

# Hisense

Hisense

Hi-Flexi R SERIES SM



Inverter-Driven Multi-Split  
Central Air Conditioning  
Heat Pump System  
Hi-Flexi R Series Outdoor Units

## Service Manual

- Installation and Operation -
- Troubleshooting -

### Models

AVWT-76FESR	AVWT-190FESZ	AVWT-308FESZ	AVWT-420FESZ
AVWT-96FESR	AVWT-212FESZ	AVWT-324FESZ	AVWT-438FESZ
AVWT-114FESR	AVWT-232FESZ	AVWT-340FESZ	AVWT-454FESZ
AVWT-136FESS	AVWT-250FESZ	AVWT-364FESZ	AVWT-476FESZ
AVWT-154FESS	AVWT-272FESZ	AVWT-382FESZ	AVWT-494FESZ
AVWT-170FESS	AVWT-290FESZ	AVWT-398FESZ	AVWT-510FESZ

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HHFR SM-1507 Rev.2

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## 1. Safety Summary

### **DANGER**

- Do not perform installation work, refrigerant piping work, drain pump, drain piping and electrical wiring connection without referring to our installation manual. If the instructions are not followed, it may result in a water leakage, electric shock or a fire.
- Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. Do not charge material other than R410A into the unit such as hydrocarbon refrigerants (propane or etc.), oxygen, flammable gases (acetylene or etc.) or poisonous gases when installing, maintaining and moving. These flammables are extremely dangerous and may cause an explosion, a fire, and injury.
- Do not pour water into the indoor or outdoor unit. These products are equipped with electrical parts. If poured, it will cause a serious electrical shock.
- Do not open the service cover or access panel for the indoor or outdoor units without turning OFF the main power supply.
- Do not touch or adjust safety devices inside the indoor unit or outdoor units. If these devices are touched or readjusted, it may cause a serious accident.
- Refrigerant leakage can cause difficulty with breathing due to insufficient air. Turn OFF the main switch, extinguish any naked flames and contact your service contractor, if refrigerant leakage occurs.
- Make sure that the refrigerant leakage test should be performed. Refrigerant (Fluorocarbon) for this unit is incombustible, non-toxic and odorless. However if the refrigerant is leaked and is contacted with fire, toxic gas will generate. Also because the fluorocarbon is heavier than air, the floor surface will be filled with it, which could cause suffocation.
- The installer and system specialist shall secure safety against refrigerant leakage according to local regulations or standards.
- Use an ELB (Earth Leakage Breaker). In the event of fault, there is danger of an electric shock or a fire if it is not used.
- Do not install the outdoor unit where there is high level of oil mist, flammable gases, salty air or harmful gases such as sulfur.
- For installation, firmly connect the refrigerant pipe before the compressor starts operating. For maintenance, relocation and disposal, remove the refrigerant pipe after the compressor stops.
- Do not perform a short-circuit of the protection device such as a pressure switch when operating. It may cause a fire and explosion.

**⚠ WARNING**

- Do not use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately one (1) meter from the system.
- If circuit breaker or fuse is often activated, stop the system and contact your service contractor.
- Check that the ground wire is securely connected. If the unit is not correctly grounded, it lead electric shock. Do not connect the ground wiring to gas piping, water piping, lighting conductor or ground wiring for telephone.
- Connect a fuse of specified capacity.
- Before performing any brazing work, check to ensure that there is no flammable material around. When using refrigerant be sure to wear leather gloves to prevent cold injuries.
- Protect the wires, electrical parts, etc. from rats or other small animals. If not protected, rats may gnaw at unprotected parts and which may lead to a fire.
- Fix the cables securely. External forces on the terminals could lead to a fire.
- Provide a sufficiently strong foundation. If not, the unit may fall down and it may lead to injuries.
- Do not install the unit in a place where oil, vapor, organic solvent and corrosive gas (ammonia, sulfur compound and acid) may be present in quantities. It may cause refrigerant leakage due to corrosion, electrical shock, deteriorated performance and breakage.
- Perform electrical work according to Installation Manual and all the relevant regulation and standards. If the instructions are not followed, an electrical shock and fire may occur due to insufficient capacity and inadequate performance.
- Use specified cables between units and choose the cables correctly. If not, an electrical shock or fire may occur.
- Ensure that the wiring terminals are tightened securely with the specified torques. If not, generating fire or electrical shock at the terminal connection part may occur.

**⚠ CAUTION**

- Do not step or put any material on the product.
- Do not put any foreign material on the unit or inside the unit.
- Provide a strong and correct foundation so that;
  - a. The outdoor unit is not on an incline.
  - b. Abnormal sound dose not occur.
  - c. The outdoor unit will not fall down due to a strong wind or earthquake.

### NOTICE

- Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.
- Supply electrical power to the system to energize the oil heater for 12 hours before startup after a long shutdown.
- Make sure that the outdoor unit is not covered with snow or ice, before operation.
- In some cases, the packaged air conditioner may not be operated normally under the following cases.
  - \* In case that electrical power for the packaged air conditioner is supplied from the same power transformer as the device\*.
  - \* In case that the power source wires for the device\* and the packaged air conditioner are located close to each other.

Device\*: (Ex) Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch.  
It consumes a large quantity of electrical power.

Regarding the cases mentioned above, surge voltage may be inducted in the power supply wiring for the packaged air conditioner due to a rapid change in power consumption of the device and an activation of switch.

Therefore, check the field regulations and standards before performing electrical work in order to protect the power supply for the packaged air conditioner.

### NOTE

- It is recommended that the room will be ventilated every 3 to 4 hours.
- The heating capacity of the heat pump unit is decreased according to the outdoor air temperature. Therefore, it is recommended that auxiliary heating equipment be used in the field when the units is installed in a low temperature region.

**2. Structure**

**2.1 Outdoor Unit & Refrigerant Cycle**

Regarding structure drawings and refrigerant cycle diagram, please refer to Technical Data in this Technical Catalog.

**2.2 Necessary Tools and Instrument List for Installation**

No.	Tool	No.	Tool	No.	Tool	No.	Tool
1	Handsaw	6	Copper Pipe Bender	11	Spanner	16	Leveller
2	Phillips Screwdriver	7	Plier	12	Charging Cylinder	17	Clamper for Solderless Terminals
3	Vacuum Pump	8	Pipe Cutter	13	Gauge Manifold	18	Hoist (for Indoor Unit)
4	Refrigerant Gas Hose	9	Brazing Kit	14	Cutter for Wires	19	Ammeter
5	Megohmmeter	10	Hexagon Wrench	15	Gas Leak Detector	20	Voltage Meter

Use tools and measuring instruments only for the new refrigerant R410A which is directly touch to refrigerant.

**⚠ DANGER**

The pressure of refrigerant R410A is 1.4 times higher than that of conventional refrigerant, impurities such as moisture, oxide film, and grease affect easily R410A. Be sure to remove any moisture, dust, different refrigerant or refrigerant oil from the refrigerant cycle.

Therefore, if the specified materials are not used, it may cause explosion, injury, leakage, electrical shock or fire.

**NOTICE**

Check the design pressure for this product is 4.15MPa.

To avoid accidental mixing of the different refrigerant or different refrigerant oil, the sizes of the charging connections have been changed.

It is necessary to prepare the following tools before performing the installation work.

# INSTALLATION & OPERATION

◇ : Interchangeability is available with current R22

● : only for Refrigerant R410A (No Interchangeability with R22)

× : Prohibited

◆ : only for Refrigerant R407C (No Interchangeability with R22)

Measuring Instrument and Tool		Interchangeability with R22		Reason of Non-Interchangeability and Attention (★ : Strictly Required)	Use
		R410A	R407C		
Refrigerant Pipe	Pipe Cutter Chamfering Reamer	◇	◇	-	Cutting Pipe Removing Burrs
	Flaring Tool	◇●	◇	* The flaring tools for R407C are applicable to R22. * If using flaring tube, make dimension of tube larger for R410A. * In case of material 1/2H, flaring is not available.	Flaring for Tubes Dimensional Control for Extruded Portion of Tube after Flaring
	Extrusion Adjustment Gauge	●	-		
	Pipe Bender	◇	◇	* In case of material 1/2H, bending is not available. Use elbow for bend and braze.	Bending
	Expanding Tool	◇	◇	* In case of material 1/2H, expanding of tube is not available. Use socket for connecting tube.	Expanding Tubes
	Torque Wrench	●	◇	* For φ12.7, φ15.88, spanner size is up 2mm.	Connection of Flare Nut
		◇	◇	* For φ6.35, φ9.53, φ19.05, spanner size is the same.	
	Brazing Tool	◇	◇	* Perform correct brazing work.	Brazing for Tubes
	Nitrogen Gas	◇	◇	* Strict Control against Contamin (Blow nitrogen during brazing.)	Prevention from Oxidation during Brazing
Lubrication Oil (for Flare Surface)	●	◆	* Use a synthetic oil which is equivalent to the oil used in the refrigeration cycle. * Synthetic oil absorbs moisture quickly.	Applying Oil to the Flared Surface	
Vacuum Drying Refrigerant Charge	Refrigerant Cylinder	●	◆	* Check refrigerant cylinder color. ★ Liquid refrigerant charging is required regarding zeotropic refrigerant.	Refrigerant Charging
	Vacuum Pump	◇	◇	★ The current ones are applicable. However, it is required to mount a vacuum pump adapter which can prevent from reverse flow when a vacuum pump stops, resulting in no reverse oil flow.	Vacuum Pumping
	Adapter for Vacuum Pump	* ●	◆		
	Manifold Valve	●	◆	* No interchangeability is available due to higher pressures when compared with R22. ★ Do not use current ones to the different refrigerant. If used, mineral oil will flow into the cycle and cause sludges, resulting in clogging or compressor failure.	Vacuum Pumping, Vacuum Holding, Refrigerant Charging and Check of Pressures
	Charging Hose	●	◆	Connection diameter is different; R410A: UNF1/2, R407C: UNF7/16.	
	Charging Cylinder	×	×	* Use the weight scale.	-
	Weight Scale	◇	◇	-	Measuring Instrument for Refrigerant Charging
Refrigerant Gas Leakage Detector	* ●	◆	* The current gas leakage detector (R22) is not applicable due to different detecting method.	Gas Leakage Check	

\*: Interchangeability with R407C.

### 3. Before Installation

#### 3.1 Line-Up of Outdoor Unit

< Base Unit >

HP	8	10	12	14	16	18
Model	AVWT-76FE(7)(9)SR	AVWT-96FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS

< Combination of Base Units > \*

HP	20	22	24	26	28	30
Model	AVWT-190FE(7)(9)SZ	AVWT-212FE(7)(9)SZ	AVWT-232FE(7)(9)SZ	AVWT-250FE(7)(9)SZ	AVWT-272FE(7)(9)SZ	AVWT-290FE(7)(9)SZ
Combination	AVWT-76FE(7)(9)SR	AVWT-76FE(7)(9)SR	AVWT-96FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS
	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS

HP	32	34	36	38	40	42
Model	AVWT-308FE(7)(9)SZ	AVWT-324FE(7)(9)SZ	AVWT-340FE(7)(9)SZ	AVWT-364FE(7)(9)SZ	AVWT-382FE(7)(9)SZ	AVWT-398FE(7)(9)SZ
Combination	AVWT-154FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR
	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-114FE(7)(9)SR	AVWT-114FESR(7)(9)	AVWT-114FE(7)(9)SR
	-	-	-	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS

HP	44	46	48	50	52	54
Model	AVWT-420FE(7)(9)SZ	AVWT-438FE(7)(9)SZ	AVWT-454FE(7)(9)SZ	AVWT-476FE(7)(9)SZ	AVWT-494FE(7)(9)SZ	AVWT-510FE(7)(9)SZ
Combination	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS
	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS
	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS

\*: Regarding the configuration of outdoor units especially for 190 ~ 510kBTu/h, combine the specified based units (2 or 3) as shown in the table above.

#### 3.2 Combination of Indoor Unit and Outdoor Unit

The following indoor units can be combined with the outdoor unit.

Table 3.1 Indoor Unit Type List

Indoor Unit Type	Nominal Capacity (kBTu/h)														
	7.5	9.6	12.3	14.7	17.1	19.1	21.5	24.2	28.7	30.7	38.2	48.5	54.6	76.5	95.6
Ceiling Ducted	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Ceiling Ducted(Low-height)	○	○	○	○	○	○	○	○							
Ceiling Ducted(Slim)	○	○	○	○											
4-Way Cassette		○	○	○	○	○	○	○	○	○	○	○	○		
4-Way Cassette(Compact)	○	○	○	○	○										
Wall	○	○	○	○	○	○	○								
Ceiling					○	○	○	○	○	○	○	○			
Floor Concealed		○		○		○		○							

○ : Available

- The number of connectable indoor unit with outdoor unit is as follows.  
Comply with the condition as follows when installing the unit.
- A maximum total capacity of 130% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

Table 3.2 System Combination

Outdoor Unit	Min. Capacity at Individual Operation (kBtu/h)	Max. Number of Connectable I.U.	Recommended Number of Connectable I.U.	Range of Combination Capacity
AVWT-76FE(7)(9)SR	07	13	8	50 to 130%
AVWT-96FE(7)(9)SR		16	10	
AVWT-114FE(7)(9)SR		19	10	
AVWT-136FE(7)(9)SS		23	16	
AVWT-154FE(7)(9)SS		26	16	
AVWT-170FE(7)(9)SS		26	16	
AVWT-190FE(7)(9)SZ		33	18	
AVWT-212FE(7)(9)SZ		36	20	
AVWT-232FE(7)(9)SZ		40	26	
AVWT-250FE(7)(9)SZ		43	26	
AVWT-272FE(7)(9)SZ		47	32	
AVWT-290FE(7)(9)SZ		50	32	
AVWT-308FE(7)(9)SZ		53	32	
AVWT-324FE(7)(9)SZ		56	32	
AVWT-340FE(7)(9)SZ		59	32	
AVWT-364FE(7)(9)SZ		64	38	
AVWT-382FE(7)(9)SZ		64	38	
AVWT-398FE(7)(9)SZ		64	38	
AVWT-420FE(7)(9)SZ		64	38	
AVWT-438FE(7)(9)SZ		64	38	
AVWT-454FE(7)(9)SZ		64	38	
AVWT-476FE(7)(9)SZ		64	38	
AVWT-494FE(7)(9)SZ		64	38	
AVWT-510FE(7)(9)SZ	64	38		

**NOTES:**

1. For the system which all indoor units are operated simultaneously, the total indoor unit capacity should be less or equal to the outdoor unit capacity. If not, poor performance or narrow operation range at overload may occur.
2. For the system which all indoor units are not operated simultaneously, the total indoor unit capacity is available up to 130% against the outdoor unit capacity.
3. If the system is used in the cold area (ambient temperature becomes under -10°C) or under the high heating load conditions, the total indoor unit capacity should be less than 100% against the outdoor unit and total piping length is less than 300m.
4. Compared to over 9kBtu/h of indoor units, 7kBtu/h of indoor units is set with higher air flow. Do not install these units in the place where the cold draft may occur during heating operation. Determine the usage environment and installation location carefully.  
If the unit is installed in such places, the number of connectable I.U. should be less than the recommended number on the table above.

## 4. Transportation and Handling

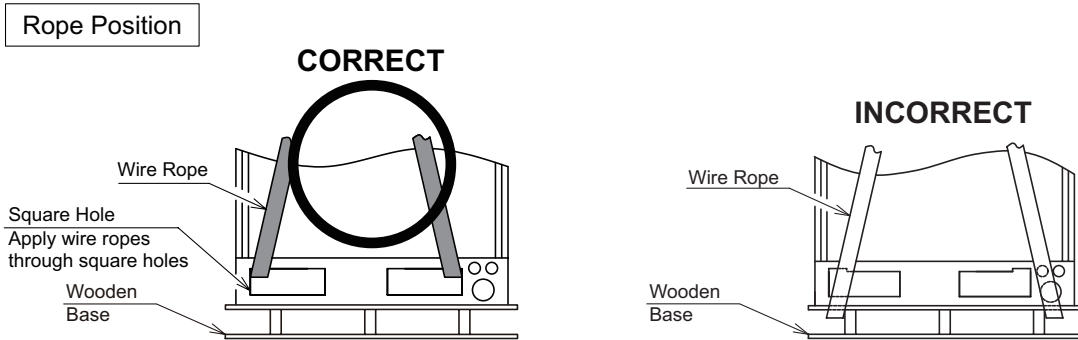
### 4.1 Transportation

Transport the product as close to the installation location as practical before unpacking.

When using a crane, hang the unit according to the description of the label attached to the outdoor unit.

# ⚠ DANGER

Do not hang the unit by the ropes at the wooden base.



# ⚠ CAUTION

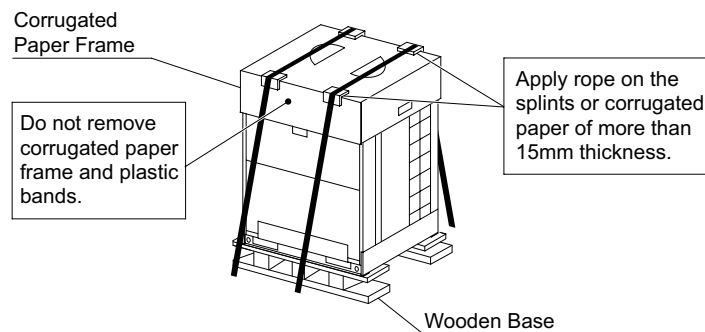
### 1. Transportation and Storage

The corrugated paper frame is not sufficiently strong, therefore pay attention to the followings in order to prevent the unit deformation.

- Do not step or put any material on the product.
- Apply two lifting wires onto the outdoor unit, when lifting it by crane.

### 2. Transportation and Wire Rope

- To protect the unit, do not remove any packing.
- Do not stack or put any material on the product.
- Apply wire ropes on the both side of the unit as shown in the figure.





- Hanging Method

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

- (1) Do not remove any packing materials.
- (2) Hang the unit under packing condition with two (2) wire ropes, as shown in Fig. 4.1.

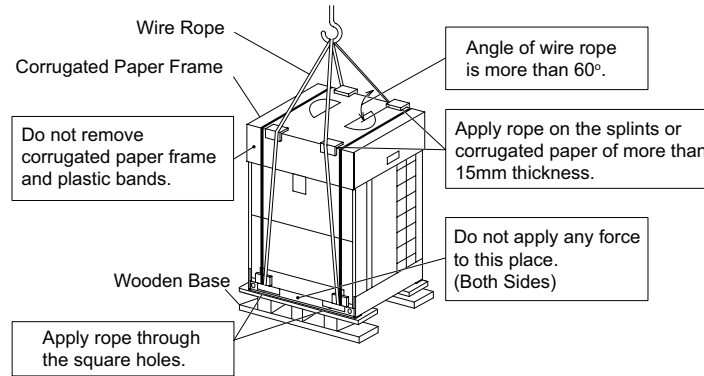


Fig. 4.1 Hanging Work for Transportation

- (3) Hang the unit without wooden base with two (2) wire ropes, as shown in Fig. 4.2.

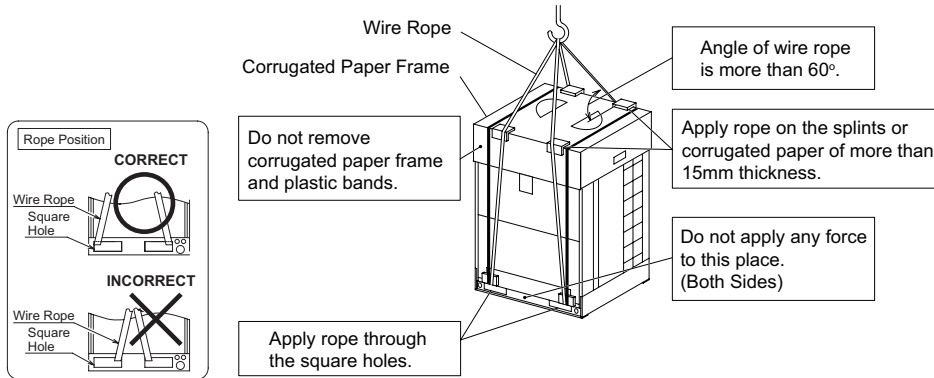
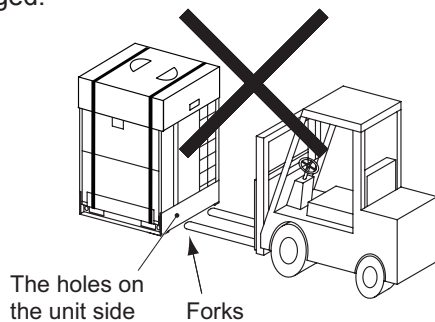


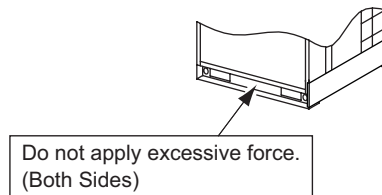
Fig. 4.2 Hanging Work without Wooden Base

When using forklift, do not insert forks into the holes on the unit side. The unit may be damaged.



Do not apply excessive force to the square holes with forks or other materials. The bottom of the unit may be deformed.

- \* Do not push the bottom base by fork.
- \* Do not use roller.



## NOTE

In case of transportation after unpacking, protect the unit with the splints or cloth.

## 4.2 Handling of Outdoor Unit

### **! WARNING**






























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

## 5. Outdoor Unit Installation

### 5.1 Factory-Supplied Accessories

Check to ensure that the following accessories are packed with the outdoor unit.

Table 5.1 Factory-Supplied Accessories

Accessory		76	96	114	136	154	170	Remarks
Accessory Pipe	(A) Connection for Refrigerant Gas (High) Pipe	 $\phi 22.2 \rightarrow \phi 15.88$	 $\phi 22.2 \rightarrow \phi 19.05$	-	 $\phi 25.4 \rightarrow \phi 22.2$	 $\phi 25.4 \rightarrow \phi 22.2$	 $\phi 25.4 \rightarrow \phi 22.2$	
	(B) Connection for Refrigerant Gas (High/Low) Pipe	 $\phi 22.2 \rightarrow \phi 19.05$	-	 $\phi 22.2 \rightarrow \phi 25.4$	-	 $\phi 25.4 \rightarrow \phi 28.6$	 $\phi 25.4 \rightarrow \phi 28.6$	
	(C) Connection for Refrigerant Liquid Pipe	-	-	 $\phi 9.53 \rightarrow \phi 12.7$	-	-	 $\phi 12.7 \rightarrow \phi 15.88$	
Rubber Bush	For Connection Hole of Power Supply Wire	 x1	 x1	 x1	 x1	 x1	 x1	
Screw (Spare)		 x3	 x3	 x3	 x3	 x3	 x3	
Combination Unit Model Label								

**NOTE**

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

## 5.2 Installation

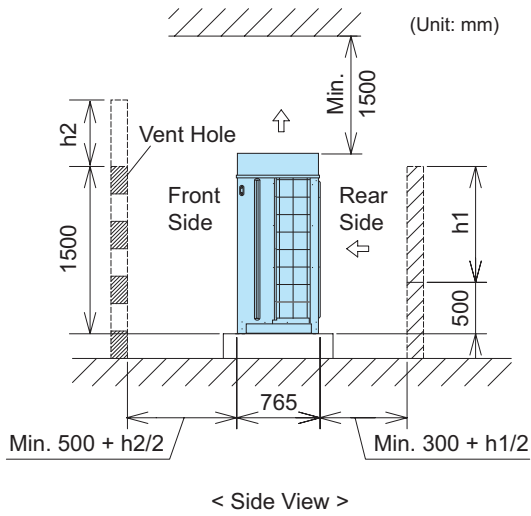
- (1) Install the outdoor unit in a dry well ventilated environment.
- (2) Install the outdoor unit where it is in the shade or it will not be exposed to direct sunshine or direct radiation from high temperature heat source.
- (3) Install the outdoor unit where the sound or the discharge air from the outdoor unit does not affect neighbors or surrounding ventilation. The operating sound at the rear or right/left sides is 3 to 6dB(A) higher than the value in the catalog at the front side.
- (4) Install the outdoor unit in a space with limited access to general public.
- (5) Check to ensure that the foundation is flat, level and sufficiently strong.
- (6) Do not install the outdoor unit where dust or other contamination could block the outdoor heat exchanger.
- (7) 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.
- (8) While heating or defrosting operation, drain water is discharged. Provide adequate drainage around the foundation. If installing the unit on a roof or a veranda, avoid draining in or over walkways to prevent water dripping on people or the formation of ice in winter. In case of installing such a place, provide the additional drainage around the foundation.
- (9) Do not install the outdoor unit in a space where a seasonal wind directly blows to the outdoor heat exchanger or a wind from a building space directly blows to the outdoor fan.

### NOTES:

1. Do not install the outdoor unit where there is a high level of oil mist, flammable gases, salty air or harmful gases such as sulphur and an acid or alkaline environment.
2. Do not install the outdoor unit where the electromagnetic wave is directly radiated to the electrical control box.
3. Install the outdoor unit as far as possible, being at least 3 meters from the electromagnetic wave radiator.

**5.3 Service Space**

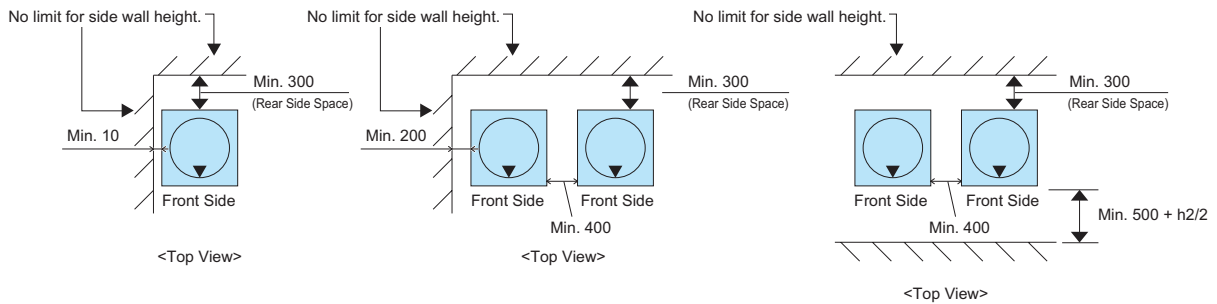
Make the service space when outdoor unit is installed as follows.



- In case of no walls at the front and the rear side of the unit, the space of 500mm for the front side and 300mm for the rear side is required.
- When the wall of front side is higher than 1,500mm, the space of  $(500 + h2/2)$  mm for the front side is required.
- When the wall of rear side is higher than 500mm, the space of  $(300 + h1/2)$  mm for the rear side is required.
- When install the wall in front of the unit, make the vent hole on the wall.
- When the space to the obstacle above the unit is less than 1,500mm or the space above the unit is closed, set up the duct at the air outlet side in order to prevent short circuit.
- When there are obstacles above the unit, the four (front, rear, right and left) sides of the unit shall be open in principle.

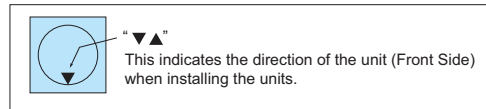
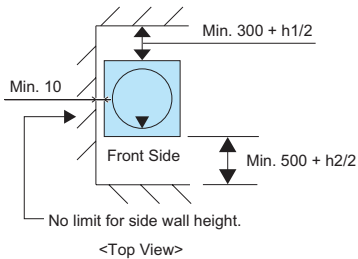
**1) Walls on 2 Directions**

In case that the units are installed adjacent to tall buildings and there are no walls in 2 directions, the minimum rear side space is 300mm.



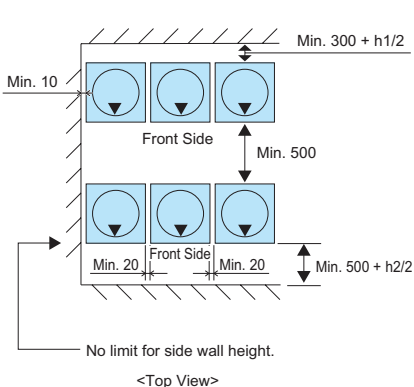
**2) Walls on 3 Directions**

**• Single Installation**

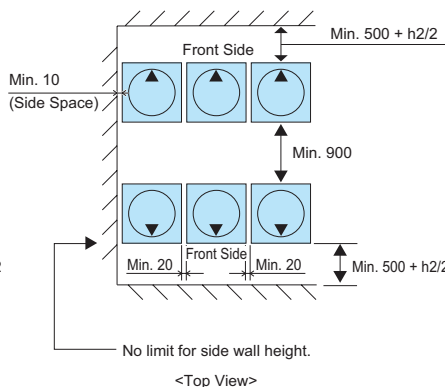


**• Multiple / Serial Installation**

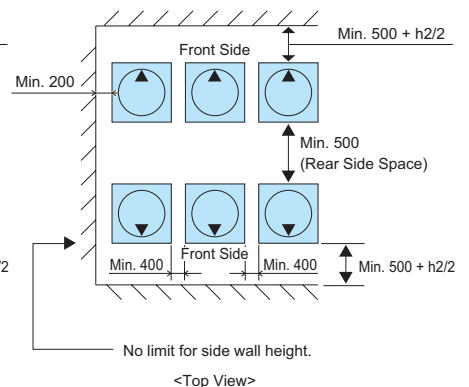
**< Installation in the Same Direction >**



**< Rear to Rear Installation 1 >**

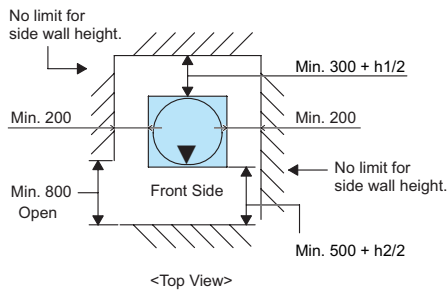


**< Rear to Rear Installation 2 >**



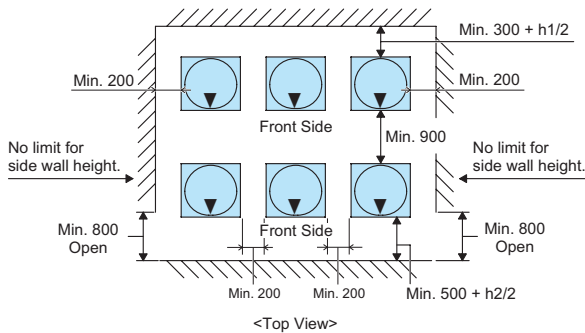
3) Walls on 4 Directions

• Single Installation

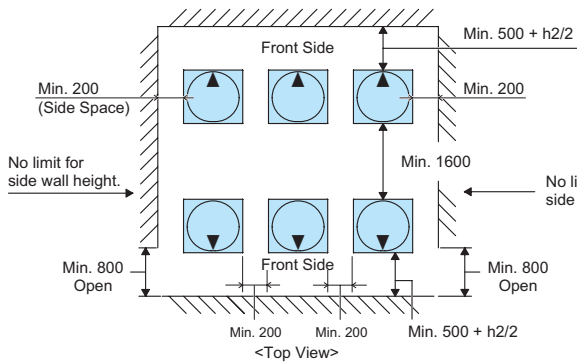


• Multiple / Serial Installation

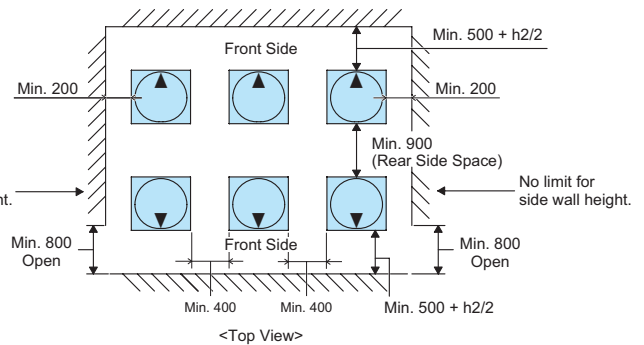
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< Rear to Rear Installation 1 >

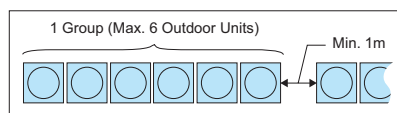


< Rear to Rear Installation 2 >



**NOTE**

1. Keep the upper side open to prevent mutual interference of inlet and outlet air of each outdoor unit.
2. The figure dimensions are sufficient spaces around outdoor units for operation and maintenance at typical installing conditions as follows. [ Operation Mode: Cooling Operation, Outside Temp.: 35°C ]  
In case that the outdoor unit ambient temperature is higher and also the short circuit is likely to occur compared to the installation condition, find an appropriate dimension by calculating air flow current.
3. For the multiple installation, 1 group allows 6 outdoor units (max.).  
The space of 1m between each group is required.

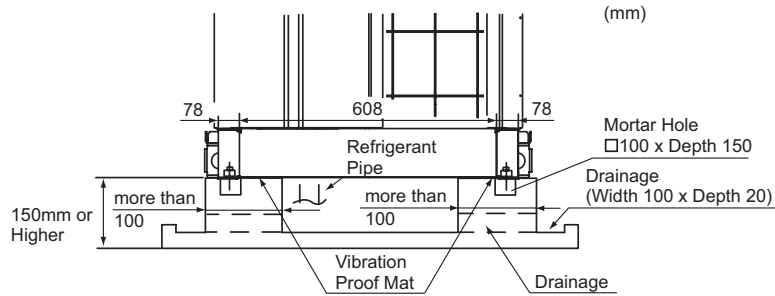


4. Partly open a wall if the unit is surrounded by walls in four directions.

**5.4 Foundation**

• **Concrete Foundations**

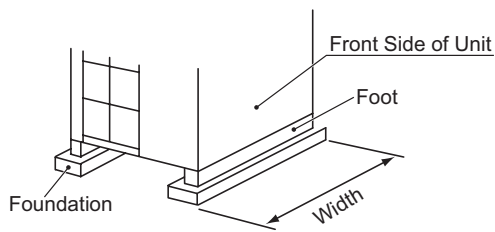
- (1) The height of the foundation should be 150mm higher than the ground level.
- (2) Install a drainage around foundation for smooth drain.



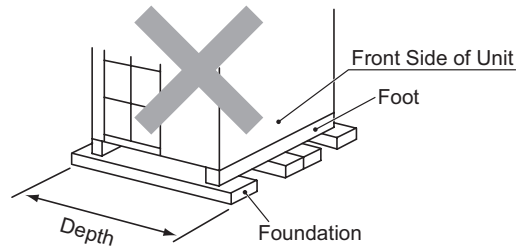
\* Provide concrete foundation as shown in the figure.

\* Do not provide concrete foundation as shown below. The foot of the outdoor unit may be deformed.

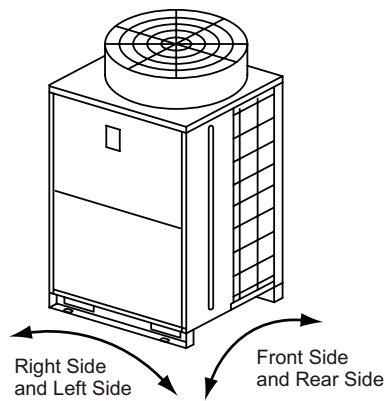
**CORRECT**



**INCORRECT**



- (3) Install the outdoor unit in the front-rear and right-left direction horizontally. (Use a level gauge.) Check to ensure that the gradient in four directions (front, rear, right and left) is within 10mm.



- (4) Provide a strong and correct foundation so that;
  - a. The outdoor unit is not on an incline.
  - b. Abnormal sound does not occur.
  - c. The outdoor unit will not fall down due to a strong wind or earthquake.

- (5) When installing the outdoor unit, fix the unit by anchor bolts (field-supplied). Refer to Fig. 5.1 regarding the location of fixing holes.

< 76kBtu/h to 114kBtu/h >

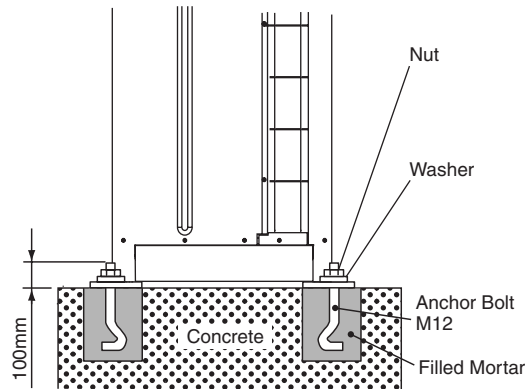
< 136kBtu/h to 170kBtu/h >

Unit: mm



Fig. 5.1 Position of Anchor Bolts

Secure the outdoor unit with the anchor bolts.



- (6) When installing the unit on a roof or a veranda, drain water sometimes turns to ice on a cold morning. Therefore, avoid draining into an area where people often use because it is slippery.
- (7) When drain piping is necessary for the outdoor unit, use the drain boss set. Do not use drain boss and drain pan kit in the cold area. The drain water in the drain pipe may be frozen and then the drain pipe may crack.

**5.5 Drain Water Treatment**

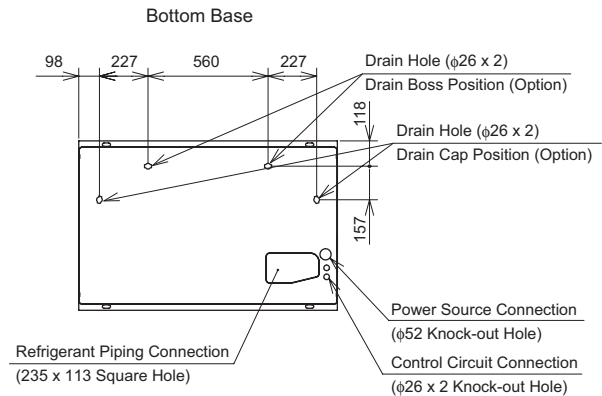
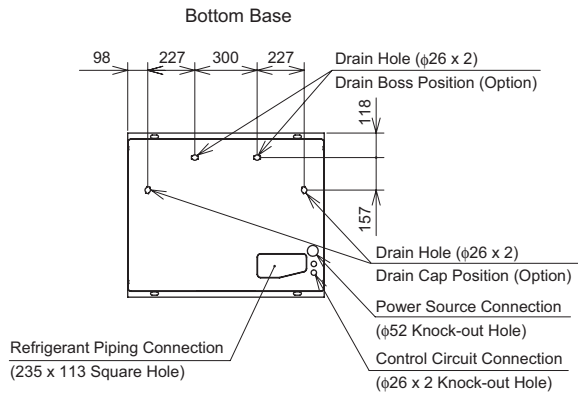
Drain water is discharged during heating and defrosting operation. (Rain water is also discharged.)  
Pay attention to the followings.

- (1) Choose a place where well drainage is available, or provide a drain ditch.
- (2) Do not install the unit over the walkways. Condensation water may fall on people.  
In case of installing the unit in such a place, provide the additional drain pan.
- (3) When drain piping is necessary for the outdoor unit, use the drain boss set.  
Do not use drain boss and drain pan kit in the cold area. The drain water in the drain pipe may be frozen and then the drain pipe may crack.

< 76kBtu/h to 114kBtu/h >

< 136kBtu/h to 170kBtu/h >

Unit: mm



• Drain Boss (Optional Parts)

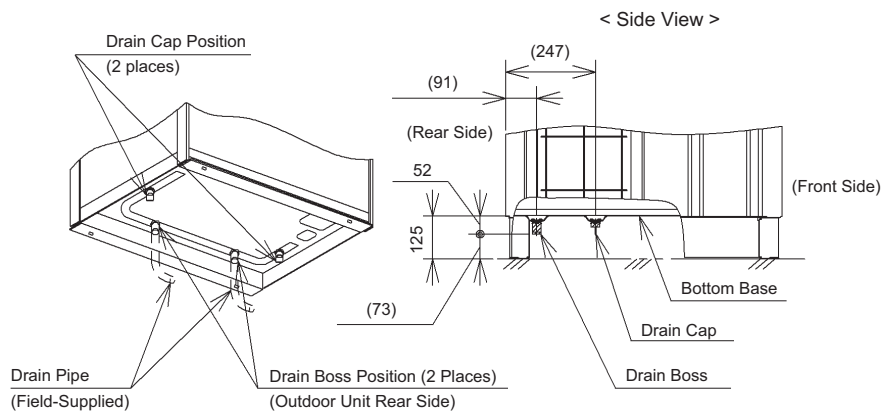
The drain boss is for the drain pipe connection in order to use outdoor unit bottom base as a drain pan.

Component Formation of Drain Boss

Parts Name	Material / Color	Q'ty	Application
Drain Boss	PP / Black	2	Connecting for Drain Piping
Drain Cap	PP / Black	2	Embolization for Drain Hole
Rubber Cap	CR / Black	4	Sealing for Boss and Cap

< Installation Position >

Example: AVWT-96FE(7)(9)SR





## 6. Refrigerant Piping Work

### ⚠ DANGER

- Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. Do not charge material other than R410A into the unit such as hydrocarbon refrigerants (propane or etc.), oxygen, flammable gases (acetylene or etc.) or poisonous gases when installing, maintaining and moving. These flammables are extremely dangerous and may cause an explosion, a fire, and injury.
- Check to ensure that no pressure exists inside the stop valve before removing the flange.

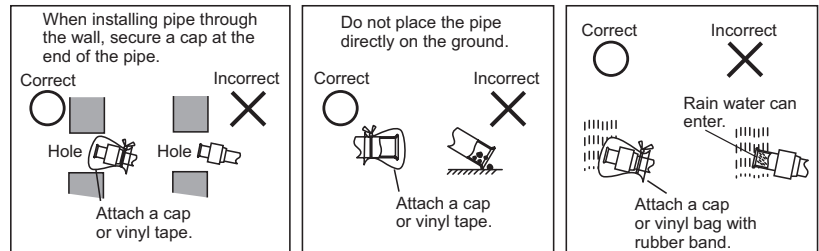
### ⚠ CAUTION

Ensure to connect the piping among the units in the same refrigerant cycle.

#### 6.1 Piping Materials

- (1) Prepare locally-supplied copper pipes.
- (2) Select the piping size from the Table 6.1 and Table 6.2.
- (3) Select clean copper pipes. Make sure there is no dust and moisture inside of the pipes. Blow the inside of the pipes with nitrogen or dry air, to remove any dust or foreign materials before connecting pipes. Do not use any tools which produce a lot of swarf such as a saw or a grinder.

- Cautions for Refrigerant Pipe Ends



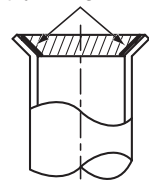
- Cautions for Piping Connection Work

- (1) Connect the indoor/outdoor units with refrigerant pipes. Fix the pipes and pay attention not to contact with weak materials such as ceiling. (Otherwise, abnormal sound may be heard due to the vibration of the piping.)
- (2) Apply refrigerant oil slightly on the sheet surface of the pipe and flare nut before the flaring work. And then tighten the flare nut with the specified tightening torque using two spanners. Perform the flaring work on the liquid piping side before the gas piping side. Check the gas leakage after the flaring work.

**NOTE:**

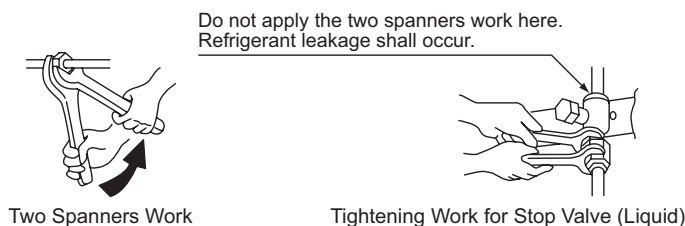
Refrigerant oil is field-supplied.  
[Ethereal Oil FVC68D]

Apply Refrigerant Oil.



- (3) In case that temperature and humidity inside the ceiling exceed 27°C/RH80%, apply additional insulation (approx. 10mm thickness) to the accessory insulation. It prevents dew condensation on the surface of the insulation (refrigerant pipe only).
- (4) Perform the air-tight test (4.15MPa for the test pressure).
- (5) Perform cold insulation work by insulating and taping the flare connection and reducer connection. Also insulate all the refrigerant pipes.

- When tightening the flare nut, use two spanners.



Two Spanners Work

Tightening Work for Stop Valve (Liquid)

### ⚠ CAUTION

Do not apply excessive force to the flare nut when tightening. If applied, the flare nut may crack due to aged deterioration and refrigerant leakage may occur. Use the specified tightening torque.

Table 6.1 Piping Size of Outdoor Unit

< For Heat Pump System (2 Pipes) >

(mm)

Model	Gas	Liquid
AVWT-76FE(7)(9)SR	φ19.05	φ9.53
AVWT-96FE(7)(9)SR	φ22.2	φ9.53
AVWT-114FE(7)(9)SR	φ25.4	φ12.7
AVWT-136FE(7)(9)SS		
AVWT-154FE(7)(9)SS	φ28.6	φ12.7
AVWT-170FE(7)(9)SS	φ28.6	φ15.88
AVWT-190FE(7)(9)SZ		
AVWT-212FE(7)(9)SZ		
AVWT-232FE(7)(9)SZ		
AVWT-250FE(7)(9)SZ	φ31.75	φ19.05
AVWT-272FE(7)(9)SZ		
AVWT-290FE(7)(9)SZ		
AVWT-308FE(7)(9)SZ		
AVWT-324FE(7)(9)SZ		
AVWT-340FE(7)(9)SZ		
AVWT-364FE(7)(9)SZ	φ38.1	φ19.05
AVWT-382FE(7)(9)SZ		
AVWT-398FE(7)(9)SZ		
AVWT-420FE(7)(9)SZ		
AVWT-438FE(7)(9)SZ		
AVWT-454FE(7)(9)SZ		
AVWT-476FE(7)(9)SZ		
AVWT-494FE(7)(9)SZ		
AVWT-510FE(7)(9)SZ		

< For Heat Recovery System (3 Pipes) >

(mm)

Model	Gas		Liquid
	Low Pressure	High Pressure	
AVWT-76FE(7)(9)SR	φ19.05	φ15.88	φ9.53
AVWT-96FE(7)(9)SR	φ22.2	φ19.05	φ9.53
AVWT-114FE(7)(9)SR	φ25.4	φ22.2	φ12.7
AVWT-136FE(7)(9)SS			
AVWT-154FE(7)(9)SS	φ28.6	φ22.2	φ12.7
AVWT-170FE(7)(9)SS	φ28.6	φ22.2	φ15.88
AVWT-190FE(7)(9)SZ			
AVWT-212FE(7)(9)SZ			
AVWT-232FE(7)(9)SZ			
AVWT-250FE(7)(9)SZ	φ31.75	φ25.4	φ19.05
AVWT-272FE(7)(9)SZ	φ31.75	φ28.6	φ19.05
AVWT-290FE(7)(9)SZ			
AVWT-308FE(7)(9)SZ			
AVWT-324FE(7)(9)SZ			
AVWT-340FE(7)(9)SZ			
AVWT-364FE(7)(9)SZ			
AVWT-382FE(7)(9)SZ	φ38.1	φ31.75	φ19.05
AVWT-398FE(7)(9)SZ			
AVWT-420FE(7)(9)SZ			
AVWT-438FE(7)(9)SZ			
AVWT-454FE(7)(9)SZ			
AVWT-476FE(7)(9)SZ			
AVWT-494FE(7)(9)SZ			
AVWT-510FE(7)(9)SZ			

Table 6.2 Piping Size of Indoor Unit

(mm)

Indoor Unit (kBtu/h)	Gas	Liquid
07 to 14	φ12.7	φ6.35
17 to 18	φ15.88	φ6.35
22 to 54	φ15.88	φ9.53
76	φ19.05	φ9.53
96	φ22.2	φ9.53

• Piping Thickness and Material

Use the pipe as below.

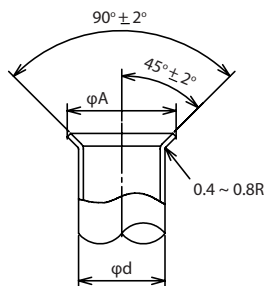
(mm)

Diameter	R410A	
	Thickness	Material
φ6.35	0.8	O material
φ9.53	0.8	O material
φ12.7	0.8	O material
φ15.88	1.0	O material
φ19.05	1.0	1/2H material
φ22.2	1.0	1/2H material
φ25.4	1.0	1/2H material
φ28.6	1.0	1/2H material
φ31.75	1.1	1/2H material
φ38.1	1.35	1/2H material
φ41.3	1.45	1/2H material
φ44.45	1.55	1/2H material

6.2 Flaring and Joint

• Flaring Dimension

Perform the flaring work as shown below.



(mm)

Diameter (φd)	A +0 -0.4
	R410A
6.35	9.1
9.53	13.2
12.7	16.6
15.88	19.7
19.05	(*)

(\*) It is impossible to perform the flaring work with 1/2H material. In this case, use an accessory pipe (with a flare).

• Joint Selection

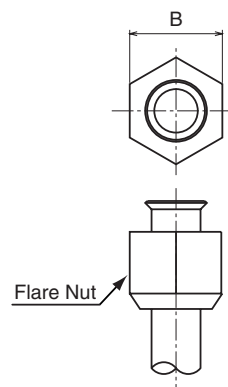
If you use 1/2H material, you can not perform the flaring work. In this case, use a joint selected from the chart below.

< Minimum Thickness of Joint (mm) >

Diameter	R410A
φ6.35	0.5
φ9.53	0.6
φ12.7	0.7
φ15.88	0.8
φ19.05	0.8
φ22.2	0.9
φ25.4	0.95
φ28.6	1.0
φ31.75	1.1
φ38.1	1.35
φ41.3	1.45
φ44.5	1.55

< Flare Nut Dimension B (mm) >

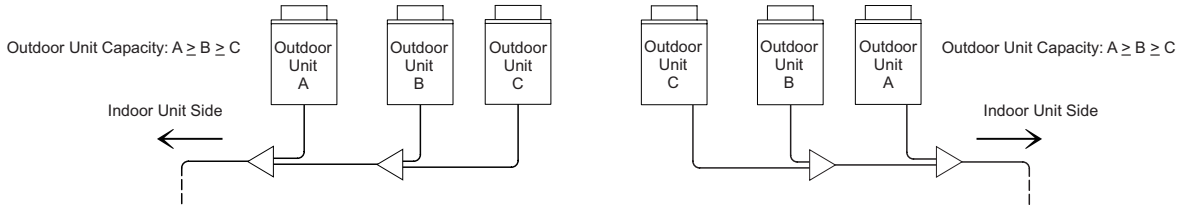
Diameter	R410A
φ6.35	17
φ9.53	22
φ12.7	26
φ15.88	29
φ19.05	36



**6.3 Caution about Outdoor Unit Installation**

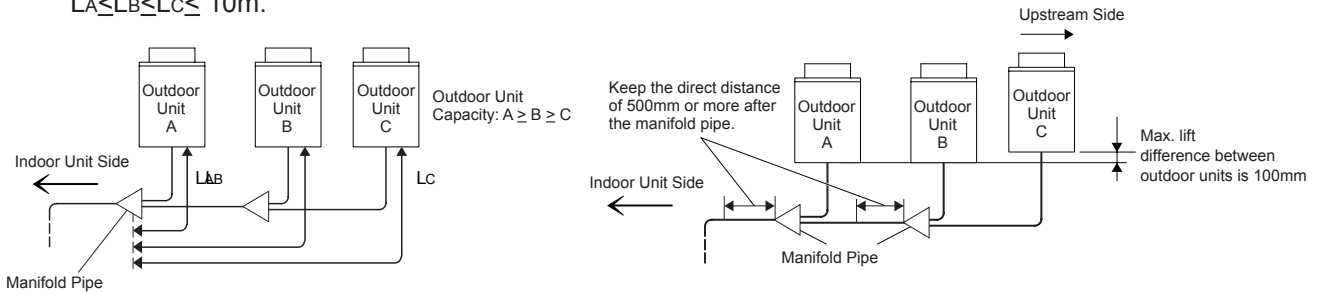
**< Outdoor Unit Alignment >**

Align the outdoor unit from large capacity as  $A \geq B \geq C$  and outdoor Unit "A" should be located at the indoor unit side.

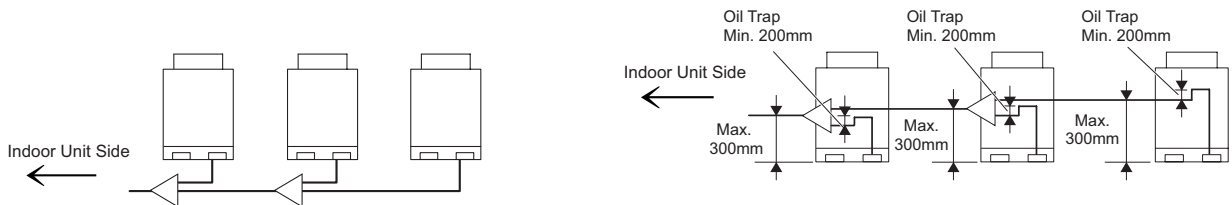


**< Piping Work between Outdoor Units >**

(1) Piping length between manifold pipe (at outdoor unit side) and outdoor unit should be  $L_A \leq L_B \leq L_C \leq 10m$ .

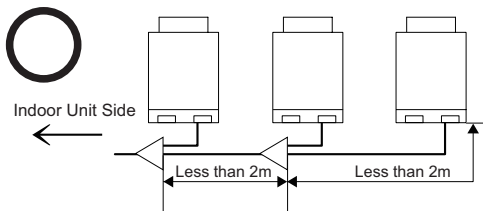


(2) Place the manifold pipe lower than the outdoor unit piping connection. In case that the manifold pipe is placed higher than the outdoor unit piping connection, keep 300mm (max.) between the manifold pipe and the bottom of the outdoor unit. Also, provide the oil trap (min. 200mm) between the manifold pipe and the outdoor unit.

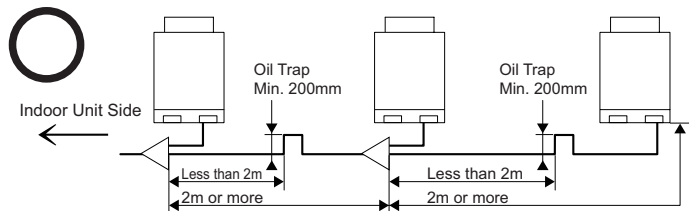


(3) In case that the piping length between outdoor units is 2m or more, the oil trap should be provided for the gas pipe so that accumulation of refrigerant oil may not occur.

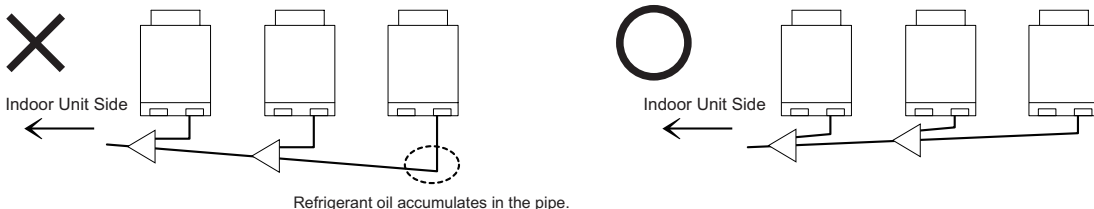
\* Less than 2m



\* 2m or More

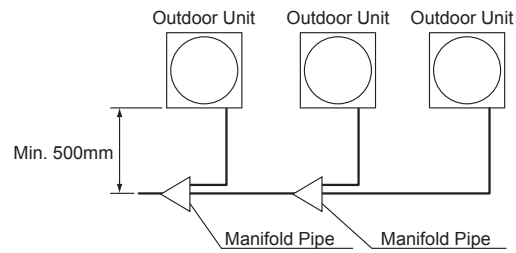


(4) Place the outdoor unit pipe horizontally or with downward gradient towards the indoor unit side, or refrigerant oil may accumulate in the pipe.

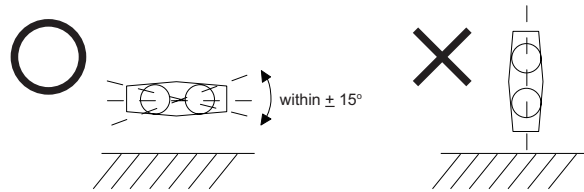


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- (5) For servicing, in case that the pipe is placed forward of the outdoor unit, secure min. 500mm between the outdoor unit and manifold pipe. (When the compressor is replaced, a space of min. 500mm is required.)



- (6) Direction of manifold pipe  
Place the manifold pipe vertically towards the ground (within  $\pm 15^\circ$ ) as shown in the figure.



### 6.4 Piping Connection for Heat Pump System

Perform the piping connection work for each outdoor unit.

**NOTE:**

Ensure that the refrigerant pipe should be connected to the same refrigerant cycle unit.

- Prepare the refrigerant pipe in the field for the piping work.  
Refer to Fig. 6.1 for the position of piping connection.

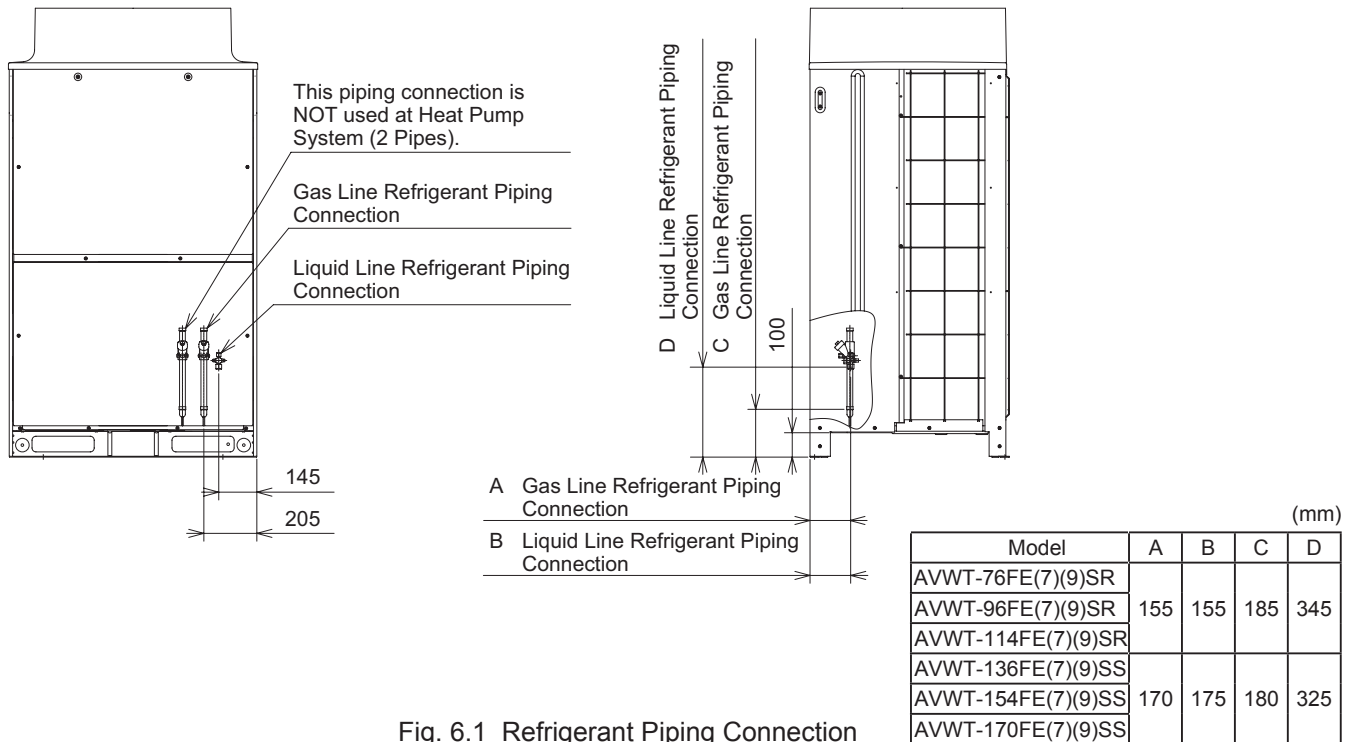
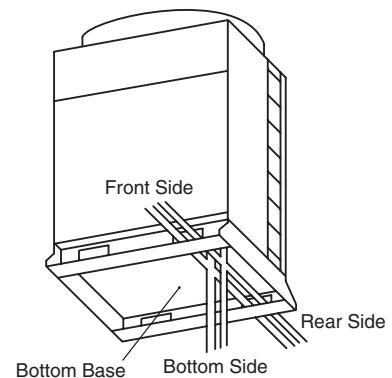


Fig. 6.1 Refrigerant Piping Connection

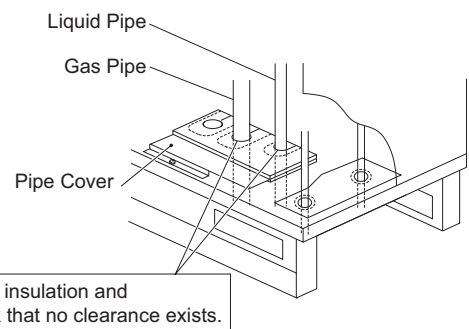
- Piping Direction

Fix the pipes adequately in order to avoid vibration and excessive force to the valve.

- (1) The pipes are available to connect in three directions (front, rear or bottom side) from the bottom base. For the vibration protection, properly fix the piping connection and check that no excessive force applied to the stop valve.

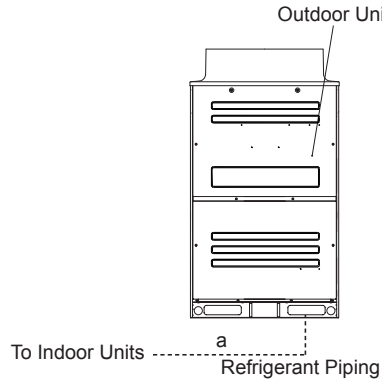


- (2) Operation of the stop valve should be performed according to Item 6.4.4.
- (3) Connect the pipes according to Table 6.1 and 6.2.
- (4) Completely seal the penetration part of the bottom pipe with insulation in order to prevent rain water entering into the conduit.



# INSTALLATION & OPERATION

## 6.4.1 Piping Size for AVWT-76FE(7)(9)SR to AVWT-170FE(7)(9)SS (Base Unit)

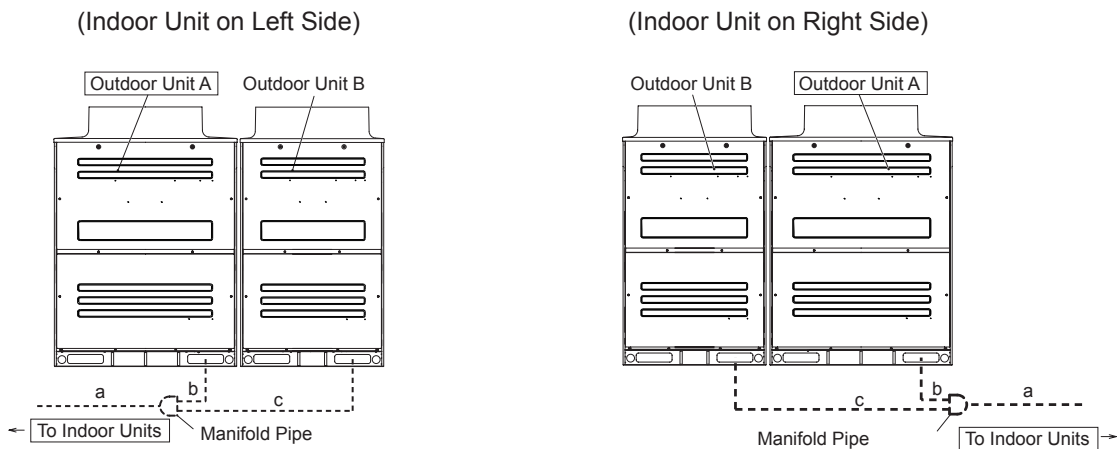


Model		AVWT-76FE(7)(9)SR	AVWT-96FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	
Piping Size	a	Gas	19.05	22.2	25.4	25.4	28.6	28.6
		Liquid	9.53	9.53	12.7	12.7	12.7	15.88

(φmm)

## 6.4.2 Piping Size for AVWT-190FE(7)(9)SZ to AVWT-340FE(7)(9)SZ (2 Units Combination)

< Figure for AVWT-232FE(7)(9)SZ >



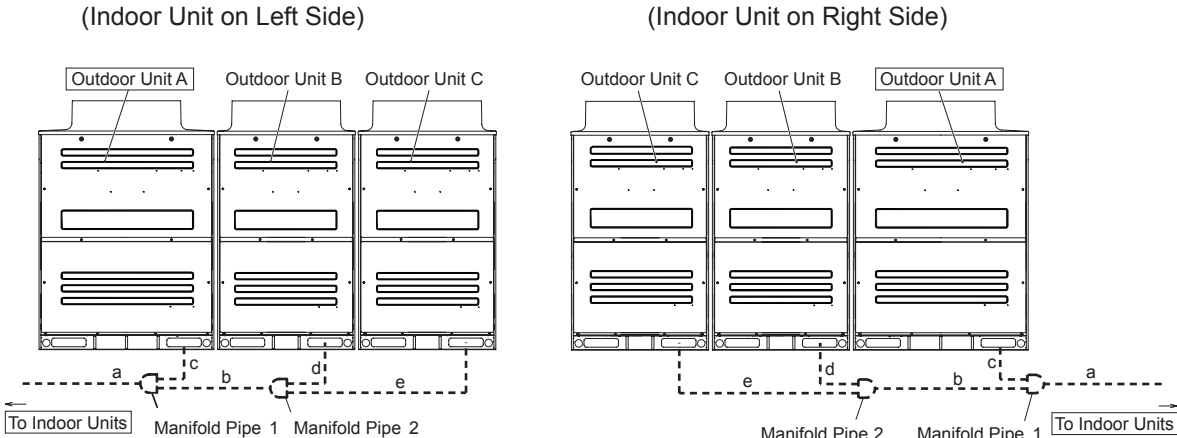
Model		AVWT-190FE(7)(9)SZ	AVWT-212FE(7)(9)SZ	AVWT-232FE(7)(9)SZ	AVWT-250FE(7)(9)SZ	AVWT-272FE(7)(9)SZ	AVWT-290FE(7)(9)SZ	AVWT-308FE(7)(9)SZ	AVWT-324FE(7)(9)SZ	AVWT-340FE(7)(9)SZ	
Combination Unit	Outdoor Unit A	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	
	Outdoor Unit B	AVWT-76FE(7)(9)SR	AVWT-76FE(7)(9)SR	AVWT-96FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	
Manifold Pipe		HFQ-M22F				HFQ-M32F					
Piping Size	a	Gas	28.6	28.6	28.6	31.75	31.75	31.75	31.75	31.75	38.1
		Liquid	15.88	15.88	15.88	19.05	19.05	19.05	19.05	19.05	19.05
	b	Gas	25.4	25.4	25.4	25.4	25.4	28.6	28.6	28.6	28.6
		Liquid	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.88	15.88
	c	Gas	19.05	19.05	22.2	25.4	25.4	25.4	28.6	28.6	28.6
		Liquid	9.53	9.53	9.53	12.7	12.7	12.7	12.7	12.7	15.88

(φmm)

\* Perform the installation of the outdoor unit and piping connection according to the figure. Refer to the table for the outdoor unit model, the manifold pipe model and the piping diameter.

6.4.3 Piping Size for AVWT-364FE(7)(9)SZ to AVWT-510FE(7)(9)SZ (Triple Units Combination)

< Figure for AVWT-364FE(7)(9)SZ >



(φmm)

Model		AVWT-364FE(7)(9)SZ	AVWT-382FE(7)(9)SZ	AVWT-398FE(7)(9)SZ	AVWT-420FE(7)(9)SZ	AVWT-438FE(7)(9)SZ	AVWT-454FE(7)(9)SZ	AVWT-476FE(7)(9)SZ	AVWT-494FE(7)(9)SZ	AVWT-510FE(7)(9)SZ	
Combination Unit	Outdoor Unit A	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	
	Outdoor Unit B	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	
	Outdoor Unit C	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	
Manifold Pipe		HFQ-M32F+HFQ-M32F									
Piping Size	a	Gas	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05	19.05	19.05	19.05
	b	Gas	28.6	28.6	28.6	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	15.88	15.88	15.88	19.05	19.05	19.05	19.05	19.05	19.05
	c	Gas	25.4	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6
		Liquid	12.7	12.7	15.88	15.88	15.88	15.88	15.88	15.88	15.88
	d	Gas	25.4	25.4	25.4	25.4	28.6	28.6	28.6	28.6	28.6
		Liquid	12.7	12.7	12.7	12.7	12.7	15.88	15.88	15.88	15.88
	e	Gas	25.4	25.4	25.4	25.4	25.4	25.4	25.4	28.6	28.6
		Liquid	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.88

\* Perform the installation of the outdoor unit and piping connection according to the figure. Refer to the table for the outdoor unit model, the manifold pipe model and the piping diameter.



## 6.4.4 Stop Valve

### < Gas Valve >

- (1) Make sure that the all the spindles are closed completely.
- (2) Connect the charging hose to the service port and release gas from the high pressure gas pipe.
- (3) Cut the end of the closing pipe ( $\phi 6.35$ ) and check that no gas exists inside the high pressure gas pipe. Do not cut the end of the closing pipe ( $\phi 6.35$ ) for the low pressure gas pipe in order to prevent refrigerant leakage. If the end of the closing pipe is cut, close it completely.
- (4) Remove the stop valve cover.
- (5) Remove the closing pipe from the brazing portion by using a burner. Pay attention to the flame from the burner not to burn the stop valve body.

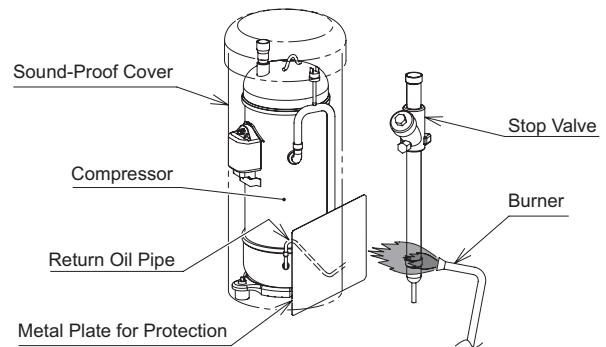
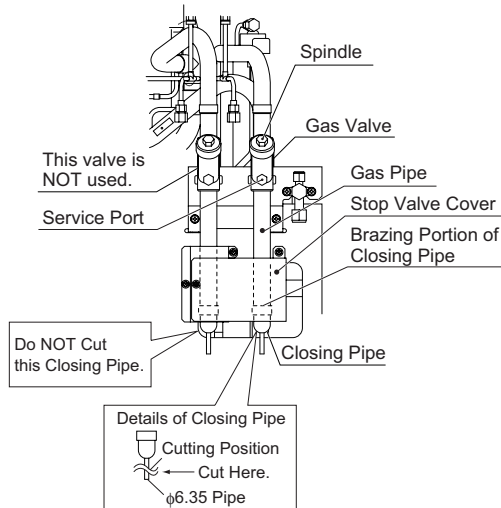


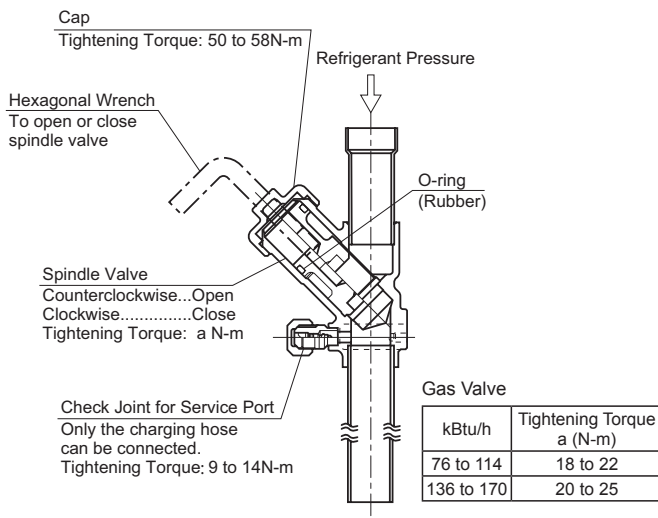
Fig. 6.2

## CAUTION

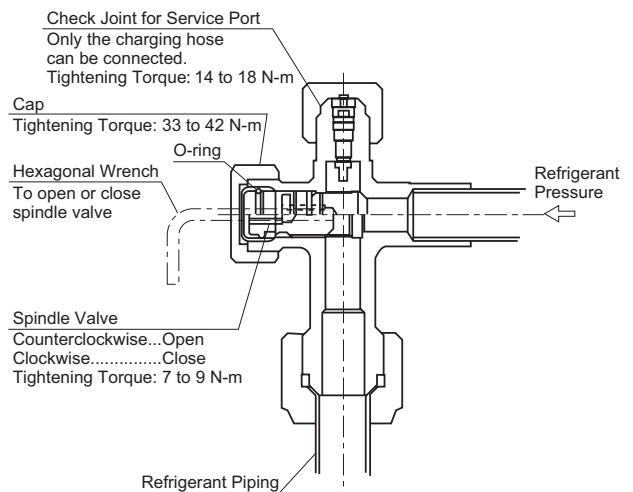
- Ensure that there is no gas inside the pipe when removing the closing pipe. Otherwise, the pipe may be blown out and it may lead to injury.
- Protect the return oil pipe and vibration proof of the compressor with the metal plate when using a burner.

- The details of stop valves are as follows.

### < Gas Valve >



### < Liquid Valve >



## CAUTION

- Do not apply an abnormal big force to the spindle valve at the end of opening. The back seat construction is not provided.
- At the test run, fully open the spindle. If not fully opened, the devices will be damaged.

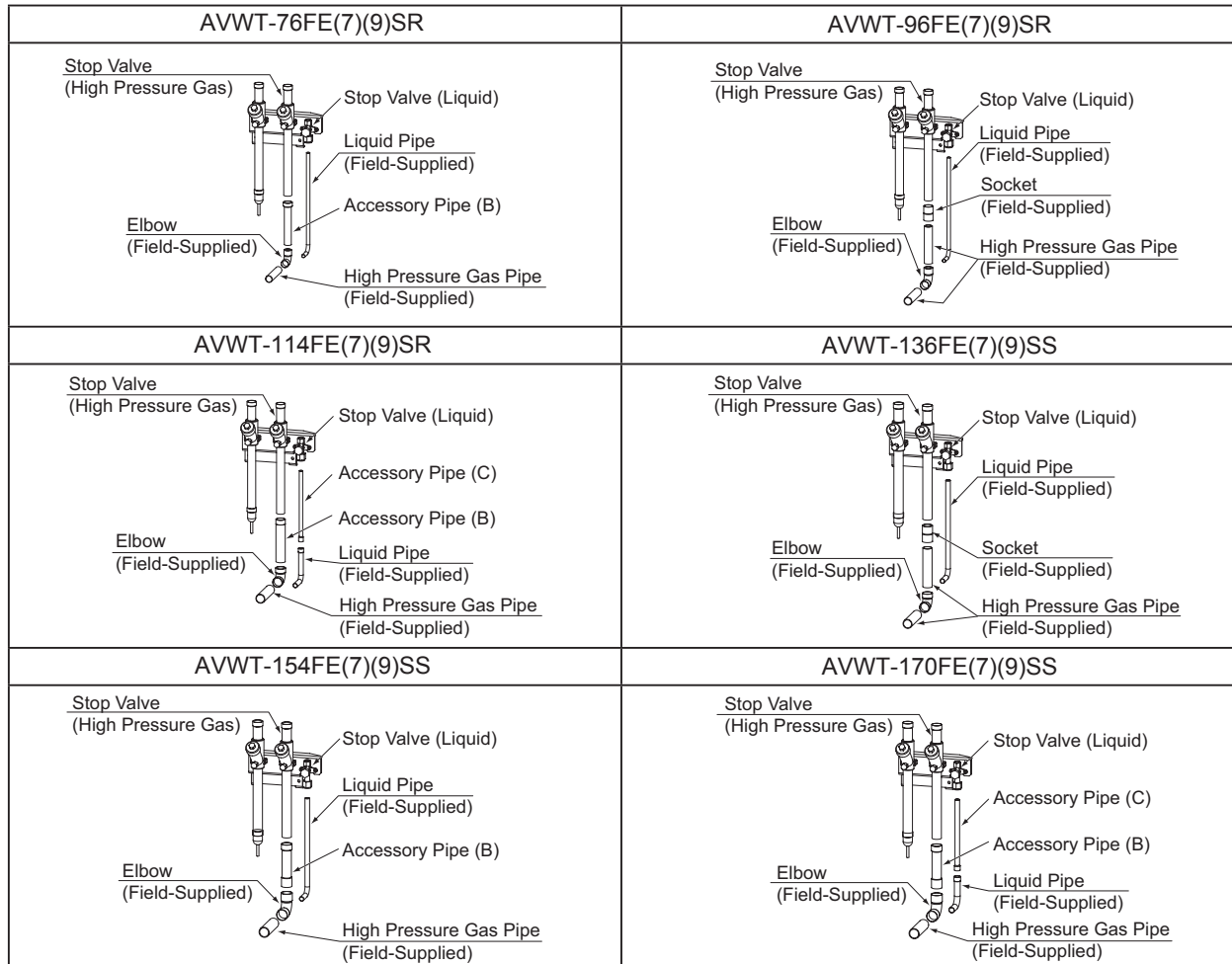
6.4.5 Piping Connection

- (1) Make sure that the stop valves are closed completely.
- (2) Protect the compressor and sound-proof cover with metal plate when brazing the high pressure gas pipe as shown in Fig. 6.2.  
Pay attention to the flame from the burner not to burn the stop valve body.
- (3) Connect the indoor unit and the outdoor unit with refrigerant piping.  
Prevent the refrigerant piping from touching weak parts of the building such as wall, ceiling, etc.  
(Abnormal sound may occur due to the vibration of the piping.)
- (4) As for the flaring work of the field pipe, use the specified tightening torque in Table 6.3.  
Put nitrogen gas into the pipe when brazing.
- (5) Insulate the high pressure gas pipe and liquid pipe completely.
- (6) Mount the piping cover equipped with the outdoor unit after the piping connection.  
If not, the unit may damaged due to snow or rain water entering.

Table. 6.3 Tightening Work of Flare Nut

Required Tightening Torque		(JIS B8607)
Pipe Size	Tightening Torque	
φ6.35 (1/4)	14 to 18 (N-m)	
φ9.53 (3/8)	34 to 42 (N-m)	
φ12.7 (1/2)	49 to 61 (N-m)	
φ15.88 (5/8)	68 to 82 (N-m)	
φ19.05 (3/4)	100 to 120 (N-m)	

● Details of Stop Valve Piping Connection



**NOTES:**

1. Ensure that the closing pipe of the high pressure gas stop valve (1 place) is removed firstly.
2. Refer to the item 6.2 for the flaring work.

# INSTALLATION & OPERATION

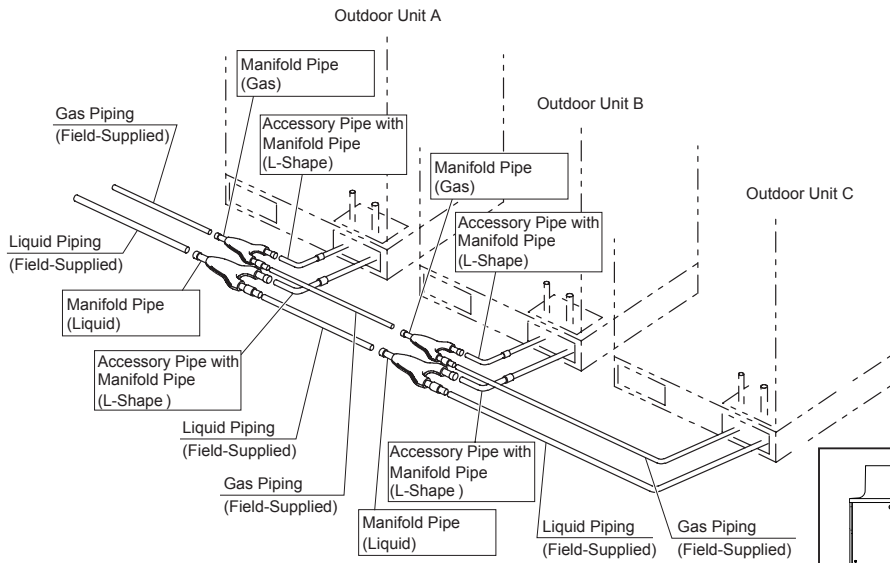
- Manifold Pipe (Optional Parts)

Item	Operation Type	Applicable Outdoor Unit		Model	Remarks
		Outdoor Unit kBtu/h	Outdoor Unit Number		
Manifold Pipe	for Heat Pump Type	190 to 232	2	HFQ-M22F	2 Pipes Type * for Gas * for Liquid
		250 to 340	2	HFQ-M32F	
		364 to 398	3	HFQ-M32F+HFQ-M32F	
		420 to 510	3		

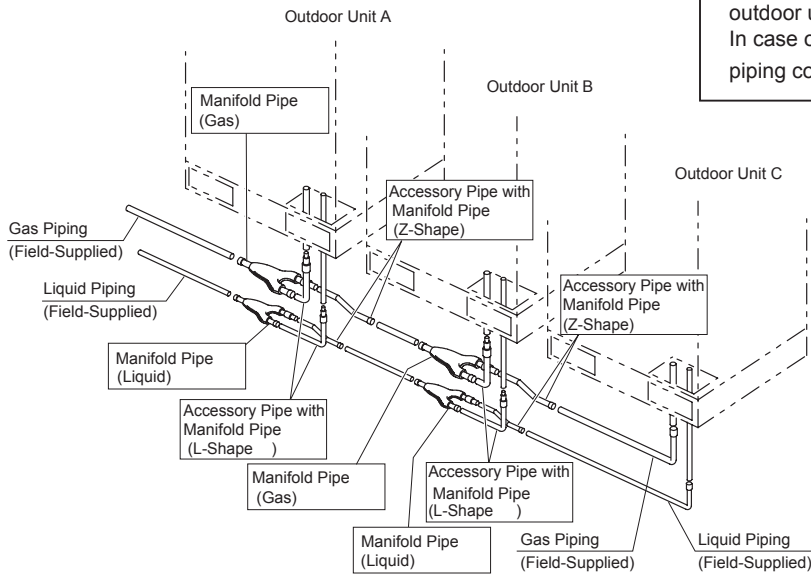
- Construction Example (In Case of 364kBtu/h: 2 Pipes Type)

Regarding the piping work for 190kBtu/h and over, refer to the item 11.3.1 "For Heat Pump System".

< Front Side or Rear Side Piping Connection >



< Downward Piping Connection >



- Branch Pipe(Optional Parts)

< Line Branch >

First Branch

Outdoor Unit (kBtu/h)	Model
76 to 96	HFQ-102F
114 to 150	HFQ-162F
170 to 232	HFQ-242F
250 to 510	HFQ-302F

Pipe Diameter and Branch Pipe after First Branch

Total Indoor Unit (kBtu/h)	Gas (φmm)	Liquid (φmm)	Model
Lower than 57	15.88	9.53	HFQ-102F
57 to 86	19.05	9.53	
86 to 114	22.2	9.53	
114 to 154	25.4	12.7	HFQ-162F
154 to 170	28.6	12.7	
170 to 250	28.6	15.88	HFQ-242F
250 to 340	31.75	19.05	HFQ-302F
Over 340	38.1	19.05	

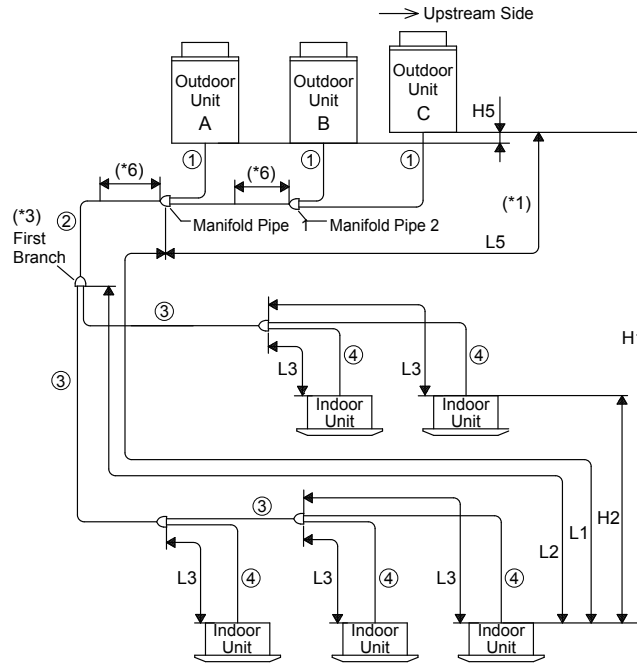
# INSTALLATION & OPERATION

- Piping Size (φmm) and Branch Pipe Selection

① Pipe Diameter for Outdoor Unit

② Main Pipe Diameter  
(Base Unit or Manifold Pipe 1 to First Branch)  
[Branch Pipe of First Branch] (\*2)

Outdoor Unit (kBtu/h)	Equivalent Piping Length < 100m	
	Gas	Liquid
76	19.05	9.53
96	22.2	9.53
114 and 136	25.4	12.7
154	28.6	12.7
170 to 232	28.6	15.88
232 to 324	31.75	19.05
340 to 510	38.1	19.05



③ [Pipe Diameter after First Branch] (\*3)

Total Indoor Unit (kBtu/h)	Gas	Liquid
Lower than 57	15.88	9.53
57 to 86	19.05	9.53
86 to 114	22.2	9.53
114 to 154	25.4	12.7
154 to 170	28.6	12.7
170 to 212	28.6	15.88
212 to 250	31.75	19.05
Over 340	38.1	19.05

④ [Pipe Diameter between Branch Pipe and Indoor Unit] (\*4)

Indoor Unit (kBtu/h)	Gas	Liquid
07 to 14	12.7	6.35 (*5)
17 to 18	15.88	6.35 (*5)
22 to 54	15.88	9.53
76	19.05	9.53
96	22.2	9.53

- Piping Work Conditions

Item	Mark	Allowable Piping Length (*7)	
		≤ the recommended connectable number of Indoor Unit	≥ the recommended connectable number of Indoor Unit
Total Piping Length	Total Liquid Piping Actual Length	≤ 1,000m (*8)	≤ 300m
Maximum Piping Length	Actual Length	≤ 165m	≤ 165m
	Equivalent Length	≤ 190m	≤ 190m
Maximum Piping Length between Branch Pipe of 1st Branch and Each Indoor Unit	L2	≤ 90m	≤ 40m
Maximum Piping Length between Each Branch Pipe and Each Indoor Unit	L3	≤ 40m	≤ 30m
Piping Length between Manifold Pipe1 and Each Outdoor Unit	L5	≤ 10m	≤ 10m
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	≤ 50m	≤ 50m
	O.U. is Lower	≤ 40m	≤ 40m
Height Difference between Indoor Units	H2	≤ 15m	≤ 15m
Height Difference between Outdoor Units	H5	≤ 0.1m	≤ 0.1m

- (\*1): The manifold pipe is counted from the indoor unit side (as Manifold Pipe 1).
- (\*2): When the maximum length of the equivalent refrigerant pipe (L1) from the outdoor unit/Manifold Pipe 1 to the indoor unit is over 100m, the pipe size of gas/liquid line from the outdoor unit/manifold pipe 1 to first branch should be increased one size with the reducer (field-supplied).
- (\*3): Even if the equivalent refrigerant piping length is more than 100m, no need to increase the pipe size after first branch. If the branch pipe size is larger than the first branch, adjust the branch pipe size to the first branch. In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as before the branch.
- (\*4): The pipe diameter (④) should be the same as the indoor unit piping connection size.
- (\*5): When the liquid piping length is longer than 15m, use φ9.53 pipe and reducer (field-supplied).
- (\*6): Keep the straight line distance of 500mm or more after the manifold pipe.
- (\*7): The condition of refrigerant piping installation is different depending on the connected indoor unit quantities.
- (\*8): Allowable total piping length may become shorter than 1,000m due to the limitation of maximum additional refrigerant amount as following table.

kBTu/h	76 and 96	114	134 and 154	170	190 to 232	250 to 510
Max. Additional Refrigerant Charge (kg)	28	33	38.5	42	46	52

**NOTES:**

1. Check the gas pipe and liquid pipe are equivalent in terms of the piping length and piping system.
2. Use a branch pipe (system components) for the branch pipe of indoor unit.
3. Install the indoor unit and branch pipe according to each "Installation & Maintenance Manual".
4. If the piping length (L3) between each branch pipe and each indoor unit is considerably longer than other indoor unit, refrigerant may not flow well and also performance may be deteriorated compared to other models.  
(Recommended Piping Length: within 15m)

# INSTALLATION & OPERATION

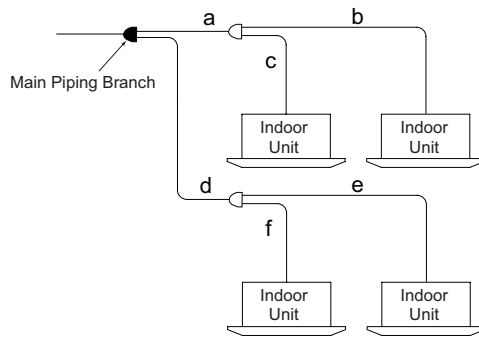
- Piping Branch Restriction

Follow the table below when performing the field-supplied piping work.

Piping Length between Branch Pipe (First Branch) and Each Indoor Unit (L2)	Main Piping Branch *		Indoor Unit Capacity Ratio After Main Branch
	Piping Length After Branch	Number of Main Piping Branch	
≤ 40m	a+b+c ≤ 30m or d+e+f ≤ 30m	without Limit	-
	a+b+c > 30m and d+e+f > 30m	within 2	
within 41m to 90m	-	within 1 (Fig.1)	≥ 40% (Fig.2)

**NOTE:**

\* Main Piping Branch: Distribution from One (1) Branch Pipe to Two (2) Branch Pipes  
The number of main piping branch depends on the piping length after branch (a to f).



Main piping branches are 2 portions.

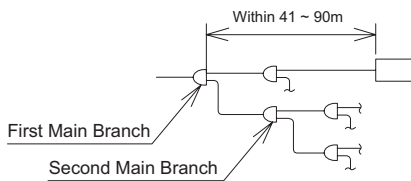


Fig. 1



Indoor unit capacity ratio is less than 40%.

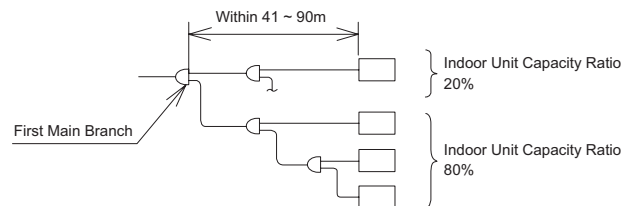


Fig. 2

### 6.5 Piping Connection for Heat Recovery System

Perform the piping connection work for each outdoor unit.

**NOTE:**

Ensure that the refrigerant pipe should be connected to the same refrigerant cycle unit.

- Prepare the refrigerant pipe in the field for the piping work. Refer to Fig. 6.3 for the position of piping connection.

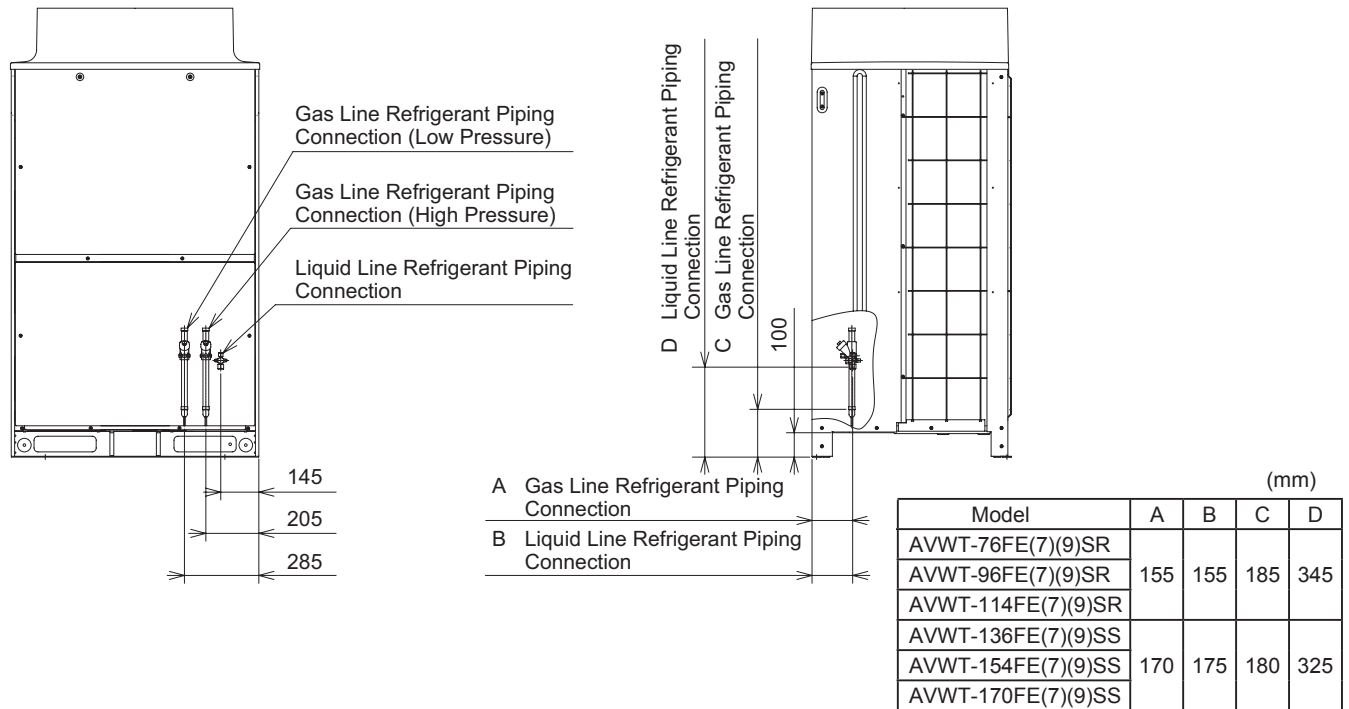
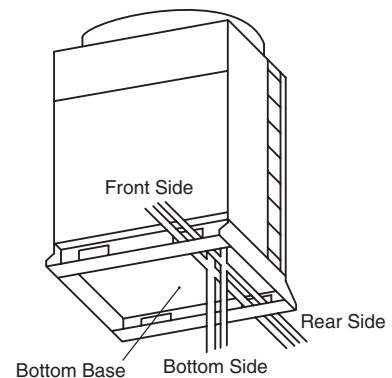


Fig. 6.3 Refrigerant Piping Connection

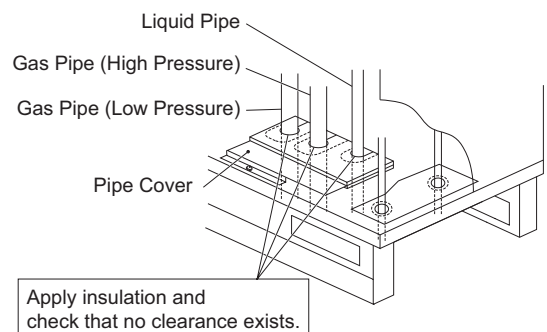
- Piping Direction

Fix the pipes adequately in order to avoid vibration and excessive force to the valve.

- (1) The pipes are available to connect in three directions (front, rear or bottom side) from the bottom base. For the vibration protection, properly fix the piping connection and check that no excessive force applied to the stop valve.

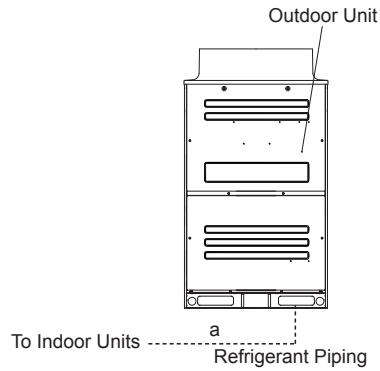


- (2) Operation of the stop valve should be performed according to Item 6.5.4.
- (3) Connect the pipes according to Table 6.1 and 6.2.
- (4) Completely seal the penetration part of the bottom pipe with insulation in order to prevent rain water entering into the conduit.





6.5.1 Piping Size for AVWT-76FE(7)(9)SR to AVWT-170FE(7)(9)SS (Base Unit)

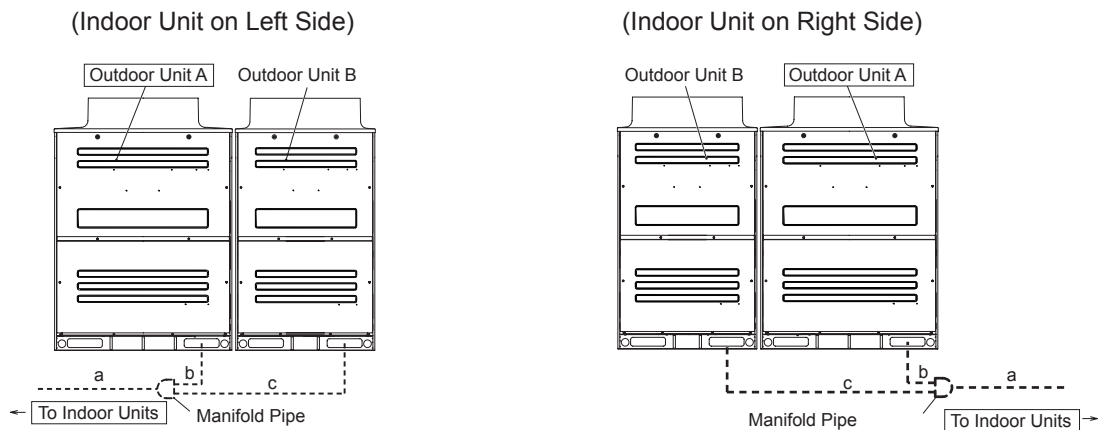


(φmm)

Model		AVWT-76FE(7)(9)SR	AVWT-96FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	
Piping Size	a	Low Pressure Gas	19.05	22.2	25.4	25.4	28.6	28.6
		High Pressure Gas	15.88	19.05	22.2	22.2	22.2	22.2
		Liquid	9.53	9.53	12.7	12.7	12.7	15.88

6.5.2 Piping Size for AVWT-190FE(7)(9)SZ to AVWT-340FE(7)(9)SZ (2 Units Combination)

< Figure for AVWT-232FE(7)(9)SZ >



(φmm)

Model		AVWT-190FE(7)(9)SZ	AVWT-212FE(7)(9)SZ	AVWT-232FE(7)(9)SZ	AVWT-250FE(7)(9)SZ	AVWT-272FE(7)(9)SZ	AVWT-290FE(7)(9)SZ	AVWT-308FE(7)(9)SZ	AVWT-324FE(7)(9)SZ	AVWT-340FE(7)(9)SZ	
Combination Unit	Outdoor Unit A	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	
	Outdoor Unit B	AVWT-76FE(7)(9)SR	AVWT-76FE(7)(9)SR	AVWT-96FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	
Manifold Pipe		HFQ-M202F				HFQ-M212F					
Piping Size	a	Low Pressure Gas	28.6	28.6	28.6	31.75	31.75	31.75	31.75	31.75	31.75
		High Pressure Gas	22.2	25.4	25.4	25.4	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	19.05	19.05	19.05	19.05	19.05	19.05
	b	Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	28.6	28.6	28.6	28.6
		High Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.88	15.88
	c	Low Pressure Gas	19.05	19.05	22.2	25.4	25.4	25.4	28.6	28.6	28.6
		High Pressure Gas	15.88	15.88	19.05	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	9.53	9.53	9.53	12.7	12.7	12.7	12.7	12.7	15.88

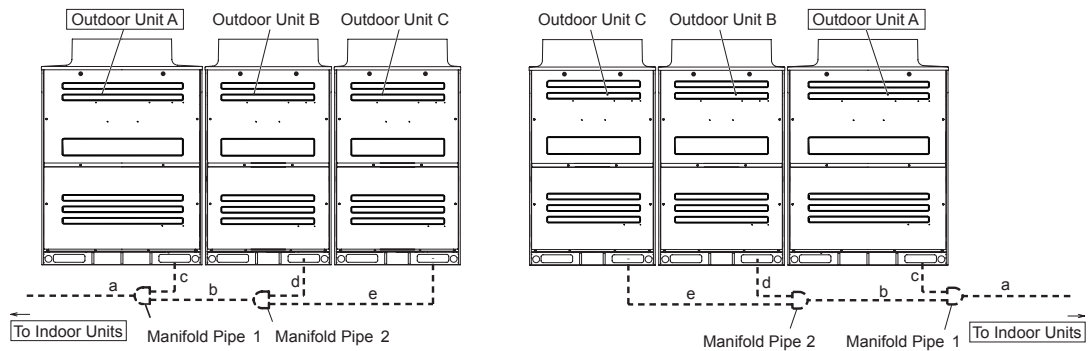
\* Perform the installation of the outdoor unit and piping connection according to the figure. Refer to the table for the outdoor unit model, the manifold pipe model and the piping diameter.

6.5.3 Piping Size for AVWT-364FE(7)(9)SZ to AVWT-510FE(7)(9)SZ (Triple Units Combination)

< Figure for AVWT-364FE(7)(9)SZ >

(Indoor Unit on Left Side)

(Indoor Unit on Right Side)



(φmm)

Model		AVWT-364FE(7)(9)SZ	AVWT-382FE(7)(9)SZ	AVWT-398FE(7)(9)SZ	AVWT-420FE(7)(9)SZ	AVWT-438FE(7)(9)SZ	AVWT-454FE(7)(9)SZ	AVWT-476FE(7)(9)SZ	AVWT-494FE(7)(9)SZ	AVWT-510FE(7)(9)SZ	
Combination Unit	Outdoor Unit A	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	
	Outdoor Unit B	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	AVWT-170FE(7)(9)SS	
	Outdoor Unit C	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-114FE(7)(9)SR	AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS	
Manifold Pipe		HFQ-M302F									
Piping Size	a	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1	38.1
		High Pressure Gas	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05	19.05	19.05	19.05
	b	Low Pressure Gas	28.6	28.6	28.6	31.75	31.75	31.75	31.75	31.75	31.75
		High Pressure Gas	25.4	25.4	25.4	28.6	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	19.05	19.05	19.05	19.05	19.05	19.05
	c	Low Pressure Gas	25.4	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6
		High Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	15.88	15.88	15.88	15.88	15.88	15.88	15.88
	d	Low Pressure Gas	25.4	25.4	25.4	25.4	28.6	28.6	28.6	28.6	28.6
		High Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	12.7	15.88	15.88	15.88	15.88
e	Low Pressure Gas	25.4	25.4	25.4	25.4	25.4	25.4	25.4	28.6	28.6	
	High Pressure Gas	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2	
	Liquid	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	15.88	

\* Perform the installation of the outdoor unit and piping connection according to the figure.  
Refer to the table for the outdoor unit model, the manifold pipe model and the piping diameter.

## 6.5.4 Stop Valve

### < Gas Valves >

- (1) Make sure that the all the spindles are closed completely.
- (2) Connect the charging hose to the service port and release gas from the high and low pressure gas pipes.
- (3) Cut the end of the closing pipes ( $\phi 6.35$ ) and check that no gas exists inside the high and low pressure gas pipes.
- (4) Remove the stop valve cover.
- (5) Remove the closing pipe from the brazing portion by using a burner. Pay attention to the flame from the burner not to burn the stop valve body.

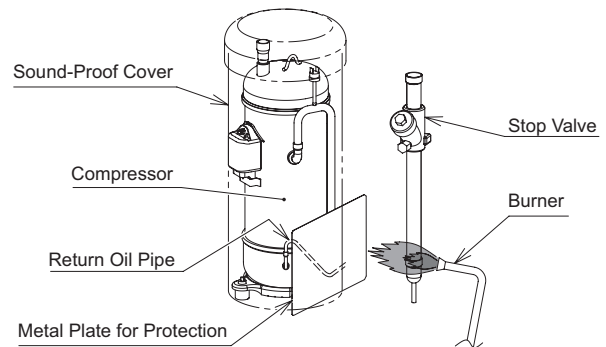
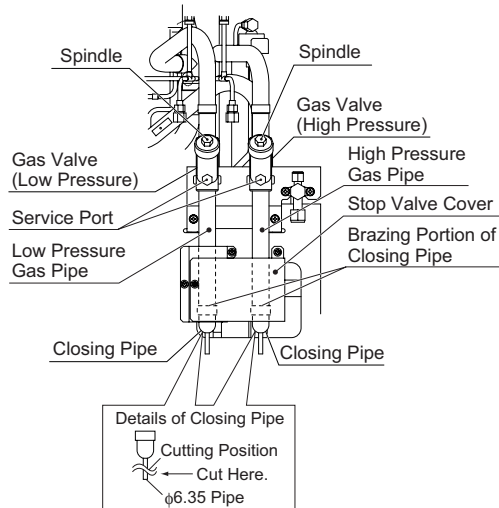


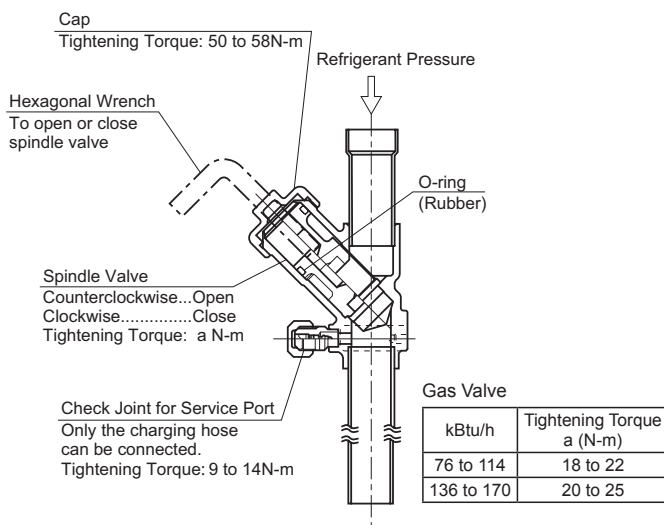
Fig. 6.4

## CAUTION

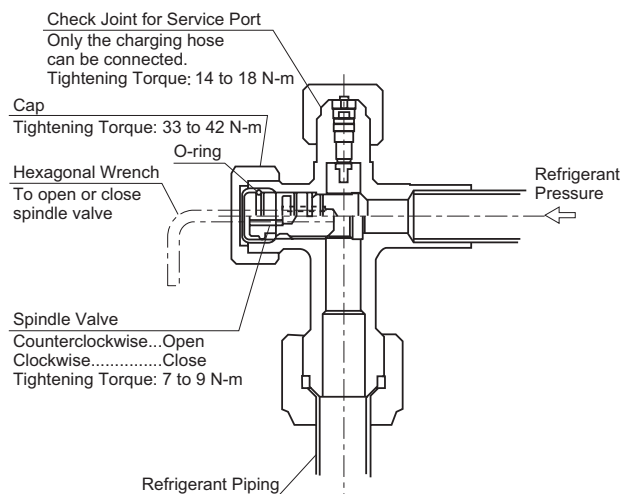
- Ensure that there is no gas inside the pipe when removing the closing pipe. Otherwise, the pipe may be blown out and it may lead to injury.
- Protect the return oil pipe and vibration proof of the compressor with the metal plate when using a burner.

- The details of stop valves are as follows.

### < Gas Valves >



### < Liquid Valve >



## CAUTION

- Do not apply an abnormal big force to the spindle valve at the end of opening. The back seat construction is not provided.
- At the test run, fully open the spindle. If not fully opened, the devices will be damaged.

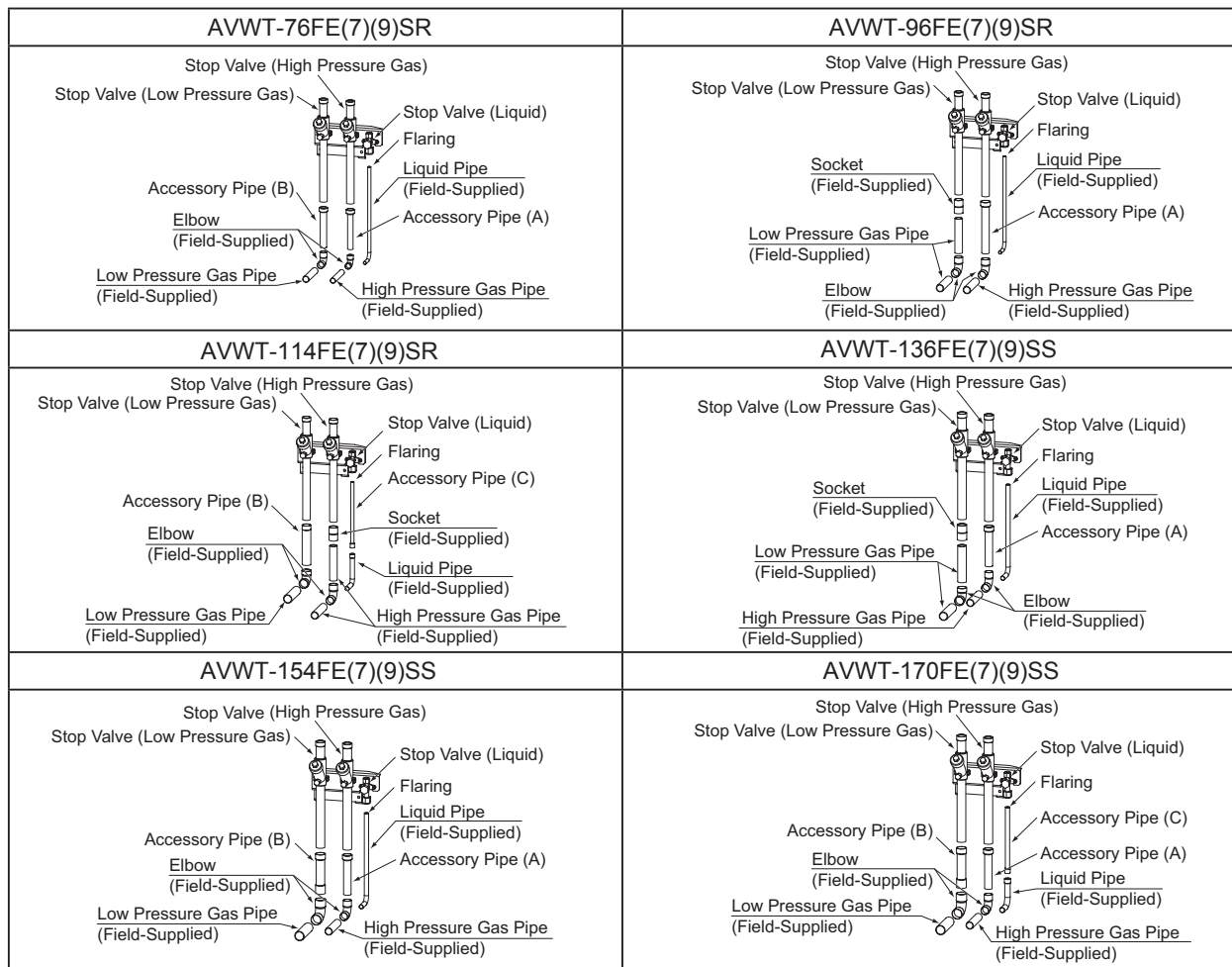
6.5.5 Piping Connection

- (1) Make sure that the stop valves are closed completely.
- (2) Protect the compressor and sound-proof cover with metal plate when brazing the gas pipes as shown in Fig. 6.4.  
Pay attention to the flame from the burner not to burn the stop valve body.
- (3) Connect the indoor unit and the outdoor unit with refrigerant piping.  
Prevent the refrigerant piping from touching weak parts of the building such as wall, ceiling, etc.  
(Abnormal sound may occur due to the vibration of the piping.)
- (4) As for the flaring work of the field pipe, use the specified tightening torque in Table 6.4.  
Put nitrogen gas into the pipe when brazing.
- (5) Insulate the gas pipe and liquid pipe completely.
- (6) Mount the piping cover equipped with the outdoor unit after the piping connection.  
If not, the unit may damaged due to snow or rain water entering.

Table. 6.4 Tightening Work of Flare Nut

Pipe Size	Tightening Torque
φ6.35 (1/4)	14 to 18 (N-m)
φ9.53 (3/8)	34 to 42 (N-m)
φ12.7 (1/2)	49 to 61 (N-m)
φ15.88 (5/8)	68 to 82 (N-m)
φ19.05 (3/4)	100 to 120 (N-m)

● Details of Stop Valve Piping Connection



**NOTES:**

1. Ensure that the closing pipe of the high and low pressure gas stop valves (2 places) is removed firstly.
2. Refer to the item 6.2 for the flaring work.

# INSTALLATION & OPERATION

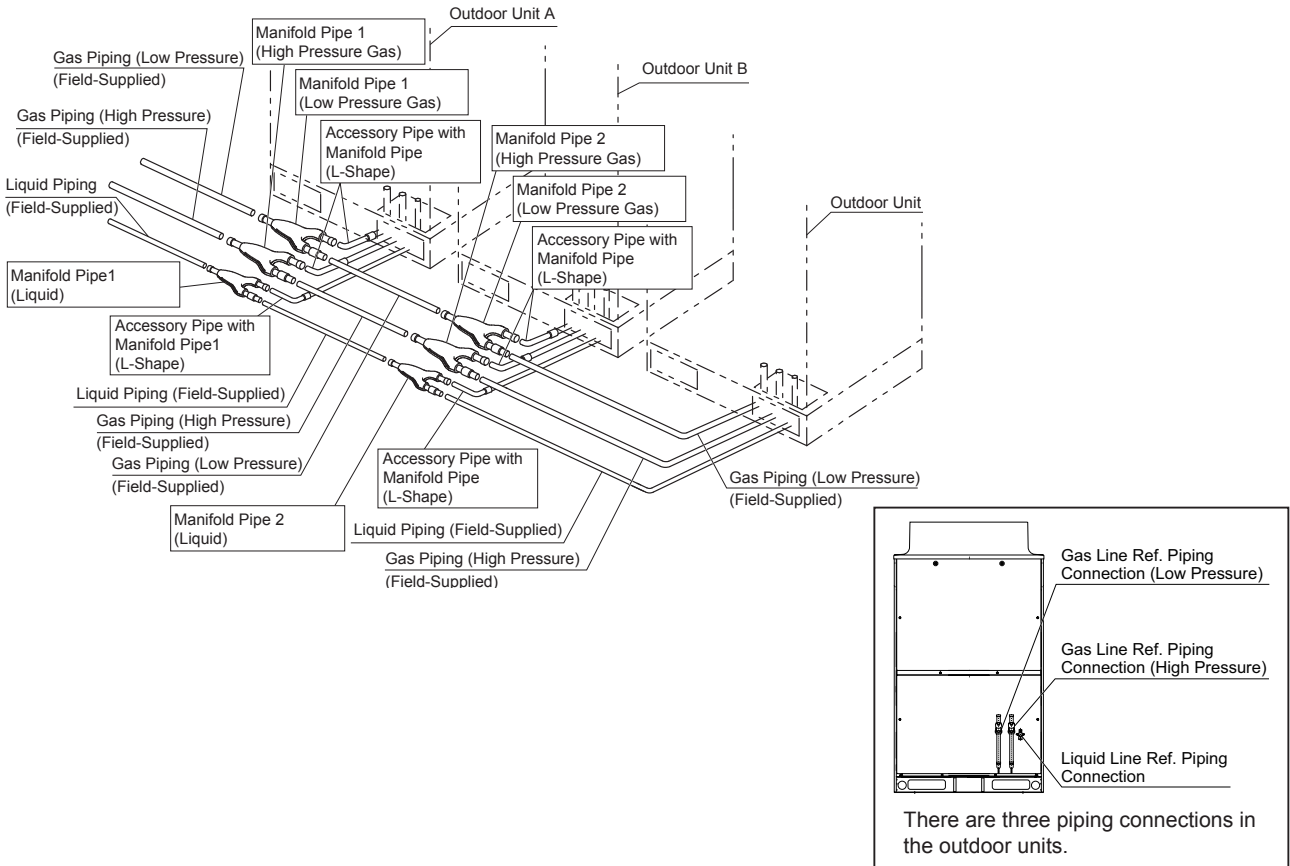
- Manifold Pipe (Optional parts)

Item	Operation Type	Applicable Outdoor Unit		Model	Remarks
		Outdoor Unit kBtu/h	Outdoor Unit Number		
Manifold Pipe	for Heat Recovery Type	190 to 232	2	HFQ-M202F	3 Pipes Type * for High Pressure Gas: 1set * for Low Pressure Gas: 1set * for Liquid: 1set
		250 to 340	2	HFQ-M212F	
		364 to 510	3	HFQ-M302F	

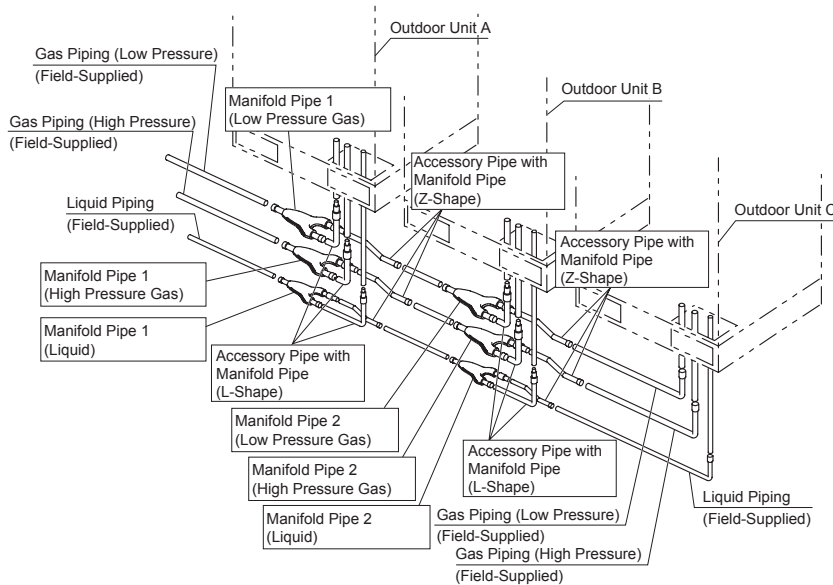
- Construction Example (In Case of 364kBtu/h: 3 Pipes Type)

Regarding the piping work for 190kBtu/h and over, refer to the item 11.3.2 “For Heat Recovery System”.

< Front Side or Rear Side Piping Connection >



< Downward Piping Connection >



- Branch Pipe (Optional Parts)

< Line Branch >

First Branch

Outdoor Unit (kBtu/h)	Model
76 to 96	HFQ-M282F
114 to 154	HFQ-M452F
170 to 232	HFQ-M562F
250 to 340	HFQ-M692F
264 to 510	HFQ-M902F

Pipe Diameter and Branch Pipe after First Branch \*

Total Indoor Unit (kBtu/h)	Low Pressure Gas (φmm)	High Pressure Gas (φmm)	Liquid (φmm)	Model
Lower than 57	15.88	12.7	9.53	HFQ-M142F
57 to 86	19.05	15.88	9.53	HFQ-M282F
86 to 114	22.2	19.05	9.53	
114 to 154	25.4	22.2	12.7	HFQ-M452F
154 to 170	28.6	22.2	12.7	HFQ-M562F
170 to 212	28.6	22.2	15.88	
212 to 250	28.6	25.4	15.88	HFQ-M692F
250 to 340	31.75	28.6	19.05	
Over 340	38.1	31.75	19.05	HFQ-M902F

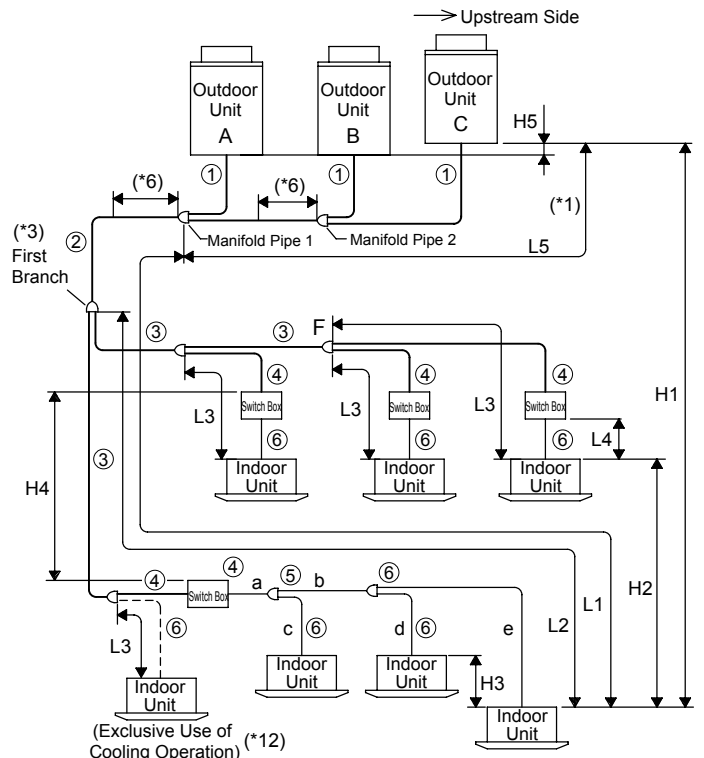
\*: If the piping branch at 2 pipes portion is necessary, use branch pipe of HFQ-102F, HFQ-162F, HFQ-242F for heat pump type.

# INSTALLATION & OPERATION

● Piping Size (φmm)

- ① Pipe Diameter for Outdoor Unit
- ② Main Pipe Diameter  
(Base Unit or Manifold Pipe 1 to First Branch)  
[Branch pipe of First Branch] (3 Pipes) (\*2)

Outdoor Unit (kBtu/h)	Low Pressure Gas	High Pressure Gas	Liquid
76	19.05	15.88	9.53
96	22.2	19.05	9.53
114 and 136	25.4	22.2	12.7
154	28.6	22.2	12.7
170 to 190	28.6	22.2	15.88
212 to 232	28.6	25.4	15.88
250	31.75	25.4	19.05
272 to 340	31.75	28.6	19.05
364 to 510	38.1	31.75	19.05



- : 3 Pipes Portion (High Pressure Gas Pipe, Low Pressure Gas Pipe, Liquid Pipe)
- : 2 Pipes Portion (Gas Pipe, Liquid Pipe)
- - - : 2 Pipes Portion (Low Pressure Gas Pipe, Liquid Pipe)

- ③ [Pipe Diameter after First Branch] (3 Pipes) (\*3)(\*7)

Total Indoor Unit kBtu/h	Low Pressure Gas	High Pressure Gas	Liquid
Lower than 57	15.88	12.7	9.53
57 to 86	19.05	15.88	9.53
86 to 114	22.2	19.05	9.53
114 to 154	25.4	22.2	12.7
154 to 170	28.6	22.2	12.7
170 to 212	28.6	22.2	15.88
212 to 250	28.6	25.4	15.88
250 to 240	31.75	28.6	19.05
Over 340	38.1	31.75	19.05

- ④ [Pipe Diameter between Switch Box to Branch Pipe] (3 Pipes and 2 Pipes) (\*9)

Switch Box Model	Max. Combination of Indoor Unit (*8)	Available Combination of Indoor Unit Capacity (kBtu/h) (*10), (*11)	3 Pipes		2 Pipes	
			Low Pressure Gas	High Pressure Gas	Gas	Liquid
HCH-160D	7	07 to 14	15.88	12.7	12.7 (*15)	9.53
		15 to 38	15.88	12.7	15.88	9.53
		39 to 57	19.05	15.88	15.88	9.53
HCH-280D	8	58 to 76	19.05	15.88	19.05	9.53
		77 to 96	22.2	19.05	22.2	9.53

- ⑤ [Pipe Diameter for 2 Pipes and Branch Pipe]

Total Indoor Unit kBtu/h	Gas	Liquid
Lower than 57	15.88	9.53
57 to 86	19.05	9.53
86 to 114	22.2	9.53
114 to 154	25.4	12.7
154 to 170	28.6	12.7
170 to 250	28.6	15.88

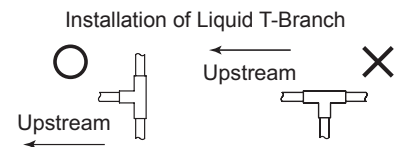
- ⑥ [Pipe Diameter between Branch Pipe and Indoor Unit](2 Pipes) (\*4)

Indoor Unit kBtu/h	Gas	Liquid
07 to 14	12.7	6.35 (*5)
17 and 18	15.88	6.35 (*5)
22 to 54	15.88	9.53
76	19.05	9.53
96	22.2	9.53

● Piping Work Conditions (Refer to the figure of previous page.)

Item	Mark	Allowable Piping Length (*13)	
		≤ the recommended connectable number of Indoor Unit	≥ the recommended connectable number of Indoor Unit
Total Piping Length	Total Liquid Piping Actual Length	≤ 1,000m (*14)	≤ 300m
Maximum Piping Length	Actual Length	L1	≤ 165m
	Equivalent Length		≤ 190m
Maximum Piping Length between Branch Pipe of 1st Branch and Each Indoor Unit	L2	≤ 90m	≤ 40m
Maximum Piping Length between Each Branch Pipe and Each Indoor Unit	L3	≤ 40m	≤ 30m
Total Piping Length between Switch Box and Each Indoor Unit	* L4 * a+b+c+d+e	HCH-160D: ≤ 30m	HCH-160D: ≤ 30m
		HCH-280D: ≤ 10m	HCH-280D: ≤ 10m
Piping Length between Manifold Pipe1 and Each Outdoor Unit	L5	≤ 10m	≤ 10m
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	H1	≤ 50m
	O.U. is Lower		≤ 40m
Height Difference between Indoor Units	H2	≤ 15m	≤ 15m
Height Difference between Indoor Units using the Same Switch Box	H3	≤ 4m	≤ 4m
Height Difference between Switch Box	H4	≤ 15m	≤ 15m
Height Difference between Outdoor Units	H5	≤ 0.1m	≤ 0.1m

- (\*1): The manifold pipe is counted from the indoor unit side (as Manifold Pipe 1).
- (\*2): When the maximum length of the equivalent refrigerant pipe (L1) from the outdoor unit/manifold pipe1 to the indoor unit is over 100m, the pipe size of liquid line from the outdoor unit/manifold pipe1 to first branch should be increased one size with the reducer (field-supplied).
- (\*3): Even if the equivalent refrigerant piping length is more than 100m, no need to increase the pipe size after first branch. If the branch pipe size is larger than the first branch, adjust the branch pipe size to the first branch. In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as before the branch.
- (\*4): The pipe diameter ⑥ should be the same as the indoor unit piping connection size.
- (\*5): When the liquid piping length is longer than 15m, use φ9.53 pipe and reducer (field-supplied).
- (\*6): Keep the straight line distance of 500mm or more after the manifold pipe.
- (\*7): In case of the line branch, if the length of the pipe between the terminal branch of 3 pipes (specified in the figure of mark F) and the farthest indoor unit exceeds 5m, use a T-branch to the applicable liquid pipe of 3 branches.



- (\*8): In case that the number of connectable indoor unit exceeds four, the high/low pressure gas pipe, gas pipe and liquid pipe ④⑤⑥ need to increase one size respectively.
  - (\*9): The liquid pipe is not required to connect to the Switch Box. Refer to Table ⑥ for the liquid pipe diameter between branch pipe and indoor unit.
  - (\*10): In case that the combination of indoor unit capacity is 96kBtu/h for HCH-280D, the performance may decrease approximate 5% in cooling and 10% in heating.
  - (\*11): The excess of the total capacity may cause insufficient performance and abnormal sound. Be sure to connect within the allowable total capacity.
  - (\*12): For the exclusive cooling operation, connect indoor units with low pressure gas pipe and liquid pipe (without Switch Box). The total capacity of the exclusive cooling operation should be smaller than 50% of the total indoor unit capacity.
  - (\*13): The condition of refrigerant piping installation is different depending on the connected indoor unit quantities.
  - (\*14): Allowable total piping length may become shorter than 1,000m due to the limitation of maximum additional refrigerant amount as following table.
- | kBtu/h                                  | 76 and 96 | 114 | 126 and 154 | 170 | 190 to 232 | 250 to 510 |
|---|-----------|-----|-------------|-----|------------|------------|
| Max. Additional Refrigerant Charge (kg) | 28        | 33  | 38.5        | 42  | 46         | 52         |
- (\*15): In case that a branch is located downstream of the Switch Box and also the connected indoor unit capacity is 7~14kBtu/h, use φ15.88 for the gas pipe.

**NOTES:**

1. Check the gas pipe and liquid pipe are equivalent in terms of the piping length and piping system.
2. Use a branch pipe (system components) for the branch pipe of indoor unit and Switch Box.
3. Install the indoor unit, Branch Pipe and Switch Box according to each "Installation & Maintenance Manual".
4. If the piping length (L3) between each branch pipe and each indoor unit is considerably longer than other indoor unit, refrigerant may not flow well and also performance may be deteriorated compared to other models.  
(Recommended Piping Length: within 15m)



# INSTALLATION & OPERATION

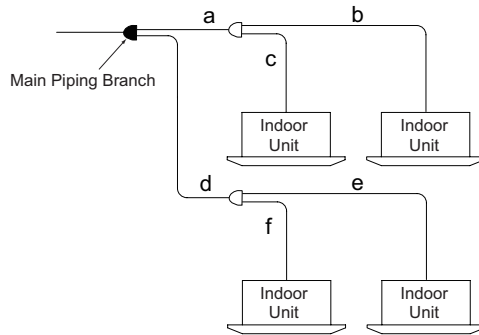
- Piping Branch Restriction

Follow the table below when performing the field-supplied piping work.

Piping Length between Branch Pipe (First Branch) and Each Indoor Unit (L2)	Main Piping Branch *		Indoor Unit Capacity Ratio After Main Branch
	Piping Length After Branch	Number of Main Piping Branch	
≤ 40m	$a+b+c \leq 30m$ or $d+e+f \leq 30m$	without Limit	-
	$a+b+c > 30m$ and $d+e+f > 30m$	within 2	
within 41m to 90m	-	within 1 (Fig.1)	≥ 40% (Fig.2)

**NOTE:**

\* Main Piping Branch: Distribution from One (1) Branch pipe to Two (2) Branch Pipes  
The number of main piping branch depends on the piping length after branch (a to f).



Main piping branches are 2 portions.

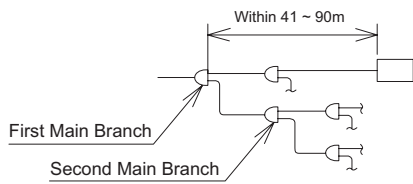


Fig. 1



Indoor unit capacity ratio is less than 40%.

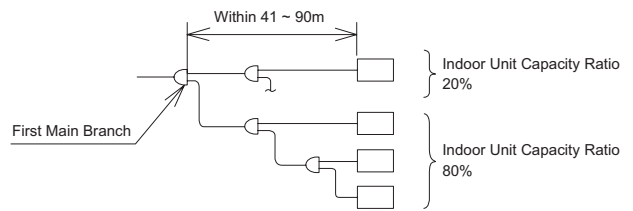


Fig. 2

## 7. Electrical Wiring

### **WARNING**

- Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 3 minutes before electrical wiring work or a periodical check is performed.
  - Check to ensure that the indoor fan and the outdoor fan have stopped before electrical wiring work or a periodical check is performed.
  - Protect the wires, electrical parts, etc. from rats or other small animals.  
If not protected, rats may gnaw at unprotected parts and which may lead to a fire.
  - Avoid the wirings from touching the refrigerant pipes, plate edges and electrical parts inside the unit. If not do, the wires will be damaged and at the worst, a fire will occur.
  - Use a medium sensing speed type ELB (Earth Leakage Breaker, activation speed of 0.1 sec. or less). If not used, it will cause an electric shock or a fire.
  - Fix the cables securely. External forces on the terminals could lead to a fire.
  - Tighten screws according to the following torque.
    - M4: 1.0 to 1.3 N-m
    - M5: 2.0 to 2.4 N-m
    - M6: 4.0 to 5.0 N-m
    - M8: 9.0 to 11.0 N-m
    - M10: 18.0 to 23.0 N-m
-

## 7.1 General Check

- (1) Make sure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data indicated in Table 7.1.
  - Supply electrical power to each outdoor unit. An ELB, fuse and main switch should be used for each outdoor unit. If not, it will be cause of fire or electrical shock.
  - The power supply for the indoor unit and outdoor unit should be provided separately. Connect a power supply wiring to each indoor unit group to be connected to the same outdoor unit. (Max. capacity of one indoor unit group is 250kBTu/h.)
  - As for the Heat Recovery system, the Switch Box and indoor unit in the same refrigerant cycle can be supplied with one main switch.
- (2) Check to ensure that the power supply voltage is within  $\pm 10\%$  of the rated voltage. If the power supply voltage is too low, the system cannot be started due to the voltage drop.
- (3) Check the size of the electrical wires.
- (4) In some cases, the packaged air conditioner may not be operated normally under the following cases.
  - In case that the packaged air conditioner is supplied with the same power transformer as the device with high electricity consumption\*
  - In case that the power source wires for the device\* and the packaged air conditioner are located close to each other.

\* (ex) Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch.

For the cases mentioned above, induction surge of the power supply wiring for the packaged air conditioner may occur due to a rapid change in electricity consumption of the device and an activation of switch. Therefore check the field regulations and standards before performing electrical work in order to protect the power supply wiring for the packaged air conditioner.
- (5) Check to ensure that the earth wire of the outdoor unit, indoor unit, Switch Box are connected.

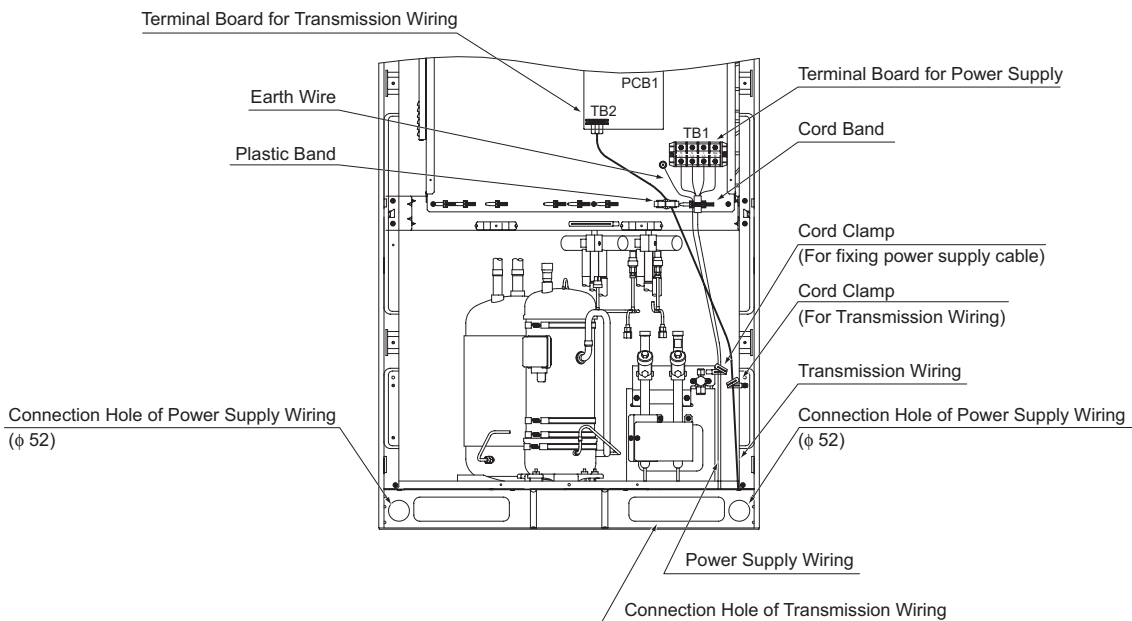


Fig. 7.1 Wiring Connection

7.2 Electrical Wiring Connection

**! WARNING**

The ELB (earth leakage breaker), FUSE and S (main switch) must be installed to the each power source of outdoor unit. If not, it may cause of electrical shock or fire.

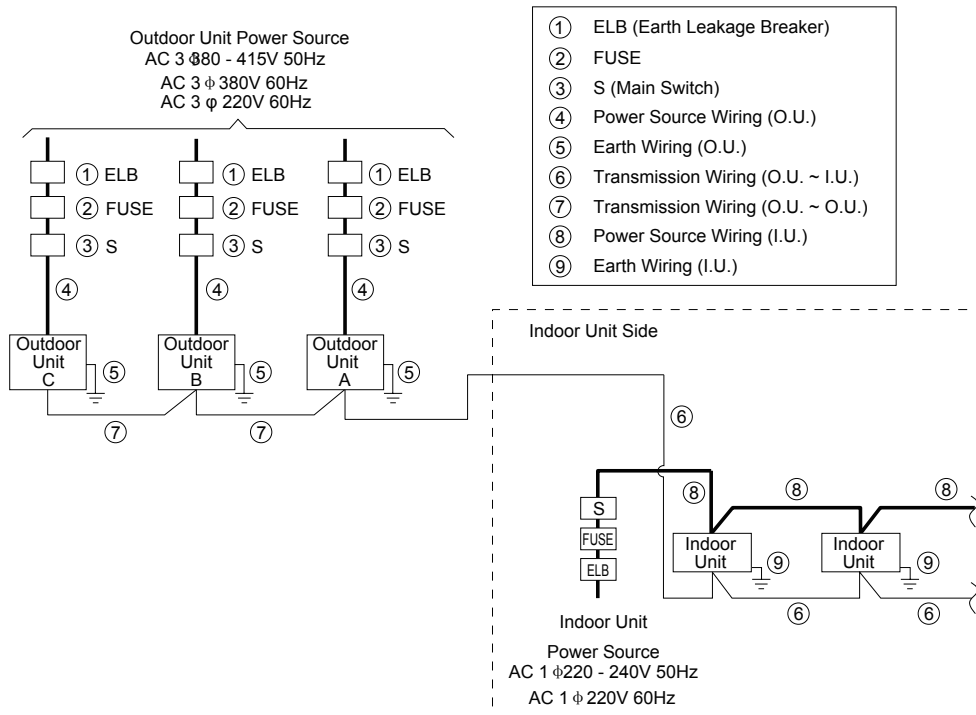
**NOTE:**

Supply the power source of outdoor units and indoor units respectively.

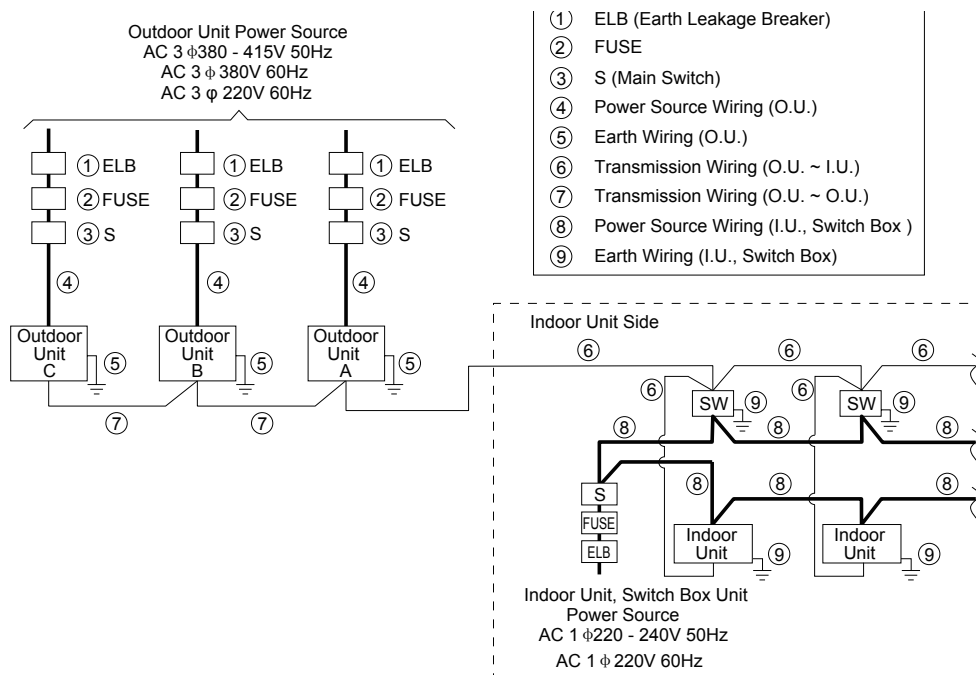
(1) Power Source Wiring

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

< Heat Pump System >



< Heat Recovery System >



(2) The recommended wiring, ELB, breaker size are shown as follow

Field Minimum Wire Sizes for Power Source

Outdoor Unit (kBtu/h)	Power Supply	Maximum Running Current (A)	Power Source Cable Size EN60335-1*1 (mm <sup>2</sup> )	Transmitting Cable Size EN60335-1*1 (mm <sup>2</sup> )	Earth Wire Size((mm <sup>2</sup> ))	ELB		Fuse (A)
						Nominal Current (A)	Nominal Sensitive Current (mA)	
76	380-415V/50Hz 380V/60Hz	13	4	0.75	4	20	30	20
96		17	6	0.75	6	30	30	30
114		23	6	0.75	6	40	30	40
136		28	10	0.75	10	50	30	40
154		31	10	0.75	10	50	30	50
170		33	10	0.75	10	50	30	50
76	220V/60Hz	23	6	0.75	3.5	40	30	40
96		29	10	0.75	3.5	50	30	40
114		40	16	0.75	3.5	50	30	50
136		49	16	0.75	5.5	75	100	70
154		55	25	0.75	5.5	75	100	70
170		59	25	0.75	5.5	100	100	70

\* Refer to the NOTES for selection of the power source cable size

ELB: Earthleakage Breaker.

**NOTES:**

- 1) Follow local codes and regulations when selecting field wires.
- 2) The wire sizes marked with \*1 in the above table are selected at the maximum current of the unit according to the European Standard, EN60 335-1. Use the wires which are not lighter than the ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).
- 3) Use a shielded cable for the transmitting circuit and connect it to ground.
- 4) In the case that power cables are connected in series, add each unit maximum current and select wires below.

**Selection According to EN60 335-1**

Current i (A)	Wire Size (mm <sup>2</sup> )
$i \leq 3$	1~2.5
$3 < i \leq 6$	1~2.5
$6 < i \leq 10$	1~2.5
$10 < i \leq 16$	1.5~4
$16 < i \leq 25$	2.5~6
$25 < i \leq 32$	4~10
$32 < i \leq 50$	6~16
$50 < i \leq 63$	10~25

Coution: In the case that current exceeds 63A, don't connect in series.

**NOTES:**

- 1) Follow local codes and regulations when selecting field wires.
- 2) The wire sizes marked with \*1 in the table of previous page are selected at the maximum current of the unit according to the European Standard, EN60 335-1. Use the wires which are not lighter than the ordinary tough rubber sheathed flexible cord (code designation H05RN-F) or ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).
- 3) Use a shielded cable for the transmitting circuit and connect it to ground.
- 4) In the case that power cables are connected in series, add each unit maximum current and select wires below.

 **CAUTION**

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

**NOTES:**

1. When the power supply wiring is longer, select the minimum wiring size which the voltage drop is within 2%.
2. Power supply voltage should be satisfied with the followings.
  - Supply Voltage: Rated Voltage within  $\pm 10\%$
  - Starting Voltage: Rated Voltage within  $-15\%$
  - Operating Voltage: Rated Voltage within  $\pm 10\%$
  - Imbalance between Phases: within 3%
3. Do not connect the earth wire to the gas pipe, water pipe, lightning conductor.
  - Gas Pipe: An explosion and ignition may occur when gas leaks.
  - Water Pipe: There is no effect of earth wire when a hard vinyl pipe is used.
  - Lightning Conductor: The earth electric potential abnormally increases when a lightning conductor is used.

## 7.3 Electrical Wiring for Outdoor Unit

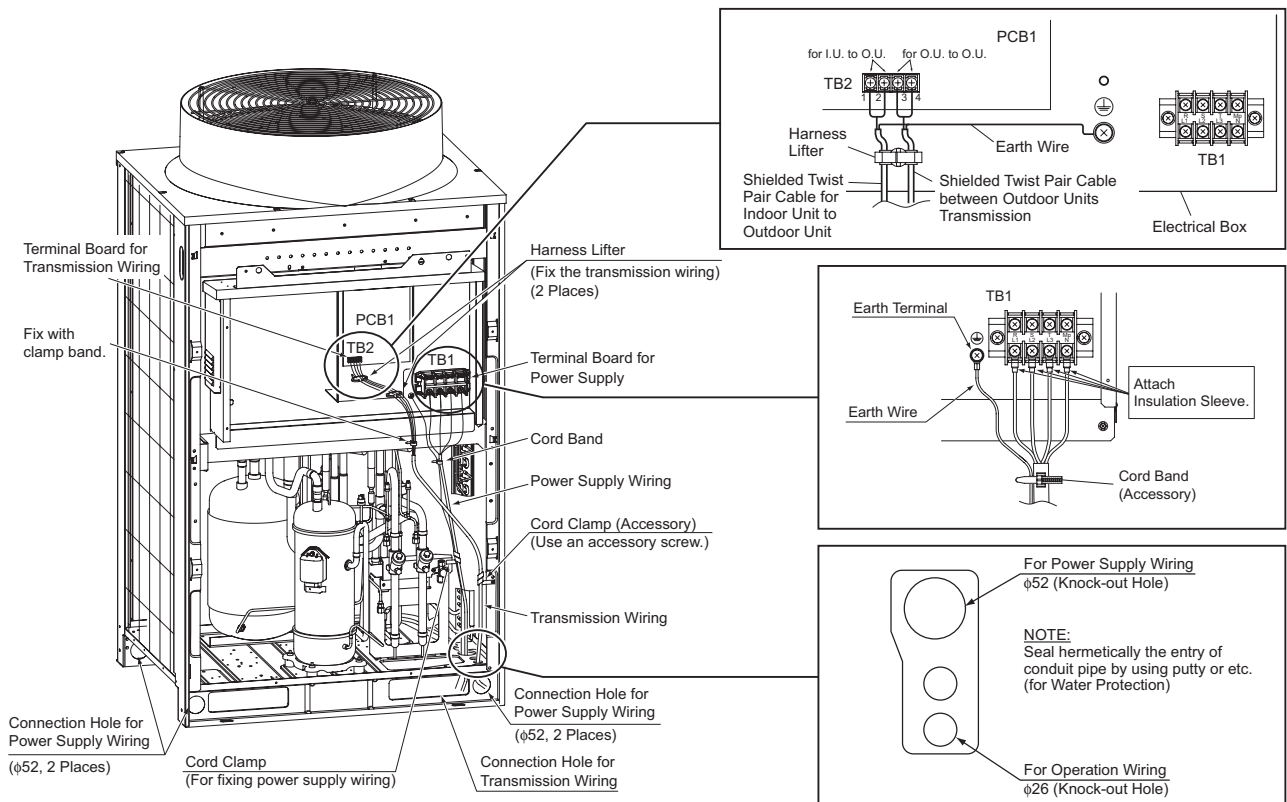
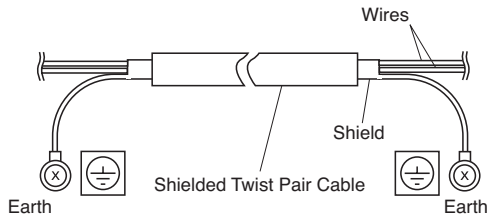
Connect the electrical wirings according to the following figure.

- (1) Connect the power supply wires to L1, L2, L3, and N (for 380-415V) for the three phase power source on the terminal board TB1 and earth wire to the terminal in the electrical control box.
- (2) Connect the transmission wires between the outdoor and indoor units to the TB2 terminals 1 and 2 on the PCB1. As for the transmission wires between outdoor units in the same refrigerant cycle, connect them to the TB2 terminals 3 and 4 on the PCB1.
- (3) Tighten screws for the terminal board according to the following table.

< Required Tightening Torque >

Size	Tightening Torque
M4	1.0 to 1.3 N-m
M5	2.0 to 2.4 N-m
M6	4.0 to 5.0 N-m
M8	9.0 to 11.0 N-m
M10	18.0 to 23.0 N-m

- (4) When installing the unit in Australia, connect the both ends of shielded twist pair cable (remote control switch cable and transmission cable) to the earth as shown bellow.



**CAUTION**

Pay attention to the followings to run through the cables under the unit using conduit tube.  
(The pipe cover is required to remove before performing piping and wiring works.)

**NOTES:**

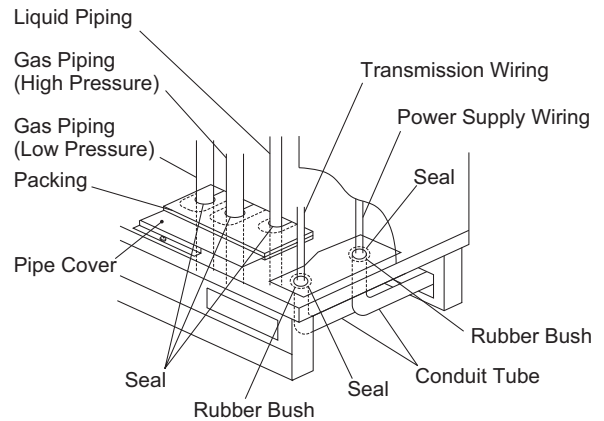
1. Do not lead the power supply wiring and transmission wiring through the same conduit tube. Moreover, keep at least 5cm between the power supply wiring and transmission wiring.
2. Cut cross line at rubber bush (accessory) and securely attach it to the knock-out hole for cable protecting.
3. Attach the pipe cover to avoid entering rats or other small animals into the unit.
4. Avoid the wirings from touching the refrigerant pipes, plate edges and electrical parts inside the unit.
5. Completely seal the end of conduit tube with sealing materials to avoid entering rain into the conduit tube.
6. Make a drain hole at the lowest part of the conduit tube.

**CAUTION**

**Tightly secure the power source wiring using the cord clamp inside the unit.**

**NOTE**

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

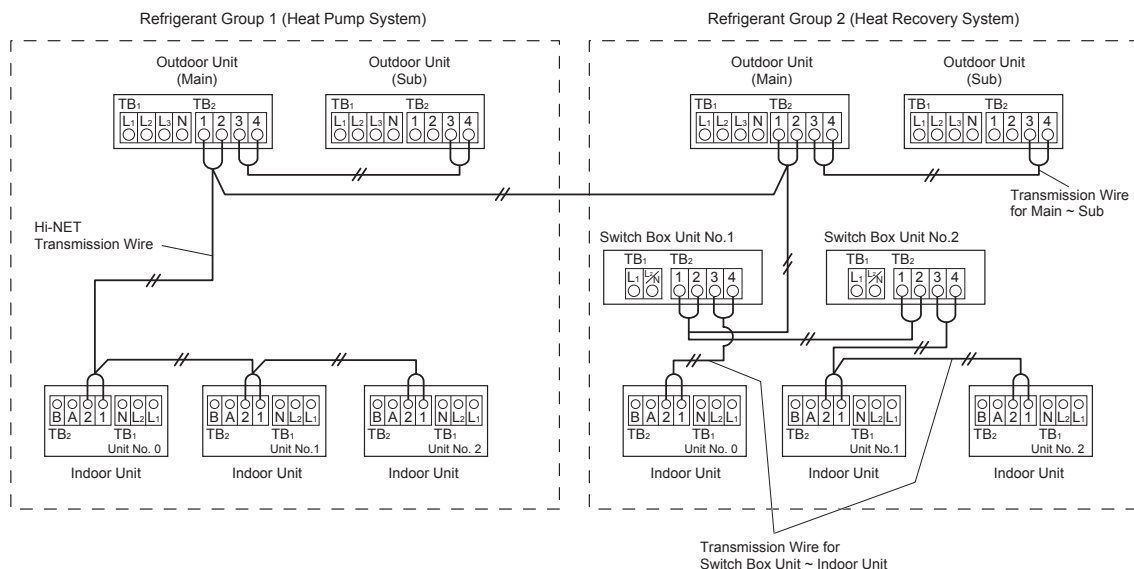




## 7.4 Electrical Wiring Connection of Indoor Unit, Outdoor Unit and Switch Box

- (1) Connect a power supply wiring to each outdoor unit. Connect an ELB, fuse and main switch (S) to each outdoor unit.
- (2) Connect a power supply wiring to each indoor unit group to be connected to the same outdoor unit. (Max. capacity of one indoor unit group is 250kBtu/h.) Connect an ELB, fuse and main switch (S) to each indoor unit group.
- (3) Connect the transmission wiring between indoor units, Switch Box and outdoor units, as shown in Fig. 7.2 and 7.3.
- (4) Connect the transmission wiring in the same refrigerant cycle unit. (In case that the refrigerant pipe of indoor unit is connected to the outdoor unit, connect the transmission wiring to the same indoor unit.) Connecting the refrigerant pipe and transmission wiring to the different refrigerant cycle systems may lead to malfunction.
- (5) Use 2-Core lead wires such as shielded twist pair cable for the transmission wiring. (Do not use 3-Core or over.)
- (6) Use the same kind of cables for the Hi-NET system of the same refrigerant cycle.
- (7) The transmission wiring is required to be separated from the power supply wiring. Keep at least 5cm between the transmission wiring and the power supply wiring, and also min. 1.5m between the transmission wiring and power supply wiring for other electrical device. If the above is not secured, put the power supply wiring into the metal conduit tube to separate from other wirings.
- (8) Connect the following transmission wiring to the terminals 1 and 2 of TB2 in the outdoor unit A (main unit).
  - between outdoor unit and indoor unit
  - between outdoor unit and Switch Box
  - between outdoor unit and indoor unit in other refrigerant cycles
- (9) Do not connect the power supply wiring to the terminal board for transmission wiring (TB2). Printed circuit board may be damaged.
- (10) For Heat Recovery System, connect the transmission wiring from indoor unit (exclusively used for cooling) to the terminals 1 and 2 of TB2 in the Switch Box .
- (11) Connect the earth wire for the outdoor/indoor units and Switch Box. The earth wiring work under the condition of 100Ω (max.) ground resistance should be performed by the qualified person.

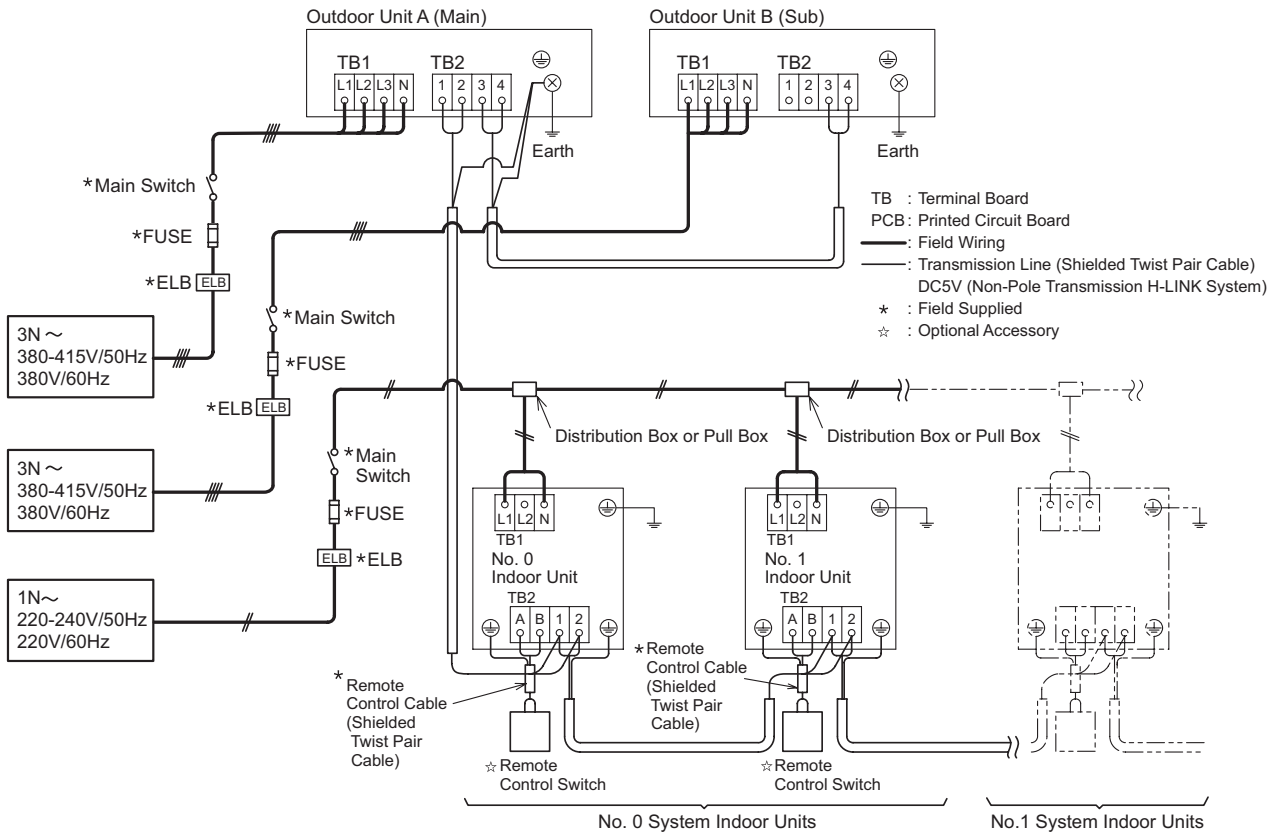
### • Transmission Wiring



### NOTES:

1. For the combination units (190~510kBtu/h), DSW settings of Main and Sub are required.
2. Alarm occurs if the transmission wires between outdoor units are connected to the terminals 1 and 2 for Hi-NET.
3. In case that alarm is indicated on the LCD of Main outdoor unit, follow the "7-segment" indication of the Main outdoor unit for checking.
4. Perform function setting from Main outdoor unit.
5. Maximum refrigerant groups with one central controller are 64. Maximum indoor units to be connected are 160.

< 380-415V/50Hz, 380V/60Hz >



< 220V/60Hz >

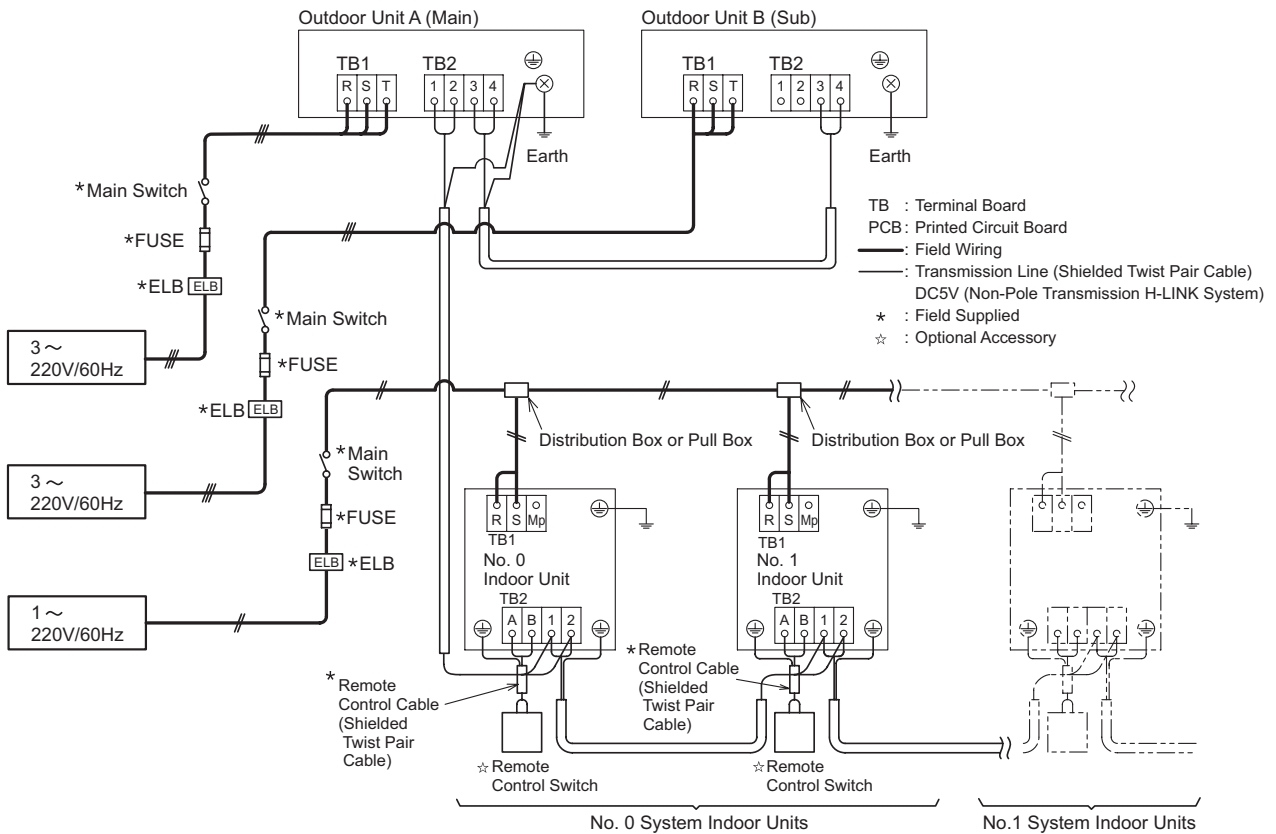
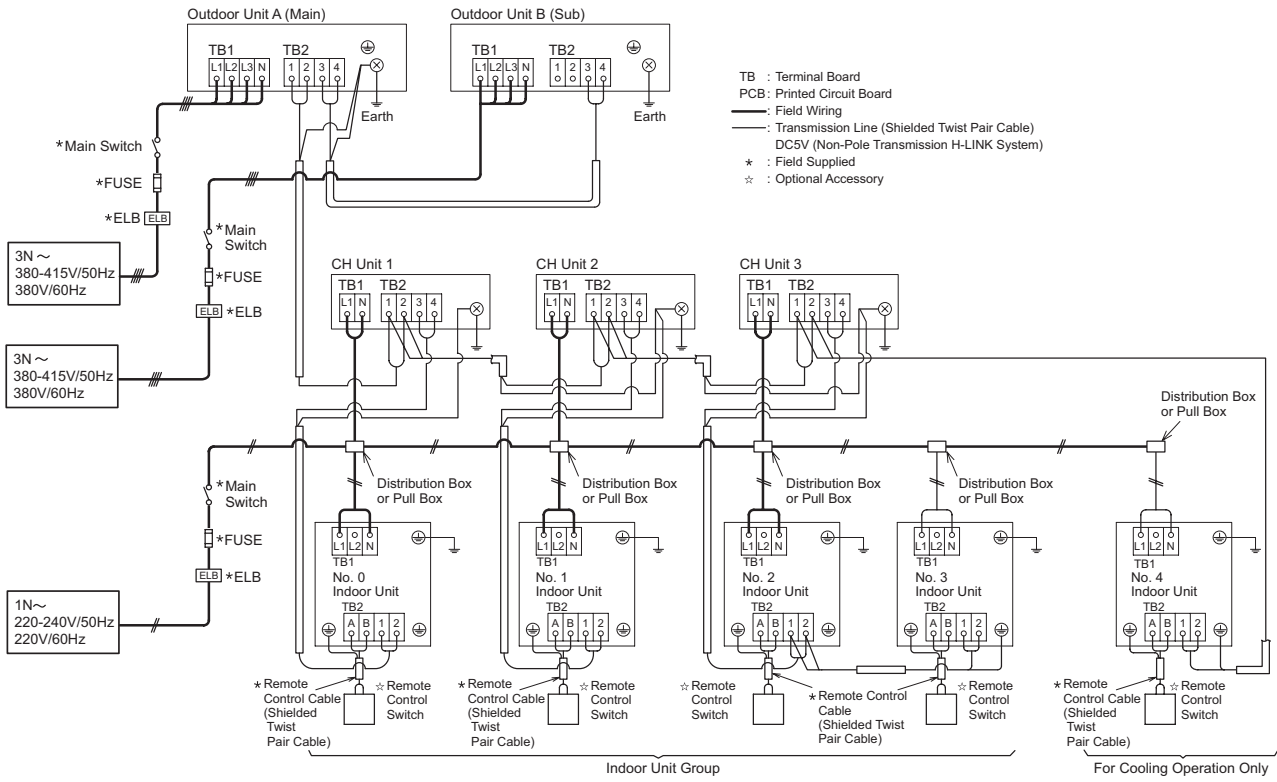


Fig. 7.2 Instruction for Electrical Wiring Connection (Heat Pump System)

# INSTALLATION & OPERATION

< 380-415V/50Hz, 380V/60Hz >



< 220V/60Hz >

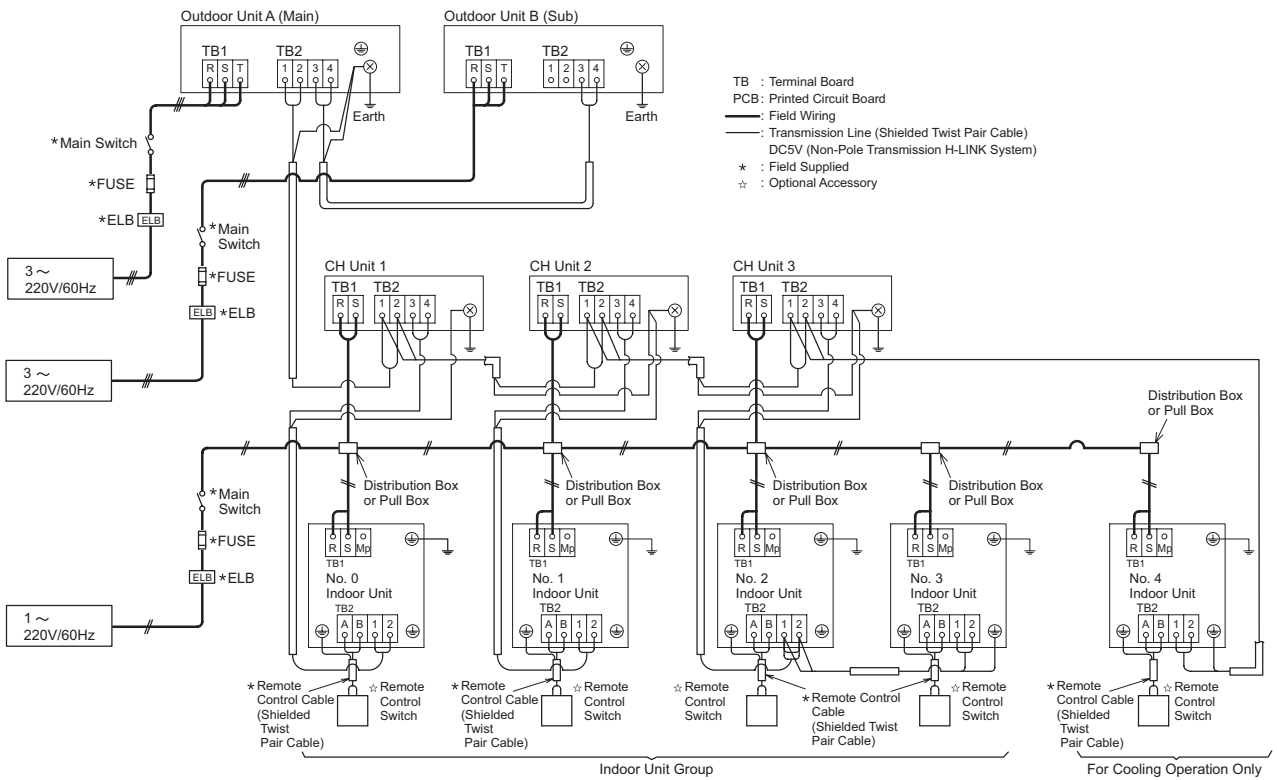


Fig. 7.3 Instruction for Electrical Wiring Connection (Heat Recovery System)

7.5 Dip Switch Setting of Outdoor Unit

TURN OFF all power sources before setting.

Without turning OFF, the switches do not work and the contents of the setting are invalid.

(However, DSW4-No.1, 2, 4 can be operated during power source is ON.)

The mark of “■” indicates the position of dip switches. Set the dip switches according to the Fig.7.4.

NOTE

- By using switch DSW4, the unit is started or stopped after 10 to 20 seconds after the switch is operated.
- Number this outdoor unit to distinguish from other outdoor units for service and maintenance.  
And write the number in the space right.



**Arrangement of Dip Switch Setting**

**Push Switches**

**DSW1 Ref. Cycle No. Setting**

Setting is required.

Setting Before Shipment

DSW1

Tens Digit      Last Digit

Set the unit number of outdoor unit at each refrigerant cycle.  
(Setting before shipment is unit 0.)

**DSW2 Capacity Setting**

No setting is required.

AVWT-86U\*    AVWT-96U\*    AVWT-114U\*

**DSW4 Test Operation and Service Setting**

Setting is required. For Test Operation and Operating Compressor

Setting Before Shipment    Test Cooling Operation    Test Heating Operation

Compressor Forced Stop

**DSW5 Emergency Operation / Test Operation and Service Setting**

No setting is required. Turn ON the dip switch when use the below functions.

Setting Before Shipment

Setting Item	Pin No.
Except No.1 Compressor Operation	1
Except No.2 Compressor Operation	2
Refrigerant Amount Judgement	4

**DSW6 Outdoor Unit No. Setting**

Setting is required. Single Setting (Setting Before Shipment)

**IMPORTANT NOTICE**

The outdoor unit is not single, the combination setting is necessary. Be sure to do this setting.

Combination Setting

Unit A (No.0 Unit)	Unit B (No.2 Unit)	Unit C (No.3 Unit)

**DSW3**

No setting is required.

**DSW7 Power Supply Setting**

Setting is required.

220V Unit: 220V Setting Before Shipment  
380-415V Unit: 380-415V Setting Before Shipment

**DSW10 Transmission Setting**

Setting is required.

For End Resistance Cancellation

Setting Before Shipment	End Resistance Cancellation

If the transmission circuit fuse is short circuited, the printed circuit board PCB1 will be recovered only once by turning DSW10 #2 pin on.

Fig. 7.4 DSW Setting

# INSTALLATION & OPERATION

- **Setting for Transmitting**

It is required to set the outdoor unit Nos., refrigerant cycle Nos. and end terminal resistance for this Hi-NET system.

- **Setting of Outdoor Unit No.**

In case of the combination of base unit, set DSW6 as shown below.

Base Unit (Before Shipment)	Combination of Base Unit		
	Unit A (No.0) (Main)	Unit B (No.2)	Unit C (No.3)

- **Setting of Refrigerant Cycle No.**

In the same refrigerant cycle, set the same refrigerant cycle No. for the outdoor unit and the indoor units as shown below.

As for setting indoor unit refrigerant cycle No., set the RSW2 and DSW5 on the indoor unit PCB.

	Setting Switch	
	10 digit	1 digit
RSW1		
Outdoor Unit	DSW1	RSW1
Indoor Unit (Hi-NET)	DSW5	RSW2

	Setting Switch	
	10 digit	1 digit
DSW8		
Outdoor Unit	DSW1	DSW8
Indoor Unit (Hi-NET)	DSW5	RSW2

Ex.: In Case of Setting Refrigerant Cycle No. 25



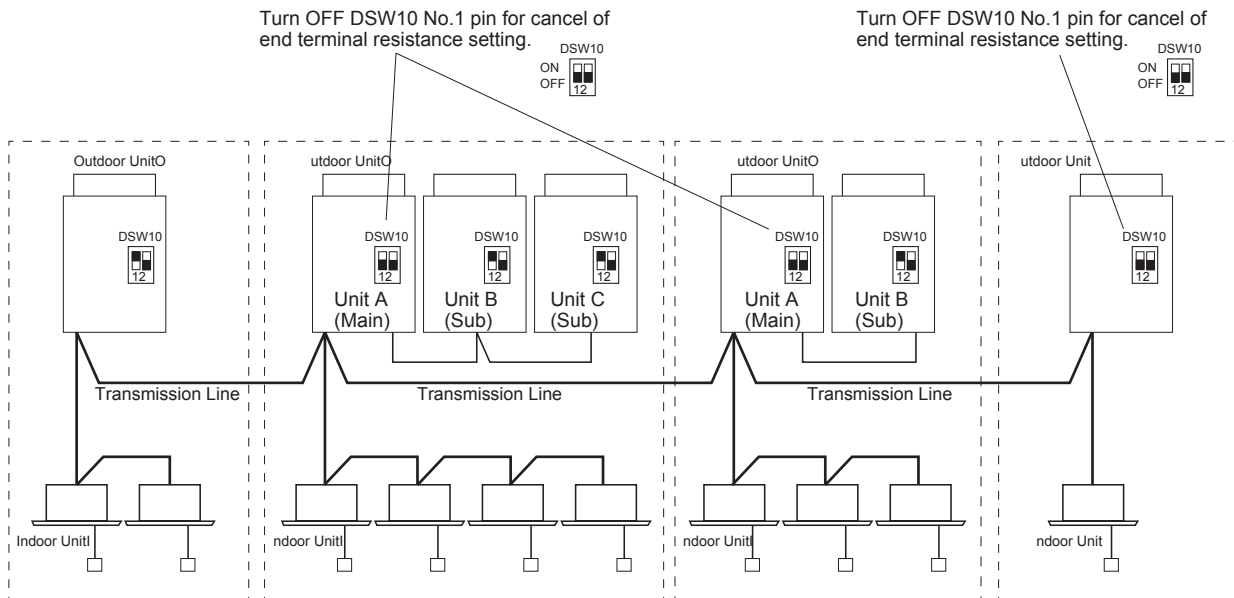
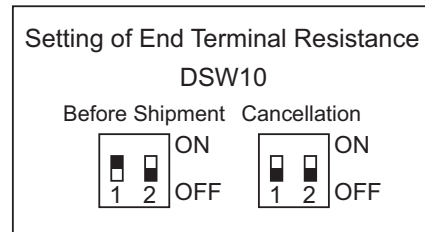
Turn ON No. 2 pin.

Set Dial No.5.

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

- **Setting of End Terminal Resistance**

Before shipment, No. 1 pin of DSW10 is set at the "ON" side. In the case that the outdoor units quantity in the same Hi-NET is 2 or more, set No. 1 pin of DSW10 at the "OFF" side from the 2nd refrigerant group outdoor unit. If only one outdoor unit is used, no setting is required.



• Function Setting

External Input/Output and Function Setting

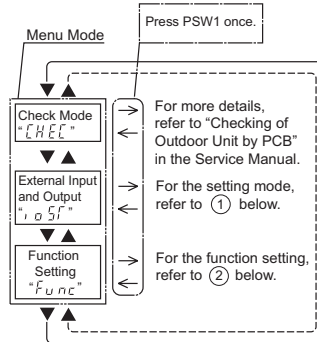
■ Start of Setting

Turn ON DSW4-No.4.  
Press PSW1 for 3 seconds or more.  
"Menu Mode" will be indicated.

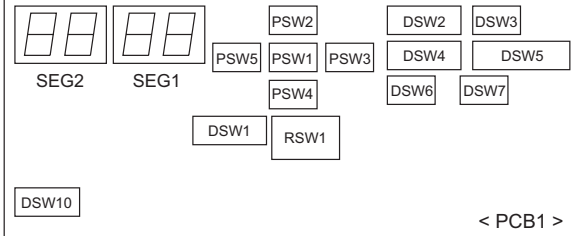
■ End of Setting

Press PSW1 for 3 seconds or more.  
The display indication become to normal indication.  
Turn OFF DSW4-No.4.

**NOTE:**  
Release "Menu Mode" after the setting is completed.  
Otherwise, the air conditioner may not operate appropriately.



Arrangement of Dip Switch Setting



① [ External Input and Output Setting ]

By pressing the push-switches PSW3 (▶) and PSW5 (◀), the function No. can be selected.  
PSW4 (▼): forward, PSW2 (▲): backward

Fill out the selected function setting No. in the space of the table as shown.

Item	SEG2	SEG1	SET
1 Input Setting 1 CN17 [1-2 pin]	11	1	
2 Input Setting 2 CN17 [2-3 pin]	12	2	
3 Input Setting 3 CN18 [1-2 pin]	13	3	
4 Output Setting 1 CN16 [1-2 pin]	01	1	
5 Output Setting 2 CN16 [1-3 pin]	02	2	

(Setting before shipment)  
Before shipping, the input/output function settings are specified to each input/output terminal according to above table. The details of function No. and external input/output settings are as shown below.

Setting of External Input and Output Function

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

The same input/output function setting can not be set to different input/output terminals.  
If set, a setting of larger function number is became invalid.

② [ Function Setting ]

By pressing the push-switches PSW3 (▶) and PSW5 (◀), the setting can be changed.  
PSW4 (▼): forward, PSW2 (▲): backward  
Refer to the Service Manual for more details.

Fill out the selected function setting No. in the space of the table as shown.

Item	SEG2	SEG1	SET
1 Circulator at Heating Function Thermo-OFF	FR	0	
2 Night-Shift	n1	0	
3 Cancellation of Outdoor Ambient Temperature Limit Defrost for Cold Area (Change of Defrost Condition)	05	0	
4 SLo (Fan Speed) Defrost Setting	60	0	
5 Cancellation of Hot Start	H1	0	
6 Priority Capacity Mode	nU	0	
7 Compressor Frequency Control Target Value for Cooling	Hc	0	
8 Compressor Frequency Control Target Value for Heating	Hh	0	
9 Indoor Expansion Valve Control Target Value for Cooling	5c	0	
10 Indoor Expansion Valve Control Target Value for Heating	5h	0	
11 Not Prepared	51	0	
12 Not Prepared	50	0	
14 Not Prepared	c1	0	
15 Not Prepared	cb	0	
16 Not Prepared	ch	0	
17 Not Prepared	db	0	
18 Demand	dE	0	
19 Wave Function Setting	UE	0	
20 Protection of Decrease in Outlet Temperature for Cooling	Fb	0	
21 Not Prepared	Ff	0	
22 Adjustment of Fan Rotation (for multiple installation)	Fo	0	
23 Not Prepared	Lf	0	
24 Not Prepared	F1	0	
25 Not Prepared	F2	0	
26 Not Prepared	F3	0	

## 8. Additional Refrigerant Charge

### 8.1 Air-Tight Test

(1) Check to ensure that the stop valves are closed completely before air-tight test.

< Tightening Check of Stop Valves >

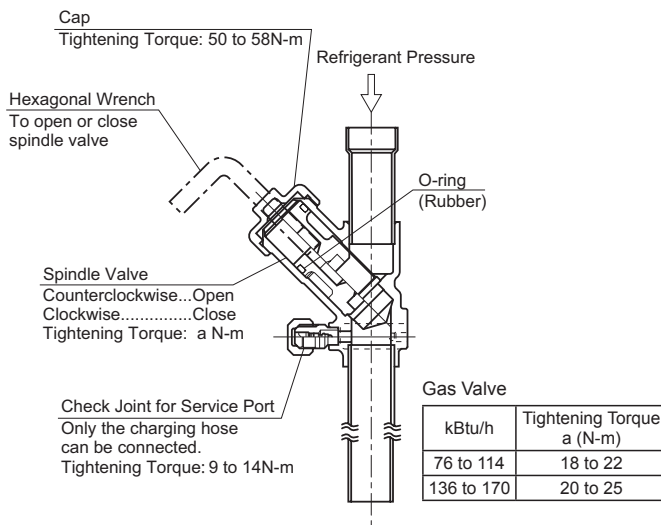
a) After connecting the pipe, remove the cap of stop valve for high pressure gas, low pressure gas (heat recovery system only) and liquid gas.

Tighten the open-close spindle in the close direction with a torque \*1).

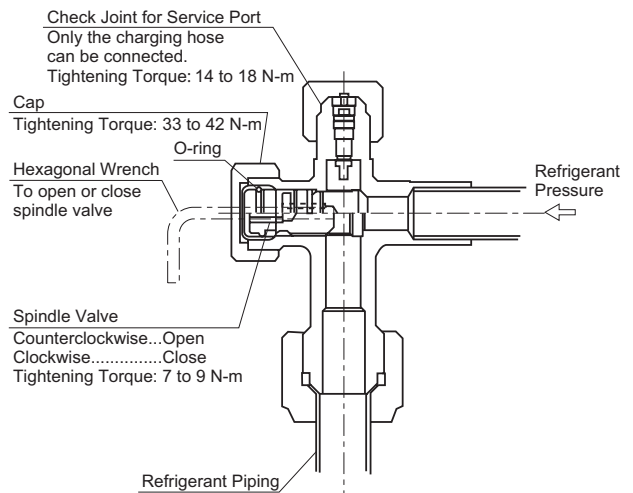
*1)	Stop Valve for High Pressure Gas and Low Pressure Gas	76 to 114	18 to 22 N-m
		136 to 170	20 to 25 N-m
	Stop Valve for Liquid Gas		7 to 9 N-m

b) Perform the air-tight test after the above check.

< Gas Valve >



< Liquid Valve >



- (2) Connect the indoor unit and the outdoor unit with field-supplied refrigerant piping. Suspend the refrigerant piping at specified points and prevent the refrigerant piping from touching weak parts of the building such as wall, ceiling, etc. (Abnormal sound may occur due to the vibration of the piping. Pay special attention in case of short piping length.)
- (3) Connect the gauge manifold using charging hoses with a vacuum pump or a nitrogen cylinder to the check joints of the liquid line and the gas line stop valves. Perform the air-tight test. Connect a manifold gauge to the check joints of the liquid and gas stop valves in the outdoor unit. Do not open the stop valves. Apply nitrogen gas pressure of **4.15MPa** .

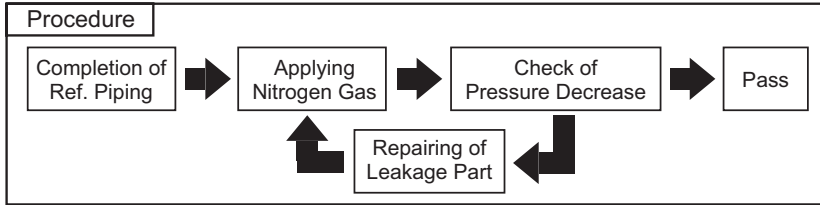
**⚠ DANGER**

**Be sure to use Nitrogen Gas for air-tight test. If other gases such as oxygen gas, acetylene gas or fluorocarbon gas are accidentally used, it may cause explosion or gas intoxication.**

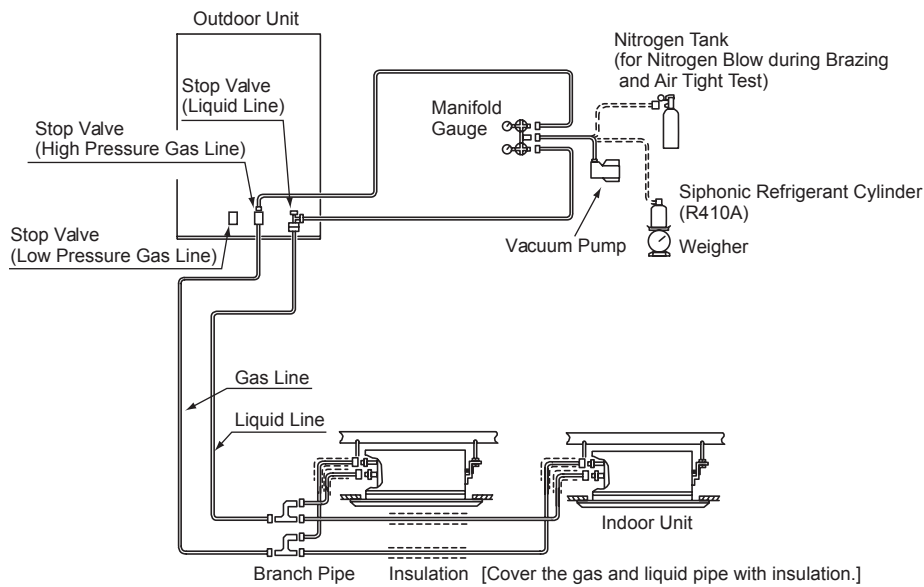
- (4) Check for any gas leakage at the flare nut connections, or brazed parts by gas leakage tester or by use of a foaming agent or gas leak detector.

Recommended Forming Agent	Manufacturer
Güproflex	Yokogawa & CO.,Ltd

- (5) Insulate high pressure and low pressure (heat recovery system only) gas piping side and liquid piping side.
- (6) Mount the piping cover equipped with the outdoor unit after connecting the pipe.



< Heat Pump System >



< Heat Recovery System >

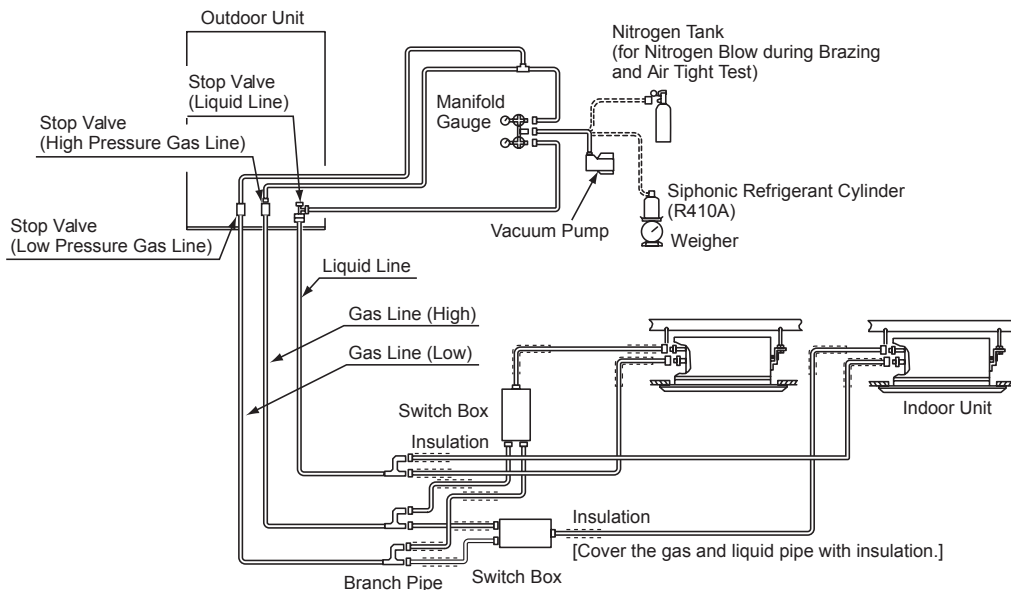


Fig. 8.1 Vacuum Pumping and Refrigerant Charge



**8.2 Vacuuming**

- (1) Connect a manifold gauge and vacuum pump to the check joints\*.

\*

Heat Pump System	High Pressure Gas Stop Valve Liquid Stop Valve
Heat Recovery System	High Pressure Gas Stop Valve Low Pressure Gas Stop Valve Liquid Stop Valve

- (2) Continue vacuum pumping work until the pressure reaches -0.1MPa (-756mmHg) or lower for one to two hours.  
After vacuum pumping work, stop the manifold valve's valve, stop the vacuum pump and leave it for one hour. Check to ensure that the pressure in the manifold gauge does not increase.
- (3) Tighten the cap of check joint (9 to 14N-m for high/low pressure gas valve, 14 to 18N-m for liquid valve) after the vacuum pumping work.

**NOTES:**

1. If tools or measuring instruments come into contact with the refrigerant, use the tools or the measuring instruments exclusive for R410A.
2. If vacuum degree of -0.1MPa (-756mmHg) is not available, it is considered that there is a gas leakage. Check for any gas leakage once again. If no leakage exists, operate the vacuum pump for one to two hours.

**NOTICE**

- Insulate the refrigerant pipes as shown in Fig. 8.2.  
After connecting the refrigerant piping, seal the refrigerant pipes by using the field-supplied insulation material. Insulate the unions and flare nuts at the piping connections completely. Insulate the liquid piping and gas piping completely to avoid decreasing of performance and dewing on the surface of the pipe.

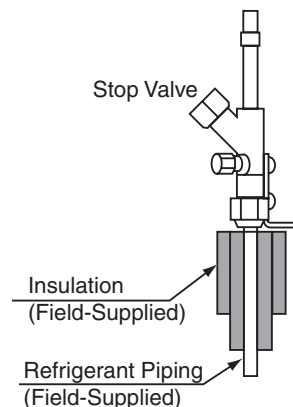


Fig. 8.2 Insulation on Pipes

### 8.3 Additional Refrigerant Charge Calculation

Table 8.1 Additional Refrigerant Charge Calculation

Although refrigerant has been charged into this unit, additional refrigerant charge is required according to piping length.  
 Determine the additional refrigerant quantity according to the following procedure, and charge it into the system.  
 Record the additional refrigerant quantity to facilitate maintenance and servicing activities thereafter.

1. Calculating Method of Additional Refrigerant Charge (W kg)

No.	Symbol	Contents	Additional Charge (kg)			
1	W1	Additional Refrigerant Charge Calculation for Liquid Piping (W1 kg)		kg		
		Pipe Diameter	Total Piping Length (m)		Refrigerant Amount for 1m Pipe	Additional Charge (kg)
		φ22.2	m		×0.39 =	
		φ19.05	m		×0.28 =	
		φ15.88	m		×0.19 =	
		φ12.7	m		×0.12 =	
		φ9.53	m		×0.06 =	
		φ6.35	m		×0.03 =	
Total Additional Charge For Liquid Piping =						
2	W2	Additional Refrigerant Charge Calculation for Indoor Unit (W2 kg) Additional refrigerant charge is 1kg/unit of 76kBtu/h and 96kBtu/h indoor unit. Additional refrigerant charge of less than 76kBtu/h indoor units is not needed.		kg		
		76 and 96 Total Indoor Unit Numbers      Additional Charge <div style="display: flex; justify-content: center; align-items: center; gap: 20px;"> <span style="border: 1px solid black; width: 40px; height: 15px; display: inline-block;"></span> × 1.0kg/unit = <span style="border: 1px solid black; width: 40px; height: 15px; display: inline-block;"></span> </div>				
3	W3	The Ratio of Indoor Unit Connection Capacity (Indoor Unit Total Capacity/ Outdoor Unit Capacity) Additional Charge Determine the ratio of indoor unit connection capacity.		kg		
		Condition	Refrigerant Amount			
		<ul style="list-style-type: none"> <li>• I.U.Capacity Ratio is less than 100% :      0.0kg</li> <li>• I.U.Capacity Ratio is 100~115% :      0.5kg</li> <li>• I.U.Capacity Ratio is 116~130% :      1.0kg</li> </ul>				
4	W	Calculation of Additional Charge (W kg) = W1 + W2 + W3		kg		

**Note:**

Ensure that the total additional charge should not be exceeded the max. additional refrigerant charge quantity as shown in the table below.

< Max. Additional Refrigerant Charge Quantity >

Outdoor Unit	76/96	114	136/154	170	190~232	250~254
Max. Additional Ref. Charge Quantity (kg)	28.0	33.0	38.5	42.0	46.0	52.0

2. Charging Work

Charge refrigerant (R410A) into the system according to Item 8.4.

3. Record of Additional Charge

Total refrigerant charge of this system is calculated in the following formula.

Total Ref. Charge = W + Wo  
 This System =  +  =  kg

Ref. Charge Amount of O.U. Before Shipment (W0) kg

Outdoor Unit	W0 Outdoor Unit Ref. Charge (kg)
AVWT-76FE(7)(9)SR	6.5
AVWT-96FE(7)(9)SR	6.5
AVWT-114FE(7)(9)SR	9.9
AVWT-136FE(7)(9)SS	9.0
AVWT-154FE(7)(9)SS	10.5
AVWT-170FE(7)(9)SS	10.5

Total Additional Charge: W  kg  
 Total Ref. Charge:  kg  
 Date of Ref. Charge Work:  /  /

**Note:**

- W0 is outdoor unit ref. charge before shipment.
- In case of the combination of the base unit, calculate the total ref. charge before shipment of the outdoor units to be combined.

## 8.4 Charging Work

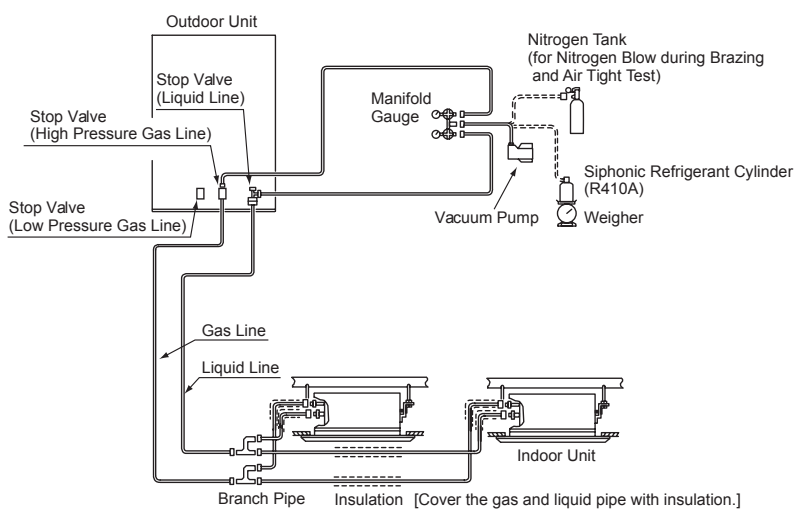
After vacuum pumping work, check that the high pressure gas valve, low pressure gas valve (low pressure gas valve is for heat recovery system only) and liquid stop valve are fully closed.

Charge the additional refrigerant (refer to Table 8.1) from the check joint of liquid stop valve (Charging Refrigerant Amount Tolerance: 0.5kg).

If the specified refrigerant quantity can not be charged, follow the procedure below.

- (1) Fully open the stop valve for high pressure gas\*.  
(\* In case of heat recovery system, fully open the stop valve for high pressure and low pressure gas.)
- (2) Operate the compressor at the cooling mode and add the refrigerant from the check joint of the liquid stop valve. At this time, the liquid stop valve is slightly opened (Charging Refrigerant Amount Tolerance: 0.5kg).
- (3) After refrigerant is charged, fully open the liquid stop valve and gas stop valve (high pressure and low pressure (heat recovery system only)).

### < Heat Pump System >



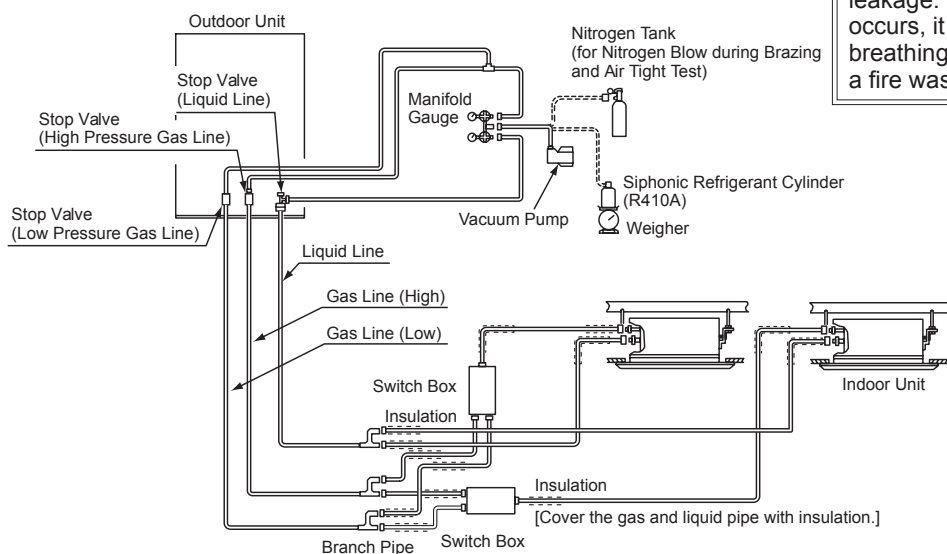
Charge the correct refrigerant quantity according to Table 8.1. If not, a compressor may be damaged due to an excess or insufficient refrigerant charge.

Refrigerant charge from check joint of gas stop valve may lead to compressor failure. Be sure to charge refrigerant from the check joint of liquid stop valve.

Insulate the liquid piping and gas piping completely to avoid decreasing of performance and dewing on the surface of the pipe.

Insulate the flare nut and union of the piping connection with insulation.

### < Heat Recovery System >



Check to ensure that there is no gas leakage. If a large refrigerant leakage occurs, it will cause difficulty with breathing or harmful gases would occur if a fire was being used in the room.

## 8.5 Automatic Simple Judgement System for Refrigerant Amount

### NOTE

1. This function is applicable when outdoor air temperature is 0 to 43°C DB and indoor air temperature is 10 to 32°C DB.
2. For 190 to 510kBTu/h, the operation and 7-segment indication check should be performed at outdoor unit A (main). Close all the covers of outdoor unit B and C (sub).

Perform the refrigerant amount check operation according to the automatic judgement function after the refrigerant charging work.

When the judgement result is excessive refrigerant, insufficient refrigerant or abnormal termination, find out the cause of abnormality and perform the refrigerant amount check operation again.

#### < Procedure of Refrigerant Amount Check Operation >

- (1) Reassemble all the cover except for the electrical control box cover and service cover of No.1 unit.
- (2) Turn ON the power supply of indoor unit and outdoor unit in the refrigerant cycle to be performed the refrigerant amount check operation. (Supply electrical power to the system 12 hours before starting this check operation to warm the compressor oil.)
- (3) Turn No.4 of DSW5 (PCB1) ON.

7-segment Display

F G C H

- (4) Check the 7-segment display and press PSW1.

The outdoor fan and compressor will be activated and the 7-segment display will be indicated the following figure.

c h 0 2

The judgement takes 30 to 40 minutes. Refer to the table below for the result indication.

When the judgement result is excessive refrigerant, insufficient refrigerant or abnormal termination, find out the cause of abnormality and perform the refrigerant amount check operation again.

#### Judgement Result Indication

7-segment Indication	Result	Remarks
E n d	Sufficient Refrigerant	The refrigerant amount is sufficient. * Turn No.4 of DSW5 OFF and perform Test Run.
c h H i	Excessive Refrigerant	The refrigerant amount is excessive. * Calculate the additional refrigerant amount according to the piping length. Collect the refrigerant using a collector and charge the correct refrigerant amount.
c h L o	Insufficient Refrigerant	The refrigerant amount is insufficient. * Check if the additional refrigerant has been charged. * Calculate the additional refrigerant amount according to the piping length and charge the refrigerant.
c h	Abnormal Termination	Find out the cause of abnormal termination as shown below. After resolved the cause of abnormal termination, restart the check operation. (1) Is No.4 pin of DSW5 ON before turning on the power supply? (2) Are all indoor units ready and waiting, before turned ON No.4 pin of DSW5? (3) Is the outdoor ambient temperature within the applicable range (0 to 43°C)? (In some cases, when the connected indoor unit number exceeds the recommended number and the outdoor ambient temperature exceeds 35°C, this check operation cannot be performed.) (4) Is the total indoor units operation capacity 30% (indoor units capacity ratio) or less? (5) Is No.4 of DSW4 (compressor forced stoppage) OFF?

- (5) Turn No.4 of DSW5 OFF when the refrigerant amount is sufficient.  
Wait 3 minutes (at least) after turning No.4 of DSW5 OFF and then the outdoor unit is ready to operate.

#### NOTE:

The 7-segment indication during the check operation may be changed to the protection control code by the activation of protection control, however it is normal. As for the protection control code, refer to the sheet attached to the inside of the outdoor unit service cover.

#### NOTE:

1. Emissions of the fluorocarbons are prohibited.
2. In case of disposal and maintenance of this product, collection of fluorocarbons is required.
3. Regarding the fluorocarbon, the specification label or refrigerant label attached to the product should be followed. After the additional refrigerant charge, record the total refrigerant (= refrigerant before shipment + additional refrigerant in the field) in the refrigerant label.

## INSTALLATION & OPERATION

- Special Attention Regarding Refrigerant Gas Leakage

Pay attention to the critical gas concentration to avoid accidental refrigerant gas leakage before installing air conditioning systems.

$$\frac{\text{Totally Charged Refrigerant Quantity in System (kg)}}{\text{Room Space for each Indoor Unit (m}^3\text{)}} \leq \text{Critical Concentration (kg/m}^3\text{)}$$

0.3 kg/m<sup>3</sup> \*

\* In case of KHK S 0010, this value should be decided according to the each country's regulation such as ISO5149 and EN378.

In the case that the calculated critical concentration is higher than 0.3kg/m<sup>3</sup>, take the following actions.

- 1) Provide a gas leakage detector and exhaust fan(s) controlled by its gas leakage detector.
- 2) Provide each effective opening at the wall or door for ventilation to next door so that the critical gas concentration can be maintained lower than the above value.  
(Provide an opening more than 0.15% of floor surface at the lower part of a door.)

### CAUTION

#### 1. Maximum Permissible Concentration of HFC GAS R410A

The refrigerant R410A is an incombustible and non-toxic gas.

However, if leakage occurs and gas fills a room, it may cause suffocation. The maximum permissible concentration of HFC gas, R410A in air is 0.3kg/m<sup>3</sup>, according to the refrigeration and air conditioning facility standard (KHK S 0010) by the KHK (High Pressure Gas Protection Association) Japan. Therefore, some effective measure must be taken to lower the R410A concentration in air below 0.3kg/m<sup>3</sup>, in case of leakage. As for R410A, this consideration is applied similarly.

#### 2. Calculation of Refrigerant Concentration

- (1) Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of objective rooms.
- (2) Calculate the room space where this unit is to be installed V (m<sup>3</sup>) of each objective room.
- (3) Calculate the refrigerant concentration C (kg/m<sup>3</sup>) of the room according to the following equation.

R: Total Quantity of Charged Refrigerant (kg)

V: Room Space Where This Unit Is to Be Installed (m<sup>3</sup>)

= C: Refrigerant Concentration ≤ 0.3 (kg/m<sup>3</sup>) \*

If local codes or regulations are specified, follow them.

<Example>

Japanese Standard KHK S 0010 C=0.3 (kg/m<sup>3</sup>)

## 9. Test Run

Test run should be performed according to the Item 9.2. And use the Table 9.1 for recording test run.

### **WARNING**

- **Do not operate the system until all the check points have been cleared.**  
**As for the test run of indoor unit, check “Installation & Maintenance Manual” attached to the indoor unit and Switch Box.**

### 9.1 Before Test Run

- (1) Check to ensure that the refrigerant piping and transmission between outdoor unit and indoor units are connected to the same refrigerant cycle. If not, it will cause an abnormal operation and a serious accident.  
 Check that the dip switch setting of the refrigerant cycle No. (DSW1 & RSW1 [O.U.], DSW5 & RSW2 [I.U.]) and the unit number (RSW) for the indoor units apply to the system.  
 Confirm that the dip switch setting on the printed circuit board of the indoor units and the outdoor units are correct. Especially, pay attention to the setting of outdoor unit No., the refrigerant cycle No. and the end terminal resistance. Refer to the chapter “7. Electrical Wiring”.
- (2) Check to ensure that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts. If not, do not operate the system until the electrical leakage is found and repaired (Refer to “Caution for Insulation Resistance” for details.).  
 Do not impress the voltage on the terminals for transmission (Outdoor Unit: TB2 1, 2, 3, 4 / Indoor Unit: TB2 1, 2, A, B / Switch Box: TB2 1, 2, 3, 4).
- (3) Check to ensure that each wire, L1, L2, L3 and N is correctly connected at the power source.  
 If incorrectly connected, the unit will not operate and the remote control switch will indicate the alarm code “05”. In this case, check and change the phase of the power source according to the attached sheet on the reverse side of the service cover.
- (4) **Check to ensure that the switch on the main power source has been ON for more than 12 hours, to warm the compressor oil by the oil heater.**  
 R series outdoor units does not operate within 4 hours after power supply (Stoppage Code d1-22).  
 In case of operating within 4 hours, release the protection control as follows:
  1. Supply power to the outdoor unit.
  2. Wait for 30 seconds.
  3. Push PSW5 on the outdoor PCB more than 3 seconds in order to release the d1-22.  
 In case of using remote control switch for release, push “Air Flow” and “Auto Louver” switch simultaneously for 3 seconds.
- (5) Main Unit Label  
 In case of the combination of base units, **attach the main unit label on a visible spot of the main unit (outdoor unit A)**, so that the outdoor unit A can be identified easily. Do not attach the main label on the sub unit (outdoor unit B and C).

**⚠ CAUTION****Caution for Insulation Resistance**

If total unit insulation resistance is lower than 1 megohm, the compressor insulation resistance may be low due to retained refrigerant in the compressor. This may occur if the unit has not been used for long periods.

1. Disconnect the cables to the compressor and measure the insulation resistance of the compressor itself. If the resistance value is over 1 megohm, then insulation failure has occurred of other electrical parts.
2. If the insulation resistance is less than 1 megohm, disconnect the compressor cable from the inverter PCB. Then, turn on the main power to apply current to the crankcase heater. After applying current for more than 3 hours, measure insulation resistance again. (Depending on the air conditions, pipe length or refrigerant conditions, it may be necessary to apply the current for a longer period of time.) Check the insulation resistance and reconnect the compressor.

If the leakage breaker is activated, check the recommended size shown in Table 7.1.

**NOTICE**

1. Confirm that field-supplied electrical components (main switch fuse, fuse-free breaker, earth leakage breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data shown in Table 7.1.
2. Use shielded wires ( $\geq 0.75\text{mm}^2$ ) for field wiring to protect electrically noise obstacle. (Total length of shielded wire shall be less than 1000m, and size of shielded wire shall comply with local codes.)
3. Check to ensure that the terminal for power source wiring (terminals "L1" to "L1" and "N" to "N" of each terminal board: AC 380-415V).  
If not, some component will be damaged.

**9.2 Test Run**

- (1) Check to ensure that the stop valves of the outdoor unit are fully opened (low pressure gas: heat recovery system only), and then start the system.  
(In case of the combination of base units, check that the stop valves of all the connected outdoor units are fully opened.)
- (2) Perform the test run of indoor units one by one sequentially and then check accordance of the refrigerant piping system and electrical wiring system. (If the multiple indoor units are operated simultaneously, the system can not be inspected the system accordance.)
- (3) Perform the test run according to the following procedure. Ensure that the test run is carried out without any problem.

**NOTE:**

In case of 2-remote control switch (main and sub), firstly perform the test run of the main remote control switch.

- a) Set the "TEST RUN" mode by pressing the "MODE" and "CHECK" switch of HYPE-A01H simultaneously for at least 3 seconds.

→ "TEST RUN" is displayed on the LCD.

The total number of the indoor units connected is indicated on the LCD.



Example when 5 indoor units are connected.

- Regarding other optional remote control switch (wireless remote control or half-size remote control), follow "Installation & Maintenance Manual" attached to each optional remote control switch and perform the test run.
- In case that the multiple indoor units are operated simultaneously controlled by one remote control switch, check the connected number of indoor unit is indicated on LCD.
- In case that the indicated number is not correct, the auto-address function is not performed correctly due to incorrect wiring, the electric noise or etc. Turn OFF the power supply and correct the wiring after checking the following points; (Do not repeat turning ON and OFF within 10 seconds.)
  - \* Power Supply for Indoor Unit is Not Turned ON or Incorrect Wiring.
  - \* Incorrect Connection of Connecting Cable between Indoor Units or Incorrect Connection of Controller Cable.
  - \* Incorrect Setting of Rotary Switch and Dip Switch (The setting is overlapped.) on the Indoor Units PCB.

- b) Set the operation mode by pressing "MODE" switch.

- c) Press "RUN/STOP" switch.

→ The operation lamp will be turned ON before the test run starts.

2-hour OFF Timer will be set automatically, and "OFF Timer" and "2HR" will be indicated on LCD. Although the air flow initial setting is "HI", the setting can be changed.

- Check the following operation range.

		Cooling Operation	Heating Operation
Indoor Temperature	Minimum	21°C DB / 15°C WB	15°C DB
	Maximum	32°C DB / 23°C WB	27°C DB
Outdoor Temperature	Minimum	-5°C DB (*)	-20°C WB (**)
	Maximum	43°C DB	15°C WB

DB: Dry Bulb, WB: Wet Bulb

**NOTES:**

(\*) 10°C DB ~ -5°C DB, Operation Control Range

(\*\*) -12°C WB ~ -20°C WB, Operation Control Range

- Pay attention to the following items while the system is running.
  - \* Do not touch any of the parts by hand at the discharge gas side, since the compressor chamber and the pipes at the discharge side are heated higher than 90°C.
  - \* DO NOT PUSH THE BUTTON OF THE MAGNETIC SWITCH(ES).  
It will cause a serious accident.
- Do not touch any electrical components for at least 3 minutes after turning OFF the main switch.
- Check that the refrigerant piping setting and electrical wiring setting are for the same system, by operating the indoor unit one by one.



- d) Depress "AUTO LOUVER" switch and check that the louver is activated normally without abnormal sound. Depress "AUTO LOUVER" again so that the louver will stop. If abnormal sound is heard, remove the panel and adjust the fitting condition of connection parts in the panel corner cover. Ensure that the panel is mounted correctly to the unit body, otherwise the panel may be deformed.
- e) The temperature control will be invalid though the protection device will be activated during the test run. If alarm occurs, find out the cause of abnormality according to Table 9.2 "Alarm Code". And again perform the test run after solving the problems.
- f) According to the label "Checking of Outdoor Unit by 7-segment Display on PCB1" attached to the rear side of the front cover of the outdoor unit, inspect temperature, pressure, operation frequency, and connected indoor unit numbers by the 7-segment displays.
- g) To end the test run, wait for 2 hours or push "RUN/STOP" switch again.

Table 9.1 Test Run and Maintenance Record

MODEL:	SERIAL. No.	COMPRESSOR MFG. No.
CUSTOMER'S NAME AND ADDRESS:		DATE:

1. Is the rotation direction of the indoor fan correct?
2. Is the rotation direction of the outdoor fan correct?
3. Are there any abnormal compressor sounds?
4. Has the unit been operated at least twenty (20) minutes?
5. Check Room Temperature
 

Inlet:	<u>    </u> No. 1 DB /WB °C,	<u>    </u> No. 2 DB /WB °C,	<u>    </u> No. 3 DB /WB °C,	<u>    </u> No. 4 DB /WB °C
Outlet:	<u>    </u> DB /WB °C,	<u>    </u> DB /WB °C,	<u>    </u> DB /WB °C,	<u>    </u> DB /WB °C
Inlet:	<u>    </u> No. 5 DB /WB °C,	<u>    </u> No. 6 DB /WB °C,	<u>    </u> No. 7 DB /WB °C,	<u>    </u> No. 8 DB /WB °C
Outlet:	<u>    </u> DB /WB °C,	<u>    </u> DB /WB °C,	<u>    </u> DB /WB °C,	<u>    </u> DB /WB °C
6. Check Outdoor Ambient Temperature
 

Inlet:	<u>    </u> DB °C,	<u>    </u> WB °C
Outlet:	<u>    </u> DB °C,	<u>    </u> WB °C
7. Check Refrigerant Temperature
 

Liquid Temperature:	<u>                    </u> °C
Discharge Gas Temperature:	<u>                    </u> °C
8. Check Pressure
 

Discharge Pressure:	<u>                    </u> MPa
Suction Pressure:	<u>                    </u> MPa
9. Check Voltage
 

Rated Voltage:	<u>                    </u> V
Operating Voltage:	<u>    </u> L <sub>1</sub> -L <sub>2</sub> <u>    </u> V, <u>    </u> L <sub>1</sub> -L <sub>3</sub> <u>    </u> V, <u>    </u> L <sub>2</sub> -L <sub>3</sub> <u>    </u> V
Starting Voltage:	<u>                    </u> V
Phase Imbalance:	$1 - \frac{V}{V_m} =$ <u>                    </u>
10. Check Compressor Input Running Current
 

Input:	<u>                    </u> kW
Running Current:	<u>                    </u> 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 cabinet panels fixed?
17. Are all 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?

Table 9.2 Alarm Code

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device (Float Switch)	Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drain Pipe, Float Switch or Drain Pan)
02	Outdoor Unit	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing)
03	Transmission	Abnormality between Indoor and Outdoor	Incorrect Wiring, Loose Terminals, Disconnect Wire, Blowout of Fuse, Outdoor Unit Power OFF
04		Abnormality between Inverter PCB and Outdoor PCB	Inverter PCB - Outdoor PCB Transmission Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
04.		Abnormality between Fan Controller and Outdoor PCB	Fan Controller - Outdoor PCB Transmission Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
05	Supply Phase	Abnormality Power Source Phases	Incorrect Power Source, Connection to Reversed Phase, Open-Phase
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Drop, Insufficient Power Capacity
06.		Abnormal Fan Controller Voltage	Outdoor Voltage Drop, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Closed Position (Disconnect Connector)
0A	Transmission	Abnormality between Outdoor and Outdoor	Incorrect Wiring, Breaking Wire, Loose Terminals
0b	Outdoor Unit	Incorrect Outdoor Unit Address Setting	Duplication of Address Setting for Outdoor Units (Sub Units) in Same Refrigerant Cycle System
0C		Incorrect Outdoor Unit Main Unit Setting	Two (or more) Outdoor Units Set as "Main Unit" Exist in Same Refrigerant Cycle System
11	Sensor on Indoor Unit	Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19	Fan Motor	Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Locking
21	Sensor on Outdoor Unit	High Pressure Sensor	Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
22		Outdoor Air Thermistor	
23		Discharge Gas Thermistor on Top of Compressor	
24		Heat Exchanger Liquid Pipe Thermistor	
25		Heat Exchanger Gas Pipe Thermistor	
29		Low Pressure Sensor	

Code	Category	Content of Abnormality	Leading Cause
31	System	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit	Incorrect Capacity Code Setting of Combination Excessive or Insufficient Indoor Unit Total Capacity Code
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. in same Ref. Gr.
36		Incorrect of Indoor Unit Combination	Indoor Unit is Designed for R22
38		Abnormality of Picking up Circuit for Protection in Outdoor Unit	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
39	Compressor	Abnormality Running Current at Constant Speed Compressor	Overcurrent, Blowout Fuse, Current Sensor Failure, Instantaneous Power Failure, Voltage Drop, Abnormal Power Supply
3A	Outdoor Unit	Abnormality of Outdoor Unit Capacity	Outdoor Unit Capacity > 510kBtu/h
3b		Incorrect Setting of Outdoor Unit Models Combination or Voltage	Incorrect Setting of Main and Sub Unit(s) Combination or Voltage
3d		Abnormality Transmission between Main Unit and Sub Unit(s)	Incorrect Wiring, Disconnect Wire, Breaking Wire, PCB Failure
43	Protection Device	Activation of Low Compression Ratio Protection Device	Defective Compression (Failure of Compressor of Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection Device	Overload at Cooling, High Temperature at Heating, Expansion Valve Locking (Loose Connector)
45		Activation of High Pressure Increase Protection Device	Overload Operation (Clogging, Short-Pass), Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)	Insufficient Refrigerant, Refrigerant Piping, Clogging, Expansion Valve Locking at Open Position (Loose Connector)
48		Activation of Inverter Overcurrent Protection Device	Overload Operation, Compressor Failure
51	Sensor	Abnormal Inverter Current Sensor	Current Sensor Failure
53	Inverter	Inverter Error Signal Detection	Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short Circuit)
54		Abnormality of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure
55		Inverter Failure	Inverter PCB Failure
57	Fan Controller	Activation of Fan Controller Protection	Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short Circuit), Instantaneous Overcurrent
5A		Abnormality of Fan Controller Fin Temperature	Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
5b		Activation of Overcurrent Protection	Fan Motor Failure
5C		Abnormality of Fan Controller Sensor	Failure of Current Sensor (Instantaneous Overcurrent, Increase of Fin Temperature, Low Voltage, Earth Fault, Step-Out)
EE	Compressor	Compressor Protection Alarm (It is can not be reset from remote Controller)	This alarm code appears when the following alarms* occurs three times within 6 hours. *02, 07, 08, 39, 43 to 45, 47
b1	Outdoor Unit No. Setting	Incorrect Setting of Unit and Refrigerant Cycle No.	Over 64 Number is Set for Address or Refrigerant Cycle.
b5	Indoor Unit No. Setting	Incorrect Indoor Unit Connection Number Setting	More than 17 Non-Corresponding to Hi-NET Units are Connected to One System.
C1	Switch Box Unit	Incorrect Indoor Unit Connection	2 or more Switch Box Units are connected between outdoor unit and indoor unit.
C2		Incorrect Indoor Unit Connection No. Setting	9 or More Indoor Units Connected to Switch Box Unit
C3		Incorrect Indoor Unit Connection	The indoor units of different refrigerant cycle is connected to Switch Box unit.

## 10. Safety and Control Device Setting

- Compressor Protection

The compressor is protected by the following devices and their combinations.

- (1) High Pressure Switch: This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.
- (2) Oil Heater: This band type heater protects against oil foaming during cold starting, as it is energized while the compressor is stopped.

Model			AVWT-76FE(7)(9)SR	AVWT-96FE(7)(9)SR	AVWT-114FE(7)(9)SR
For Compressor Pressure Switches			Automatic Reset, Non-Adjustable (each one for each compressor)		
High	Cut-Out	MPa	4.15 <sup>-0.05</sup> <sub>-0.15</sub>	4.15 <sup>-0.05</sup> <sub>-0.15</sub>	4.15 <sup>-0.05</sup> <sub>-0.15</sub>
	Cut-In	MPa	3.20±0.15	3.20±0.15	3.20±0.15
Fuse Capacity					
3φ, 380-415V, 50Hz 3φ, 380V, 60Hz		A	40 x 2	40 x 2	40 x 2
3φ, 220V, 60Hz		A	60 x 2	60 x 2	60 x 2
Oil Heater Capacity		W	40 x 2	40 x 2	40 x 2
CCP Timer Setting Time		min.	3	Non-Adjustable 3	3
For DC Fan Module Fuse Capacity					
3φ, 380-415V, 50Hz 3φ, 380V, 60Hz		A	20 x 1	20 x 1	20 x 1
3φ, 220V, 60Hz		A	16 x 2	16 x 2	16 x 2

Model			AVWT-136FE(7)(9)SS	AVWT-154FE(7)(9)SS	AVWT-170FE(7)(9)SS
For Compressor Pressure Switches			Automatic Reset, Non-Adjustable (each one for each compressor)		
High	Cut-Out	MPa	4.15 <sup>-0.05</sup> <sub>-0.15</sub>	4.15 <sup>-0.05</sup> <sub>-0.15</sub>	4.15 <sup>-0.05</sup> <sub>-0.15</sub>
	Cut-In	MPa	3.20±0.15	3.20±0.15	3.20±0.15
Fuse Capacity					
3φ, 380-415V, 50Hz 3φ, 380V, 60Hz		A	40 x 2 + 32 x 2	40 x 2 + 32 x 2	40 x 2 + 32 x 2
3φ, 220V, 60Hz		A	60 x 2 + 50 x 2	60 x 2 + 50 x 2	60 x 4
Oil Heater Capacity		W	40 x 4	40 x 4	40 x 4
CCP Timer Setting Time		min.	3	Non-Adjustable 3	3
For DC Fan Module Fuse Capacity					
3φ, 380-415V, 50Hz 3φ, 380V, 60Hz		A	20 x 1	20 x 1	20 x 1
3φ, 220V, 60Hz		A	16 x 2	16 x 2	16 x 2

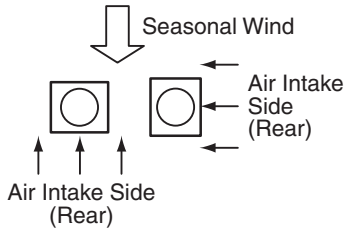
**11. Common**

**11.1 Caution of Outdoor Unit Installation**

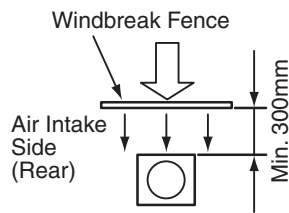
**(1) Consideration to Seasonal Wind**

Avoid the installation that the air intake side (Rear) of the unit is faced directly against a seasonal strong wind.

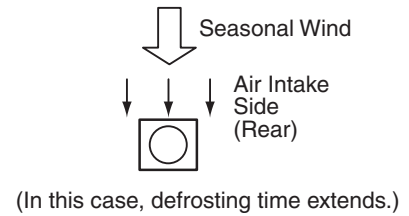
**Correct**



**Correct**



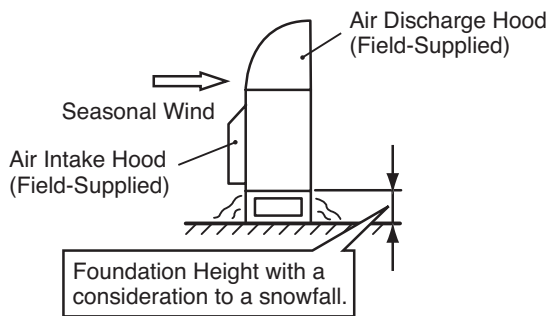
**Incorrect**



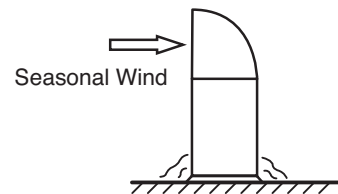
**(2) Consideration to Snow**

Apply an air discharge hood, an air intake hood and a higher foundation to prevent accumulation of snow on the air outlet and air inlet.

**Correct**



**Incorrect**

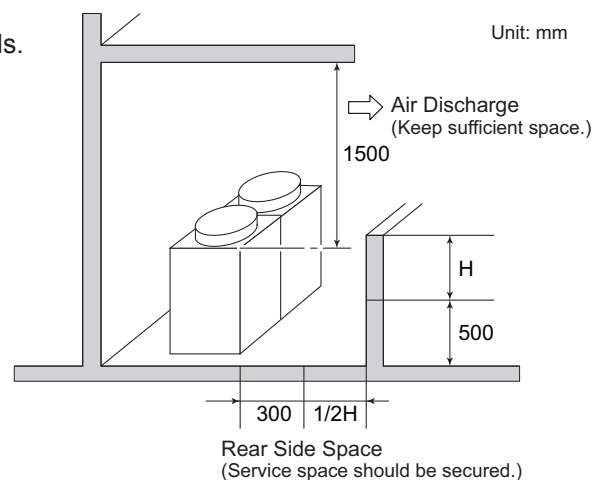


**NOTES:**

1. Refer to the (4) "Dimensions of the Hood (Field-Supplied)".
2. Install the unit on a sunny place to prevent accumulation of snow.

**(3) Prevention of Short-circuiting**

Refer to the item 5.3 "Service Space" for more details.



(Example: for Single Unit Installation)

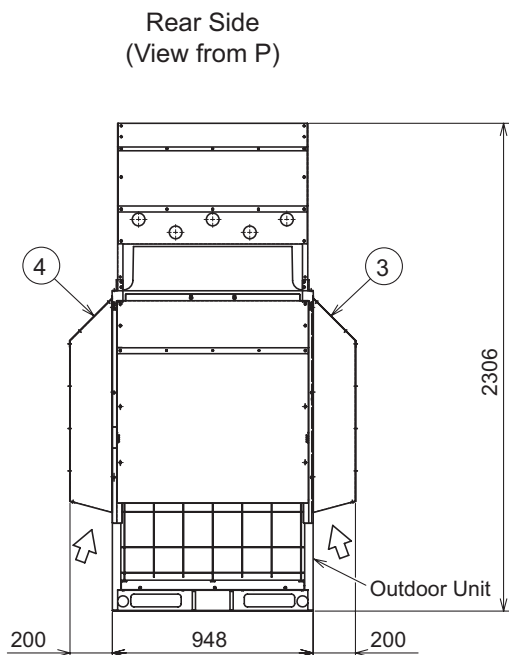
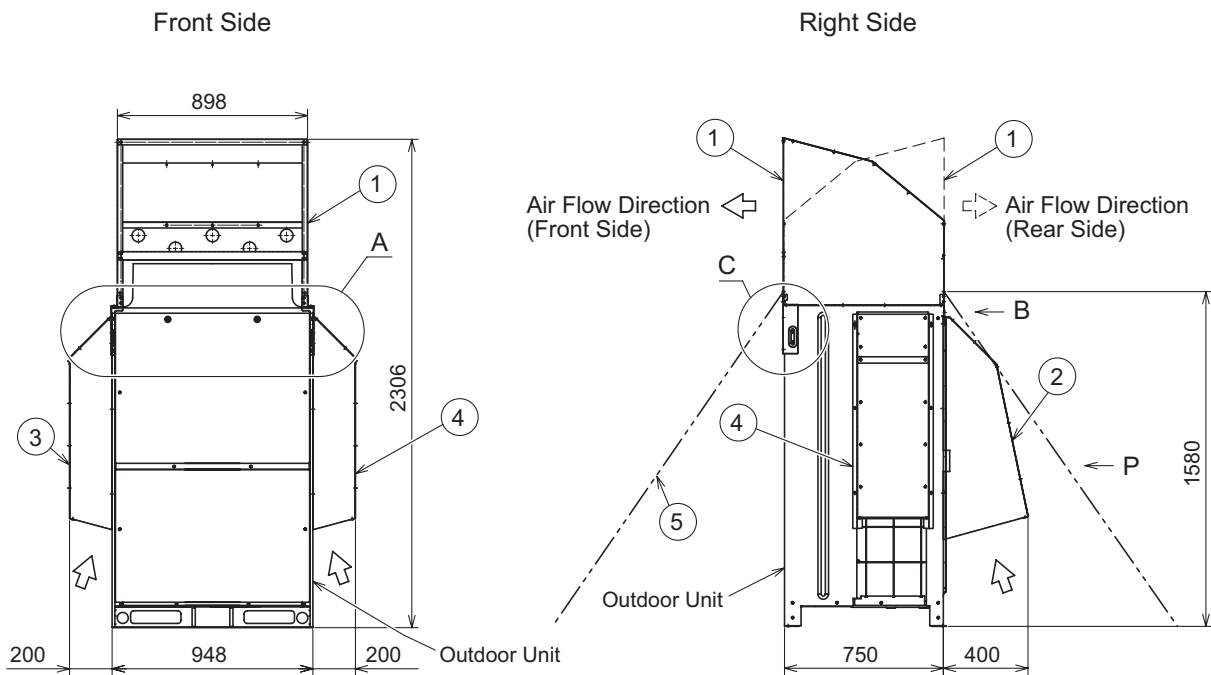
# INSTALLATION & OPERATION

## (4) Dimensions of the Hood (Field-Supplied)

- Following figures show the recommended dimensions of air discharge hood and air intake hood for the outdoor unit.
- Apply steel plate of thickness 1mm for hood part, and of thickness 1.6mm for flange part and stay part.
- Apply steel plate with holes for hood part of air intake hood.
- Apply munsell code 1.0Y 8.5/0.5 beige color for painting the hood
- Apply M5 tapping screws for fixing the hood.
- Reinforce the hood with supports, if they are necessary in consideration of the weather such as a strong wind.

AVWT-76~114FE(7)(9)SR (Cabinet: W948mm)

Unit: mm

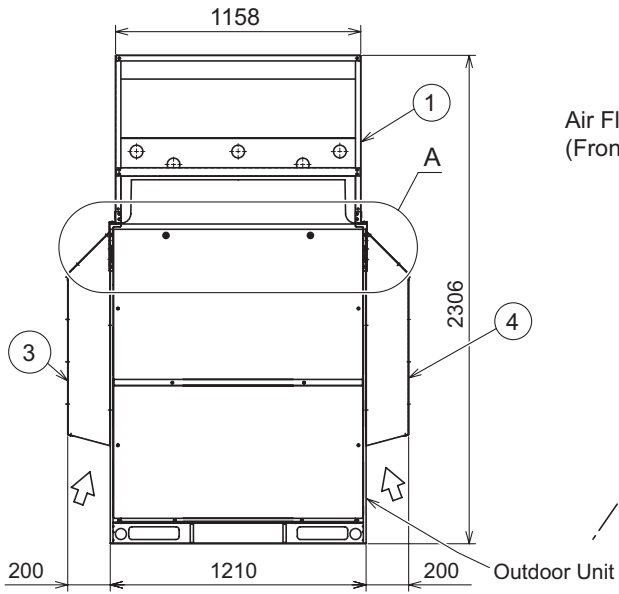


No.	Part Name
1	Air Discharge Hood
2	Rear Suction Hood
3	Left Suction Hood
4	Right Suction Hood
5	Safety Wire Rope (to prevent overturning)

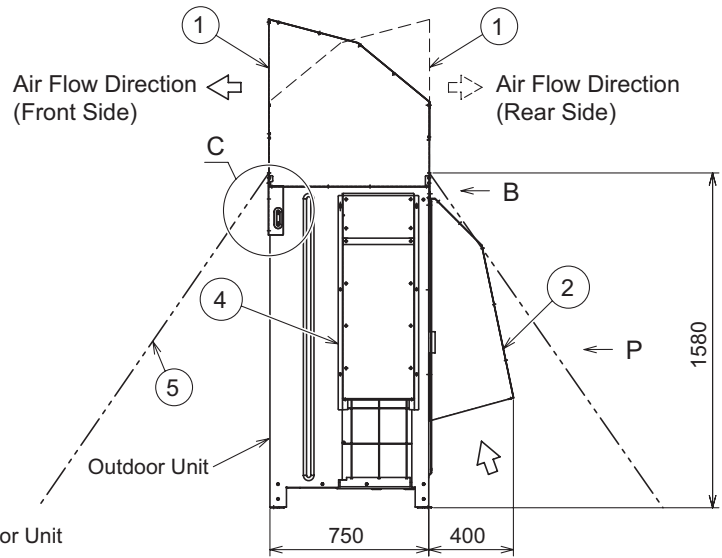
AVWT-136~170FE(7)(9)SS (Cabinet: W1210mm)

Unit: mm

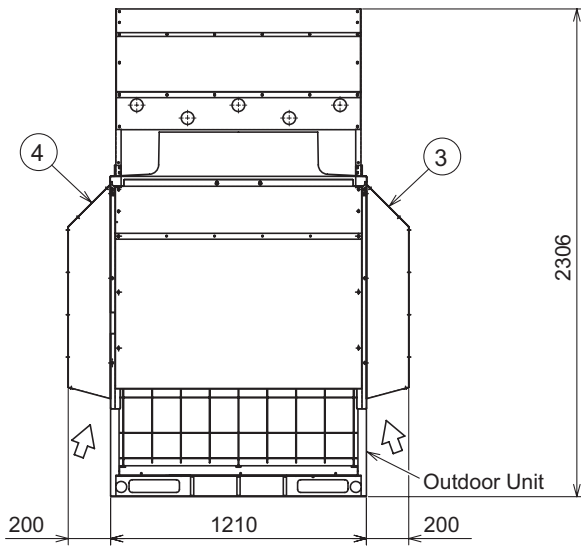
Front Side



Right Side



Rear Side  
(View from P)



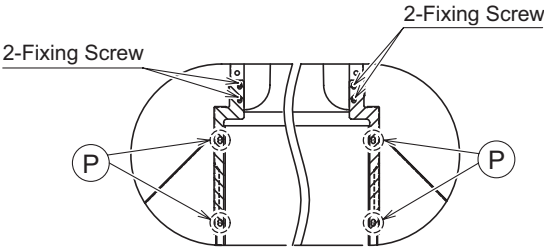
No.	Part Name
1	Air Discharge Hood
2	Rear Suction Hood
3	Left Suction Hood
4	Right Suction Hood
5	Safety Wire Rope (to prevent overturning)



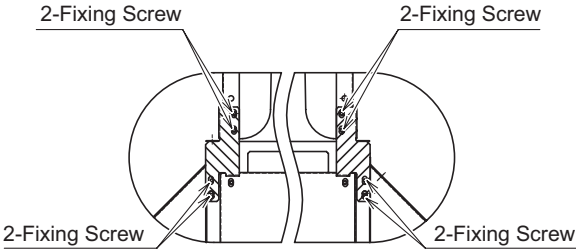
# INSTALLATION & OPERATION

< Enlarged View of A, B and C >

Enlarged View of A



Enlarged View of B

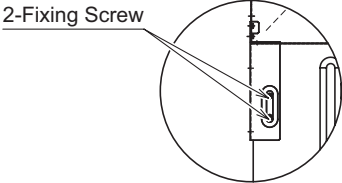


Enlarged View of P

Punch Mark (4 places)

Drill a pilot hole into the punch mark and mount the fixing plate.

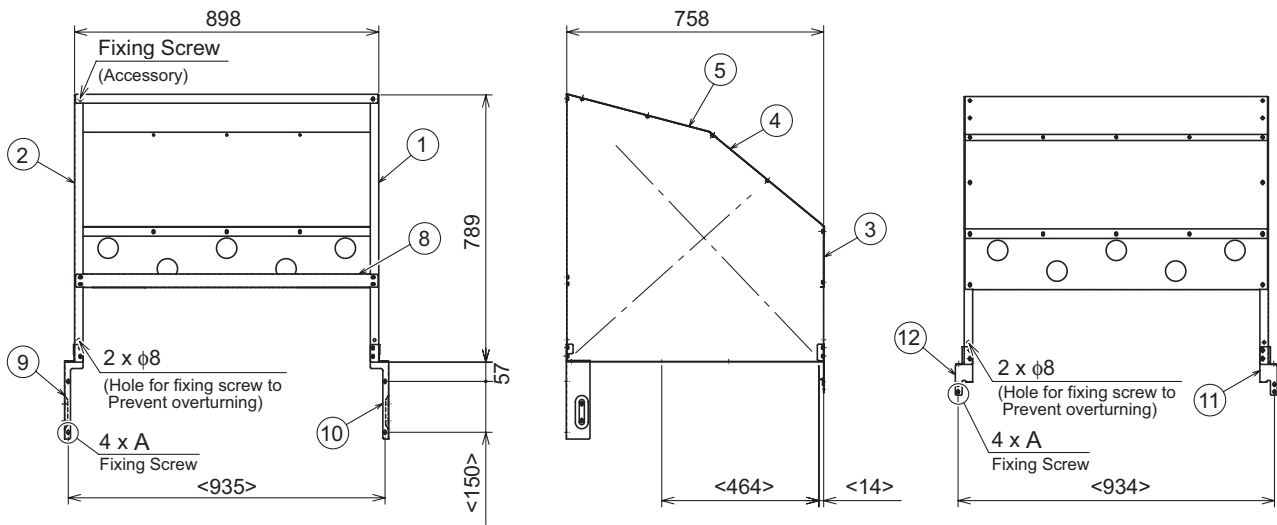
Enlarged View of C



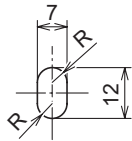
< Air Discharge and Rear Suction Hood for AVWT-76~114FESR >

Unit: mm

• Air Discharge Hood

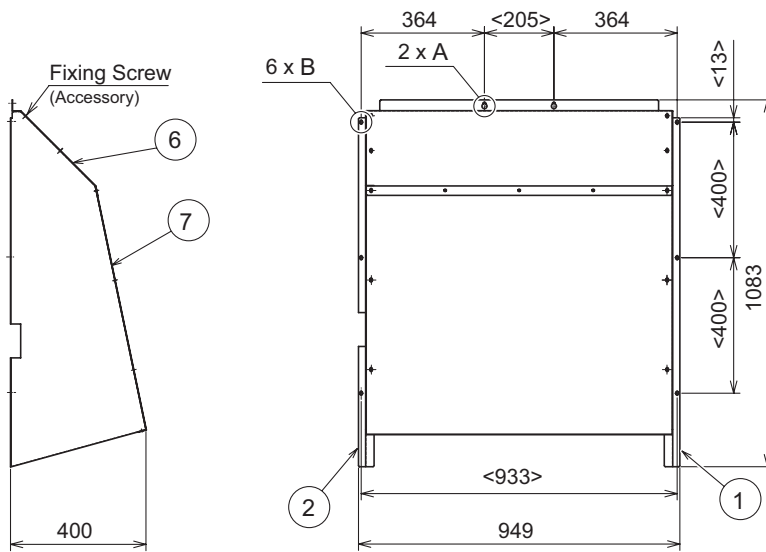


Enlarged View of A

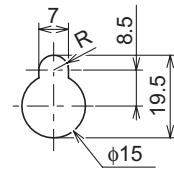


No.	Part Name	Quantity	
		Air Discharge Hood	Rear Suction Hood
1	Right Plate	1	1
2	Left Plate	1	1
3	Front Panel (1)	1	-
4	Front Panel (2)	1	-
5	Front Panel (3)	1	-
6	Front Panel (Upper)	-	1
7	Front Panel (Lower)	-	1
8	Side Plate	1	-
9	Left Fixing Plate for Front	1	-
10	Right Fixing Plate for Front	1	-
11	Left Fixing Plate for Rear	1	-
12	Right Fixing Plate for Rear	1	-

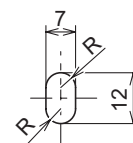
• Rear Suction Hood



Enlarged View of A



Enlarged View of B



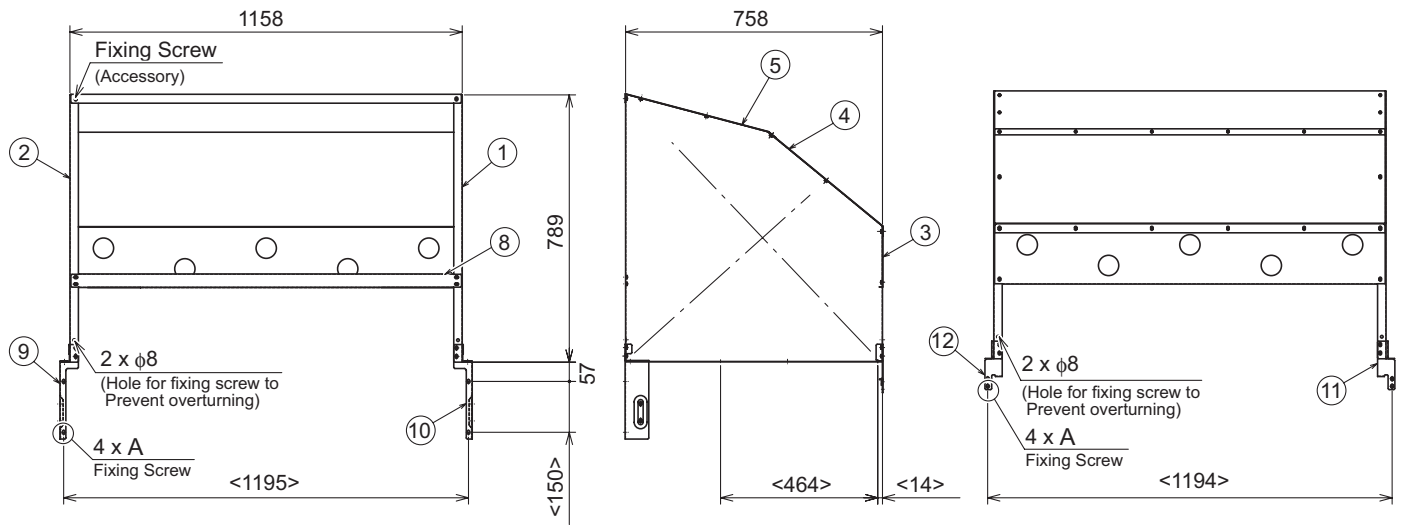
< >: Installation Dimension

# INSTALLATION & OPERATION

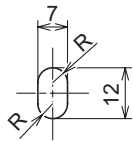
## < Air Discharge and Rear Suction Hood for AVWT-136~170FESS >

Unit: mm

### • Air Discharge Hood

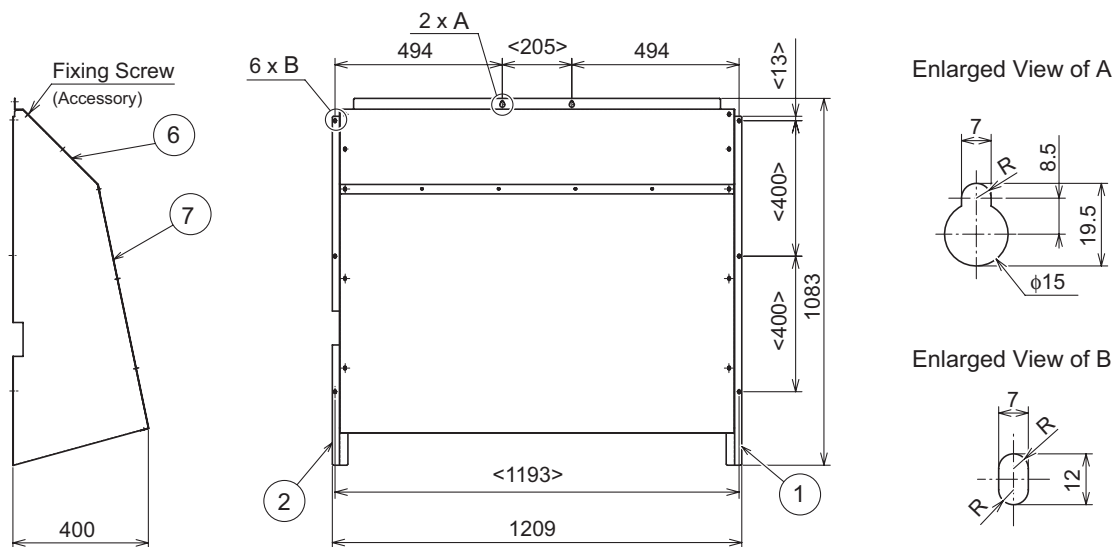


Enlarged View of A



No.	Part Name	Quantity	
		Air Discharge Hood	Rear Suction Hood
1	Right Plate	1	1
2	Left Plate	1	1
3	Front Panel (1)	1	-
4	Front Panel (2)	1	-
5	Front Panel (3)	1	-
6	Front Panel (Upper)	-	1
7	Front Panel (Lower)	-	1
8	Side Plate	1	-
9	Left Fixing Plate for Front	1	-
10	Right Fixing Plate for Front	1	-
11	Left Fixing Plate for Rear	1	-
12	Right Fixing Plate for Rear	1	-

### • Rear Suction Hood

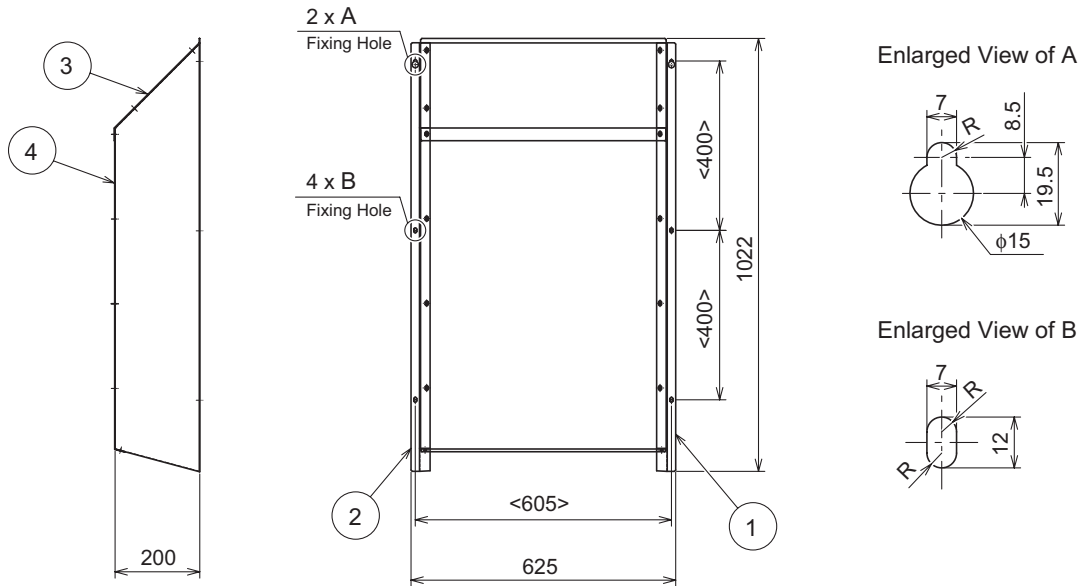


< >: Installation Dimension

< Left and Right Suction Hood for AVWT-76~170 >

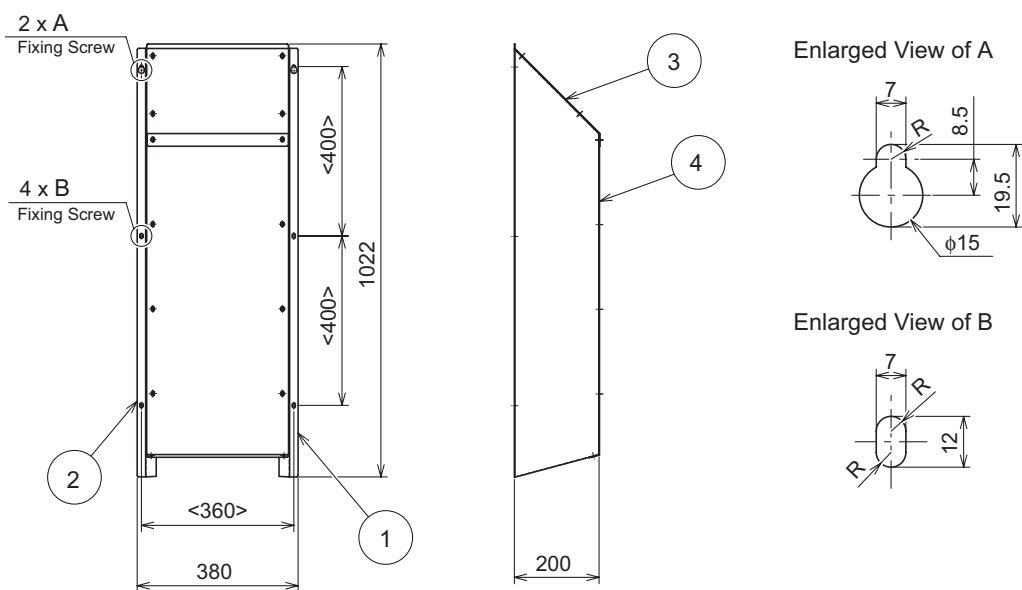
Unit: mm

• Left Suction Hood



No.	Part Name	Quantity	
		Left Suction Hood	Right Suction Hood
1	Right Plate	1	1
2	Left Plate	1	1
3	Front Panel (1)	1	1
4	Front Panel (2)	1	1

• Right Suction Hood



< >: Installation Dimension

11.2 Refrigerant Piping Provision

< Suspension of Refrigerant Piping >

**! DANGER**

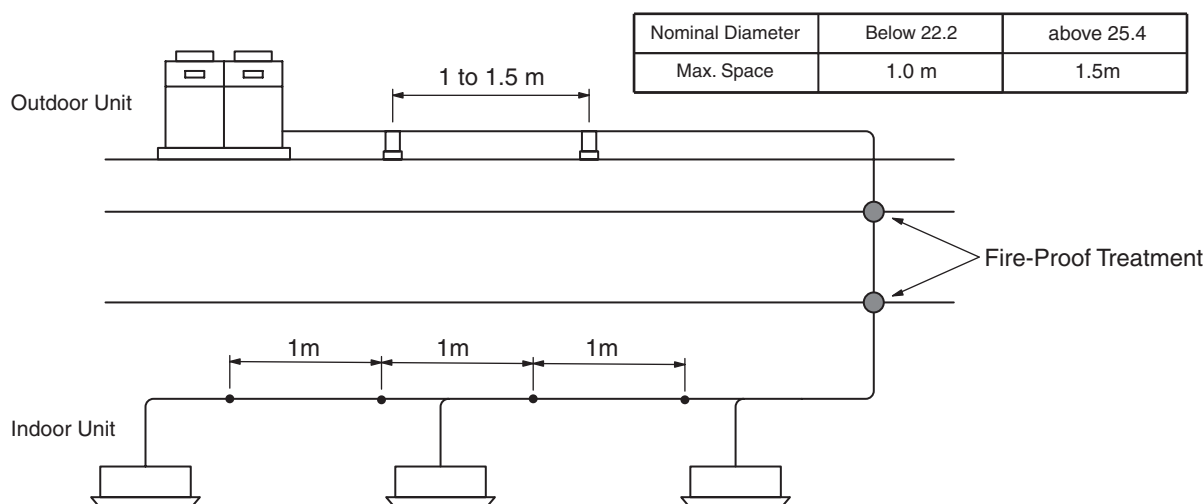
**Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. Do not charge material other than R410A into the unit such as hydrocarbon refrigerants (propane or etc.), oxygen, flammable gases (acetylene or etc.) or poisonous gases when installing, maintaining and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

(1) Piping Materials

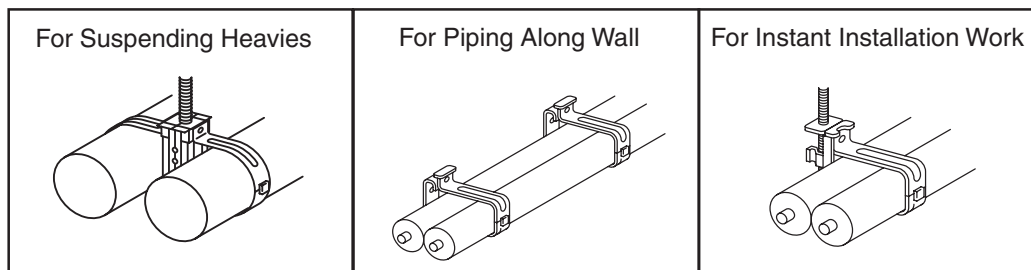
- (a) Prepare field-supplied copper pipes.
- (b) The piping size should be selected using the following figures.
- (c) Select clean copper pipes. Make sure there is no dust and moisture inside. Before connecting pipes, blow the inside of the pipes with nitrogen or dry air, to remove any dust and foreign materials.

(2) Suspension of Refrigerant Piping

Suspend the refrigerant piping at certain points and prevent the refrigerant piping from touching the weak part of the building such as wall, ceiling, etc. (If touched, abnormal sound may occur due to the vibration of the piping. Pay special attention in case of short piping length.)



Do not fix the refrigerant piping directly with the metal fittings (The refrigerant piping may expand and contract). Some examples for suspension method are shown below.



There are 2 kinds of surface treatment such as; standard chromating and ceramic coating treatment (\*).

< Ceramic Coating >

Coating Treatment with triple strong coating on the iron material surface, and has the following characters.

- Corrosion Resistance: Superior in adhesion and corrosion resistance due to triple coating
- Weather Resistance and Heat Resistance: Strong resistance to ultra-violet rays and solar heat due to ceramic coating
- Surface Hardness: Superior in excoriation resistance due to high hardness of the surface

11.3 Distribution Method by Branch Pipe (Optional Parts)

- Applicable Outdoor Units  
These multiple manifold pipes can be applied to the R series.
- Transportation  
Transport the product as close to the installation location as practical before unpacking.

- Before Installation  
Confirm the number of the following parts by referring to the model printed on the package before unpacking.  
Do NOT put any foreign material into the parts.  
Check to confirm that no foreign materials are inside the parts before installation.

**CAUTION**

Do not put any material on the product.

11.3.1 For Heat Pump System

< Manifold Pipe (Models: HFQ-M22F, HFQ-M32F) >

[ Installation Work ]

- Piping Connection Size  
The ends of the branch pipes are finished as shown in the following figures. Cut the end of the pipe to meet with the pipe size.

**CAUTION**

Piping shall be supported with adequate space. Bent pipes and bypass piping (horizontal loop) shall also be installed in order to absorb piping elasticity caused by temperature changes.

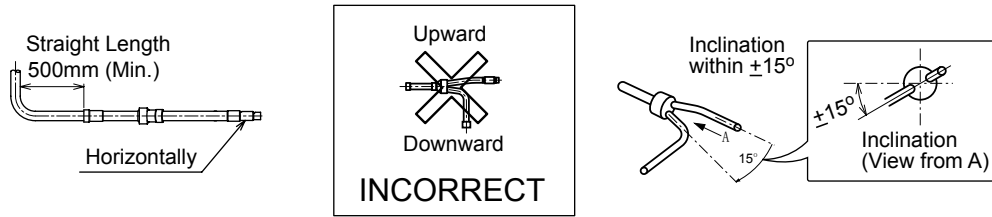
Model	Gas Line	Liquid Line	Reducer for Gas Line	Reducer for Liquid Line
HFQ-M22F	<p>Diagram showing Gas Line connections for HFQ-M22F. Main pipe ID: 25.4. Branch pipes: ID 28.6, ID 25.4, ID 22.2, ID 15.88, ID 12.7. Pipe diameters: Ø 25.4, Ø 22.2.</p>	<p>Diagram showing Liquid Line connections for HFQ-M22F. Main pipe ID: 15.88. Branch pipes: ID 9.53, ID 12.7, ID 15.88, ID 19.05, ID 9.53, ID 6.35. Pipe diameters: Ø 25.4, Ø 19.05.</p>	<p>Reducer for Gas Line: ID 25.4, ID 15.88, OD 28.6, ID 22.2, ID 19.05. Q'ty: 2</p>	—
HFQ-M32F	<p>Diagram showing Gas Line connections for HFQ-M32F. Main pipe ID: 31.75. Branch pipes: ID 38.1, ID 32.0, ID 31.75, ID 28.6, ID 28.6. Pipe diameters: Ø 31.75, Ø 28.6.</p>	<p>Diagram showing Liquid Line connections for HFQ-M32F. Main pipe ID: 19.05. Branch pipes: ID 9.53, ID 15.88, ID 19.05, ID 12.7, ID 22.2, ID 22.2, ID 9.53, ID 6.35. Pipe diameters: Ø 25.4, Ø 19.05.</p>	<p>Reducer for Gas Line (top): OD 31.75, ID 22.2, ID 28.6, ID 25.4. Q'ty: 1</p>	—
			<p>Reducer for Gas Line (middle): ID 25.4, ID 15.88, OD 28.6, ID 12.7, ID 22.2, ID 19.05. Q'ty: 1</p>	
			<p>Reducer for Gas Line (bottom): OD 38.1, ID 34.92. Q'ty: 1</p>	

Unit: mm, ID: Inner Diameter, OD: Outer Diameter

# INSTALLATION & OPERATION

## ■ Installation Position (Horizontal Installation)

Locate the branch pipes on the same horizontal plane. (Inclination within  $\pm 15^\circ$ )  
 Make the straight length a minimum of 500mm after the vertical bend.  
 Incorrect installation may lead to a failure of outdoor unit.

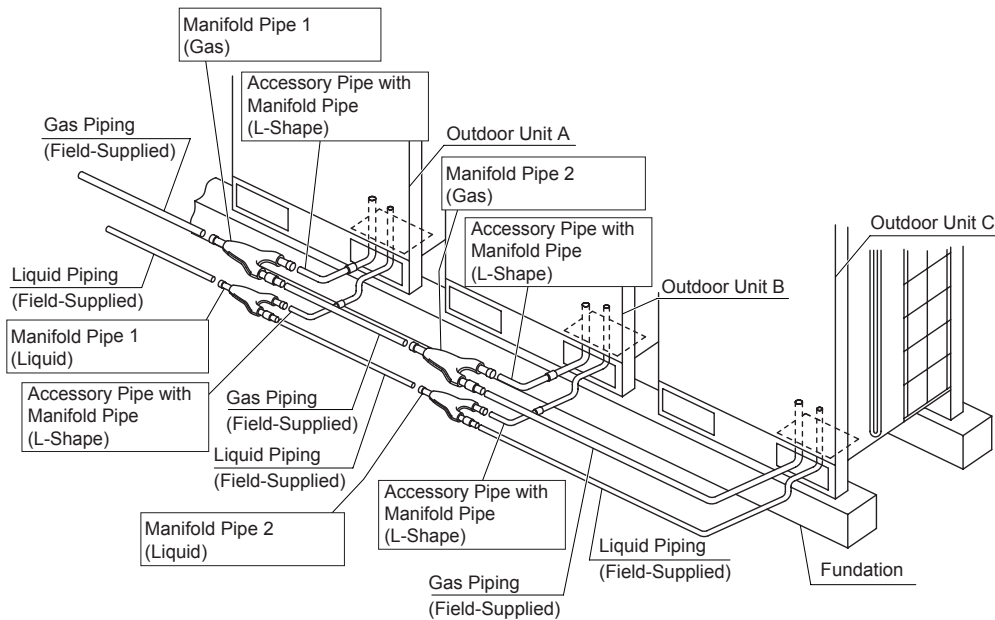


## ■ Piping Connection

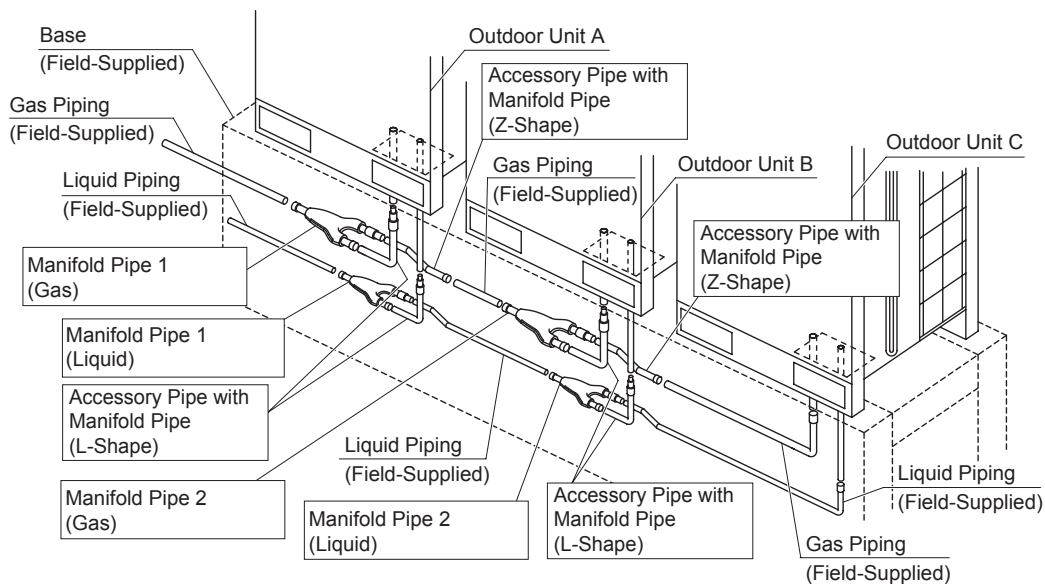
Perform the piping connection work by referring to the figure below.  
 Refer to the item 6.3 “Caution about Outdoor Unit Installation” for the piping length between outdoor units and between manifold pipes.

Example: 364kBtu/h (The combination of 3 outdoor units)

< Front Side or Rear Side Piping Connection >



< Downward Piping Connection >

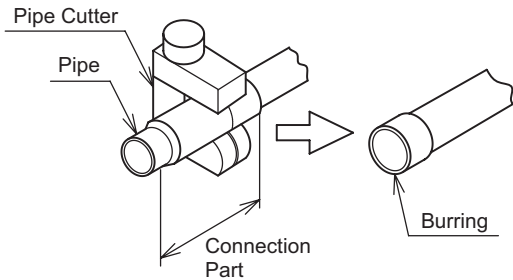


■ Piping Connection

- (1) Use clean copper pipes without any moisture or foreign materials on inner surface of pipes. When connecting refrigerant pipe, cut the copper pipes with a pipe cutter as shown below.

Also blow the pipes with nitrogen or air to remain no dust inside the pipe.

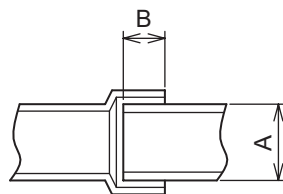
Do NOT use a saw, a grindstone or others which causes a large amount of cutting powder.



- (2) When cutting the pipe, secure the adequate depth for brazing as shown in the following table.

(mm)

A: Outer Diameter	B: Minimum Depth
Over 5, Below 8	6
Over 8, Below 12	7
Over 12, Below 16	8
Over 16, Below 25	10
Over 25, Below 35	12
Over 35, Below 45	14



● Caution for Refrigerant Piping

When installing pipe through the wall, secure a cap at the end of the pipe.

Attach a cap or vinyl tape.

Do NOT place the pipe directly on the ground.

Attach a cap or vinyl tape.

**CORRECT**

Attach a cap or vinyl tape with rubber band.

**INCORRECT**

Rain water can enter.

- (3) Make sure that all stop valves of the outdoor unit are closed completely.
- (4) Blow the inside of the pipes with nitrogen gas when brazing.

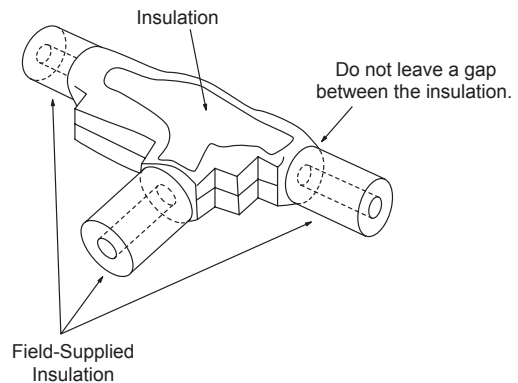
**⚠ DANGER**

**Check for the refrigerant leakage carefully. If large amount of refrigerant leakage occurs, it will cause to breathe with difficulty or to generate harmful gas due to the fire.**

- (5) The air tight test pressure of this product is 4.15MPa.
- (6) Apply the insulation supplied with this branch pipes to each branch (liquid side and gas side) with a tape. Also apply the field-supplied insulation to the field-supplied pipes.

**NOTE**

When polyethylene foam is applied, a thickness of 10mm for liquid piping and 15mm to 20mm for gas piping is recommended. (Use the insulation with heat resistance of 100°C for gas piping.)



**⚠ CAUTION**

- Perform the insulation work when the pipe surface temperature decreases to the room temperature. If insulation work is performed immediately after brazing, insulation may melt.
- If the ends of pipe are open to the atmosphere for a while after performing piping work, securely put caps or plastic bags over the pipe ends for avoiding moisture or dust.



< Line Branch (Models: HFQ-102F, HFQ-162F, HFQ-242F, HFQ-302F) >

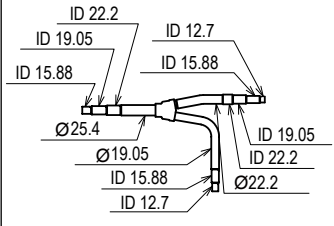
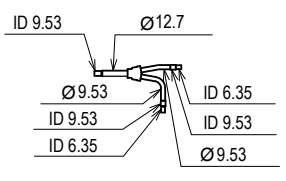
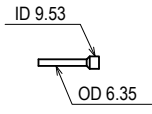
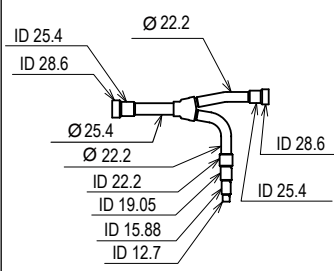
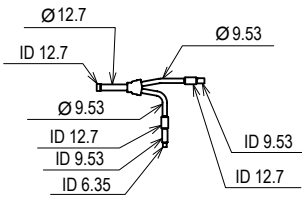
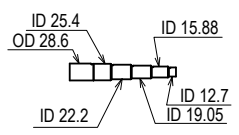
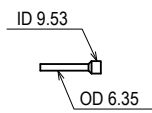
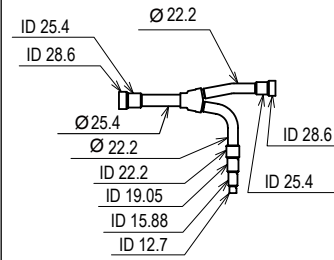
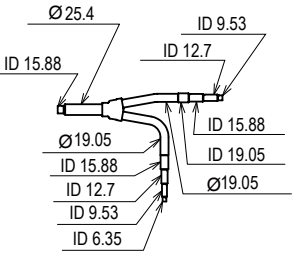
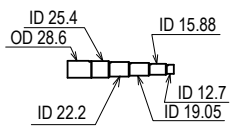
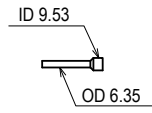
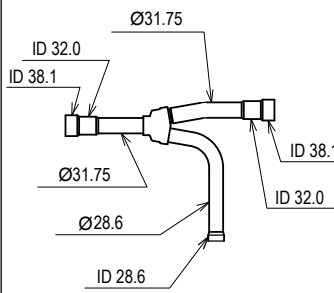
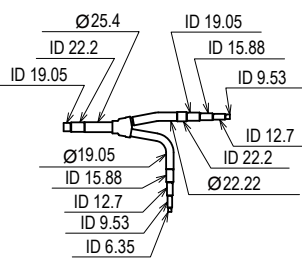
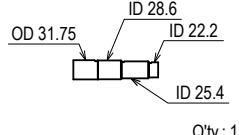
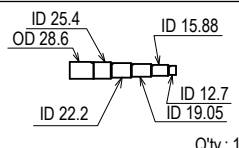
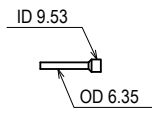
[ Installation Work ]

■ Piping Connection Size

The ends of the branch pipes are finished as shown in the following figures. Cut the end of the pipe to meet with the pipe size.

**CAUTION**

Piping shall be supported with adequate space. Bent pipes and bypass piping (horizontal loop) shall also be installed in order to absorb piping elasticity caused by temperature changes.

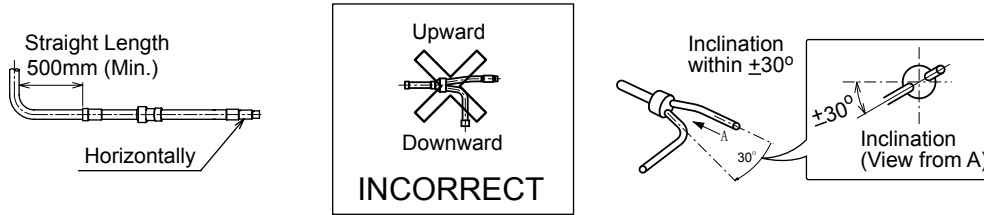
Models	Gas Line	Liquid Line	Reducer for Gas Line	Reducer for Liquid Line
HFQ-102F			—	 Qty : 2
HFQ-162F			 Qty : 1	 Qty : 1
HFQ-242F			 Qty : 1	 Qty : 1
HFQ-302F			 Qty : 1  Qty : 1	 Qty : 1

Unit: mm, ID: Inner Diameter, OD: Outer Diameter

■ Installation Position

(1) Horizontal Installation

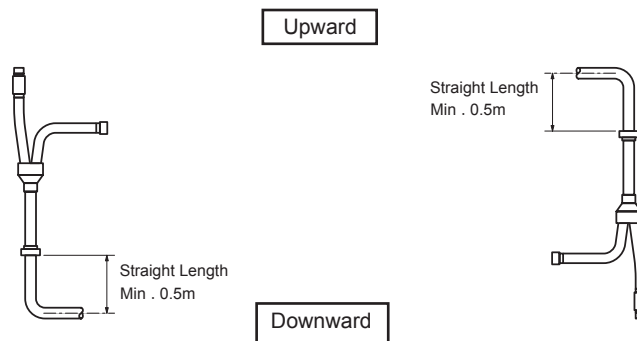
Locate the branch pipes on the same horizontal plane. (Inclination within 30°)  
 Make the straight length a minimum of 0.5m after the vertical bend.



(2) Vertical Installation

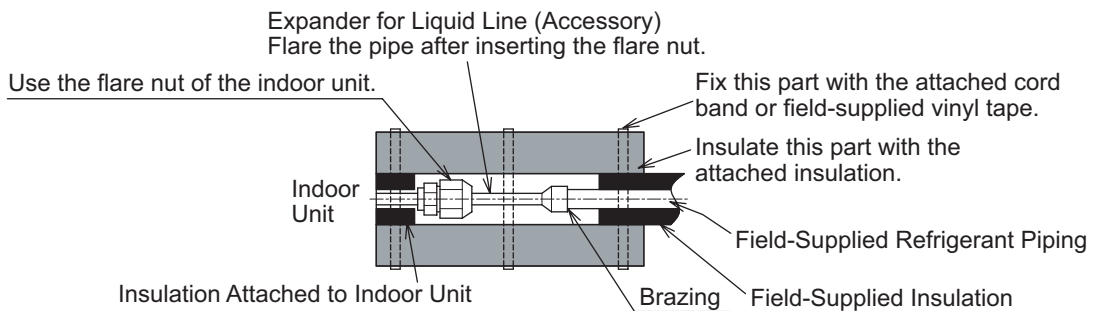
Straight length of the pipe connection on the outdoor unit side is made as follows:

- a) The collective pipe connection part is installed upward, the straight length must be min. 0.5m.
- b) The collective pipe connection part is installed downward, the straight length must be min.0.5m.



■ Connection Procedure for Piping Joint

When connecting liquid piping for the unit with a capacity 18kBTu/h or smaller, and with the length of piping is 15 meters or longer, apply the piping size of φ9.53mm. Fix the connecting pipe as shown in the below figure. Use the insulation attached to the indoor unit.

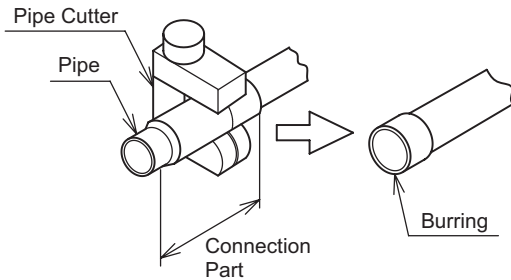


## ■ Piping Connection

- (1) Use clean copper pipes without any moisture or foreign materials on inner surface of pipes. When connecting refrigerant pipe, cut the copper pipes with a pipe cutter as shown below.

Also blow the pipes with nitrogen or air to remain no dust inside the pipe.

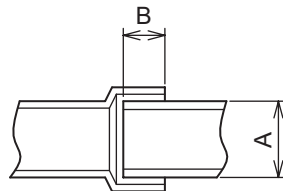
Do NOT use a saw, a grindstone or others which causes a large amount of cutting powder.



- (2) When cutting the pipe, secure the adequate depth for brazing as shown in the following table.

(mm)

A: Outer Diameter	B: Minimum Depth
Over 5, Below 8	6
Over 8, Below 12	7
Over 12, Below 16	8
Over 16, Below 25	10
Over 25, Below 35	12
Over 35, Below 45	14



## ● Caution for Refrigerant Piping

When installing pipe through the wall, secure a cap at the end of the pipe.

INCORRECT

Hole

Attach a cap or vinyl tape.

CORRECT

Do NOT place the pipe directly on the ground.

CORRECT

INCORRECT

Attach a cap or vinyl tape.

CORRECT

Attach a cap or vinyl tape with rubber band.

INCORRECT

Rain water can enter.

- (3) Make sure that all stop valves of the outdoor unit are closed completely.
- (4) Blow the inside of the pipes with nitrogen gas when brazing.

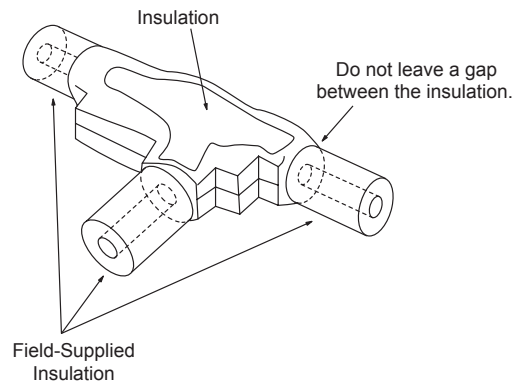
## ⚠ DANGER

**Check for the refrigerant leakage carefully. If large amount of refrigerant leakage occurs, it will cause to breathe with difficulty or to generate harmful gas due to the fire.**

- (5) The air tight test pressure of this product is 4.15MPa.
- (6) Apply the insulation supplied with this branch pipes to each branch (liquid side and gas side) with a tape. Also apply the field-supplied insulation to the field-supplied pipes.

## NOTE

When polyethylene foam is applied, a thickness of 10mm for liquid piping and 15mm to 20mm for gas piping is recommended. (Use the insulation with heat resistance of 100°C for gas piping.)



## ⚠ CAUTION

- Perform the insulation work when the pipe surface temperature decreases to the room temperature. If insulation work is performed immediately after brazing, insulation may melt.
- If the ends of pipe are open to the atmosphere for a while after performing piping work, securely put caps or plastic bags over the pipe ends for avoiding moisture or dust.

11.3.2 For Heat Recovery System

< Manifold Pipe (Models: HFQ-M202F, HFQ-M212F, HFQ-M302F) >

[ Installation Work ]

■ Piping Connection Size

The ends of the branch pipes are finished as shown in the following figures. Cut the end of the pipe to meet with the pipe size.

**CAUTION**

Piping shall be supported with adequate space. Bent pipes and bypass piping (horizontal loop) shall also be installed in order to absorb piping elasticity caused by temperature changes.

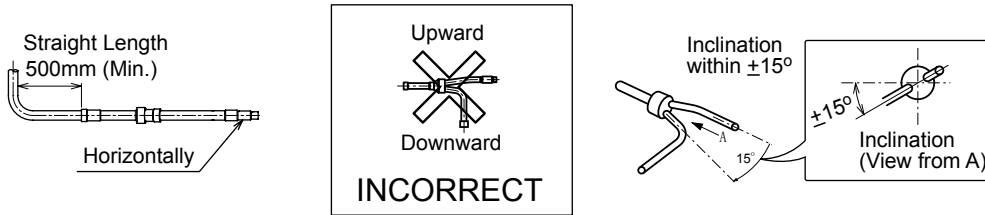
Model	Low Pressure Gas Line	High Pressure Gas Line	Liquid Line	Reducer for Low Pressure Gas Line	Reducer for High Pressure Gas Line	Reducer for Liquid Line
HFQ-M202F						—
HFQ-M212F						—
HFQ-M302F						—
						—
					—	—

Unit: mm, ID: Inner Diameter, OD: Outer Diameter

# INSTALLATION & OPERATION

## ■ Installation Position (Horizontal Installation)

Locate the branch pipes on the same horizontal plane. (Inclination within  $\pm 15^\circ$ )  
 Make the straight length a minimum of 500mm after the vertical bend.  
 Incorrect installation may lead to a failure of outdoor unit.

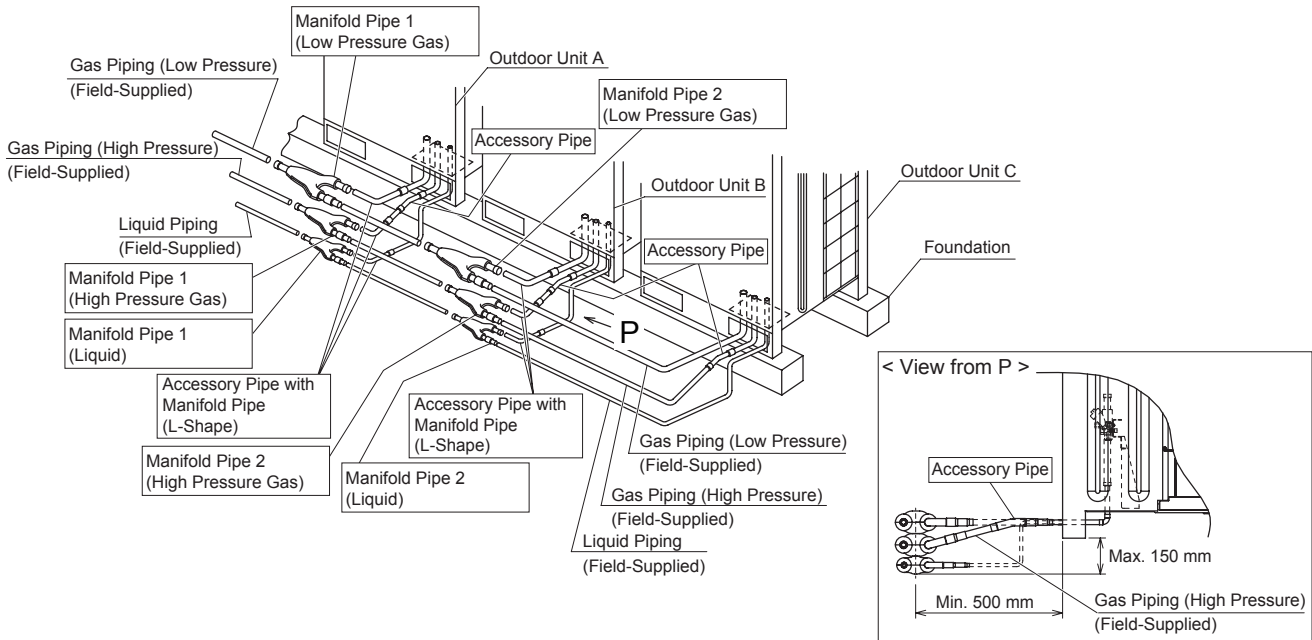


## ■ Piping Connection

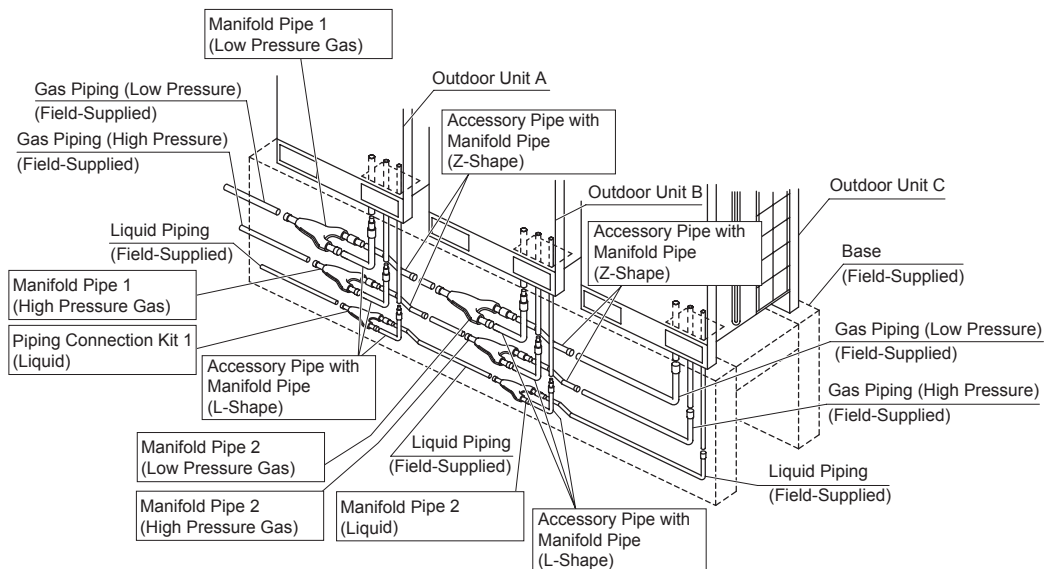
Perform the piping connection work by referring to the figure below.  
 Refer to the item 6.3 "Caution about Outdoor Unit Installation" for the piping length between outdoor units and between manifold pipes.

Example: 364kBtu/h(The combination of 3 outdoor units)

< Front Side or Rear Side Piping Connection >



< Downward Piping Connection >

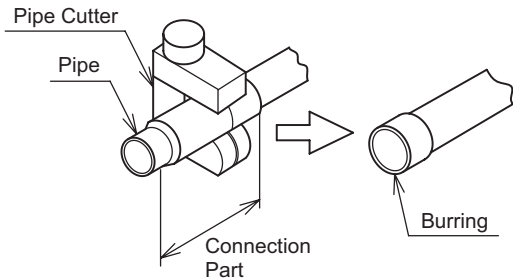


■ Piping Connection

- (1) Use clean copper pipes without any moisture or foreign materials on inner surface of pipes. When connecting refrigerant pipe, cut the copper pipes with a pipe cutter as shown below.

Also blow the pipes with nitrogen or air to remain no dust inside the pipe.

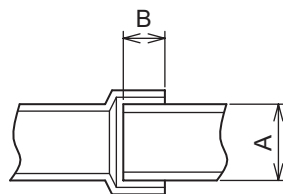
Do NOT use a saw, a grindstone or others which causes a large amount of cutting powder.



- (2) When cutting the pipe, secure the adequate depth for brazing as shown in the following table.

(mm)

A: Outer Diameter	B: Minimum Depth
Over 5, Below 8	6
Over 8, Below 12	7
Over 12, Below 16	8
Over 16, Below 25	10
Over 25, Below 35	12
Over 35, Below 45	14



● Caution for Refrigerant Piping

When installing pipe through the wall, secure a cap at the end of the pipe.

INCORRECT

Hole

Attach a cap or vinyl tape.

CORRECT

Do NOT place the pipe directly on the ground.

CORRECT

INCORRECT

Attach a cap or vinyl tape.

CORRECT

Attach a cap or vinyl tape with rubber band.

INCORRECT

Rain water can enter.

- (3) Make sure that all stop valves of the outdoor unit are closed completely.
- (4) Blow the inside of the pipes with nitrogen gas when brazing.

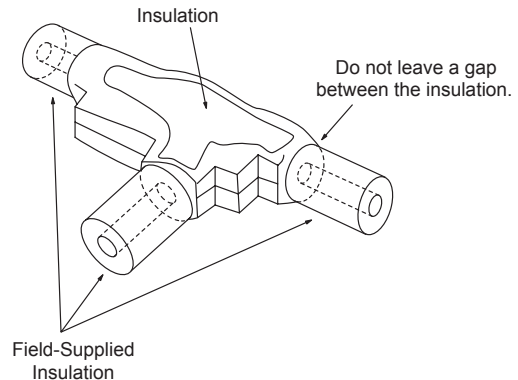
**⚠ DANGER**

**Check for the refrigerant leakage carefully. If large amount of refrigerant leakage occurs, it will cause to breathe with difficulty or to generate harmful gas due to the fire.**

- (5) The air tight test pressure of this product is 4.15MPa.
- (6) Apply the insulation supplied with this branch pipes to each branch (liquid side and gas side) with a tape. Also apply the field-supplied insulation to the field-supplied pipes.

**NOTE**

When polyethylene foam is applied, a thickness of 10mm for liquid piping and 15mm to 20mm for gas piping is recommended. (Use the insulation with heat resistance of 100°C for gas piping.)



**⚠ CAUTION**

- Perform the insulation work when the pipe surface temperature decreases to the room temperature. If insulation work is performed immediately after brazing, insulation may melt.
- If the ends of pipe are open to the atmosphere for a while after performing piping work, securely put caps or plastic bags over the pipe ends for avoiding moisture or dust.

< Line Branch (Models: HFQ-M142F, HFQ-M282F, HFQ-M452F, HFQ-M562F, HFQ-M692F, HFQ-M902F) >

[ Installation Work ]

■ Piping Connection Size

The ends of the branch pipes are finished as shown in the following figures. Cut the end of the pipe to meet with the pipe size.



**Piping shall be supported with adequate space. Bent pipes and bypass piping (horizontal loop) shall also be installed in order to absorb piping elasticity caused by temperature changes.**

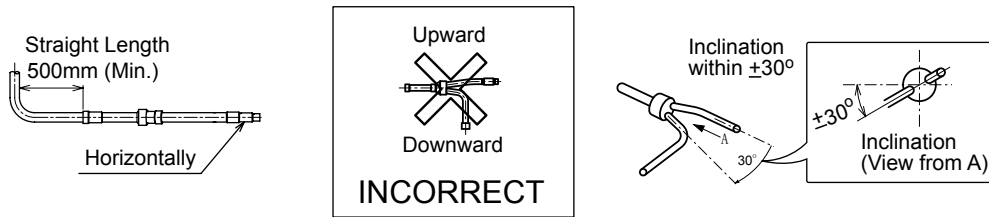
Model	Low Pressure Gas Line	High Pressure Gas Line	Liquid Line	Reducer for Low Pressure Gas Line	Reducer for High Pressure Gas Line	Reducer for Liquid Line
HFQ-M142F				—	—	 Qty: 2
HFQ-M282F				—	—	 Qty: 2
HFQ-M452F				 Qty: 1	 Qty: 2	 Qty: 1
HFQ-M562F				 Qty: 1	 Qty: 2	 Qty: 1
HFQ-M692F				 Qty: 1	 Qty: 1	 Qty: 1
HFQ-M902F				 Qty: 1	 Qty: 1	 Qty: 1

Unit: mm, ID: Inner Diameter, OD: Outer Diameter

■ Installation Position

(1) Horizontal Installation

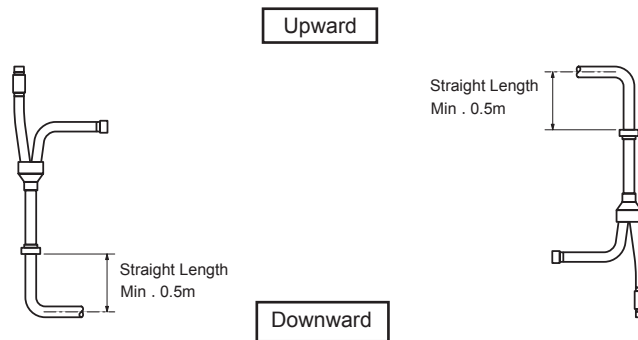
Locate the branch pipes on the same horizontal plane. (Inclination within 30°)  
 Make the straight length a minimum of 0.5m after the vertical bend.



(2) Vertical Installation

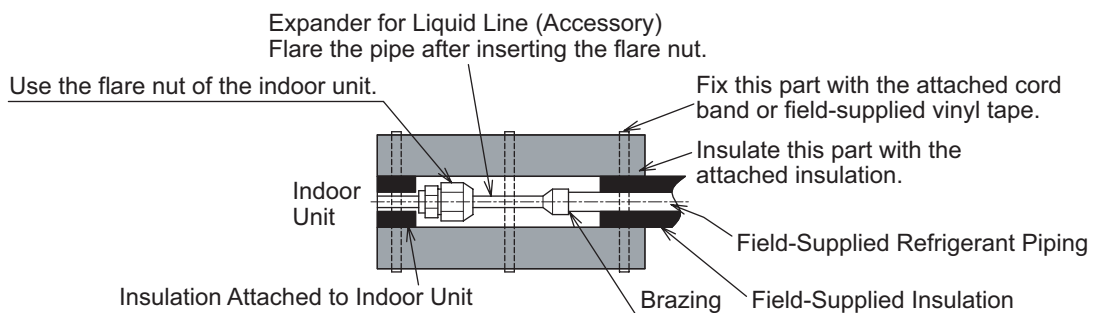
Straight length of the pipe connection on the outdoor unit side is made as follows:

- a) The collective pipe connection part is installed upward, the straight length must be min. 0.5m.
- b) The collective pipe connection part is installed downward, the straight length must be min.0.5m.



■ Connection Procedure for Piping Joint

When connecting liquid piping for the unit with a capacity 18kBTu/h or smaller, and with the length of piping is 15 meters or longer, apply the piping size of φ9.53mm. Fix the connecting pipe as shown in the below figure. Use the insulation attached to the indoor unit.



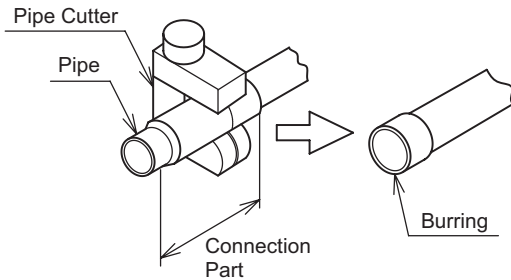


## ■ Piping Connection

- (1) Use clean copper pipes without any moisture or foreign materials on inner surface of pipes. When connecting refrigerant pipe, cut the copper pipes with a pipe cutter as shown below.

Also blow the pipes with nitrogen or air to remain no dust inside the pipe.

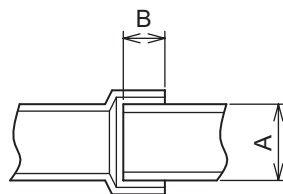
Do NOT use a saw, a grindstone or others which causes a large amount of cutting powder.



- (2) When cutting the pipe, secure the adequate depth for brazing as shown in the following table.

(mm)

A: Outer Diameter	B: Minimum Depth
Over 5, Below 8	6
Over 8, Below 12	7
Over 12, Below 16	8
Over 16, Below 25	10
Over 25, Below 35	12
Over 35, Below 45	14



## ● Caution for Refrigerant Piping

When installing pipe through the wall, secure a cap at the end of the pipe.

INCORRECT

Hole

Attach a cap or vinyl tape.

CORRECT

Do NOT place the pipe directly on the ground.

CORRECT

INCORRECT

Attach a cap or vinyl tape.

CORRECT

Attach a cap or vinyl tape with rubber band.

INCORRECT

Rain water can enter.

- (3) Make sure that all stop valves of the outdoor unit are closed completely.
- (4) Blow the inside of the pipes with nitrogen gas when brazing.

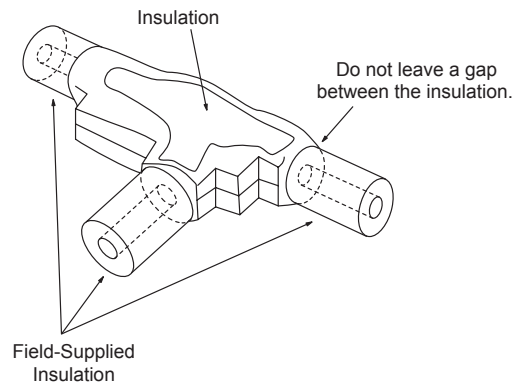
## ⚠ DANGER

**Check for the refrigerant leakage carefully. If large amount of refrigerant leakage occurs, it will cause to breathe with difficulty or to generate harmful gas due to the fire.**

- (5) The air tight test pressure of this product is 4.15MPa.
- (6) Apply the insulation supplied with this branch pipes to each branch (liquid side and gas side) with a tape. Also apply the field-supplied insulation to the field-supplied pipes.

## NOTE

When polyethylene foam is applied, a thickness of 10mm for liquid piping and 15mm to 20mm for gas piping is recommended. (Use the insulation with heat resistance of 100°C for gas piping.)



## ⚠ CAUTION

- Perform the insulation work when the pipe surface temperature decreases to the room temperature. If insulation work is performed immediately after brazing, insulation may melt.
- If the ends of pipe are open to the atmosphere for a while after performing piping work, securely put caps or plastic bags over the pipe ends for avoiding moisture or dust.

11.4 Switch Box (Optional Parts)

11.4.1 Safety Summary

**! WARNING**

- Do not perform installation work, refrigerant piping work and electrical wiring connection without referring to our installation manual.
- Check that the ground wire is securely connected.
- Connect a fuse of specified capacity.

**! CAUTION**

Do not install the Switch Box and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.

11.4.2 Structure

■ Dimensions & Refrigerant Cycle

Regarding dimensional drawings and refrigerant cycle diagram, please refer to Technical Data in this Technical Catalog.

■ Necessary Tools and Instrument List for Installation

No.	Tool	No.	Tool
1	Handsaw	11	Spanner
2	Phillips Screwdriver	12	Charging Cylinder
3	Vacuum Pump	13	Gauge Manifold
4	Refrigerant Gas Hose	14	Cutter for Wires
5	Megohmmeter	15	Gas Leak Detector
6	Copper Pipe Bender	16	Leveller
7	Manual Water Pump	17	Clamper for Solderless Terminals
8	Pipe Cutter	18	Hoist (for Indoor Unit)
9	Brazing Kit	19	Ammeter
10	Hexagon Wrench	20	Voltage Meter

11.4.3 Transportation and Handling

■ Transportation

Transport the product as close to the installation location as practical before unpacking.

**! CAUTION**

Do not put any material on the product.

■ Handling of Switch Box

**! WARNING**

Do not put any foreign material into the indoor unit and check to ensure that none exists in the Switch Box before the installation and test run. Otherwise, a fire or failure, etc. may occur.

**! CAUTION**

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

■ Combination of Switch Box and Indoor Unit  
Combination is as follows.

Combination of Indoor Unit

Switch Box Model	Indoor Unit	
	Quantity	Total Capacity
HCH-160D	1 to 7	less than 54kBtu/h
HCH-280D	1 to 8	54kBtu/h to 96kBtu/h

NOTE:

- The excess of the total capacity may cause insufficient performance and abnormal sound. Be sure to connect within the allowable total capacity.
- In case that the indoor unit total capacity is 96kBtu/h for CH-10.0N1, the performance may decrease approximately 5% in cooling and 10% in heating.

11.4.4 Switch Box Installation

**! DANGER**

- Do not install the Switch Box in a flammable environment to avoid fire or an explosion.

**! WARNING**

- Check to ensure that the ceiling slab is strong enough.
- Do not install the Switch Box outdoors. If installed outdoors, an electric hazard or electric leakage will occur.

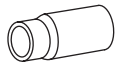
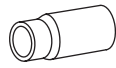
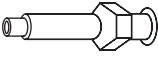
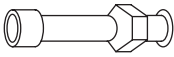






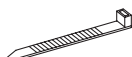
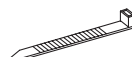
■ Factory-Supplied Accessories

Check to ensure that the following accessories are packed with the Switch Box.

**NOTE**

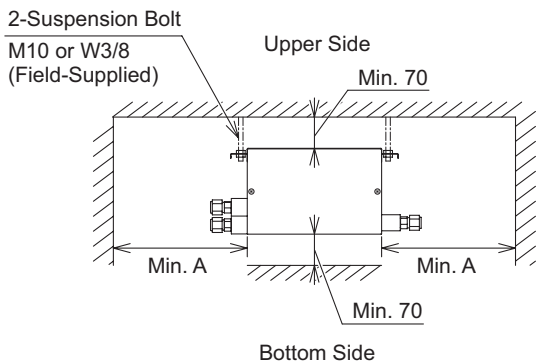
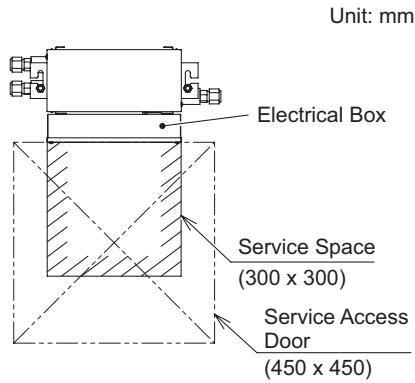
If any of these accessories are not packed with the unit, please contact your contractor.

Factory-Supplied Accessories

Accessory \ Model		HCH-160D	PCS	HCH-280D	PCS
Reducer		 ID15.88      ID19.05	1	 ID15.88      ID19.05	1
Accessory Pipe (for Flare Nut)		 ID12.7      ID15.88	2	-	-
		-	-	 ID22.2      ID19.05	2
		-	-	 ID19.05      ID19.05	2
Insulation Material	ID16		2	-	-
	ID38		3	-	-
	ID20	-	-		1
	ID22	-	-		2
	ID43	-	-		3
Clamp			6		6

■ Initial Check

- Install the Switch Box with a proper clearance around it for maintenance working space, as shown in the below figure.



Model \ Size	A
HCH-160D	300
HCH-280D	400

Maintenance Space

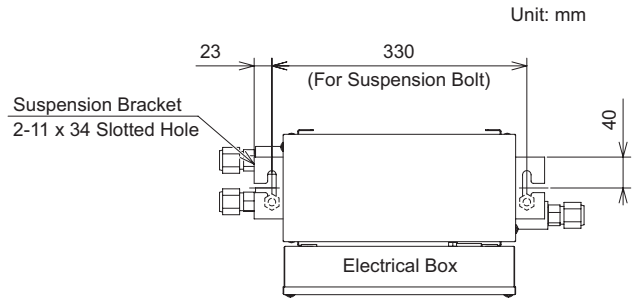
- Check to ensure that the ceiling is sufficiently strong to sustain the Switch Box. If the ceiling is weak, abnormal sound and vibration may occur.
- The refrigerant flow sound may be heard from the Switch Box when the electric expansion valve in the Switch Box is activated. Therefore, take the following action to minimize the sound.
  - (A) Install the Switch Box inside the ceiling. As for the ceiling material, select a material like a plaster board (at least 9mm) which minimizes operation sound.
  - (B) Do not install the Switch Box in a place near bed rooms or hospital rooms.
- The refrigerant flow sound may be heard from the Switch Box when the operation is changed to cooling/heating mode. Therefore install the Switch Box in the ceiling of corridor so that refrigerant flowing sound may not be heard in the room.
- Do not install the Switch Box in a hot or humid place like kitchen to prevent dew condensation on the outer surface of the Switch Box. When installing the Switch Box in such places, apply additional insulation.
- Pay attention to the following points when the Switch Box is installed in a hospital or other facilities where there are electronic waves from medical equipment.
  - (A) Do not install the Switch Box where the electromagnetic wave is directly radiated to the electrical box or intermediate wiring. (Operating Line)
  - (B) Install the Switch Box and components as far as practical or at least 3 meters from the electromagnetic wave radiator.
  - (C) Install a noise filter when the power supply emits harmful noises.
- The installation place should be convenient for the refrigerant piping or electrical wiring connection.
- Do not install the Switch Box in the place with organic solvent atmospheres, such as painting and cleaning factories. Synthetic resin material may be damaged.
- Do not install the Switch Box in the place where flammable gas may generate, drift or accumulate. Also avoid the place where the carbon fabric may float.

# INSTALLATION & OPERATION

## ■ Suspension Bolts

### Step 1

- (1) Select a final location and installation direction of the Switch Box paying careful attention to the space for the piping, wiring and maintenance.
- (2) Mount suspension bolts after selecting the final location of the Switch Box.
- (3) Mount the suspension bolts in the slotted hole on the electrical box side as shown in the right figure.
- (4) Contact the qualified constructor or carpenter for the ceiling treatment.

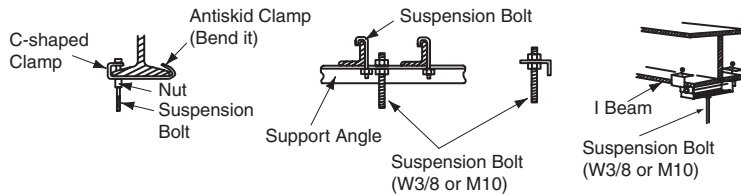


Position of Suspension Bolts

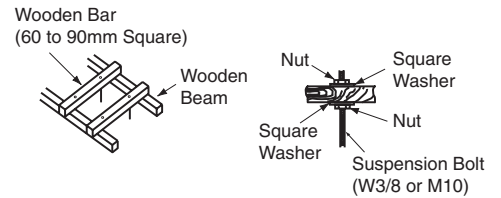
### Step 2

Mount suspension bolts, as shown in the below figure.

#### ● For Steel Beam

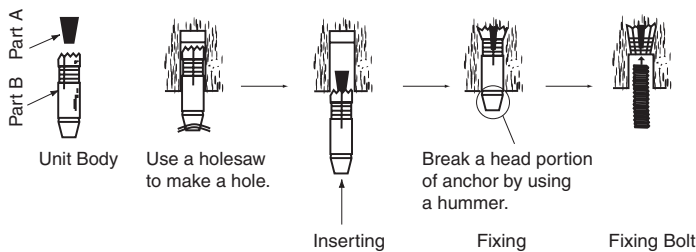


#### ● For Wooden Beam Suspension

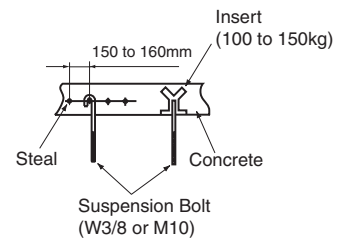


#### ● For Concrete Slab

##### (1) Hole-In Anchor

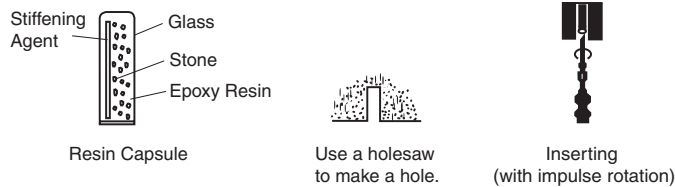


#### ● For Reinforcing Steel

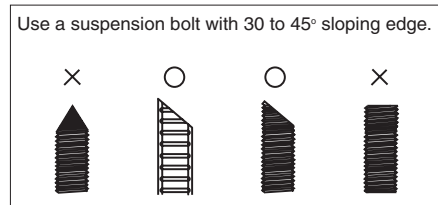


##### (2) Resin Capsule

Use the resin capsule within a warranty period.  
It effects for 6 months from the manufacturing date.



After inserting, do not rotate or put any force until resin is hardened.  
Required time is as shown in the right table.



Ambient Temp. (°C)	Time
20	Min. 30min.
15	Min. 1hr.
10	Min. 2hr.
5	Min. 4hr.
0	Min. 8hr.

#### NOTE:

- Use a suspension bolt (W3/8, Metric screw thread: M10).
- Prepare suitable washer and nut.

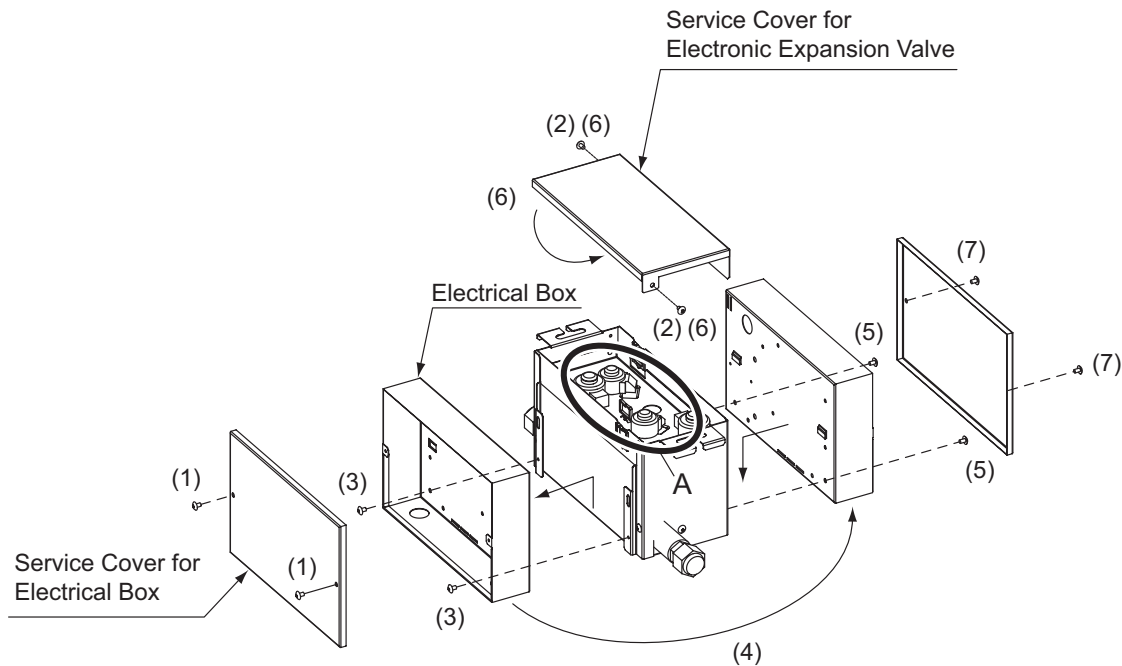
## Mounting of Suspension Bolts

■ Installation

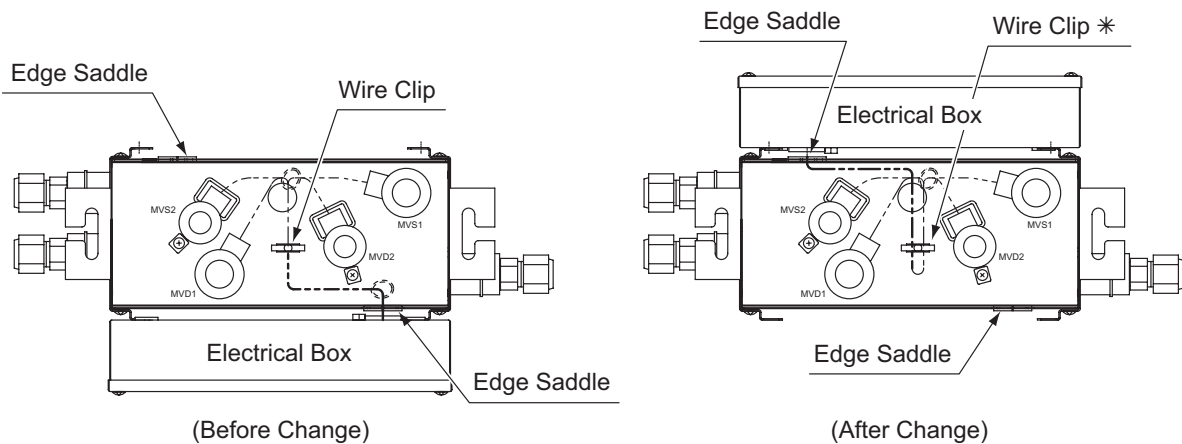
< Changing the Location of Electrical Box >

Depending on the installation space, changing the location of electrical box is available. In case of changing the location of electrical box, follow the procedure below.

- (1) Remove the service cover for the electrical box.
- (2) Remove the service cover for the electronic expansion valve.
- (3) Remove the electrical box.
- (4) Remove the wiring from the wire clip and edge saddle, and move the electrical box. After moving the electrical box, the wiring should be put into the edge saddle and bounded with the wire clip. (Refer to "Enlarged View of A" below.)
- (5) Mount the electrical box.
- (6) Rotate the service cover for the electronic expansion valve 180 degrees and mount it.
- (7) Mount the service cover for the electrical box.



< Enlarged View of A >



\*: Make sure that the wirings are bounded with the wire clips in order to prevent the electrical box from entering water.

## INSTALLATION & OPERATION

### ■ Marking of the Positions of the Suspension Bolts and Wiring Connections

- (1) Mark the positions of the suspension bolts, refrigerant piping connections and wiring connection.
- (2) Installation dimensions are shown in Technical Data.

### ■ Mounting the Switch Box

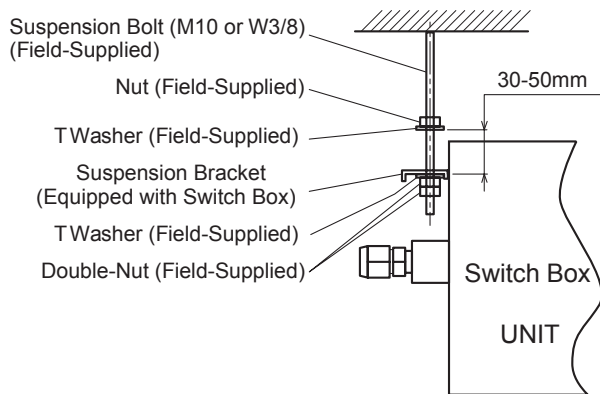
#### (1) How to put Nuts

Put nuts on each of the two suspension bolts before hanging the Switch Box, as shown in the below figure.

\* : Mounting washers are required in order to fix the suspension bracket to the suspension bolt.

#### Field-Supplied Parts

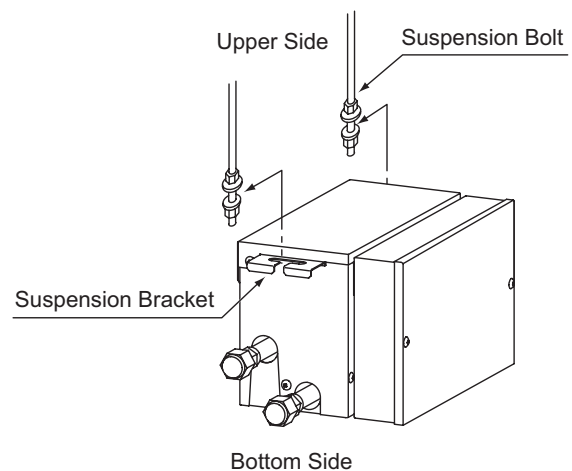
- \* Suspension Bolt: 2-M10 or W3/8
- \* Nut: 6-M10 or W3/8
- \* Washer: 4-M10 or W3/8



Putting Nut

#### (2) Hanging the Switch Box

- (a) Hang the Switch Box by putting hands on the bottom of the cabinet.
- (b) Insert the suspension bolt into the groove part of the suspension bracket as shown in the below figure. Ensure that the washers are correctly fixed to the suspension bracket.
- (c) After the hanging work, the piping and wiring connection work will be required inside the ceiling. Therefore, determine the drawing direction of the pipe after selecting the installation location of the Switch Box. If the ceiling was existed, the piping and wiring work should be carried out up to the connecting positions before the hanging work.
- (d) Keep the Switch Box level to the ceiling surface. If the Switch Box is not level, a malfunction may occur.
- (e) Tighten the nuts of the suspension bolt with the suspension bracket after adjustment is completed. Special plastic paint must be applied to the nuts in order to prevent them from loosening.



Hanging Method

11.4.5 Refrigerant Piping Work

**! DANGER**

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

■ Refrigerant Piping

- (1) Prepare locally-supplied copper pipes.
- (2) Select clean copper tubes making sure there is no dust and moisture inside the tubes. Before connecting pipes, blow the inside of the tubes with nitrogen or dry air, to remove any dust or foreign materials.
- (3) Select the piping size as shown in the tables below. Furthermore, check for the flare nut and flaring dimension according to the following figure and table.

● Joint Selection

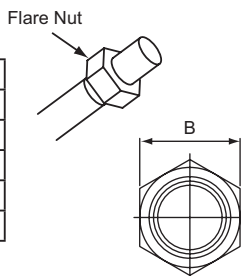
When using 1/2H material, the flaring work is not available. In this case, use a joint selected from the chart below.

< Minimum Thickness of Joint (mm) >

Diameter	R410A
φ6.35	0.5
φ9.53	0.6
φ12.7	0.7
φ15.88	0.8
φ19.05	0.8
φ22.2	0.9
φ25.4	0.95
φ28.6	1.0
φ31.75	1.1
φ38.1	1.35
φ41.3	1.45
φ44.45	1.55

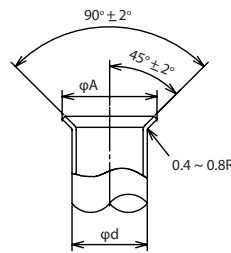
< Flare Nut Dimension B (mm) >

Diameter	R410A
φ6.35	17
φ9.53	22
φ12.7	26
φ15.88	29
φ19.05	36



● Flaring Dimension

Perform the flaring work as shown below.



Diameter (φd)	(mm)	
	A +0	A -0.4
	R410A	
6.35	9.1	
9.53	13.2	
12.7	16.6	
15.88	19.7	
19.05	(*)	

(\*) It is impossible to perform the flaring work with 1/2H material. In this case, use an accessory pipe (with a flare).

**NOTICE**

● Cautions for Refrigerant Pipe Work (Example)

When installing pipe through the wall, secure a cap at the end of the pipe.

Correct

Hole

Incorrect

Hole

Attach a cap or vinyl tape.

Do not place the pipe directly on the ground.

Correct

Incorrect

Attach a cap or vinyl tape.

Correct

Incorrect

Rain water can enter.

Attach a cap or vinyl bag with rubber band.

**NOTE:**

Do not use the joint other than those specified in the table above.



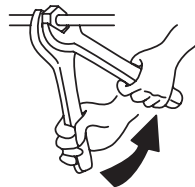
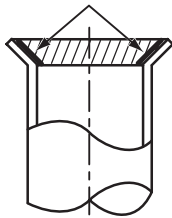
- Cautions for Piping Connection Work
  - (a) Connect the indoor/outdoor connecting pipes. Fix the pipes and pay attention not to contact with weak materials such as ceiling. (Otherwise, abnormal sound may be heard due to the vibration of the piping.)
  - (b) Apply refrigerant oil slightly on the sheet surface of the pipe and flare nut before the flaring work. And then tighten the flare nut with the specified tightening torque using two spanners. Perform the flaring work on the liquid piping side before the gas piping side. Check the gas leakage after the flaring work.

**NOTE:**

Refrigerant oil is field-supplied.  
 [Ethereal Oil FVC50K, FVC68D (Idemitsu Kousan Co. Ltd.)]

- (c) In case that temperature and humidity inside the ceiling exceed 27°C/RH80%, apply additional insulation (approx. 10mm thickness) to the accessory insulation. It prevents dew condensation on the surface of the insulation (refrigerant pipe only).
- (d) Perform the air-tight test (4.15MPa for the test pressure). Refer to the item 8.1 "Air-Tight Test" for more details.
- (e) Perform cold insulation work by insulating and taping the flare connection and reducer connection. Also insulate all the refrigerant pipes.

Apply Refrigerant Oil.



Two Spanners Work

< Required Tightening Torque >

Pipe Size	Tightening Torque
φ6.35 (1/4)	14 ~ 18 N-m
φ9.53 (3/8)	34 ~ 42 N-m
φ12.7 (1/2)	49 ~ 61 N-m
φ15.88 (5/8)	68 ~ 82 N-m
φ19.05 (3/4)	100 ~ 120 N-m

## CAUTION

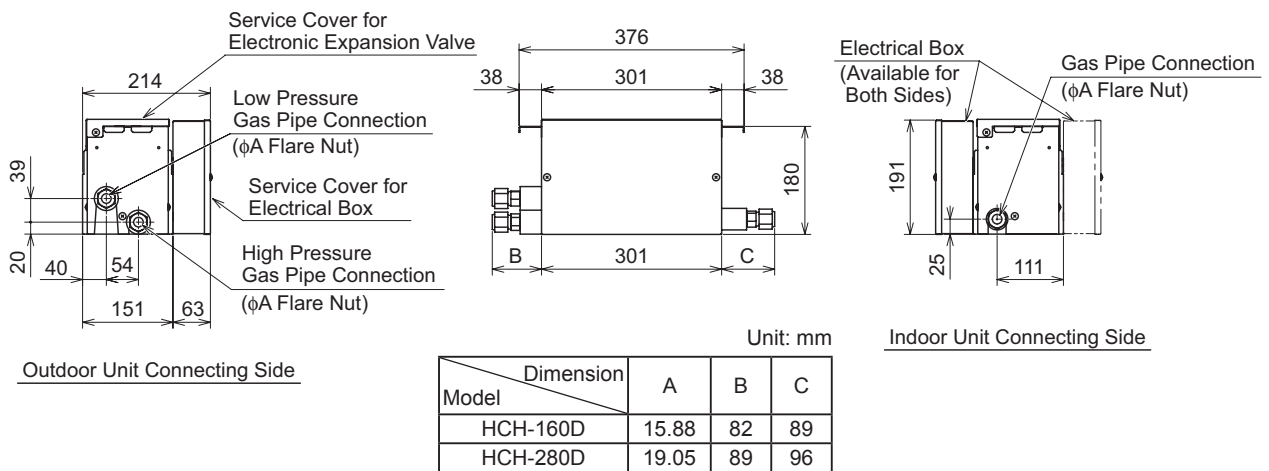
- Do not apply excessive force to the flare nut when tightening. If applied, the flare nut may crack due to aged deterioration and refrigerant leakage may occur. Use the specified tightening torque.
- For more details of the refrigerant piping work, vacuum pumping and refrigerant charge, refer to the item 6 "Refrigerant Piping Work" and the item 8 "Additional Refrigerant Charge".

■ Refrigerant Piping Work

Provide the refrigerant pipe in the field.

Make sure that the refrigerant pipe should be connected to the same refrigerant cycle unit.

(1) Position of Piping Connection



(2) Selecting Piping Size

- (a) Select the size for the high pressure gas pipe, low pressure gas pipe and gas pipe according to the table A. The size depends on the indoor unit total capacity connected downstream of the Switch Box.
- (b) In case that the piping size from Table A and the piping connection size for Switch Box from Table B are different, use an accessory pipe according to the next page.
- (c) As for the multi-kit branch or header branch, refer to the Item 11.3.

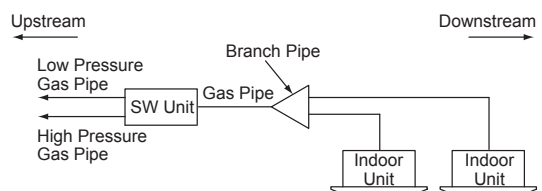
Table A Connected Indoor Unit Capacity and Piping Size

Model	Connected Indoor Unit Capacity (kBtu/h)	Low Pressure Gas Pipe (mm)	High Pressure Gas Pipe (mm)	Gas Pipe (mm)
HCH-160D	7~14	φ15.88	φ12.7	φ12.7 *
	15~38	φ15.88	φ12.7	φ15.88
	39~54	φ19.05	φ15.88	φ15.88
HCH-280D	55~76	φ19.05	φ15.88	φ19.05
	77~96	φ22.2	φ19.05	φ22.2

\*: In case that a branch is located downstream of the Switch Box and also the connected indoor unit capacity is 7~14kBtu/h, use φ15.88 for the gas pipe.

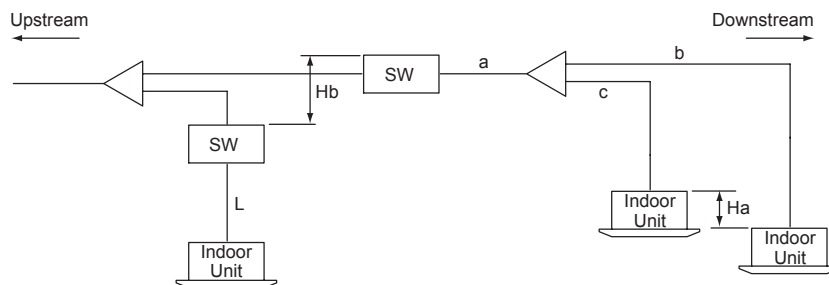
Table B Piping Connection Size for Switch Box

Model	Low Pressure Gas Pipe (mm)	High Pressure Gas Pipe (mm)	Gas Pipe (mm)
HCH-160D	φ15.88	φ15.88	φ15.88
HCH-280D	φ19.05	φ19.05	φ19.05



● Piping Work for Switch Box

Perform the piping work for Switch Box according to the following table.



Condition of Piping Work

Item		Allowable Piping Length	
Total Piping Length between Switch Box and Indoor Unit	L a+b+c	HCH-160D	within 30m
		HCH-280D	within 10m
Height Difference between Indoor Units Connected to the Same Switch Box	Ha	within 4m	
Height Difference between Switch Box	Hb	within 15m	

**INSTALLATION & OPERATION**

(3) Piping Connection

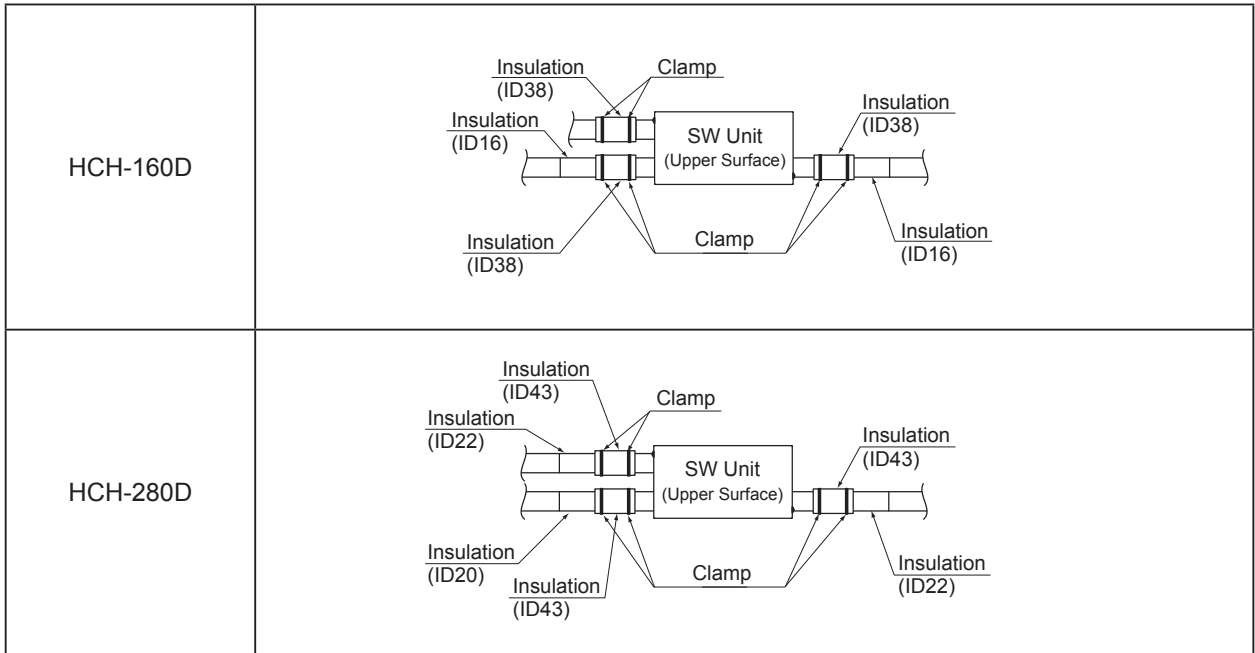
Perform the piping connection according to “Refrigerant Piping” in Item 11.4.5.

Connected Indoor Unit Capacity (kBtu/h)	HCH-160D
7 to 14	
15 to 38	
39 to 54	

- \* 1: In case that a branch is located downstream of the Switch Box and also the connected indoor unit capacity is 7~14kBtu/h perform the flaring work of the field gas pipe and connect it to the Switch Box.
- \* 2: Refer to “Refrigerant Piping” in Item 11.4.5 for the flaring work.

Connected Indoor Unit Capacity (kBtu/h)	HCH-280D
55 to 76	
77 to 96	

(4) Piping Insulation



NOTE:

In case that the humidity inside the ceiling is high, apply additional insulation to the flare nut connection. Refer to "Initial Check" in Item 11.4.4 for more details.

## 11.4.6 Electrical Wiring

**⚠ DANGER**

- Turn off the main power switch to the Switch Box, the indoor unit and the outdoor unit before electrical wiring work or a periodical check is performed.
- Protect the wires, drain pipe, electrical parts, etc. from rats or other small animals. If not protected, rats may gnaw at unprotected parts and at the worst, a fire will occur.

**⚠ WARNING**

- Use a medium sensing speed type ELB (Electric Leakage Breaker, activation speed of 0.1 sec. or less). If not used, it will cause an electric shock or a fire.
- Fix the cables securely. External forces on the terminals could lead to a fire.
- Tighten screws according to the following torque.  
M4: 1.0 to 1.3 N-m (TB1, TB2)

**⚠ CAUTION**

- Use twisted shielded pair cable or shield pair cable for transmission wires between the indoor and the outdoor units (Max. 1000m), and connect the shielded part to the earth screw in the electrical box of the indoor unit as shown the next page figure.
- Wrap the field supplied insulation around the wires, and plug the wiring connection hole with the seal material to protect the product from any condensate water or insects.
- Tightly secure the wires with the cord clamp inside the Switch Box.
- Do not connect the earth wire to the gas pipe, water pipe and lightning conductor.  
Gas pipe: An explosion and ignition may occur when gas leaks.  
Water pipe: There is no effect of earth wire when a hard vinyl pipe is used.  
Lightening conductor: The earth electric potential abnormally increases when a lightening conductor is used.

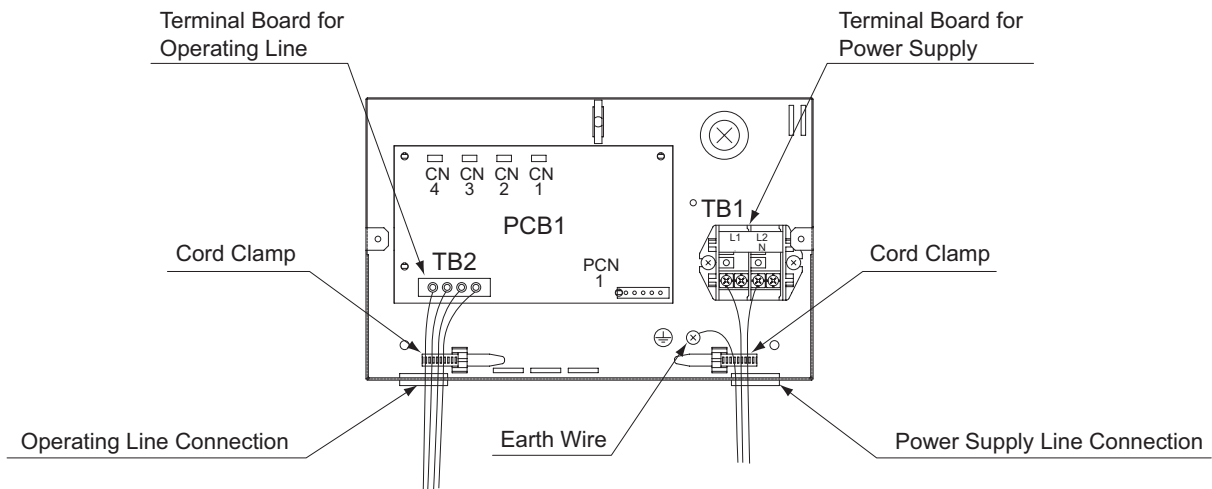
**■ General Check**

- (1) Make sure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the next page table.
- (2) Check to ensure that the power supply voltage is within  $\pm 10\%$  of the rated voltage.
- (3) Check the capacity of the electrical wires. If the power source capacity is too low, the system cannot be started due to the voltage drop.
- (4) Check to ensure that the ground wire is connected.

■ Electrical Wiring Connection

The electrical wiring connection for the Switch Box is shown in the below figure.

- (1) Turn OFF the main power switch and take off the electrical box cover of Switch Box.
- (2) Connect the power supply and earth wires to the terminals in the electrical box.
- (3) Connect the wires of the operating line to the terminals in the electrical box.
- (4) Tightly clamp the wires using the cord clamp inside the electrical box.
- (5) Fix the electrical box cover after wiring work.



Electrical Wiring Connection

• Field Minimum Wire Sizes

- (1) Perform the electrical wiring work for the Switch Box. Determine the cable size according to the table below.
- (2) Pay attention to the marks on the terminal board when connecting wires for Switch Box and I.U./O.U. Refer to “Example of Electrical Wiring” for the wiring connection on the next page.

Model	Power Source	Maximum Current	Power Source Cable Size	Transmitting Cable Size	Earth Wire Size
			EN60 335-1 *1	EN60 335-1 *1	
HCH-160D HCH-280D	220-240V/1φ/50Hz 220V/1φ/60Hz	1A	0.75mm <sup>2</sup>	0.75mm <sup>2</sup>	2.0mm <sup>2</sup>

**NOTES:**

- 1) Follow local codes and regulations when selecting field wires.
- 2) The wire sizes marked with \*1 in the above table are selected at the maximum current of the unit according to the European Standard, EN60 335-1. Use the wires which are not lighter than the ordinary tough rubber sheathed flexible cord (code designation H05RN-F) or ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).
- 3) Use a shielded cable for the transmitting circuit and connect it to ground.
- 4) In the case that power cables are connected in series, add each unit maximum current and select wires below.

**Selection According to EN60 335-1**

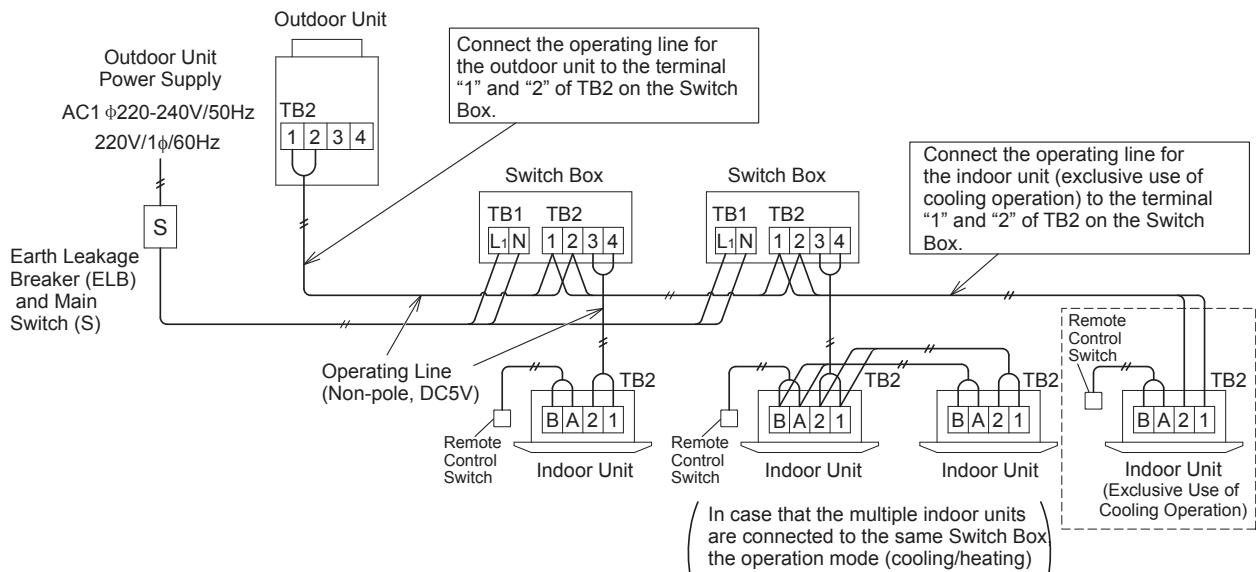
Current i (A)	Wire Size (mm <sup>2</sup> )
$i \leq 6$	0.75
$6 < i \leq 10$	1
$10 < i \leq 16$	1.5
$16 < i \leq 25$	2.5
$25 < i \leq 32$	4
$32 < i \leq 40$	6
$63 < i$	*2

\*2 :In the case that current exceeds 63A, do not connect cables in series.

## INSTALLATION & OPERATION

- Example of Electrical Wiring

The following figure shows the example of electrical wiring around the Switch Box. Refer to the item 7.4 regarding the electrical wiring of the whole system.



### NOTE:

- (1) Do not apply excessive voltage to the operating line (DC5V (non-pole)) between outdoor unit and Switch Box, between Switch Box and indoor unit, between Switch Box.
- (2) Use 2-Core cable for the operating line. (Do not use 3-Core cable or over.)
- (3) Connect the operating line for the outdoor unit to the terminal "1" and "2" of TB2 on the Switch Box.
- (4) Connect the operating line for the indoor unit exclusively for cooling operation to the terminal "1" and "2" of TB2 on the Switch Box.
- (5) For the Switch Box in the same refrigerant cycle, electrical power source can be supplied by one switch.
- (6) Do not connect the power supply line (220V~240V) to the terminal board for operating line.
- (7) Connect the earth wire for the outdoor/indoor units and Switch Box. The ground wiring work under the condition of 100Ω (max.) ground resistance should be performed by the qualified electrician.

- Setting of Dip Switches

Ensure that DSWs on the PCB1 are set before shipping as shown below and no setting is required.

- DSW1



- DSW101



- DSW301



### NOTE

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

## CAUTION

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

11.4.7 Test Run

**NOTICE**

Refrigerant piping and connecting wires should be connected to the same refrigerant cycle system. If they are connected to the dissimilar refrigerant cycle systems, a malfunction may occur.

**! WARNING**

● **Special Attention Regarding Refrigerant Gas Leakage**

Pay attention to the critical gas concentration to avoid accidental refrigerant gas leakage before installing air conditioning systems.

$$\frac{\text{Totally Charged Refrigerant Quantity in System (kg)}}{\text{Room Space for each Indoor Unit (m}^3\text{)}} \leq \text{Critical Concentration (kg/m}^3\text{)}$$

↑

0.3 kg/m<sup>3</sup>

Test run should be performed according to Item 9.

**! WARNING**

● **Do not operate the system until all the check points have been cleared.**

- (A) Check to ensure that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts. If not, do not operate the system until the electrical leakage is found and repaired.
- (B) Check to ensure that the stop valves of the outdoor unit are fully opened, and then start the system.
- (C) Check to ensure that the switch on the main power source has been ON for more than 12 hours, to warm the compressor oil by the crankcase heater.

● **Pay attention to the following items while the system is running.**

- (A) Do not touch any of the parts by hand at the discharge gas side, since the compressor chamber and the pipes at the discharge side are heated higher than 90°C.
- (B) **DO NOT PUSH THE BUTTON OF THE MAGNETIC SWITCH(ES).** It will cause a serious accident.

11.4.8 Safety and Control Device Setting

Switch Box

	Model	HCH-160D,HCH-280D
For Control Circuit Fuse Capacity	A	5



### 11.5 Hi-NET System

Hi-NET is the wiring system that multiple refrigerant cycles link together with transmission wires connecting indoor units and outdoor units.

There is no limitation on the connecting order of the units and the number of wiring branch.

(It is essential to ensure that all units are connected.)

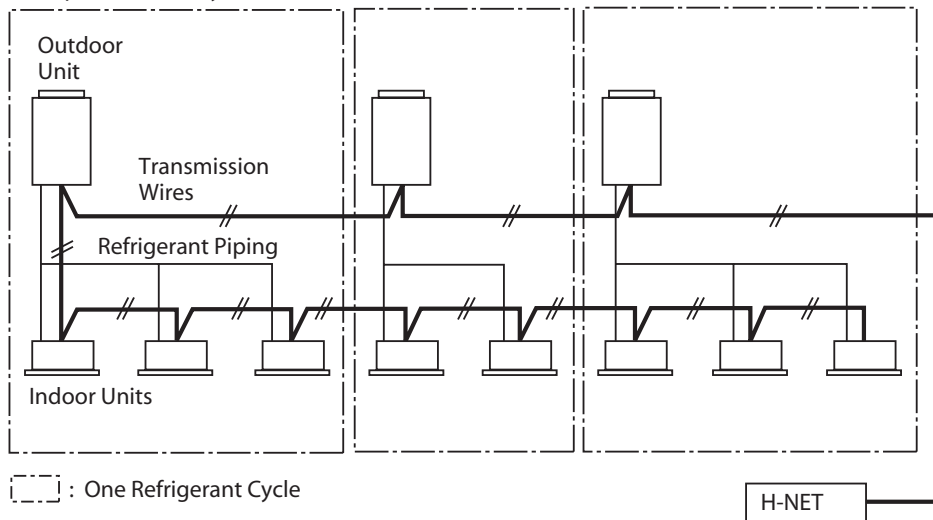
This Hi-NET system facilitates wiring design and field wiring work, and also it helps total cost reduce.

■ Connecting with H-NET

H-NET can be simply set by connecting to a terminal board in any unit close to H-NET.

Centralized control is easily realized.

Example of Hi-NET System



# *Troubleshooting*

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## 1. Initial Troubleshooting

### 1.1 Checking of Electrical Wiring and Power Source

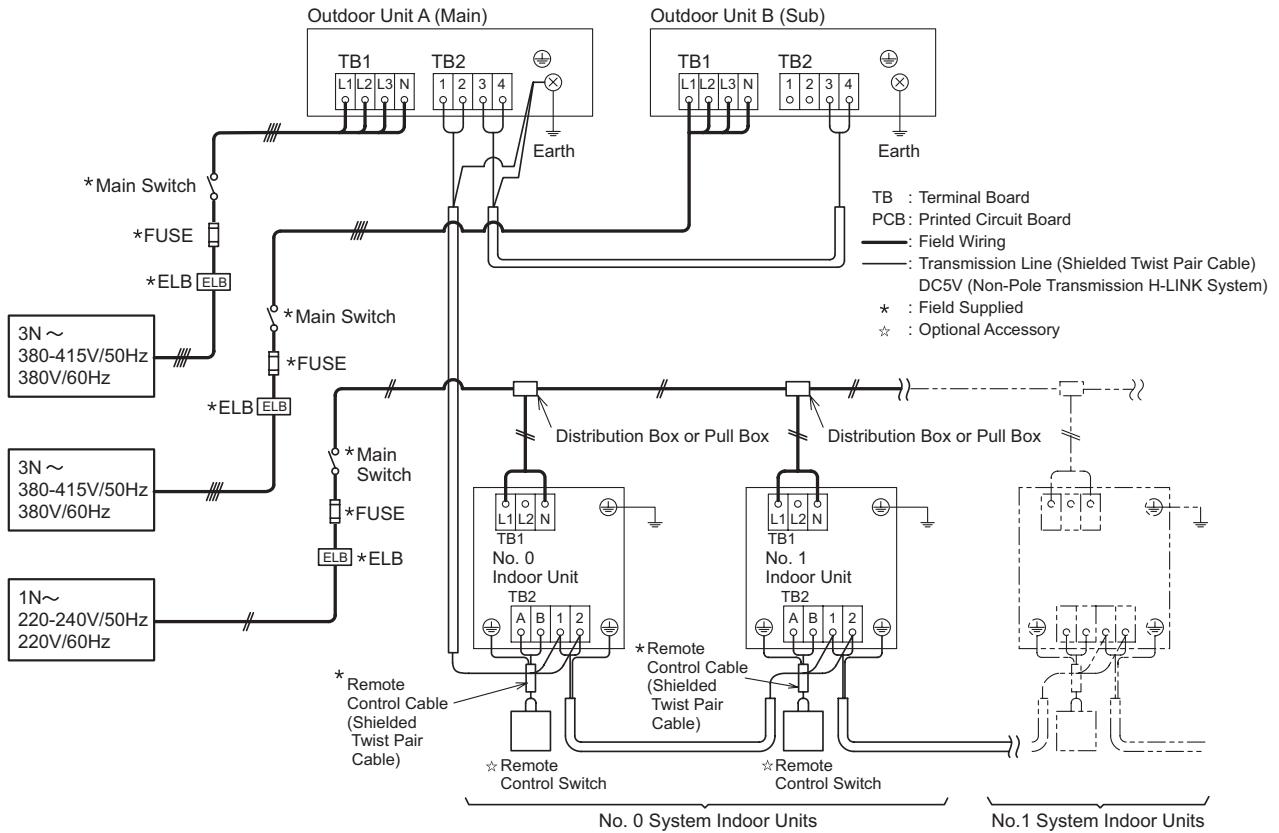
Inspect the following items when abnormality is found during the system activation.

No.	Check Item	Check Method
1	Is power source breaker or fuse blown out?	Check the voltage (secondary side) of the breaker and also check the conductivity of fuse by a tester.
2	Is voltage at secondary side of transformer correct?	Disconnect connection at the secondary side of the transformer and measure voltage by a tester.
3	Is wiring firmly fixed or correctly connected?	<ul style="list-style-type: none"> <li>• Check to ensure that the terminal for power source wiring (terminals “L1” to “L1” and “N” to “N” of each terminal board: AC380-415V) and intermediate wiring (Operating Line: terminals “1” to “1” and “2” to “2” of each terminal board: DC5V) between the indoor unit and the outdoor unit coincide correctly, as figure on the next page. If not, some component will be damaged.</li> <li>• Check the wiring connection to the PCB and especially ensure that the following connections are NOT loosened.               <ul style="list-style-type: none"> <li>(a) thermistor connector plug (each)</li> <li>(b) remote control cable connector plug</li> <li>(c) transformer connector plug</li> <li>(d) each connector plug of main power source circuit</li> </ul> </li> <li>• Check to ensure that the twist pair cable with shield (<math>\geq 0.75\text{mm}^2</math>) are used for intermediate wiring to protect noise obstacle at total length of less than 1000m and size complied with local code.</li> <li>• Check to ensure that the wirings and the breakers are chosen correctly, as shown in Table 1.1.</li> <li>• All the field wiring and equipment must comply with local code.</li> </ul>

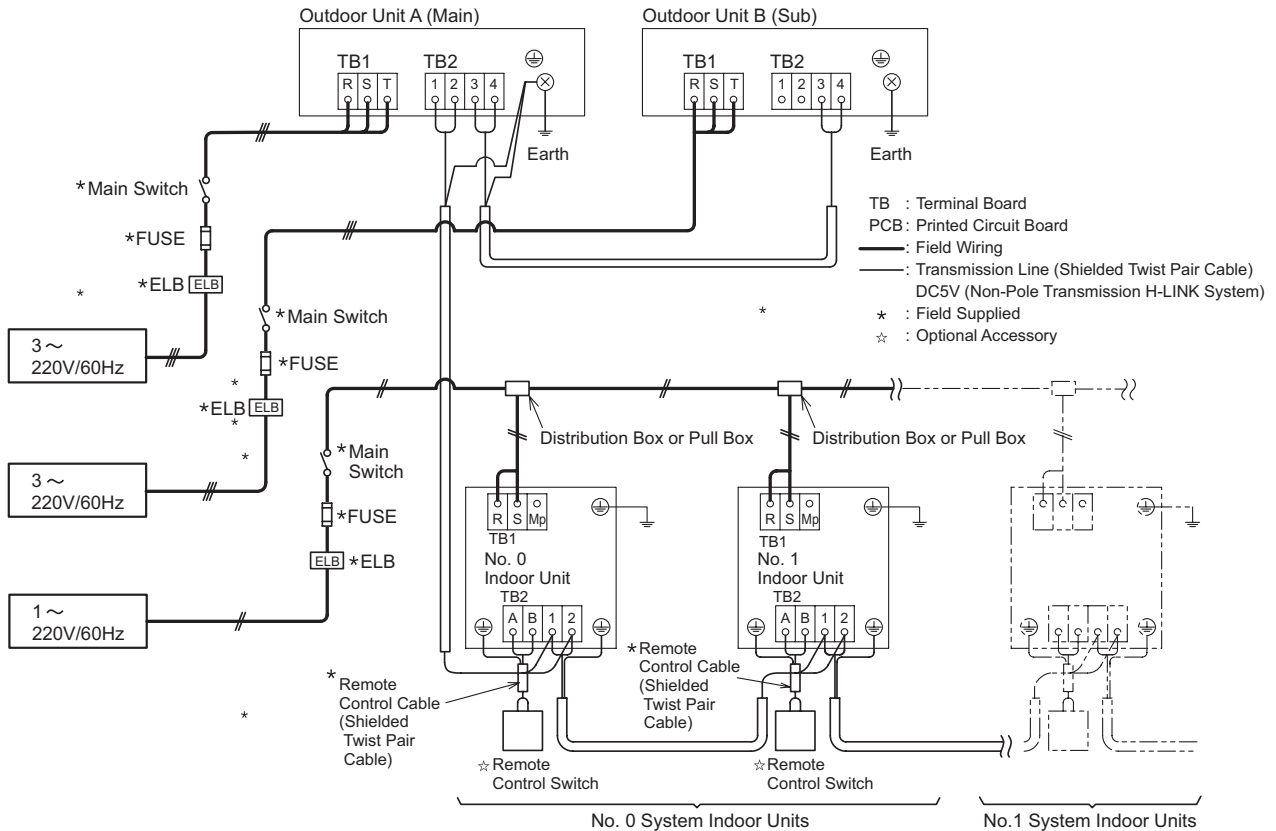
# TROUBLESHOOTING

## Example for Electrical Wiring Connection (Heat Pump System)

< 380-415V/50Hz, 380V/60Hz >

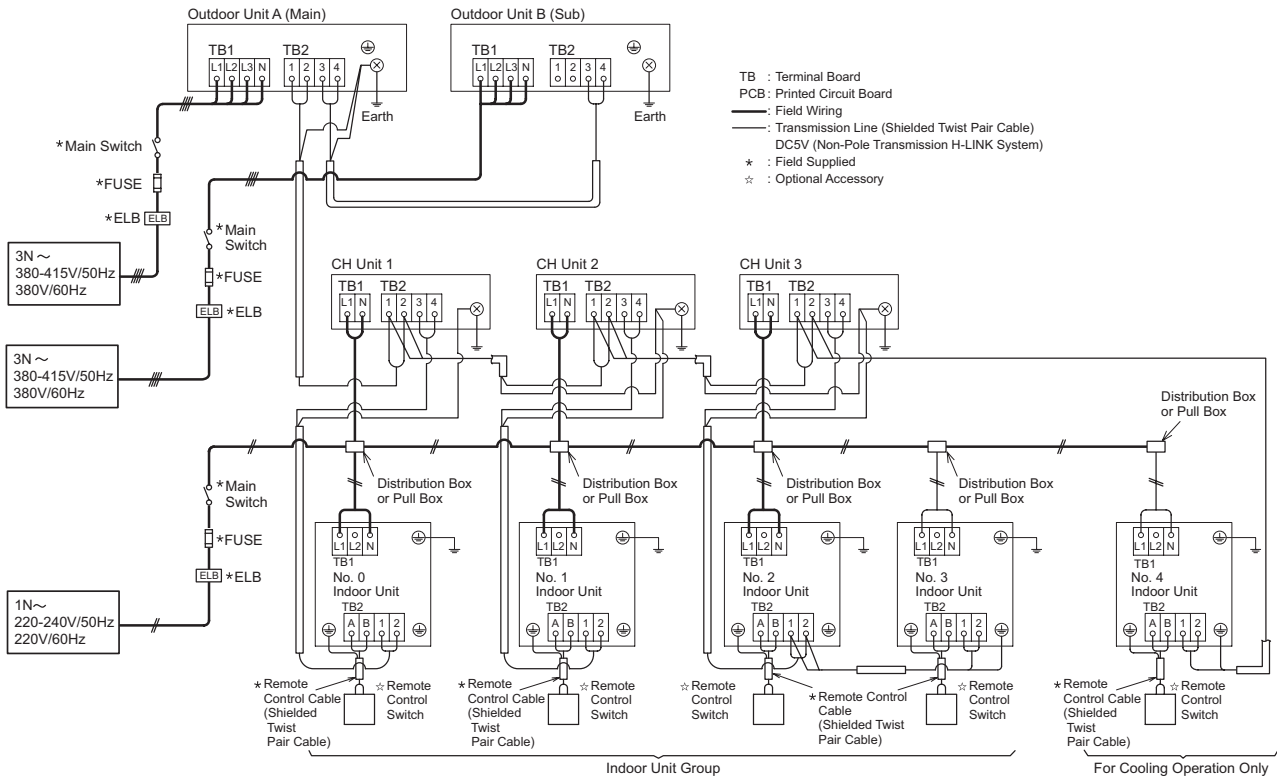


< 220V/60Hz >



**Example for Electrical Wiring Connection (Heat Recovery System)**

< 380-415V/50Hz, 380V/60Hz >



< 220V/60Hz >

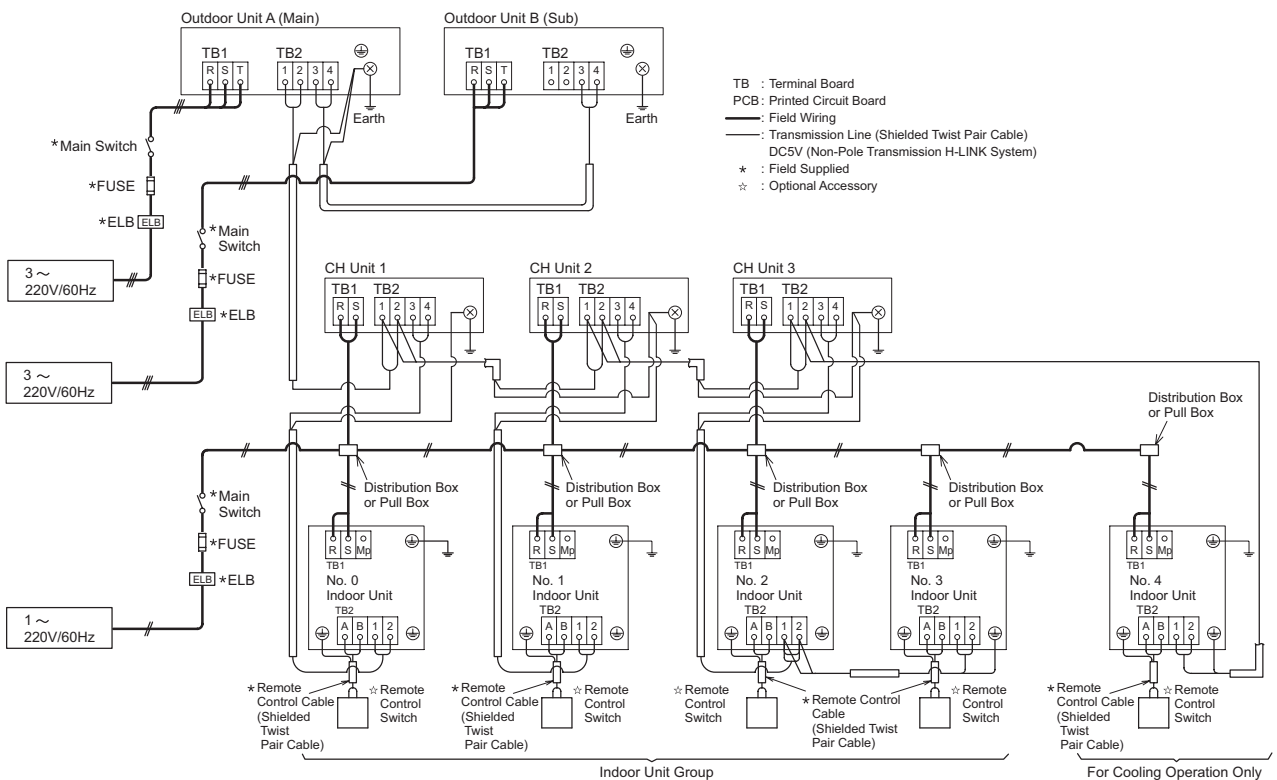


Table 1.1 Electrical Data and Recommended Wiring, Breaker Size/1 Outdoor Unit

Model	Power Supply	Maximum Running Current (A)	Power Supply Line (φmm)	ELB		Fuse (A)
				Nominal Current (A)	Nominal Sensitive Current (mA)	
AVWT-76FE(7)SR	380-415V/50Hz 380V/60Hz	16.1	MLFC 2.0SQ	20	30	20
AVWT-96FE(7)SR		17	MLFC 3.5SQ	30	30	30
AVWT-114FE(7)SR		23	MLFC 5.5SQ	40	30	40
AVWT-136FE(7)SS		28	MLFC 5.5SQ	50	30	40
AVWT-154FE(7)SS		31	MLFC 8SQ	50	30	50
AVWT-170FE(7)SS		33	MLFC 8SQ	50	30	50
AVWT-76F9SR	220V/60Hz	23	MLFC 5.5SQ	40	30	40
AVWT-96F9SR		29	MLFC 5.5SQ	50	30	40
AVWT-114F9SR		40	MLFC 8SQ	50	30	50
AVWT-136F9SS		49	MLFC 14SQ	75	100	70
AVWT-154F9SS		55	MLFC 14SQ	75	100	70
AVWT-170F9SS		59	MLFC 14SQ	100	100	70

ELB: Earthleakage Breaker, MLFC: Flame Retardant Polyflex Wire

■ Field Minimum Wire Sizes for Power Source

Model	Power Supply	Maximum Running Current (A)	Power Source Cable Size	Transmitting Cable Size	EarthWire Size (mm <sup>2</sup> )
			EN60 335-1 *1 (mm <sup>2</sup> )	EN60 335-1 *1 (mm <sup>2</sup> )	
AVWT-76FE(7)SR	380-415V/50Hz 380V/60Hz	16.1	2.5	0.75	2.0
AVWT-96FE(7)SR		17	4	0.75	2.0
AVWT-114FE(7)SR		23	6	0.75	3.5
AVWT-136FE(7)SS		28	10	0.75	3.5
AVWT-154FE(7)SS		31	10	0.75	3.5
AVWT-170FE(7)SS		33	10	0.75	3.5
AVWT-76F9SR	220V/60Hz	23	6	0.75	3.5
AVWT-96F9SR		29	10	0.75	3.5
AVWT-114F9SR		40	10	0.75	3.5
AVWT-136F9SS		49	-	0.75	5.5
AVWT-154F9SS		55	-	0.75	5.5
AVWT-170F9SS		59	-	0.75	5.5

\* Refer to the NOTES for selection of the power source cable size

NOTES:

- 1) Follow local codes and regulations when selecting field wires.
- 2) The wire sizes marked with \*1 in the table of previous page are selected at the maximum current of the unit according to the European Standard, EN60 335-1. Use the wires which are not lighter than the ordinary tough rubber sheathed flexible cord (code designation H05RN-F) or ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).
- 3) Use a shielded cable for the transmitting circuit and connect it to ground.
- 4) In the case that power cables are connected in series, add each unit maximum current and select wires below.

**Selection According to EN60 335-1**

<b>Current i (A)</b>	<b>Wire Size (mm<sup>2</sup>)</b>
i ≤ 6	0.75
6 < i ≤ 10	1
10 < i ≤ 16	1.5
16 < i ≤ 25	2.5
25 < i ≤ 32	4
32 < i ≤ 40	6
40 < i ≤ 63	10
63 < i	*2

\*2: In the case that current exceeds 63A, don't connect in series.

 **CAUTION**

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



1.2 Checking of Rotary Switch and Dip Switch Setting

The following figures indicate the normal setting (before shipment) of DSW on PCB in the indoor and outdoor unit. When simultaneous operation control of multiple units or room thermo control is operated, DSW setting will be different with the following figures.

(1) Outdoor Unit (before shipment)

TURN OFF all power sources before setting. Without turning OFF, the switches do not work and the contents of the setting are invalid. (However, DSW4-No.1, 2, 4 and push switches can be operated during power sources is ON.) Mark of "■" indicates the position of dip switches.

**Arrangement of Dip Switch Setting**

**Push Switches**

**DSW1 | Ref. Cycle No. Setting**

Setting is required.

Setting Before Shipment

DSW1

Tens Digit      Last Digit

Set the unit number of outdoor unit at each refrigerant cycle. (Setting before shipment is unit 0.)

**DSW2 | Capacity Setting**

No setting is required.

AVWT-86U\*    AVWT-96U\*    AVWT-114U\*

AVWT-136U\*    AVWT-154U\*    AVWT-154U\*

**DSW4 | Test Operation and Service Setting**

Setting is required. For Test Operation and Operating Compressor

Setting Before Shipment    Test Cooling Operation    Test Heating Operation

Compressor Forced Stop

**DSW5 | Emergency Operation / Test Operation and Service Setting**

No setting is required. Turn ON the dip switch when use the below functions.

Setting Before Shipment

Setting Item	Pin No.
Except No.1 Compressor Operation	1
Except No.2 Compressor Operation	2
Refrigerant Amount Judgement	4

**DSW6 | Outdoor Unit No. Setting**

Setting is required. Single Setting (Setting Before Shipment)

**IMPORTANT NOTICE**

The outdoor unit is not single, the combination setting is necessary. Be sure to do this setting.

Combination Setting

Unit A (No.0 Unit)	Unit B (No.2 Unit)	Unit C (No.3 Unit)

**DSW3**

No setting is required.

**DSW7 | Power Supply Setting**

Setting is required.

220V Unit: 220V Setting Before Shipment  
380-415V Unit: 380-415V Setting Before Shipment

**DSW10 | Transmission Setting**

Setting is required.

For End Resistance Cancellation

Setting Before Shipment	End Resistance Cancellation

If the transmission circuit fuse is short circuited, the printed circuit board PCB1 will be recovered only once by turning DSW10 #2 pin on.

(2) Indoor Unit (before shipment)

Mark of "■" indicates the position of dip switches.

a. Unit No. Setting (RSW1 & DSW6) < Except for AVS Models >

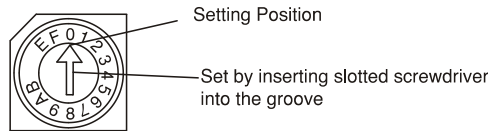
Setting is required. Set the unit No. of all indoor units respectively and serially by following setting position shown in the table below. Numbering must start from "1" for every outdoor unit.

Unit No. Setting

DSW6 (Tens Digit)	RSW1 (Units Digit)	Ex.) Set at No.16 Unit
Before shipment, DSW6 and RSW1 are set to "0". Max. 64 units are available to set when all the equipment to be connected are corresponding to Hi-NET		Set No.1 Pin ON Set at "6"

< Only for AVS Models (RSW) >

Numbering must start from "0" for every outdoor unit.



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

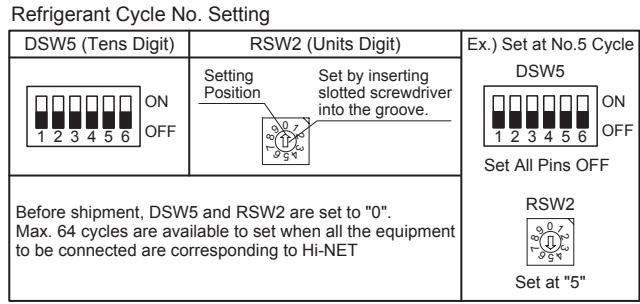
b. Capacity Code Setting (DSW3)

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

Capacity	07	09	12	14	17	18	22
Setting Position							
Capacity	24	27	30	38	48	54	76
Setting Position							
Capacity	96	114	154	190			
Setting Position							

# TROUBLESHOOTING

- c. Refrigerant Cycle No. Setting (RSW2 & DSW5) < Except for AVS Models >  
 Setting is required. Setting positions before shipment are all OFF.

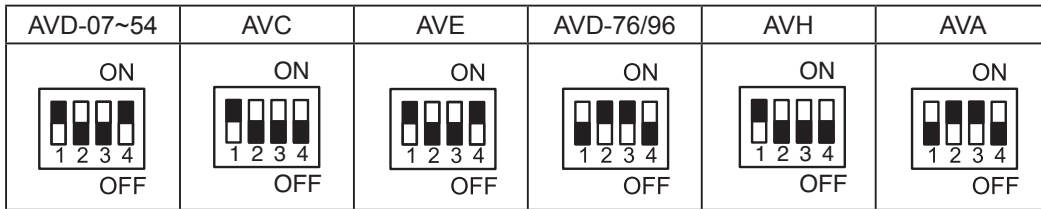


- < Only for AVS Models (DSW5) >

Setting is required.  
 Setting positions before shipment are all OFF.



- d. Unit Model Code Setting (DSW4) < Except for AVS Models >  
 No setting is required.  
 Setting the model code of the indoor unit.



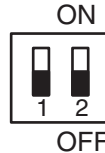
- < Only for AVS Models (DSW6) >

\* No setting is required.

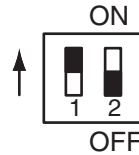


- e. Fuse Recover (DSW7)

\* Factory Setting



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



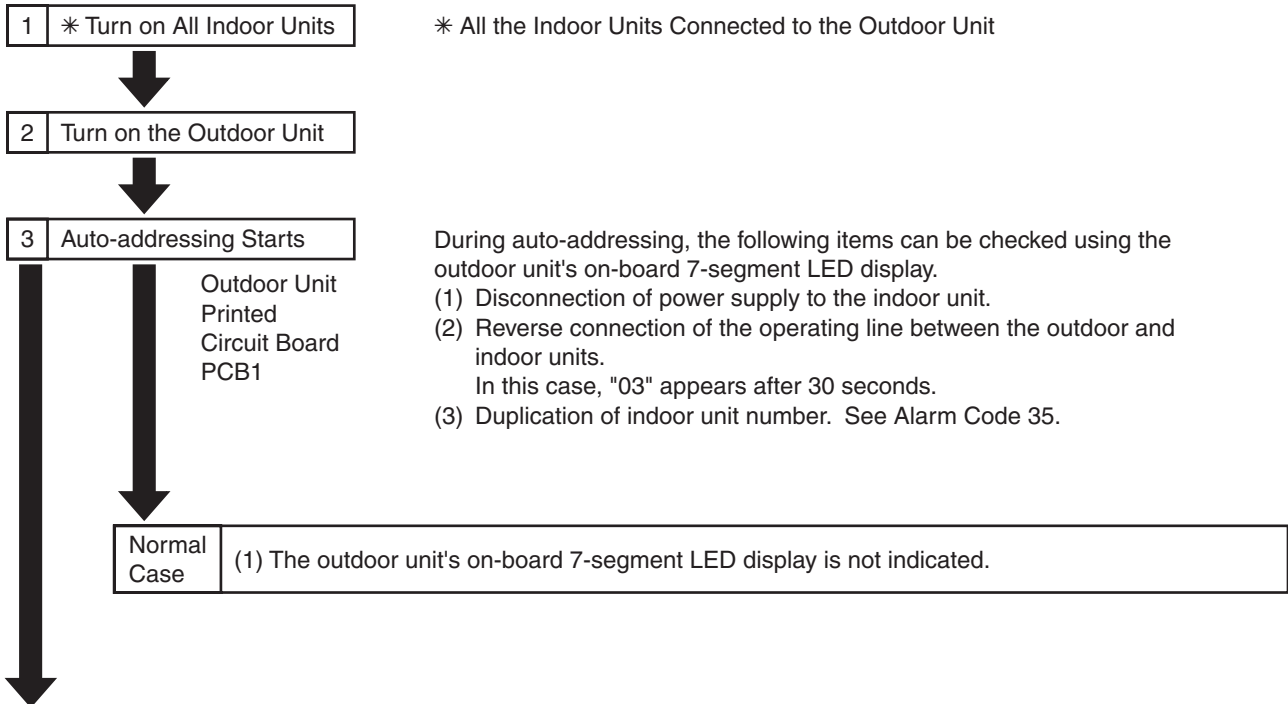
- f. Optional Function Setting (DSW8)

\* In case of AVD, AVE, AVA Models  
 No setting is required.  
 Setting positions before shipment are all OFF.



1.3 Checking by 7-Segment Display

• Simple Checking by 7-Segment Display



Abnormal Case	<p>(2) The outdoor unit's on-board 7-segment LED display indicates as follows if there is something wrong.</p> <p>(A) Alarm code will be displayed on the 7-segment when alarm is received from indoor unit in normal mode. As for the following alarm codes, however, alarm code will be displayed on the 7-segment when alarm is detected by outdoor unit itself.</p> <ul style="list-style-type: none"> <li>• Alarm Code "03" (Abnormal Transmission between Indoor Unit and Outdoor Unit)</li> <li>• Alarm Code "35" (Incorrect Indoor and Outdoor Unit No. Setting)</li> </ul> <p>(B) Alarm code of smaller indoor unit address No. will be displayed when alarm is received from multiple indoor units.</p> <p>(C) The following 7-segment is displayed and flashed every 0.5 seconds.</p>							
	<p>(D) SEG1 and SEG2 are as follows.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">7-Segment Display</th> <th style="width: 30%;">Dotted Indication</th> <th style="width: 30%;">Remarks</th> </tr> </thead> <tbody> <tr> <td> <p>&lt;In Case of Unit No. 63, Alarm Code "01"&gt;</p> <p>SEG2: Indoor Unit No. (0~63) SEG1: Alarm Code</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>SEG2</p> <p>Indoor Unit No.</p> </div> <div style="text-align: center;"> <p>SEG1</p> <p>Alarm Code</p> </div> </div> </td> <td style="text-align: center; vertical-align: middle;"> <p style="font-size: small;">In case of "Setting Refrigerant Cycle Group +1"</p> </td> <td style="vertical-align: middle;"> <p>In case of 2-refrigerant cycle group, identify from SEG2 dotted indication.</p> </td> </tr> </tbody> </table>		7-Segment Display	Dotted Indication	Remarks	<p>&lt;In Case of Unit No. 63, Alarm Code "01"&gt;</p> <p>SEG2: Indoor Unit No. (0~63) SEG1: Alarm Code</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>SEG2</p> <p>Indoor Unit No.</p> </div> <div style="text-align: center;"> <p>SEG1</p> <p>Alarm Code</p> </div> </div>	<p style="font-size: small;">In case of "Setting Refrigerant Cycle Group +1"</p>	<p>In case of 2-refrigerant cycle group, identify from SEG2 dotted indication.</p>
7-Segment Display	Dotted Indication	Remarks						
<p>&lt;In Case of Unit No. 63, Alarm Code "01"&gt;</p> <p>SEG2: Indoor Unit No. (0~63) SEG1: Alarm Code</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>SEG2</p> <p>Indoor Unit No.</p> </div> <div style="text-align: center;"> <p>SEG1</p> <p>Alarm Code</p> </div> </div>	<p style="font-size: small;">In case of "Setting Refrigerant Cycle Group +1"</p>	<p>In case of 2-refrigerant cycle group, identify from SEG2 dotted indication.</p>						

# TROUBLESHOOTING

## 1.4 Function Setting

No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
1	Circular at Heating Function Thermo-off	FA	00	No setting
			01	Indoor fan forced ON and OFF (2 min. ON / 6 min. OFF)
2	Night-Shift	ni	00	No Setting
			01	Setting of night-shift
3	Cancellation of Outdoor Ambient Temperature Limit	GS	00	No setting
			01	For heating
			02	For cooling
			03	For cooling/heating
4	Defrost for Cold Area (Change of Defrost Condition)	Jo	00	No setting
			01	Condition 2 of defrost operation
5	SLo (Fan Speed) Defrost Setting	bJ	00	Indoor fan stop when heating operation is activated/during defrost operation
			01	Indoor fan SLo operation during defrost operation
			02	Indoor fan SLo operation when heating operation is activated
			03	Fan operation when heating operation is activated/ Indoor fan SLo operation during defrost operation
6	Cancellation of Hot Start	HT	00	Hot start control is available
			01	Cancellation of hot start
7	Priority Capacity Mode	nU	00	No setting
			01	Change of frequency maximum limit value
			02	Change of current limit value
			03	Change of frequency maximum limit value and current limit value
8	Compressor Frequency Control Target Value for Cooling	Hc	00	Initial setting (Ps evaporation temperature targeted value 7°C)
			01	Targeted value (2°C)
			02	Targeted value (3°C)
			03	Targeted value (4°C)
			04	Targeted value (5°C)
			05	Targeted value (9°C)
			06	Targeted value (10°C)
			07	Targeted value (11°C)
			08-09	Not prepared (If set, the setting item will be ignored by the control PCB.)
9	Compressor Frequency Control Target Value for Heating	Hh	00	Initial setting (Ps targeted value 2.85MPa)
			01	Targeted value (2.60MPa)
			02	Targeted value (2.75MPa)
			03	Targeted value (2.80MPa)
			04	Targeted value (2.82MPa)
			05	Targeted value (2.88MPa)
			06	Targeted value (2.90MPa)
			07	Targeted value (2.95MPa)
			08-09	Not prepared (If set, the setting item will be ignored by the control PCB.)
10	Indoor Expansion Valve Control Target Value for Cooling	SC	00	Initial setting (SH targeted value +5°C)
			01	SH Targeted value 7
			02	SH Targeted value 6
			03	SH Targeted value 4
			04	SH Targeted value 3
			05-09	Not prepared (If set, the setting item will be ignored by the control PCB.)
11	Indoor Expansion Valve Control Target Value for Heating	SH	00	Initial setting (SC targeted value +5°C)
			01	SC Targeted value 11
			02	SC Targeted value 8
			03	SC Targeted value 2
			04	SC Targeted value -1
			05-09	Not prepared (If set, the setting item will be ignored by the control PCB.)
12	Indoor Expansion Valve Opening Change for Stoppage Indoor Unit in Heating Mode	Si	00	Initial setting (stoppage unit expansion valve opening (150~325 pulse))
			01	Expansion valve opening 07~22: 175 pulse, 24 or over: 300 pulse
			02	Expansion valve opening 07~22: 100 pulse, 24 or over: 150 pulse
			03-09	Not prepared (If set, the setting item will be ignored by the control PCB.)
13	Indoor Expansion Valve Opening Change for Thermo-OFF Indoor Unit in Heating Mode	So	00	Thermo-OFF unit expansion valve opening (150~325 pulse)
			01	Expansion valve opening 07~22: 175 pulse, 24 or over: 300 pulse
			02	Expansion valve opening 07~22: 100 pulse, 24 or over: 150 pulse
			03-09	Not prepared (If set, the setting item will be ignored by the control PCB.)

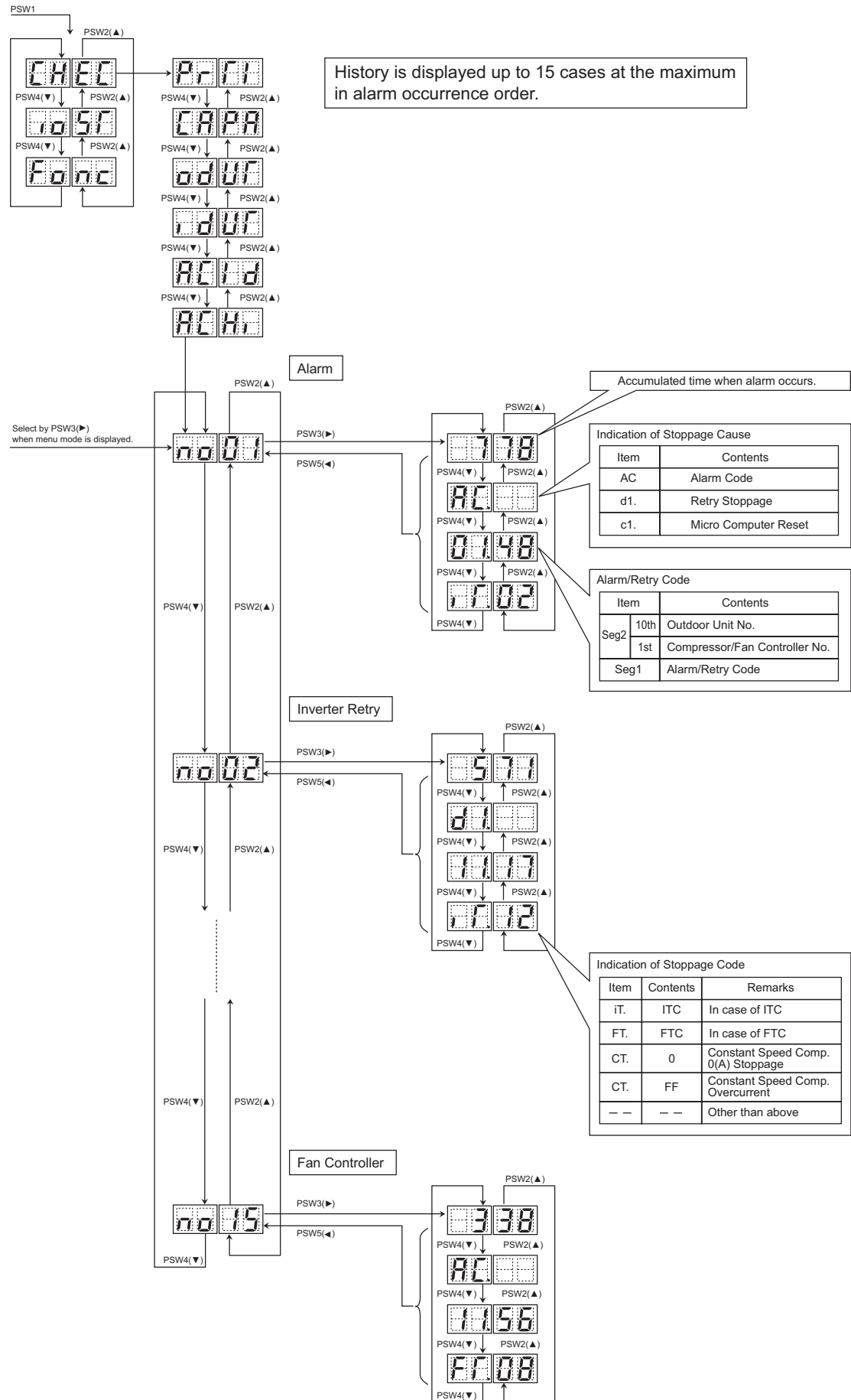
No.	Setting Item	7-Segment Display		Contents
		SEG2	SEG1	
14	Indoor Expansion Valve Initial Opening of Thermo-ON Indoor Unit in Heating Mode	ci	00	Initial setting (300~650PK)
			01	2000 pulse
			02	1400 pulse
			03	1000 pulse
			04	600 pulse
			05-09	Not prepared (If set, the setting item will be ignored by the control PCB.)
15	Fine Adjustment of Indoor Expansion Valve Initial Opening in Cooling Mode	cb	00	Initial setting
			01	Cooling operation initial opening -2%
			02	Cooling operation initial opening +1%
			03	Cooling operation initial opening +3%
			04	Cooling operation initial opening +5%
			05-09	Not prepared (If set, the setting item will be ignored by the control PCB.)
16	Fine Adjustment of Indoor Expansion Valve Initial Opening in Heating Mode	ch	00	Initial setting
			01	Heating operation initial opening -2%
			02	Heating operation initial opening +1%
			03	Heating operation initial opening +3%
			04	Heating operation initial opening +5%
			05-09	Not prepared (If set, the setting item will be ignored by the control PCB.)
17	Low Noise Setting (In the case of low noise setting, cooling/heating operation range will be restricted.)	db	00	Initial setting
			01	Fan rotation maximum limit 20 steps
			02	Fan rotation maximum limit 18 steps
			03	Fan rotation maximum limit 16 steps
			04	Frequency limit 1
			05	Frequency limit 2
			06	Frequency limit 3
			07	Operation sound value, Catalog value-2dB
			08	Operation sound value, Catalog value-5dB
			09	Operation sound value, Catalog value-8dB
18	Demand Function Setting	dE	00	No demand control
			01	Demand control 40%
			02	Demand control 60%
			03	Demand control 70%
			04	Demand control 80%
			05	Demand control 100%
19	Wave Function Setting	UE	00	No wave function
			01	Minimum limit 40%
			02	Minimum limit 60%
			03	Minimum limit 70%
			04	Minimum limit 80%
20	Cold Draft Protection	Fb	00	Initial setting
			01	Outlet temperature $\geq 10^{\circ}\text{C}$
			02	Outlet temperature $\geq 12^{\circ}\text{C}$
			03	Outlet temperature $\geq 14^{\circ}\text{C}$
21	Not Prepared	FT	00	-
22	Adjustment of Fan Rotation (To avoid a whining sound for the multiple installation.)	Fo	00	Initial setting
			01	Change of fan rotation -15rpm
			02	Change of fan rotation -30rpm
23	Not Prepared	LT	00	-
24	Not Prepared	F1	00	-
25	Not Prepared	F2	00	-
26	Not Prepared	F3	00	-

1.5 Checking of Alarm Code History

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

“no01” (latest) ↔ history data ~ “no15” (oldest) ↔ history data

Refer to the figure below as an example.



(1) Register of Alarm Code History

Cause of Stoppage (Alarm Code or Stoppage Code)	Contents	Indication of Alarm Code History					
		Time	*Alarm	Alarm Code			Alarm Code or Stoppage Code
				O.U. Unit No.	Comp. No.	Fan No.	
02	Activation of protection device	Accumulated Time	AC.	○	○		--
03	Abnormality transmitting between indoor units and outdoor units	Accumulated Time	AC.				--
04	Abnormality transmitting between inverter PCB and outdoor PCB	Accumulated Time	AC.	○	○		--
04.	Abnormality transmitting between fan controller and outdoor PCB	Accumulated Time	AC.	○		○	--
05	Abnormality of power source phase	Accumulated Time	AC.	○			--
06	Abnormality of inverter voltage	Accumulated Time	AC.	○	○		iTC
d1-18		Accumulated Time	d1.	○	○		iTC
06.	Abnormality of fan controller voltage	Accumulated Time	AC.	○		○	FTC
07	Decrease in discharge gas superheat	Accumulated Time	AC.	○	○		--
d1-16		Accumulated Time	d1.	○	○		--
08	Increase in discharge gas temperature at the top of compressor	Accumulated Time	AC.	○	○		--
d1-15		Accumulated Time	d1.	○	○		--
0A	Abnormality transmitting between outdoor units	Accumulated Time	AC.				--
0b	Incorrect outdoor unit address setting	Accumulated Time	AC.				--
0c	Incorrect outdoor main unit setting	Accumulated Time	AC.				--
21	Abnormality of high pressure sensor	Accumulated Time	AC.	○			--
22	Abnormality of thermistor for outdoor air temperature	Accumulated Time	AC.	○			--
23	Abnormality of thermistor for discharge gas temp. on top of compressor	Accumulated Time	AC.	○	○		--
24	Abnormality of thermistor for outdoor unit heat exchanger liquid pipe (Te/Tchg)	Accumulated Time	AC.	○		Thermistor Signal Te: E Tchg: C	--
25	Abnormality of thermistor for outdoor unit heat exchanger gas pipe (Tg/TbG)	Accumulated Time	AC.	○		Thermistor Signal TG: G TbG: b	--
29	Abnormality of low pressure sensor	Accumulated Time	AC.	○			--
31	Incorrect capacity setting of indoor unit and outdoor unit	Accumulated Time	AC.				--
35	Incorrect indoor unit No. setting	Accumulated Time	AC.				--
36	Incorrect indoor unit combination	Accumulated Time	AC.				--
38	Abnormality of picking up circuit for protection in outdoor unit	Accumulated Time	AC.	○			--
39	Abnormality of running current at constant speed compressor	Accumulated Time	AC.	○			CT Detected Value
d1-14		Accumulated Time	d1.	○			
3A	Abnormality of outdoor unit capacity	Accumulated Time	AC.				--
3b	Incorrect setting of outdoor unit model combination or voltage	Accumulated Time	AC.				--
3d	Abnormality transmitting between main unit and sub unit(s)	Accumulated Time	AC.				--

\* (Details of Alarm)

AC.: Alarm  
d1.: Retry  
Ci.: Control Information

iTC: Inverter Stoppage Code  
FTC: Fan Controller Stoppage Code



## TROUBLESHOOTING

Cause of Stoppage (Alarm Code or Stoppage Code)	Contents	Indication of Alarm Code History					
		Time	* Alarm	Alarm Code			Alarm Code or Stoppage Code
				O.U. Unit No.	Comp. No.	Fan No.	
43	Abnormality of low compression ratio	Accumulated Time		○			--
d1-11		Accumulated Time	d1.	○			--
44	Abnormality of low-pressure increase	Accumulated Time	AC.	○			--
d1-12		Accumulated Time	d1.	○			--
45	Abnormality of high-pressure increase	Accumulated Time	AC.	○			--
d1-13		Accumulated Time	d1.	○			--
47	Activation of low-pressure decrease protection device (Vacuum operation protection)	Accumulated Time	AC.	○			--
d1-15		Accumulated Time	d1.	○			--
48	Activation of inverter overcurrent protection device	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	d1.	○	○		iTC
51	Abnormality of inverter current sensor	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	d1.	○	○		iTC
53	Inverter error signal detection	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	d1.	○	○		iTC
54	Abnormality of inverter fin temperature	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	d1.	○	○		iTC
55	Inverter failure	Accumulated Time	AC.	○	○		iTC
d1-17		Accumulated Time	d1.	○	○		iTC
57	Activation of fan controller protection device	Accumulated Time	AC.	○		○	FTC
b5	Incorrect setting of indoor unit connection number	Accumulated Time	AC.				--
EE	Compressor protection alarm	Accumulated Time	AC.				--
d1-05	Instantaneous power failure	Accumulated Time	di.				--
d1-18	Abnormality of inverter and other	Accumulated Time	di.				iTC
d1-26	Abnormality of high pressure decrease	Accumulated Time	di.				--
d1-32	Retry stoppage by indoor unit auto address setting	Accumulated Time	di.				--
Control Information	Micro-computer reset by abnormality of inverter transmission	Accumulated Time	Ci.				1
	Micro-computer reset by abnormality of fan controller transmission	Accumulated Time	Ci.				2
	Micro-computer reset by abnormality of indoor unit transmission	Accumulated Time	Ci.				3
	Micro-computer reset by abnormality transmitting between outdoor unit and outdoor unit	Accumulated Time	Ci.				4
	Micro-computer reset for abnormality of control state	Accumulated Time	Ci.				6

\* (Details of Alarm)

AC.: Alarm

d1.: Retry

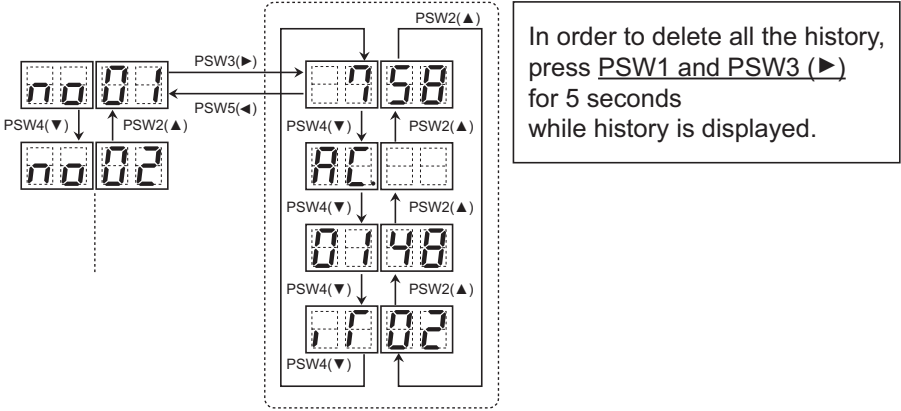
Ci.: Control Information

iTC: Inverter Stoppage Code

FTC: Fan Controller Stoppage Code

(2) Deletion of Alarm Code History

Press PSW1 and PSW3 for 5 seconds to clear the alarm code history while the history data is displayed. (All history can be deleted.)



## 1.6 Emergency Operation

### (1) Emergency Mode Operation from Remote Control Switch (AVWT-190FESZ to AVWT-510FESZ Only)

If compressor is failed, emergency operation mode is available by the remote control switch. Even if the compressor is failed, the air conditioning operation is continuously available until the troubleshooting is performed.

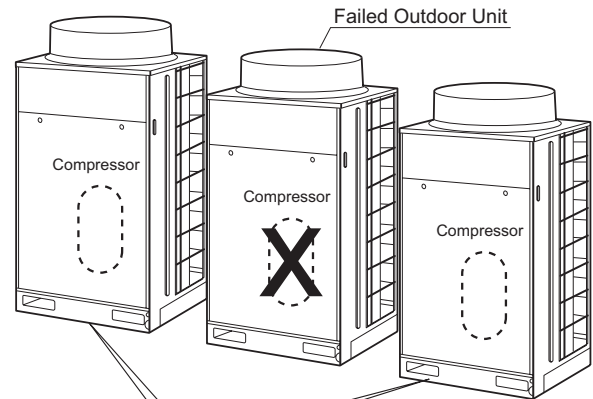
\* In case of following alarm code, emergency operation is available.

#### (1) Inverter Compressor Failure

- 06: Abnormality of Inverter Voltage
- 23: Abnormality of Discharge Gas Thermistor
- 48: Activation of Overcurrent Protection Device
- 51: Abnormality of Inverter Current Sensor
- 53: Inverter Error Signal Detection
- 54: Abnormality of Inverter Fin Temperature

#### (2) Constant Speed Compressor Failure

- 23: Abnormality of Discharge Gas Thermistor
- 39: Abnormality of Running Current at Constant Speed Compressor



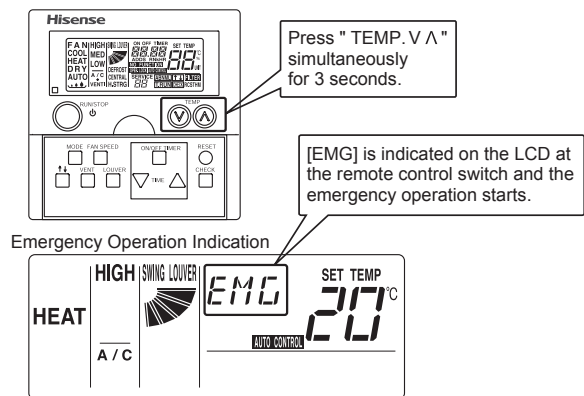
Even if one unit is failed, the others can operate continuously.

#### (a) Procedure

By pressing "TEMP." (V) (A) for 3 seconds simultaneously, emergency mode operation starts. "EMG" can be displayed on the LCD during this operation.

#### (b) Operation Condition

This emergency operation is NOT applicable to all the compressors mounted in the failed outdoor unit.



#### NOTES:

- Emergency operation is available only when all the indoor unit and remote control to be connected are for Hi-NET.
- Emergency operation is available only for when the alarm codes above (\*) are indicated.
- The emergency operation is not available for the failures of inverter PCB or fan controller.
- This emergency operation is not a normal operation but a temporary operation until the service people comes. If the alarm is indicated again during the emergency operation, the alarm cannot be canceled.
- Do not perform emergency operation more than 8 hours. If not, the unit may be damaged.

(2) Emergency Mode Operation from Outdoor Unit PCB for Inverter Compressor Failure  
(AVWT-136FESS to AVWT-170FESS Only)

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

<Alarms Corresponding to Inverter Compressor Failure>

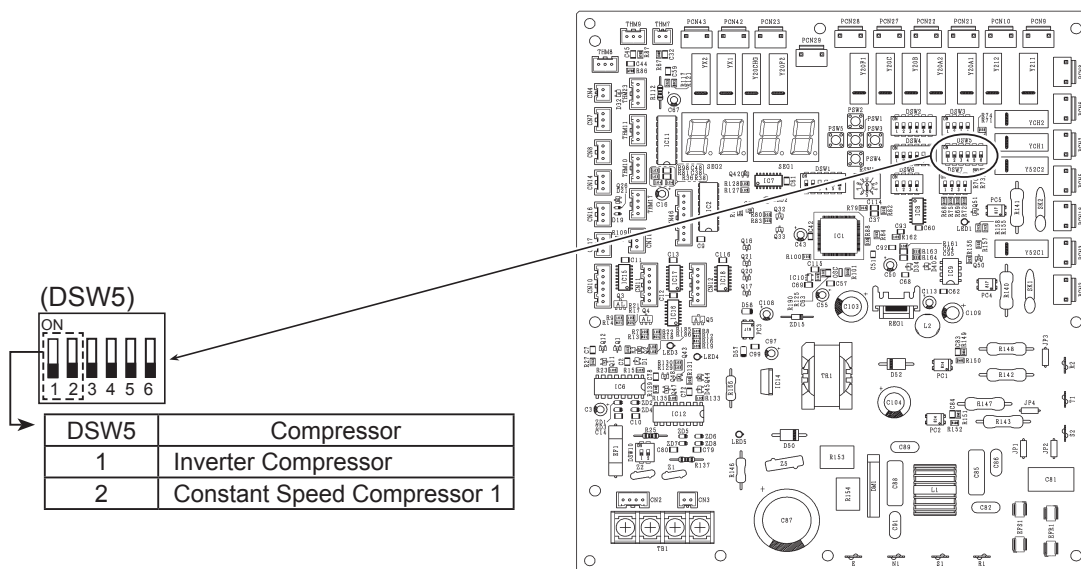
- 04: Abnormality Transmitting between inverter PCB and Outdoor Unit PCB
- 06: Abnormality of Inverter Voltage
- 23: Abnormality of Discharge Gas Thermistor
- 48: Activation of Overcurrent Protection Device
- 51: Abnormality of Inverter Current Sensor
- 53: Inverter Error Signal Detection
- 54: Abnormality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

(a) Procedure

1. Turn OFF all the main switches of outdoor and indoor units.
2. Check the inverter PCB. If inverter PCB is faulty, disconnect the wiring (U, V, W) of diode module.  
(Insulate the disconnected terminals.)
3. Turn ON DSW5-No.1 of outdoor unit PCB1.
4. Turn ON the power supply.
5. Start the operation by remote control switch.

Turn the DSW5-No.1 or No.2 ON to stop the compressor operation.

(When 2 compressors are stopped simultaneously, d1-30 is indicated on 7-segment display.)



<Outdoor Unit PCB1>

## (3) Emergency Mode Operation from Outdoor Unit PCB for Constant Speed Compressor Failure (AVWT-136FESS to AVWT-170FESS Only)

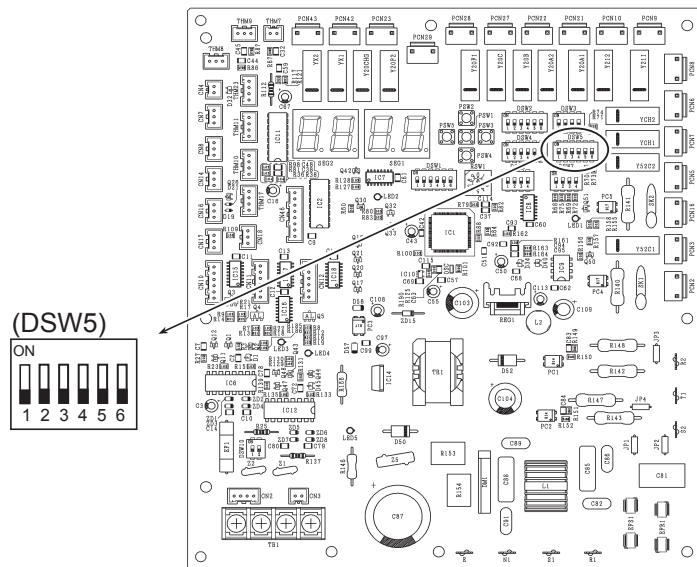
This operation is an emergency operation by the other compressor when the constant speed compressor is failed.

<Alarms Corresponding to Constant Speed Compressor Failure>

- 23: Abnormality of Discharge Gas Thermistor
- 39: Abnormality of Running Current at Constant Speed Compressor

### (a) Procedure

1. Turn OFF all the main switches of outdoor and indoor units.
2. Turn ON DSW5 of outdoor PCB1 for the failure constant speed compressor.
3. Turn ON the power supply.
4. Start the operation by remote control switch.



<Outdoor Unit PCB1>

### (b) Operation Condition

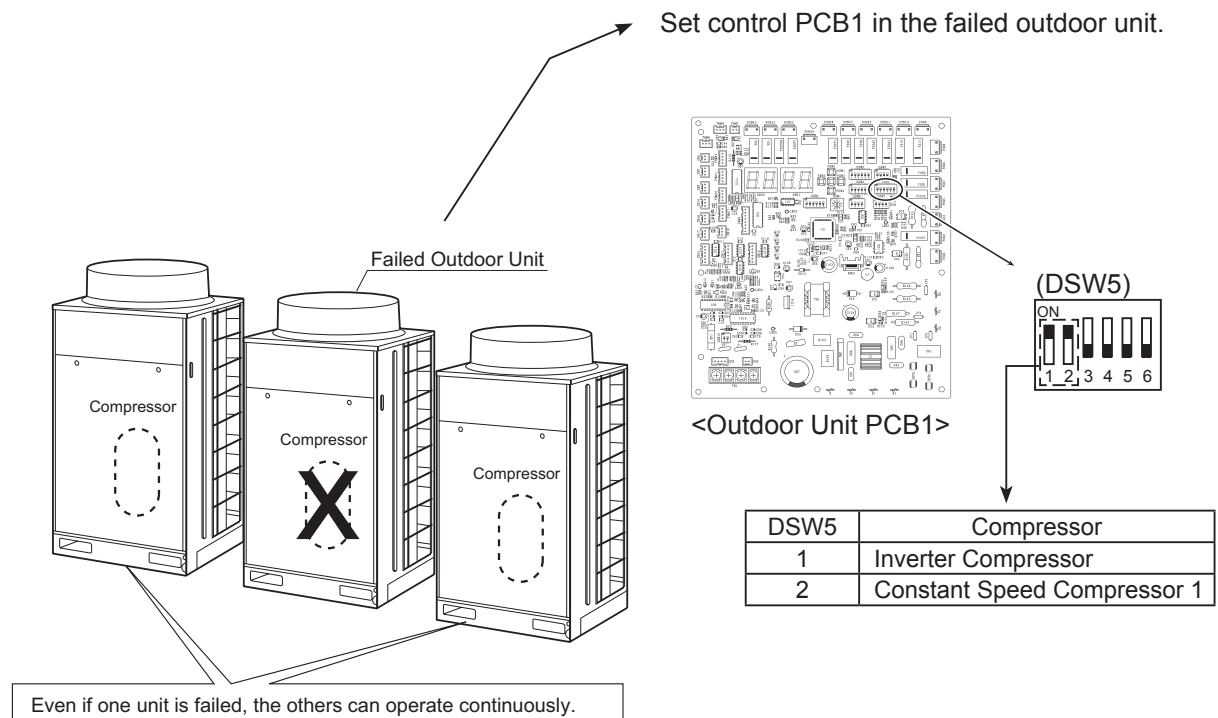
- Td Thermistor  
Td thermistor on the failure constant speed compressor is ignored by setting DSW5.  
If the thermistor is short-circuited, this operation is available.

### NOTES:

- Measure the insulation resistance of constant speed compressor.  
Do not perform the emergency operation when the insulation resistance is 0Ω  
Other compressor may be damaged because there is a possibility that refrigerant oil may be oxidized.
- In this emergency operation, compressor frequency cannot be controlled normally.  
Therefore, alarm code "07", "43", "44", "45", or "47" may be indicated on LCD.
- This emergency operation may not provide sufficient cooling and heating capacity.
- This operation is an emergency and temporary operation when the constant speed compressor is damaged. Therefore, change the new one as soon as possible.
- Turn OFF DSW5 on outdoor PCB1 after replacing the compressor.  
If this setting is not performed, the constant speed compressor will be damaged.

(4) Emergency Mode Operation from Outdoor Unit PCB for Compressor Failure  
(AVWT-190FESZ to AVWT-510FESZ Only)

Turn DSW5-No.1 or No.2 ON to stop the compressor operation. If set, all the compressors in the failed outdoor unit will NOT be operated.



**NOTE:**

Fully close the stop valves (gas/liquid) in the failed outdoor unit.

• Operation Condition

< Indoor Unit Operation Capacity >

The compressor is forced to stop for compressor protection under the following condition:

Total Capacity of Thermo ON I.U. < 50% of O.U. Capacity and

Total Capacity of Thermo ON I.U. < 96kBtu/h

(A lack of thermo ON indoor unit may lead a constant speed compressor failure because the compressor is operated and stopped repeatedly.)

**NOTES:**

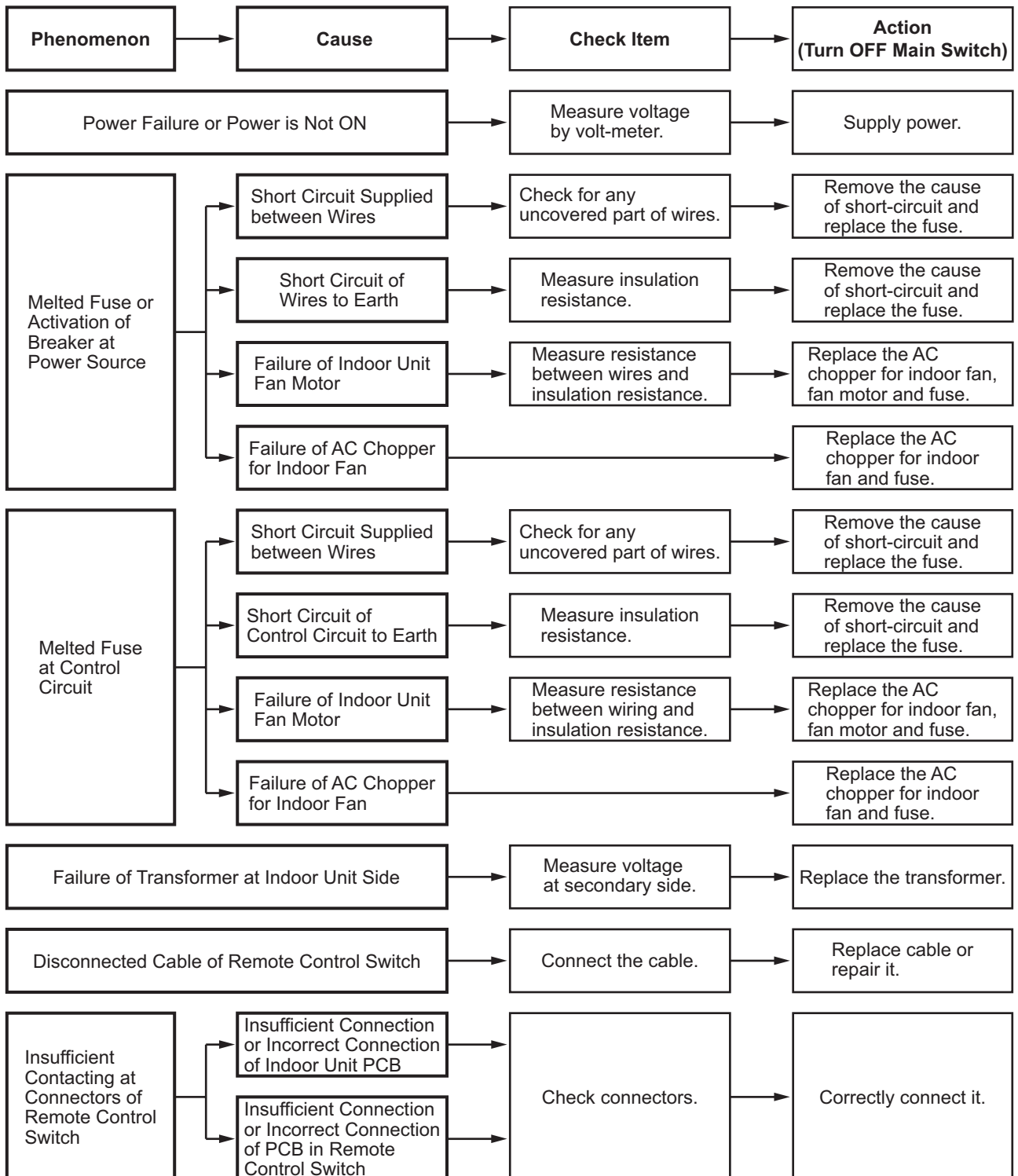
- Measure the insulation resistance of inverter compressor.  
Do not perform the emergency operation when the insulation resistance is 0Ω  
Other compressor may be damaged because there is a possibility that refrigerant oil may be oxidized.
- Total operating capacity of indoor unit should be 96kBtu/h and over.  
(Less than 96kBtu/h: Forced stoppage)
- In this emergency operation, compressor frequency cannot be controlled normally.  
Therefore, alarm code "07", "43", "44", "45" or "47" may be indicated on LCD.
- This emergency operation may not provide sufficient cooling and heating capacity.
- This operation is an emergency but a temporary operation when the inverter compressor is damaged.  
Therefore, change the new one as soon as possible.
- Turn OFF DSW5-No.1 of outdoor PCB1 after replacing the compressor.  
If this setting is not performed, the inverter compressor will be damaged.

# TROUBLESHOOTING

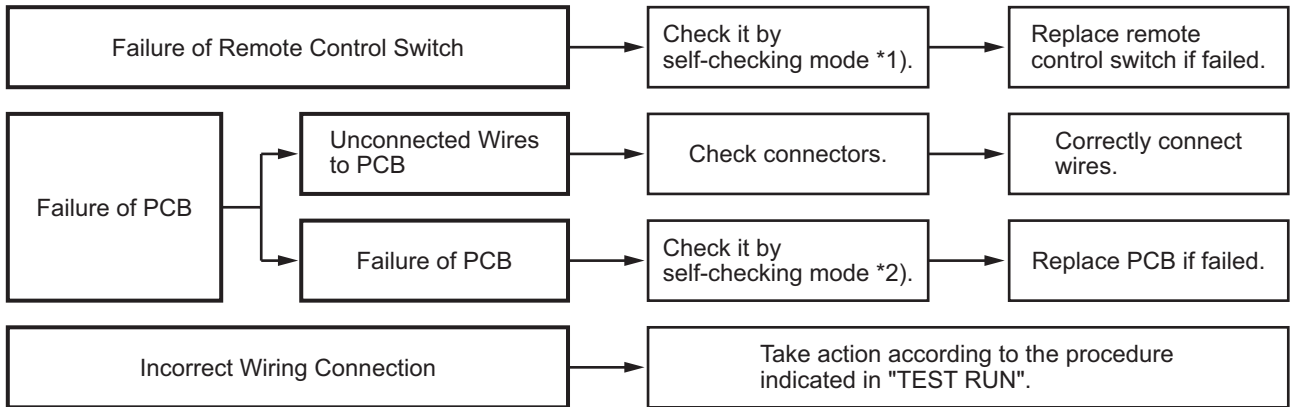
## 1.7 Failure of Power Supply to Indoor Unit and Remote Control Switch

- Lights and LCD are not Indicated.
- Not Operated

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



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

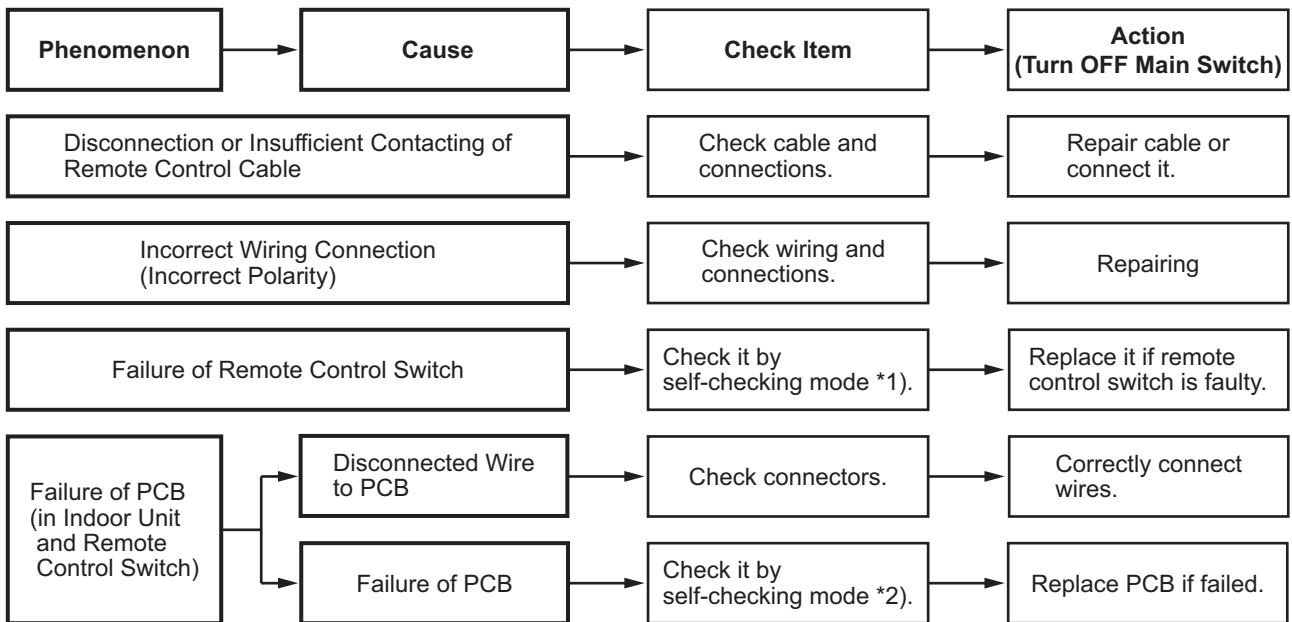


\*1): Refer to Item 3.2 in *Troubleshooting*.

\*2): Refer to Item 3.1 in *Troubleshooting*.

1.8 Abnormal Transmission between Remote Control Switch and Indoor Unit

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



\*1): Refer to Item 3.2 in *Troubleshooting*.

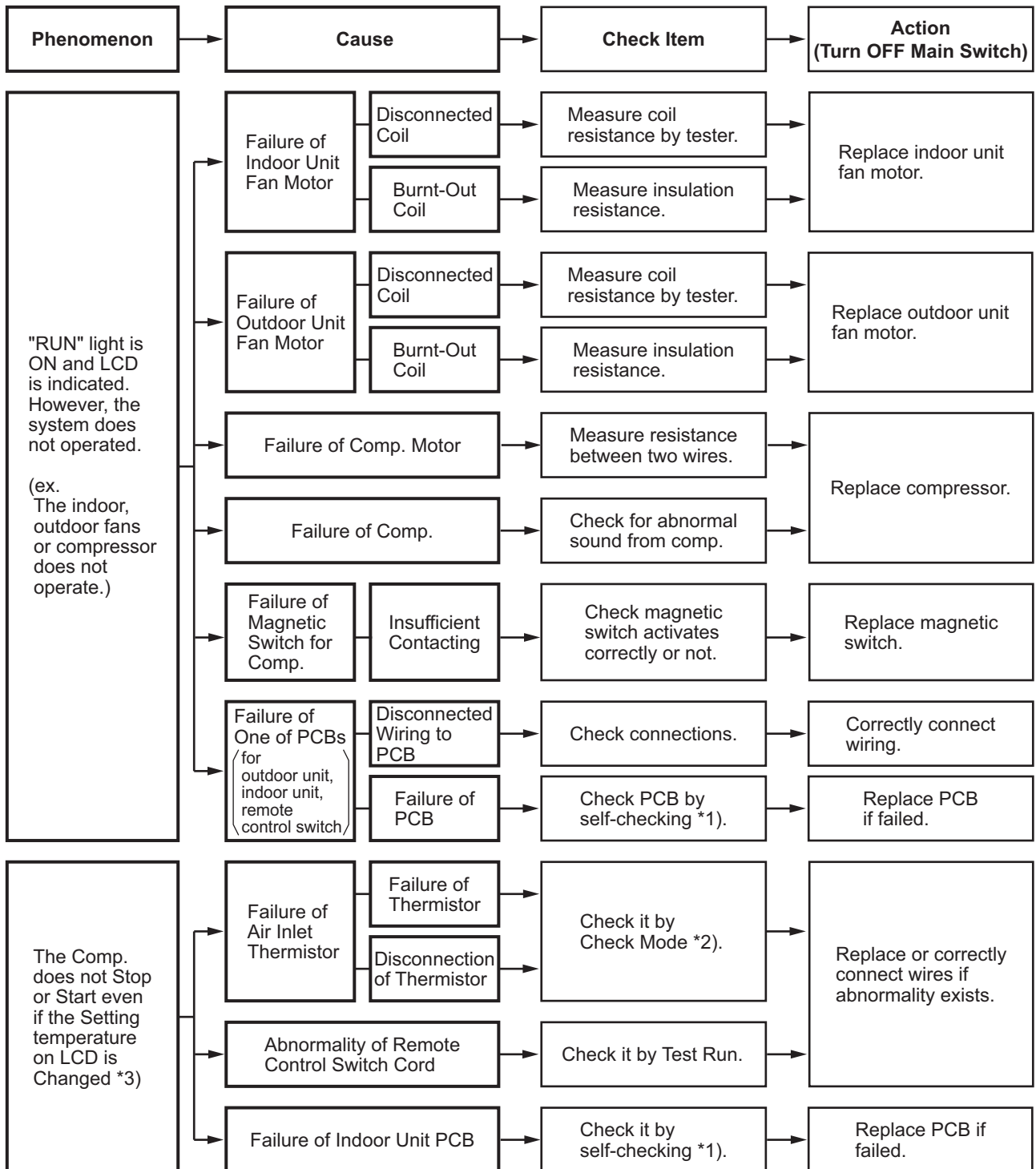
\*2): Refer to Item 3.1 in *Troubleshooting*.



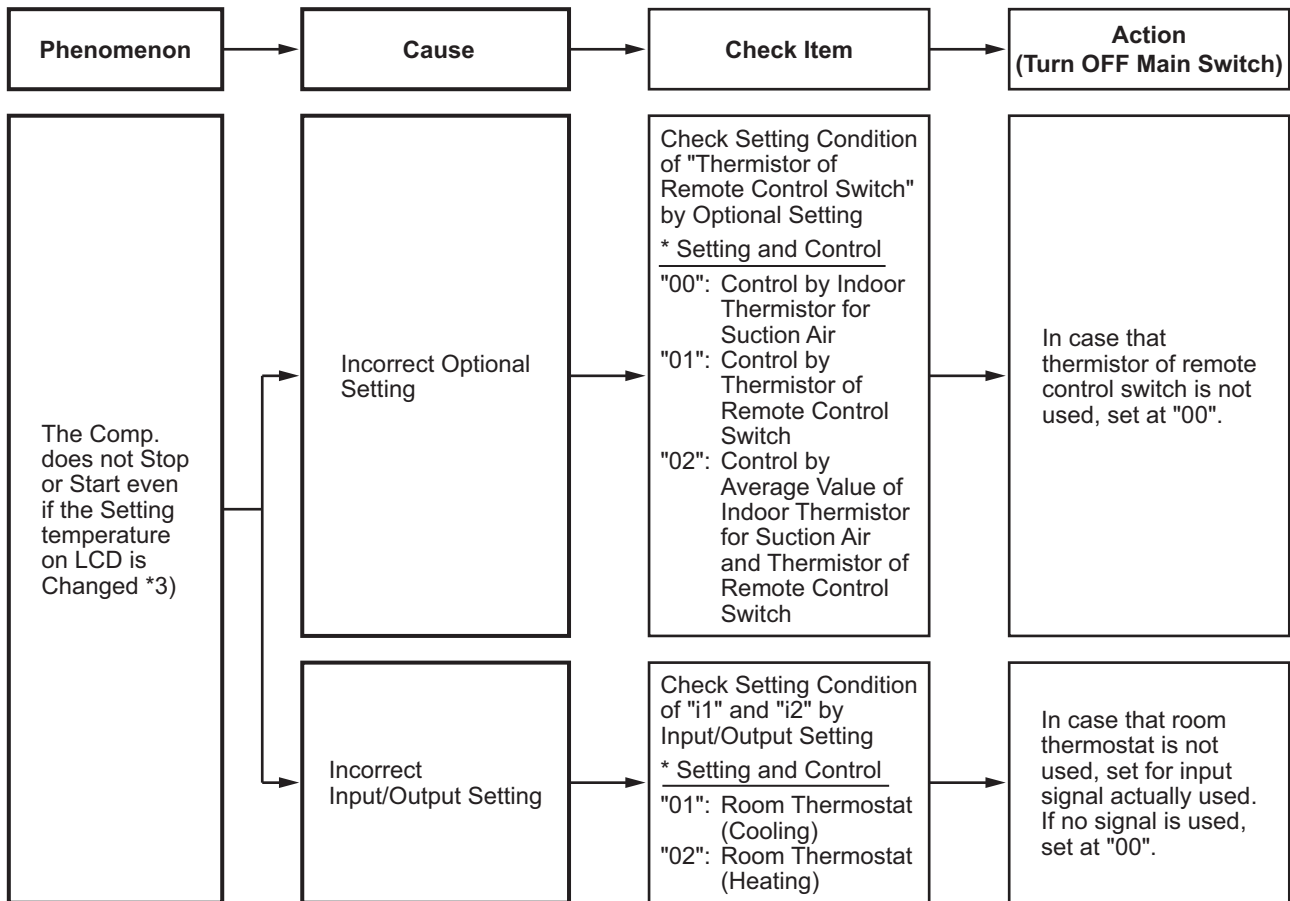
# TROUBLESHOOTING

## 1.9 Abnormalities of Devices

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



(1.9 Abnormalities of Devices)



\*1): Refer to Item 3.1 in *Troubleshooting*.

\*2): Refer to Item 2.3 in *Troubleshooting*.

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

- \* Indoor Air Temp. is lower than 19°C or Outdoor Air Temp. is lower than -5°C during cooling operation.
- \* Indoor Air Temp. is higher than 30°C or Outdoor Air Temp. is higher than 23°C during heating operation.
- \* When a cooling (or heating) operation signal is given to the outdoor unit and a different mode as heating (or cooling) operation signal is given to indoor units.
- \* When demand signal or emergency stop signal is given to outdoor unit.

# TROUBLESHOOTING

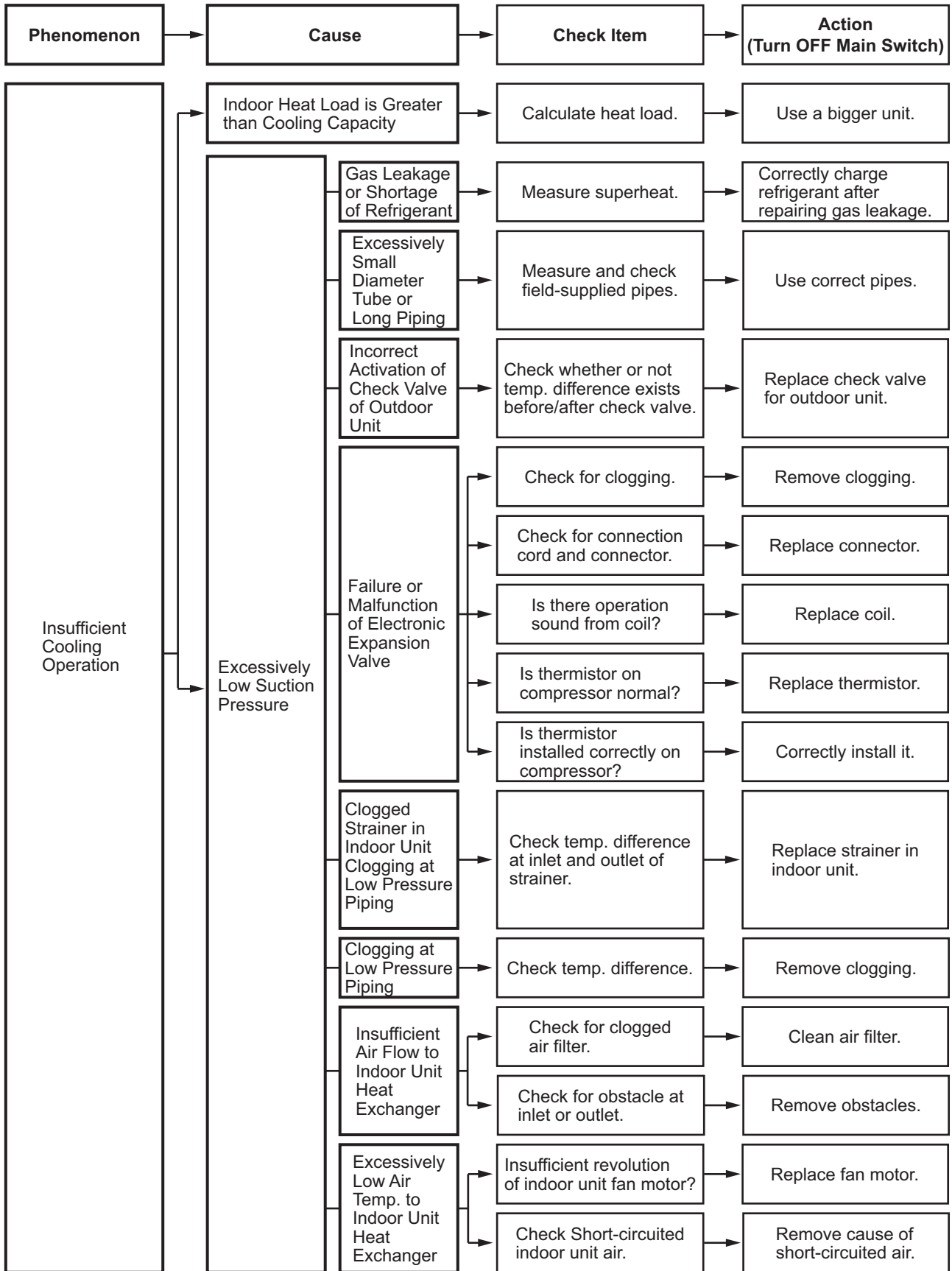
## (1.9 Abnormalities of Devices)

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)	
Indoor Fan Speed is Not Changed	Failure of Discharge Air Temp. Thermistor	Failure of Thermistor Disconnected Wire of Thermistor	Check thermistor by self-checking *2). Replace or correctly connect wiring when it is abnormal.	
	Failure of Remote Control Switch	Check it by self-checking *1).	Replace if failed.	
	Failure of PCB for Indoor Unit	Check it by self-checking *1).	Replace if PCB is failed.	
	Failure of AC Chopper for Indoor Unit	Check the indoor unit stoppage when the remote control switch is switched OFF.	Replace if AC Chopper is failed.	
No Defrosting Operation Mode is Available during Heating Operation or Defrosting Operation is Continued	Failure of Thermistor for Outdoor Evaporating Temp. during Heating	Failure of Thermistor Disconnected Wire of Thermistor	Replace or connect correctly when it is abnormal.	
	Failure of Reversing Valve	Disconnected Reversing Valve Coil	Measure resistance of coil.	Replace reversing valve.
		Incorrect Activation of Reversing Valve	Enforced power supply.	
	Disconnected Control Wires between Indoor Unit and Outdoor Unit	Check connectors.	Correctly connect wiring.	
	Failure of Outdoor Unit PCB	Disconnected Wires to PCB	Check connectors.	Correctly connect wiring.
		Failure of PCB	Check it by self-checking *1).	Replace it when check mode is not available.
	Failure of Indoor Unit PCB	Disconnected Wires to PCB	Check connectors.	Correctly connect wiring.
		Failure of PCB	Check it by self-checking *1).	Replace if PCB is failed.
Light and LCD Indication on Remote Control Switch are Kept ON	Failure of PCB in Indoor Unit or Remote Control Switch	Check PCB by self-checking *1).	Replace if PCB is failed.	

\*1): Refer to Item 3.1 to 3.2 in *Troubleshooting*.

\*2): Refer to Item 2.3 in *Troubleshooting*.

(1.9 Abnormalities of Devices)

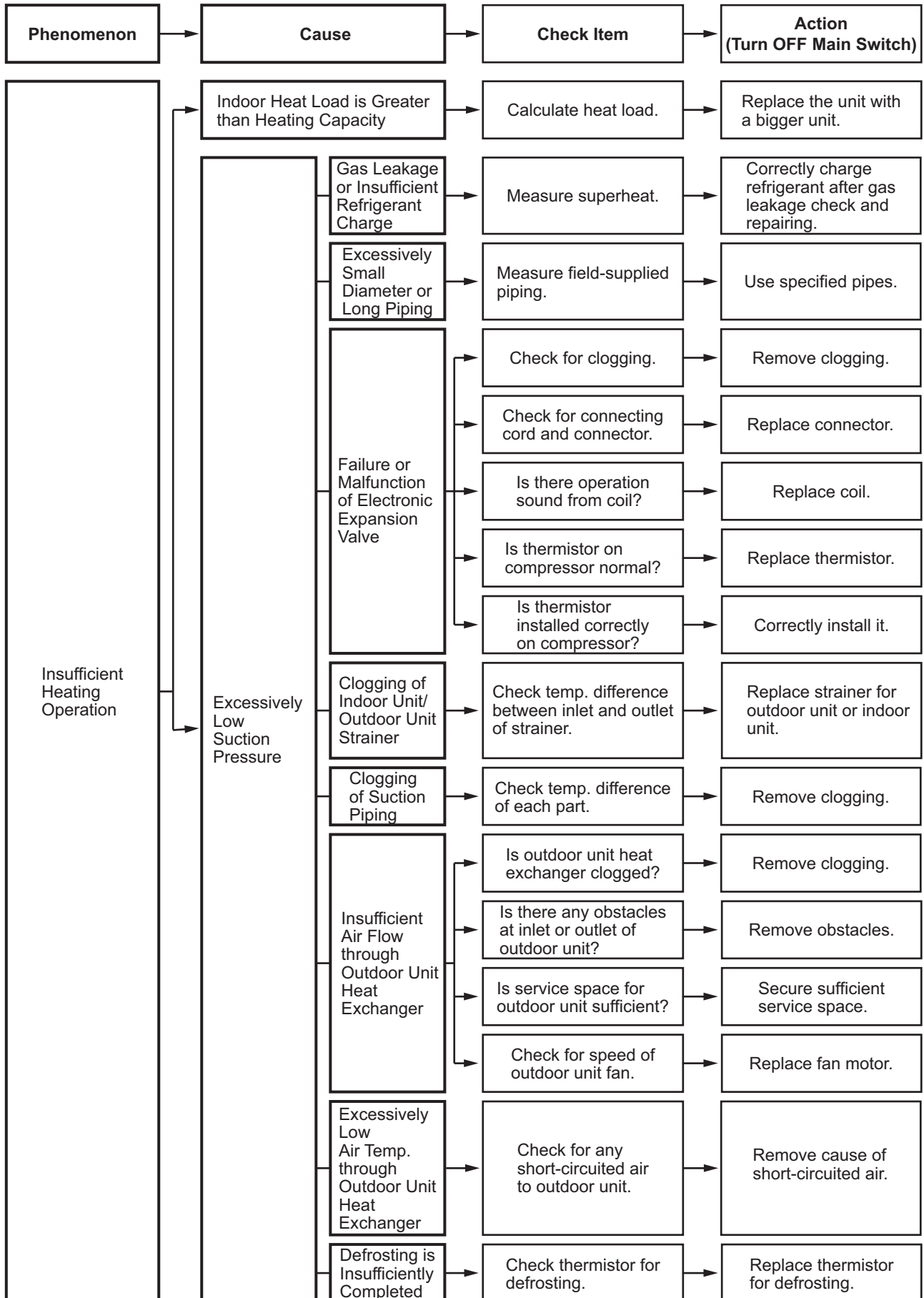


# TROUBLESHOOTING

## (1.9 Abnormalities of Devices)

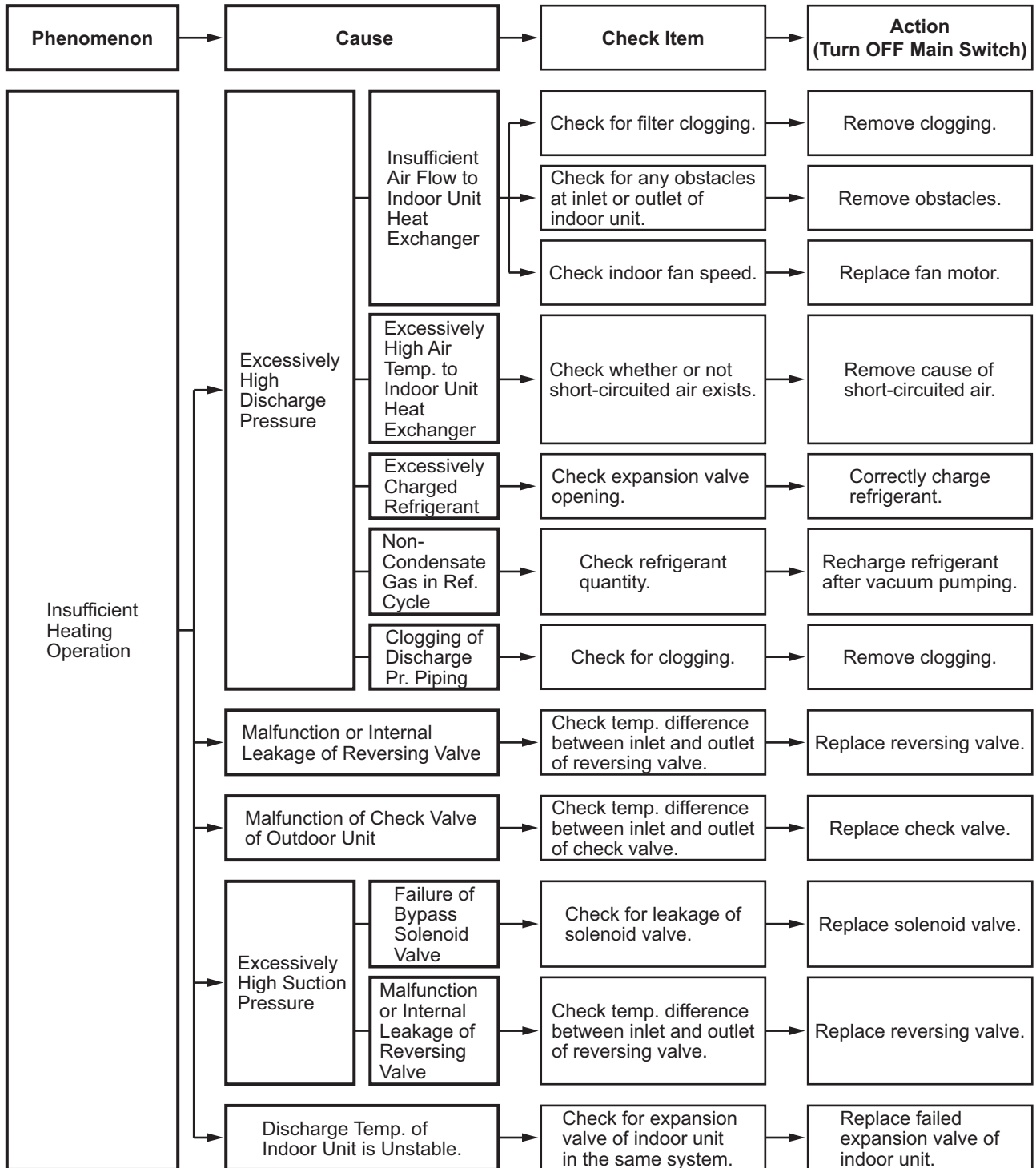
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)	
Insufficient Cooling Operation	Insufficient Air Flow to Outdoor Unit Heat Exchanger	Check Clogging of Outdoor Unit Heat Exchanger.	Remove clogging.	
		Obstacles at inlet or outlet of outdoor unit heat exchanger?	Remove obstacles.	
		Is service space for outdoor unit sufficient?	Secure service space.	
		Correct Fan Speed?	Replace fan motor.	
	Excessively High Air Temp. to Outdoor Unit Heat Exchanger	Short-Circuited Air to Outdoor Unit?	Remove cause of short-circuited air.	
		Any Other Heat Load near Outdoor Unit?	Remove heat source.	
	Excessively High Discharge Pressure	Excessively Charged Refrigerant	Check expansion valve opening.	Correctly charge refrigerant.
		Non-Condensed Gas in Cycle	Check each temp. and pressure.	Charge refrigerant after vacuum pumping.
		Clogging of Discharge Piping	Check for clogging.	Remove clogging.
		Failure or Malfunction of Expansion Valve	Check for clogging.	Remove clogging.
			Check for connecting cord and connector.	Replace connector.
	Is there operation sound from coil?		Replace coil.	
	Malfunction or Internal Leakage of Reversing Valve	Is thermistor on compressor normal?	Replace thermistor.	
		Is thermistor installed correctly on compressor?	Correctly install it.	
		Check temp. difference at inlet and outlet of reversing valve.	Replace reversing valve.	
	Excessively Low Suction Pressure	Failure of Bypass Solenoid Valve	Check for leakage of solenoid valve.	Replace solenoid valve.
Malfunction or Internal Leakage of Reversing Valve		Check temp. difference between inlet and outlet of reversing valve.	Replace reversing valve.	
Discharge Temp. of Indoor Unit is Unstable.	Check for expansion valve of indoor unit in the same system.	Replace failed expansion valve of indoor unit.		

(1.9 Abnormalities of Devices)



# TROUBLESHOOTING

## (1.9 Abnormalities of Devices)



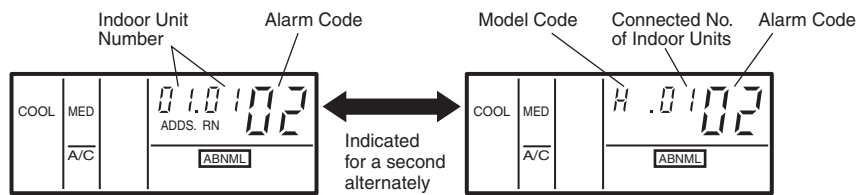
(1.9 Abnormalities of Devices)

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)	
Cooling or Heating Operation with Abnormal Sound	Foreign Particles Inside of Fan Casing	Check it by viewing.	Remove foreign particles.	
	Indoor Unit Fan Runner is Hitting Casing	Check it by viewing.	Adjust position of fan runner.	
	Outdoor Unit Propeller Fan is Hitting Shroud	Check it by viewing.	Adjust position of propeller fan.	
	Abnormal Sound from Compressor	Faulty Installation	Check each part is tightly fixed.	Tightly fix it.
		Liquid Ref. Compression	Check expansion valve opening.	Ensure superheat.
		Wear or Breakage of Internal Comp. Parts	Abnormal Sound from Inside of Compressor	Replace compressor.
		No Heating by Crankcase Heater	Check resistance. (Crankcase Heater, Fuse)	Replace crankcase heater or fuse.
	Hamming Sound from Magnetic Contactor	Check surface of contacts.	Replace magnetic switch.	
	Abnormal Vibration of Cabinets	Check each fixing screws.	Tightly fix it.	
	Outdoor Fan is Not Operated When Compressor is Operated	Obstacle at Outdoor Fan	Check obstacles.	Remove obstacles.
Watching Condition for Heating Operation		Wait for switching of reversing Valve. (1 to 3 minutes)	In case that reversing Valve is not switched, check for insufficient refrigerant.	
Indoor Fan is Not Operated When Compressor is Operated	Discharge Pressure Does Not Increase Higher than 1.5MPa due to insufficient refrigerant.	Check operation pressure.	Add refrigerant.	
	Disconnected Wiring for Indoor Fan	Check wiring.	Connect wiring correctly.	
	Failure of AC Chopper	Check AC chopper.	Replace AC chopper.	



## 2. Troubleshooting Procedure

- Alarm Code Indication of Remote Control Switch



### 2.1 Alarm Code Table

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device (Float Switch)	Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drain Pipe, Float Switch or Drain Pan)
02	Outdoor Unit	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing)
03	Transmission	Abnormality between Indoor and Outdoor	Incorrect Wiring, Loose Terminals, Disconnect Wire, Blowout of Fuse, Outdoor Unit Power OFF
04		Abnormality between Inverter PCB and Outdoor PCB	Inverter PCB - Outdoor PCB Transmission Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
04.		Abnormality between Fan Controller and Outdoor PCB	Fan Controller - Outdoor PCB Transmission Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
05	Supply Phase	Abnormality Power Source Phases	Incorrect Power Source, Connection to Reversed Phase, Open-Phase
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Drop, Insufficient Power Capacity
06.		Abnormal Fan Controller Voltage	Outdoor Voltage Drop, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
08		Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Closed Position (Disconnect Connector)
0A	Transmission	Abnormality between Outdoor and Outdoor	Incorrect Wiring, Breaking Wire, Loose Terminals
0b	Outdoor Unit	Incorrect Outdoor Unit Address Setting	Duplication of Address Setting for Outdoor Units (Sub Units) in Same Refrigerant Cycle System
0C		Incorrect Outdoor Unit Main Unit Setting	Two (or more) Outdoor Units Set as "Main Unit" Exist in Same Refrigerant Cycle System
11	Sensor on Indoor Unit	Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19	Fan Motor	Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Locking
21	Sensor on Outdoor Unit	High Pressure Sensor	Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
22		Outdoor Air Thermistor	
23		Discharge Gas Thermistor on Top of Compressor	
24		Heat Exchanger Liquid Pipe Thermistor	
25		Heat Exchanger Gas Pipe Thermistor	
29		Low Pressure Sensor	

Code	Category	Content of Abnormality	Leading Cause
31	System	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit	Incorrect Capacity Code Setting of Combination Excessive or Insufficient Indoor Unit Total Capacity Code
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. in same Ref. Gr.
36		Incorrect of Indoor Unit Combination	Indoor Unit is Designed for R22
38		Abnormality of Picking up Circuit for Protection in Outdoor Unit	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
39	Compressor	Abnormality Running Current at Constant Speed Compressor	Overcurrent, Blowout Fuse, Current Sensor Failure, Instantaneous Power Failure, Voltage Drop, Abnormal Power Supply
3A	Outdoor Unit	Abnormality of Outdoor Unit Capacity	Outdoor Unit Capacity > 510kBTu/h
3b		Incorrect Setting of Outdoor Unit Models Combination or Voltage	Incorrect Setting of Main and Sub Unit(s) Combination or Voltage
3d		Abnormality Transmission between Main Unit and Sub Unit(s)	Incorrect Wiring, Disconnect Wire, Breaking Wire, PCB Failure
43	Protection Device	Activation of Low Compression Ratio Protection Device	Defective Compression (Failure of Compressor of Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection Device	Overload at Cooling, High Temperature at Heating, Expansion Valve Locking (Loose Connector)
45		Activation of High Pressure Increase Protection Device	Overload Operation (Clogging, Short-Pass), Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)	Insufficient Refrigerant, Refrigerant Piping, Clogging, Expansion Valve Locking at Open Position (Loose Connector)
48		Activation of Inverter Overcurrent Protection Device	Overload Operation, Compressor Failure
51	Sensor	Abnormal Inverter Current Sensor	Current Sensor Failure
53	Inverter	Inverter Error Signal Detection	Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short Circuit)
54		Abnormality of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure
55		Inverter Failure	Inverter PCB Failure
57	Fan Controller	Activation of Fan Controller Protection	Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short Circuit), Instantaneous Overcurrent
5A		Abnormality of Fan Controller Fin Temperature	Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
5b		Activation of Overcurrent Protection	Fan Motor Failure
5C		Abnormality of Fan Controller Sensor	Failure of Current Sensor (Instantaneous Overcurrent, Increase of Fin Temperature, Low Voltage, Earth Fault, Step-Out)
EE	Compressor	Compressor Protection Alarm (It is can not be reset from remote Controller)	This alarm code appears when the following alarms* occurs three times within 6 hours. *02, 07, 08, 39, 43 to 45, 47
b1	Outdoor Unit No. Setting	Incorrect Setting of Unit and Refrigerant Cycle No.	Over 64 Number is Set for Address or Refrigerant Cycle.
b5	Indoor Unit No. Setting	Incorrect Indoor Unit Connection Number Setting	More than 17 Non-Corresponding to Hi-NET Units are Connected to One System.
C1	Switch Box	Incorrect Indoor Unit Connection	2 or more Switch Boxes are connected between outdoor unit and indoor unit.
C2		Incorrect Indoor Unit Connection No. Setting	9 or More Indoor Units Connected to Switch Box
C3		Incorrect Indoor Unit Connection	The indoor units of different refrigerant cycle is connected to Switch Box.

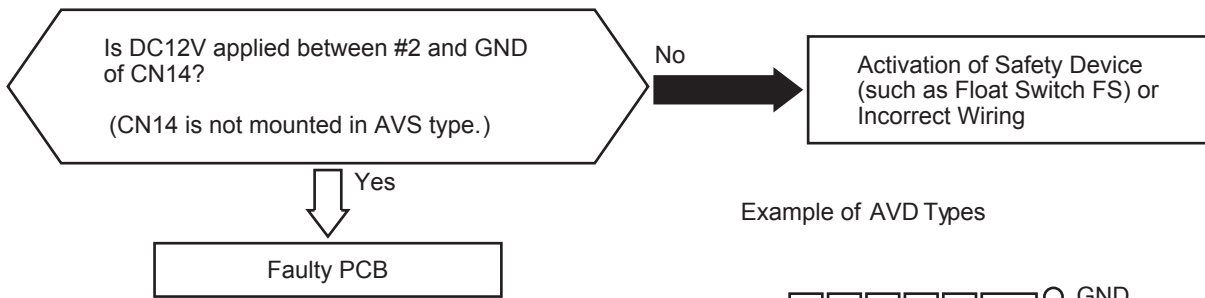
# TROUBLESHOOTING

## 2.2 Troubleshooting by Alarm Code

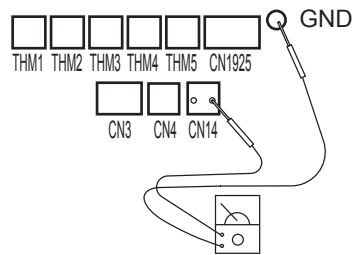
Alarm Code	01	Activation of Protection Device in Indoor Unit
------------	----	--

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the contact between #1 and #2 of CN14 is not closed over 120 seconds during the cooling, fan or heating operation.

PCB1: Control PCB in Outdoor Unit  
 PCB: Indoor Unit PCB

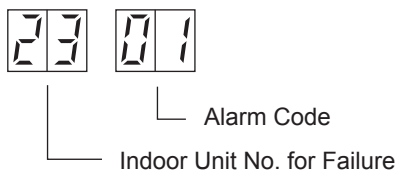


Example of AVD Types



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

<Outdoor Unit PCB1 Display Indication>

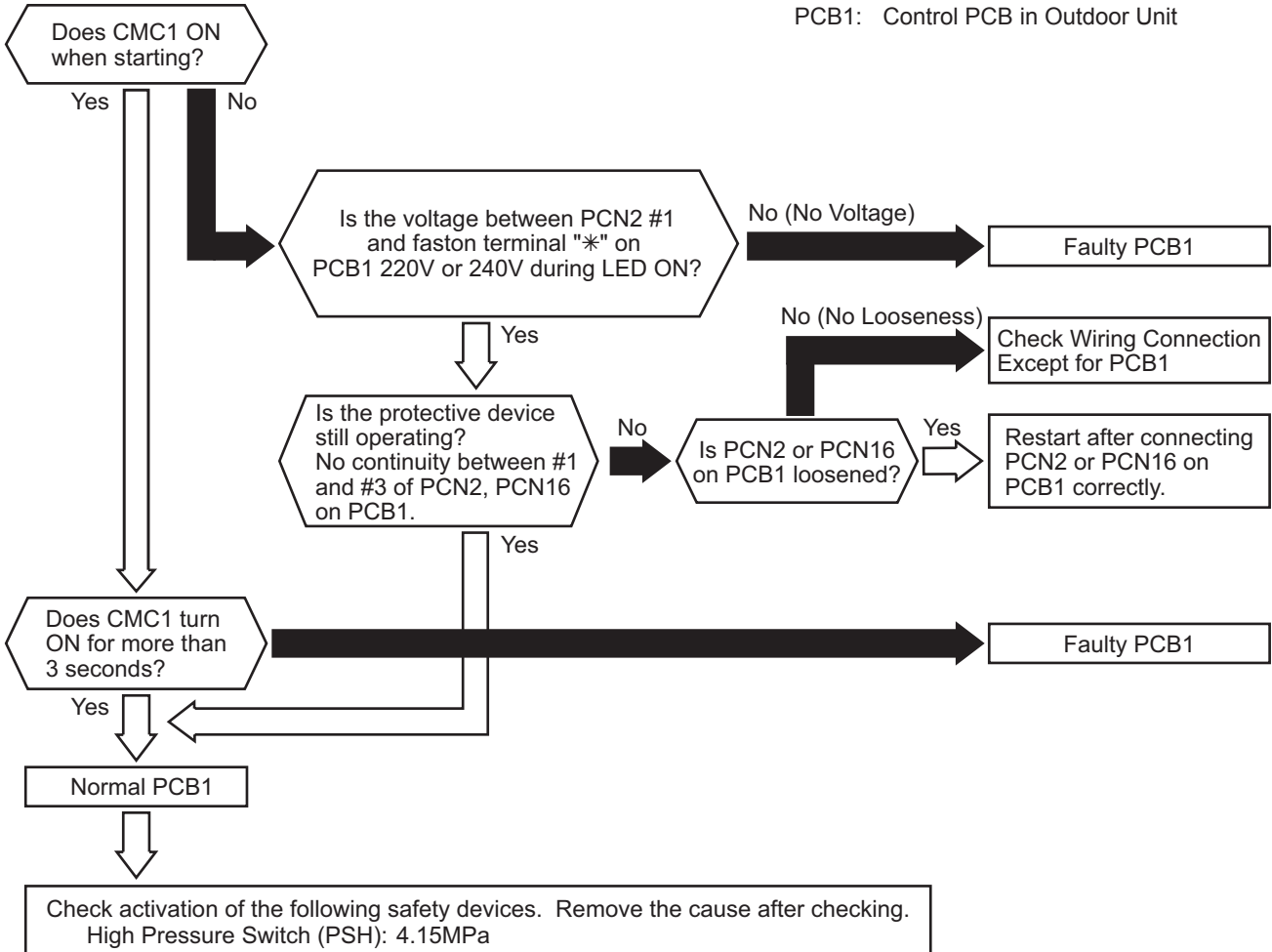


Alarm Code <span style="font-size: 2em; font-family: monospace;">02</span>	Activation of Protection Device in Outdoor Unit
--	---

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

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

PCB1: Control PCB in Outdoor Unit

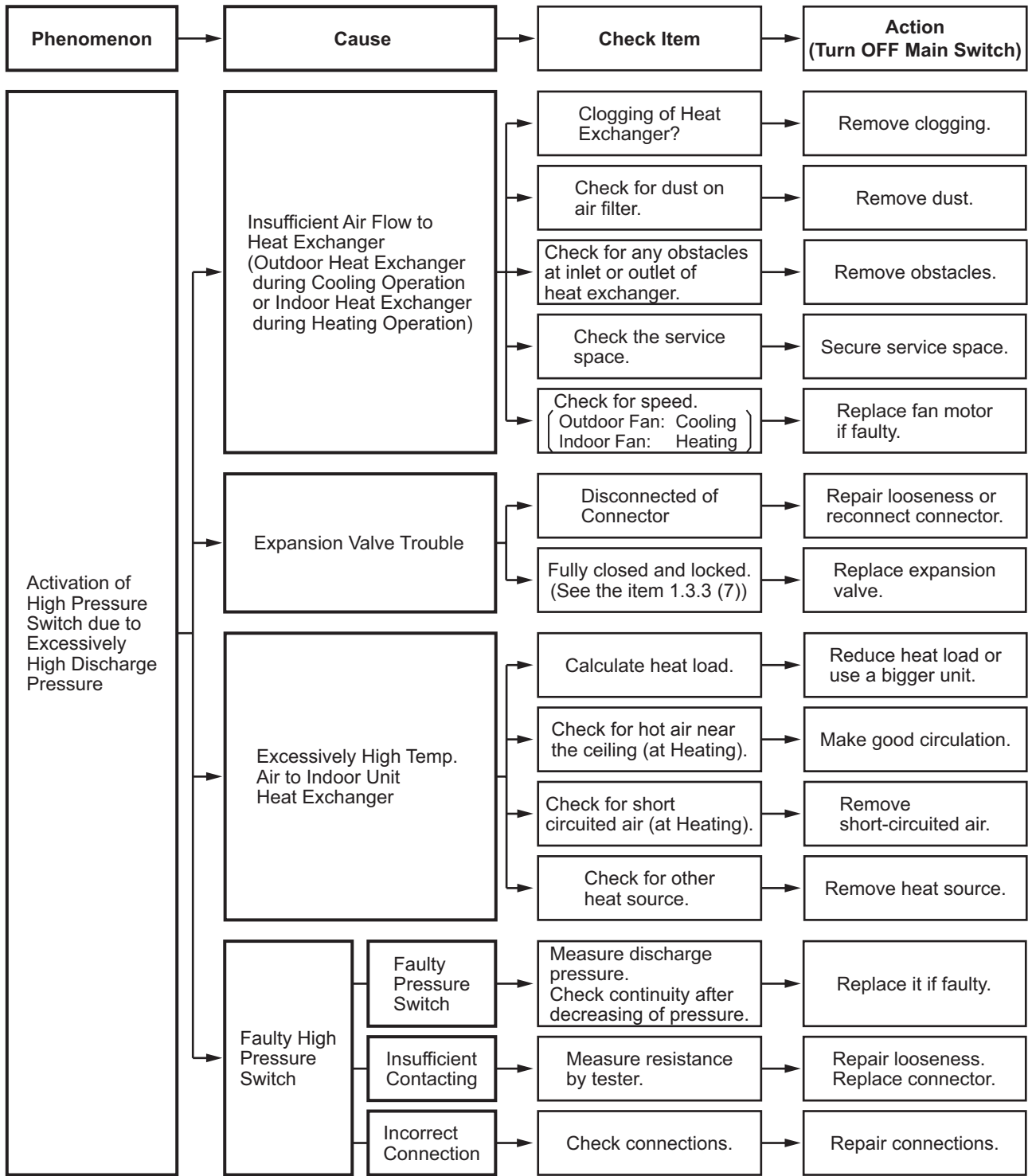


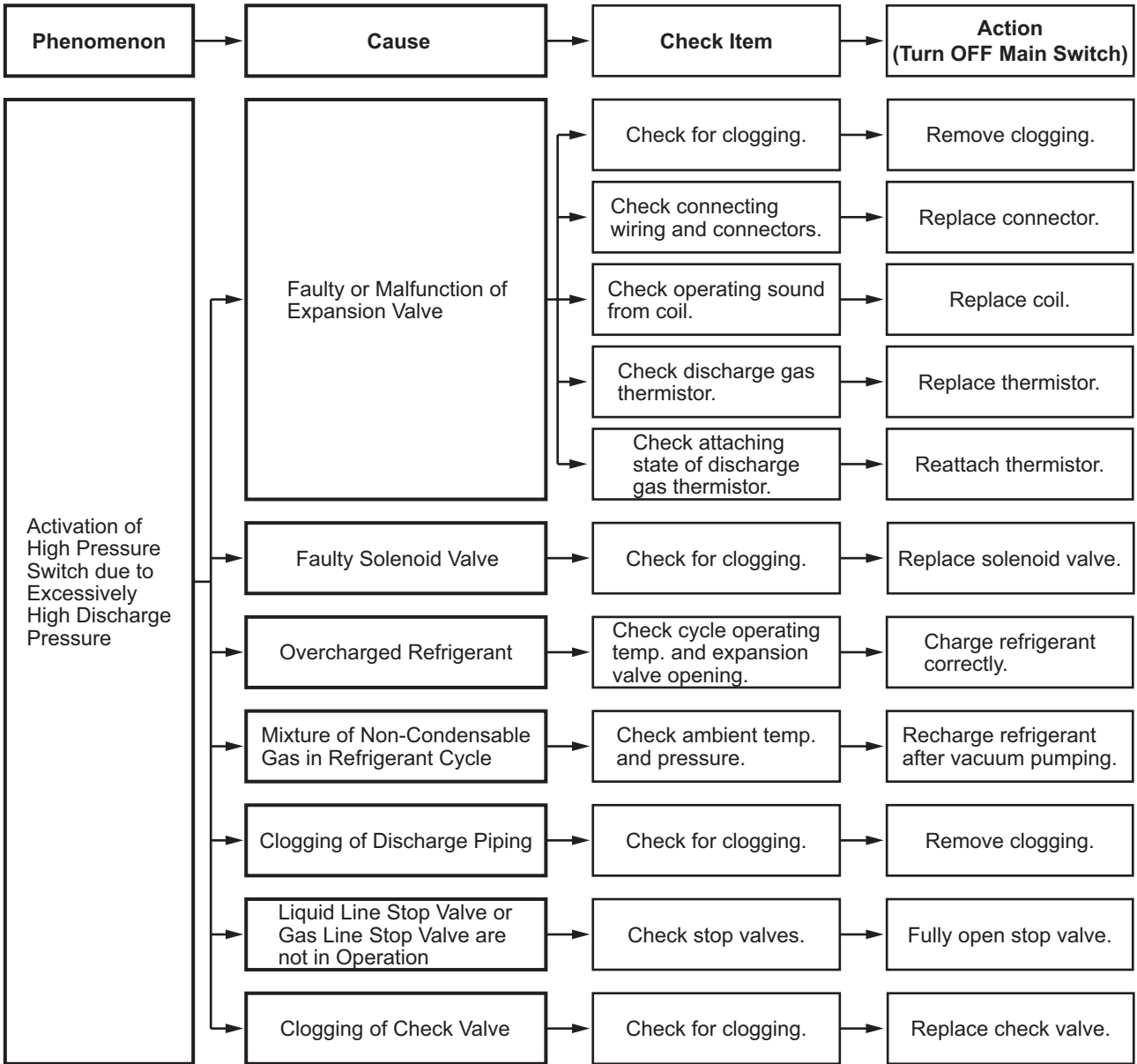
Check Item

Connector for CMC1	Faston Terminal *	N1	Connector for Protection Device
PCN3	380-415V/50Hz 380V/60Hz 220V/60Hz	N1	PCN2 or PCN16

Model	High Pressure Switch (Connector No.)	
	63H1 (PCN2)	63H2 (PCN16)
AVWT-76 to AVWT-114	○	-
AVWT-136 to AVWT-170	○	○

**TROUBLESHOOTING**



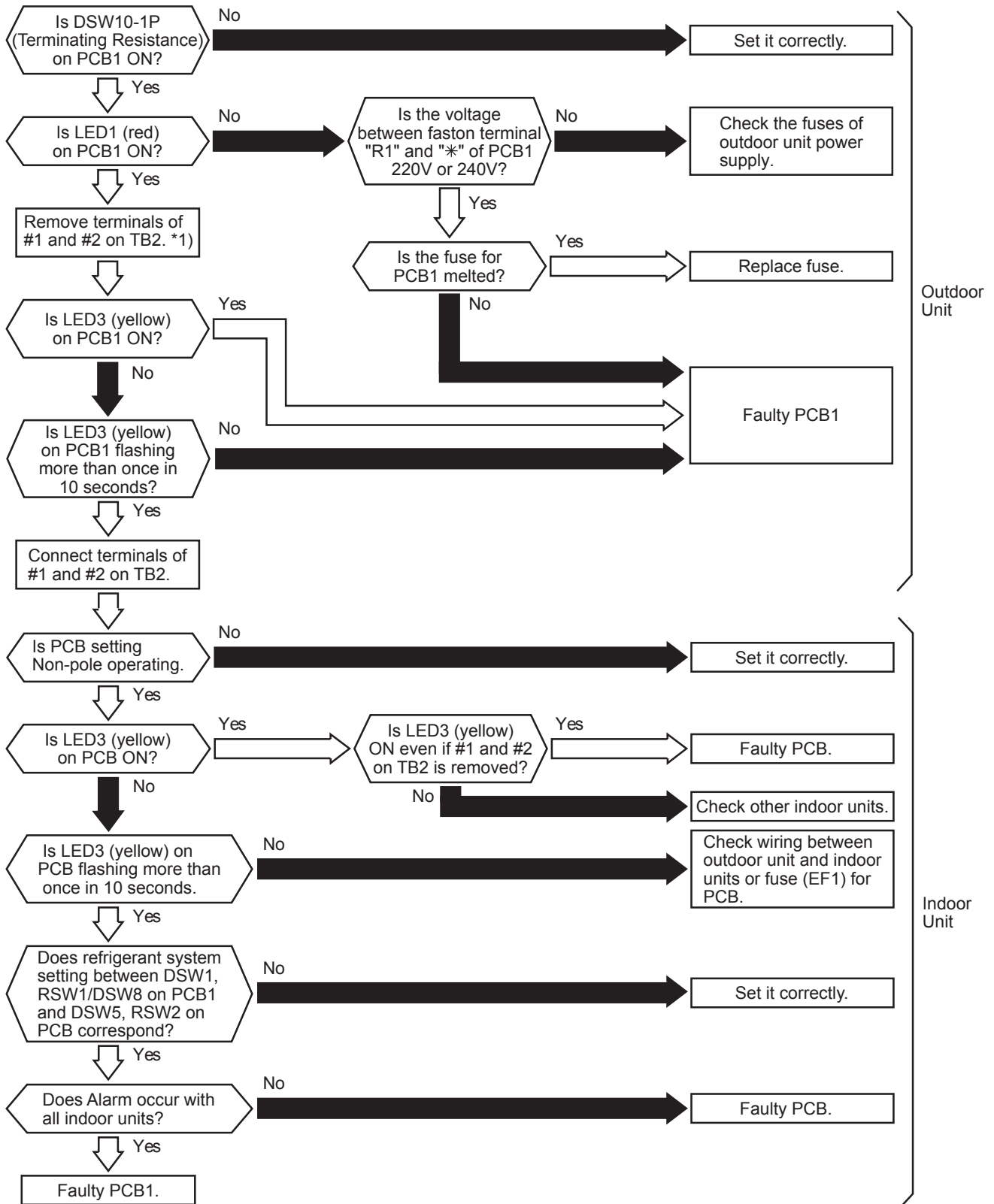


## Heat Pump System

Alarm Code	03	Abnormal Transmitting between Indoor Units and Outdoor Units
------------	----	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
  
- ★ This alarm is indicated when abnormality is maintained for 3 minutes after normal transmitting between indoor units and outdoor unit, and also abnormality is maintained for 30 seconds after the micro-computer is automatically reset.  
The alarm is indicated when the abnormal transmitting is maintained for 30 seconds from starting of the outdoor unit.
- ★ Investigate the cause of overcurrent and take necessary action when fuses are melted or the breakers for the outdoor unit are activated.

PCB1: Control PCB in Outdoor Unit  
PCB: Indoor Unit PCB



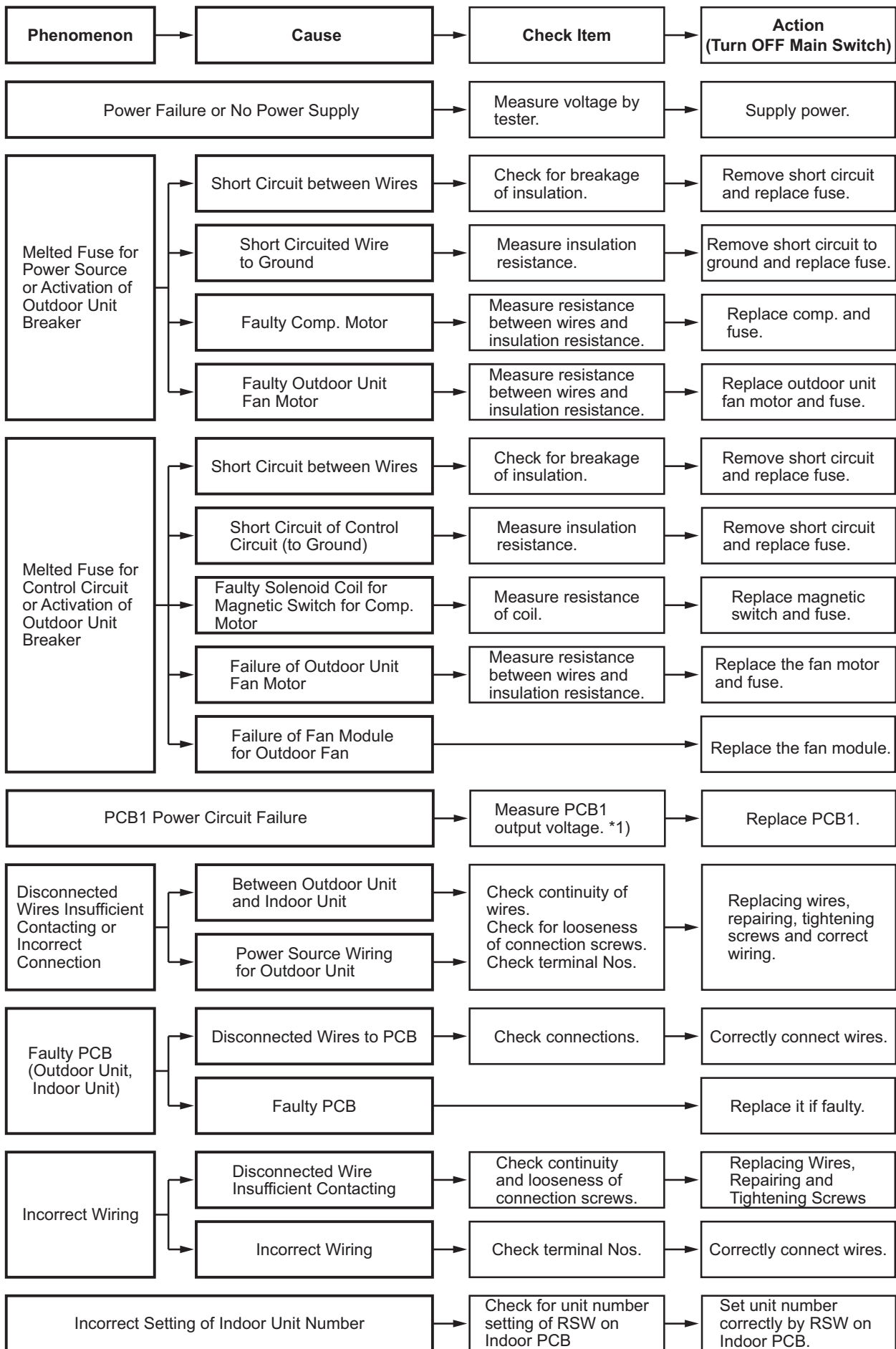
\*1): In case that terminating resistance (DSW10-1P) is OFF when Hi-NET Connection is performed. Set the terminating resistance to ON when #1 and #2 on TB2 is removed. Set the terminating resistance to OFF when #1 and #2 on TB2 is reconnected.

\*Check Item

Power Supply	Faston Terminal
380-415V/50Hz	N1
380V/60Hz	N1
220V/60Hz	S1



# TROUBLESHOOTING



\*1): 12VDC between VCC12 and GND2, 5VDC between VCC05 and GND1, 12VDC between VCC12 and GND1, 15VDC between VCC15 and GND1, 24VDC between VCC24 and GND1, 12VDC between VCC12T and GND1

## Heat Recovery System

Alarm  
Code

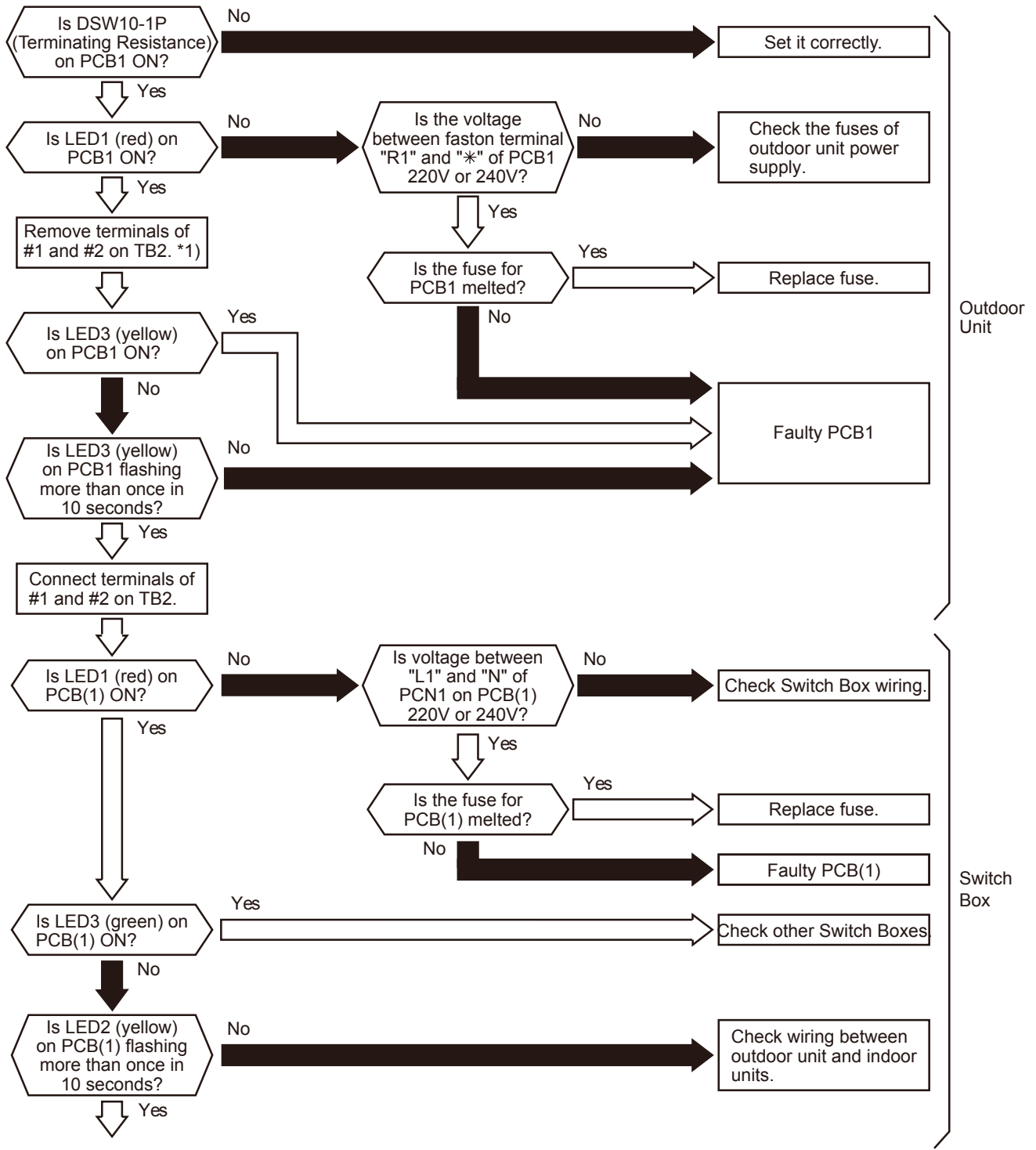
03

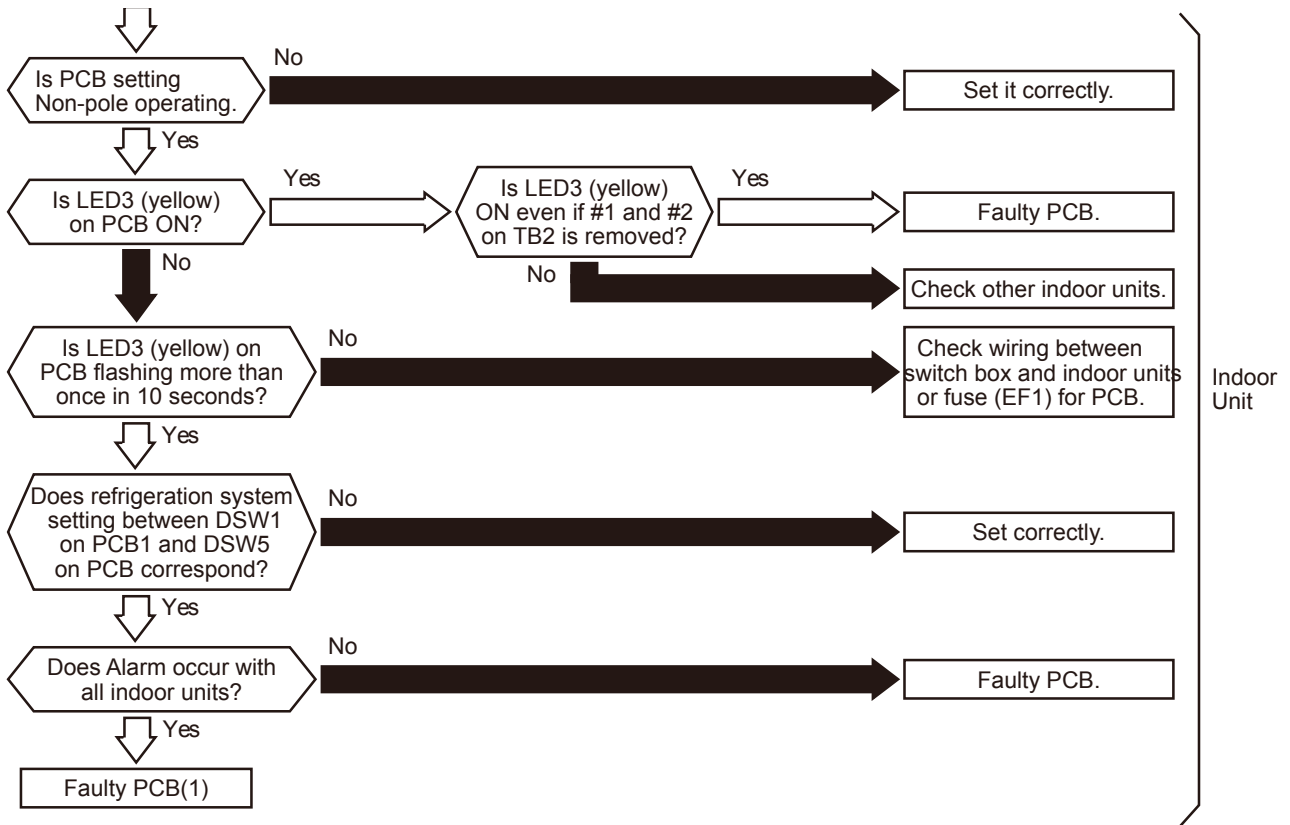
Abnormal Transmitting between Indoor Units and Outdoor Units

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
  
- ★ This alarm is indicated when abnormality is maintained for 3 minutes after normal transmitting between indoor units, switch box and outdoor unit, and also abnormality is maintained for 30 seconds after the micro-computer is automatically reset.  
The alarm is indicated when the abnormal transmitting is maintained for 30 seconds from starting of the outdoor unit.
- ★ Investigate the cause of overcurrent and take necessary action when fuses are melted or the breakers for the outdoor unit are activated.

# TROUBLESHOOTING

PCB1: Control PCB in Outdoor Unit  
 PCB: Indoor Unit PCB  
 PCB(1): Switch box PCB



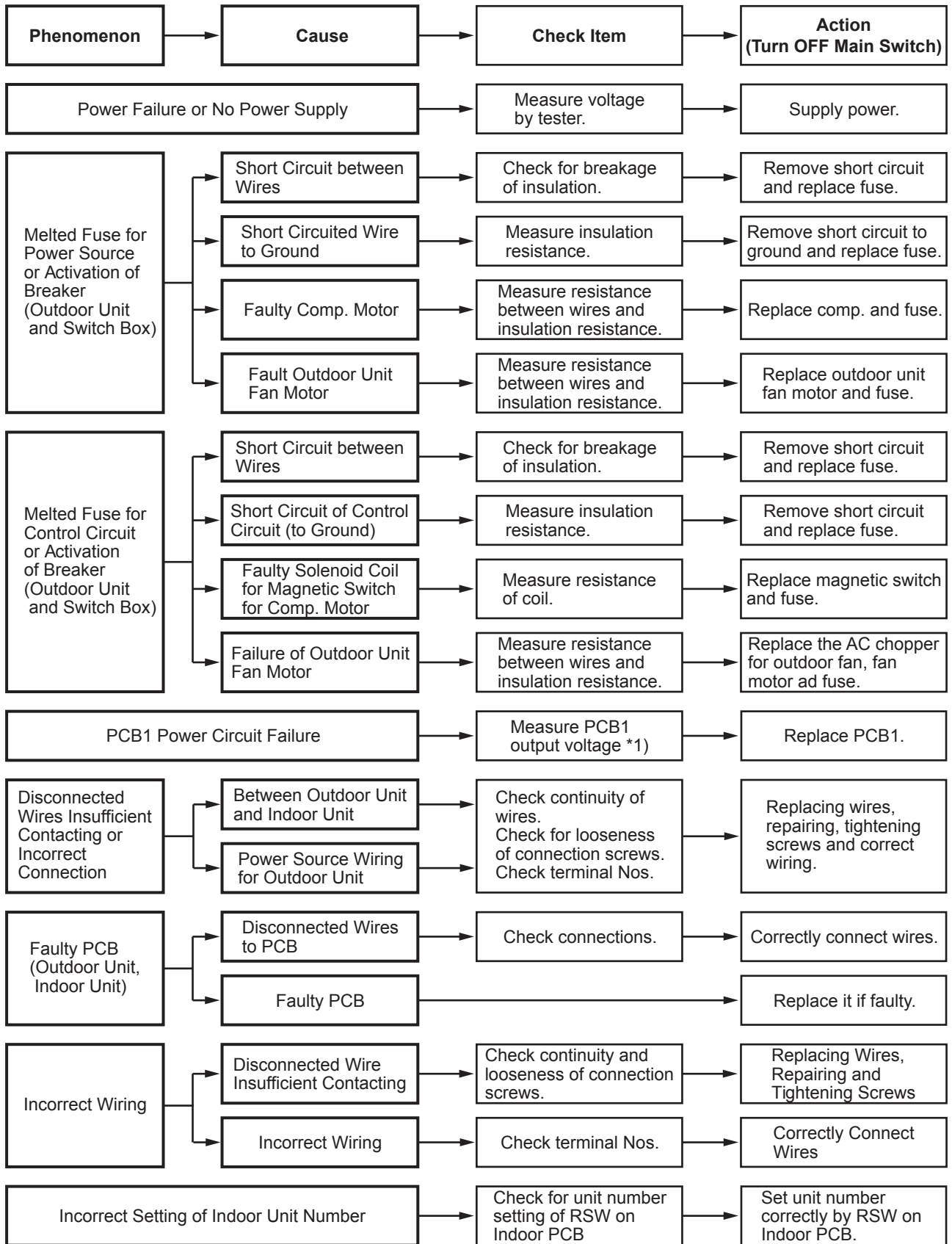


\*1): In case that terminating resistance (DSW10-1P) is OFF when Hi-NETff Connection is performed.  
 Set the terminating resistance to ON when #1 and #2 on TB2 is removed.  
 Set the terminating resistance to OFF when #1 and #2 on TB2 is reconnected.

\* Check Item

Power Supply	Faston Terminal
380-415V/50Hz	N1
380V/60Hz	N1
220V/60Hz	S1

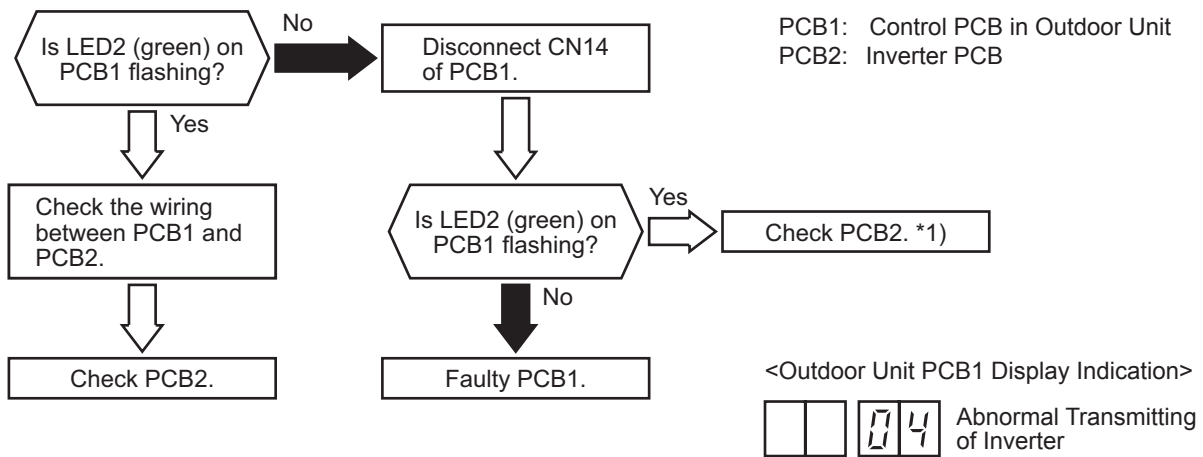
# TROUBLESHOOTING



\*1): 12VDC between VCC12 and GND2, 5VDC between VCC05 and GND1, 12VDC between VCC12 and GND1, 15VDC between VCC15 and GND1, 24VDC between VCC24 and GND1, 12VDC between VCC12T and GND1

Alarm Code <span style="font-size: 2em; font-family: monospace;">04</span>	Abnormal Transmitting between Inverter PCB and Outdoor PCB
--	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when abnormality is maintained for 30 seconds after normal transmitting between the outdoor unit PCB1 and PCB2, and also abnormality is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is indicated when the abnormal transmitting is maintained for 30 seconds from starting of the outdoor unit.

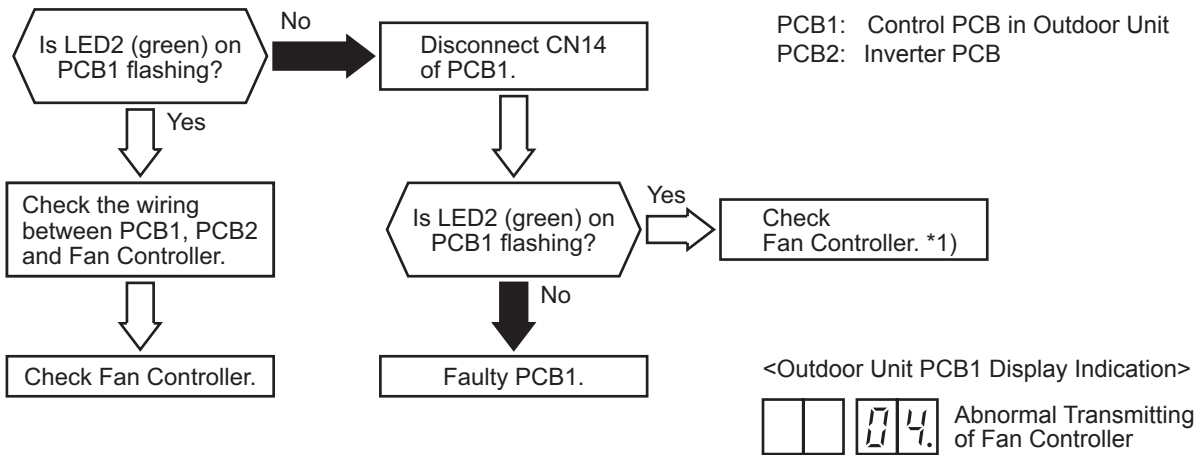


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Disconnected Wires, Insufficient Contacting or Incorrect Connection	Between PCB1 and PCB2	Check continuity of wires. Check for looseness of connection screws. Check connection No.	Replacing wires, repairing, tightening screws and incorrect wiring.
	Power Source Wiring for Outdoor Unit		
Faulty PCB (PCB1 and PCB2)	Disconnected Wires to PCB	Check connections.	Repair wiring connections.
	Faulty PCB		Replace PCB if faulty.
Faulty Electrical Components (Power Fuse, Resistance)	Melted Power Fuse	Check conductivity of power fuse, power transistor, diode module.	Replace power fuse, power transistor, and diode module.
	Disconnected Incoming Current Limit Resistance	Check resistance of incoming current limit resistance.	Replace incoming current limit resistance.
Incorrect Wiring	Disconnected Wires Insufficient Contacting	Check continuity. Check for looseness of connection screws.	Replacing Wires, Repairing and Tightening Screws
	Incorrect Wiring	Check connection Nos.	Correctly Connect Wires

**TROUBLESHOOTING**

Alarm Code <span style="font-size: 2em; font-family: monospace;">04.</span>	<b>Abnormal Transmitting between Fan Controller and Outdoor PCB</b>
---	---

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when abnormality is maintained for 30 seconds after normal transmitting between the outdoor unit PCB1 and fan controller, and also abnormality is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is indicated when the abnormal transmitting is maintained for 30 seconds from starting of the outdoor unit.



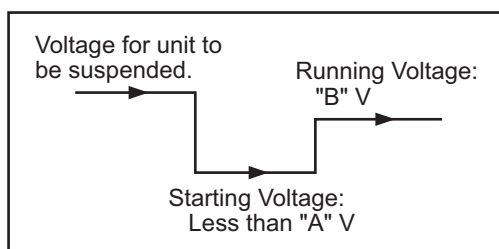
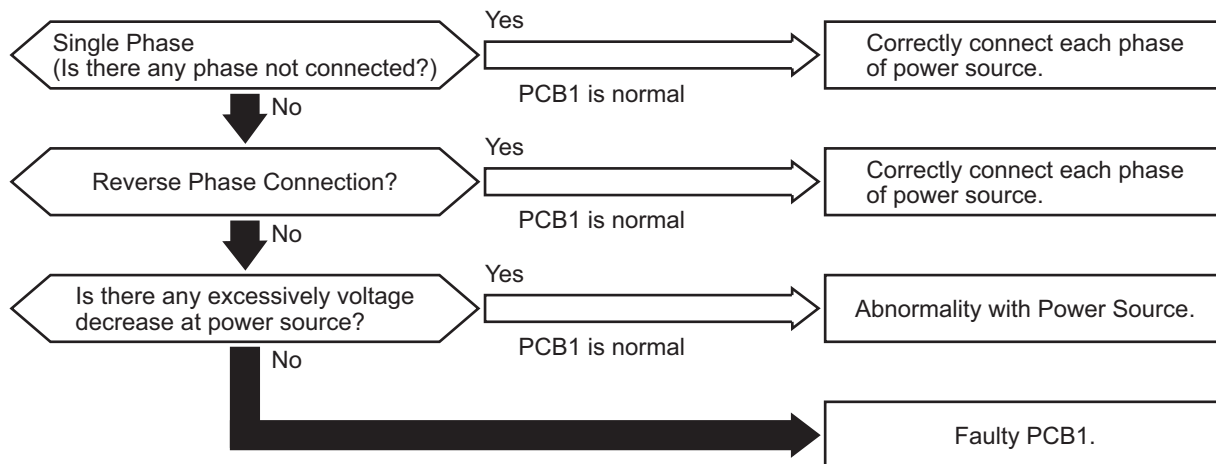
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Disconnected Wires, Insufficient Contacting or Incorrect Connection	Between PCB1, PCB2 and Fan Controller	Check continuity of wires. Check for looseness of connection screws. Check connection No.	Replacing wires, repairing, tightening screws and incorrect wiring.
	Power Source Wiring for Outdoor Unit		
Faulty PCB (PCB1 and PCB2) Fan Controller	Disconnected Wires to PCB	Check connections.	Repair wiring connections.
	Faulty PCB		Replace PCB if faulty.
	Melted Fuse (Fan Controller)	Check conductivity of fuse.	Replace fan controller. *1)
Faulty Electrical Components (Power Fuse, Resistance)	Melted Power Fuse	Check conductivity of power fuse, power transistor, diode module.	Replace power fuse, power transistor, and diode module.
	Disconnected Incoming Current Limit Resistance	Check resistance of incoming current limit resistance.	Replace incoming current limit resistance.
Incorrect Wiring	Disconnected Wires Insufficient Contacting	Check continuity. Check for looseness of connection screws.	Replacing Wires, Repairing and Tightening Screws
	Incorrect Wiring	Check connection Nos.	Correctly Connect Wires

\*1): The fan controller may be damaged if the fuse of fan controller is melted. In that case, replace the fan controller.

Alarm Code <span style="font-size: 2em; font-weight: bold;">05</span>	<b>Abnormality Power Source Phase</b>
---	---------------------------------------

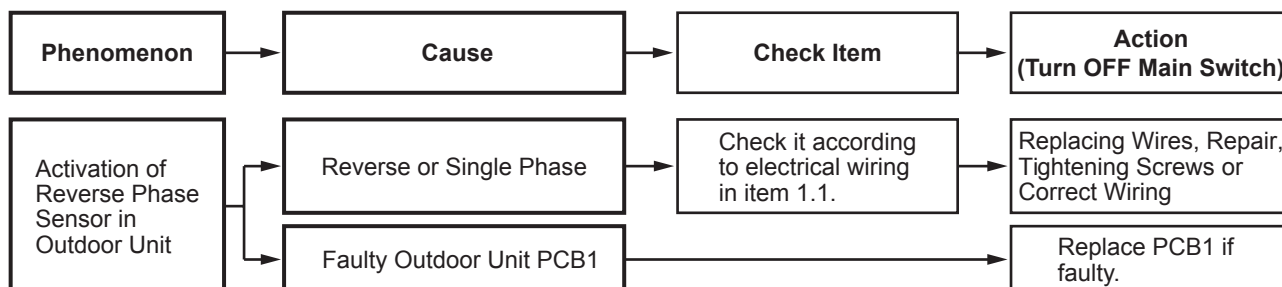
- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the main power source phase is reversely connected or one phase is not connected.

PCB1: Control PCB in Outdoor Unit



Check Item

Power Supply	"A"	"B"
380-415V/50Hz	323	342 to 456
380V/60Hz	323	342 to 418
220V/60Hz	187	198 to 242





# TROUBLESHOOTING

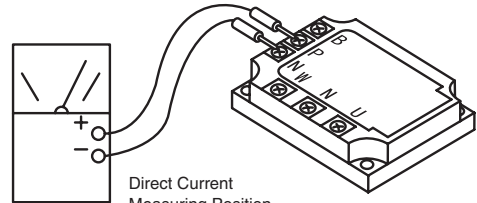
Alarm Code	06	Abnormal Inverter Voltage
------------	----	---------------------------

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

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

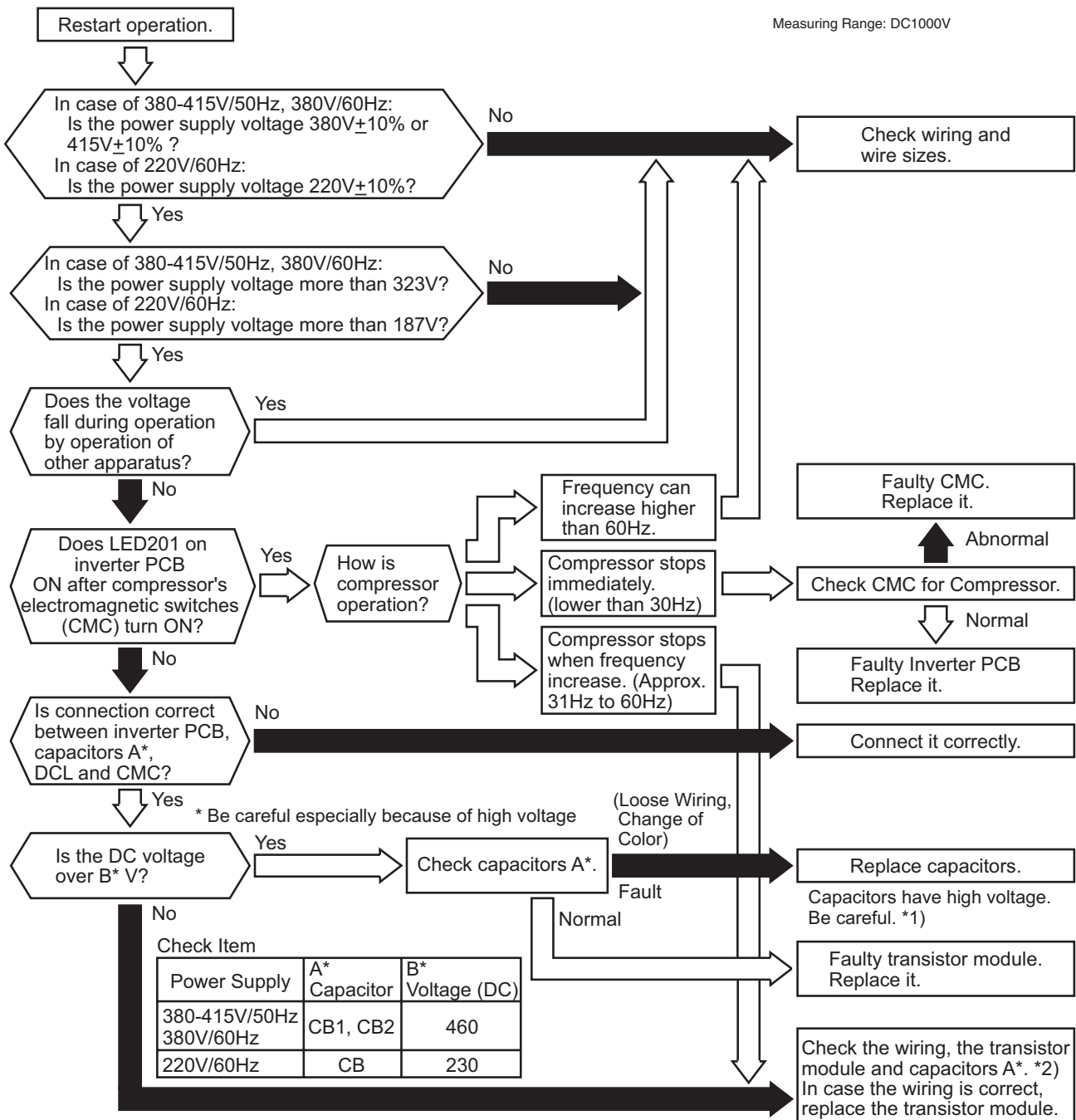
PCB1: Control PCB in Outdoor Unit  
PCB2: Inverter PCB

<Outdoor Unit PCB1 Display Indication>



Direct Current Measuring Position

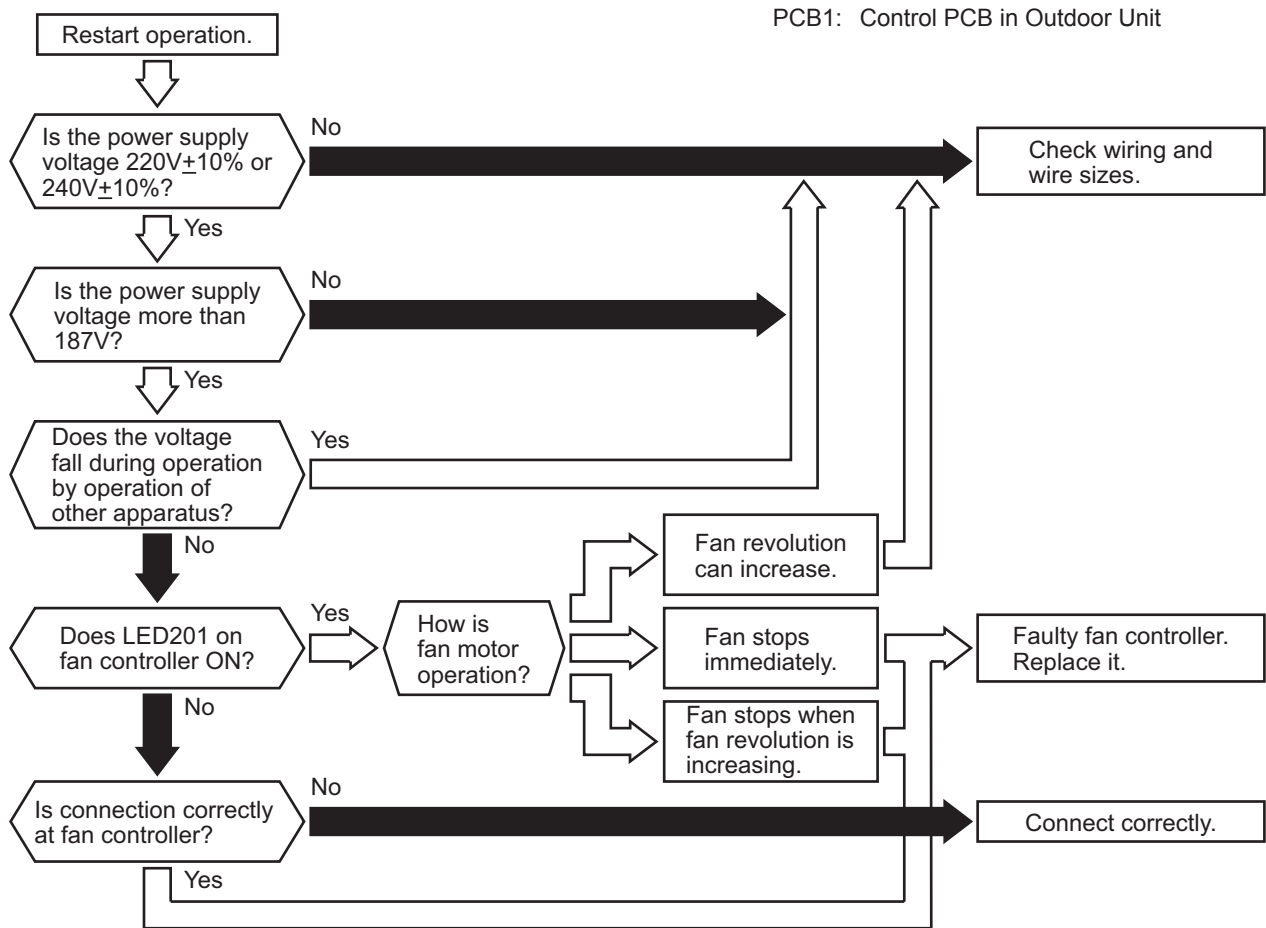
Measuring Range: DC1000V



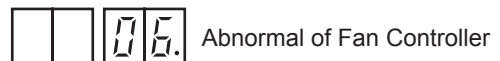
\*1): If capacitor has high voltage, perform the high voltage discharge work according to the item 3.3.  
\*2): Checking procedures of transistor module is indicated in the item 3.3.

Alarm Code	06.	Abnormal Fan Controller Voltage
------------	-----	---------------------------------

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when voltage between terminal “R” and “S” of Fan Controller is insufficient and its occurrence is three times in 30 minutes. In the case that the occurrence is smaller than 2 times, retry is performed.



<Outdoor Unit PCB1 Display Indication>



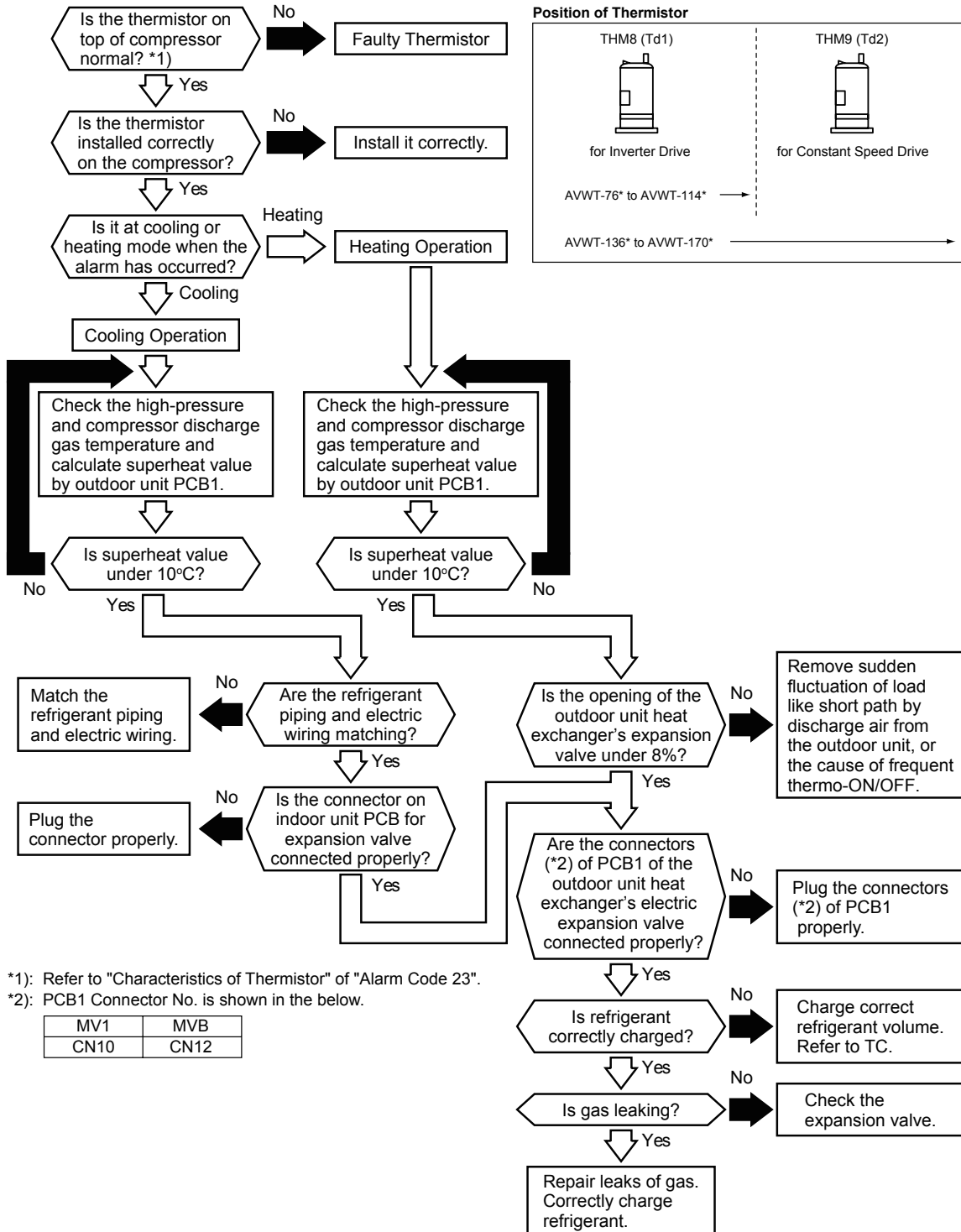
**NOTES:**

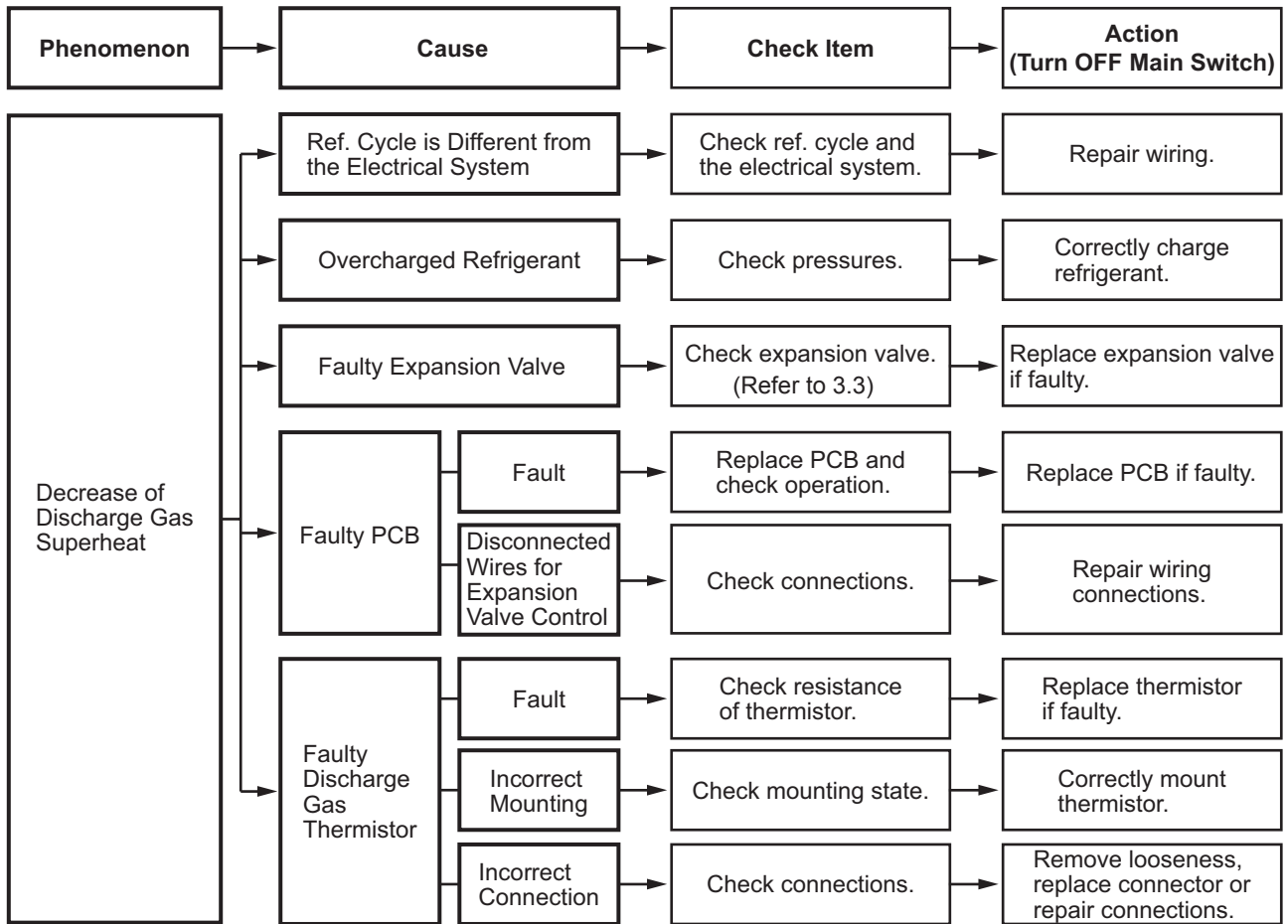
- If fan controller has high voltage, perform the high voltage discharge work according to the item 3.3.
- Check the wiring connection according to the checking procedure of fan controller indicated in the item 3.3.

Alarm Code **07** Decrease in Discharge Gas Superheat

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ In the case that the discharge gas superheat less than 10 deg. at the top of the compressor is maintained for 30 minutes, retry operation is performed. However, when the alarm occurs twice within two hours, this alarm code is indicated.

PCB1: Control PCB in Outdoor Unit



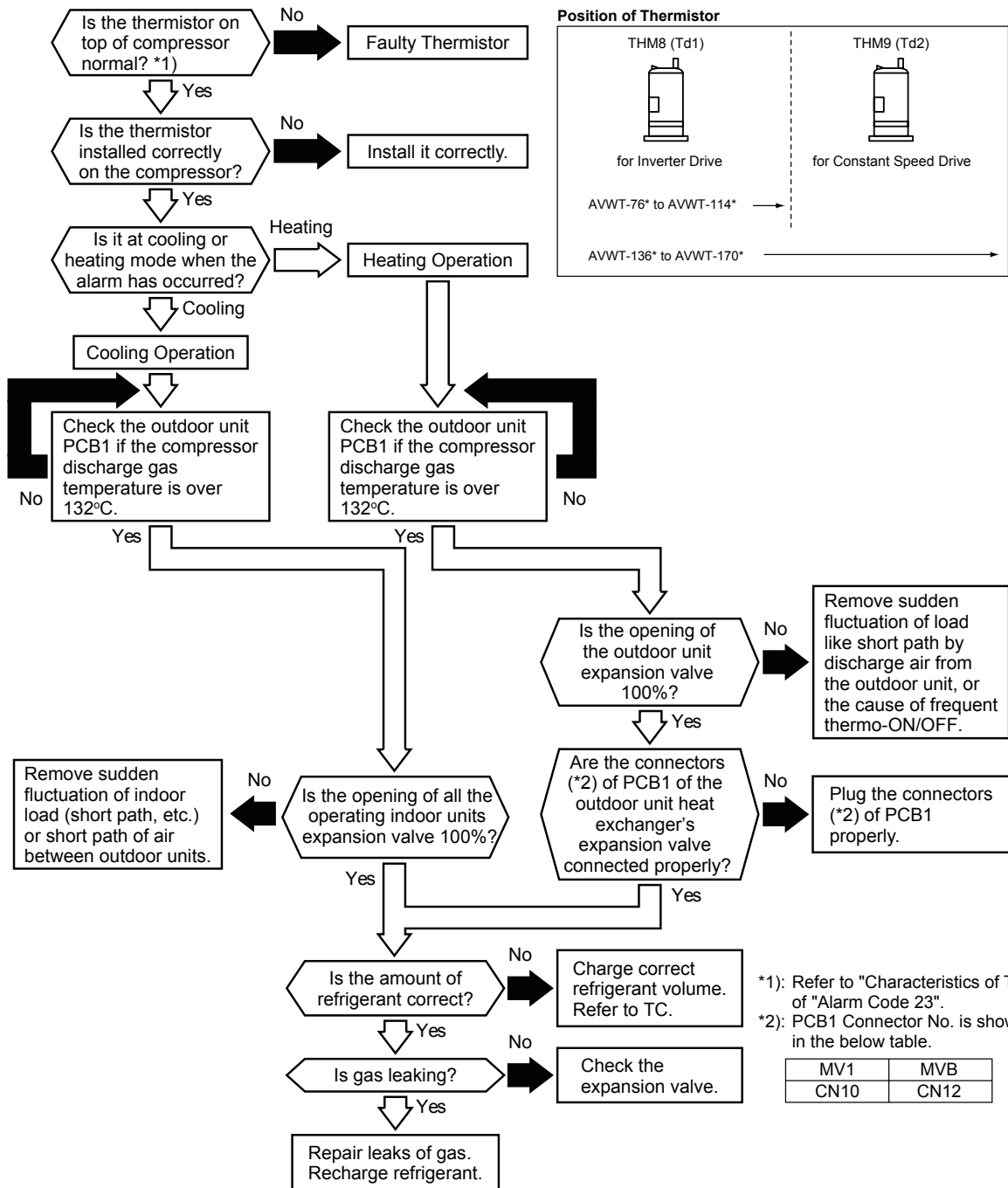


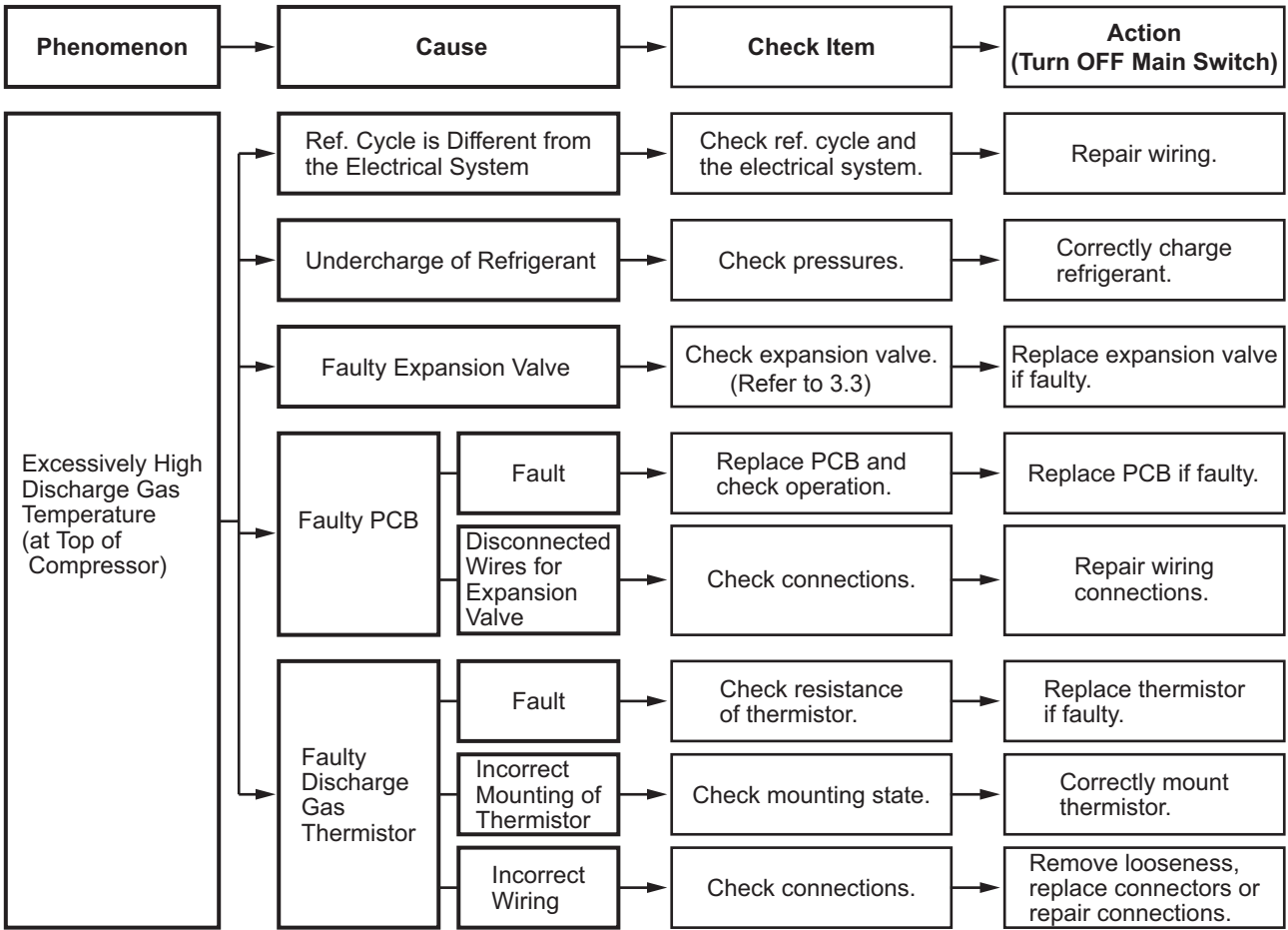
# TROUBLESHOOTING

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

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the following conditions occurs three times within one hour;  
 (1) The temperature of the thermistor on the top of the compressor is maintained higher than 132°C for 10 minutes, or (2) The temperature of the thermistor on the top of the compressor is maintained higher than 140°C for 5 seconds.

PCB1: Control PCB in Outdoor Unit



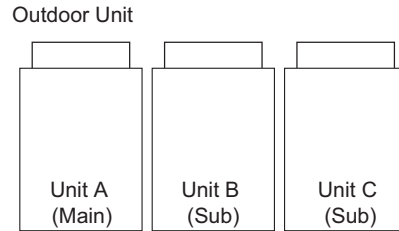
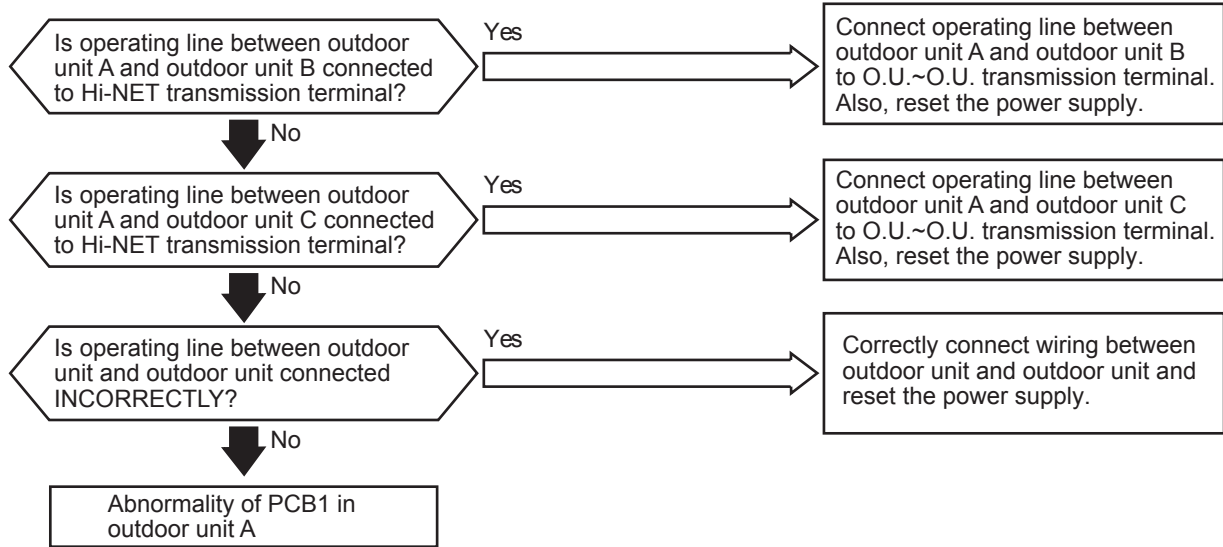


# TROUBLESHOOTING

Alarm Code	09	<b>Abnormality Transmitting between Outdoor Units</b>
------------	----	---

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

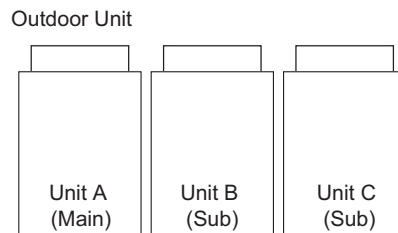
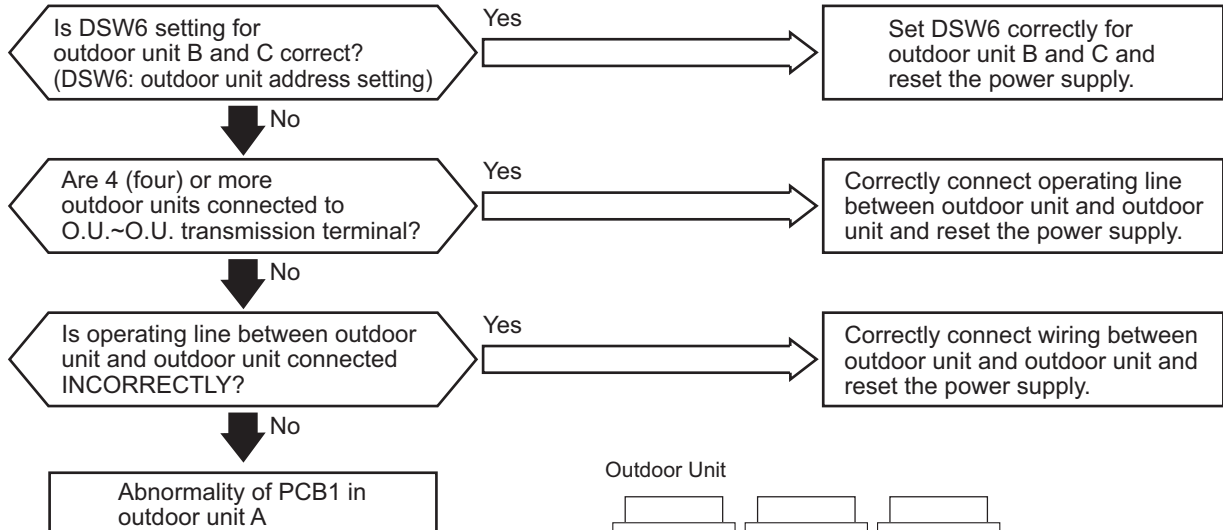
PCB1: Control PCB in Outdoor Unit  
O.U.: Outdoor Unit



Alarm Code	06	<b>Incorrect Outdoor Unit Address Setting</b>
------------	----	---

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

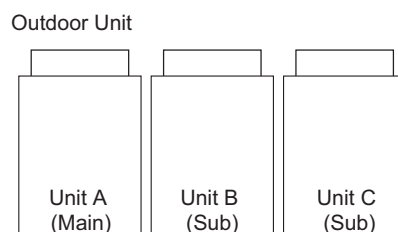
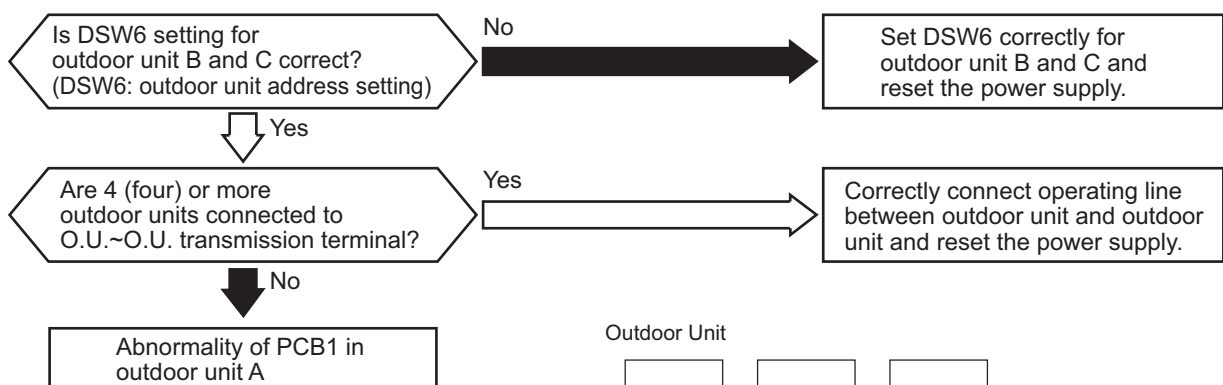
PCB1: Control PCB in Outdoor Unit  
O.U.: Outdoor Unit



Alarm Code	07	<b>Incorrect Outdoor Main Unit Setting</b>
------------	----	--

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

PCB1: Control PCB in Outdoor Unit  
O.U.: Outdoor Unit



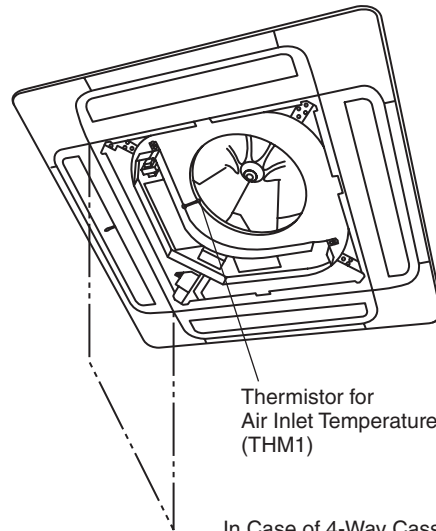
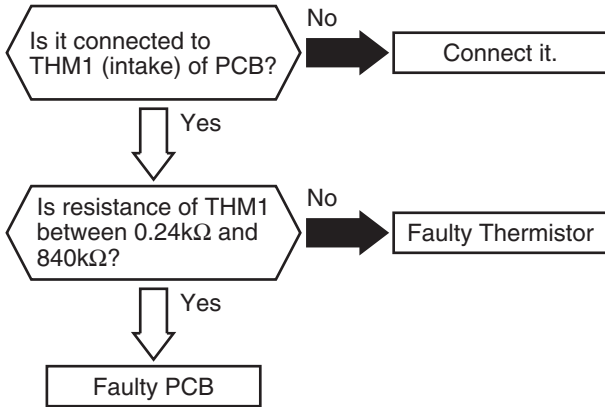


# TROUBLESHOOTING

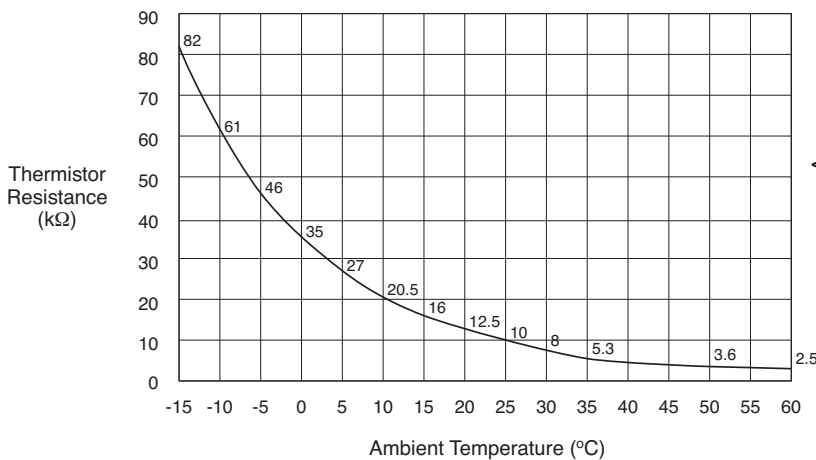
Alarm Code	11	Abnormality of Thermistor for Indoor Unit Inlet Air Temperature (Air Inlet Thermistor)
------------	----	---

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling or heating operation. The system is automatically restarted when the fault is removed.

PCB1: Control PCB in Outdoor Unit  
PCB: Indoor Unit PCB



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



<Outdoor Unit PCB1 Display Indication>  
(Alarm Code 11~19)



Alarm Code (11~19)  
Indoor Unit No. for Failure

**NOTE:**

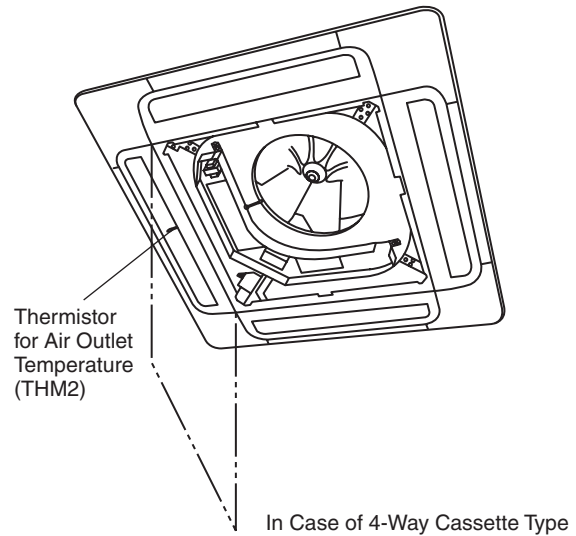
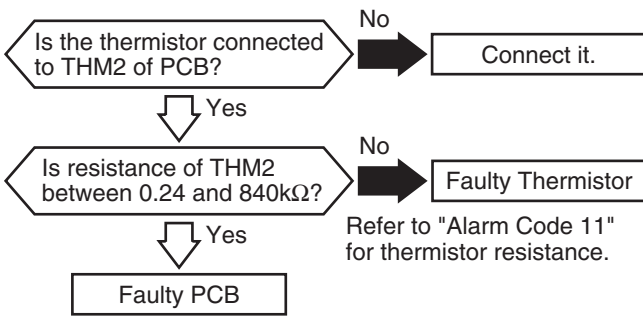
This data is applicable to the following thermistors;

1. Indoor Unit Discharge Air Temperature, 2. Indoor Unit Intake Air Temperature, 3. Indoor Unit Liquid Piping Temperature, 4. Indoor Unit Gas Piping Temperature, 5. Outdoor Air Temperature, 6. Outdoor Unit Liquid Piping Temperature, 7. Outdoor Unit Gas Piping Temperature

Alarm Code	12	<b>Abnormality of Thermistor for Indoor Unit Discharge Air Temperature (Air Outlet Thermistor)</b>
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- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
  
- ★ This alarm is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling or heating operation. The system is automatically restarted when the fault is removed.

PCB1: Control PCB in Outdoor Unit  
 PCB: Indoor Unit PCB



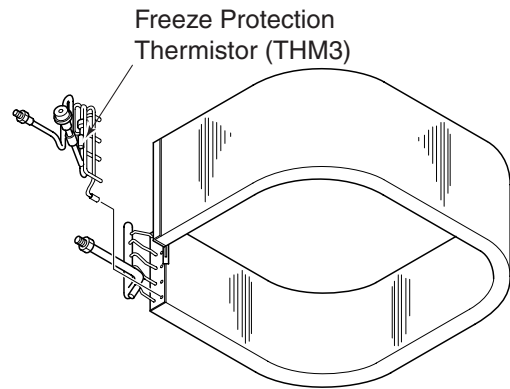
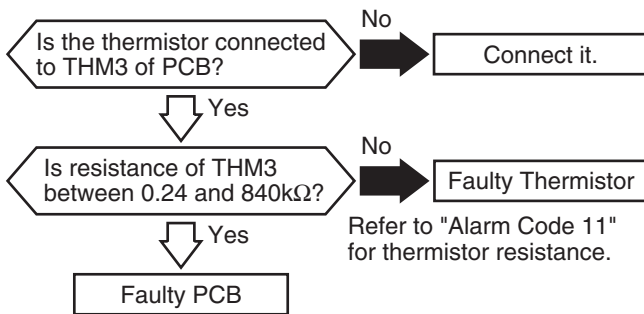
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Air Outlet Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Connect wiring correctly.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.

# TROUBLESHOOTING

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

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling operation or heating operation. The system is automatically restarted when the fault is removed.

PCB1: Control PCB in Outdoor Unit  
 PCB: Indoor Unit PCB



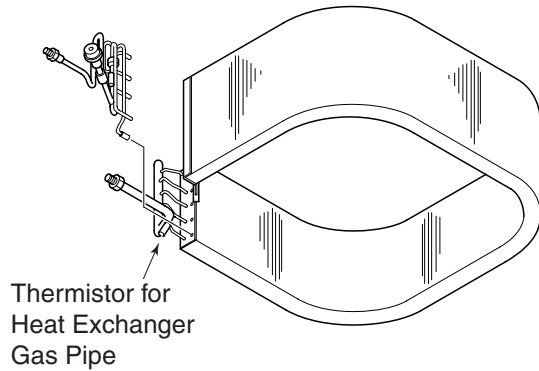
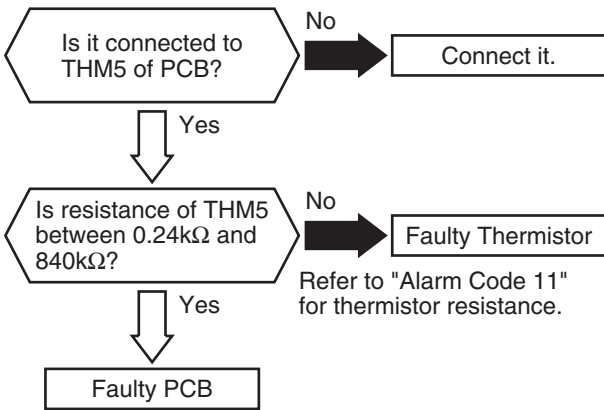
In Case of 4-Way Cassette Type

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

Alarm Code <b>14</b>	<b>Abnormality of Thermistor for Indoor Unit Heat Exchanger Gas Refrigerant Pipe Temperature (Gas Piping Thermistor)</b>
----------------------	--

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling or heating operation. The system is automatically restarted when the fault is removed.

PCB1: Control PCB in Outdoor Unit  
PCB: Indoor Unit PCB



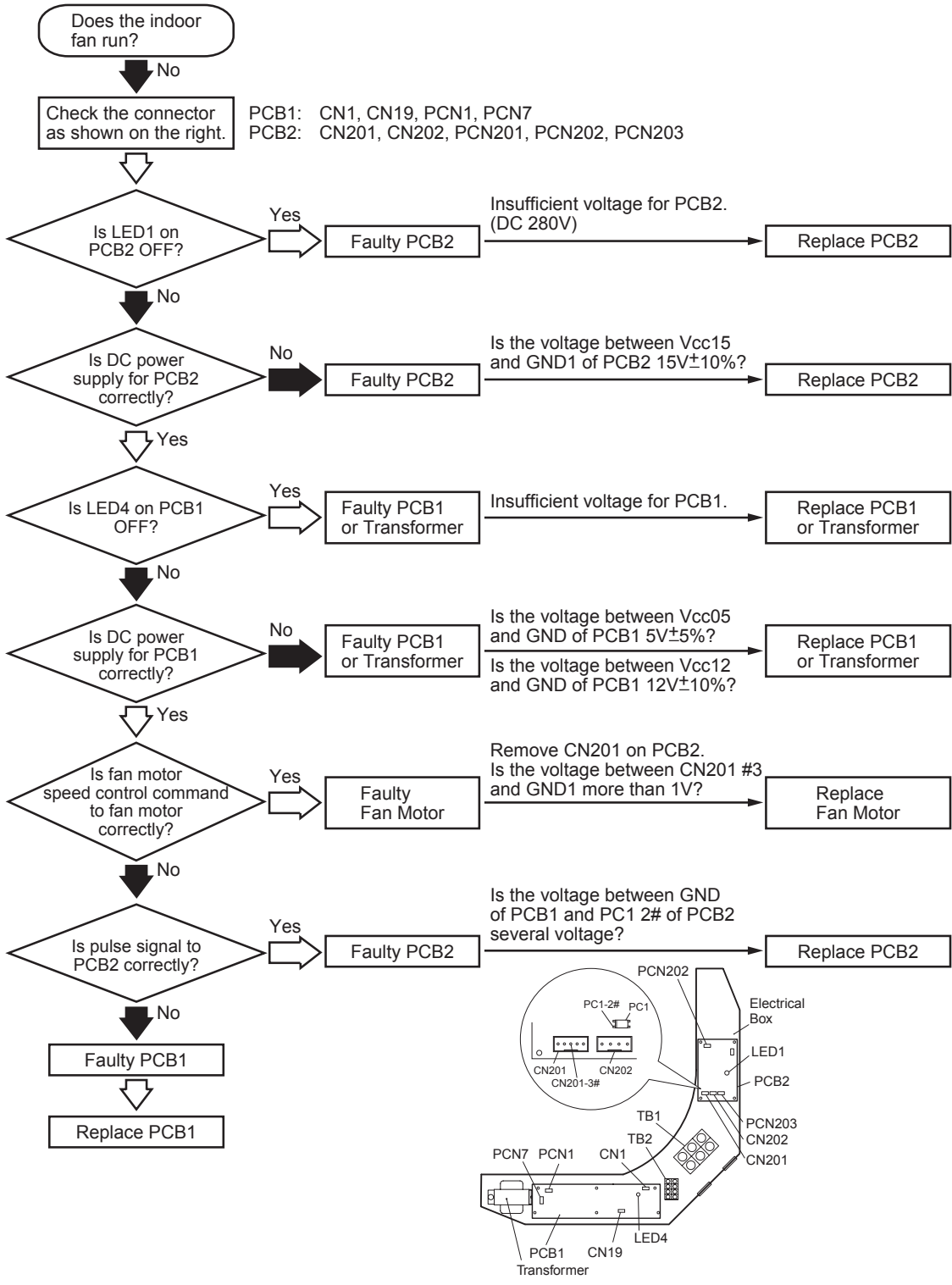
In Case of 4-Way Cassette Type

Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Gas Pipe Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB.	Connect wiring correctly.
Faulty PCB		Replace PCB and check operation.	Replace PCB if faulty.

# TROUBLESHOOTING

Alarm Code	19	Activation of Protection Device for Indoor Fan Motor (AVC-Model)
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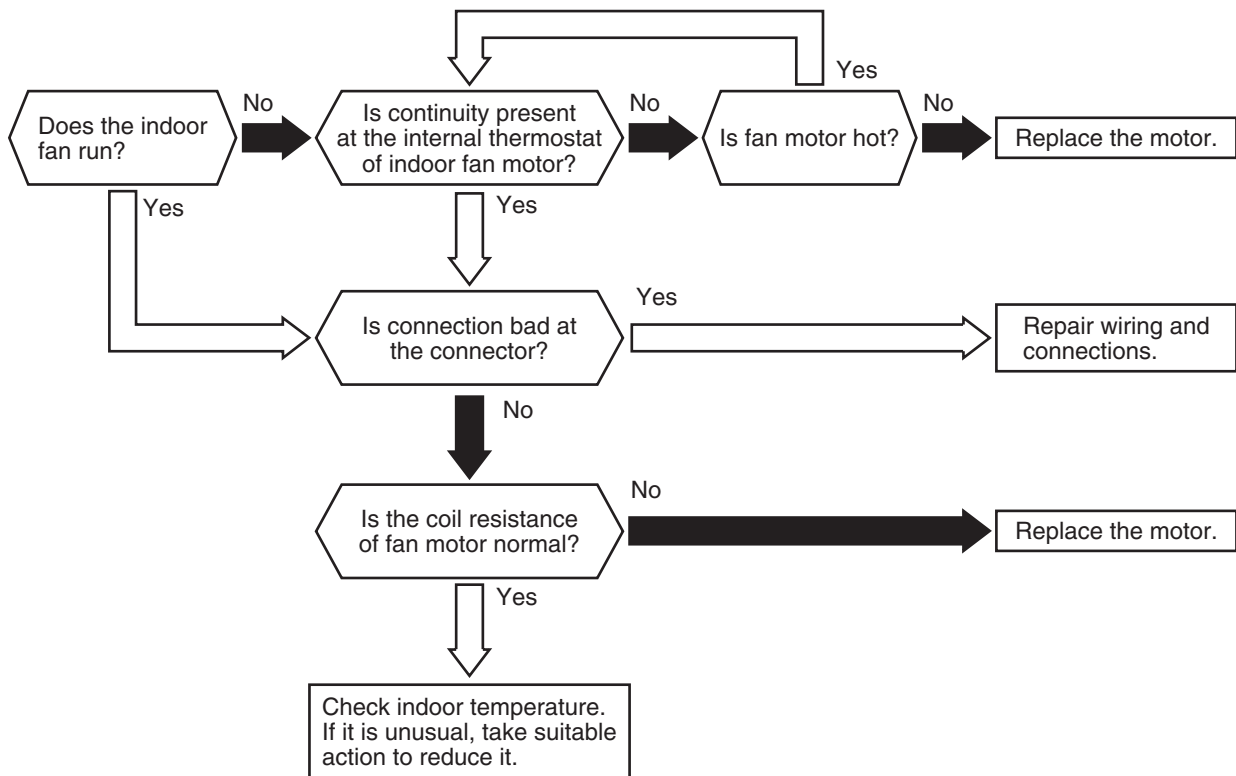
- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB.
- ★ This alarm is indicated when the following conditions occurs three times in 30 minutes.
  - \* Indoor fan rotates less than 70rpm for 5 seconds during operation.
- ★ Check to ensure that power is OFF before checking the connector connections. If not, PCB and fan motor may be damaged.



Alarm Code	19	<b>Activation of Protection Device for Indoor Fan Motor (except AVC Model)</b>
------------	----	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and alarm code is indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the temperature of the internal thermostat for the indoor fan motor is higher than 130°C.

PCB1: Control PCB in Outdoor Unit



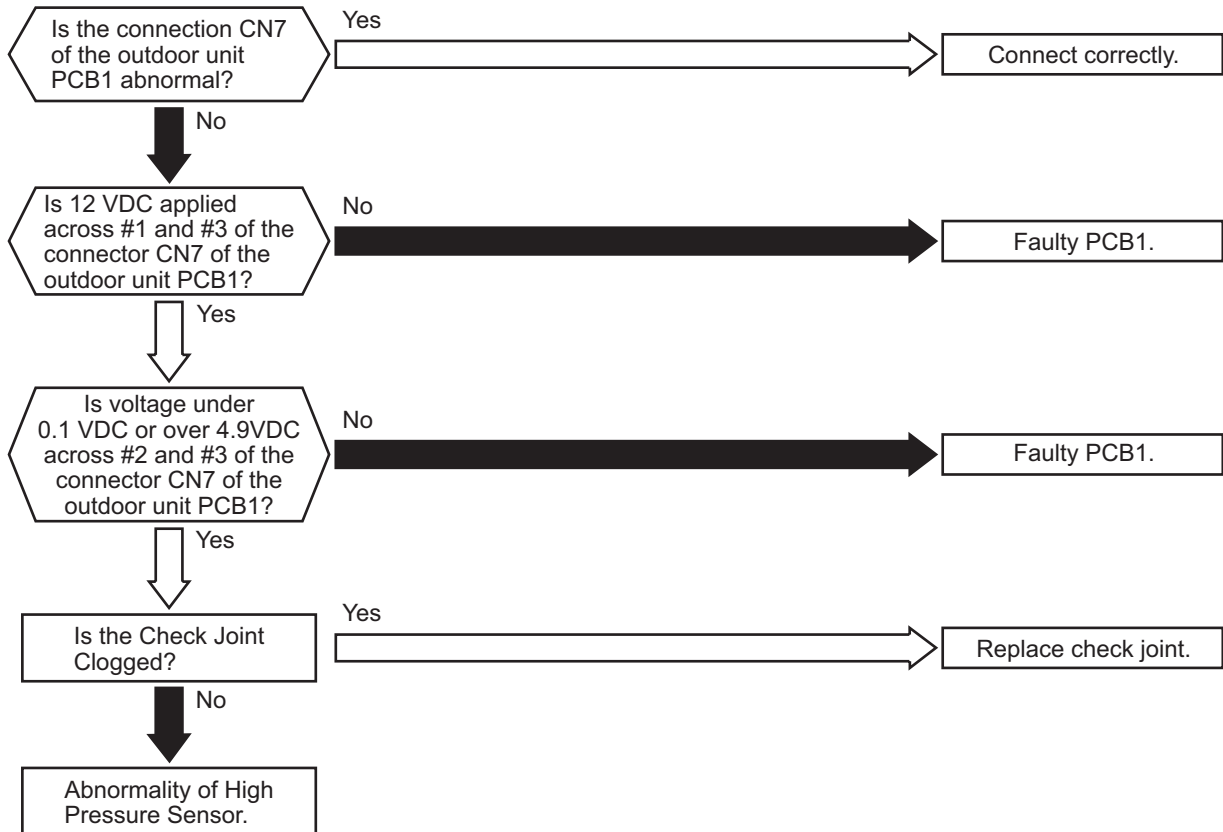
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)	
Activation of Internal Thermostat for Indoor Unit Fan Motor	Faulty Indoor Unit Fan Motor	Measure coil resistance and insulation resistance.	Replace motor if faulty.	
	Faulty Internal Thermostat	Fault	Check continuity after fan motor temperature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

# TROUBLESHOOTING

Alarm Code	21	Abnormality of High Pressure Sensor for Outdoor Unit
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- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the pressure sensor voltage decreases lower than 0.1V or increases higher than 4.9V during running.

PCB1: Control PCB in Outdoor Unit

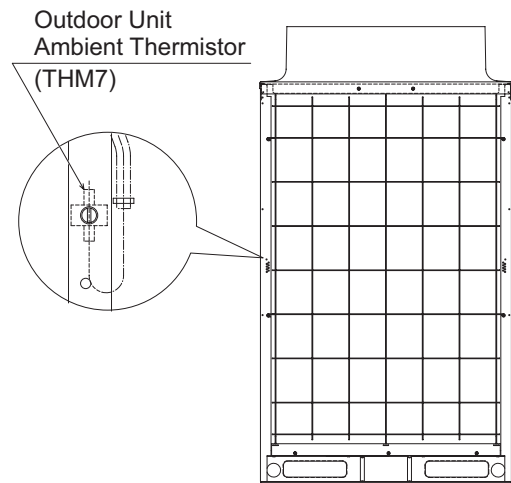
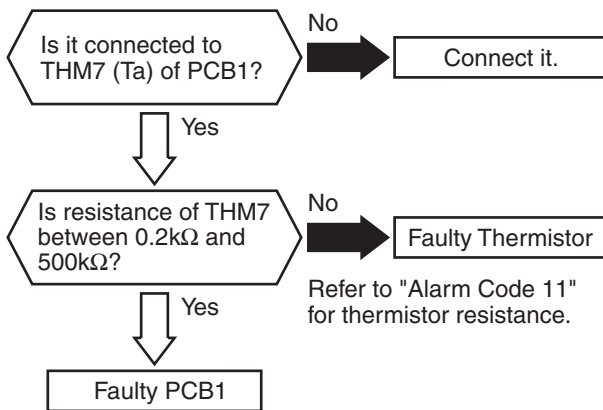


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty High Pressure Sensor	Fault	Check output voltage is correct.	Replace pressure sensor if faulty.
	Incorrect Connection	Check connections.	Repair wiring and connections.
Faulty PCB1		Replace PCB1 and check operation.	Replace PCB1 if faulty.
Indicated Pressure Value is Excessively High or Low	Malfunction of Pressure Sensor due to Faulty Check Joint	Check for clogging of check joint.	Replace check joint.

Alarm Code	22	Abnormality of Thermistor for Outdoor Air Temperature (Outdoor Unit Ambient Thermistor)
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- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the thermistor is short-circuited (less than 0.2 kΩ) or cut (greater than 500 kΩ) during running.

PCB1: Control PCB in Outdoor Unit



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

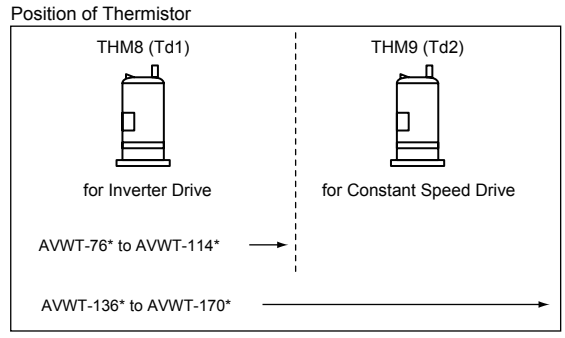
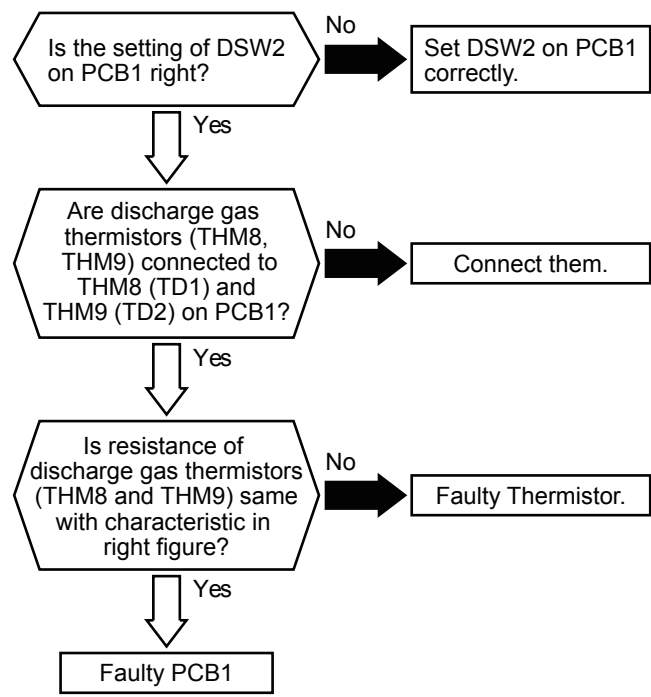


# TROUBLESHOOTING

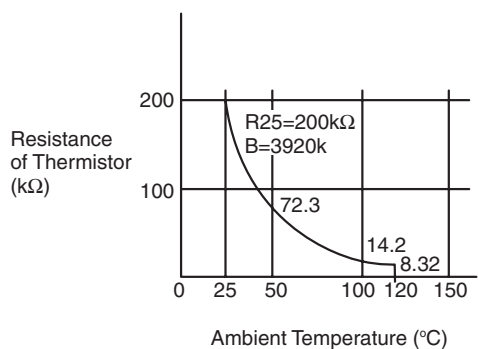
Alarm Code	23	Abnormality of Thermistor for Discharge Gas Temperature on the Top of Compressor
------------	----	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, or the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.  
If abnormality with the thermistor is found, check all the thermistors as shown below.
- ★ This alarm is indicated when the thermistor is short-circuited (less than 0.9 kΩ) or cut (greater than 5,946 kΩ) during running.

PCB1: Control PCB in Outdoor Unit



Characteristics of Thermistor

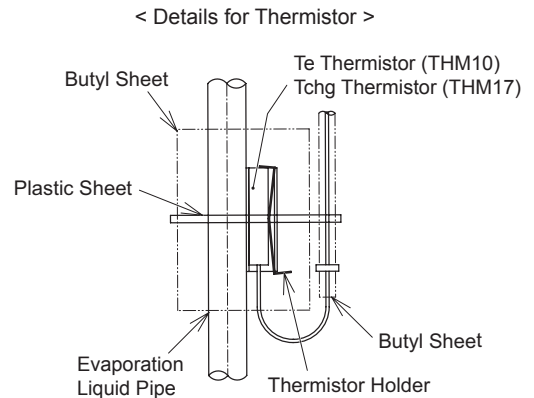
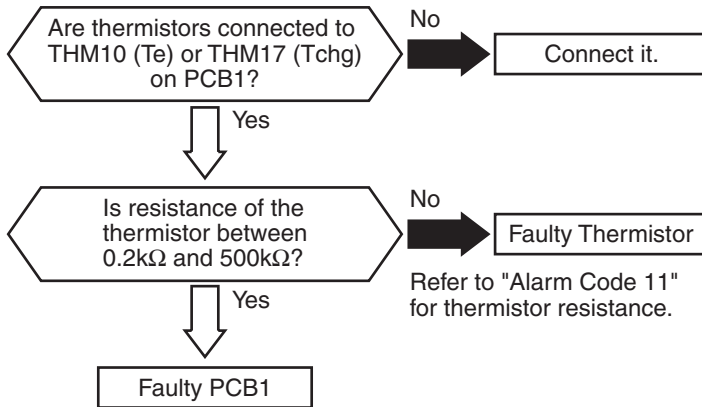


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Discharge Gas Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB1.	Repair wiring and connections.
Faulty PCB1		Replace PCB1 and check operation.	Replace PCB1 if faulty.
Incorrect Setting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

Alarm Code	24	<b>Abnormality of Thermistor for Outdoor Unit Heat Exchanger Liquid Pipe (Te/Tchg)</b>
------------	----	--

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.  
If abnormality with the thermistor is found, check the thermistors as shown below.
  
- ★ This alarm is indicated when the thermistor is short-circuited (less than 0.2kΩ) or cut (greater than 840kΩ) for 8 minutes during running.

If this thermistor is faulty, this alarm is indicated.



Te: Thermistor for Outdoor Liquid Pipe  
 Tchg: Thermistor for Super Cooling Main Line  
 PCB1: Control PCB in Outdoor Unit

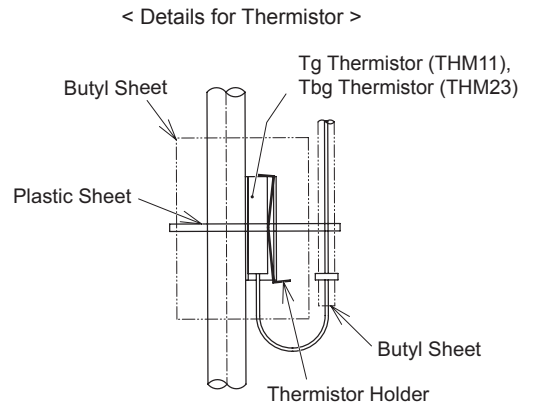
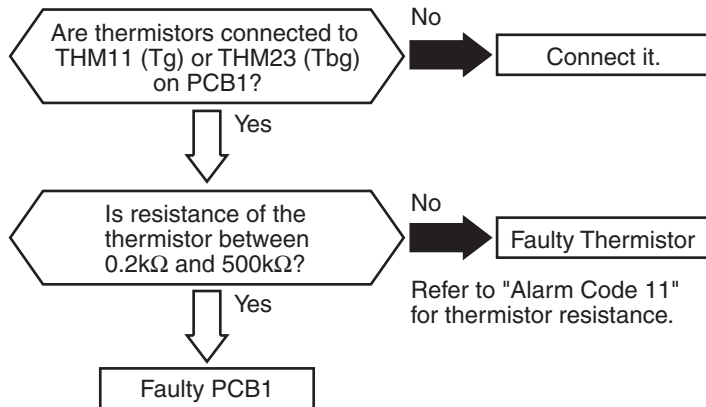
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Outdoor Unit Liquid Pipe Thermistor	Fault	Check resistance.	Replace thermistor if faulty.
	Incorrect Connection	Check wiring to PCB1.	Repair wiring and connections.
Faulty PCB1		Replace PCB1 and check operation.	Replace PCB1 if faulty.

# TROUBLESHOOTING

Alarm Code	25	Abnormality of Thermistor for Outdoor Unit Heat Exchanger Gas Pipe (Tg/Tbg)
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- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.  
If abnormality with the thermistor is found, check all the thermistors as shown below.
- ★ This alarm is indicated when the thermistor is short-circuited (less than 0.2kΩ) or cut (greater than 840kΩ) for 8 minutes during running.

If this thermistor is faulty, this alarm is indicated.



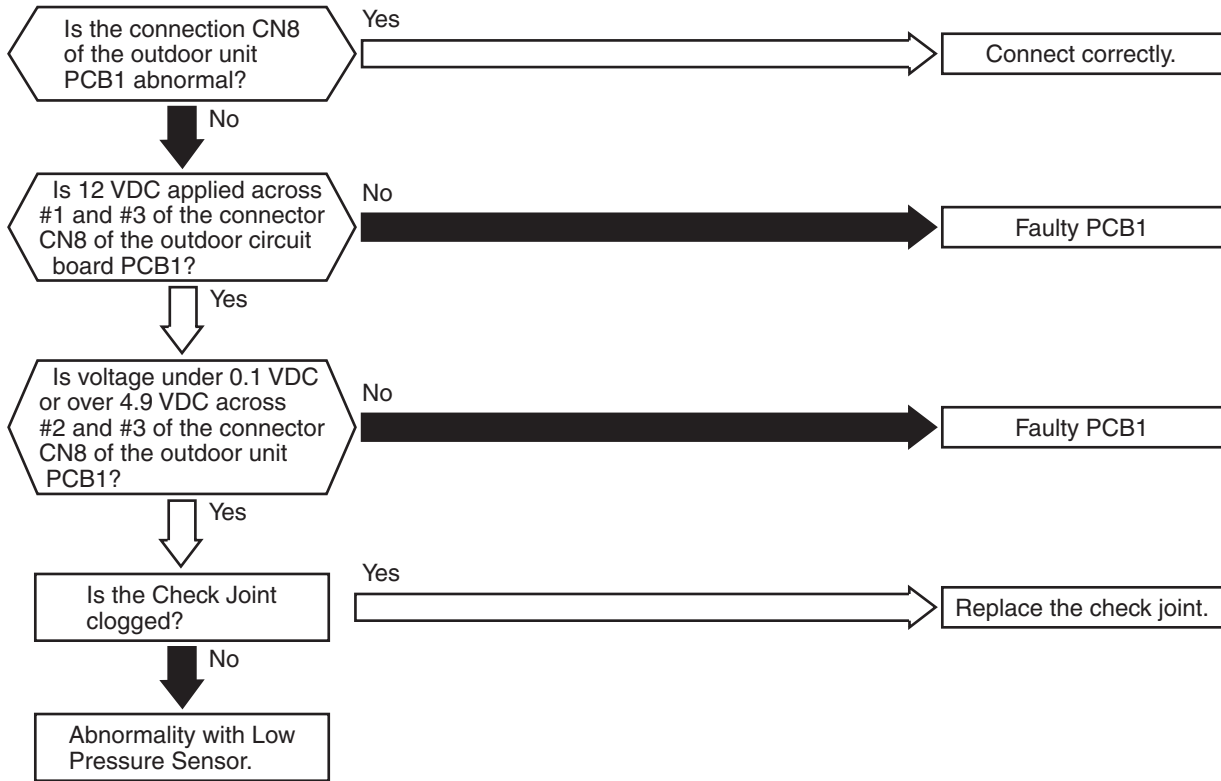
Tg: Thermistor for Outdoor Gas Pipe  
 Tbg: Thermistor for Super Cooling Bypass Line  
 PCB1: Control PCB in Outdoor Unit

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

Alarm Code <span style="font-size: 2em; font-weight: bold; margin-left: 10px;">29</span>	<b>Abnormality of Low Pressure Sensor for Outdoor Unit</b>
--	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the pressure sensor voltage decreases lower than 0.1V or increases higher than 4.9V during running.

PCB1: Control PCB in Outdoor Unit



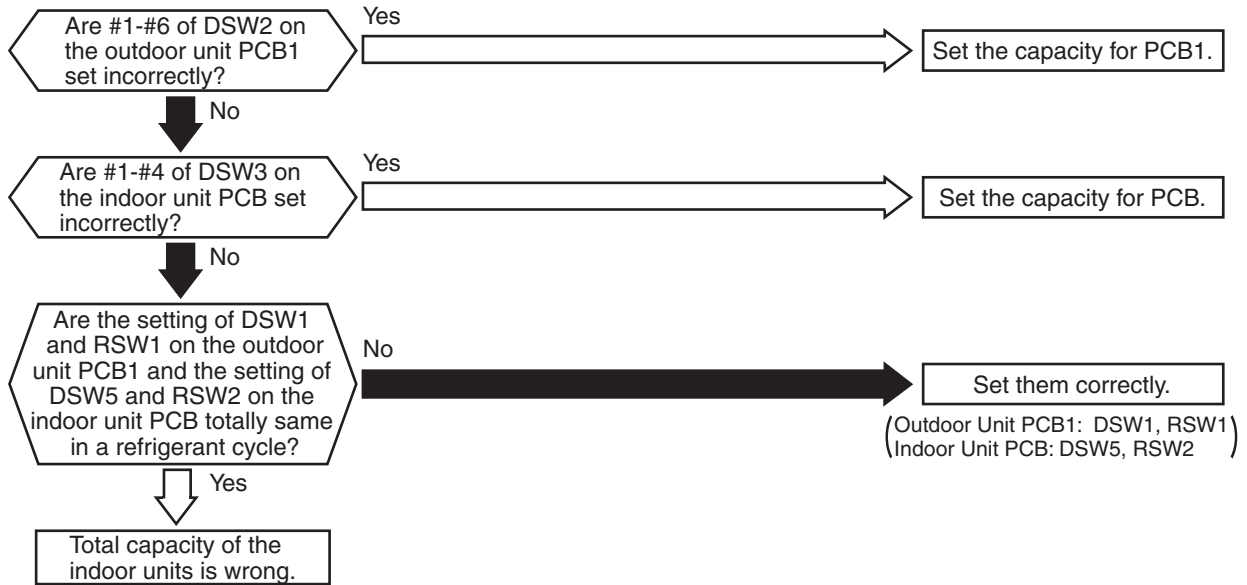
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Faulty Low Pressure Sensor	Fault	Check output voltage is correct.	Replace pressure sensor if faulty.
	Incorrect Connection	Check connections.	Repair wiring and connections.
Faulty PCB1		Replace PCB1 and check operation.	Replace PCB1 if faulty.
Indicated Pressure Value is Excessively High or Low	Malfunction of Pressure Sensor due to Faulty Check Joint	Check for clogging of check joint.	Replace check joint.

# TROUBLESHOOTING

Alarm Code	31	Incorrect Capacity Setting of Indoor Unit and Outdoor Unit
------------	----	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the capacity setting dip switch, DSW2 on the outdoor unit PCB1, is not set (all the settings from #1 to #6 are OFF) or mis-setting.
- ★ This alarm is indicated when the total indoor unit capacity is smaller than 50% or greater than 130% of the combined outdoor unit capacity.

PCB1: Control PCB in Outdoor Unit  
 PCB: Indoor Unit PCB

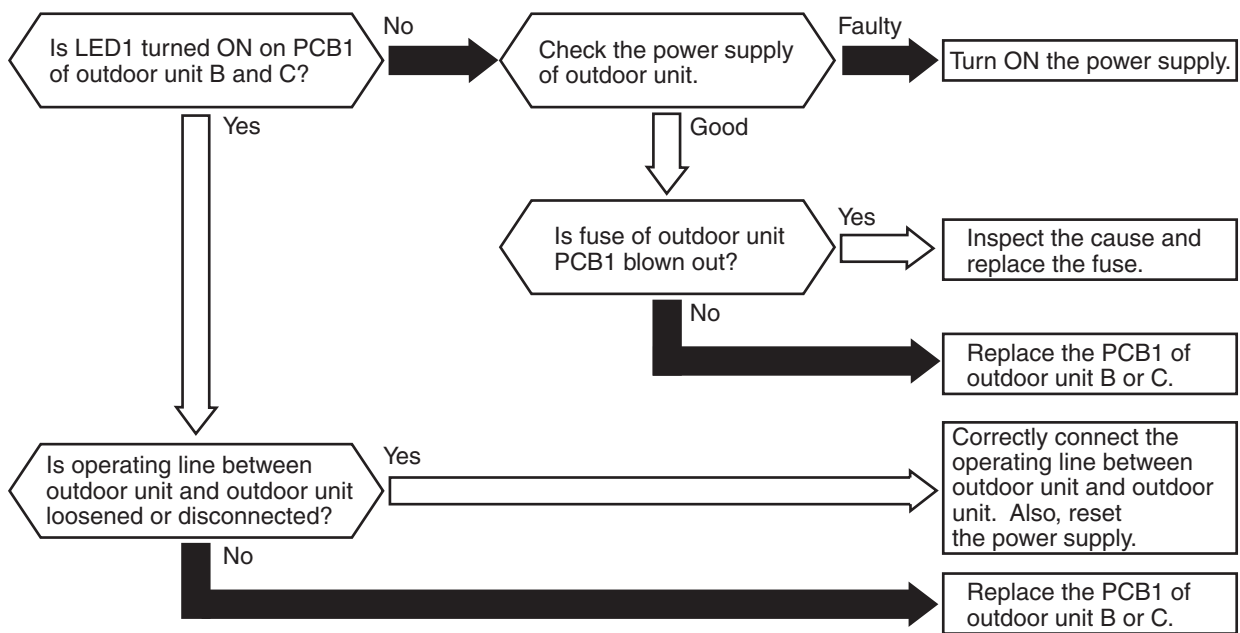


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Incorrect Capacity Setting of Indoor Unit		Check combination of indoor units and capacity setting on PCB.	Correctly set dip switch, DSW3.
Incorrect Capacity Setting of Outdoor Unit		Check capacity setting on outdoor unit PCB1.	Correctly set dip switch, DSW2.
Total Indoor Unit Capacity Connected to the Outdoor Unit is Beyond Permissible Range		Check outdoor unit model by calculating total indoor units capacity.	Ensure that total indoor unit capacity is from 50% to 130%.
Refrigeration Cycle Setting of Outdoor Unit and Indoor Unit is Different		Check refrigeration cycle setting on outdoor unit PCB1 and indoor unit PCB.	Set them correctly.

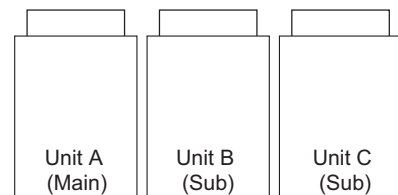
Alarm Code <b>31</b>	<b>Abnormal Transmitting between Outdoor Units</b>
----------------------	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
  
- ★ This alarm is indicated when the following condition occurs after normal transmitting between outdoor unit and outdoor unit is maintained;
  - Abnormality is maintained for 30 seconds.
  - Abnormality is maintained for 30 seconds even after micro-computer reset (automatically).

PCB1: Control PCB in Outdoor Unit



Outdoor Unit



## TROUBLESHOOTING

Alarm Code	35	Incorrect Indoor Unit No. Setting
------------	----	-----------------------------------

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated 5 minutes after power is supplied to the outdoor unit when the indoor unit No. connected to the outdoor unit is duplicated by setting of DSW and RSW.

Alarm Code	36	Incorrect Indoor Unit Combination
------------	----	-----------------------------------

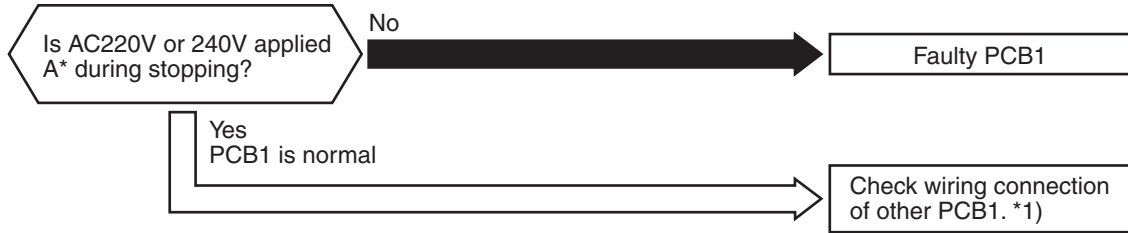
- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the indoor unit connected to outdoor unit is designed for refrigerant R22 type.

PCB1: Control PCB in Outdoor Unit

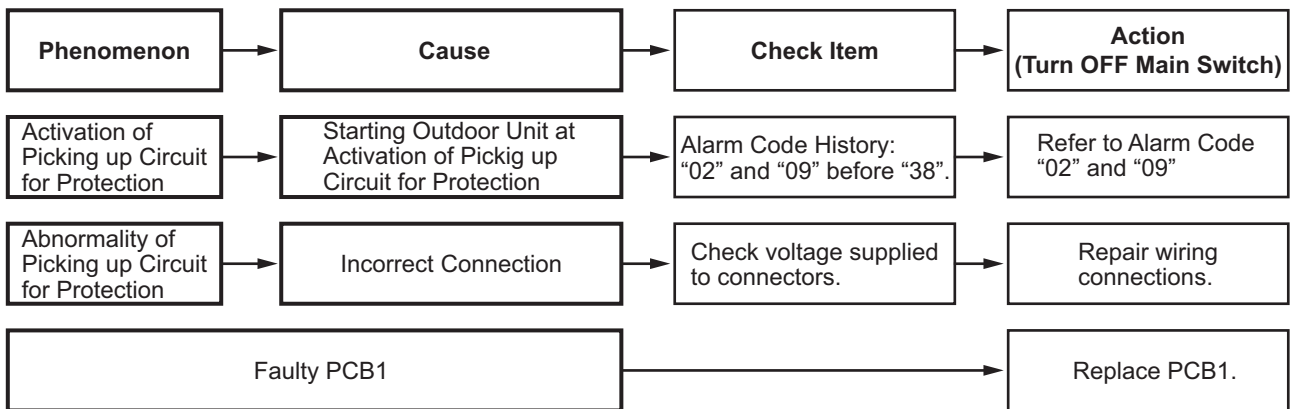
Alarm Code	38	Abnormality of Picking up Circuit for Protection in Outdoor Unit
------------	----	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and the alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when AC 220V or 240V is not detected in A\* during inverter compressor stoppage.

PCB1: Control PCB in Outdoor Unit



Power Supply	A*
380-415V/50Hz 380V/60Hz	Between terminal #3 of PCN2, PCN16 and faston terminal "N1" on PCB1
220V/60Hz	Between terminal #3 of PCN2, PCN16 and faston terminal "S1" on O.U. PCB1



\*1): Check wiring system connecting to PCN2 and PCN16 on PCB1.

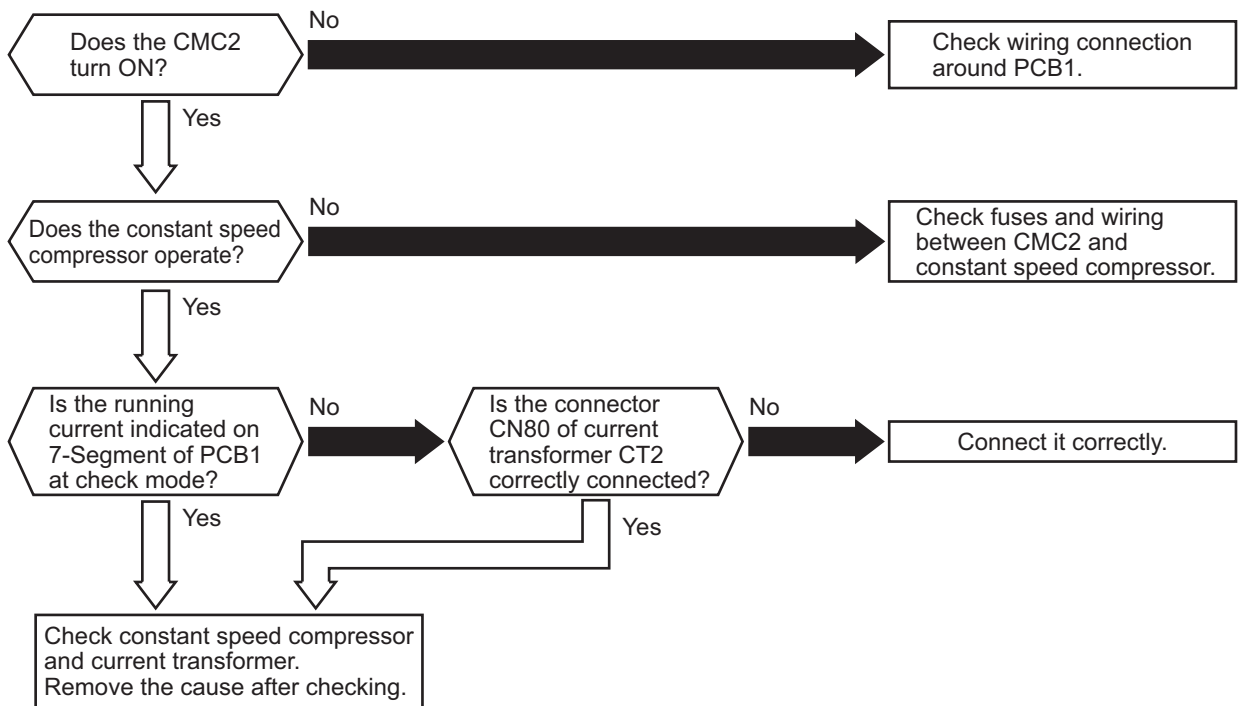


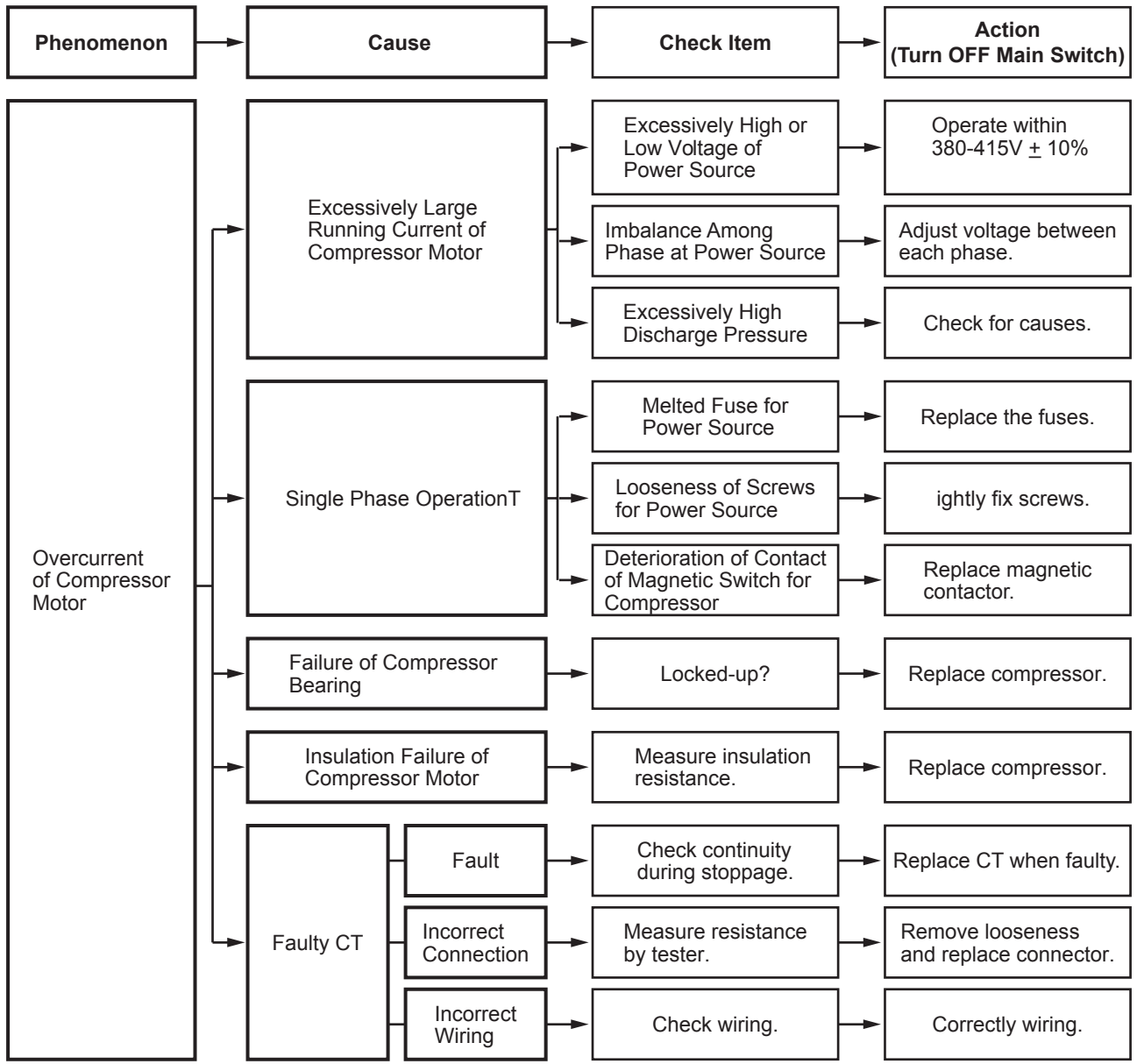
# TROUBLESHOOTING

Alarm Code	<b>39</b>	Abnormality of Running Current at Constant Speed Compressor
------------	-----------	---

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the following conditions occurs;
- The running current of the constant speed compressor exceeds the value of overcurrent limitation during operating.
  - The running current of the constant speed compressor is detected 0A and retry when 3 minutes are passed after all compressors are stopped, and this phenomenon occurs three times within 30 minutes.

PCB1: Control PCB in Outdoor Unit



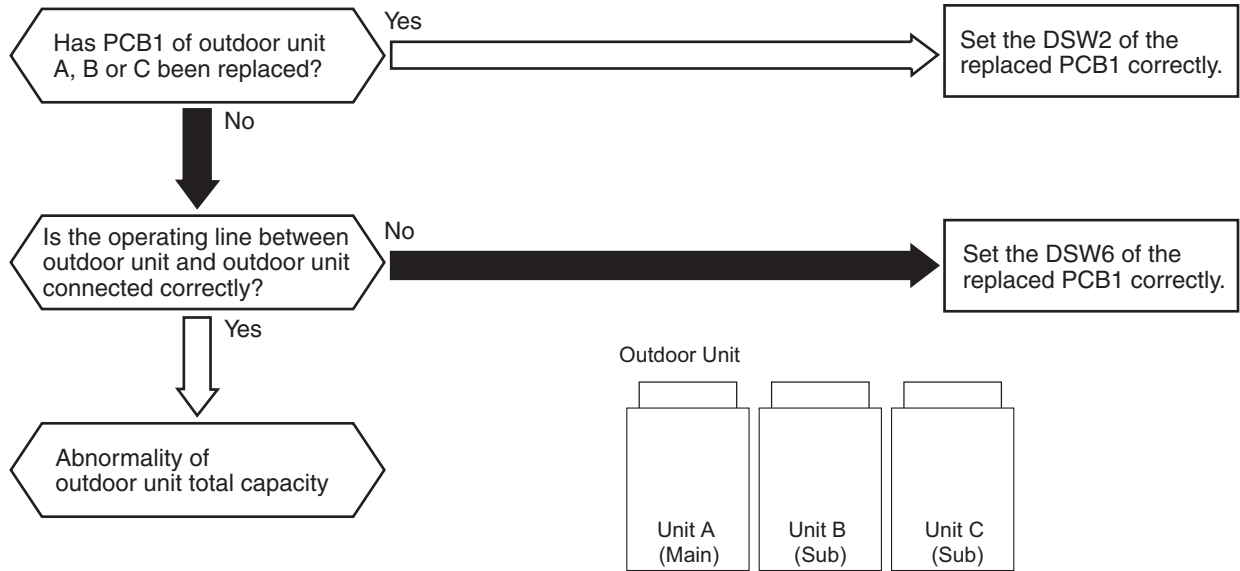


# TROUBLESHOOTING

Alarm Code	3A	<b>Abnormality of Outdoor Unit Capacity</b>
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- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the total capacity of outdoor unit connected to O.U.~O.U. transmission terminal exceeds 54HP.

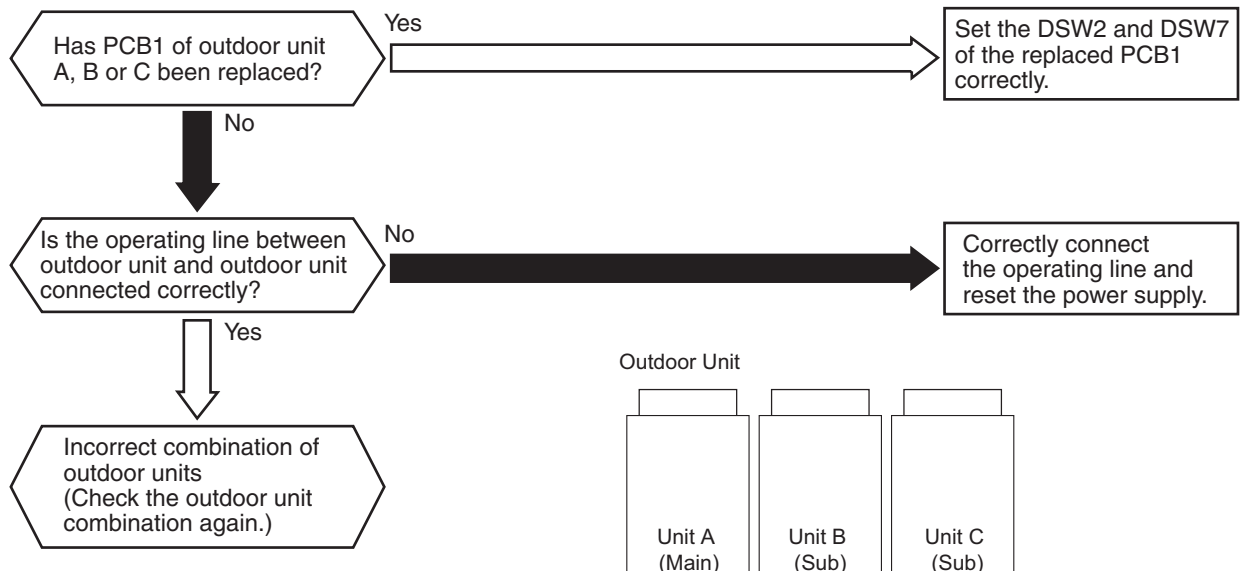
PCB1: Control PCB in Outdoor Unit  
O.U. Outdoor Unit



Alarm Code	3B	<b>Incorrect Setting of Outdoor Unit Model Combination or Voltage</b>
------------	----	---

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the model setting for outdoor unit connected to O.U.~O.U. transmission terminal is incorrect.

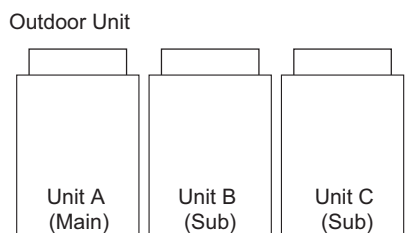
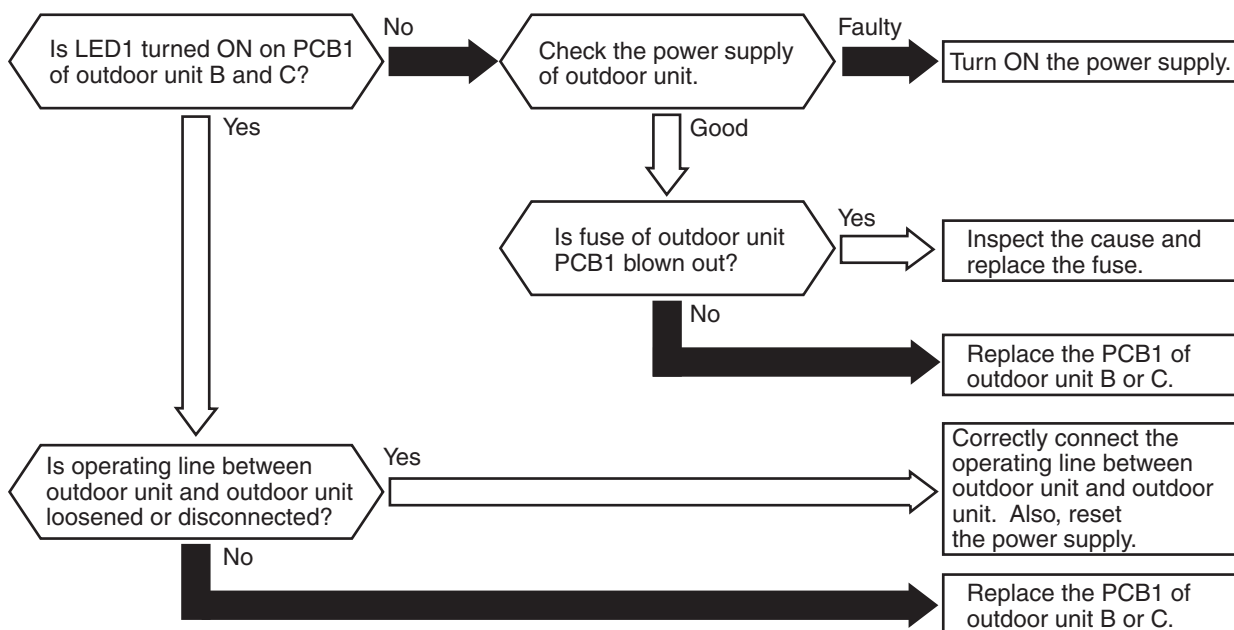
PCB1: Control PCB in Outdoor Unit  
O.U. Outdoor Unit



Alarm Code	<b>3d</b>	Abnormality Transmitting between Main Unit and Sub Unit(s)
------------	-----------	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when transmission to outdoor unit B or C is NOT maintained for 30 seconds. (Alarm code “31” will be indicated when transmission to all the outdoor units connected to O.U.~O.U. transmission terminal is NOT maintained.)

PCB1: Control PCB in Outdoor Unit  
O.U.: Outdoor Unit

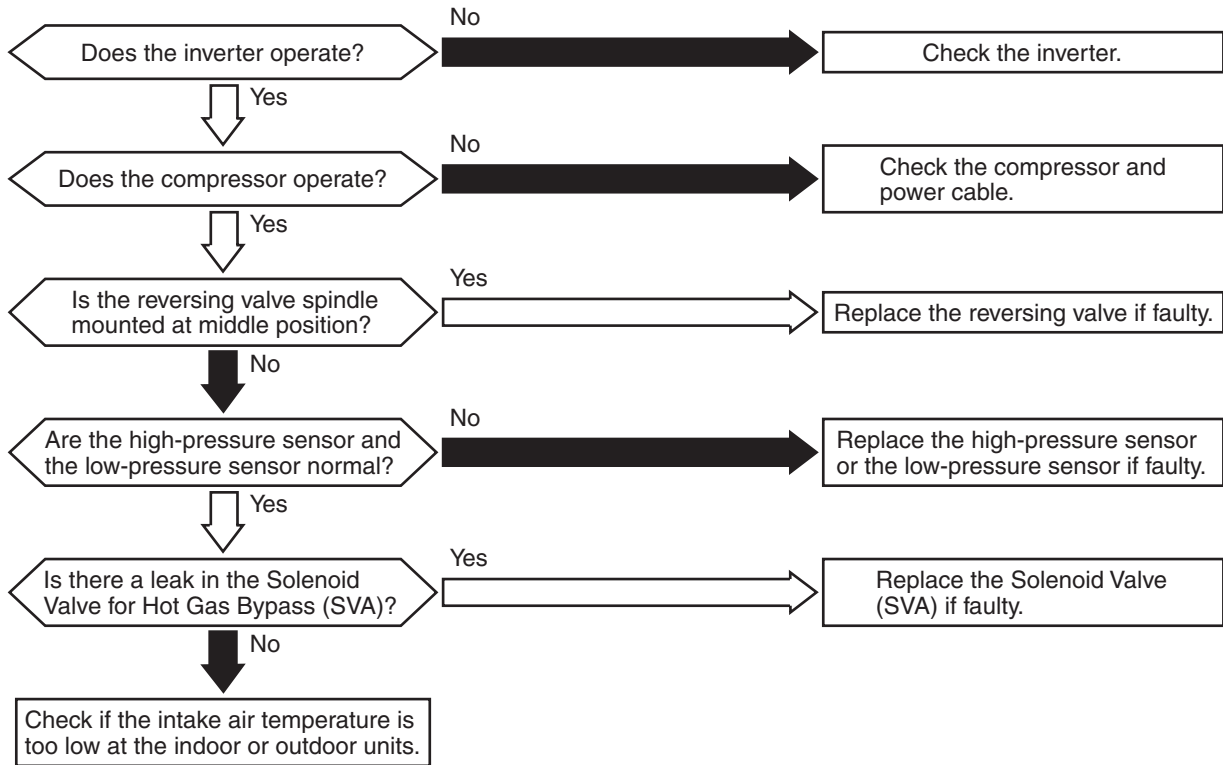


# TROUBLESHOOTING

Alarm Code	43	Activation of Low Compression Ratio Protection Device
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- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when a compression ratio,  $\epsilon = \{(Pd + 0.1) / (Ps + 0.06)\}$  is calculated from a discharge pressure (Pd MPa) and suction pressure (Ps MPa) and the condition lower than  $\epsilon < 1.8$  occurs more than three times (including three) in one hour.

PCB1: Control PCB in Outdoor Unit

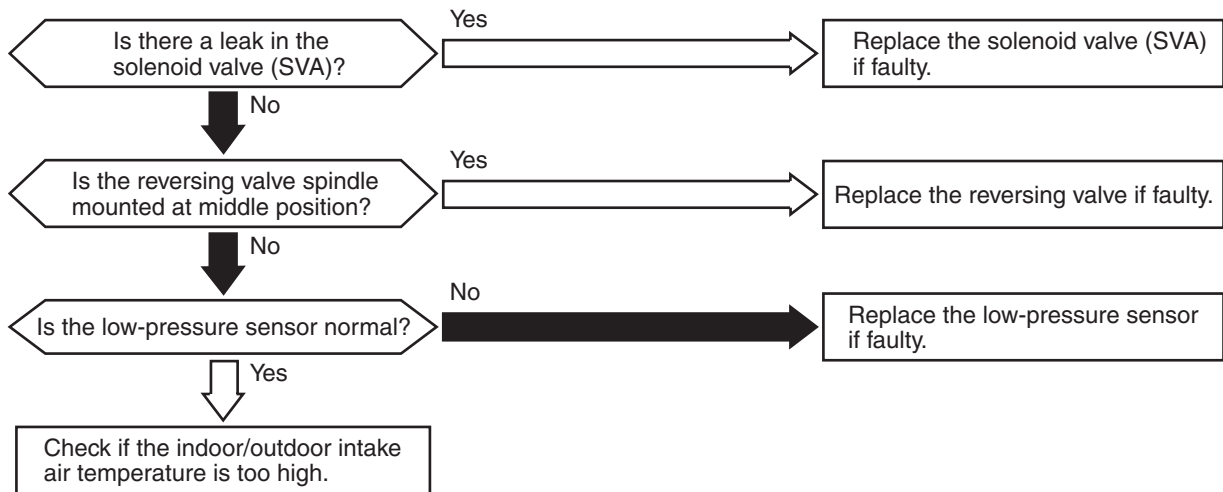


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Compression Ratio	Inverter is not Functioning	Check inverter.	Repair faulty part.
	Compressor is not Operating	Check compressor.	Replace comp. if faulty.
	Valve Stoppage at Middle Position of Reversing Valve	Measure suction pipe temp. of reversing valve.	Replace reversing valve if faulty.
	Abnormality of High or Low Pressure Sensor	Check connector for PCB1, power source and pressure indication.	Replace sensor if faulty.
	Excessively Low Indoor Intake Air Temperature	Check indoor unit and outdoor unit air temp. thermistor.	Replace thermistor if faulty.
	Leakage from Solenoid Valve (SVA)	Check Solenoid Valve.	Replace SVA if leaking.

Alarm Code	44	Activation of Low Pressure Increase Protection Device
------------	----	---

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ In case that compressor is operated under the condition that is higher than 1.4MPa of suction pressure (Ps) for 1 minute, all compressors are stopped and retry operation is started after 3 minutes. However this alarm is indicated when same phenomenon is occurred at two times within the next 30 minutes.

PCB1: Control PCB in Outdoor Unit



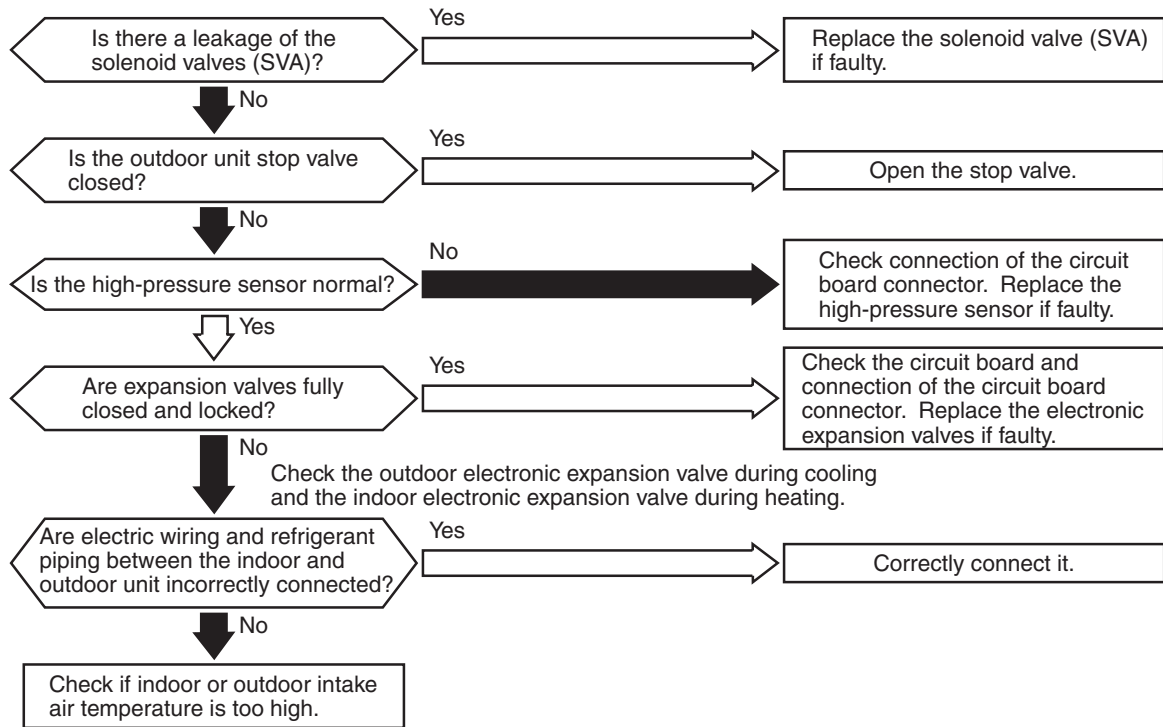
Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively Low Suction Pressure	Leakage of Solenoid Valve (SVA)	Check outlet pipe temp. of solenoid valve (SVA).	Check connecting wires. Replace solenoid valve (SVA) if faulty.
	Valve Stoppage at Middle Position of Reversing Valve	Measure suction gas pipe temp. of reversing valve.	Replace reversing valve if faulty.
	Abnormal Suction Pressure Sensor	Check connectors of PCB1 and power source.	Replace sensor if faulty.
	Excessively High Indoor Unit and Outdoor Unit Suction Air Temperature	Check indoor unit and outdoor unit suction air temp. thermistor.	Replace thermistor if faulty.

# TROUBLESHOOTING

Alarm Code	<b>45</b>	Activation of High Pressure Increase Protection Device
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- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ In case that compressor is operated under the condition that is higher than 3.8MPa of discharge pressure (Pd) for 1 minute, all compressors are stopped and retry operation is started after 3 minutes. However this alarm is indicated when same phenomenon is occurred at two times within the next 30 minutes.

PCB1: Control PCB in Outdoor Unit  
 PCB: Indoor Unit PCB

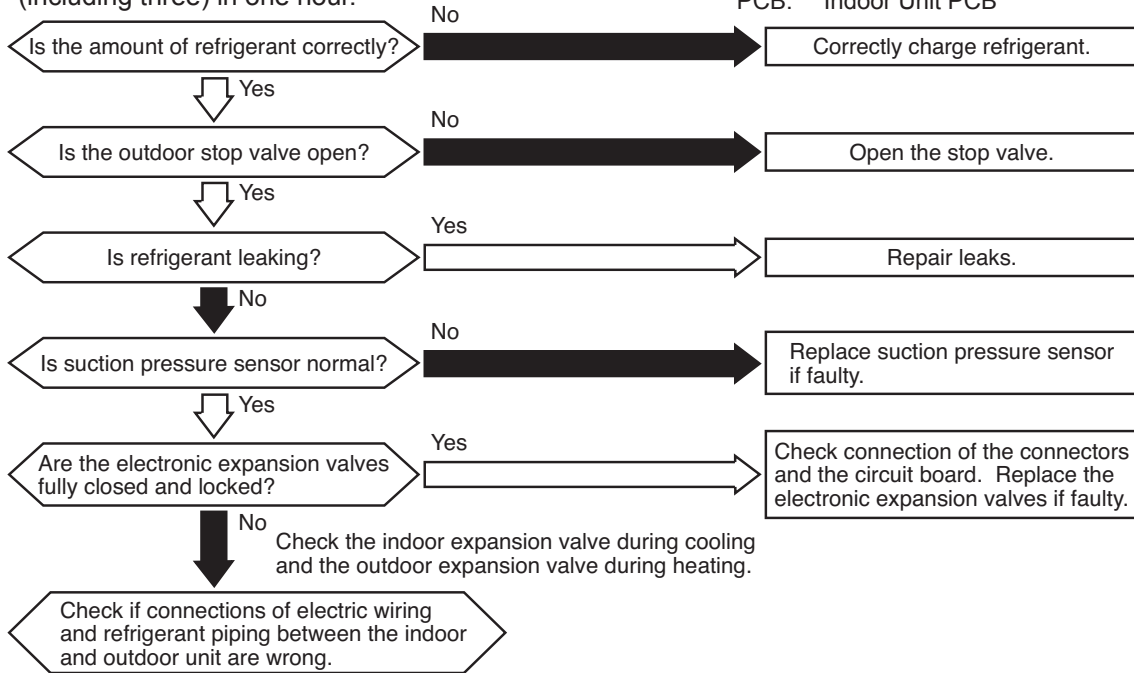


Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)
Excessively High Discharge Pressure	Leakage of Solenoid Valve (SVA)	Check outlet temp. of solenoid valve (SVA).	Check connection. Replace solenoid valve (SVA) if faulty.
	Closed Stop Valve	Check stop valve.	Open stop valve.
	Abnormal High Pressure Sensor	Check connectors for PCB1.	Replace pressure sensor if faulty.
	Excessively High Indoor Unit and Outdoor Unit Inlet Air Temp.	Check thermistor for indoor unit and outdoor unit inlet air temp.	Replace thermistor if faulty.
	Incorrect Connection between Indoor Unit and Outdoor Unit	Check electrical system and ref. cycle.	Correctly connect.
	Locked Expansion Valve with Fully Closed	Check connector for PCB.	Repair connector for PCB or expansion valve. Replace it if faulty.

Alarm Code	47	<b>Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)</b>
------------	----	--

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when a suction pressure (Ps) is lower than 0.09 MPa for over 12 minutes and its state occurs more than three times (including three) in one hour.

PCB1: Control PCB in Outdoor Unit  
PCB: Indoor Unit PCB



Phenomenon	Cause	Check Item	Action (Turn OFF Main Switch)	
Excessively Low Suction Pressure (in Vacuum)	Shortage of Ref.	Check ref. charged volume or check for leakage.	Repair leakage and correctly charge.	
	Closed Stop Valve	Check stop valve.	Open stop valve.	
	Abnormal Low or High Pressure Sensor	Check connector for PCB1.	Replace pressure sensor if faulty.	
	Incorrect Connection between Indoor Unit and Outdoor Unit	Check electrical system and ref. cycle.	Correctly connect between indoor unit and outdoor unit.	
	Locked Expansion Valve with Fully Closed	Check connector for PCB.	Repair connector for PCB or expansion valve. Replace it if faulty.	
	Closed Expansion Valve by Disconnecting Td Thermistor	Check Td thermistors for compressors and measure Td thermistor resistance.	Repair or replace Td thermistor.	
	Internal Thermostat for Outdoor Fan is Activated in Heating Operation	Faulty Outdoor Fan Motor	Measure coil resistance and insulation resistance.	Replace outdoor fan motor if faulty.
Faulty Internal Thermostat		Fault	Check for conduction after temperature of outdoor fan motor is decreased.	Replace outdoor fan motor.
		Incorrect Contact	Measure resistance by tester.	Remove looseness and replace connector.
		Incorrect Connection	Check connection.	Connect correctly.



Alarm Code	<b>48</b>	Activation of Inverter Overcurrent Protection Device (1)
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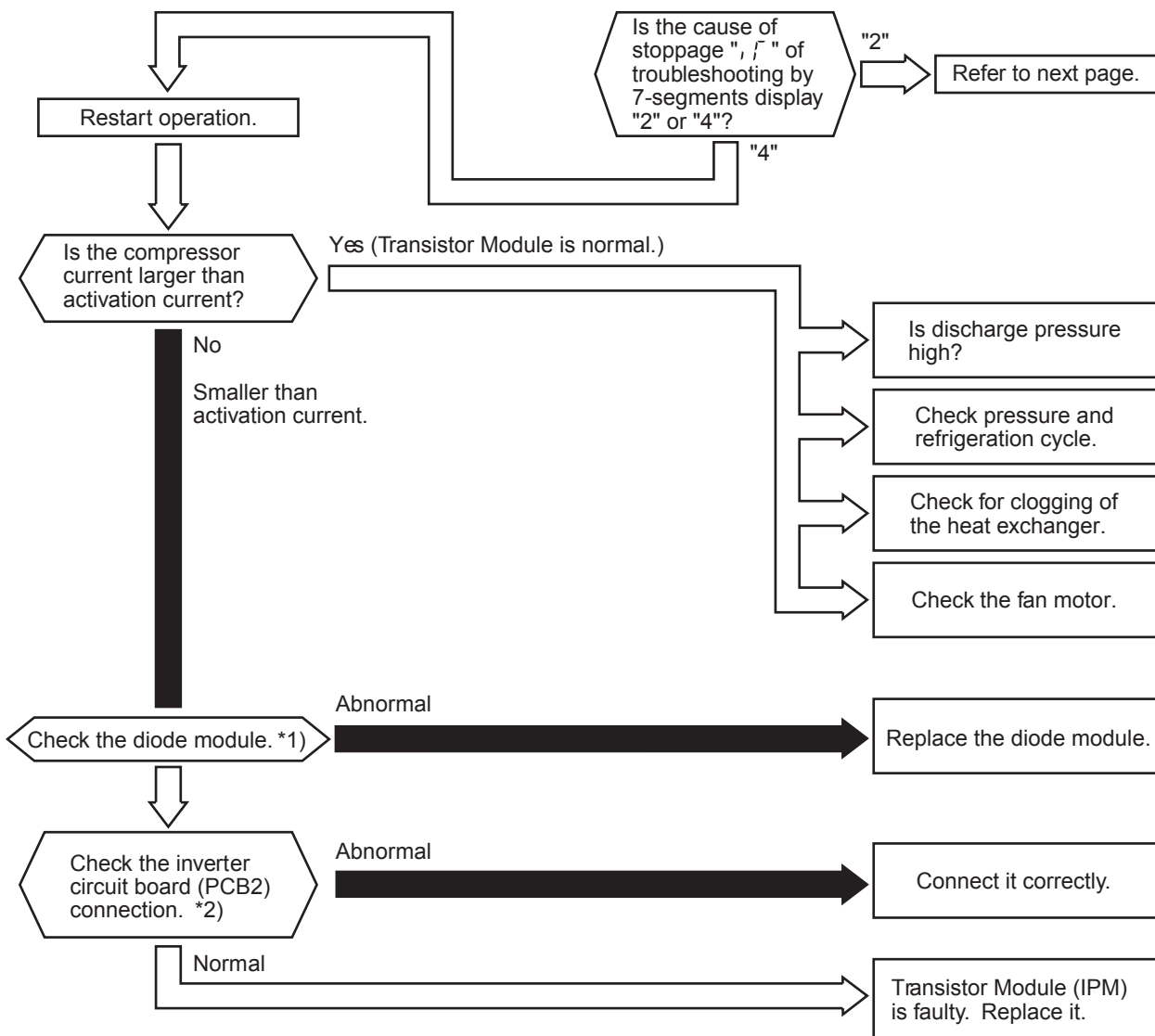
- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.

★ This alarm is indicated when inverter electronic thermal protection is activated at six times within 30 minutes. (Retry operation is performed up to the occurrence of five times.)

Conditions of Activation:

Inverter current with 105% of the rated current runs for 30 seconds continuously.  
or  
Inverter current runs intermittently and the accumulated time reaches up to 3 minutes, in 10 minutes.

PCB1: Control PCB in Outdoor Unit  
PCB2: Inverter PCB



\*1): Regarding replacing or the checking diode module, refer to the item 3.3 in *Troubleshooting*.

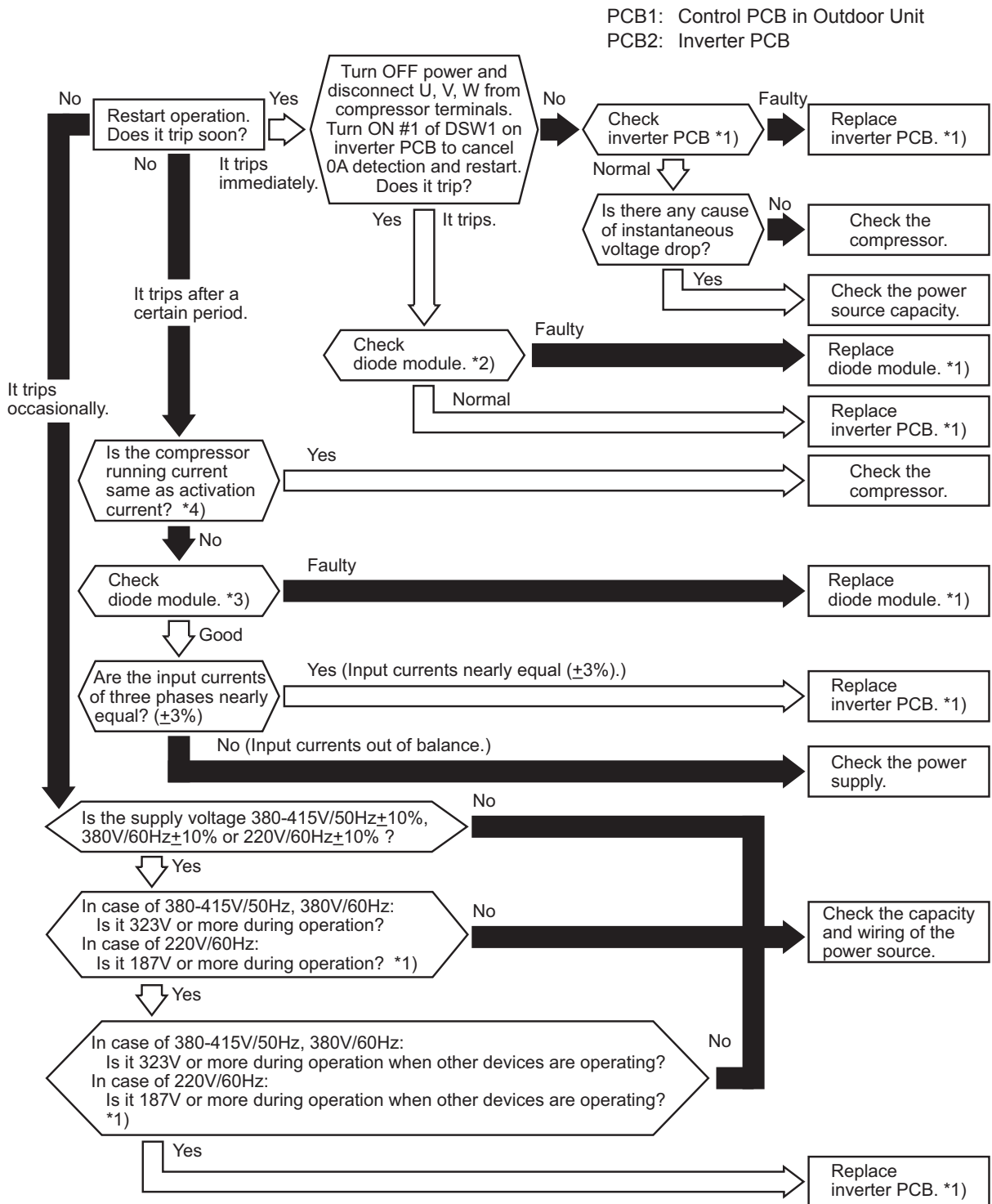
\*2): Regarding replacing or checking method for inverter parts, refer to the item 3.3 in *Troubleshooting*.

Alarm Code	48	Activation of Inverter Overcurrent Protection Device (2)
------------	----	--

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

★ This alarm is indicated when instantaneous overcurrent occurs at six times within 30 minutes. (Retry operation is performed up to the occurrence of five times.)

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



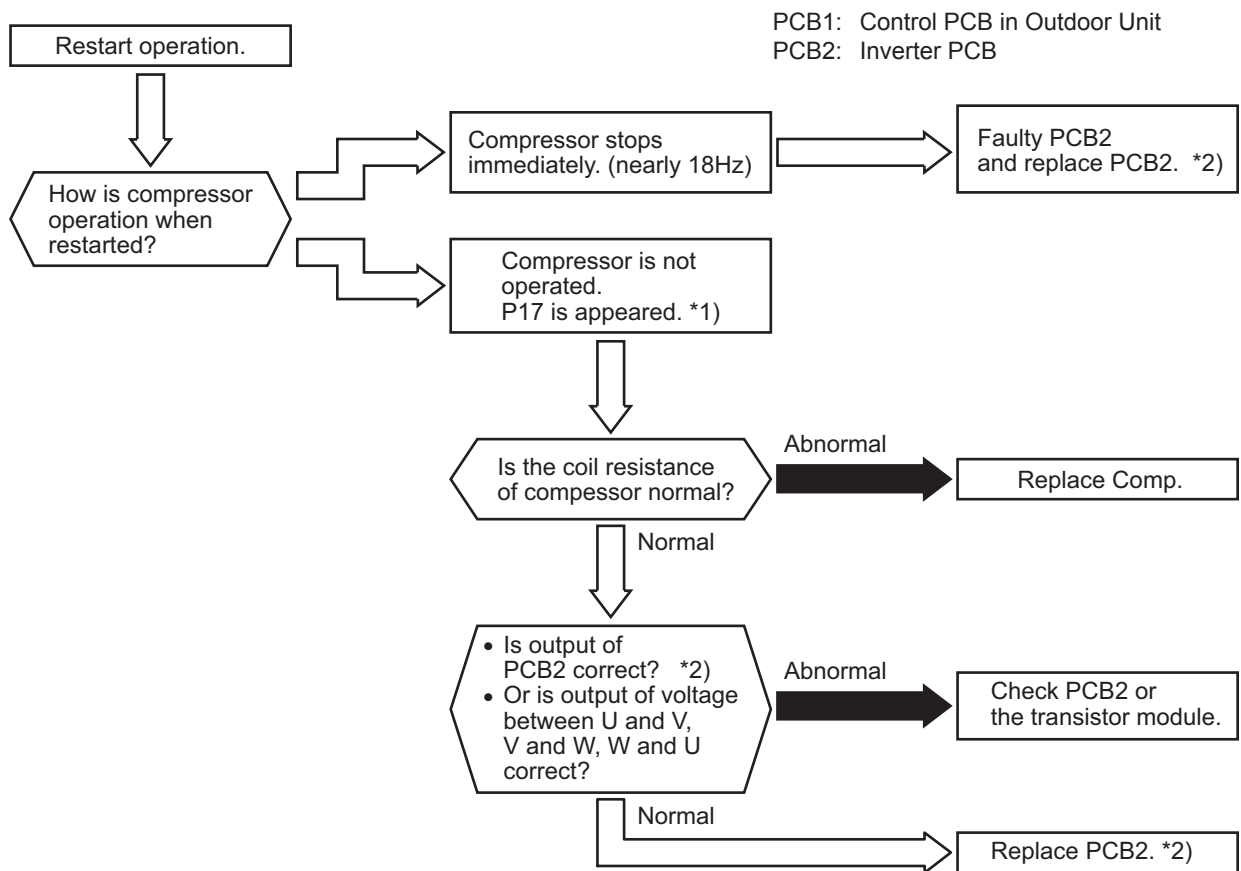
\*1): Perform electrical discharge when replacing or the checking for inverter parts by referring to the item 3.3 in *Troubleshooting*.

\*2): Before checking of diode module, refer to the item 3.3 in *Troubleshooting*.

Alarm Code	<b>51</b>	Abnormality of Inverter Current Sensor
------------	-----------	--

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ In case that the abnormality of current transformer (0A detecting) occurs three times within 30 minutes, this alarm is indicated at the third time.  
(Retry operation is performed up to second time of abnormality occurrence.)

Condition of Activation: When the frequency of compressor is maintained at 15 to 18Hz after compressor is started, one of the absolute value of running current detected by the current transformer at each phase U+, U-, V+ and V- is less than 1.5A (including 1.5A).



\*1): P17 is shown at 7-segment on the outdoor unit PCB1.

\*2): Perform the high voltage discharge work by referring to the item 3.3 in *Troubleshooting* before checking and replacing the inverter parts.

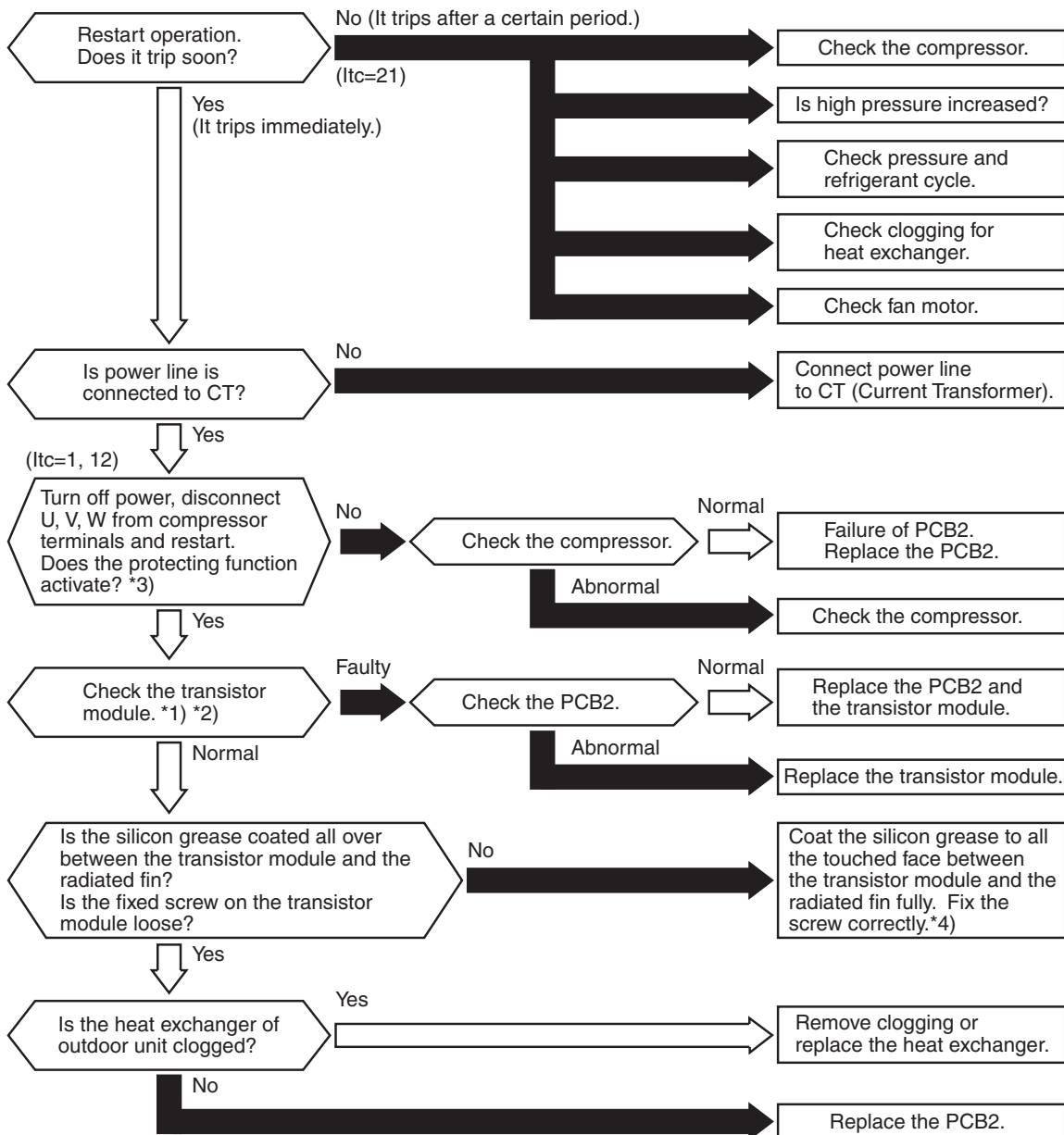
Alarm Code	53	Inverter Error Signal Detection
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- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ IPM (Transistor Module) has detecting function of abnormality.  
 This alarm is indicated when the transistor module detects the abnormality seven times in 30 minutes. (Retry operation is performed up to the occurrence of six times.)

Conditions of Activation:

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

PCB1: Control PCB in Outdoor Unit  
 PCB2: Inverter PCB



\*1): Perform electrical discharge when replacing or checking inverter parts by referring to the item 3.3 in *Troubleshooting*.  
 \*2): Regarding checking method of transistor module, refer to the item 3.3 in *Troubleshooting*.  
 \*3): Turn ON the No.1 switch of the dip switch DSW1 on PCB2 when restarting with disconnecting the terminals of the compressor. After troubleshooting, turn OFF the No.1 switch of the dip switch DSW1 on PCB2.  
 \*4): Use the silicon grease provided as accessory.

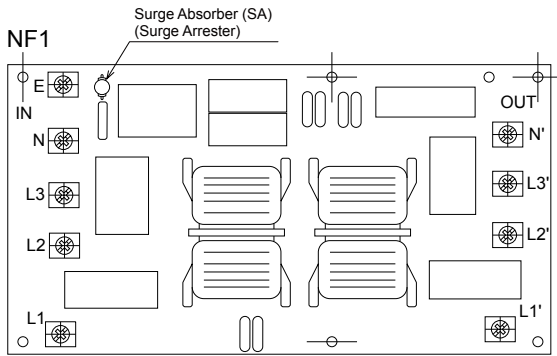
# TROUBLESHOOTING

**NOTE:**

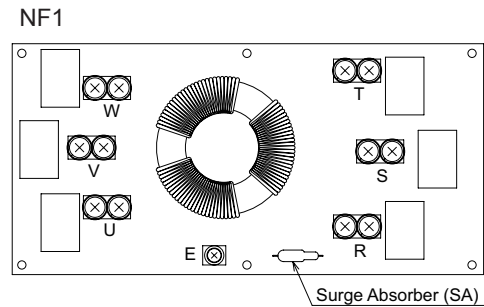
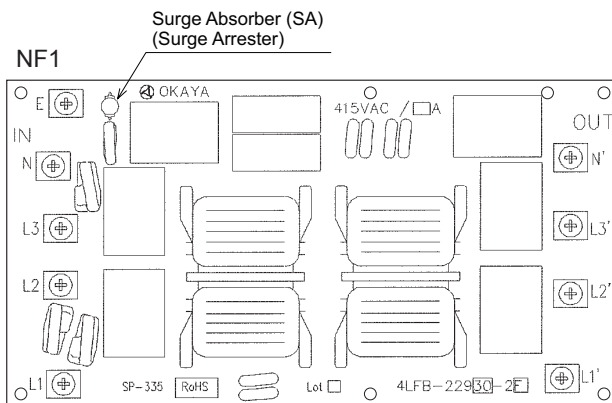
When the unit is applied the excessive surge current due to lighting or other causes, this alarm code "53" or the inverter stoppage code (IT) "11" will be indicated and the unit can not be operated. In this case, check to ensure the surge absorber/surge arrester (SA) on the noise filter (NF1). The surge absorber may be damaged if the inner surface of the surge absorber is black. In that case, replace the surge absorber.

If the inside of the surge absorber is normal, turn OFF the power once and wait for PCB2's LED201 (red) OFF (approx. 5 min.) and turn ON again.

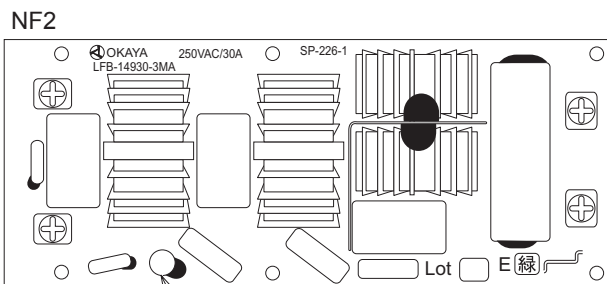
< Position of Surge Absorber >



< Position of Surge Absorber >



(220V)

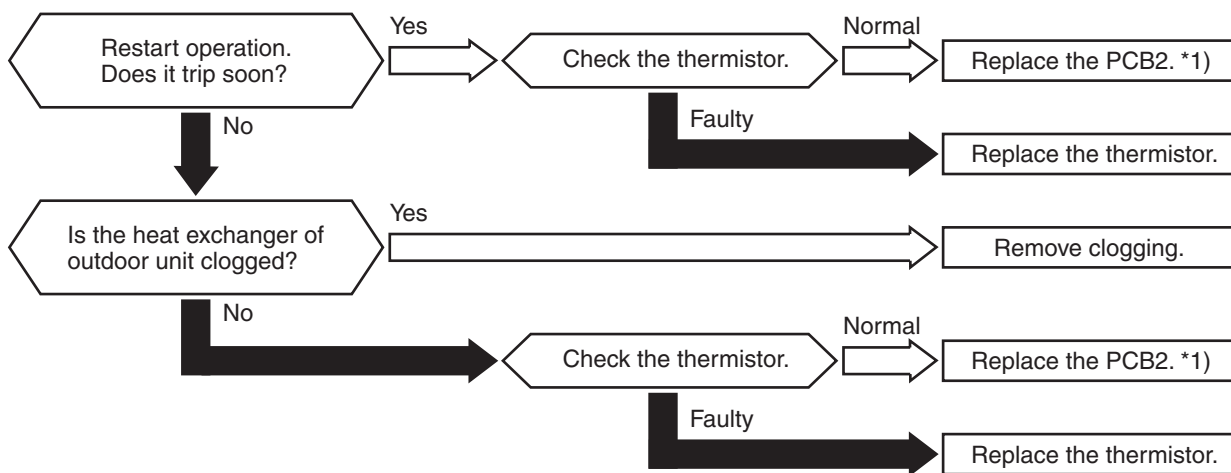


(380-415V)

Alarm Code	<b>54</b>	Abnormality of Inverter Fin Temperature
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- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ In case that the abnormality of inverter fin temperature occurs three times within 30 minutes, this alarm is indicated at the third time.  
 (Retry operation is performed up to second time of abnormality occurrence.)  
 Conditions of Activation: This alarm is indicated when the temperature of the inverter fin thermistor for Transistor Module is higher than 90°C.

PCB1: Control PCB in Outdoor Unit  
 PCB2: Inverter PCB



\*1): Perform electrical discharge when replacing or checking inverter parts by referring to the item 3.3 in *Troubleshooting*.

## TROUBLESHOOTING

Alarm  
Code

55

Inverter Failure

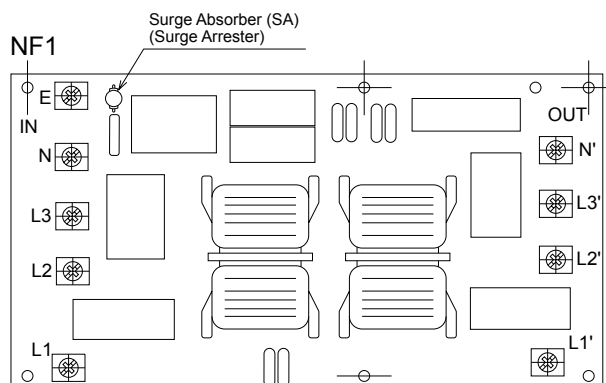
- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when the following phenomenon occurs three times in 30 minutes.  
(Retry operation is performed up to the occurrence of two times.)  
Actual frequency from PCB2 is less than 10Hz (after inverter frequency output from PCB1).  
Conditions of Activation: This alarm is indicated when PCB2 is not performed normally.

PCB1: Control PCB in Outdoor Unit  
PCB2: Inverter PCB

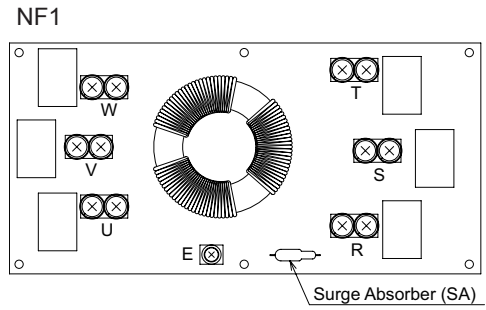
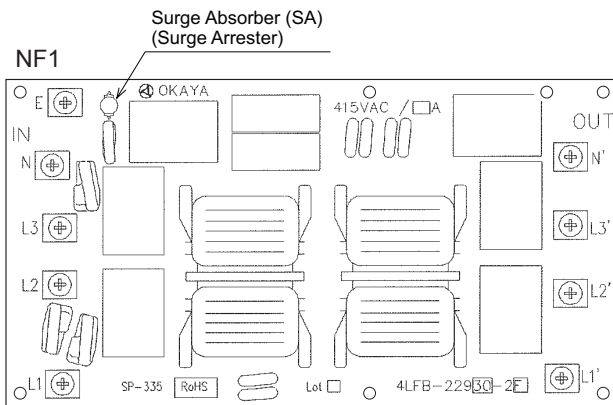


- \*1): When the unit is applied the excessive surge current due to lightning or other causes, this alarm code "55" or the inverter stoppage code (IT) "11" will be indicated and the unit can not be operated. In this case, check to ensure the surge absorber/surge arrester (SA) on the noise filter (NF1). The surge absorber may be damaged if the inner surface of the surge absorber is black. In that case, replace the surge absorber.  
If the inside of the surge absorber is normal, turn OFF the power once and wait for PCB2's LED201 (red) OFF (approx. 5 min.) and turn ON again.

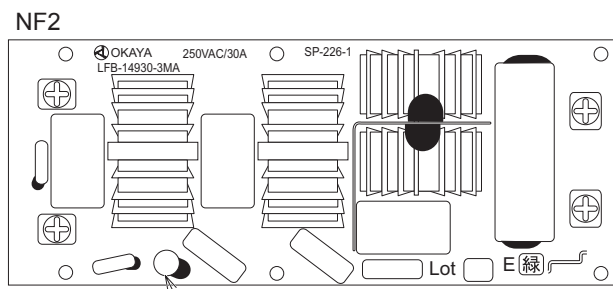
< Position of Surge Absorber >



< Position of Surge Absorber >



(220V)



(380-415V)



# TROUBLESHOOTING

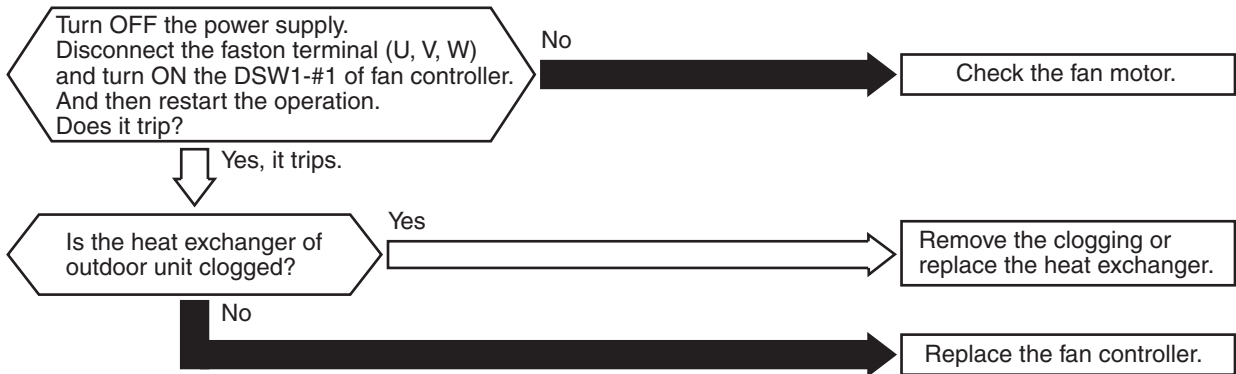
Alarm Code	<b>57</b>	Activation of Fan Controller Protection
------------	-----------	---

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ IPM (Transistor Module) has detecting function of abnormality.  
 This alarm is indicated when the abnormality is detected ten times within 30 minutes.  
 (Retry operation is performed up to the occurrence of nine times.)

Conditions of Activation:

Abnormal Current to the Transistor Module such as Short Circuited or Grounded  
 or Overcurrent  
 or Control Voltage Decrease

PCB1: Control PCB in Outdoor Unit

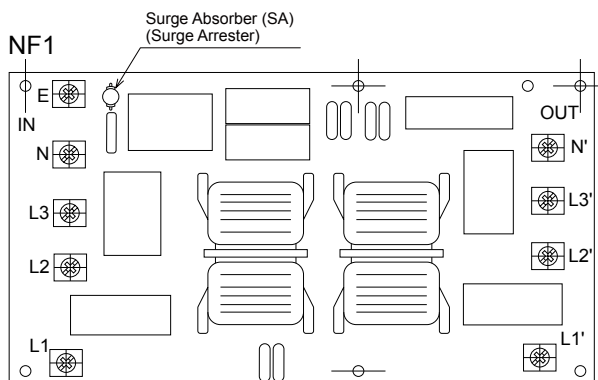


**NOTE:**

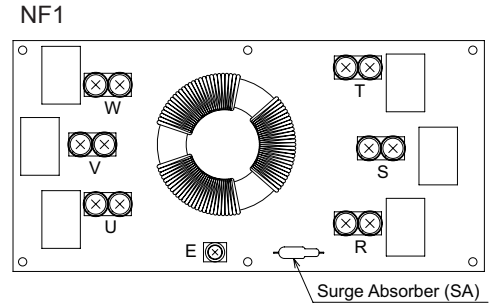
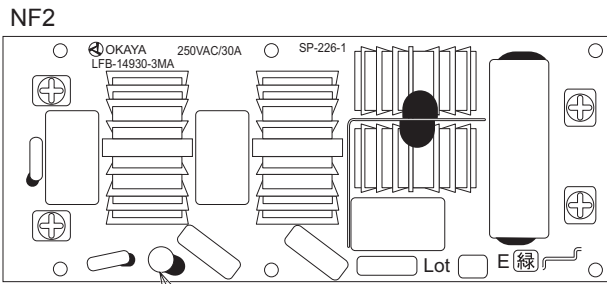
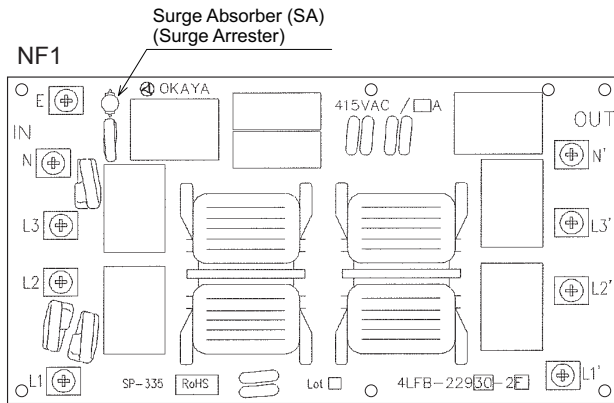
When the unit is applied the excessive surge current due to lightning or other causes, this alarm code “57” or the inverter stoppage code (IT) “11” will be indicated and the unit can not be operated. In this case, check to ensure the surge absorber/surge arrester (SA) on the noise filter (NF1). The surge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

If the inside of the surge absorber is normal, turn OFF the power once and wait for PCB2’s LED201 (red) OFF (approx. 5 min.) and turn ON again.

< Position of Surge Absorber >



< Position of Surge Absorber >



(220V)

(380-415V)

## TROUBLESHOOTING

Alarm  
Code

5A

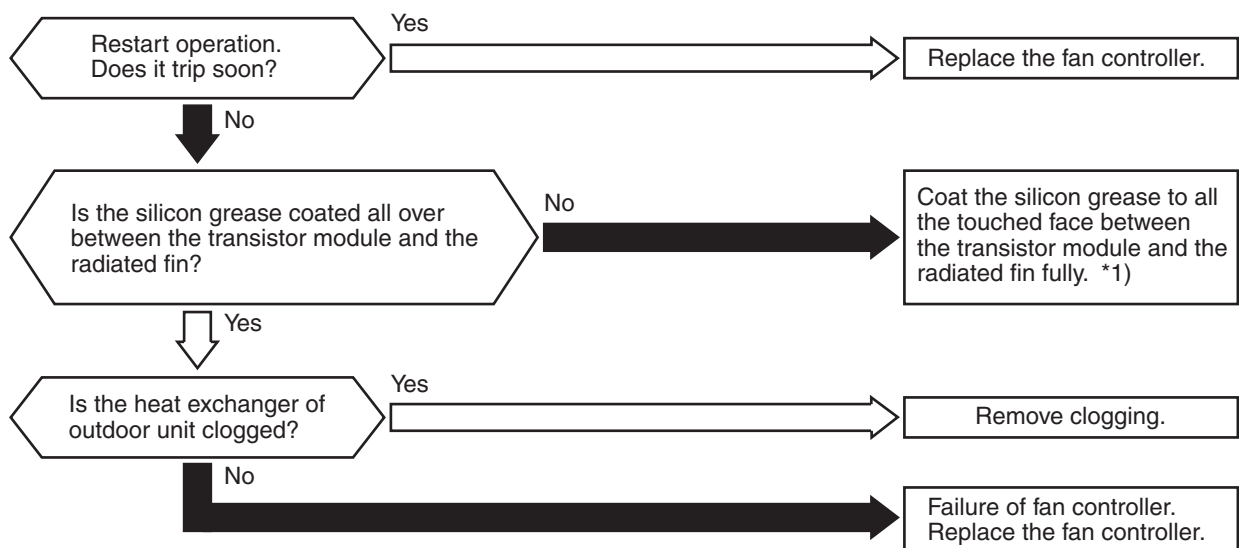
### Abnormality of Fan Controller Fin Temperature

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

- ★ This alarm is indicated when the abnormality of fin temperature occurs ten times within 30 minutes. (Retry operation is performed up to the occurrence of nine times.)

Conditions of Activation: This alarm is indicated when the thermistor temperature inside the transistor module exceeds 100°C.

PCB1: Control PCB in Outdoor Unit



\*1): Use the silicon grease provided as accessory.

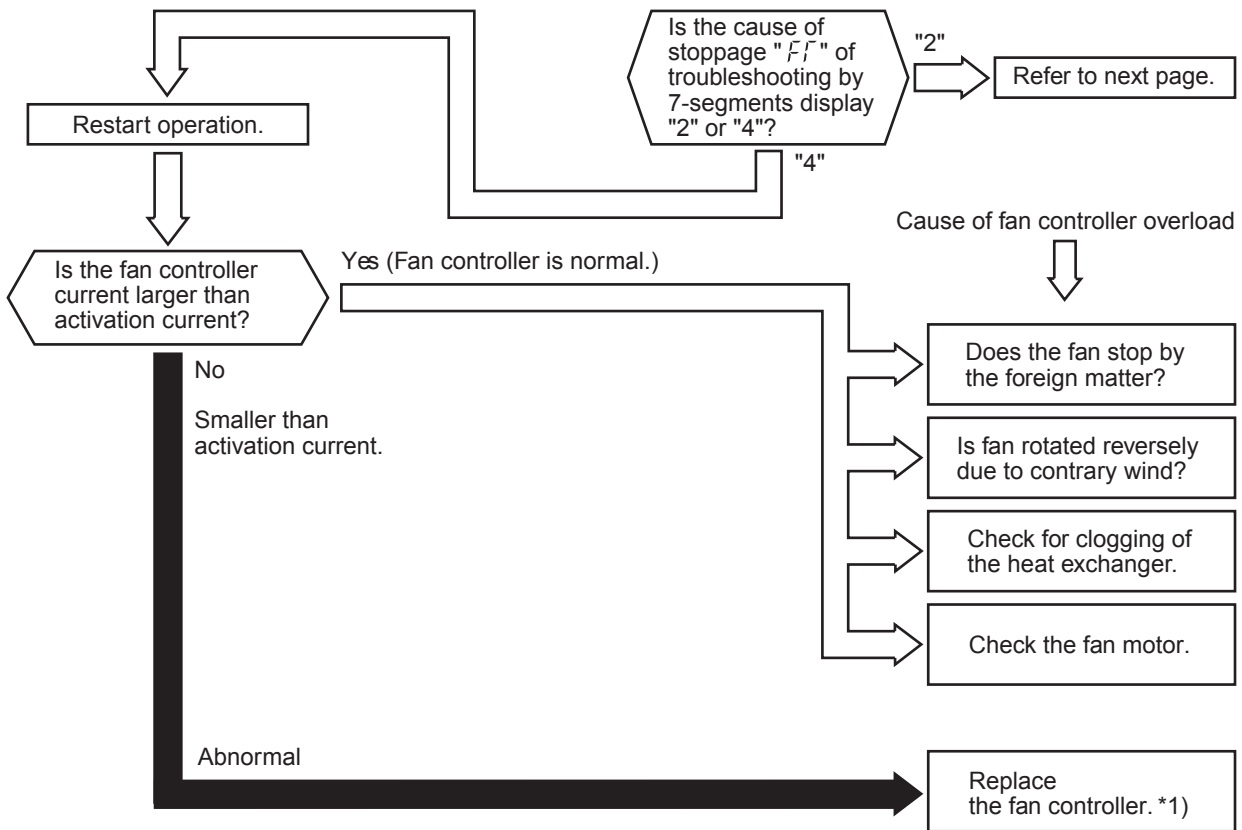
Alarm Code	<b>56</b>	Activation of Fan Controller Overcurrent Protection Device (1)
------------	-----------	--

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when fan controller electronic thermal protection is activated at ten times within 30 minutes.  
(Retry operation is performed up to the occurrence of nine times.)

Conditions of Activation:

Electric current with 105% of the rated current runs for 30 seconds continuously.  
or  
Electric current runs intermittently and the accumulated time reaches up to 3 minutes, in 10 minutes.

PCB1: Control PCB in Outdoor Unit



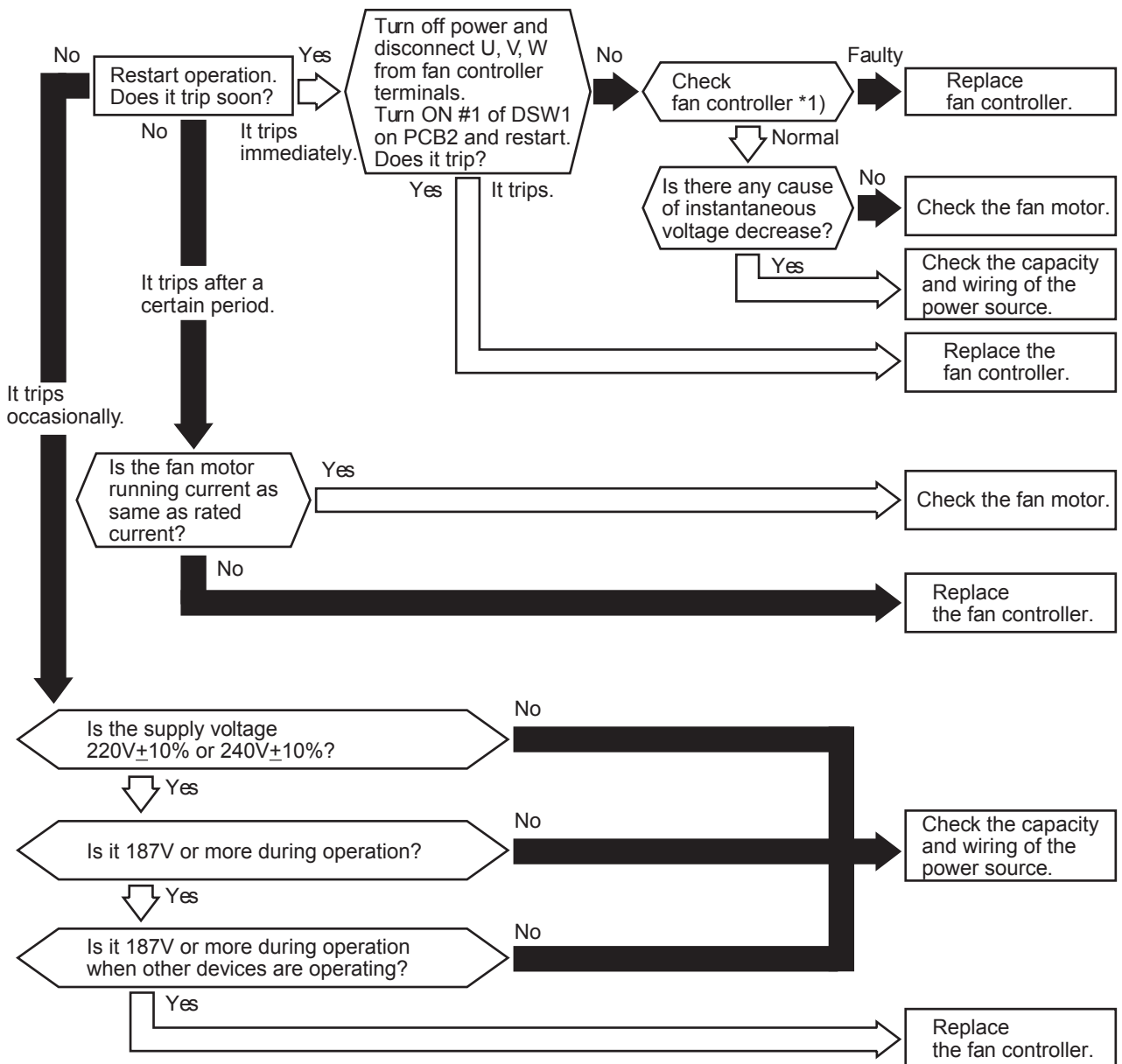
\*1): Perform electrical discharge when replacing or checking fan controller by referring to the item 3.3 in *Troubleshooting*.

# TROUBLESHOOTING

Alarm Code	<b>56</b>	Activation of Fan Controller Overcurrent Protection Device (2)
------------	-----------	--

- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.
- ★ This alarm is indicated when instantaneous overcurrent occurs at ten times within 30 minutes. (Retry operation is performed up to the occurrence of nine times.)
- Conditions of Activation: Fan controller current with 150% of the rated current.

PCB1: Control PCB in Outdoor Unit  
PCB2: Inverter PCB



\*1): Perform electrical discharge when checking or replacing fan controller by referring to the item 3.3 in *Troubleshooting*.

Alarm  
Code

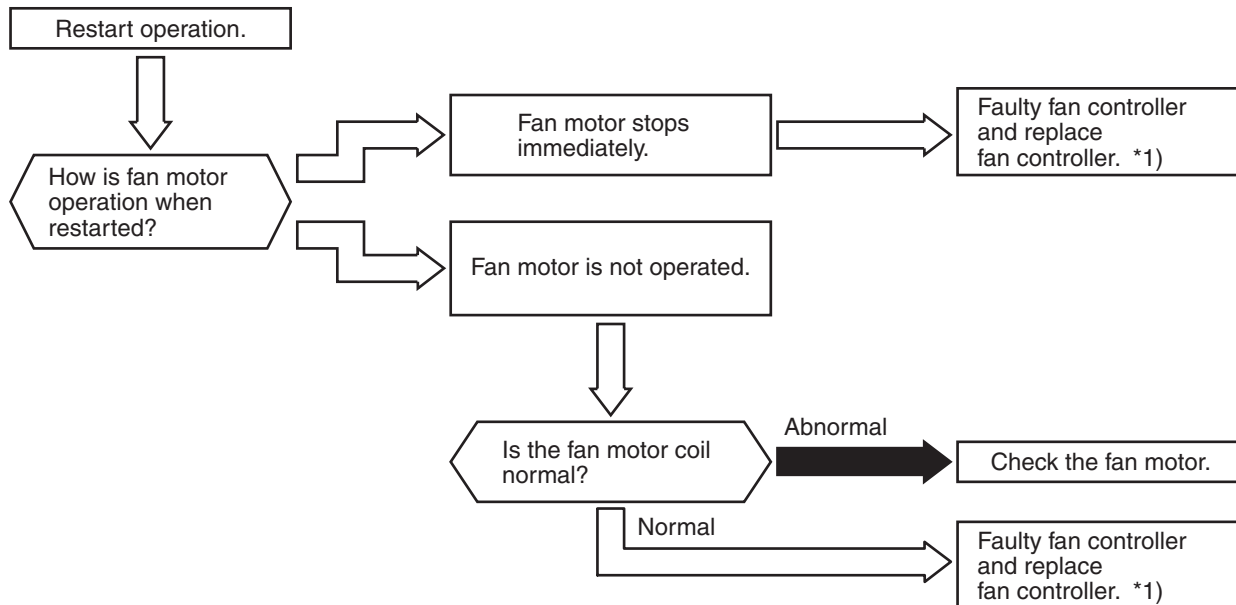
5E

## Abnormality of Fan Controller Sensor

## ★ Conditions of Activation:

This alarm is indicated when the following condition occurs.

- After fan motor operation is started, fan controller current does NOT exceed 1.5A.
- Before fan motor operation is started, fan controller peak current does NOT exceed 4A.



\*1): Perform electrical discharge when checking or replacing fan controller by referring to the item 3.3 in *Troubleshooting*.

Alarm  
Code

EE

## Compressor Protection Alarm

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

*Alarm Code:**Content of Abnormality*

02	<i>Activation of Protection Device (High Pressure Cut)</i>
07	<i>Decrease in Discharge Gas Superheat</i>
08	<i>Increase in Discharge Gas Temperature</i>
39	<i>Abnormality of Running Current at Constant Speed Compressor</i>
43	<i>Activation of Low Compression Ratio Protection Device</i>
44	<i>Activation of Low Pressure Increase Protection Device</i>
45	<i>Activation of High Pressure Increase Protection Device</i>
47	<i>Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)</i>

These alarms are able to be checked by the CHECK Mode 1. Follow the action indicated in each alarm chart.

These alarms are cleared only by turning OFF the main power switch to the system. **However, careful attention is required before starting, since there is a possibility which will result in serious damages to the compressors.**

## TROUBLESHOOTING

Alarm Code	61	Incorrect Setting of Unit and Refrigerant Cycle No.
------------	----	---

- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
  - The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and alarm code is indicated on the display of the outdoor unit PCB.
- ★ This alarm is indicated under the following conditions. Turn off the power source and check for DSW and RSW settings.

Conditions	Action
Unit No. (DSW6 and RSW1) or Refrigerant Cycle No. (DSW5 and RSW2) are set above “64”. Or, more than 2 pins are set at DSW5 and DSW6.	Set Unit No. and Refrigerant Cycle No. below “63”.

Alarm Code	65	Incorrect Indoor Unit Connection No. Setting
------------	----	--

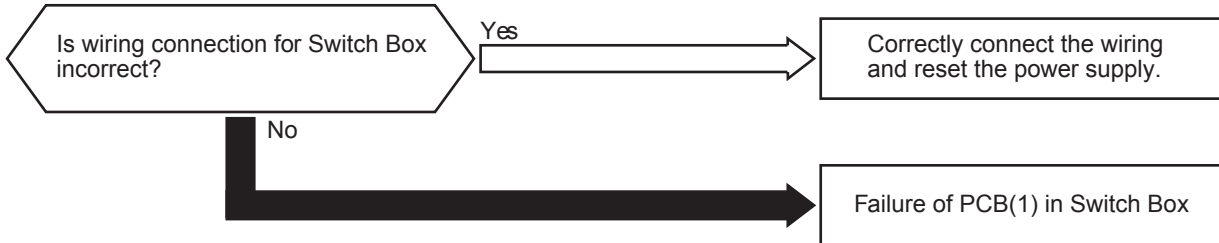
- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code is indicated on the display of the outdoor unit PCB1.  
(“35” is indicated on the display of the remote control switch.)

Alarm Code	C1	Incorrect Indoor Unit Connection (Switch Box)
------------	----	---

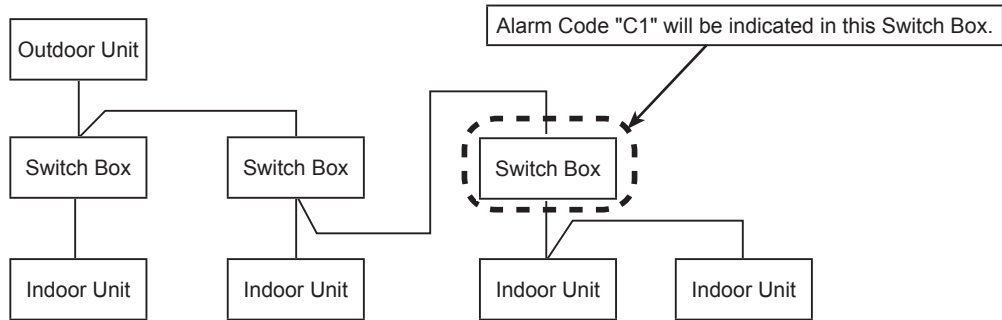
- "RUN" light flashes and "ALARM" is indicated on the remote control switch.
- The unit No., alarm code and the unit code is alternately indicated on the set temperature section, and the unit No. and alarm code are indicated on the display of the outdoor unit PCB1.

★ <Heat Recovery System>  
 This alarm is indicated when two or more Switch Boxes are connected between outdoor unit and indoor unit.

PCB1: Control PCB in Outdoor Unit  
 PCB(1): Switch Box PCB



• Alarm Code "C1" will be indicated when the units are connected as follows.





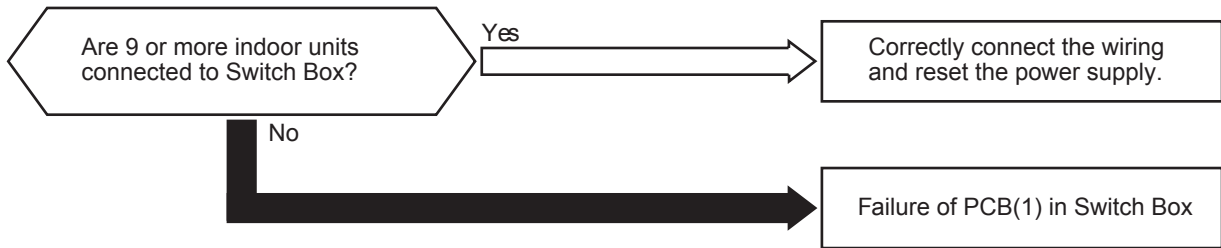
**TROUBLESHOOTING**

Alarm Code	C2	Incorrect Indoor Unit Connection No. Setting (Switch Box)
------------	----	---

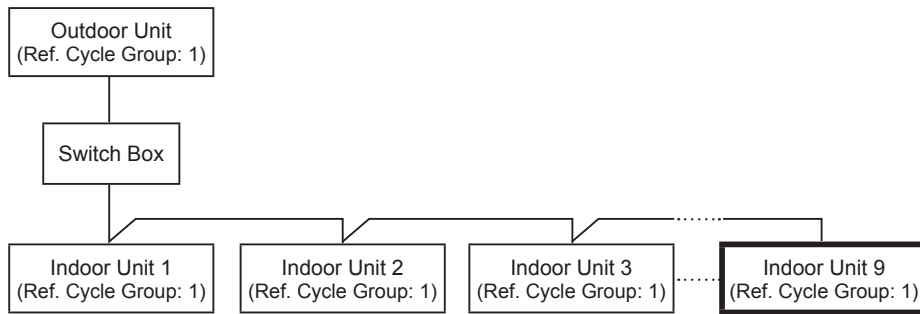
- The unit No., alarm code ("35") and the unit code is alternately indicated on the set temperature section of indoor unit connected to Switch Box.
- LED (LED4, 5, 6 ) on PCB(1) in Switch Box flashes.

★ <Heat Recovery System>  
This alarm is indicated when nine or more indoor units are connected to Switch Box.

PCB1: Control PCB in Outdoor Unit  
PCB(1): Switch Box PCB



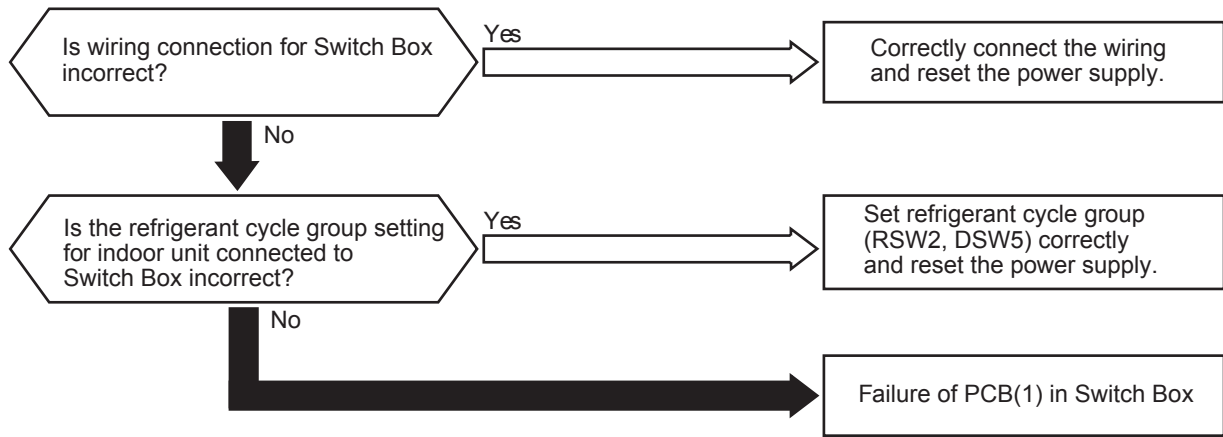
• Alarm Code "C2" will be indicated when the units are connected as follows.



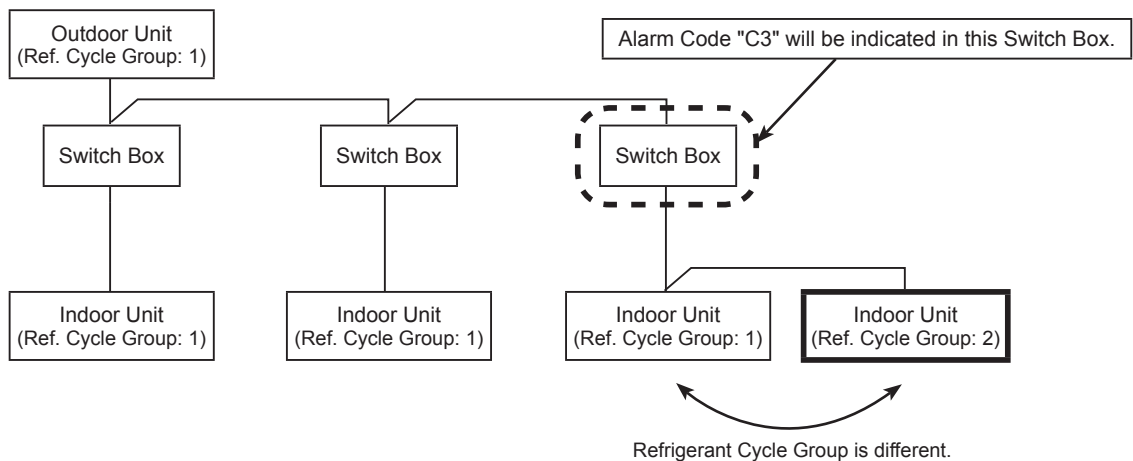
Alarm Code	C3	<b>Incorrect Indoor Unit Connection (Switch Box)</b>
------------	----	--

- The unit No., alarm code ("35") and the unit code is alternately indicated on the set temperature section of indoor unit connected to Switch Box.
- LED (LED5, 6) on PCB(1) in Switch Box flashes.
  
- ★ <Heat Recovery System>  
This alarm is indicated when indoor unit with different refrigerant cycle group is connected to Switch Box.

PCB1: Control PCB in Outdoor Unit  
PCB(1): Switch Box PCB



• Alarm Code "C3" will be indicated when the units are connected as follows.

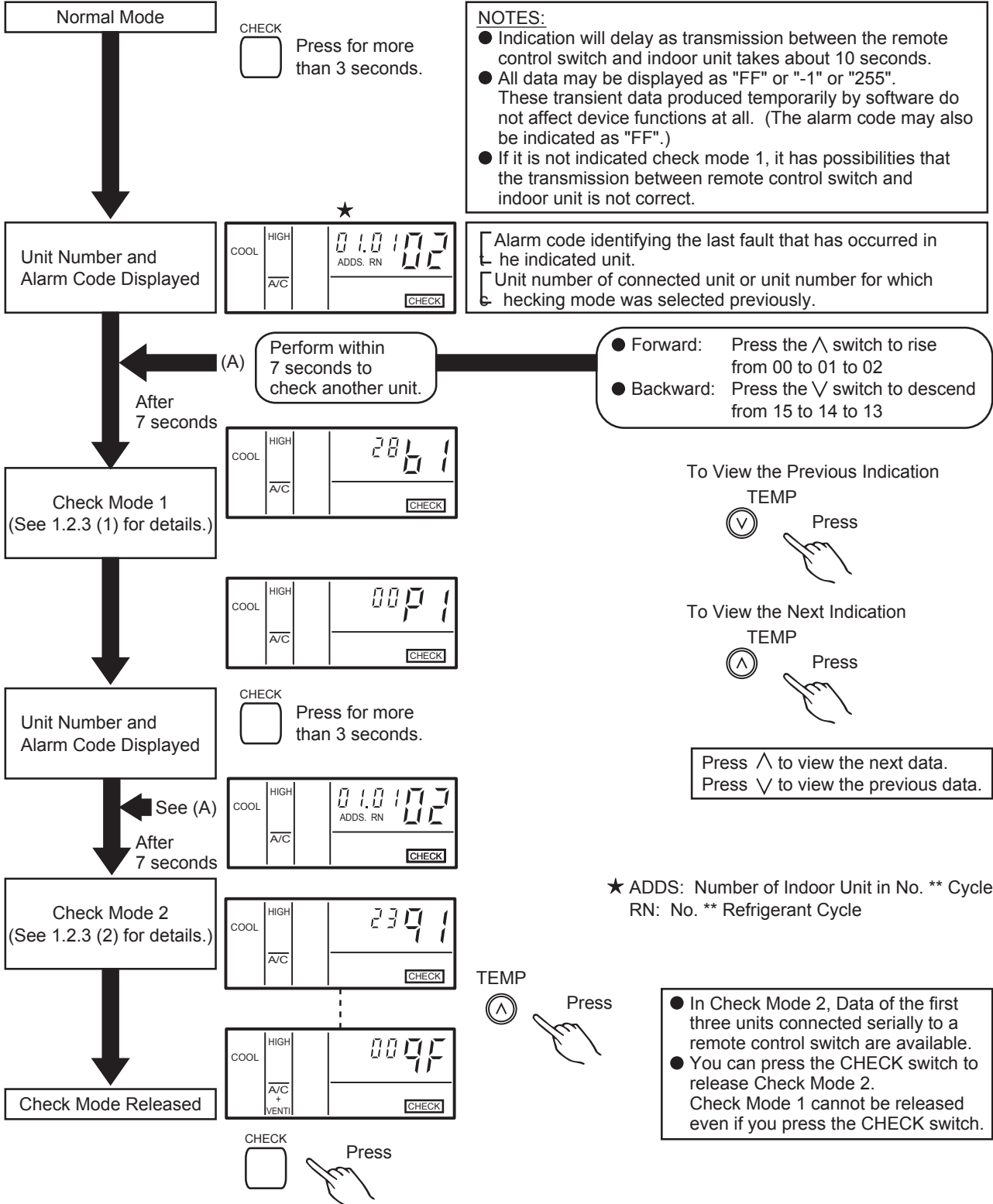
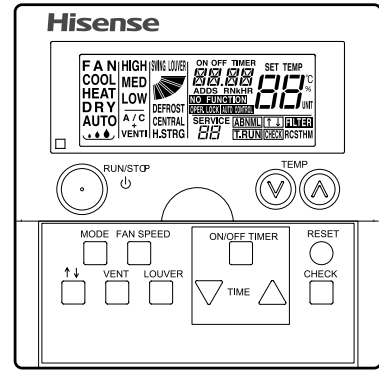


# TROUBLESHOOTING

## 2.3 Troubleshooting in Check Mode by Remote Control Switch

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

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



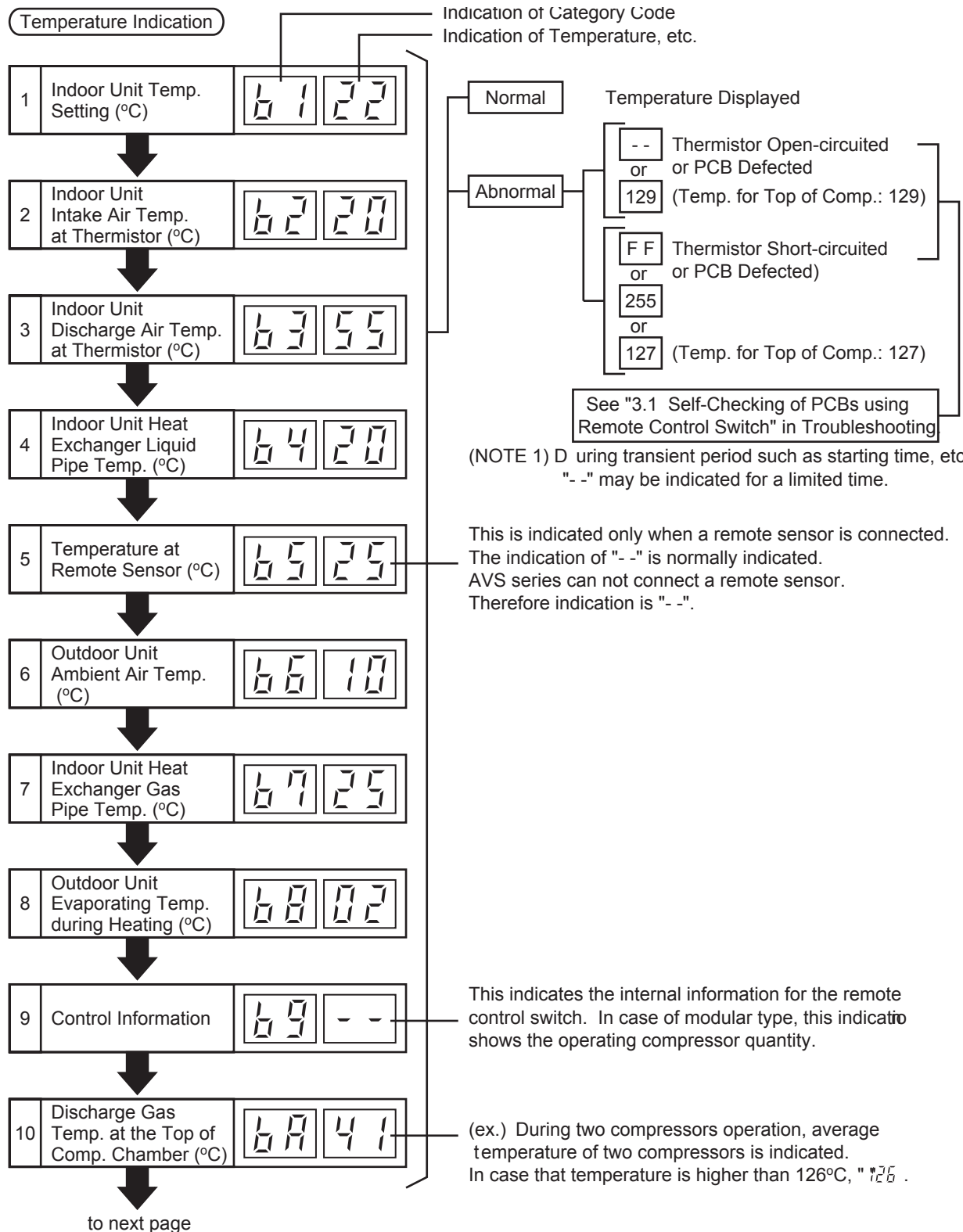
Although the wireless remote controller is used for wall type indoor unit with built-in receiver part, the alarm code can be checked by connecting wired controller to the connector of the unit and pressing the operation switch.

**NOTES:**

1. The unit is not operated by pressing operation switch.
2. The above function is available only when alarm occurs.
3. The PCB check by remote controller is not available.
4. The indication is the data when connecting wired controller, not the data before the alarm occurs.

(1) Contents of Check Mode 1

The next indication is shown by pressing the  $\wedge$  part of "TEMP" switch. If the  $\vee$  part of "TEMP" switch is pressed the previous indication is shown.



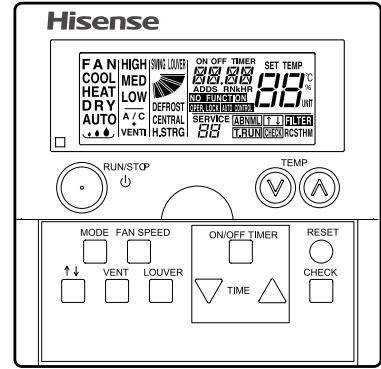
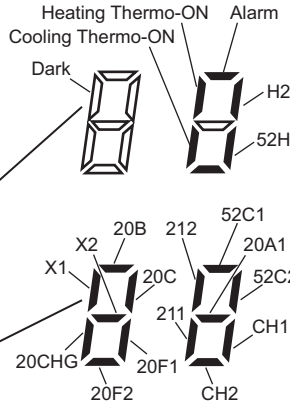
# TROUBLESHOOTING

11 Thermo Temp. of Remote Control Switch bb 23

Indication on Micro-Computer Input/Output

12 Micro-Computer Input/Output in Indoor Unit E1 4

13 Micro-Computer Input/Output in Outdoor Unit E2 -



Indication of Unit Stoppage Cause

14 Cause of Stoppage d1 01

Abnormality Occurrence Counter

15 Abnormality Occurrence Times E1 01

16 Instantaneous Power Failure Occurrence Times in Indoor Unit E2 00

17 Transmission Error Occurrence Times between Remote Control Switch and Indoor Unit E3 00

18 Abnormality Occurrence Times on Inverter E4 00

Indication of Automatic Louver Condition

19 Louver Sensor F1 00

00	Operation OFF, Power OFF
01	Thermo-OFF (NOTE 1), Activating Float Switch
02	Alarm (NOTE 2)
03	Freeze Protection, Overheating Protection
05	Instantaneous Power Failure at Outdoor Unit, Reset (NOTE 3)
06	Instantaneous Power Failure at Indoor Unit, Reset (NOTE 4)
07	Stoppage of Cooling Operation due to Low Outdoor Air Temperature, Stoppage of Heating Operation due to High Outdoor Air Temperature
09	Reversing Valve Changeover, Stoppage
10	Demand, Enforced Stoppage
11	Retry due to Pressure Ratio Decrease
12	Retry due to Low Pressure Increase
13	Retry due to High Pressure Increase
14	Retry due to Abnormal Current of Constant Compressor
15	Retry due to Abnormal High Temperature of Discharge Gas, Excessively Low Suction Pressure
16	Retry due to Decrease of Discharge Gas Superheat
17	Retry due to Inverter Abnormality
18	Retry due to Voltage Decrease, Other Retry due to Inverter
19	Expansion Valve Opening Change Protection
21	Thermo-OFF by Oil Return Control
22	Hot Start of Outdoor Unit
26	Retry due to High Pressure Decrease
28	Cold Draft Control
30	Thermo-OFF due to Compressor Forced Stop
32	Retry due to Excessive Outdoor Unit Number

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

Countable up to 99.  
Over 99 times, "99" is always indicated.  
(NOTE 1) If a transmitting error continues for 3 minutes, one is added to the occurrence times.

to next page

**Compressor Pressure/Frequency Indication**

20 Discharge Pressure (High) (x 0.1 MPa) 41 18

21 Suction Pressure (Low) (x 0.01 MPa) 42 04

22 Control Information 43 44

This is an indication for internal information for the remote control switch. This does not have any specific meaning.

23 Operation Frequency (Hz) 44 44

This is an indication for frequency of Inverter.

**Indoor Unit Capacity Indication**

24 Indoor Unit Capacity 11 00

The capacity of the indoor unit is indicated as shown in the table below.

**Capacity Code of Indoor Unit**

Indication Code	Equivalent Capacity (kBtu/h)
06	07
08	09
10	12
13	14
14	17
16	18
18	22
20	24
22	26
26	27
32	38
40	48
64	76
80	96

25 Outdoor Unit Code 12 F n

"n" indicates total number of indoor units;  
 n = 1~9, A, B, C, D, E, F, U  
(10) (11) (12) (13) (14) (15) (16)

26 Refrigerant Cycle Number 13 01

27 Refrigerant Cycle Number 14 00

J3: 01 to 16  
 (01: when shipment (DSW5), Decimal Indication)  
 J4: 00 to 0F  
 (00: when shipment (DSW5), Indication with 16 numbers)

**Expansion Opening Indication**

28 Indoor Unit Expansion Valve Opening (%) 11 20

29 Outdoor Unit Expansion Valve MV1 Opening (%) 12 99

In case of models without Expansion Valve (MV2), the same figure is indicated.

30 Outdoor Unit Expansion Valve MV2 Opening (%) 13 99

31 Outdoor Unit Expansion Valve MVB Opening (%) 14 00

**Estimated Electric Current Indication**

32 Compressor Running Current (A) P1 25

The total current is indicated when several compressors are running.  
 In case of inverter compressor, the running current of primary side of inverter is indicated.

Returns to Temperature Indication

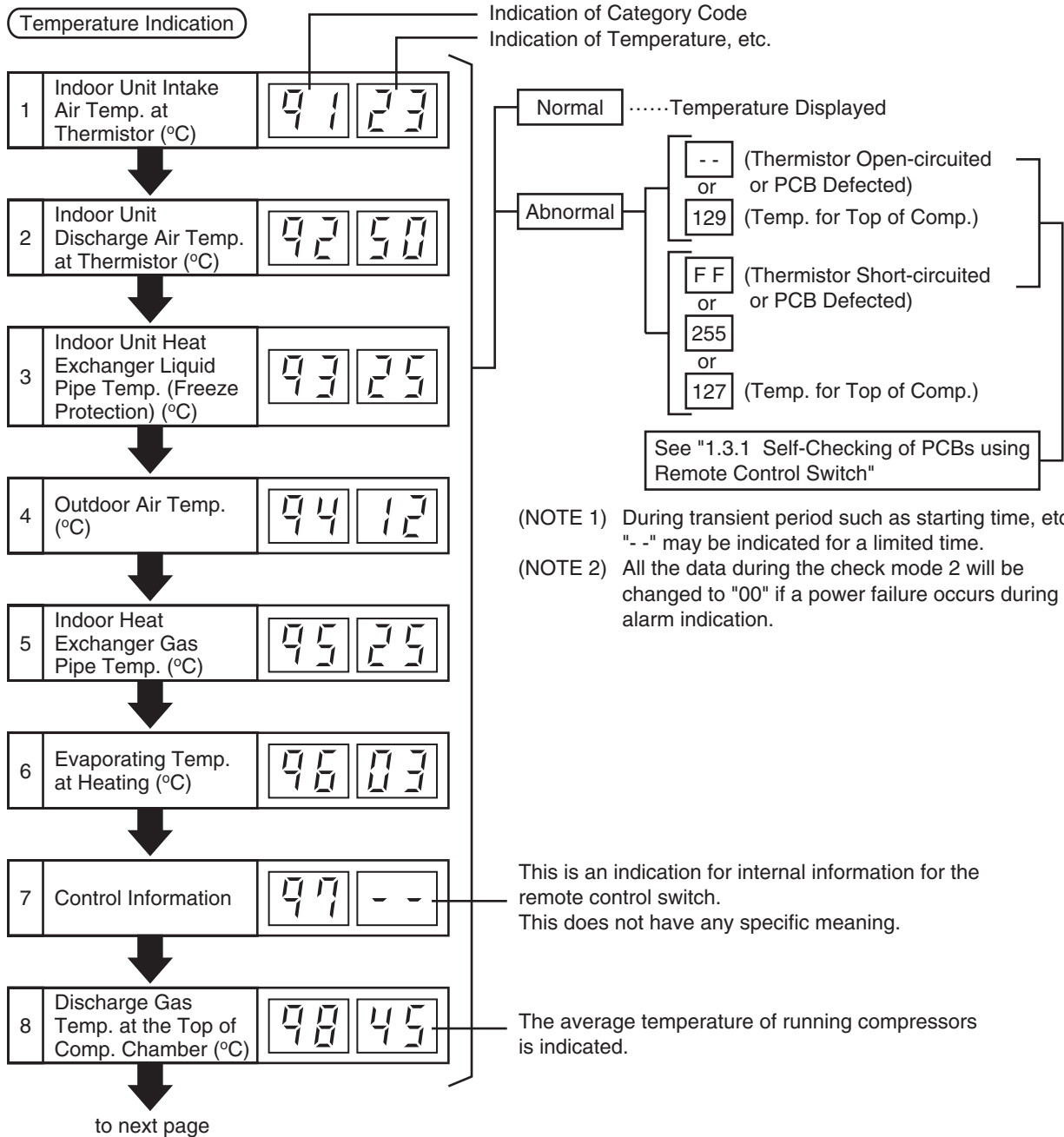
**Temperature Indication**

# TROUBLESHOOTING

## (2) Contents of Check Mode 2

The latest data of the first three indoor units only connected serially are indicated when more than three indoor units are connected to one remote control switch.

By pressing the  $\wedge$  part of "TEMP" switch, the next display is indicated, If the  $\vee$  part of "TEMP" switch is pressed, the previous display is indicated.



Compressor Pressure/Frequency Indication

9	Discharge Pressure (High) (x 0.1 MPa)	99	18
---	---------------------------------------	----	----



10	Suction Pressure (Low) (x 0.01 MPa)	99	04
----	-------------------------------------	----	----



11	Control Information	96	44
----	---------------------	----	----

This is an indication for internal information for the remote control switch. This does not have any specific meaning.



12	Operating Frequency (Hz)	95	44
----	--------------------------	----	----

This is an indication for frequency of inverter.



Expansion Opening Indication

13	Indoor Unit Expansion Valve Opening (%)	98	20
----	---	----	----



14	Outdoor Unit Expansion Valve MV1 Opening (%)	95	99
----	--	----	----



Estimated Electric Current Indication

15	Compressor Running Current (A)	95	20
----	--------------------------------	----	----

The total value is indicated when two compressors are running.



Returns to Temperature Indication

Temperature Indication



## 2.4 Troubleshooting by 7-Segment Display

Only the authorized person can check with this method. Operating conditions and each part of refrigeration cycle can be checked by 7-segments and push switches on the PCB1 in the outdoor unit.

### (1) Before Checking

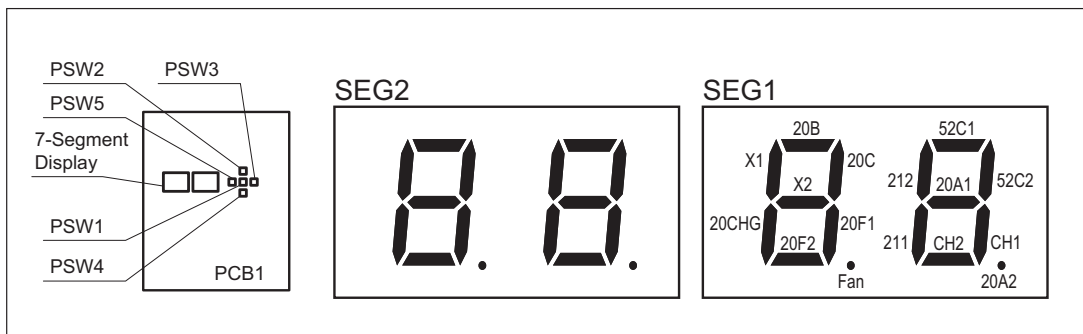
- (a) Turn ON main power source. Wait for more than 20 seconds to start checking.
- (b) Checking Items
  - \* Connecting Information
  - \* Outdoor Unit Information
  - \* Indoor Unit Information
  - \* Cause of Alarm Code Information
  - \* Alarm Code History Information
- (c) Check the location of 7-segments and push switches.

## ! WARNING

**AC220-240V is applied to PCB and electrical parts. Never touch electrical parts and wires when checking.**

### (2) Location of Push Switches and 7-segments Display

The push switches and 7-segments display are located on the PCB1.



(3) Protection Control Code on 7-Segment Display

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

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

< Priority Order >

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>&lt;1&gt; Pressure Ratio Control</li> <li>&lt;2&gt; High-Pressure Increase Protection</li> <li>&lt;3&gt; Current Protection</li> <li>&lt;4&gt; Inverter Fin Temperature Increase Protection</li> <li>&lt;5&gt; Discharge Gas Temperature Increase Protection</li> </ul> | <ul style="list-style-type: none"> <li>&lt;6&gt; Low-Pressure Decrease Protection</li> <li>&lt;7&gt; Demand Current Control<br/>(Running Current Limit Control)</li> <li>&lt;8&gt; Low-Pressure Increase Protection</li> <li>&lt;9&gt; High-Pressure Decrease Protection</li> </ul> |
|--|---|

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

Code	Protection Control	Code during Degeneration Control
P01	Pressure Ratio Protection Control	Pc1
P02	High-Pressure Increase Protection	Pc2
P03	Inverter Current Protection	Pc3
P04	Inverter Fin Temperature Increase Protection	Pc4
P05	Discharge Gas Temperature on Top of Compressor Increase Protection	Pc5
P06	Low-Pressure Decrease Protection	Without
P09	High-Pressure Decrease Protection	
P08	Demand Current Protection Control	
P0d	Low-Pressure Increase Protection	

Code	Retry Control	Code during Degeneration Control
P11	Pressure Ratio Decrease Retry	Without
P12	Low-Pressure Increase Retry	
P13	High-Pressure Increase Retry	
P14	Overcurrent Retry of Constant Speed Compressor	
P15	Discharge Gas Temperature Increase Retry/Low-Pressure Decrease Retry	
P16	Discharge Gas SUPERHEAT Decrease Retry	
P17	Inverter Abnormality Retry	
P18	Abnormal Inverter Voltage Retry/Inverter Failure Retry	
P26	High-Pressure Decrease Retry	

**NOTE:**

- (1) Retry indication continues for 30 minutes unless a protection control is indicated.
- (2) Retry indication disappears if the stop signal comes from all rooms.
- (3) The protection control code being indicated on 7-segment display is changed to an alarm code when the abnormal operation occurs. Also, the same alarm code is indicated on the remote control switch.
- (4) In case that the degeneration control is activated, the indications Pc1 to Pc5 are indicated instead of P01 to P05.

## TROUBLESHOOTING

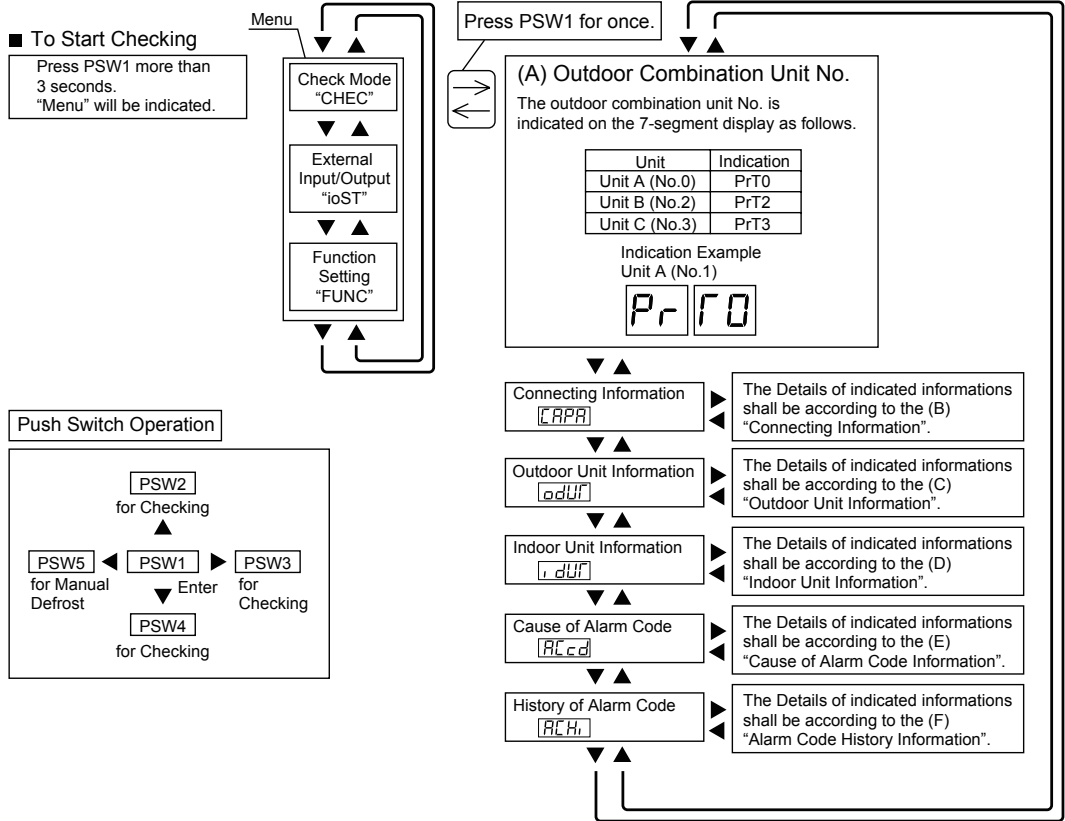
- (4) Activating Condition of Protection Retry Control Code  
 Protection Control or Retry Control is performed to prevent the abnormal operation.  
 The activating conditions are shown in the table below.

Code	Protection Control	Activating Condition	Remarks						
P01	Pressure Ratio Protection Control	Compression Ratio $\varepsilon \geq 8.5$ or Compression Ratio $\varepsilon \leq 2.0$	-						
P02	High-Pressure Increase Protection	Discharge Pressure $P_d \geq 3.45$ (at Cooling Mode) $P_d \geq 3.35$ (at Heating Mode and Heat Recovery Mode)	-						
P03	Inverter Current Protection	Inverter Output Current $\geq (a)A$ <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>(a)</td> </tr> <tr> <td>380-415V</td> <td>22.5</td> </tr> <tr> <td>220V</td> <td>38.5</td> </tr> </table>		(a)	380-415V	22.5	220V	38.5	-
	(a)								
380-415V	22.5								
220V	38.5								
P04	Inverter Fin Temperature Increase Protection	Inverter Fin Temperature $\geq 80^\circ C$	-						
P05	Discharge Gas Temperature Increase Protection	Temperature at the Top of Compressor $T_d \geq 112^\circ C$	-						
P06	Low-Pressure Decrease Protection	Suction Pressure $P_s \leq 0.1MPa$	-						
P09	High-Pressure Decrease Protection	Discharge Pressure $P_d \leq 1.0MPa$	-						
P0A	Demand Current Protection Control	Running Current for Compressor $\geq$ Demand Current Setting Value	Demand Current Setting Value: Upper limit of total running current is set 100%, 80%, 70%, 60% and 40% at normal operation.						
P0d	Low-Pressure Increase Protection	Suction Pressure $\geq 1.3MPa$	-						

Code	Retry Control	Activating Condition	Remarks											
P11	Pressure Ratio Decrease Retry	Pressure Ratio $\varepsilon < 1.8$	When activating 3 times in 30 minutes, "43" alarm is indicated.											
P12	Low-Pressure Increase Retry	$P_s > 1.4MPa$	When activating 3 times in 30 minutes, "44" alarm is indicated.											
P13	High-Pressure Increase Retry	$P_d \geq 3.8MPa$	When activating 3 times in 30 minutes, "45" alarm is indicated.											
P14	Overcurrent Retry of Constant Compressor	* $i_{co} < 2.5A$ over 50ms * $i_{co} \geq i_{comax}$ over 50ms ico: Running Current of Constant Compressor icomax: Maximum Current of Constant Compressor <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2">Constant Comp.</td> <td colspan="2">icomax</td> </tr> <tr> <td>380-415V</td> <td>220V</td> </tr> <tr> <td>E655</td> <td>15.5A</td> <td>30.0A</td> </tr> <tr> <td>E855</td> <td>21.0A</td> <td>40.5A</td> </tr> </table>	Constant Comp.	icomax		380-415V	220V	E655	15.5A	30.0A	E855	21.0A	40.5A	When activating 3 times in 30 minutes, "39" alarm is indicated.
Constant Comp.	icomax													
	380-415V	220V												
E655	15.5A	30.0A												
E855	21.0A	40.5A												
P15	Discharge Gas Temperature Increase Retry	Discharge Gas Temperature $\geq 132^\circ C$ over 10 minutes or Discharge Gas Temperature $\geq 140^\circ C$ over 5 seconds	When activating 3 times in 60 minutes, "08" alarm is indicated.											
	Low-Pressure Decrease Retry	$P_s < 0.09MPa$ over 12 minutes	When activating 3 times in 60 minutes, "47" alarm is indicated.											
P16	Discharge Gas SUPERHEAT Decrease Retry	Discharge Gas SUPERHEAT $\leq T_c + 10$ deg. over 30 minutes. Tc: Saturation Temperature	When activating 3 times in 120 minutes, "07" alarm is indicated.											
P17	Inverter Abnormality Retry	Instantaneous Overcurrent	When activating 6 times in 30 minutes, "48" alarm is indicated.											
		Abnormality of Current Sensor	When activating 3 times in 30 minutes, "51" alarm is indicated.											
		IPM Error	When activating 7 times in 30 minutes, "53" alarm is indicated.											
		Fin Temperature $\geq 100^\circ C$	When activating 3 times in 30 minutes, "54" alarm is indicated.											
P18	Abnormal Inverter Voltage Retry	Insufficient Voltage at Inverter Circuit	When activating 3 times in 30 minutes, "06" alarm is indicated.											
		Excessive Voltage at Inverter Circuit	When activating 3 times in 30 minutes, "06" alarm is indicated.											
	Inverter Failure Retry	Actual Inverter Frequency is 0Hz over 3 seconds after Inverter Frequency is outputted.	When activating 3 times in 30 minutes, "55" alarm is indicated.											
P26	High-Pressure Decrease Retry	$P_d < T_a / 130 + 0.1MPa$ over 4 minutes or $P_d < 1.0MPa$ over 60 minutes Ta: Ambient Temperature	Without Alarm											

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

- (5) Alarm Code  
Refer to the item 2.1.
- (6) Checking Method by Checking Mode



**■ To Cancel Checking Method**

Press "PSW1" for more than 3 seconds while "Menu Mode" is displayed.  
The indication of LCD will be turned off and condition will return to normal.

**NOTICE**

Make sure to cancel Checking Mode after checking is completed.

**(B) Connecting Information**

This information is indicated on the unit A (main unit) only.  
Press PSW4 (▼) to forward or press PSW2 (▲) to backward.

Unit	Indication
Unit A (No.0)	od00
Unit B (No.2)	od02
Unit C (No.3)	od03

Select the outdoor unit No. for indication.  
Press PSW3 (▶) for details information of selected unit No..  
Press PSW4 (▼) to forward or PSW2 (▲) to backward.  
The information will be indicated alternately as "Item"→"Details"  
Press PSW5 (◀) for return to Outdoor Unit No. Selection.

**Details of Indication**

Item	7-Segment Display		Details
	SEG2	SEG1	
1 Total Capacity of Connected Outdoor Units	□	CP	Total Capacity of O.U. Combination Refer to "Outdoor Unit Capacity Table".
2 Outdoor Unit Constitution Quantities	□	RR	Constitution Quantities of O.U. Combination
3 Total Capacity of Connected Indoor Units	,	CP	Total Capacity of Connected Indoor Units
4 Connected I.U. Number	,	RR	Connected Indoor Unit Number
5 Refrigerant Group		CR	Refrigerant Group Number (0 to 64)
6 Total Capacity of Operated I.U.		oP	Total Capacity of Operated Indoor Units Refer to "Indoor Unit Capacity Table".
7 Total Comp. Frequency		Ht	Unit: Hz
8 Accumulated Operation Time		UU	Unit: Hour (Indication x 10 Hours)

# TROUBLESHOOTING

## (C) Outdoor Unit Information

Select the outdoor combination unit No. for indication.  
When the selection is changed, press PSW4 (▼) to forward or PSW2 (▲) to backward.

Unit	Indication
Unit A (No.0)	0d00
Unit B (No.2)	0d02
Unit C (No.3)	0d03

Select the outdoor combination unit No. for indication by pressing PSW4 or PSW2.  
Press PSW3 (▶) for details information.  
Press PSW4 (▼) to forward or PSW2 (▲) to backward.  
The information will be indicated alternately as "Item"→"Details"  
Press PSW5 (◀) for return to Outdoor Combination Unit No. Selection.

### Details of Indication

Item	7-Segment Display		Details
	SEG2	SEG1	
1 Outdoor Unit Capacity	CR	0	Unit Capacity Indication Refer to "Outdoor Unit Capacity Table"
2 Output State of Outdoor Micro-Computer	SC	0	Output State of Outdoor Micro-Computer Indication Refer to "Location of Push Switches and 7-Segment Display"
3 Running Frequency of Inverter Compressor MC1	H1	0	Running Frequency of INV. Compressor Indication (Hz)
4 Total Number of Running Compressor	CC	0	Total Number of Running Compressor Indication
5 Air Flow Rate	F0	0	Air Flow Rate Indication (0 to 25 Steps)
6 Outdoor Expansion Valve MV1 Opening	E1	0	Outdoor Expansion Valve MV1 Opening Indication (Unit: %)
7 Outdoor Expansion Valve MVB Opening for Bypass	Eb	0	Expansion Valve Opening for Bypass Indication (Unit: %)
8 Discharge Pressure (High)	Pd	0	Unit: MPa Indication of Thermistor Open Circuit: 562 Indication of Thermistor Short Circuit: -052
9 Suction Pressure (Low)	PS	0	Unit: MPa Indication of Thermistor Open Circuit: 225 Indication of Thermistor Short Circuit: -025
10 Ambient Air Temperature (Ta)	T0	0	Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
11 Discharge Gas Temperature on the Top of Compressor MC1 (TD1)	Td	10	Unit: °C Indication of Thermistor Open Circuit: 0 Indication of Thermistor Short Circuit: 255
12 Discharge Gas Temperature on the Top of Compressor MC2 (TD2)	Td	20	Unit: °C Indication of Thermistor Open Circuit: 0 Indication of Thermistor Short Circuit: 255 AVWT-136 to AVWT-170 only
13 Evaporating Temperature TE at Heating	TE	0	Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
14 Outdoor Heat Exchanger Gas Temperature	TE	0	Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
15 Supercooling Temperature	TC	40	Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
16 Supercooling Temperature at Bypass	Tb	00	Unit: °C Indication of Thermistor Open Circuit: -127 Indication of Thermistor Short Circuit: 127
17 Inverter Fin Temperature	TF	0	Unit: °C
18 Fan Controller Fin Temp.	TF	F0	Unit: °C
19 Compressor MC1 Current *1)	R1	0	Unit: A
20 Compressor MC2 Current *1)	R2	0	Unit: A AVWT-136 to AVWT-170 only
21 Fan Motor (MFO1) Current *1)	RF	0	Unit: A
22 Accumulated Operation Time of Compressor MC1	UU	10	Unit: Hour (Indication x 10 Hours)
23 Accumulated Operation Time of Compressor MC2	UU	20	Unit: Hour (Indication x 10 Hours) AVWT-136 to AVWT-170 only
24 Accumulated Operation Time of Compressor MC1	cU	10	Unit: Hour (Indication x 10 Hours) Accumulated operation time can be reset. *2)
25 Accumulated Operation Time of Compressor MC2	cU	20	Unit: Hour (Indication x 10 Hours) AVWT-136 to AVWT-170 only Accumulated operation time can be reset. *2)
26 Cause of Inverter Stoppage	rF	10	Refer to "Inverter Stoppage Cause Table" <span style="margin-left: 20px;">rF10</span> O.U. No.
27 Cause of Fan Controller Stoppage	Ff	10	Refer to "Fan Controller Stoppage Cause Table" <span style="margin-left: 20px;">Ff10</span> O.U. No.

\*1) The indicated current is reduced value. Use a clamp meter for the accurate current value.

\*2) For resetting the accumulated operation time, press "PSW1 + PSW3" for 5 seconds while the accumulated data is displayed.

(Example)



NOTE: The outdoor unit No. is indicated on the one digit of "SEG1".

### ● Outdoor Unit Capacity Table

Indication	Capacity (kW)	kBtu/h
64	22.4	76
80	28.0	96
96	33.5	114
112	40.0	136
128	45.0	154
144	50.0	170

### NOTE:

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

**(D) Indoor Unit Information**

This information is indicated on the unit A (main unit) only.  
 Select the indoor unit number for the information indication.  
 Press PSW4 (▼) to forward or press PSW2 (▲) for backward.

Unit No.	Indication
No.0	, d00
No.1	, d01
↓	↓
No.63	, d63

Select the indoor unit No. for indication.  
 Press PSW3 (▶) for details information of selected unit No..  
 Press PSW4 (▼) to forward or PSW2 (▲) to backward.  
 The information will be indicated alternately as "Item"→"Details"  
 Press PSW5 (◀) for return to Indoor Unit No. Selection.

**Details of Indication**

Item	7-Segment Display		Details
	SEG2	SEG1	
1 Indoor Unit Capacity	CR	00	Unit Capacity Indication Refer to "Indoor Unit Capacity Table".
2 Expansion Valve Opening	, E	00	Unit: %
3 Heat Exchanger Liquid Piping Temp.	FL	00	Unit: °C
4 Heat Exchanger Gas Piping Temp.	FG	00	Unit: °C
5 Air Inlet Temp.	Fi	00	Unit: °C
6 Air Outlet Temp.	Fo	00	Unit: °C
7 Unit Stoppage Cause Code	d1	00	Indoor Unit Stoppage Cause Code Indication Refer to "Cause of Indoor Unit Stoppage Table".

(Example)



**NOTE:** The indoor unit No. is indicated on "SEG1" .

● **Indoor Unit Capacity Table**

Indication	Capacity (kW)	kBtu/h	Indication	Capacity (kW)	kBtu/h	Indication	Capacity (kW)	kBtu/h
6	2.2	7	16	5.6	18	40	14.0	48
8	2.8	9	18	6.3	22	48	16.0	54
10	3.6	12	20	7.1	24	64	22.4	76
11	4.0	13	22	8.0	27	80	28.0	96
13	4.5	14	26	9.0	30	128	45.0	154
14	5.0	17	32	11.2	38	160	56.0	190

**(E) Cause of Alarm Code Information**

This information is indicated on the unit A (main unit) only.  
 Press PSW4 (▼) to forward or press PSW2 (▲) to backward.  
 The indication will be indicated alternately as "Item"→"Details".

**Details of Indication**

Item	7-Segment Display		Details
	SEG2	SEG1	
1 Alarm Cause Code		RC	Latest O.U. Stoppage Alarm Code Indication Refer to "Alarm Code Table".
2 Degeneracy Control for Pressure Ratio Decrease Protection	C	11	□: Degeneracy Control is not Activated. ! : Degeneracy Control is Activated.
3 Degeneracy Control for High Pressure Increase Protection	C	13	□: Degeneracy Control is not Activated. ! : Degeneracy Control is Activated.
4 Degeneracy Control for Inverter Fin Temp. Increase Protection	C	14	□: Degeneracy Control is not Activated. ! : Degeneracy Control is Activated.
5 Degeneracy Control for Discharge Gas Temp. Increase Protection	C	15	□: Degeneracy Control is not Activated. ! : Degeneracy Control is Activated.
6 Degeneracy Control for Td SH Decrease Protection	C	16	□: Degeneracy Control is not Activated. ! : Degeneracy Control is Activated.
7 Degeneracy Control for Overcurrent Protection	C	17	□: Degeneracy Control is not Activated. ! : Degeneracy Control is Activated.

## TROUBLESHOOTING

### (F) Alarm Code History Information

This information is indicated on the unit A (main unit) only.  
 If history of abnormality exists, it is indicated maximum 15 case in chronological order.  
 Press PSW4 (▼) to forward or press PSW2 (▲) for backward.

Select the data No. for indication by pressing PSW4 or PSW2.  
 Press PSW3 (▶) for details information.  
 Press PSW4 (▼) to forward or PSW2 (▲) to backward.  
 Press PSW5 (◀) for return to Combination Unit No. Selection.

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

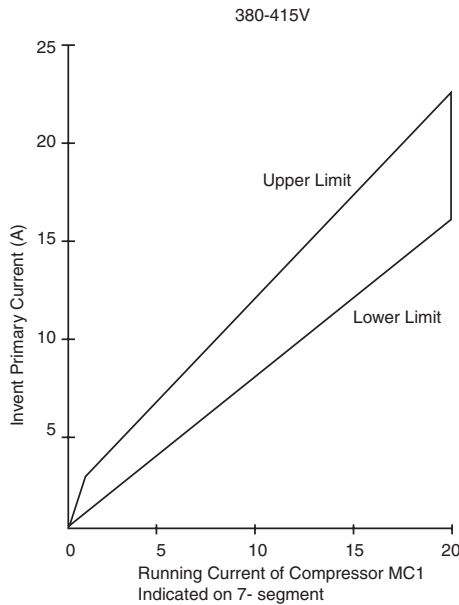
#### Details of Indication

Item	7-Segment Display		Details
	SEG2	SEG1	
1 Unit Accumulated Operation Time	07	08	O.U. Accumulated Operation Time at Stoppage Unit: Hour (Indication x 10 Hours)
2 Cause of Stoppage	RC		Alarm Stoppage
	d1		Retry Stoppage
	E1		Control Information
3 Alarm/Stoppage Cause Code	01	48	Alarm and Stoppage Cause Code O.U. No. is indicated on 10 digit of SEG2. Compressor and fan controller No. are indicated on one digit of SEG2. Alarm and stoppage code are indicated on SEG1.
4 Abnormal Data Indication	IT	12	Inverter stoppage cause code is indicated when IT code is existing on SEG2.
	FT	12	Fan controller stoppage cause code is indicated when FT code is existing on SEG2.
	CF	0	Stoppage cause of constant speed compressor abnormal current is 0A stoppage.
	CF	FF	Overcurrent Stoppage of Constant Speed Comp.
	--	--	Except for the above.

(7) Running Current of Compressor

● Inverter Primary Current

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



● Indicated Running Current of Compressor MC2

The running current of the compressor MC2 is detected by current sensor. (CT2)

● Cause of Inverter Stoppage (Check Item “*i*”)

Code	Cause
1	IPM Error (Overcurrent, Decrease Voltage, Short Circuit)
2	Instantaneous Overcurrent
3	Abnormal Inverter Fin Temperature
4	Inverter Overcurrent
5	Inverter Voltage Decrease
6	Inverter Voltage Increase
7	Abnormal Inverter Transmission
8	Abnormal Current Sensor
9	Instantaneous Power Failure Abnormal Power Source Phase
11	Micro Computer Reset
12	Earth Fault Detecting
13	Abnormal Power Source Phase
16	Inverter Failure
21	Abnormal Start-up

● Cause of Fan Controller Stoppage (Check Item “*F*”)

Code	Cause
1	Driver IC Error
2	Instantaneous Overcurrent
3	Abnormal Inverter Fin Temperature
4	Inverter Overcurrent
5	Fan Controller Voltage Decrease
6	Fan Controller Voltage Increase
7	Abnormal Fan Controller Transmission
8	Abnormal Current Sensor
9	Instantaneous Power Failure
11	Micro Computer Reset
12	Earth Fault Detecting
15	Reverse Rotation
16	Fan Controller Retry
17	Abnormal Control
21	Abnormal Start-up

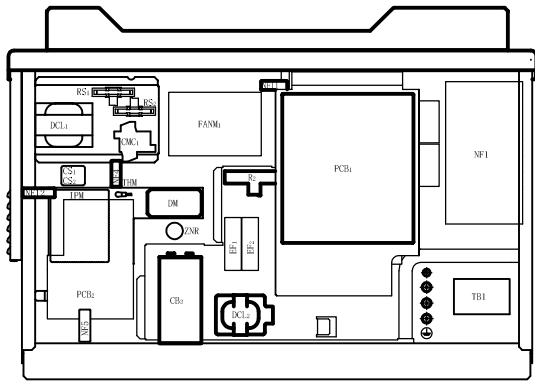


# TROUBLESHOOTING

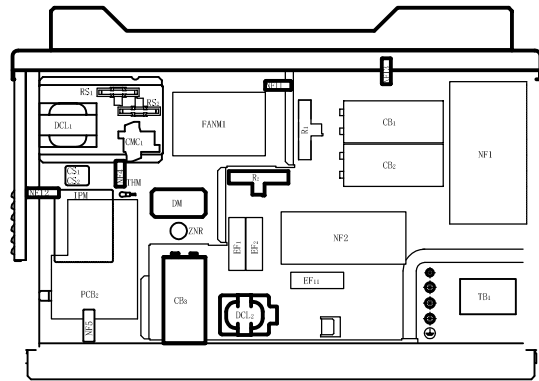
## 2.5 Function of RSW, DSWs and LEDs

<380-415V/50Hz,380V/60Hz>

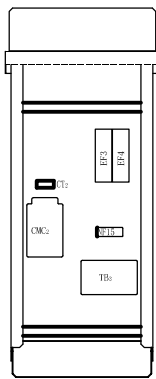
Front Side



The Interior of the Electrical Control Box



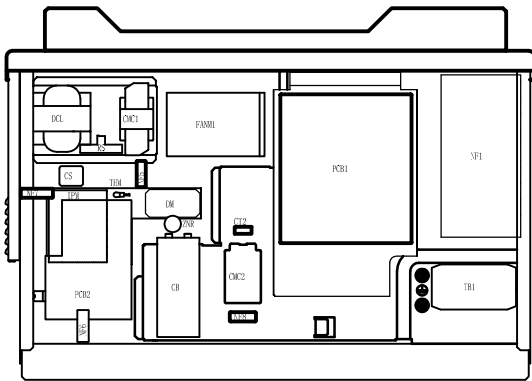
Front Side (Sub Electrical Control Box, AVWT-136 ~ 170\*)



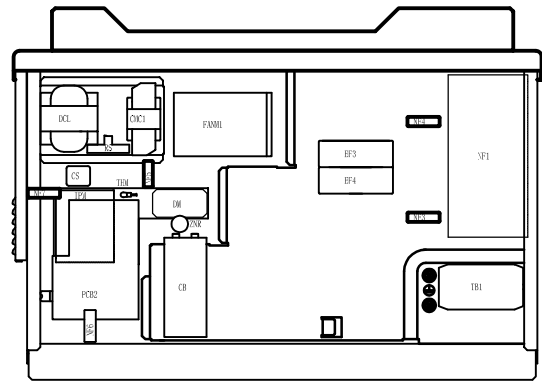
<220V/60Hz>

Model: AVWT-86~114\*

Front Side

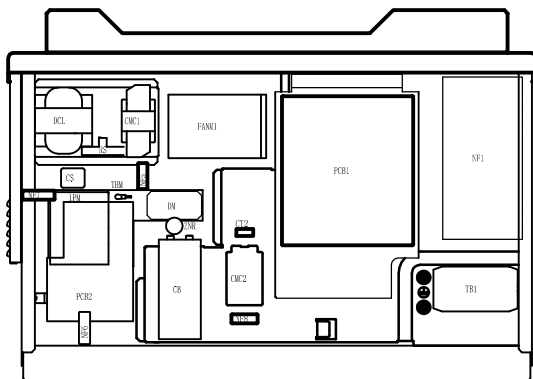


The Interior of the Electrical Control Box

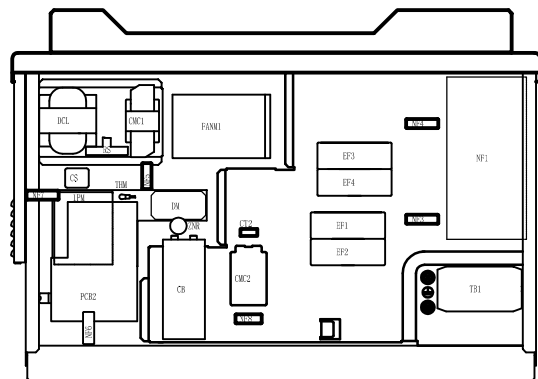


Model: AVWT-136~170\*

Front Side



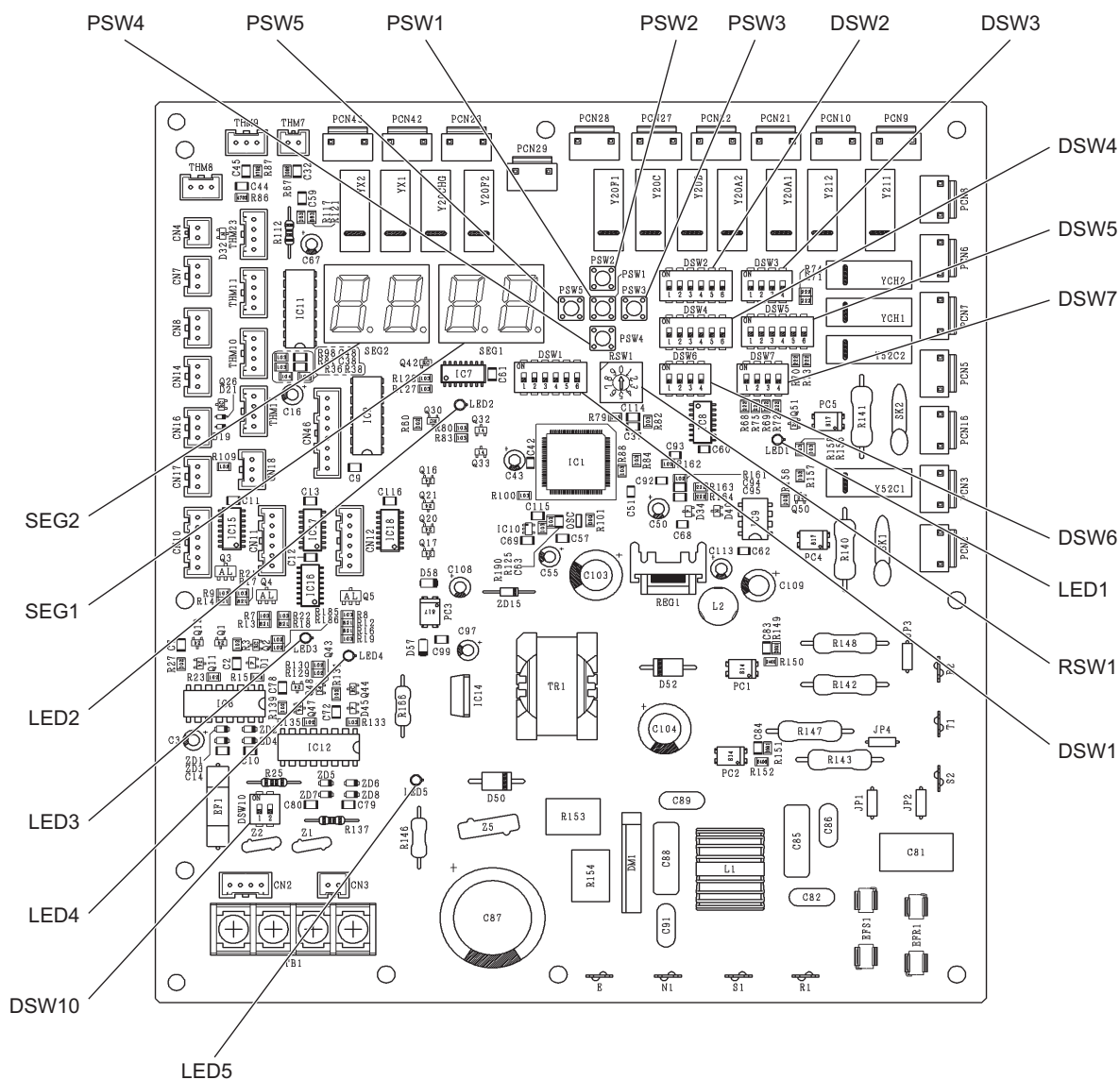
The Interior of the Electrical Control Box



■ Purpose

Symbol	PCB	Purpose
PCB1	for Control	1. Transmitting between Indoor Unit and Outdoor Unit 2. Processing for Sensor Input 3. Processing for Dip Switch Input 4. Operation Control for Above Items 1 to 3. Compressor Operation Control, Bypass Valve Control, Fan Control and Overcurrent Control 5. 7-Segment Indication 6. Processing of Safety Device Input 7. Processing of Relay Output 8. Reverse Phase Detection for Power Source
PCB2	for Inverter	1. Inverter power part is driven by instruction of PCB1 and compressor is driven. 2. Overcurrent Control 3. Protection Control for Inverter Part
FANM	for Fan	1. DC Fan Motor Speed Control 2. Overcurrent Control

a. Control Printed Circuit Board: PCB1



# TROUBLESHOOTING

## < Dip Switch Setting of Outdoor Unit >

TURN OFF all power sources before setting.

Without turning OFF, the switches do not work and the contents of the setting are invalid.

(However, DSW4-No.1, 2, 4 and push switches can be operated during power source is ON.)

The mark of "■" indicates the position of dip switches.

### Arrangement of Dip Switch Setting

### Push Switches

### DSW1 Ref. Cycle No. Setting

Setting is required. Setting Before Shipment

DSW1

Tens Digit

Setting Position

Last Digit

Set the unit number of outdoor unit at each refrigerant cycle.  
(Setting before shipment is unit 0.)

### DSW2 Capacity Setting

No setting is required.

AVWT-86U\* AVWT-96U\* AVWT-114U\*

AVWT-136U\* AVWT-154U\* AVWT-154U\*

### DSW4 Test Operation and Service Setting

Setting is required. For Test Operation and Operating Compressor

Setting Before Shipment Test Cooling Operation Test Heating Operation

Compressor Forced Stop

### DSW5 Emergency Operation / Test Operation and Service Setting

No setting is required. Turn ON the dip switch when use the below functions.

Setting Before Shipment

Setting Item	Pin No.
Except No.1 Compressor Operation	1
Except No.2 Compressor Operation	2
Refrigerant Amount Judgement	4

### DSW6 Outdoor Unit No. Setting

Setting is required. Single Setting (Setting Before Shipment)

Combination Setting

Unit A (No.0 Unit)	Unit B (No.2 Unit)	Unit C (No.3 Unit)

**IMPORTANT NOTICE**

The outdoor unit is not single, the combination setting is necessary. Be sure to do this setting.

### DSW3

No setting is required.

### DSW7 Power Supply Setting

Setting is required.

220V Unit: 220V Setting Before Shipment  
380-415V Unit: 380-415V Setting Before Shipment

220V

380-415V

### DSW10 Transmission Setting

Setting is required.

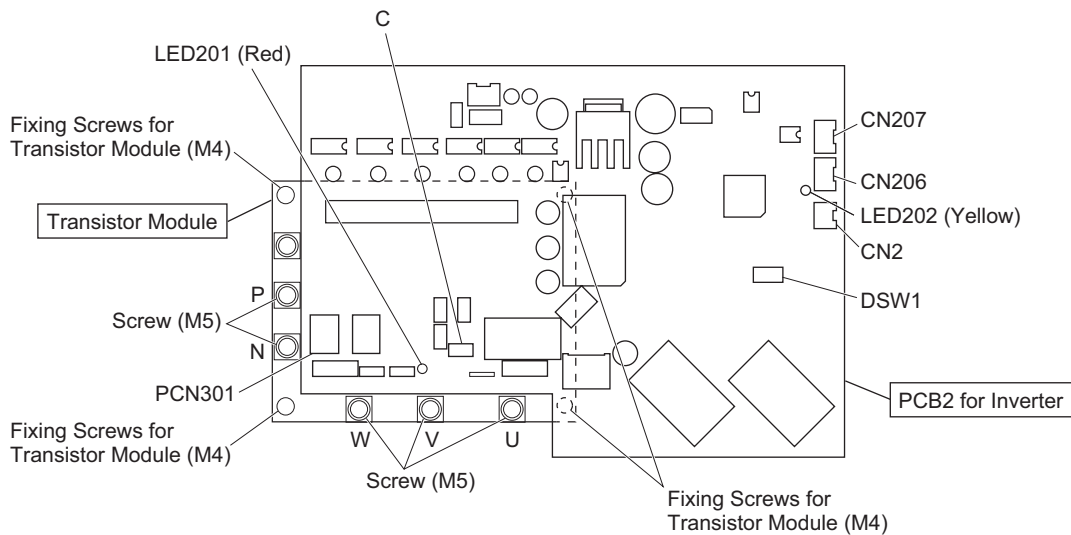
For End Resistance Cancellation

Setting Before Shipment End Resistance Cancellation

If the transmission circuit fuse is short circuited, the printed circuit board PCB1 will be recovered only once by turning DSW10 #2 pin on.

Part Name		Contents of Functions
LEDs	LED1 (Red)	Power Source Indication for PCB1 (Low Voltage) Normal Condition: Activated Abnormal Condition: Deactivated
	LED2 (Green)	This LED2 indicates the transmission state between the PCB1 and PCB2. Normal Condition: Flashing Abnormal Condition: Activated or Deactivated
	LED3 (Yellow)	This LED3 indicates the transmission state between the indoor unit and outdoor unit. Normal Condition: Flashing Abnormal Condition: Activated or Deactivated
	LED4 (Yellow)	This LED4 indicates the transmission state between the outdoor units. Normal Condition: Flashing Abnormal Condition: Activated or Deactivated
	LED5 (Red)	Power Source Indication for PCB1 (High Voltage) Normal Condition: Activated Abnormal Condition: Deactivated
SEGs	SEG1, SEG2	These indicate the following "Alarm", "Protective Safety Device has Tripped" or "Checking Items".

b. Inverter Printed Circuit Board: PCB2 (and Transistor Module)



Part Name	Contents of Functions
LED201 (Red)	Power Source Indication for PCB2 Normal Condition: Activated Abnormal Condition: Deactivated
LED202 (Yellow)	This indicates the state of microcomputer. Normal Condition: Activated Abnormal Condition: Deactivated

• DSW1

No setting is required.

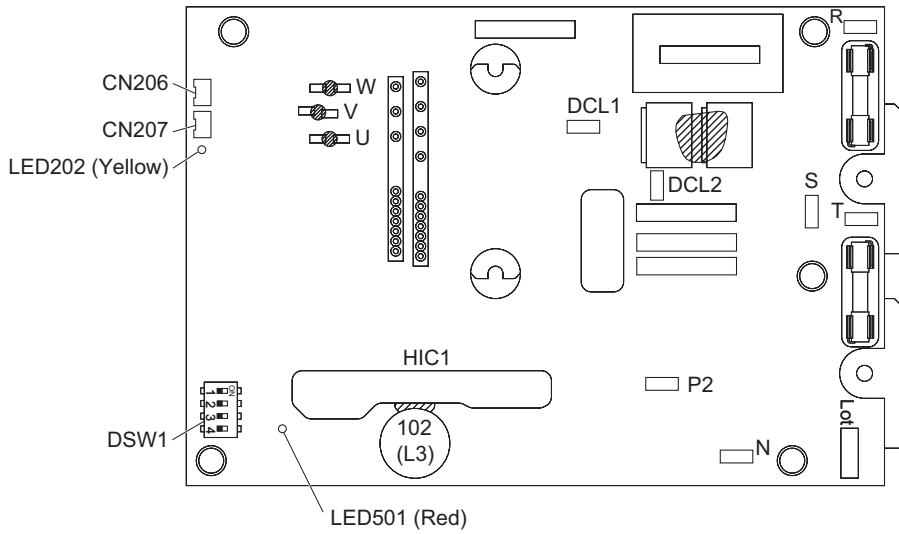
When set No.1 pin to ON, the electric current detection is canceled.

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

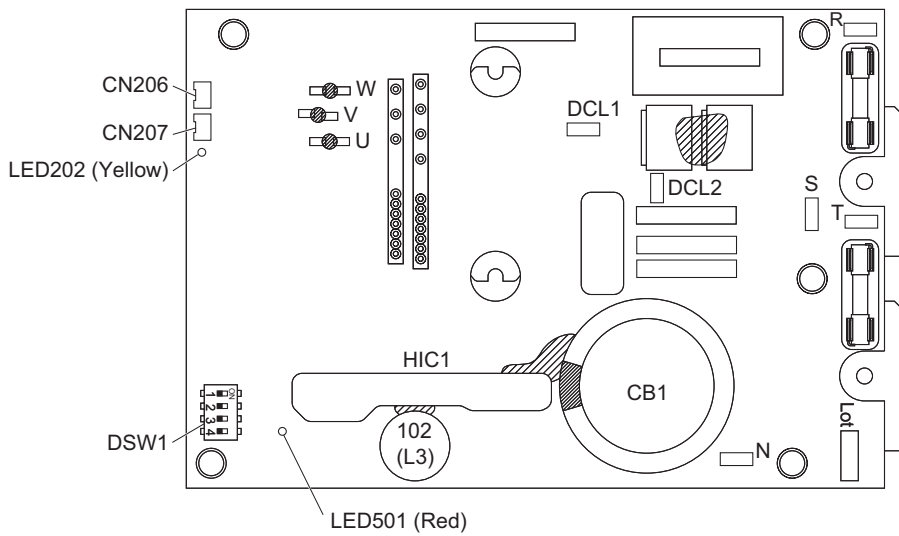


c. Fan Controller

< 380-415V/50Hz, 380V/60Hz >



< 220V/60Hz >



Part Name	Contents of Functions
LED501 (Red)	Power Source Indication for Fan Controller Normal Condition: Activated Abnormal Condition: Deactivated
LED202 (Yellow)	This indicates the state of microcomputer. Normal Condition: Activated Abnormal Condition: Deactivated

• DSW

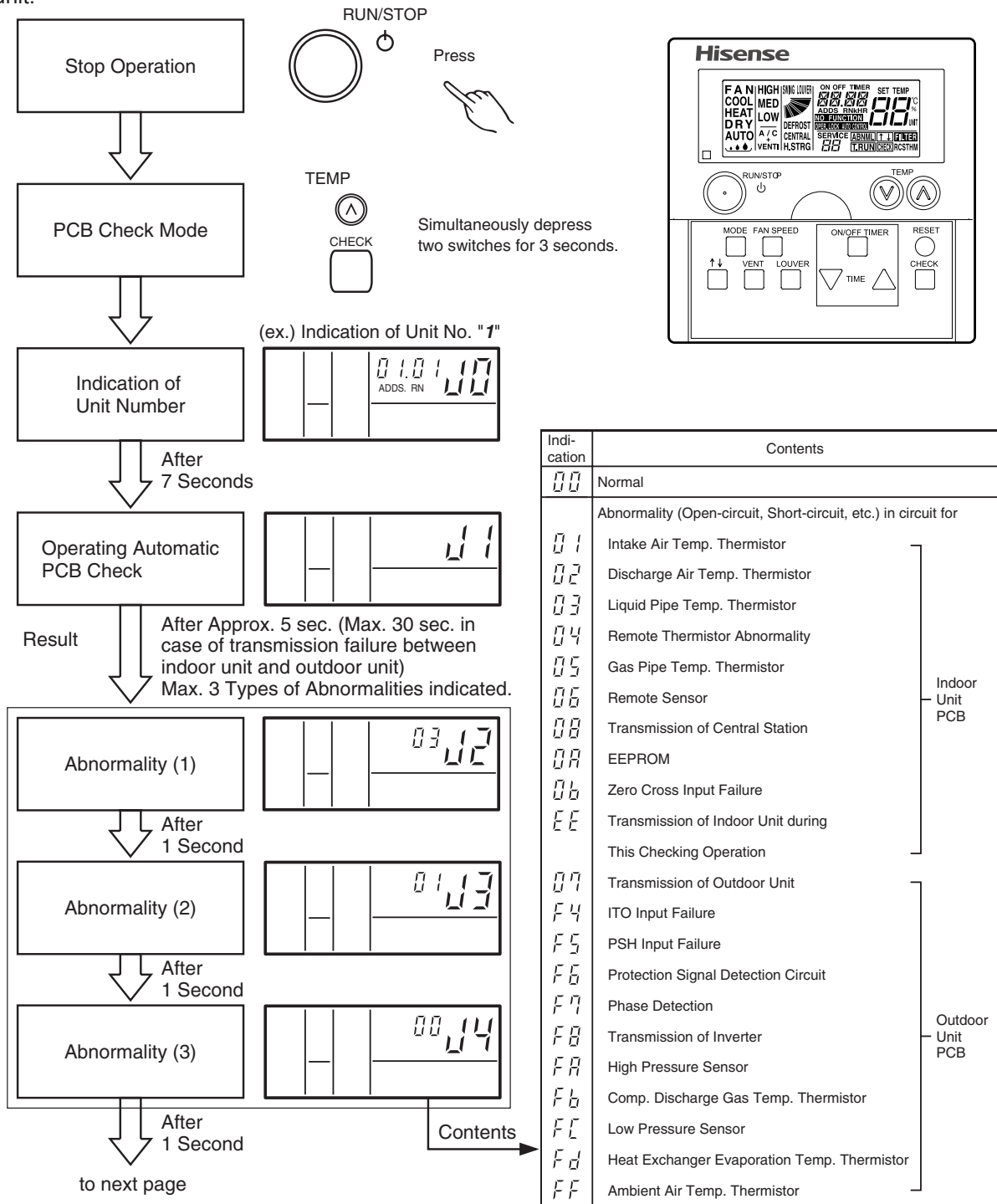
No setting is required.



### 3. Procedure of Checking Each Main Parts

#### 3.1 Self-Checking of PCBs using Remote Control Switch

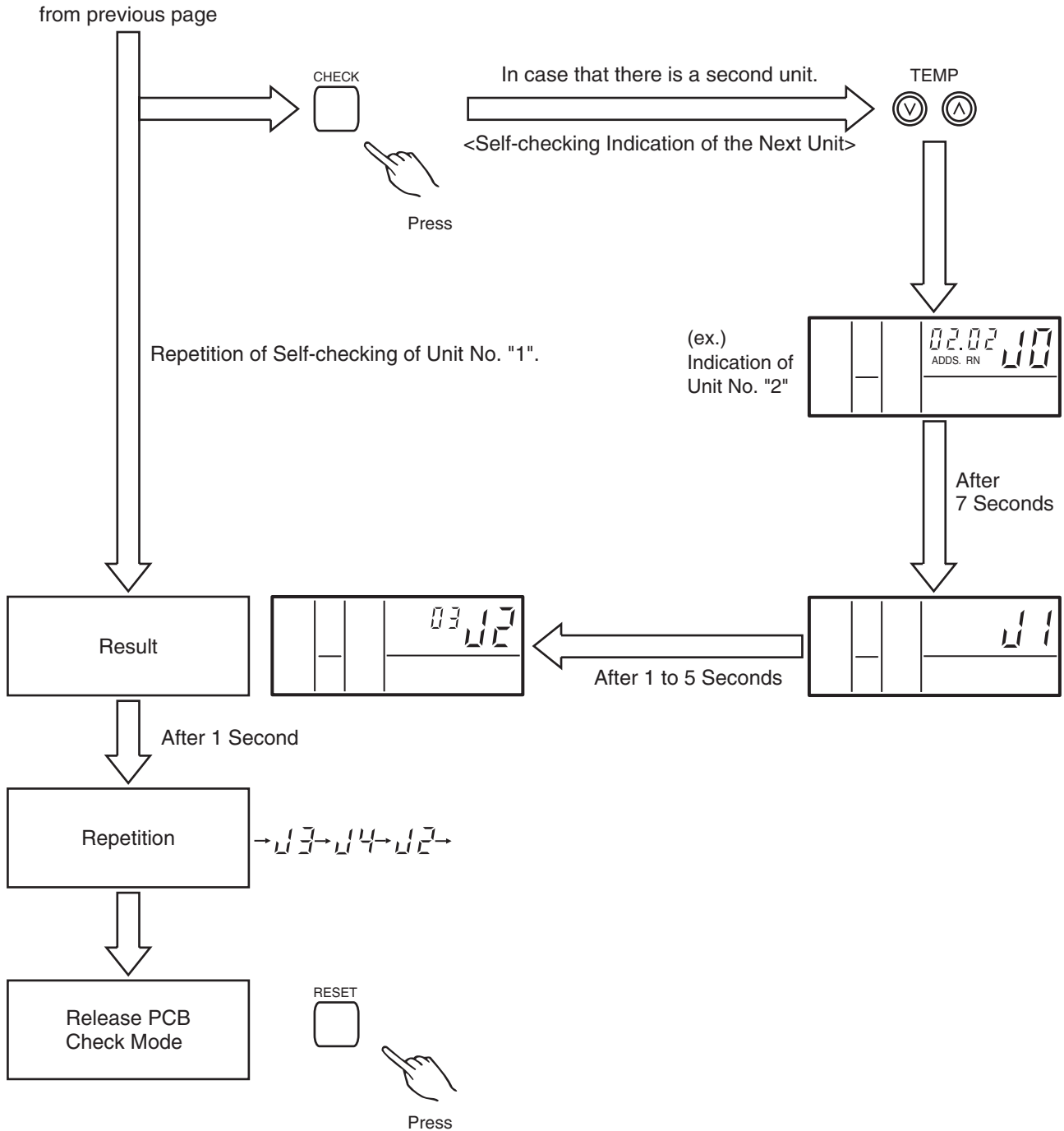
The following troubleshooting procedure is utilized for function test of PCBs in the indoor unit and outdoor unit.



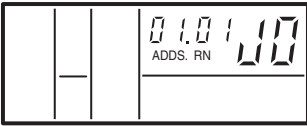
For performing the above checking in the case that the wireless remote control switch is used, perform the following procedures;

- (1) Turn OFF the power supply.
- (2) Set Dip Switch (SW3 No.1 Pin) of the wireless receiver kit at "ON" side.
- (3) Connect remote control switch to the Terminal Board.
- (4) Turn ON the power supply.

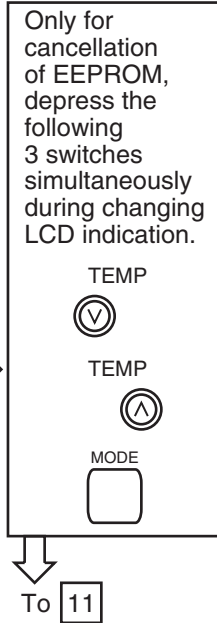
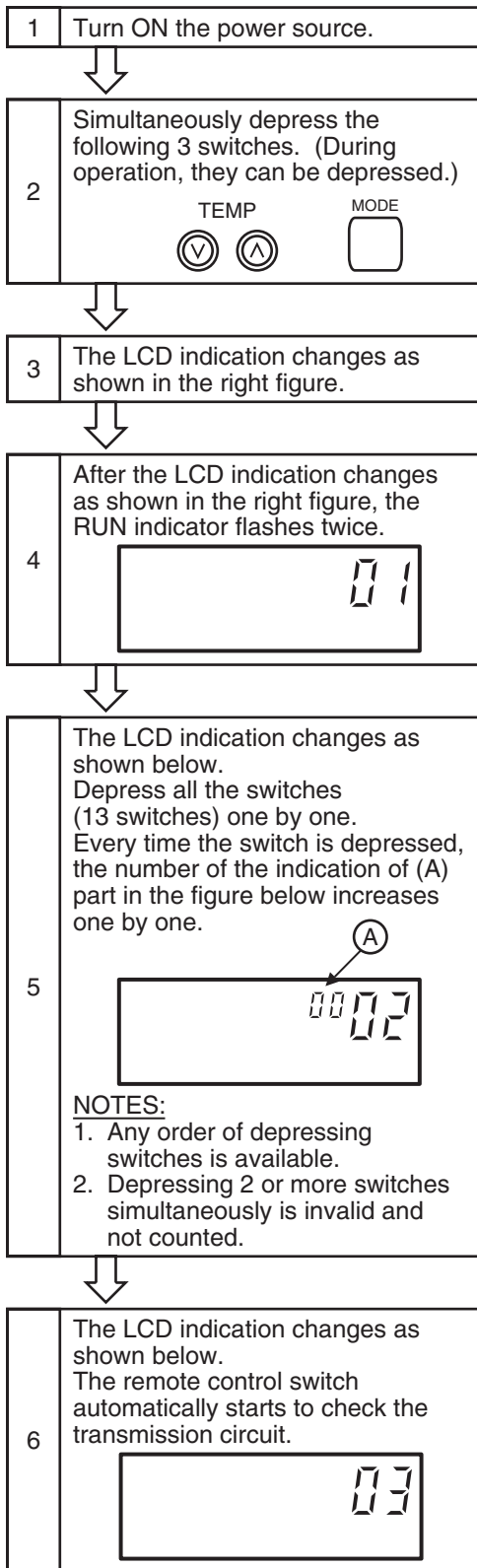
After completion of checking, turn OFF the power supply again and make connectors as before checking.



**NOTES:**

- (1)  If this indication is continued and "J1" is not shown, this indicates that each one of indoor units is not connected to the remote control switch. Check the wiring between the remote control switch and indoor unit.
- (2) In this troubleshooting procedure, checking of the following part of the PCB's is not available.  
 PCB in Indoor Unit: Relay Circuit, Dip Switch, Option Circuit, Fan Circuit, Protection Circuit  
 PCB in Outdoor Unit: Relay Circuit, Dip Switch, Option Circuit
- (3) In the case that this troubleshooting is performed in the system using the central station, indication of the central station may change during this procedure. However, this is not abnormal.

3.2 Self-Checking of Remote Control Switch



Changing of LCD Indication

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

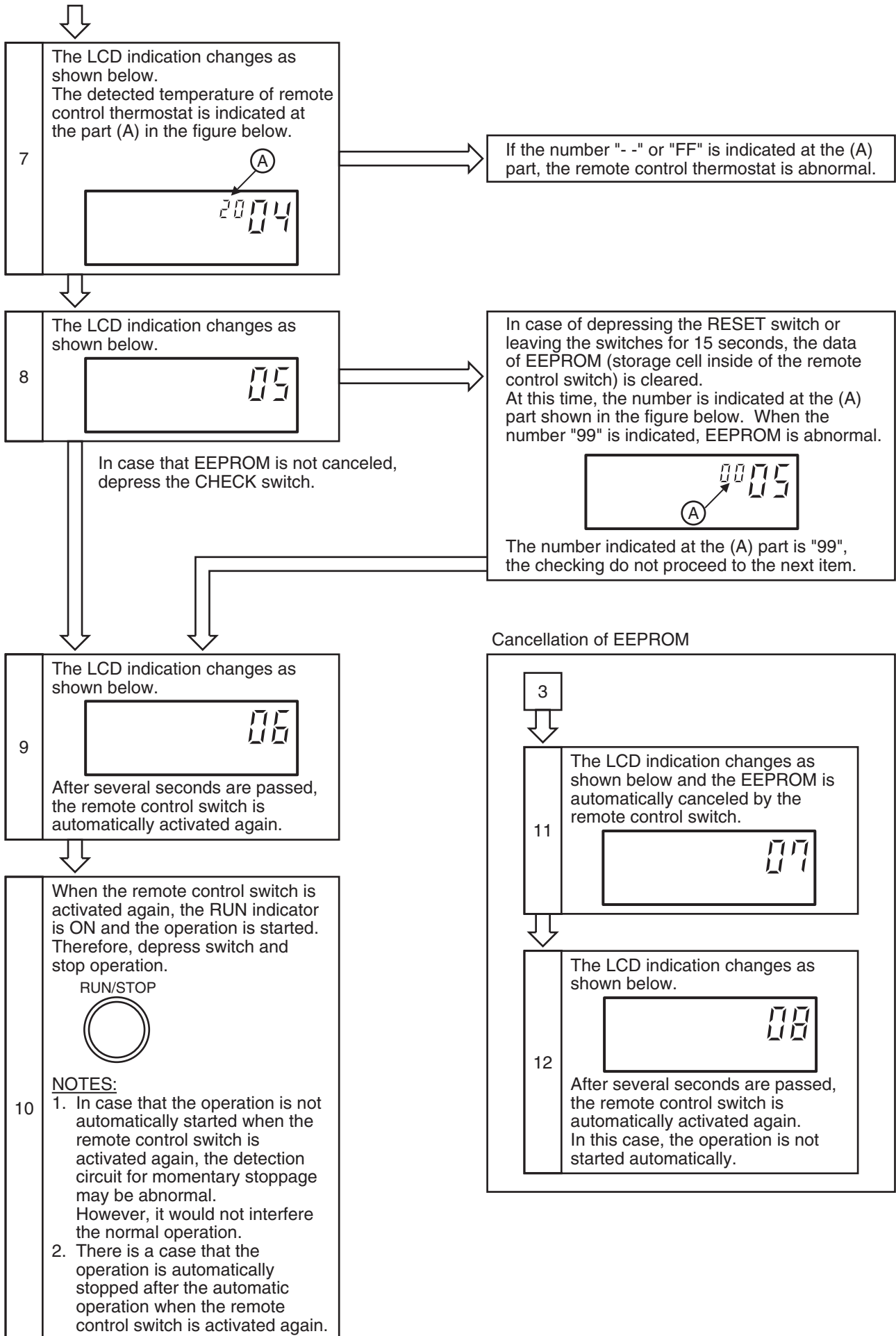
Unless all the switches are depressed, the checking do not proceed to the next item.

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

To the next page



## TROUBLESHOOTING



## 3.3 Procedure of Checking Other Main Parts

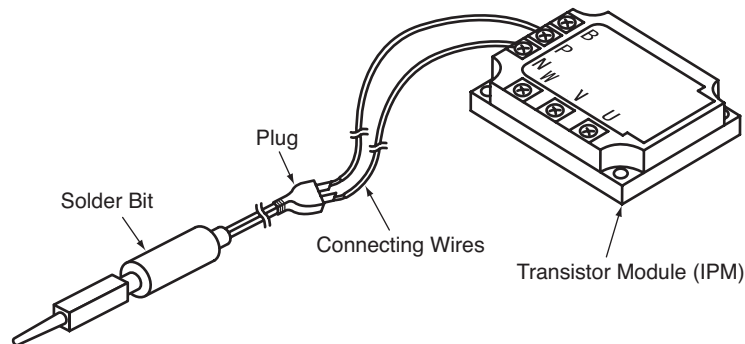
## (1) High Voltage Discharge Work for Replacing Parts

**CAUTION**

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

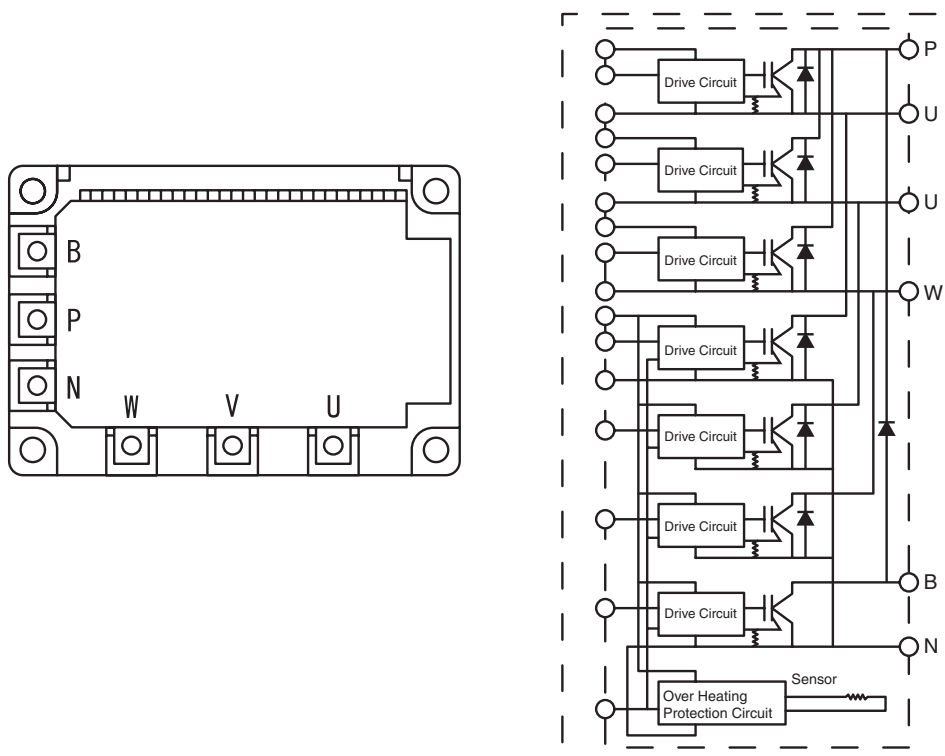
## &lt; Procedure &gt;

- Turn OFF the main switches and wait for three minutes. Check to ensure that no high voltage exists. If LED201 is ON after start-up and LED201 is OFF after turning OFF power source, the voltage will decrease lower than DC50V.
- Connect connecting wires to an electrical solder bit
- Connect the wires to terminals, P and N on IPM. => Discharging is started, resulting in hot solder bit. Pay attention not to short-circuit between terminal P and N.
- Wait for 2 or 3 minutes and measure the voltage once again. Check to ensure that no voltage is charged.



## (2) Checking Method of Transistor Module (IPM)

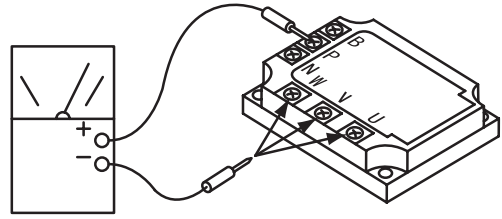
## Outer Appearance and Internal Circuit of Transistor Module



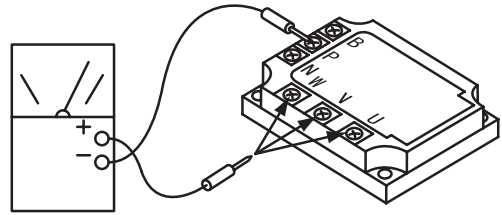
## TROUBLESHOOTING

Remove all the terminals of the transistor module before check. If items (a) to (d) are performing and the results are satisfactory, the transistor module is normal. Measure it under 1k $\Omega$  range of a tester. Do not use a digital tester.

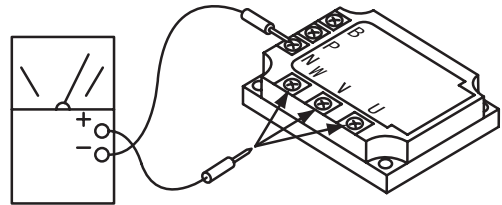
- (a) By touching the + side of the tester to the P terminal of transistor module and the - side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are from 1 to 5k $\Omega$ , it is normal.



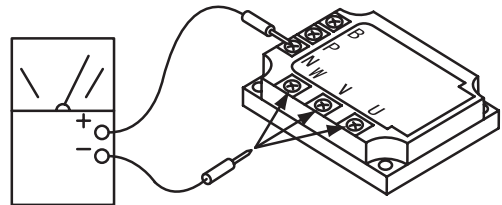
- (b) By touching the - side of the tester to the P terminal of transistor module and the + side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than 100k $\Omega$ , it is normal.



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

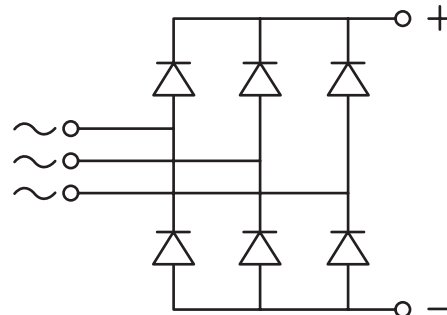
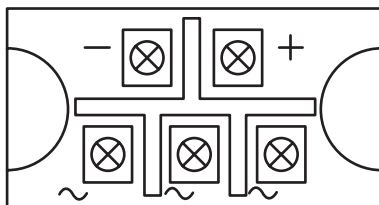


- (d) By touching the + side of the tester to the N terminal of transistor module and the - side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than 100k $\Omega$ , it is normal.



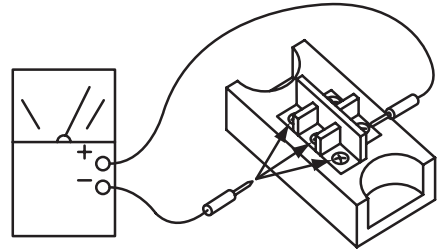
### (3) Checking Method of Diode Module (DM)

Outer Appearance and Internal Circuit of Diode Module

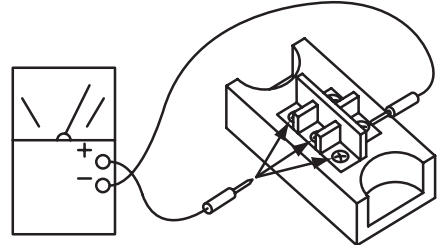


If items (a) to (d) are performing and the results are satisfactory, the diode module is normal. Measure it under 1kΩ range of a tester. Do not use a digital tester.

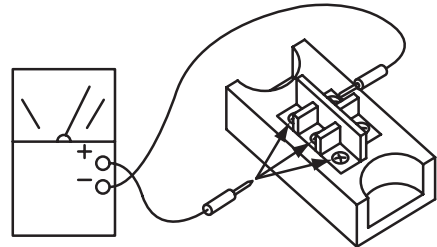
- (a) By touching the + side of the tester to the + terminal of diode module and the - side of tester to the ~ terminals (3 NOs.) of the diode module, measure the resistance. If all the resistances are from 5 to 50kΩ, it is normal.



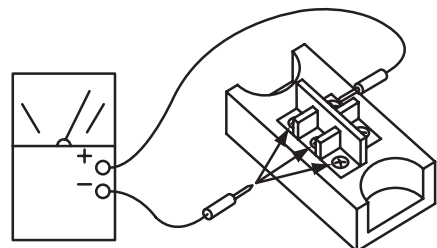
- (b) By touching the - side of the tester to the + terminal of diode module and the + side of tester to the ~ terminals (3 NOs.) of the diode module, measure the resistance. If all the resistances are greater than 500kΩ, it is normal.



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



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

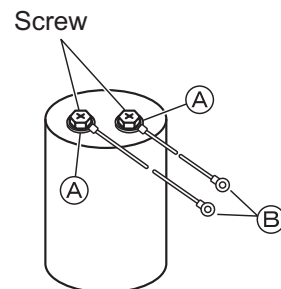


**(4) Checking Method of Capacitor**

- (a) Check that the screws are connected tightly.  
 (b) Check that the capacitor is not tarnished or expanded.

\* When checking the capacitor, disconnect the terminals (B). Do not disconnect the terminals (A).

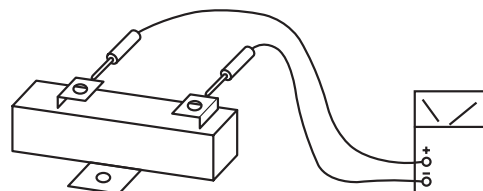
Capacitance	380-415V	220V
For Inverter	4700μF	4700μF
For Fan Controller	2700μF	-



**(5) Checking Method of Resistor**

Measure the both ends of resistor as shown in the figure. If the resistance is ∞Ω, it is abnormal.

Resistance		380-415V	220V
For Inverter	RS	-	0.5kΩ
	RS1	0.5kΩ	-
	RS2	0.5kΩ	-
	R1	6.3kΩ	-
	R2	10.5kΩ	-

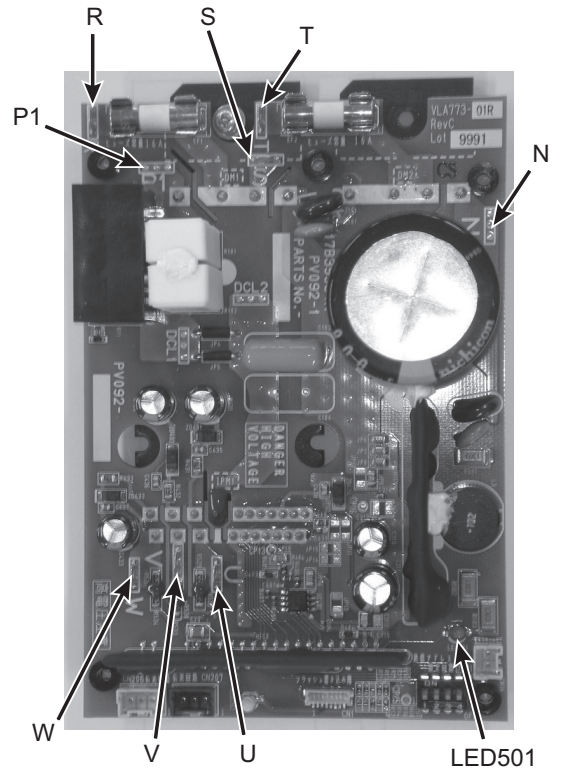


## TROUBLESHOOTING

### (6) Checking of Fan Controller

- (a) Turn OFF the power source switches before this work.  
Also ensure that LED501 (Red) on the fan controller is turned OFF.  
If LED501 is ON, electrical shock may occur.
- (b) Disconnect all the wirings connected to the fan controller.  
Measure the resistance between terminals using the tester. (Do not use a digital tester.)  
When measuring, check the color of tester probe and the terminals to be measured as shown in the table below.

Tester Probe Red (+) - Black (-)	Resistance Range
P1 - R P1 - S P1 - T R - N S - N T - N P1 - U P1 - V P1 - W U - N V - N W - N	1 kΩ and over
R - P1 S - P1 T - P1 N - R N - S N - T U - P1 V - P1 W - P1 N - U N - V N - W	Resistance will gradually increase once after it is between 1700 kΩ to 1900 kΩ. (*)



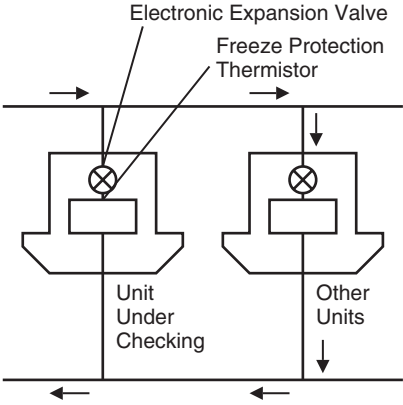
(\*) Leave at least 30 seconds when measuring the next terminals.

#### < DSW Initial Setting >

DSW1			
1	2	3	4
OFF	OFF	OFF	OFF

Regarding DSW setting, do not change from the original setting. Abnormal transmitting and fan controller failure may occur if the setting is changed.

(7) Checking Method of Electronic Expansion Valve

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

**TROUBLESHOOTING**

(8) Checking of Electrical Coil Parts

Name of Parts	Electrical Wiring Diagram	Wiring No.	Resistance (Ω)
DC Fan Motor for Outdoor Unit (AVWT-76 to AVWT-114)		White-Black Black-Red Red-White	2.58±0.3 at 20°C
DC Fan Motor for Outdoor Unit (AVWT-136 to AVWT-170)		White-Black Black-Red Red-White	0.794±5% at 20°C

Name of Parts	Resistance (Ω)
Solenoid Valve for Gas Bypass	1,250 at 20°C
Compressor Motor (for Inverter Compressor)	0.839 (380-415V/50Hz, 380V/60Hz) 0.199 (220V/60Hz) at 75°C
Compressor Motor (for Constant Compressor)	2.487 (380-415V/50Hz) 2.114 (380V/60Hz) 0.520 (220V/60Hz) at 75°C

## (9) Checking of Compressor

## CHECK LIST ON COMPRESSOR

CLIENT: \_\_\_\_\_

MODEL: \_\_\_\_\_

DATE: \_\_\_\_\_

Serial No.: \_\_\_\_\_

Production Date: \_\_\_\_\_

Checker: \_\_\_\_\_

No.	Check Item	Check Method	Result	Remarks
1	Are THM8 and THM9 correctly connected?  THM8 and THM9: Discharge Gas Thermistor	(1) Are wires of each thermistor correctly connected by viewing? (2) Check to ensure that 7-segment indication of Td1 is higher than Td2 when No.1 comp. is operating.  Td1: Temperature of THM8 Td2: Temperature of THM9		
2	Are thermistor, THM8 and THM9 disconnected?	(1) Check to ensure that thermistor on the top of comp. is correctly mounted by viewing? (2) Check to ensure that actually measured temp. are greatly different from the indication (Td1, Td2) during check mode.		
3	Are connectors for current sensor correctly connected?	(1) Check to ensure that 7-segment indication A1 and A2 are 0 during compressor stopping. (2) Check to ensure that indication A1 and A2 are not 0 during compressor running. (However, A2 is 0 during stopping of No.2 comp.)		
4	Is current sensor faulty?			
5	Is current sensing part on PCB2 faulty?			
6	Is the direction of current sensor (CTU, CTV) reverse?	Check the direction ⇒ by viewing.		
7	Are power source wires, U and V inserted correctly into current sensor?	Check to ensure that wires are correctly inserted.		
8	Are expansion valves (MV1 and MVB) correctly connected?	Check to ensure that MV1 to CN10 and MVB to CN12 are correctly connected.		
9	Are expansion valve coils (MV1 and MVB) correctly mounted?	Check to ensure that each coil is correctly mounted on the valve.		
10	Are the refrigeration cycle and electrical wiring system incorrectly connected?	Check to ensure that refrigerant is flowing into indoor units by operating one refrigerating cycle only from the outdoor unit.		
11	Is opening of expansion valve completely closed (locked)?	Check the following by the check mode of outdoor units. (1) Liquid Pipe Temp. (TL) < Air Intake Temp. (Ti) during Cooling Operation (2) Liquid Pipe Temp. (TL) > Air Intake Temp. (Ti) during Heating Operation		
12	Is opening of expansion valve fully opened (locked)?	Check to ensure that liquid pipe temp. is lower than air intake temp. of stopping indoor unit when other indoor units are operating under cooling operation.		
13	Are the contacts for comp. magnetic switch CMC1 and CMC2 faulty?	Check the surface of each contact by viewing.		
14	Is there any voltage abnormality among L1-L2, L2-L3 and L3-L1?	Check to ensure that voltage imbalance is smaller than 3%. Please note that power source voltage must be within 415V or 380V±10%. or 220V±10%.		
15	Is the comp. oil acidified during compressor motor burning?	Check to ensure that the oil color is not black.		



Additional Information for “CHECK LIST ON COMPRESSOR”

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

## 4. Test Run

**Turn OFF all the power source switches.  
Use a tester and make sure that all the switches are turned OFF.**

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

Check Item		Contents
1	Damage	Are the unit appearance and inside of the unit damaged?
2	Fan Motor	Is the fan motor runner mounted in the center of the casing? Is the fan motor mounted away from the casing? (The fan motor should NOT be touched with the casing.)
3	Screw Part	Are the screws loosened due to the vibration during transportation? Check that the screw part is fixed firmly when installing, <u>especially for the screw of electrical wiring.</u>
4	Refrigerant Leakage	<u>Check that there is NO refrigerant leakage.</u> The tightening part of pipe (flare part) may be loosened due to the vibration during transportation.
5	DSW Setting	Check the DSW setting is the same as before shipping. (Refer to the item 2.5.)
6	Insulation*	Measure resistance between electrical component terminal and ground with a tester. It is normal if the resistance is 1MΩ and over. If 1MΩ or less, do not perform the operation due to insulation failure of electrical charge part. <u>Do NOT apply electricity to the terminal board of operating line. (Control PCB may be damaged.)</u>
7	Stop Valve Fully Opening	Prior to test run, check that the stop valve of the outdoor unit is completely open.
8	Power Source Phase	The operation is NOT available with the incorrect power phase order or lacking phase. • Alarm "05" will be indicated on the LCD of remote control switch. • "05" will be indicated on the 7-segment of outdoor unit. Check the power source phase according to the caution label attached close to the outdoor unit terminal board or rear side of the service cover.
9	Turn ON Crankcase Heater *	After completion of the check item 1 to 8, turn ON the power supply of the outdoor unit. The electricity is supplied for the crankcase heater to warm the compressor. The compressor may be damaged without preheating. Therefore, the compressor should be activated after the power supply is turned ON for at least 12 hours.
10	Indoor and Outdoor Temperature	<For Use in both Cooling and Heating Operation> Is indoor temperature DB27°C or less during heating operation? (Heating operation may not be operated due to the activation of the overload operation prevention under the ambient temperature of 19°C or over.) To perform the test run, set the test run mode by the remote control switch.

### <\* Insulation Resistance>

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

- (a) Disconnect the cables of the compressor and measure the insulation resistance of the compressor itself. If the resistance is 1MΩ and over, insulation failure of other electrical charge part has occurred.
- (b) If the resistance is 1MΩ or less, reconnect the compressor and turn ON the main power supply. The compressor will be warmed up automatically. Check the insulation resistance again after applying current for at least 3 hours. (Preheating time depends on the air condition, piping length or refrigerant condition.)

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

### <\* Stoppage of Compressor Operation>

The compressor may NOT be available for the max. 4 hours if the power supply is NOT turned ON in advance. At this time, the stoppage Code (d1-22) is displayed on the LCD of remote control switch and the forced Thermo-OFF function is started.

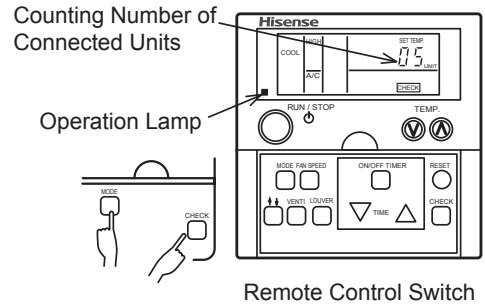
If operating compressor is necessary, turn ON the power supply of outdoor unit, wait for 30 seconds and press PSW5 on the outdoor PCB1 for at least 3 seconds. The forced Thermo-OFF function (d1-22) will be cancelled and the compressor operation will be available.

**4.1 Test Run by Remote Control Switch**

- (1) Turn ON the power source of the indoor and outdoor units.
- (2) Set the TEST RUN mode by the remote control switch.

Depress the "MODE" and the "CHECK" switches simultaneously for more than 3 second.

- If "TEST RUN" and the counting number of the connected units to the remote control switch (for example "05") are indicated on the remote control switch, the connection of remote control cable is correct.
- If no indication or "00" appears or the number of the units indicated is less than the actual number of the units, some abnormalities exist.



(3)

Remote Control Switch Indication	Fault	Inspection Points after the Power Source OFF
No Indication*	The power source is not turned ON. * The connection of the remote control cable is incorrect.  * The connecting wires of power supply line are incorrect or loosened.	<ul style="list-style-type: none"> <li>1. Connection between Connector and Wires</li> <li>2. Connecting Points of Remote Control Cable</li> <li>3. Contact of Connectors of Remote Control Cable</li> <li>4. Connection Order of each Terminal Boards</li> <li>5. Screw Fastening of each Terminal Boards</li> </ul>
Counting number of connected units is incorrect.	* The setting of unit number is incorrect. * The connection of control cables between each indoor units are incorrect. (When one remote control switch controls multiple units.)	<ul style="list-style-type: none"> <li>6. Dip Switch Setting on Printed Circuit Board</li> <li>7. Wire Connecting Order of Bridge Cable</li> <li>8. Connecting Points of Bridge Cable</li> <li>9. Contact of Connectors of Bridge Cable</li> </ul>

Back to (1) after checking

- (4) Select TEST RUN MODE by depressing MODE switch. (COOL or HEAT)
- (5) Depress RUN/STOP switch.

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

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

(6)


Remote Control Switch Indication	Unit Condition	Fault	Inspection Points after the Power Source OFF
The operation lamp flashes. (1 time/1 sec.) And the Unit No. and Alarm Code "03" flash.	The unit does not start.	The connecting wires of operating line are incorrect or loosened.	<ul style="list-style-type: none"> <li>1. Connecting Order of each Terminal Boards. The fuse on the PCB may be blown out due to miswiring. (Can be recovered only once by the DSW on the PCB)</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p style="text-align: center;">Procedures for Recovery When Transmitting Circuit Fuse is Blown Out</p> <ul style="list-style-type: none"> <li>1. Correct the wiring for the terminal board.</li> <li>2. Setting position of the model code are shown below.</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Indoor PCB DSW7</b></p> <p>ON ↑ OFF ↓</p> </div> <div style="text-align: center;"> <p><b>Outdoor PCB DSW10</b></p> <p>ON ↑ OFF ↓</p> </div> </div> </div> <ul style="list-style-type: none"> <li>2. Screw Fastening of each Terminal Boards.</li> <li>3. Connecting Order of Power Line Between Indoor Units and Outdoor Unit.</li> </ul>
The operation lamp flashes. (1 time/2 sec.)	The unit does not start.	The connection of remote control cable is incorrect.	This is the same as item (3)-1, 2 and 3.
Indication of flash different to above.	The unit does not start, or starts once and then stops.	The connection of the thermistors or other connectors are incorrect. Tripping of protector exists, or else.	Check by the alarm code table in the service manual. (Do it by service people.)
The operation lamp flashes. (1 time/1 sec.) And the Unit No. <b>00</b> . Alarm Code <b>dd</b> and Unit Code <b>E.00</b> flash.	The unit does not start.	The connecting wires of operating line are incorrect or loosened.	Check by the alarm code table in the service manual. (Do it by service people.)

Back to (1) after checking

4.2 Test Run from Outdoor Unit Side


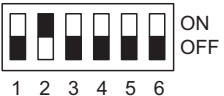

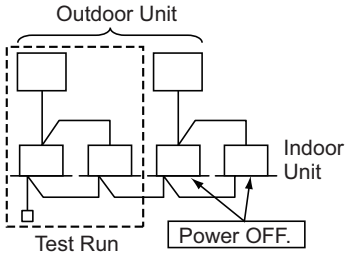
The procedure of test run from the outdoor unit side is indicated below. Setting of this dip switch is available with the power source ON.

**Setting of Dip Switch (Before Shipment)**




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

**! WARNING**

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

	Dip Switch Setting	Operation	Remarks
Test Run	<p>1. Setting of Operation Mode Cool: Set DSW4-2 OFF.</p>  <p>Heat: Set DSW4-2 ON.</p>  <p>2. Starting Test Run Set DSW4-1 ON and the operation is started after a few ~ 20 seconds.</p> <p>When <b>heating operation</b>, leave DSW4-2 at ON.</p> 	<ol style="list-style-type: none"> <li>The indoor unit automatically start to operate when the test run of the outdoor unit is set.</li> <li>The ON/OFF operation can be performed from the remote control switch or DSW4-1 of the outdoor unit.</li> <li>Continuous operation during 2 hours is performed without Thermo-OFF.</li> </ol>	<p>* Take care that the indoor units operate in accordance with the test run operation of the outdoor unit.</p> <p>* The test run is started from the outdoor unit and stopped 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. Check to ensure that the DSW4-1 of the outdoor unit PCB is turned OFF.</p> <p>* In case that the plural indoor units are connected with one remote control switch, perform the test run operation at each refrigerant system one by one. Then, make sure to turn the power source OFF for the indoor units at other refrigerant system not to operate test run.</p> <div style="text-align: center;">  </div> <p>* The setting of DSW4 is not required for the test run from the remote control switch.</p>

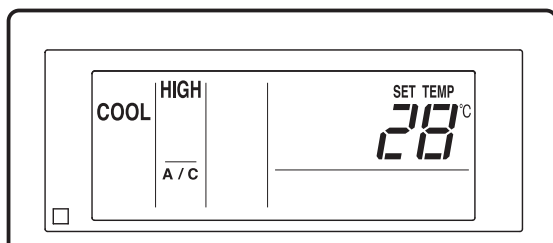
## TROUBLESHOOTING

	Dip Switch Setting	Operation	Remarks
Manual OFF of Comp.	<p>1. Setting *Compressor Manual OFF: Set DSW4-4 ON.</p> <div style="text-align: center;">  <p>ON OFF</p> <p>1 2 3 4 5 6</p> </div> <p>2. Reset *Compressor ON: Set DSW4-4 OFF.</p> <div style="text-align: center;">  <p>ON OFF</p> <p>1 2 3 4 5 6</p> </div>	<p>1. When DSW4-4 is ON during compressor operation, the compressor stops to operate immediately and the indoor unit is under the condition of Thermo-OFF.</p> <p>2. When DSW4-4 is OFF, the compressor starts to operate after the cancellation of 3-minutes guard.</p>	* Do not repeat compressor ON/OFF frequently.
Manual Defrost	<p>1. Manual Defrost Operation Press PSW5 for more than 3 seconds during heating operation, the defrost operation is started after 2 minutes. This function is not available within 5 minutes after starting heating operation.</p> <p>2. Manual Defrost Operation Completion Defrost operation is automatically ended and the heating operation is restarted.</p>	<p>1. Defrost operation is available regardless of frosting condition and total time of heating operation.</p> <p>2. Defrost operation is not performed when the temperature of outdoor heat exchanger is higher than 10°C, high pressure is higher than 3.3MPa or Thermo-OFF.</p>	<p>* Do not repeat defrost operation frequently.</p> <p>* When manual defrost operation is accepted by PSW5, the time left before starting defrost operation is indicated at the 7-segment indicator on the PCB.</p> <div style="text-align: center;">  <p>Time Left (Every 4 Seconds)</p> </div>

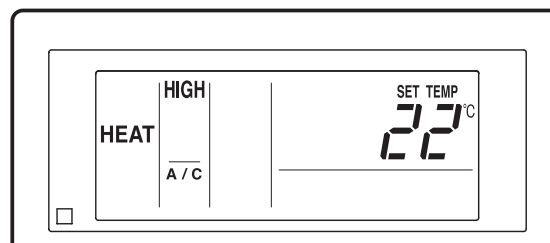
When the test run operation is completed, turn all switches of DSW4 OFF.

(1) During the test run mode, the following default indication will appear.

(a) Cooling



(b) Heating



(2) If the remote control switch is set to a different mode, the test run function will not start. In this case, perform the following actions before the test run.

Remote Control Switch: STOP

Central Station: STOP and Remote Control Switch is available mode.

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

During the test run mode, do not change the remote control switch setting, the central station setting and cool/heat changeover switch setting.

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

4.3 Checking at Test Run

(1) Indoor and Outdoor Fan

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

(2) Power Supply Voltage

Check the power supply.

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

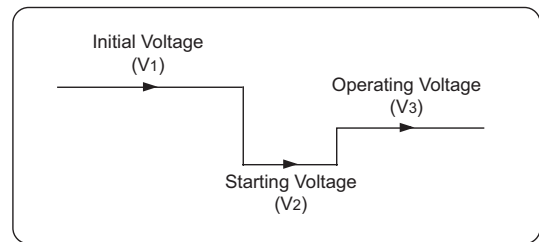
Usually, voltage drop will occur when starting as shown in the figure (V<sub>2</sub>).

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

<Normal Range of Power Supply Voltage>

- Supply Voltage: Rated Voltage ≤ ±10%
- Starting Voltage (V<sub>2</sub>): Rated Voltage ≥ -15%

< Voltage Change >



- Operating Voltage (V<sub>3</sub>): Rated Voltage ≤ ±10%
- Voltage Imbalance between Phase: ≤ 3%

(3) Normal Operating Pressure

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

(4) High Pressure Switch

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

Refrigerant	Operation Pressure
R410A	4.15MPa

(5) High Pressure Increase Retry (Protection Control)

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

Cover the air inlet of outdoor unit 2-130 during cooling operation.	Cover the air inlet of indoor unit during heating operation.

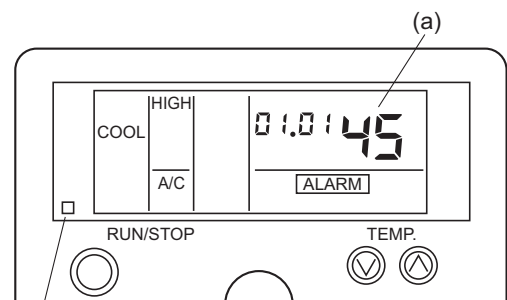
(b) When the high pressure retry control is activated, alarm code “P13” will be indicated on the 7-segment of outdoor unit PCB. If the high pressure retry control occurs 3 times or more within 30 minutes, alarm code “45” will be indicated on the LCD of remote control switch or the 7-segment of outdoor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

<Performed from remote control switch>

- Alarm code “45” will be indicated.
- The operation lamp will be flashed.

**NOTE:**

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



4.4 Checking List for Refrigerant Cycle

**CHECK LIST ON TEST OPERATION**

CLIENT: \_\_\_\_\_ INSTALLER: \_\_\_\_\_ DATE: \_\_\_\_\_

O.U. MODEL: \_\_\_\_\_ O.U. SERIAL NO.: \_\_\_\_\_ CHECKER: \_\_\_\_\_

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

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

Piping Length: \_\_\_\_\_ m Additional Refrigerant Charge: \_\_\_\_\_ kg

(1) General

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

(2) Refrigerant Cycle

a. Operation (Cooling/Heating)

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

b. Sampling Data (Cooling/Heating, Indoor Temperature 21~30°C)

No.	Check Item	Result
1	Check the operating data after the 20 minutes operation.	
2	Check <u>Pd</u> and <u>Td</u> . Is Td-SH 15 to 45 deg.?	
3	Is <u>Ps</u> 0.2 to 1.1 MPa?	
4	Is <u>Pd</u> 1.0 to 3.5 MPa? (If the outdoor temperature is high, <u>Pd</u> becomes high.)	

**NOTE:**

The symbol with an underline \_\_\_ indicates checking item.

(3) Check Item after Sampling Data

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

No.	Check Item	Standard	Causes	Result
1	Is fan actually running when $E_o$ (Air Flow Rate of O.U. Fan) is not "0"?	-	<ul style="list-style-type: none"> <li>• Fan Motor Failure</li> <li>• PCB1 Failure</li> <li>• Condenser Failure</li> </ul>	
2	Is the total of $iE$ (I.U. Ex. Valves Opening) abnormally low or high?	-	<ul style="list-style-type: none"> <li>• Low → Excessive Refrigerant</li> <li>• High → Insufficient Refrigerant or Excessive Pipe Pressure Loss</li> </ul>	
3	Is $TL$ (Liquid Pipe Temp. of I.U. Heat Exchanger) lower than $Ti$ (Intake Air Temp. of I.U.)?	It is normal when $TL - Ti < -5$ deg.	<ul style="list-style-type: none"> <li>• TL Thermistor Failure</li> <li>• I.U. Ex. Valve; Fully Closed</li> <li>• Short-Circuit</li> </ul>	
4	Is $TG$ (Gas Pipe Temp. of I.U. Heat Exchanger) lower than $Ti$ (Intake Air Temp. of I.U.)? (It is applicable when Intake Air Temp. is 3 deg. higher than Setting Temp.)	It is normal when $TG - Ti < -5$ deg.	<ul style="list-style-type: none"> <li>• TG Thermistor Failure</li> <li>• I.U. Ex. Valve; Fully Closed or Slightly Open</li> <li>• Short-Circuit</li> </ul>	
5	Is there any excessive difference among I.U. at SH ( $TG - TL$ ) of I.U. heat exchanger? (It is applicable when Intake Air Temp. is 3 deg. higher than Setting Temp.)	It is normal if the difference among units is within 7 deg.	<ul style="list-style-type: none"> <li>• TL/TG Thermistor Failure</li> <li>• I.U. Ex. Valve; Fully Open, Slightly Open or Fully Closed</li> </ul>	
6	Is there any I.U. with the I.U. heat exchanger SH ( $TG - TL$ ) excessively different from other units' value and is $iE$ (I.U. Ex. Valves Opening) lower than "7"?	It is normal if SH is within - 3 deg. lower than other units.	<ul style="list-style-type: none"> <li>• I.U. Ex. Valve; Locked with Fully Open</li> <li>• Mismatched Wiring and Piping</li> </ul>	
7	Is there any I.U. with the I.U. heat exchanger SH ( $TG - TL$ ) excessively different from other units' value and is $iE$ (I.U. Ex. Valves Opening) lower than "100"?	It is normal if SH is within + 3 deg. higher than other units.	<ul style="list-style-type: none"> <li>• I.U. Ex. Valve; Locked with Slightly Open or Closed</li> <li>• Mismatched between Wiring and Piping</li> </ul>	
8	Is the temperature difference between I.U.* more than 7 deg.? * The temperature difference between I.U. means the following; $b3$ (Discharge Air Temp.) - $b2$ (Intake Air Temp.) indicated on the remote control switch by check mode.	-	-	



## TROUBLESHOOTING

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

No.	Check Item	Standard	Causes	Result
1	Are <u>oE1</u> and <u>oE2</u> (O.U. Ex. Valves Opening) abnormally low or high when TdSH is 15 to 45 deg.?	-	<ul style="list-style-type: none"> <li>• Low → Excessive Refrigerant</li> <li>• High → Insufficient Refrigerant</li> </ul>	
2	Is <u>Pd</u> "1.6" to "3.5"? (Pd is high when the indoor temperature is high.)	-	<ul style="list-style-type: none"> <li>• Low → Solenoid Valve SVA Leakage</li> <li>• High → Excessive Gas Pipe Pressure Loss</li> </ul>	
3	Is <u>Ps</u> "0.2" to "1.1"?	-	<ul style="list-style-type: none"> <li>• Low → O.U. Short-circuit</li> <li>• Low/High → O.U. Fan Motor Failure, Fan Module Failure or Outdoor Ambient Thermistor Failure</li> </ul>	
4	Is the temperature difference between I.U.* more than 10 deg. when <u>iE</u> (I.U. Ex. Valve) is "100"? * The temperature difference between I.U. means the following; <u>b3</u> (Discharge Air Temp.) - <u>b2</u> (Intake Air Temp.) indicated on the remote control switch by check mode. However, this is applicable only when <u>b2</u> (Intake Air Temp.) - <u>b1</u> (Setting Temp.) is higher than 3 deg.	-	<ul style="list-style-type: none"> <li>• Failure such as PCB, Wiring, I.U. Ex. Valve and Coil</li> <li>• Excessive Pipe Pressure Loss</li> <li>• Thermistor Failure for Discharge Air</li> </ul>	

**NOTE:**

The symbol with an underline \_\_\_ indicates checking item and the mark " " indicates checking data.

## 4.5 Reset for Accumulated Operation Time of Compressor 1-2 after Maintenance (cUJ1-cUJ2)

<Procedure>

Press PSW1 and PSW3 for 5 seconds while the accumulated operation time of compressor data is displayed.

<Example of Compressor 1>



"cUJ1" (Accumulated Operation Time of Compressor 1) will be indicated.

PSW2 ↑↓ PSW3



Press PSW1 and PSW3 for 5 seconds while the accumulated operation time is displayed.



The indication will be changed to "0".

(The accumulated operation time of compressor 1 is "0")



**NOTE:**

In the case of AVWT-190 to AVWT-510, it is required to reset the accumulated operation time for each outdoor units.