TOSHIBA

FILE NO. SVM-13004

SERVICE MANUAL

AIR-CONDITIONER

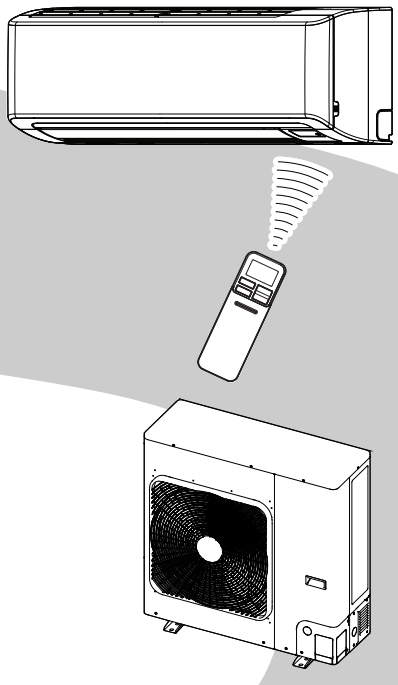
SPLIT TYPE

Indoor Unit
<High Wall, Heat Pump Type>

RAS-24N3KV2-A

Outdoor Unit
<Heat Pump Type>

RAS-24N3AV2-A



HFC
R410A

February,2013

FILE NO. SVM-13004

CONTENTS

1. PRECAUTIONS FOR SAFETY

- Before insallation, please read these precautions for safety carefully.
- Be sure to follow the precautions provided here to avoid safety risks. The symbols and their meanings are shown below.

WARNING : It indicates that incorrect use of this unit may cause severe injury or death.
CAUTION : It indicates that incorrect use of this unit may cause personal injury (*1), or property damage (*2).
*1 : Personal injury means a slight accident, burn, or electrical shock which dose not require admission or repeated hospital treatmint.
*2 : Property damage means geater damage which affects addets or resources.

For general public use

Power supply cord of parts of appliance for outdoor use shall be at least polychloroprene sheathed flexible cord (design H07RN-F) or cord designation 60245 IEC66 (2.5 mm^2 or more and 1.5 mm^2 or more for connecting cable). Shall be installed in accordance with national regulations).

CAUTION

New refrigerant air conditioner installation

- **THIS AIR CONDITIONER USES THE NEW HFC REFRIGERANT (R410A), WHICH DOES NOT DESTROY THE OZONE LAYER.**
  R410A refrigerant is apt to be affected by impurities such as water, oxidizing membranes, and oils because the pressure of R410A refrigerant is approx. 1.6 times of refrigerant R22. As well as he adoption of this new refrigerant, refrigerating oil has also been changed. Therefore, during installation work, be sure that water, dust, former refrigerant, machine oil does not enter the refrigeration cycle of a new-refrigerant air conditioner. To avoid mixing refrigerant and refrigerating machine oil, the sizes of charging port connecting sections on the main unit are different from those for the conventional refrigerant, and different size tools are also required. For connecting pipes, use new and clean piping naterials with highpressure withstand capabilities, designed for R410A only, and ensure that water or dust does not enter. Moreover, do not use any existing piping as its pressure withstand may be insufficient and may contain impurities.

DANGER

- FOR USE BY QUALIFIED PERSONS ONLY.
- TURN OFF MAIN POWER SUPPLY BEFORE.ATTEMPTING ANY ELECTRICAL WORK. MAKE SURE ALL POWER SWITCHES ARE OFF. FAILURE TO DO SO MAY CAUSE ELECTRIC SHOCK.
- CONNECT THE CONNECTING CABLE CORRECTLY. IF THE CONNECTING CABLE IS CONNECTED WRONGLY, ELECTRIC PARTS MAY BE DAMAGED.
- CHECK THE EARTH WIRE THAT IT IS NOT BROKEN OR DISCONNECTED BEFORE INSTALLATION.
- DO NOT INSTALL NEAR CONCENTRATIONS OF COMBUSTIBLE GAS OR GAS VAPORS. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FIRE OR EXPLOSION.
- TO PREVENT OVERHEATION THE INDOOR UNIT AND CAUSING A FIRE HAZARD, PLACE THE UNIT WELL AWAY (MORE THAN 2 M) FROM HEAT SOURCES SUCH AS RADIATORS, HEATERS, FURNACE, STOVES, ETC.
- WHEN MOVING THE AIR CONDITIONER FOR INSTALLING IT IN ANOTHER PLACE AGAIN, BE VERY CAREFUL NOT TO GET THE SPECIFIED REFRIGERANT (R410A) WITH ANY OTHER GASEOUS BODY INTO THE REFRIGERATION CYCLE. IF AIR OR ANY OTHER GAS IS MIXED IN THE REFRIGERANT, THE GAS PRESSURE IN THE REFRIGERATION CYCLE BECOMES ABNORMALLY HIGH AND IT RESULTINGLY CAUSES BURST OF THE PIPE AND INJURIES ON PERSONS.
- IN THE EVENT THAT THE REFRIGERANT LEAK, DURING INSTALLATION WORK, IMMEDIATELY ALLOW FRESH AIR INTO THE ROOM. IF THE REFRIGERANT GAS IS HEATED BY FIRE OR SOMETHING ELSE, IT CAUSE GENERATION OF POISONOUS GAS.

WARNING

- Never modify this unit by removing any of the safety guards or bypassing any of the safety interlock switches.
- Installation work must be requested from the supplying retail dealership or professional vendors. Self-installation may cause water leakage, electrical shock, or fire as a result of improper installation.
- Specified tools and pipe parts for model R410A are required, and installation work must be done in accordance with the manual. HFC type refrigerant R410A has 1.6 times more pressure than that of conventional refrigerant (R22). Use the specified pipe parts, and ensure correct installation, otherwise damage and/or injury may be caused. At the same time, water leakage, electrical shock, and fire may occur.
- Be sure to install the unit in a place which can sufficiently bear its weight. If the load bearing of the unit is not enough, or installation of the unit is improper, the unit may fall and result in injury.
- Electrical work must be performed by a qualified electrical engineer in accordance with the cond governing such installation work, intermal wiring regulations, and the manual. A dedicated circuit and the rated voltage must be used. Insufficient power supply or improper installation may cause electrical shock or fire.
- Use a cabtyre cable to connect wires in the indoor/outdoor units. Midway connection, stranded wire, and single-wire commections are not allowed. Improper connection or fixing may cause a fire.
- Wiring between the indoor unit and outdoor units must be well shaped so that the cover can be firmly placed. Improper cover installation may cause increased heat, fire, or electrical shock at the terminal area.
- Be sure to use only approved accessories or the specified parts. Failure to do so may cause the unit to fall, water leakage, fire or electrical shock.
- After the installation work, ensure that there is no leakage of refrigerant gas. If the refrigerant gas leaks out of the pipe into the room and is heated by fire or something else from a fanheater, stove or gas range, it causes generation of poisonous gas.
- Make sure the equipment is properly earthed. Do not connect the earth wire to a gas pipe, water pipe, lightning conductor, or telephone earth wire. Improper earth work may be the cause of electrical shock.
- Do not install the unit where flammable gas may leak. If there is any gas leakage or accumulation around the unit, it can cause a fire.
- Do not select a location for installation where there may be excessive water or humidity, such as a bathroom. Deterioration of insulation may cause electrical shock or fire.
- Installation work must be performed fallowing the instructions in this installation monual. Improper installaion may cause water leakage, electrical shock or fire. Check the following iems before operating the unit.
  - Be sure that the pipe connection is well placed and there are no leaks.
  - Check that the service valve is open. If the service valve is closed, it may cause overpressure and result in compressor damage. At the same time, if there is a leak in the connection part, it may cause air suction and overpressure, resulting in damage to the unit or injury.
- In a pump-down operation, be sure to stop the compressor unit before removing the refrigerant pipe. It removing the refrigerant pipe while the compressor is operating with the service valve opened, it may cause air suction and overpressure, resulting in damage to the unit or injury.
- Do not modify the power cable, connect the cable midway, or use a multiple outlet extension cable. Doing so may cause contact failure, insulation failure, or excess current, resulting in fire or electrical shock.
- Appliance shall be installed in accordance with national wiring regulations.
  If you detect any damage, do no install the unit. Conact your supplying dealer immediately.
- Do not use any refrigerant different from the one specified for complement or replacement.
  Otherwise, abnormally high pressure may be generated in the refrigeration cycle, which may result in a failure or explosion of the product or an injury to your body.

CAUTION

- Exposure of unit to waer or other moisture before installation could result in electric shock. Do not store it in a wet basement or expose to rain or water.
- After unpacking the unit, examine it carefully for possible damage.
- Do not install in a place that can increase the vibration of the unit. Do not install in a place that can amplify the noise level of the unit or where noise and discharged air might disturb neighbors.
- Please read this installation manual carefully before installing the unit. It contains further important instructions for proper installation.
- This appliance must be connected to the main power supply by means of a circuit breaker depending on the place where the unit is installed. Failure to do so may cause electrical shock.
- Follow the instructions in this installation manual to arrange the drain pipe for proper drainage from the unit. Ensure that drained water is discharged. Improper drainage can result in water leakage, causing water damage to furmiture.
- Tighten the flare nut with a torque wrench using the prescribed method. Do not apply excess torque. Otherwise, the nut may crack after a long period of usage and it may cause the leakage of refrigerant.
- Wear gloves (heavy gloves such as cotton gloves) for installation work. Failure to do so may cause personal injury when handling parts with sharp edges.
- Do not touch the air intake section or the aluminum fins of the outdoor unit. It may cause injury.
- Do not install the outdoor unit in a place which can be a nest for small animals. Small animals could enter and contact internal electrical parts, causing a failure or fire.
- Reques the user to keep the place around the unit tidy and clean.
- Make sure to conduct a trial operation after the installation work, and explain how to use and maintain the unit to the customer in accordance with the manual. Ask the customer to keep the operation manual along with the installation manual.
- The manufacturer shall not assume any liability for the damage caused by not observing the description of this manual.

2. SPECIFICATIONS

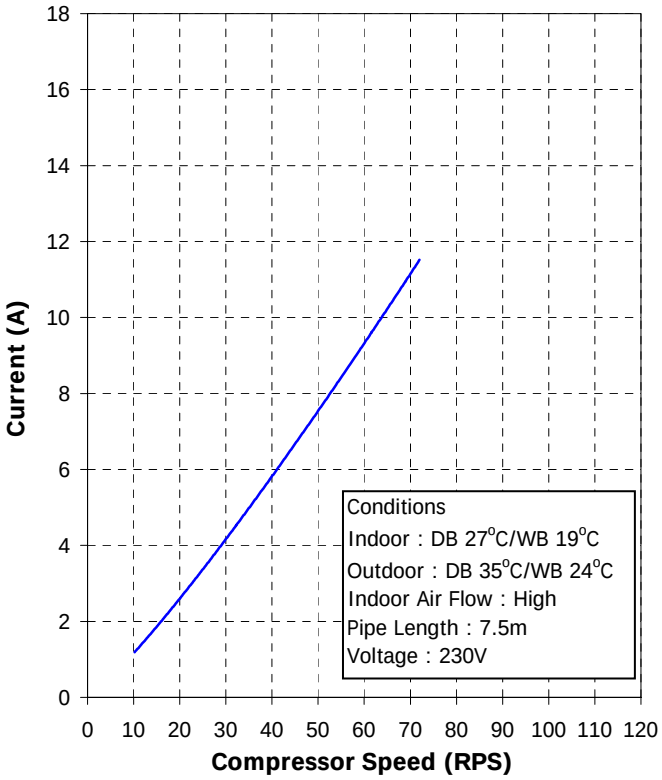
2-1. Specifications

Unit model	Indoor			**RAS-24N3KV2-A**	
	Outdoor			**RAS-24N3AV2-A**	
Cooling capacity			(kW)	7.10	
Cooling capacity range			(kW)	1.50-7.70	
Heating capacity			(kW)	8.10	
Heating capacity range			(kW)	1.60-9.00	
Power supply				1Ph/50Hz/220-240V	
Electric characteristic	Indoor	Operation mode		Cooling	Heating
		Running current	(A)	0.38-0.35	0.38-0.35
		Power consumption	(W)	50	50
		Power factor	(%)	60	60
	Outdoor	Operation mode		Cooling	Heating
		Running current	(A)	10.77-9.86	11.33-10.38
		Power consumption	(W)	2280	2400
		Power factor	(%)	96	96
		Starting current	(A)	-	
COP				3.05	3.31
Sound Pressure level	Indoor	H/M/L	(dB-A)	45/43/41/38/36	45/43/41/38/36
	Outdoor	H	(dB-A)	52	52
Sound power level	Indoor	H/M/L	(dB-A)	58/56/54/51/49	
	Outdoor	H	(dB-A)	65	65
Indoor unit	Unit model			**RAS-24N3KV2-A**	
	Dimension	Height	(mm)	320	
		Width	(mm)	1050	
		Depth	(mm)	243	
	Net weight		(kg)	13	
	Fan motor output		(W)	30	
	Air flow rate	(Cooling/Heating)	(m3/min)	16.8/18.0	
Outdoor unit	Unit model			**RAS-24N3AV2-A**	
	Dimension	Height	(mm)	890	
		Width	(mm)	900	
		Depth	(mm)	320	
	Net weight		(kg)	65	
	Compressor	Motor output	(W)	2000	
		Type		Twin rotary type with DC-inverter variablespeed control	
		Model		DA220A2F-22L	
	Fan motor output		(W)	60	
	Air flow rate	(Cooling/Heating)	(m3/min)	56.6/48.0	
Piping connection	Type			Flare connection	
	Indoor unit	Liquid side	(mm)	∅9.52	
		Gas side	(mm)	∅15.88	
	Outdoor unit	Liquid side	(mm)	∅9.52	
		Gas side	(mm)	∅15.88	
	Maximum length		(m)	30	
	Maximum chargeless length		(m)	20	
	Maximum height difference		(m)	20	
Refrigerant	Name of refrigerant			R410A	
	Weight		(kg)	2.10	
Wiring connection	Power supply			3Wires:includes earth(Outdoor)	
	Interconnection			4Wires:includes earth	
Usable temperature range	Indoor	(Cooling/Heating)	(°C)	21~32/ ~28	
	Outdoor	(Cooling/Heating)	(°C)	-10~46/-15~24	
Accessory	Indoor unit	Installation plate		1	
		Wireless remote controller		1	
		Batteries		2	
		Remote controller holder		1	
		Toshiba New IAQ filte (Long)		2	
		Mounting screw		6(∅4x25L)	
		Remote controller holder Pan head wood screw		2(∅3.1x16L), (∅3.1x25L)	
		Plasma air purifier		–	
		Installation manual		1	
		Owner's manual		1	
	Outdoor unit	Drain nipple		1	
		Water-proof rubber cap		2	

* The specifications may be subject to change without notice for purpose of improvement

2-2. Operation Characteristic Curve

<Cooling>



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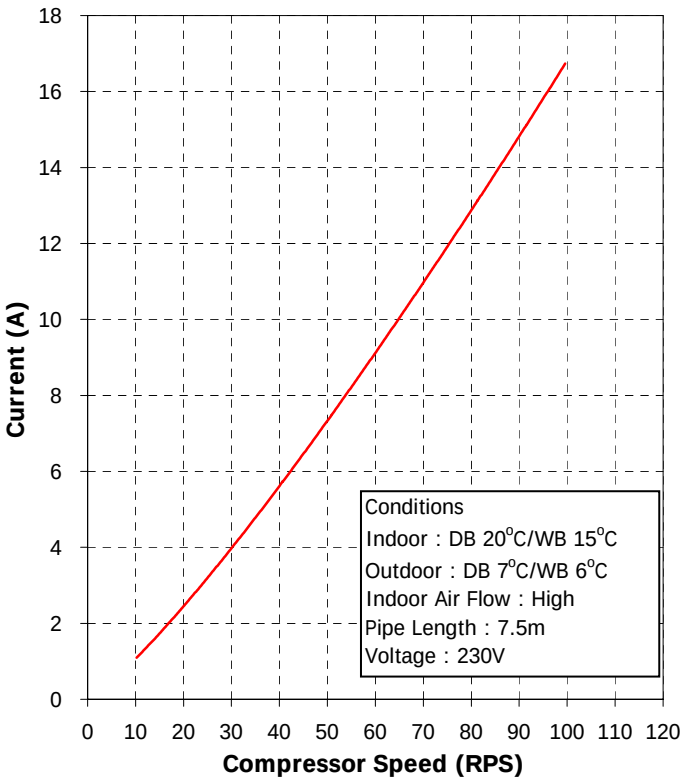

2-3. Capacity Variation Ratio According to Temperature

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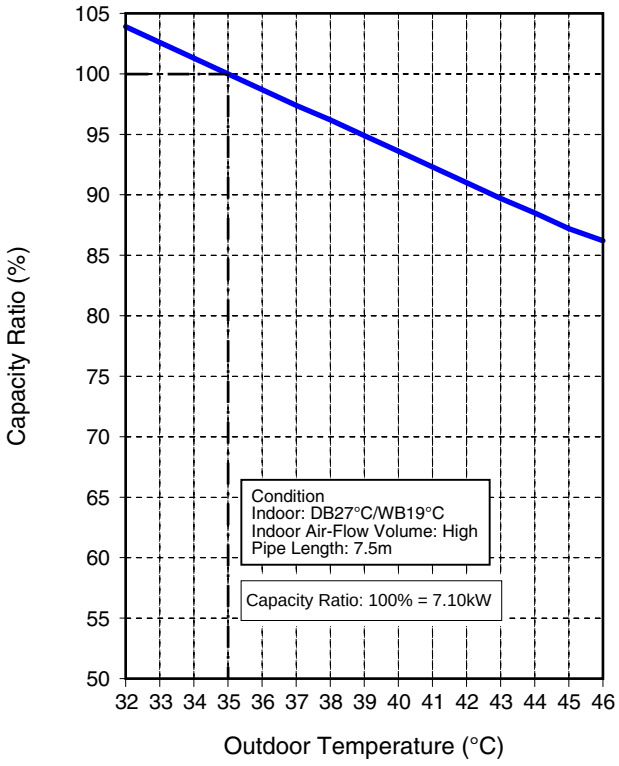

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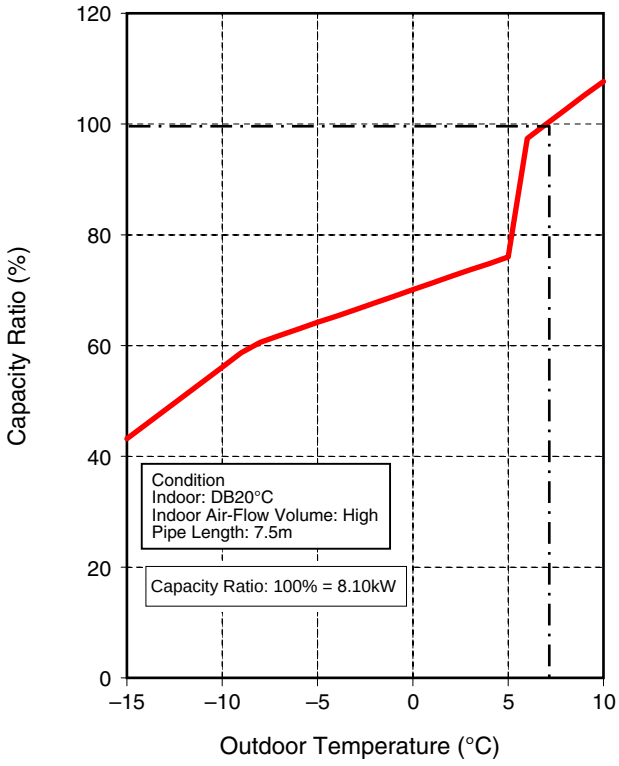


3. REFRIGERANT R410A

This air conditioner adopts the new refrigerant HFC (R410A) which does not damage the ozone layer.

The working pressure of the new refrigerant R410A is 1.6 times higher than conventional refrigerant (R22). The refrigerating oil is also changed in accordance with change of refrigerant, so be careful that water, dust, and existing refrigerant or refrigerating oil are not entered in the refrigerant cycle of the air conditioner using the new refrigerant during installation work or servicing time.

The next section describes the precautions for air conditioner using the new refrigerant. Conforming to contents of the next section together with the general cautions included in this manual, perform the correct and safe work.

3-1. Safety During Installation/Servicing

As R410A's pressure is about 1.6 times higher than that of R22, improper installation/servicing may cause a serious trouble. By using tools and materials exclusive for R410A, it is necessary to carry out installation/servicing safely while taking the following precautions into consideration.

1. Never use refrigerant other than R410A in an air conditioner which is designed to operate with R410A.

   If other refrigerant than R410A is mixed, pressure in the refrigeration cycle becomes abnormally high, and it may cause personal injury, etc. by a rupture.
2. Confirm the used refrigerant name, and use tools and materials exclusive for the refrigerant R410A.

   The refrigerant name R410A is indicated on the visible place of the outdoor unit of the air conditioner using R410A as refrigerant. To prevent mischarging, the diameter of the service port differs from that of R22.
3. If a refrigeration gas leakage occurs during installation/servicing, be sure to ventilate fully.

   If the refrigerant gas comes into contact with fire, a poisonous gas may occur.
4. When installing or removing an air conditioner, do not allow air or moisture to remain in the refrigeration cycle. Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused.
5. After completion of installation work, check to make sure that there is no refrigeration gas leakage.

   If the refrigerant gas leaks into the room, coming into contact with fire in the fan-driven heater, space heater, etc., a poisonous gas may occur.
6. When an air conditioning system charged with a large volume of refrigerant is installed in a small room, it is necessary to exercise care so that, even when refrigerant leaks, its concentration does not exceed the marginal level.

   If the refrigerant gas leakage occurs and its concentration exceeds the marginal level, an oxygen starvation accident may result.
7. Be sure to carry out installation or removal according to the installation manual.

   Improper installation may cause refrigeration trouble, water leakage, electric shock, fire, etc.
8. Unauthorized modifications to the air conditioner may be dangerous.

   If a breakdown occurs please call a qualified air conditioner technician or electrician.

   Improper repair may result in water leakage, electric shock and fire, etc.

3-2. Refrigerant Piping Installation

3-2-1. Piping Materials and Joints Used

For the refrigerant piping installation, copper pipes and joints are mainly used.

Copper pipes and joints suitable for the refrigerant must be chosen and installed.

Furthermore, it is necessary to use clean copper pipes and joints whose interior surfaces are less affected by contaminants.

1. Copper Pipes

It is necessary to use seamless copper pipes which are made of either copper or copper alloy and it is desirable that the amount of residual oil is less than 40 mg/10 m.

Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface).

Otherwise, the expansion valve or capillary tube may become blocked with contaminants.

As an air conditioner using R410A incurs pressure higher than when using R22, it is necessary to choose adequate materials.

Thicknesses of copper pipes used with R410A are as shown in Table 3-2-1.

Never use copper pipes thinner than 0.8 mm even when it is available on the market.

Table 3-2-1 Thicknesses of annealed copper pipes

		Thickness (mm)	
Nominal diameter (in.)	**Outer diameter (mm)**	**R410A**	R22
1/4	6.35	0.80	0.80
3/8	9.52	0.80	0.80
1/2	12.70	0.80	0.80
5/8	15.88	1.00	1.00

2. Joints

For copper pipes, flare joints or socket joints are used. Prior to use, be sure to remove all contaminants.

a) Flare Joints

Flare joints used to connect the copper pipes cannot be used for pipings whose outer diameter exceeds 20 mm. In such a case, socket joints can be used.

Sizes of flare pipe ends, flare joint ends and flare nuts are as shown in Tables 3-2-3 to 3-2-6 below.

b) Socket Joints

Socket joints are such that they are brazed for connections, and used mainly for thick pipings whose diameter is larger than 20 mm.

Thicknesses of socket joints are as shown in Table 3-2-2.

Table 3-2-2 Minimum thicknesses of socket joints

Nominal diameter (in.)	Reference outer diameter of copper pipe jointed (mm)	Minimum joint thickness (mm)
1/4	6.35	0.50
3/8	9.52	0.60
1/2	12.70	0.70
5/8	15.88	0.80

3-2-2. Processing of Piping Materials

When performing the refrigerant piping installation, care should be taken to ensure that water or dust does not enter the pipe interior, that no other oil than lubricating oils used in the installed air-water heat pump is used, and that refrigerant does not leak.
When using lubricating oils in the piping processing, use such lubricating oils whose water content has been removed. When stored, be sure to seal the container with an airtight cap or any other cover.

1. Flare processing procedures and precautions

a) Cutting the Pipe

By means of a pipe cutter, slowly cut the pipe so that it is not deformed.

b) Removing Burrs and Chips

If the flared section has chips or burrs, refrigerant leakage may occur.
Carefully remove all burrs and clean the cut surface before installation.

c) Insertion of Flare Nut

d) Flare Processing

Make certain that a clamp bar and copper pipe have been cleaned.

By means of the clamp bar, perform the flare processing correctly.

Use either a flare tool for R410A or conventional flare tool.

Flare processing dimensions differ according to the type of flare tool.

When using a conventional flare tool, be sure to secure “dimension A” by using a gauge for size adjustment.

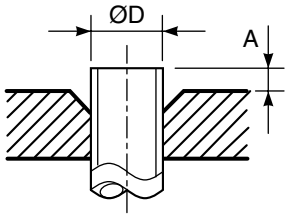


Fig. 3-2-1 Flare processing dimensions

Table 3-2-3 Dimensions related to flare processing for R410A

Nominal diameter (in.)	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R410A clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0
3/8	9.52	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0
1/2	12.70	0.8	0 to 0.5	1.0 to 1.5	2.0 to 2.5
5/8	15.88	1.0	0 to 0.5	1.0 to 1.5	2.0 to 2.5

Table 3-2-4 Dimensions related to flare processing for R22

Nominal diameter (in.)	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R22 clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0 to 0.5	0.5 to 1.0	1.0 to 1.5
3/8	9.52	0.8	0 to 0.5	0.5 to 1.0	1.0 to 1.5
1/2	12.70	0.8	0 to 0.5	0.5 to 1.0	1.5 to 2.0
5/8	15.88	1.0	0 to 0.5	0.5 to 1.0	1.5 to 2.0

Table 3-2-5 Flare and flare nut dimensions for R410A

Nominal diameter (in.)	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.35	0.8	9.1	9.2	6.5	13	17
3/8	9.52	0.8	13.2	13.5	9.7	20	22
1/2	12.70	0.8	16.0	16.6	12.9	23	26
5/8	15.88	1.0	19.0	19.7	16.0	25	29

Table 3-2-6 Flare and flare nut dimensions for R22

Nominal diameter (in.)	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.35	0.8	9.0	9.2	6.5	13	17
3/8	9.52	0.8	13.0	13.5	9.7	20	22
1/2	12.70	0.8	16.0	16.2	12.9	20	24
5/8	15.88	1.0	19.0	19.7	16.0	23	27

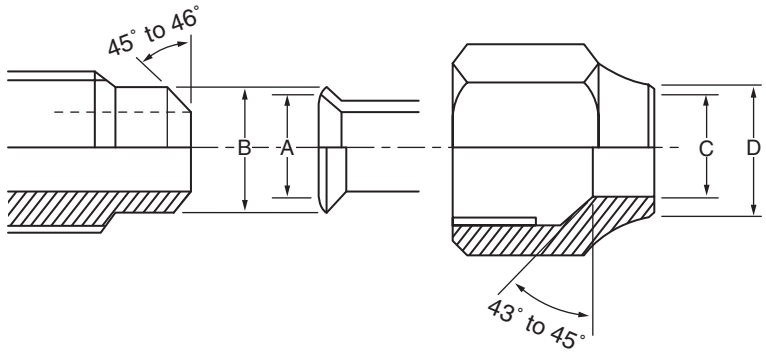


Fig. 3-2-2 Relations between flare nut and flare seal surface

2. Flare Connecting Procedures and Precautions

a) Make sure that the flare and union portions do not have any scar or dust, etc.

b) Correctly align the processed flare surface with the union axis.

c) Tighten the flare with designated torque by means of a torque wrench.

The tightening torque for R410A is the same as that for conventional R22.
Incidentally, when the torque is weak, the gas leakage may occur.

When it is strong, the flare nut may crack and may be made non-removable.
When choosing the tightening torque, comply with values designated by manufacturers.
Table 3-2-7 shows reference values.

NOTE :

When applying oil to the flare surface, be sure to use oil designated by the manufacturer.
If any other oil is used, the lubricating oils may deteriorate and cause the compressor to burn out.

Table 3-2-7 Tightening torque of flare for R410A [Reference values]

Nominal diameter (in.)	Outer diameter (mm)	Tightening torque N•m (kgf•cm)	Tightening torque of torque wrenches available on the market N•m (kgf•cm)
1/4	6.35	14 to 18 (140 to 180)	16 (160), 18 (180)
3/8	9.52	33 to 42 (330 to 420)	42 (420)
1/2	12.70	50 to 62 (500 to 620)	55 (550)
5/8	15.88	63 to 77 (630 to 770)	65 (650)

3-3. Tools

3-3-1. Required Tools

The service port diameter of packed valve of the outdoor unit in the air-water heat pump using R410A is changed to prevent mixing of other refrigerant.
To reinforce the pressure-resisting strength, flare processing dimensions and opposite side dimension of flare nut (For Ø12.7 copper pipe) of the refrigerant piping are lengthened.

The used refrigerating oil is changed, and mixing of oil may cause a trouble such as generation of sludge, clogging of capillary, etc. Accordingly, the tools to be used are classified into the following three types.

1. Tools exclusive for R410A (Those which cannot be used for conventional refrigerant (R22))
2. Tools exclusive for R410A, but can be also used for conventional refrigerant (R22)
3. Tools commonly used for R410A and for conventional refrigerant (R22)

The table below shows the tools exclusive for R410A and their interchangeability.

Tools exclusive for R410A (The following tools for R410A are required.)

Tools whose specifications are changed for R410A and their interchangeability

No.	Used tool	Usage	R410A air-water heat pump installation		Conventional air-water heat pump installation
			Existence of new equipment for R410A	Whether conventional equipment can be used	Whether new equipment can be used with conventional refrigerant
1	Flare tool	Pipe flaring	Yes	* **(Note 1)**	Yes
2	Copper pipe gauge for adjusting projection margin	Flaring by conventional flare tool	Yes	* **(Note 1)**	* **(Note 1)**
3	Torque wrench (For Ø12.7)	Connection of flare nut	Yes	No	No
4	Gauge manifold	Evacuating, refrigerant charge, run check, etc.	Yes	No	No
5	Charge hose				
6	Vacuum pump adapter	Vacuum evacuating	Yes	No	Yes
7	Electronic balance for refrigerant charging	Refrigerant charge	Yes	No	Yes
8	Refrigerant cylinder	Refrigerant charge	Yes	No	No
9	Leakage detector	Gas leakage check	Yes	No	Yes
10	Charging cylinder	Refrigerant charge	* **(Note 2)**	No	No

(Note 1) When flaring is carried out for R410A using the conventional flare tools, adjustment of projection margin is necessary. For this adjustment, a copper pipe gauge, etc. are necessary.

(Note 2) Charging cylinder for R410A is being currently developed.

General tools (Conventional tools can be used.)

In addition to the above exclusive tools, the following equipments which serve also for R22 are necessary as the general tools.

1. Vacuum pump
   Use vacuum pump by attaching vacuum pump adapter.
2. Torque wrench (For Ø6.35, Ø9.52)
3. Pipe cutter
4. Reamer
5. Pipe bender
6. Level vial
7. Screwdriver (+, –)
8. Spanner or Monkey wrench
9. Hole core drill (Ø65)
10. Hexagon wrench (Opposite side 4mm)
11. Tape measure
12. Metal saw

Also prepare the following equipments for other installation method and run check.

1. Clamp meter
2. Thermometer
3. Insulation resistance tester
4. Electroscope

3-4. Recharging of Refrigerant

When it is necessary to recharge refrigerant, charge the specified amount of new refrigerant according to the following steps.

Recover the refrigerant, and check no refrigerant remains in the equipment.

↓

Connect the charge hose to packed valve service port at the outdoor unit's gas side.

↓

Connect the charge hose to the vacuum pump adapter.

↓

Open fully both packed valves at liquid and gas sides.

↓

Place the handle of the gauge manifold Low in the fully opened position, and turn on the vacuum pump's power switch. Then, evacuating the refrigerant in the cycle.

↓

When the compound gauge's pointer has indicated –0.1 Mpa (–76 cmHg), place the handle Low in the fully closed position, and turn off the vacuum pump's power switch.

↓

Keep the status as it is for 1 to 2 minutes, and ensure that the compound gauge's pointer does not return.

↓

Set the refrigerant cylinder to the electronic balance, connect the connecting hose to the cylinder and the connecting port of the electronic balance, and charge **liquid refrigerant**.

(For refrigerant charging, see the figure below.)

1. Never charge refrigerant exceeding the specified amount.
2. If the specified amount of refrigerant cannot be charged, charge refrigerant **bit by bit** in COOL mode.
3. Do not carry out additional charging.
   When additional charging is carried out if refrigerant leaks, the refrigerant composition changes in the refrigeration cycle, that is characteristics of the air conditioner changes, refrigerant exceeding the specified amount is charged, and working pressure in the refrigeration cycle becomes abnormally high pressure, and may cause a rupture or personal injury.

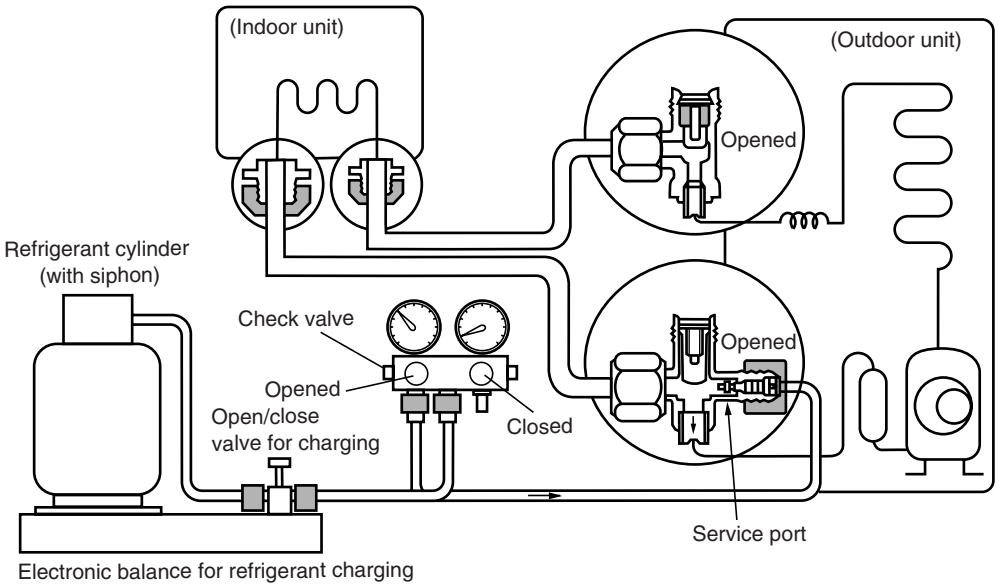
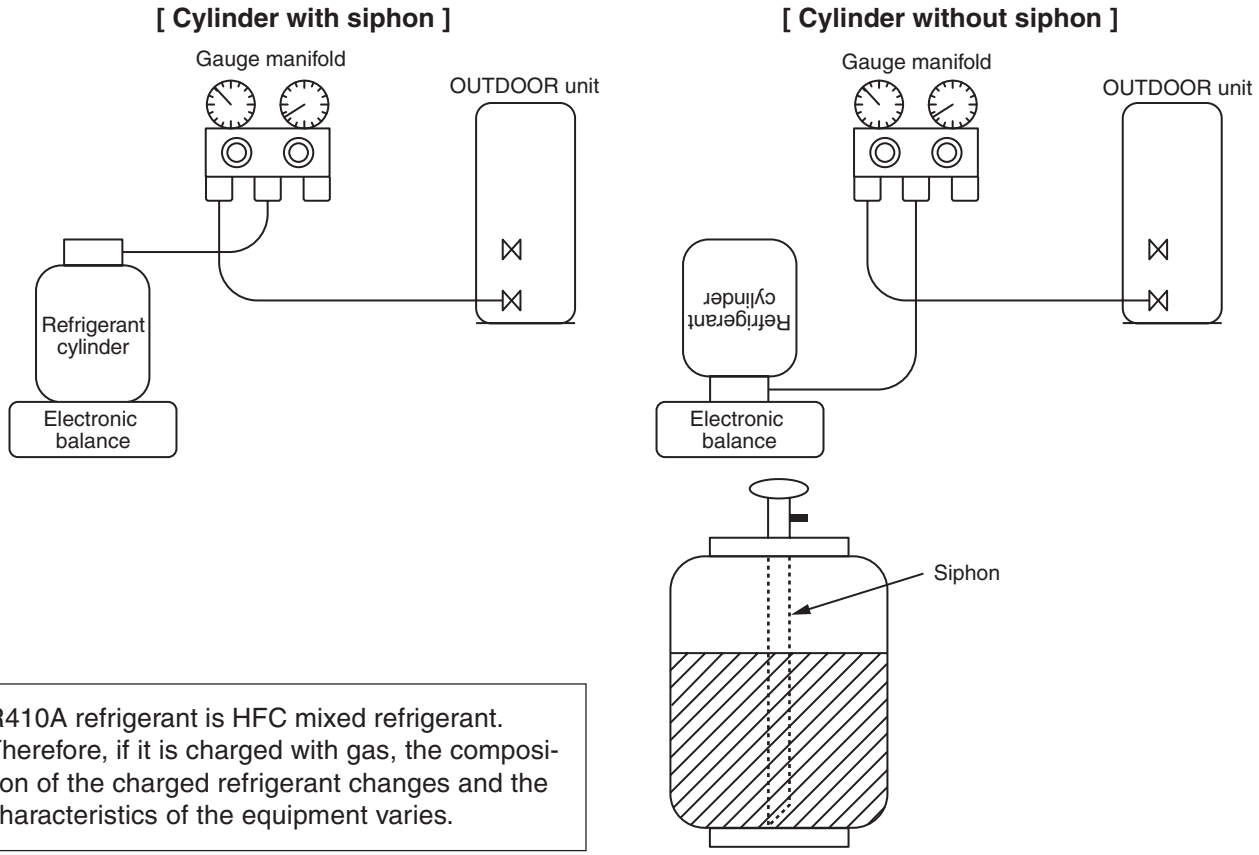


Fig. 3-4-1 Configuration of refrigerant charging

1. Be sure to make setting so that **liquid** can be charged.
2. When using a cylinder equipped with a siphon, liquid can be charged without turning it upside down.

It is necessary for charging refrigerant under condition of liquid because R410A is mixed type of refrigerant. Accordingly, when charging refrigerant from the refrigerant cylinder to the equipment, charge it turning the cylinder upside down if cylinder is not equipped with siphon.



R410A refrigerant is HFC mixed refrigerant. Therefore, if it is charged with gas, the composition of the charged refrigerant changes and the characteristics of the equipment varies.

Fig. 3-4-2

3-5. Brazing of Pipes

3-5-1. Materials for Brazing

1. Silver brazing filler

Silver brazing filler is an alloy mainly composed of silver and copper. It is used to join iron, copper or copper alloy, and is relatively expensive though it excels in solderability.

2. Phosphor bronze brazing filler

Phosphor bronze brazing filler is generally used to join copper or copper alloy.

3. Low temperature brazing filler

Low temperature brazing filler is generally called solder, and is an alloy of tin and lead.
Since it is weak in adhesive strength, do not use it for refrigerant pipes.

1. Phosphor bronze brazing filler tends to react with sulfur and produce a fragile compound water solution, which may cause a gas leakage. Therefore, use any other type of brazing filler at a hot spring resort, etc., and coat the surface with a paint.
2. When performing brazing again at time of servicing, use the same type of brazing filler.

3-5-2. Flux

1. Reason why flux is necessary

- By removing the oxide film and any foreign matter on the metal surface, it assists the flow of brazing filler.
- In the brazing process, it prevents the metal surface from being oxidized.
- By reducing the brazing filler's surface tension, the brazing filler adheres better to the treated metal.

2. Characteristics required for flux

- Activated temperature of flux coincides with the brazing temperature.
- Due to a wide effective temperature range, flux is hard to carbonize.
- It is easy to remove slag after brazing.
- The corrosive action to the treated metal and brazing filler is minimum.
- It excels in coating performance and is harmless to the human body.

As the flux works in a complicated manner as described above, it is necessary to select an adequate type of flux according to the type and shape of treated metal, type of brazing filler and brazing method, etc.

3. Types of flux

- **Noncorrosive flux**

  Generally, it is a compound of borax and boric acid.

  It is effective in case where the brazing temperature is higher than 800°C.

- **Activated flux**

  Most of fluxes generally used for silver brazing are this type.

  It features an increased oxide film removing capability due to the addition of compounds such as potassium fluoride, potassium chloride and sodium fluoride to the borax-boric acid compound.

4. Piping materials for brazing and used brazing filler/flux

Piping material	Used brazing filler	Used flux
Copper - Copper	Phosphor copper	Do not use
Copper - Iron	Silver	Paste flux
Iron - Iron	Silver	Vapor flux

1. Do not enter flux into the refrigeration cycle.
2. When chlorine contained in the flux remains within the pipe, the lubricating oil deteriorates. Therefore, use a flux which does not contain chlorine.
3. When adding water to the flux, use water which does not contain chlorine (e.g. distilled water or ion-exchange water).
4. Remove the flux after brazing.

3-5-3. Brazing

As brazing work requires sophisticated techniques, experiences based upon a theoretical knowledge, it must be performed by a person qualified.

In order to prevent the oxide film from occurring in the pipe interior during brazing, it is effective to proceed with brazing while letting dry Nitrogen gas (N2) flow.

Never use gas other than Nitrogen gas.

1. Brazing method to prevent oxidation

1) Attach a reducing valve and a flow-meter to the Nitrogen gas cylinder.
2) Use a copper pipe to direct the piping material, and attach a flow-meter to the cylinder.
3) Apply a seal onto the clearance between the piping material and inserted copper pipe for Nitrogen in order to prevent backflow of the Nitrogen gas.
4) When the Nitrogen gas is flowing, be sure to keep the piping end open.
5) Adjust the flow rate of Nitrogen gas so that it is lower than 0.05 m^3/Hr or 0.02 MPa (0.2kgf/cm^2) by means of the reducing valve.
6) After performing the steps above, keep the Nitrogen gas flowing until the pipe cools down to a certain extent (temperature at which pipes are touchable with hands).
7) Remove the flux completely after brazing.

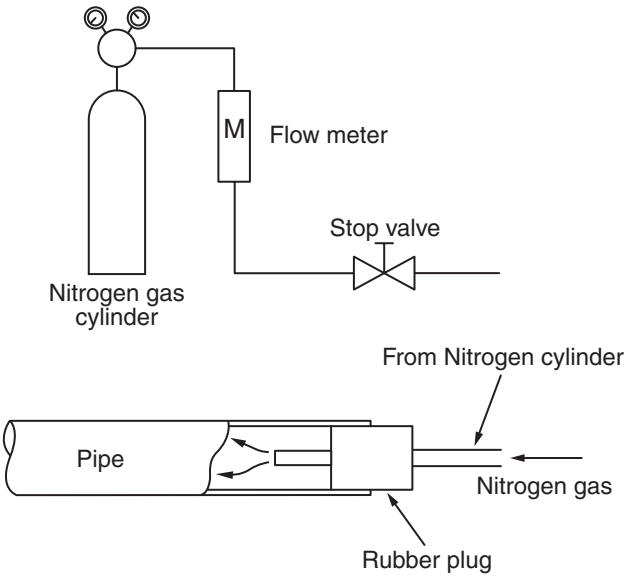
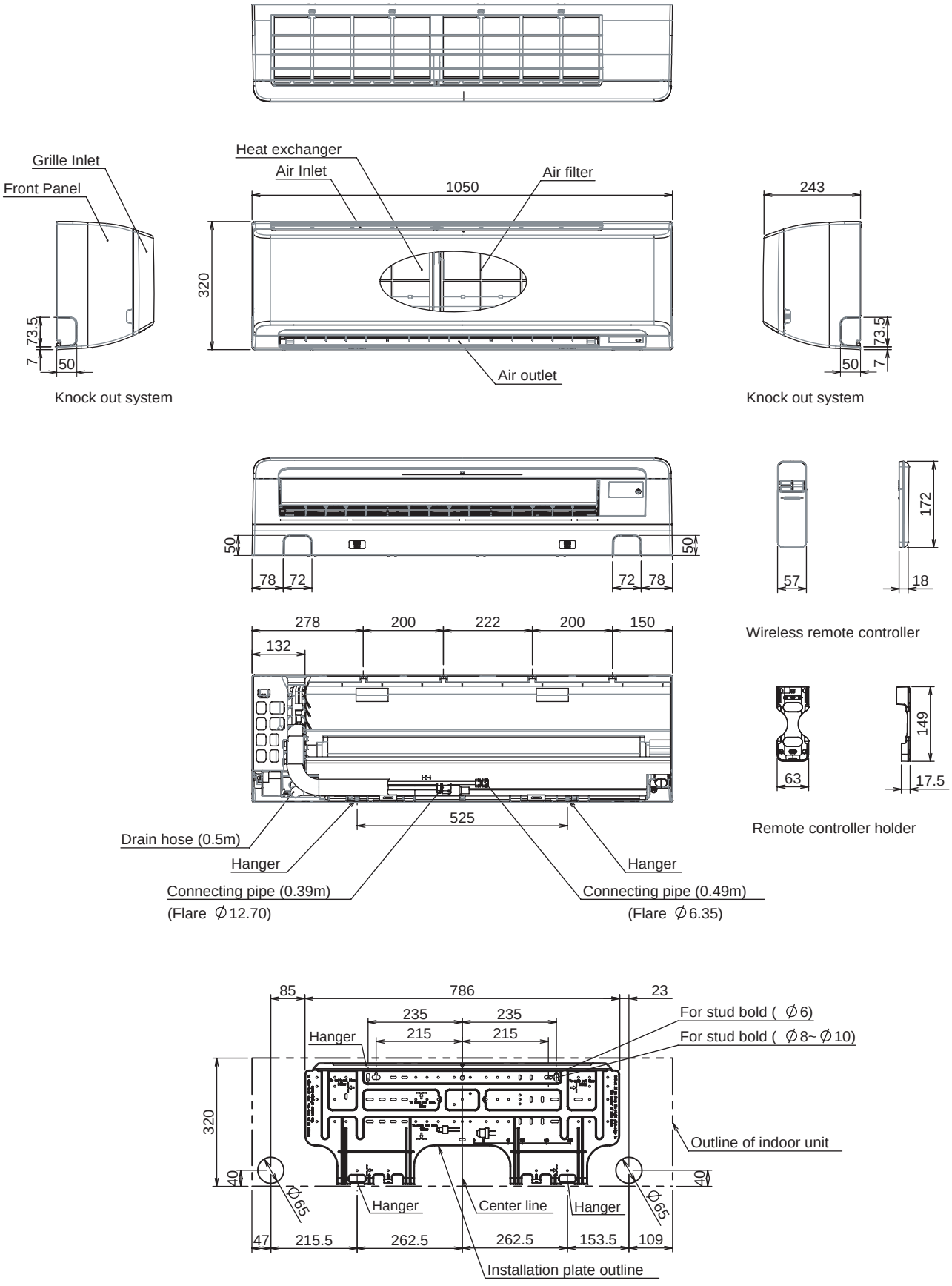


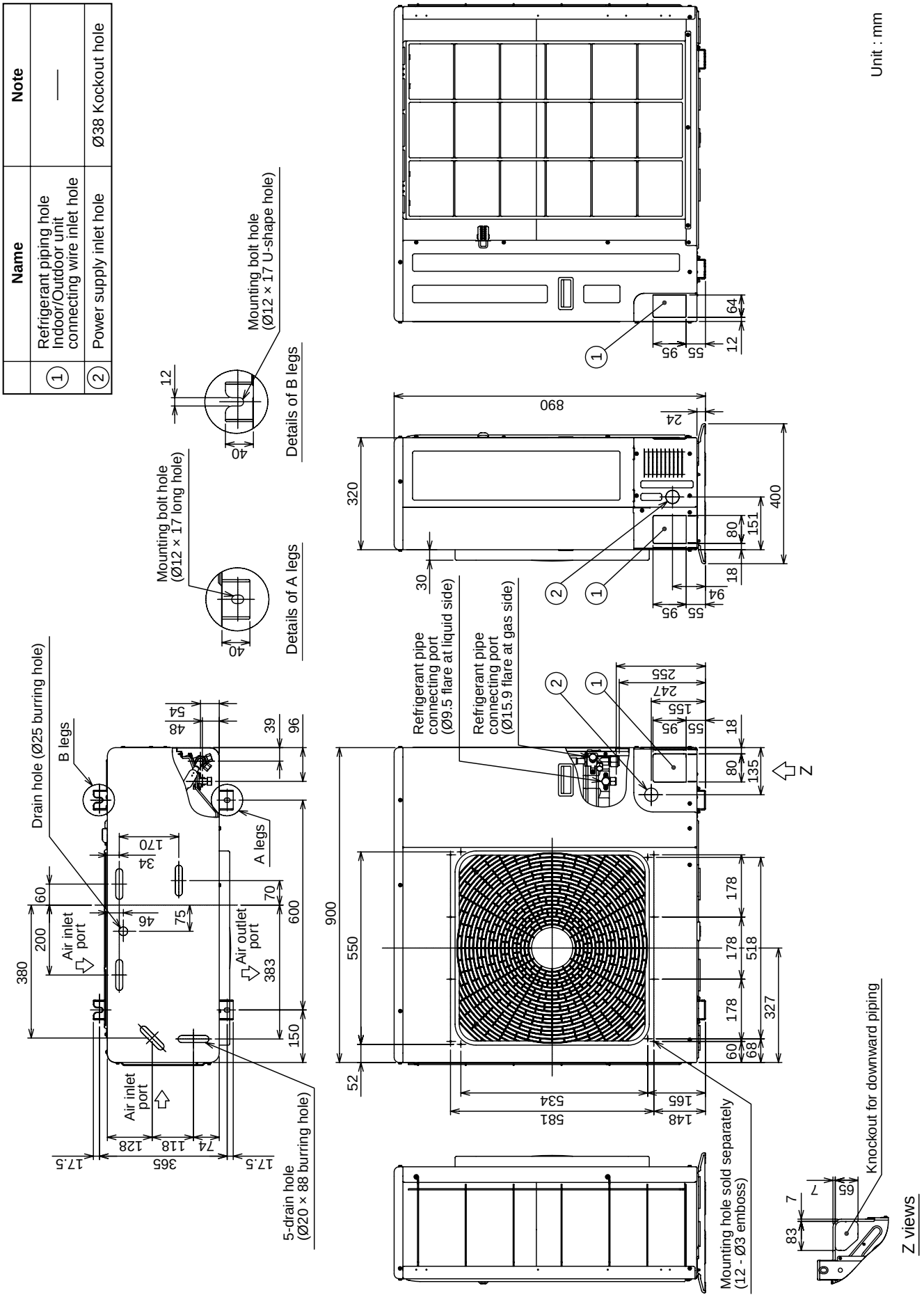
Fig. 3-5-1
Prevention of oxidation during brazing

4. CONSTRUCTION VIEWS

4-1. Indoor Unit

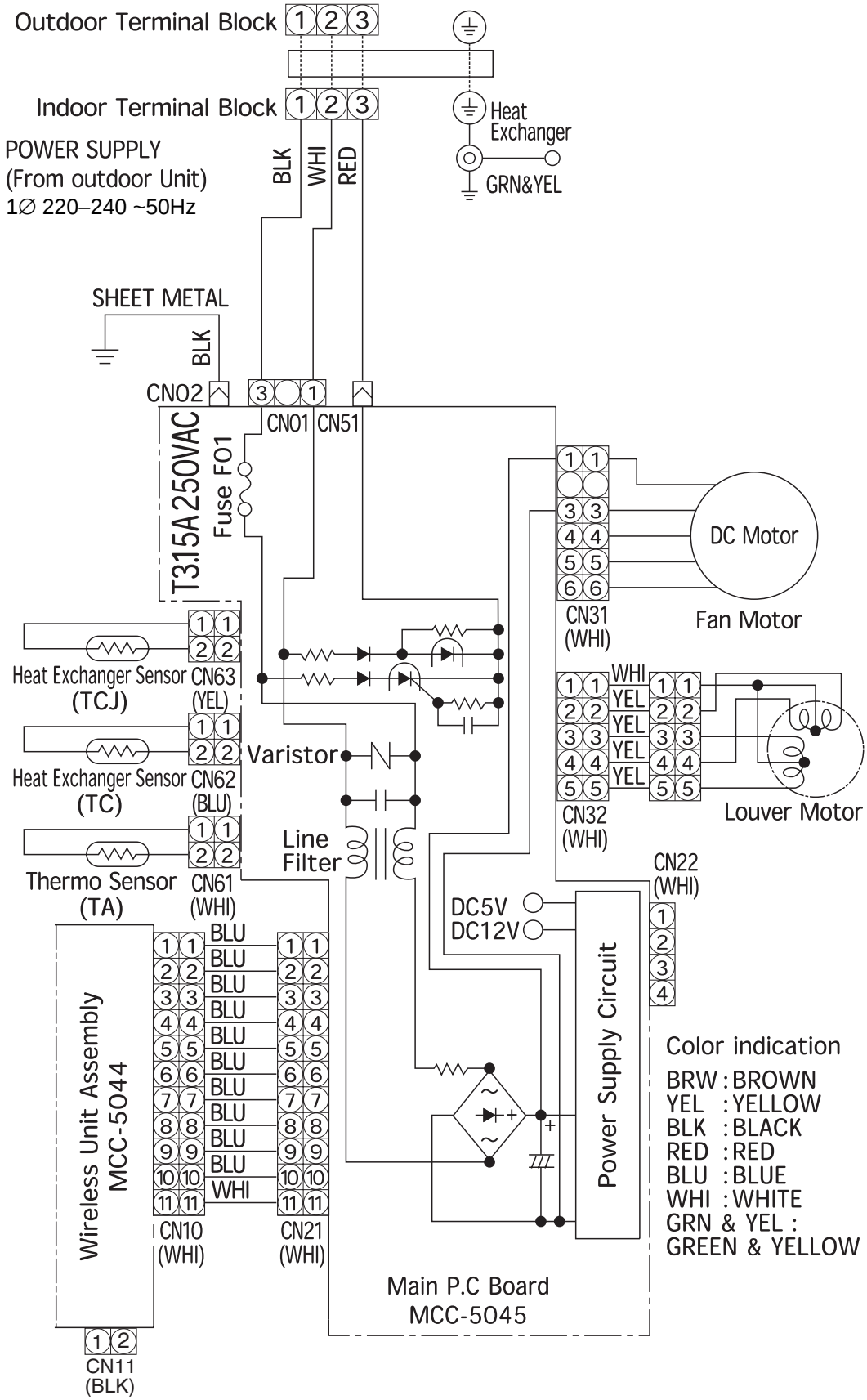


4-2. Outdoor Unit

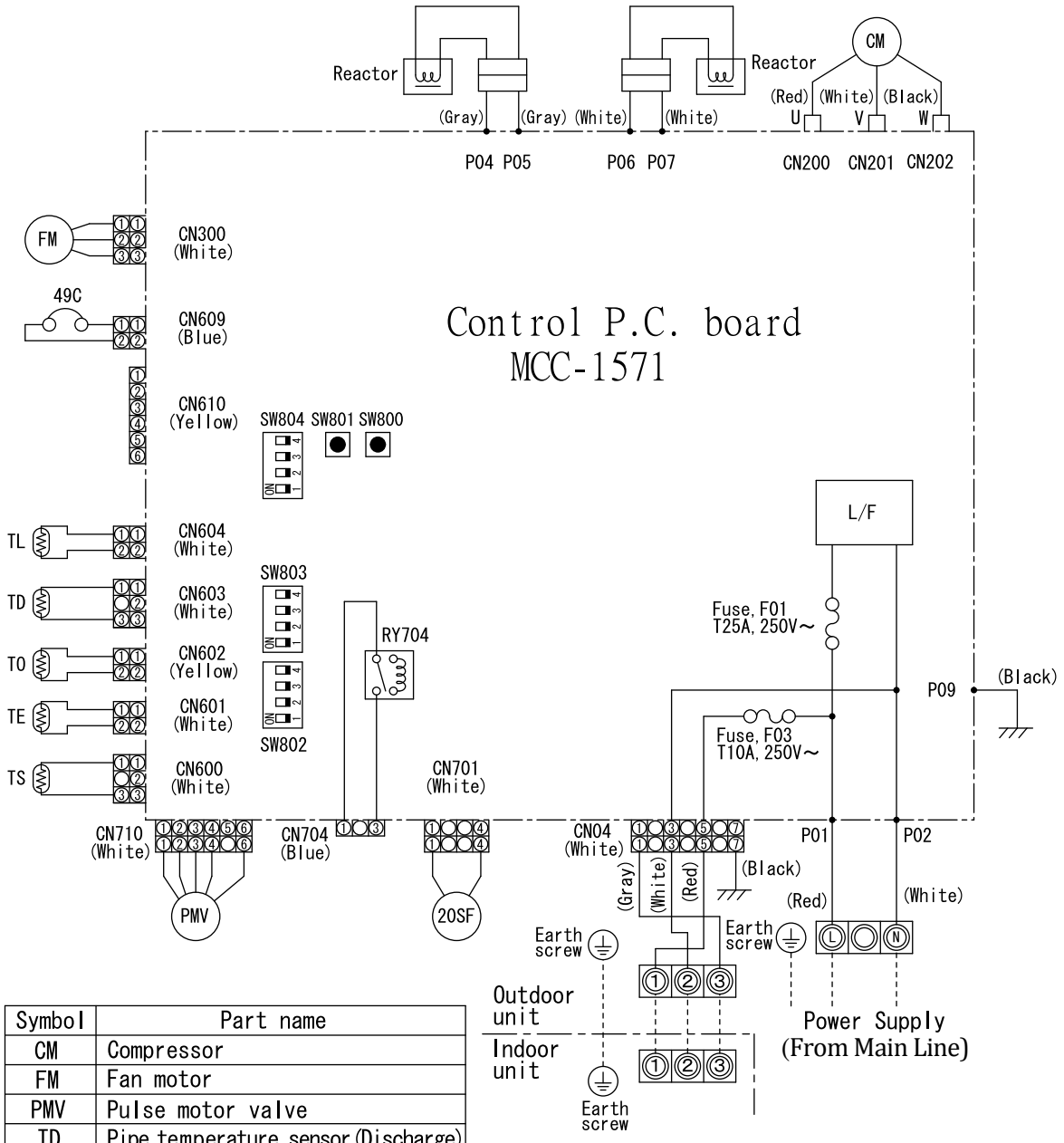


5. WIRING DIAGRAM

5-1. Indoor Unit



5-2. Outdoor Unit



Symbol	Part name
CM	Compressor
FM	Fan motor
PMV	Pulse motor valve
TD	Pipe temperature sensor (Discharge)
TS	Pipe temperature sensor (Suction)
TE	Heat exchanger sensor 1
TL	Heat exchanger sensor 2
TO	Outside temperature sensor
20SF	4-way valve coil
49C	Compressor case thermostat
RY	Relay
L/F	Line Filter

1. ◎ indicates the terminal block. Alphanumeric characters in the cycle indicate the termial No.
2. The two-dot chain line indicates the wiring procured locally.
3. [____] indicates the P.C. board.
4. For the indoor unit circuit, refer to the wiring diagram of the indoor unit.

6. SPECIFICATIONS OF ELECTRICAL PARTS

6-1. Indoor Unit

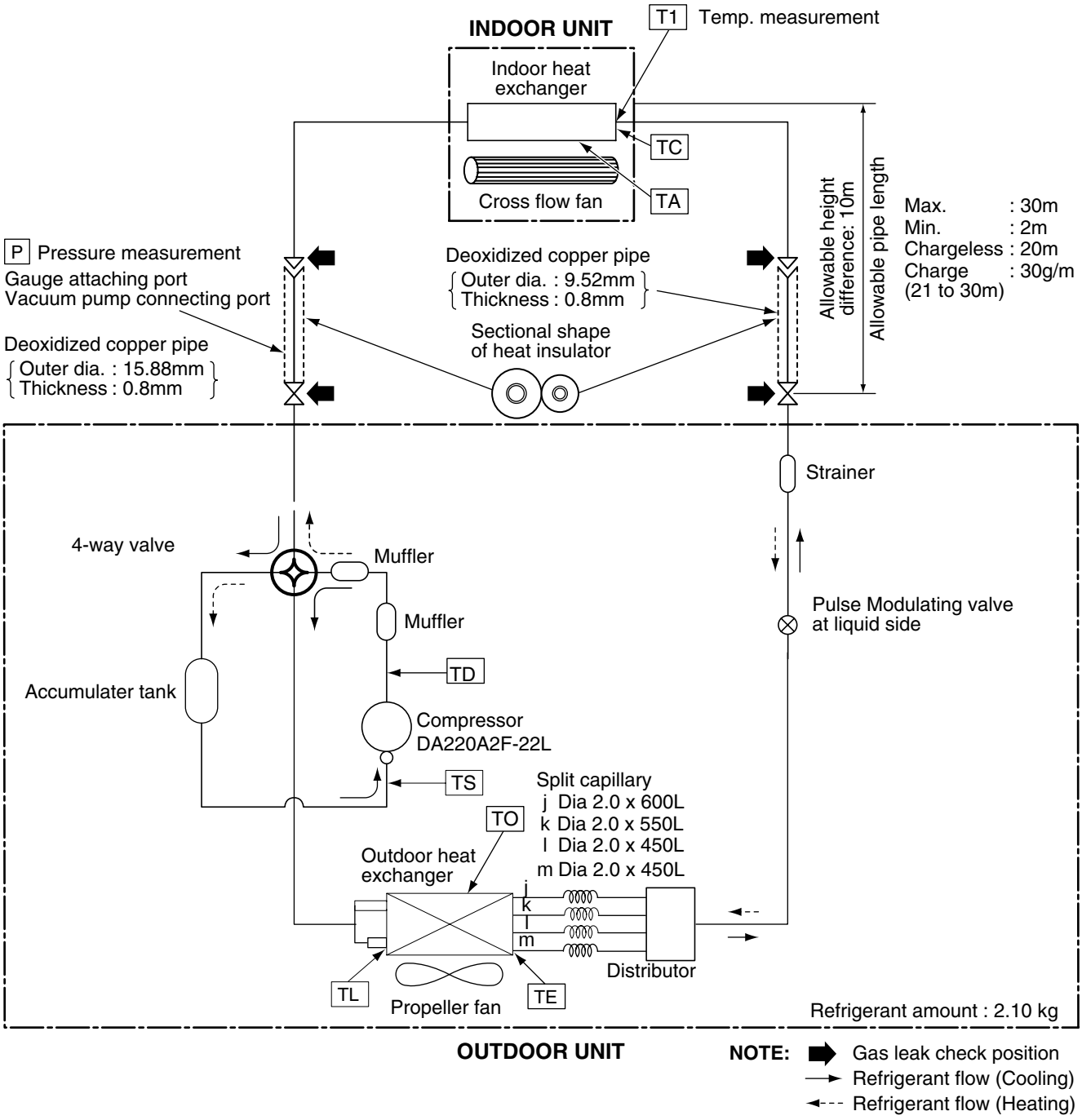
No.	Parts name	Type	Specifications
1	Fan motor (for indoor)	ICF-340-30-2B	DC340V, 30W
2	Room temp. sensor (TA-sensor)	(—)	10kΩ at 25°C
3	Heat exchanger temp. sensor (TC-sensor)	(—)	10kΩ at 25°C
4	Heat exchanger temp. sensor (TCJ-sensor)	(—)	10kΩ at 25°C
5	Louver motor	MP24Z3N	4 phase, 16 poles, DC12V

6-2. Outdoor Unit

No.	Parts name	Type	Specifications
1	Compressor	DA220A2F-22L	—
2	Outdoor fan motor	ICF-280-A60-1	Output 60 W
3	Reactor	CH-56	5.8 mH, 18.5 A
4	4-way valve coil	VHV-H01AP1874A1	AC200 ~ 240 V
5	PMV coil	CAM-MD12TCTH-6	DC12 V
6	P.C. board	MCC-1571	AC220 ~ 240 V
7	Fuse (Mounted on P.C. board)	—	AC250 V, 25 A
8	Fuse (Mounted on P.C. board)	—	AC250 V, 10 A
9	Fuse (Mounted on P.C. board)	—	AC250 V, 3.15 A
10	Outdoor temp. sensor (TO sensor)	—	10 kΩ at 25°C
11	Heat exchanger sensor (Te sensor)	—	10 kΩ at 25°C
12	Discharge temp. sensor (Td sensor)	—	50 kΩ at 25°C
13	Heat exchanger Temp sensor (Ts sensor)	—	10 kΩ at 25°C
14	Compressor thermo. (Protection)	CS-12AL	OFF: 125 ± 4°C, ON: 90 ± 5°C

7. REFRIGERANT CYCLE DIAGRAM

7-1. Refrigerant Cycle Diagram



NOTE :

- The maximum pipe length of this air conditioner is 30m. When the pipe length exceeds 20m, the additional charging of refrigerant, 30g per 1m for the part of pipe exceeded 20m is required. (Max. 300g)

7-2. Operation Data

<Cooling>

Tempeature condition(°C)		Standard pressure	Heat exchanger pipe temp.		Indoor fan mode	Outdoor fan mode	Compressor revolution (rps)
Indoor	Outdoor	P (MPa)	T1 (°C)	T2 (°C)			
27/19	35/24	0.8 to 0.9	7.0 to 9.0	46 to 47	High	High	67

<Heating>

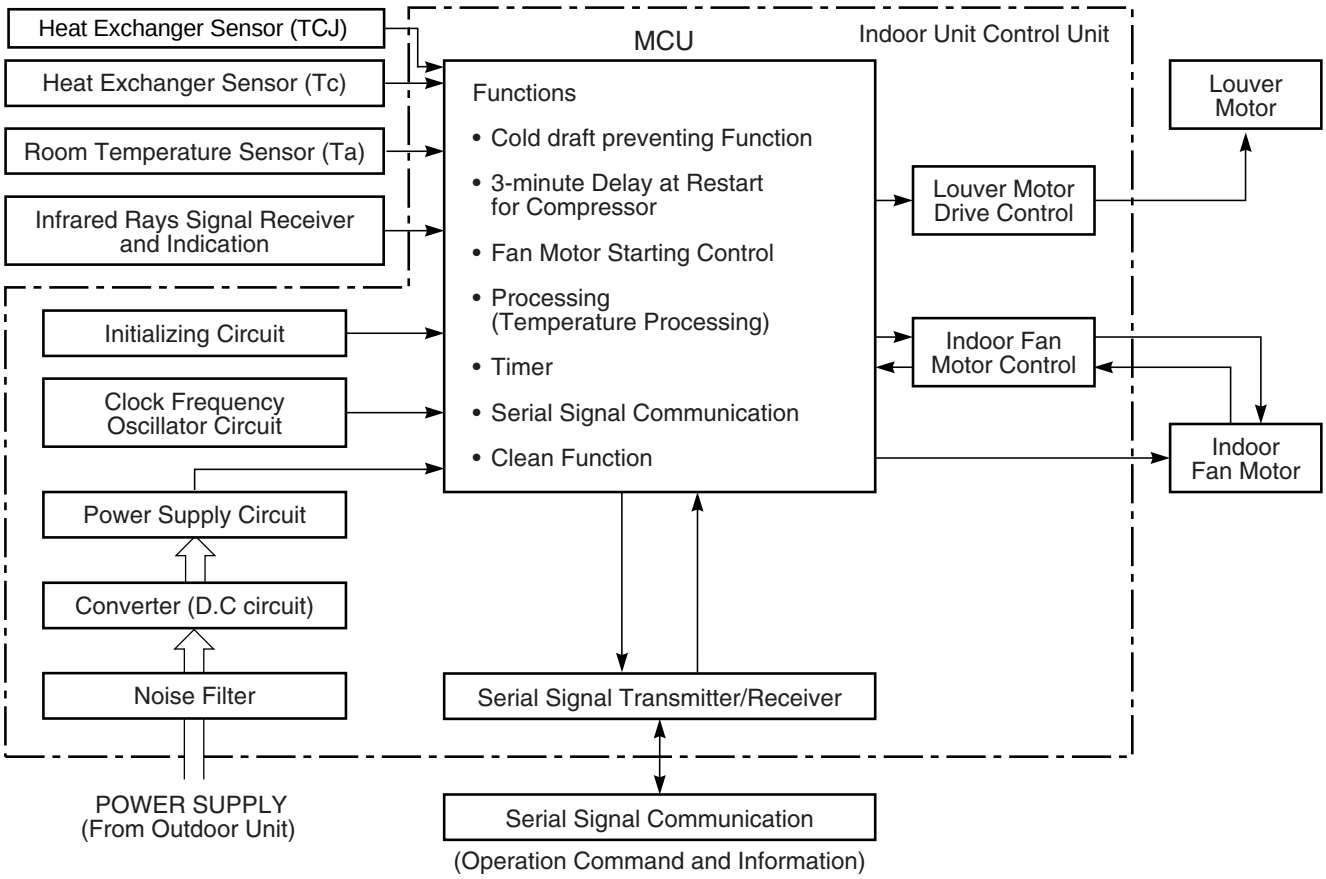
Tempeature condition(°C)		Standard pressure	Heat exchanger pipe temp.		Indoor fan mode	Outdoor fan mode	Compressor revolution (rps)
Indoor	Outdoor	P (MPa)	T1 (°C)	T2 (°C)			
20/15	7/6	3.0 to 3.1	50 to 52	1.0 to 2.0	High	High	67

NOTES :

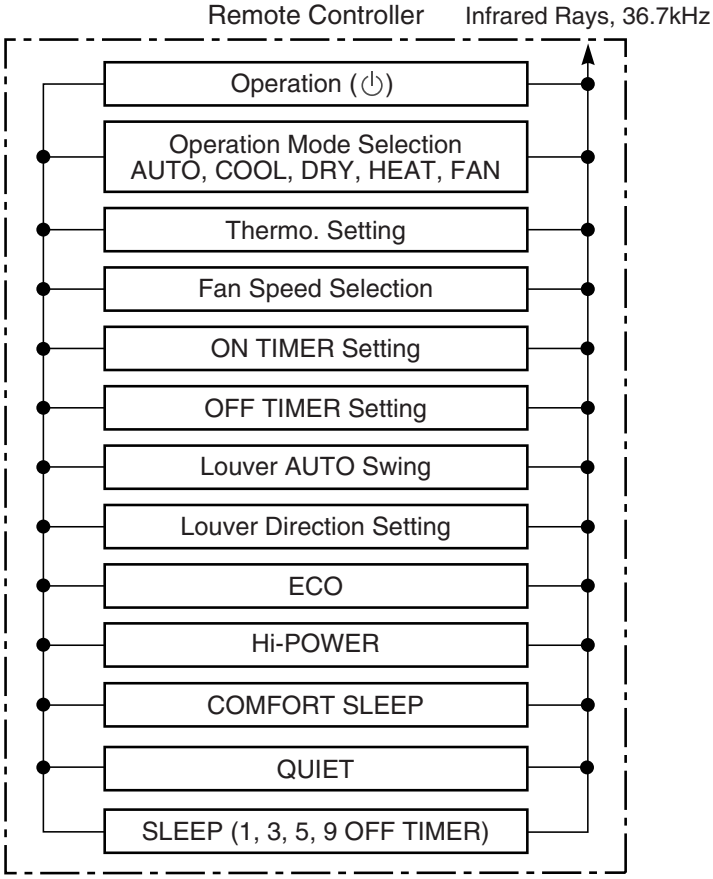
1. Measure surface temperature of heat exchanger pipe around center of heat exchaner path U bent.
   (Thermistor themometer)
2. Connecting piping condition : 7.5 m

8. CONTROL BLOCK DIAGRAM

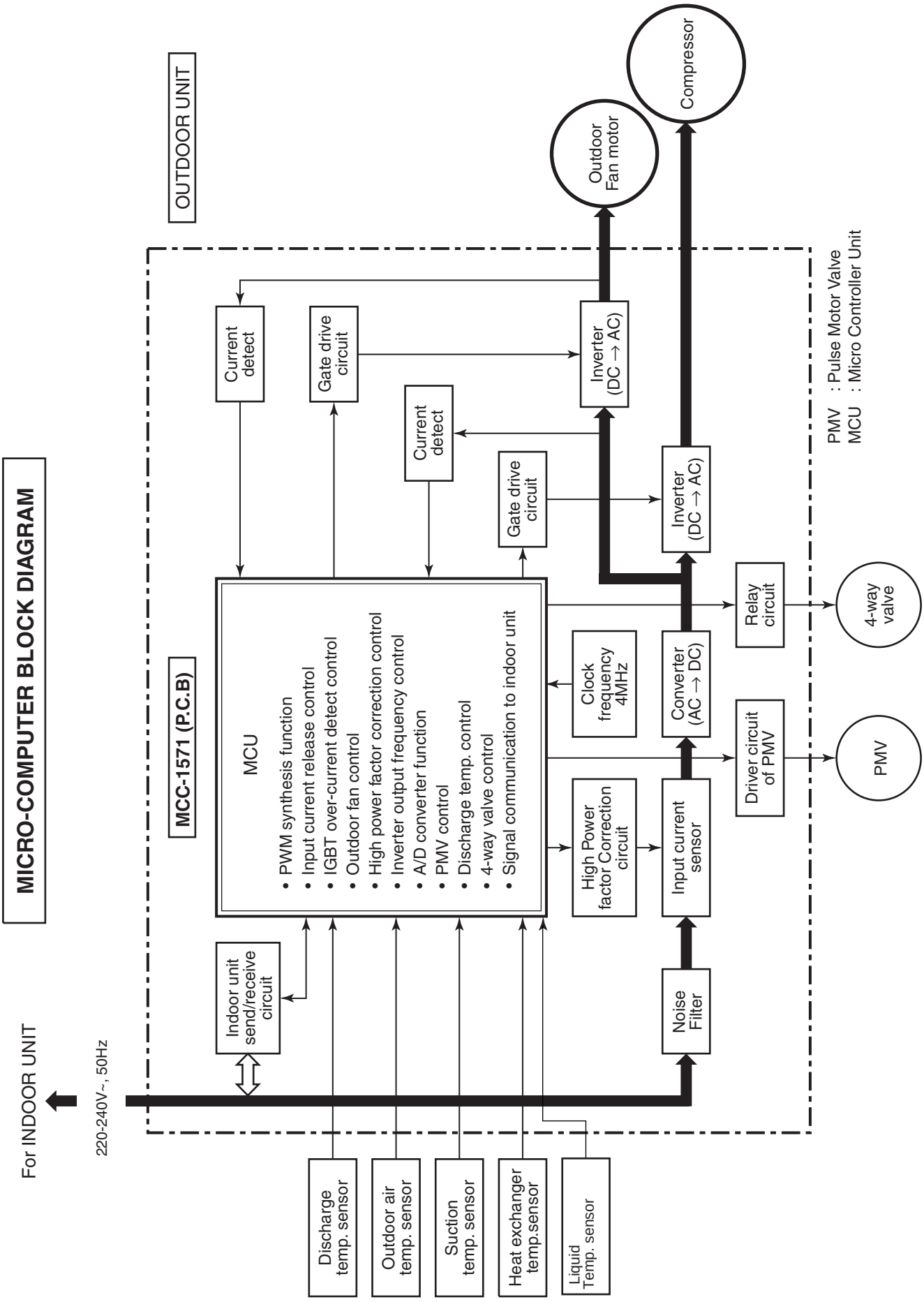
8-1. Indoor Unit



REMOTE CONTROLLER



8-2. Outdoor Unit (Inverter Assembly)



9. OPERATION DESCRIPTION

9-1. Outline of Air Conditioner Control

This air conditioner is a capacity-variable type air conditioner, which uses DC motor for the indoor fan motor and the outdoor fan motor. And the capacity-proportional control compressor which can change the motor speed in the range from 11 to 120 rps is mounted. The DC motor drive circuit is mounted to the indoor unit. The compressor and the inverter to control fan motor are mounted to the outdoor unit.

The entire air conditioner is mainly controlled by the indoor unit controller.

The indoor unit controller drives the indoor fan motor based upon command sent from the remote controller, and transfers the operation command to the outdoor unit controller.

The outdoor unit controller receives operation command from the indoor unit side, and controls the outdoor fan and the pulse motor valve. (PMV)

Besides, detecting revolution position of the compressor motor, the outdoor unit controller controls speed of the compressor motor by controlling output voltage of the inverter and switching timing of the supply power (current transfer timing) so that motors drive according to the operation command.

And then, the outdoor unit controller transfers reversely the operating status information of the outdoor unit to control the indoor unit controller.

As the compressor adopts four-pole brushless DC motor, the frequency of the supply power from inverter to compressor is two-times cycles of the actual number of revolution.

1. Role of indoor unit controller

The indoor unit controller judges the operation commands from the remote controller and assumes the following functions.

- Judgment of suction air temperature of the indoor heat exchanger by using the indoor temp. sensor. (TA sensor)
- Judgment of the indoor heat exchanger temperature by using heat exchanger sensor (TC sensor) (Prevent-freezing control, etc.)
- Louver motor control
- Indoor fan motor operation control
- LED (Light Emitting Diode) display control
- Transferring of operation command signal (Serial signal) to the outdoor unit
- Reception of information of operation status (Serial signal including outside temperature data) to the outdoor unit and judgment/display of error

2. Role of outdoor unit controller

Receiving the operation command signal (Serial signal) from the indoor unit controller, the outdoor unit performs its role.

- Compressor operation control
- Operation control of outdoor fan motor
- PMV control
- 4-way valve control

} Operations followed to judgment of serial signal from indoor side.

- Detection of inverter input current and current release operation
- Over-current detection and prevention operation to IGBT module (Compressor stop function)
- Compressor and outdoor fan stop function when serial signal is off (when the serial signal does not reach the board assembly of outdoor control by trouble of the signal system)
- Transferring of operation information (Serial signal) from outdoor unit controller to indoor unit controller
- Detection of outdoor temperature and operation revolution control
- Defrost control in heating operation (Temperature measurement by outdoor heat exchanger and control 4-way valve and outdoor fan)

3. Contents of operation command signal (Serial signal) from indoor unit controller to outdoor unit controller

The following three types of signals are sent from the indoor unit controller.

- Operation mode set on the remote controller
- Compressor revolution command signal defined by indoor temperature and set temperature (Correction along with variation of room temperature and correction of indoor heat exchanger temperature are added.)
- Temperature of indoor heat exchanger
- For these signals ([Operation mode] and [Compressor revolution] indoor heat exchanger temperature), the outdoor unit controller monitors the input current to the inverter, and performs the followed operation within the range that current does not exceed the allowable value.

4. Contents of operation command signal (Serial signal) from outdoor unit controller to indoor unit controller

The following signals are sent from the outdoor unit controller.

- The current operation mode
- The current compressor revolution
- Outdoor temperature
- Existence of protective circuit operation

  For transferring of these signals, the indoor unit controller monitors the contents of signals, and judges existence of trouble occurrence.

  Contents of judgment are described below.

  - Whether distinction of the current operation status meets to the operation command signal
  - Whether protective circuit operates

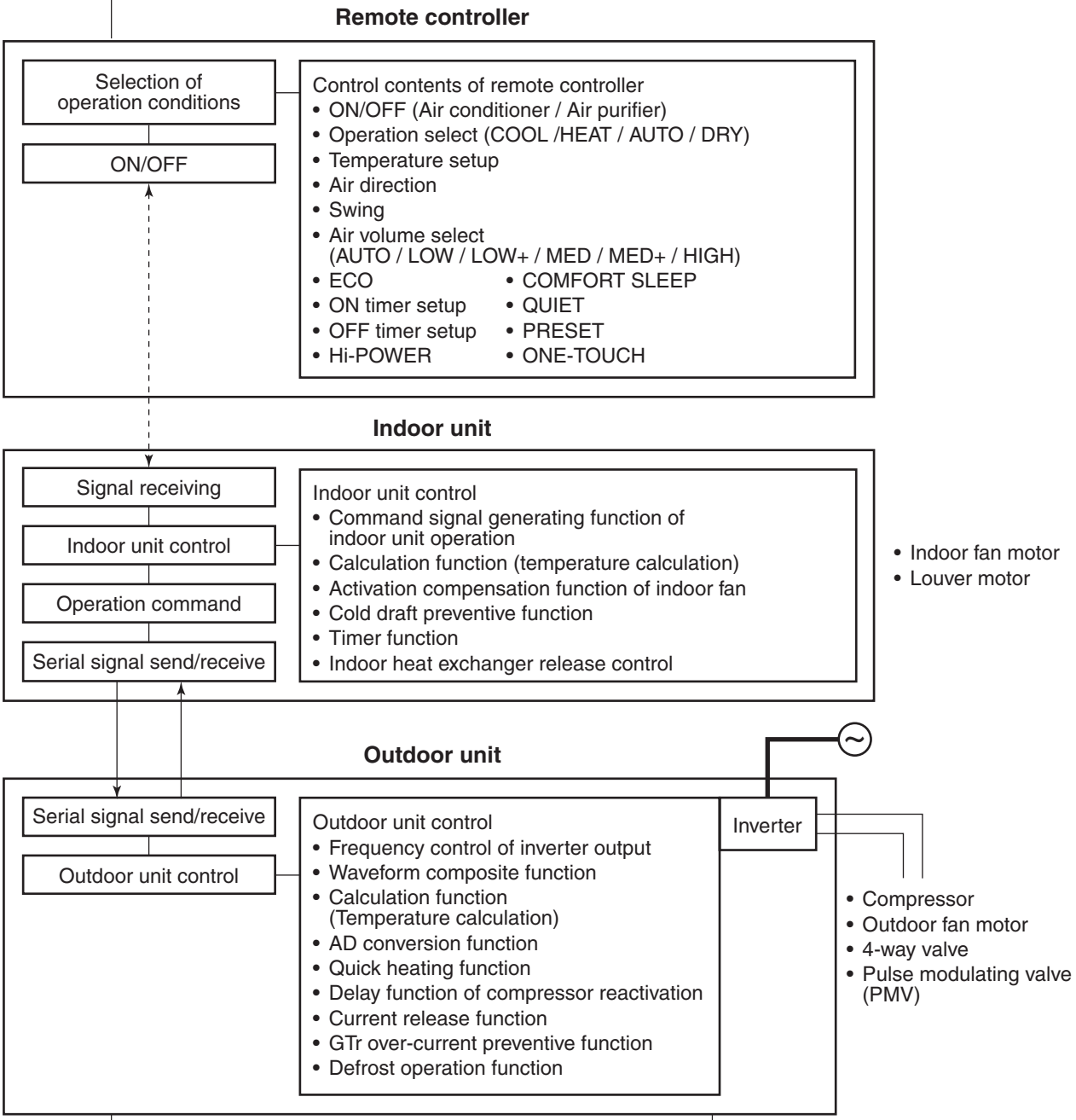
    When no signal is received from the outdoor unit controller, it is assumed as a trouble.

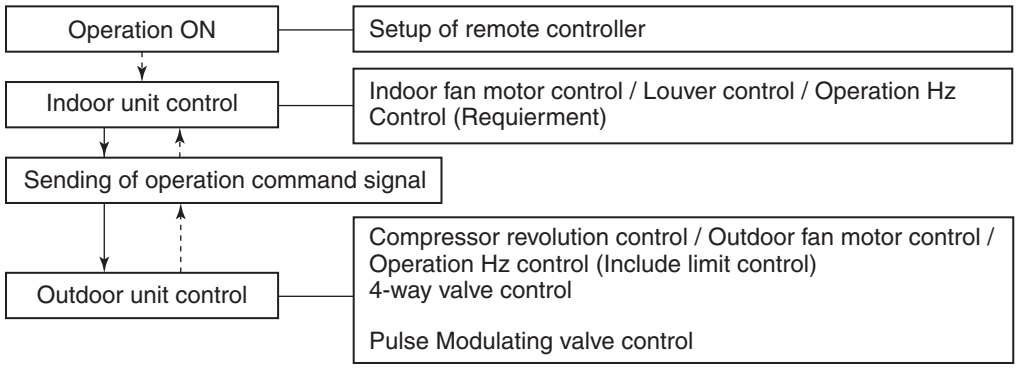
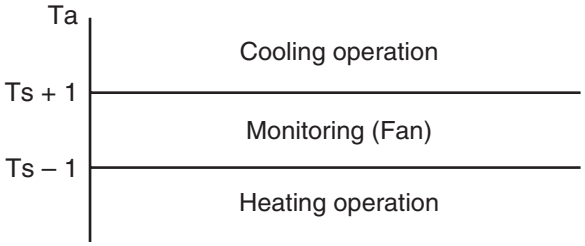
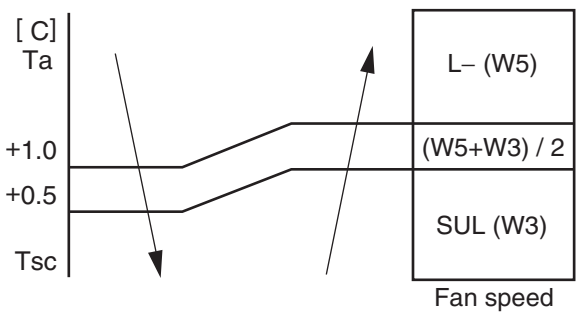
9-2. Operation Description

Item	Operation flow and applicable data, etc.	Description
1. Basic operation	1. Operation control	

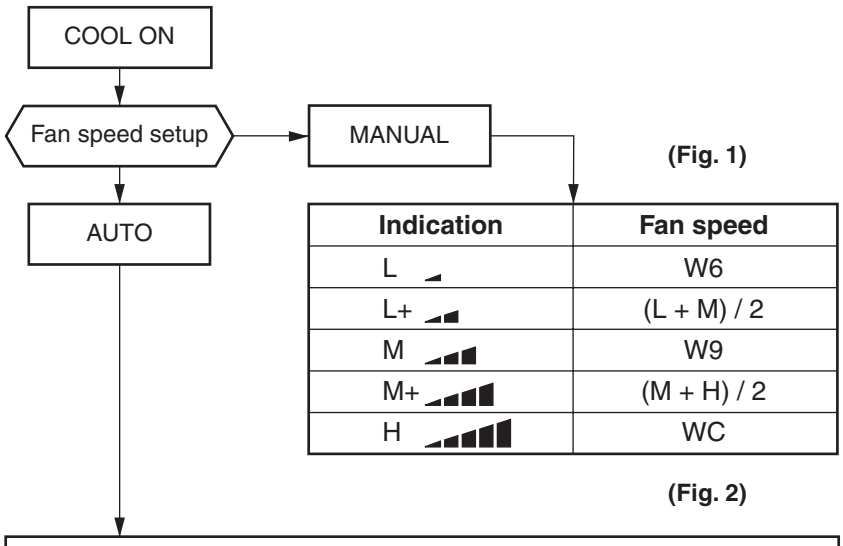
Receiving the user's operation condition setup, the operation statuses of indoor/outdoor units are controlled.

1) The operation conditions are selected by the remote controller as shown in the below.
2) A signal is sent by ON button of the remote controller.
3) The signal is received by a sensor of the indoor unit and processed by the indoor controllers as shown in the below.
4) The indoor controller controls the indoor fan motor and louver motor.
5) The indoor controller sends the operation command to the outdoor controller, and sends/receives the control status with a serial signal.
6) The outdoor controller controls the operation as shown in the left, and also controls the compressor, outdoor fan motor, 4-way valve and pulse modulating valve.



Item	Operation flow and applicable data, etc.	Description
1. Basic operation	**2. Cooling/Heating operation** The operations are performed in the following parts by controls according to cooling/heating conditions. 1) Receiving the operation ON signal of the remote controller, the cooling or heating operation signal starts being transferred from the indoor controller to the outdoor unit. 2) At the indoor unit side, the indoor fan is operated according to the contents of "**2. Indoor fan motor control**" and the louver according to the contents of "**11. Louver control**", respectively. 3) The outdoor unit controls the outdoor fan motor, compressor, pulse modulating valve and 4-way valve according to the operation signal sent from the indoor unit.  	
	3. AUTO operation Selection of operation mode As shown in the following figure, the operation starts by selecting automatically the status of room temperature (Ta) when starting AUTO operation. *1. When reselecting the operation mode, the fan speed is controlled by the previous operation mode.  	1) Detects the room temperature (Ta) when the operation started. 2) Selects an operation mode from Ta in the left figure. 3) Fan operation continues until an operation mode is selected. 4) When AUTO operation has started within 2 hours after heating operation stopped and if the room temperature is 20°C or more, the fan operation is performed with "Super Ultra LOW" mode for 3 minutes. Then, select an operation mode. 5) In AUTO mode, either cooling or heating operation will be selected. When room temperature reach set temperature commpressor will stop. In case that the compressor stops for 15 minutes, the AUTO mode will reselect cooling or heating operation.
	4. DRY operation DRY operation is performed according to the difference between room temperature and the setup temperature as shown below. In DRY operation, fan speed is controlled in order to prevent lowering of the room temperature and to avoid air flow blowing directly to persons.  	1) Detects the room temperature (Ta) when the DRY operation started. 2) Starts operation under conditions in the left figure according to the temperature difference between the room temperature and the setup temperature (Tsc). Setup temperature (Tsc) = Set temperature on remote controller (Ts) + (0 ~ 1°C) 3) When the room temperature is lower 1°C or less than the setup temperature, turn off the compressor.

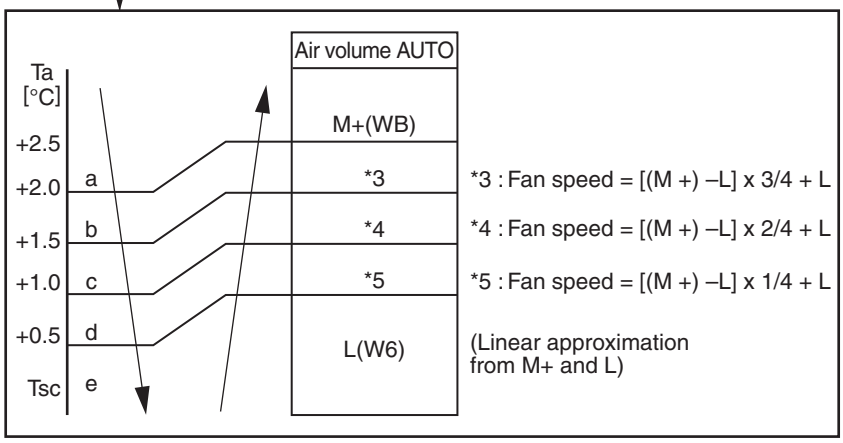
Item	Operation flow and applicable data, etc.	Description
2. Indoor fan motor control	**<In cooling operation>** (This operation controls the fan speed at indoor unit side.) The indoor fan (cross flow fan) is operated by the phase-control induction motor. The fan rotates in 5 stages in MANUAL mode, and in 5 stages in AUTO mode, respectively. (Table 1)	



(Fig. 1)

Indication	Fan speed
L	W6
L+	(L + M) / 2
M	W9
M+	(M + H) / 2
H	WC

(Fig. 2)



(Table 1) Indoor fan air flow rate

Fan speed level	COOL	HEAT	DRY	Fan speed (rpm)	Air flow rate (m^3/h)
WF		UH		1180	1059
WE		H		1180	1059
WD		M+		1180	1059
WC	H			1130	1005
WB	M+	M		1010	875
WA				960	821
W9	M	L+		960	821
W8		L		850	702
W7	L+	L-	L+	820	670
W6	L		L	800	648
W5	L-	UL	L-	760	605
W4	UL		UL	700	540
W3	SUL		SUL	650	485
W2		SUL		500	324
W1				500	324

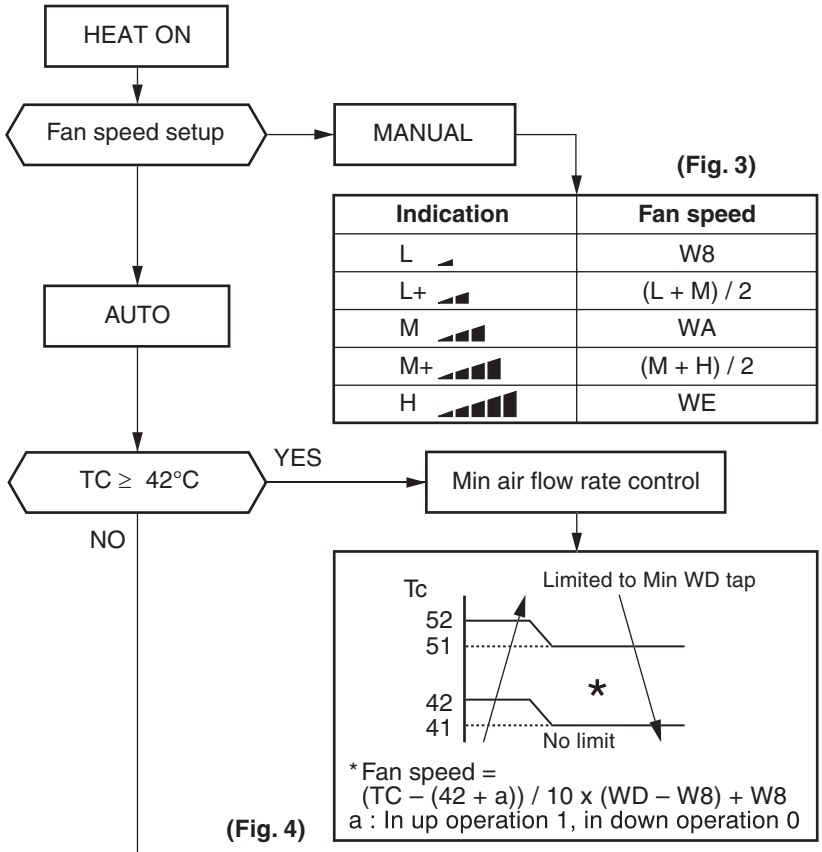
*** Symbols**

UH: Ultra High
H : High
M+: Medium+
M : Medium
L+ : Low+
L : Low
L- : Low–
UL : Ultra Low
SUL : Super Ultra Low

* The values of fan speed and air flow volume indicate on the table are measured when the louver is inclined downward. Fan speed and air flow volume broadly vary with position of louver.

1) When setting the fan speed to L, L+, M, M+ or H on the remote controller, the operation is performed with the constant speed shown in Fig. 1.
2) When setting the fan speed to AUTO on the remote controller, revolution of the fan motor is controlled to the fan speed level shown in Fig. 2 and Table 1 according to the setup temperature, room temperature.

Item	Operation flow and applicable data, etc.	Description
2. Indoor fan motor control	**<In heating operation>**	1) When setting the fan speed to L, L+, M, M+ or H on the remote controller, the operation is performed with the constant speed shown in Fig. 3 and Table 1. 2) When setting the fan speed to AUTO on the remote controller, revolution of the fan motor is controlled to the fan speed level shown in Fig. 5 according to the set temperature and room temperature. 3) Minimum air flow rate is controlled by temperature of the indoor heat exchanger (Tc) as shown in Fig. 4. for prevent high temperature of heat exchanger. 4) Cold draft prevention, the fan speed is controlled by temperature of the indoor heat exchanger (Tc as shown in Fig. 6 for keep warm temperature of air flow. 5) In order to prevent Cold draft when compressor step during heating operation. Then louver will move to upper position and fan speed will reduce or off.

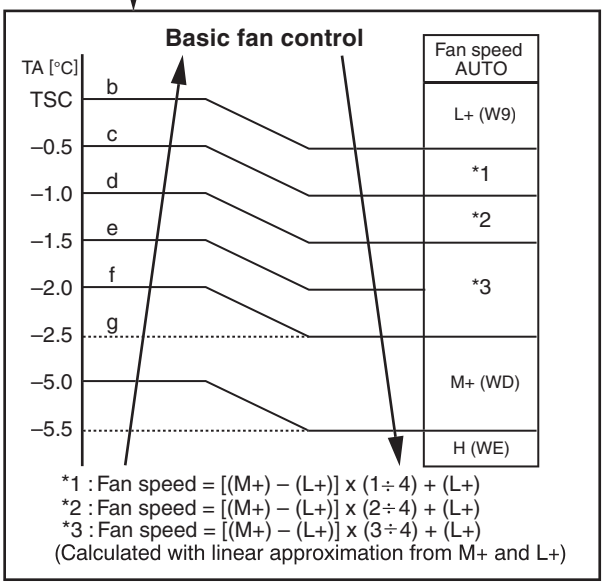


(Fig. 3)

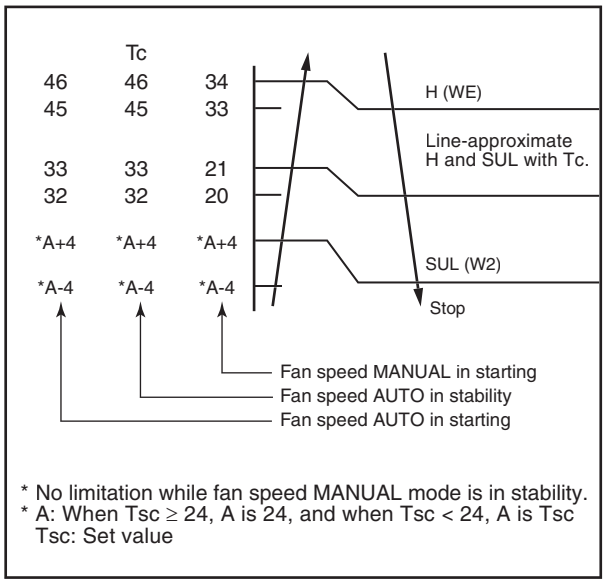
Indication	Fan speed
L	W8
L+	(L + M) / 2
M	WA
M+	(M + H) / 2
H	WE

(Fig. 4)

Cold draft preventive control



(Fig. 5)



(Fig. 6)

[In starting and in stability]

	In starting	In stability
FAN AUTO	• Until 12 minutes passed after operation start • When 12 to 25 minutes passed after operation start and room temp. is 3°C or lower than set temp.	• When 12 to 25 minutes passed after operation start and room temp. is higher than (set temp. –3°C) • When 25 minutes or more passed after operation start
FAN Manual	• Room temp. < Set temp. –4°C	• Room temp. ≥ Set temp. –3.5°C

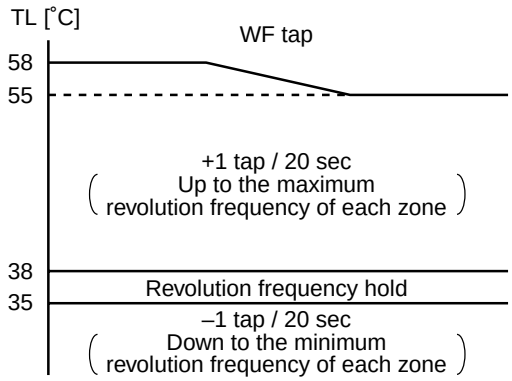
Item	Operation flow and applicable data,etc	Description
3. Outdoor fan control	**3-1) Cooling fan control**	

Revolution frequency allocation of fan taps [rpm]

W1	W2	W3	W4	W5	W6	W7	W8	W9	WA	WB	WC	WD	WE	WF
200	230	260	300	340	380	420	460	520	570	600	630	670	710	740

① The outdoor fan is controlled by TL sensor, TO sensor and the operation frequency.
The outdoor fan is controlled by every 1 tap of DC fan control (15 taps).

② Only for 60 seconds after the operation has started, the maximum fan tap corresponding to the zone in the following table is fixed and then the fan is controlled by temperature of TL sensor.



Temp. range	20 Hz or lower		20Hz to 45Hz		45Hz or higher	
	Min.	Max.	Min.	Max.	Min.	Max.
38°C ≤ TO	W6	WC	W8	WE	WA	WE
29°C ≤ TO < 38°C	W5	WB	W7	WD	W9	WD
15°C ≤ TO < 29°C	W4	W8	W6	WA	W8	WC
5°C ≤ TO < 15°C	W3	W6	W5	W8	W7	WA
0°C ≤ TO < 5°C	W2	W4	W4	W6	W5	W8
–4°C ≤ TO < 0°C	W2	W3	W3	W5	W4	W6
TO < –4°C	OFF	OFF	OFF	W2	OFF	W3
TO error	OFF	WC	OFF	WE	OFF	WE

Item	Operation flow and applicable data,etc	Description
3. Outdoor fan control	**3-2) Heating fan control**	

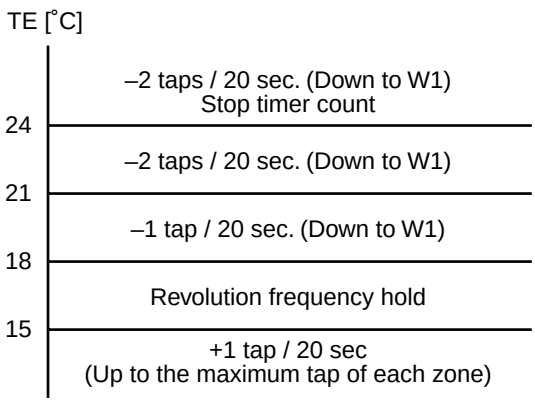
① The outdoor fan is controlled by TE sensor, TO sensor and the operation frequency.
(Control from minimum W1 to maximum (according to the following table))

② For 3 minutes after the operation has started, the maximum fan tap corresponding to the zone in the following table is fixed and then the fan is controlled by temperature of TE sensor.

③ When TE ≥ 24°C continues for 5 minutes, the compressor stops.
It is the same status as the normal THERMO OFF without error display.

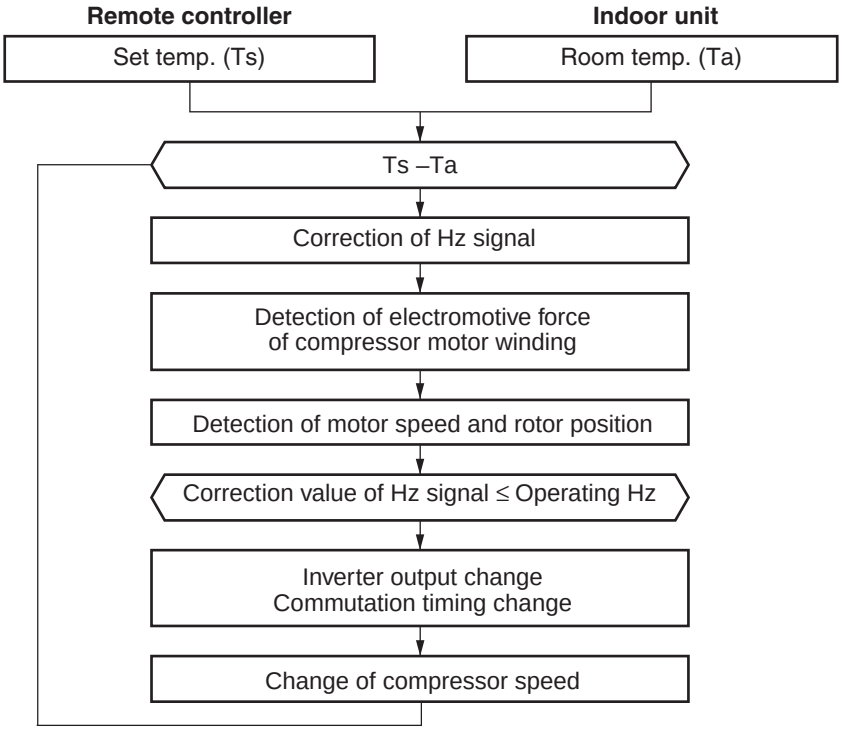
The compressor restarts after approx. 2 minutes 30 seconds and this intermittent operation is not abnormal.

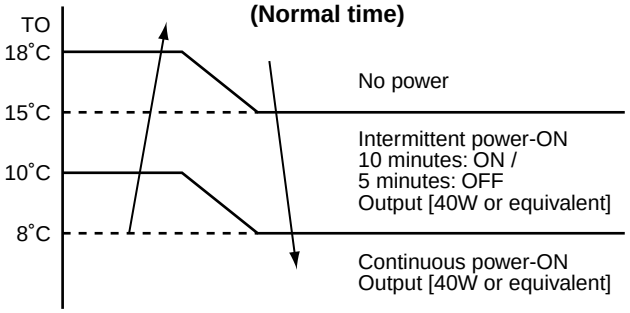
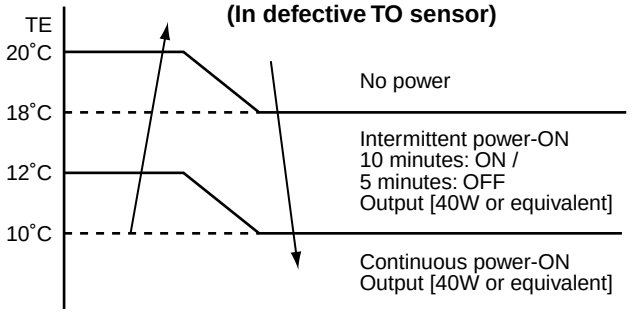
④ In case that the status in item ③ generates frequently, stain on filter of the suction part of the indoor unit is considered.
Clean the filter and then restart the operation.



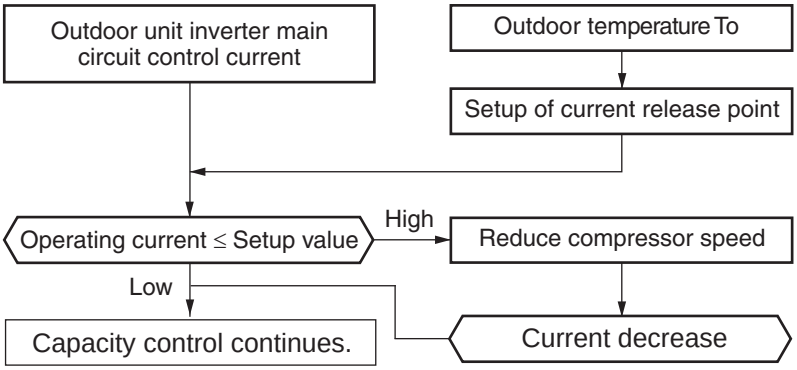
Temp. range	20 Hz or lower	20Hz to 45Hz	45Hz or higher
	Max.	Max.	Max.
10°C ≤ TO	W7	W8	W9
5°C ≤ TO < 10°C	W9	WB	WD
–3°C ≤ TO < 5°C	WD	WD	WE
–10°C ≤ TO < –3°C	WE	WE	WE
TO < –10°C	WF	WF	WF
TO error	WF	WF	WF

Item	Operation flow and applicable data, etc.	Description
4. Capacity control	The cooling or heating capacity depending on the load is adjusted. According to difference between the setup value of temperature and the room temperature, the capacity is adjusted by the compressor revolution.	1) The difference between set temperature on remote controller (Ts) and room temperature (Ta) is calculated. 2) According to the temperature difference, the correction value of Hz signal which determines the compressor speed is set up. 3) The rotating position and speed of the motor are detected by the electromotive force occurred on the motor winding with operation of the compressor. 4) According to the difference resulted from comparison of the correction value of Hz signal with the present operation Hz, the inverter output and the commutation timing are varied. 5) Change the compressor motor speed by outputting power to the compressor. ∗ The contents of control operation are same in cooling operation and heating operation



Item	Operation flow and applicable data,etc	Description
5. Coil heating control	1) This control function heats the compressor by turning on the stopped compressor instead of a case heater. It purposes to prevent stagnation of the refrigerant inside of the compressor. 2) As usual, turn on power of the compressor for the specified time before a test run after installation; otherwise a trouble of the compressor may be caused. As same as a test run, it is recommended to turn on power of the compressor beforehand when starting operation after power of the compressor has been interrupted and left as it is for a long time. 3) Judgment for electricity is performed by TD and TO sensors. If TO sensor is defective, a backup control is automatically performed by TE sensor. For a case of defective TO sensor, judge it with outdoor LED display. Using TD sensor and TE sensor. 4) The power is turned off when TD is 30°C or more. **REQUIREMENT** In some cases, the sound of power-ON may be heard. It is not abnormal. • Power-ON condition TD < 30˚C **(Normal time)**  • Power-ON condition TD < 30˚C **(In defective TO sensor)**  **REQUIREMENT** While heating the coil, the power sound may be heard. However it is not a trouble.	
6. Short intermittent operation preventive control	1) For 3 to 10 minutes after operation start, in some cases, the compressor does not stop to protect the compressor even if receiving the THERMO OFF signal from indoor. However it is not abnormal status. (The operation continuance differs according to the operation status.) 2) When the operation stops by the remote controller, the operation does not continue.	

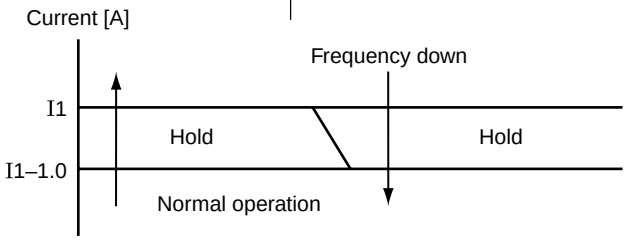
Item	Operation flow and applicable data, etc.	Description
7. Current release control	This function prevents troubles on the electronic parts of the compressor driving inverter. This function also controls drive circuit of the compressor speed so that electric power of the compressor drive circuit does not exceed the specified value.	1) The input current of the outdoor unit is detected in the inverter section of the outdoor unit. 2) According to the detected outdoor temperature, the specified value of the current is selected. 3) Whether the current value exceeds the specified value or not is judged. 4) If the current value exceeds the specified value, this function reduces the compressor speed and controls speed up to the closest one commanded from the indoor unit within the range which does not exceed the specified value.



Current release control value (I1)

[A]

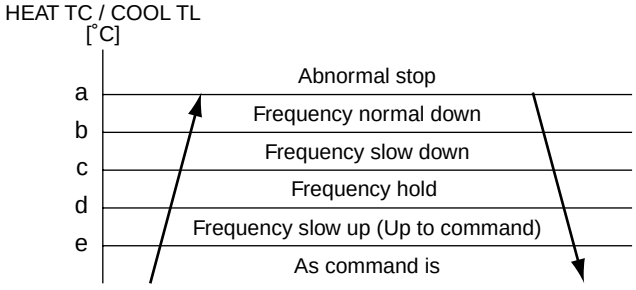
Temperature range	I1
50°C ≤ TO	9.5
45°C ≤ TO < 50°C	9.5
39°C ≤ TO < 45°C	13.0
TO < 39°C	16.0
TO error	9.5



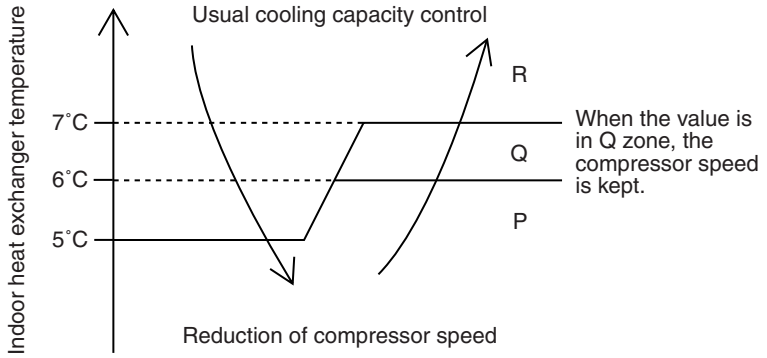
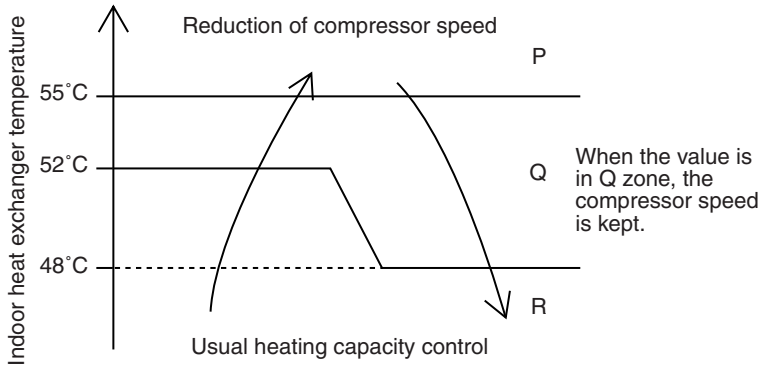
1) When the over-current protective circuit detected an abnormal current, stop the compressor.
2) The compressor restarts after 2 minutes 30 seconds as setting [1] as an error count.
3) When the error count [8] was found, determine an error and restart operation is not performed.
4) For the error display contents, confirm on the check code list.

8. High-pressure release control

1) The operation frequency is controlled to restrain abnormal rising of high pressure by TL sensor in cooling operation and TC sensor in heating operation.
2) When TL sensor in cooling operation or TC sensor in heating operation detects abnormal temperature of the stop zone, stop the compressor and the error count becomes +1.
3) When the compressor stopped with 2), the operation restarts from the point of the normal operation zone (e point or lower) where it returned after 2 minutes 30 seconds.
4) The error count when the compressor stopped with 2) is cleared after the operation continued for 10 minutes. If the error count becomes [10] without clearing, the error is determined and reactivation is not performed.
5) For the error display contents, confirm on the check code list.

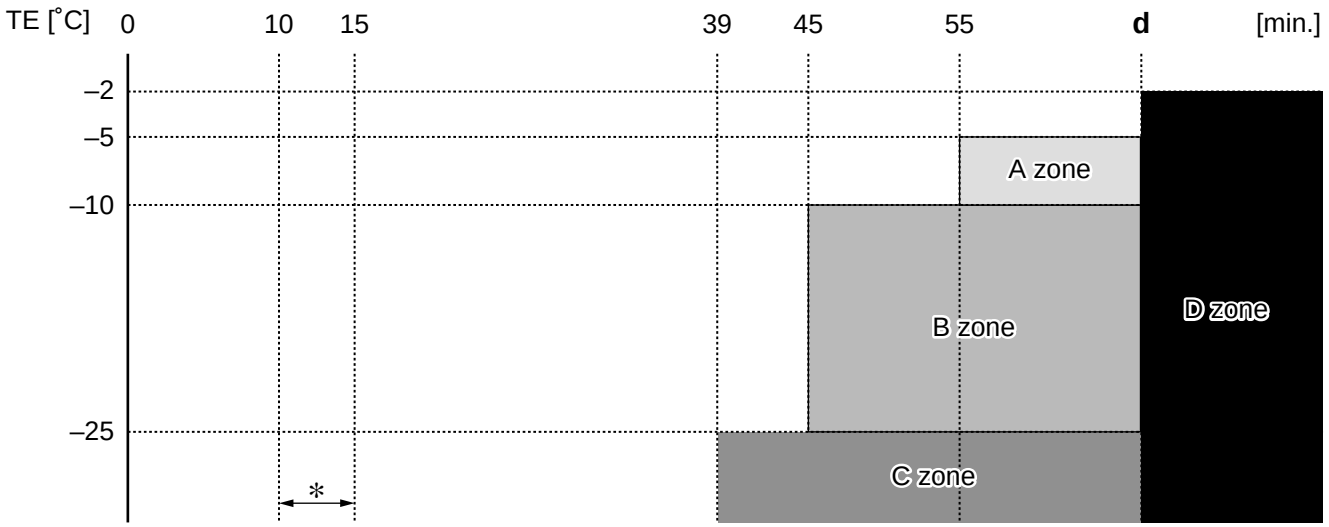


	HEAT	COOL
	TC	TL
a	61°C	63°C
b	56°C	62°C
c	54°C	60°C
d	52°C	58°C
e	48°C	54°C

Item	Operation flow and applicable data, etc.	Description
9. Release protective control by temperature of indoor heat exchanger	**<In cooling/dry operation>** (Prevent-freezing control for indoor heat exchanger) In cooling/dry operation, the sensor of indoor heat exchanger detects evaporation temperature and controls the compressor speed so that temperature of the heat exchanger does not exceed the specified value.  	1) When temperature of the indoor heat exchanger drops below 5°C, the compressor speed is reduced. (P zone) 2) When temperature of the indoor heat exchanger rises in the range from 6°C to under 7°C, the compressor speed is kept. (Q zone) 3) When temperature of the indoor heat exchanger rises to 7°C or higher, the capacity control operation returns to the usual control in cooling operation. (R zone)
	<In heating operation> (Prevent-overpressure control for refrigerating cycle) In heating operation, the sensor of indoor heat exchanger detects condensation temperature and controls the compressor speed so that temperature of the heat exchanger does not exceed the specified value.  	1) When temperature of the indoor heat exchanger rises in the range from 50°C to 55°C, the compressor speed is kept. (Q zone) When temperature of the indoor heat exchanger drops in the range from 48°C to under 55°C, the compressor speed is kept. (Q zone) 2) When temperature of the indoor heat exchanger rises to 55°C or higher, the compressor speed is reduced. (P zone) 3) When temperature of the indoor heat exchanger does not rise to 52°C, or when it drops below to 48°C, the capacity control operation returns to the usual control in heating operation. (R zone)

Item	Operation flow and applicable data, etc.	Description
10. Detrost control (only in heating operation)	1) In heating operation, defrost operation is performed when TE sensor satisfies any condition in A zone to D zone. 2) During defrosting operation, it finishes if TE sensor continued 12°C or higher for 3 seconds or continued 7°C ≤ TE < 12°C for 1 minute. The defrost operation also finishes when it continued for 10 minutes even if TE sensor temperature was 7°C or lower. 3) After defrost operation was reset, the compressor stopped for approx. 40 seconds and then the heating operation starts.	

Start of heating operation



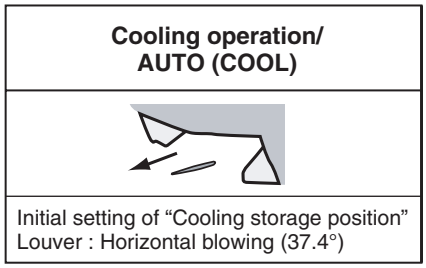
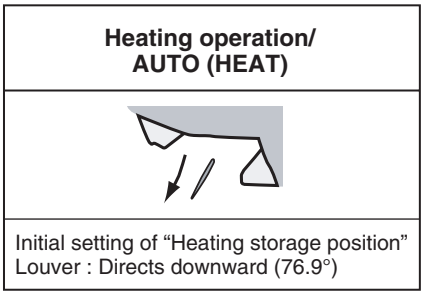
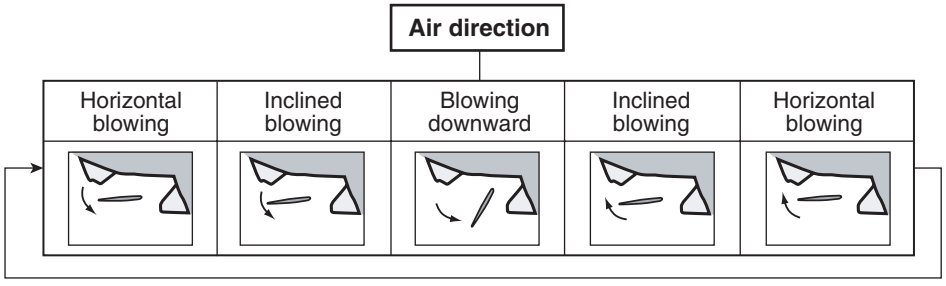
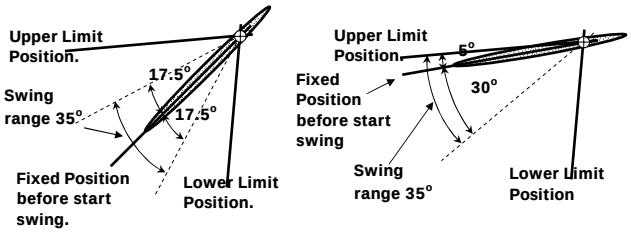
* The minimum TE value and To value between 10 and 15 minutes after heating operation has started are stored in memory as TE0 and To0, respectively.

	In normal To	In abnormal To
A zone	When status (TE0 – TE) – (To0 – To) ≥ 3°C continued for 20 seconds	When status (TE0 – TE) ≥ 3°C continued for 20 seconds
B zone	When status (TE0 – TE) – (To0 – To) ≥ 2°C continued for 20 seconds	When status (TE0 – TE) ≥ 2°C continued for 20 seconds
C zone	When the status (TE ≤ –25°C) continued for 20 seconds	
D zone	When compressor operation status of TE < –2°C is calculated as **d** minutes	

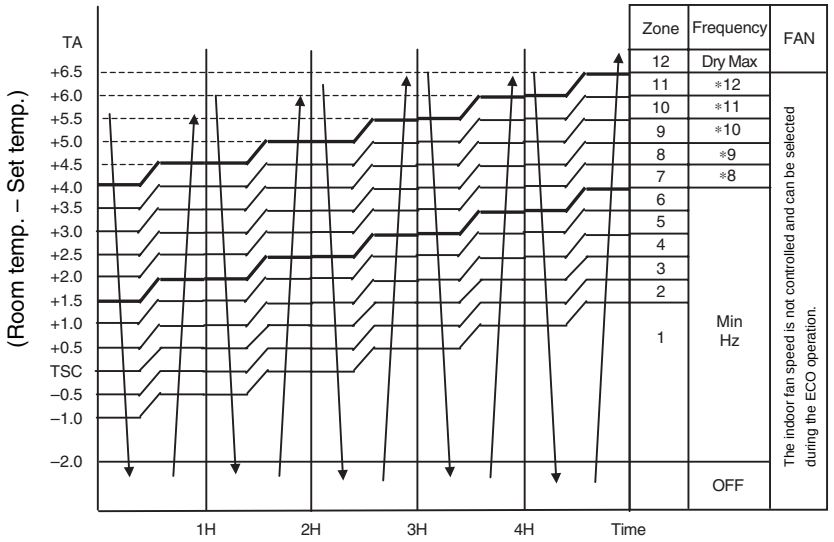
4) The time of above **d** can be changed by exchanging jumper [J805] and [J806] of the outdoor control P.C. board.
(Setting at shipment: 150 minutes)

J805	J806	d
○	○	150 minutes Setting at shipment
○	×	90 minutes
×	○	60 minutes
×	×	30 minutes

○ : Short circuit, × : Open

Item	Operation flow and applicable data, etc.	Description
11. Louver control 1) Louver position	This function controls the air direction of the indoor unit. • The position is automatically controlled according to the operation mode (COOL/HEAT). • The set louver position is stored in memory by the microcomputer, and the louver returns to the stored position when the next operation is performed. (Cooling/heating memory position) The angle of the louver is indicated as the horizontal angle is 0°. **1) Louver position in cooling operation**  **2) Louver position in heating operation** 	
2) Air direction adjustment		• The louver position can be arbitrarily set up by pushing [FIX] button.
3) Swing	• Swing operation is perform in range 35° with the Fixed position as the center. • If the swing range exceeded either upper or lower limit position, swing operation is perfomed in range 35° from the limit. 	• Swing When pressing [SWING] button during operation, the louver starts swinging.

Item	Operation flow and applicable data, etc.	Description
12. ECO operation	When pressing [ECO] button on the remote controller, a Economic operation is performed. **<Cooling operation>** This function operates the air conditioner with the difference between the set and the room temperature as shown in the following figure.	**<Cooling operation>** 1) The control target temperature increases 0.5°C per hour up to 2°C starting from the set temperature when ECONO has been received. 2) The indoor fan speed depends on presetting and can change every speed after setting ECO operation. 3) The compressor speed is controlled as shown in the left figure.



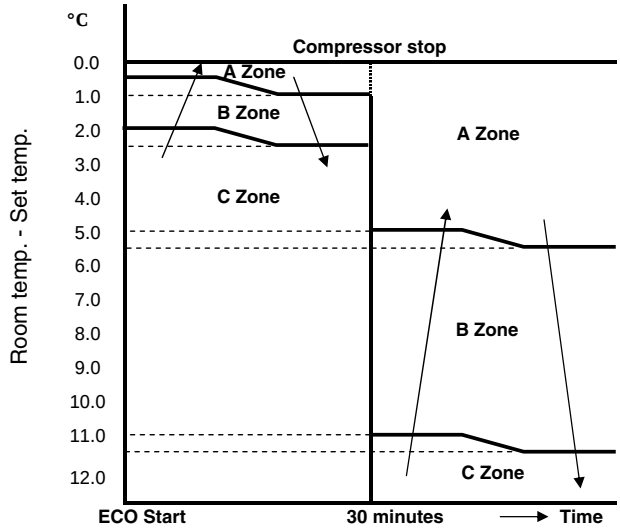
* 12 (DRY max - COOL min) /6 × 5 + COOL min
* 11 (DRY max - COOL min) /6 × 4 + COOL min
* 10 (DRY max - COOL min) /6 × 3 + COOL min
* 9 (DRY max - COOL min) /6 × 2 + COOL min
* 8 (DRY max - COOL min) /6 × 1 + COOL min

Hz	
Cool min	10
DRY max	50

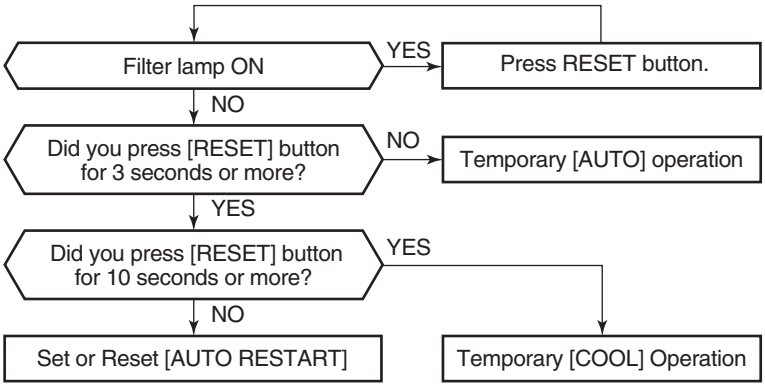
<Heating operation>

<Heating operation>

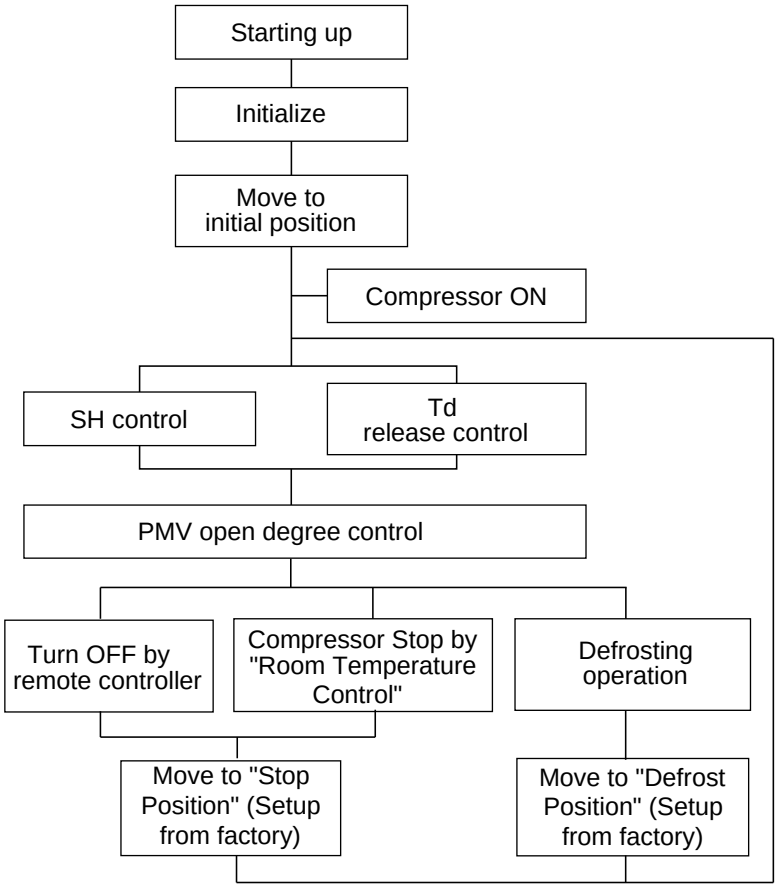
1) The difference of room temperature and set temperature are separated in to A zone, B zone and C zone.
   Three zone will changed again 30 minutes after ECO operation start.
2) The compressor speed is controlled as shown on the table.
3) The indoor fan speed is not controlled and can be selected during the ECO operation.



Hz	
a	10
c	72

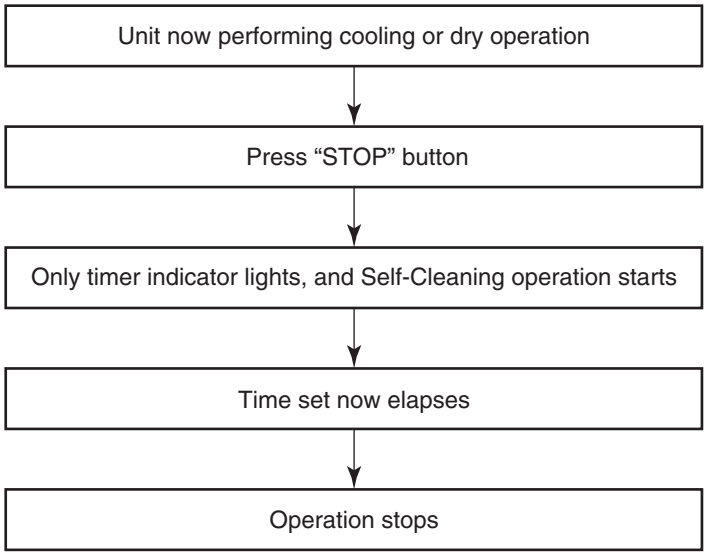
Item	Operation flow and applicable data, etc.	Description
13. Temporary operation	Pressing [RESET] button starts the temporary operation of [AUTO] operation. When keeping [RESET] button pressed for 10 seconds or more, the temporary [COOL] operation is performed. 	1) When pressing [RESET] button, the temporary [AUTO] operation starts. 2) When keeping [RESET] button pressed for 3 seconds or more, Pi, Pi, Pi sound is heard and [AUTO RESTART] control is changed. 3) When keeping [RESET] button pressed for 10 seconds or more, “Pi” sound is heard and the temporary [COOL] operation starts. 4) If the filter lamp goes on, press [RESET] button to go off the filter lamp, and then press [RESET] button again. 5) To stop the temporary operation, press the button again.
14. Discharge temperature control **Td value** / **Control operation** 117°C: Judges as an error and stops the compressor. 107°C: Reduce the compressor speed. 103°C: Reduce slowly compressor speed. 100°C: Keeps the compressor speed. 93°C: If the operation is performed with lower speed than one commanded by the serial signal, speed is slowly raised up to the commanded speed. Operates with speed commanded by the serial signal.		**1. Purpose** This function detects error on the refrigerating cycle or error on the compressor, and performs protective control. **2. Operation** • Control of the compressor speed The speed control is performed as described in the left table based upon the discharge temperature.

Item	Operation flow and applicable data, etc.	Description
15. Pulse modulating valve (PMV) control	This function controls throttle amount of the refrigerant in the refrigerating cycle. According to operating status of the air conditioner, this function also controls the open degree of valve with an expansion valve with pulse modulation.	1) When starting the operation, move the valve once until it fits to the stopper. (Initialize) * In this time, “Click” sound may be heard. 2) Adjust the open degree of valve by super heat amount. (SH control) 3) If the discharge temperature was excessively up, adjust the open degree of valve so that it is in the range of set temperature. (Discharge temp. control) 4) When defrost operation is performed, the open degree of valve is adjusted according to each setup conditions during preparation for defrost or during defrost operation (4-way valve is inversed.). 5) When operation is OFF by the remote controller or when compressor is OFF by room temperature control, the open degree of valve is adjusted to the stop position.



* SH (Super Heat amount) =
  Ts (Temperature of suction pipe of the compressor) –
  Tc or Te (Heat exchanger temperature at evaporation side)
* PMV: Pulse Modulating Valve

Item	Operation flow and applicable data, etc.	Description
16. Self-Cleaning function		**1. Purpose** The Self-Cleaning operation is to minimize the growth of mold, bacteria etc. by running the fan and drying so as to keep the inside of the air conditioner clean. **Self-Cleaning operation** When the cooling or dry operation shuts down, the unit automatically starts the Self- Cleaning operation which is then performed for the specified period based on duration of the operation which was performed prior to the shutdown, after which the Self-Cleaning operation stops. (The Self-Cleaning operation is not performed after a heating operation.) **2. Operation** 1) When the stop signal from the remote controller or timer-off function is received, only the timer indicator light. 2) The period of the Self-Cleaning operation is determined by the duration of the operation performed prior to the reception of the stop code. 3) After the Self-Cleaning operation has been performed for the specified period, the unit stops operating.



- During Self-Cleaning operations:
  The louver opens slightly. The indoor fan operates continuously at a speed of 500 rpm.

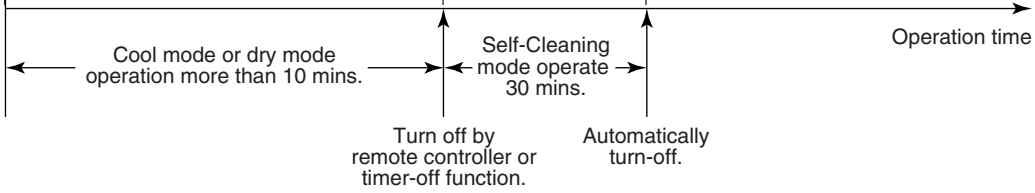
Self-Cleaning operation times

	Operation time	Self-Cleaning operation time
Cooling: Auto (cooling) Dry	Up to 10 minutes	No Self-Cleaning operation performed (0 minutes)
	10 minutes or longer	30 minutes
Heating: Auto (heating)	No Self-Cleaning operation performed	
Auto (fan only)		
Shutdown		

- To stop an ongoing Self-Cleaning operation at any time
  Press the start/stop button on the remote controller twice during the Self-Cleaning operation. (After pressing the button for the first time, press it for the second time without delay (within 10 minutes).)

Item	Operation flow and applicable data, etc.	Description
16. Self-Cleaning function	• Self-Cleaning diagram	

Operation display	ON	OFF	OFF
FCU fan	ON rpm is depend on presetting.	ON (500rpm)	OFF
FCU louver	OPEN	OPEN (12.7°)	CLOSE
Timer display	ON or OFF depend on presetting of timer function.	ON	ON or OFF depend on presetting of timer function.
Compressor	ON or OFF depend on presetting per room temperature.	OFF	OFF
CDU fan	ON or OFF depend on presetting per room temperature.	OFF	OFF



17. Remote Controller-A or B selection

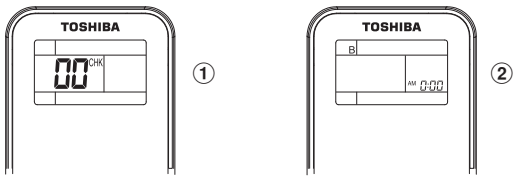
Setting the remote controller

To separate using of remote controller for each indoor unit in case of 2 air conditioner are installed nearly.

Remote Control B Setup.

1. Press [RESET] button on the indoor unit to turn the air conditioner ON.
2. Point the remote control at the indoor unit.
3. Push and hold [CHECK] button on the Remote Control by the tip of the pencil. "00" will be shown on the display (Picture ①).
4. Press [MODE] during pushing [CHECK]. "B" will show on the display and "00" will disappear and the air conditioner will turn OFF. The Remote Control B is memorized [Picture ②).

NOTE : 1. Repeat above step to reset Remote Control to be A.
2. Remote Control A has not "A" display.
3. Default setting of Remote Control from factory is A.



1. Purpose

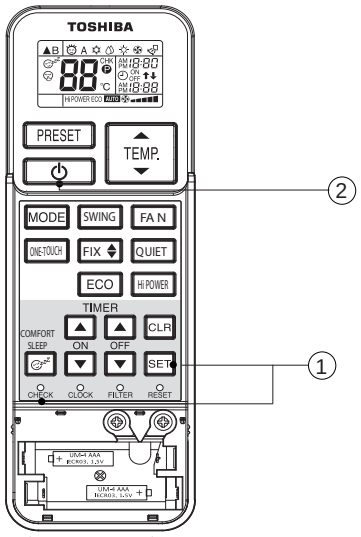
This operation is to operate only one indoor unit using one remote controller.

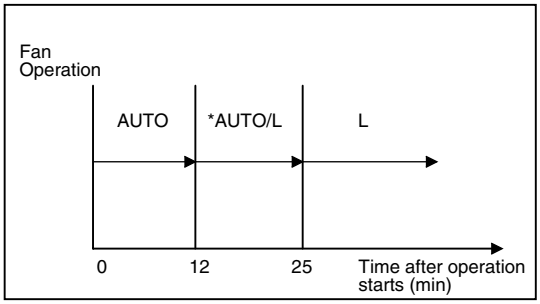
2. Description

When operating one indoor unit in a situation where two indoor units have been installed in the same room or nearby rooms, this operation prevents the remote controller signal from being received simultaneously by both units, thus preventing both units from operating.

3. Operation

The indoor unit on which the remote controller selection has been set to B receives the signal of the remote controller also set to B. (At the factory the remote controller selection is set to A on all the indoor units.
There is no A setting display.)

Item	Operation flow and applicable data, etc.	Description
18. QUIET mode	When the [QUIET] button is pressed, the fan of the indoor unit will be restricted the revolving speed at speed L - until the [QUIET] button is pressed once again (cancel Quiet mode).	Quiet mode is the system which, control the revolving speed of indoor fan to work constantly at lower than speed L. In addition, noise level of indoor unit is less than usual. **Remarks :** 1. Quiet mode is unable to work in dry mode. 2. Quiet mode is appropriate to work with less cooling load and less heating load condition. Because of the fan speed L- may cause not enough the cooling capacity or heating capacity.
19. COMFORT SLEEP	**Cooling mode** • The preset temperature will increase as shown on ECO operation (Item No. 9) • Press the [COMFORT SLEEP] button to choose the operating hours. Repeat pressing to select the hours. (1hr, 3hr, 5hr or 9hr) • If the [COMFORT SLEEP] button is pressed again means cancel comfort sleep mode. **Heating mode** • The preset temperature will drop down as shown on ECO operation (Item No. 9) • Press the [COMFORT SLEEP] button to choose the operating hours. Repeat pressing to setect the hours. (1hr, 3hr, 5hr or 9hr) • If the [COMFORT SLEEP] button is pressed again means cancel comfort sleep mode.	The principles of comfort sleep mode are: • Quietness for more comfortable. When room temperature reach setting temperature • Save energy by changing room temperature automatically. • The air condition can shut down by itself automatically. **Remarks:** 1. Comfort sleep mode will not operate in dry mode and fan only mode.
20. Short Timer	In the normal condition, after switching one circuit breaker, 3-minute delay time for compressor and 1 hour for plasma air purifier are set for the maintenance of the unit.  	**Purpose** To start the unit immediately for the purpose of testing, trial...etc, short timer can be used maintenance of the unit. **Short Timer Setting** ① Push [⏻] button to turn the unit OFF. ② Set the operation mode or plasma air purifier on the remote controller without sending the signal to the unit. ③ Use the tip of the pencil to push the [CHK] button and hold, “00” will show on display, then push [SET] button to make "00" disappear. ④ Push [⏻] button to turn the unit ON. ⑤ When short timer is activated, all setting on the remote controller operates immediately, besides, all indicatiors on front panel turn ON continuously for 3 seconds.

Item	Operation flow and applicable data, etc.	Description
21. One Touch Comfort	One touch comfort is the fully automated operation that is set according to the preferable condition in a region.  * AUTO/L: Fan operates depends on the setting temperature and room temperature. During the One Touch Comfort mode if the indoor unit receives any signal with other operation mode, the unit will cancel the comfort mode and operates according to the signal received.	**Operation condition for model to Europe market** When an indoor unit receives "One Touch Comfort Signal" from the remote controller, the indoor unit operates as following. 1) Air conditioner starts to operation when the signal is received, even if the air conditioner was OFF. 2) Operation mode is set according to room temperature, the same as AUTO mode. 3) Target temperature is 24°C. 4) Louver position is set as stored position of the operating mode. 5) Fan is controlled as followings.
22. Hi POWER Mode	**([Hi-POWER] button on the remote controller is pressed)** When [Hi-POWER] button is pressed while the indoor unit is in Auto, Cooling or Heating operation, Hi POWER mark is indicated on the display of the remote controller and the unit operates as follows. **1. Automatic operation** • The indoor unit operates in according to the current operation. **2. Cooling operation** • The preset temperature drops 1 degree (The value of the preset temperature on the remote controller does not change.) The indoor unit's fan speed level increases 1 tap. **3. Heating operation** • The preset temperature increases 2 degree (The value of the preset temperature on the remote controller does not change.) The indoor unit's fan speed level increases 1 tap **4. The Hi POWER mode can not be set in Dry operation**	* The Hi-POWER operation will be cancelled when press [Hi-POWER] button again.
23. FILTER Indicator	When the elapsed time reaches 1000 hours after air conditioner operation, the FILTER indicator lights. After cleaning the filters, turn off the FILTER indicator. **How to Turn Off FILTER Indicator** Press [RESET] button on the indoor unit. **NOTE :** If [RESET] button is pressed while the FILTER indicator is not lit, the indoor unit will start the automatic operation.	

9-3. Auto Restart Function

This indoor unit is equipped with an automatic restarting function which allows the unit to restart operating with the set operating conditions in the event of a power supply being accidentally shut down.
The operation will resume without warning three minutes after power is restored.

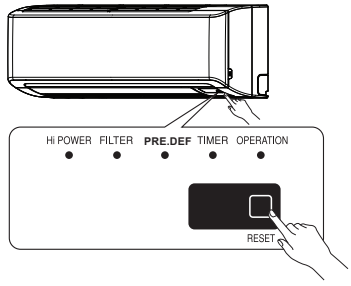
This function is not set to work when shipped from the factory. Therefore it is necessary to set it to work.

9-3-1. How to Set the Auto Restart Function

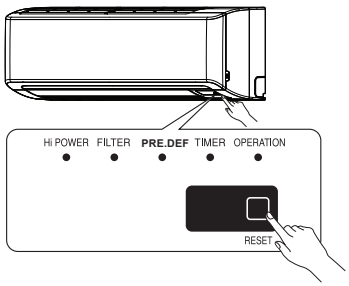
To set Auto Restart Function, proceed as follows:

1. The power supply to the unit must be ON ; The function will not set or reset if the power supply is OFF.
2. Press the [RESET] button located on the front panel of the indoor unit for more than 3 seconds.
3. After 3 seconds, the unit beeps three times and the indicator blinks for 5 seconds.

• When the unit is standby (Not operating)

Operation	Motions
Press [RESET] button for more than three seconds. (Less than 10 seconds) 	The unit is on standby. ↓ The unit starts to operate. The green indicator is on. ↓ After approx. three seconds, The unit beeps three times and continues to operate. **The green indicator flashes for 5 seconds.** If the unit is not required to operate at this time, press [RESET] button once more or use the remote controller to turn it off.

• When the unit is in operation

Operation	Motions
Press [RESET] button for more than three seconds. (Less than 10 seconds) 	The unit is in operation. The green indicator is on. ↓ The unit stops operating. The green indicator is turned off. ↓ After approx. three seconds, The unit beeps three times. **The green indicator flashes for 5 seconds.** If the unit is required to operate at this time, press [RESET] button once more or use the remote controller to turn it on.

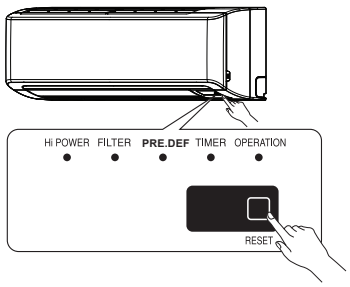
• While the filter check indicator is on, the RESET button has the function of filter reset betton.

9-3-2. How to Cancel the Auto Restart Function

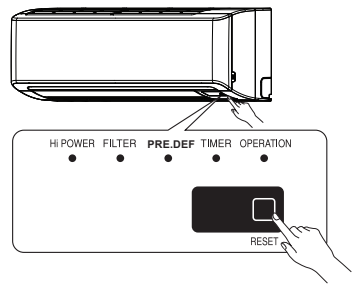
To cancel Auto Restart Function, proceed as follows.

1. The power supply to the unit must be ON ; The function will not set or reset if the power supply is OFF.
2. Press the [RESET] button located on the front panel of the indoor unit for more than 3 seconds.
3. After 3 seconds, the unit beeps three times.

• When the system is on stand-by (not operating)

Operation	Motions
Press [RESET] button for more than three seconds. (Less than 10 seconds) 	The unit is on standby. ↓ The unit starts to operate. The green indicator is on. ↓ After approx. three seconds, The unit beeps three times and continues to operate. If the unit is not required to operate at this time, press [RESET] button once more or use the remote controller to turn it off.

• When the system is operating

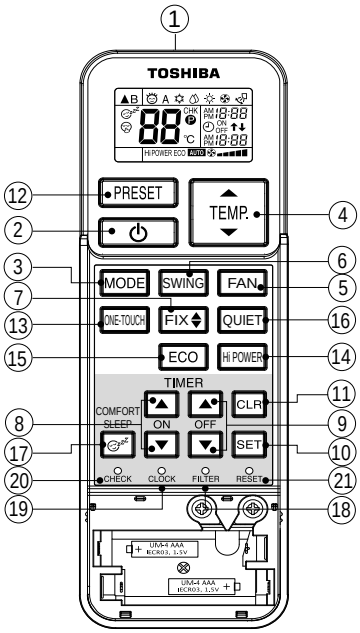
Operation	Motions
Press [RESET] button for more than three seconds. (Less than 10 seconds) 	The unit is in operation. The green indicator is on. ↓ The unit stops operating. The green indicator is turned off. ↓ After approx. three seconds, The unit beeps three times. If the unit is required to operate at this time, press [RESET] button once more or use the remote controller to turn it on.

9-3-3. Power Failure During Timer Operation

- If Timer operation is set and the power supply shut down accidentally, the previous Timer setting will be cancelled.
- Daily-Timer operation will be not affected by power supply failure, if the remote controller is located on the position which it can send the command signal to the indoor unit. It is because the remote controller will send signal every 30 minutes and Daily-Timer operation will be restore.

9-4. Remote controller

9-4-1. Remote Controller and Its Functions



① Infrared signal emitter
② Start/Stop button
③ Mode select button (MODE)
④ Temperature button (TEMP)
⑤ Fan speed button (FAN)
⑥ Swing louver button (SWING)
⑦ Set louver button (FIX)
⑧ On timer button (ON)
⑨ Off timer button (OFF)
⑩ Setup button (SET)
⑪ Clear button (CLR)
⑫ Memory and Preset button (PRESET)
⑬ One-Touch button (ONE-TOUCH)
⑭ High power button (Hi-POWER)
⑮ Economy button (ECO)
⑯ Quiet button (QUIET)
⑰ Comfort sleep button (COMFORT SLEEP)
⑱ Filter reset button (FILTER)
⑲ Set clock button (CLOCK)
⑳ Check button (CHECK)
㉑ Reset button (RESET)

Note:

- The provided Remote Controller is a wireless type, which also can be used as a wire.
  Please see “How to Connect The Remote Controller for Wired Operation", located in installation instruction, in case of wired control is required.
- In wire operation, remote controller will return to initial condition (PRESET, TIMER and CLOCK will return to initial condition) when user shutdown power supply of Air conditioner.

9-4-2. Operation of remote control

1. ONE-TOUCH

Press the "ONE-TOUCH" button for fully automated operation that is customised to the typical consumer preferences in your region of the world. The coutomised settings control temperature air flow strength, air flow direction and other settings to provide you alternate contact with "ONE-TOUCH" OF THE BUTTON. If you prefer other settings you can select from the many other operation functions of your Toshiba unit

Press ONE-TOUCH : Start the operaton.

2. AUTOMATIC OPERATION

To automatically select cooling, or fan only operation.

1. Press MODE : Select A.
2. Press TEMP. : Set the desired temperature.

3. COOLING / HEATING / FAN ONLY OPERATION

To automatically select cooling, or fan only operation.

1. Press MODE : Select Cool ☼, Heat ☼, or Fan only .
2. Press TEMP. : Set the desired temperature.
   Cooling / Heating : Min 17°C - Max 30°C, Fan Only: No temperature indication
3. Press FAN : Select AUTO, LOW , LOW+ , MED , MED+ , or
   HIGH .

4. DRY OPERATION (COOLING ONLY)

For dehumidification, a moderate cooling performance is controlled automatically.

1. Press MODE : Select Dry .
2. Press TEMP. : Set the desired temperature.

5. Hi-POWER OPERATION

To automatically control room temperature and airflow for faster cooling operation (except in DRY and FAN ONLY mode).

Press Hi-POWER : Start and stop the operation.

6. ECO OPERATION

To automatically control room to save energy (except in DRY and FAN ONLY mode)

Press ECO : Start and stop the operation.

Note: Cooling operation; the set temperature will increase automatically 1°C/hour for 2 hours (maximum 2 °C increase).
Heating operation : the set temperature does not change.

7. TEMPORARY OPERATION

In case of the misplaced or discharged remote control

- Pressing the RESET button, the unit can start or stop without using the remote control.
- Operation mode is set on AUTOMATIC operation, preset temperature is 24°C and fan operation is automatic speed.

8. TIMER OPERATION

	Setting the ON Timer	Setting the OFF Timer
1	Press ▲ ON ▼ : Set the desired ON timer.	Press ▲ OFF ▼ : Set the desired OFF timer.
2	Press SET : Set the timer	Press SET : Set the timer.
3	Press CLR : Cancel the timer	Press CLR

Daily timer allows the user to set both the ON & OFF timers and will be activated on a daily basis.

Setting Daily Timer

1	Press ▲ ON ▼ : Set the ON timer.	3	Press SET.
2	Press ▲ OFF ▼ : Set the OFF timer.	4	Press SET button during the (⬆ or ⬇) mark flashing.

· During the daily timer is activation, both arrows (⬆ or ⬇)are indicated.

Note:

· Keep the remote control in accessible transmission to the indoor unit; otherwise, the time lag of up to 15 minutes will occur.

· The setting will be saved for the next same operation.

9. PRESET OPERATION

Set your preferred operation for future use. The setting will be memorized by the unit for future operation (except air flow direction).

1. Select your preferred operation.
2. Press and hold PRESET for 3 seconds to memorize the setting. The Ⓟ mark displays.
3. Press PRESET : Operate the preset operation.

10. AUTO RESTART OPERATION

To automatically restart the conditioner after the power failure (Power of the unit must be on.)

Setting

1. Press and hold the RESET button on the indoor unit for 3 seconds to set the operation. (3 beep sound and OPERATION lamp blink 5 time/sec for 5 seconds)
   - Do not operate ON timer and OFF timer.
2. Press and hold the RESET button on the indoor unit for 3 seconds to cancel the operation. (3 beep sound but OPERATION lamp does not blink)

11. QUIET OPERATION

To operate at super low fan speed for quiet operation (except in DRY mode)

Press QUIET : Start and stop the operation.

Note: Under certain conditions, QUIET operation may not provide adequate cooling due to low sound features.

12. COMFORT SLEEP OPERATION

To save energy while sleeping, automatically control air flow and automatically turn OFF.

Press COMFORT SLEEP : Select 1, 3, 5 or 9 hrs for OFF timer operation.

Note: The cooling operation, the set temperature will increase automatically 0.5 degree/hour for 4 hours (maximum 2 degrees increase).

9-4-3. Names and Functions of Indications on Remote Controller

[Display]

All indications, except for the clock time indicator, are displayed by pushing the ⏻ button.

1 Transmission mark

This transmission mark ▲ indicates when the remote controller transmits signals to the indoor unit.

2 Mode indicator

Indicates the current operation mode.
(AUTO : Automatic control, A : Auto changeover control, ☼ : Cool, 💧 : Dry, ☀ : Heat)

3 Temperature indicator

Indicates the temperature setting.
(17°C to 30°C)

4 FAN speed indicator

Indicates the selected fan speed.

AUTO or five fan speed levels
(LOW ▁ , LOW+ ▁▂ , MED ▁▂▃ , MED+ ▁▂▃▄ , HIGH ▁▂▃▄▅) can be shown.

Indicates AUTO when the operating mode is either AUTO or 💧 : Dry.

5 TIMER and clock time indicator

The time setting for timer operation or the clock time is indicated.

The current time is always indicated except during TIMER operation.

6 Hi POWER indicator

Indicates when the Hi POWER operation starts.

Push the Hi-POWER button to start and push it again to stop the operation.

7 Ⓟ (PRESET) indicator

Flashes for 3 seconds when the PRESET button is pushed during operation.

The Ⓟ mark is shown when holding down the button for more than 3 seconds while the mark is flashing.

Push another button to turn off the mark.

8 ECO indicator

Indicates when the ECO is in activated.

Push the ECO button to start and push it again to stop operation.

9 A, B change indicator remote controller

When the remote controller switching function is set, “B” appears in the remote controller display. (When the remote controller setting is “A”, there is no indication at this position.)

10 Comfort sleep

Indicates when comfort sleep is activaled.

Push comfort sleep button to select.

11 Quiet

Indicates when quiet is activated.

Push quiet button to start and push it again to stop operation.

12 One-Touch

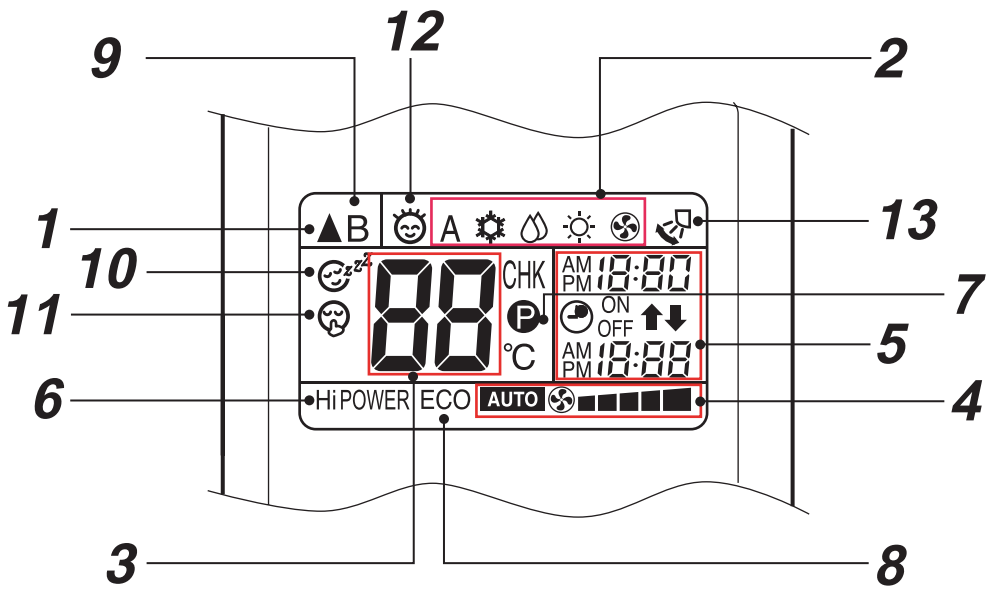
Indicates when one touch comfort is activated.

Push one-touch button to start the operation.

13 Swing

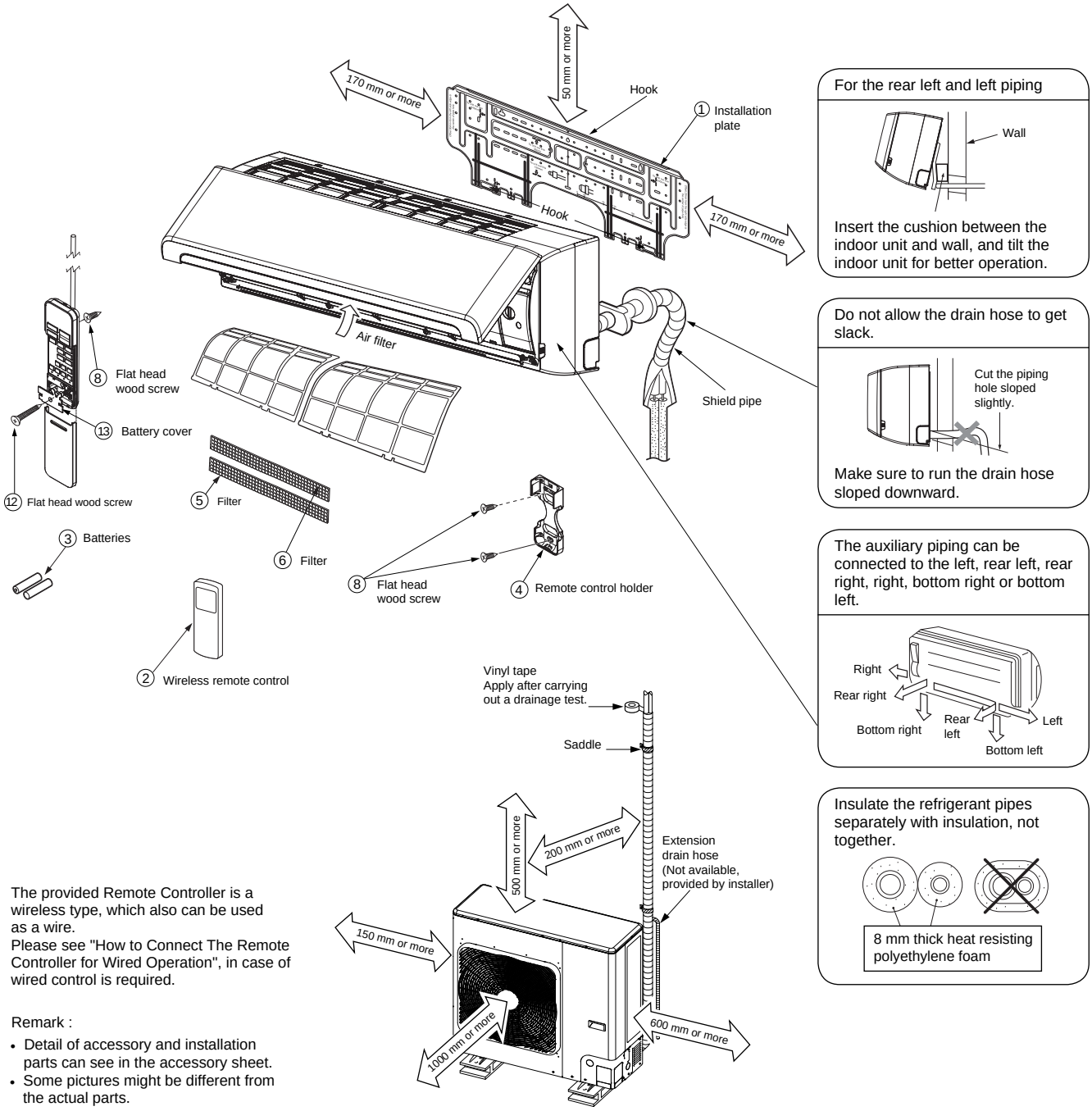
Indicates when louver is swing.

Push swing button to start the swing operation and push it again to stop the swing operation.



10. INSTALLATION PROCEDURE

10-1. Installation Diagram of Indoor and Outdoor Units



For the rear left and left piping

Insert the cushion between the indoor unit and wall, and tilt the indoor unit for better operation.

Do not allow the drain hose to get slack.

Make sure to run the drain hose sloped downward.

The auxiliary piping can be connected to the left, rear left, rear right, right, bottom right or bottom left.

Insulate the refrigerant pipes separately with insulation, not together.

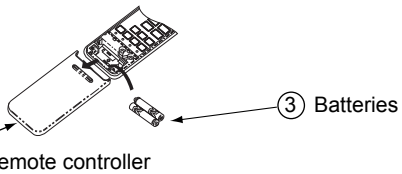
The provided Remote Controller is a wireless type, which also can be used as a wire.
Please see "How to Connect The Remote Controller for Wired Operation", in case of wired control is required.

Remark :

- Detail of accessory and installation parts can see in the accessory sheet.
- Some pictures might be different from the actual parts.

Before installing the wireless remote controller

- Loading Batteries
  1. Remove the battery cover.
  2. Insert 2 new batteries (AAA type) following the (+) and (–) positions.



10-2. Installation

10-2-1. Optional installation parts

Part Code	Parts name	Q'ty
Ⓐ	Refrigerant piping Liquid side : ∅9.52 mm Gas side : ∅15.88 mm	One each
Ⓑ	Pipe insulating material (polyethylene foam, 8 mm thick)	1
Ⓒ	Putty, PVC tapes	One each

<Fixing bolt arrangement of outdoor unit>

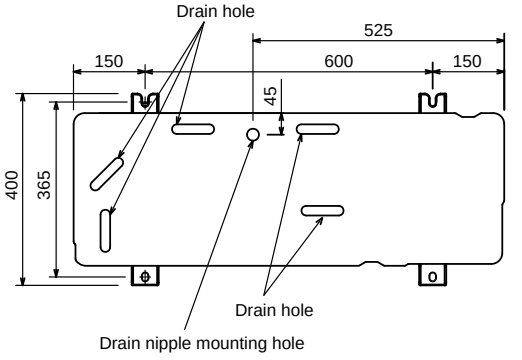
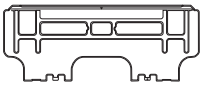
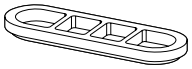
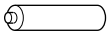


Fig. 8-2-1

- Secure the outdoor unit with fixing bolts and nuts if the unit is likely to be exposed to a strong wind.
- Use ∅10 mm anchor bolts and nuts.
- If it is necessary to drain the defrost water, attach drain nipple (9) and cap water proof (10) to the bottom plate of the outdoor unit before installing it.

10-2-2. Accessory and installation parts

Part No.	Part name (Q'ty)	Part No.	Part name (Q'ty)	Part No.	Part name (Q'ty)
①	 Installation plate x 1	④	 Remote control holder x 1	⑨	 Drain nipple* x 1
②	 Wireless remote control x 1	⑤	 Filter x 1	⑩	 Cap water proof* x 5
③	 Battery x 2	⑥	 Filter x 1	⑪	 Screw ∅4 x 10 ℓ x 2
Others	**Name** Owner's manual Installation manual	⑦	 Mounting screw ∅4 x 25 ℓ x 6	⑫	 Flat head wood screw ∅3.1 x 25 ℓ x 1
		⑧	 Flat head wood screw ∅3.1 x 16 ℓ x 2	⑬	 Battery-cover x 1

10-2-3. Installation/Servicing Tools

Changes in the product and components

In the case of an air conditioner using R410A, in order to prevent any other refrigerant from being charged accidentally, the service port diameter of the outdoor unit control valve (3-way valve) has been changed.
(1/2 UNF 20 threads per inch)

- In order to increase the pressure resisting strength of the refrigerant piping flare processing diameter and size of opposite side of flare nuts has been changed. (for copper pipes with nominal dimensions 1/2 and 5/8)

New tools for R410A

New tools for R410A	Applicable to R22 model		Changes
Gauge manifold	×		As pressure is high, it is impossible to measure by means of conventional gauge. In order to prevent any other refrigerant from being charged, each port diameter has been changed.
Charge hose	×		In order to increase pressure resisting strength, hose materials and port size have been changed (to 1/2 UNF 20 threads per inch). When purchasing a charge hose, be sure to confirm the port size.
Electronic balance for refrigerant charging	○		As pressure is high and gasification speed is fast, it is difficult to read the indicated value by means of charging cylinder, as air bubbles occur.
Torque wrench (nominal diam. 1/2, 5/8)	×		The size of opposite sides of flare nuts have been increased. Incidentally, a common wrench is used for nominal diameters 1/4 and 3/8.
Flare tool (clutch type)	○		By increasing the clamp bar's receiving hole, strength of spring in the tool has been improved.
Gauge for projection adjustment	—	—	Used when flare is made by using conventional flare tool.
Vacuum pump adapter	○		Connected to conventional vacuum pump. It is necessary to use an adapter to prevent vacuum pump oil from flowing back to the charge hose. The charge hose connecting part has two ports-one for conventional refrigerant (7/16 UNF 20 threads per inch) and one for R410A. If the vacuum pump oil (mineral) mixes with R410A a sludge may occur and damage the equipment.
Gas leakage detector	×		Exclusive for HFC refrigerant.

- Incidentally, the "refrigerant cylinder" comes with the refrigerant designation (R410A) and protector coating in the U. S's ARI specified rose color (ARI color code: PMS 507).
- Also, the "charge port and packing for refrigerant cylinder" require 1/2 UNF 20 threads per inch corresponding to the charge hose's port size.

10-3. Indoor Unit

10-3-1. Installation Place

- A place which provides the spaces around the indoor unit as shown in the diagram.
- A place where there are no obstacle near the air inlet and outlet.
- A place which allows easy installation of the piping to the outdoor unit.
- A place which allows the front panel to be opened.
- The indoor unit shall be installed as top of the indoor unit comes to at least 2 m in height.

  Also, it must be avoided to put anything on the top of the indoor unit.

CAUTION

- Direct sunlight on the indoor unit's wireless receiver should be avoided.
- The microprocessor in the indoor unit should not be too close to RF noise sources. (For details, see the owner's manual.)

Remote controller

- A place where there are no obstacles such as a curtain that may block the signal from the remote control.
- Do not install the remote controller in a place exposed to direct sunlight or close to a heating source, such as a stove.
- Keep the remote controller at least 1 m away from the nearest TV set or stereo equipment. (This is necessary to prevent image disturbances or noise interference.)
- The location of the remote controller should be determined as shown below.

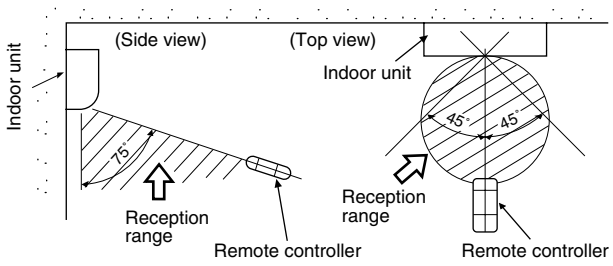


Fig. 10-3-1

10-3-2. Drilling a Hole and Mounting Installation Plate

Drilling a hole

When install the refrigerant pipes from the rear.

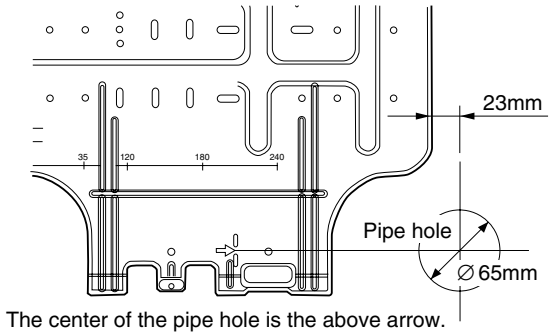


Fig. 10-3-2

1. After determining the pipe hole position on the installation plate (⇨) drill the pipe hole (Ø65 mm) at a slight downward slant to the outdoor side.

NOTE :

- When drilling into a wall that contains a metal lath, wire lath or metal plate, be sure to use a pipe hole brim ring sold separately.

Mounting the installation plate

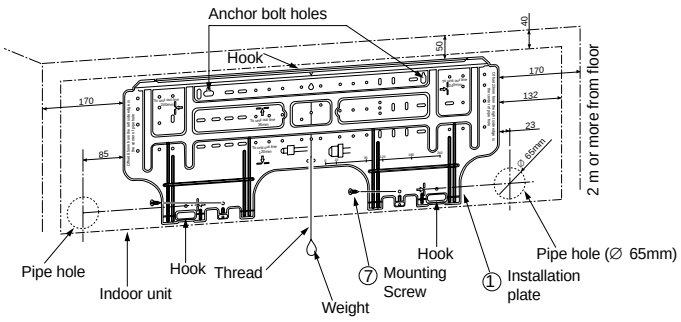


Fig. 10-3-3

When the installation plate is directly mounted on the wall

1. Securely fit the installation plate onto the wall by screwing it in the upper and lower parts to hook up the indoor unit.
2. To mount the installation plate on a concrete wall with anchor bolts, use the anchor bolt holes as illustrated in the below figure.
3. Install the installation plate horizontally in the wall.

CAUTION

When installing the installation plate with mounting screw, do not use the anchor bolt holes.

Otherwise, the unit may fall down and result in personal injury and property damage.

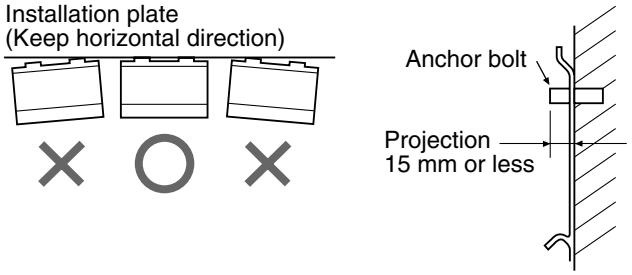


Fig. 10-3-4

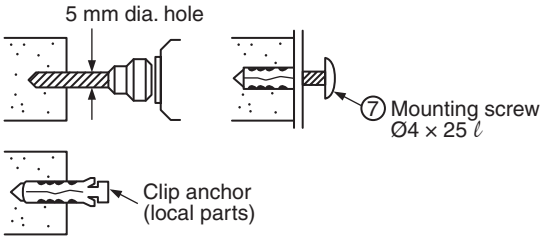


Fig. 10-3-5

CAUTION

Failure to securely install the unit may result in personal injury and property damage if the unit falls.

- In case of block, brick, concrete or similar type walls, make 5 mm dia. holes in the wall.
- Insert clip anchors for appropriate mounting screws ⑦ .

NOTE :

- Secure four corners and lower parts the installation plate with 4 to 6 mounting screws to install it.

10-3-3. Wiring Connection

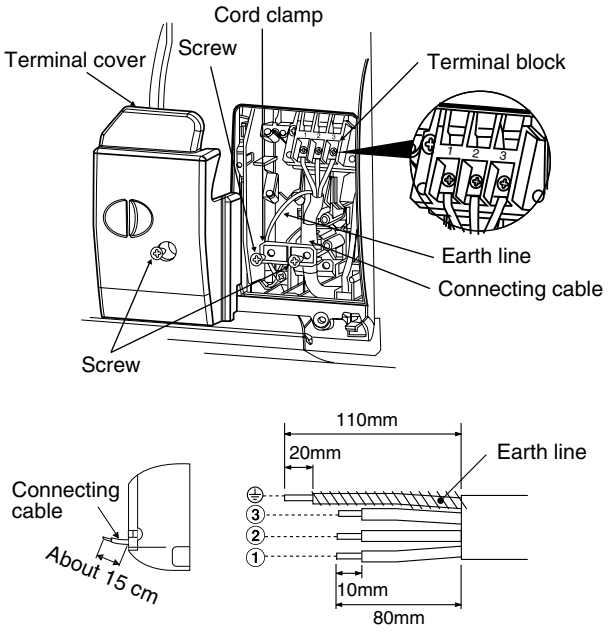
How to connect the connecting cable

Wiring of the connecting cable can be carried out without removing the front panel.

1. Remove the air inlet grille. Open the air inlet grille upward and pull it toward you.
2. Remove the terminal cover and cord clamp.
3. Insert the connecting cable (or as according to local rule) into the pipe hole on the wall.
4. Take out the connecting cable through the cable slot on the rear panel so that it protrudes about 15 cm from the front.
5. Insert the connecting cable fully into the terminal block and secure it tightly with screws.
6. Tighten firmly but not over : 1.2 N•m (0.12 kgf•m)
7. Secure the connecting cable with the cord clamp.
8. Fix the terminal cover, rear plate bushing and air inlet grille on the indoor unit.

CAUTION

- Be sure to refer to the wiring system diagram labeled inside the front panel.
- Check local electrical cords and also any specific wiring instructions or limitations.



Stripping length of the connecting cable

Fig. 10-3-6

NOTE :

- Use stranded wire only.
- Wire type : More than 1.5 mm^2 (H07RN-F or 60245 IEC66) or 1.3 mm^2 (AWG-16)

10-3-4. How to Connect Remote Controller for Wire Operation

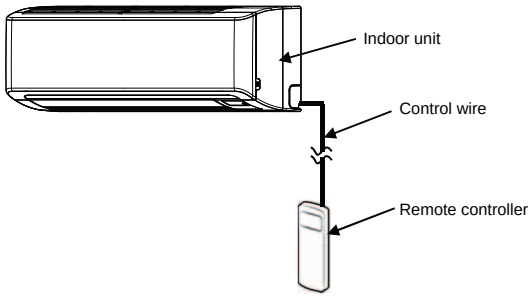


Fig. 10-3-7

<For indoor unit>

1. Open the air inlet grille upward.
2. Securely remove four screws at the front panel.
3. Slightly open the lower part of the front panel then pull the upper part of the front toward you to remove it from the rear plate as shown on figure ①.
4. After removing the front panel, remove the screws and Display unit from the unit as shown on figure ② then open the front cover of Display unit as shown on figure ③.
5. Arrange the control wire as detail and specification as shown on figure ④.
6. Securely connect the control wire to terminal of display unit board as shown on figure ⑤ (tighten firmly but not over : 0.12 N·m (0.01 kgf·m).
7. Set the control wire throughout at slot on front cover of display unit then reassembly display with main casing by reverse process of figure ② and ③. Make sure the control wire must not be pressed by front and rear cover of display unit.
8. Set the control wire out from indoor unit same portion as power supply and connecting cable as shown on figure ⑥.
9. Reassembly the indoor unit by reverse process of 1 to 3.

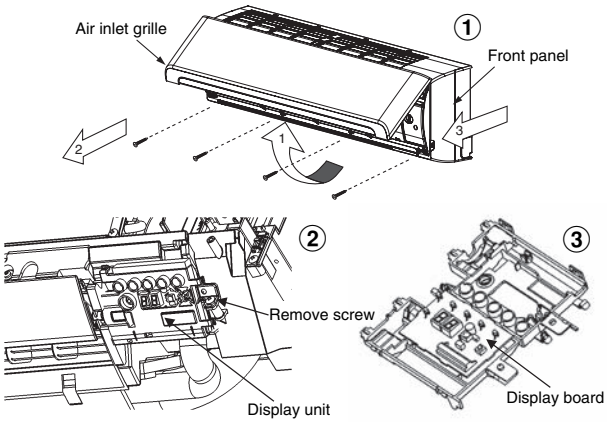


Fig. 10-3-8

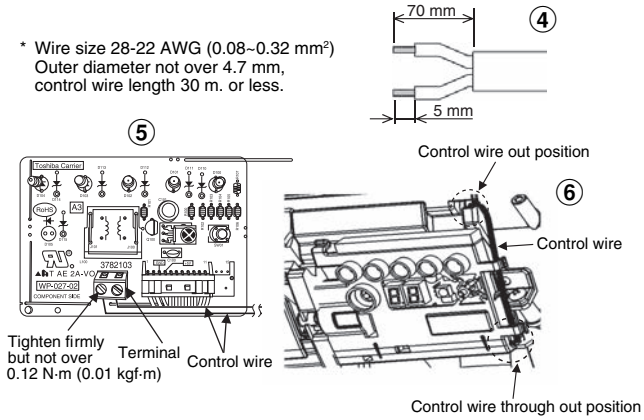


Fig. 10-3-9

<For remote controller>

1. Remove cover of remote controller by sliding down and take it out.
2. If batteries are exist, please take them out. The combination of using wire controller and batteries may cause of batteries explosion.
3. Make hole for insert control wire by use screwdriver break the polyester sheet as shown on figure ⑦.
4. Insert control wire from rear side of remote controller as shown on figure ⑧.
5. Fix control wire which arrange as shown on figure ⑨ and ⑩ to terminal by provided screws (tighten firmly but not over : 0.25 N·m (0.03 kgf·m).
6. Set control wire through gutter way at rear side of remote controller as shown on figure ⑪.
7. Fix provided screw (∅3.1 x 16L) on the wall to hang remote controller as shown on figure ⑫.
8. Mark and arrange hole for fix below screw (∅3.1 x 25L) as shown on figure ⑫.
9. Assembly battery cover which provided with accessory bag then use provide screw (∅3.1 x 25L) to fix battery cover together with wall as shown on figure ⑬ (tighten firmly but not over 0.15 N.m (0.02 kgf.m)).
10. Reassembly cover of remote controller.

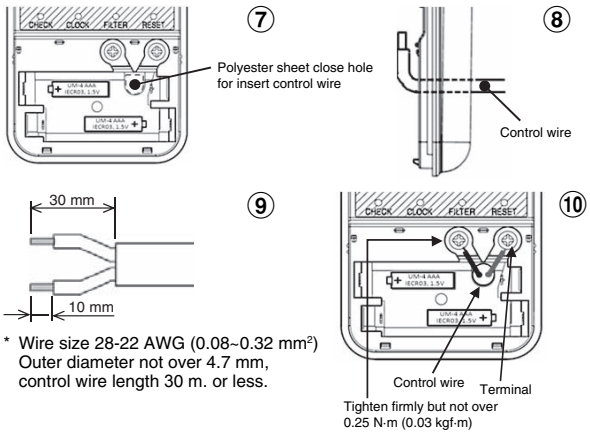


Fig. 10-3-10

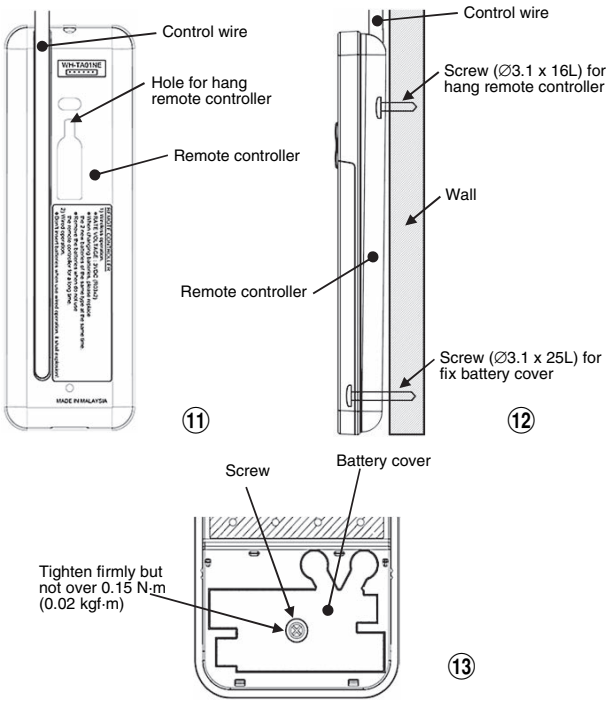


Fig. 10-3-11

***Remark :**

1. Recommend to use double insulation lead wire for connect remote control and air conditioner.
2. For wire operation, 1 remote control can control only 1 indoor unit.
3. In wire operation, remote controller will return to initial condition (PRESET, TIMER and CLOCK will return to initial condition) when user shutdown power supply of air conditioner.

<How to install the air inlet grille on the indoor unit>

- When attaching the air inlet grille, perform the same process as for removal but in severse order.

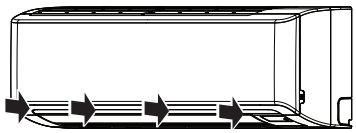
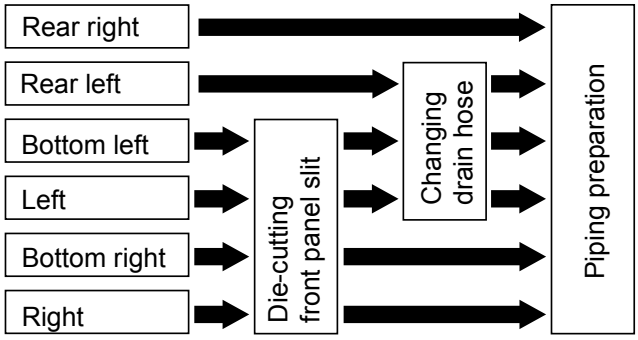


Fig. 10-3-12

10-3-5. Piping and drain hose installation

<Piping and drain hose forming>

* Since dewing results in a machine trouble, make sure to insulate both connecting pipes. (Use polyethylene foam as insulating material.)



1. Die-cutting front panel slit

Cut out the slit on the left or right side of the front panel for the letf or right connection and the slit on the bottom left or right side of the front panel for the bottom left or right connection with a pair of nippers.

2. Changing drain hose

For leftward connection, bottom leftward connection and rear leftward connection's piping, it is necessary to change the drain hose and drain cap.

<How to remove the drain cap>

Clip the drain cap by needle-nose pliers and pull out.

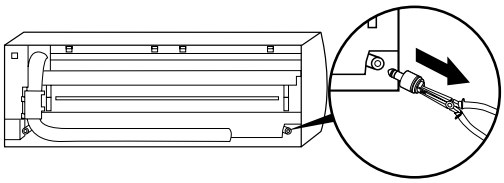


Fig. 10-3-13

<How to install the drain hose>

Firmly insert drain hose connecting part until hitting on a heat insulator and fix it with a screw.

<How to remove the drain hose>

- The drain hose can be removed by removing the screw securing the drain hose and then pulling out the drain hose.
- When removing the drain hose, be careful of any sharp edges of steel plate. The edges can injuries.
- To install the drain hose, insert the drain hose firmly until the connection part contacts with heat insulator, and the secure it with original screw.

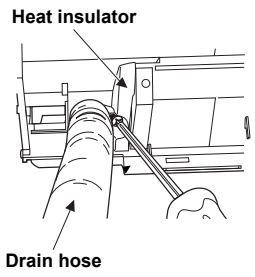


Fig. 10-3-14

<How to attach the drain cap>

1. Insert hexagon wrench (4 mm) in a center head.

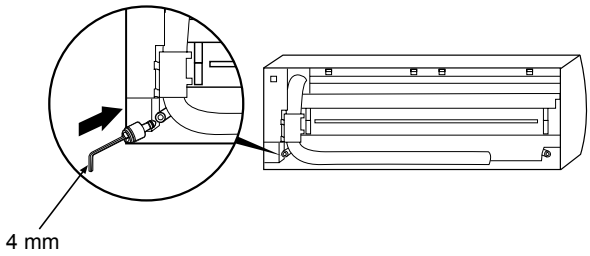


Fig. 10-3-15

2. Firmly insert drain cap.

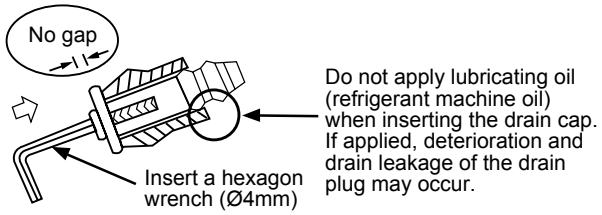


Fig. 10-3-16

<How to attach the drain hose>

Always use the original screw that secured the drain hose to the unit. If using a different screw may cause water to leak.

Insert the drain hose firmly until the connector contacts with the insulation, then secure it in place using the original screw.

CAUTION

Firmly insert the drain hose and drain cap; otherwise, water may leak.

<In case of right or left piping>

- After scribing slits on the front panel with a knife or a making-off pin, cut them with a pair of nippers or an equivalent tool.

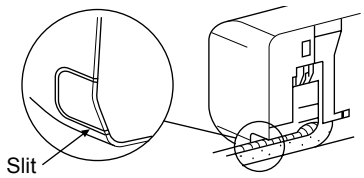


Fig. 10-3-17

<In case of bottom right or bottom left piping>

- After scribing slits of the front panel with a knife or a making-off pin, cut them with a pair of nippers or an equivalent tool.

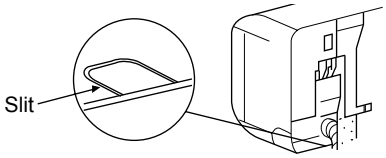


Fig. 10-3-18

<Left-hand connection with piping>

Bend the connecting pipe so that it is laid within 43 mm above the wall surface.

If the connecting pipe is laid exceeding 43 mm above the wall surface, the indoor unit may unstably be set on the wall.

When bending the connecting pipe, make sure to use a spring bender so as not to crush the pipe.

Refer to the table below for the bending radius of each connection pipe.

Outer diameter	Bending radius
∅6.35 mm	30 mm
∅12.70 mm, ∅15.88 mm	50 mm

To connect the pipe after installation of the unit (figure)

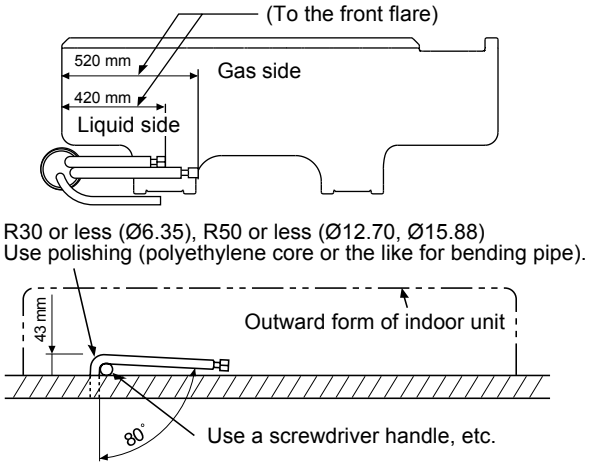


Fig. 10-3-19

NOTE :

If the pipe is bent incorrectly, the indoor unit may unstably be set on the wall.

After passing the connecting pipe through the pipe hole, connect the connecting pipes to the auxiliary pipes and wrap the facing tape around them.

CAUTION

- Bind the auxiliary pipes (two) and connecting cable with facing tape tightly.

  In case of leftward piping and rear-leftward piping, bind the auxiliary pipes (two) only with facing tape.

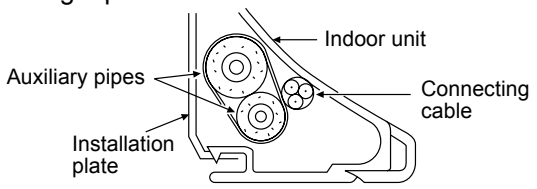


Fig. 10-3-20

- Carefully arrange pipes so that any pipe does not stick out of the rear plate of the indoor unit.
- Carefully connect the auxiliary pipes and connecting pipes to one another and cut off the insulating tape wound on the connecting pipe to avoid double-taping at the joint, moreover, seal the joint with the vinyl tape, etc.
- Since dewing results in a machine trouble, make sure to insulate both connecting pipes. (Use polyethylene foam as insulating material.)
- When bending a pipe, be careful not to crush it.

10-3-6. Indoor Unit Fixing

1. Pass the pipe through the hole in the wall and hook the indoor unit on the installation plate at the upper hook.
2. Swing the indoor unit to right and left to confirm that it is firmly hooked on the installation plate.
3. While pressing the indoor unit onto the wall, hook it at the lower part on the installation plate. Pull the indoor unit toward you to confirm that it is firmly hooked on the installation plate.

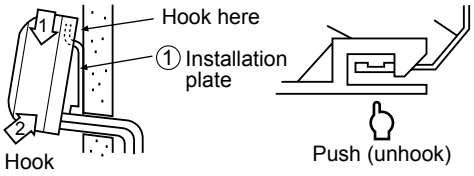


Fig. 10-3-21

- For detaching the indoor unit from the installation plate, pull the indoor unit toward you while pushing its bottom up at the specified parts.

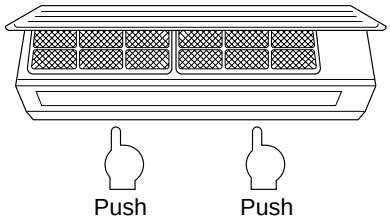


Fig. 10-3-22

Information

The lower part of indoor unit may float, due to the condition of piping and you cannot fix it to the installation plate. In that case, use the ⑭ screws trovided to fix the unit and the installation plate.

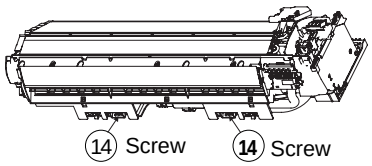


Fig. 10-3-23

10-3-7. Drainage

1. Run the drain hose sloped downwards.

NOTE :

- The hole should be made at a slight downward slant on the outdoor side.

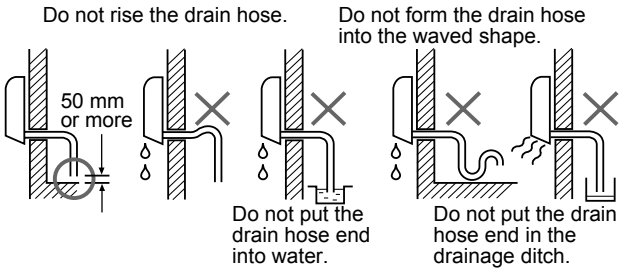


Fig. 10-3-24

2. Put water in the drain pan and make sure that the water is drained out of doors.
3. When connecting extension drain hose, insulate the connection part of extension drain hose with shield pipe.

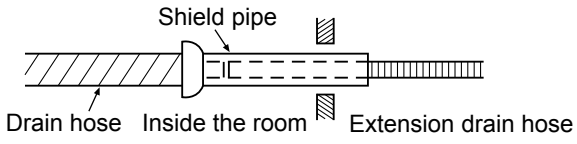


Fig. 10-3-25

CAUTION

Arrange the drain pipe for proper drainage from the unit.
Improper drainage can result in dew-dropping.

This air conditioner has the structure designed to drain water collected from dew, which forms on the back of the indoor unit, to the drain pan.

Therefore, do not store the power cord and other parts at a height above the drain guide.

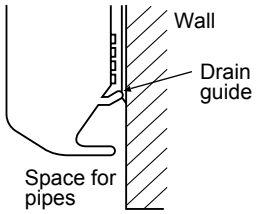
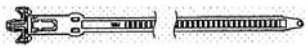
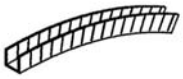
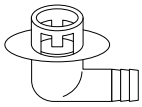


Fig. 10-3-26

10-4. Outdoor unit

10-4-1. Accessory Parts

Part name	Q'ty	Shape	Usage
Cable tie	2		For fixing the Power cord
Protective bush	1		For protecting wire (pipe cover)
Guard material for passage part	1		For protecting passage part (pipe cover)
Drain nipple	1		For Heat pump model
Waterproof rubber cap	5		For Heat pump model

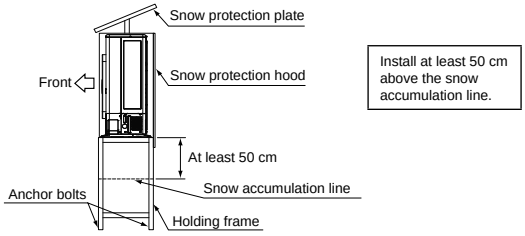
10-4-2. Installation Place

- A place which provides enough spaces around the outdoor unit as shown in the diagram.
- A place which can bear the weight of the outdoor unit and does not allow an increase in noise level and vibration.
- A place where the operation noise and discharged air do not disturb your neighbors.
- A place which is not exposed to a strong wind.
- A place free of a leakage of combustible gases.
- A place which does not block a passage.
- When the outdoor unit is to be installed in an elevated position, be sure to secure its feet.
- An allowable length of the connecting pipe is up to 30 m.
- There is no need to add refrigerant as long as the length of the connection piping is 20 m or less.
- You will need to add 30g of refrigerant per meter of added connection piping for installations requiring connection piping to be between 21 m to 30 m.
- An allowable height level is up to 20 m.
- A place where the drain water does not cause any problems.

10-4-3. Precautions about Installation in Regions with Snowfall and Cold Temperatures

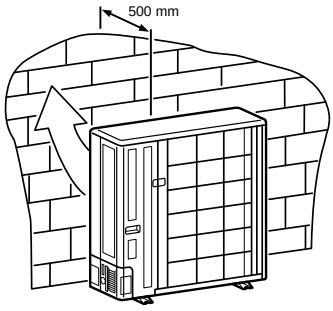
- Do not use the supplied drain nipple for draining water. Drain the water from all the drain holes directly.
- To protect the outdoor unit from snow accumulation, install a holding frame, and attach a snow protection hood and plate.

* Do not use a double-stacked design.

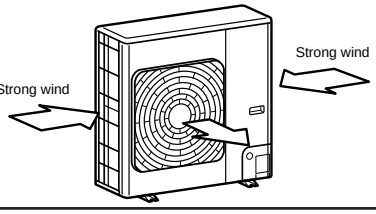


CAUTION

1. Install the outdoor unit in a location where the discharge air is not blocked.
2. When an outdoor unit is installed in a location that is always exposed to strong winds like a coast or on the high stories of a building, secure normal fan operation by using a duct or wind shield.
3. When installing the outdoor unit in a location that is constantly exposed to strong winds such as on the upper stairs or rooftop of a building, apply the windproofing measures referred to in the following examples.
   1) Install the unit so that its discharge port faces the wall of the building.
      Keep a distance 500 mm or more between the unit and wall surface.



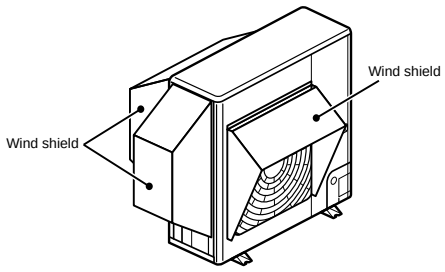
   2) Consider the wind direction during the operational season of the air conditioner, and install the unit so that the discharge port is set at a right angle relative to the wind direction.



CAUTION

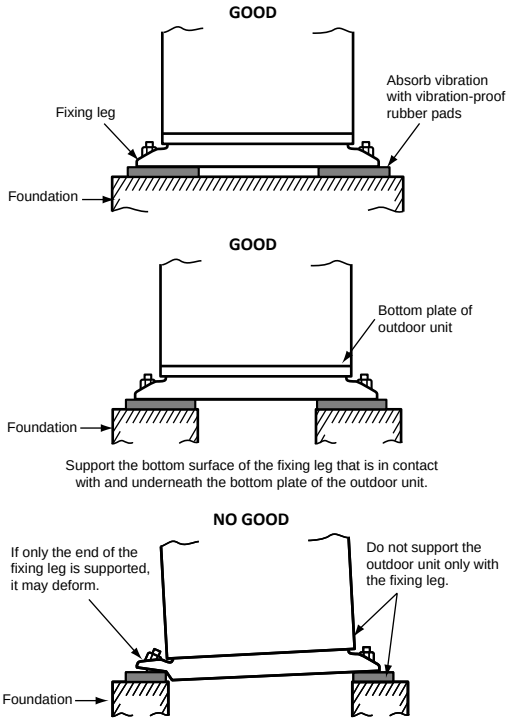
- When using an air conditioner under low outside temperature conditions (Outside temp:-5 °C or lower) in COOL mode, prepare a duct or wind shield so that it is not affected by the wind.

<Example>

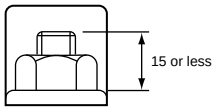


- As shown in the figure below, install the foundation and vibration-proof rubber pads to directly support the bottom surface of the fixing leg that is in contact with and underneath the bottom plate of the outdoor unit.

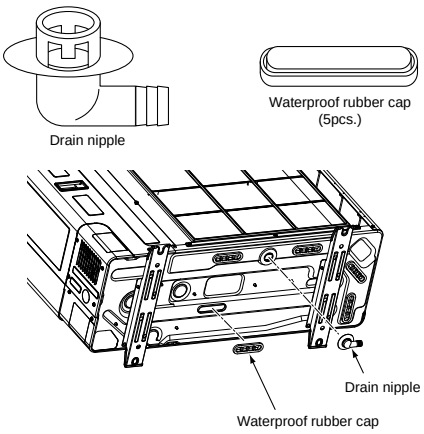
* When installing the foundation for an outdoor unit with downward piping, consider the piping work.



Set the out margin of the anchor bolt to 15 mm or less.



- When water is to be drained through the drain hose, attach the following drain nipple and waterproof rubber cap, and use the drain hose (Inner dia.: 16 mm) sold on the market. Also seal the screws securely with silicone material, etc., to prevent water from leaking.
  Some conditions may cause dewing or dripping of water.
- When collectively draining discharged water completely, use a drain pan.



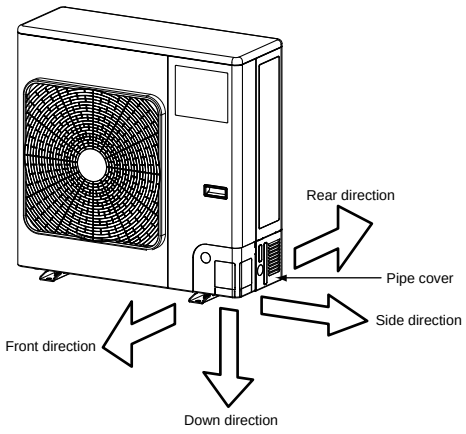
For reference

If a heating operation is to be continuously performed for a long time under the condition that the outdoor temperature is 0°C or lower, draining defrosted water may be difficult due to the bottom plate freezing, resulting in trouble with the cabinet or fan.
It is recommended to procure an anti-freeze heater locally in order to safely install the air conditioner.
For details, contact the dealer.

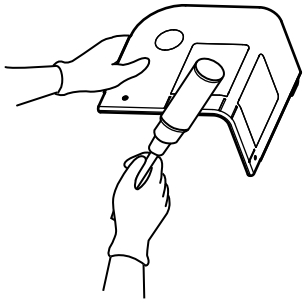
10-4-4. Refrigerant Piping

Knockout of pipe cover

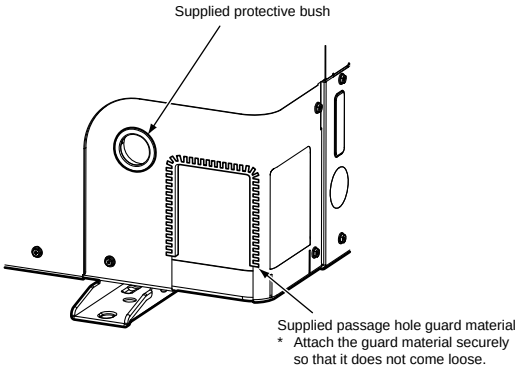
Knockout procedure



- The indoor/outdoor connecting pipes can be connected in 4 directions. Take off the knockout part of the pipe cover through which pipes or wires will pass through the base plate.
- Detach the pipe cover and tap on the knockout section a few times with the shank of a screwdriver. A knockout hole can easily be punched.
- After punching out the knockout hole, remove burrs from the hole and then install the supplied protective bush and guard material around the passage hole to protect wires and pipes.
  Be sure to attach the pipe covers after pipes have been connected. Cut the slits under the pipe covers to facilitate the installation.
  After connecting the pipes, be sure to mount the pipe cover. The pipe cover is easily mounted by cutting off the slit at the lower part of the pipe cover.



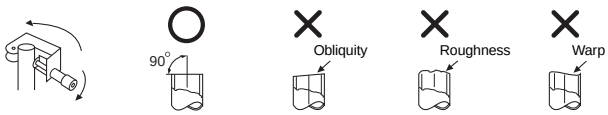
* Be sure to wear heavy work gloves while working.



10-4-5. Refrigerant Piping Connection

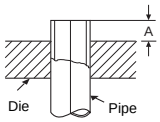
Flaring

1. Cut the pipe with a pipe cutter.



2. Insert a flare nut into the pipe and flare the pipe.

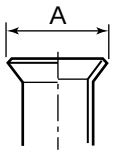
Projection margin in flaring : A (Unit : mm)



Rigid (clutch type)

Outer dia. of copper pipe	A	
	R410A tool used	Conventional tool used
∅9.52 mm	0 to 0.5	1.5 to 2.0
∅15.88 mm	1.0 to 1.5	2.0 to 2.5

Flaring dia. meter size: A (Unit: mm)



Outer dia. of copper pipe	$A^{+0}_{-0.4}$
∅9.52 mm	13.2
∅15.88 mm	19.7

* In case of flaring for R410A with the conventional flare tool, pull it out approx. 0.5 mm more than that for R22 to adjust to the specified flare size.
The copper pipe gauge is useful for adjusting the projection margin size.

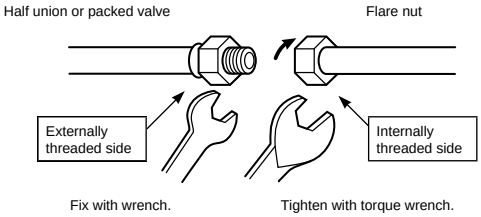
Piping connection

Liquid side	
Outer diameter	Thickness
∅9.52 mm	0.8 mm

Gas side	
Outer diameter	Thickness
∅15.88 mm	1.0 mm

Tightening of connecting part

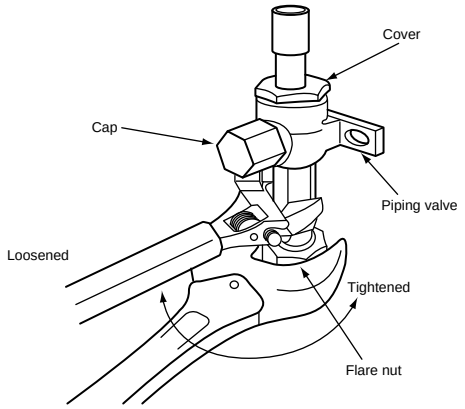
1. Align the centers of the connecting pipes and fully tighten the flare nut with your fingers. Then fix the nut with a wrench as shown in the figure and tighten it with a torque wrench.



2. As shown in the figure, be sure to use two wrenches to loosen or tighten the flare nut of the valve on the gas side. If you use a single crescent, the flare nut cannot be tightened to the required tightening torque.
   On the other hand, use a single crescent to loosen or tighten the flare nut of the valve on the liquid side.

(Unit : N·m)

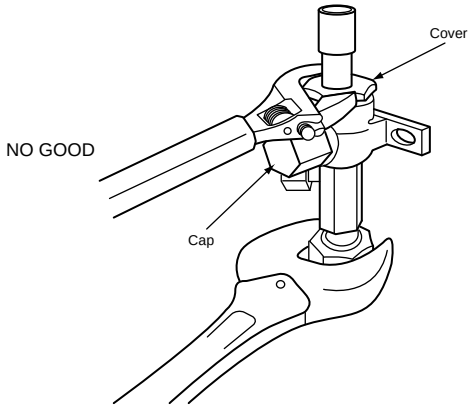
Outer dia. of copper pipe	Tightening torque
∅9.52 mm	33 to 42 (3.3 to 4.2 kgf·m)
∅15.88 mm	68 to 82 (6.8 to 8.2 kgf·m)



Valve at gas side

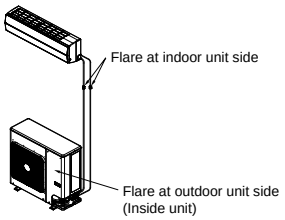
CAUTION

1. Do not put the crescent wrench on the cap or cover.
   The valve may break.
2. If applying excessive torque, the nut may break according to some installation conditions.



- After the installation work, be sure to check for gas leaks of the pipe connections with nitrogen.
- Pressure of R410A is higher than that of R22 (Approx. 1.6 times). Therefore, using a torque wrench, tighten the flare pipe connecting sections that connect the indoor/outdoor units at the specified tightening torque.
  Incomplete connections may cause not only a gas leak, but also trouble with the refrigeration cycle.

Do not apply refrigerant oil to the flared surface.



CAUTION

- KEEP IMPORTANT 5 POINTS FOR PIPING WORK.

(1) Take away dust and moisture (inside of the connecting pipes).
(2) Tighten the connections (between pipes and unit).
(3) Evacuate the air in the connecting pipes using a VACUUM PUMP.
(4) Check gas leak (connected points).
(5) Be sure to fully open the packed valves before operation.

10-4-6. Evacuating

After the piping has been connected to the indoor unit, you can perform vacuuming together at once.

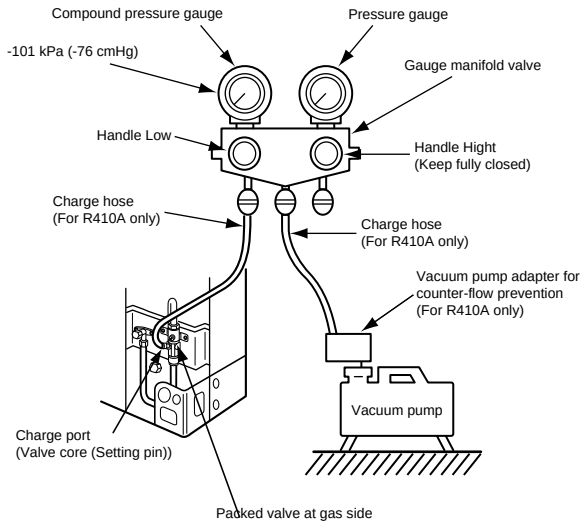
VACUUMING

Evacuate the air in the connecting pipes and in the indoor unit using a vacuum pump. Do not use the refrigerant in the outdoor unit. For details, see the manual of the vacuum pump.

Using a vacuum pump

Be sure to use a vacuum pump with counter-flow prevention function so that inside oil of the pump does not flow backward into pipes of the air conditioner when the pump stops.
(If oil inside of the vacuum pump enters the air conditioner, which use R410A, refrigeration cycle trouble may happen)

1. Connect the charge hose from the manifold valve to the service port of the packed valve at gas side.
2. Connect the charge hose to the port of the vacuum pump.
3. Open fully the low pressure side handle of the gauge manifold valve.
4. Operate the vacuum pump to start evacuating. Perform evacuating for about 15 minutes if the piping length is 20 meters (15 minutes for 20 meters) (assuming a pump capacity of 27 liters per minute). Then confirm that the compound pressure gauge reading is -101 kPa (-76 cmHg).
5. Close the low pressure side valve handle of the gauge manifold valve.
6. Open fully the valve stem of the packed valves (both gas and liquid sides).
7. Remove the charging hose from the service port.
8. Securely tighten the caps on the packed valves.



TO CHARGE REFRIGERANT	
Refrigerant	**24 Class**
Non refrigerant charging	Less than 20 m
Refrigerant charging	21 – 30 m (30g/m)

<Packed valve handling precautions>

- Open the valve stem all the way out, but do not try to open it beyond the stopper.

Pipe size of Packed Valve	Size of Hexagon wrench
12.70 mm and smallers	A = 4 mm
15.88 mm	A = 5 mm

- Securely tighten the valve cap with torque in the following table

Cap	Cap Size (H)	Torque
Valve Rod Cap	H17 - H19	14~18 N.m (1.4 to 1.8 kgf·m)
	H22 - H30	33~42 N.m (3.3 to 4.2 kgf·m)
Service Port Cap	H14	8~12 N.m (0.8 to 1.2 kgf·m)
	H17	14~18 N.m (1.4 to 1.8 kgf·m)

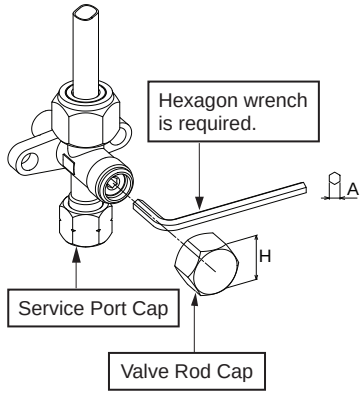
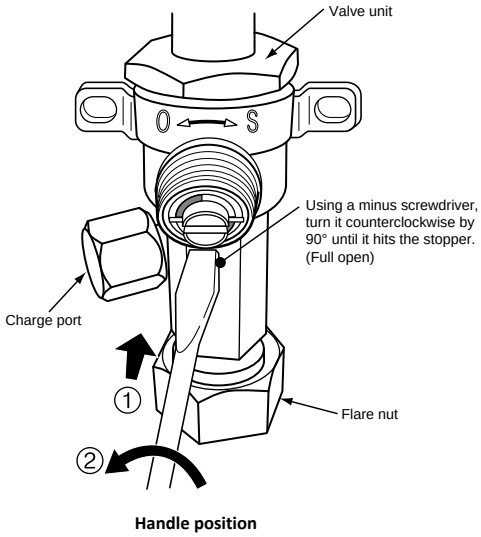
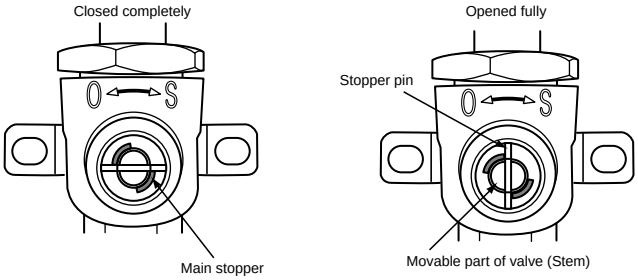


Fig. 10-4-8





- While the valve is fully opened, after the screwdriver has reached the stopper, do not apply torque exceeding 5 N·m. Applying excessive torque may damage the valve.

10-4-7 . Wiring Connection

1. Remove the valve cover, the electric parts cover and the cord clamp from the outdoor unit.
2. Connect the connecting cable to the terminal as identi ed by the matching numbers on the terminal block of indoor and outdoor unit.
3. Insert the power cord and the connecting cable carefully into the terminal block and secure it tightly with screws.
4. Use vinyl tape, etc. to insulate the cords which are not going to be used. Locate them so that they do not touch any electrical or metal parts.
5. Secure the power cord and the connecting cable with the cord clamp.
6. Attach the electric parts cover and the valve cover on the outdoor unit.

10-4-8. Electrical Work

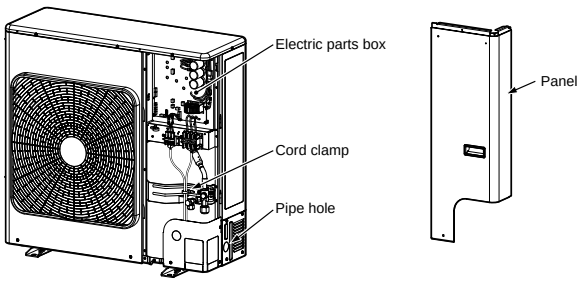
WARNING

1. Using the specified wires, ensure that the wires are connected, and fix wires securely so that the external tension to the wires does not affect the connecting part of the terminals.
   Incomplete connection or fixation may cause a fire, etc.
2. Be sure to connect the earth wire. (grounding work) Incomplete grounding may lead to electric shock.
   Do not connect ground wires to gas pipes, water pipes, lightning rods or ground wires for telephone wires.
3. The appliance shall be installed in accordance with national wiring regulations.
   Capacity shortages of the power circuit or an incomplete installation may cause an electric shock or fire.

CAUTION

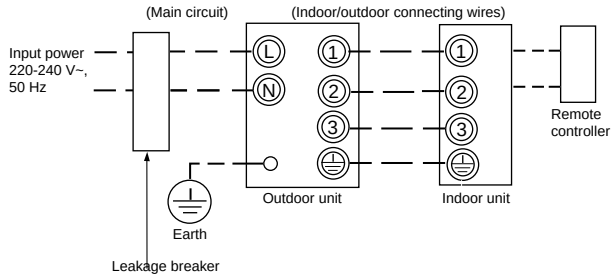
- Wrong wiring may cause a burn-out of some electrical parts.
- Be sure to use the cord clamps attached to the product.
- Do not damage or scratch the conductive core or inner insulator of the power and inter-connecting wires when peeling them.
- Use the power and Inter-connecting wires with specified thicknesses, specified types and protective devices required.

- Remove the panel, and you can see electric parts on the front side.
- A metal pipe can be installed through the hole for wiring. If the hole size does not fit the wiring pipe to be used, drill the hole again to an appropriate size.
- Be sure to clamp the power wires and indoor/outdoor connecting wires with a banding band along the connecting pipe so that the wires do not touch the compressor or discharge pipe.
  (The compressor and the discharge pipe become hot.)
  Furthermore, be sure to secure these wires with the pipe valve fixing plate and cord clamps stored in the electric parts box.



Wiring between indoor unit and outdoor unit

The dashed lines show on-site wiring.



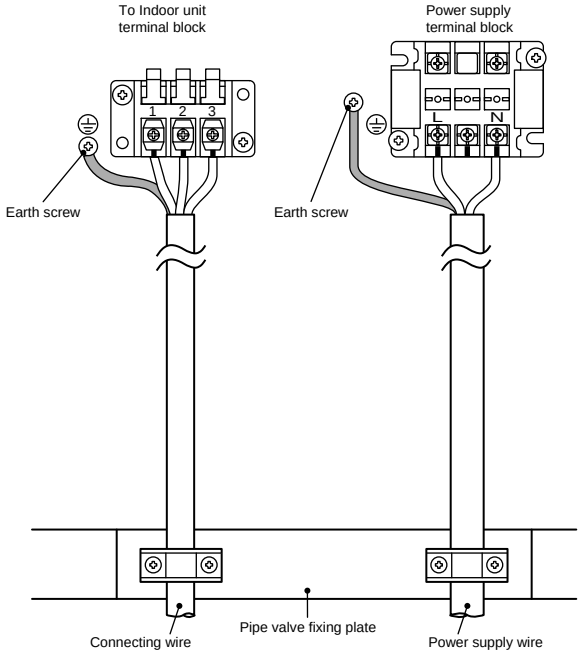
- Connect the indoor/outdoor connecting wires to the identical terminal numbers on the terminal block of each unit.
  Incorrect connection may cause a failure.

For the air conditioner, connect a power wire with the following specifications.

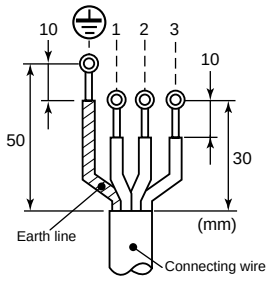
Model	24 Class
Power supply	220-240 V~, 50 Hz
Maximum running current	20A
Installation fuse rating	25 A (all types can be used)
Power wire	H07 RN-F or 60245 IEC 66 (2.5 mm² or more)
Indoor/outdoor connecting wires	H07 RN-F or 60245 IEC 66 (1.5 mm² or more)

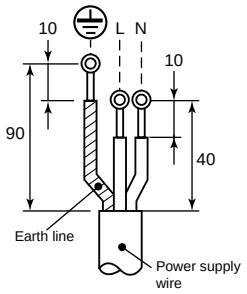
How to wire

1. Connect the connecting wire to the terminal as identified with their respective numbers on the terminal block of the indoor and outdoor units. H07 RN-F or 60245 IEC 66 (1.5 mm² or more)
2. When connecting the connecting wire to the outdoor unit terminal, prevent water from coming into the outdoor unit.
3. Insulate the unsheathed cords (conductors) with electrical insulation tape. Process them so that they do not touch any electrical or metal parts.
4. For interconnecting wires, do not use a wire joined to another on the way. Use wires long enough to cover the entire length.



Stripping length power cord and connecting wire





CAUTION

- An installation fuse must be used for the power supply line of this air conditioner.
- Incorrect/incomplete wiring may lead to an electrical fire or smoke.
- Prepare an exclusive power supply for the air conditioner.
- This product can be connected to the mains power.
  Fixed wire connections :
  A switch that disconnects all poles and has a contact separation of at least 3 mm must be incorporated in the fixed wiring.

10-4-9. Earthing

WARNING

- Be sure to connect the earth wire. (grounding work)
  Incomplete grounding may cause an electric shock.

Connect the earth line properly following applicable technical standards.
Connecting the earth line is essential to preventing electric shock and to reducing noise and electrical charges on the outdoor unit surface due to the high-frequency wave generated by the frequency converter (inverter) in the outdoor unit.
If you touch the charged outdoor unit without an earth line, you may experience an electric shock.

10-4-10. Finishing

After the refrigerant pipe, inter-unit wires, and drain pipe have been connected, cover them with finishing tape and clamp them to the wall with off-the-shelf support brackets or their equivalent.
Keep the power wires and indoor/outdoor connecting wires off the valve on the gas side or pipes that have no heat insulator.

10-4-11. Test Run

- Turn on the leakage breaker at least 12 hours before starting a test run to protect the compressor during startup.
  To protect the compressor, power is supplied from the 220-240 VAC input to the unit to preheat the compressor.
- Check the following before starting a test run:
  That all pipes are connected securely without leaks.
  That the valve is open.
  If the compressor is operated with the valve closed, the outdoor unit will become overpressurized, which may damage the compressor or other components.
  If there is a leak at a connection, air can be sucked in and the internal pressure further increases, which may cause a burst or injury.
- Operate the air conditioner in the correct procedure as specified in the Owner's Manual.

10-4-12. Annual Maintenance

- For an air conditioning system that is operated on a regular basis, cleaning and maintenance of the indoor/outdoor units are strongly recommended.
  As a general rule, if an indoor unit is operated for about 8 hours daily, the indoor/outdoor units will need to be cleaned at least once every 3 months. This cleaning and maintenance should be carried out by a qualified service person.
  Failure to clean the indoor/outdoor units regularly will result in poor performance, icing, water leaking and even compressor failure.

10-4-13. Functions to be Implemented Locally

Night operation control

- Low-noise operation is available during nighttime hours by connecting a commercially available timer and separately sold applicable control wire TCB-KBOS1E.
  For more information, refer to the manuals of these parts.
- The power saving function of the air conditioner reduces the level of nighttime operating noise.
- Sufficient capacity for low-noise operation cannot always be provided, depending on external conditions, including the outside air temperature.

Handling existing pipe

When using the existing pipe, carefully check for the following:
- Wall thickness (within the specified range)
- Scratches and dents
- Water, oil, dirt, or dust in the pipe
- Flare looseness and leakage from welds
- Deterioration of copper pipe and heat insulator

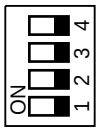
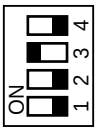
Cautions for using existing pipe

- Do not reuse a flare nut to prevent gas leaks.
  Replace it with the supplied flare nut and then process it to a flare.
- Blow nitrogen gas or use an appropriate means to keep the inside of the pipe clean. If discolored oil or much residue is discharged, wash the pipe.
- Check welds, if any, on the pipe for gas leaks.

When the pipe corresponds to any of the following, do not use it. Install a new pipe instead.
- The pipe has been opened (disconnected from indoor unit or outdoor unit) for a long period.
- The pipe has been connected to an outdoor unit that does not use refrigerant R22, R410A or R407C.
- The existing pipe must have a wall thickness equal to or larger than the following thicknesses.

Reference outside diameter (mm)	Wall thickness (mm)
∅9.52	0.8
∅15.88	1.0
∅19.1	1.0

- Do not use any pipe with a wall thickness less than these thicknesses due to insufficient pressure capacity.
- To use an existing ∅19.1 mm pipe, set bit 3 of SW802 (switch for existing pipe) on the P.C. board of the outdoor unit to ON. In this case, the heating performance may be reduced depending on the outside air temperature and room temperature.

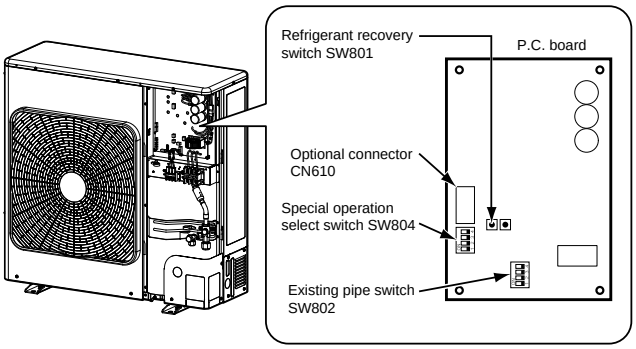
SW802	
When shipped from factory	When using existing pipe
	

Recovering refrigerant

- Use refrigerant recovery switch SW801 on the P.C. board of the outdoor unit to recover refrigerant when the indoor or outdoor unit is moved.

Procedure

1. Turn on the power of the air conditioner.
2. Select the FAN mode for indoor unit operation with the remote controller.
3. Set SW804 on the P.C. board of the outdoor unit to all OFF, and then press SW801 for 1 second or more. The air conditioner enters the forced cooling mode for up to 10 minutes.
   Operate or handle the valve to recover refrigerant during this time period.
4. Upon completion of refrigerant recovery, close the valve and press SW801 for at least 1 second to stop operation.
5. Turn off the power.



DANGER

Be careful of electric shock because the P.C. board has an electrical current running through it.

10-4-14. Troubleshooting

You can perform fault diagnosis of the outdoor unit with the LEDs on the P.C. board of the outdoor unit in addition to using the check codes displayed on the wired remote controller of the indoor unit.
Use the LEDs and check codes for various checks. Details of the check codes displayed on the wired remote controller of the indoor unit are described in the Installation Manual of the indoor unit.

Verifying current abnormal status

1. Check that DIP switch SW803 is set to OFF.
2. Jot down the states of LED800 to LED804. (Display mode 1)
3. Press SW800 for at least 1 second. The LED status changes to display mode 2.
4. Check the code whose display mode 1 equals the LED states jotted down and display mode 2 equals the current flashing status of LED800 to LED804 from the following table to identify the cause.

Verifying an abnormal state in the past although the abnormal state no longer occurs

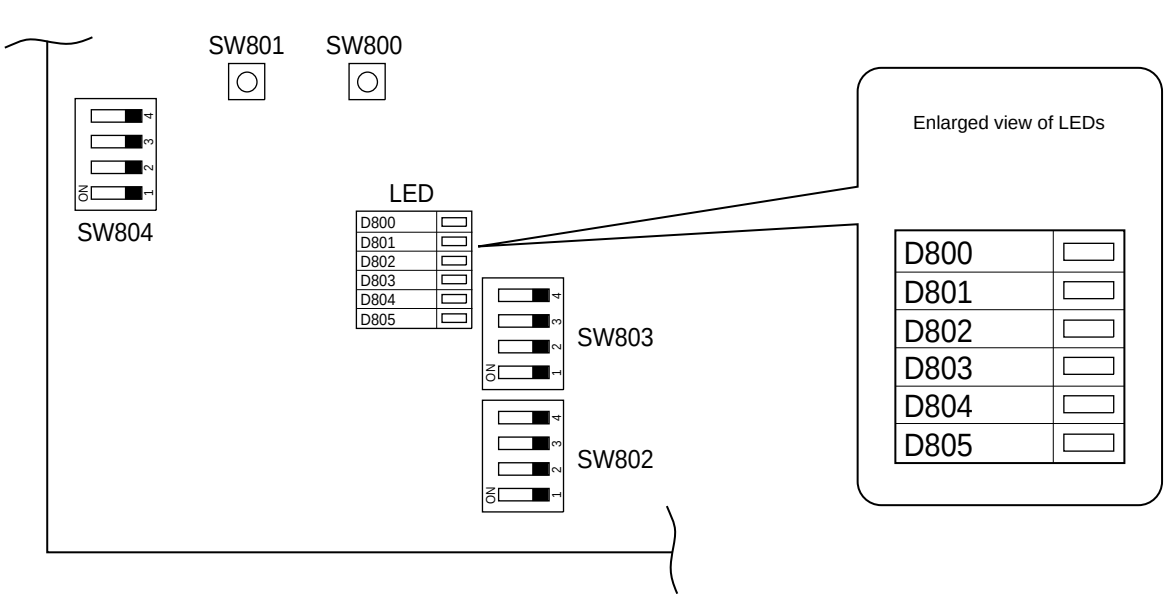
1. Set bit 1 of DIP switch SW803 to ON.
2. Jot down the states of LED800 to LED804. (Display mode 1)
3. Press SW800 for at least 1 second. The LED status changes to display mode 2.
4. Find an error whose display mode 1 equals the LED states jotted down and display mode 2 equals the current flashing states of LED800 to LED804 from the following table to identify the error.

- An outside air temperature (TO) sensor error can be checked only while it occurs.

No.	Cause	Display mode 1					Display mode 2				
		D800	D801	D802	D803	D804	D800	D801	D802	D803	D804
1	Normal	●	●	●	●	●	●	●	●	●	●
2	Discharge (TD) sensor error	○	○	●	●	○	●	●	◎	●	●
3	Heat exchanger (TE) sensor error	○	○	●	●	○	●	◎	◎	●	●
4	Heat exchanger (TL) sensor error	○	○	●	●	○	◎	◎	◎	●	●
5	Outside air temperature (TO) sensor error	○	○	●	●	○	●	●	●	◎	●
6	Suction (TS) sensor error	○	○	●	●	○	●	●	◎	◎	●
7	Heat sink (TH) sensor error	○	○	●	●	○	◎	●	◎	◎	●
8	Outdoor temperature sensor (TE/TS) connection error	○	○	●	●	○	◎	◎	◎	◎	●
9	Outdoor EEPROM error	○	○	●	●	○	◎	◎	◎	◎	◎
10	Compressor lock	●	●	○	●	○	◎	●	●	●	●
11	Compressor lock	●	●	○	●	○	●	◎	●	●	●
12	Current detection circuit error	●	●	○	●	○	◎	◎	●	●	●
13	Thermostat for compressor activated	●	●	○	●	○	●	●	◎	●	●
14	Model data not set (on the service P.C. board)	●	○	○	●	○	●	◎	●	◎	●
15	MCU-MCU communication error	●	○	○	●	○	◎	●	◎	◎	◎
16	Discharge temperature error	○	○	○	●	○	◎	◎	●	●	●
17	Abnormal power (open phase detected or abnormal voltage)	○	○	○	●	○	◎	●	◎	●	●
18	Heat sink overheat	○	○	○	●	○	◎	◎	◎	●	●
19	Gas leak detected	○	○	○	●	○	◎	◎	◎	◎	●
20	4-way valve reverse error	○	○	○	●	○	◎	◎	●	●	◎
21	High pressure release operation	○	○	○	●	○	●	●	◎	●	◎
22	Outdoor fan motor error	○	○	○	●	○	●	◎	◎	●	◎
23	Compressor driver short-circuit protection	○	○	○	●	○	●	◎	●	◎	◎
24	Position detection circuit error in one-line display	○	○	○	●	○	◎	●	◎	◎	◎

(●:OFF ○:ON ◎:Flashing)

* The LEDs and DIP switches are located on the lower left of the P.C. board of the outdoor unit.



10-4-15. Appendix

Work instructions:
The existing R22 and R407C piping can be reused for our digital inverter R410A product installations.

NOTE

Confirming the existence of scratches or dents on the existing pipes and confirming the reliability of the pipe strength are conventionally referred to the local site.
If the specified conditions can be cleared, it is possible to update existing R22 and R407C pipes to those for R410A models.

Basic conditions needed to reuse existing pipes

Check and observe the presence of three conditions in the refrigerant piping works.
1. Dry (There is no moisture inside of the pipes.)
2. Clean (There is no dust inside of the pipes.)
3. Tight (There are no refrigerant leaks.)

Restrictions for use of existing pipes

In the following cases, the existing pipes should not be reused as they are. Clean the existing pipes or exchange them with new pipes.

1. When a scratch or dent is heavy, be sure to use new pipes for the refrigerant piping works.
2. When the existing pipe thickness is thinner than the specified "Pipe diameter and thickness," be sure to use new pipes for the refrigerant piping works.
   - The operating pressure of R410A is high (1.6 times that of R22 and R407C). If there is a scratch or dent on the pipe or a thinner pipe is used, the pressure strength may be inadequate, which may cause the pipe to break in the worst case.

* Pipe diameter and thickness (mm)

Pipe outer diameter		∅6.4	∅9.5	∅12.7	∅15.9	∅19.0
Thickness	R410A	0.8	0.8	0.8	1.0	1.0
	R22 (R407C)					

- In case the pipe diameter is ∅12.7 mm or less and the thickness is less than 0.7 mm, be sure to use new pipes for the refrigerant piping works.

3. When the outdoor unit was left with the pipes disconnected, or the gas leaked from the pipes and the pipes were not repaired and refilled.
   - There is the possibility of rain water or air, including moisture, entering the pipe.
4. When refrigerant cannot be recovered using a refrigerant recovery unit.
   - There is the possibility that a large quantity of dirty oil or moisture remains inside the pipes.
5. When a commercially available dryer is attached to the existing pipes.
   - There is the possibility that copper green rust has been generated.
6. When the existing air conditioner is removed after refrigerant has been recovered.
   Check if the oil is judged to be clearly different from normal oil.
   - The refrigerator oil is copper rust green in color.
     There is the possibility that moisture has mixed with the oil and rust has been generated inside the pipe.
   - There is discolored oil, a large quantity of residue, or a bad smell.
   - A large quantity of shiny metal dust or other wear residue can be seen in the refrigerant oil.
7. When the air conditioner has a history of the compressor failing and being replaced.
   - When discolored oil, a large quantity of residue, shiny metal dust, or other wear residue or mixture of foreign matter is observed, trouble will occur.
8. When temporary installation and removal of the air conditioner are repeated such as when leased etc.
9. If the type of refrigerator oil of the existing air conditioner is other than the following oil (Mineral oil), Suniso, Freol-S, MS (Synthetic oil), alkyl benzene (HAB, Barrel-freeze), ester series, PVE only of ether series.
   - The winding-insulation of the compressor may deteriorate.

NOTE

The above descriptions are results have been confirmed by our company and represent our views on our air conditioners, but do not guarantee the use of the existing pipes of air conditioners that have adopted R410A in other companies.

Branc hing pipe f or sim ultaneous operation system

- In the concurrent twin system, when TOSHIBA has specified that branching pipe is to be used, it can be reused.
  Branching pipe model name:
  RBC-TWP30E2
  On the existing air conditioner for simultaneous operation system (twin system), there are cases of branch pipes being used that have insufficient compressive strength. In such case, please change the piping to a branch pipe for R410A.

Curing of pipes

When removing and opening the indoor or outdoor unit for a long time, cure the pipes as follows:
- Otherwise rust may be generated when moisture or foreign matter due to condensation enters the pipes.
- The rust cannot be removed by cleaning, and new pipes are necessary.

Placement location	Term	Curing manner
Outdoors	1 month or more	Pinching
	Less than 1 month	Pinching or taping
Indoors	Every time	

Are there scratches or dents on the existing pipes?

YES → Existing pipes: Cannot be used.
- Use new pipes.

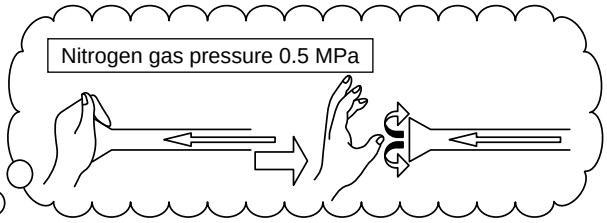
NO

Is it possible to operate the existing air conditioner?

NO →

YES

- After the existing air conditioner is operated in cooling mode for approx. 30 minutes or longer,* recover the refrigerant.
- For cleaning the pipes and recovering oil
- Refrigerant recovery: Pump down method



- Remove the existing air conditioner from the piping and carry out fiushing (nitrogen pressure 0.5 MPa) to remove any remains inside of the pipe.

Note In case of twin pipes, also be sure to flush the branching pipe.

(If there is discharge of remains, it is judged that a large quantity of remains are present.)

Was largely discolored oil or a large quantity of remains discharged? (When the oil deteriorates, the color of the oil changes to a muddy or black color.)

YES → Clean the pipes or use new pipes.

NO

Connect the indoor/outdoor units to the existing pipe.
- Use a flare nut attached to the main unit for the indoor/outdoor units. (Do not use the flare nut of the existing pipe.)
- Re-machine the flare machining size to size for R410A.

In case that a gas pipe ∅19 mm or bigger is used for the outdoor unit of (3 HP): (Our R410A model 3 to 5 HP gas pipe size is 15.9 mm)

→ Turn the existing pipe switch on the cycle control PC board of the outdoor unit to ON side. At shipment from factory OFF → ON for existing pipe (Refer to the table below.) (Be sure to set the contents in the table below in order to restrict the refrigerating cycle pressure of the equipment in the pipe standard.)

Existing pipe SW

	Switch
3 HP	Bit 3 of SW802 → ON

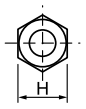
- (Airtight test), Vacuum dry, Refrigerant charge, Gas leak check

Trial run

Piping necessary to change the flare nut/ machining size due to pipe compression

1) Flare nut width: H

(mm)



Copper pipe outer diameter	∅6.4	∅9.5	∅12.7	∅15.9	∅19.0
For R410A	17	22	26	29	36
For R22	Same as above		24	27	Same as above

2) Flare machining size: A

(mm)

Copper pipe outer diameter	∅6.4	∅9.5	∅12.7	∅15.9	∅19.0
For R410A	9.1	13.2	16.6	19.7	24.0
For R22	9.0	13.0	16.2	19.4	23.3

Becomes a little larger for R410A

Do not apply refrigerator oil to the flare surface.

10-5. Others

10-5-1. Remote Control A-B Selection

- When two indoor units are installed in the same room or adjacent two rooms, if operating a unit, two units may receive the remote control signal simultaneously and operate. In this case, the operation can be preserved by setting either one remote control to B setting. (Both are set to A setting in factory shipment.)
- The remote control signal is not received when the settings of indoor unit and remote control are different.
- There is no relation between A setting/B setting and A room/B room when connecting the piping and cables.

<Remote control A-B selection>

To separate using of remote control for each indoor unit in case of 2 air conditioners are installed nearly.

<Remote Control B Setup>

1. Press [RESET] button on the indoor unit to turn the air conditioner ON.
2. Point the remote control at the indoor unit.
3. Push and hold [CHECK] button on the Remote Control by the tip of the pencil. "00" will be shown on the display (Picture ①).
4. Press [MODE] during pushing [CHECK]. "B" will show on the display and "00" will disappear and the air conditioner will turn OFF. The Remote Control B is memorized (Picture ②).

NOTE : 1. Repeat above step to reset Remote Control to be A.
2. Remote Control A has not "A" display.
3. Default setting of Remote Control from factory is A.

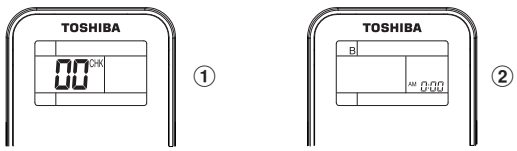


Fig. 10-5-1

10-5-2. Test operation

To switch the TEST RUN (COOL) mode, press [RESET] button for 10 sec.
(The beeper will make a short beep.)

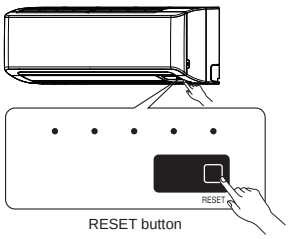


Fig. 10-5-2

10-5-3. Auto restart setting

This product is designed so that, after a power failure, it can restart automatically in the same operating mode as before the power failure.

Information

The product was shipped with Auto Restart function in the off position. Turn it on as required.

<How to set the auto restart>

1. Press and hold the [RESET] button on the indoor unit 3 seconds to set the operation. (3 beep sound and OPERATION lamp blink 5 time/sec for 5 seconds)
2. Press and hold the [RESET] button on the indoor unit for 3 seconds to cancel the operation. (3 beep sound but OPERATION lamp does not blink)
   - In case of ON timer or OFF timer are set, AUTO RESTART OPERATION dose not activate.

11. HOW TO DIAGNOSE THE TROUBLE

The pulse motor circuits are mounted to both indoor and outdoor units.

Therefore, diagnose troubles according to the trouble diagnosis procedure as described below.
(Refer to the check points in servicing written on the wiring diagrams attached to the indoor/outdoor units.)

Table 11-1

No.	Troubleshooting Procedure
1	First Confirmation
2	Primary Judgment
3	Judgment by Flashing LED of Indoor Unit
4	Self-Diagnosis by Remote Controller (Check Code)
5	Judgment of Trouble by Every Symptom
6	Check Code 18 and 1E
7	Troubleshooting
8	How to Diagnose Trouble in Outdoor Unit
9	How to Check Simply the Main Parts
10	How to Simply Judge Whether Outdoor Fan Motor is Good or Bad

11-1. First Confirmation

11-1-1. Confirmation of Power Supply

Confirm that the power breaker operates (ON) normally.

11-1-2. Confirmation of Power Voltage

Confirm that power voltage is AC 220–230–240 ± 10%.

If power voltage is not in this range, the unit may not operate normally.

11-1-3. Operation Which is not a Trouble (Program Operation)

For controlling the air conditioner, the program operations are built in the microcomputer as described in the following table.

If a claim is made for running operation, check whether or not it meets to the contents in the following table.

When it does, we inform you that it is not trouble of equipment, but it is indispensable for controlling and maintaining of air conditioner.

Table 11-1-1

No.	Operation of air conditioner	Description
1	When power breaker is turned “ON”, the operation indicator (Green) of the indoor unit flashes.	The OPERATION lamp of the indoor unit flashes when power source is turned on. If [⏻] button is operated once, flashing stops. (Flashes also in power failure)
2	Compressor may not operate even if the room temperature is within range of compressor-ON.	The compressor does not operate while compressor restart delay timer (3-minutes timer) operates. The same phenomenon is found after power source has been turned on because 3-minutes timer operates.
3	In Dry and ECO mode, FAN (air flow) display does not change even though FAN (air flow select) button is operated.	The air flow indication is fixed to [AUTO].
4	Increasing of compressor motor speed stops approx. 30 seconds after operation started, and then compressor motor speed increases again approx. 30 seconds after.	For smooth operation of the compressor, the compressor motor speed is restricted to Max. 41 rps for 2 minutes, and Max.91 rps for 2 minutes to 3 minutes, respectively after the operation has started.
5	In AUTO mode, the operation mode is changed.	After selecting Cool or Heat mode, select an operation mode again if the compressor keeps stop status for 15 minutes.
6	In HEAT mode, the compressor motor speed does not increase up to the maximum speed or decreases before the temperature arrives at the set temperature.	The compressor motor speed may decrease by hightemp. release control (Release protective operation by temp.-up of the indoor heat exchanger) or current release control.

11-2. Primary Judgment

To diagnose the troubles, use the following methods.

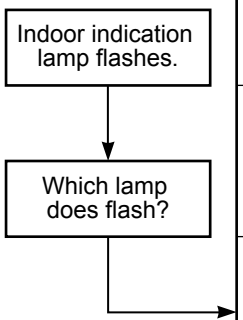
1) Judgment by flashing LED of indoor unit
2) Self-diagnosis by service check remote controller
3) Judgment of trouble by every symptom

Firstly use the method 1) for diagnosis. Then, use the method 2) or 3) to diagnose the details of troubles.

11-3. Judgment by Flashing LED of Indoor Unit

While the indoor unit monitors the operation status of the air conditioner, if the protective circuit operates, the contents of self-diagnosis are displayed with block on the indoor unit indication section.

Table 11-3-1



Item	Check code	Block display	Description for self-diagnosis
A	—	OPERATION (Green) Flashing display (1 Hz)	• When turn ON power supply. • Power supply ON after failure or OFF. • This flashing display is not air conditioner failure.
B	00	OPERATION (Green) Flashing display (5 Hz)	Protective circuit operation for indoor P.C. board
C	01	OPERATION (Green) TIMER (Yellow) Flashing display (5 Hz)	Protective circuit operation for connecting cable and serial signal system
D	02	OPERATION (Green) FILTER (Orange) Flashing display (5 Hz)	Protective circuit operation for outdoor P.C. board
E	03	OPERATION (Green) TIMER (Yellow) FILTER (Orange) Flashing display (5 Hz)	Protective circuit operation for others (including compressor)

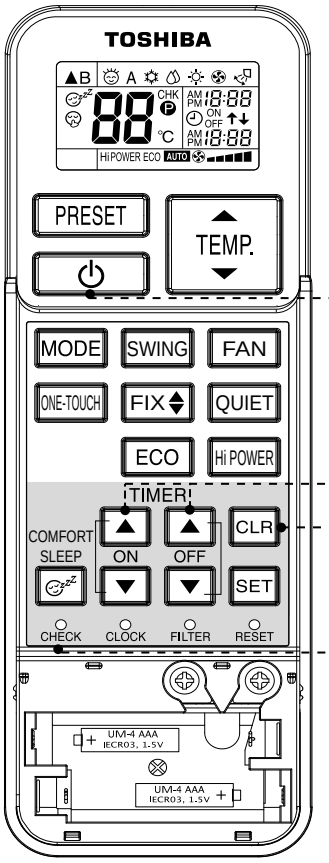
NOTES :

1. Some check code will flash display of the indoor unit, when the air conditioner operates with some limitation.
2. Some check code will flash display of the indoor unit and stop operation of the air conditioner.
3. When item B and C or item B and apart of item E occur concurrently, priority is given to the block of item B.
4. The check codes can be confirmed on the remote controller for servicing.

11-4. Self-Diagnosis by Remote Controller (Check Code)

1. If the lamps are indicated as shown B to E in Table 11-3-1, execute the self-diagnosis by the remote controller.
2. When the remote controller is set to the service mode, the indoor controller diagnoses the operation condition and indicates the information of the self-diagnosis on the display of the remote controller with the check codes. If a fault is detected, all lamps on the indoor unit will flash at 5Hz and it will beep for 10 seconds (Beep, Beep, Beep ...). The timer lamp usually flashes (5Hz) during self-diagnosis.

11-4-1. How to Use Remote Controller in Service Mode



Alphanumeric characters are used for the check codes.

5 is 5.	6 is 6.
A is A.	b is B.
C is C.	d is D.

1 **Press [CHECK] button with a tip of pencil to set the remote controller to the service mode.**

- " 00 " is indicated on the display of the remote controller.

2 **Press [ON ▲] or [OFF ▲] button**

If there is no fault with a code, the indoor unit will beep once (Beep) and the display of the remote controller will change as follows :

→ 00 → 01 → 02 ··· 1d → 1E → 33 →

- The TIMER indicator of the indoor unit flashes continuously. (5 times per 1 sec.)
- Check the unit with all 52 check codes (00 to 33) as shown in Table-11-4-1.
- Press [ON▼] or [OFF ▼] button to change the check code backward.

If there is a fault, the indoor unit will beep for 10 seconds (Beep, Beep, Beep...).

Note the check code on the display of the remote controller.

- 2-digits alphanumeric will be indicated on the display.
- All indicators on the indoor unit will flash. (5 times per 1 sec.)

3 **Press [CLR] button. After service finish for clear** service code in memory.

- "7F" is indicated on the display of the remote control.

4 **Press [⏻] button to release the service mode.**

- The display of the remote controller returns to as it was before service mode was engaged.

Fig. 11-4-1

11-4-2 Caution at Servicing

1. After using the service mode of remote controller finished, press the [⏻] button to reset the remote controller to normal function.
2. After finished the diagnosis by the remote controller, turn OFF power supply and turn its ON again to reset the air conditioner to normal operation. However, the check codes are not deleted from memory of the microcomputer.
3. After servicing finished, press [CLR] button of remote controller under service mode status to send code "7F" to the indoor unit. The check code stored in memory is cleared.

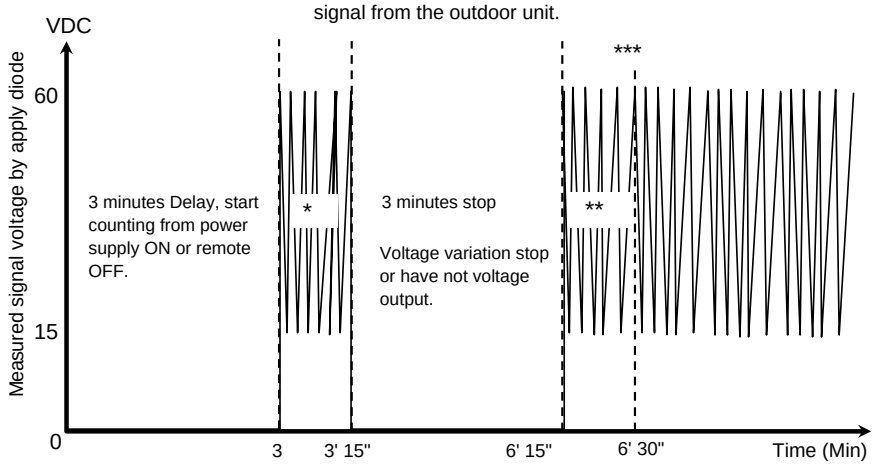
Table 11-4-1

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
00	Indoor P.C. board.	0C	TA sensor ; The room temperature sensor is short-Circuit or disconnection.	Operation continues.	Flashes when error is detected.	1. Check the sensor TA and connection. 2. In case of the sensor and its connection is normal, check the P.C. board.
		0d	TC sensor ; The heat exchanger temperature sensor of the indoor unit is out of place, disconnection, short-circuit or migration.	Operation continues.	Flashes when error is detected.	1. Check the sensor TC and connection. 2. In case of the sensor and its connection is normal, check the P.C. board.
		11	Fan motor of the indoor unit is failure, lock-rotor, short-circuit, disconnection, etc. Or its circuit on P.C. board has problem.	All OFF	Flashes when error is detected.	1. Check the fan motor and connection. 2. In case of the motor and its connection is normal, check the P.C. board.
		12	Other trouble on the indoor P.C. board.	Depend on cause of failure.	Depend on cause of failure.	Replace P.C. board.

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
01	Serial signal and connecting cable.	04	1) Defective wiring of the connecting cable or miss-wiring. 2) Operation signal has not send from the indoor unit when operation start. 3) Outdoor unit has not send return signal to the indoor unit when operation started. 4) Return signal from the outdoor unit is stop during operation. ● Some protector (hardware, if exist) of the outdoor unit open circuit of signal. ● Signal circuit of indoor P.C. board or outdoor P.C. board is failure in some period.	Indoor unit operates continue. Outdoor unit stop.	Flashes when error is detected. Flashing stop and outdoor unit start to operate when the return signal from the outdoor unit is normal.	1) to 3) The outdoor unit never operate. ● Check connecting cable and correct if defective wiring. ● Check 25A fuse of inverter P.C. board. ● Check 3.15A fuse of inverter P.C. board. ● Check operation signal of the indoor unit by using diode. Measure voltage at terminal block of the indoor unit between No.2 and No.3 (or L2 and S) If signal is varied 15-60V continuously, replace inverter P.C. board. If signal is not varied, replace indoor P.C. board. 4) The outdoor unit abnormal stop at some time. ● If the other check codes are found concurrently, check them together. ● Check protector (hardware) such as Hi-Pressure switch, Thermal-Relay, etc. ● Check refrigerant amount or any possibility case which may caused high temperature or high pressure. ● Check operation signal of the indoor unit by using diode. Measure voltage at terminal block of the indoor unit between No.2 and No.3 (or L2 and S) If signal is varied 15-60V continuously, replace inverter P.C. board. If signal is not varied, replace indoor P.C. board.

Note : Operation signal of the indoor unit shall be measured in the sending period as picture below.

Sending signal of the indoor unit when have not return signal from the outdoor unit.



* Signal send only 15 sec. and stop. Because of return signal from outdoor unit has not received.

** Signal resend again after 3 minutes stop. And the signal will send continuously.

*** 15 sec. after resending, the indoor unit display flashes error.

Block distinction		Operation of diagnosis function				
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	Action and Judgment
02	Outdoor P.C. board	14	Current on inverter circuit is over limit in short time. ● Inverter P.C. board is failure, IGBT shortage, etc. ● Compressor current is higher than limitation, lock rotor, etc.	All OFF	Flashes after error is detected 4 times*.	1. Remove connecting lead wire of the compressor, and operate again. 2. If outdoor fan does not operate or operate but stop after some period, replace the inverter P.C. board. 3. If outdoor fan operates normally, measure 3-Phase output of inverter P.C. board (150-270VAC) at the connecting lead wire of compressor. 4. If 3-Phase output is abnormal, replace inverter P.C.Board. 5. If 3-Phase output is normal, replace compressor. (lock rotor, etc.)
		16	Compressor position-detect circuit error or short-circuit between winding of compressor.	All OFF	Flashes after error is detected 4 times*.	1. Remove connecting lead wire of the compressor, and operate again. 2. If outdoor fan does not operate or operation but stop after some period, replace the inverter P.C. board. 3. If outdoor fan operates normally, measure resistance of compressor winding. If circuit is shortage, replace the compressor.
		17	Current-detect circuit of inverter P.C. board error.	All OFF	Flashes after error is detected 4 times*.	Even if trying to operate again, all operations stop, replace inverter P.C. board.
		18	TE sensor ; The heat exchanger temperature sensor of the outdoor unit either TS sensor ; Suction pipe temperature sensor, out of place, disconnection or shortage.	All OFF	Flashes after error is detected 4 times*.	1. Check sensors TE, TS and connection. 2. In case of the sensors and its connection is normal, check the inverter P.C. board.
		19	TD sensor ; Discharge pipe temperature sensor is disconnection or shortage.	All OFF	Flashes after error is detected 4 times*.	1. Check sensors TD and connection. 2. In case of the sensor and its connection is normal, check the inverter P.C. board.
		1A	Outdoor fan failure or its drive-circuit on the inverter P.C. board failure.	All OFF	Flashes after error is detected 4 times*.	1. Check the motor, measure winding resistance, shortage or lock rotor. 2. Check the inverter P.C. board.
	Not displayed	1b	TO sensor ; The outdoor temperature sensor is disconnection or shortage.	Operation continues.	Record error after detected 4 times*. But does not flash display.	1. Check sensors TO and connection. 2. In case of the sensor and its connection is normal, check the inverter P.C. board.

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
		1C	4-way value inverse error (TC sensor value lowered during heating operation)	All OFF	Flashes after error is detected 4 times*.	- Check 4-way value operation. - Check 4-way value coil.
03	The others (including compressor)	1d	Compressor does not rotate. Because of missed wiring, missed phase or shortage.	All OFF	Flashes after error is detected 4 times*.	1. Remove connecting lead wire of the compressor, and operate again. 2. If outdoor fan does not operate or operation but stop after some period, replace the inverter P.C. board. 3. If outdoor fan operates normally, measure 3-Phase output of inverter P.C. board (150-270VAC) at the connecting lead wire of compressor. 4. If 3-Phase output is abnormal, replace inverter P.C.Board. 5. If 3-Phase output is normal, measure resistance of compressor winding. 6. If winding is shortage, replace the compressor.
		1E	Discharge temperature exceeded 117°C.	All OFF	Flashes after error is detected 4 times*.	1. Check sensors TD. 2. Check refrigerant amount. 3. Check P.M.V. by measure the resistance of the coil and confirm its operation (sound of initial operation, etc.) 4. Observe any possibility cause which may affect high temperature of compressor.
		1F	Compressor is high current though operation Hz is decreased to minimum limit. ● Installation problem. ● Instantaneous power failure. ● Refrigeration cycle problem. ● Compressor break down.	All OFF	Flashes after error is detected 4 times*.	1. Check installation conditions such as packed valve opening, refrigerant amount and power supply (rate ±10%, both of operation and non operation condition). 2. Check P.M.V. by measure the resistance of the coil and confirm its operation (sound of initial operation, etc.) 3. Observe any possibility cause which may affect high current of compressor. 4. If 1, 2 and 3 are normal, replace compressor.

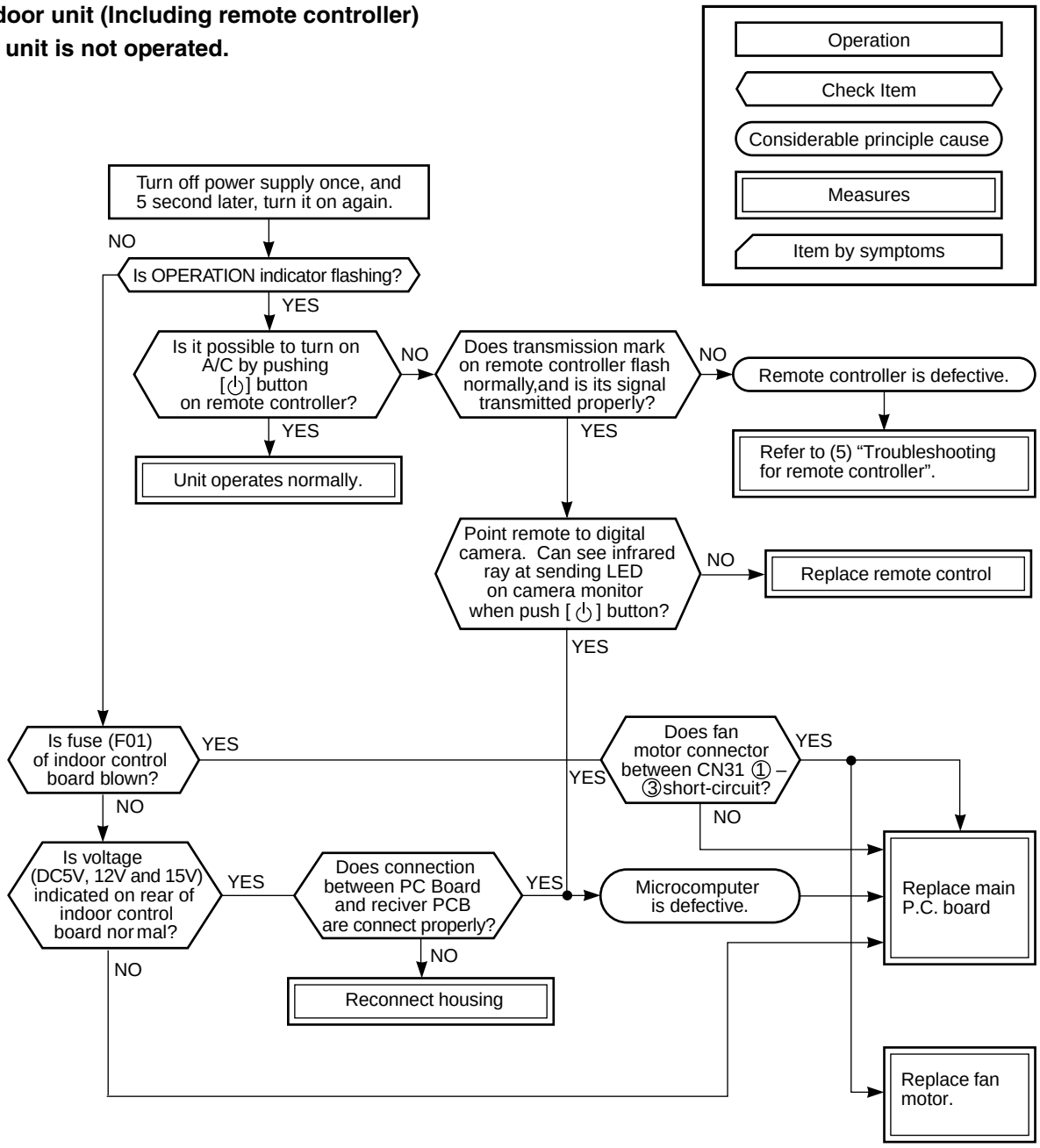
* 4 times ; When first error is detected, error is count as 1 time, then once operation is stop and re-started.
After re-starting operation within 6 minutes, if same error is detected, error count is add (count become 2 times)
When error count comes 4 times, record error to check code. But after re-starting operation, if no error is detected and air conditioner can operate more than 6 minutes, error count is cleared.

Block distinction		Operation of diagnosis function				Action and Judgment
Check code	Block	Check code	Cause of operation	Air conditioner status	Display flashing error	
		21	Return signal of the outdoor unit has been sent when operation start. But after that, signal is stop some time. ● Instantaneous power failure. ● Some protector (hardware) of the outdoor unit open circuit of signal. ● Signal circuit of indoor P.C. board or outdoor P.C. board is failure in some period.	Indoor unit operates continue. Outdoor unit stop.	Flashes when error is detected. Flashing stop and outdoor unit start to operate when the return signal from the outdoor unit is normal.	1. Check power supply (Rate ± 10%) 2. If the air conditioner repeat operates and stop with interval of approx. 10 to 40 minutes. ● Check protector (hardware) such as Hi-Pressure switch, Thermal-Relay, etc. ● Check refrigerant amount, packed valve opening and any possibility cause which may affect high temperature or high pressure. 3. Check operation signal of the indoor unit by using diode. Measure voltage at terminal block of the indoor unit between No.2 and No.3 (or L2 and S) If signal is varied 15-60V continuously, replace inverter P.C. board. If signal is not varied, replace indoor P.C. board.

11-5. Judgement of Trouble by Every Symptom

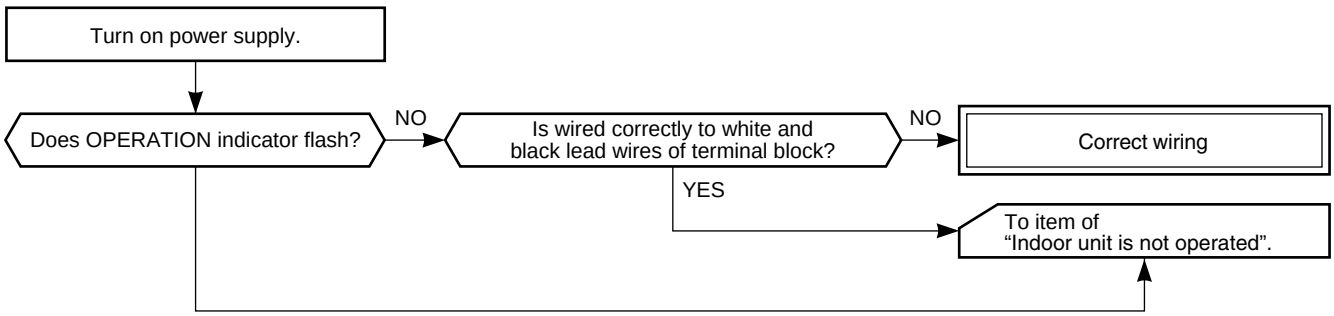
11-5-1. Indoor unit (Including remote controller)

(1) Indoor unit is not operated.



(2) Operation is not turned on though Indoor P.C. board is replaced

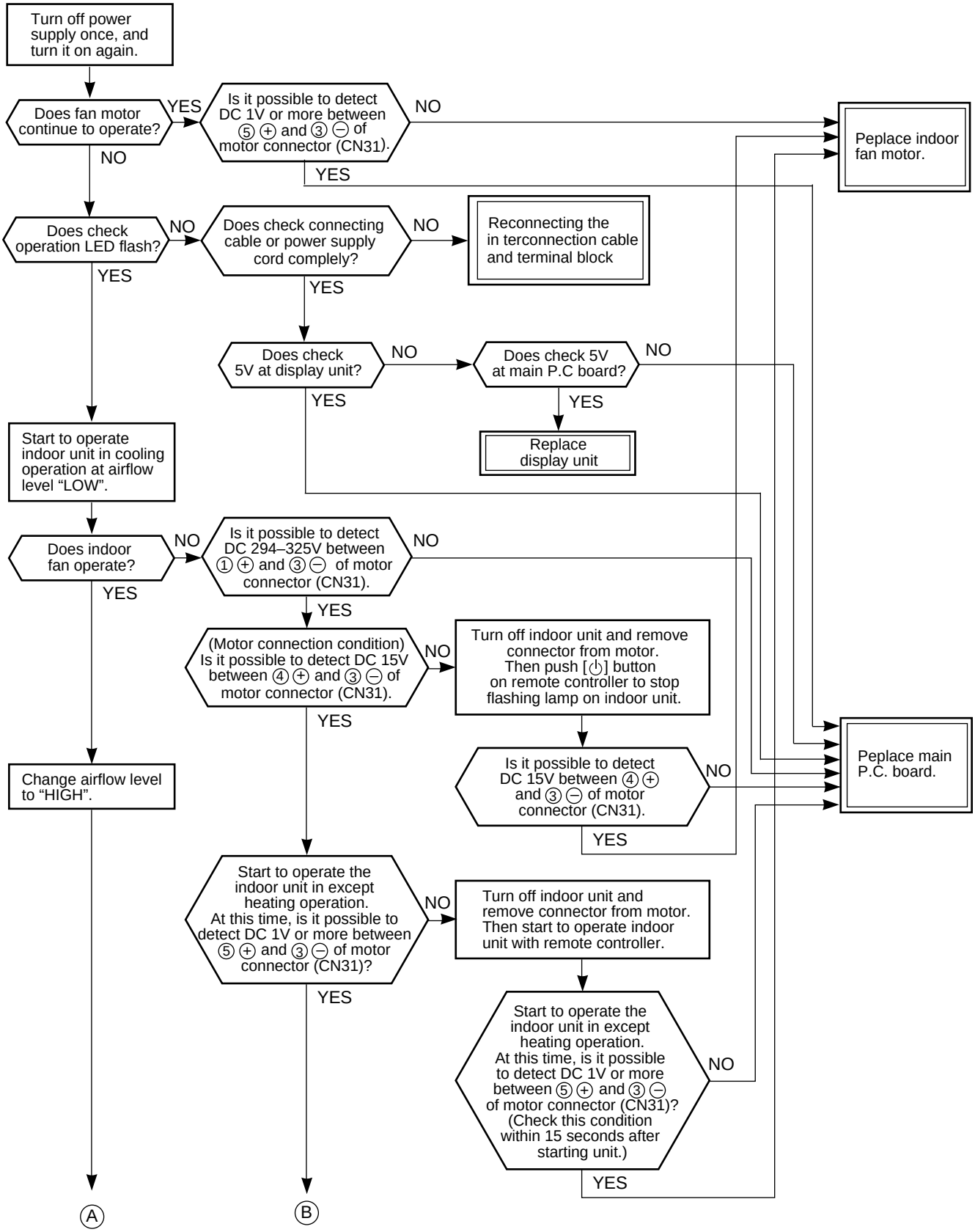
<Confirmation procedure>

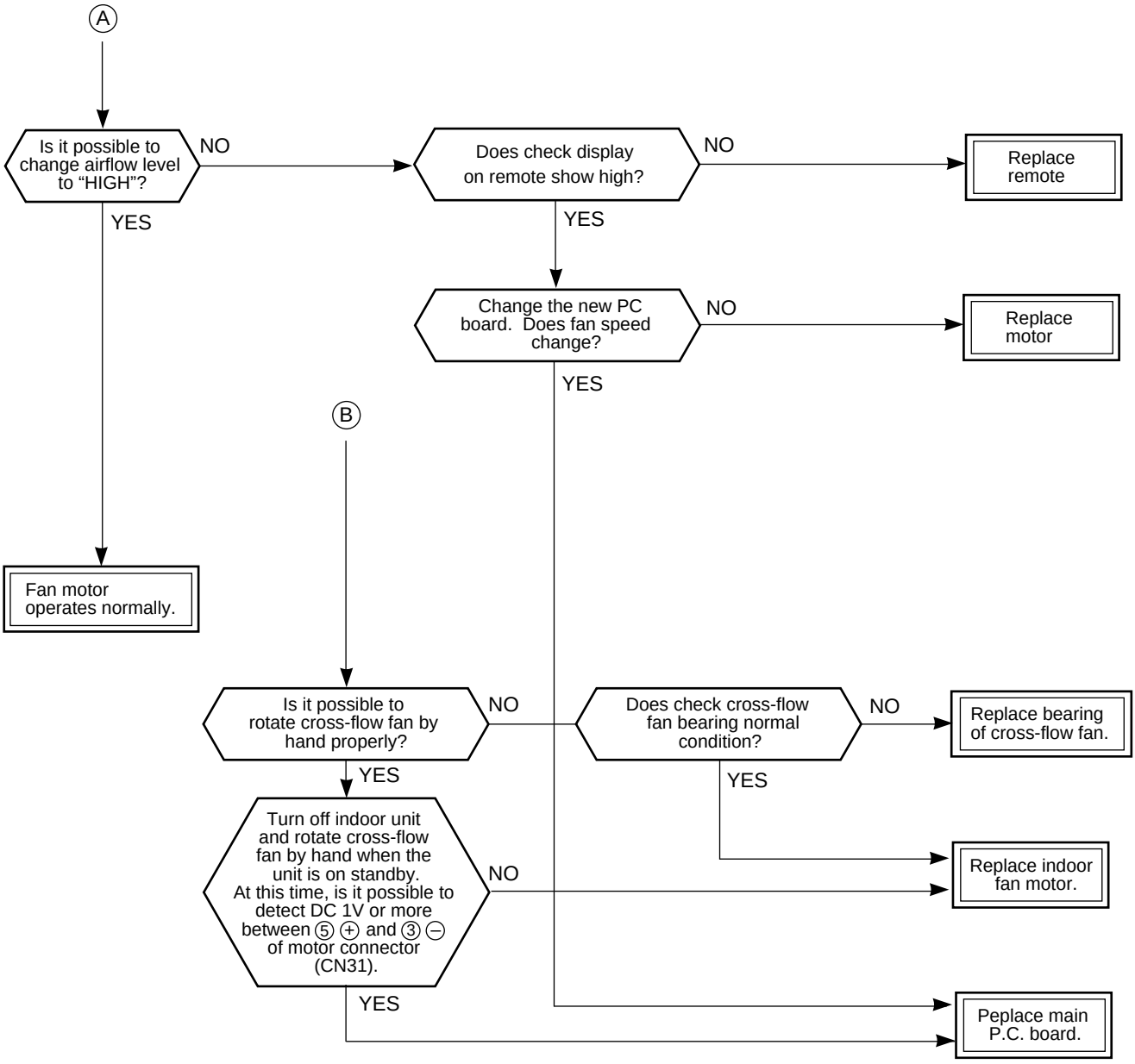


(3) Only the indoor motor fan does not operate

<Primary check>

1. Is it possible to detect the power supply voltage (AC220–240V) between ① and ② on the terminal block?
2. Does the indoor fan motor operate in cooling operation?
   (In heating operation, the indoor fan motor does not operate for approximately 10 minutes after it is turned on, to prevent a cold air from blowing in.)




A
Is it possible to change airflow level to “HIGH”?
NO
YES
Does check display on remote show high?
NO
Replace remote
YES
Change the new PC board. Does fan speed change?
NO
Replace motor
YES
Fan motor operates normally.
B
Is it possible to rotate cross-flow fan by hand properly?
NO
YES
Does check cross-flow fan bearing normal condition?
NO
Replace bearing of cross-flow fan.
YES
Turn off indoor unit and rotate cross-flow fan by hand when the unit is on standby. At this time, is it possible to detect DC 1V or more between ⑤ ⊕ and ③ ⊖ of motor connector (CN31).
NO
Replace indoor fan motor.
YES
Peplace main P.C. board.

(4) Indoor fan motor automatically starts to rotate by turning on power supply

<Cause>

The IC is built in the indoor fan motor. Therefore the P.C. board is also mounted to inside of the motor.

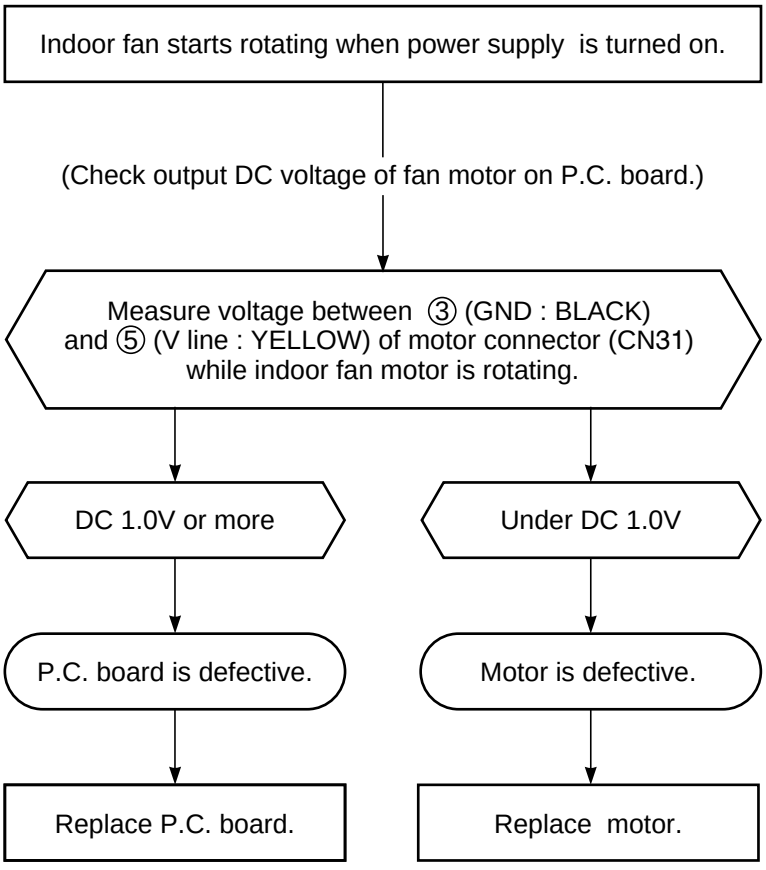
If the P.C. board is soldered imperfectly or the IC is defective, the fan motor may automatically rotate by turning on power supply.

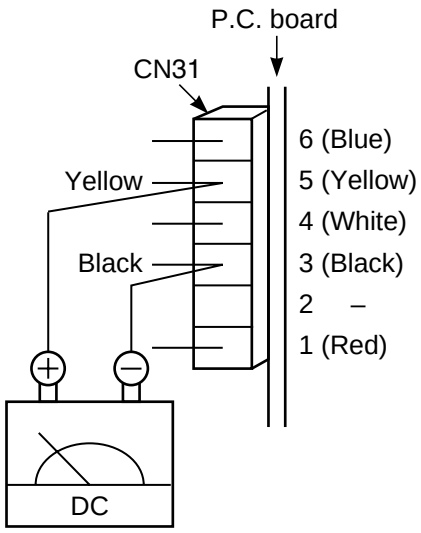
<Inspection procedure>

1. Turn on breaker.
2. After Fan motor operate, off A/C by remote controller.
3. Turn off breaker for a while, then turn it ON.
   - 3.1. If fan motor not operate, it means an unit in Auto-restart operation. (see more detail in P. 50-51)
   - 3.2. If Fan motor still operate, follow the below.
     - 3.2.1. Remove the grille.
     - 3.2.2. Remove the cover terminal by release one screw.
     - 3.2.3. Check DC voltage with CN31 connector while the fan motor is rotating.

NOTE :

- Do not disconnect the connector while the fan motor is rotating.
- Use a thin test rod.

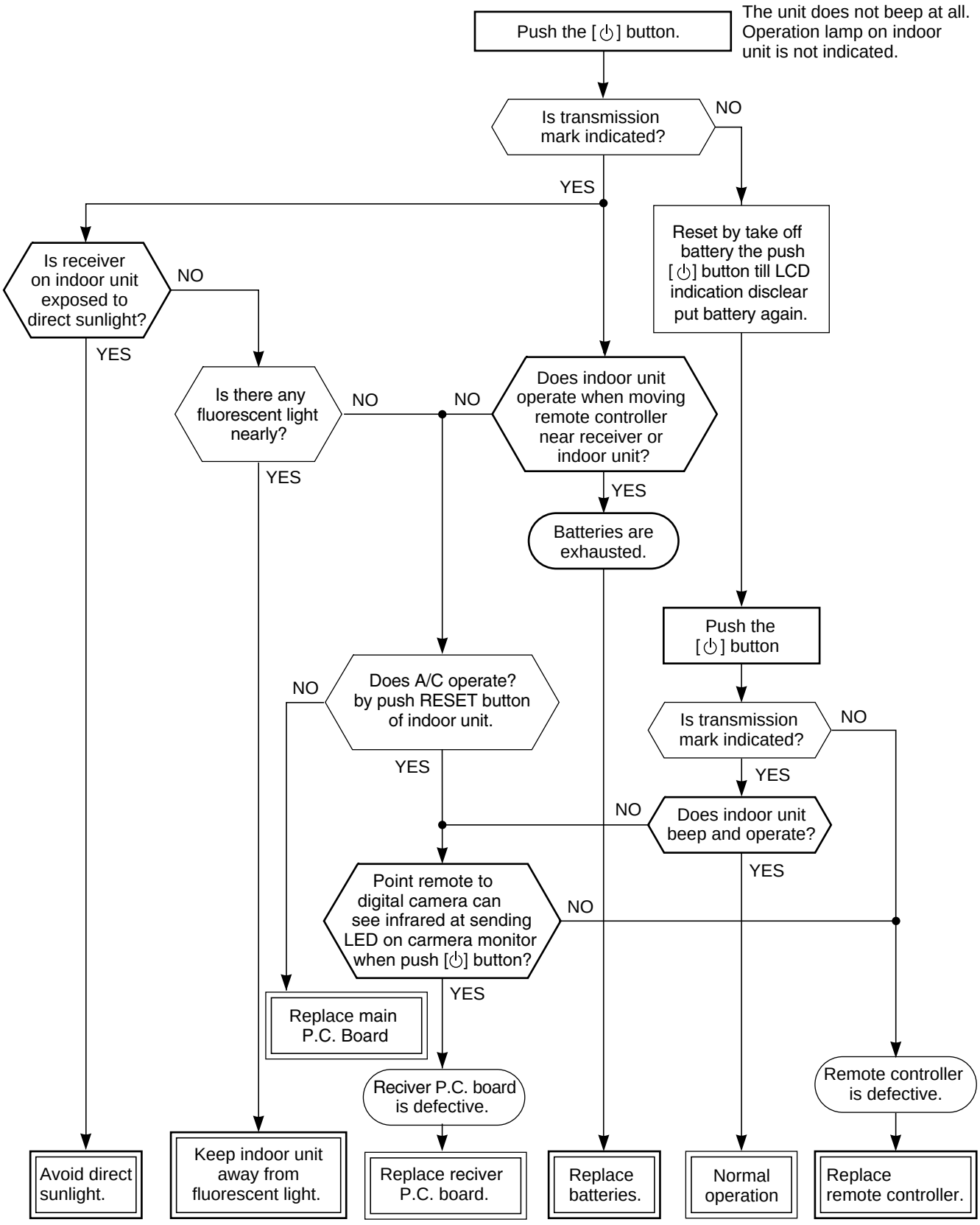




(5) Troubleshooting for remote controller

<Primary check>

Check that A or B selected on the main unit is matched with A or B selected on the remote controller.



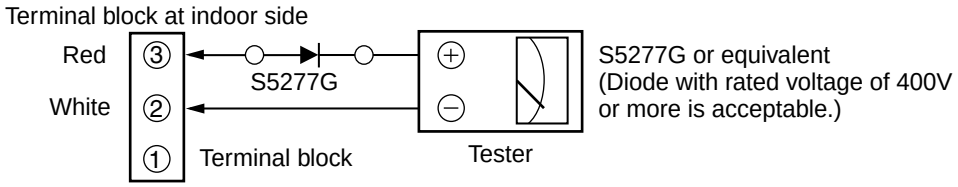
11-5-2. Wiring Failure (Interconnecting and Serial Signal Wire)

(1) Outdoor unit does not operate

1) Is the voltage between ② and ③ of the indoor terminal block varied?
   Confirm that transmission from indoor unit to outdoor unit is correctly performed based upon the following diagram.

NOTE:

- Measurement should be performed 2 minutes and 30 seconds after starting of the operation.
- Be sure to prepare a diode for judgment.

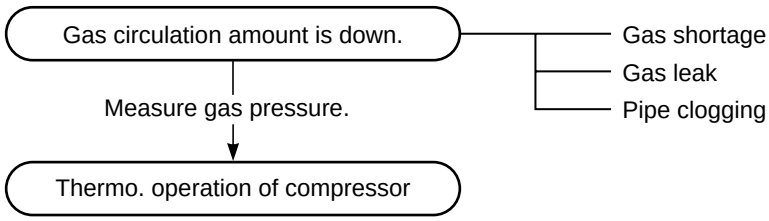


Normal time : Voltage swings between DC15 and 60V. ..... Inverter Assembly check (**11-5-1.**)
Abnormal time : Voltage does not vary.

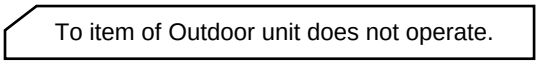
(2) Outdoor unit stops in a little while after operation started

<Check procedure> Select phenomena described below.

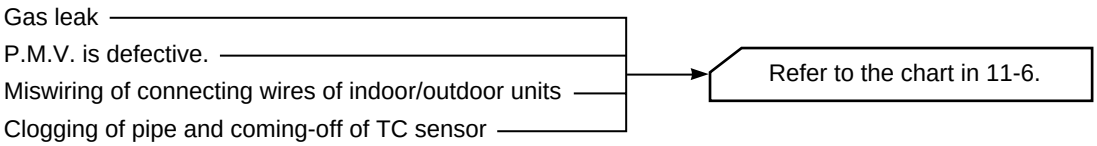
1) The outdoor unit stops 10 to 20 minutes after operation started, and 10 minutes or more are required to restart the unit.



2) If the unit stops once, it does not operate until the power will be turned on again.

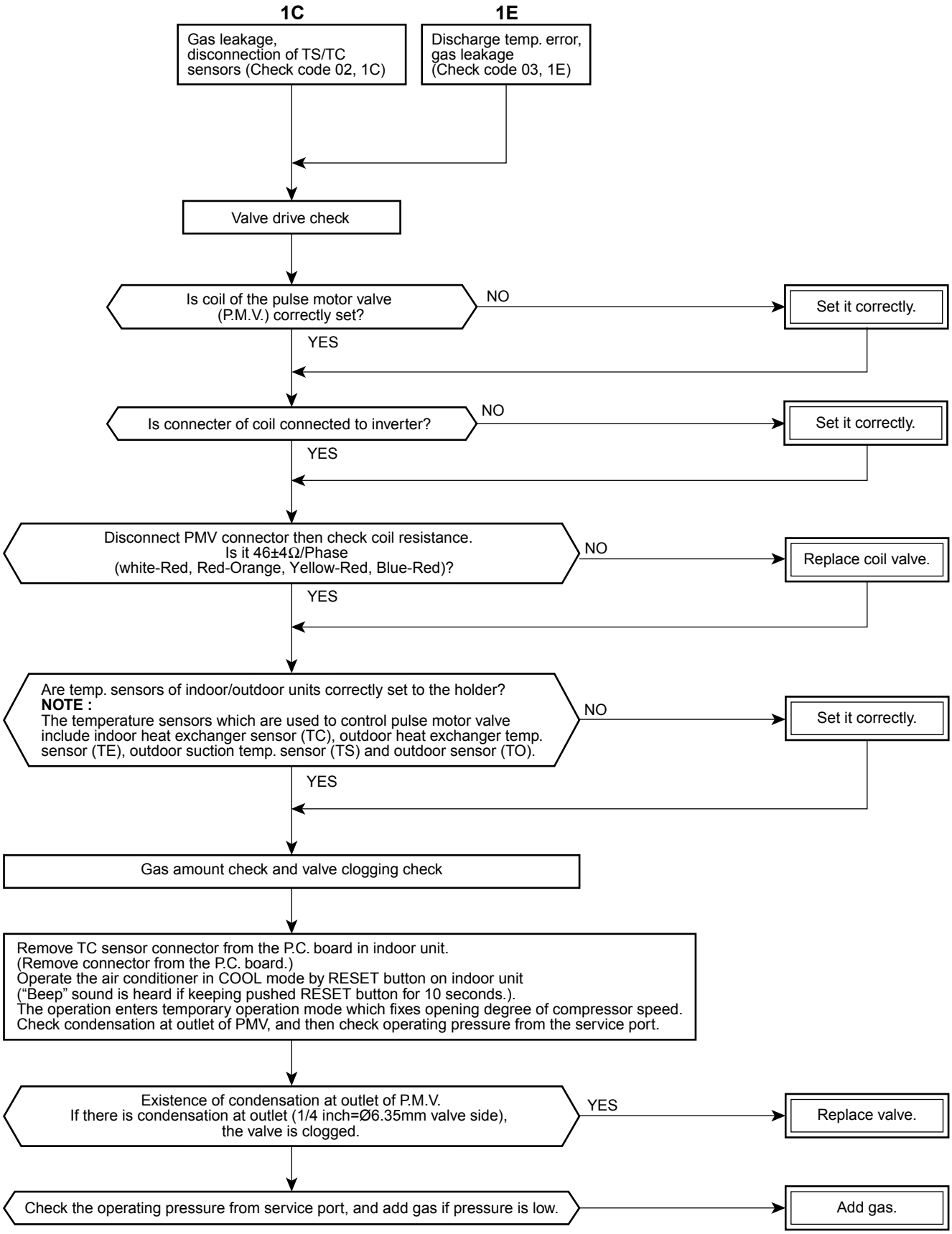


3) The outdoor unit stops 10 minutes to 1 hour after operation started, and an alarm is displayed. (Discharge temp. error check code 03, 1E Sensor temp. error check code 02, 1C)



11-6. Check Code 1C (Miswiring in indoor/outdoor units) and 1E

<Check procedure>



11-6-1. Diagnostic Procedure for Each Check Code (Outdoor Unit)

1) This section describes the diagnostic method for each check code displayed on the wired remote controller.
2) In some cases, a check code indicates multiple symptoms.
   In this case, confirm LED display on the outdoor P.C. board to narrow the contents to be confirmed.
3) The check code on the remote controller is displayed only when the same error occurred continuously by multiple times while LED of the outdoor P.C. board displays even an error which occurred once.
   Therefore the display on the remote controller may differ from that of LED.

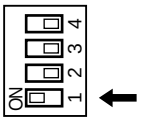
How to check LED display on outdoor P.C. board

Dip switch setup

- When turning on 1) only of SW803, the latest error is displayed. As the memory is stored, it can be confirmed even if the power supply is turned off once. (excluding outside temp. sensor (TO) error)
- When the work finished or the outdoor temp. sensor (TO) error was found, turn off all of SW803. (The error which occurs at present is displayed.)

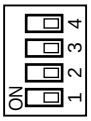
<Latest error display>

Only 1) of SW803 is ON.



<Error display, which occurs at present>

All SW803 are OFF. (Initial status)



Display selection

- When an error happens, some of yellow LED (D800 to D804) turn on. **<Display 1>**
- If pushing the button switch SW800 for 1 second under the above condition, the yellow LED is displayed with flashing. **<Display 2>**
- When pushing SW800 for 1 second again, the status returns to **<Display 1>**.
- The error contents can be confirmed by combining **<Display 1>** and **<Display 2>**.

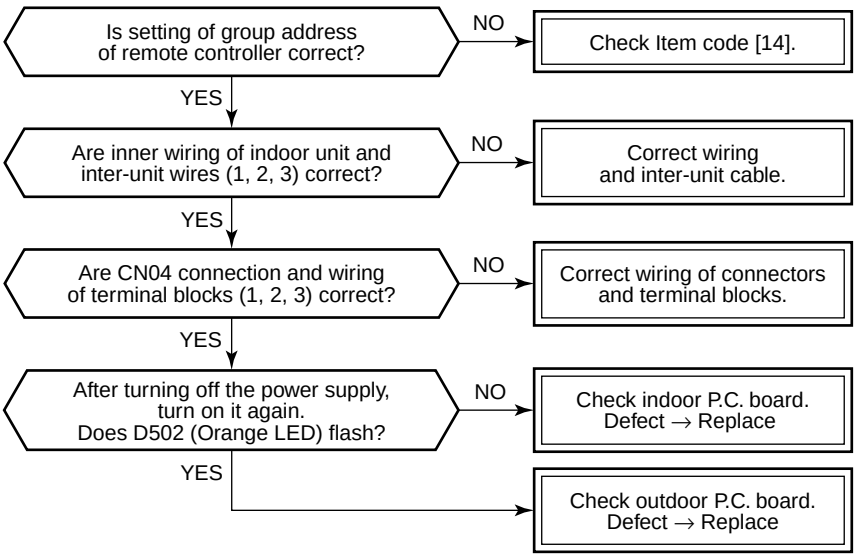
<Display 1> ⇔ <Display 2>

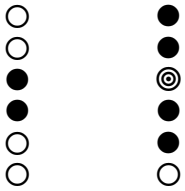
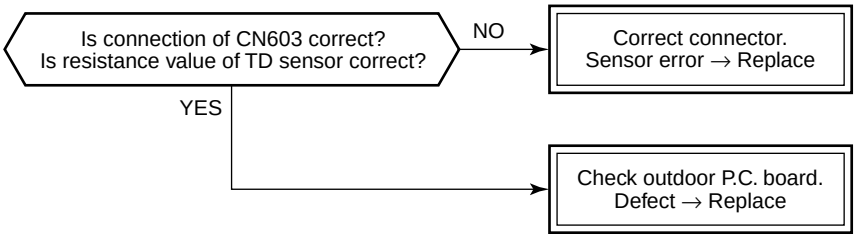
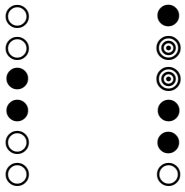
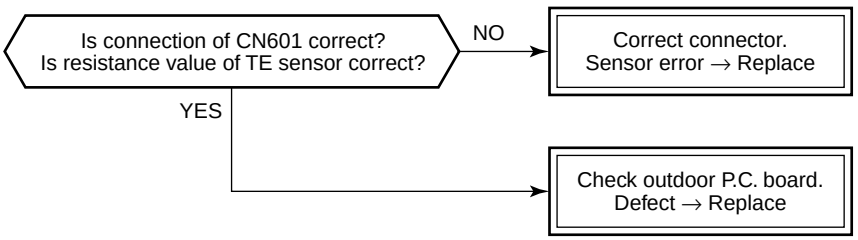
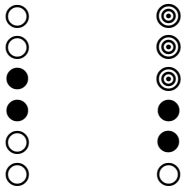
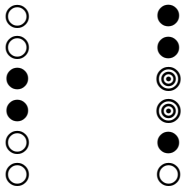
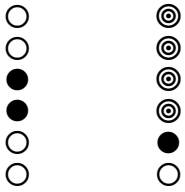
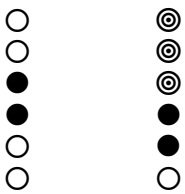
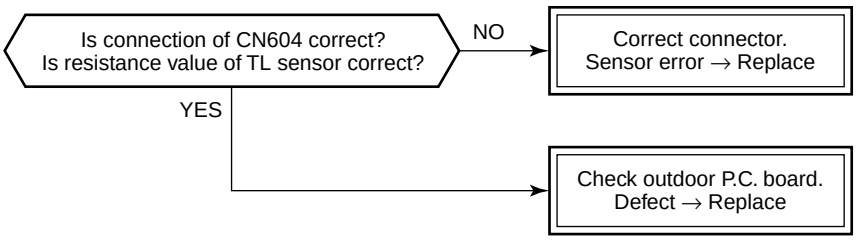
	(No error)	(Error occurred)	(Push SW800)
D800 (Yellow)	●	○	●
D801 (Yellow)	●	○	●
D802 (Yellow)	●	●	◎
D803 (Yellow)	●	●	●
D804 (Yellow)	●	○	●
D805 (Green)	○	○	○

(Example of discharge temp. sensor error)

● : Go off, ○ : Go on, ◎ : Flash

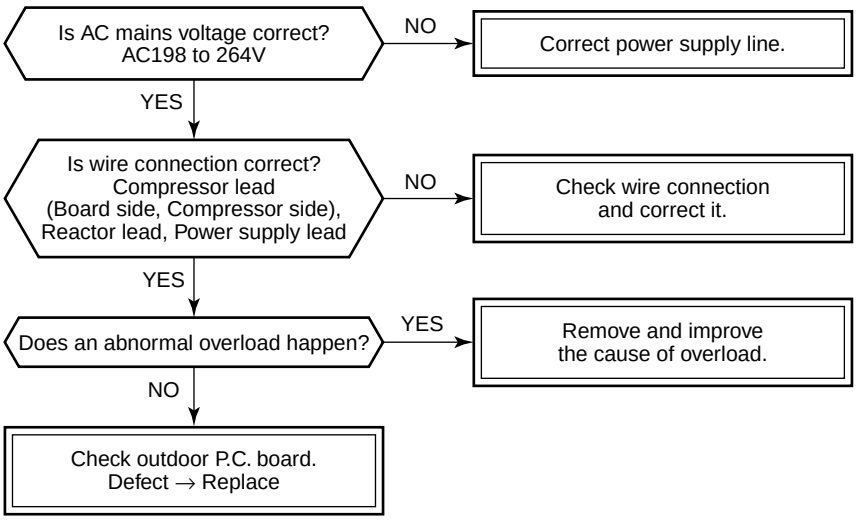
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[E04]	—	[Indoor/Outdoor communication error]

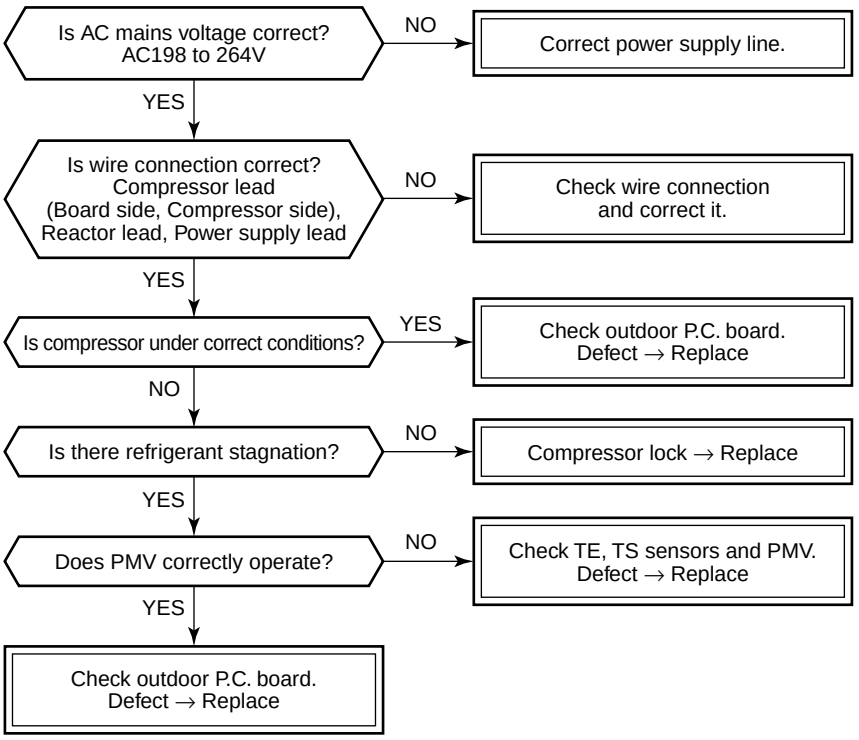


<table>
<tr><th>Check code</th><th>Outdoor LED display</th><th>Check and troubleshooting
(Item without special mention Indicates part of outdoor unit.)</th></tr>
<tr><td>[F04]</td><td><Display 1> <Display 2>
  </td><td>[Discharge temp. sensor (TD) error]
 
</td></tr>
<tr><td>[F06]</td><td></td><td>• There is a possibility that it is one of the following errors.
Confirm LED on outdoor P.C. board to judge which error it is.
Heat exchanger temp. sensor (TE) error, Heat exchanger temp. sensor (TL) error, Suction temp. sensor (TS) error, Miswiring of heat exchanger sensor (TE, TS)</td></tr>
<tr><td></td><td><Display 1> <Display 2>
  </td><td>Heat exchanger temp. sensor (TE) error]
 
</td></tr>
<tr><td></td><td><Display 1> <Display 2>
  </td><td>[Heat exchanger temp. sensor (TL) error] → Refer to [F07] column.</td></tr>
<tr><td></td><td><Display 1> <Display 2>
  </td><td>[Suction temp. sensor (TS) error] → Refer to [F12] column.</td></tr>
<tr><td></td><td><Display 1> <Display 2>
  </td><td>[Miswiring of heat exchanger sensor (TE, TS)] → Refer to [F15] column.</td></tr>
<tr><td>[F07]</td><td><Display 1> <Display 2>
  </td><td>[Heat exchanger temp. sensor (TL) error]
 
</td></tr>
</table>

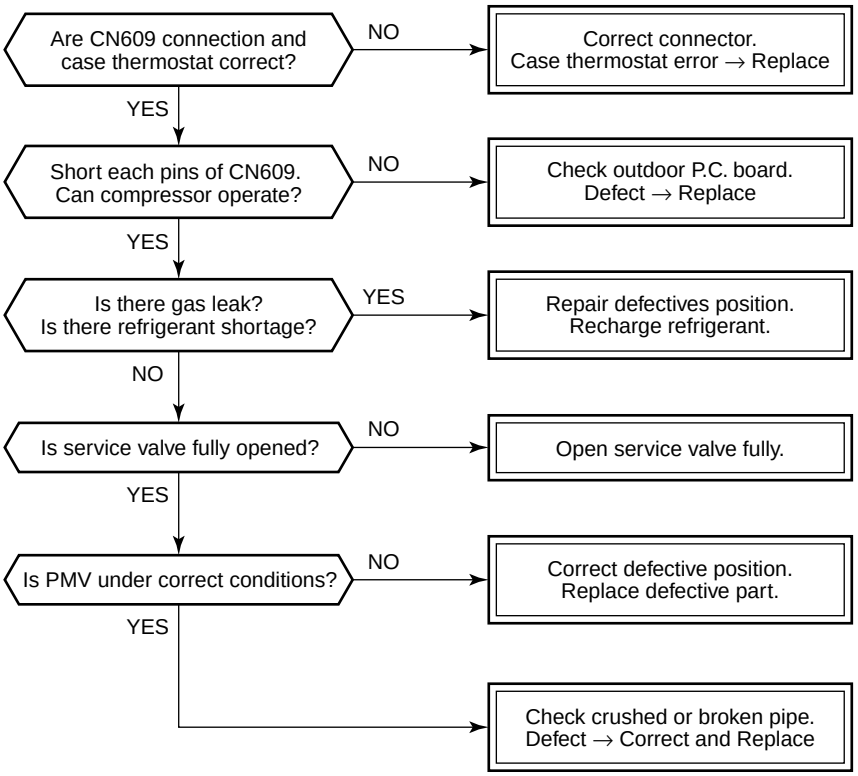
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[F08]	<Display 1> <Display 2> ○ ● ○ ● ● ◎ ● ● ○ ◎ ○ ○	**[Outside temp. sensor (TO) error]** Is connection of CN602 correct? Is resistance value of TO sensor correct? → NO → Correct connector. Sensor error → Replace YES → Check outdoor P.C. board. Defect → Replace
[F12]	<Display 1> <Display 2> ○ ● ○ ● ● ◎ ● ◎ ○ ● ○ ○	**[Suction temp. sensor (TS) error]** Is connection of CN600 correct? Is resistance value of TS sensor correct? → NO → Correct connector. Sensor error → Replace YES → Check outdoor P.C. board. Defect → Replace
[F13]	<Display 1> <Display 2> ○ ◎ ○ ● ● ◎ ● ◎ ○ ● ○ ○	**[Heat sink temp. sensor (TH) error]** Check outdoor P.C. board. Defect → Replac
[F15]	<Display 1> <Display 2> ○ ◎ ○ ◎ ● ◎ ● ◎ ○ ● ○ ○	**[Miswiring of heat exchanger sensor (TE, TS)]** Is mounting status of TE and TS sensors correct? → NO → Correct sensor mounting. YES → Is connection of CN600 correct? Is resistance value of TS sensor correct? → NO → Correct connector. Sensor error → Replace YES → Is connection of CN601 correct? Is resistance value of TE sensor correct? → NO → Correct connector. Sensor error → Replace YES → Check outdoor P.C. board. Defect → Replace
[F31]	<Display 1> <Display 2> ○ ◎ ○ ◎ ● ◎ ● ◎ ○ ◎ ○ ○	**[EEPROM error]** Check outdoor P.C. board. Defect → Replace

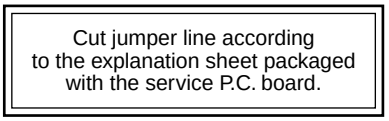
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[H01]	<Display 1> <Display 2>	[Compressor break down]
[H02]	<Display 1> <Display 2>	[Compressor lock]
[H03]	<Display 1> <Display 2>	[Current detection circuit error]

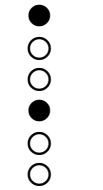
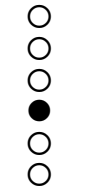
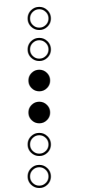
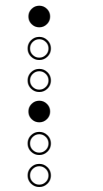
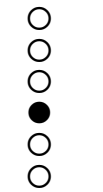
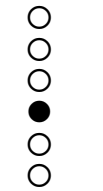
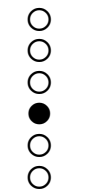


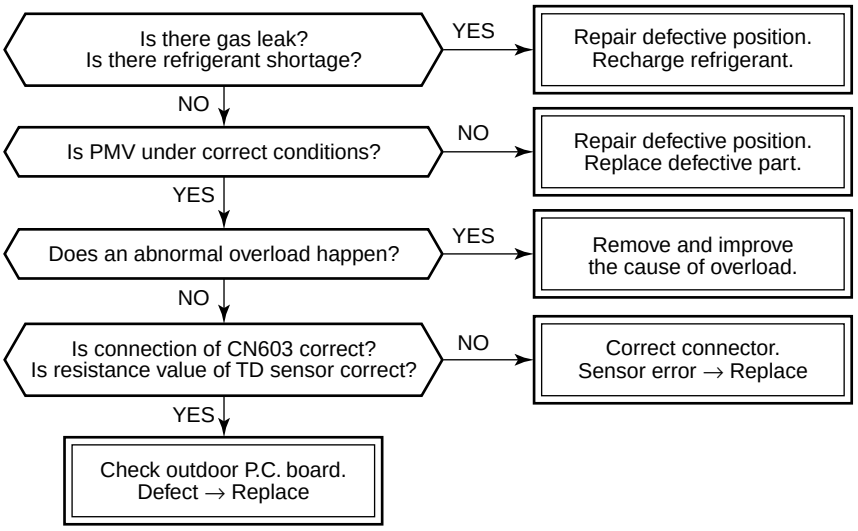
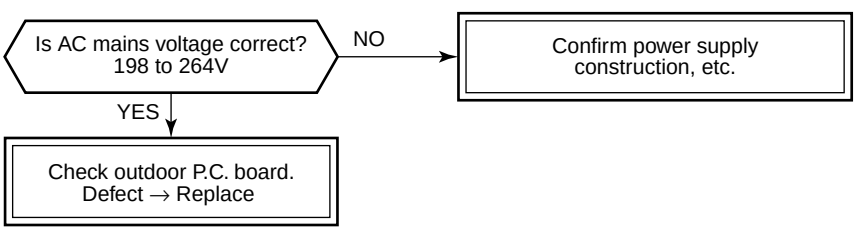


Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[H04]	<Display 1> <Display 2> ● ● ○ ● ○ ○ / ● ● ◎ ● ● ○	**[Case thermostat operation]**
[L10]	<Display 1> <Display 2> ● ○ ○ ● ○ ○ / ● ◎ ● ◎ ● ○	**[Unset model type]:** Only when service P.C. board is used

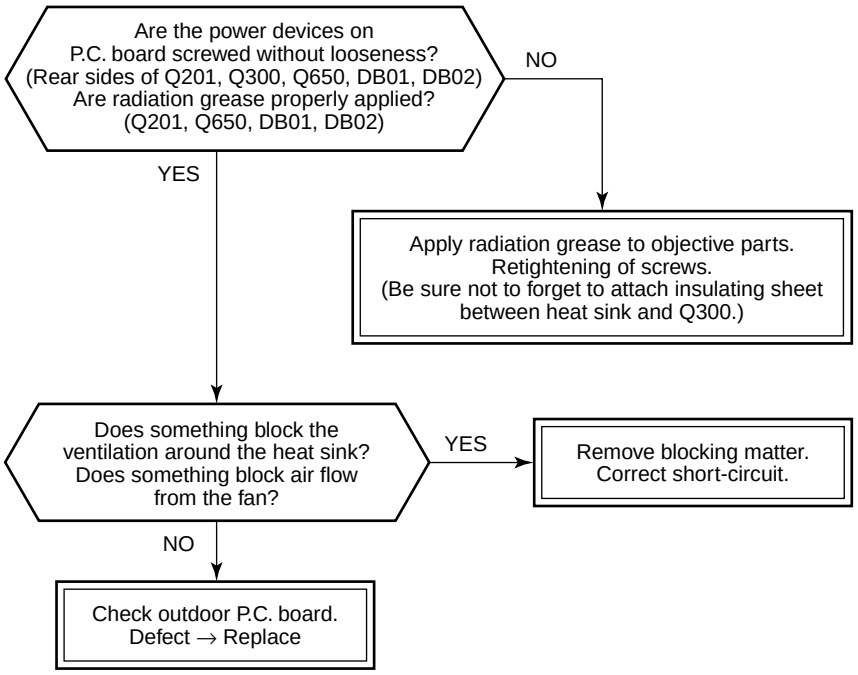


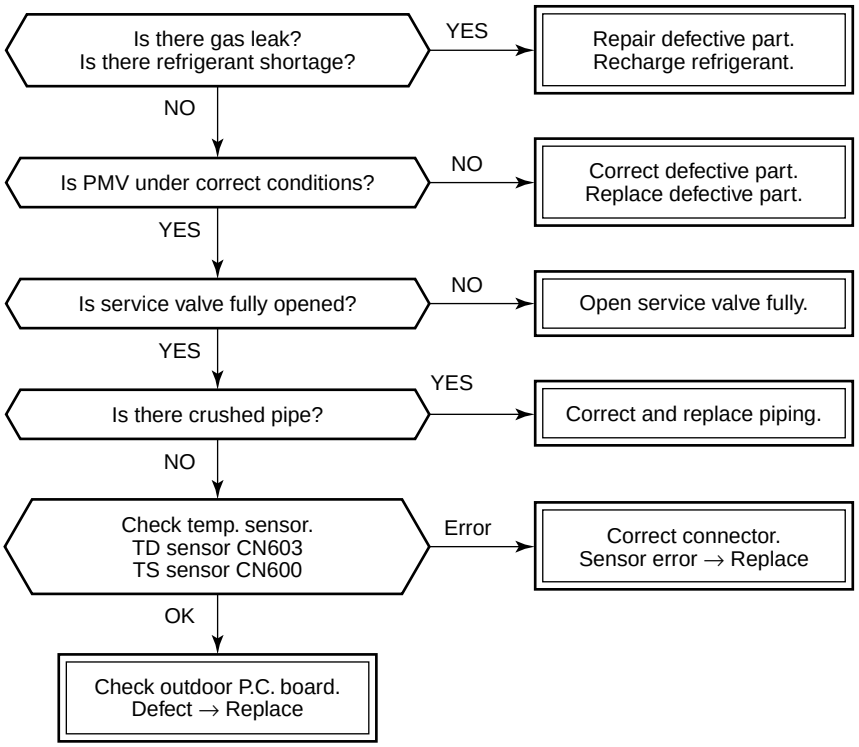


Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[L29]		∗ There is a possibility that it is one of the following errors. Confirm LED on outdoor P.C. board to judge which error it is. Communication error between MCU, Heat sing temp. sensor (TH) error, EEPROM error, Unset model type, Heat sink overheat error, Gas leak detection, 4-way valve inverse error
	<Display 1> <Display 2> 	**[Communication error between MCUs]** Check outdoor P.C. board. Defect → Replace
	<Display 1> <Display 2> 	**[Heat sink temp. sensor (TH) error]** → Refer to **[F13]** column.
	<Display 1> <Display 2> 	**[EEPROM error]** → Refer to **[F31]** column.
	<Display 1> <Display 2> 	**[Unset model type]** → Refer to **[L10]** column.
	<Display 1> <Display 2> 	**[Heat sink overheat error]** → Refer to **[P07]** column.
	<Display 1> <Display 2> 	**[Gas leak detection]** → Refer to **[P15]** column.
	<Display 1> <Display 2> 	**[4-way valve inverse error]** → Refer to **[P19]** column.

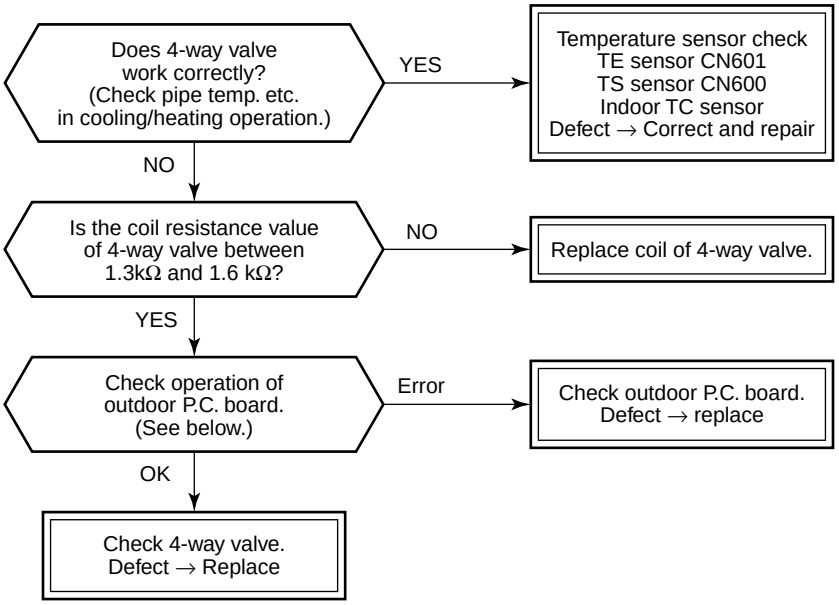
<table>
<tr><th>Check code</th><th>Outdoor LED display</th><th>Check and troubleshooting
(Item without special mention Indicates part of outdoor unit.)</th></tr>
<tr><td>[P03]</td><td><Display 1> <Display 2>
○ ◎
○ ◎
○ ●
● ●
○ ●
○ ○</td><td>[Discharge temp. error]
 
</td></tr>
<tr><td>[P04]</td><td></td><td>∗ There is a possibility that it is one of the following errors.
Confirm LED on outdoor P.C. board to judge which error it is.
Power supply error (Vdc), High pressure protective operation, Case thermostat operation</td></tr>
<tr><td></td><td><Display 1> <Display 2>
● ●
● ●
○ ◎
● ●
○ ●
○ ○</td><td>[Case thermostat operation] → Refer to [H04] column.</td></tr>
<tr><td></td><td><Display 1> <Display 2>
○ ◎
○ ●
○ ◎
● ●
○ ●
○ ○</td><td>[Power supply error] → Refer to [P05] column.</td></tr>
<tr><td></td><td><Display 1> <Display 2>
○ ●
○ ●
○ ◎
● ●
○ ◎
○ ○</td><td>[High pressure protective operation] → Refer to [P20] column.</td></tr>
<tr><td>[P05]</td><td><Display 1> <Display 2>
○ ◎
○ ●
○ ◎
● ●
○ ●
○ ○</td><td>[Power supply error]
 
</td></tr>
</table>

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P07]	<Display 1> <Display 2> ○ ◎ ○ ◎ ○ ◎ ● ● ○ ● ○ ○	**[Heat sink overheat error]**
[P15]	<Display 1> <Display 2> ○ ◎ ○ ◎ ○ ◎ ● ◎ ○ ● ○ ○	**[Gas leak detection]**



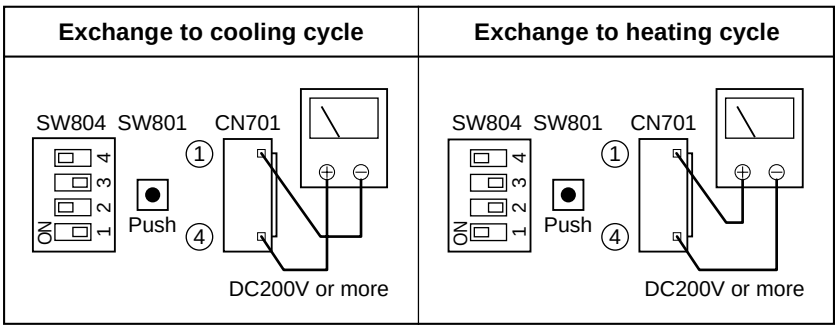


Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P19]	<Display 1> <Display 2> ○ ◎ ○ ◎ ○ ● ● ● ○ ◎ ○ ○	**[4-way valve reversal error]**



Check method of outdoor P.C. board operation (Self-holding valve type)

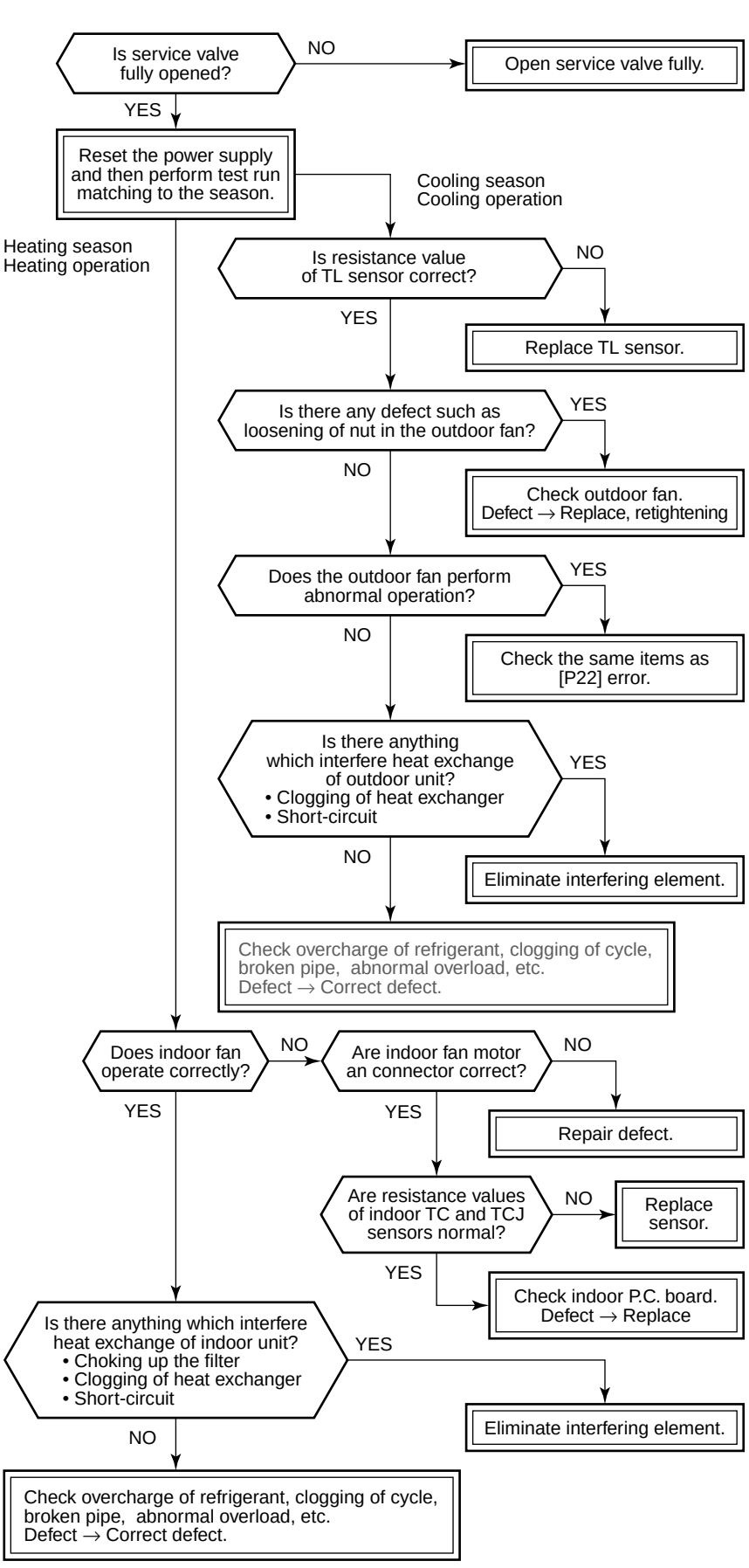
1) Set SW804 of Dip switch as the following figure and then push SW801 for approx. 1 second to check exchange operation to cooling cycle/heating cycle.
   - Power is turned on for approx. 10 seconds.
   - In case of operating with the coil of 4-way valve connected to CN701, take interval over 1 minute before re-operation; otherwise it may cause overheat of the coil.
2) After check, turn off all the Dip switch SW804.



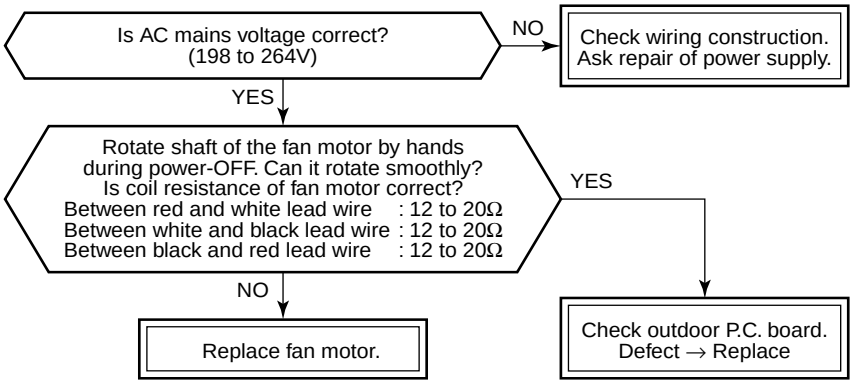
Note) Check by tester
Analog tester : Good if over DC200V
Digital tester : Good if the maximum voltage is over DC200V though the varied voltage may be displayed.

∗ In cooling operation, [P19] error may happen when the refrigerant pressure rose abnormally. In this case, remove the cause of pressure rising and then diagnose the error again.

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P20]	<Display 1> <Display 2> ○ ● ○ ● ○ ◎ ● ● ○ ◎ ○ ○	**[High pressure protective operation]**

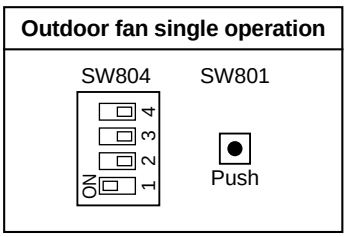


Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P22]	<Display 1> <Display 2>	**[Fan system error]**

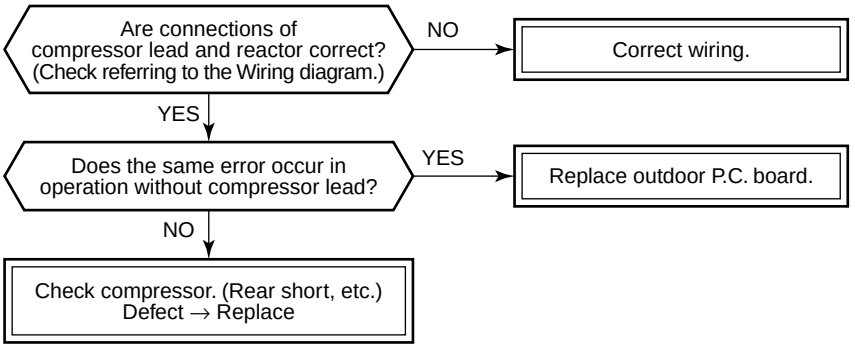


Single operation check for outdoor fan

1) Set Dip switch of SW804 as the following figure and then push SW801 for approx. 1 second to check single operation of outdoor fan.
   Use this method to check which fan, upper or lower fan, has a trouble.
   - When SW801 is pushed for 1 second again or 2 minutes passed, the fan stops.
2) After check, turn off all Dip switch of SW804.



[P26]	<Display 1> <Display 2>	**[Short-circuit of compressor drive element]**



[P29]	<Display 1> <Display 2>	**[Position detection circuit error]**

— No code	<Display 1> <Display 2>	**[Other error]** Compressor disorder due to sudden change of load, etc. ∗ Although the display of outdoor LED outputs, the unit automatically restarts and error is not determined. ∗ LED display also may output due to wire coming-off of compressor.

11-6-2. Diagnostic Procedure for Each Check Code (Outdoor Unit)

Temperature sensor **Temperature – Resistance value characteristic table**

TA, TC, TCJ, TE, TS, TO sensors

Representative value

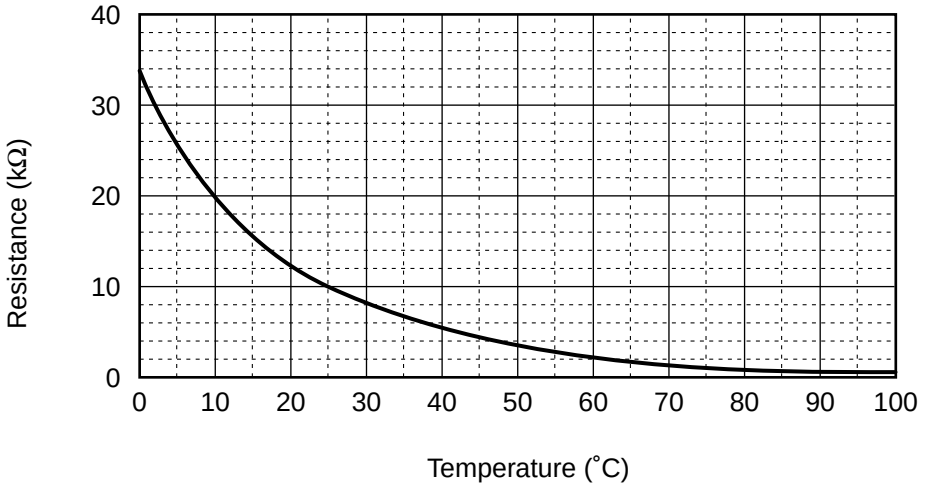
Temperature (°C)	Resistance value (kΩ)		
	(Minimum value)	(Standard value)	(Maximum value)
0	32.33	33.80	35.30
10	19.63	20.35	21.09
20	12.23	12.59	12.95
25	9.75	10.00	10.25
30	7.764	7.990	8.218
40	5.013	5.192	5.375
50	3.312	3.451	3.594
60	2.236	2.343	2.454
70	1.540	1.623	1.709
80	1.082	1.146	1.213
90	0.7740	0.8237	0.8761
100	0.5634	0.6023	0.6434

TD, TL sensors

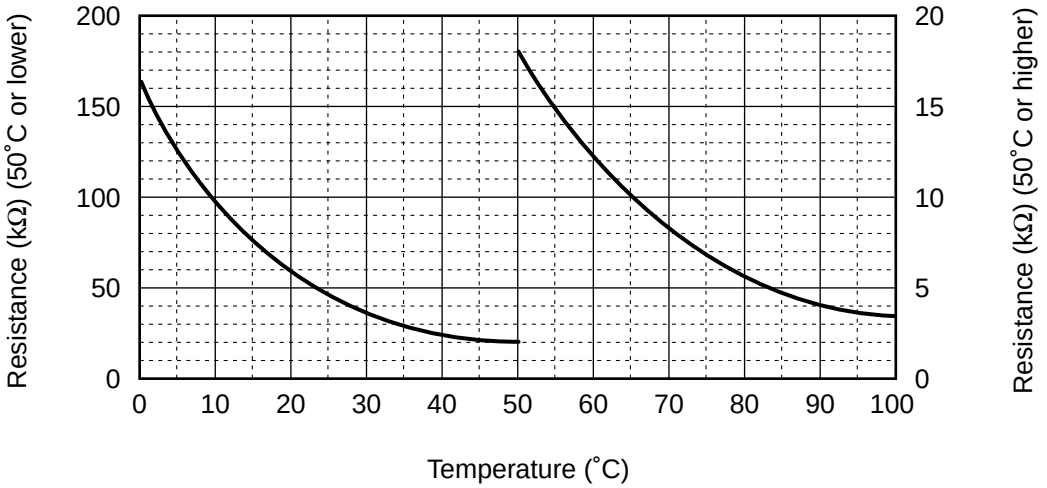
Representative value

Temperature (°C)	Resistance value (kΩ)		
	(Minimum value)	(Standard value)	(Maximum value)
0	150.5	161.3	172.7
10	92.76	99.05	105.6
20	58.61	62.36	66.26
25	47.01	49.93	52.97
30	37.93	40.22	42.59
40	25.12	26.55	28.03
50	17.00	17.92	18.86
60	11.74	12.34	12.95
70	8.269	8.668	9.074
80	5.925	6.195	6.470
90	4.321	4.507	4.696
100	3.205	3.336	3.468

TA, TC, TCJ, TE, TS, TO sensors



TD, TL sensors



∗ As TH sensor (Outdoor unit heat sink temp. sensor) is incorporated in the outdoor control P.C. board, the resistance value cannot be measured.

11-7. How to Check Simply the Main Parts

11-7-1. How to check the P.C. board (Indoor unit)

(1) Operating precautions

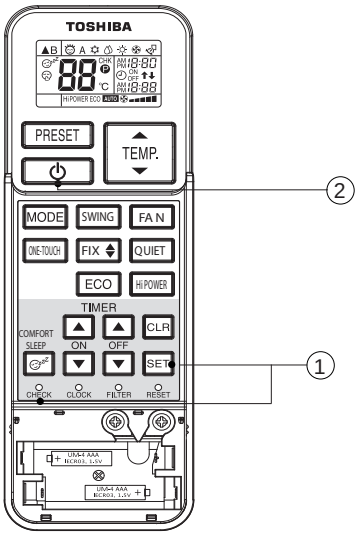
1) When removing the front panel or the P.C. board, be sure to shut off the power supply breaker.
2) When removing the P.C. board, hold the edge of the P.C. board and do not apply force to the parts.
3) When connecting or disconnecting the connectors on the P.C. board, hold the whole housing. Do not pull at the lead wire.

(2) Inspection procedures

1) When a P.C. board is judged to be defective, check for disconnection, burning, or discoloration of the copper foil pattern or this P.C. board.
2) The P.C. board consists of the following 2 parts
   a. Main P.C. board part:
   DC power supply circuit (5 V, 12 V),
   Indoor fan motor control circuit, CPU and peripheral circuits, buzzer, and Driving circuit of louver.
   b. Indication unit of infrared ray receiving
   Infrared ray receiving circuit, LED:

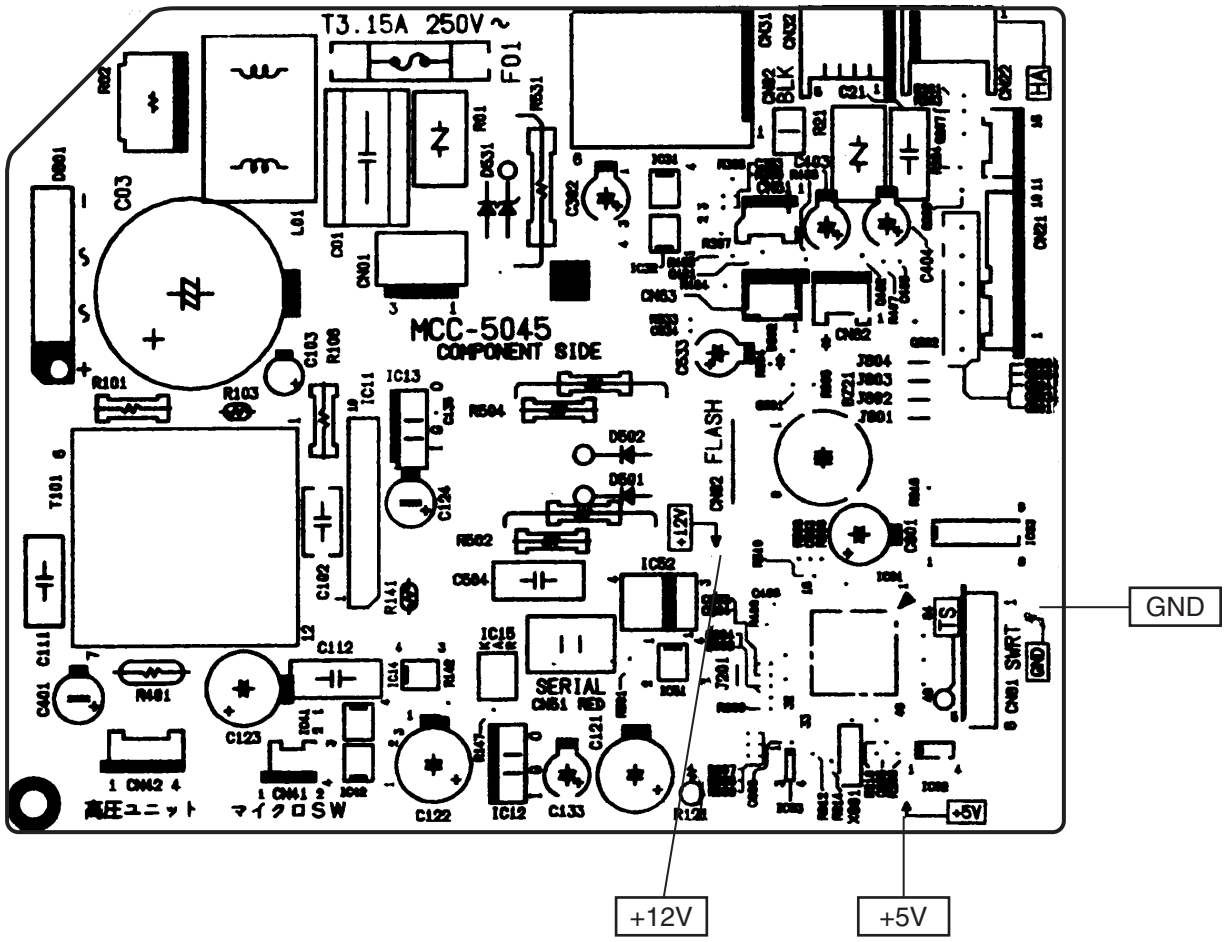
11-7-2. How to shorten time for start the compressor.

1. Turn on remote.
2. Setting requirment operation.
3. Push off remote.
4. Press [SET] button while pressing [CHECK] button with a tip of a pencil.
5. Then press [⏻] button to transmit the signal to the indoor unit.

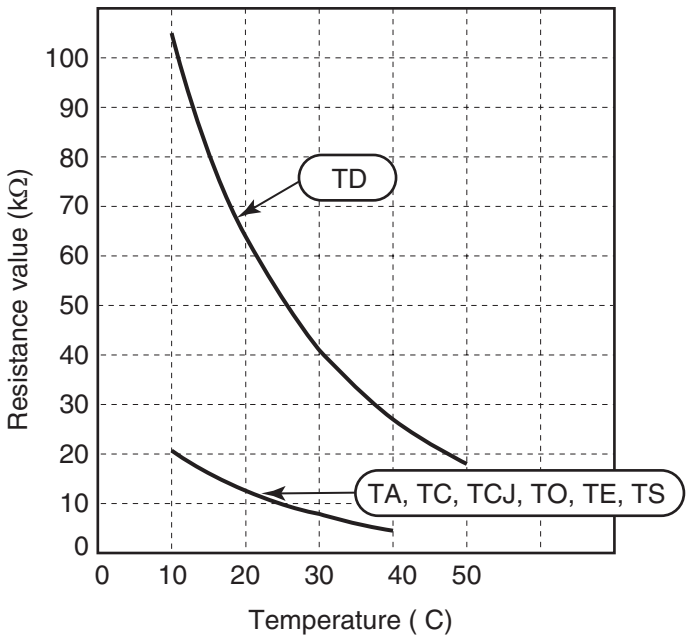


This setting helps to shortern a compressor waiting period when operate cool, heat or dry mode.
A compressor suddenly starts one order of Remote controller is received.

11-7-2. P.C. Board Layout

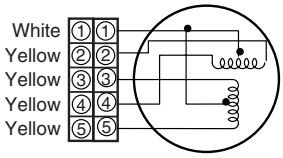


[1] Sensor characteristic table



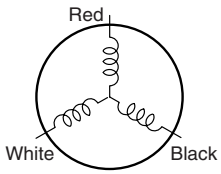
TD : Discharge temp. sensor
TA : Room temp. sensor
TC, TCJ : Heat exchanger temp. sensor
TO : Outdoor temp. sensor
TE : Outdoor heat exchanger temp. sensor
TS : Suction temp. sensor

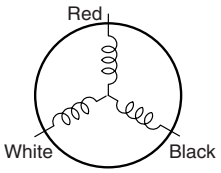
11-7-3. Indoor Unit (Other Parts)

<table>
<tr><th>No.</th><th>Part name</th><th>Checking procedure</th></tr>
<tr><td>1</td><td>Room temp. (TA) sensor
Heat exchanger (TC) sensor
Heat exchanger (TCJ) sensor</td><td>Disconnect the connector and measure the resistance value with tester.
(Normal temp.)
<table>
<tr><th>Sensor \ Temperature</th><th>10°C</th><th>20°C</th><th>25°C</th><th>30°C</th><th>40°C</th></tr>
<tr><td>TA, TC, TCJ (kΩ)</td><td>20.7</td><td>12.6</td><td>10.0</td><td>7.9</td><td>4.5</td></tr>
</table></td></tr>
<tr><td>2</td><td>Remote controller</td><td>Refer to 11-5-1. (5).</td></tr>
<tr><td>3</td><td>Louver motor
MP24Z3T</td><td>Measure the resistance value of each winding coil by using the tester.
(Under normal temp. 25°C)
 

<table>
<tr><th>Position</th><th>Resistance value</th></tr>
<tr><td>1 to 2
1 to 3
1 to 4
1 to 5</td><td>250 ± 20Ω</td></tr>
</table></td></tr>
<tr><td>4</td><td>Indoor fan motor</td><td>Refer to 11-5-1. (3) and (4).</td></tr>
</table>

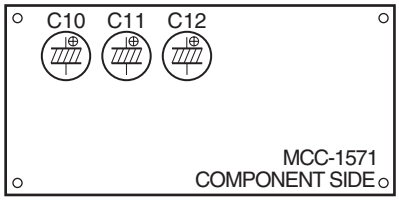
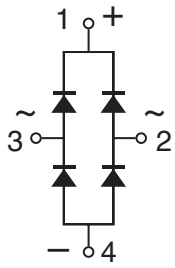
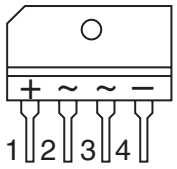
11-7-4. Outdoor Unit

<table>
<tr><th>No.</th><th>Part name</th><th>Checking procedure</th></tr>
<tr><td>1</td><td>Compressor
(Model : DA220A2F-22L)</td><td>Measure the resistance value of each winding by using the tester.
 

<table>
<tr><th rowspan="2">Position</th><th>Resistance value</th></tr>
<tr><th>DA220A2F-22L</th></tr>
<tr><td>Red - White</td><td rowspan="3">0.61Ω</td></tr>
<tr><td>White - Black</td></tr>
<tr><td>Black - Red</td></tr>
</table>
Under 20°C</td></tr>
<tr><td>2</td><td>Outdoor fan motor
(Model : ICF-280-A60-1)</td><td>Measure the resistance value of winding by using the tester.
 

<table>
<tr><th>Position</th><th>Resistance value</th></tr>
<tr><td>Red - White</td><td>32.6 ± 3.3Ω</td></tr>
<tr><td>White - Black</td><td>32.6 ± 3.3Ω</td></tr>
<tr><td>Black- Red</td><td>32.6 ± 3.3Ω</td></tr>
</table>
Under 20°C</td></tr>
<tr><td>3</td><td>4-way valve coil
(Model : VHV)</td><td>Measure the resistance value of winding by using the tester.
<table>
<tr><th>Resistance value</th></tr>
<tr><td>1617 ± 113Ω</td></tr>
</table>
Under 20°C</td></tr>
<tr><td>4</td><td>Pulse motor valve coil
(Model : CAM-MD12TCTH-6)</td><td>Measure the resistance value of winding by using the tester.
<table>
<tr><th>Position</th><th>Resistance value</th></tr>
<tr><td>Red - White</td><td>42 to 50Ω</td></tr>
<tr><td>White - Orange</td><td>42 to 50Ω</td></tr>
<tr><td>Brown- Yellow</td><td>42 to 50Ω</td></tr>
<tr><td>Brown- Blue</td><td>42 to 50Ω</td></tr>
</table>
Under 20°C</td></tr>
<tr><td>5</td><td>Outdoor temperature sensor (TO), discharge temperature sensor (TD), suction temperature sensor (TS), outdoor heat exchanger temperature sensor (TE)</td><td>Disconnect the connector, and measure resistance value with the tester.
(Normal temperature)
<table>
<tr><th>Sensor \ Temperature</th><th>10°C</th><th>20°C</th><th>25°C</th><th>30°C</th><th>40°C</th><th>50°C</th></tr>
<tr><td>TD (kΩ)</td><td>100</td><td>62</td><td>50</td><td>41</td><td>27</td><td>18</td></tr>
<tr><td>TO,TS,TE (kΩ)</td><td>20.7</td><td>12.6</td><td>10.0</td><td>7.9</td><td>4.5</td><td>—</td></tr>
</table></td></tr>
</table>

11-7-5. Checking Method for Each Part

<table>
<tr><th>No.</th><th>Part name</th><th>Checking procedure</th></tr>
<tr><td>1</td><td>Electrolytic capacitor
(For boost, smoothing)</td><td>1. Turn OFF the power supply breaker.
2. Discharge all three capacitors completely.
3. Check that safety valve at the bottom of capacitor is not broken.
4. Check that vessel is not swollen or exploded.
5. Check that electrolytic liquid does not blow off.
6. Check that the normal charging characteristics are shown in continuity test by the tester.
 
Case that product is good
Pointer swings once, and returns slowly. When performing test once again under another polarity, the pointer should return.
C10, C11, C12 : 760µF/400V</td></tr>
<tr><td>2</td><td>Diode block</td><td>1. Turn OFF the power supply breaker.
2. Completely discharge the four electrolytic capacitors.
3. Remove the diode block from the P.C. board (which is soldered in place).
4. Use a multimeter with a pointer to test the continuity, and check that the diode block has the proper rectification characteristics.
 
 
(DB01)
<table><tr><th colspan="2">Tester rod</th><th rowspan="2">Resistance value in good product</th></tr><tr><th>⊕</th><th>⊖</th></tr><tr><td>~ 2</td><td rowspan="2">+ 1</td><td rowspan="3">∞</td></tr><tr><td>~ 3</td></tr><tr><td rowspan="2">– 4</td><td>~ 2</td></tr><tr><td>~ 3</td><td></td></tr></table>10 to 20 Ω when the multimeter probe is reversed</td></tr>
</table>

11-8. How to Simply Judge Whether Outdoor Fan Motor is Good or Bad

1. Symptom

- Outdoor fan motor does not rotate.
- Outdoor fan motor stops within several 10 seconds though it started rotating.
- Outdoor fan motor rotates or does not rotate according to the position where the fan stopped, etc.

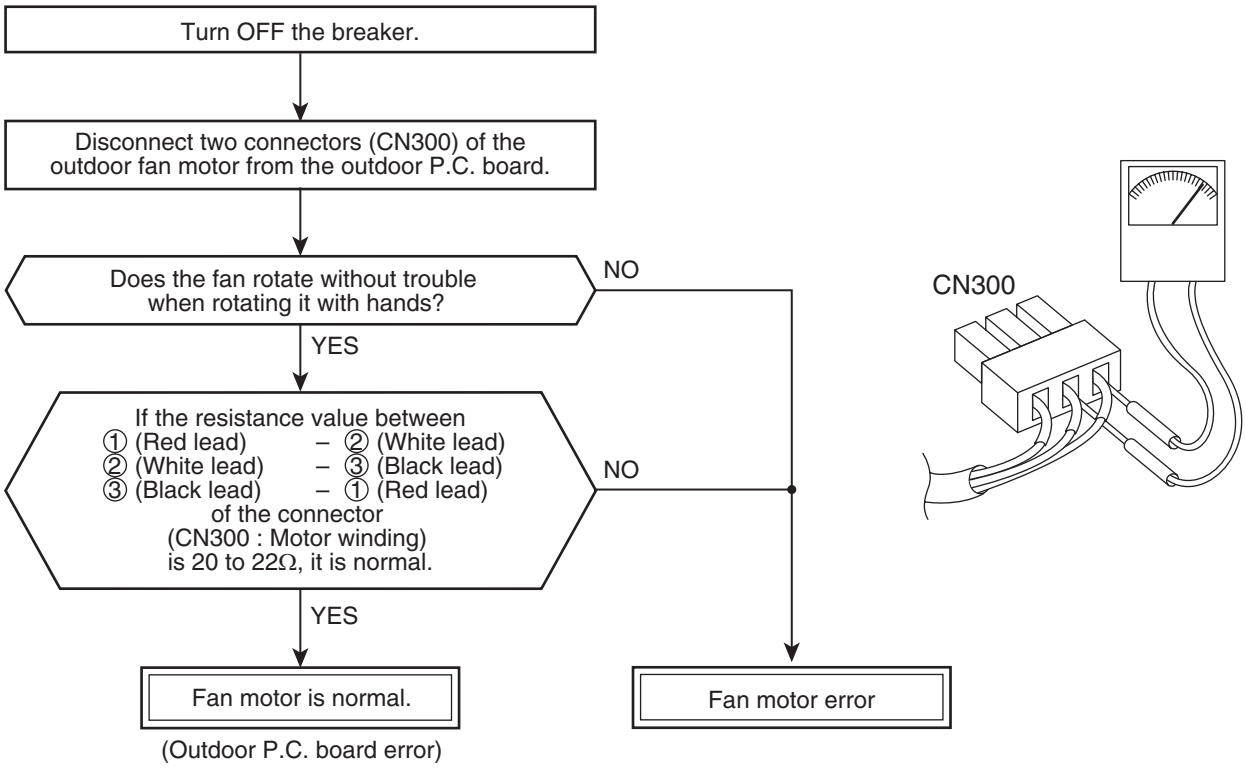
Remote controller check code “02 : Outdoor block, 1A : Outdoor fan drive system error”

2. Cause

The following causes are considered when the outdoor fan motor does not normally rotate.

1) Mechanical lock of the outdoor fan motor
2) Winding failure of the outdoor fan motor
3) Position-detect circuit failure inside of the outdoor fan motor
4) Motor drive circuit failure of the outdoor P.C. board

3. How to simply judge whether outdoor fan motor is good or bad



NOTE :

However, GND circuit error inside of the motor may be accepted in some cases when the above check is performed.

When the fan motor does not become normal even if P.C. board is replaced, replace the outdoor fan motor.

12. HOW TO REPLACE THE MAIN PARTS

WARNING

- Since high voltages pass through the electrical parts, turn off the power without fail before proceeding with the repairs.

  Electric shocks may occur if the power plug is not disconnected.
- After the repairs have been completed (after the front panel and cabinet have been installed), perform a test run, and check for smoking, unusual sounds and other abnormalities.

  If this check is omitted, a fire and/or electric shocks may occur.
  Before proceeding with the test run, install the front panel and cabinet.
- Ensure that the following steps are taken when doing repairs on the refrigerating cycle.
  1. Do not allow any naked flames in the surrounding area.
     If a gas stove or other appliance is being used, extinguish the flames before proceeding.

     If the flames are not extinguished, they may ignite any oil mixed with the refrigerant gas.
  2. Do not use welding equipment in an airtight room.

     Carbon monoxide poisoning may result if the room is not properly ventilated.
  3. Do not bring welding equipment near flammable objects.

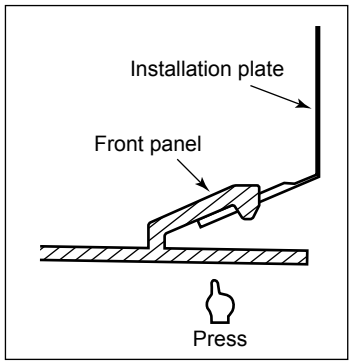
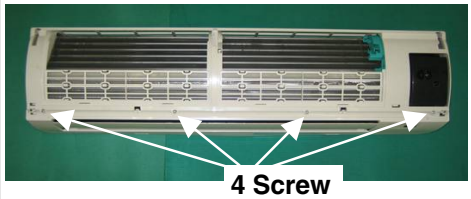
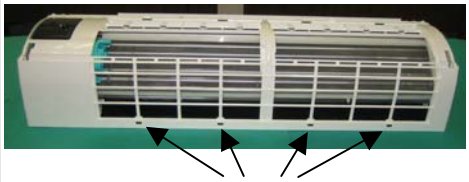
     Flames from the equipment may cause the flammable objects to catch fire.
- **If keeping the power on is absolutely unavoidable while doing a job such as inspecting the circuitry, wear rubber gloves to avoid contact with the live parts.**

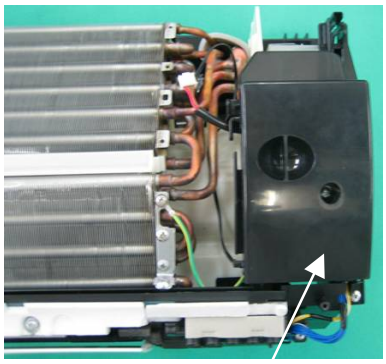
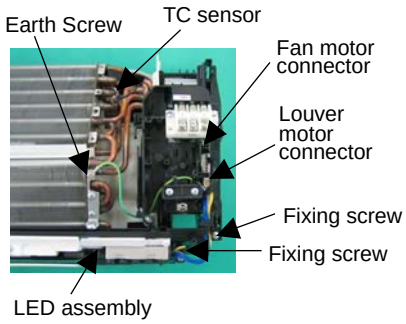
  Electric shocks may be received if the live parts are touched.
  High-voltage circuits are contained inside this unit.

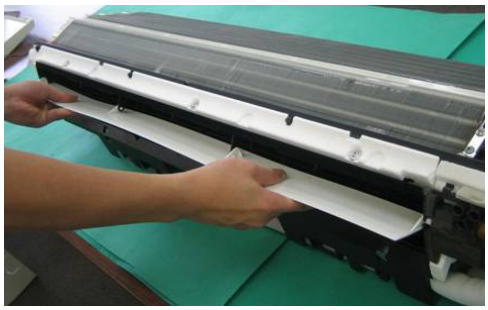
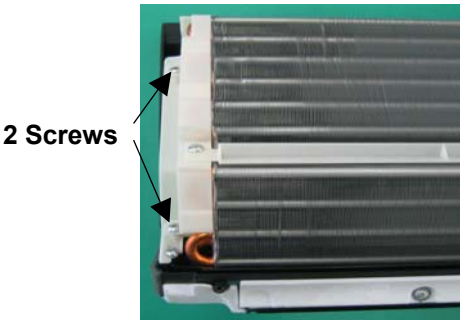
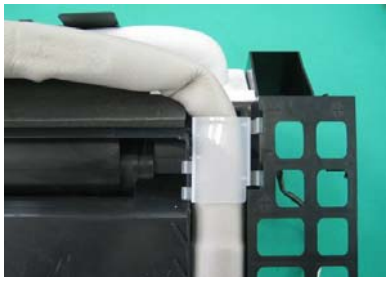
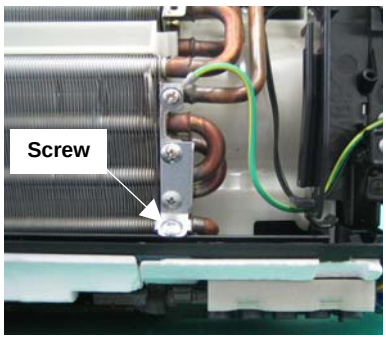
  Proceed very carefully when conducting checks since directly touching the parts on the control circuit board may result in electric shocks.

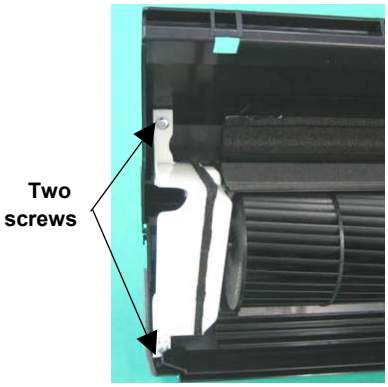
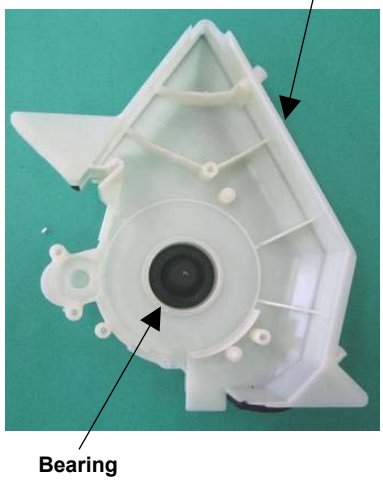
12-1. Indoor Unit

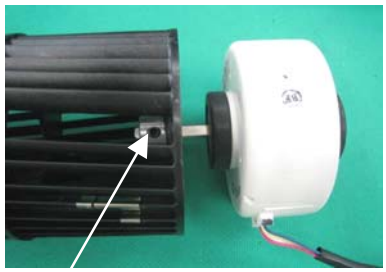
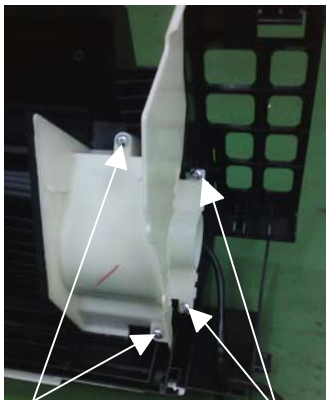
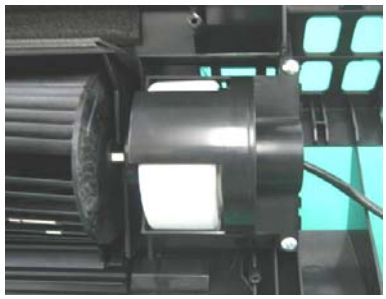
No.	Part name	Procedures	Remarks
①	Front panel	1) Stop operation of the air conditioner and turn off its main power supply. 2) Open the air inlet grille, push the arm toward the outside, and remove the grille.	
		3) Remove the left and right air filters.	

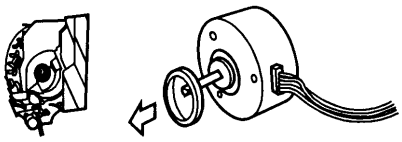
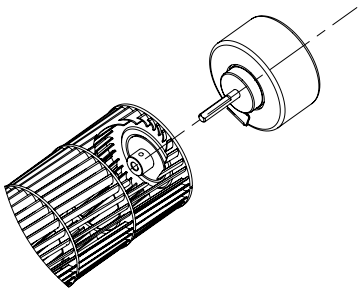
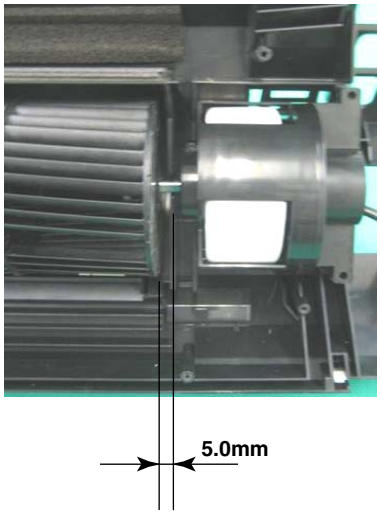
No.	Part name	Procedures	Remarks
①	Front panel	4) Press "PUSH" part under the front panel and remove hooks of the front panel from the installation plate.	
		5) Remove the front panel fixing screws. (4 pcs.) 6) Take off four hooks of panel from rear side.	
			
		<How to assemble the front panel> 1) Press three center positions and two lower center positions of the air outlet, and then hang the hanging hooks (4 pcs.) at the top side of the front panel to the rear plate. 2) Tighten four screws. • Incomplete hanging or incomplete pressing may cause a dewdrops or generation of a fluttering sound.	

No.	Part name	Procedures	Remarks
②	Electric parts box assembly	1) Follow the procedure up to 6) in ① above. 2) Remove screw of earth lead attached to the end plate of the evaporator. 3) Remove the lead wire cover, and remove connector for the fan motor and connector for the louver motor from the electric parts box assembly. 4) Pull out TC sensor from sensor holder of the evaporator.	
		5) Disengage the display unit by simply pushing at the top of the display unit. 6) Remove the fixing screw that secures the electric parts box assembly, LED assembly and remove the assembly.	
		<How to assemble the electric parts box> 1) Hook the top part of the electric parts box assembly onto the claws on the back body, and secure it using the fixing screw. Now attach the display unit. Connect the connectors for the fan motor and louver motor. 2) Secure the grounding wire using the fixing screw. Insert the TC sensor into the sensor holder. * Be absolutely sure to loop the grounding wire and TC sensor leads once at the bottom.	

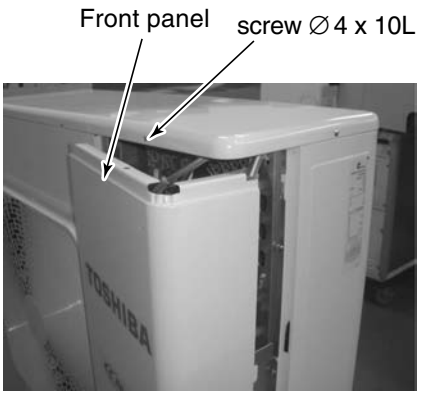
No.	Part name	Procedures	Remarks
③	Horizontal louver	1) Remove shaft of the horizontal louver from the back body. (First remove the left shaft, and then remove other shafts while sliding the horizontal louver leftward.)	
④	Evaporator (Heat exchanger)	1) Follow to the procedure in the item ② . 2) Remove the pipe holder from the rear side of the main unit. 3) Remove two fixing screws at the left side of the end plate of the heat exchanger.  4) Remove two fixing screw on the heat exchage fixing holder to separate the heat exchage from the back body.	  

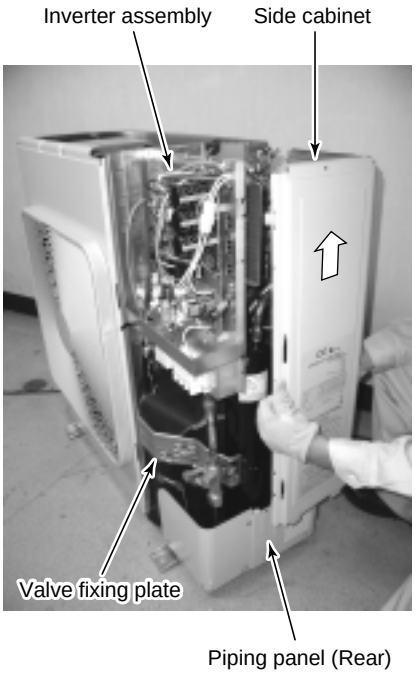
No.	Part name	Procedures	Remarks
⑤	Bearing	1) Follow to the procedure in the item ④ . 2) Remove the two screws used to secure the bearing base. 3) Remove the bearing base. **<Caution at assembling>** • If the bearing is out from the housing, push it into the specified position and then incorporate it in the main body.	 

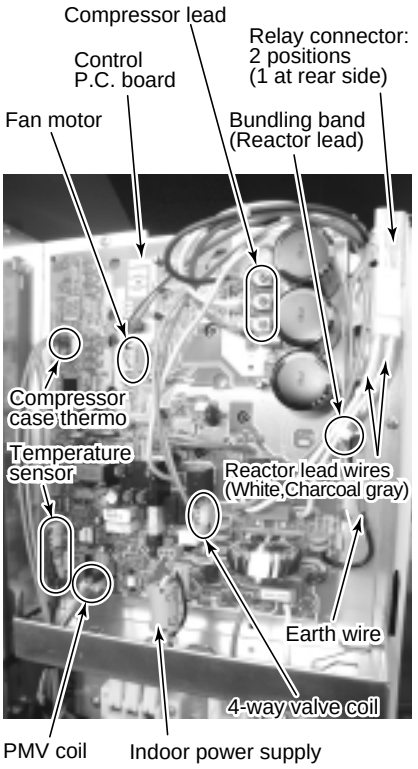
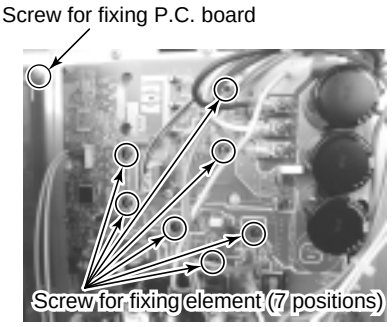
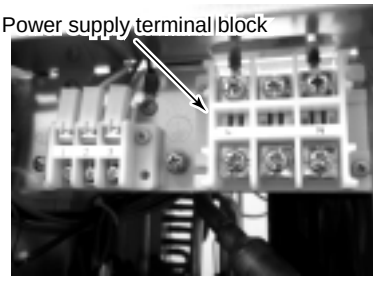
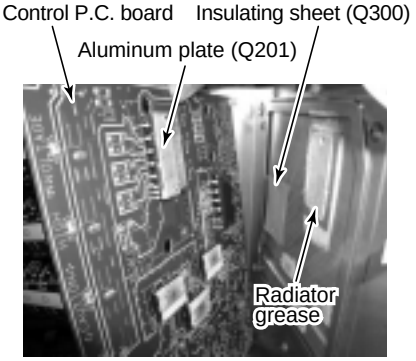
No.	Part name	Procedures	Remarks
⑥	Fan motor	1) Follow to the procedure till item④. 2) Loosen the set screw of the cross flow fan. 3) Remove two fixing screws of the motor cover and them remove the motor cover. 4) Remove two more fixing screws of the motor band and remove the motor band.	 **Set screw**  **Two screws on motor cover** **Two screws on motor band**
		5) Pull the fan motor outward.	

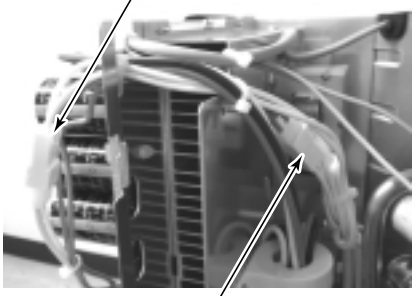
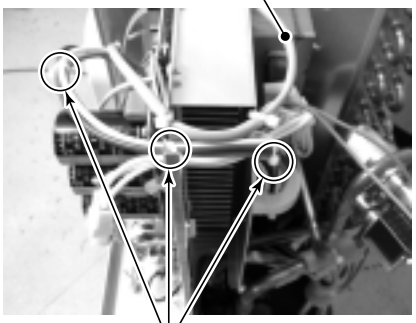
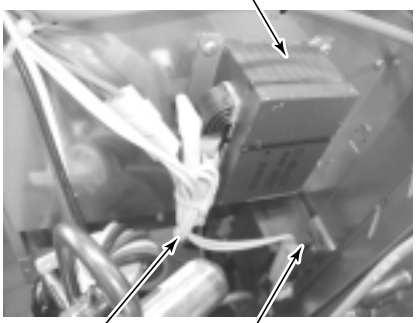
No.	Part name	Procedures	Remarks
⑦	Cross flow fan	**<Caution at reassembling>** 1) To incorporate the fan motor, remove the fan motor rubber (at shaft core side), incorporate the motor into the position in the following figure, and then install the fan motor. • Install the cross flow fan so that the right end of the 1st joint from the right of the cross flow fan is set keeping 5 mm from wall of rear plate of the main unit. • Holding the set screw, install the cross flow fan so that U-groove of the fan motor comes to the mounting hole of the set screw.  • Perform positioning of the fan motor as follows: • When assembling the fan motor, the fan motor must be installed in such a way that the fan motor leads will be taken out is positioned at the bottom front. • After assembling the two fixing screw of the motor band (right) into the main body, position the fan motor, insert it, and then secure the motor band (right) using the two fixing screws. 	

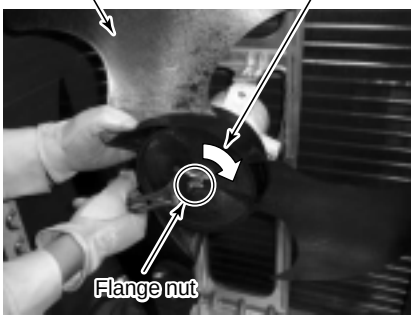
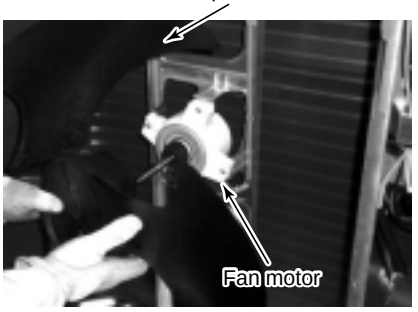
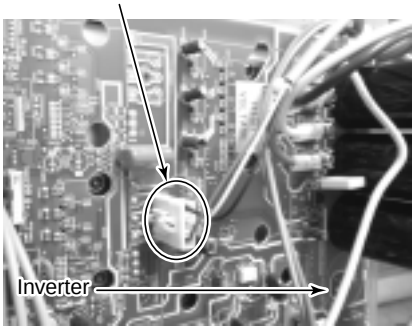
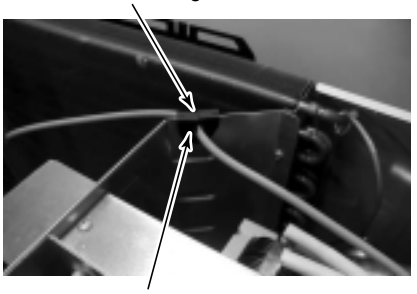
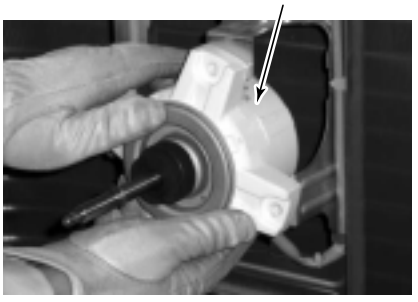
12-2. Outdoor Unit

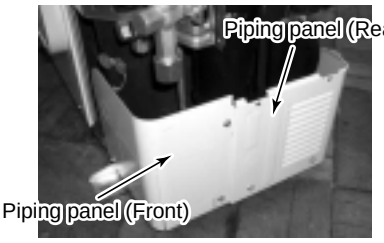
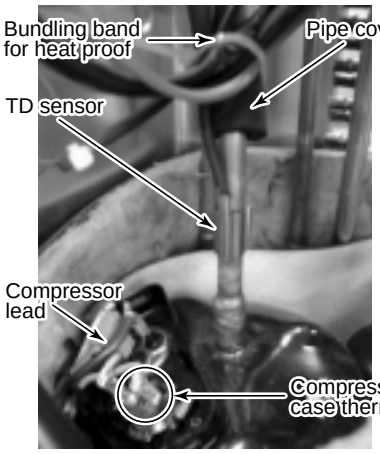
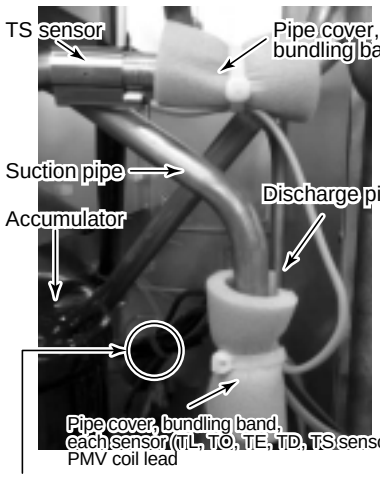
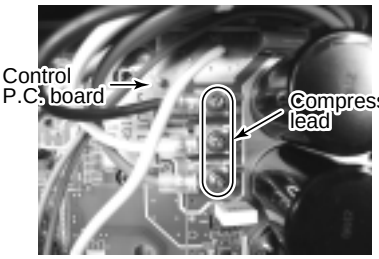
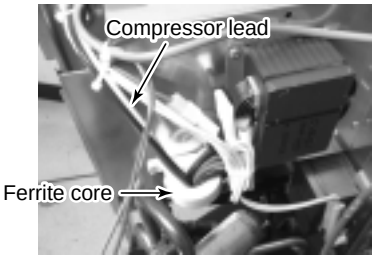
No.	Part name	Procedure	Remarks
①	Common procedure	**CAUTION** Be sure to put on the gloves at working time; otherwise an injury may be caused by a part, etc. **1. Detachment** 1) Stop operation of the air conditioner and then turn off switch of the breaker. 2) Remove the front panel. (screw Ø4 × 10, 2 pcs.) ∗ After removing screws, remove the front panel while pulling it downward. 3) Remove the power wire and indoor/outdoor connecting wire from the cord clamp and the terminals. 4) Remove the top plate. (screw Ø4 × 10, 5 pcs.) **2. Attachment** 1) Attach the top plate. (screw Ø4 × 10, 5 pcs.) In this time, insert the fin guard of rear side between the top plate and the heat exchanger (Rear side). 2) Connect the power supply wire and the indoor/outdoor connecting wire to the terminal and fix it with cord clamp. **CAUTION** Using bundling band on the market, be sure to fix the power wire and indoor/outdoor connecting wire along the crossover pipe so that they do not come to contact with the compressor, valve at gas side, pipe at gas side and discharge pipe. 3) Attach the front panel. (screw Ø4 × 10, 2 pcs.)	  

No.	Part name	Procedure	Remarks
②	Discharge port cabinet	**1. Detachment** 1) Carry out work of 1 of ①. 2) Remove screws for the discharge port cabinet and the partition plate. (ST1T Ø4 × 10, 3 pcs.) 3) Remove screws for the discharge port cabinet and the bottom plate. (screw Ø4 × 10, 2 pcs.) 4) Remove screws of the discharge port cabinet and the motor base. (ST1T Ø4 × 10, 2 pcs.) 5) Remove screws of the discharge port cabinet and the heat exchanger. (ST1T Ø4 × 10, 1 pc.) 6) Remove screws of the discharge port cabinet and the fin guard. (screw Ø4 × 10, 2 pcs.)	
③	Side cabinet	1) Carry out work of 1 of ①. 2) Remove screws which fix the inverter assembly and the side cabinet. (ST1T Ø4 × 10, 2 pcs.) 3) Remove screws of the side cabinet and the valve fixing plate. (ST1T Ø4 × 10, 2 pcs.) 4) Remove screws of the side cabinet and the pipe panel (Rear). (screw Ø4 × 10, 2 pcs.) 5) Remove screws of the side cabinet and the bottom plate. (screw Ø4 × 10, 1 pc.) 6) Remove screws of the side cabinet and the heat exchanger. (screw Ø4 × 10, 3 pcs.) 7) Slide the side cabinet upward and then remove it. (Hook of inverter)	

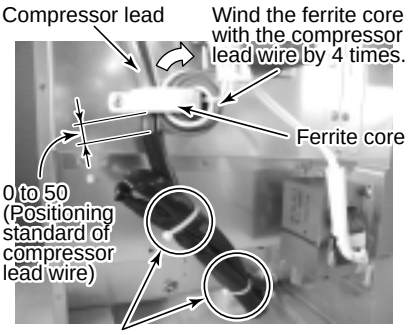
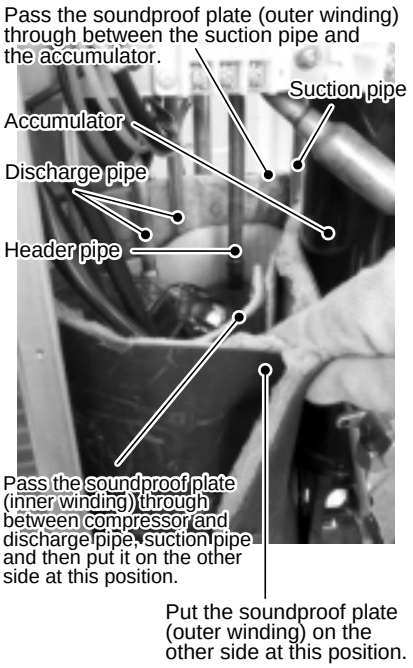
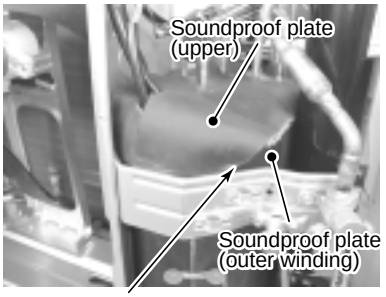
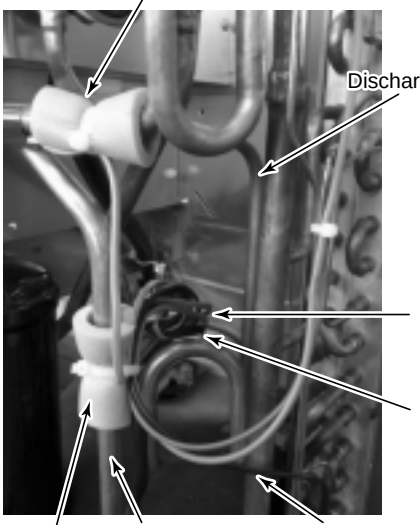
No.	Part name	Procedure	Remarks
④	Exchange of electric parts	**1. Control P.C. board** 1) Carry out work of 1 of ①. **⚠ WARNING** Never disassemble the inverter for 1 minute after power has been turned off because an electric shock may be caused. 2) Remove the connectors connected to the control P.C. board. (Indoor power supply, temperature sensors, PMV coil, 4-way valve coil, compressor case thermo, fan motor) ∗ Unlock the lock of the housing part and then remove the connectors. 3) Remove the lead wires connected to the control P.C. board. (Torque at tightening time: 1.47 ± 0.1N•m) Compressor lead U: CN200 Red V: CN201 White W: CN202 Black Reactor lead Relay connector: 2 positions Remove the power wire from the power supply terminal block. (Torque at tightening time: 2.5 ± 0.1N•m) 4) Remove the earth wire from the control P.C. board. (Truss B tight screw Ø4 × 6, 1 pc.) 5) Remove the fixing screws of the control P.C. board. (Screw with collar for fixing element Ø3 × 16, 7 pcs. Pan S tight screw for fixing P.C. board Ø3 × 20, 1 pc.) 6) Remove the control P.C. board. (Supporter: 5 positions) **NOTE:** It is difficult to take out it because of radiator grease for heat sink. 7) Mount a new control P.C. board. **NOTE:** Do not forget to attach the aluminum plate (Q201) and the insulating sheet (Q300). (Applying a little of radiator grease at the rear surface of the insulating sheet in advance to adhere to the heat sink makes easy the work.)	   

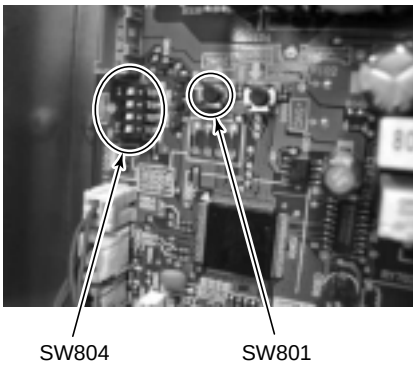
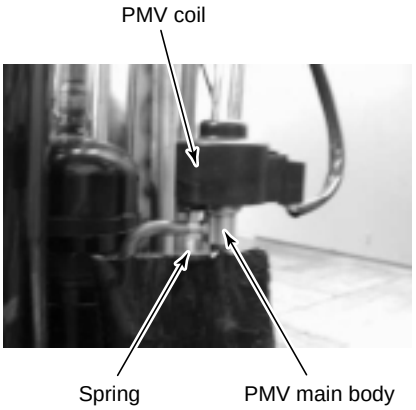
No.	Part name	Procedure	Remarks
④	Exchange of electric parts (Continued)	**1. Reactor** 1) Carry out works of 1 of ① and ③ . 2) Remove the relay connector connected to the control P.C. board. 3) Cut off the bundling band binding the compressor lead and the relay connector. 4) Remove each reactor. (Truss B tight screw Ø4 × 6, 2 pcs. each) 5) Attach a new reactor. **NOTE:** Be sure to bind the removed bundling band with the bundling band on the market. Be careful that the fan motor lead does not come to contact with the reactor body.	Reactor relay connector (Connected to lead wire (White) at P.C. board side)  Reactor relay connector (Connected to lead wire (Charcoal gray) at P.C. board side) Fan motor lead  Bundling band (Compressor lead, reactor lead) Upper reactor Connected to reactor relay connector (Connected to lead wire (White) at P.C. board side)  Bundling band Lower reactor Connected to reactor relay connector (Connected to lead wire (Charcoal gray) at P.C. board side)

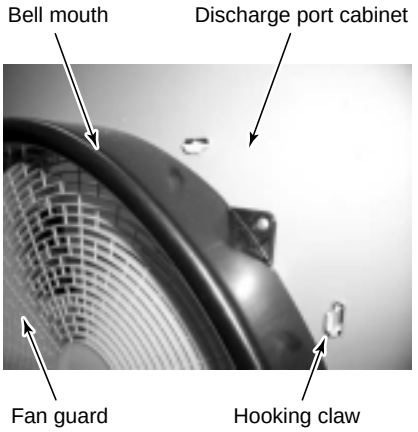
No.	Part name	Procedure	Remarks
⑤	Fan motor	1) Carry out works of 1 of ① and ②. 2) Remove the flange nut fixing the fan motor and the propeller fan. ∗ The flange nut is loosened by turning clockwise. (To tighten it, turn it counterclockwise.) 3) Remove the propeller fan. 4) Remove the connector for fan motor from the inverter. 5) Remove the fan motor lead from the fan motor lead fixing rubber of the penetrated part of the partition plate. 6) Remove the fixing screws (4 pcs. each) while supporting the fan motor so that it does not fall. **∗ Cautions when assembling the fan motor** ∗ Tighten the flange nut with 4.95N•m (50kgf.cm). ∗ Adjust length on the fan motor lead fixing rubber so that the fan motor lead does not slacken in order not to put the fan motor lead into contact with the propeller fan. Attach the fan motor lead fixing rubber to the partition plate so that projection directs to the refrigerating cycle side. ∗ Be sure that the rector body does not come to contact with the fan motor lead. ∗ Be sure to bind the removed bundling band with the bundling band on the market. **⚠ CAUTION** Use the metal band of the motor base to fix the fan motor lead on the motor base so that the fan motor lead does not come to contact with the propeller fan.	Propeller fan Loosened by turning clockwise  Propeller fan  Fan motor connector  Fan motor lead fixing rubber  Projection/Refrigerating cycle side Fan motor 

No.	Part name	Procedure	Remarks
⑥	Compressor Compressor lead	**1. Removal of broken compressor** 1) Recover the refrigerant gas. 2) Carry out works of 1 of ① and ② , ③ . 3) Remove the piping panel (Front). Remove screws of the piping panel (Front) and the bottom plate. (screw Ø4 × 10, 2 pcs.) Remove screws of the piping panel (Front) and the piping panel (Rear). (screw Ø4 × 10, 1 pc.) 4) Remove the piping panel (Rear). Remove screws of the piping panel (Rear) and the bottom plate. (screw Ø4 × 10, 2 pcs.) 5) Remove the valve fixing plate. Remove bolts of the valve. (screw Ø6 × 15, 4 pcs.) Remove screws of the valve fixing plate and the partition plate. (ST1T Ø4 × 10, 1 pc.) Remove screws of the valve fixing plate and the accumulator. (ST1T Ø4 × 10, 1 pc.) Cut off the bundling band for the discharge pipe and the suction pipe and then remove each sensor and coil lead of PMV. 6) Remove the sound insulating plate. (Upper side, outer winding, inner winding) 7) Remove terminal cover from the compressor and then remove the compressor lead and also the compressor case thermo. 8) Remove TD sensor fixed to the discharge pipe. 9) Remove the compressor lead. (Leave the ferrite core attached to the electric parts box as it is.) **Control P.C. board** U : CN200 Red V : CN201 White W : CN202 Black (Tightening torque: 1.47 ± 0.1N•m)	   Black pipe cover for heat proof, bundling band for heat proof, each sensor (TL, TO, TE, TD, TS sensors) PMV coil lead  

No.	Part name	Procedure	Remarks
⑥	Compressor Compressor lead (Continued)	10) Using a burner, remove the discharge pipe and the suction pipe connected to the compressor. **⚠ WARNING** In case of removing the piping by broiling the welded part with a burner, if the piping includes oil, it may burst into flames at the moment when wax melted, so take sufficient care. **⚠ CAUTION** Note so that the flame does not catch the 4-way valve and PMV. (An operation may become an error.) 11) Pull off the discharge pipe and the suction pipe of the refrigerating cycle upward. 12) Remove the compressor bolts which fix the compressor to the bottom plate. (3 pcs.) 13) Pull out the compressor toward you. **⚠ CAUTION** The weight of the compressor is 15kg or more, so handle it by 2 workers.	

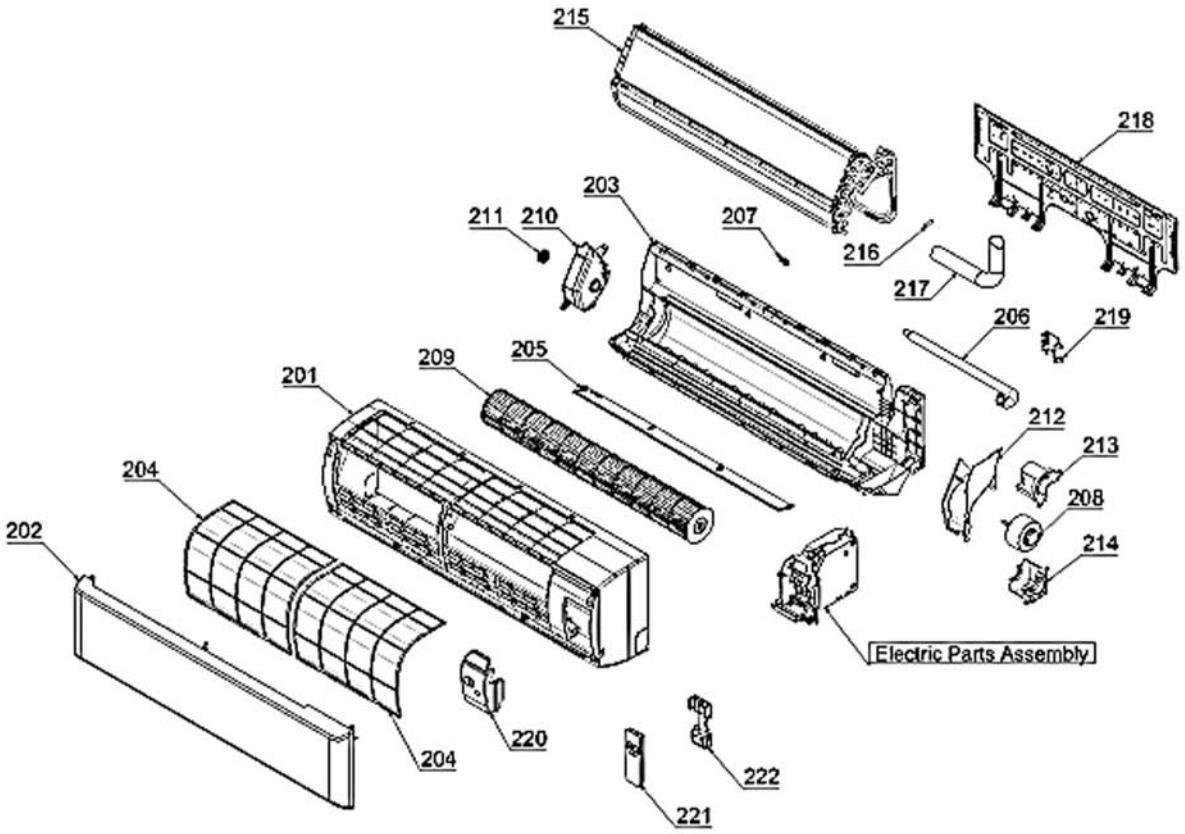
No.	Part name	Procedure	Remarks
⑥	Compressor Compressor lead (Continued)	**2. Mounting of compressor** 1) Mount the compressor in the reverse procedure of removal. **NOTES:** ∗ After exchange of the compressor, be sure to exchange the compressor lead. (Repair part code of compressor lead: 43T41445) In this time, wrap the ferrite core with the compressor lead wire by 4 times. Using bundling band on the market, bind the compressor lead. As the compressor lead is long, be sure that the compressor lead does not contact with the discharge pipe. ∗ Fix the removed each sensor and PMV coil lead wire to the discharge pipe and the suction pipe with the bundling band via the pipe cover. In this time, take note that each sensor and PMV coil lead wire do not come to contact with the discharge pipe and the reactor. (For fixing to the discharge pipe, use the black heat-proof pipe cover and the bundling band for heat-proof which is sold on the market.) ∗ As shown in the right figure, mount the soundproof plate (inner winding, outer winding) by inserting between the compressor and the piping, and between piping and the partition plate. ∗ Put the compressor lead wire and the compressor case thermo between inner winding and outer winding of the soundproof as if dropping them in.	 Using the bundling band on the market, fix the bundle at 2 positions.   Do not make clearance between the soundproof plate (upper) and the soundproof plate (outer winding). 

No.	Part name	Procedure	Remarks
⑥	Compressor Compressor lead (Continued)	**3. Vacuuming** 1) Connect the vacuum pump to the charge port of the gas pipe valve and then drive the vacuum pump. 2) Carry out vacuuming until the vacuum low pressure gauge indicates 1 (mmHg). **NOTE:** Before vacuuming, open PMV fully. If PMV is closed, vacuuming may be impossible between the liquid pipe valve and PMV of the outdoor unit. **Forced full-opening method of PMV** ∗ Turn on the leakage breaker. ∗ Turn on 1 and 3 of DIP SW804 on the control P.C. board of the outdoor unit. ∗ Keep pushing SW801 on the control P.C. board of the outdoor unit for 1 second or more. ∗ After pushing SW801 for 1 second or more, turn off the leakage breaker within 2 minutes. **4. Refrigerant charging** 1) Add the quantity of refrigerant specified by the pipe length into the charge port of the valve.	
⑦	PMV coil	**1. Detachment** 1) Carry out works of 1 of ① and ③. 2) While pulling the coil upward and removing the spring which pinches the copper pipe, remove the coil from PMV main body. **2. Attachment** 1) Match the spring to the copper pipe and fix it.	

No.	Part name	Procedure	Remarks
⑧	Fan guard	**3. Detachment** 1) Carry out works of 1 of ① and ②. **CAUTION** To prevent scratching on the product, handle the product on a cardboard or cloth. 2) Remove the discharge port cabinet and then put on it so that the fan guard side directs downward. 3) Remove the hooking claws (8 positions) of the fan guard. **2. Attachment** 1) Push the hooking claws (8 positions) with hands from the front side to fix the claws. **CAUTION** Check that all the hooking claws are fixed at the specified positions.	

13. EXPLODED VIEWS AND PARTS LIST

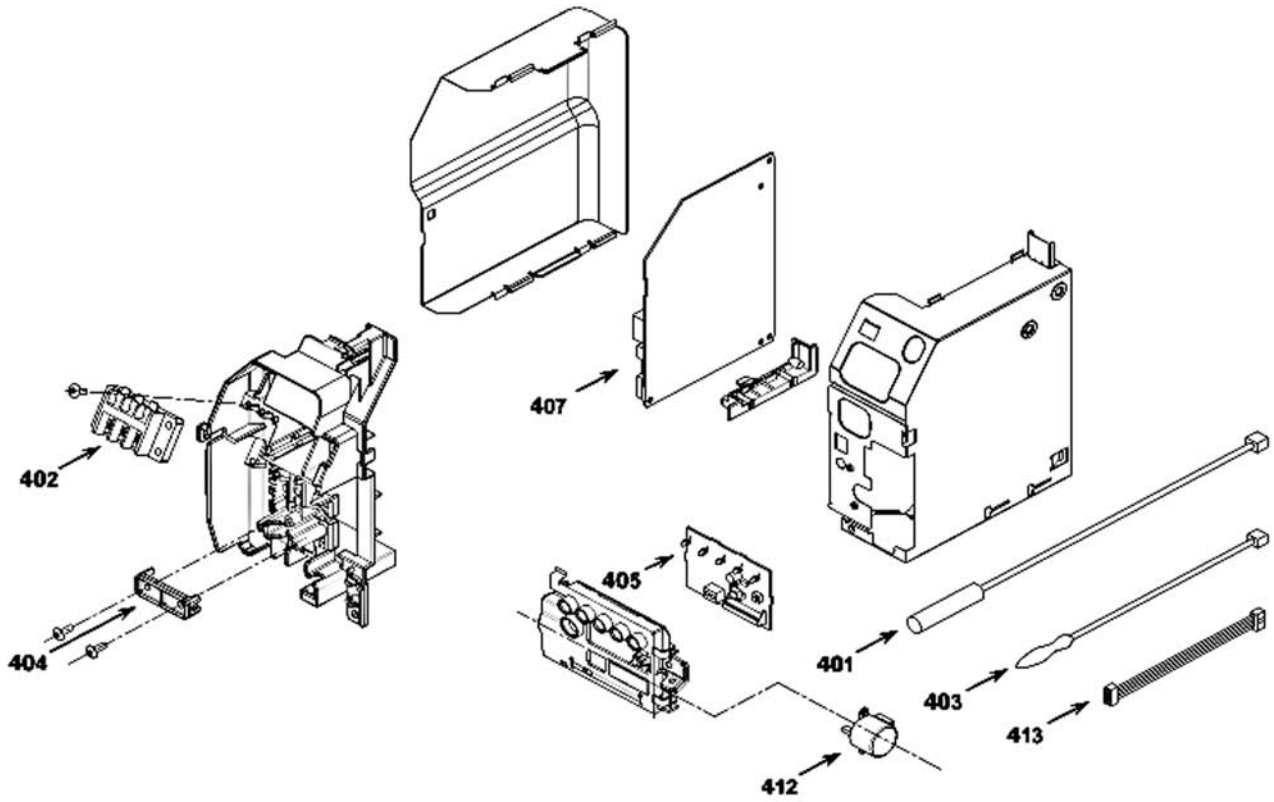
13-1. Indoor Unit



Location No.	Part No.	Description
201	43T00597	FRONT PANEL ASSY
202	43T09469	GRILLE OF AIR INLET ASSY
203	43T03381	BODY ASSY BACK
204	43T80331	FILTER-AIR
205	43T09040	LOUVER, HORIZONTAL
206	43T70313	HOSE, DRAIN
207	43T79313	CAP, DRAIN
208	43T21371	MOTOR, FAN
209	43T20016	FAN, ASSY, CROSS FLOW
210	43T39021	BASE, BEARING
211	43T22312	BEARING ASSY, MOLD

Location No.	Part No.	Description
212	43T39020	BAND, MOTOR, LEFT
213	43T39022	BAND, MOTOR, RIGHT UP
214	43T39023	BAND,MOTOR, RIGHT DOWN
215	43T44460	EVAPORATOR ASSY
216	43T19333	HOLDER, SENSOR
217	43T49010	PIPE, SHIELD
218	43T82008	PLATE, INSTALLATION
219	43T49043	HOLDER, PIPE
220	43T62031	COVER, TERMINAL
221	43T66315	WIRELESS REMOTE CONTROLLER
222	43T83305	HOLDER, REMOTE CONTROL

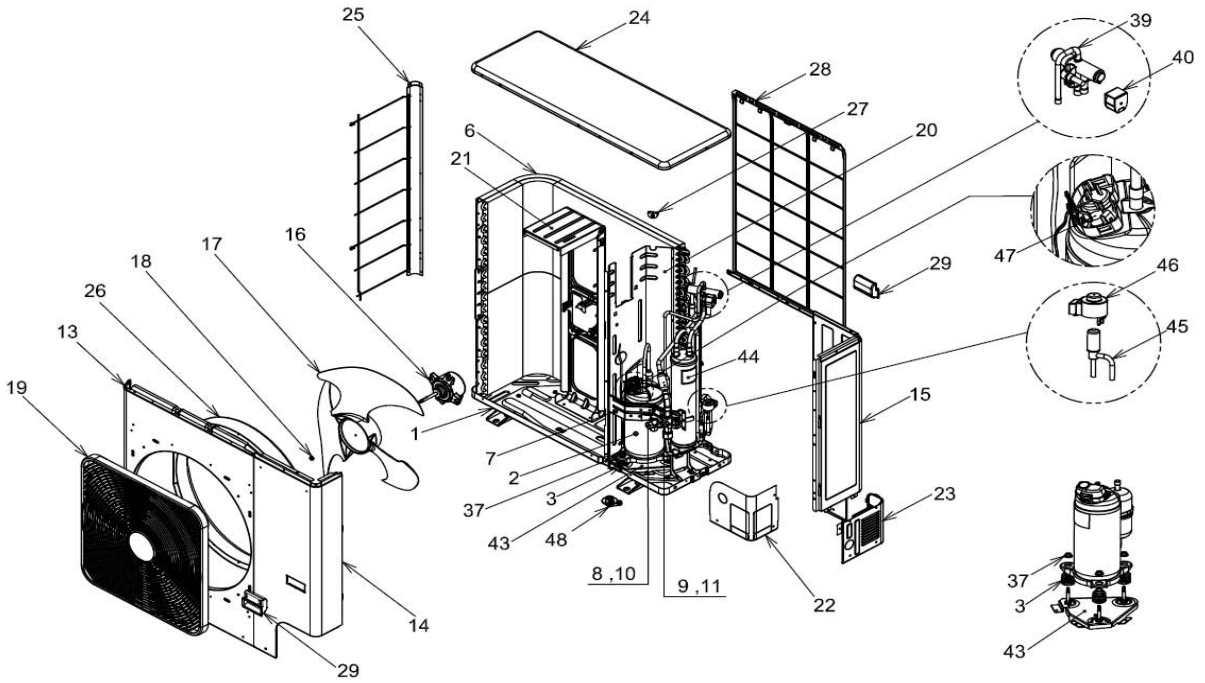
13-2. Indoor Unit (Part-E)



Location No.	Part No.	Description
401	43T50308	SENSOR HEAT EXCHANGER
402	43T60331	TERMINAL; 3P
403	43T69320	TEMPERATURE SENSOR
404	43T62003	CORD CLAMP

Location No.	Part No.	Description
405	43T6V316	PC BOARD ASSY;WRS-LED
407	43T69902	ASM-PCB-SERV
412	43T21397	STEPPING-MOTOR
413	43T60386	MOTOR CORD
414	43T50320	SENSOR HEAT EXCHANGER

13-3. Outdoor Unit

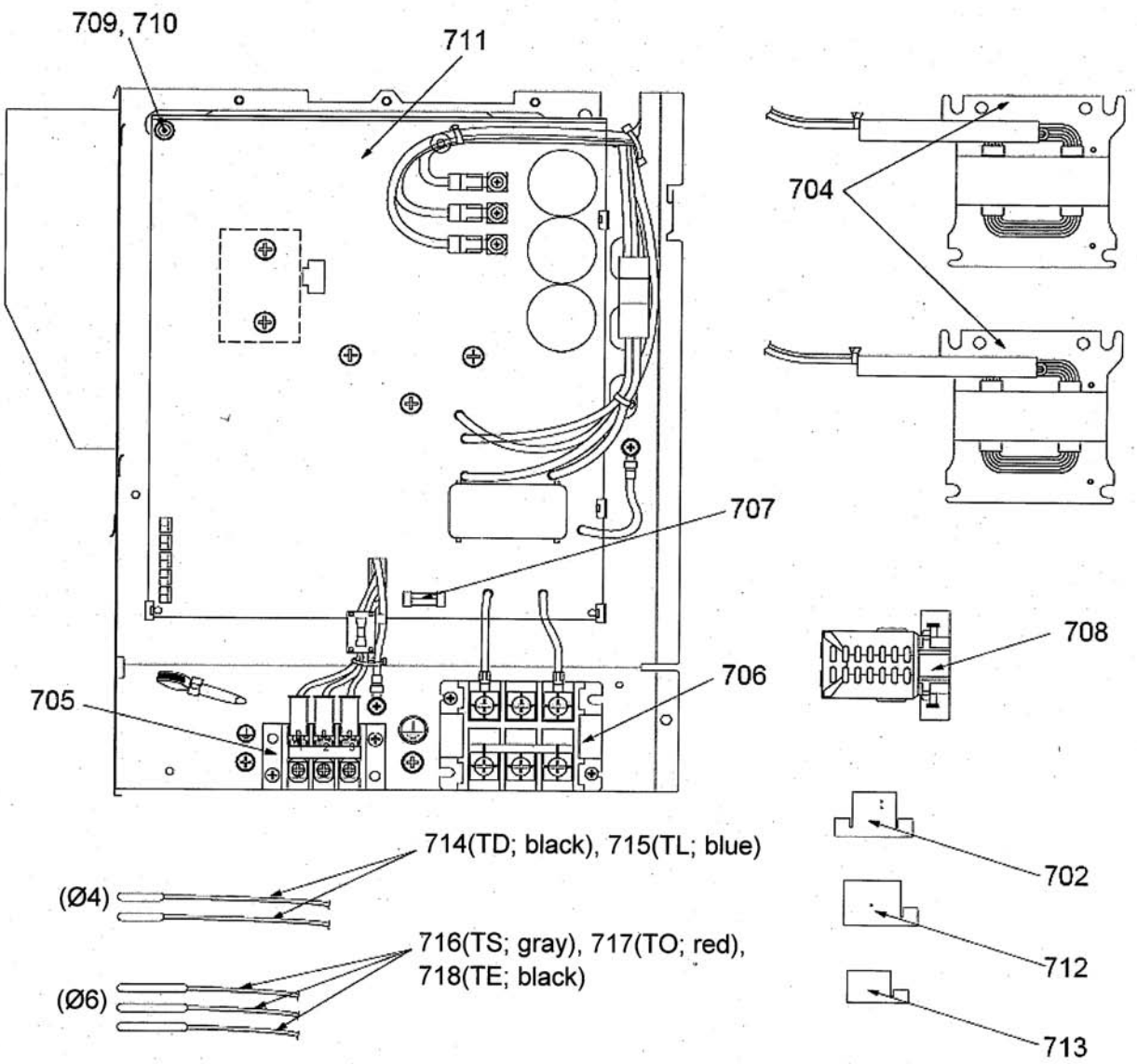


12. CAPILLARY TUBE : ID. 2.0 MM

Location No.	Part No.	Description
1	43T42347	BASE PLATE ASSEMBLY
2	43T41445	COMPRESSOR(DA220A2F-22L)
3	43T49008	CUSHION,RUBBER
6	43T43460	CONDENSER ASSEMBLY
7	43T00565	FIX PLATE VALVE
8	43T46380	VALVE;PACKED 9.52 DIA
9	43T46381	VALVE;BALL 15.88 DIA
10	43T47021	BONNET, 9.52 DIA
11	43T47334	BONNET; 15.88 DIA.
12	43T47370	CAPILLARY TUBE; 2.0 DIA
13	43T00551	AIR OUTLET CABINET
14	43T00566	FRONT PANEL CABINET ASSEMBLY
15	43T00568	RIGHT PANEL CABINET
16	43T21429	FAN MOTOR; ICF-280-A60-1
17	43T20329	PROPELLER FAN
18	43T47001	NUT FLANGE
19	43T19343	FAN GUARD(TOSHIBA)
20	43T04309	PARTITION
21	43T39342	MOTOR BASE

Location No.	Part No.	Description
22	43T00545	FRONT PANEL PIPING CABINET
23	43T00546	BACK PANEL PIPING CABINET
24	43T00564	UPPER CABINET ASSEMBLY
25	43T19346	FIN GUARD ASSEMBLY
26	43T22313	BELLMOUTH
27	43T96305	BUSHING
28	43T19345	FIN GUARD
29	43T71302	HANDLE
37	43T97001	NUT
39	43T46383	VALVE-4WAY
40	43T63344	COIL-V-4WAY
43	43T42348	COMPRESSOR PLATE ASSEMBLY
44	43T48301	ACCUMLATOR ASSEMBLY
45	43T46382	BODY-PMV
46	43T63338	COIL-PMV
47	43T50343	COMPRESSOR THERMOSTAT ASSEMBLY
48	43T79305	DRAIN NIPPLE

13-4. P.C. Board Layout (Outdoor)



Location No.	Part No.	Description
702	43T63318	HOLDER SENSOR
704	43T58307	REACTOR
705	43T60331	TERMINAL; 3P
706	43T60405	TERMINAL 3P
707	43T60413	FUSE
708	43T63335	HOLDER-SENSOR
709	43T61315	SPACER(BUSH)
710	43T61316	SPACER(COLLAR)

Location No.	Part No.	Description
711	43T69904	ASM-PCB-SERV
712	43T63323	HOLDER,SENSOR
713	43T63317	HOLDER,SENSOR
714	43T50334	TEMPERATURE SENSOR
715	43T50335	TEMPERATURE SENSOR
716	43T50336	TEMPERATURE SENSOR
717	43T50337	TEMPERATURE SENSOR
718	43T50338	TEMPERATURE SENSOR

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