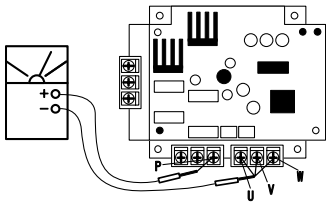
c. By touching the - side of the tester to the N terminal of the ISPM and the + side of tester to R, S and T of the ISPM, measure the resistance. If all the resistances are more than 1kΩ, the resistance is normal.



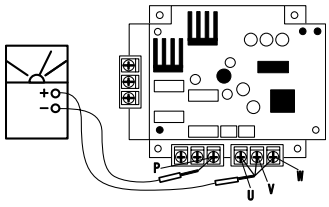
d. By touching the + side of the tester to the N terminal of the ISPM and the - side of tester to R, S and T of the ISPM, measure the resistance. If all the resistances are greater than 100 kΩ, the resistance is normal.



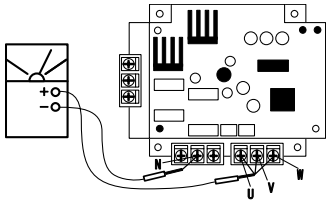
e. By touching the + side of the tester to the P terminal of the ISPM and the - side of tester to U, V and W of the ISPM, measure the resistance. If all the resistances are greater than 1 kΩ, the resistance is normal.



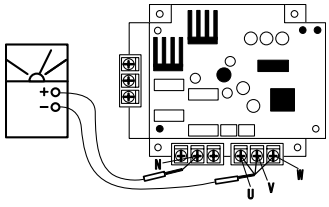
f. By touching the - side of the tester to the P terminal of the ISPM and the + side of tester to U, V and W of the ISPM, measure the resistance. If all the resistances are more than 100 kΩ, the resistance is normal.



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



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

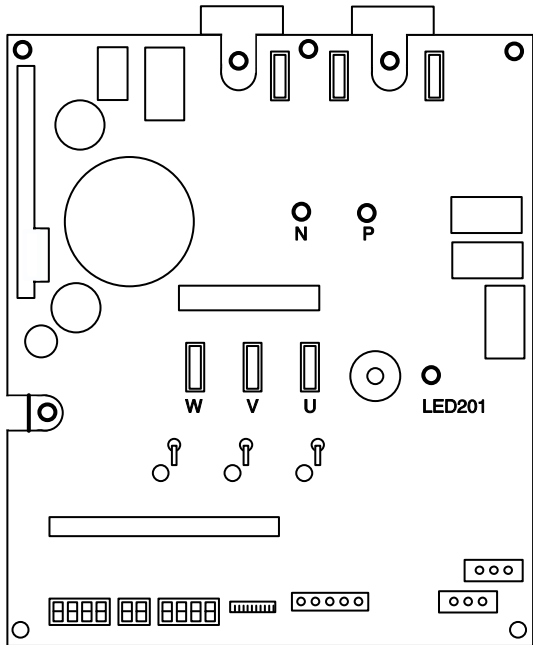


■ **Checking procedure for the fan controller failure**

1) Turn OFF the main switches and make sure that LED201 (Red) on Fan Controller is OFF. Otherwise, an electrical shock may occur because the voltage may have changed more than DC50V in Fan Controller.

2) Remove all the wirings in Fan Controller and measure the resistance between the terminals by means of an analog tester, according to the table below. Fix the tester range to 1KΩ. Check the color and the terminal for measuring. Do not use a digital tester.

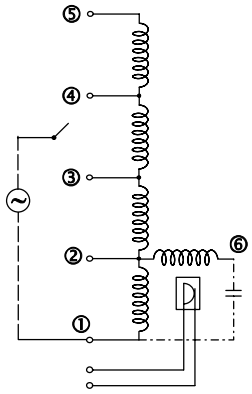
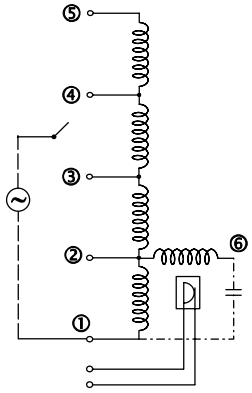
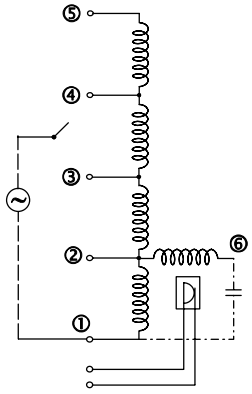
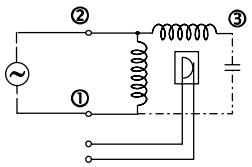
Tester probe Red (+) Black (-)	Criteria for resistance value
P-R P-S P-T R-N S-N T-N P-U P-V P-W U-N V-N W-N	More than 1KΩ
R-P S-P T-P N-R N-S N-T U-P V-P W-P N-U N-V N-W	The resistance value increases by degrees after the indicator moves for a moment. The resistance value increases by degrees after 1700KΩ~1900, KΩ is displayed (x).

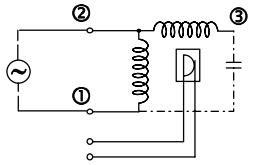
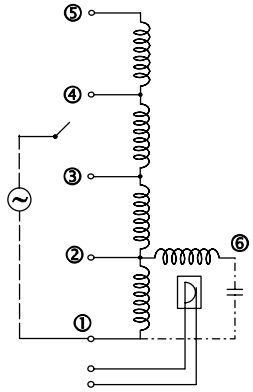
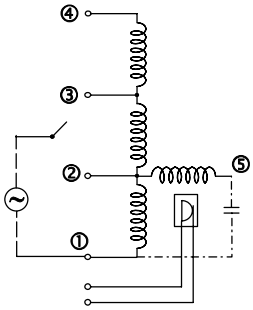
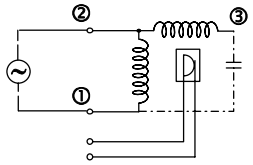
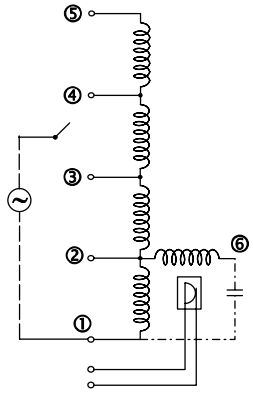
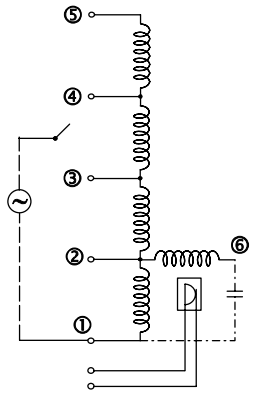


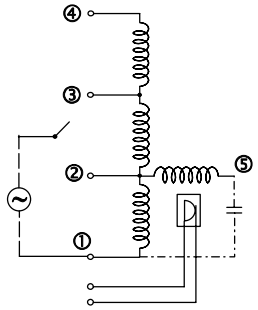
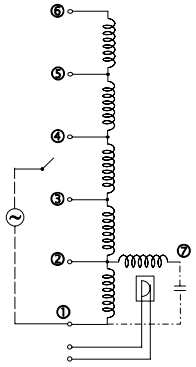
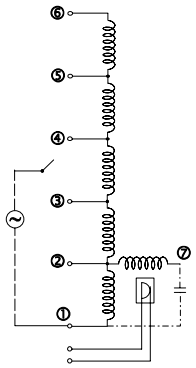
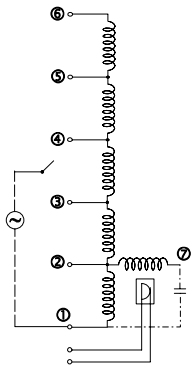
The interval of the measurement should be more than 30 seconds. Otherwise, an excessively high value may be displayed.

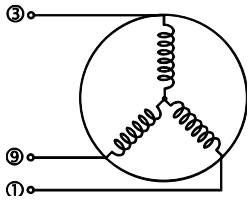
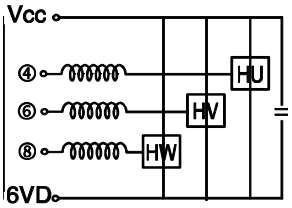
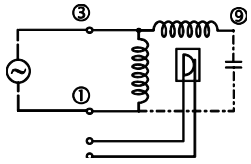
■ Checking procedure for the electrical coil parts

	Abbreviations used for colors	
1	Black	BLK
2	Brown	BRN
3	Red	RED
4	Yellow	YEL
5	Green	GRN
6	Blue	BLU
7	Grey	GRY
8	Orange	ORN
9	White	WHT

Part names	Model	Electrical wiring diagram	Wiring No.	Resistance (Ω)
Fan motor for the indoor unit for: RCI-1.0FSNE	5W		BLK① - ②RED RED② - ③BLU BLU③ - ④ORN ORN④ - ⑤YEL RED② - ⑥WHT	167.10 47.30 46.70 58.70 249.00 at 25 °C
Fan motor for the indoor unit for: RCI-1.5FSNE	17W			
Fan motor for the indoor unit for: RCI-2.0FSNE RCI-2.5FSNE RCI-3.0FSNE	60W		BLK① - ②RED RED② - ③BLU BLU③ - ④ORN ORN④ - ⑤YEL RED② - ⑥WHT	117.10 28.50 40.35 39.60 210.65 at 25 °C
Fan motor for the indoor unit for: RCI-4.0FSNE RCI-5.0FSNE	60W		BLK① - ②RED RED② - ③BLU BLU③ - ④ORN ORN④ - ⑤YEL RED② - ⑥WHT	66.00 26.80 26.80 33.40 95.5 at 25 °C
Fan motor for the indoor unit for: RCD-1.0FSN RCD-1.5FSN RCD-2.0FSN	35W		BLK① - ③RED RED③ - ⑤WHT	159.0 92.0 at 20 °C
Fan motor for the indoor unit for: RCD-2.0FSN RCD-2.5FSN RCD-3.0FSN	55W		BLK① - ③RED RED③ - ⑤WHT	70.9 81.7 at 20 °C

Part names	Model	Electrical wiring diagram	Wiring No.	Resistance (Ω)
Fan motor for the indoor unit for: RCD-4.0FSN	35Wx2		BLK① - ③RED RED③ - ⑤WHT	159.0 92.0 at 20 °C
Fan motor for the indoor unit for: RCD-5.0FSN	55Wx2		BLK① - ③RED RED③ - ⑤WHT	70.9 81.7 at 20 °C
Fan motor for the indoor unit for: RPC-2.0FSNE RPC-2.5FSNE RPC-3.0FSNE	65W		BLK① - ②RED RED② - ③YEL YEL③ - ④GRY GRY④ - ⑤BLU RED② - ⑥WHT	59.90 16.90 15.80 15.80 63.60 at 20.1 °C
Fan motor for the indoor unit for: RPC-4.0FSNE RPC-5.0FSNE	180W		BLK① - ②RED RED② - ③YEL YEL③ - ④GRY RED② - ⑥WHT	32.10 24.50 24.50 44.70 at 25 °C
Fan motor for the indoor unit for: RPI-0.8FSNE RPI-1.0FSNE RPI-1.5FSNE	55W		BLK① -②RED RED② -③BLU BLU③ -④GRY	119.70 87.98 52.08 at 21 °C
Fan motor for the indoor unit for: RPI-2.0FSNE RPI-2.5FSNE	80W		BLK① -②RED RED ② - ③BLU BLU③ - ④GRY GRY④ - ⑤YEL RED② - ⑥WHT	50 13 13 13 110 at 20 °C
Fan motor for the indoor unit for: RPI-3.0FSNE	225W		BLK① -②RED RED ② - ③BLU BLU③ - ④GRY GRY④ - ⑤YEL RED② - ⑥WHT	20 14.5 7.3 7.3 26.5 at 21 °C

Part Names	Model	Electrical Wiring Diagram	Wiring No.	Resistance (Ω)
Fan motor for the indoor unit for: RPI-4.0FSNE RPI-5.0FSNE	350W		BLK① -②RED RED ② - ③BLU BLU③ - ④GRY GRY④ - ⑤YEL RED② - ⑥WHT	10.5 8.4 4.2 4.2 25 at 20 °C
Fan motor for the indoor unit for: RPK-0.8FSNM RPK-1.0FSNM RPK-1.5FSNM RPK-2.0FSNM	20W	DC Motor	--	-
Fan motor for the indoor unit for: RPK-2.5FSNM RPK-3.0FSNM	40W			
Fan motor for the indoor unit for: RPK-4.0FSNM	41W			
Fan motor for the indoor unit for: RPF(I)-1.0FSNE	28W		BLK① -③RED RED③ - ⑤WHT RED③ -⑥BLU BLU⑥ -⑦ORN ORN⑦- ⑧YEL	534.5 193.1 113.5 92.8 201.3 at 21 °C
Fan motor for the indoor unit for: RPF(I)-2.0FSNE RPF(I)-2.5FSNE	45W		BLK① -③RED RED③ - ⑤WHT RED③ -⑥BLU BLU⑥ -⑦ORN ORN⑦- ⑧YEL	97.9 138.1 61.6 35.2 61.0 at 20 °C
Fan motor for the indoor unit for: RPF(I)-1.5FSNE	28W		BLK① -③RED RED③ - ⑤WHT RED③ -⑥BLU BLU⑥ -⑦ORN ORN⑦- ⑧YEL	231.7 198.7 136.2 71.2 202.4 at 21 °C

Part Names	Model	Electrical wiring diagram	Wiring No.	Resistance (Ω)
Fan motor for the outdoor unit for: RAS-5FSN	DC Motor 370W		RED③ -⑨WHT WHT⑨ -①BLK RED③ -①BLK	6,75 6,75 6,75 at 21ºC
Fan motor for the outdoor unit for: RAS-8FSN RAS-10FSN RAS-16FSN RAS-20FSN RAS-24FSN RAS-30FSN	DC Motor 810W		YEL④ -⑥BLU BLU⑥ -⑧ORN ORN⑧ -④YEL	3,25 3,25 3,25
Fan motor for the outdoor unit for: RAS-20FSN RAS-24FSN RAS-30FSN	NF7024 275w		RED③ - ①BLK RED③ - ⑨WHT	6,74 5,91

Part names	Model code	Resistance (Ω)
Drain-up motor for: RCI-1.0FSNE, RCI-1.5FSNE, RCI-2.0FSNE, RCI-2.5FSNE, RCI-3.0FSNE, RCI-4.0FSNE, RCI-5.0FSNE	P19837	139.1 at 21 °C
Drain-up motor for: RCD-1.0FSN, RCD-1.5FSN, RCD-2.0FSN, RCD-2.5FSN, RCD-3.0FSN, RCD-4.0FSN, RCD-5.0FSN	KJV-1004	347 at 20 °C
4-way valve for: RAS-5FSN	VT40101 + LB64046	1,435 at 21 °C
4-way valve for: RAS-8FSN, RAS-10FSN RAS-16FSN, RAS-20FSN RAS-24FSN, RAS-30FSN	VT60101 + LB64046	1,890 at 20 °C
Solenoid valve for the gas bypass (sva) for: RAS-5FSN ~ RAS-30FSN	SR10PA	1,800 at 20 °C
Solenoid valve for heat exchanger changeover (SV6) for: RAS-5FSN ~ RAS-30FSN	SR10PA	1,800 at 20 °C
Solenoid valve for oil return (svf) for: RAS-5FSN ~ RAS-30FSN	SR10PA	1,800 at 20 °C
Inverter compressor motor for: RAS-5FSN ~ 30FSN	E405AHD-36A2	0,239 at 20 °C
Constant speed compressor motor for: RAS-10FSN~ 24FSN	E605DH-59A2Y	0,61 at 20 °C
Constant speed compressor motor for: RAS-30FSN	E655DH-65A2Y	0,60 at 20 °C
Contactor for the compressor motor for: RAS-5FSN, RAS-8FSN, RAS-10FSN	To be informed later	To be informed later
Contactor for the compressor motor for: RAS-16FSN, RAS-20FSN RAS-24FSN, RAS-30FSN	To be informed later	To be informed later

■ Checking procedure for the compressor

CHECK LIST ON THE COMPRESSOR

Client:	Model:	Date:
Serial No:	Production date:	Checker:

No.	Check item	Check method	Result	Remarks
1	Are THM8, THM9, THM12 and THM13 correctly connected? THM8, THM9, THM12, THM13: Discharge gas thermistor	① Are the wires of each thermistor correctly connected in a visual inspection? ② Make sure that 7-segment display of Td1 is higher than Td2, Td3, Td4 when No.1 comp. is operating. Td1: Temperature of THM8 Td2: Temperature of THM9 Td3: Temperature of THM12 Td4: Temperature of THM13		
2	Are the thermistors THM8, THM9, THM12 and THM13 disconnected?	① Make sure that thermistor on the top of comp. is correctly mounted in a visual inspection. ② Make sure that the actually measured temp. is greatly different from the display (Td1, Td2, Td3, Td4) during the check mode.		
3	Are the connectors for current sensor correctly connected	① Make sure that indications A1, A2, A3 and A4 are 0 during the compressor stoppage. ② Make sure that indications A1, A2, A3 and A4 are not 0 during the compressor operation. (However, A2, A3 and A4 are 0 during the stoppage of the compressors No.2, No.3 and No.4).		
4	Is current sensor faulty?			
5	Is current sensing part on PCB3 faulty?			
6	Is the direction of current sensor (CTU, CTV) reverse?	Check the direction → in a visual inspection.		
7	Are the power supply wires U and V inserted correctly into the current sensor?	Make sure that the wires are correctly inserted.		
8	Are the ex. valves (MV1, MV2, MV3, MV4 and MVB) correctly connected?	Make sure that MV1~CN10 and MV2~CN11 are correctly connected.		
9	Are the ex. valve coils (MV1, MV2, MV3, MV4 and MVB) correctly mounted?	Make sure that each coil is correctly mounted on the valve.		
10	Are the refrigerant cycle and electrical wiring system incorrectly connected?	Make sure that the refrigerant is flowing into the indoor units by operating one refrigerating cycle only from the outdoor unit.		
11	Is the opening of ex. valve completely closed (locked)?	Check the following by means of the check mode of the outdoor unit. ① Liquid pipe temp.(TL)< Inlet air temp.(Ti) during the cooling process ② Liquid pipe temp.(TL)> Inlet air temp.(Ti) during the heating process		
12	Is the opening of ex. valve fully opened (locked)?	Make sure that the liquid pipe temp. is lower than the inlet air temp. of the stopped indoor unit when other indoor units are operating under the cooling process.		
13	Are the contacts for the comp. magnetic switch CMC faulty?	Check the surface of each contact (L1, L2 and L3) in a visual inspection.		
14	Is there any voltage malfunction among L1-L2, L2-L3 and L3-L1?	Make sure that the voltage imbalance is smaller than 3%. Note that the power source voltage must be within 380V or 415V±10%, 220V±10 %.		
15	Is the comp. oil acidified during the burning of the compressor motor?	Make sure that the oil color is not black.		

Additional information for "CHECK LIST ON THE COMPRESSOR"

Check item	Additional information (mechanism of the compressor failure)
1 & 2	The discharge gas temperature (Td1) controls the liquid refrigerant return volume to the compressor when only the compressor No.1 is operating. If THM8 and THM9 are connected in the reverse order, the liquid refrigerant return volume will decrease even if the actual discharge gas temperature is high, because PCB1 is checking the wrong compressor temperature. Therefore, this abnormal overheating process will result in the insulation failure of the motor winding.
3, 4 & 5	The current sensor performs the overcurrent control (the operation frequency control) by detecting the current. In this case, the insulation failure of the motor winding will occur because the control is not available in spite of the actually high current.
6, 7	The current sensor checks the phase and adjusts the output electrical wave, in addition to the above-mentioned items. If a fault occurs, the output electrical wave becomes unstable. This generates stress to the motor winding and results in the insulation failure of the motor winding.
8, 9	During a cooling process, the fan speed of the outdoor unit controls the Pd and the MV of each indoor unit controls the Td and the SH. During a heating process, MV1, MV2, MV3, MV4 and MVB control the Td and the SH. If the expansion valves are incorrectly connected, the correct control is not available. This results in the compressor seizure depending on the returning conditions of the liquid refrigerant. Also, this may result in the insulation failure of the motor winding depending on the overheating conditions.
10	If the refrigerant cycle and the electrical system are incorrectly connected, an abnormally low suction pressure operation is maintained or an abnormally high discharge pressure operation is maintained. This results in further stress to the compressor because the correct control of the compressor is not available.
11	Ditto.
12	The compressor may be locked due to the return operation of the liquid refrigerant during the cooling process.
13	If the contacting resistance becomes large, the voltage imbalance among each phase will cause an abnormal overcurrent.
14	In this case, the overcurrent will occur, the efficiency will decrease or the motor winding will be excessively heated.
15	In this case, it will result in the burning of the motor or the compressor seizure.

9 SERVICING

CONTENTS

9.1. OUTDOOR UNIT

$ ***WARNING:*** *TURN OFF all the main switches*

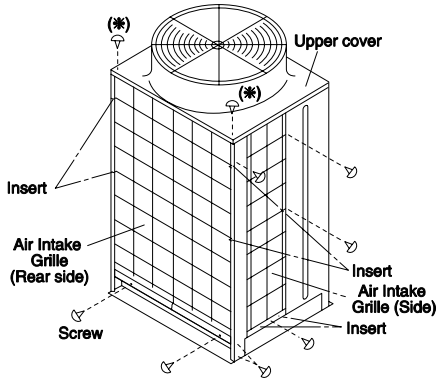
TOOL	Phillips screwdriver

9.1.1. REMOVING THE AIR INLET GRILLE

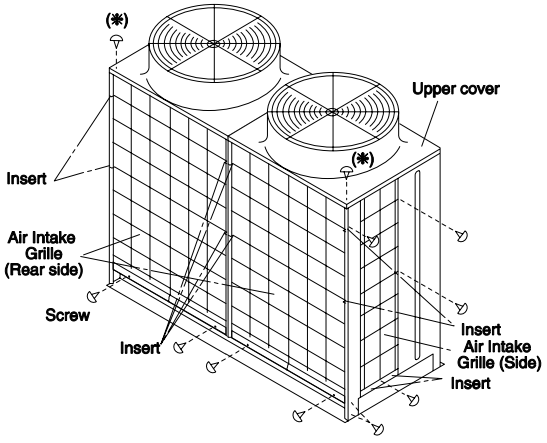
1. Remove the two/the four screws at the bottom of the air inlet grille (rear side of the unit).
2. Remove the air inlet grille (rear side) by pulling and unhooking the four hooks at both sides.
3. Remove the six screws for the air inlet grille (side of the unit).
4. Remove the two screws for the upper panel (indicated by (❊).

NOTE:
The length of the screws for the upper panel (❊) is different from the other screws (M4 x l 20mm).

5. Remove the air inlet grille (side of the unit) by pulling and unhooking.



RAS - 5 ~ 16 FSN



RAS - 20 ~ 30 FSN

$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver

9.1.2. REMOVING THE FRONT SERVICE PANEL

1. Remove the screws. Slightly lift the panels upwards and remove the panels.

   RAS-5FSN..... 6 screws.

   RAS-8, 10 FSN..... 8 screws.

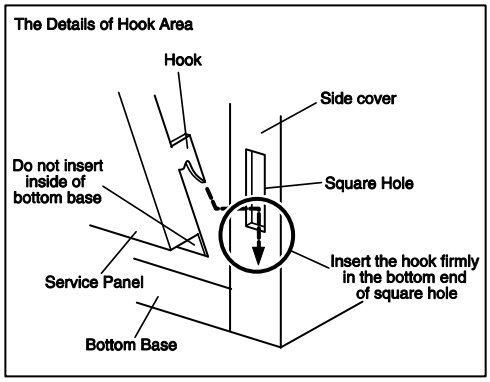
   RAS-16 FSN..... 10 screws.

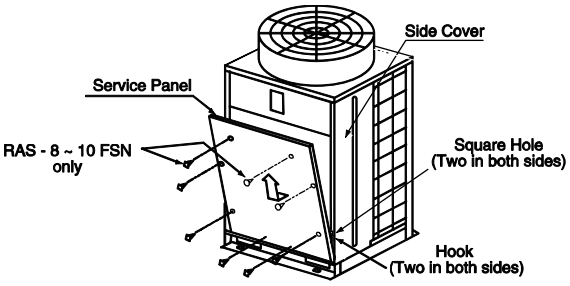
   RAS-20, 24 FSN..... 8 screws.

   RAS-30 FSN..... 10 screws.

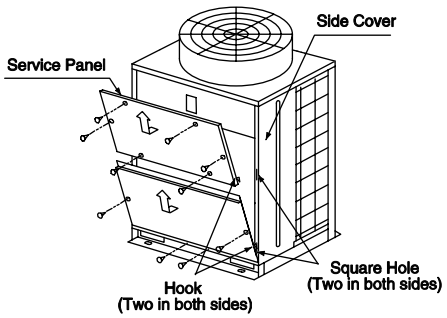
NOTES:

1) *When you are removing screws for the front service access panel, remove the screw at the lower part of the panel first.*
2) *When you are attaching the front service access panel, insert the hook in the bottom end of the square hole at the side panel, as shown in the figure below. (Do not insert inside the bottom of the base).*

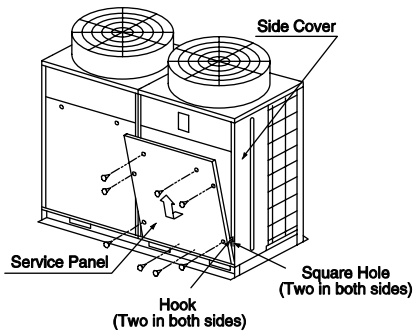




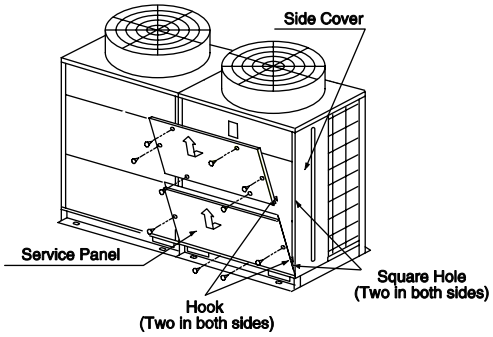
RAS - 5 ~ 10 FSN



RAS - 16 FSN



RAS - 20 FSN



RAS - 24 ~ 30 FSN

$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver

9.1.3. REMOVING THE FAN GUARD NETS

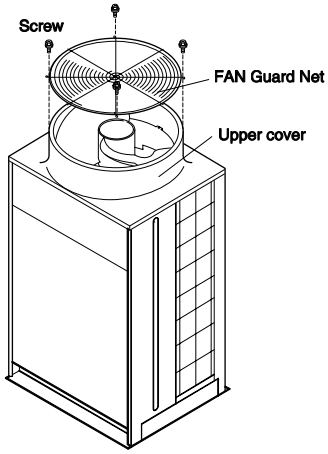
1. Remove the four/the eight screws and remove the fan guard net.

   RAS-5, 8, 10, 16 FSN….4 screws.

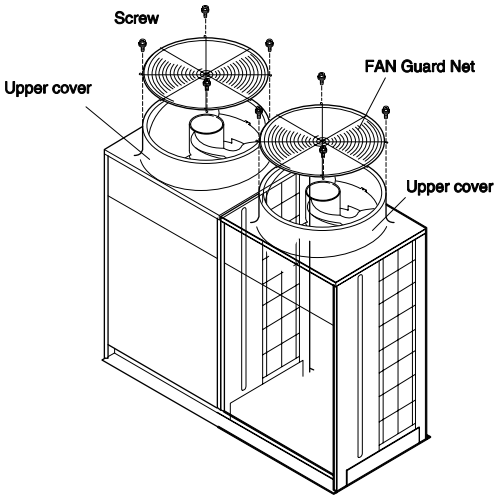
   RAS-20, 24, 30 FSN…. 8 screws.

NOTE:

Do not apply load on the upper panel (plastic part). Otherwise, you may deform or break the upper panel.



RAS - 5 ~ 16 FSN



RAS - 20 ~ 30 FSN

$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Spanner, adjustable wrench, box wrench, puller

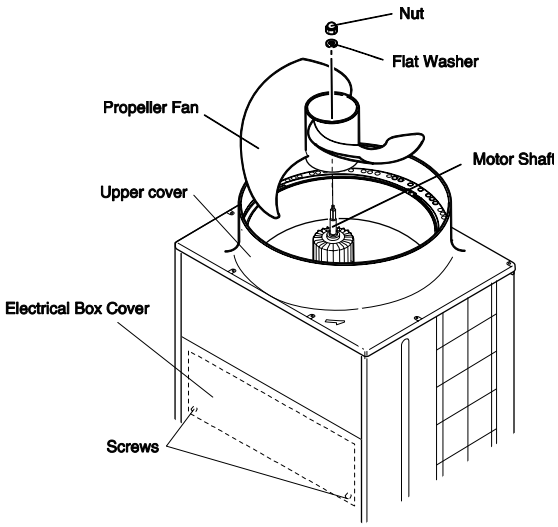
9.1.4. REMOVING THE OUTDOOR FAN

1. Remove the fan guard nets according to the section 9.1.3, "Removing the Fan Guard Nets".

NOTE:

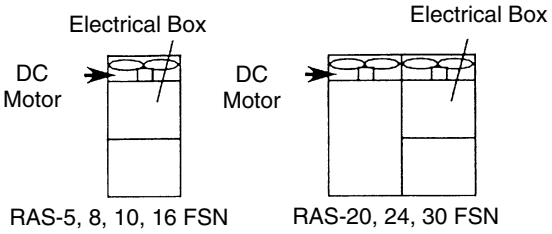
Do not apply load on the upper panel (plastic part). Otherwise, you may deform or break the upper panel.

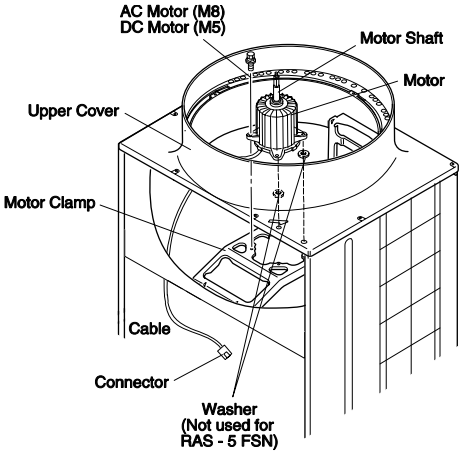
2. Remove the fans by removing the cap nuts and flat washers that fix the propeller fans onto the motor shafts. If it is difficult to remove the fan, use a puller.
3. Remove the front service access panel and the electrical box panel according to the information in section 9.1.2. Disconnect the connectors for the motors in the electrical box. Remove the motors by removing the four fixing bolts for the motors.



NOTE:

1. *There are washers (two locations on the heat exchanger side) between the motor and the motor clamp. Pay special attention when you are ready for removing the motor.*
2. *Keep the cord outlet of the motor pointing downward when you are mounting the motor.*
3. *Fix firmly the washers (two pieces) between the motor and the motor clamp on the heat exchanger side (washer: SUS, outer diameter Ø18 x inner diameter Ø8.5 x thickness t1.6).*
4. *Mounting the propeller fan. Put and push the propeller fan by identifying the ▽ mark with the cut part of the motor shaft. Firmly fix the propeller fan twice with a tightening torque of 30N·m (300 kg·cm) after the head of the fan shaft comes up.*
5. *Connect the motor wires to the power connectors at the upper part of the electrical box.*





$ ***WARNING:*** *TURN OFF all the main switches*

9.1.5. POSITION FOR ATTACHING THE AC MOTOR

When you are attaching the AC motor (*), attach the motor by positioning the motor toward front side. Otherwise, the gap between the propeller fan and the bell mouth will not be enough. If that is the case, the propeller fan and the bell mouth may touch each other while they are running.

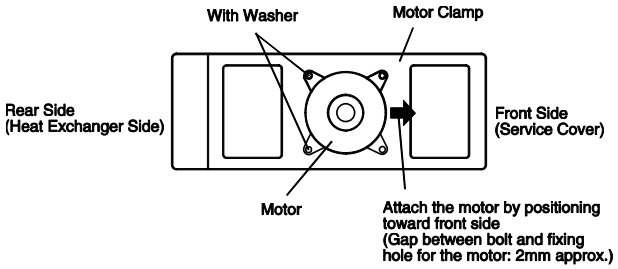
1. To attach the outdoor fan, perform in reverse order the procedure for removing the outdoor fan.
2. Make sure that the gap between the propeller fan and the upper panel is even. Make sure that there is no contact noise between the propeller fan and the upper panel when the propeller fan is operating.

NOTE:

If the washers are not attached, the washers are attached in incorrect positions, or the AC Motor is positioned incorrectly, a contact or an abnormal noise may occur.

(*) The AC motor is available for the following units only:

RAS-8FSN, RAS-10FSN, RAS-16FSN, RAS-20FSN, RAS-24FSN and RAS-30FSN.



RAS - 8 ~ 30 FSN

TOOL	Adjustable wrench or spanner, burner, pipe cutter, pliers

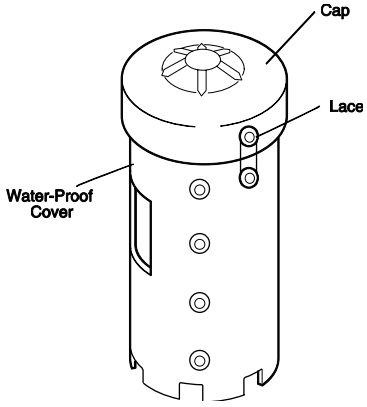
9.1.6. REMOVING THE COMPRESSOR

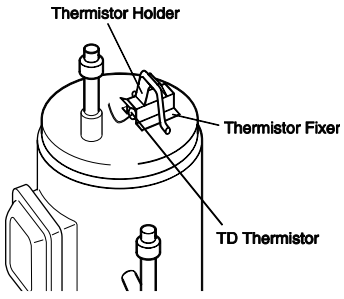
Before starting the work, collect the refrigerant into a cylinder from the cycle or refer to the "Pump-Down Procedure".

1. Remove the front service access panel according to the section 9.1.2, "Removing the Front Service Panel".
2. Release the lace for the top cap of the compressor and remove the top cap.
3. Remove the Td thermistor on the top of the compressor.

NOTE:

You will use again the thermostat fixer, the holder and the thermostat holder when you are ready for reassembling.
Keep the fixers and the holders in a box so that these parts are stored correctly.





$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Adjustable wrench or spanner, burner, pipe cutter, pliers

4. Release the lace for the waterproof panel. Open the waterproof panel from the front side.

NOTE:

Remove the waterproof panel in the arrow mark direction as shown. Pay attention to the cut part (*) of the waterproof panel in order to avoid any damage.

NOTE:

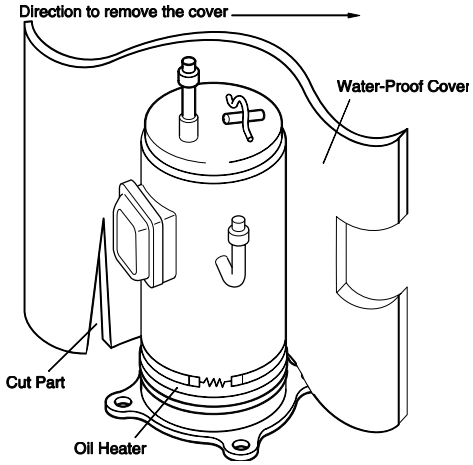
Do not deform any piping when you are removing the panel. If you deform the piping, the welded portion may be broken. Pay attention to the sharp edges of the side panel in order to avoid any injury.

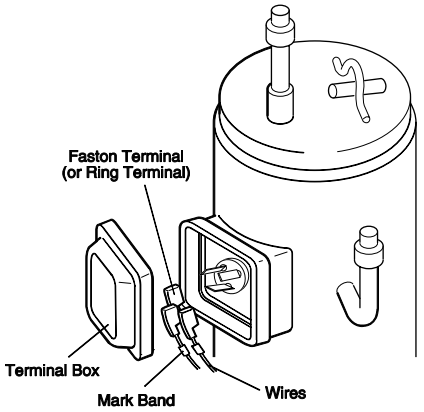
5. Remove the terminal panel for the compressor and disconnect the wiring to the compressor terminals. Make sure that the terminal N^{os}. and the mark band are correct. If the terminal N^{os}. and the mark band are not identified, this will cause incorrect wiring when you are reassembling.

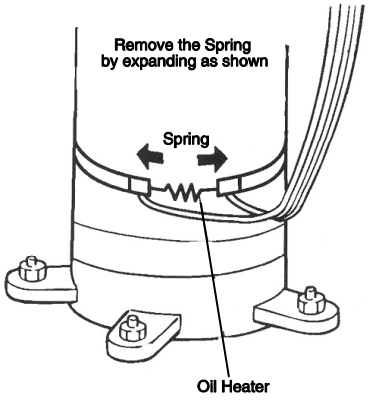
NOTES:

1. *Make sure that the fasten terminals for the compressors are normal. When a pulling force of 20N or more is required, it is normal. Otherwise, replace the fasten terminals with new terminals.*
2. *Make sure that the wires are correctly inserted.*
3. *It is recommended that the fasten terminals be clamped to increase the contacting force after replacing the compressor.*

6. Remove the oil heater by releasing the spring.



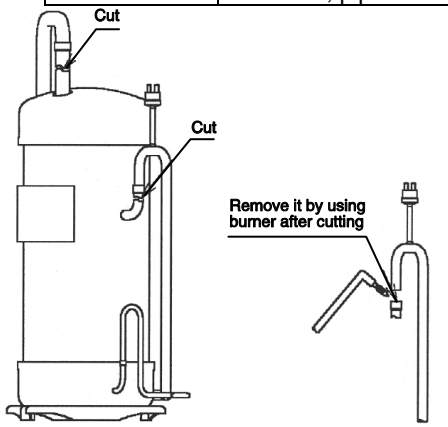




$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Adjustable wrench or spanner, burner, pipe cutter, pliers

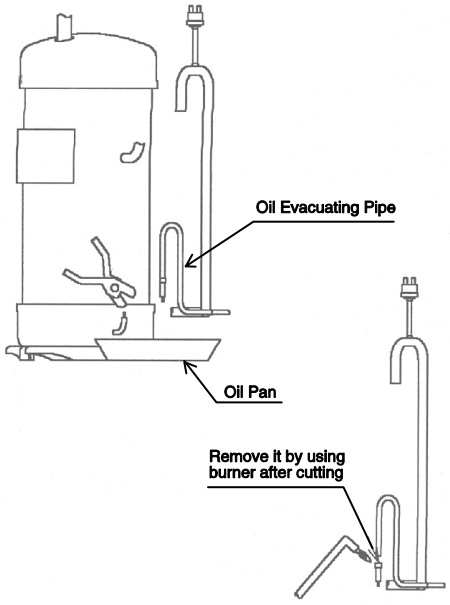
7. Disconnect the discharge and suction pipes of the compressor.
   Make sure that there is no positive pressure inside the pipes. Cut the pipe at the compressor side of the brazing part. Remove the cut pipe of the compressor.



NOTES:

1. *Completely clean the oil if the oil has spread to the other parts such as the compressor panel, the wiring bottom base, and others.*
2. *Make sure that the pipes are cut before working with a burner.*

8. Remove the oil-evacuating pipe of the compressor (only the constant speed compressor). Pinch and cut the pipe at the compressor side of the brazing part, so that the refrigerant oil does not spill from the oil-evacuating pipe. Make sure that the oil of the brazing part is removed before removing the oil-evacuating pipe from the pipe side.



NOTE:

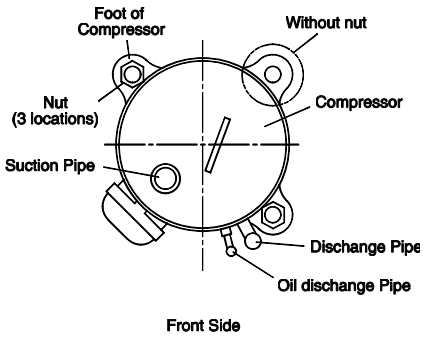
Work according to this procedure. If a burner is applied directly without cutting, it will cause a fire.

Do not throw out the oil that is collected by the oil pan and others. (The oil will be measured).

$ ***WARNING:*** *TURN OFF all the main switches*

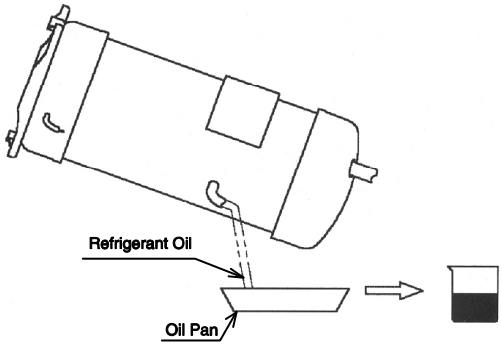
TOOL	Adjustable wrench or spanner, burner, pipe cutter, pliers

9. Remove the three nuts that fix the compressor and remove the compressor. There is no nut at the rear side. When you are removing the compressor, pay special attention not to touch or deform the surrounding pipes.



NOTES:

1. *Pay special attention to the edges of the plates and others when you are working.*
2. *If you are removing the compressor with the oil pipe, cover the end of the pipe with the tape in order to avoid a spill.*
3. *Do not expose the refrigerant cycle to the environment for a long period in order to avoid mixing the water with foreign particles. Mount the new compressor quickly.*
4. *If you cannot measure the oil level, charge an additional 300(cm^3).*
5. *If the oil is foul, replace the old oil with the new oil.*



10. Take out the rest of the refrigerant oil from the discharge piping and measure the rest of the refrigerant oil. (This work is necessary when you are replacing the constant speed compressor):
    - The oil quantity from the old compressor is larger that the oil quantity of the new compressor→ An additional change is necessary.
    - The oil quantity of the refrigerant which remains in the compressor is less than the oil level of the new compressor → An additional change is unnecessary.
    - Additional oil change: Evacuated charge of the old compressor – initial change of the new compressor (cm^3) + 200(cm^3) (Inside Compressor Chamber).

Compressor	Initial charge (cm^3)
E405AH-D	1200
E505DH E605DH E655DH	500

$ ***WARNING:*** *TURN OFF all the main switches*

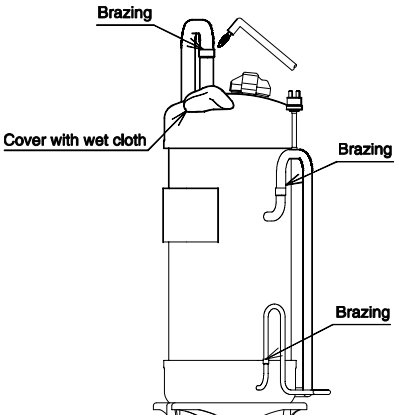
TOOL	Adjustable wrench or spanner, burner, pipe cutter, pliers

11. Attach the new compressor. Perform the brazing according to the following order:
    1) Oil Evacuating Pipe (in the case of the constant speed compressor).
    2) Discharge Pipe.
    3) Suction Pipe.

    Pay special attention to the oil pipe: do not to deform the oil pipe when you are attaching the nuts on the front side.

NOTES:

- *Attach the compressor with the cap. Remove the cap just before you start the brazing work.*
- *Connect the change hose for the pressure release to the check joint of the low-pressure side.*
- *When you are brazing the suction pipe, make sure that the connecting part is firmly inserted and that the compressor side is cooled in order to avoid the brazing material from entering the compressor.*



12. Change the refrigerant oil that was calculated in procedure 10 from the check joint of the low-pressure side. Change the refrigerant oil from the change hose after the light vacuum.

NOTES:

- *Use a clean change hose.*
- *Perform this work in a short time (within 20 minutes approximately) and use a container with a small opening so that the refrigerant oil does not absorb the moisture in the atmosphere.*

13. In order to perform the vacuum pumping and changing the refrigerant. Set all the conditions to their original state. If the compressor is in replacing mode, follow the indications in section 11.11.2, "Pump-down method for replacing the compressor".

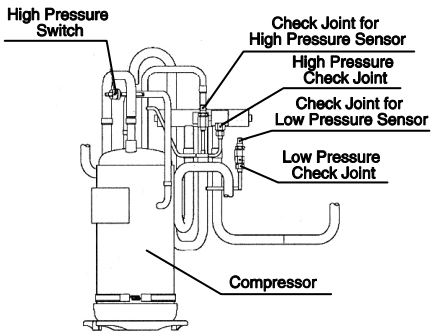
$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Spanner (14) or adjustable wrench

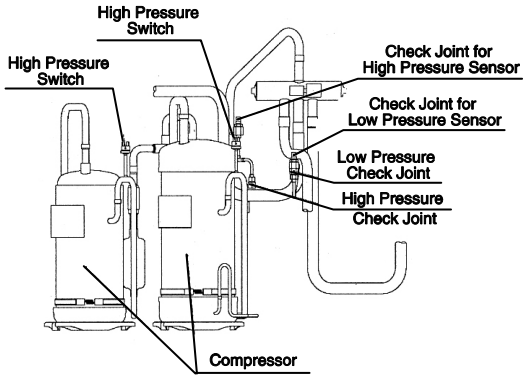
9.1.7. REMOVING THE HIGH-PRESSURE SWITCH, THE HIGH-PRESSURE SENSOR AND THE LOW-PRESSURE SENSOR

1. Remove the front service access panel according to the section 9.1.2, "Removing the Front Service Panel".

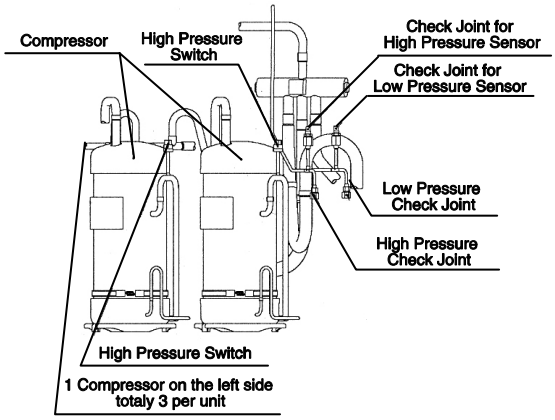
RAS - 5 FSN



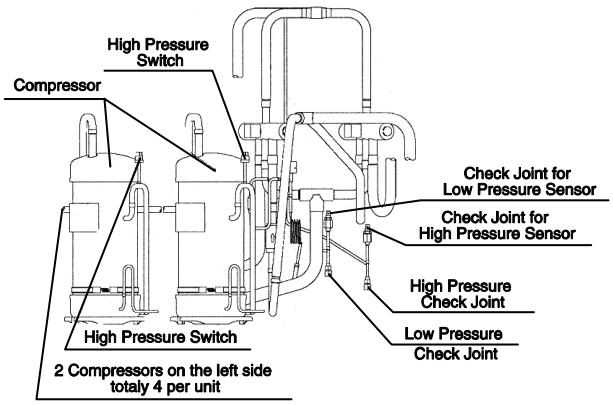
RAS - 8 ~ 10 FSN



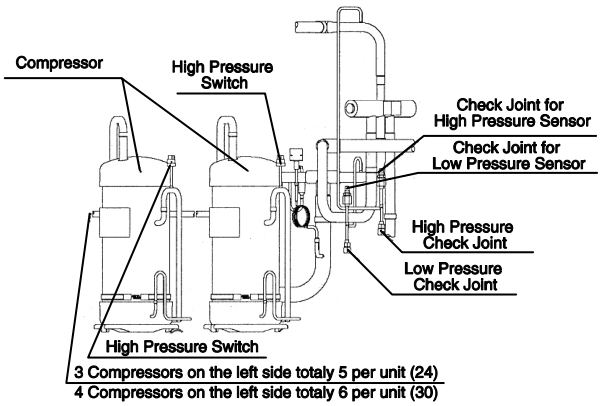
RAS - 16 FSN



RAS - 20 FSN



RAS - 24 ~ 30 FSN



$ ***WARNING:*** *TURN OFF all the main switches*

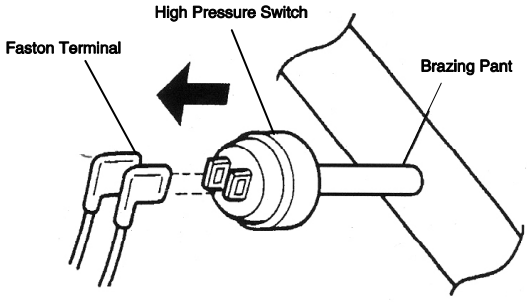
TOOL	Burner, spanner

9.1.8. REMOVING THE HIGH-PRESSURE SWITCH (DETAILED PROCEDURE)

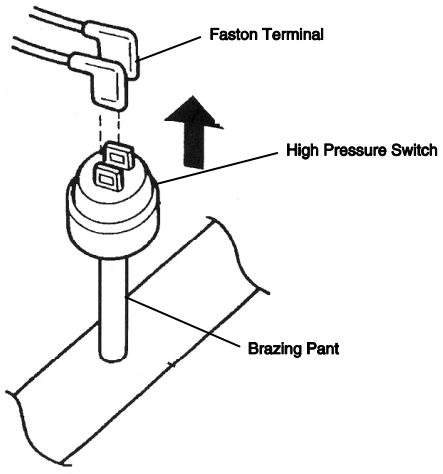
1. Collect the refrigerant.
2. Disconnect the fasten terminals.
3. Remove the high-pressure switch from the brazing part of the discharge pipe by means of a burner.

NOTE:

Do not expose the refrigerant cycle to the environment for a long period in order to avoid mixing the water with foreign particles in the refrigerant cycle. If you expose the refrigerant cycle for a long period, seal the hole.



RAS - 5 FSN



RAS - 8 ~ 30 FSN

$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver, spanner or adjustable wrench

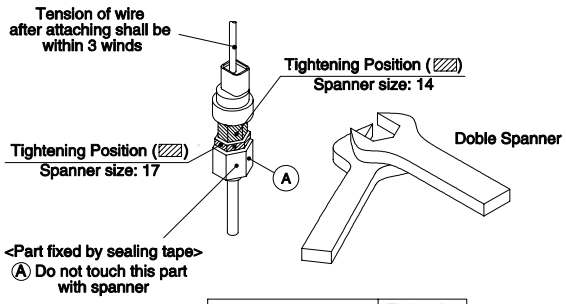
9.1.9. REMOVING THE HIGH-PRESSURE SENSOR AND THE LOW-PRESSURE SENSOR (DETAILED PROCEDURE)

1. Remove the connector for the pressure sensor wiring at the various PCB.

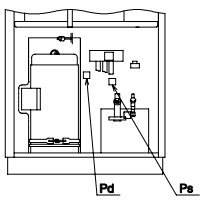
NOTE:

Make sure that you remove the connector first. Otherwise, you will damage the wire.

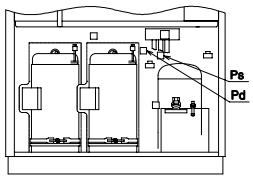
2. Remove the refrigerant pipe of the high-pressure sensor or the low-pressure sensor by using two spanners.



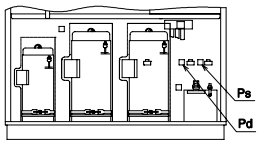
Model	Tightening Torque
RAS - 5 ~ 30 FSN	14 N · m



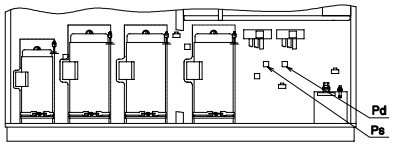
RAS - 5 FSN



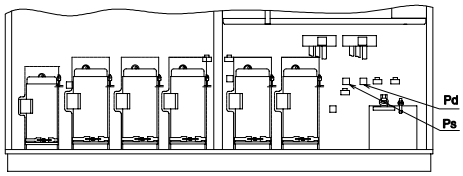
RAS - 8 ~ 10 FSN



RAS - 16 FSN



RAS - 20 FSN



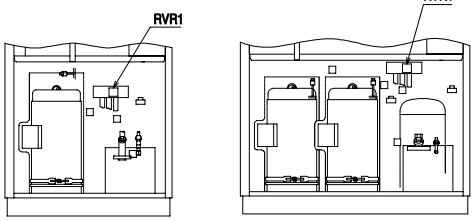
RAS - 24 ~ 30 FSN

$ ***WARNING:*** *TURN OFF all the main switches*

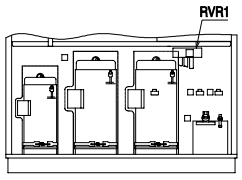
TOOL	Phillips screwdriver, spanner or adjustable wrench

9.1.10. REMOVING THE 4-WAY VALVE COIL

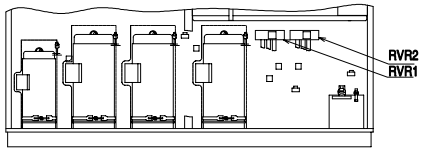
1. Remove the front service access panel according to the section 9.1.2, "Removing the Front Service Panel".
2. Remove the 4-way valve coil by means of a Phillips screwdriver first. Use a spanner or an adjustable wrench.



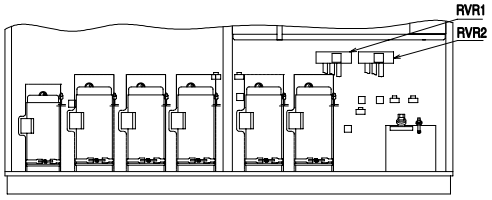
RAS - 5 FSN RAS - 8 ~ 10 FSN



RAS - 16 FSN

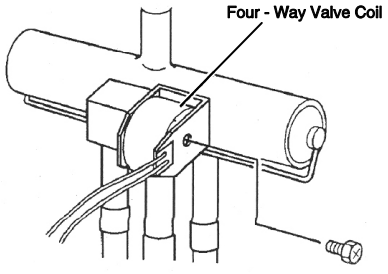


RAS - 20 FSN



RAS - 24 ~ 30 FSN

Location for Four - Way Valve



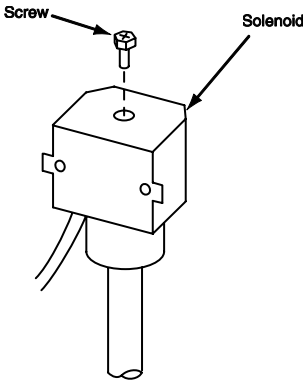
Removing the coil

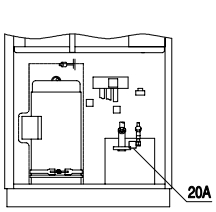
$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver, spanner or adjustable wrench

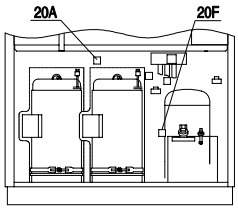
9.1.11. REMOVING THE SOLENOID VALVE COIL

1. Remove the front service access panel according to the section 9.1.2, "Removing the Front Service Panel".
2. Remove the fixing screw (1 piece) for the solenoid valve coil. If it is impossible to use the Phillips screwdriver, use a spanner or an adjustable wrench.
3. Replace the solenoid valve coil.

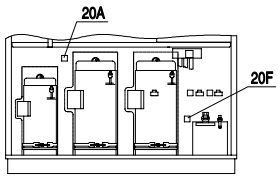




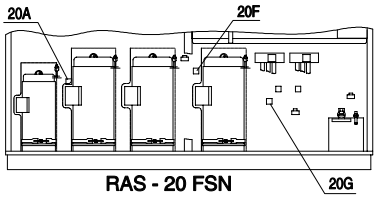
RAS - 5 FSN



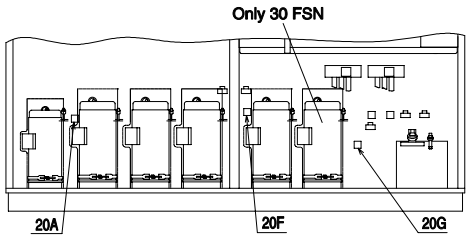
RAS - 8 ~ 10 FSN



RAS - 16 FSN



RAS - 20 FSN



RAS - 24 ~ 30 FSN

$ ***WARNING:*** *TURN OFF all the main switches*

9.1.12. REMOVING THE EXPANSION VALVE COIL

1. Before this work, remove the service access panel according to the section 9.1.2, "Removing the Front Service Panel".
2. Turn the coil as shown in the diagram and remove the coil bracket from the slot. Then, pull the coil upwards.

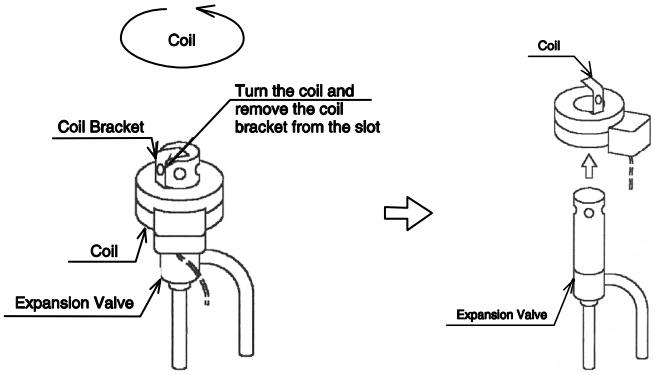
NOTE:

Pay special attention to avoid any injury when you are removing the coil.

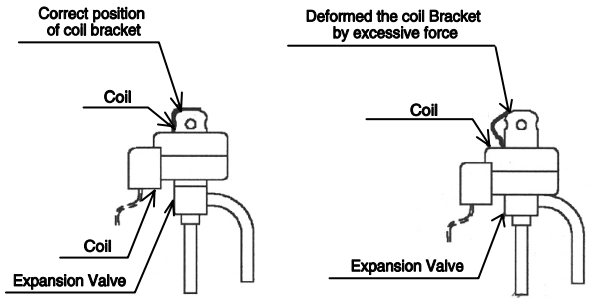
3. When you are attaching the coil, fix the coil to the expansion valve slot by turning the coil. If you apply an excessive force, you could deform the coil bracket. There are several slots on the expansion valve circumference. Any slot is acceptable.

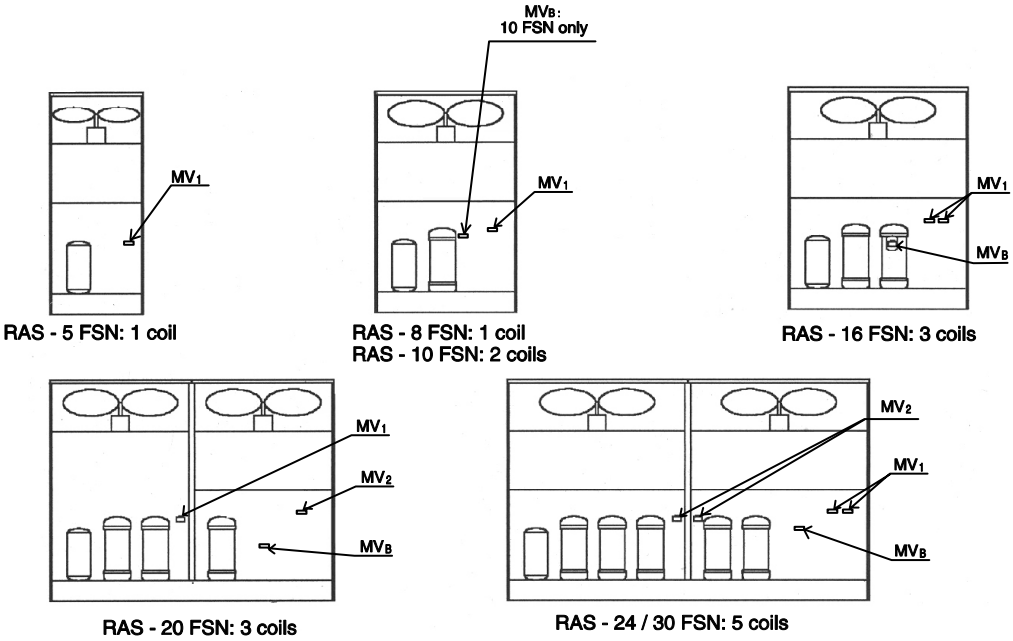
NOTE:

The force that you apply to attach the coil should be less than 60N. Verify the position of the coil.



Correct Incorrect





RAS - 5 FSN: 1 coil

RAS - 8 FSN: 1 coil
RAS - 10 FSN: 2 coils

RAS - 16 FSN: 3 coils

RAS - 20 FSN: 3 coils

RAS - 24 / 30 FSN: 5 coils

$ ***WARNING:*** *TURN OFF all the main switches*

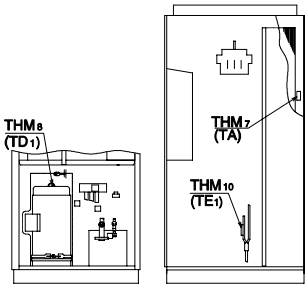
TOOL	Phillips screwdriver

9.1.13. REMOVING THE THERMISTOR FOR THE LIQUID PIPE

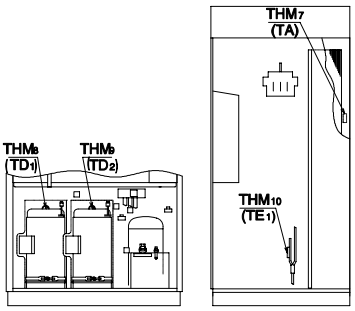
NOTE:

When you are removing the thermistor for the liquid pipe, make sure that you do not remove the valve when you are pulling the cable.

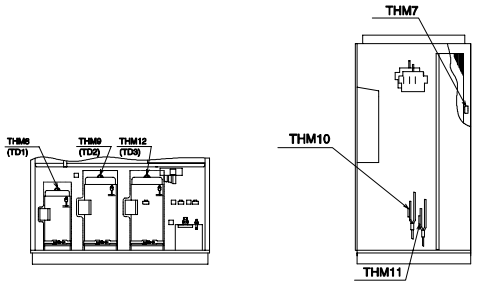
1. Remove the front service access panel according to the section 9.1.2, "Removing the Front Service Panel".
2. Remove the two screws that fix the electrical box panel and remove the electrical box panel.
3. Pull out the fixing plate for the thermistor from the pipe after removing the CORK TAPE. Then, remove the thermistor for the liquid pipe.



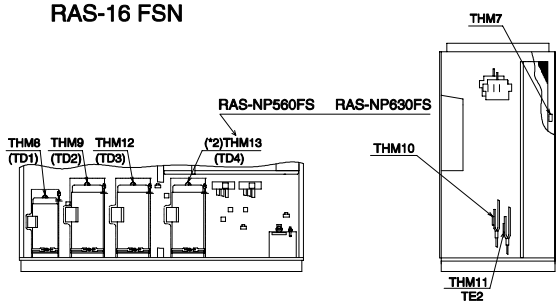
RAS - 5 FSN



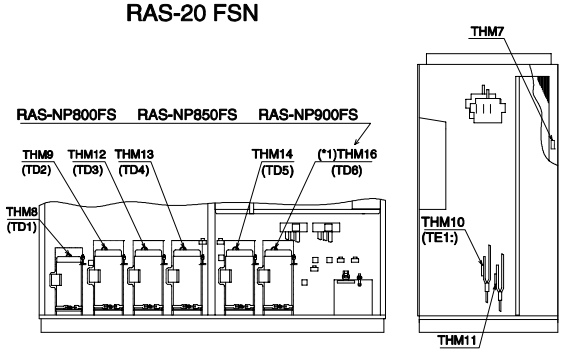
RAS - 8 ~ 10 FSN



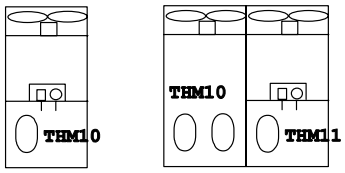
RAS-16 FSN



RAS-20 FSN

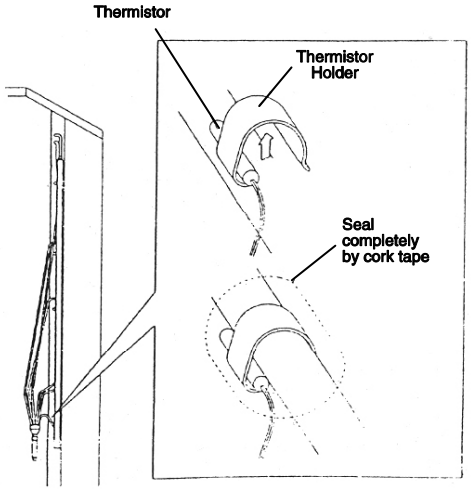


RAS-24,30 FSN



RAS - 5FSN
RAS - 8FSN
RAS - 10FSN
RAS - 16FSN

RAS - 20FSN
RAS - 24FSN
RAS - 30FSN



$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver

RAS - 10 FSN

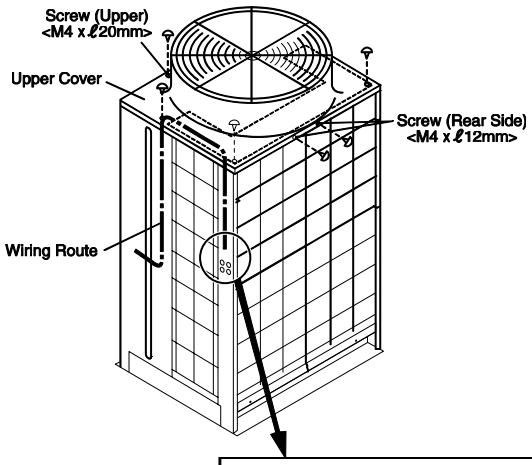
9.1.14. REMOVING THE OUTDOOR THERMISTOR

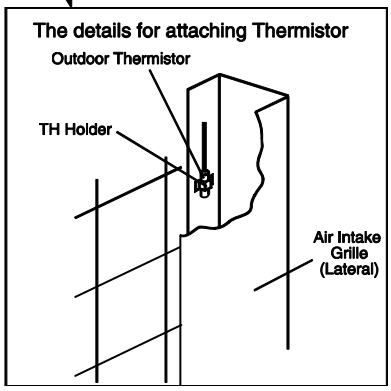
1. Remove the front service access panel according to the section 9.1.2, "Removing the Front Service Panel"
2. Remove the two screws for the electrical box panel and remove the electrical box panel.
3. Remove the screws that are indicated in the diagram and remove the upper panel.
4. Remove the air inlet grille according to the section 9.1.1, "Removing the Air Inlet Grille".
5. Remove the fixing clamp of the wiring.
6. To attach the thermistor, perform in reverse order the procedure for removing the thermistor.

NOTES:

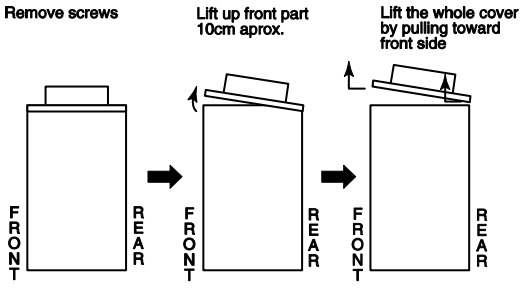
1) The length of screws for the upper panel is different from the other screws (M4 x L20mm).

2) Follow the procedure for removing the upper panel in order to avoid damaging the part.





<Removing Upper Cover>

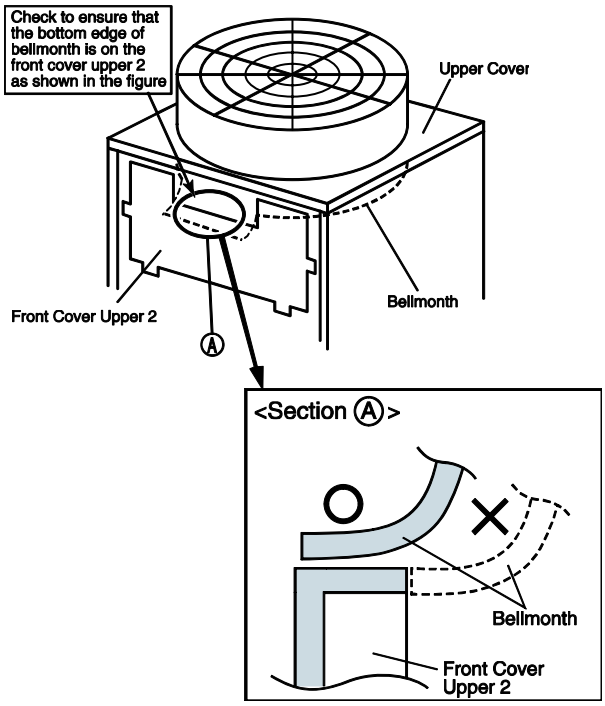


$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver

NOTES:

Refer to the diagram and pay special attention to the mounting bell mouth and the front upper panel 2 correctly. Otherwise, an abnormal vibration on the upper cover may occur during the operation of the outdoor fan.



$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver, spanner or adjustable wrench, hexagon wrench, wet cloth, burner, pliers

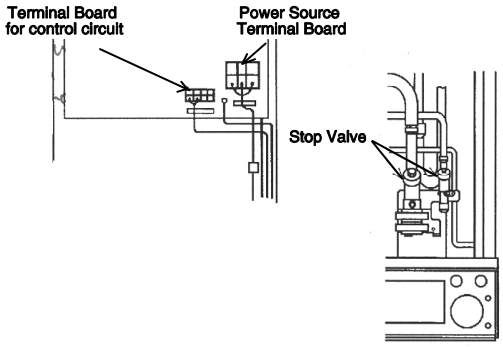
9.1.15. REMOVING THE 4-WAY VALVE

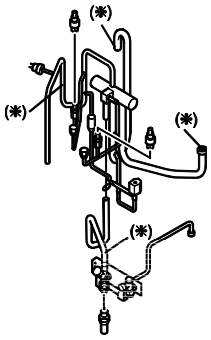
Before starting the work, collect the refrigerant into a cylinder from the cycle and turn off all the main switches.

1. Remove the front service access panel according to the section 9.1.2, "Removing the Front Service Panel".
2. Remove the electrical box panel according to the section "Removing the Electrical Components".
3. Remove all the field wiring at the terminal board for the control between the indoor units and the outdoor units, and the power source terminal board.
4. Disconnect the wiring connections and make sure that the two stop valves are open.
5. Remove the discharge pipe, the suction pipe and the oil heater for the compressor wiring according to the section "Removing the Compressor". Remove the 4-way valve coil.
6. Disconnect the brazing that is indicated by (✻) in the diagram. Cover the reversing valve with a wet cloth in order to protect the reversing valve from excessively high temperatures from a burner.

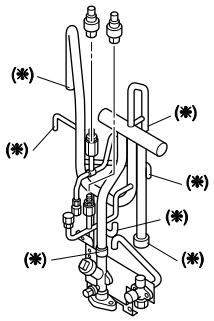
NOTE:

Do not break the brazing of the upper end of the 4-way valve. Otherwise, leakage may occur when you mount it again.

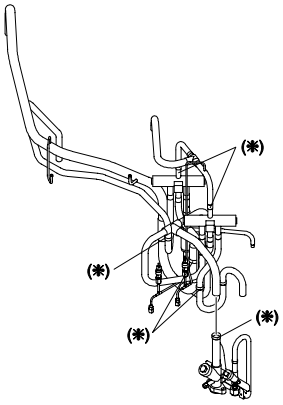




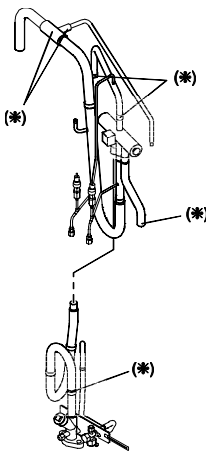
RAS-5FSN



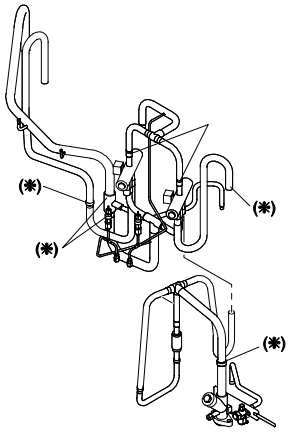
RAS-8/10FSN



RAS-24/30FSN



RAS-16FSN



RAS-20FSN

$ ***WARNING:*** *TURN OFF all the main switches*

Disconnect the following parts in order to remove the 4-way valve:

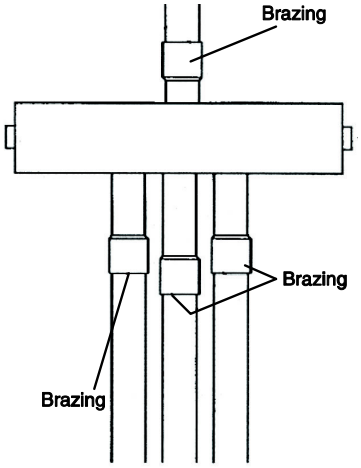
a) Brazing portion between the 4-way valve and the discharge pipe.

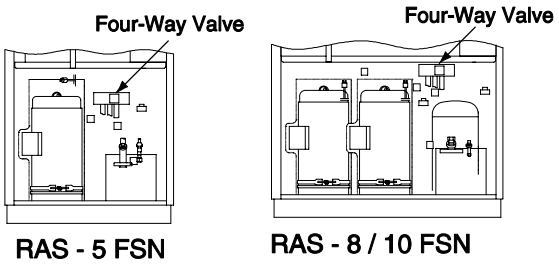
b) Brazing portion of the right pipes and the left pipes or the three pipes from the 4-way valve.

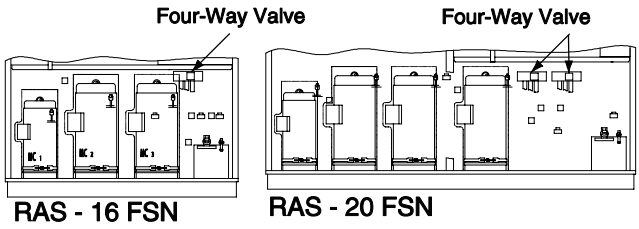
c) Brazing portion of the center pipe of the three pipes from the 4-way valve.

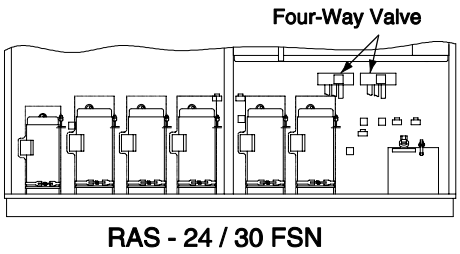
NOTES:

Cover the reversing valve with a wet cloth in order to protect the reversing valve from excessively high temperatures from a burner.









$ ***WARNING:*** *TURN OFF all the main switches*

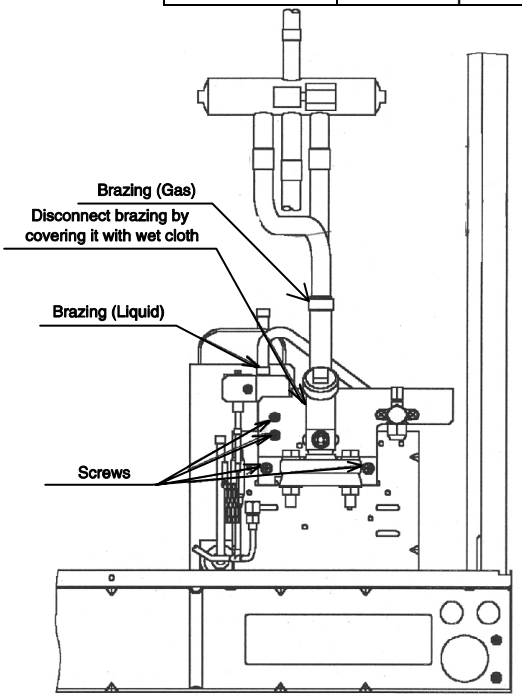
TOOL	Wet cloth, burner, pliers, Phillips screwdriver

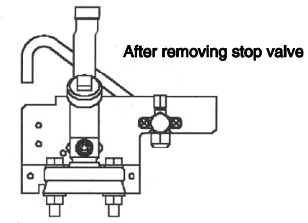
9.1.16. REMOVING THE STOP VALVE

This procedure is an example for the RAS-10FSN. A similar procedure can be applied to other models.

Before starting the work, collect the refrigerant into a cylinder from the cycle and turn off all the main switches.

1) Remove the front service access panel according to the section 9.1.2, "Removing the Front Service Panel".
2) When you are removing the stop valve (gas side), disconnect the brazing (which is indicated in the diagram) by covering the stop valve with a wet cloth. When you are removing the stop valve (liquid side), disconnect the brazing in the pipes between the stop valve and the plate heat exchanger.
3) Remove the screws for the plate and remove the stop valve with the plate. (In the case of only the liquid side, you do not need to remove the plate).
4) To attach the stop valve, perform in reverse order the procedure for removing the stop valve.





$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver, pincher

9.1.17. REMOVING THE ELECTRICAL COMPONENTS

Removing the electrical box:

Before this work, remove the service access panel according to the section "Removing the Front Service Panel".

a) Loosen the two screws that fix the electrical box cover. Make sure that the electrical box cover does not fall off.

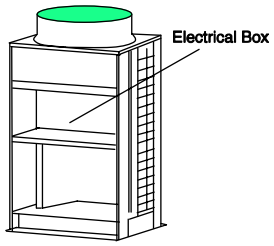
b) Loosen the clamps for the electrical wiring.

c) Disconnect the connectors that are connected to the PCB.

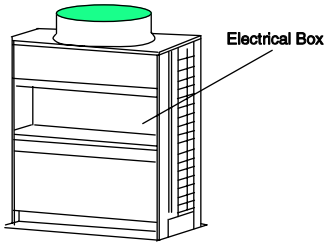
d) Remove the compressor cables, the power source cables and the operation wires from the electrical box.

e) Disconnect the connectors for the fan motor.

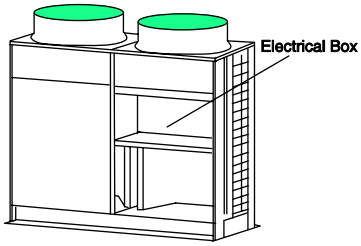
f) Lift up the electrical box and unhook the electrical box from the side panel. Draw the electrical box forwards. (Make sure not to pull the cables with a great force).



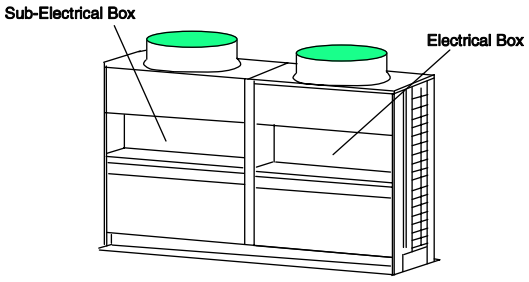
Ras – 5, 8, 10 FSN



Ras – 16 FSN



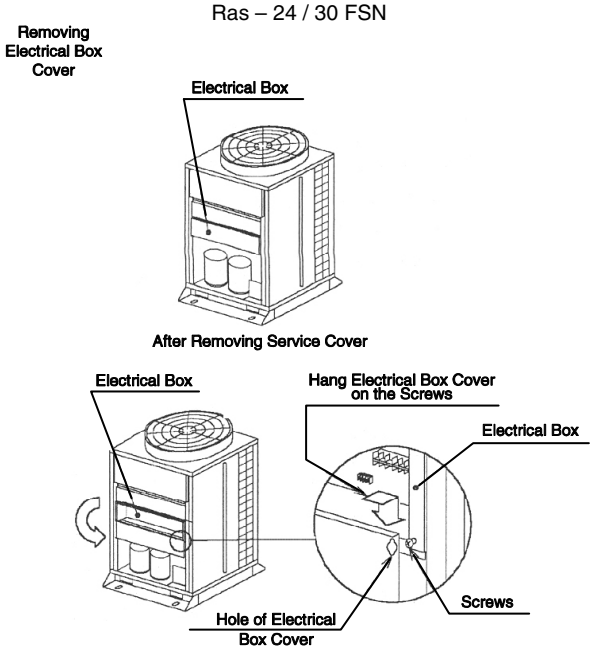
Ras – 20 FSN



Ras – 24 / 30 FSN

$ ***WARNING***

1. *Identify the terminal Numbers with the mark band Numbers when you are reassembling. If you connect the terminals incorrectly, a malfunction or a damage of the electrical components will occur.*
2. *If you replace the control PCB, set all the DIP switches at the same position as the original position that the DIP switches had. Otherwise, a malfunction may occur.*



$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver, pincher, nippers

9.1.18. REMOVING THE PCB (ELECTRICAL BOX FOR CONTROL)

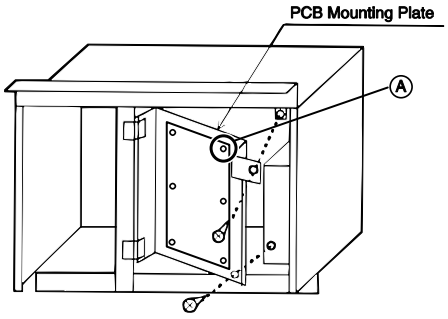
RAS-5FSN

Before this work, remove the front panel according to section 9.1.2, "Removing the Front Service Panel".

a) Disconnect the connectors that are connected to the PCB and clamp the hook of the holder A by means of pinchers and pull out the PCB.

NOTES:

1. *Do not touch the electrical components of the PCB.*
2. *Do not apply a great force to the PCB.*



RAS-5 FSN

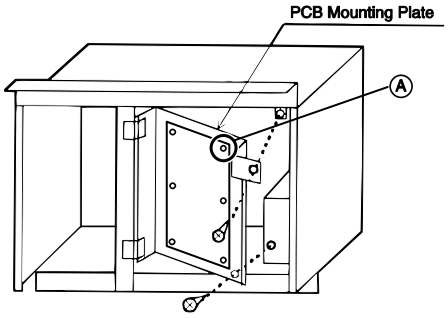
RAS-8,10,20FSN

Before this work, remove the right-side front panel according to the section "Removing the Front Service Panel".

a) Disconnect the connectors that are connected to the PCB and clamp the middle portion of the holder A by means of pinchers and pull out the PCB.

NOTES:

1. *Do not touch the electrical components of the PCB.*
2. *Do not apply a great force to the PCB.*



RAS-8, 10, 20 FSN

RAS-16,24,30FSN

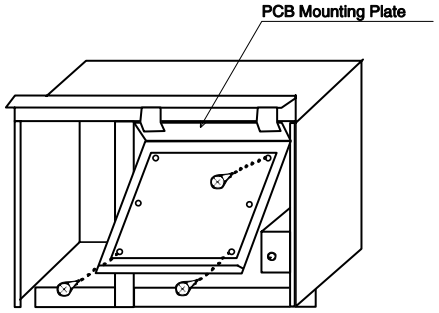
Before this work, remove the right-side front panel according to the section "Removing the Front Service Panel".

a) Disconnect the connectors that are connected to the PCB and clamp the middle portion of the holder A by means of pinchers and pull out the PCB.(*)

NOTES:

1. *Do not touch the electrical components of the PCB.*
2. *Do not apply a great force to the PCB.*

(*) The 16 HP machines have 6 holes and the 20 – 30 HP machines have 8 holes.



RAS-16, 24, 30 FSN

$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver, pincher, nippers

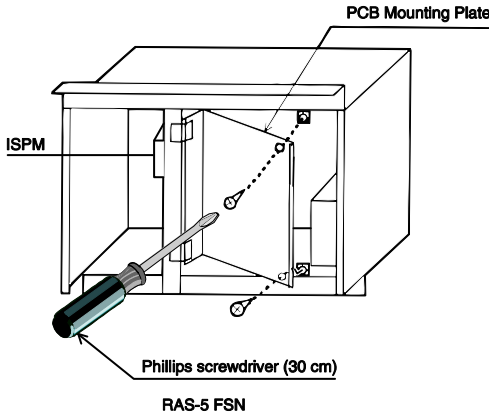
9.1.19. REMOVING OTHER ELECTRICAL COMPONENTS (ELECTRICAL BOX FOR CONTROL)

Before this work, remove the right-side front panel according to the section "Removing the Front Service Panel".

a) Disconnect the cables that are connected to each electrical component.

b) Remove the screws for the mounting of the electrical components.

c) When you are replacing the electrical box behind the PCB mounting plate, remove the two screws that are located towards the front side (RAS-5,8,10,20FSN).



Removing the ISPM (RAS-5FSN)

Half open the PCB mounting plate and loosen the U, V terminal (Inverter Secondary Part) by using a Phillips screwdriver (30cm). Loosen other terminals after fixing the PCB mounting plate.

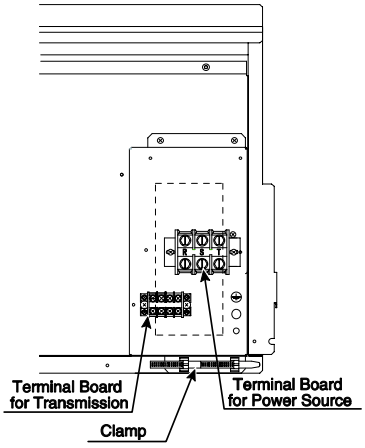
$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver (30 cm.), pinchers, box wrench for M8

9.1.20. REMOVING THE NOISE FILTER

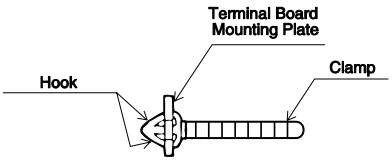
1) Remove the field wiring on the terminal board for the transmission (TB2) and the terminal board for the power source (TB1).
2) Remove the clamp for the field wiring by pinching and pulling the hook of the clamp by means of pinchers.
3) Remove the four fixing screws for the mounting plate of the terminal board.

Disconnect the wiring that is connected to the noise filter and remove the noise filter by pinching and pulling the holder hook by means of pinchers. Insert your finger into the noise filter attaching area and pull the noise filter.



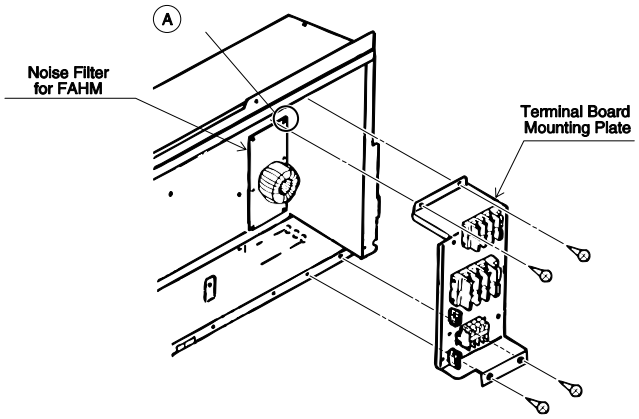
NOTE:

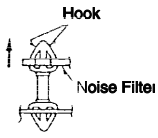
Do not touch the electrical components on the noise filter. Do not apply a great force to the noise filter.



NOTE:

Identify the terminal N^{ps}. with the mark band N^{ps}. when you are reassembling. If you connect the terminals incorrectly, a malfunction or a damage of the electrical components will occur.





$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver

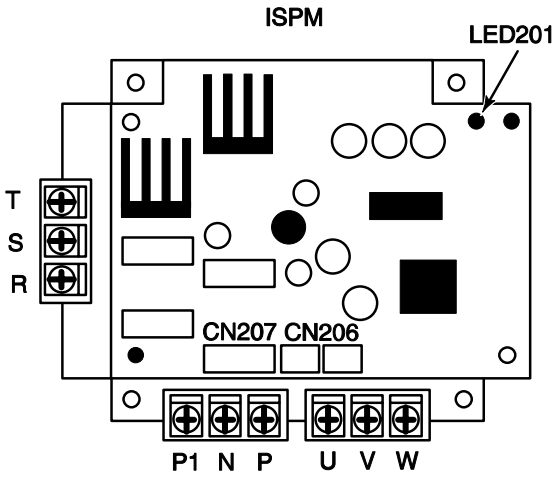
9.1.21. REMOVING THE ISPM

1. Disconnect all the wires that are connected to the ISPM:
   1) Disconnect CN206, CN207.
   2) Disconnect N, P, P1, RB and R, S, T, U, V, W on ISPM.

NOTE:

Do not touch the electrical components when the red LED on the ISPM and the Fan Controller is lit up. If you touch the electrical components, an electrical shock will occur.

2. Remove the four fixing screws for the ISPM and remove the SPM.



NOTES:

1. *Identify the terminal N[os]. with the mark band N[os]. when you are reassembling. If you connect the terminals incorrectly, a malfunction or a damage of the electrical components will occur.*
2. *When you are remounting the plate, do not clamp the electrical wires between a mounted electrical component and the plates or the electrical parts.*
3. *When you are attaching the ISPM, spread silicon grease over the rear surface. Silicon grease is provided as a spare part (P24773).*

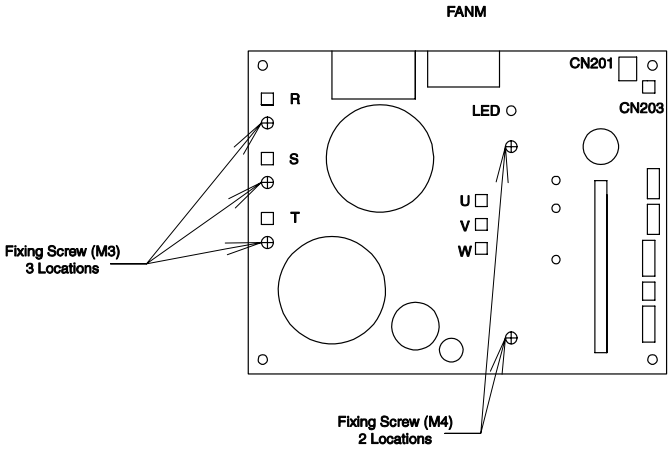
9.1.22. REMOVING THE FAN CONTROLLER

1. Disconnect all the wires that are connected to the Fan Controller:
   1) Disconnect CN201, CN203.
   2) Disconnect the fasten terminals S, N, U, V, W on the Fan Controller.

NOTE:

Do not touch the electrical components when the red LED on the ISPM and the Fan Controller is lit up. If you touch the electrical components, an electrical shock will occur.

2. Remove the five screws for the Fan Controller and remove the Fan Controller.



NOTES:

1. *Identify the terminal N[os]. with the mark band N[os]. when you are reassembling. If you connect the terminals incorrectly, a malfunction or a damage of the electrical components will occur.*
2. *When you are remounting the plate, do not clamp the electrical wires between a mounted electrical component and the plates or the electrical parts.*
3. *When you are attaching the Fan Controller, spread silicon grease over the rear surface. Silicon grease is provided as a spare part (P26221).*

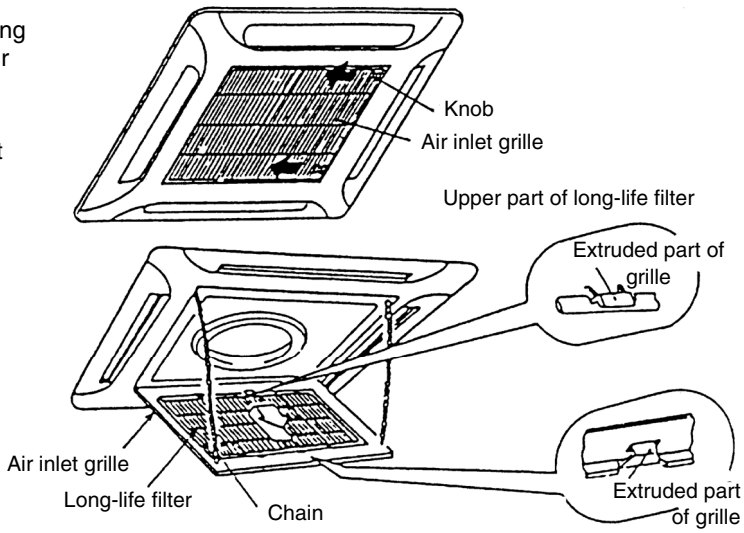
9.2. RCI

4-WAY CASSETTE: (MODELS: RCI-0.8FSNE, RNI-1.0FSNE, RCI1.5FSNE, RCI-2.0FSNE, RCI-2.5FSNE, RCI-3.0FSNE, RCI-4.0FSNE AND RCI-5.0FSNE)

4-WAY CASSETTE

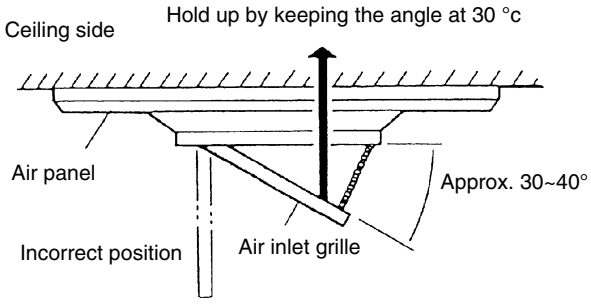
9.2.1. REMOVING THE LONG-LIFE FILTER

1. The long-life filter is located inside of the air inlet grille. Detach the filter after opening the air inlet grille. By pushing the knob in the arrow mark direction, you can open the air inlet grille.
2. You can remove the filter from the air inlet grille by supporting the lower side of the air inlet grille and the filet filter, and unhooking the grille from the extrusion part.



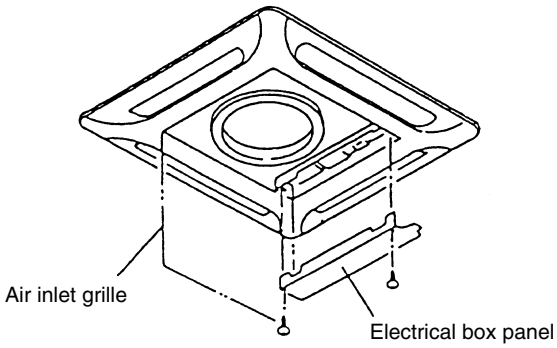
9.2.2. REMOVING THE AIR INLET GRILLE

1. If you lift the air inlet grille at an angle of approximately 30° and you release the chain of the air inlet grille, you can remove the air inlet grille by holding the air inlet grille upwards and then towards you. If you release the chain at an angle of 90°, you cannot remove the air inlet grille.



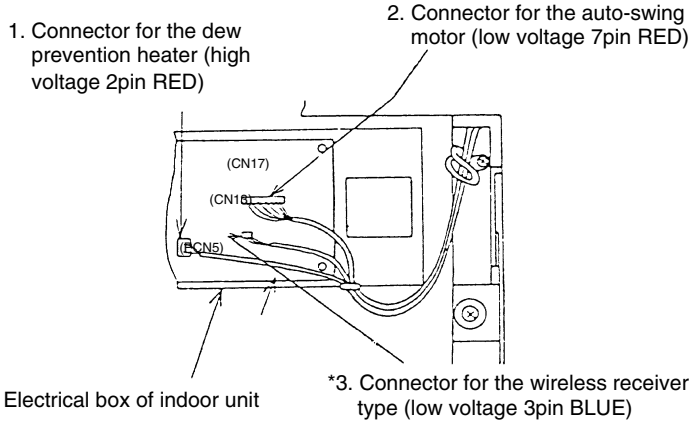
9.2.3. REMOVING THE ELECTRICAL BOX PANEL

1. If you open the air inlet grille, you can see the electrical box. Remove the two screws that fix the electrical box panel and remove the panel.



9.2.4. REMOVING THE OPTIONAL AIR PANEL

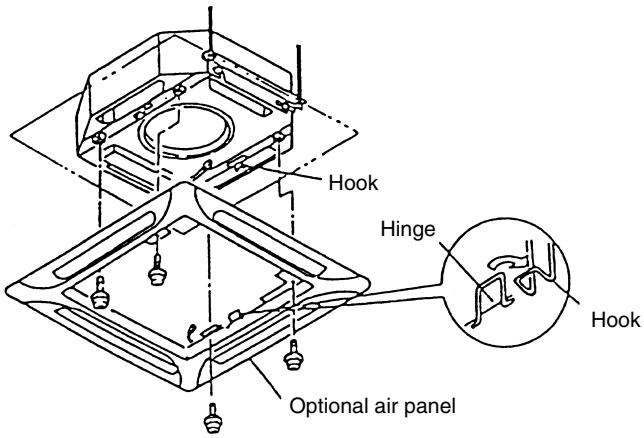
1 If you open the air inlet grille, you can see the electrical box. Disconnect the connector (Red; 2 Pins) for the dew prevention heater on the indoor unit PCB.
2 Disconnect the connector (Red; 7 Pins) for the automatic louver motor on the indoor unit PCB.



(*Only for the wireless receiver type)

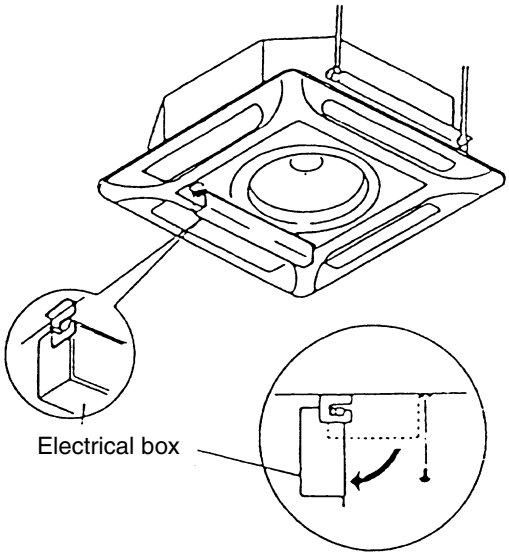
$ ***WARNING:*** *TURN OFF all the main switches*

1. Remove the air inlet grille from the optional air panel. Remove the four screws that fix the optional air panel. (Remove the fixing screws by hooking on the hinge). Remove the optional air panel after unhooking the hinge off the hooks at the two positions near the drain pan.

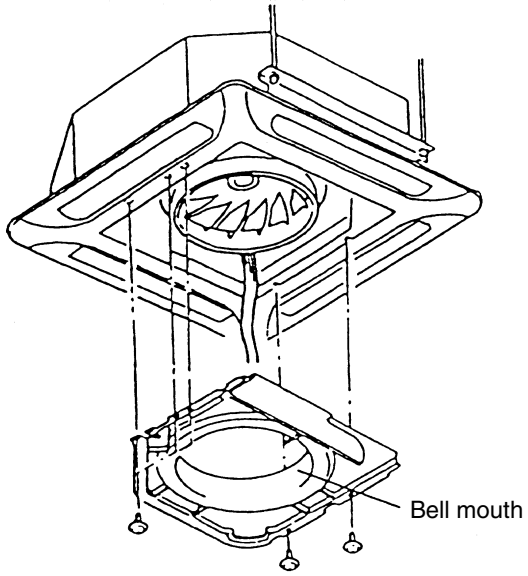


9.2.5. REMOVING THE TURBO FAN AND THE FAN MOTOR

1. Remove the air inlet grille according to the section 9.2.2, "Removing the Air Inlet Grille".
2. Pulling the Electrical Box
   1 Remove the discharge air thermistor from the PCB.
   2 Disconnect the connector of each lead wire.
   3 Remove the two fixing screws for the electrical box and pull the electrical box towards the front. Then, the electrical box will turn at an angle of approximately 90°.



3. Removing the bell mouth.
   1 Remove the four screws that fix the bell mouth onto the drain pan and remove the bell mouth.

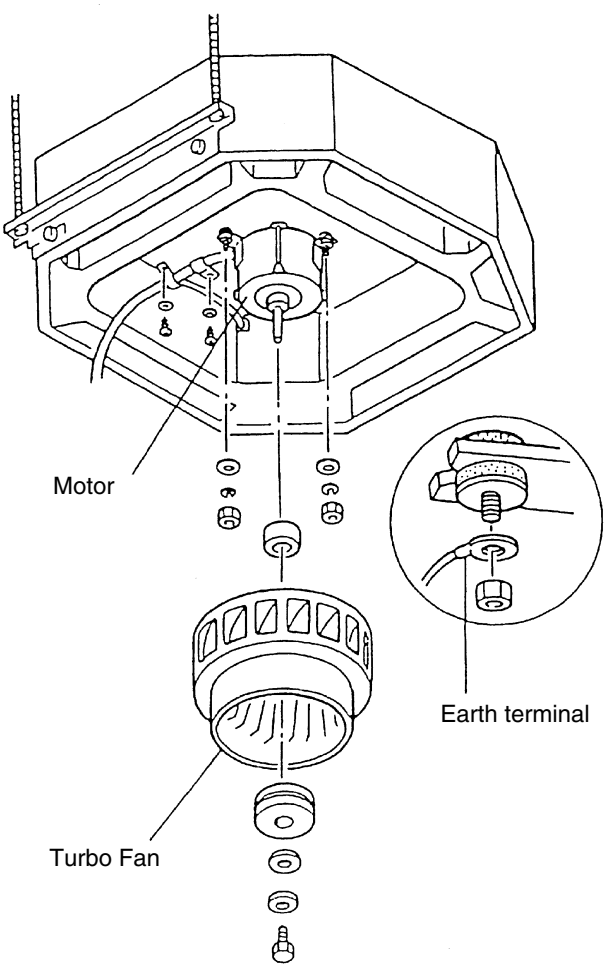


$ ***WARNING:*** *TURN OFF all the main switches*

4. Removing the Turbo Fan and the Fan Motor
   You can remove the turbo fan after removing the fixing screws for the turbo fan, the vibration absorbing rubber, the special washers and the flat washers.
   1 Remove the wiring connector for the fan motor and the ground wire.
   2 Remove the motor after removing the four fixing screws.

NOTE:

After mounting the vibration absorbing rubber onto the turbo fan when you are assembling, fix the turbo fan with a torque of approximately 30kg-cm for each screw.

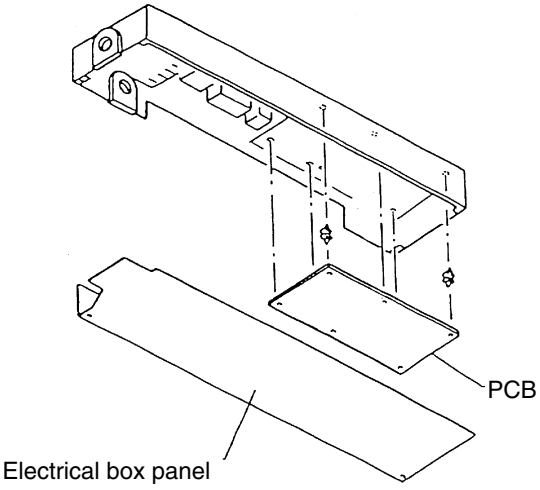


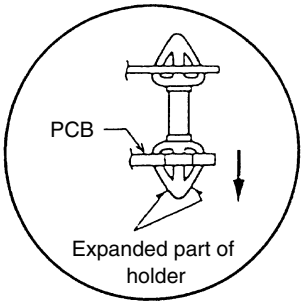
9.2.6. REMOVING THE PRINTED CIRCUIT BOARD (PCB)

1. Remove the air inlet grille according to the section 9.2.2, "Removing the Air Inlet Grille".
2. Remove the electrical box panel according to the section 9.2.5, "Removing the Turbo Fan and the Fan Motor".
3. There is a printed circuit boards (PCB) in the electrical box. Disconnect the connectors.
   The PCB is supported by six holders. Remove the PCB by holding the expanded part of the holders by means of long-nose pliers.

NOTE:

Do not touch the electrical components on the PCB. If you apply a great force to the PCB, the PCB will become faulty.

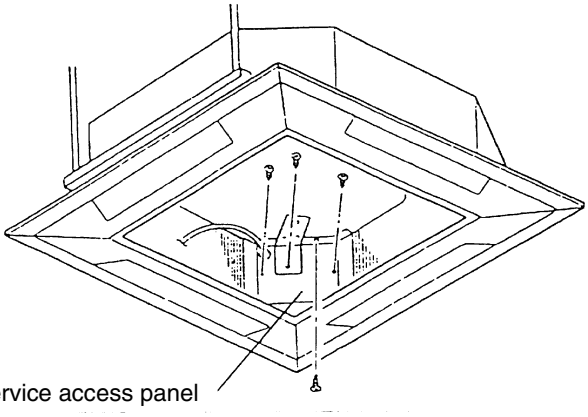




$ ***WARNING:*** *TURN OFF all the main switches*

9.2.7. REMOVING THE FLOAT SWITCH

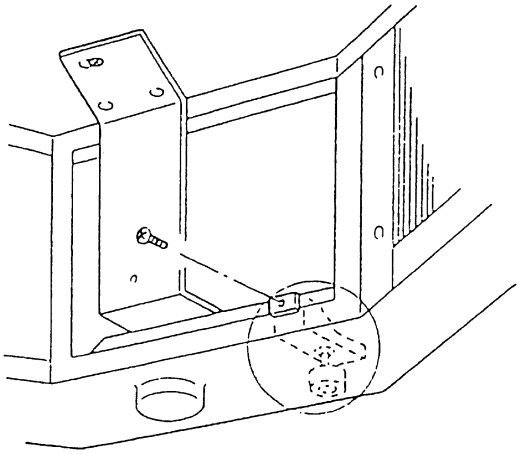
1. Remove the air inlet grille according to the section 9.2.2, "Removing the Air Inlet Grille".
2. Remove the bell mouth and the turbo fan according to the section 9.2.5, "Removing the Turbo Fan and Fan Motor".
3. Remove the service access panel after removing the three fixing screws near the pipes inside of the indoor unit.

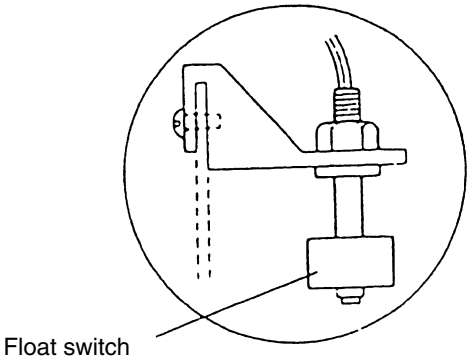


4. REMOVING THE FLOAT SWITCH
   Remove the float switch after removing one fixing screw from the fixing plate of the heat exchanger.

NOTE:

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

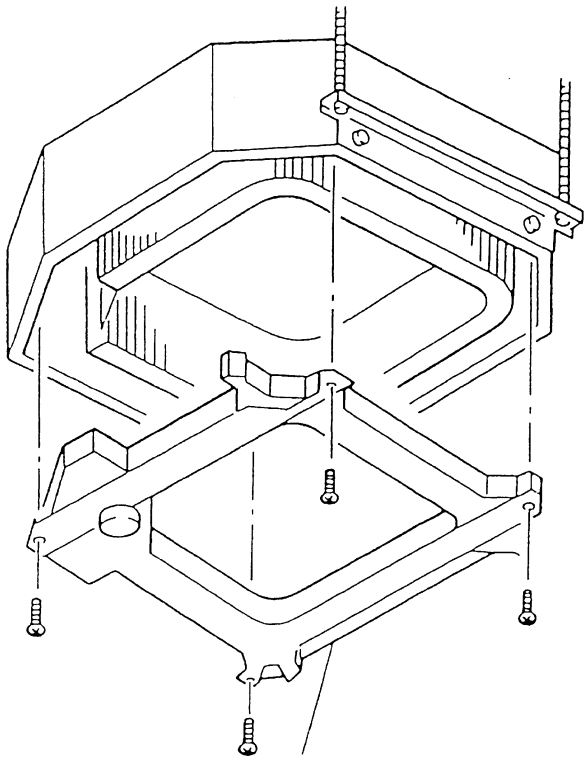




$ ***WARNING:*** *TURN OFF all the main switches*

9.2.8. REMOVING THE DRAIN PAN

1. Remove the optional air panel according to the section 9.2.4, "Removing the Optional Air panel".
2. Disconnect the connectors between the indoor unit and the outdoor unit in the electrical box after opening the electrical box panel according to the section 9.2.3, "Removing the Electrical Box Panel".
3. Remove the bell mouth according to the item 3 of the section 9.2.5, "Removing the Turbo Fan and the Fan Motor".
4. Remove the drain water.
5. Remove the drain pan after removing the four screws that fix the drain pan onto the indoor unit.



9.2.9. REMOVING THE THERMISTORS FOR THE LIQUID PIPE AND THE GAS PIPE

1. Remove the optional air panel according to the section 2.3.4, "Removing the Optional Air panel".
2. Remove the bell mouth according to the item 3 of the section 9.2.5, "Removing the Turbo Fan and the Fan Motor".
3. Remove the drain pan according to the section 9.2.8, "Removing the Drain Pan".
4. Remove the cork tape, pull out the fixing plate for the thermistor from the gas pipe, where the thermistor is located, and then pull out the thermistor.

NOTE:

Fix the fixing plate as shown in the Figure 2.

Figure 1

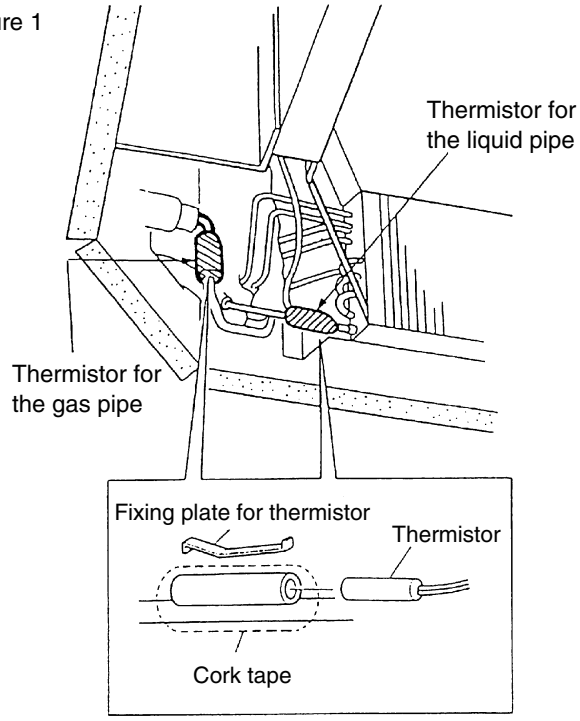
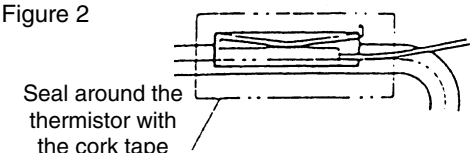


Figure 2



$ ***WARNING:*** *TURN OFF all the main switches*

9.2.10. REMOVING THE EXPANSION VALVE COIL

1. Remove the optional air panel according to the section 9.3.3, "Removing the Optional Air panel".
2. Remove the bell mouth according to the item 3 of the section 9.2.5, "Removing the Turbo Fan and the Fan Motor".
3. Remove the drain pan according to the section 9.2.8, "Removing the Drain Pan".
4. Prepare two spanners. Hold the part of the valve body with one spanner and loosen the lock nut with another spanner by turning the lock nut counterclockwise.

NOTE:

Do not hold the motor when you are loosening the lock nut by means of a spanner. The base of the drive part may turn idle and may break.

5. Turn the lock nut by a few turns. Then, the drive part separates from the screw and you can remove the drive part.
6. Prepare the new drive part for replacement (service part) with the position of the driver already adjusted.

NOTE:

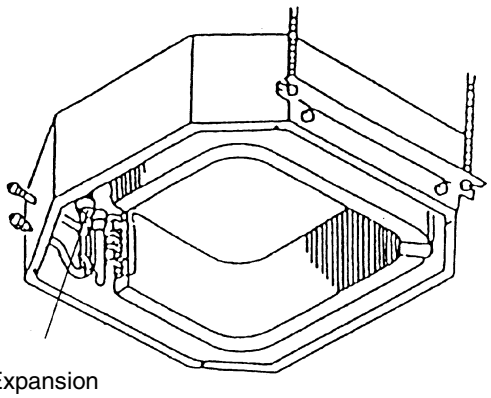
During the replacement work, pay attention to the exposed part and prevent the dust, the foreign particles and others from entering the separation part. (The part that is exposed by the separation is the mechanical part of the valve). Do not damage the junction part of the valve with the tools.

7. Put the drive part onto the valve body, hold the drive part and the valve body with their axes matching and attach the lock nut to the screw part of the valve body.
8. Tighten the lock nut with a spanner after tightening lightly by hand. The tightening torque should be within the range of 12Nm(120kg-cm) ~15Nm(150kg-cm).

NOTE:

Do not apply great forces, such as the rotating torque and the bending load, to the motor by holding the motor by hand when you are tightening the lock nut.
The direction of the eccentric part of the motor is assembled as the eccentric part of the expansion valve. Although the motor is directed toward the counterdirection of the fittings for piping at the valve body, the alteration of this direction do not affect the open/close function of the valve. Therefore, the adjustment of the direction of the motor part is not required if the position of the motor is moved toward the rotating direction after the replacement, as shown in the Figure 2.
However, make sure that the direction of the motor for the coil of the electronic expansion valve does not touch other piping and the side plate of the electrical box.

9. After finishing the replacement, attach the electronic expansion valve by performing in reverse order the procedure for removing the electronic expansion valve.



Expansion valve

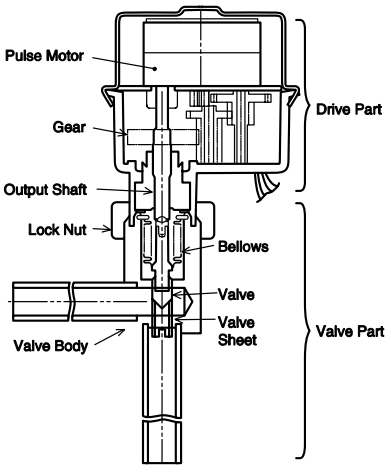


Fig. 1 Expansion Valve

Adjustment of direction is not required.

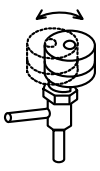
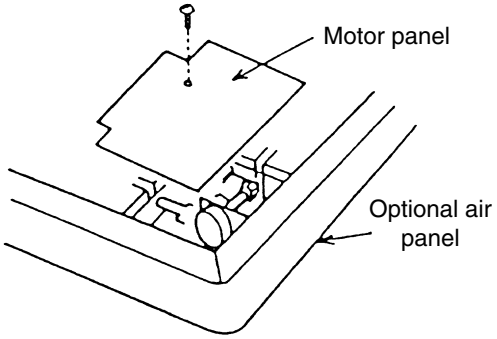


Fig. 2 Direction of Drive Part

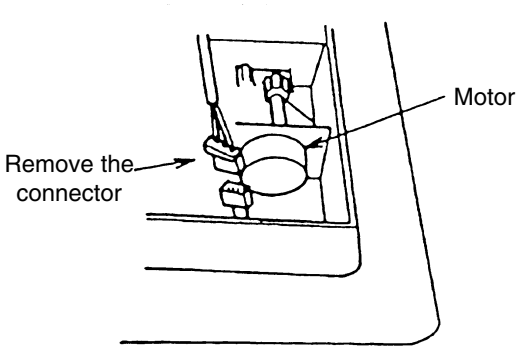
$ ***WARNING:*** *TURN OFF all the main switches*

9.2.11. REMOVING THE AUTOMATIC LOUVER MOTOR

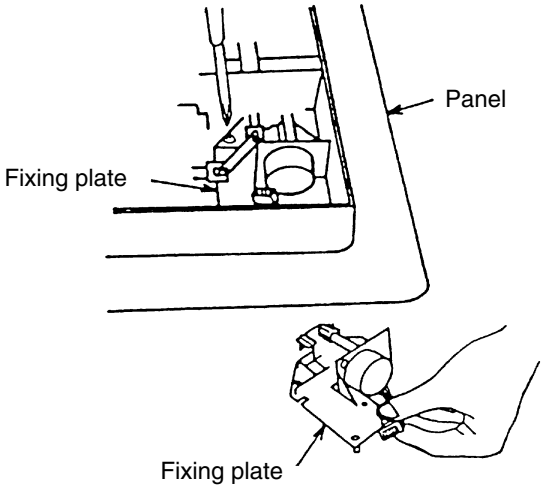
1. Remove the optional air panel according to the section 9.2.4, "Removing the Optional Air panel".
2. Remove the motor panel after removing the two screws that fix the motor panel for the automatic louver motor.



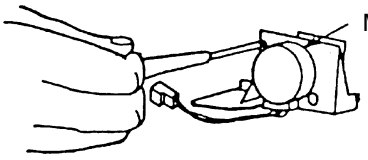
3. Disconnect all the connectors that are connected to the motor.

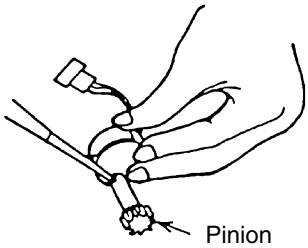


4. Remove the motor with the fixing plate after removing the three fixing screws.



5. Remove the motor from the fixing plate after removing the two fixing screws. Then, remove the pinion from the motor after removing one screw.



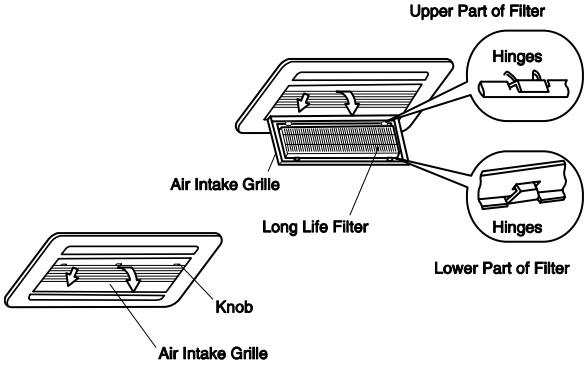


9.3. RCD

2-WAY CASSETTE

9.3.1. REMOVING THE LONG-LIFE FILTER AND THE AIR INLET GRILLE

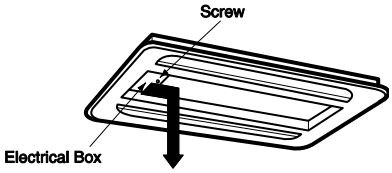
1. The long-life filter is located inside of the air inlet grille. You can open the air inlet grille by pushing the knob as shown below.
2. Detach the filter after opening the air inlet grille. You can remove the filter from the air inlet panel by supporting the louver side of the air inlet grille and the filter, and by unhooking the grille from the extrusion part.
3. You can remove the air inlet grille by releasing the chain of the air inlet grille, lifting the chain upwards, and then drawing the chain towards you.



TOOL	Phillips screwdriver

9.3.2. REMOVING THE ELECTRICAL BOX PANEL

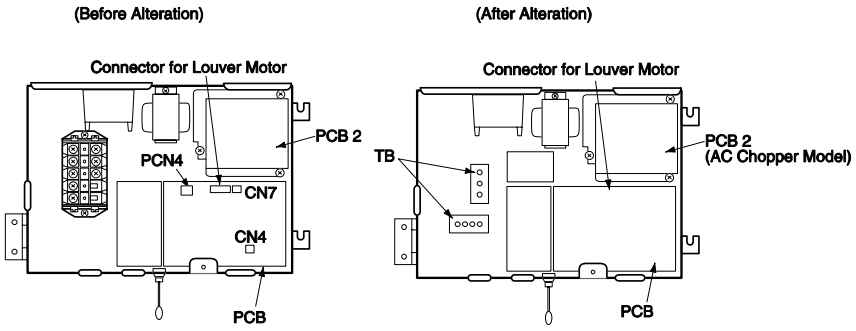
If you open the air inlet grille, you can see the electrical box. Loosen one screw that fix the electrical box panel and remove the panel.

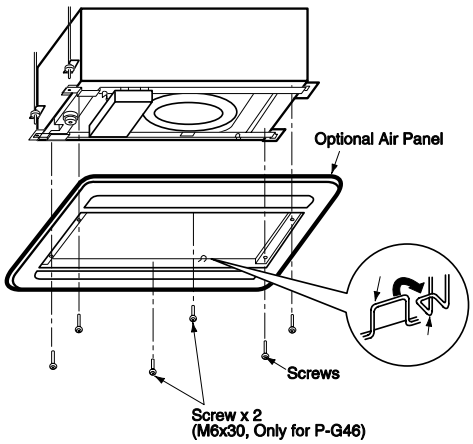


TOOL	Phillips screwdriver

9.3.3. REMOVING THE OPTIONAL AIR PANEL

1. Remove the electrical box panel by opening the air inlet grille.
   Disconnect the connector (CN17) for the auto-louver on the indoor unit PCB.
2. Remove the air inlet grille from the optional air panel.
   Remove the four screws that fix the optional air panel.
3. Remove the optional air panel after unhooking the hinge off the hooks at the two positions near the drain pan.



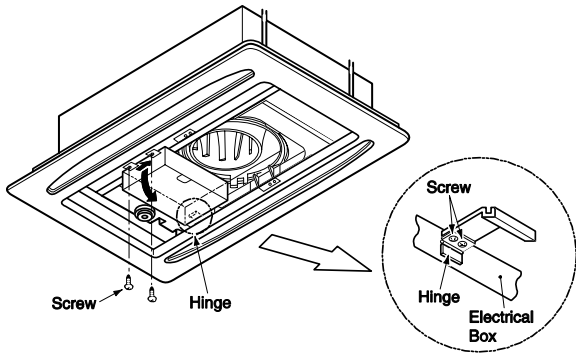


$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver

9.3.4. REMOVING THE FAN RUNNER AND THE FAN MOTOR

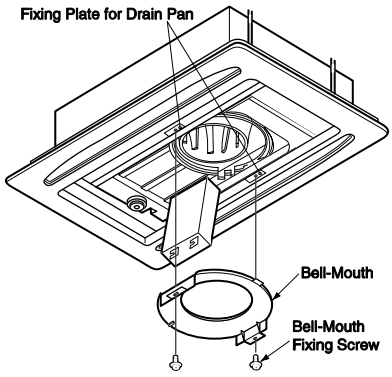
1. Remove the optional air panel according to the section 9.3.3, "Removing the Optional Air Panel".
2. Removing the Electrical Box.
   a. Disconnect the connectors for each wire.
   b. Remove the two screws that fix the electrical box and turn the electrical box downwards by approximately 90º. (The electrical box is hung by the hinge. Do not remove the fixing screw for the hinge).



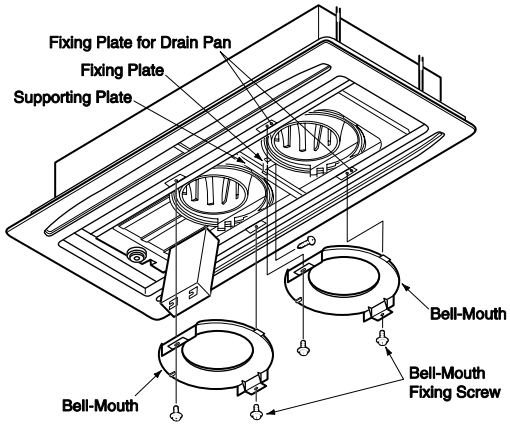
TOOL	Phillips screwdriver

3. Removing the Bell Mouth
   Remove the fixing plate after removing one screw that fix the fixing plate on the support plate of the indoor unit.
   (For 4.0 and 5.0HP)
   Remove the bell mouth by removing the two screws that fix the bell mouth onto the fixing plate for the drain pan of the indoor unit.
   * Q'ty of Bell Mouth: 1 (RCD-1.0 to 3.0FSN)
     2 (RCD-4.0 to 5.0FSN)

● RCD-1.0 to 3.0 FSN

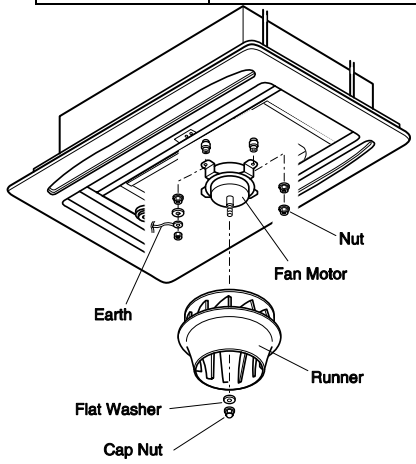


● RCD-4.0 to 5.0 FSN



TOOL	Phillips screwdriver, spanner

4. Remove the fan runner and the fan motor
   Remove the fan runner after removing the cap nut and the washer that fixes the fan runner.
   a. Disconnect the ground wire for the fan motor.
   b. Remove the four nuts that fix the fan motor and remove the fan motor.
      (When you are reassembling, the required tightening torque for the cap nut is approximately 8N-m (80kg-cm).
      * Qty of the Fan Runner and the Fan Motor:
        Each 1 (RCD-1.0 to 3.0FSN)
        Each 2 (RCD-4.0 to 5.0FSN)



$ ***WARNING:*** *TURN OFF all the main switches*

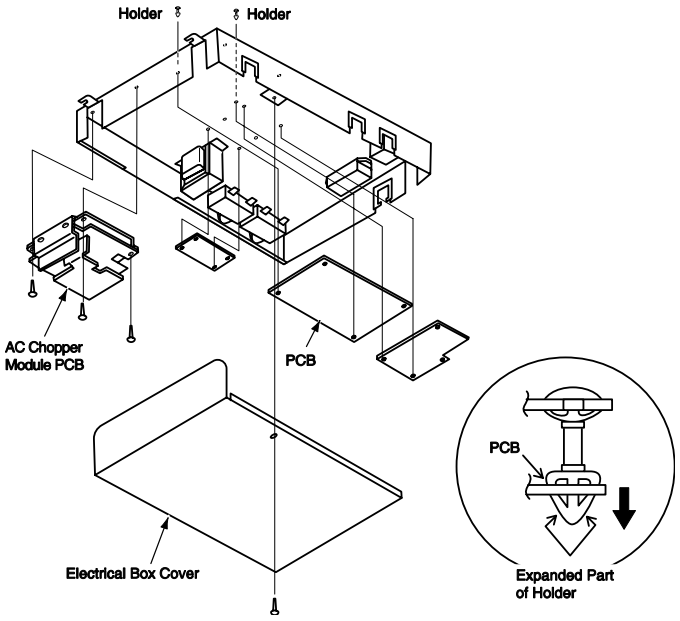
TOOL	Phillips screwdriver, long-nose pliers

9.3.5. REMOVING THE PRINTED CIRCUIT BOARD (PCB)

1. Remove the air inlet grille according to the section 9.3.1, "Removing the Long-Life Filter and the Air Inlet Grille".
2. Remove the electrical box panel according to the section 9.3.2, "Removing the Electrical Box Panel".
3. Pull out the PCB by pinching the expanded part of the PCB holders (which hold the PCB at four positions) by means of long-nose pliers.
4. Remove the three fixing screws for the AC chopper. (When you are reassembling, pay attention not to squeeze, because the sealed ground wire and the transformer ground wire are commonly squeezed by one screw).

NOTE:

Do not touch the electrical components on the PCB. If you apply a great force to the PCB, the PCB will become faulty.

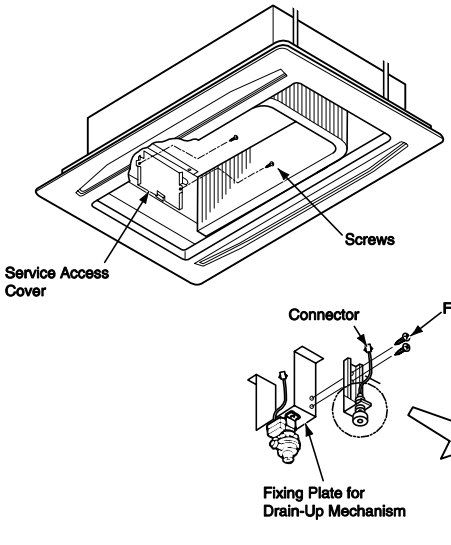


$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver

9.3.6. REMOVING THE FLOAT SWITCH

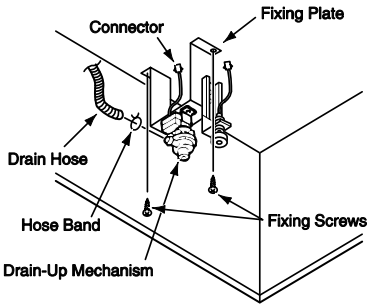
1. Remove the air inlet grille according to the section 9.3.1, "Removing the Long-Life Filter and the Air Inlet Grille".
2. Remove the bell mouth according to the section 9.3.4, "Removing the Fan Runner and the Fan Motor".
3. Remove the panel after removing the two fixing screws for the panel of the service access hole near the pipes inside the unit.
4. REMOVING THE FLOAT SWITCH
   Disconnect the connectors and remove the float switch after removing two screws which fix the fixing plate for the float switch onto the fixing plate for the drain-up mechanism.



TOOL	Phillips screwdriver

9.3.7. REMOVING THE DRAIN-UP MECHANISM

1. Remove the air inlet grille according to the section 9.3.1, "Removing the Long-Life Filter and the Air Inlet Grille".
2. Remove the bell mouth according to the section 9.3.4, "Removing the Fan Runner and the Fan Motor".
3. Remove the drain pan according to the section 9.3.8, "Removing the Drain Pan".
4. After disconnecting the wire connector, remove the two fixing screws for the fixing plate for the drain-up mechanism. First support the drain-up mechanism by hand in order not to drop the drain-up mechanism. Then, remove the hose band from the drain hose. Then, disconnect the drain hose, and finally remove the drain-up mechanism.



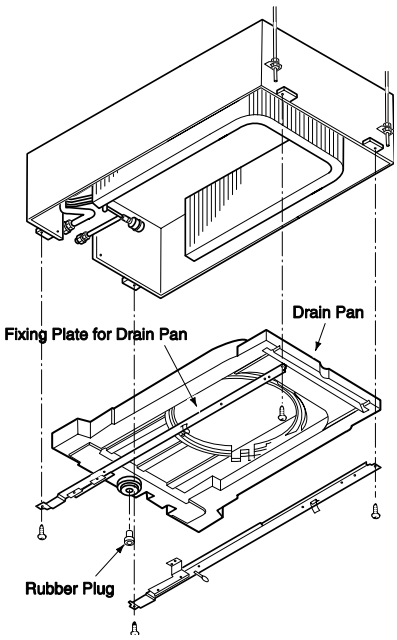
$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver, Bucket (approx. 5 liters of content)

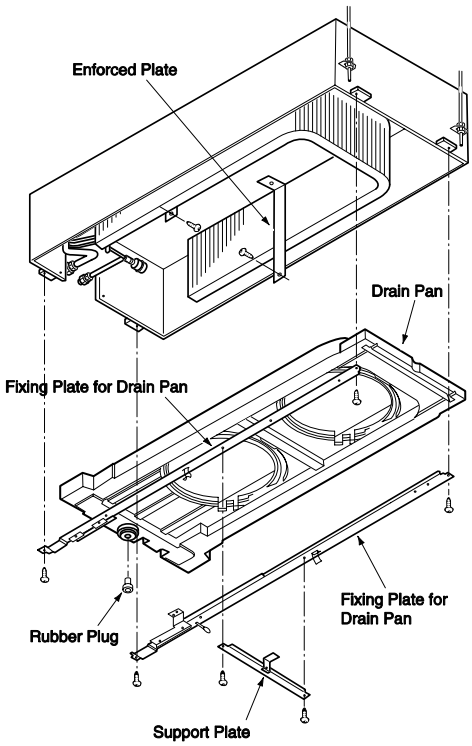
9.3.8. REMOVING THE DRAIN PAN

1. Remove the air inlet grille according to the section 9.3.1, "Removing the Long-Life Filter and the Air Inlet Grille".
2. Open the electrical box panel according to the section 9.3.2, "Removing the Electrical Box Panel". Disconnect the connect wire between the indoor unit and the outdoor unit, the electrical wiring for the electrical box and the connectors inside of the electrical box.
3. Remove the bell-mouth according to the section 9.3.4, "Removing the Fan Runner and the Fan Motor".
4. Discharge the drain water on the drain pan by removing the rubber plug. The sealing agent is used around the rubber plug. However, you can remove the rubber plug by pulling out the rubber plug. Do not scratch the rubber plug with a cutter and others. Make sure that the water hole is not clogged by pricking the water hole with a pencil.
5. REMOVING THE DRAIN PAN
   a. Remove two screws that fix the enforced plate onto the fixing plate for the drain pan. Remove the two screws that fix the support plate onto the fixing plate for the drain pan and remove the support plate. (For RCD-4.0FSN and RCD-5.0FSN)
   b. Remove the two fixing plates for the drain pan.
   c. Remove the drain pan.

● RCD-1.0 to 3.0 FSN



● RCD-4.0 to 5.0 FSN

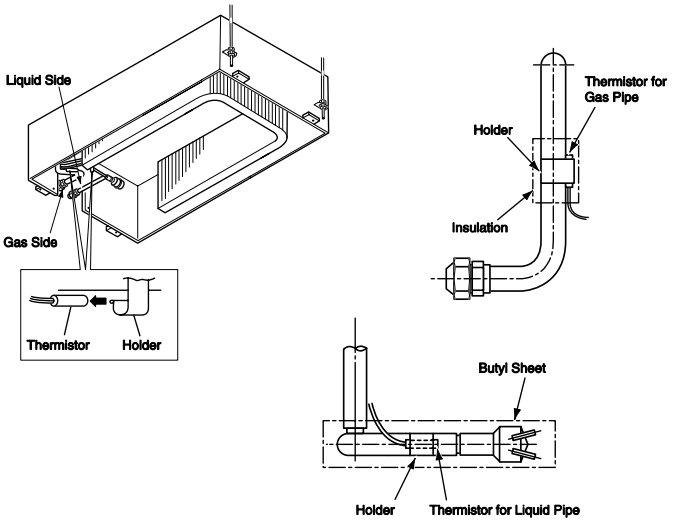


$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver

9.3.9. REMOVING THE THERMISTORS FOR THE LIQUID PIPE AND THE GAS PIPE

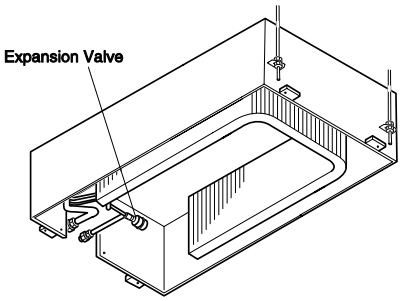
1. Remove the optional air panel according to the section 9.3.3, "Removing the Optional Air Panel".
2. Remove the bell mouth according to the section 9.3.4, "Removing the Fan Runner and the Fan Motor".
3. Remove the drain pan according to the section 9.3.8, "Removing the Drain Pan".
4. Remove the insulation material for the pipe, remove the thermistor holder from the gas piping and remove the thermistor for the gas pipe.
5. Remove the butyl sheet, remove the thermistor holder from the liquid piping and remove the thermistor for the liquid pipe.



TOOL	Phillips screwdriver

9.3.10. REMOVING THE ELECTRONIC EXPANSION VALVE COIL

1. Remove the optional air panel according to the section 9.3.3, "Removing the Optional Air Panel".
2. Remove the fan assembly according to the section 9.3.4, "Removing the Fan Runner and the Fan Motor".
3. Remove the drain pan according to the section 9.3.8, "Removing the Drain Pan".



4. Remove the butyl sheet at the electronic expansion valve.
5. Prepare two spanners (#19 and #14). Hold the part of the valve body with one spanner and loosen the lock nut with another spanner by turning the lock nut counterclockwise.

NOTE:

Do not hold the motor part when you are loosening the lock nut by means of a spanner. The base of the drive part may turn idle and may break.

6. Turn the lock nut by a few turns. Then, the drive part separates from the screw and you can remove the drive part.
7. Prepare the new drive part for replacement (service part) with the position of the driver (drive screw) already adjusted.

NOTE:

During the replacement work, pay attention to the separation part and prevent the dust, the foreign particles and others from entering the separation part. (The part that is exposed by the separation is the mechanical part of the valve.) Do not damage the junction part of the valve with the tools.

8. Put the drive part onto the valve body, hold the drive part and the valve body with their axes matching and attach the lock nut to the screw part of the valve body.

$ ***WARNING:*** *TURN OFF all the main switches*

TOOL	Phillips screwdriver

9. Tighten the lock nut with a spanner after tightening lightly by hand. The tightening torque should be within the range of 12Nm (120kg-cm) to 15Nm (150kg-cm).

NOTE:

Do not apply great forces, such as the rotating torque and the bending load, to the motor by holding the motor by hand when you are tightening the lock nut.
The direction of the eccentric part of the motor is assembled as the eccentric part of the expansion valve. Although the motor is directed toward the counter direction of the fittings for piping at the valve body, the alteration of this direction does not affect the open/close function of the valve. Therefore, the adjustment of the direction of the motor part is not required if the position of the motor is moved toward the rotating direction after the replacement, as shown below.
However, make sure that the direction of the motor for the coil of the electronic expansion valve does not touch other piping and the side plate of the electrical box.

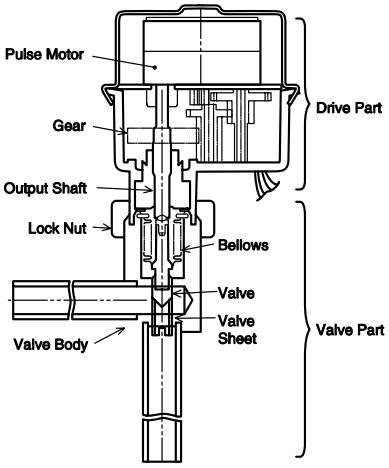


Fig. 1 Expansion Valve

Adjustment of direction is not required.

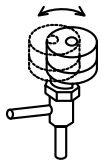


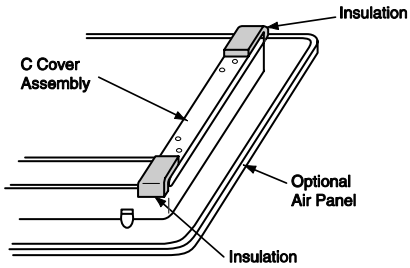
Fig. 2 Direction of Drive Part

10. After finishing the replacement, attach the electronic expansion valve by performing in reverse order the procedure for removing the electronic expansion valve.

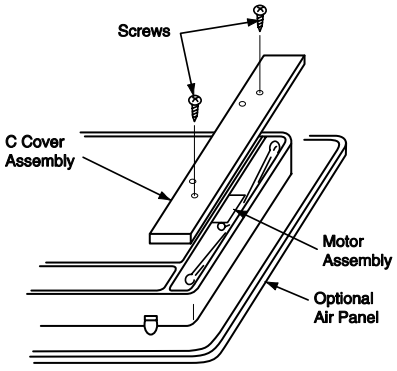
9.3.11. REMOVING THE AUTOMATIC LOUVER MOTOR

TOOL	Phillips screwdriver

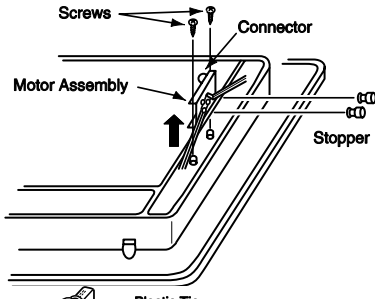
1. Remove the optional air panel according to the section 9.3.3, "Removing the Optional Air Panel".
2. Remove the insulation material that is mounted with the adhesive at both sides of the C panel assembly.



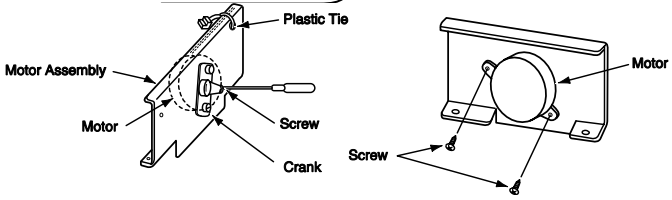
3. Remove the two screws that fix the C panel assembly and remove the C panel assembly from the optional air panel.



4. Remove the two screws that fix the motor assembly and remove the two stoppers by lifting the motor assembly upwards (to the arrow direction) by hand.
You can remove the stopper by pulling the stopper. You can remove the motor assembly by removing the connector at the same time.



5. Remove one screw that fixes the crank and cut the plastic tie that fixes the motor cord.
Remove the motor after removing the two fixing screws.

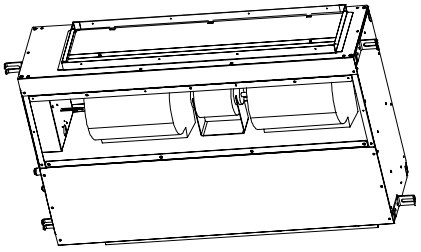


9.4. RPI

IN-THE-CEILING TYPE (MODELS: RPI-2.0 5.0 FSNE)

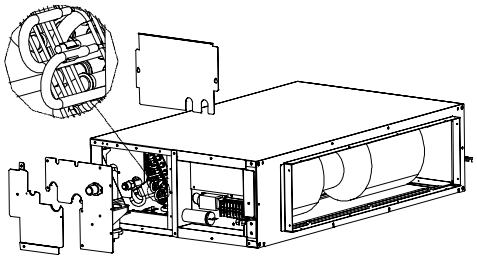
9.4.1. REMOVING THE AIR INLET THERMISTOR

1. Remove the screws that fix the fan panel.
2. The thermistor is located on the left side.



9.4.2. REMOVING THE THERMISTORS FOR THE LIQUID PIPE AND THE GAS PIPE

1. Remove the screws that fix the electrical box panel. (This panel slides vertically).
2. Remove the float switch cover.
3. Remove the cork tape and pull out the thermistors after removing the fixing plate for the thermistor.
4. The thermistors are located in front of the float switch cover.

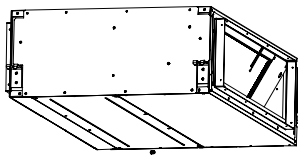


NOTE:

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

9.4.3. REMOVING THE THERMISTOR OULET

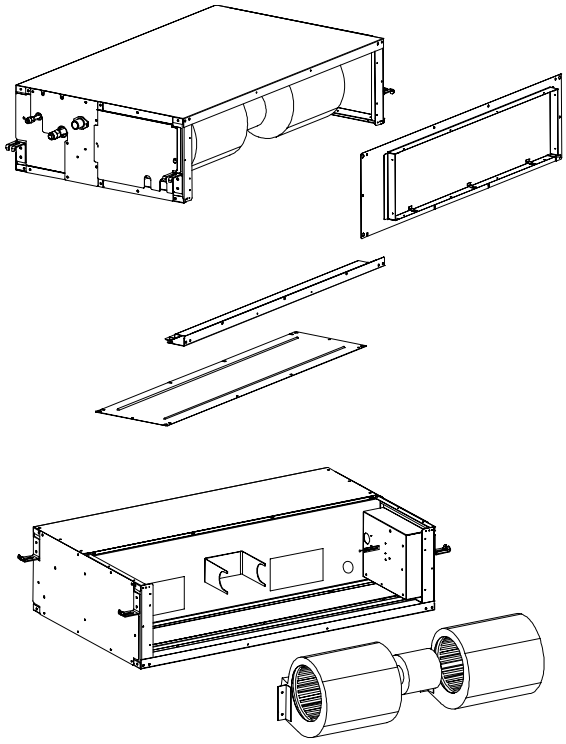
1. The thermistor is located on the outlet side.



$ ***WARNING:*** *TURN OFF all the main switches*

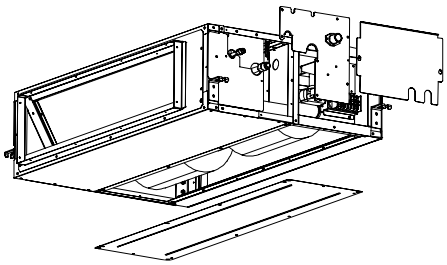
9.4.4. REMOVING THE FAN UNIT

1. Remove the screws that fix the fan panel.
2. Remove the screws that fix the back panel.
3. Remove the fan motor.
4. Loosen the screw that fixes each fan runner.
5. Remove the screws that fix each casing and pull out each casing.
6. Remove the holding band for the motor and remove the motor carefully.



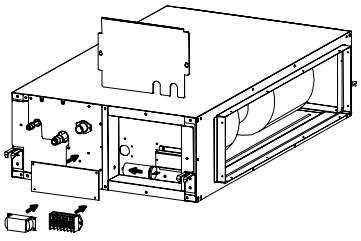
9.4.5. REMOVING THE DRAIN PUMP

1. Remove the screws that fix the fan panel.
2. Remove the screws that fix the electrical box panel. (This panel slides vertically).
3. Remove the float switch cover.
4. Remove the drain pump.



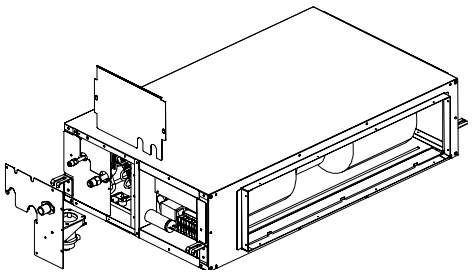
9.4.6. REMOVING THE ELECTRICAL BOX

1. Remove the screws that fix the electrical box panel. (This panel slides vertically).
2. The transformer and the terminal board are on the front side.
3. The PCB is behind the transformer and the terminal board.
4. The capacitor is behind the PCB.



9.4.7. REMOVING THE FLOAT SWITCH

1. Remove the screws that fix the electrical box panel. (This panel slides vertically).
2. Remove the float switch cover.
3. The Float Switch is located behind the electrical box panel.

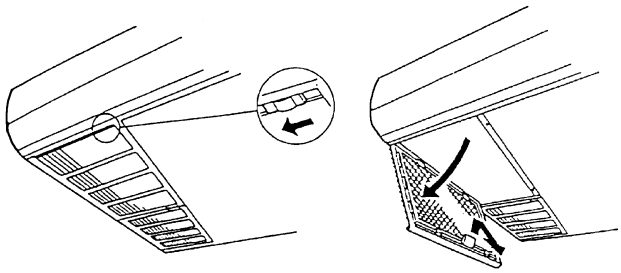


9.5. RPC

CEILING TYPE

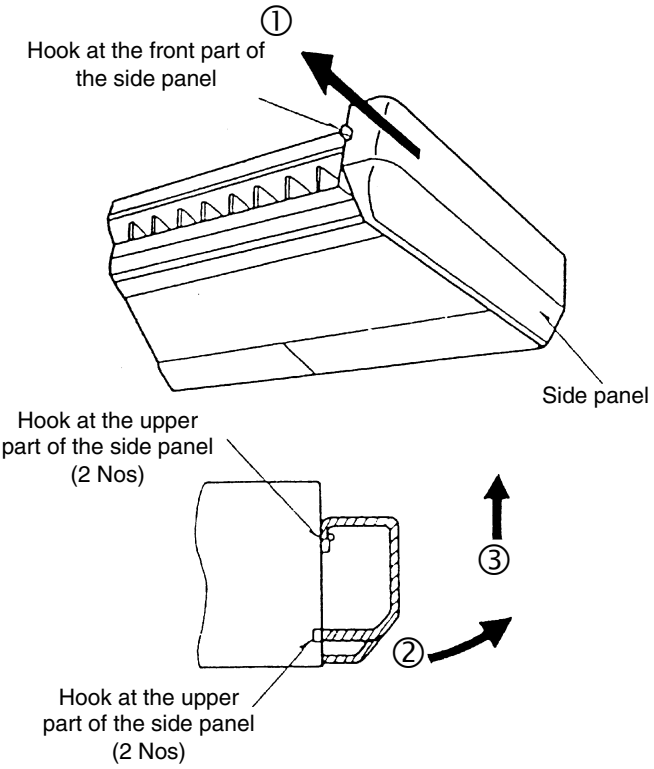
9.5.1. REMOVING THE AIR FILTER

1. The air filter is located inside of the air inlet grille. Remove the air filter after opening the air inlet grilles.
2. Push the knobs of the air inlet grille backwards.
3. Open the air inlet grille downwards.
4. By lifting up the knob, you can remove the filter.



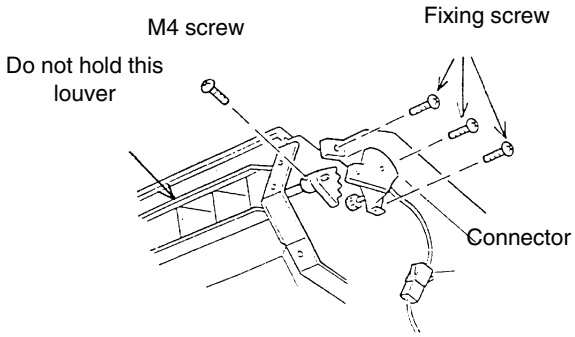
9.5.2. REMOVING THE SIDE PANEL

5. Pull the side panel towards you.
6. Unhook the hook at the lower part of the side panel.
7. Lift up the side panel.



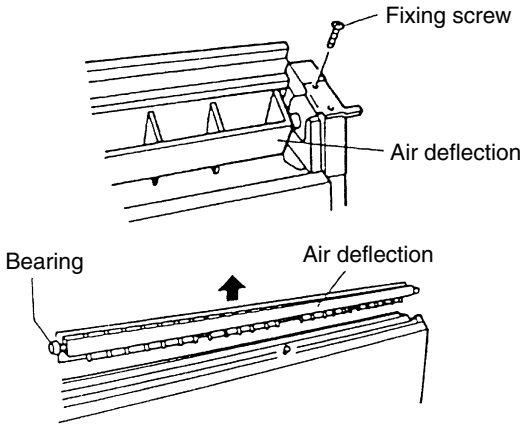
9.5.3. REMOVING THE DISCHARGE AIR GRILLE

1. Remove the side panel according to the section 9.5.2, "Removing the Side Panel".
2. Remove the crank assembly that is mounted on the right-side shaft of the air deflector.



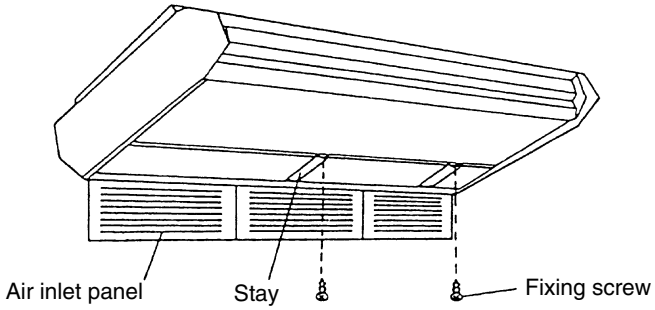
$ ***WARNING:*** *TURN OFF all the main switches*

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

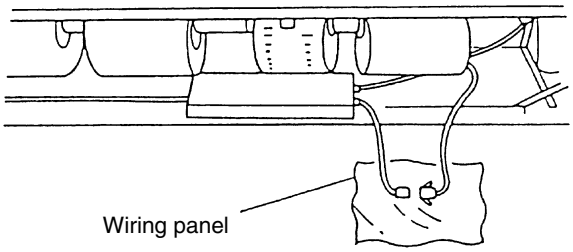


9.5.4. REMOVING THE FAN MOTOR

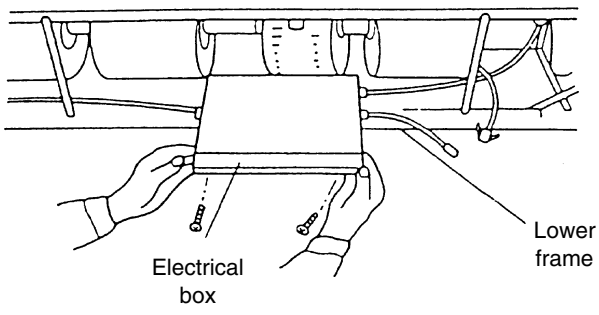
1. Open the air inlet grille according to the section 9.5.1, "Removing the Air Filter".
2. Remove the stay at the air inlet.



3. Disconnect the connector for the indoor fan motor.



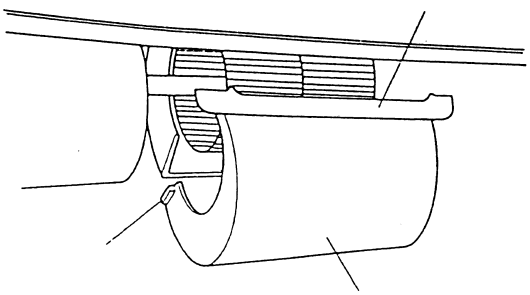
4. Hook the electrical box on the lower frame after removing the screws that fix the electrical box.



ⓘ ***NOTE:***

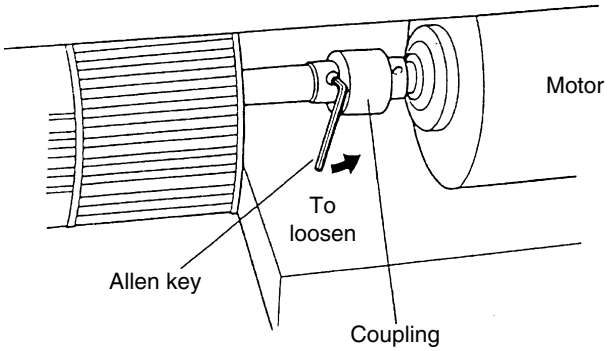
During this work, support the electrical box by hand and make sure not to drop the electrical box.

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

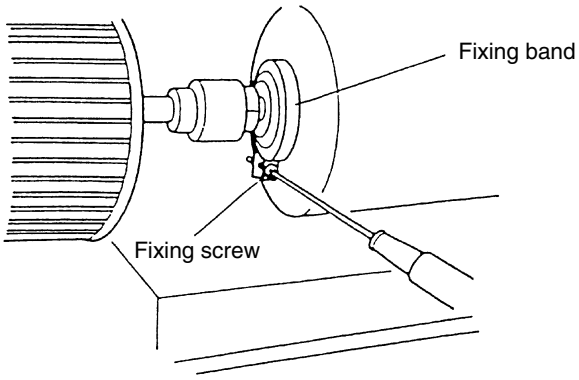


$ ***WARNING:*** *TURN OFF all the main switches*

6. Loosen the screws by means of a hexagon wrench.

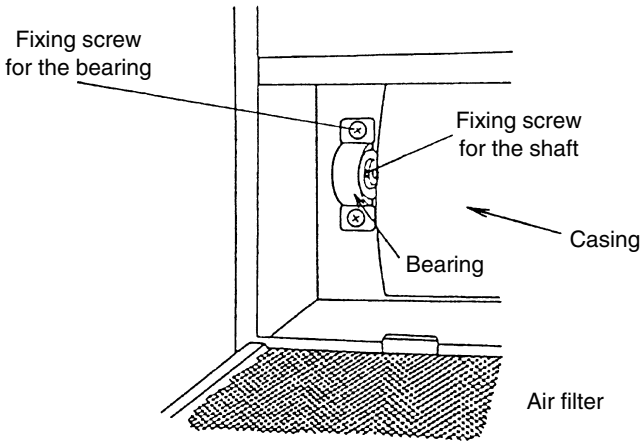


7. After removing the fixing band, remove the fan motor by sliding the fan motor backwards. Pay attention not to drop the fan motor.



9.5.5. REMOVING THE BEARING

1. Remove the side panel according to the section 9.5.2, "Removing the side panel".
2. Loosen the two screws that fix the bearing and the shaft by means of a hexagon wrench.
3. Remove the bearing after removing the two fixing screws (M8).



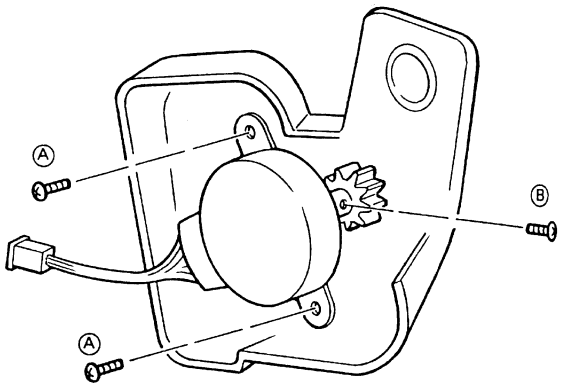
9.5.6. REMOVING THE COUPLING

1. Remove the side panel according to the section 9.5.2, "Removing the Side Panel".
2. Separate the casing into two pieces according to the section 2.8.4, "Removing the Fan Motor".
   Loosen the screw for the coupling by means of a hexagon wrench.
3. Remove the M8 screw that fixes the bearing, according to the section 9.5.5, "Removing the Bearing".
4. Remove the coupling after removing the shaft and the turbo fan assembly.

$ ***WARNING:*** *TURN OFF all the main switches*

9.5.7. REMOVING THE AUTOMATIC LOUVER MOTOR

1. Remove the right-side panel according to the section 9.5.2, "Removing the Side Panel".
2. Remove the M4 screws and remove the AS motor assembly from the right shaft of the discharge air grille. Pay attention not to damage the AS Motor assembly.
3. Remove the two screws (A) that fix the motor for the auto-louver and remove the motor from the AS Motor fixing plate. Remove one screw (B) that fixes the shaft of the motor for the auto-louver and the pinion AS.

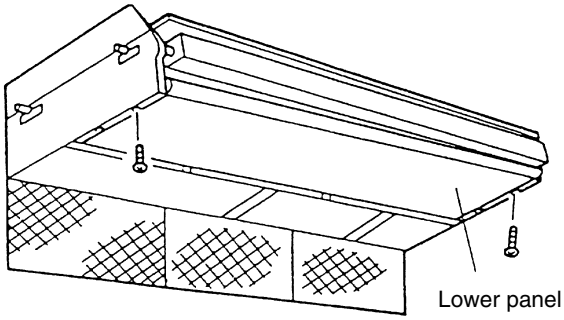


NOTE:

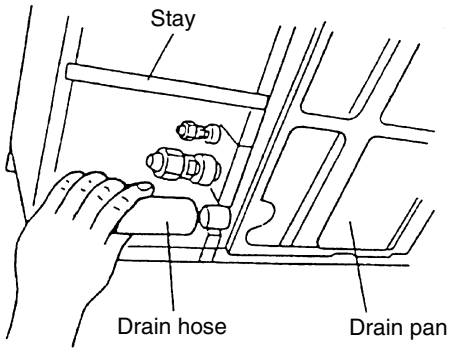
When you are assembling, tighten the two screws (A) with a torque of 0.8Nm (8kg-cm) and one screw (B) with a torque of 0.4 Nm (4kg-cm) by means of a torque wrench.

9.5.8. REMOVING THE THERMISTORS FOR THE LIQUID PIPE AND THE GAS PIPE

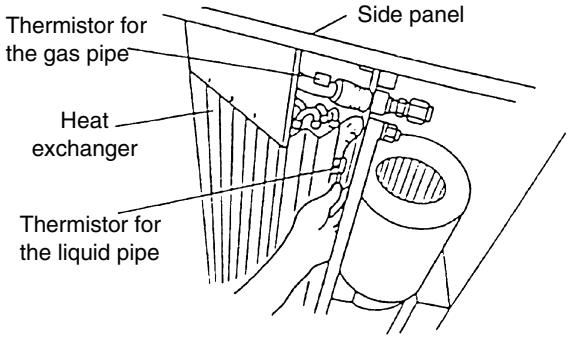
1. Remove the right-side panel and the left-side panel according to the section 9.5.2, "Removing the Side Panel".
2. Remove the lower panel.



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



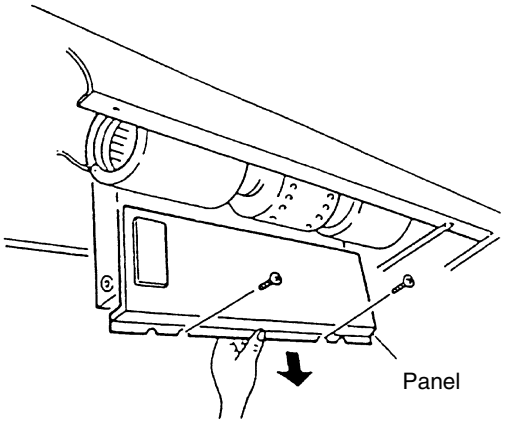
4. Remove the thermistors for the liquid pipe and the gas pipe.



$ ***WARNING:*** *TURN OFF all the main switches*

9.5.9. REMOVING THE PRINTED CIRCUIT BOARD (PCB)

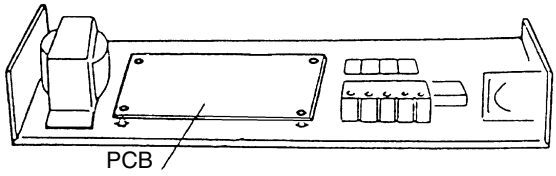
1. Open the air inlet panel according to the section 9.5.1, "Removing the Air Filter".
2. Disconnect the wiring connector for the fan motor.
3. Turn the electrical box according to item 4 of the section 9.5.4, "Removing the Fan Motor" and hook the electrical box at the lower frame.
4. Remove the panel after removing the two screws that fix the electrical box panel.



NOTE:

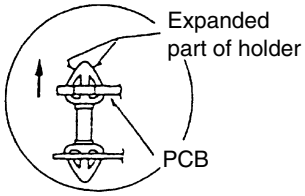
During this work, support the electrical box and make sure not to drop the electrical box.

5. Four holders support the PCB. Pinch the expanded part of the holder by means of long-nose pliers.



NOTE:

Do not touch the electrical components. Do not apply a great force to the PCB. If you apply a great force, the PCB will become faulty.

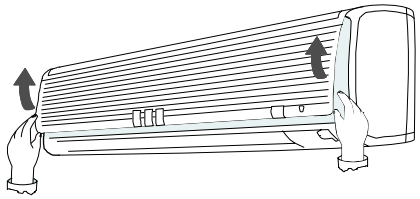


9.6. RPK

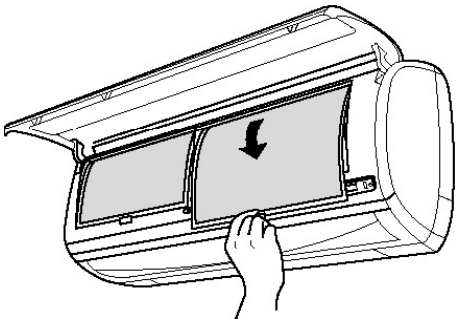
9.6.1. REMOVING THE AIR FILTER

■ **RPK-0.8~2.0**

1. Pull up the right side and the left side of the air inlet grille as shown in the figure.



2. Pull down the air filter after lifting the grille and remove the air filter from the hinge.



$ ***WARNING:*** *TURN OFF all the main switches*

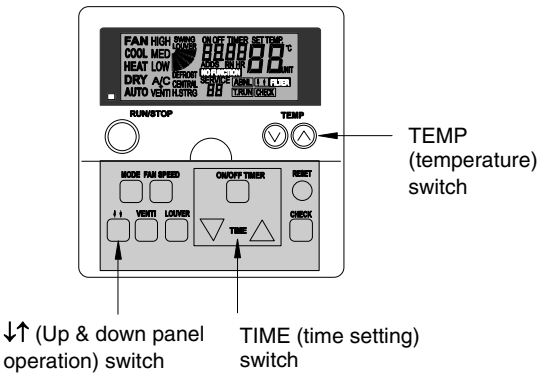
■ **RPK-2.5~4.0**

NOTE:

In order to remove the filter, you need to change the louver position using one of the following remote control switches: PC-P1HE and PC-RLH3A.

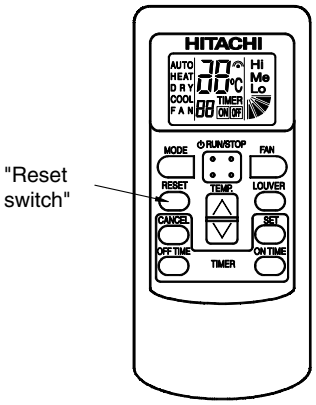
1. Press the "↑↓" switch. "↑↓" (Up & Down Panel Operation) will be displayed in the Liquid Crystal Display.
2. When you are operating multiple indoor units by means of a remote control switch, press the TEMP. (Temperature Setting) switch and set the address that you need to open.
3. By pressing the TIME (Time Setting) switch, you keep the louver at a horizontal position. If you press the "∇" when the louver angle is at a closing position, the louver will move to the horizontal position.

   If you press the "Δ" when the louver angle is at the horizontal position, the louver angle will move to the closing position.

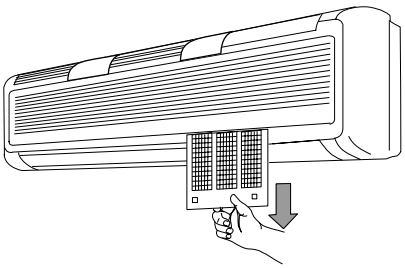


■ **In case of PC-LH3A**

1. Face the transmitter toward the receiver of the indoor unit and press the RESET switch.
2. Change the louver angle to the horizontal position. If you press the RESET switch when the louver angle is horizontal position, the louver will be moved at the closing position.



Pull the air filter downward from the air filter grille.



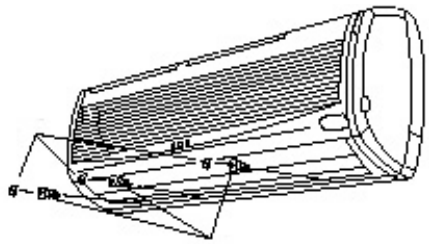
■ Press the "Reset" switch on the remote control switch after cleaning the air filter.

$ ***WARNING:*** *TURN OFF all the main switches*

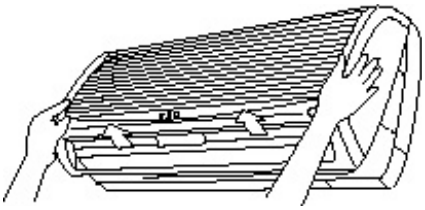
9.6.2. REMOVING THE FRONT PANEL

■ **RPK-0.8~2.0**

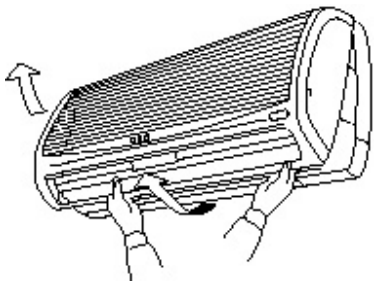
1. Remove the three bushes and the screws as shown in the picture.



2. Slowly pull the lower side of the front panel at your side. The air outlet must not touch the outlet grille.



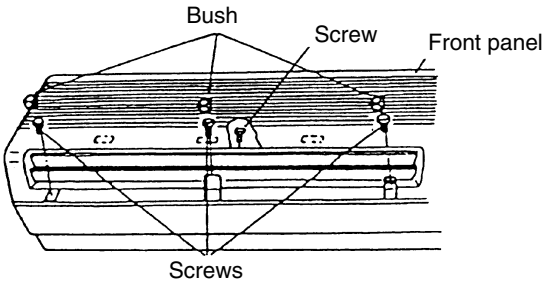
3. Slightly lift the front panel upward in order to release the three hooks of upper side of the front panel.



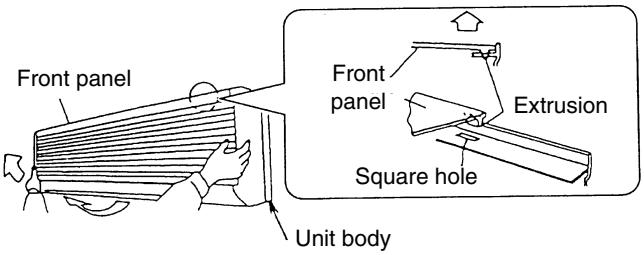
4. For attaching the front panel, first attach the lower side of the front panel. Then, attach the three hooks at the upper part of the front panel.
5. There are three stoppers inside the front panel. Make sure that there is no gap between the front panel, the drain pan and the unit body.

■ RPK-2.5~4.0

1. Press the "PUSH" marks at both ends of the front panel and open the suction grille by pulling toward the front side.
2. Remove one screw at the center of the front panel. After removing the screw, close the front panel once.
3. Remove the three bushes at the louver part of the air outlet and remove three screws.



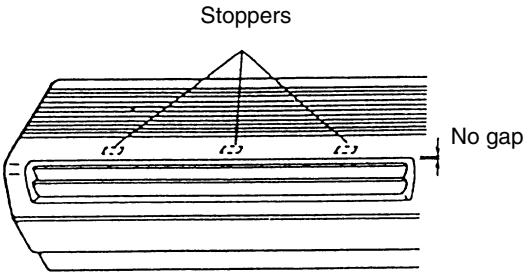
4. Hold both sides of the front panel, pull the front panel toward the front side slowly and lift up the front panel while you pay attention not to touch the louver at the air outlet.
5. Lift up the front panel slightly. Then, the three hooks at the upward part of the front panel are detached from the holes of the unit body and you can remove the front panel toward the front side.



NOTE:

DO NOT hit the front panel when you are removing the front panel. If you do so, you may break the unit body.

6. For attaching the front panel, first attach the front panel at the air outlet side. Then, attach the three hooks at the upper part of the front panel.
7. Open the front panel as the procedure (1) and fix the screw (1 piece) at the center of the front panel.
8. There are three stoppers at the inner side of the front panel. Press the hook part from the front side and make sure that there is no gap between the front panel and the unit body.



NOTE:

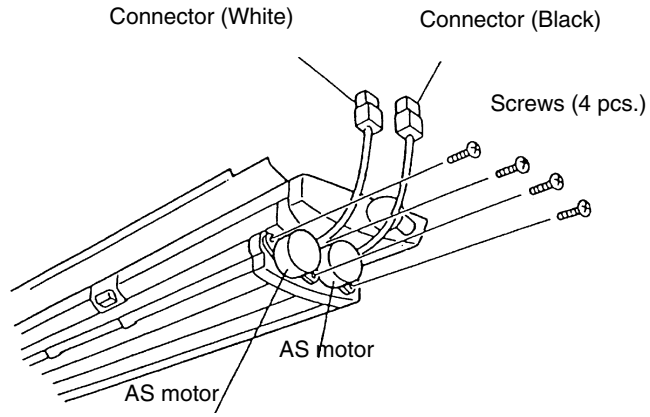
If there is a gap between the front panel and the air outlet, the gap may cause an air leakage and dew may appear at the front panel. Then, the dew may drop.

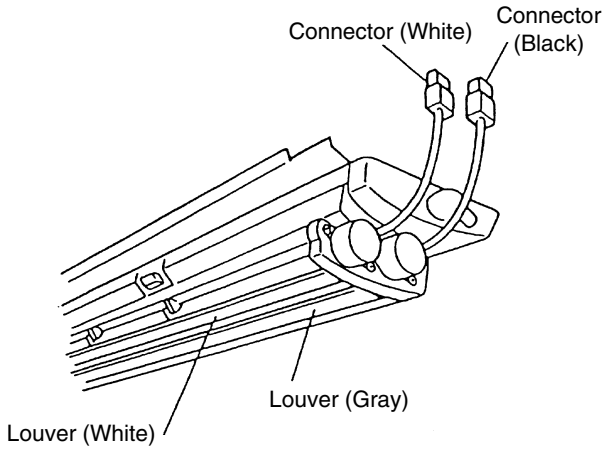
9. After attaching the front panel, tighten the three screws at the lower part of the air outlet and cover the three screws with the bushes.

$ ***WARNING:*** *TURN OFF all the main switches*

9.6.3. REMOVING THE MOTOR FOR THE AUTOMATIC LOUVER

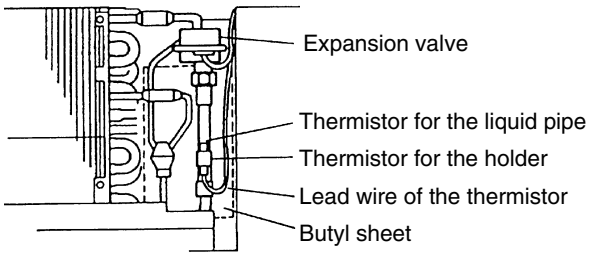
1. Remove the front panel according to the section 9.6.2, "Removing the Front Panel".
2. Remove the electrical box according to the section 9.6.5, "Removing the Electrical Box Panel".
3. Remove the four screws which fix the AS motor.
4. Draw out the AS motor horizontally. The AS motor separates from the louver shaft.
5. For attaching the AS motor, insert the shaft of the AS motor into the D-cut hole of the louver, and perform in reverse order the procedure for removing the AS motor.

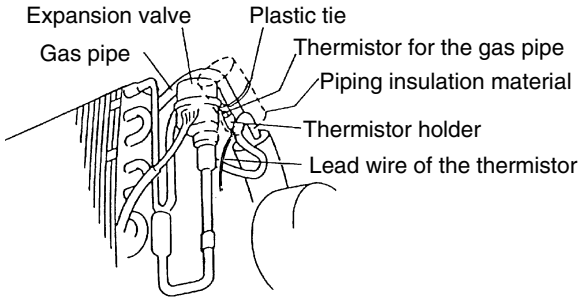




9.6.4. REMOVING THE THERMISTORS FOR THE LIQUID PIPE, THE GAS PIPE, THE DISCHARGE AIR AND THE SUCTION AIR

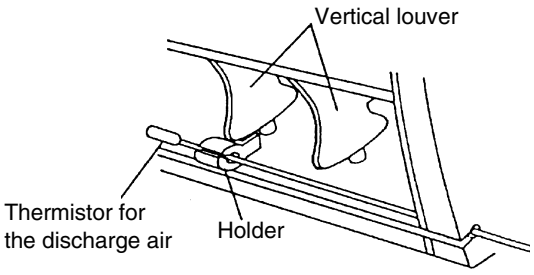
1. Remove the front panel according to the section 9.6.2, "Removing the Front Panel".
2. Remove the electrical box according to the section 9.6.5, "Removing the Electrical Box".
3. Removing the Thermistor for the Liquid Pipe
   Remove the butyl sheet that protects the thermistor for the liquid pipe and remove the thermistor from the holder.
4. Removing the Thermistor for the Gas Pipe
   Remove the piping insulation material that protects the thermistor for the gas pipe, by cutting the plastic tie and the surrounding tapes. Then, remove the thermistor from the holder.

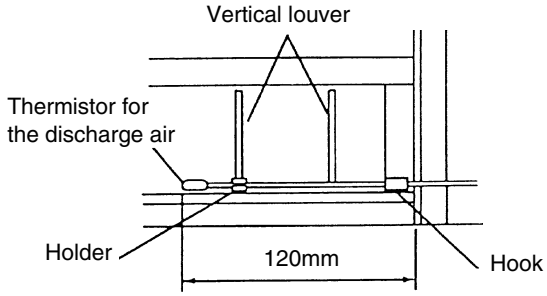




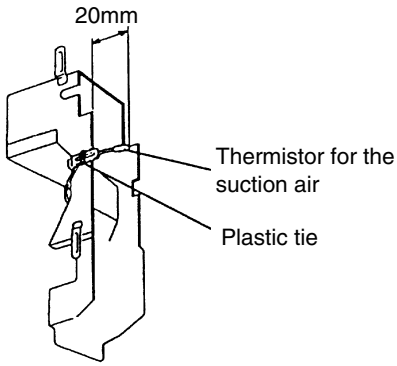
$ ***WARNING:*** *TURN OFF all the main switches*

5. Removing the thermistor for the discharge air
   Remove the thermistor for the discharge air from the holder of the vertical louver and the hook at the right side of the air outlet.



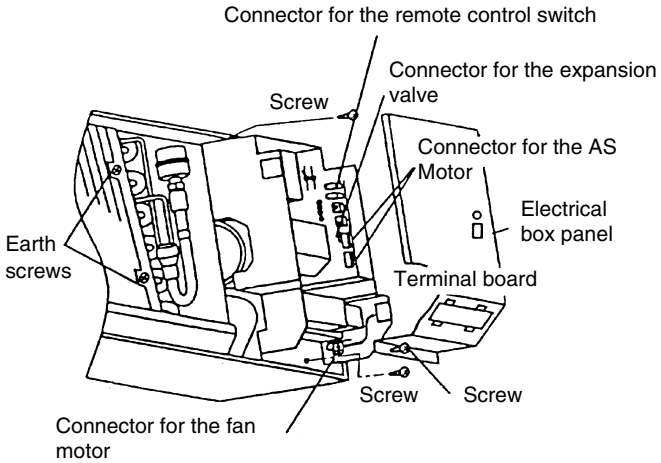


6. Removing the thermistor for the suction air
   Remove the thermistor for the suction air by cutting the plastic tie that fixes the thermistor onto the right side of the electrical box.



9.6.5. REMOVING THE ELECTRICAL BOX PANEL

1. Remove the front panel according to the section 9.6.2, "Removing the Front Panel".
2. Remove one screw for the electrical box panel.
3. Remove the power supply wiring and the wiring connection between the indoor unit and outdoor unit.



4. Remove the lead wires for the expansion valve, the fan motor, the thermistors for the liquid pipe and the gas pipe, the AS Motor (X 2) and the remote control switch from the connectors. Also, remove ground wires (x2) of the heat exchanger.
5. Remove the thermistor for the discharge air from the holder that is fixed at the vertical louver of the air outlet.
6. Draw out the electrical box toward the front side after removing the two screws that fix the electrical box.
7. For attaching the electrical box, set the electrical box, connect the connectors and perform in reverse order the procedure for removing the electrical box.

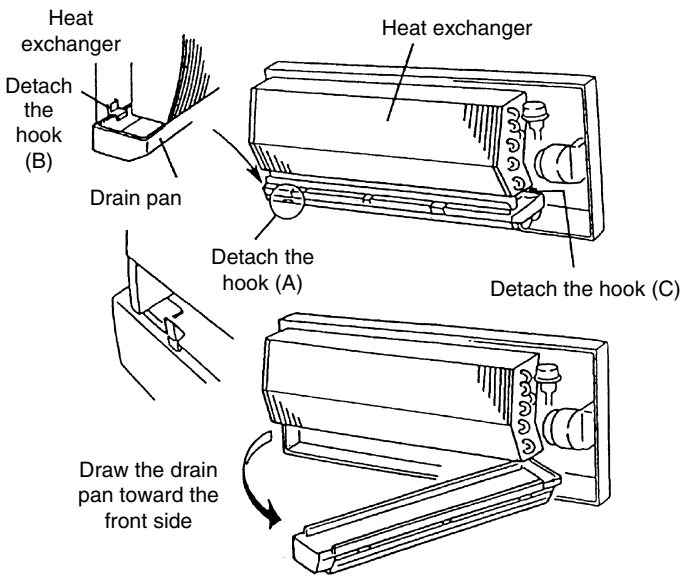
$ ***WARNING:*** *TURN OFF all the main switches*

9.6.6. REMOVING THE DRAIN PAN

1. Remove the front panel according to the section 9.6.2, "Removing the Front Panel".
2. Remove the electrical box according to the section 9.6.5, "Removing the Electrical Box Panel".
3. Remove the drain pan from the unit by detaching the hooks (A) and (B) from the left side of the drain pan, and by detaching the hook (C) while you are pulling the right side of the air panel toward the front side.
4. For attaching the drain pan, perform in reverse order the procedure for removing the drain pan.

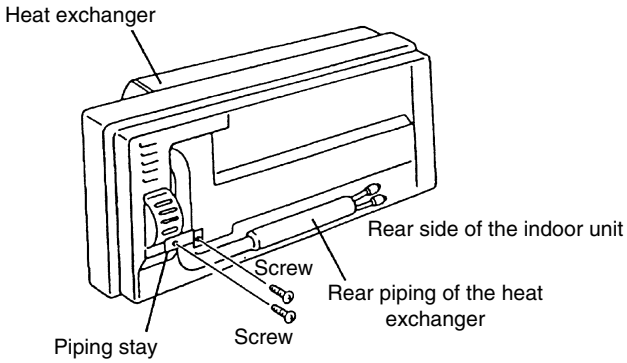
NOTE:

Make sure that the hooks (A), (B) and (C) are hooked correctly.

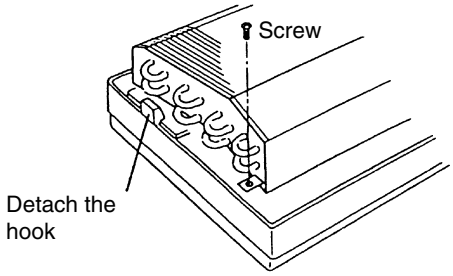


9.6.7. REMOVING THE HEAT EXCHANGER

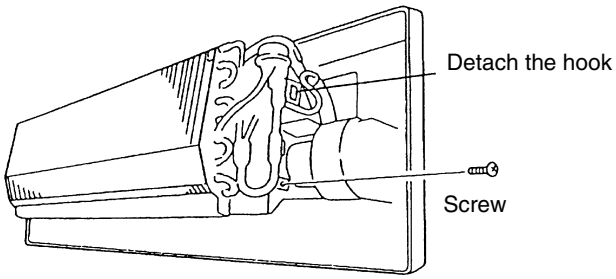
1. Remove the front panel according to the section 9.6.2, "Removing the Front Panel".
2. Remove the electrical box according to the section 9.6.5, "Removing the Electrical Box Panel".
3. Remove the drain pan according to the section 9.6.6, "Removing the Drain Pan".
4. Remove the piping stay at the rear side of the indoor unit.



5. Detach the hook that holds the left side of the heat exchanger and remove one screw that fixes the heat exchanger.

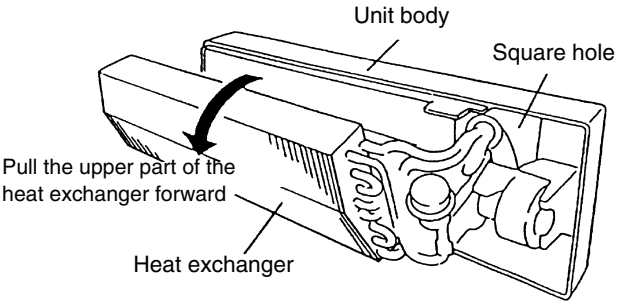


6. Remove one screw that fixes the heat exchanger and detach the hook that holds the right side of the heat exchanger.



$ ***WARNING:*** *TURN OFF all the main switches*

7. Lift up the heat exchanger. Draw out the rear piping of the heat exchanger from the square hole by pulling the upper part of the heat exchanger forward, and then remove the heat exchanger.
8. For attaching the heat exchanger, perform in reverse order the procedure for removing the heat exchanger.

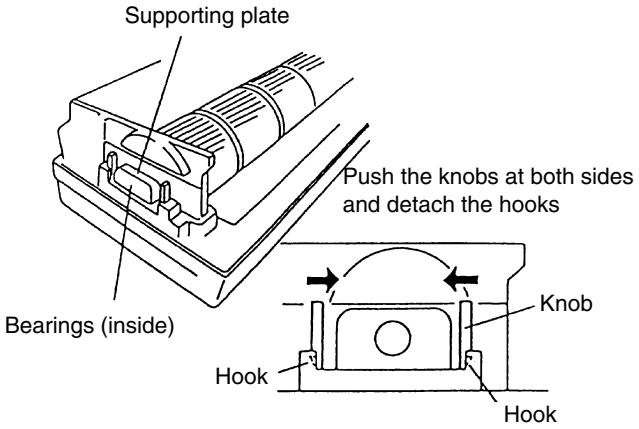


NOTE:

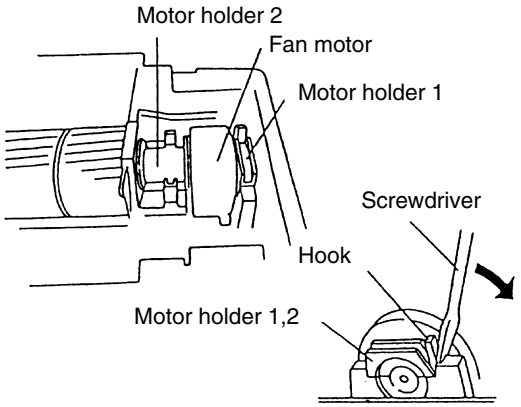
After attaching the heat exchanger, make sure that the hooks and the screws at the right side and the left side of the heat exchanger are correctly attached.

9.6.8. REMOVING THE FAN AND THE FAN MOTOR

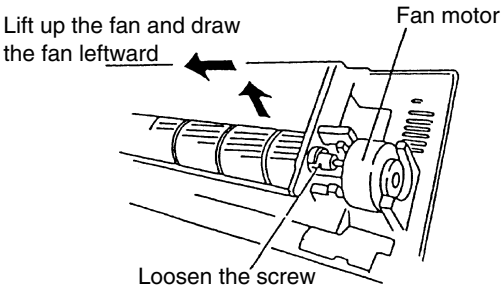
1. Remove the heat exchanger according to the section 9.6.7, "Removing the Heat Exchanger".
2. Remove the supporting plate for the bearing by pushing the knobs at both sides of the supporting plate toward the inside and by detaching the hooks.



3. Remove the motor holders 1 and 2 that fix the fan motor. In order to remove the motor holder, insert the screwdriver at the hook part as shown in the figure.
4. After removing the motor holder 1, loosen one screw (1) that fixes the motor shaft and the fan.

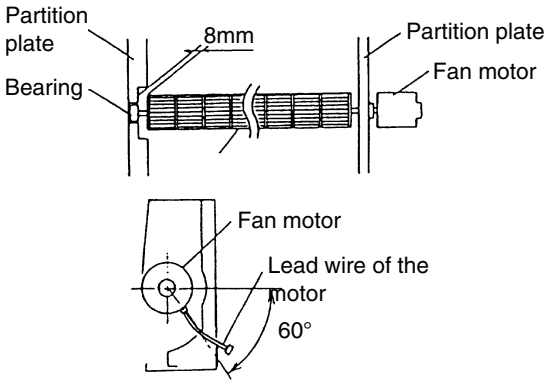


5. Draw the fan leftward while you are lifting up the bearing side of the fan slightly. Then, the fan and the fan motor are removed.



$ ***WARNING:*** *TURN OFF all the main switches*

6. For attaching the fan motor and the fan, perform in reverse order the procedure for removing the fan motor and the fan.
7. Fix the fan at the position with a 8mm clearance between the left end (bearing side) of the fan and the partition plate.
8. Fix the fan motor with the outlet of the lead wire at the position as shown below.



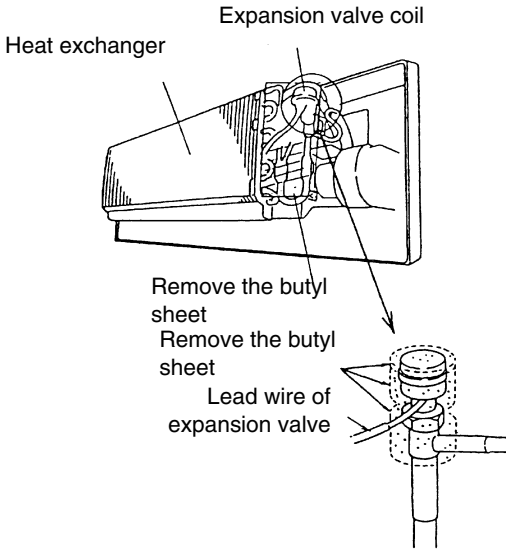
9.6.9. REMOVING THE ELECTRONIC EXPANSION VALVE COIL

1. Remove the front panel according to the section 9.6.2, "Removing the Front Panel".
2. Remove the electrical box according to the section 9.6.5, "Removing the Electrical Box Panel".
3. The butyl sheet is adhered around the piping of the heat exchanger, the electronic expansion valve and the inlet piping and outlet piping of the electronic expansion valve. Remove the butyl sheet of the surface of the piping, the coil part of the expansion valve and the part of the valve body.
4. Prepare two spanners. Hold the part of the valve body with one spanner and loosen the lock nut with another spanner by turning the lock nut counterclockwise.

NOTE:

Do not hold the motor part when you are loosening the lock nut by means of a spanner. The base of the drive part may turn idle and may break.

Turn the lock nut by a few turns. Then, the drive part separates from the screw and you can remove the drive part.
Prepare the new drive part for replacement (service part) with the position of the driver (drive screw) already adjusted.



NOTE:

During replacement work, pay attention to the separation part and prevent the dust, the foreign particles and others from entering the separation part. (The part that is exposed by the separation is the mechanical part of the valve).
Do not damage the junction part of the valve with the tools.

Put the drive part onto the valve body, hold the drive part and the valve body with their axes matching and attach the lock nut to the screw part of the valve body. Tighten the lock nut with a spanner after tightening lightly by hand.
The tightening torque should be within the range of 12Nm(120kg-cm) ~ 15Nm (150kg-cm).

$ ***WARNING:*** *TURN OFF all the main switches*

NOTE:

Do not apply great forces, such as the rotating torque and the bending load, to the motor by holding the motor by hand when you are tightening the lock nut.
Although the direction of the eccentric part of the motor is assembled with the eccentric part of the motor directed toward the counterdirection of the fittings for piping at the valve body, the alteration of this direction does not affect the open/close function of the valve.
Therefore, the adjustment of the direction of the motor part is not required if the position of the motor is moved toward the rotating direction after the replacement, as shown in the Figure 2.
However, make sure that the direction of the motor for the coil of the electronic expansion valve does not touch other piping and the side plate of the electrical box.

5. Attach the removed butyl sheet to the electronic expansion valve again.
6. After finishing the replacement, attach the electronic expansion valve by performing in reverse order the procedure for removing the electronic expansion valve.

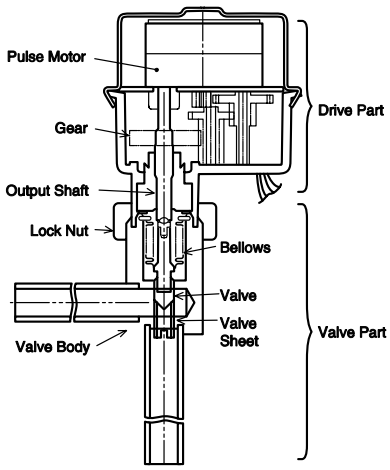


Fig. 1 Expansion Valve

Adjustment of direction is not required.

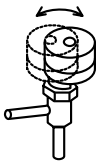


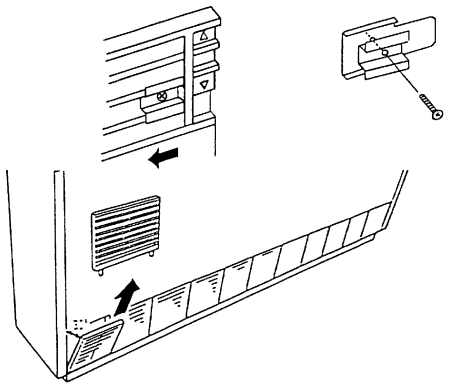
Fig. 2 Direction of Drive Part

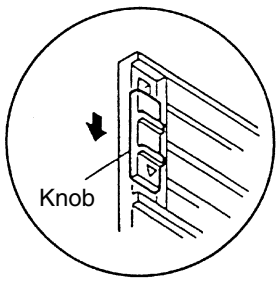
9.7. RPF

Floor Type

9.7.1. REMOVING THE AIR INLET GRILLE

1. Loosen the screws for the fixing plate at the right side of each air inlet grille. Then, move the fixing plates.
2. By pushing the knob at both sides of the air inlet grille towards the arrow mark direction, the air inlet grille can be opened with an angle of 30°.
3. Remove the air inlet grille from the hinged part.

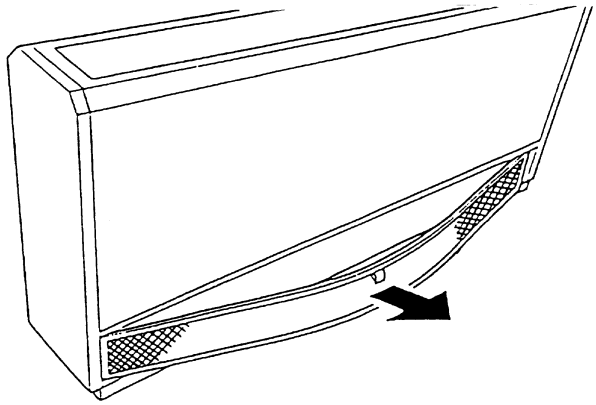




$ ***WARNING:*** *TURN OFF all the main switches*

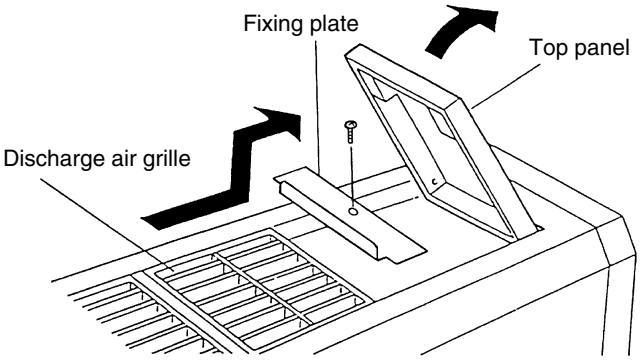
9.7.2. REMOVING THE AIR FILTER

1. The air filter is located on the inner side of the air inlet grille. Remove all the air inlet grilles.
2. Remove the air filter by pulling the knob of the air filter.



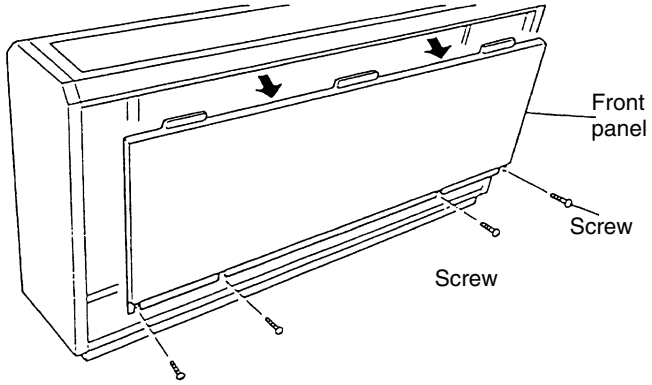
9.7.3. REMOVING THE DISCHARGE AIR GRILLE

1. The discharge air grilles are mounted on the top by means of a guiderail.
2. By opening the top panel and by sliding the discharge air grilles, you can remove the discharge air grilles.



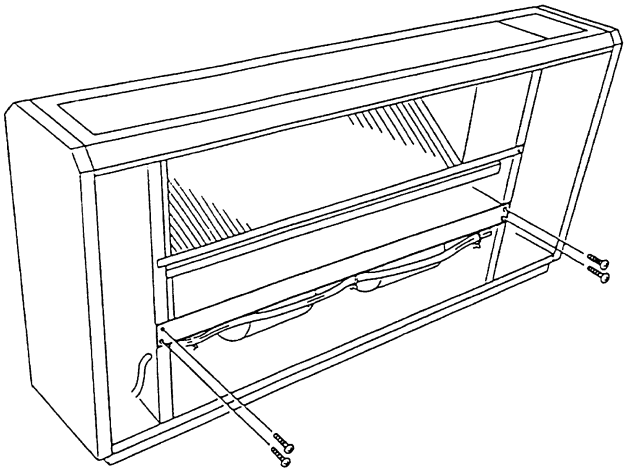
9.7.4. REMOVING THE FRONT PANEL

1. Remove the air filter according to the section 9.7.2, "Removing the Air Filter".
2. Remove the front panel from the slit after removing the four fixing screws at the lower part and pulling out the front panel downwards.



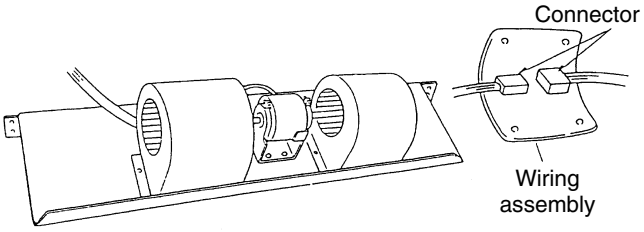
9.7.5. REMOVING THE FAN MOTOR

1. Remove the air inlet grille according to the section 9.7.1, "Removing the Air Inlet Grille".
2. Remove the air filter according to the section 9.7.2, "Removing the Air Filter".
3. Remove the front panel according to the section 9.7.4, "Removing the front panel".
4. Remove the mounting plate for the fan motor after removing the four fixing screws.

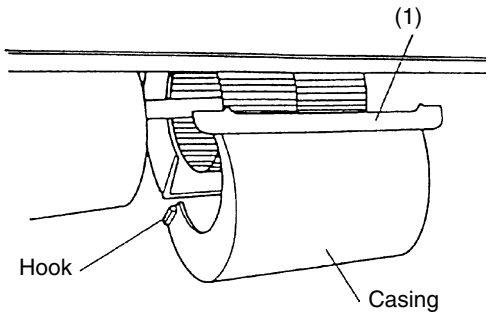


$ ***WARNING:*** *TURN OFF all the main switches*

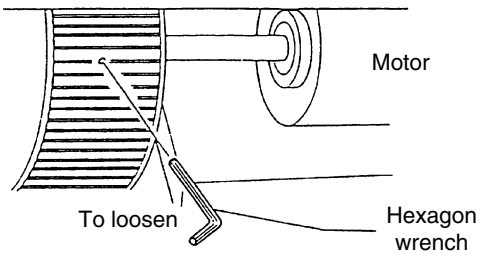
5. Disconnect the wiring connector for the fan motor. Remove the wiring assembly and the connector.



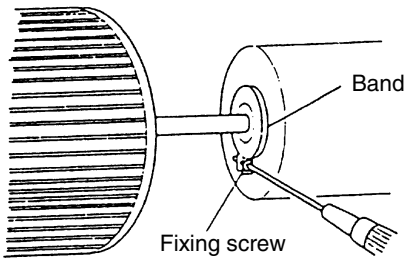
6. Remove the casing (1) by pressing the hook part at the four positions towards the inner side.



7. Loosen the screws by means of a hexagon wrench.

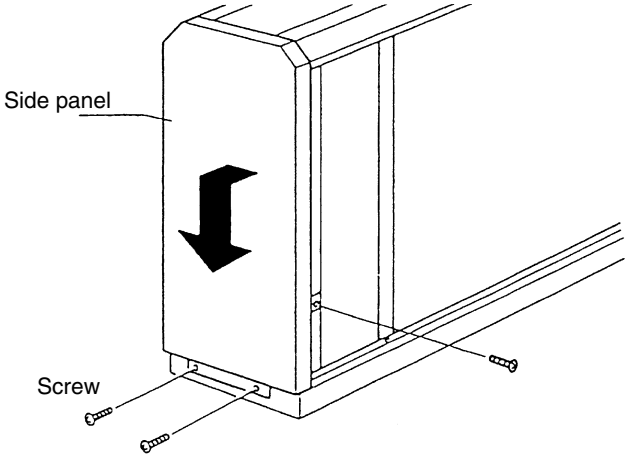


8. After removing the fixing plate, remove the fan motor by sliding the fan motor backwards. Pay attention not to drop the fan motor.



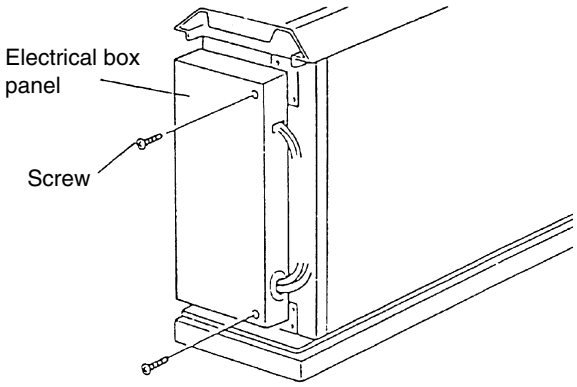
9.7.6. REMOVING THE PRINTED CIRCUIT BOARD (PCB)

1. Remove the air inlet grille according to the section 9.7.1, "Removing the Air Inlet Grille".
2. Remove the air filter according to the section 9.7.2, "Removing the Air Filter".
3. Remove the front panel according to the section 9.7.4, "Removing the front panel".
4. You can remove the side panel by removing the three fixing screws and pulling the side panel downwards.

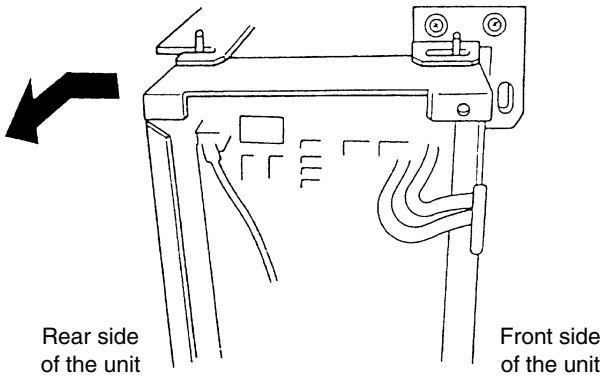


$ ***WARNING:*** *TURN OFF all the main switches*

5. Remove the electrical box panel after removing the two fixing screws.

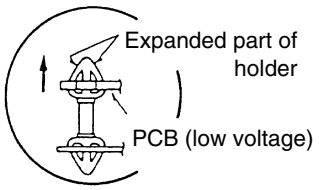


6. You can turn the electrical box up to an angle of 90° by removing the two fixing screws and by unhooking the hook at the rear side of the electrical box.
7. Four holders support the PCB. Pull out the PCB from the PCB hole by pushing the expanded part of the holder by means of long-nose pliers and by putting a finger near the hole of the PCB.



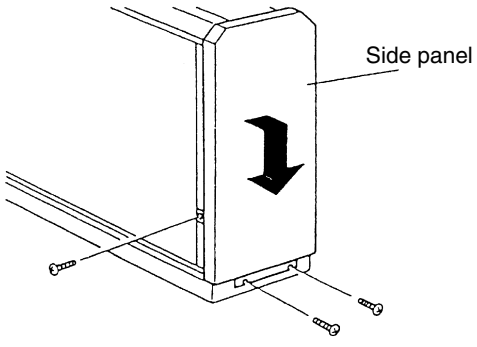
NOTES:

1. *Do not touch the electrical components. Do not apply a great force to the PCB. If you apply a great force, the PCB will become faulty.*
2. *When you are reassembling, make sure that each terminal is correctly connected. Refer to the wire marks and the terminal codes. If you connect the terminals incorrectly, a malfunction or a damage of the electrical components will occur.*



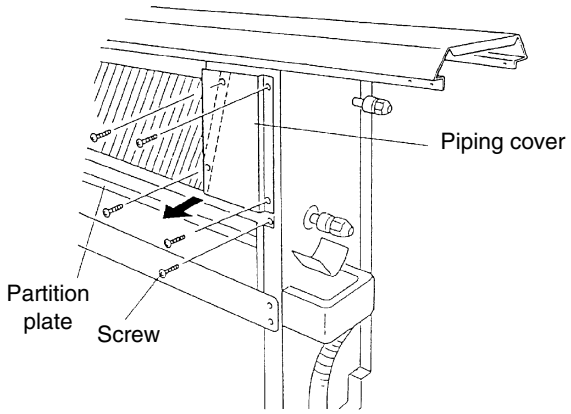
9.7.7. REMOVING THE THERMISTORS FOR THE LIQUID PIPE AND THE GAS PIPE

1. Remove the air inlet grille according to the section 9.7.1, "Removing the Air Inlet Grille".
2. Remove the air filter according to the section 9.7.2, "Removing the Air Filter".
3. Remove the front panel according to the section 9.7.4, "Removing the front panel".
4. Remove the side panel after removing the three fixing screws.

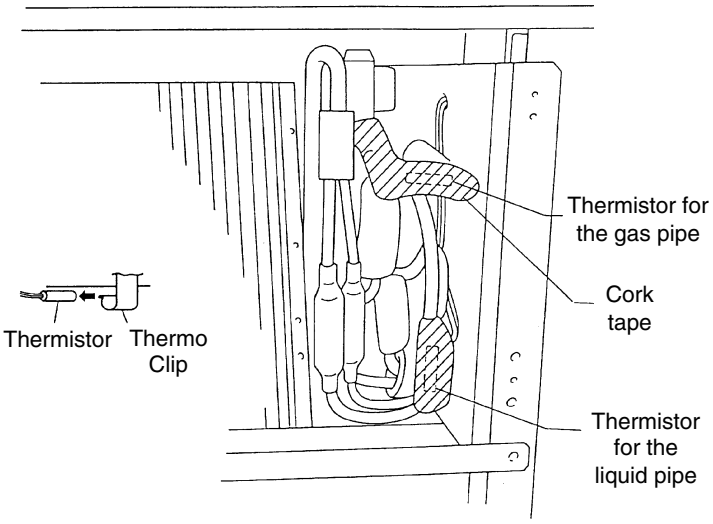


$ ***WARNING:*** *TURN OFF all the main switches*

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



6. Remove the CORK TAPE and pull out the thermistor after removing the thermo clip for the thermistors.
7. Seal the thermistor with the CORK TAPE.
8. Mount the thermistor as shown beside.

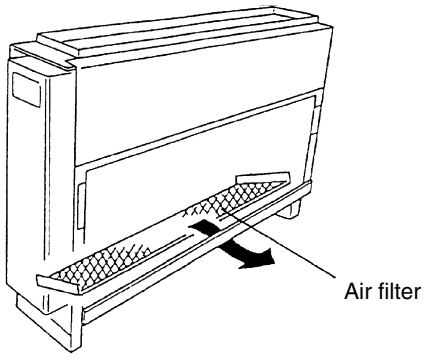


9.8. RPFI

Floor-Concealed Type

9.8.1. REMOVING THE AIR FILTER

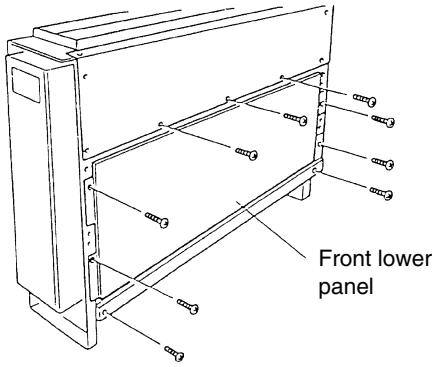
1. The air filter is located at the inner upper part of the inlet.
2. Remove the air filter by pulling the center knob and by bending the filter.



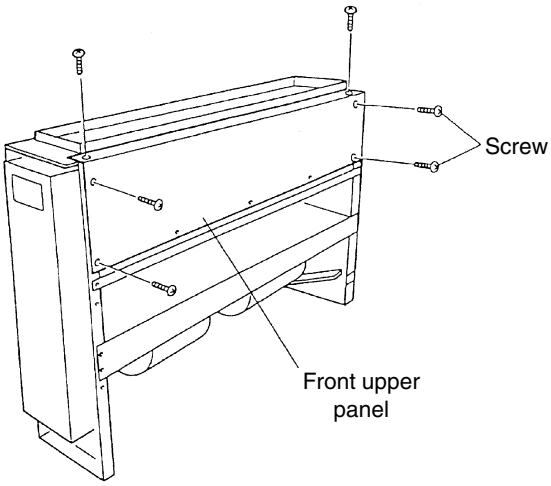
$ ***WARNING:*** *TURN OFF all the main switches*

9.8.2. REMOVING THE FRONT PANEL

1. Remove the air filter according to the section 9.7.1, "Removing the Air Filter".
2. Remove the front lower panel after removing the screws (1.0HP: 9 pcs. 1.5HP: 10 pcs.) at the lower part of the front panel.



3. Remove the front upper panel after removing the eleven fixing screws.



9.8.3. REMOVING THE FAN MOTOR

1. Remove the air filter according to the section 9.7.1, "Removing the Air Filter".
2. Remove the front panel according to the section 9.7.2, "Removing the Front Panel".
3. Remove the fan motor as explained in items 4 to 8 of the section 9.7.5, "Removing the Fan Motor".

9.8.4. REMOVING THE PRINTED CIRCUIT BOARD (PCB)

1. Remove the front panel according to the section 9.7.2, "Removing the Front Panel".
2. Remove the PCBs as explained in items 5 to 7 of the section 9.7.6, "Removing the Printed Circuit Board (PCB)".

9.8.5. REMOVING THE THERMISTORS FOR THE LIQUID PIPE AND THE GAS PIPE

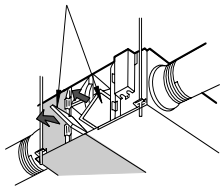
1. Remove the air filter according to the section 9.7.1, "Removing the Air Filter".
2. Remove the front panel according to the section 9.7.2, "Removing the Front Panel".
3. Remove the thermistor as explained in items 4 to 6 of the section 9.7.7, "Removing the Thermistors for the Liquid Pipe and the Gas Pipe".

9.9. KPI

TOTAL HEAT EXCHANGER

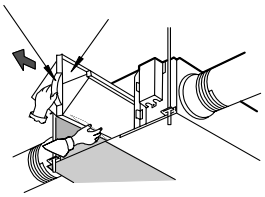
9.9.1. REMOVING THE AIR FILTER

1. Turn off the power source for the total heat exchanger.
2. Remove the fixing screws, pull back the hinges, open the service panel and remove the panel from the catches.).



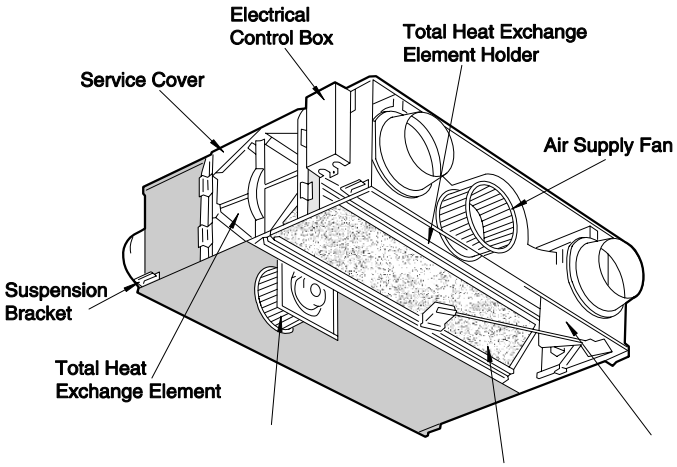
9.9.2. REMOVING THE TOTAL HEAT EXCHANGER

1. Turn off the power source for the total heat exchanger.
2. Open the service panel and take out the filter.
3. Hold the handle and draw the total heat exchanger elements (two elements) out from the main unit.



9.9.3. REMOVING THE AIR SUPPLY FAN ASSEMBLY AND THE DISCHARGE FAN ASSEMBLY

1. Turn off the power source for the total heat exchanger.
2. Remove the air filters and the total heat exchanger rotor according to the sections 9.9.1 and 9.9.2 before removing the air supply fan assembly and the discharge fan assembly.
3. Remove the partition plate of the air supply side and the partition plate of the discharge side.
   The partition plate of the air supply side is fixed with one screw and the partition plate of the discharge side is fixed with three screws at the side of the check hole. Remove these screws and remove these plates by drawing towards the center of the unit.

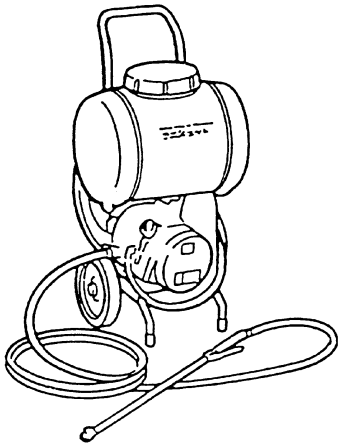
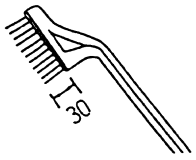


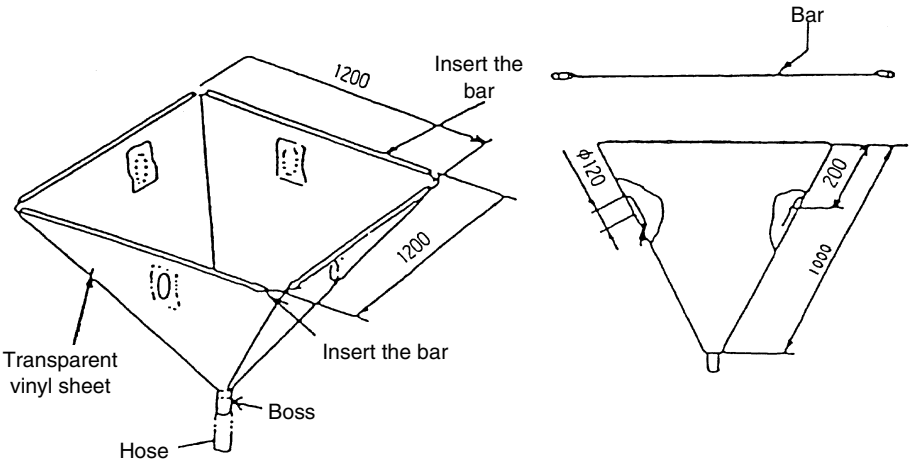
$ ***WARNING:*** *TURN OFF all the main switches*

4. When you are removing the fan assembly, remove the eight M6 bolts that fix the motor base to the unit and the suction bell mouth that is fixed to the fan casing together. You can remove the suction bell mouth when the cutout part of the bell mouth is horizontal by rotating counterclockwise.
   Remove the air supply fan assembly by pulling out the assembly from the fan casing, by drawing towards the center and by drawing out towards the front side.
   Remove the discharge fan assembly by pulling out the assembly from the fan casing, by drawing towards the center and by drawing out towards the front side.

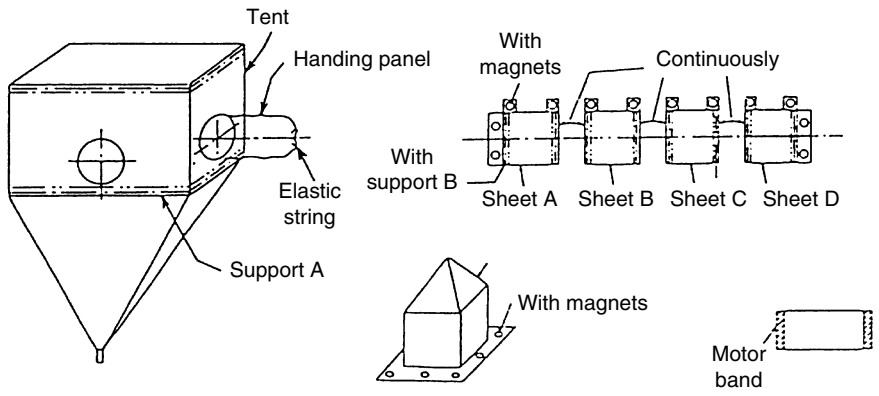
9.10. CLEANING THE INDOOR HEAT EXCHANGER

9.10.1. REQUIRED TOOLS FOR CLEANING (FOR ALL INDOOR UNITS)

No.	Tool	Remarks
1	Cleaning water pump 	A water pump that is equipped with a tank is recommended
2	Water tank clean water	Approx. 18 liters
3	Nozzle	
4	Brush (non-metal) 	If the heat exchanger is heavily clogged with dust, remove the dust with this brush. The length of brush should be 25 ~ 35mm.
5	Hose for water pan	Select a hose according to the site requirements
6	Bucket	2 for 5 liters
7	Phillips screwdriver	1
8	Nipper	1
9	Adjustable wrench	1
10	Megohm tester	500V
11	Cleaning agent	Select a neutral-type cleaning agent
12	Spray	To spray the cleaning water
13	Tape with adhesive	To fix the vinyl sheet in order to protect the room from the cleaning water
14	Rope	1m, 4 Pieces
15	Vinyl sheet	Select a vinyl sheet with 0.5mm thickness
16	Gloves	

No.	Remarks
17	Cleaning water collector ■ In-the-ceiling type ■ 2-way cassette ■ Wall type ■ Ceiling type  Inner side of Ø120 hole should be covered with felt sheet in order to insert the spray nozzle.
18	Cleaning water collector kit ■ 4-way cassette

No	Part	Material	Remarks	Qty
1	Tent with handling panel	Vinyl chloride sheet	1t, with handling panel 0.3t	1
2	Support A	Stainless		8
3	Sheet A	Vinyl chloride sheet	1t, with support B and magnet	1
4	Sheet B	Vinyl chloride sheet	1t, with support B and magnet	1
5	Sheet C	Vinyl chloride sheet	1t, with support B and magnet	1
6	Sheet D	Vinyl chloride sheet	1t, with support B and magnet	1
7	Motor panel	Vinyl chloride sheet	1t, with magnet	1
8	Motor band	Vinyl chloride sheet	1t, magic tape	1
9	Wiring panel	Vinyl chloride sheet		1
10	Gloves	Rubber		1
11	Sling rope		1 m	4



$ ***WARNING:*** *TURN OFF all the main switches*

9.10.2. CLEANING THE 4-WAY CASSETTE INDOOR UNIT

■ Spread a vinyl sheet over the floor in order to protect furniture and others from the cleaning water before doing this work.

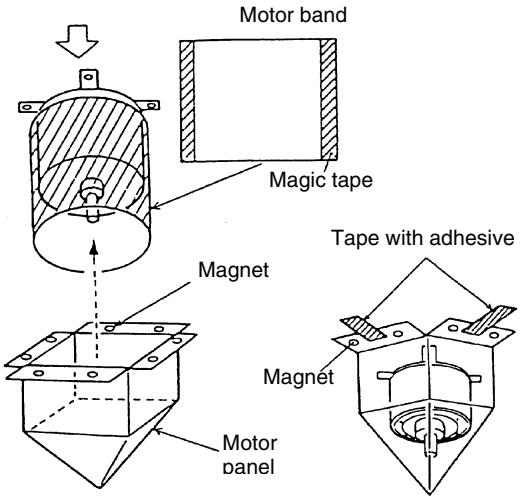
Procedure:

- Remove the optional air panel according to the section 9.2.4, "Removing the Optional Air panel".
- Remove the electrical box after opening the electrical box panel and after disconnecting the connectors between the indoor units and the outdoor units and other connectors, according to the section 9.2.3, "Removing the Electrical box Panel".
- Remove the bell mouth and the fan according to the section 9.2.5, "Removing the Turbo Fan and the Fan Motor".
- Remove the drain pan according to the section 9.2.8, "Removing the Drain Pan".
- Remove the float switch according to the section 9.2.7, "Removing the Float Switch".
-

1. Attach a vinyl sheet around the heat exchanger so that the cleaning water will not be splashed over the insulation surface and the drain-up pump. Fix the vinyl sheet on the side plate of the heat exchanger by means of a tape with adhesive. Seal the gap between the vinyl sheets by means of a tape with adhesive.

NOTE:

Wear gloves to avoid any injury by the fins of the heat exchanger.
In addition to the magnets, fix the motor panel by means of a tape with adhesive



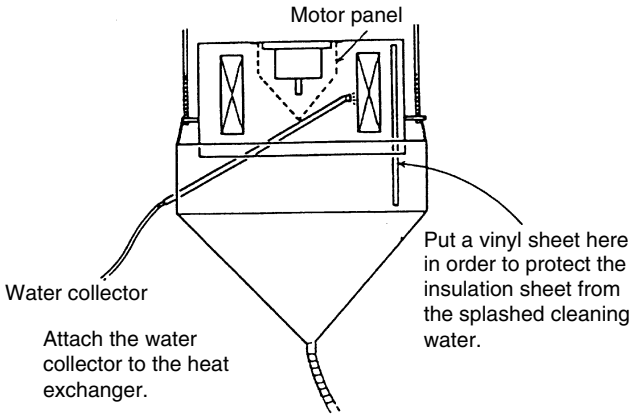
NOTES:

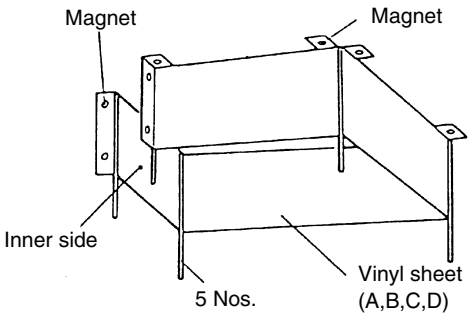
Remove the drain pan after removing the drain water on the drain pan.

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

2 Remove the drain pan after removing the four fixing screws. Carefully remove the drain pan, because the drain water may remain at the bottom of the drain pan.

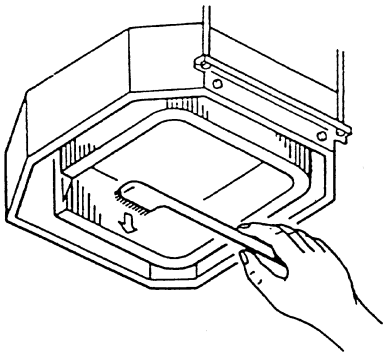
3 Clean and dry the drain pan after removing the drain pan. Carefully handle the drain pan to avoid damaging the drain pan.



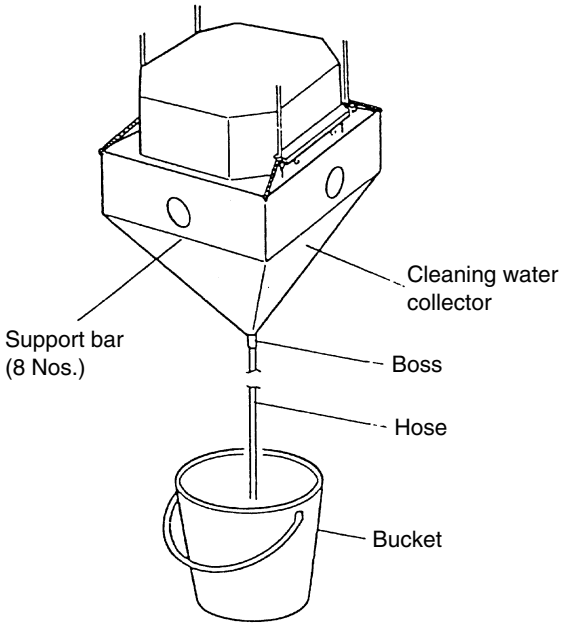


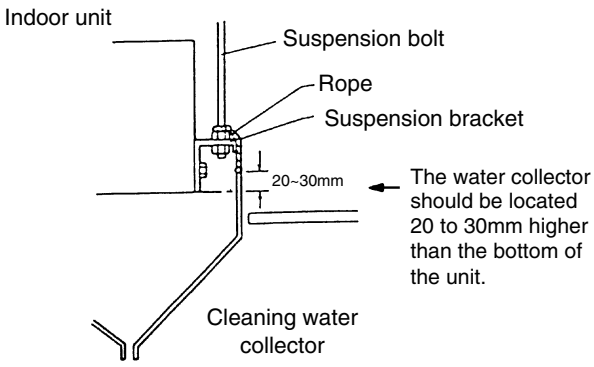
$ ***WARNING:*** *TURN OFF all the main switches*

2. Scratch off the dust on the inner surface of the heat exchanger downwards by means of a brush. Collect all the dust in a bucket or a carton box.

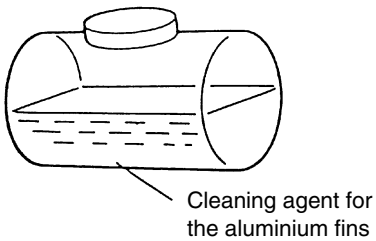


3. Suspend the cleaning water collector from the indoor unit.
   a. Tie the rope on the suspension bolts for the indoor unit and put the rope downwards.
   b. Insert the support bars into the holes of the water collector.
   c. Tie the rope on the support bar of the water collector and suspend the water collector.
   d. Connect a hose to the boss and put the end of the hose in a bucket.





4. Put approximately 15 liters of the cleaning agent for the aluminium fins in a supply tank.

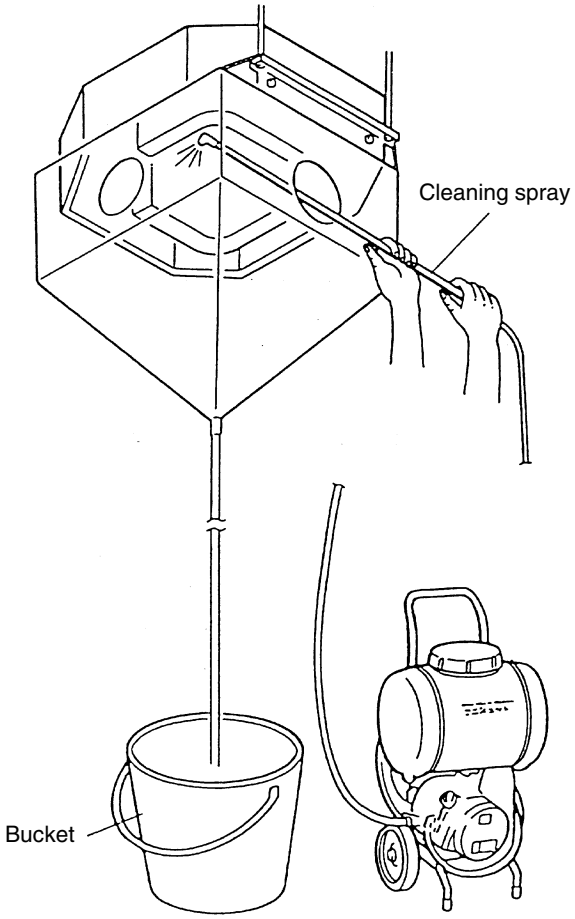


$ ***WARNING:*** *TURN OFF all the main switches*

5. Insert the spray nozzle through the hole of the cleaning water collector. Operate the water pump and clean the dust on the heat exchanger. After cleaning, spray the clean water in order to remove the cleaning water.
   Adjust the pressure of the water pump in order not to damage the fins.

NOTE:

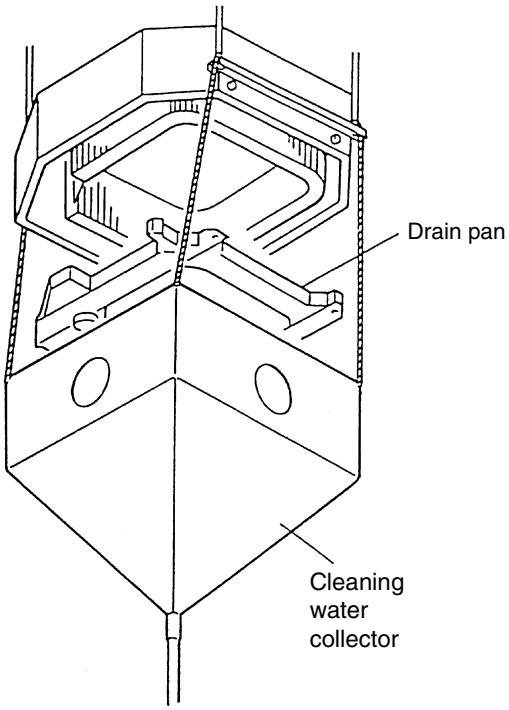
If the cleaning water stays, the fins will be corroded. Adjust the pressure of the pump at 2.5 to 5.0 kg/cm² in order not to damage the fins.



6. After cleaning, mount the drain pan by extending the rope downwards.

NOTE:

If the cleaning water collector is removed, wipe off the drops from the indoor unit.



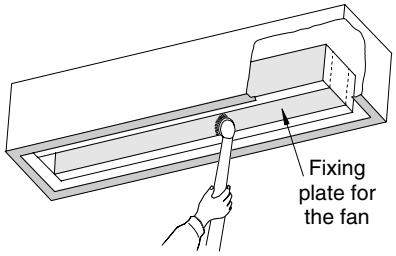
$ ***WARNING:*** *TURN OFF all the main switches*

7. Check the insulation of the drain pump with a megohm-meter. Make sure that the insulation is greater than 1 MΩ when 500V is applied.
8. Connect the wiring as the wiring was connected before.
9. Neutralization Treatment after the Cleaning
   The cleaning agent that is specified in the section 9.10.1 is neutral-type. However, the cleaning water after the use may not be neutral. Collect all the cleaning water and make the necessary neutralization treatment for the cleaning water.

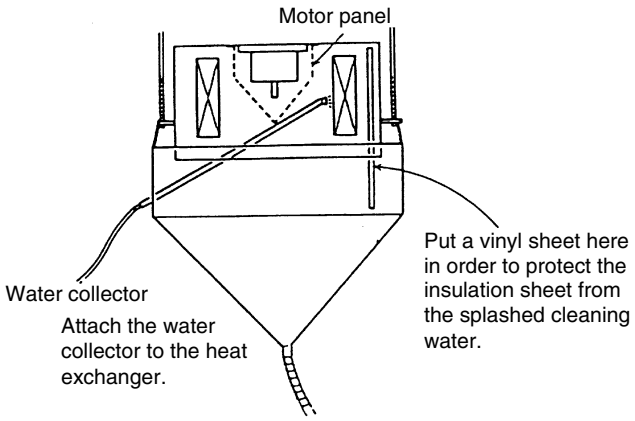
9.10.3. CLEANING THE 2-WAY CASSETTE INDOOR UNIT

Spread a vinyl sheet over the floor in order to protect furniture and others from the cleaning water before doing this work.

1. Remove the drain pan according to the section 9.3.8, "Removing the Drain Pan". Clean the drain pan after removing the drain pan.
2. Remove the float switch according to the section 9.3.6, "Removing the Float Switch"
3. Remove the drain-up mechanism according to the section 9.3.7, "Removing the Drain-Up Mechanism".



4. Removing the Dust on the Heat Exchanger
   Remove the dust on the fins at the inlet side of the heat exchanger by scratching off downwards.
   Collect all the dust in a bucket or a carton box.



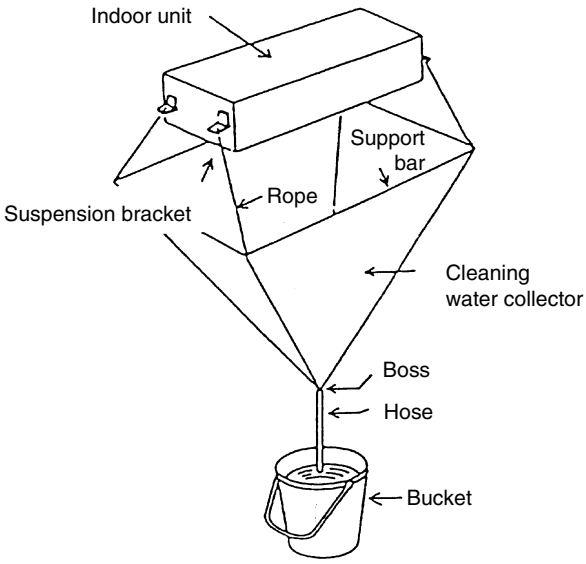
5. Put a vinyl sheet around the heat exchanger so that the cleaning water will not be splashed over the insulation surface and the drain-up pump. Fix the vinyl sheet on the side plate of the heat exchanger by means of a tape with adhesive.
   Seal the gap between the vinyl sheets by means of a tape with adhesive.

NOTE:

It is recommended that gloves be used during this work in order to avoid any injury.
Put a vinyl sheet in order to avoid the splashed cleaning water.

$ ***WARNING:*** *TURN OFF all the main switches*

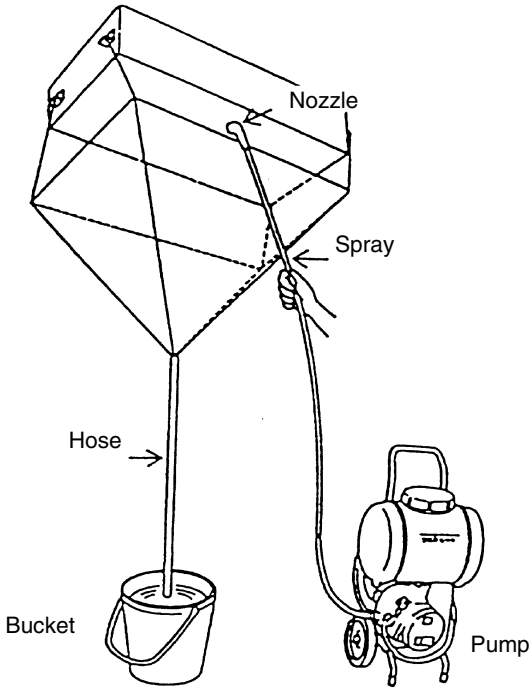
6. Suspend the cleaning water collector from the indoor unit.
   a. Connect a rope to the suspension bracket of the indoor unit and put the rope downwards.
   b. Insert the support bar into the hole of the cleaning water collector.
   c. Suspend the cleaning water collector with the rope from the indoor unit.
   d. Connect a hose to the boss for the cleaning water collector and put the other end in a bucket.
7. Spraying the Cleaning Water
   Spray the cleaning water over the fins of the heat exchanger.



8. Cleaning with clean water
   Insert the spray nozzle through the hole of the cleaning water collector.
   Operate the pump and clean the fins with the clean water.
   Adjust the pressure of the water pump in order not to damage the fins.

NOTE:

If the cleaning water stays, the fins will be corroded. Adjust the pressure of the pump at 2.5 to 5.0 kg/cm² in order not to damage the fins.



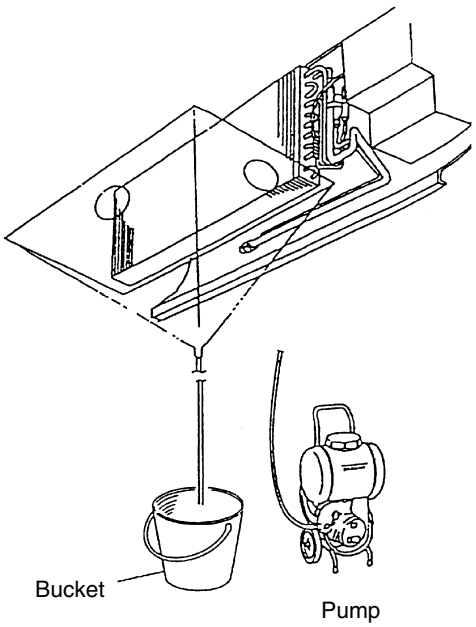
9. After you finish the cleaning and the dropping water stops, attach the fan assembly and the drain pan.
10. Check the insulation of the drain-up pump with a megohm-meter. Make sure that the insulation is greater than 1 MΩ when 500V is applied.
11. Connect the wiring as the wiring was connected before. Mount the air distribution chamber and the optional air panel
12. Neutralization Treatment after the Cleaning
    The cleaning agent that is specified in the section 9.10.1 is neutral-type. However, the cleaning water after the use may not be neutral. Collect all the cleaning water and make the necessary neutralization treatment for the cleaning water.

$ ***WARNING:*** *TURN OFF all the main switches*

9.10.4. CLEANING THE WALL TYPE INDOOR UNIT

Spread a vinyl sheet over the floor in order to protect furniture and others from the cleaning water before doing this work.

1. Remove each part according to the section 9.6, "Wall Type".
2. Remove the front panel according to the section 9.6.2, "Removing the Front Panel".
3. Remove the electrical box according to the section 9.6.5, "Removing the Electrical Box Panel".
4. Remove the drain pan according to the section 9.6.6, "Removing the Drain Pan".
5. Remove the heat exchanger according to the sections 9.6.7 and 9.6.8, "Removing the Heat Exchanger and the Fan Motor".
6. Cleaning
   a. Remove the dust with a brush.
   b. Cover a vinyl sheet over the electrical components in order to protect the electrical components from the splashed cleaning water.
   c. If you use the cleaning agent, clean the heat exchanger with the clean water completely.
   d. Adjust the pressure of the pump in order not to damage the fins.
7. Neutralization Treatment after the Cleaning
   The cleaning agent that is specified in the section 9.10.1 is neutral-type.
   However, the cleaning water after the use may not be neutral.
   Collect all the cleaning water and make the necessary neutralization treatment for the cleaning water.



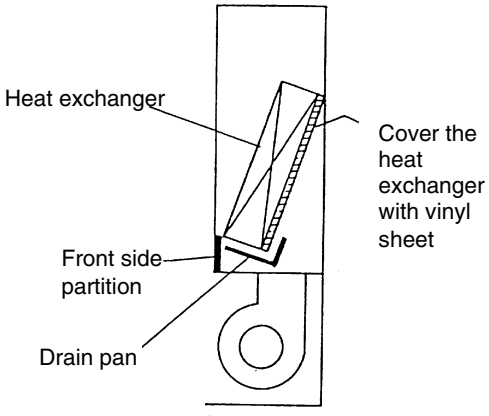
NOTES:

If the cleaning water stays, the fins will be corroded. Adjust the pressure of the pump at 2.5 to 5.0 kg/cm² in order not to damage the fins.

9.10.5. CLEANING THE FLOOR TYPE INDOOR UNIT AND THE FLOOR-CONCEALED TYPE INDOOR UNIT

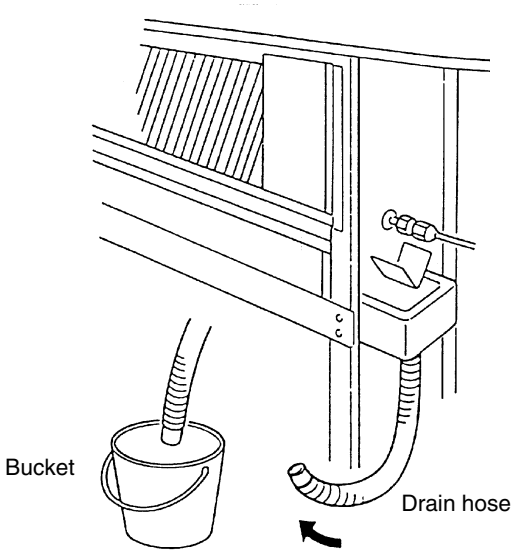
Spread a vinyl sheet over the floor in order to protect furniture and others from the cleaning water before doing this work.

1. Remove the front panel according to the section 9.7.3, "Removing the Front Panel".
2. Disconnect the drain hose from the field-supplied pipe.
3. Cover the rear side of the heat exchanger with a vinyl sheet after removing the front side partition and the drain pan. After covering the rear side, remount the front side partition and the drain pan.

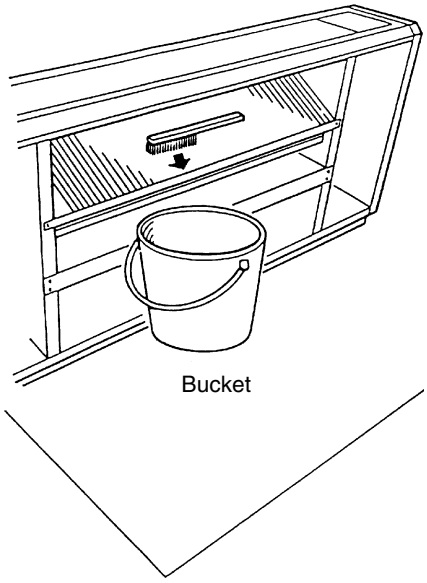


$ ***WARNING:*** *TURN OFF all the main switches*

4. By lifting the drain hose, put the end of the hose in a bucket.

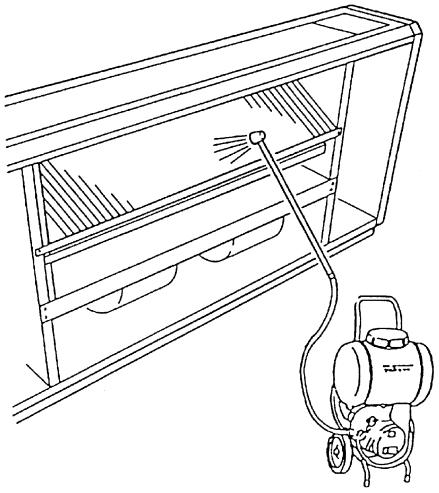


5. Removing the Dust on the Heat Exchanger
   Remove the dust on the heat exchanger with a brush by scratching the dust downwards. Collect all the dust in a bucket or a carton box.



6. Spray the cleaning water over the fins of the heat exchanger.

7. Cleaning with the clean water
   Cover the wiring connectors with the insulation tape.
   Operate the pump and clean the heat exchanger with the clean water completely.
   Adjust the pressure of the pump in order not to damage the fins.



NOTES:

If the cleaning water stays, the fins will be corroded.
Adjust the pressure of the pump at 2.5 to 5.0 kg/cm² in order not to damage the fins.

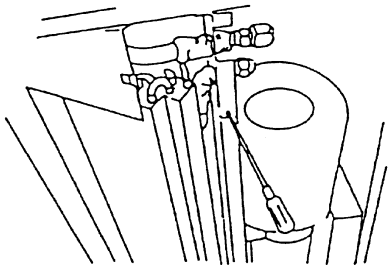
$ ***WARNING:*** *TURN OFF all the main switches*

8. After checking that no power is supplied, connect the drain pipe and remove the insulation tape for the wiring connectors. Then, mount the front panel correctly.
9. Check the insulation of the terminal board in the electrical box. If the insulation is greater than 1MΩ by a 500 Megohm-meter, the insulation is normal.
10. Neutralization Treatment after the Cleaning
    The cleaning agent that is specified in the section 9.6.1 is neutral-type. However, the cleaning water after the use may not be neutral. Collect all the cleaning water and make the necessary neutralization treatment for the cleaning water.

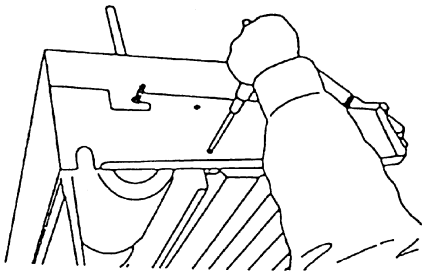
9.10.6. CLEANING THE CEILING TYPE INDOOR UNIT

Spread a vinyl sheet over the floor in order to avoid the cleaning water before doing this work.

1. Remove the left-side panel and the right-side panel according to the section 9.5.2, "Removing the Side Panel".
2. Remove the discharge deflector according to the section 9.5.3, "Removing the Discharge Air Grille".
3. Open the air inlet grille according to the section 9.5.1, "Removing the Air Filter".
4. Remove the lower panel and the drain pan according to the section 9.5.8, "Removing the Thermistors for the Liquid Pipe and the Gas Pipe".
5. Remove the indoor fan motor and the fan assembly according to the section 9.5.4, "Removing the Fan Motor".
6. Remove the partition plate 2 after removing the two fixing screws.



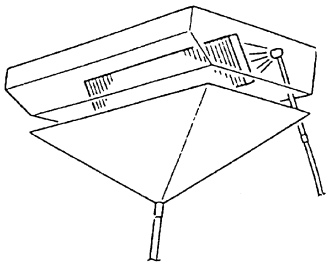
7. Remove the fixing plate for the fan after removing the two screws at the left-side partition and one screw at the right-side partition.



8. Attach the drain pan and the lower panel according to the procedures in reverse order in the section 4.

$ ***WARNING:*** *TURN OFF all the main switches*

9. Cover all the components (except the drain pan) with a vinyl sheet in order to avoid the splashed cleaning water.
10. Spray the cleaning water over the fins from the rear side of the heat exchanger. If the heat exchanger is heavily covered with the dust, use a brush in order to wipe off the dust.
11. Cleaning with the Clean Water
    a. Operate the pump and clean the heat exchanger with the clean water completely.
    b. Adjust the pressure of the pump in order not to damage the fins.



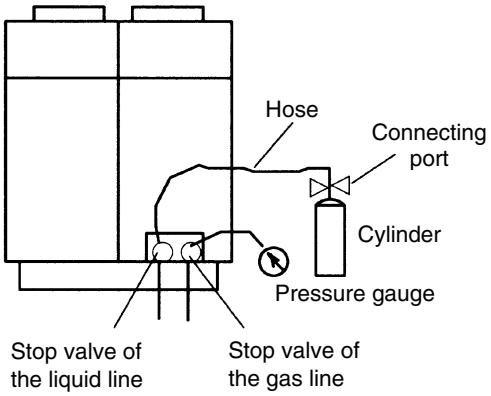
NOTES:

Wear the gloves in order to avoid any injury during this work due to the sharp edges of the fins.
If the cleaning water stays, the fins will be corroded.
Adjust the pressure of the pump at 2.5 to 5.0 kg/cm² in order not to damage the fins.
Pay attention to the drain pan not to overflow.

12. Check the insulation of the terminal board with a megohm-meter. Make sure that the insulation is greater than 1 MΩ when 500V is applied.
13. Make sure that the water can flow smoothly after pouring the water on the drain pan.
14. Neutralization Treatment after the Cleaning
    The cleaning agent that is specified in the section 9.10.1 is neutral-type. However, the cleaning water after the use may not be neutral.
    Collect all the cleaning water and make the necessary neutralization treatment for the cleaning water.

9.11. COLLECTING THE REFRIGERANT FOR REPLACING THE INDOOR UNIT

1. Prepare an empty refrigerant cylinder at -760mmHg with a charging hose. Measure the weight of the empty cylinder.
2. After shutting the stop valve on the cylinder, connect the charging hose to the stop valve of the liquid line. Connect a pressure gauge in order to the check joint on the stop valve of the gas line.
3. Air-purge inside of the hose between the stop valve of the liquid line and the cylinder by loosening the connection of the stop valve of the liquid line. Then, close the connecting port of the cylinder after finishing the air purging.
4. Operate the inverter compressor only in cooling mode by setting DIP switch DSW4.
5. Open the stop valve of the liquid line on the cylinder in order to collect the refrigerant into the cylinder. The cylinder capacity should be equivalent to half of the total refrigerant capacity. Check the refrigerant quantity by measuring the weight.
6. Close the stop valve of the liquid line on the cylinder gradually during the cooling process.
7. Fix the opening of the stop valve of the liquid line at a slightly opened position. Continue the cooling process.
8. Finally, close the stop valve of the liquid line. Then, close the stop valve of the gas line and stop the units when the pressure at the stop valve of the liquid line reaches -400mmHg.



NOTES:

The cylinder capacity should be equivalent to half of the total refrigerant capacity.
In case of 8HP to 30HP outdoor units:
Operate the inverter compressor only by setting DIP switch DSW4.

NOTE:

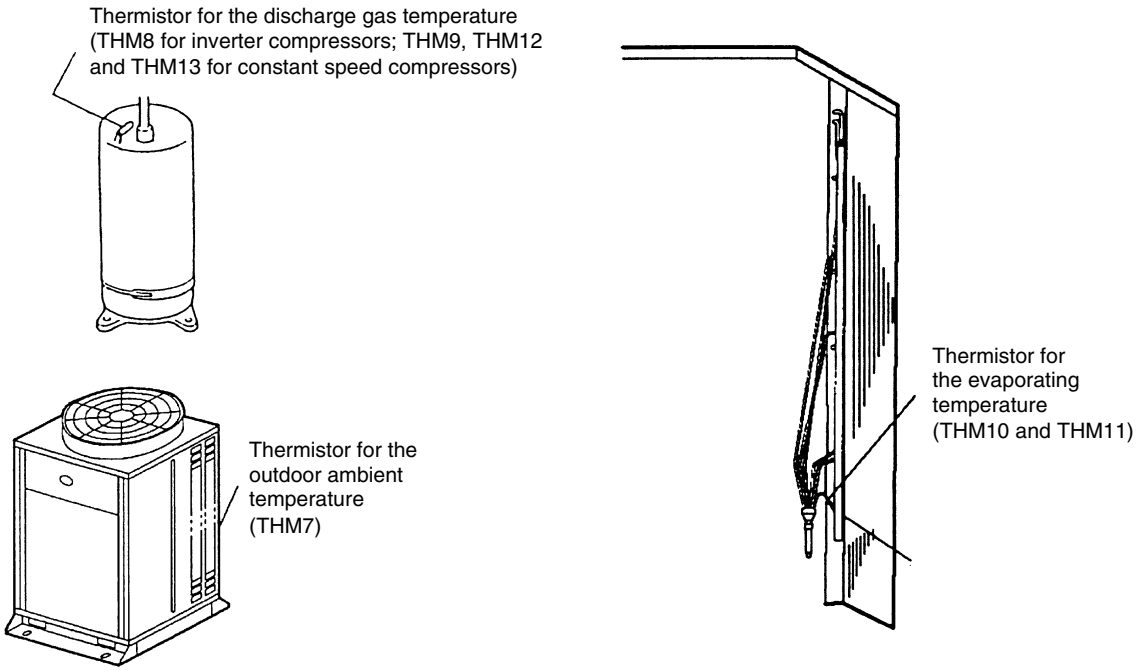
If you recharge the collected refrigerant into the system, charge the collected refrigerant by placing the cylinder up side down so that the refrigerant and the oil can be charged together.

10. MAIN PARTS

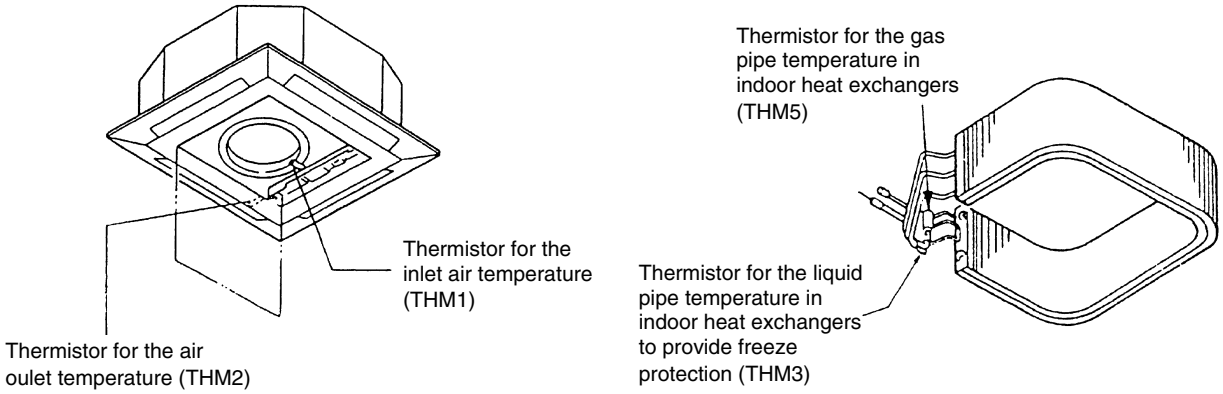
CONTENTS

10.1. THERMISTOR

Thermistors for the outdoor unit



Thermistors for the indoor unit



10.1.1. RESISTANCE VALUE OF THE THERMISTOR

■ **Overheating prevention of the discharge gas (Thermistor for checking the upper part of compressor: THM8, THM9, THM12, THM13, THM14 and THM16)**

a. There is a thermistor that checks the temperature of the upper part of the compressor in order to prevent the discharge gas from overheating. If the discharge gas temperature increases excessively, the deterioration of the lubrication oil and its lubrication properties will occur. This will cause a shorter compressor life.

b. If the discharge gas temperature increases excessively, the compressor temperature increases. In the worst case, the winding of the compressor motor will burn out.

c When the temperature of the upper part of the compressor increases during the heating process, the unit is controlled according to the following method:

1. An electronic expansion valve of the liquid bypass opens and the high-pressure refrigerant returns to the compressor through the accumulator. This decreases the compressor temperature.
2. If the temperature of the upper part of the compressor exceeds 127°C for 10 minutes, the compressor will stop. Even if an electronic expansion valve opens in that situation, the compressor will also stop. This way, the compressor is protected. Resistance values of the thermistor are shown in Fig. 10.1.

d. If the temperature of the upper part of the compressor exceeds 127°C for 10 minutes during the cooling process, the compressor will stop. (Refer to the block diagram for details.)

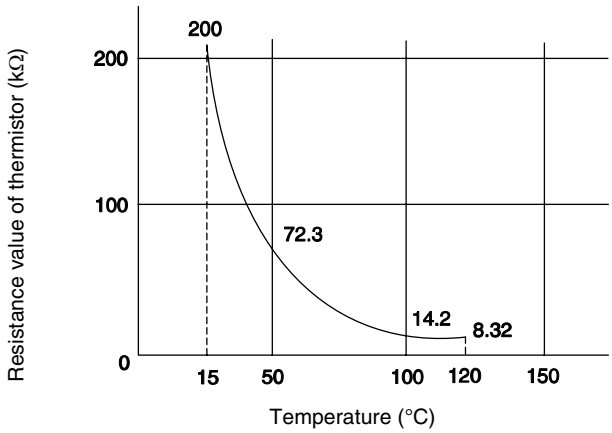


Fig. 10.1. Resistance values of the thermistor for overheating protection of the discharge gas

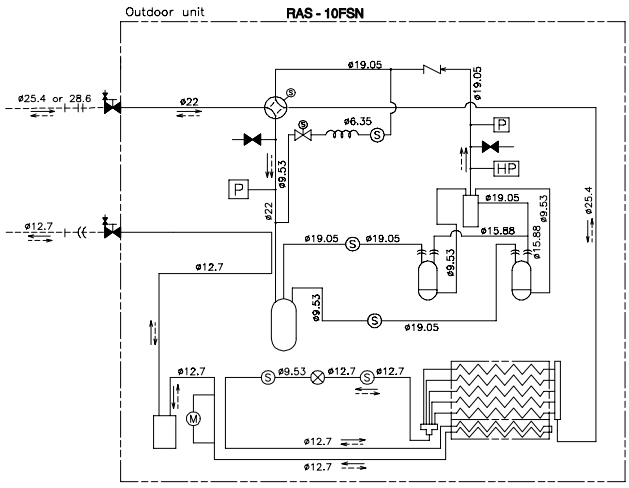


Fig. 10.2. Refrigerant cycle of the outdoor unit (RAS-10FSN)

■ **Thermistor for the outdoor temperature (THM7)**

When the outdoor ambient temperature decreases to -8°C or a lower temperature during the cooling process, the compressor will stop. Resistance values of the thermistor are shown in Fig. 10.3.

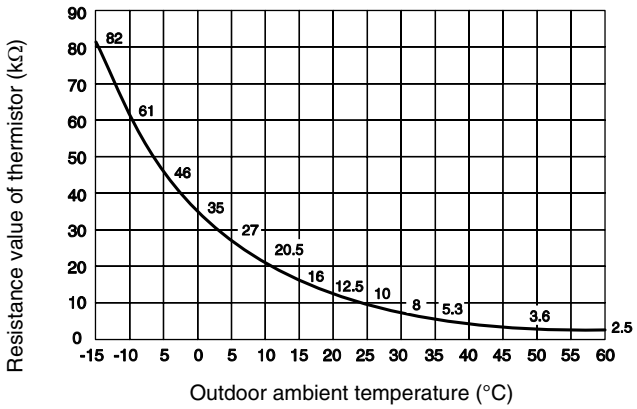


Fig. 10.3. Refrigerant cycle of the outdoor unit (RAS-10FSN)

■ **Thermistor for the defrost operation (THM10, THM11)**

The resistance values of this thermistor are the same as the resistance values of the thermistor for the outdoor ambient temperature.

■ Thermistor for the room temperature control (thermistor for the inlet air temperature of the indoor unit, THM1)

The thermistor for the inlet air temperature (THM1) controls the room temperature. The remote control switch displays the selected temperatures by means of figures. Set the room temperature so that the room temperature does not become too cool or too hot. It is recommended to set the room temperature in the following ranges.
Economical cooling mode: 27°C to 29°C
Economical heating mode: 18°C to 20°C
The resistance values of the thermistor are shown in Fig. 10.4.

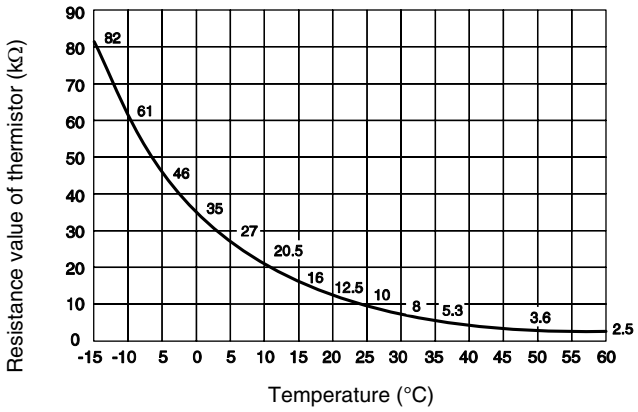


Fig. 10.4. Resistance values of the thermistor for the inlet air temperature

CAUTION:
The thermo-off valve of the thermistor for the inlet air temperature of the indoor unit is set at a higher temperature than the temperature displayed on the remote control switch by 4°C (the maximum inlet air temperature is 34º). The suction air temperature during the heating process has a tendency to become higher than the temperature of the occupied zone in order to provide a more efficient heating operation.

■ Thermistor for the control of the discharge air temperature (Thermistor for the discharge air temperature of the indoor unit, THM2)

The thermistor for the discharge air temperature (THM2) prevents the cold blow during the heating process. The resistance values of the thermistor are shown in Fig. 10.4.

■ Thermistor for the liquid pipe temperature of the indoor heat exchanger

When the temperature of the indoor heat exchanger decreases to 0°C or a lower temperature for 3 minutes, the thermostat automatically turns off. When the temperature of the indoor heat exchanger increases to 16°C or a higher temperature, the thermostat turns on.

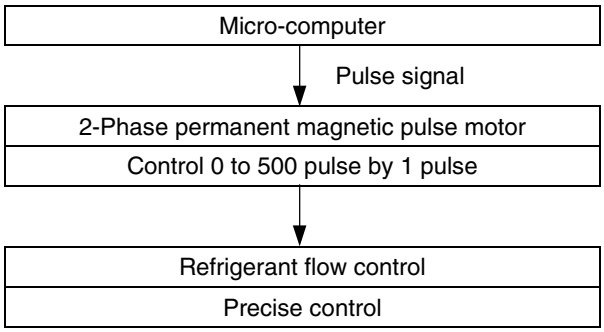
The purpose of this function is to prevent frosting on the indoor heat exchanger during the cooling process and the dry operation.
The resistance values of the thermistor are shown in Fig. 10.4.

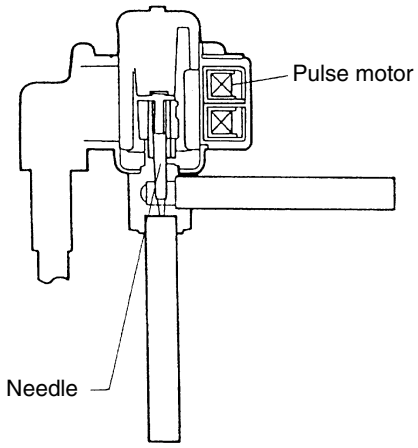
■ Thermistor for the gas pipe temperature of the indoor heat exchanger

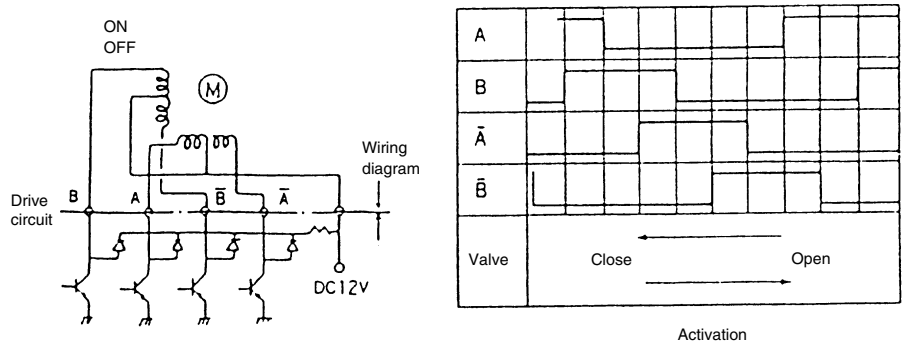
The thermistor for the gas pipe temperature senses the evaporating temperature during the heating process. The resistance values of the thermistor are shown in Fig. 10.4.

10.2. ELECTRONIC EXPANSION VALVE

10.2.1. ELECTRONIC EXPANSION VALVE FOR THE OUTDOOR UNIT





Items	Specifications
Applicable to the models	For the main cycle of: RAS-5FSN, RAS-8FSN, RAS-10FSN, RAS-16FSN, RAS-20FSN,RAS-24FSN,RAS-30FSN
Type	EKV (10.0USRT) series
Refrigerant	R410A
Working temperature range	-30°C ~ 65°C (Operation time of the coil: less than 50%)
Mounting direction	Drive shaft in vertical direction within an angle of 45° as maximum
Flow direction	Reversible
Drive method	4-Phase canned motor method
Rated voltage	DC12V±1.8V
Drive condition	83PPS (Pulse width at ON: 36mm sec, OFF: 60mm sec) 1,2 Phase excitation
Coil resistance (each phase)	46Ω ± 10% (at 20°C)
Wiring diagram, Drive circuit and activation mode	

10.2.2. ELECTRONIC EXPANSION VALVE FOR THE INDOOR UNIT

Micro-computer

↓ Pulse signal

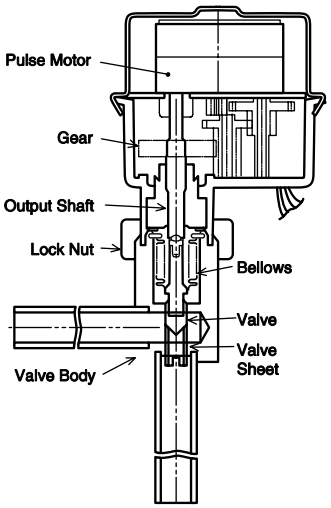
2-Phase permanent magnetic pulse motor

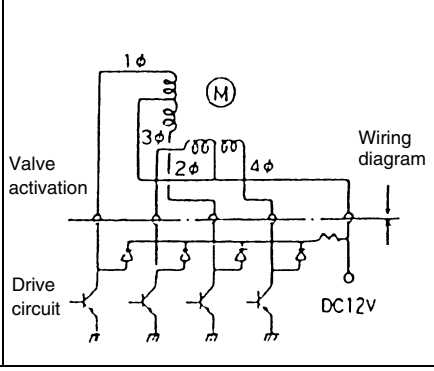
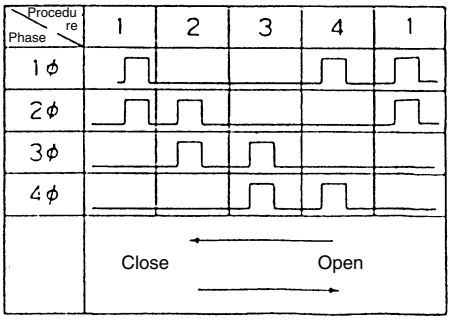
Control 0 to 2,000 pulse by 1 pulse

↓

Refrigerant flow control

Precise control

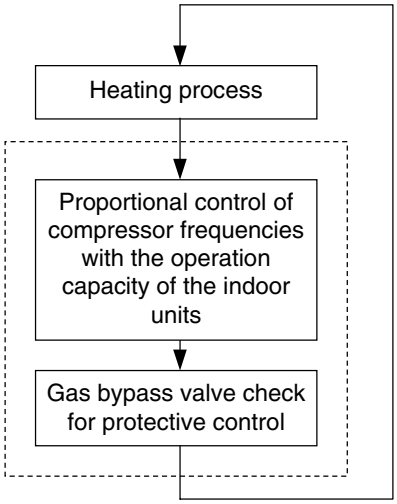


Items	Specifications
Type	EDM type
Refrigerant	R410A
Working temperature range	-30°C ~ 70°C (with coils which are not electrified)
Mounting direction	Drive shaft in vertical direction, motor upside and 90° in four direction
Flow direction	Reversible
Drive method	4-Phase pulse motor
Voltage rate	DC12V±1.2V
Drive condition	100Ω ± 250PPS (Pulse width over 3mm) 2 Phase excitation
Coil resistance (each phase)	150Ω ± 10% (at 20°C)
Wiring diagram, drive circuit and activation mode	  Activation mode

10.3. PRESSURE SENSOR

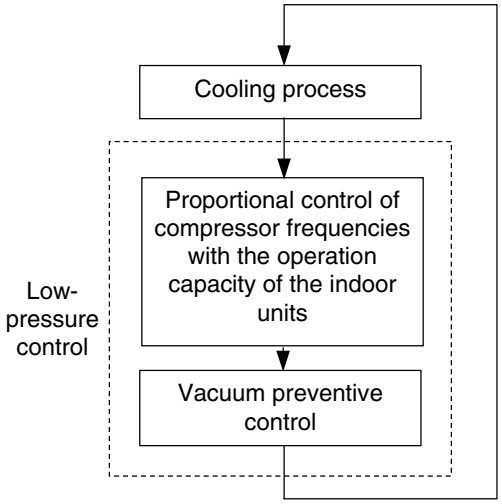
■ High-pressure control

A high-pressure sensor detects the high pressure during the heating process. The proportional control with the operation capacity of the indoor units controls the compressor frequencies. This way the high pressure is controlled within an appropriate range. The output of the high-pressure sensor during the heating process performs the protective control and the control of the gas bypass valve.



■ Low-pressure control

A low-pressure sensor detects the suction pressure during the cooling process. The proportional control with the operation capacity of the indoor units controls the compressor frequencies. This way the suction pressure is controlled within an appropriate range. If the suction pressure becomes excessively low, the cooling action may be insufficient and the parts in the refrigerant cycle may be damaged. Therefore, if the output of the low-pressure sensor indicates vacuum and the valve remains in the same position for 12 minutes or longer, the compressor will stop in order to avoid damage.



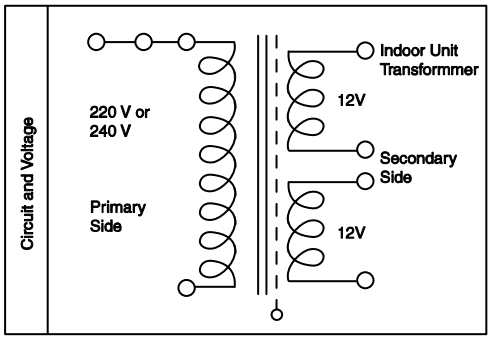
11 FIELD WORK INSTRUCTION

CONTENTS

⚠ ***WARNING:*** *TURN OFF all the main switches.*

11.1. CHECKING THE POWER SOURCE AND THE WIRING CONNECTION

Check the following items in the case of abnormal operation:

No.	Check item	Procedure
1	Is the breaker of the fuse cut out?	Check the secondary voltage of the breaker and the fuse by means of a tester.
2	Is the secondary power source on the transformer correct?	Disconnect the secondary side of the transformer and check the voltage by means of a tester. 
3	Is the wiring loosened or incorrectly connected?	Check the wiring connection on the PCB. ■ Thermistor connectors ■ Connector of the remote control cable ■ Connector of the transformer ■ Each connector in a high-voltage circuit Check the connectors according to the **Electrical Wiring** diagram.

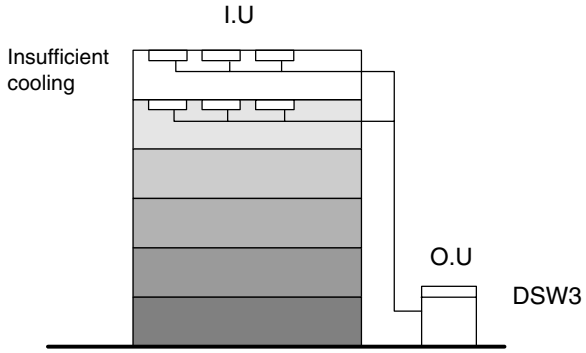
11.2. BURNT-OUT COMPRESSOR DUE TO AN INSUFFICIENT REFRIGERANT CHARGE

■ Question and answer for the field work

Example 1: Burnt-out compressor due to an insufficient refrigerant charge	
Phenomenon	After commissioning, the alarm code "08" sometimes occurred and the compressors were burnt out after operating for two months.
Cause	The refrigerant piping work was performed during the summer season. The additional refrigerant was not sufficiently charged from the discharge gas side. This insufficient refrigerant charge resulted in the overheating of the discharge gas and the oil deterioration, which was finally due to the separated operation despite the alarm code "08".
Countermeasure	1. The compressor was replaced with a new compressor. 2. The correct refrigerant amount was charged according to the refrigerant piping length and the connected indoor units.
Remarks	Additional refrigerant charge: Open the liquid stop valves slightly when you charge the additional refrigerant from the check joint of the liquid stop valves (the discharge gas side) during the cooling process. If the liquid stop valve is fully open, it is difficult to charge the additional refrigerant. Do not charge the refrigerant from the gas stop valve.

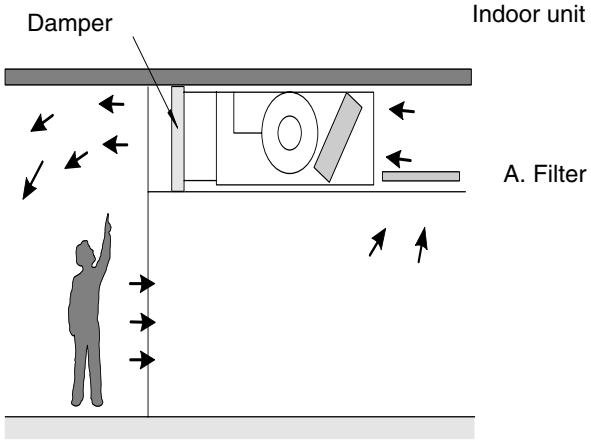
11.3. INSUFFICIENT COOLING PERFORMANCE WHEN A LONG PIPING IS APPLIED

■ **Question and answer for the field work**

Example 2: Insufficient cooling performance when a long piping is applied	
Phenomenon	Sufficient cooling was not available for an indoor unit that was located at the farthest position.
Cause	If the location of an outdoor unit is 20 meters lower than the location of the indoor units, resetting of the DIP switch DSW3 is required. However, no setting was performed. Therefore, the largest discharge pressure was not increased. This resulted in an insufficient cooling performance for the indoor unit. 
Countermeasure	The setting of the DSW3 was changed.
Remarks	Pay a special attention to the size of the liquid pipe if the lift between the indoor units and the outdoor units is higher than 20 meters. Refer to "Piping Work in TC" for details.

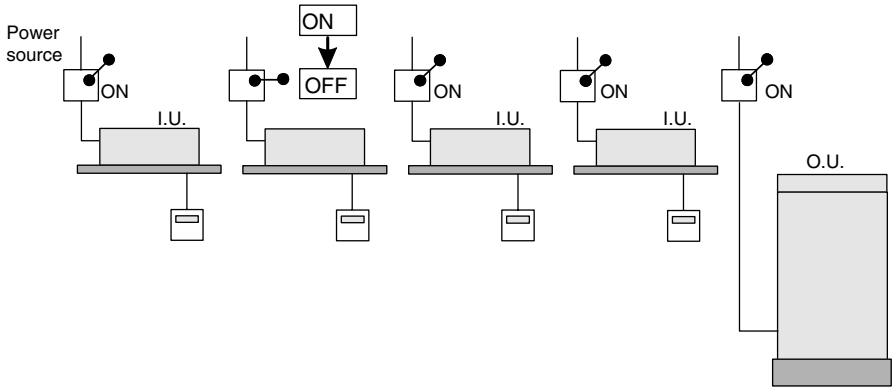
11.4. ABNORMALLY HIGH OPERATION SOUND (in-the-CEILING type INDOOR UNIT)

■ **Question and answer for the field work**

Example 3: Abnormally high operation sound (in-the-ceiling type indoor unit)	
Phenomenon	The operation sound at the "HIGH" speed was abnormally high.
Cause	The indoor units were installed without the ducts. Since there scarcely was any external static pressure, an abnormally big air volume was supplied. This resulted in a higher air speed through the heat exchanger. 
Countermeasure	In order to reduce the airflow rate, a plate that is used as a damper at the discharge gas side was added.
Remarks	Note that the running current is increased when no external pressure is given to the indoor unit. This results in an overheating.

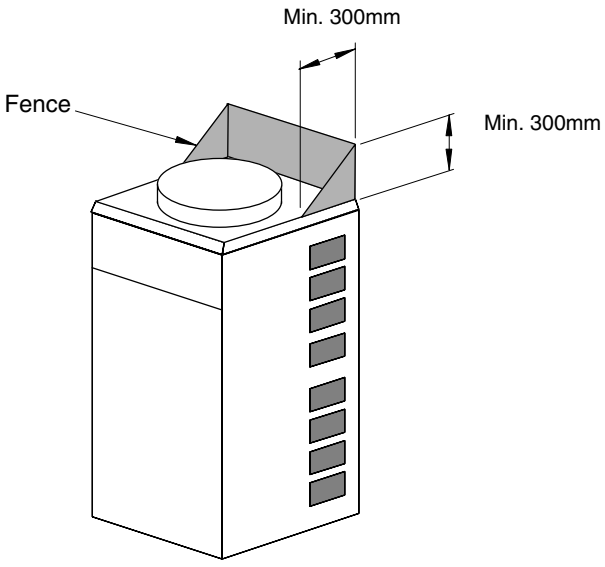
11.5. Alarm Code "31"

■ **Question and answer for the field work**

Example 4: Alarm code "31"	
Phenomenon	Alarm code "31" sometimes occurred and the system stopped.
Cause	The combination of the indoor units and the outdoor unit was the following.  This system was used in a tenant building. One of tenant's customers turned off the main switch for the indoor unit while other indoor units are running. This results in a different setting of the total indoor unit capacity in the same refrigerant cycle.
Countermeasure	All the main switches for the indoor units were always ON.

11.6. NOT COOLING WELL DUE TO INSUFFICIENT INSTALLATION SPACE FOR THE OUTDOOR UNIT

■ **Question and answer for the field work**

Example 5: Not cooling well due to insufficient installation space for the outdoor unit	
Phenomenon	The cooling process was well performed through the intermediate season. However, the cooling process was not adequately available when the outdoor temperature was higher than 35°C.
Cause	Since the outdoor units were installed without a sufficient installation space, the hot discharge air from other outdoor units circulated. In this case, although the outdoor temperature was 35°C, the actual suction air temperature was nearly 50°C and the protection system against the excessively high suction pressure was activated. Then, the frequency of the compressor was decreased and the cooling capacity was also decreased accordingly. Since the outdoor units were installed in-line back to back with a distance of 600mm between the backs, the hot discharge air from other outdoor units circulated. 
Countermeasure	To protect the unit from a short circuit, fences were mounted at the discharge air side as shown below.

11.7. GUIDELINE FOR SELECTING THE DRAIN PIPE FOR THE INDOOR UNIT

■ Method for selecting the drain pipe diameter

1. Calculation of the Drain Flow Volume
   Calculate that the drain flow volume is approximately 3 (l/hr) per 1HP of the nominal capacity of the indoor unit.

   For Example:

Common drain pipe for four 2HP indoor units and four 2.5HP indoor units.	
Total horsepower of the indoor unit	4 × 2HP + 4 × 2.5 HP=18HP
Total drain flow volume	18HP× 3 (l/hr × HP) = 54 (l/hr)

2. Select the drain pipe from the Table A and the Table B

Horizontal common pipe with the slope 1/50	VP30 for above Example
Horizontal common pipe with the slope 1/100	VP30 for above Example
Vertical common pipe	VP30 for above Example

Table A. Permissible drain flow volume of the horizontal vinyl pipe

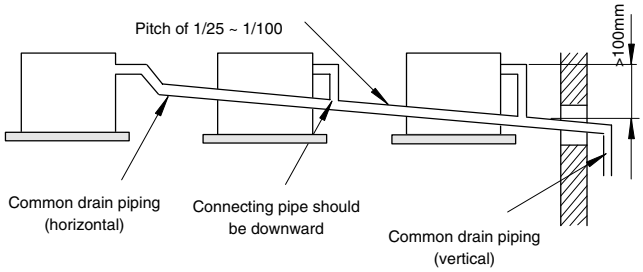
JIS symbol	Inner diameter (mm)	Permissible flow volume (l/hr]	
		Slope=1/50	Slope=1/100
VP20	20	39	27
VP25	25	70	50
VP30	31	125	88
VP40	40	247	175
VP50	51	472	334

NOTE:
VP20 and VP25: Not Applicable to the Common Pipe
VP30, VP40 and VP50: Applicable to the Common Pipe

Table B. Permissible drain flow volume of the vertical vinyl pipe

JIS symbol	Inner diameter (mm)	Permissible flow volume (l/hr]
VP20	20	220
VP25	25	410
VP30	31	730
VP40	40	1400
VP50	51	2760
VP65	67	5710
VP75	77	8280

NOTE:
VP20, VP25 and VP30: Not applicable to the common pipe
VP40, VP50, VP65 and VP75: Applicable to the common pipe



11.8. CAUTION WITH THE REFRIGERANT LEAKAGE

The designers and the installers have the responsibility to follow the local codes and the local regulations that specify the safety requirements against the refrigerant leakage.

11.8.1. MAXIMUM PERMISSIBLE CONCENTRATION OF THE HCFC GAS

The refrigerant R410A, which is charged in the SET-FREE FSN system, is an incombustible non-toxic gas. However, if the leakage occurs and the gas fills a room, the gas may cause suffocation.
The maximum permissible concentration of the HCFC gas and the R410A in the air is 0.44 kg/m³, according to the refrigeration and air conditioning system standard (KHK S 0010) by the KHK (High-Pressure Gas Protection Association) of Japan. Therefore, you must take some effective measures in order to lower the R410A concentration in the air below 0.44 kg/m³, if there is a leakage.

11.8.2. CALCULATION OF THE REFRIGERANT CONCENTRATION

1. Calculate the total quantity of refrigerant R (kg) that is charged in the system that connects all the indoor units of the rooms that need air conditioning systems.
2. Calculate the room volume V (m³) of each room.
3. Calculate the refrigerant concentration C (kg/m³) of the room according to the following equation:

$\frac{R}{V} = C$	R: Total quantity of charged refrigerant (kg) V: Room volume (m³) C: Refrigerant concentration (≤0.44* kg/m³ for the R410A)

* Use this value only for reference because this value is not fixed yet.

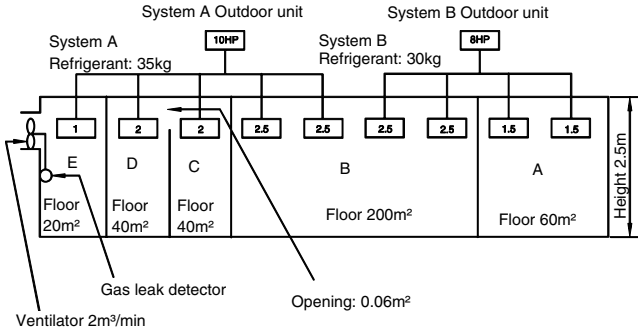
11.8.3. COUNTERMEASURE FOR THE REFRIGERANT LEAKAGE ACCORDING TO THE KHK STANDARD

According to the KHK standards, you should arrange the facility as follows so that the refrigerant concentration will be bellow 0.44 kg/m³.

1. Provide a shutterless opening that will allow the fresh air to circulate into the room.
2. Provide a doorless opening with a size of 0.15% or more to the floor area.
3. Provide a ventilator, which must be linked with a gas leak detector, with a ventilating capacity of 0.5m³/min or more per Japanese Refrigeration Ton (=compressor displacement m³/h/8.5 of the air conditioning system which uses the refrigerant).

O.U. model ton	O.U. model ton
RAS-5FSN	2.27
RAS-8FSN	3.76
RAS-10FSN	4.04
RAS-16FSN	5.81
RAS-20FSN	7.58
RAS-24FSN	9.35
RAS-30FSN	12.12

4. Pay a special attention to the place, such as a basement and others, where the refrigerant may stay, because the refrigerant is heavier than the air.



Room	R (kg)	V (m³)	C (kg/m³)	Countermeasure
A	30	150	0.2	-
B	65	500	0.13	-
C	35	100	0.35	-
D	35	100	0.35	-
C+D	35	200	0.175	-
E	35	50	0.7	2m³/min

11.9. MAINTENANCE WORK

■ For the indoor unit and the outdoor unit

1. Fan and fan motor
   - Lubrication: All the fan motors are prelubricated and sealed at the factory. Therefore, no lubrication maintenance is required.
   - Sound and vibration: Check for abnormal sounds and vibrations.
   - Rotation: Check the clockwise rotation and the rotating speed.
   - Insulation: Check the electrical insulation resistance.
2. Heat exchanger
   - Clog: Inspect the heat exchanger at regular intervals and remove any accumulated dirt and any accumulated dust from the heat exchanger. You should also remove from the outdoor units other obstacles, such as the growing grass and the pieces of paper, which might restrict the airflow.
3. Piping connection
   - Leakage: Check for the refrigerant leakage at the piping connection.
4. Cabinet
   - Stain and Lubrication: Check for any stain and any lubrication. Remove the stain and the lubrication.
   - Fixing Screw: Check for any loosened screw or any lost screw. Fix the loosened screws and the lost screws. Insulation Material: Check for any peeled thermal insulator on the cabinet. Repair the thermal insulator.
5. Electrical equipment
   - Activation: Check for an abnormal activation of the magnetic contactor, the auxiliary relay, the PCB and others.
   - Line condition: Pay attention to the working voltage, the working amperage and the working phase balance. Check for any faulty contact that is caused by the loosened terminal connections, the oxidized contacts, the foreign matter, and other items. Check the electrical insulation resistance.
6. Control device and protection device
   - Setting: Do not readjust the setting in the field unless the setting is maintained at a point that is different from the point that is listed in the section "7.6. SAFETY AND CONTROL DEVICE SETTING" of "TC".

■ For the indoor unit

1. Air filter
   - Cleaning: Check for any accumulated dirt and any accumulated dust. Remove the dirt and the dust.
2. Drain pan, drain-up mechanism and drain pipe
   - Drain line: Check and clean the condensate drain pipe at least twice a year.
   - Drain-up mechanism: Check the activation of the drain-up mechanism.
3. Float switch
   - Activation: Check the activation of the float switch.

■ For the outdoor unit

1. Compressor
   - Sound and vibration: Check for abnormal sounds and vibrations.
   - Activation: Check that the voltage drop of the power supply line is within 15% at the start and within 2% during the operation.
2. Reverse valve
   - Activation: Check for any abnormal activation sound.
3. Strainer
   - Clog: Check that there is no temperature difference between both ends.
4. Ground wire
   - Ground line: Check for the continuity to earth.
5. Oil heater
   - Activation: You should activate the oil heater at least twelve hours before the start-up by turning ON the main switch.

11.10. SERVICE AND MAINTENANCE RECORD

No.	Check item	Action	Judgement	
1	Is the service area sufficient?		Yes	No
2	Is there a short circuit of the discharged air?		Yes	No
3	Any heat influence?		Yes	No
4	Is the ground wire connected?		Yes	No
5	Refrigerant piping		Good	Not good
6	Fixing the units		Good	Not good
7	Is there any damage on the outer surface or the internal surface?		Yes	No
8	Checking the screw and the bolts	Tighten if loosened.	Tightened	Not tightened
9	Tightening the Terminal Screws	Tighten all the terminal screws with a Phillips screwdriver.	Tightened	Not tightened
10	Are the compressor terminals tightly fixed?	Push all the terminals.	Pushed	Not pushed
11	Insulation resistance	Measure the insulation resistance with an insulation resistance meter. Comp. and fan motor: greater than 3MΩ Others: greater than 3MΩ	Good	Not good
12	Does the drain water flow smoothly?	Check the smooth flow by pouring some water.	Good	Not good
13	Check for a leakage in the compressor.	Check for any leakage.	Good	Not good
14	Check for a leakage in the outdoor heat exchanger.	ditto	Good	Not good
15	Check for a leakage in the indoor heat exchanger.	ditto	Good	Not good
16	Check for a leakage in the 4-way valve.	ditto	Good	Not good
17	Check for a leakage in the check valve.	ditto	Good	Not good
18	Check for a leakage in the accumulator.	ditto	Good	Not good
19	Check for a leakage in the strainer.	ditto	Good	Not good

No.	Check item	Action	Judgement	
20	Check for a leakage in the electronic expansion valve.	ditto	Good	Not good
21	Check for a leakage in the piping.	ditto	Good	Not good
22	Check the direction of the fans.	By viewing the airflow volume	Good	Not good
23	Voltage among each phase	Higher than AC220V	Good	Not good
24	Vibration and sound	Check the fan, the compressor, the piping, and others.	Good	Not good
25	Activation of each operation mode	Check the activation of the COOL switch, the HEAT switch, the STOP switch and the TEMP switch.	Good	Not good
26	High-pressure cut-out switch	Check the actual activation value.	Good	Not good
27	Check the activation of the drain-up mechanism.	Check the activation during the cooling process.	Good	Not good
28	Air inlet temperature of the indoor unit DB/WB		(°C)DB	(°C)WB
29	Air outlet temperature of the indoor unit DB/WB		(°C)DB	(°C)WB
30	Air inlet temperature of the outdoor unit DB/WB		(°C)DB	(°C)WB
31	Air outlet temperature of the outdoor unit DB/WB		(°C)DB	(°C)WB
32	High-pressure switch		kg/cm²G	
33	Low-pressure switch		kg/cm²G	
34	Operating voltage		V	
35	Operating current		A	
36	Instructions to the client for cleaning the air filter		Done	Not yet
37	Instructions to the client about the cleaning method		Done	Not yet
38	Instructions to the client about the operation		Done	Not yet

11.11. SERVICE AND MAINTENANCE RECORD BY MEANS OF THE 7-SEGMENT DISPLAY

11.11.1. SERVICE AND MAINTENANCE RECORD BY MEANS OF THE 7-SEGMENT DISPLAY

■ **Data sheet for checking by means of the 7-segment display**

Outdoor unit model (Serial No.)		RAS- (Serial No.)							
1. Operation mode									
2. Start time of the test run									
3. Start time of the data collection									
4. Read-out data from the 7-segment display									
Protection control code									
Outdoor micro-computer input/output	SC	PSH_1	PSH_2	PSH_3	PSH_4	PSH_5	PSH_6	DCFan	FAN1
		SVA_1	SVF_1	SVG	RVR_1	RVR_2	CH_1		
Total of running indoor unit capacity	Op								
Inverter frequency at the compressor No.1	H 1								
Number of running compressors	C C								
Airflow rate of the outdoor fan	Fo								
Expansion valve opening 1~6 of the outdoor unit	oE1~6, B	oE1	oE2	oE3	oE4	oE5	oE6	oEB	
High discharge pressure [MPa]	Pd								
Low suction pressure [MPa]	Ps								
Temperature on the top of the compressor No.1~No.6	Td1~6	Td1	Td2	Td3	Td4	Td5	Td6		
Evaporating temperature at heating 1.2	TE 1.2	TE1	TE2						
Outdoor temperature	To								
Current at the compressor No.1~No.6	A1~6	A1	A2	A3	A4	A5	A6		
Expansion valve opening of the indoor unit	iEN								
Liquid pipe (freeze) temperature of the heat exchanger of the indoor unit	TLn								
Gas pipe temperature of the heat exchanger of the indoor unit	TGn								
Air inlet temperature of the indoor unit	Tin								
Discharge air temperature of the indoor unit	Ton								
Indoor unit capacity	CAn								
Cause code of the stoppage at the indoor unit	d1n								
Restricted control for prevention of compression ratio decrease	C11								
Restricted control for prevention of high pressure increase	C13								
Restricted control for prevention of the temperature increase of the inverter fan	C14								
Restricted control for prevention of discharge gas temperature increase	C15								
Restricted control for prevention of TdSH decrease	C16								
Restricted control for prevention of overcurrent	C17								
Total accumulated hours of the compressors No.1~No.6	UJ1~6	UJ1	UJ2	UJ3	UJ4	UJ5	UJ6		
Outdoor alarm code	AC								
Cause code of the stoppage at the inverter	iTC								
Total capacity setting of	CP								
Total quantity of the combined	AA								
Address of the refrigerant system	GA								

Outdoor unit model (Serial No.)		RAS- (Serial No.)							
1. Operation mode									
2. Start time of the test run									
3. Start time of the data collection									
4. Read-out data from the 7-segment display									
Protection control code									
Outdoor micro-computer input/output	SC	PSH_1	PSH_2	PSH_3	PSH_4	PSH_5	PSH_6	DCFan	FAN1
		SVA_1	SVF_1	SVG	RVR_1	RVR_2	CH_1		
Total of running indoor unit capacity	Op								
Inverter frequency at the compressor No.1	H 1								
Number of running compressors	C C								
Airflow rate of the outdoor fan	Fo								
Expansion valve opening 1~6 of the outdoor unit	oE1~6, B	oE1	oE2	oE3	oE4	oE5	oE6	oEB	
High discharge pressure [MPa]	Pd								
Low suction pressure [MPa]	Ps								
Temperature on the top of the compressor No.1~No.6	Td1~6	Td1	Td2	Td3	Td4	Td5	Td6		
Evaporating temperature at heating 1.2	TE 1.2	TE1	TE2						
Outdoor temperature	To								
Current at the compressor No.1~No.6	A1~6	A1	A2	A3	A4	A5	A6		
Expansion valve opening of the indoor unit	iEN								
Liquid pipe (freeze) temperature of the heat exchanger of the indoor unit	TLn								
Gas pipe temperature of the heat exchanger of the indoor unit	TGn								
Air inlet temperature of the indoor unit	Tin								
Discharge air temperature of the indoor unit	Ton								
Indoor unit capacity	CAn								
Cause code of the stoppage at the indoor unit	d1n								
Restricted control for prevention of compression ratio decrease	C11								
Restricted control for prevention of high pressure increase	C13								
Restricted control for prevention of the temperature increase of the inverter fan	C14								
Restricted control for prevention of discharge gas temperature increase	C15								
Restricted control for prevention of TdSH decrease	C16								
Restricted control for prevention of overcurrent	C17								
Total accumulated hours of the compressors No.1~No.6	UJ1~6	UJ1	UJ2	UJ3	UJ4	UJ5	UJ6		
Outdoor alarm code	AC								
Cause code of the stoppage at the inverter	iTC								
Total capacity setting of	CP								
Total quantity of the combined	AA								
Address of the refrigerant system	GA								

Outdoor unit model (Serial No.)		RAS- (Serial No.)							
1. Operation mode									
2. Start time of the test run									
3. Start time of the data collection									
4. Read-out data from the 7-segment display									
Protection control code									
Outdoor micro-computer input/output	SC	PSH_1	PSH_2	PSH_3	PSH_4	PSH_5	PSH_6	DCFan	FAN1
		SVA_1	SVF_1	SVG	RVR_1	RVR_2	CH_1		
Total of running indoor unit capacity	Op								
Inverter frequency at the compressor No.1	H 1								
Number of running compressors	C C								
Airflow rate of the outdoor fan	Fo								
Expansion valve opening 1~6 of the outdoor unit	oE1~6, B	oE1	oE2	oE3	oE4	oE5	oE6	oEB	
High discharge pressure [MPa]	Pd								
Low suction pressure [MPa]	Ps								
Temperature on the top of the compressor No.1~No.6	Td1~6	Td1	Td2	Td3	Td4	Td5	Td6		
Evaporating temperature at heating 1.2	TE 1.2	TE1	TE2						
Outdoor temperature	To								
Current at the compressor No.1~No.6	A1~6	A1	A2	A3	A4	A5	A6		
Expansion valve opening of the indoor unit	iEN								
Liquid pipe (freeze) temperature of the heat exchanger of the indoor unit	TLn								
Gas pipe temperature of the heat exchanger of the indoor unit	TGn								
Air inlet temperature of the indoor unit	Tin								
Discharge air temperature of the indoor unit	Ton								
Indoor unit capacity	CAn								
Cause code of the stoppage at the indoor unit	d1n								
Restricted control for prevention of compression ratio decrease	C11								
Restricted control for prevention of high pressure increase	C13								
Restricted control for prevention of the temperature increase of the inverter fan	C14								
Restricted control for prevention of discharge gas temperature increase	C15								
Restricted control for prevention of TdSH decrease	C16								
Restricted control for prevention of overcurrent	C17								
Total accumulated hours of the compressors No.1~No.6	UJ1~6	UJ1	UJ2	UJ3	UJ4	UJ5	UJ6		
Outdoor alarm code	AC								
Cause code of the stoppage at the inverter	iTC								
Total capacity setting of	CP								
Total quantity of the combined	AA								
Address of the refrigerant system	GA								

Outdoor unit model (Serial No.)		RAS- (Serial No.)							
1. Operation mode									
2. Start time of the test run									
3. Start time of the data collection									
4. Read-out data from the 7-segment display									
Protection control code									
Outdoor micro-computer input/output	SC	PSH_1	PSH_2	PSH_3	PSH_4	PSH_5	PSH_6	DCFan	FAN1
		SVA_1	SVF_1	SVG	RVR_1	RVR_2	CH_1		
Total of running indoor unit capacity	Op								
Inverter frequency at the compressor No.1	H 1								
Number of running compressors	C C								
Airflow rate of the outdoor fan	Fo								
Expansion valve opening 1~6 of the outdoor unit	oE1~6, B	oE1	oE2	oE3	oE4	oE5	oE6	oEB	
High discharge pressure [MPa]	Pd								
Low suction pressure [MPa]	Ps								
Temperature on the top of the compressor No.1~No.6	Td1~6	Td1	Td2	Td3	Td4	Td5	Td6		
Evaporating temperature at heating 1.2	TE 1.2	TE1	TE2						
Outdoor temperature	To								
Current at the compressor No.1~No.6	A1~6	A1	A2	A3	A4	A5	A6		
Expansion valve opening of the indoor unit	iEN								
Liquid pipe (freeze) temperature of the heat exchanger of the indoor unit	TLn								
Gas pipe temperature of the heat exchanger of the indoor unit	TGn								
Air inlet temperature of the indoor unit	Tin								
Discharge air temperature of the indoor unit	Ton								
Indoor unit capacity	CAn								
Cause code of the stoppage at the indoor unit	d1n								
Restricted control for prevention of compression ratio decrease	C11								
Restricted control for prevention of high pressure increase	C13								
Restricted control for prevention of the temperature increase of the inverter fan	C14								
Restricted control for prevention of discharge gas temperature increase	C15								
Restricted control for prevention of TdSH decrease	C16								
Restricted control for prevention of overcurrent	C17								
Total accumulated hours of the compressors No.1~No.6	UJ1~6	UJ1	UJ2	UJ3	UJ4	UJ5	UJ6		
Outdoor alarm code	AC								
Cause code of the stoppage at the inverter	iTC								
Total capacity setting of	CP								
Total quantity of the combined	AA								
Address of the refrigerant system	GA								

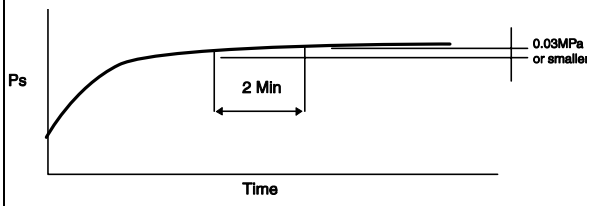
Outdoor unit model (Serial No.)		RAS- (Serial No.)							
1. Operation mode									
2. Start time of the test run									
3. Start time of the data collection									
4. Read-out data from the 7-segment display									
Protection control code									
Outdoor micro-computer input/output	SC	PSH_1	PSH_2	PSH_3	PSH_4	PSH_5	PSH_6	DCFan	FAN1
		SVA_1	SVF_1	SVG	RVR_1	RVR_2	CH_1		
Total of running indoor unit capacity	Op								
Inverter frequency at the compressor No.1	H 1								
Number of running compressors	C C								
Airflow rate of the outdoor fan	Fo								
Expansion valve opening 1~6 of the outdoor unit	oE1~6, B	oE1	oE2	oE3	oE4	oE5	oE6	oEB	
High discharge pressure [MPa]	Pd								
Low suction pressure [MPa]	Ps								
Temperature on the top of the compressor No.1~No.6	Td1~6	Td1	Td2	Td3	Td4	Td5	Td6		
Evaporating temperature at heating 1.2	TE 1.2	TE1	TE2						
Outdoor temperature	To								
Current at the compressor No.1~No.6	A1~6	A1	A2	A3	A4	A5	A6		
Expansion valve opening of the indoor unit	iEN								
Liquid pipe (freeze) temperature of the heat exchanger of the indoor unit	TLn								
Gas pipe temperature of the heat exchanger of the indoor unit	TGn								
Air inlet temperature of the indoor unit	Tin								
Discharge air temperature of the indoor unit	Ton								
Indoor unit capacity	CAn								
Cause code of the stoppage at the indoor unit	d1n								
Restricted control for prevention of compression ratio decrease	C11								
Restricted control for prevention of high pressure increase	C13								
Restricted control for prevention of the temperature increase of the inverter fan	C14								
Restricted control for prevention of discharge gas temperature increase	C15								
Restricted control for prevention of TdSH decrease	C16								
Restricted control for prevention of overcurrent	C17								
Total accumulated hours of the compressors No.1~No.6	UJ1~6	UJ1	UJ2	UJ3	UJ4	UJ5	UJ6		
Outdoor alarm code	AC								
Cause code of the stoppage at the inverter	iTC								
Total capacity setting of	CP								
Total quantity of the combined	AA								
Address of the refrigerant system	GA								

RVR1: 4-way valve
RVR2: 4-way valve
SVA_1: Solenoid valve
SVF_1: Solenoid valve
SVG: Solenoid valve

CH_1: Crankcase heater
DC Fan: Direct control fan
Fan 1: Constant speed fan

11.11.2. PUMP-DOWN METHOD FOR REPLACING THE COMPRESSOR

No.	Procedure	Remarks
1	Turn off the main switch of the outdoor unit.	
2	Remove the covers, the thermistor, the crankcase heater, the power wirings, and other items according to the chapter "Removing the Parts of the Oudoor Unit".	Make sure that the terminal part of the detached power supply wires is not exposed by the winding insulation tape and other items.
3	Attach the manifold to the check joint of the high-pressure side and the low-pressure side of the outdoor unit.	
4	Turn on the main switch of the outdoor unit.	
5	Set the exclusion of the compressor by setting the DSW so that a broken compressor will not work. You can set the exclusion of the compressor by setting the DSW5-1~DSW5-6 of the PCB1.	DSW5-1 ON: Compressor No.1 (52C1: Inverter compressor), DSW5-2 ON: Compressor No.2 (52C2), DSW5-3 ON: Compressor No.3 (52C3), and the others.
6	Pre-Pump-Down by means of the Cooling Process: ■ Start the test run of the cooling process. (DSW4-1 ON). ■ The test run should run for approximately 20 minutes (until the test run reaches PS>0.3Mpa, Td>75°C, as a rough target). ■ Display of Ps in seven seconds of the outdoor PCB. ■ Close the gas stop valve quickly. Then, perform the enforced stoppage (DSW4-4 ON) when Ps < 0.2Mpa. ■ Set the DSW4-1 to OFF in order to cancel the test run of the cooling. Set the DSW4-4 to OFF in order to cancel the enforced stoppage.	■ After closing the gas stop valve, the decrease of Ps is fast. To guarantee the reliability of the compressor, make sure that **the decrease does not reach PS< 0.1Mpa** when you perform the enforced stoppage.
7	The compressor replacing mode is performed: ■ The DSW4-6 on the outdoor unit PCB→ ON (The cooling is run).	■ This operation is performed for up to a maximum of ten minutes. ■ If the inverter compressor is excluded, the operation starts after three minutes.
8	The operation finishes when one of the following conditions occurs: 1) Ten minutes have passed and STP is displayed in seven seconds. 2) "08" is displayed in seven seconds. 3) When Ps< 0.1MPa is continued for one minute, in ten minutes STP is displayed in seven seconds and the operation finishes.	■ The operation may finished when any of the conditions 1) to 3) occurs.
9	Close the liquid stop valve completely.	To avoid the spillage of all the refrigerant if the check valve is broken.

No.	Procedure	Remarks
10	Check for a leakage of the check valve on the discharge gas side: ■ DSW4-4 (Enforced stoppage of the compressor) → ON, so that the compressor will not run although the running command is sent from the remote control switch. ■ Check that variation of Ps on the outdoor unit PCB is 17 seconds. Make sure that the Ps increase is within 0.03 Mpa in two minutes after the Ps increase at the stoppage (during approximately five minutes). Also make sure that Pd>Ps.  	■ When you stop the compressor for replacing: ■ You can check the leakage of the check valve by means of the Ps variation because the SVA opens so that the discharge gas side of the inverter compressor can connect to the low-pressure side. ■ 0.03 Mpa / 2 minutes is within the permissible limits for the check valve on the discharge gas side. ■ The leakage of the check valve may cause an incorrect brazing, due to the gas pressure at the brazing of the discharge piping. ■ If the compressor-replacing mode is performed again, set the DSW4-4 to OFF and keep the DSW4-4 at the OFF side during ten minutes. Then, start according to the procedure N°6.
11	Collect the refrigerant by means of the refrigerant collection: ■ Perform either A or B, depending on the process 10. **A**: The leak rate at the process 10 is within the specification → Collect the refrigerant only at the low-pressure side. **B**: The leak rate at the process 10 is greater than the specification → Collect all the refrigerant of the outdoor unit side by means of the machine.	■ The discharge of the refrigerant in the atmosphere is strictly forbidden. Make sure that the refrigerant is collected by the collector. ■ Keep a note of the quantity of the collected refrigerant.
12	After collecting the refrigerant, remove the change hose (collector side) of the low-pressure side, so that the low-pressure side of the refrigerant cycle will be the atmosphere pressure.	■ Make sure that there is no pressure increase of the low-pressure sides after collecting the refrigerant. ■ Make sure that the refrigerant cycle is the atmosphere pressure. Otherwise, problems such as the blowing of gas and the suction of the cutting material) may occur when you are removing the compressors.
13	Turn OFF the main switch of the outdoor unit.	
14	Perform the replacement of the compressor and the change of the refrigerant oil according to the section "Replacing the Compressor".	Make sure that you follow the instructions.
15	Perform the vacuum from the check joint of the low-pressure side.	If you collect the refrigerant only on the low-pressure side (**A** in 11). You cannot perform the vacuum of the refrigerant from the check joint of the high-pressure side.
16	Open the liquid stop valve and the gas stop valve completely when you finish the vacuum.	
17	Make sure that the power is turned OFF and attach the following items: the power supply wire, the thermistor, the crankcase heater, the 63H wiring, the panel and the nut).	
18	Set the DSW back to the original setting. Make sure that all the wirings to the compressor are connected correctly.	
19	Recharge the refrigerant that is collected in the process by the stop valve of the liquid side during the cooling at the TEST RUN mode.	If the replacement of the compressor takes more than two hours, an additional change of the refrigerant is necessary. Additional Change = (Replacing Time – 2 hours) x 0.5kg.

11.11.3. CHECK DATA SHEET OF THE OUTDOOR UNIT (SET-FREE FSN SERIES)

Client: Date:

Remote control switch of the indoor unit					
Operation mode					
Test run is started at:					
Data is collected at:					
Data item			Example		
Check mode 1	Setting temperature of the indoor unit	50	1		
	Air inlet temperature	51	1 /		
	Discharge air temperature.	52	4		
	Liquid pipe temperature of the heat exchanger of the indoor unit	53	1 /		
	Temperature of the remote control thermistor	54	14		
	Outdoor temperature	5	0 /		
	Gas pipe temperature of the heat exchanger of the indoor unit.	56	14		
	Evaporating temperature at heating	57	1		
	Control information	58	,		
	Discharge gas temperature	5_	30		
	Indoor micro-computer input/output	B0	3		
	Outdoor micro-computer input/output	B1	,		
	Cause of the stoppage at the unit	b0	0		
	Number of the abnormal operation	D0	0		
	Number of the instantaneous power failure at the indoor unit	D1	/		
	Number of the transmission error	D2	/		
	Number of the abnormal operation at the inverter	D3	/		
	Status of the lower sensor	E0	/		
	Discharge pressure	G0	0@		
	Suction pressure	G1	3		
	Control information	G2	3		
	Working frequency	G3	3		
	Indoor unit capacity	I0	7		
	Outdoor unit code	I1	G0		
	Refrigerant cycle number	I2	0		
	Refrigerant cycle number (only FS2 HNM2)	I3	0		
	Expansion valve opening of the indoor unit	K0	1 /		
	Expansion valve opening 1 of the outdoor unit	K1	8		
	Expansion valve opening 2 of the outdoor unit	K2	8		
	Expansion valve opening 3 of the outdoor unit	K3	/		
	Current at the compressor	O0	1 /		

Check mode 2	Air inlet temperature	80	12		
	Discharge air temperature	81	4/		
	Liquid pipe temperature of the heat exchanger of the indoor unit	82	14		
	Outdoor temperature	83	01		
	Gas pipe temperature of the heat exchanger of the indoor unit.	84	14		
	Evaporating temperature at heating	85	2		
	Control information	86	,		
	Discharge gas temperature	87	34		
	Discharge pressure	8	07		
	Suction pressure	8@	3		
	Control information	8`	,		
	Working frequency	8B	3		
	Expansion valve opening of the indoor unit	8C	1/		
	Expansion valve opening of the outdoor unit	8D	8		
	Current at the compressor	8E	1/		

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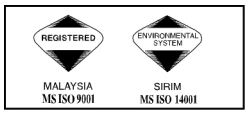

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