TOSHIBA

FILE No. A10-1701

SERVICE MANUAL

AIR-CONDITIONER

SPLIT TYPE

OUTDOOR UNIT

<DIGITAL INVERTER>

RAV-SM2246AT8-E
RAV-SM2806AT8-E
RAV-SM2246AT8-TR
RAV-SM2806AT8-TR
RAV-SM2246AT8J-E
RAV-SM2806AT8J-E

HFC
R410A

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CONTENTS

Original instruction

Please read carefully through these instructions that contain important information which complies with the "Machinery" Directive (Directive 2006/42/EC), and ensure that you understand them.
Some of the details provided in these instructions differ from the service manual, and the instructions provided here take precedence.

Generic Denomination: Air Conditioner

Definition of Qualified Installer or Qualified Service Person

The air conditioner must be installed, maintained, repaired and removed by a qualified installer or qualified service person.
When any of these jobs is to be done, ask a qualified installer or qualified service person to do them for you.
A qualified installer or qualified service person is an agent who has the qualifications and knowledge described in the table below.

Agent	Qualifications and knowledge which the agent must have
Qualified installer (∗1)	• The qualified installer is a person who installs, maintains, relocates and removes the air conditioners made by Toshiba Carrier Corporation. He or she has been trained to install, maintain, relocate and remove the air conditioners made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified installer who is allowed to do the electrical work involved in installation, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the air conditioners made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified installer who is allowed to do the refrigerant handling and piping work involved in installation, relocation and removal has the qualifications pertaining to this refrigerant handling and piping work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to refrigerant handling and piping work on the air conditioners made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified installer who is allowed to work at heights has been trained in matters relating to working at heights with the air conditioners made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.
Qualified service person (∗1)	• The qualified service person is a person who installs, repairs, maintains, relocates and removes the air conditioners made by Toshiba Carrier Corporation. He or she has been trained to install, repair, maintain, relocate and remove the air conditioners made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified service person who is allowed to do the electrical work involved in installation, repair, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the air conditioners made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified service person who is allowed to do the refrigerant handling and piping work involved in installation, repair, relocation and removal has the qualifications pertaining to this refrigerant handling and piping work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to refrigerant handling and piping work on the air conditioners made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified service person who is allowed to work at heights has been trained in matters relating to working at heights with the air conditioners made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.

Definition of Protective Gear

When the air conditioner is to be transported, installed, maintained, repaired or removed, wear protective gloves and 'safety' work clothing.
In addition to such normal protective gear, wear the protective gear described below when undertaking the special work detailed in the table below.
Failure to wear the proper protective gear is dangerous because you will be more susceptible to injury, burns, electric shocks and other injuries.

Work undertaken	Protective gear worn
All types of work	Protective gloves "Safety" working clothing
Electrical-related work	Gloves to provide protection for electricians Insulating shoes Clothing to provide protection from electric shock
Work done at heights (50 cm or more)	Helmets for use in industry
Transportation of heavy objects	Shoes with additional protective toe cap
Repair of outdoor unit	Gloves to provide protection for electricians

The important contents concerned to the safety are described on the product itself and on this Service Manual.
Please read this Service Manual after understanding the described items thoroughly in the following contents (Indications/Illustrated marks), and keep them.

[Explanation of indications]

Indication	Explanation
⚠ **DANGER**	Indicates contents assumed that an imminent danger causing a death or serious injury of the repair engineers and the third parties when an incorrect work has been executed.
⚠ **WARNING**	Indicates possibilities assumed that a danger causing a death or serious injury of the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed.
⚠ **CAUTION**	Indicates contents assumed that an injury or property damage (*) may be caused on the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed.

* Property damage : Enlarged damage concerned to property, furniture, and domestic animal/pet

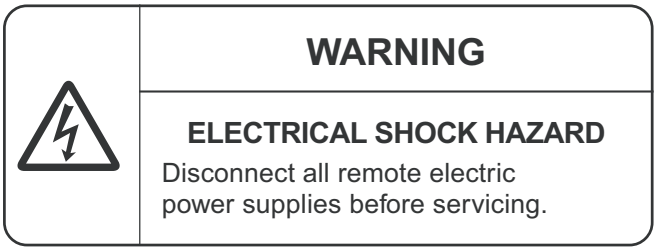
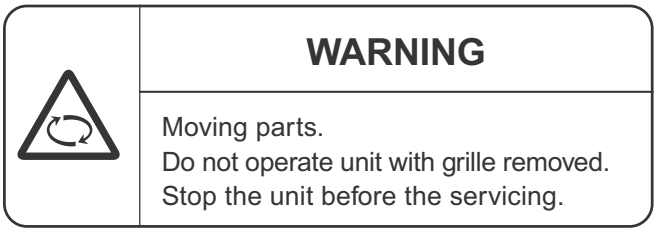
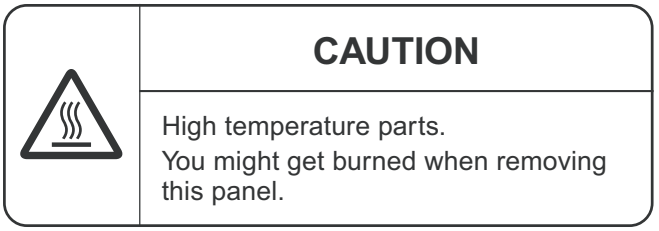
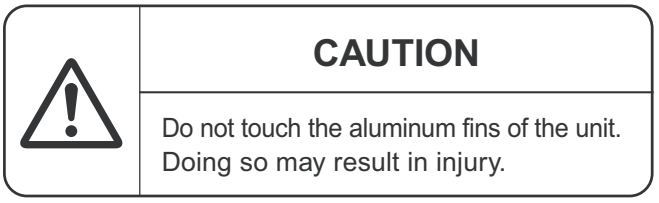
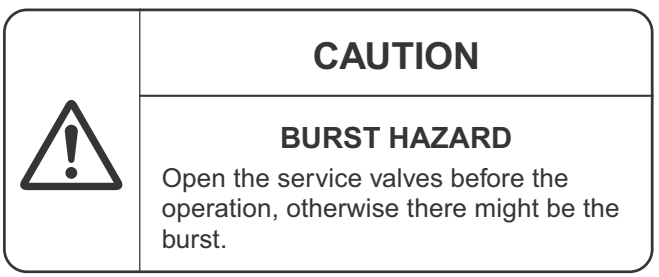
[Explanation of illustrated marks]

Mark	Explanation
	Indicates prohibited items (Forbidden items to do) The sentences near an illustrated mark describe the concrete prohibited contents.
	Indicates mandatory items (Compulsory items to do) The sentences near an illustrated mark describe the concrete mandatory contents.
	Indicates cautions (Including danger/warning) The sentences or illustration near or in an illustrated mark describe the concrete cautious contents.

Warning Indications on the Air Conditioner Unit

[Confirmation of warning label on the main unit]

Confirm that labels are indicated on the specified positions
If removing the label during parts replace, stick it as the original.

Warning indication	Description
	**WARNING** ELECTRICAL SHOCK HAZARD Disconnect all remote electric power supplies before servicing.
	**WARNING** Moving parts. Do not operate unit with grille removed. Stop the unit before the servicing.
	**CAUTION** High temperature parts. You might get burned when removing this panel.
	**CAUTION** Do not touch the aluminum fins of the unit. Doing so may result in injury.
	**CAUTION** **BURST HAZARD** Open the service valves before the operation, otherwise there might be the burst.

Precaution for Safety

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.

⚠ DANGER

 Turn off breaker.	Before carrying out the installation, maintenance, repair or removal work, be sure to set the circuit breaker to the OFF position. Otherwise, electric shocks may result.
	Before opening the intake grille of the indoor unit or service panel of the outdoor unit, set the circuit breaker to the OFF position. Failure to set the circuit breaker to the OFF position may result in electric shocks through contact with the interior parts. Only a qualified installer (∗1) or qualified service person (∗1) is allowed to remove the intake grille of the indoor unit or service panel of the outdoor unit and do the work required.
	Before starting to repair the outdoor unit fan or fan guard, be absolutely sure to set the circuit breaker to the OFF position, and place a “Work in progress” sign on the circuit breaker.
	When cleaning the filter or other parts of the indoor unit, set the circuit breaker to OFF without fail, and place a “Work in progress” sign near the circuit breaker before proceeding with the work.

⚠ WARNING

	Before starting to repair the air conditioner, read carefully through the Service Manual, and repair the air conditioner by following its instructions.
	Only qualified service person (∗1) is allowed to repair the air conditioner. Repair of the air conditioner by unqualified person may give rise to a fire, electric shocks, injury, water leaks and/or other problems.
	Only a qualified installer (∗1) or qualified service person (∗1) is allowed to carry out the electrical work of the air conditioner. Under no circumstances must this work be done by an unqualified individual since failure to carry out the work properly may result in electric shocks and/or electrical leaks.
	Wear protective gloves and safety work clothing during installation, servicing and removal.
	When connecting the electrical wires, repairing the electrical parts or undertaking other electrical jobs, wear gloves to provide protection for electricians, insulating shoes and clothing to provide protection from electric shocks. Failure to wear this protective gear may result in electric shocks.
 General	Use wiring that meets the specifications in the Installation Manual and the stipulations in the local regulations and laws. Use of wiring which does not meet the specifications may give rise to electric shocks, electrical leakage, smoking and/or a fire.
	Only a qualified installer (∗1) or qualified service person (∗1) is allowed to undertake work at heights using a stand of 50 cm or more.
	When working at heights, use a ladder which complies with the ISO 14122 standard, and follow the procedure in the ladder’s instructions. Also wear a helmet for use in industry as protective gear to undertake the work.
	When working at heights, put a sign in place so that no-one will approach the work location, before proceeding with the work. Parts and other objects may fall from above, possibly injuring a person below.
	Do not touch the aluminum fin of the outdoor unit. You may injure yourself if you do so. If the fin must be touched for some reason, first put on protective gloves and safety work clothing, and then proceed.
	Do not climb onto or place objects on top of the outdoor unit. You may fall or the objects may fall off of the outdoor unit and result in injury.
	When transporting the air conditioner, wear shoes with additional protective toe caps.
	When transporting the air conditioner, do not take hold of the bands around the packing carton. You may injure yourself if the bands should break.
	This air conditioner has passed the pressure test as specified in IEC 60335-2-40 Annex EE.

Electric shock hazard	When you access inside of the electric cover to repair electric parts, wait for about five minutes after turning off the breaker. Do not start repairing immediately. Otherwise you may get electric shock by touching terminals of high-voltage capacitors. Natural discharge of the capacitor takes about five minutes.
Prohibition	Place a “Work in progress” sign near the circuit breaker while the installation, maintenance, repair or removal work is being carried out. There is a danger of electric shocks if the circuit breaker is set to ON by mistake.
	When checking the electric parts, removing the cover of the electric parts box of Indoor Unit and/or front panel of Outdoor Unit inevitably to determine the failure, put a sign “Do not enter” around the site before the work. Failure to do this may result in third person getting electric shock.
	Before operating the air conditioner after having completed the work, check that the electrical parts box cover of the indoor unit and service panel of the outdoor unit are closed, and set the circuit breaker to the ON position. You may receive an electric shock if the power is turned on without first conducting these checks.
Stay on protection	If, in the course of carrying out repairs, it becomes absolutely necessary to check out the electrical parts with the electrical parts box cover of one or more of the indoor units and the service panel of the outdoor unit removed in order to find out exactly where the trouble lies, wear insulated heat-resistant gloves, insulated boots and insulated work overalls, and take care to avoid touching any live parts. You may receive an electric shock if you fail to heed this warning. Only qualified service person (∗1) is allowed to do this kind of work.

⚠ WARNING

Check earth wires.	Before troubleshooting or repair work, check the earth wire is connected to the earth terminals of the main unit, otherwise an electric shock is caused when a leak occurs.If the earth wire is not correctly connected, contact an electric engineer for rework.
	After completing the repair or relocation work, check that the ground wires are connected properly.
	Be sure to connect earth wire. (Grounding work) Incomplete grounding causes an electric shock. Do not connect ground wires to gas pipes, water pipes, and lightning rods or ground wires for telephone wires.
Prohibition of modification.	Do not modify the products.Do not also disassemble or modify the parts. It may cause a fire, electric shock or injury.
Use specified parts.	When any of the electrical parts are to be replaced, ensure that the replacement parts satisfy the specifications given in the Service Manual (or use the parts contained on the parts list in the Service Manual). Use of any parts which do not satisfy the required specifications may give rise to electric shocks, smoking and/or a fire.
Do not bring a child close to the equipment.	If, in the course of carrying out repairs, it becomes absolutely necessary to check out the electrical parts with the electrical parts box cover of one or more of the indoor units and the service panel of the outdoor unit removed in order to find out exactly where the trouble lies, place "Keep out" signs around the work site before proceeding. Third-party individuals may enter the work site and receive electric shocks if this warning is not heeded.
Insulating measures	Connect the cut-off lead wires with crimp contact, etc, put the closed end side upward and then apply a water-cut method, otherwise a leak or production of fire is caused at the users’ side.

 No fire	When performing repairs using a gas burner, replace the refrigerant with nitrogen gas because the oil that coats the pipes may otherwise burn. When repairing the refrigerating cycle, take the following measures. 1) Be attentive to fire around the cycle. When using a gas stove, etc, be sure to put out fire before work; otherwise the oil mixed with refrigerant gas may catch fire. 2) Do not use a welder in the closed room. When using it without ventilation, carbon monoxide poisoning may be caused. 3) Do not bring inflammables close to the refrigerant cycle, otherwise fire of the welder may catch the inflammables.
 Refrigerant	The refrigerant used by this air conditioner is the R410A.
	Check the used refrigerant name and use tools and materials of the parts which match with it. For the products which use R410A refrigerant, the refrigerant name is indicated at a position on the outdoor unit where is easy to see. To prevent miss-charging, the route of the service port is changed from one of the former R22.
	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.
	For an air conditioner which uses R410A, never use other refrigerant than R410A. For an air conditioner which uses other refrigerant (R22, etc.), never use R410A. If different types of refrigerant are mixed, abnormal high pressure generates in the refrigerating cycle and an injury due to breakage may be caused.
	Do not charge refrigerant additionally. If charging refrigerant additionally when refrigerant gas leaks, the refrigerant composition in the refrigerating cycle changes resulted in change of air conditioner characteristics or refrigerant over the specified standard amount is charged and an abnormal high pressure is applied to the inside of the refrigerating cycle resulted in cause of breakage or injury. Therefore if the refrigerant gas leaks, recover the refrigerant in the air conditioner, execute vacuuming, and then newly recharge the specified amount of liquid refrigerant. In this time, never charge the refrigerant over the specified amount.
	When recharging the refrigerant in the refrigerating cycle, do not mix the refrigerant or air other than R410A into the specified refrigerant. If air or others is mixed with the refrigerant, abnormal high pressure generates in the refrigerating cycle resulted in cause of injury due to breakage.
	After the installation work, confirm that refrigerant gas does not leak. If refrigerant gas leaks into the room and flows near a fire source, such as a cooking range, noxious gas may be generated.
	Never recover the refrigerant into the outdoor unit. When the equipment is moved or repaired, be sure to recover the refrigerant with recovering device. The refrigerant cannot be recovered in the outdoor unit; otherwise a serious accident such as breakage or injury is caused.
 Assembly/ Cabling	After repair work, surely assemble the disassembled parts, and connect and lead the removed wires as before. Perform the work so that the cabinet or panel does not catch the inner wires. If incorrect assembly or incorrect wire connection was done, a disaster such as a leak or fire is caused at user's side.
 Insulator check	After the work has finished, be sure to use an insulation tester set (500V Megger) to check the resistance is 1MΩ or more between the charge section and the non-charge metal section (Earth position). If the resistance value is low, a disaster such as a leak or electric shock is caused at user's side.
 Ventilation	When the refrigerant gas leaks during work, execute ventilation. If the refrigerant gas touches to a fire, poisonous gas generates. A case of leakage of the refrigerant and the closed room full with gas is dangerous because a shortage of oxygen occurs. Be sure to execute ventilation.
	If refrigerant gas has leaked during the installation work, ventilate the room immediately. If the leaked refrigerant gas comes in contact with fire, noxious gas may generate.

 Compulsion	When the refrigerant gas leaks, find up the leaked position and repair it surely. If the leaked position cannot be found up and the repair work is interrupted, pump-down and tighten the service valve, otherwise the refrigerant gas may leak into the room. The poisonous gas generates when gas touches to fire such as fan heater, stove or cocking stove though the refrigerant gas itself is innocuous. When installing equipment which includes a large amount of charged refrigerant such as a multi air conditioner in a sub-room, it is necessary that the density does not the limit even if the refrigerant leaks. If the refrigerant leaks and exceeds the limit density, an accident of shortage of oxygen is caused.
	Tighten the flare nut with a torque wrench in the specified manner. Excessive tighten of the flare nut may cause a crack in the flare nut after a long period, which may result in refrigerant leakage.
	Nitrogen gas must be used for the airtight test.
	The charge hose must be connected in such a way that it is not slack.
	For the installation/moving/reinstallation work, follow to the Installation Manual. If an incorrect installation is done, a trouble of the refrigerating cycle, water leak, electric shock or fire is caused.
 Check after repair	Once the repair work has been completed, check for refrigerant leaks, and check the insulation resistance and water drainage. Then perform a trial run to check that the air conditioner is running properly.
	After repair work has finished, check there is no trouble. If check is not executed, a fire, electric shock or injury may be caused. For a check, turn off the power breaker.
	After repair work (installation of front panel and cabinet) has finished, execute a test run to check there is no generation of smoke or abnormal sound. If check is not executed, a fire or an electric shock is caused. Before test run, install the front panel and cabinet.
 Do not operate the unit with the valve closed.	Check the following matters before a test run after repairing piping. • Connect the pipes surely and there is no leak of refrigerant. • The valve is opened. Running the compressor under condition that the valve closes causes an abnormal high pressure resulted in damage of the parts of the compressor and etc. and moreover if there is leak of refrigerant at connecting section of pipes, the air is suctioned and causes further abnormal high pressure resulted in burst or injury.
 Check after reinstallation	Only a qualified installer (∗1) or qualified service person (∗1) is allowed to relocate the air conditioner. It is dangerous for the air conditioner to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
	Check the following items after reinstallation. 1) The earth wire is correctly connected. 2) The power cord is not caught in the product. 3) There is no inclination or unsteadiness and the installation is stable. If check is not executed, a fire, an electric shock or an injury is caused.
	When carrying out the pump-down work shut down the compressor before disconnecting the refrigerant pipe. Disconnecting the refrigerant pipe with the service valve left open and the compressor still operating will cause air, etc. to be sucked in, raising the pressure inside the refrigeration cycle to an abnormally high level, and possibly resulting in reputing, injury, etc.
 Cooling check	When the service panel of the outdoor unit is to be opened in order for the compressor or the area around this part to be repaired immediately after the air conditioner has been shut down, set the circuit breaker to the OFF position, and then wait at least 10 minutes before opening the service panel. If you fail to heed this warning, you will run the risk of burning yourself because the compressor pipes and other parts will be very hot to the touch. In addition, before proceeding with the repair work, wear the kind of insulated heat-resistant gloves designed to protect electricians.
	When the service panel of the outdoor unit is to be opened in order for the fan motor, reactor, inverter or the areas around these parts to be repaired immediately after the air conditioner has been shut down, set the circuit breaker to the OFF position, and then wait at least 10 minutes before opening the service panel. If you fail to heed this warning, you will run the risk of burning yourself because the fan motor, reactor, inverter heat sink and other parts will be very hot to the touch. In addition, before proceeding with the repair work, wear the kind of insulated heat-resistant gloves designed to protect electricians.

 Installation	Only a qualified installer (∗1) or qualified service person (∗1) is allowed to install the air conditioner. If the air conditioner is installed by an unqualified individual, a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
	Before starting to install the air conditioner, read carefully through the Installation Manual, and follow its instructions to install the air conditioner.
	Do not install the air conditioner in a location that may be subject to a risk of expire to a combustible gas. If a combustible gas leaks and becomes concentrated around the unit, a fire may occur.
	When transporting the air conditioner, use a forklift and when moving the air conditioner by hand, move the unit with 6 people.
	Install a circuit breaker that meets the specifications in the installation manual and the stipulations in the local regulations and laws.
	Install the circuit breaker where it can be easily accessed by the agent.
	Do not place any combustion appliance in a place where it is directly exposed to the wind of air conditioner, otherwise it may cause imperfect combustion.

Explanations given to user

- If you have discovered that the fan grille is damaged, do not approach the outdoor unit but set the circuit breaker to the OFF position, and contact a qualified service person to have the repairs done.
  Do not set the circuit breaker to the ON position until the repairs are completed.

Relocation

- Only a qualified installer (∗1) or qualified service person (∗1) is allowed to relocate the air conditioner.
  It is dangerous for the air conditioner to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
- When carrying out the pump-down work shut down the compressor before disconnecting the refrigerant pipe.
  Disconnecting the refrigerant pipe with the service valve left open and the compressor still operating will cause air, etc. to be sucked in, raising the pressure inside the refrigeration cycle to an abnormally high level, and possibly resulting in reputing, injury, etc.

(∗1) Refer to the “Definition of Qualified Installer or Qualified Service Person.”

Declaration of Conformity

Manufacturer: TOSHIBA CARRIER CORPORATION
336 Tadehara, Fuji-shi, Shizuoka-ken 416-8521 JAPAN

TCF holder: TOSHIBA CARRIER EUROPE S.A.S
Route de Thil
01120 Montluel FRANCE

Hereby declares that the machinery described below:

Generic Denomination: Air Conditioner

Model/type: RAV-SM2246AT8-E, RAV-SM2246AT8J-E
RAV-SM2806AT8-E, RAV-SM2806AT8J-E
RAV-SM2246AT8-TR, RAV-SM2806AT8-TR

Commercial name: Digital Inverter Series Air Conditioner

Complies with the provisions of the “Machinery” Directive (Directive 2006/42/EC) and the regulations transposing into national law

Note: This declaration becomes invalid if technical or operational modifications are introduced without the manufacturer’s consent.

Specifications

Model	Sound presser level (dBA)		Weight (kg)
	Cooling	Heating	
RAV-SM2246AT8-E	∗	∗	142
RAV-SM2246AT8J-E	∗	∗	142
RAV-SM2806AT8-E	∗	∗	142
RAV-SM2806AT8J-E	∗	∗	142
RAV-SM2246AT8-TR	∗	∗	142
RAV-SM2806AT8-TR	∗	∗	142

∗ Under 70 dBA

Refrigerant R410A

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

1. Safety Caution Concerned to Refrigerant R410A

The pressure of R410A is high 1.6 times of that of the former refrigerant (R22).
Accompanied with change of refrigerant, the refrigerating oil has been also changed.
Therefore, be sure that water, dust, the former refrigerant or the former refrigerating oil is not mixed into the refrigerating cycle of the air conditioner with refrigerant R410A during installation work or service work.
If an incorrect work or incorrect service is performed, there is a possibility to cause a serious accident.
Use the tools and materials exclusive to R410A to purpose a safe work.

2. Cautions on Installation/Service

1) Do not mix the other refrigerant or refrigerating oil.
   For the tools exclusive to R410A, shapes of all the joints including the service port differ from those of the former refrigerant in order to prevent mixture of them.
2) As the use pressure of the refrigerant R410A is high, use material thickness of the pipe and tools which are specified for R410A.
3) In the installation time, use clean pipe materials and work with great attention so that water and others do not mix in because pipes are affected by impurities such as water, oxide scales, oil, etc.
   Use the clean pipes.
   Be sure to brazing with flowing nitrogen gas. (Never use gas other than nitrogen gas.)
4) For the earth protection, use a vacuum pump for air purge.
5) R410A refrigerant is azeotropic mixture type refrigerant.
   Therefore use liquid type to charge the refrigerant. (If using gas for charging, composition of the refrigerant changes and then characteristics of the air conditioner change.)

3. Pipe Materials

For the refrigerant pipes, copper pipe and joints are mainly used.
It is necessary to select the most appropriate pipes to conform to the standard.
Use clean material in which impurities adhere inside of pipe or joint to a minimum.

1) Copper pipe

<Piping>

The pipe thickness, flare finishing size, flare nut and others differ according to a refrigerant type.
When using a long copper pipe for R410A, it is recommended to select “Copper or copper-base pipe without seam” and one with bonded oil amount 40mg/10m or less.
Also do not use crushed, deformed, discolored (especially inside) pipes.
(Impurities cause clogging of expansion valves and capillary tubes.)

<Flare nut>

Use the flare nuts which are attached to the air conditioner unit.

2) Joint

The flare joint and socket joint are used for joints of the copper pipe.
The joints are rarely used for installation of the air conditioner.
However clear impurities when using them.

4. Tools

1. Required Tools for R410A

Mixing of different types 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 conditioner installation		Conventional air conditioner installation
			Existence of new equipment for R410A	Whether conventional equipment can be used	Whether conventional equipment can be used
①	Flare tool	Pipe flaring	Yes	∗ (Note)	Yes
②	Copper pipe gauge for adjusting projection margin	Flaring by conventional flare tool	Yes	∗ (Note)	∗ (Note)
③	Torque wrench	Tightening 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	Yes	Yes
⑧	Refrigerant cylinder	Refrigerant charge	Yes	No	No
⑨	Leakage detector	Gas leakage check	Yes	No	Yes

(Note) 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.

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
3) Pipe cutter
4) Reamer
5) Pipe bender
6) Level vial
7) Screwdriver (+, –)
8) Spanner or Monkey wrench
9) Hole core drill
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 (Megger)
4) Electroscope

■ Combination Pattern (Indoor Unit / Outdoor Unit)

<RAV-SM2246AT series>

Single

Concealed Duct High Static Pressure Type
RAV-SM2244DTP-E

Simultaneous twin

4-way cassette type	Concealed duct type	Ceiling type
RAV-SM1104UTP-E ×2	RAV-SM1106BTP-E1 ×2	RAV-SM1108CTP-E ×2

Simultaneous triple

4-way cassette type	Concealed duct type	Ceiling type	High wall type
RAV-SM804UTP-E ×3	RAV-SM806BTP-E1 ×3	RAV-SM808CTP-E ×3	RAV-SM806KRT-E ×3

Simultaneous double twin

4-way cassette type	Compact 4-way cassette type	Slim duct type
RAV-SM564UTP-E ×4	RAV-SM567MUT-E ×4	RAV-SM564SDT-E ×4

Concealed duct type	Ceiling type	High wall type
RAV-SM566BTP-E1 ×4	RAV-SM568CTP-E ×4	RAV-SM566KRT-E ×4

<RAV-SM2806AT series>

Single

Concealed Duct High Static Pressure Type
RAV-SM2804DTP-E

Simultaneous twin

4-way cassette type	Concealed duct type	Ceiling type
RAV-SM1404UTP-E ×2	RAV-SM1406BTP-E ×2	RAV-SM1408CTP-E ×2

Simultaneous triple

4-way cassette type	Concealed duct type	Ceiling type	High wall type
RAV-SM804UTP-E ×3	RAV-SM806BTP-E1 ×3	RAV-SM808CTP-E ×3	RAV-SM806KRT-E ×3

Simultaneous double twin

4-way cassette type	Concealed duct type	Ceiling type	High wall type
RAV-SM804UTP-E ×4	RAV-SM806BTP-E1 ×4	RAV-SM808CTP-E ×4	RAV-SM806KRT-E ×4

	RAV-SM224AT series	Branch kit
Simultaneous twin	SM110 — SM110	RBC-TWP101E
Simultaneous triple	SM80 — SM80 — SM80	RBC-TRP100E
Simultaneous double twin	SM56 — SM56 — SM56 — SM56	RBC-DTWP101E

	RAV-SM280AT series	Branch kit
Simultaneous twin	SM140 — SM140	RBC-TWP101E
Simultaneous triple	SM80 — SM80 — SM80	RBC-TRP100E
Simultaneous double twin	SM80 — SM80 — SM80 — SM80	RBC-DTWP101E

1. SPECIFICATIONS

1-1. Indoor Unit

1-1-1. 4-Way Cassette Type

<Double twin type>

Model		**Indoor unit 1**			**RAV-SM**	**564UTP-E**	**804UTP-E**
		Indoor unit 2			**RAV-SM**	**564UTP-E**	**804UTP-E**
		Indoor unit 3			**RAV-SM**	**564UTP-E**	**804UTP-E**
		Indoor unit 4			**RAV-SM**	**564UTP-E**	**804UTP-E**
		Outdoor unit			**RAV-SM**	**2246AT8-E**	**2806AT8-E**
Cooling capacity					(kW)	20.0	23.5
Heating capacity					(kW)	22.4	27.0
Power supply						3phase 380-415V/50Hz	
Indoor unit							
Electrical characteristics	Cooling	Running current			(A)	8.99-8.23	12.79-11.71
		Power consumption			(kW)	5.56	7.83
		Power factor			(%)	94	93
		EER				3.60	3.00
		Energy efficiency class				-	-
	Heating	Running current			(A)	8.83-8.08	12.02-11.01
		Power consumption			(kW)	5.46	7.36
		Power factor			(%)	94	93
		COP				4.10	3.67
		Energy efficiency class				-	-
		Maximum current			(A)	18.0	23.0
Fan unit		Fan				turbo fan	turbo fan
		Standard air flow		H/M/L	(m^3/min)	17.5/14.5/13.0	20.5/16.0/13.5
		Motor			(W)	14	20
Sound pressure level				H/M/L	(dB-A)	32/29/28	35/31/28
Sound power level				H/M/L	(dB-A)	47/44/43	50/46/43
Outdoor unit							
Outer dimension	Max total length				(m)	100	100
	Min length				(m)	5	5
	Height difference		Outdoor lower		(m)	30	30
			Outdoor high		(m)	30	30
Fan unit	Fan				(m)	Propeller fan	Propeller fan
	Standard air flow high			H/M/L	(m^3/min)	153	182
	Motor				(W)	200+200	200+200
Connecting pipe	Outdoor unit - First Pipe branch			Gas side	(mm)	28.6	28.6
				Liquid side	(mm)	12.7	12.7
	First Pipe branch- Second Pipe branch			Gas side	(mm)	15.9	15.9
				Liquid side	(mm)	9.5	9.5
	Second Pipe branch- indoor unit			Gas side	(mm)	12.7	15.9
				Liquid side	(mm)	6.4	9.5
Sound pressure level			Cooling/Heating		(dB-A)	58/60	61/63
Sound power level			Cooling/Heating		(dB-A)	76/76	78/80

1-1-2. Compact 4-Way Cassette Type

<Double twin type>

Model		**Indoor unit 1**		**RAV-SM**	**567MUT-E**
		Indoor unit 2		**RAV-SM**	**567MUT-E**
		Indoor unit 3		**RAV-SM**	**567MUT-E**
		Indoor unit 4		**RAV-SM**	**567MUT-E**
		Outdoor unit		**RAV-SM**	**2246AT8-E**
Cooling capacity				(kW)	20.0
Heating capacity				(kW)	22.4
Power supply					3phase 380-415V/50Hz
Indoor unit					
Electrical characteristics	Cooling	Running current		(A)	10.26-9.40
		Power consumption		(kW)	6.35
		Power factor		(%)	93
		EER			3.15
		Energy efficiency class			-
	Heating	Running current		(A)	10.20-9.34
		Power consumption		(kW)	6.31
		Power factor		(%)	94
		COP			3.55
		Energy efficiency class			-
		Maximum current		(A)	18.0
Fan unit		Fan			turbo fan
		Standard air flow	H/M+/M/L+/L	(m^3/min)	13.3/12.0/11.2/9.4/9.1
		Motor		(W)	60
Sound pressure level			H/M+/M/L+/L	(dB-A)	44/42/39/36/35
Sound power level			H/M+/M/L+/L	(dB-A)	59/57/54/51/50
Outdoor unit					
Outer dimension	Max total length			(m)	100
	Min length			(m)	5
	Height difference	Outdoor lower		(m)	30
		Outdoor high		(m)	30
Fan unit	Fan				Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153
	Motor			(W)	200+200
Connecting pipe	Outdoor unit - First Pipe branch		Gas side	(mm)	28.6
			Liquid side	(mm)	12.7
	First Pipe branch- Second Pipe branch		Gas side	(mm)	15.9
			Liquid side	(mm)	9.5
	Second Pipe branch- indoor unit		Gas side	(mm)	12.7
			Liquid side	(mm)	6.4
Sound pressure level		Cooling/Heating		(dB-A)	58/60
Sound power level		Cooling/Heating		(dB-A)	76/76

1-1-3. Duct Type

<Double twin type>

Model		**Indoor unit 1**			**RAV-SM**	**566BTP-E1**	**806BTP-E1**
		Indoor unit 2			**RAV-SM**	**566BTP-E1**	**806BTP-E1**
		Indoor unit 3			**RAV-SM**	**566BTP-E1**	**806BTP-E1**
		Indoor unit 4			**RAV-SM**	**566BTP-E1**	**806BTP-E1**
		Outdoor unit			**RAV-SM**	**2246AT8-E**	**2406AT8-E**
Cooling capacity					(kW)	20.0	23.5
Heating capacity					(kW)	22.4	27.0
Power supply						3phase 380-415V/50Hz	
Indoor unit							
Electrical characteristics	Cooling	Running current			(A)	9.97-9.13	14.49-13.27
		Power consumption			(kW)	6.17	8.87
		Power factor			(%)	94	93
		EER				3.24	2.65
		Energy efficiency class				-	-
	Heating	Running current			(A)	9.28-8.50	12.60-11.53
		Power consumption			(kW)	5.74	7.71
		Power factor			(%)	94	93
		COP				3.90	3.50
		Energy efficiency class				-	-
		Maximum current			(A)	18.0	23.0
Fan unit		Fan				Centrifugal fan	Centrifugal fan
		Standard air flow		H/M/L	(m^3/min)	13.3/11.0/9.0	20/16.5/14.5
		Motor			(W)	150	150
Sound pressure level				H/M/L	(dB-A)	33/29/25	34/30/26
Sound power level				H/M/L	(dB-A)	55/51/46	55/51/46
Outdoor unit							
Outer dimension	Max total length				(m)	100	100
	Min length				(m)	5	5
	Height difference		Outdoor lower		(m)	30	30
			Outdoor high		(m)	30	30
Fan unit	Fan					Propeller fan	Propeller fan
	Standard air flow high			H/M/L	(m^3/min)	153	182
	Motor				(W)	200+200	200+200
Connecting pipe	Outdoor unit - First Pipe branch			Gas side	(mm)	28.6	28.6
				Liquid side	(mm)	12.7	12.7
	First Pipe branch- Second Pipe branch			Gas side	(mm)	15.9	15.9
				Liquid side	(mm)	9.5	9.5
	Second Pipe branch- indoor unit			Gas side	(mm)	12.7	15.9
				Liquid side	(mm)	6.4	9.5
Sound pressure level			Cooling/Heating		(dB-A)	58/60	61/63
Sound power level			Cooling/Heating		(dB-A)	76/76	78/80

1-1-4. Slim Duct Type

<Double twin type>

Model		**Indoor unit 1**		**RAV-SM**	**564SDT-E**
		Indoor unit 2		**RAV-SM**	**564SDT-E**
		Indoor unit 3		**RAV-SM**	**564SDT-E**
		Indoor unit 4		**RAV-SM**	**564SDT-E**
		Outdoor unit		**RAV-SM**	**2246AT8-E**
Cooling capacity				(kW)	20.0
Heating capacity				(kW)	22.4
Power supply					3phase 380-415V/50Hz
Indoor unit					
Electrical characteristics	Cooling	Running current		(A)	10.78-9.87
		Power consumption		(kW)	6.67
		Power factor		(%)	94
		EER			3.00
		Energy efficiency class			-
	Heating	Running current		(A)	10.20-9.34
		Power consumption		(kW)	6.31
		Power factor		(%)	94
		COP			3.55
		Energy efficiency class			-
		Maximum current		(A)	18.0
Fan unit		Fan			Centrifugal fan
		Standard air flow	H/M/L	(m^3/min)	13.0/11.3/9.7
		Motor		(W)	60
Sound pressure level			H/M/L	(dB-A)	45/40/36
Sound power level			H/M/L	(dB-A)	60/55/51
Outdoor unit					
Outer dimension	Max total length			(m)	100
	Min length			(m)	5
	Height difference	Outdoor lower		(m)	30
		Outdoor high		(m)	30
Fan unit	Fan				Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153
	Motor			(W)	200+200
Connecting pipe	Outdoor unit - First Pipe branch		Gas side	(mm)	28.6
			Liquid side	(mm)	12.7
	First Pipe branch- Second Pipe branch		Gas side	(mm)	15.9
			Liquid side	(mm)	9.5
	Second Pipe branch- indoor unit		Gas side	(mm)	12.7
			Liquid side	(mm)	6.4
Sound pressure level		Cooling/Heating		(dB-A)	58/60
Sound power level		Cooling/Heating		(dB-A)	76/76

1-1-5. Ceiling Type

<Double twin type>

Model		**Indoor unit 1**		**RAV-SM**	**568CTP-E**	**808CTP-E**
		Indoor unit 2		**RAV-SM**	**568CTP-E**	**808CTP-E**
		Indoor unit 3		**RAV-SM**	**568CTP-E**	**808CTP-E**
		Indoor unit 4		**RAV-SM**	**568CTP-E**	**808CTP-E**
		Outdoor unit		**RAV-SM**	**2246AT8-E**	**2806AT8-E**
Cooling capacity				(kW)	20.0	23.5
Heating capacity				(kW)	22.4	27.0
Power supply					3phase 380-415V/50Hz	
Indoor unit						
Electrical characteristics	Cooling	Running current		(A)	9.97-9.13	14.65-13.42
		Power consumption		(kW)	6.17	8.97
		Power factor		(%)	94	93
		EER			3.24	2.62
		Energy efficiency class			-	-
	Heating	Running current		(A)	9.52-8.72	12.79-11.71
		Power consumption		(kW)	5.89	7.83
		Power factor		(%)	94	93
		COP			3.80	3.45
		Energy efficiency class			-	-
		Maximum current		(A)	18.0	23.0
Fan unit		Fan			Centrifugal fan	Centrifugal fan
		Standard air flow	H/M/L	(m^3/min)	15.0/12.0/9.0	23.5/16.7/12.5
		Motor		(W)	94	94
Sound pressure level			H/M/L	(dB-A)	37/35/28	41/36/29
Sound power level			H/M/L	(dB-A)	52/50/43	56/51/44
Outdoor unit						
Outer dimension	Max total length			(m)	100	100
	Min length			(m)	5	5
	Height difference	Outdoor lower		(m)	30	30
		Outdoor high		(m)	30	30
Fan unit	Fan				Propeller fan	Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153	182
	Motor			(W)	200+200	200+200
Connecting pipe	Outdoor unit - First Pipe branch		Gas side	(mm)	28.6	28.6
			Liquid side	(mm)	12.7	12.7
	First Pipe branch- Second Pipe branch		Gas side	(mm)	15.9	15.9
			Liquid side	(mm)	9.5	9.5
	Second Pipe branch- indoor unit		Gas side	(mm)	12.7	15.9
			Liquid side	(mm)	6.4	9.5
Sound pressure level		Cooling/Heating		(dB-A)	58/60	61/63
Sound power level		Cooling/Heating		(dB-A)	76/76	78/80

1-1-6. High Wall Type

<Double twin type>

Model		**Indoor unit 1**		**RAV-SM**	**566KRT-E**	**806KRT-E**
		Indoor unit 2		**RAV-SM**	**566KRT-E**	**806KRT-E**
		Indoor unit 3		**RAV-SM**	**566KRT-E**	**806KRT-E**
		Indoor unit 4		**RAV-SM**	**566KRT-E**	**806KRT-E**
		Outdoor unit		**RAV-SM**	**2246AT8-E**	**2806AT8-E**
Cooling capacity				(kW)	20.0	23.5
Heating capacity				(kW)	22.4	27.0
Power supply					3phase 380-415V/50Hz	
Indoor unit						
Electrical characteristics	Cooling	Running current		(A)	10.78-9.87	15.06-13.79
		Power consumption		(kW)	6.67	9.22
		Power factor		(%)	94	93
		EER			3.00	2.55
		Energy efficiency class			-	-
	Heating	Running current		(A)	10.20-9.34	12.94-11.85
		Power consumption		(kW)	6.31	7.92
		Power factor		(%)	94	93
		COP			3.55	3.41
		Energy efficiency class			-	-
		Maximum current		(A)	18.0	23.0
Fan unit		Fan			Cross flow fan	Cross flow fan
		Standard air flow	H/M/L	(m^3/min)	14.0/12.5/11.0	17.0/12.5/11.0
		Motor		(W)	30	30
Sound pressure level			H/M/L	(dB-A)	42/39/36	47/41/36
Sound power level			H/M/L	(dB-A)	57/54/51	62/56/51
Outdoor unit						
Outer dimension	Max total length			(m)	100	100
	Min length			(m)	5	5
	Height difference	Outdoor lower		(m)	30	30
		Outdoor high		(m)	30	30
Fan unit	Fan				Propeller fan	Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153	182
	Motor			(W)	200+200	200+200
Connecting pipe	Outdoor unit - First Pipe branch		Gas side	(mm)	28.6	28.6
			Liquid side	(mm)	12.7	12.7
	First Pipe branch- Second Pipe branch		Gas side	(mm)	15.9	15.9
			Liquid side	(mm)	9.5	9.5
	Second Pipe branch- indoor unit		Gas side	(mm)	12.7	15.9
			Liquid side	(mm)	6.4	9.5
Sound pressure level		Cooling/Heating		(dB-A)	58/60	61/63
Sound power level		Cooling/Heating		(dB-A)	76/76	78/80

1-2-1. 4-Way Cassette Type

<Triple type>

Model		Indoor unit 1		RAV-SM	804UTP-E	804UTP-E
		Indoor unit 2		RAV-SM	804UTP-E	804UTP-E
		Indoor unit 3		RAV-SM	804UTP-E	804UTP-E
		Outdoor unit		RAV-SM	2246AT8-E	2806AT8-E
Cooling capacity				(kW)	20.0	23.5
Heating capacity				(kW)	22.4	27.0
Power supply					3phase 380-415V/50Hz	
Indoor unit						
Electrical characteristics	Cooling	Running current		(A)	8.99-8.23	12.79-11.71
		Power consumption		(kW)	5.56	7.83
		Power factor		(%)	94	93
		EER			3.60	3.00
		Energy efficiency class			-	-
	Heating	Running current		(A)	8.83-8.08	12.02-11.01
		Power consumption		(kW)	5.46	7.36
		Power factor		(%)	94	93
		COP			4.10	3.67
		Energy efficiency class			-	-
		Maximum current		(A)	18.0	23.0
Fan unit		Fan			turbo fan	turbo fan
		Standard air flow	H/M/L	(m^3/min)	20.5/16.0/13.5	20.5/16.0/13.5
		Motor		(W)	20	20
Sound pressure level			H/M/L	(dB-A)	35/31/28	35/31/28
Sound power level			H/M/L	(dB-A)	50/46/43	50/46/43
Outdoor unit						
Outer dimension	Max total length			(m)	100	100
	Min length			(m)	5	5
	Height difference	Outdoor lower		(m)	30	30
		Outdoor high		(m)	30	30
Fan unit	Fan				Propeller fan	Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153	182
	Motor			(W)	200+200	200+200
Connecting pipe	Outdoor unit - Pipe branch		Gas side	(mm)	28.6	28.6
			Liquid side	(mm)	12.7	12.7
	Pipe branch- indoor unit		Gas side	(mm)	15.9	15.9
			Liquid side	(mm)	9.5	9.5
Sound pressure level		Cooling/Heating		(dB-A)	58/60	61/63
Sound power level		Cooling/Heating		(dB-A)	76/76	78/80

1-2-2. Duct Type

<Triple type>

Model		**Indoor unit 1**			**RAV-SM**	**806BTP-E1**	**806BTP-E1**
		Indoor unit 2			**RAV-SM**	**806BTP-E1**	**806BTP-E1**
		Indoor unit 3			**RAV-SM**	**806BTP-E1**	**806BTP-E1**
		Outdoor unit			**RAV-SM**	**2246AT8-E**	**2406AT8-E**
Cooling capacity					(kW)	20.0	23.5
Heating capacity					(kW)	22.4	27.0
Power supply						3phase 380-415V/50Hz	
Indoor unit							
Electrical characteristics	Cooling	Running current			(A)	9.97-9.13	14.49-13.27
		Power consumption			(kW)	6.17	8.87
		Power factor			(%)	94	93
		EER				3.24	2.65
		Energy efficiency class				-	-
	Heating	Running current			(A)	9.28-8.50	12.60-11.53
		Power consumption			(kW)	5.74	7.71
		Power factor			(%)	94	93
		COP				3.90	3.50
		Energy efficiency class				-	-
		Maximum current			(A)	18.0	23.0
Fan unit		Fan				Centrifugal fan	Centrifugal fan
		Standard air flow		H/M/L	(m^3/min)	20/16.5/14.5	20/16.5/14.5
		Motor			(W)	150	150
Sound pressure level				H/M/L	(dB-A)	34/30/26	34/30/26
Sound power level				H/M/L	(dB-A)	55/51/46	55/51/46
Outdoor unit							
Outer dimension	Max total length				(m)	100	100
	Min length				(m)	5	5
	Height difference		Outdoor lower		(m)	30	30
			Outdoor high		(m)	30	30
Fan unit	Fan					Propeller fan	Propeller fan
	Standard air flow hige			H/M/L	(m^3/min)	153	182
	Motor				(W)	200+200	200+200
Connecting pipe	Outdoor unit - Pipe branch			Gas side	(mm)	28.6	28.6
				Liquid side	(mm)	12.7	12.7
	Pipe branch- indoor unit			Gas side	(mm)	15.9	15.9
				Liquid side	(mm)	9.5	9.5
Sound pressure level			Cooling/Heating		(dB-A)	58/60	61/63
Sound power level			Cooling/Heating		(dB-A)	76/76	78/80

1-2-3. Ceiling Type

<Triple type>

Model		**Indoor unit 1**		**RAV-SM**	**808CTP-E**	**808CTP-E**
		Indoor unit 2		**RAV-SM**	**808CTP-E**	**808CTP-E**
		Indoor unit 3		**RAV-SM**	**808CTP-E**	**808CTP-E**
		Outdoor unit		**RAV-SM**	**2246AT8-E**	**2806AT8-E**
Cooling capacity				(kW)	20.0	23.5
Heating capacity				(kW)	22.4	27.0
Power supply					3phase 380-415V/50Hz	
Indoor unit						
Electrical characteristics	Cooling	Running current		(A)	9.97-9.13	14.65-13.42
		Power consumption		(kW)	6.17	8.97
		Power factor		(%)	94	93
		EER			3.24	2.62
		Energy efficiency class			-	-
	Heating	Running current		(A)	9.52-8.72	12.79-11.71
		Power consumption		(kW)	5.89	7.83
		Power factor		(%)	94	93
		COP			3.80	3.45
		Energy efficiency class			-	-
		Maximum current		(A)	18.0	23.0
Fan unit		Fan			Centrifugal fan	Centrifugal fan
		Standard air flow	H/M/L	(m^3/min)	23.5/16.7/12.5	23.5/16.7/12.5
		Motor		(W)	94	94
Sound pressure level			H/M/L	(dB-A)	41/36/29	41/36/29
Sound power level			H/M/L	(dB-A)	56/51/44	56/51/44
Outdoor unit						
Outer dimension	Max total length			(m)	100	100
	Min length			(m)	5	5
	Height difference	Outdoor lower		(m)	30	30
		Outdoor high		(m)	30	30
Fan unit	Fan				Propeller fan	Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153	182
	Motor			(W)	200+200	200+200
Connecting pipe	Outdoor unit - Pipe branch		Gas side	(mm)	28.6	28.6
			Liquid side	(mm)	12.7	12.7
	Pipe branch- indoor unit		Gas side	(mm)	15.9	15.9
			Liquid side	(mm)	9.5	9.5
Sound pressure level		Cooling/Heating		(dB-A)	58/60	61/63
Sound power level		Cooling/Heating		(dB-A)	76/76	78/80

1-2-4. High Wall Type

<Triple type>

Model		**Indoor unit 1**			**RAV-SM**	**806KRT-E**	**806KRT-E**
		Indoor unit 2			**RAV-SM**	**806KRT-E**	**806KRT-E**
		Indoor unit 3			**RAV-SM**	**806KRT-E**	**806KRT-E**
		Outdoor unit			**RAV-SM**	**2246AT8-E**	**2806AT8-E**
Cooling capacity					(kW)	20.0	23.5
Heating capacity					(kW)	22.4	27.0
Power supply						3phase 380-415V/50Hz	
Indoor unit							
Electrical characteristics	Cooling	Running current			(A)	10.78-9.87	15.06-13.79
		Power consumption			(kW)	6.67	9.22
		Power factor			(%)	94	93
		EER				3.00	2.55
		Energy efficiency class				-	-
	Heating	Running current			(A)	10.20-9.34	12.94-11.85
		Power consumption			(kW)	6.31	7.92
		Power factor			(%)	94	93
		COP				3.55	3.41
		Energy efficiency class				-	-
		Maximum current			(A)	18.0	23.0
Fan unit		Fan				Cross flow fan	Cross flow fan
		Standard air flow		H/M/L	(m^3/min)	17.0/12.5/11.0	17.0/12.5/11.0
		Motor			(W)	30	30
Sound pressure level				H/M/L	(dB-A)	47/41/36	47/41/36
Sound power level				H/M/L	(dB-A)	62/56/51	62/56/51
Outdoor unit							
Outer dimension	Max total length				(m)	100	100
	Min length				(m)	5	5
	Height difference		Outdoor lower		(m)	30	30
			Outdoor high		(m)	30	30
Fan unit	Fan					Propeller fan	Propeller fan
	Standard air flow high			H/M/L	(m^3/min)	153	182
	Motor				(W)	200+200	200+200
Connecting pipe	Outdoor unit - Pipe branch			Gas side	(mm)	28.6	28.6
				Liquid side	(mm)	12.7	12.7
	Pipe branch- indoor unit			Gas side	(mm)	15.9	15.9
				Liquid side	(mm)	9.5	9.5
Sound pressure level			Cooling/Heating		(dB-A)	58/60	61/63
Sound power level			Cooling/Heating		(dB-A)	76/76	78/80

1-3-1. 4-Way Cassette Type

<Twin type>

Model		Indoor unit 1		RAV-SM	1104UTP-E	1404UPT-E
		Indoor unit 2		RAV-SM	1104UTP-E	1404UPT-E
		Outdoor unit		RAV-SM	2246AT8-E	2806AT8-E
Cooling capacity				(kW)	20.0	23.5
Heating capacity				(kW)	22.4	27.0
Power supply					3phase 380-415V/50Hz	
Indoor unit						
Electrical characteristics	Cooling	Running current		(A)	8.99-8.23	12.79-11.71
		Power consumption		(kW)	5.56	7.83
		Power factor		(%)	94	93
		EER			3.60	3.00
		Energy efficiency class			-	-
	Heating	Running current		(A)	8.83-8.08	12.02-11.01
		Power consumption		(kW)	5.46	7.36
		Power factor		(%)	94	93
		COP			4.10	3.67
		Energy efficiency class			-	-
		Maximum current		(A)	18.0	23.0
Fan unit		Fan			turbo fan	turbo fan
		Standard air flow	H/M/L	(m^3/min)	33.5/24.0/19.5	35.0/24.0/20.5
		Motor		(W)	68	72
Sound pressure level			H/M/L	(dB-A)	43/38/33	44/38/34
Sound power level			H/M/L	(dB-A)	58/53/48	59/53/49
Outdoor unit						
Outer dimension	Max total length			(m)	100	100
	Min length			(m)	5	5
	Height difference	Outdoor lower		(m)	30	30
		Outdoor high		(m)	30	30
Fan unit	Fan				Propeller fan	Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153	182
	Motor			(W)	200+200	200+200
Connecting pipe	Outdoor unit - Pipe branch		Gas side	(mm)	28.6	28.6
			Liquid side	(mm)	12.7	12.7
	Pipe branch- indoor unit		Gas side	(mm)	15.9	15.9
			Liquid side	(mm)	9.5	9.5
Sound pressure level		Cooling/Heating		(dB-A)	58/60	61/63
Sound power level		Cooling/Heating		(dB-A)	76/76	78/80

1-3-2. Duct Type

<Twin type>

Model		Indoor unit 1		RAV-SM	1106BTP-E1	1406BTP-E
		Indoor unit 2		RAV-SM	1106BTP-E1	1406BTP-E
		Outdoor unit		RAV-SM	2246AT8-E	2806AT8-E
Cooling capacity				(kW)	20.0	23.5
Heating capacity				(kW)	22.4	27.0
Power supply					3phase 380-415V/50Hz	
Indoor unit						
Electrical characteristics	Cooling	Running current		(A)	9.97-9.13	14.49-13.27
		Power consumption		(kW)	6.17	8.87
		Power factor		(%)	94	93
		EER			3.24	2.65
		Energy efficiency class			-	-
	Heating	Running current		(A)	9.28-8.50	12.60-11.53
		Power consumption		(kW)	5.74	7.71
		Power factor		(%)	94	93
		COP			3.90	3.50
		Energy efficiency class			-	-
		Maximum current		(A)	18.0	23.0
Fan unit		Fan			Centrifugal fan	Centrifugal fan
		Standard air flow	H/M/L	(m^3/min)	35/29/25	35/29/25
		Motor		(W)	250	250
Sound pressure level			H/M/L	(dB-A)	40/36/33	40/36/33
Sound power level			H/M/L	(dB-A)	63/58/54	63/58/54
Outdoor unit						
Outer dimension	Max total length			(m)	100	100
	Min length			(m)	5	5
	Height difference	Outdoor lower		(m)	30	30
		Outdoor high		(m)	30	30
Fan unit	Fan				Propeller fan	Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153	182
	Motor			(W)	200+200	200+200
Connecting pipe	Outdoor unit - Pipe branch		Gas side	(mm)	28.6	28.6
			Liquid side	(mm)	12.7	12.7
	Pipe branch- indoor unit		Gas side	(mm)	15.9	15.9
			Liquid side	(mm)	9.5	9.5
Sound pressure level		Cooling/Heating		(dB-A)	58/60	61/63
Sound power level		Cooling/Heating		(dB-A)	76/76	78/80

1-3-3. Ceiling Type

<Twin type>

Model		Indoor unit 1		RAV-SM	1108CTP-E	1408CTP-E
		Indoor unit 2		RAV-SM	1108CTP-E	1408CTP-E
		Outdoor unit		RAV-SM	2246AT8-E	2406AT8-E
Cooling capacity				(kW)	20.0	23.5
Heating capacity				(kW)	22.4	27.0
Power supply					3phase 380-415V/50Hz	
Indoor unit						
Electrical characteristics	Cooling	Running current		(A)	9.97-9.13	14.65-13.42
		Power consumption		(kW)	6.17	8.97
		Power factor		(%)	94	93
		EER			3.24	2.62
		Energy efficiency class			-	-
	Heating	Running current		(A)	9.52-8.72	12.79-11.71
		Power consumption		(kW)	5.89	7.83
		Power factor		(%)	94	93
		COP			3.80	3.45
		Energy efficiency class			-	-
		Maximum current		(A)	18.0	23.0
Fan unit		Fan			Centrifugal fan	Centrifugal fan
		Standard air flow	H/M/L	(m^3/min)	31.0/22.5/17.0	34.0/25.5/20.0
		Motor		(W)	139	139
Sound pressure level			H/M/L	(dB-A)	44/38/32	46/41/35
Sound power level			H/M/L	(dB-A)	59/53/47	61/56/50
Outdoor unit						
Outer dimension	Max total length			(m)	100	100
	Min length			(m)	5	5
	Height difference	Outdoor lower		(m)	30	30
		Outdoor high		(m)	30	30
Fan unit	Fan				Propeller fan	Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153	182
	Motor			(W)	200+200	200+200
Connecting pipe	Outdoor unit - Pipe branch		Gas side	(mm)	28.6	28.6
			Liquid side	(mm)	12.7	12.7
	Pipe branch- indoor unit		Gas side	(mm)	15.9	15.9
			Liquid side	(mm)	9.5	9.5
Sound pressure level		Cooling/Heating		(dB-A)	58/60	61/63
Sound power level		Cooling/Heating		(dB-A)	76/76	78/80

1-4. Concealed Duct High Static Pressure Type

<Single type>

Model		**Indoor unit1**		**RAV-SM**	**2244DTP-E**	**2804DTP-E**
		Outdoor unit		**RAV-SM**	**2246AT8-E**	**2806AT8-E**
Cooling capacity				(kW)	19.0	22.5
Heating capacity				(kW)	22.4	27.0
Power supply					3phase 380-415V/50Hz	
Indoor unit						
Electrical characteristics	Cooling	Running current		(A)	9.47-8.67	13.04-11.94
		Power consumption		(kW)	5.86	7.98
		Power factor		(%)	94	93
		EER			3.24	2.82
		Energy efficiency class			-	-
	Heating	Running current		(A)	9.52-8.72	12.71-11.64
		Power consumption		(kW)	5.89	7.78
		Power factor		(%)	94	93
		COP			3.80	3.47
		Energy efficiency class			-	-
		Maximum current		(A)	18.0	23.0
Fan unit		Fan			Centrifugal fan	Centrifugal fan
		Standard air flow	H/M/L	(m^3/min)	63.3/53.3/41.7	80.0/70.0/58.3
		Motor		(W)	1000	1000
Sound pressure level			H/M/L	(dB-A)	44/40/36	46/42/38
Sound power level			H/M/L	(dB-A)	79/75/71	81/77/73
Outdoor unit						
Outer dimension	Max total length			(m)	100	100
	Min length			(m)	5	5
	Height difference	Outdoor lower		(m)	30	30
		Outdoor high		(m)	30	30
Fan unit	Fan				Propeller fan	Propeller fan
	Standard air flow high		H/M/L	(m^3/min)	153	182
	Motor			(W)	200+200	200+200
Connecting pipe	Outdoor unit - Pipe branch		Gas side	(mm)	28.6	28.6
			Liquid side	(mm)	12.7	12.7
Sound pressure level		Cooling/Heating		(dB-A)	58/60	61/63
Sound power level		Cooling/Heating		(dB-A)	76/76	78/80

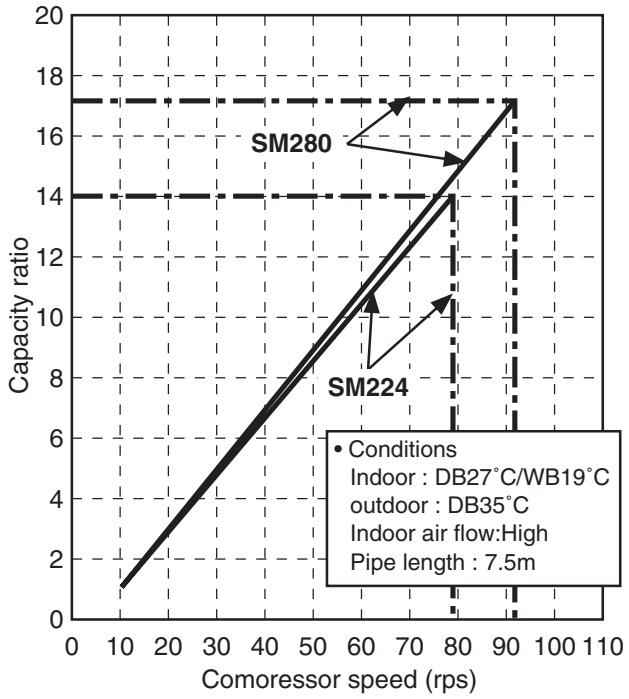
1-5. Outdoor Unit

Model	Outdoor unit RAV-SM			2246AT8-E	2806AT8-E
Power supply				3 phase 380-415 50Hz (Power exclusive to outdoor is required)	
Compressor	Type			Hermetic compressor	
	Motor		(kW)	5.60	5.60
	Pole			4	4
Refrigerant charged			(kg)	5.9	5.9
Refrigerant control				Pulse motor valve	
Pipe	Max		(m)	100	100
	Min		(m)	5	5
	Height difference	Outdoor lower	(m)	30	30
		Outdoor Height	(m)	30	30
Outer dimension	Height		(m)	1550	1550
	Width		(m)	1010	1010
	Depth		(m)	370	370
Appearance				Silky shade (Muncel 1Y8.5/0.5)	
Total weight			(kg)	142	142
Heat exchanger				Finned tube	
Fan unit	Fan			Propeller fan	
	Standard air flow		(m^3/min)	153	182
	Motor		(W)	200+200	200+200
Connecting pipe (Outdoor unit side)	Gas side		(mm)	28.6	28.6
	Liquid side		(mm)	12.7	12.7
Sound pressure level	Cooling/Heating		(dB-A)	58/60	61/63
Sound power level	Cooling/Heating		(dB-A)	76/76	78/80
Outside air temperature cooling			(˚C)	52 to -15˚C	
Outside air temperature heating			(˚C)	15 to -27˚C	

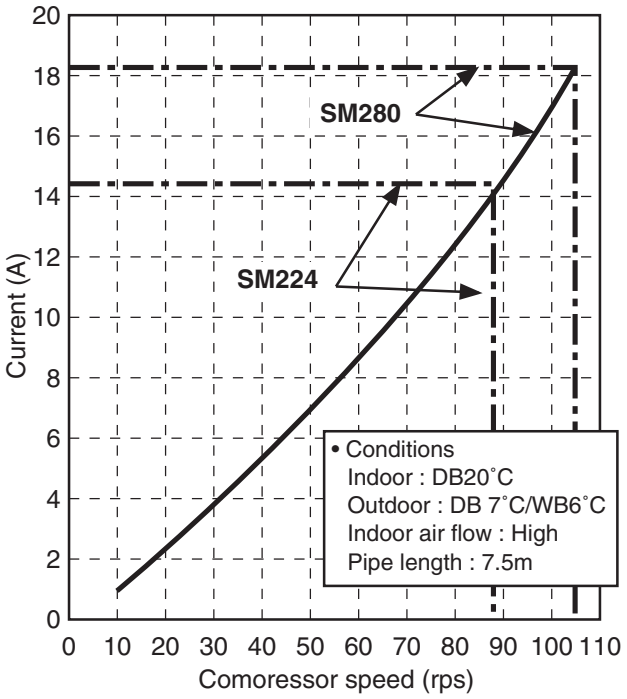
1-6. Operation Characteristic Curve

• Operation characteristic curve <Digital Inverter>

<Cooling>

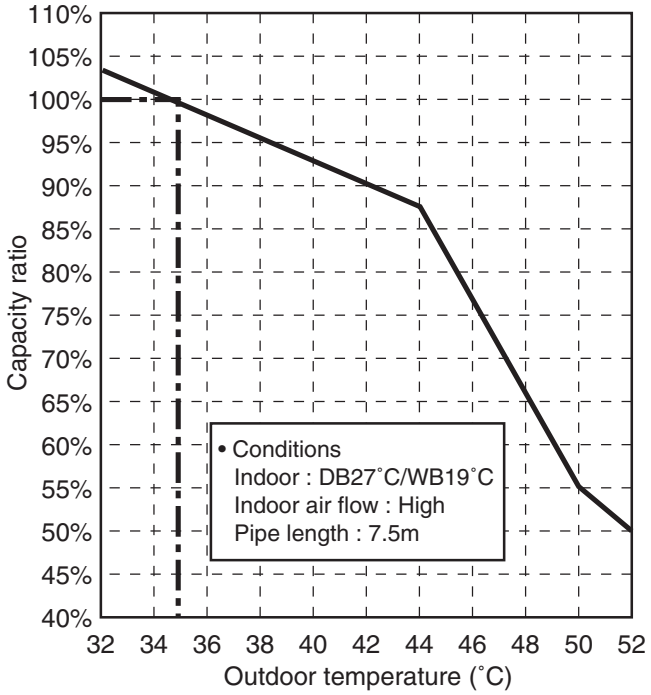


<Heating>

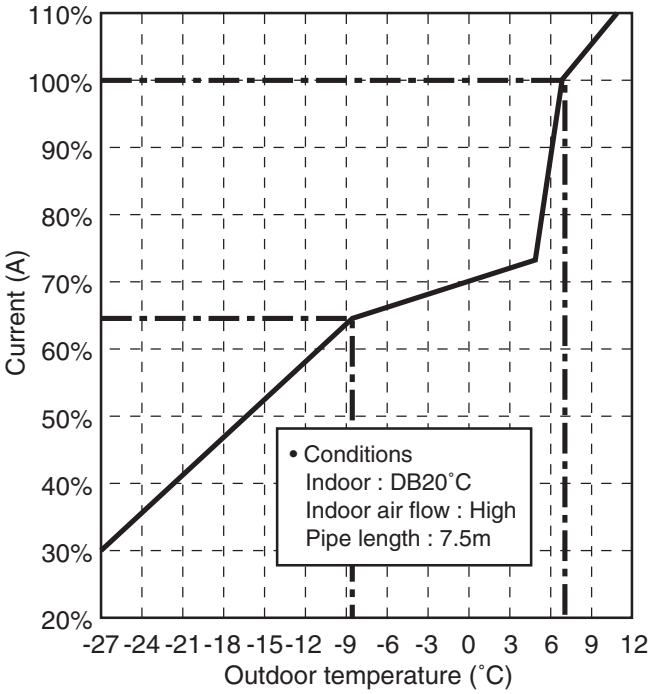


• Capacity variation ratio according to temperature

<Cooling>

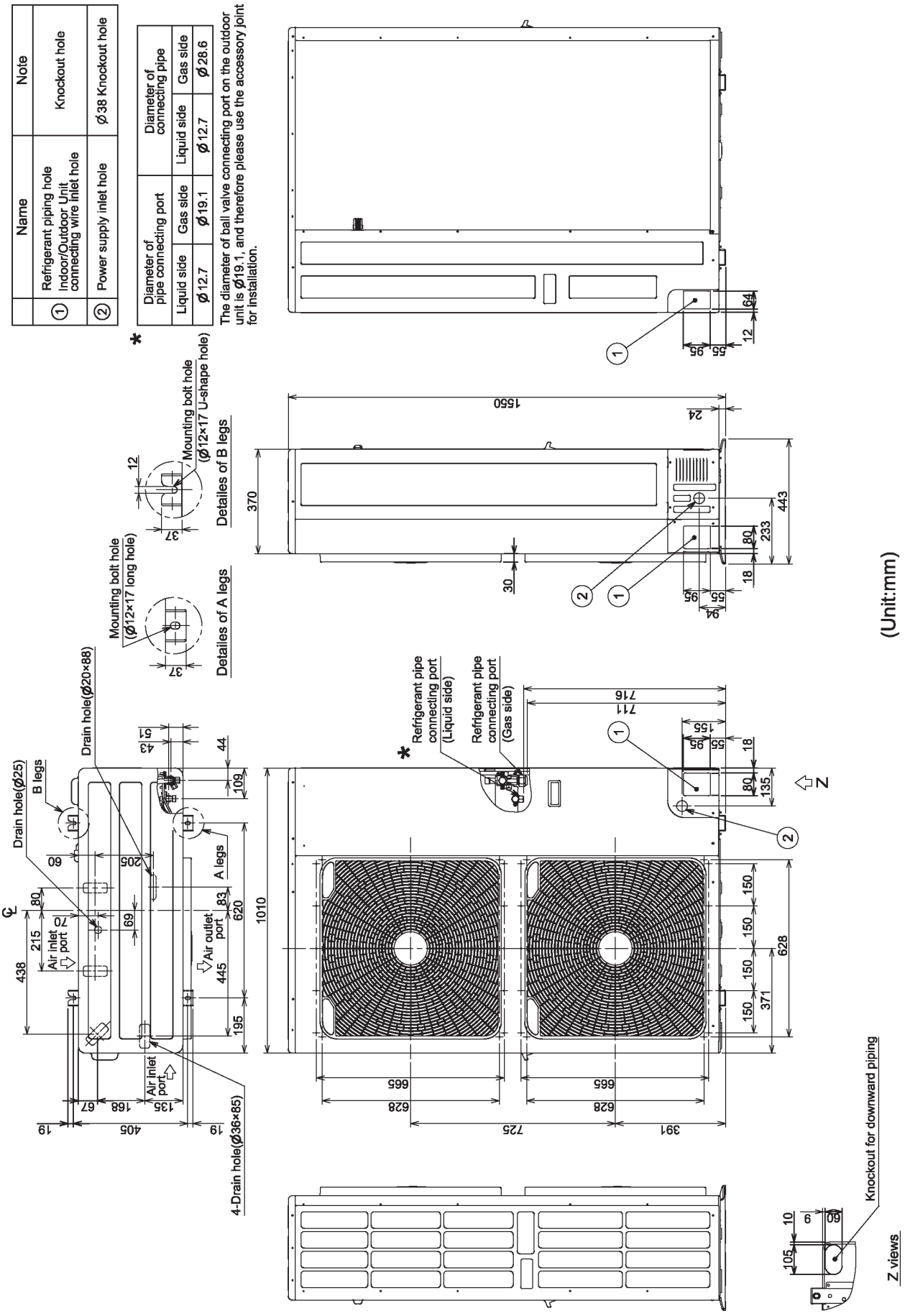


<Heating>



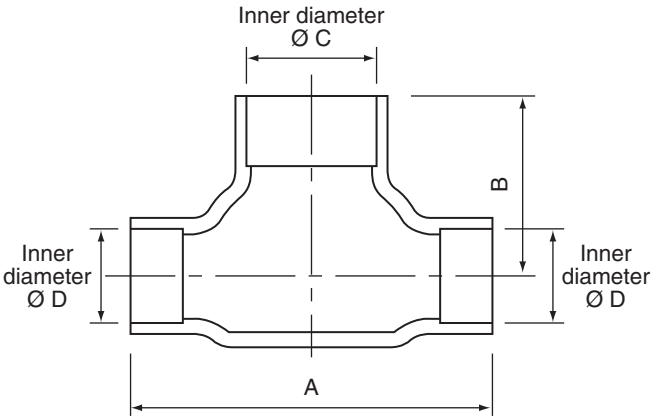
2. CONSTRUCTION VIEWS (EXTERNAL VIEWS)

2-1. Outdoor Unit

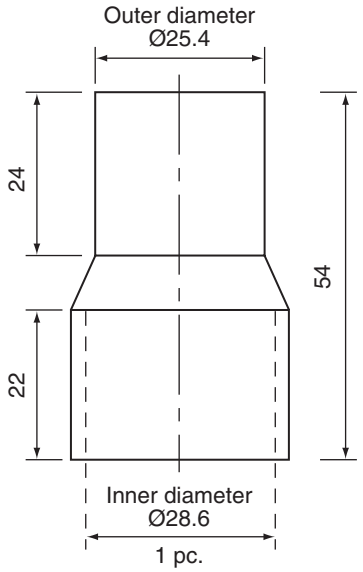


RBC-DTWP101E (Simultaneous Double Twin)

<Branch pipe>



<Joint pipe>

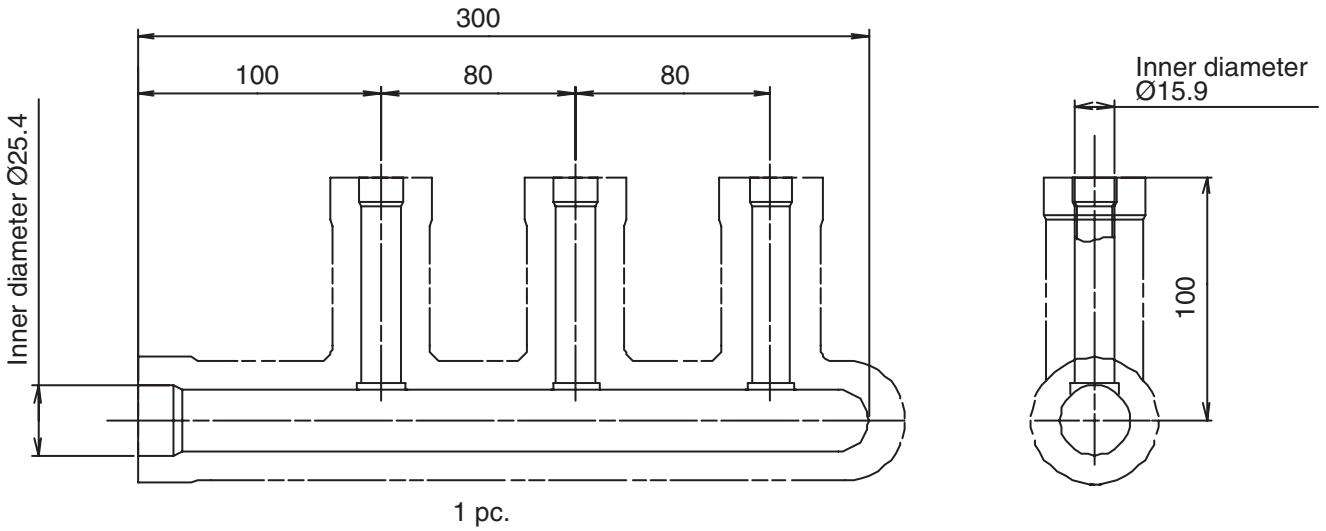


Model		A	B	C	D	Q'ty
RBC-DTWP101E	Gas side	74	37	25.4	15.9	1
		42	23	15.9	15.9	2
		43	23	15.9	12.7	2
	Liquid side	35	18	12.7	9.5	1
		34	14	9.5	9.5	2
		36	14	9.5	6.4	2

RBC-TRP100E (Simultaneous Triple)

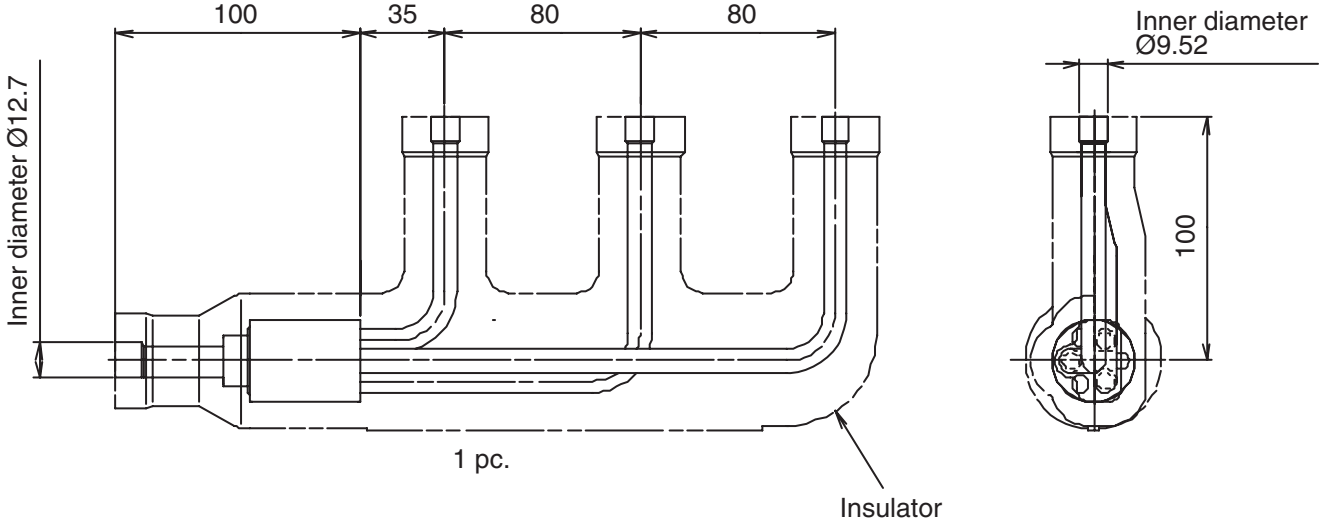
<Gas side>

Header assembly

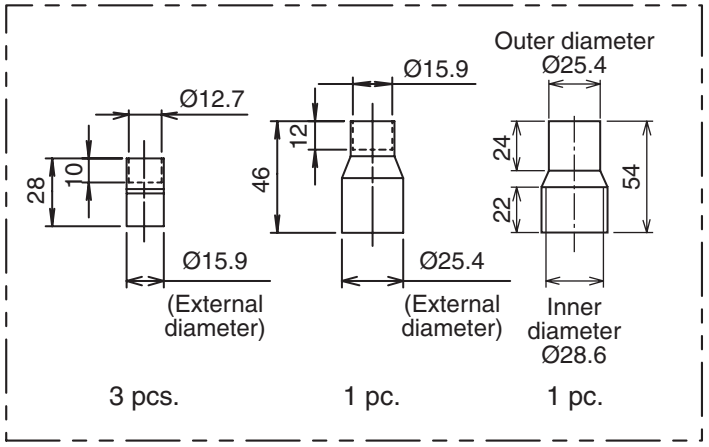


<Liquid side>

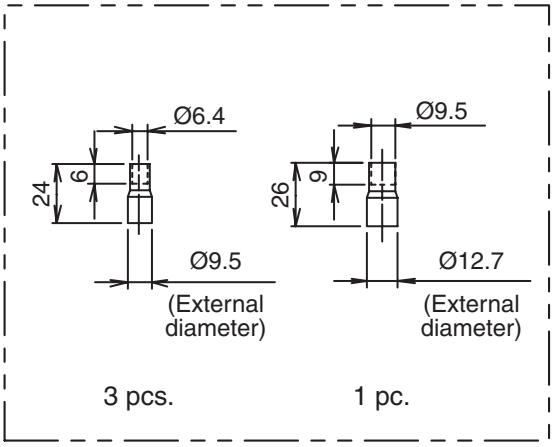
Branch pipe assembly



Gas side socket

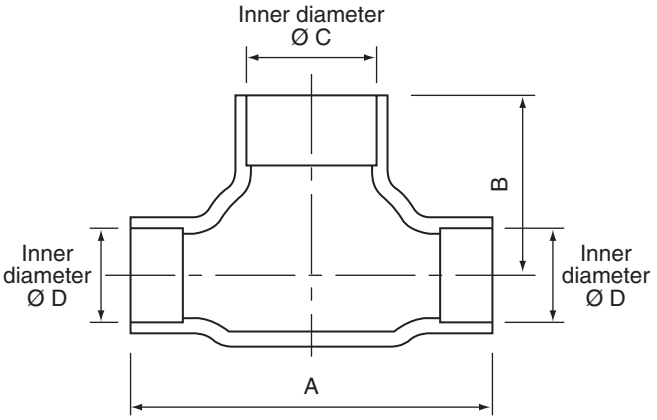


Liquid side socket

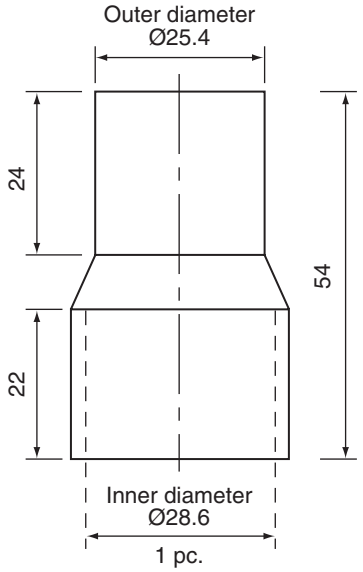


RBC-TWP101E (Simultaneous Twin)

<Branch pipe>

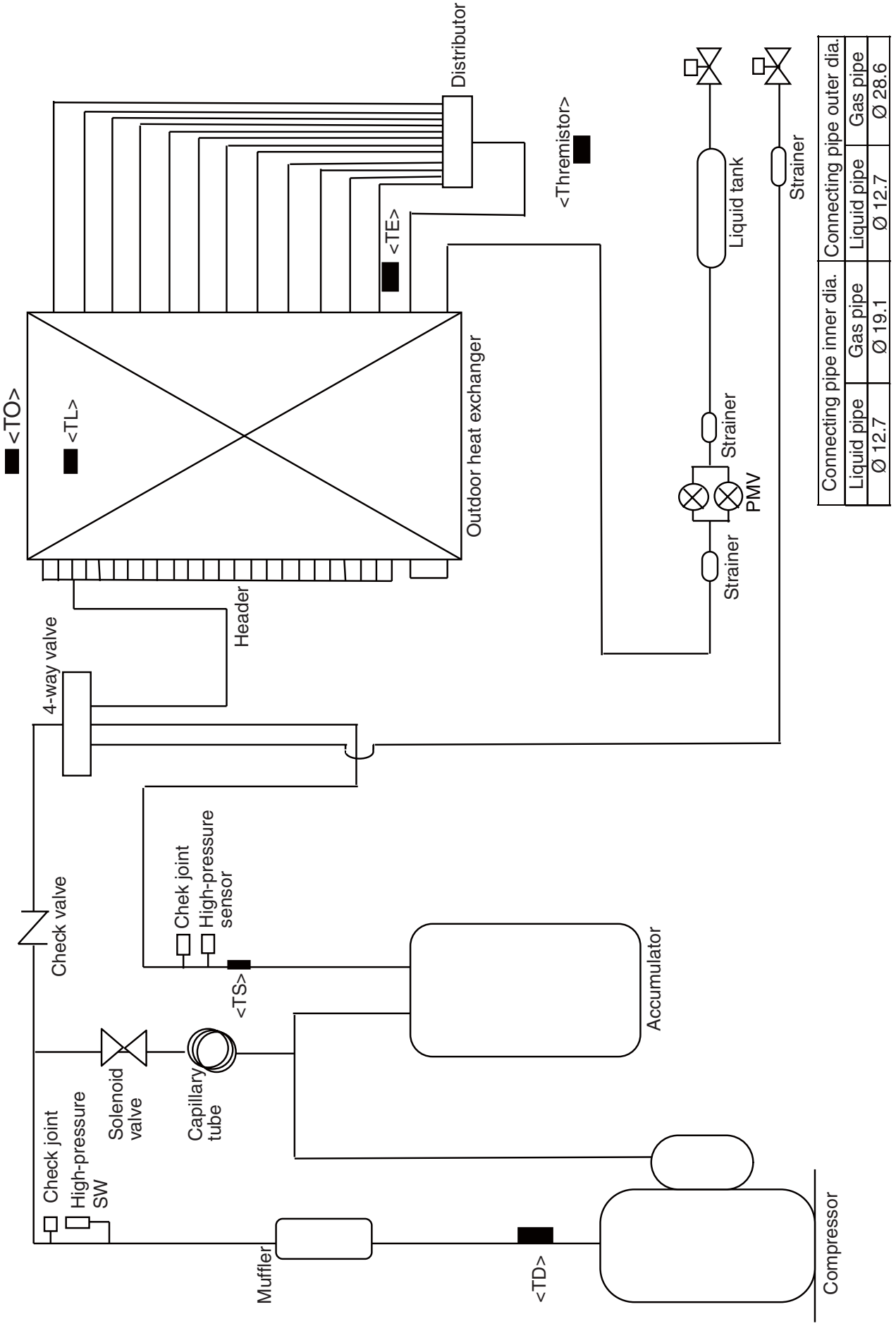


<Joint pipe>



Model		A	B	C	D	Q'ty
RBC-TWP101E	Gas side	74	37	25.4	15.9	1
	Liquid side	35	18	12.7	9.5	1

3. OUTDOOR UNIT REFRIGERANTING CYCLE DIAGRAM



Connecting pipe inner dia.		Connecting pipe outer dia.	
Liquid pipe	Gas pipe	Liquid pipe	Gas pipe
Ø 12.7	Ø 19.1	Ø 12.7	Ø 28.6

Systematic diagram of refrigerating cycle

RAV-SM224 series

		Pressure				Pipe surface temperature (˚C)					Compressor drive revolution frequency (rps) *	indoor fan	Indoor/outdoor temp.condition	
		(Mpa)		(kg/cm²g)		Discharge	suction	indoor heat exchanger	Outdoor heat exchanger					
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TC)	(TL)	(TE)			indoor	outdoor
cooling	Standard	2.9	0.9	29.3	9.7	70.8	11.5	13.0	48.4	41.3	54.0	HIGH	27/19	35/-
	Overload	3.8	1.4	38.7	13.9	86.0	26.7	24.0	60.0	54.5	31.2	HIGH	32/24	52/-
	Low load	2.5	0.6	25.7	6.3	57.1	6.2	9.0	49.5	43.9	53.4	LOW	18/15.5	-15/-
Heating	Standard	2.3	0.6	23.0	6.6	68.0	2.4	36.0	5.9	0.7	60.6	HIGH	20/-	7/6
	Overload	3.5	1.1	35.9	11.6	84.6	16.3	43.0	17.9	16.0	39.0	LOW	30/-	24/18
	Low load	1.6	0.2	16.6	1.6	82.7	-26.6	24.0	-14.3	-26.1	88.0	HIGH	15/-	-27/-

* This compressor has a 4-pole motor.
  The value when compressor frequency (Hz) is measured by a clamp meter is twice the compressor revolution number (rps).
* This data is cycle data obtained by combining a four-way ceiling cassette simultaneous twin at a target pipe length. Data will change depending on the mounted pipe length or combination with the indoor unit.

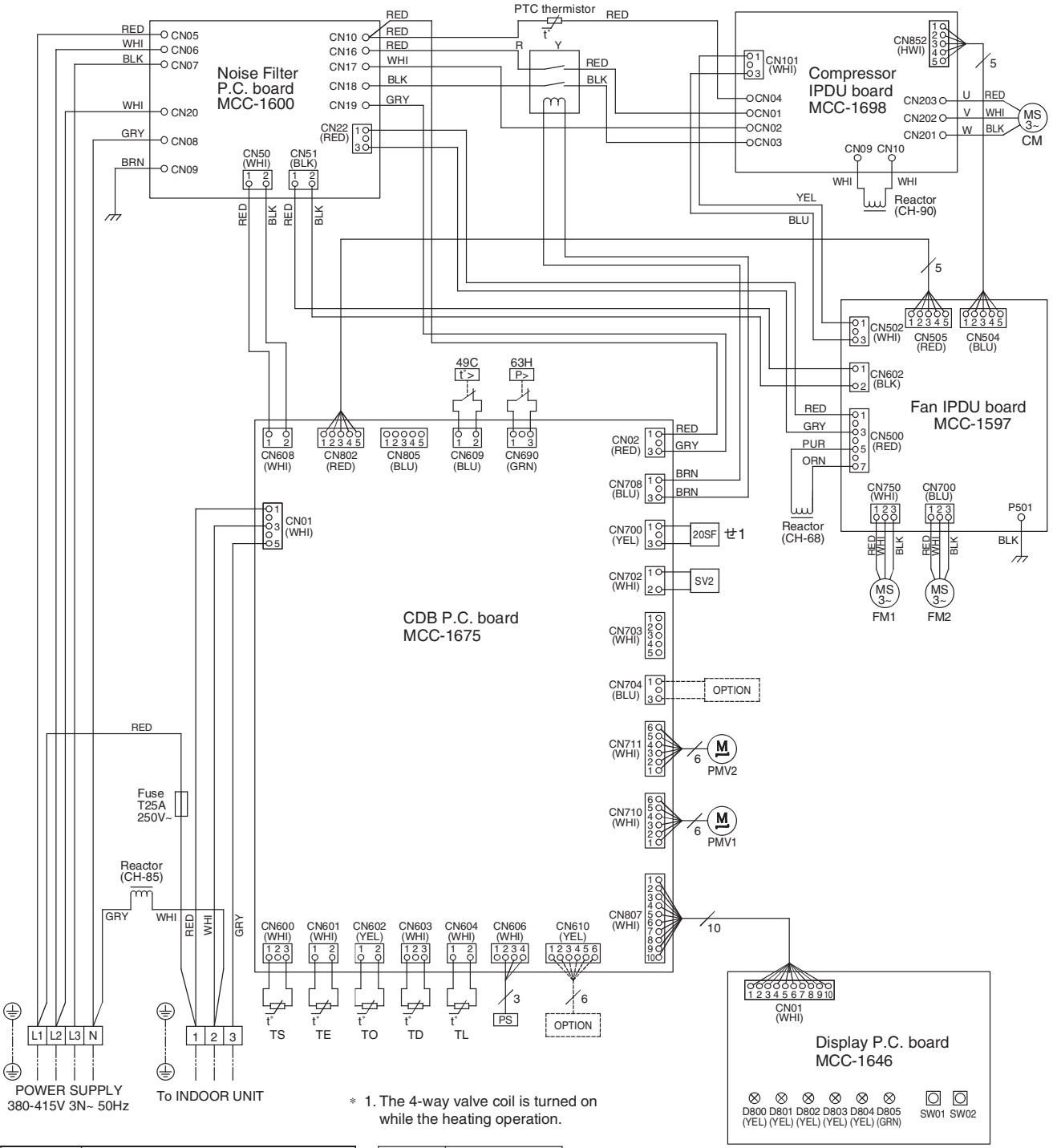
RAV-SM280 series

		Pressure				Pipe surface temperature (˚C)					Compressor drive revolution frequency (rps) *	indoor fan	Indoor/outdoor temp.condition	
		(Mpa)		(kg/cm²g)		Discharge	suction	indoor heat exchanger	Outdoor heat exchanger					
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TC)	(TL)	(TE)			indoor	outdoor
cooling	Standard	3.0	0.8	31.1	8.1	79.6	7.4	11.0	50.5	43.0	76.2	HIGH	27/19	35/-
	Overload	3.8	1.4	38.7	13.9	86.0	26.7	24.0	60.0	54.5	31.2	HIGH	32/24	52/-
	Low load	2.5	0.6	25.7	6.3	57.1	6.2	9.0	49.5	43.9	53.4	LOW	18/15.5	-15/-
Heating	Standard	2.5	0.6	25.5	6.6	75.5	1.2	39.0	5.9	1.0	75.6	HIGH	20/-	7/6
	Overload	3.5	1.1	35.9	11.6	84.6	16.3	43.0	17.9	16.0	39.0	LOW	30/-	24/18
	Low load	1.7	0.2	17.0	1.5	86.7	-27.0	25.0	-14.3	-26.6	105.0	HIGH	15/-	-27/-

* This compressor has a 4-pole motor.
  The value when compressor frequency (Hz) is measured by a clamp meter is twice the compressor revolution number (rps).
* This data is cycle data obtained by combining a four-way ceiling cassette simultaneous twin at a target pipe length. Data will change depending on the mounted pipe length or combination with the indoor unit.

4. WIRING DIAGRAM

4-1. Outdoor Unit



＊ 1. The 4-way valve coil is turned on while the heating operation.

For D800～D805 and SW01～SW02, refer to the installation manual.

Symbol	Part name
CM	Compressor
FM1,2	Fan motor
PMV1,2	Pulse motor valve
PS	Low-pressure sensor
RY	Relay
SV2	2-way valve coil
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
63H	High-pressure switch

——·——	Field wiring
⏚	Protective earth
▭▭	Terminal block
—○—	Terminal
○ ○	Connector
▭	P.C.board

Color Indication

BLK : BLACK	GRY : GRAY
BLU : BLUE	BRN : BROWN
RED : RED	PUR : PURPLE
YEL : YELLOW	ORN : ORANGE
WHI : WHITE	GRN : GREEN

⚠ CAUTION : HIGH VOLTAGE

The high voltage circuit is incorporated.
Be careful to do the check service, as the electric shock may be caused in case of touching parts on the P.C.board by hand.

5. SPECIFICATIONS OF ELECTRICAL PARTS

5-1. Outdoor Unit

RAV-SM2246AT8(J)-E, RAV-SM2806AT8(J)-E

No.	Parts name	Type	Specifications
1	Compressor	RA640A3F-21M	—
2	Outdoor fan motor	ICF-340-A200-1 or SDF-340-A200-1	DC 340V, 200W
3	4-way valve coil	STF-H01AJ1736A1	AC 220-240V
4	2-way valve coil	VPV-MOAJ510B0	AC 220-240V
5	PMV coil	PQ-M10012-000***	DC12V
6	High pressure switch	ACB-4UB83W	OFF: 4.15 MPa
7	Reactor	CH-90	2.9 mH, 25A
8	Reactor	CH-68	18 mH, 5A
9	Reactor	CH-56	5.8 mH, 18.5A
10	P.C.board (Compressor drive)	MCC-1698	—
11	P.C.board (Fan motor drive)	MCC-1597	—
12	P.C.board (Control)	MCC-1675	—
13	P.C.board (Noise filter)	MCC-1600	—
14	P.C.board (LED display)	MCC-1646	—
15	Outdoor temp. sensor (TO sensor)	—	10kΩ at 25˚C
16	Discharge temp. sensor (TD sensor)	—	50kΩ at 25˚C
17	Suction temp. sensor (TS sensor)	—	10kΩ at 25˚C
18	Heat exchanger temp. sensor (TE sensor)	—	10kΩ at 25˚C
19	Heat exchanger mid. temp. sensor (TL sensor)	—	10kΩ at 25˚C
20	Fuse	TLC 25A	25A, 250V
21	Fuse (Mounted on P.C.board, MCC-1698)	GAC1 31.5A	31.5A, 500V
22	Fuse (Mounted on P.C.board, MCC-1698)	SCT 3.15A	3.15A, 250V
23	Fuse (Mounted on P.C.board, MCC-1597)	GDM 250V 15A	15A, 250V
24	Fuse (Mounted on P.C.board, MCC-1597)	SCT 3.15A	3.15A, 250V
25	Fuse (Mounted on P.C.board, MCC-1675)	FJL 250V 3.15A	3.15A, 250V
26	Fuse (Mounted on P.C.board, MCC-1600)	ET 6.3A	6.3A, 250V
27	Relay	EL 200/240A2-F(M)	AC480V, 20A
28	Compressor thermostat	US-622	OFF: 125 ± 4˚C,ON: 90 ± 5˚C

6. REFRIGERANT R410A

This air conditioner adopts the R410A refrigerant 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.

6-1. 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.

6-2. Refrigerant Piping Installation

6-2-1. 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 6-2-1. Never use copper pipes thinner than 0.8mm even when it is available on the market.

NOTE

Refer to the "**6-6. Instructions for Re-use Piping of R22 or R407C**".

Table 6-2-1 Thicknesses of annealed copper pipes

		Thickness (mm)	
Nominal diameter	**Outer diameter (mm)**	**R410A**	**R22**
1/4	6.4	0.80	0.80
3/8	9.5	0.80	0.80
1/2	12.7	0.80	0.80
5/8	15.9	1.00	1.00

1. 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 6-2-3 to 6-2-5 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 6-2-2.

Table 6-2-2 Minimum thicknesses of socket joints

Nominal diameter	Reference outer diameter of copper pipe jointed (mm)	Minimum joint thickness (mm)
1/4	6.4	0.50
3/8	9.5	0.60
1/2	12.7	0.70
5/8	15.9	0.80

6-2-2. 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 other than lubricating oils used in the installed air conditioner 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.

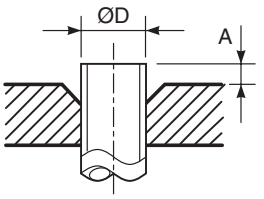


Fig. 6-2-1 Flare processing dimensions

Table 6-2-3 Dimensions related to flare processing for R410A / R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)				
			Flare tool for R410A, R22 clutch type	Conventional flare tool (R410A)		Conventional flare tool (R22)	
				Clutch type	Wing nut type	Clutch type	Wing nut type
1/4	6.4	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0	0.5 to 1.0	1.0 to 1.5
3/8	9.5	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0	0.5 to 1.0	1.0 to 1.5
1/2	12.7	0.8	0 to 0.5	1.0 to 1.5	2.0 to 2.5	0.5 to 1.0	1.5 to 2.0
5/8	15.9	1.0	0 to 0.5	1.0 to 1.5	2.0 to 2.5	0.5 to 1.0	1.5 to 2.0
3/4	19.1	1.2	0 to 0.5	1.0 to 1.5	2.0 to 2.5	—	—

Table 6-2-4 Flare and flare nut dimensions for R410A

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.4	0.8	9.1	9.2	6.5	13	17
3/8	9.5	0.8	13.2	13.5	9.7	20	22
1/2	12.7	0.8	16.6	16.0	12.9	23	26
5/8	15.9	1.0	19.7	19.0	16.0	25	29
3/4	19.1	1.2	24.0	—	19.2	28	36

Table 6-2-5 Flare and flare nut dimensions for R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.4	0.8	9.1	9.2	6.5	13	17
3/8	9.5	0.8	13.0	13.5	9.7	20	22
1/2	12.7	0.8	16.2	16.0	12.9	20	24
5/8	15.9	1.0	19.4	19.0	16.0	23	27
3/4	19.1	1.0	23.3	24.0	19.2	34	36

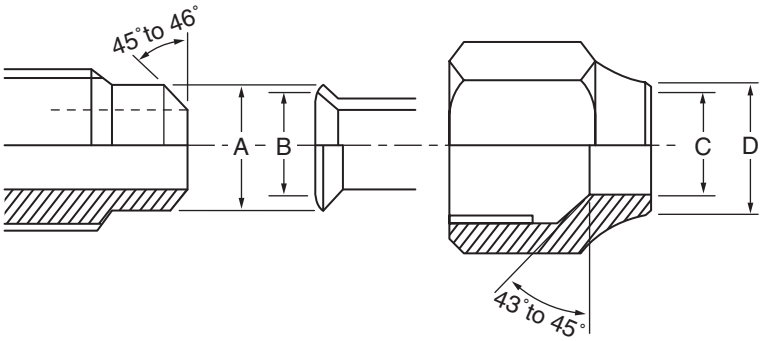


Fig. 6-2-2 Relations between flare nut and flare seal surface

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 6-2-6 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 6-2-6 Tightening torque of flare for R410A [Reference values]

Nominal diameter	Outer diameter (mm)	Tightening torque N•m (kgf m)	Tightening torque of torque wrenches available on the market N m (kgf m)
1/4	6.4	14 to 18 (1.4 to 1.8)	16 (1.6), 18 (1.8)
3/8	9.5	33 to 42 (3.3 to 4.2)	42 (4.2)
1/2	12.7	50 to 62 (5.0 to 6.2)	55 (5.5)
5/8	15.9	63 to 77 (6.3 to 7.7)	65 (6.5)
3/4	19.1	100 to 120 (10.0 to 12.0)	——

6-3. Tools

6-3-1. Required Tools

Refer to the "**4. Tools**" (Page 14)

6-4. 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 of 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.

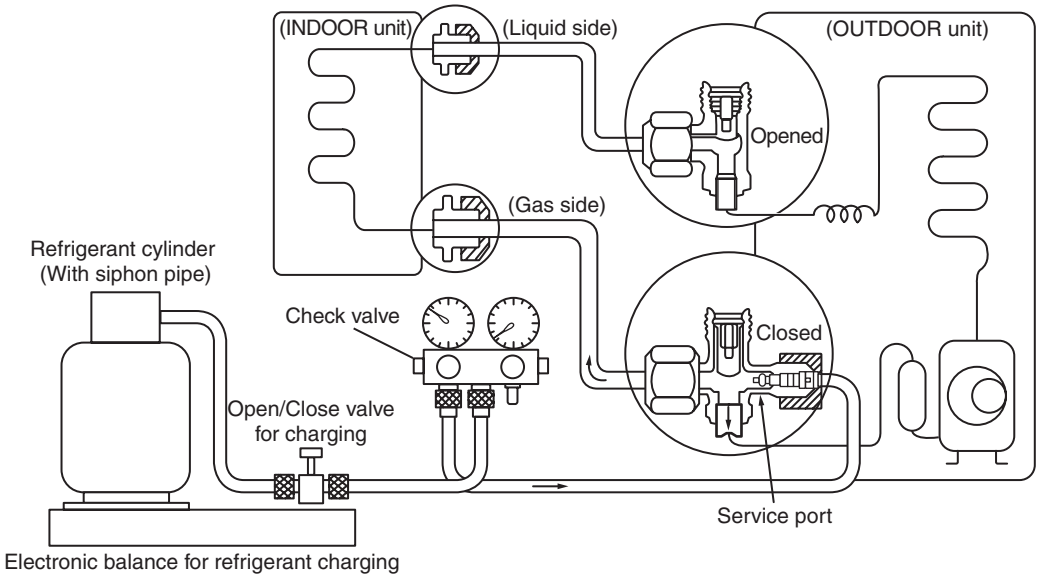
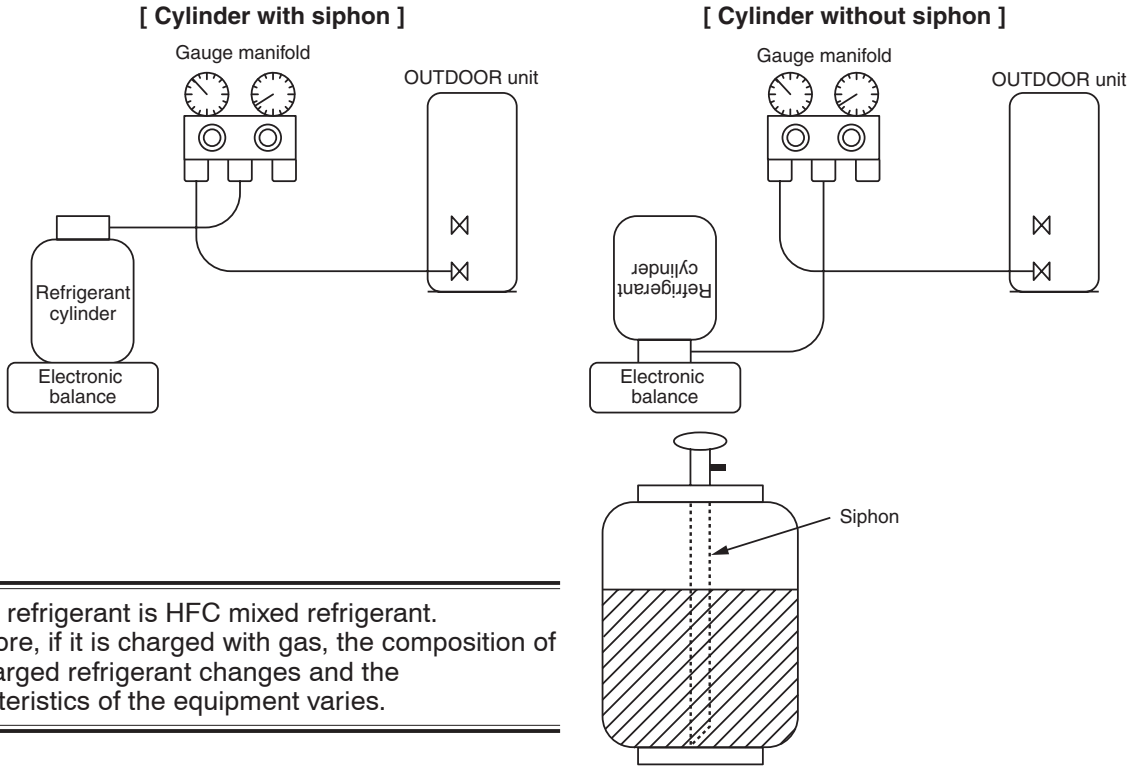


Fig. 6-4-1 Configuration of refrigerant charging

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. 6-4-2

6-5. Brazing of Pipes

6-5-1. 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.

6-5-2. 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.

6-5-3. 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 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 m³/Hr or 0.02 MPa (0.2kgf/cm²) 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.

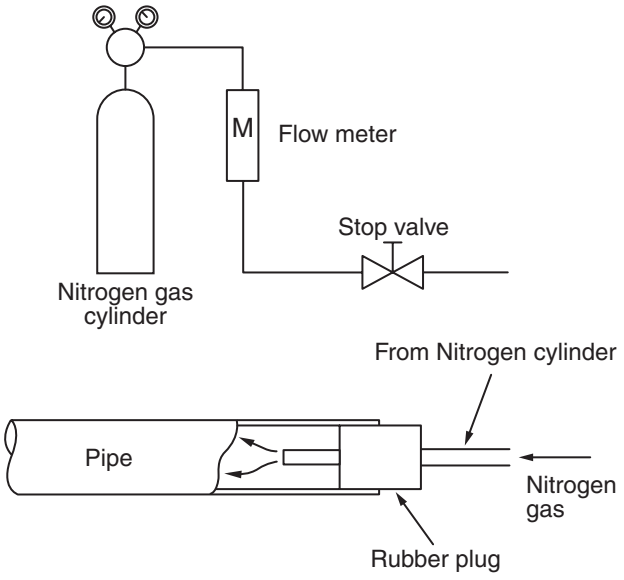


Fig. 6-5-1 Prevention of oxidation during brazing

6-6. Instructions for Re-use Piping of R22 or R407C

Instruction of Works:
The existing R22 and R407C piping can be reused for our digital inverter R410A products installations.

⚠ WARNING

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 definite conditions can be cleared, it is possible to update the existing R22 and R407C pipes to those for R410A models.

6-6-1. Basic Conditions Needed to Reuse the Existing Pipe

Check and observe three conditions of 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 is no refrigerant leak.)

6-6-2. Restricted Items to Use the Existing Pipes

In the following cases, the existing pipes cannot 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 the new pipes for the works.
2. When the thickness of the existing pipe is thinner than the specified “Pipe diameter and thickness” be sure to use the new pipes for the works.
   - The operating pressure of R410A is high (1.6 times of R22 and R407C). If there is a scratch or dent on the pipe or thinner pipe is used, the pressure strength is poor and may cause breakage of the pipe at the worst.

∗ Pipe diameter and thickness (mm)

Reference outside diameter (mm)	Wall thickness (mm)	Material
6.4	0.8	—
9.5	0.8	—
12.7	0.8	—
15.9	1.0	—
19.1	1.2	—
22.2	1.0	Half hard
28.6	1.0	Half hard

   - In case that the pipe diameter is Ø12.7 mm or less and the thickness is less than 0.7 mm, be sure to use the new pipes for works.
3. The pipes are left as coming out or gas leaks. (Poor refrigerant)
   - There is possibility that rain water or air including moisture enters in the pipe.
4. Refrigerant recovery is impossible. (Refrigerant recovery by the pump-down operation on the existing air conditioner)
   - There is possibility that a large quantity of poor oil or moisture remains inside of the pipe.
5. A dryer on the market is attached to the existing pipes.
   - There is possibility that copper green rust generated.
6. Check the oil when the existing air conditioner was removed after refrigerant had been recovered. In this case, if the oil is judged as clearly different compared with normal oil
   - The refrigerator oil is copper rust green : There is possibility that moisture is mixed with the oil and rust generates inside of the pipe.
   - There is discolored oil, a large quantity of the remains, or bad smell.
   - A large quantity of sparkle remained wear-out powder is observed in the refrigerator oil.
7. The air conditioner which compressor was exchanged due to a faulty compressor. When the discolored oil, a large quantity of the remains, mixture of foreign matter, or a large quantity of sparkle remained wear-out powder is observed, the cause of trouble will occur.
8. Installation and removal of the air conditioner are repeated with temporary installation by lease and etc.
9. In case that type of the 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.
   - Winding-insulation of the compressor may become inferior.

NOTE

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

6-6-3. Branching Pipe for Simultaneous Operation System

- In the concurrent twin system, when TOSHIBA-specified branching pipe is used, it can be reused. Branching pipe model name: RBC-TWP30E-2, RBC-TWP50E-2, RBC-TRP100E On the existing air conditioner for simultaneous operation system (twin system), there is a case of using branch pipe that has insufficient compressive strength. In this case please change it to the branch pipe for R410A.

6-6-4. Curing of Pipes

When removing and opening the indoor unit or outdoor unit for a long time, cure the pipes as follows:

- Otherwise rust may generate when moisture or foreign matter due to dewing enters in the pipes.
- The rust cannot be removed by cleaning, and a new piping work is necessary.

Place position	Term	Curing manner
Outdoors	1 month or more	Pinching
	Less than 1 month	Pinching or taping
Indoors	Every time	

6-6-5. Final Installation Checks

Is there no scratch or dent on the existing pipes?

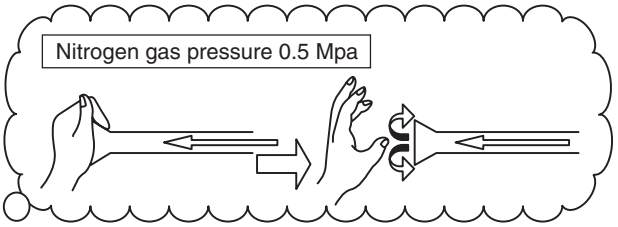
→ Existing pipe: NO * Use a new pipes.

Is it possible to operate the existing air conditioner?

NO

YES

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



* Remove the existing air conditioner from the piping and carry out flashing (nitrogen pressure 0.5 Mpa) to remove the remains inside of the pipe.

  Note] In case of twin, also be sure to flash the branching pipe.

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

Was not largely discolored oil or a large quantity of remains discharged? (When the oil deteriorates, the color of the oil changes to muddy and black color.)

NO → Clean the pipes or use the new pipes.

If you are in trouble of pipe cleaning, please contact us.

YES

■ 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.

* (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 dia.	Ø6.4	Ø9.5	Ø12.7	Ø15.9	Ø19.1
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 dia.	Ø6.4	Ø9.5	Ø12.7	Ø15.9	Ø19.1
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 large a little for R410A

Do not apply the refrigerator oil to the flare surface.

6-6-6. Handling of Existing Pipe

When using the existing pipe, carefully check it 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
- Before recovering the refrigerant in the existing system, perform a cooling operation for at least 30 minutes.

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.
- There may be a problem with the pressure resistance of the branching pipes of the existing piping.
  Replace them with branch pipes (sold separately).

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)	Material
6.4	0.8	—
9.5	0.8	—
12.7	0.8	—
15.9	1.0	—
19.1	1.2	—
22.2	1.0	Half hard
28.6	1.0	Half hard

- Do not use any pipe with a wall thickness less than these thicknesses due to insufficient pressure capacity.

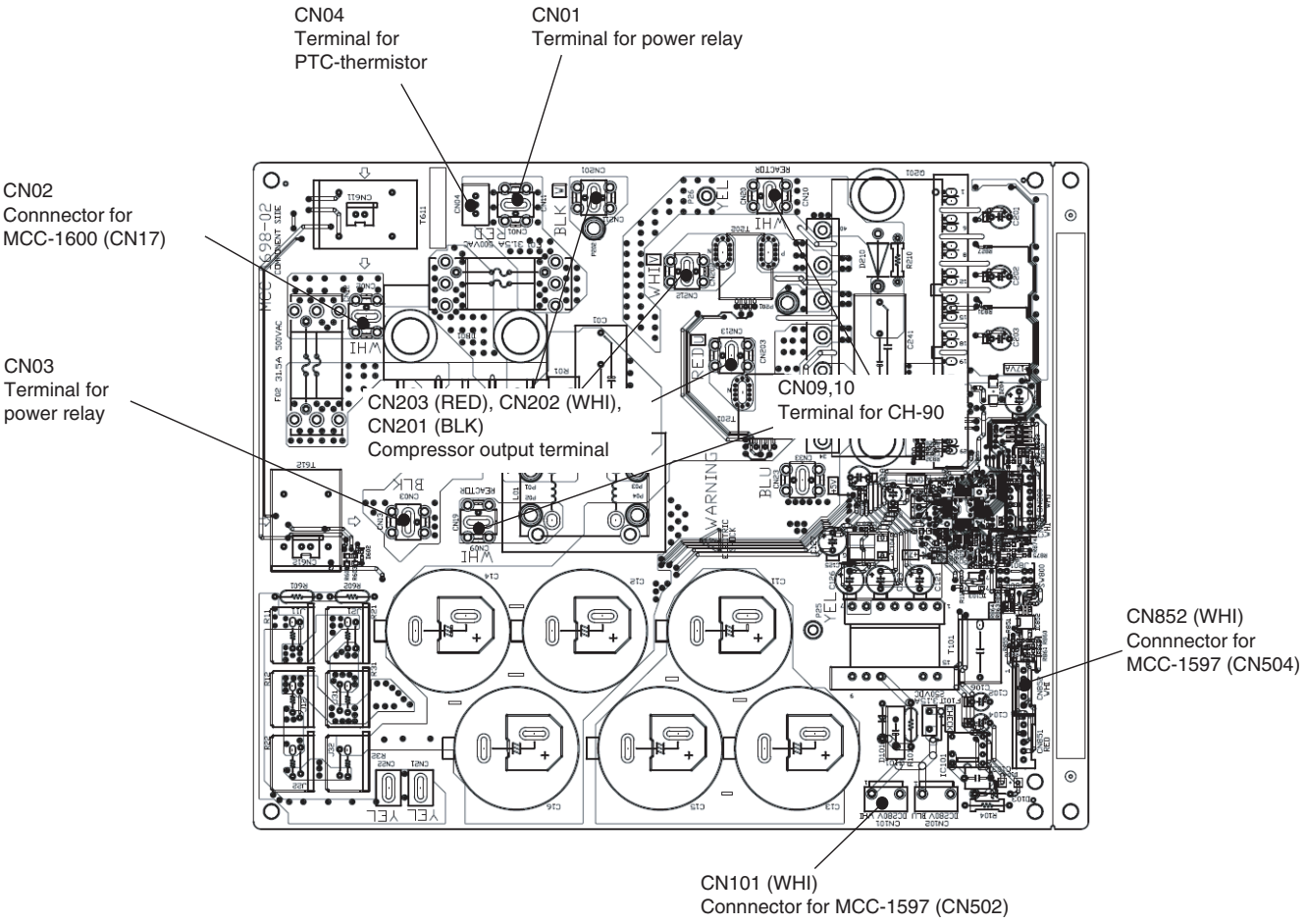
6-6-7. Recovering Refrigerant

Use the refrigerant recovery equipment to recover the refrigerant.

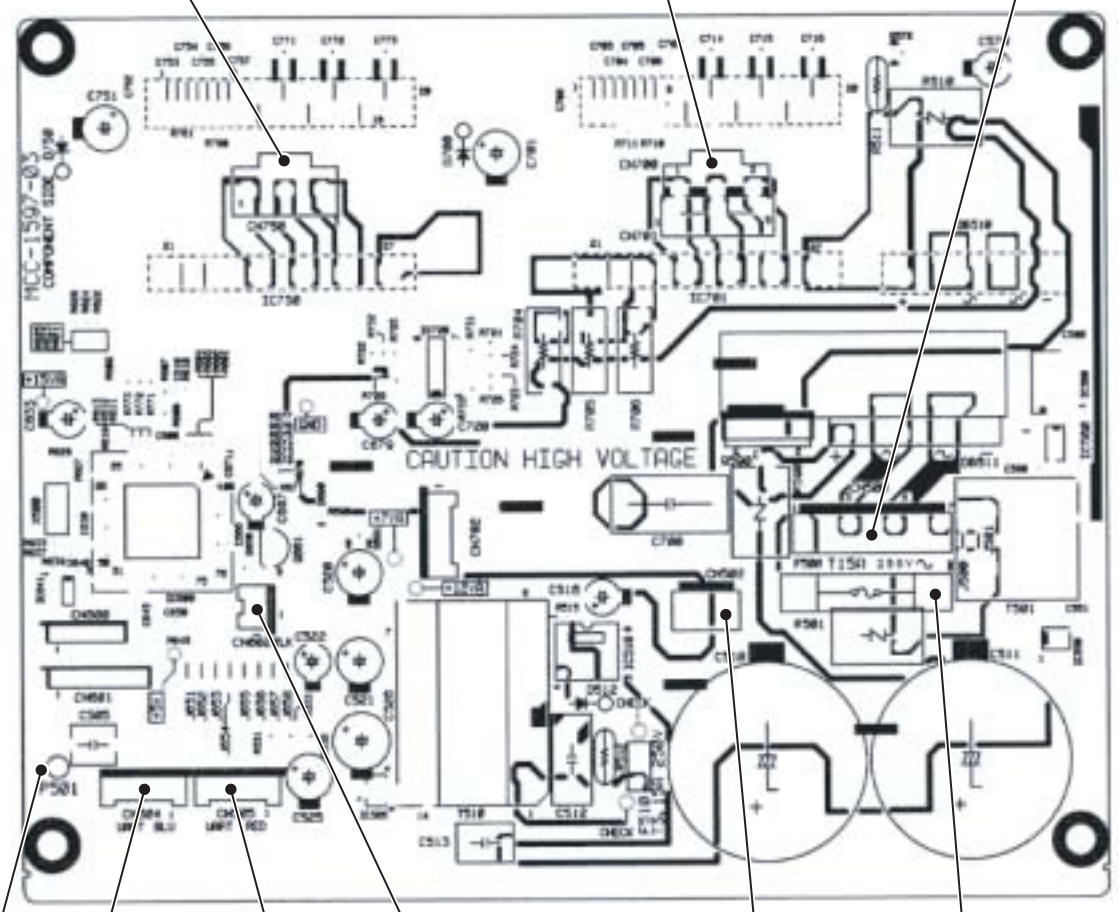
7. CIRCUIT CONFIGURATION AND CONTROL SPECIFICATIONS

7-1. Outdoor Unit Control

7-1-1. Print Circuit Board, MCC-1698 (Compressor IPDU)



7-1-2. Print Circuit Board, MCC-1597 (Fan Motor IPDU)



CN750 (White)
Fan motor output (Upper side)

CN700 (Blue)
Fan motor output (Down side)

CN500 (Red)
Connector for MCC-1600 (CN22) and reactor CH68

CN504 (Blue)
Connector for MCC-1698 (CN852)

CN602 (Black)
Connector for MCC-1600 (CN51)

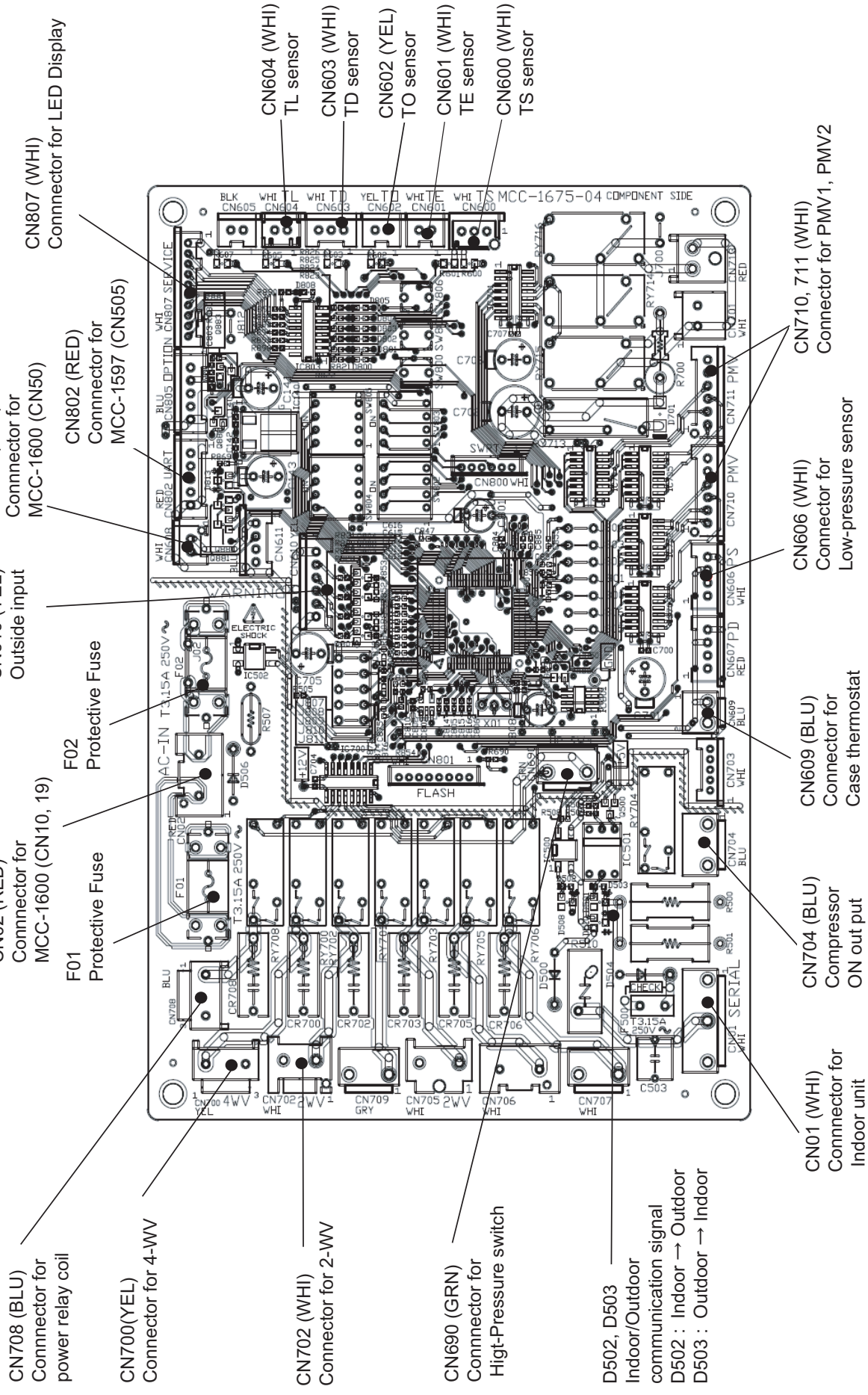
F500
Electric circuit protective fuse (250V, 15A)

P501 (Black)
Lead wire for grounding

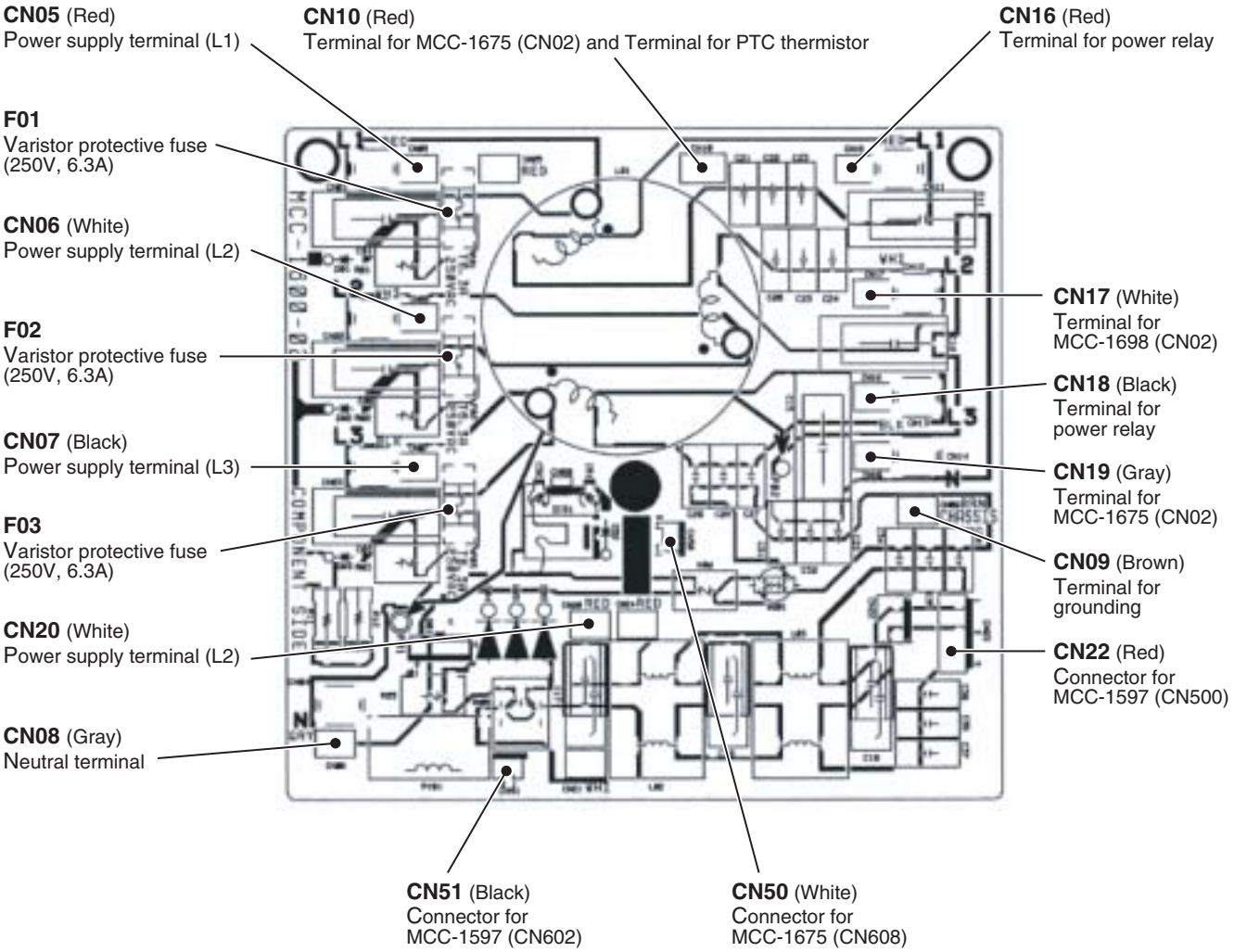
CN505 (Red)
Connector for MCC-1675 (CN802)

CN502 (White)
Connector for MCC-1698 (CN101)

7-1-3. Print Circuit Board, MCC-1675 (Interface (CDB))



7-1-4. Print Circuit Board, MCC-1600 (Noise Filter)



7-2. Outline of Main Controls

1. PMV (Pulse Motor Valve) control

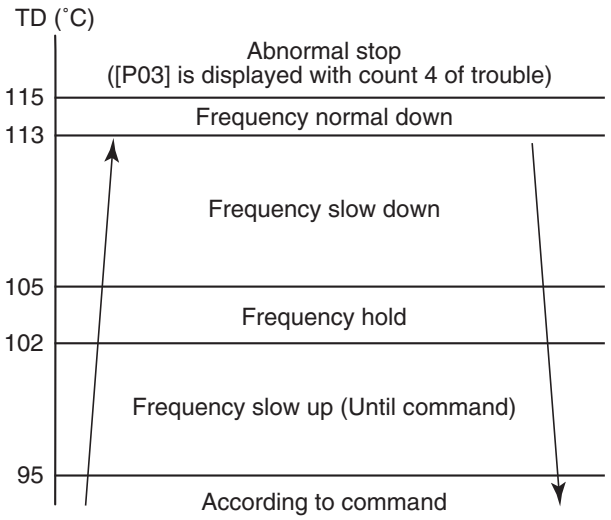
1) The aperture of the PMV (1, 2) is controlled between 90(45+45) to 1000 (500 + 500) pulses during operation.
2) During cooling and heating operations, the PMV aperture is controlled by the temperature difference between a detected temperature from a TS sensor and a saturation temperature equivalent value (TU temperature) from a Ps sensor. (SH control).
3) The temperature difference in 2) in both cooling and heating operations is usually controlled using a 1~6K target value.
   (However control may be performed more than 6K depending on operating conditions).
4) When the cycle overheats during both cooling and heating operations, the PMV aperture is controlled using a detection value from a TD sensor.
   The normal target value is 95°C for cooling operations and 101°C for heating operations.

⚠ CAUTION

Sensor malfunction may cause liquid back-flow or overheating trouble in the compressor resulting in dramatic reduction in the durable life of the compressor.
In the event of malfunction and repair of the compressor, restart operation after checking that there are no trouble in the resistance values or the refrigerating cycle of each sensor.

2. Discharge temperature release control

1) This control lowers the revolution number of the compressor in the event that the discharge temperature is not reduced or in the event the discharge temperature increases rapidly during PMV control.
   The cycle is stabilized by dividing compressor revolution number control into units up to 0.6 rps.
2) When the detected discharge temperature is in a trouble zone, compressor operation is stopped and then restarted after 2 minutes 30 seconds. A trouble count is added on each occasion the trouble zone is detected and when the trouble is detected 4 times, a “P03” trouble is performed. When normal operation continues for a period of 10 minutes, the trouble count is cleared.



3. Outdoor fan revolution number control

Control of fan revolution number and the fan taps in this unit are shown below.

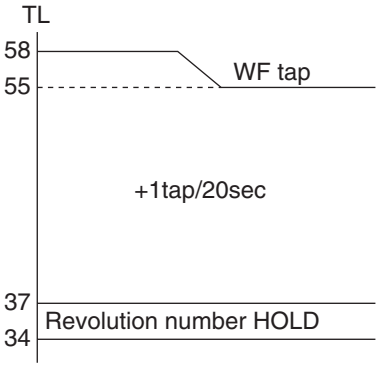
Fan Taps Revolution number Allocation [rpm]

		W1	W2	W3	W4	W5	W6	W7	W8	W9	WA	WB	WC	WD	WE	WF
SM224	Upper Fan	200	240	340	430	460	500	580	640	680	720	760	820	860	910	960
	Lower Fan	0	0	380	470	500	540	610	680	720	760	800	860	900	950	1000
SM280	Upper Fan	200	240	340	430	460	500	580	640	680	720	760	820	860	910	960
	Lower Fan	0	0	380	470	500	540	610	680	720	760	800	860	900	950	1000

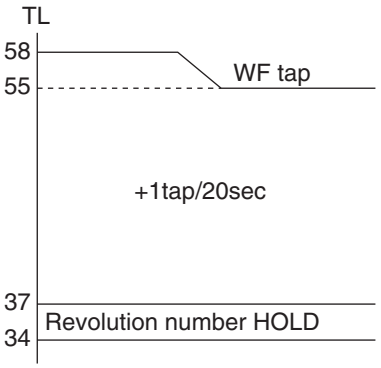
3-1. Cooling fan control

1) Cooling operations of the outdoor fan are controlled by a TL sensor, TO sensor and the compressor revolution number. Control is performed per 1 tap of DC fan control.
The outdoor fan is controlled by every 1 tap of DC fan control (14 taps).
During startup, operation is fixed for 60 seconds to a maximum fan tap corresponding to the zones shown in the table below. Thereafter fan tap is controlled by a temperature outputted from the TL sensor.

SM280	Less than 38rps		38rps or more and less than 52 rps		52rps or more	
	Min.	Max.	Min.	Max.	Min.	Max.
38˚C ≤ TO	W6	WB	W8	WF	WA	WF
29˚C ≤ TO < 38˚C	W5	WA	W7	WF	W9	WF
15˚C ≤ TO < 29˚C	W3	W7	W5	W9	W7	WB
5˚C ≤ TO < 15˚C	W2	W5	W4	W7	W6	W9
0˚C ≤ TO < 5˚C	W1	W3	W3	W5	W4	W7
-5˚C ≤ TO < 0˚C	W1	W2	W2	W4	W3	W5
TO < -5˚C	OFF	W2	W1	W3	W2	W4
To trouble	OFF	WB	W1	WF	W2	WF



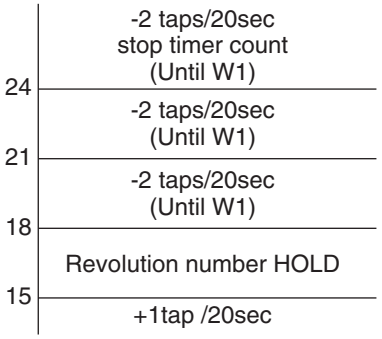
SM224	Less than 38rps		38rps or more and less than 52 rps		52rps or more	
	Min.	Max.	Min.	Max.	Min.	Max.
38˚C ≤ TO	W6	WB	W8	WE	WA	WE
29˚C ≤ TO < 38˚C	W5	WA	W7	WD	W9	WD
15˚C ≤ TO < 29˚C	W3	W7	W5	W9	W7	WB
5˚C ≤ TO < 15˚C	W2	W5	W4	W7	W6	W9
0˚C ≤ TO < 5˚C	W1	W3	W3	W5	W4	W7
-5˚C ≤ TO < 0˚C	W1	W2	W2	W4	W3	W5
TO < -5˚C	OFF	W2	W1	W3	W2	W4
To trouble	OFF	WB	W1	WE	W2	WE



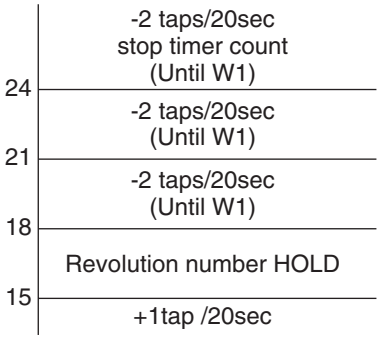
3-2. Heating fan control

1) Heating operations of the outdoor fan are controlled by a TE sensor, TO sensor and the compressor revolution number.
   (Control from a minimum W1 to a maximum is performed according to the table below).
2) Operation is fixed for 3 minutes after start up by a maximum fan tap corresponding to the zones in the table below. Thereafter fan control is performed using the temperature from the TE sensor.
3) When TE ≥ 24°C continues for 5 minutes, the compressor is stopped. The compressor is placed in the same state as a normal thermostat OFF without a check code display.
   The compressor is restarted after approximately 2 minutes 30 seconds and such interrupted operation does not constitute a trouble.
   When the operation in 3) above is frequently performed, the filter of the intake section of the indoor unit may require cleaning.
   Therefore restart operation after cleaning the filter.

SM280		Less than 38 rps	38rps or more and less than 52rps	52rps or more
Maximum	10˚C ≤ TO	WA	WA	WC
	5˚C ≤ TO < 10˚C	WC	WA	WF
	-3˚C ≤ TO < 5˚C	WF	WF	WF
	-10˚C ≤ TO < -3˚C	WF	WF	WF
	TO < -10˚C	WF	WF	WF
	To trouble	WF	WF	WF

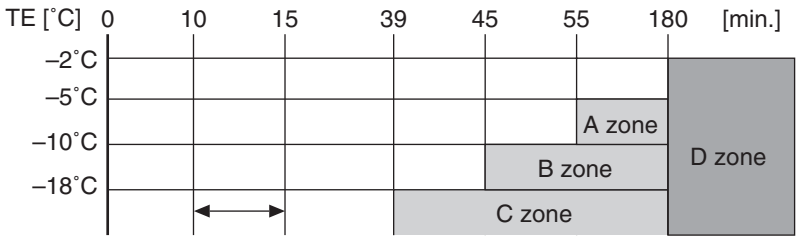


SM224		Less than 38 rps	38rps or more and less than 52rps	52rps or more
Maximum	10˚C ≤ TO	WA	WA	WC
	5˚C ≤ TO < 10˚C	WC	WA	WC
	-3˚C ≤ TO < 5˚C	WC	WC	WF
	-10˚C ≤ TO < -3˚C	WF	WF	WF
	TO < -10˚C	WF	WF	WF
	To trouble	WF	WF	WF



4. Defrost control

1) During heating operations, defrost operations are performed when the temperature from the TE sensor satisfies any of the conditions in the A to D zones.
2) During defrosting operations, defrost will be terminated if the temperature from the TE sensor continues at 12°C or higher for 3 seconds or if the temperature is 7°C ≤ TE < 12°C for 1 minute.
   Furthermore the defrost operation will be terminated if defrosting operations have continued for 10 minutes even if TE sensor temperature is less than 7°C.
3) After defrost operations have been reset, the compressor restarts heating operations without stopping.



∗ The minimum TE value during 10 and 15 minutes after starting heating operation is stored as TEO.

	When To is normal	When To is abnormal
A Zone	Status [(TEO-TE) – (ToO-To) ≥ 3˚C] continues for 20 seconds	Status [TEO- TE ≥ 3˚C] continues for 20 seconds
B Zone	Status [(TEO-TE) – (ToO-To) ≥ 2˚C] continues for 20 seconds	Status [TEO-TE ≥ 2˚C] continues for 20 seconds
C Zone	Status [TE ≥ 23˚C] continues for 20 seconds	
D Zone	When compressor operation status TE < 2˚C is calculated for d minutes	

5. Short interrupted operation preventive control

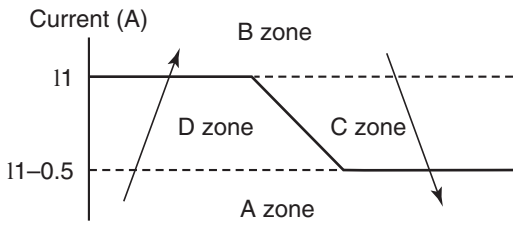
1) Even when a thermostat OFF signal is received from the indoor unit, the compressor may not stop during an 8 minute period after startup in order to protect the compressor.
   This operation is not a trouble condition.
2) When operation is terminated by using a remote controller, operation will not continue.

6. Electrical current release control

An AC current detection value from T611 on the IPDU control board is used to suppress the revolution number of the compressor so that the input current of the inverter does not exceed a specified value.

A Zone	Normal operation.
D Zone	Maintain frequency of current operation.
B Zone	Reduce operating frequency.
C Zone	Cease reduction of operating frequency and maintain frequency of current operation.

	SM224 Type	SM280 Type
I1 value (A)	15.7	18.6



7. Heat sink temperature detection control

1) IGBT overheating prevention is protective control performed by a thermistor (TH sensor) in proximity to IGBT.
2) When a temperature of TH e" 83°C is detected, the fan tap is moved by 1 step up.
   Thereafter step-up is performed at a rate of +1 tap/5 seconds until a maximum fan tap is reached.
3) After 2) above, operation is returned to normal fan control at a temperature of TH < 78°C.
4) Operation of the compressor is terminated at a temperature of TH e" 100°C.
5) Operation is restarted after 2 minutes and 30 seconds using [1] as the trouble count. However a count of [4] in the same operation confirms a trouble.
   The check code display is "P07" (Restart will not be performed).

* When trouble is confirmed, this may be a trouble caused by heat build-up or blower fan failure in the outdoor unit, or a trouble in the IPDU board.

8. Electrical current release value shift control

1) This control is for the purpose of preventing malfunction of the compressor or electronic components such as the IGBT of the inverter in the compressor drive system during cooling operations.
2) Select the current release control value (I1) by TO sensor value from the right table.

The correction is based on the table below:

Temp. range	SM224	SM280
50˚C ≤ TO	9.0A	9.0A
47˚C ≤ TO < 50˚C	11.0A	11.0A
44˚C ≤ TO < 47˚C	14.0A	14.0A
39˚C ≤ TO < 44˚C	15.7A	17.6A
TO < 39˚C	15.7A	18.6A
TO trouble	9.0A	9.0A

9. Over-current protective control

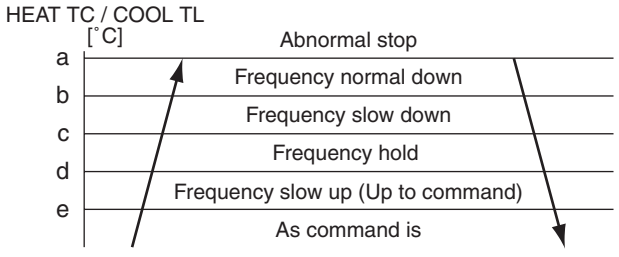
1) Operation of the compressor is stopped when the over-current protective circuit detects a trouble current.
2) The compressor restarts after 2 minutes 30 seconds using [1] as a trouble count.
   After restart, the trouble count is cleared when operation continues for 6 minutes or more.
3) A trouble is confirmed when the trouble count takes a value of [8].
4) For the indicated contents of trouble, confirm using the check code table.

10. High-pressure switch/Compressor case thermostat control

1) When the high-pressure switch or the compressor case thermostat operates, the operation of the compressor is terminated.
2) The compressor restarts after 2 minutes 30 seconds using [1] as a trouble count.
   After restart, the trouble count is cleared when operation continues for 10 minutes or more.
3) A trouble is confirmed with the trouble count [10].
4) For the indicated contents of trouble, confirm using the check code table.

11. 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 trouble 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 trouble count when the compressor stopped with 2) is cleared after the operation continued for 10 minutes. If the trouble count becomes [10] without clearing, the trouble is determined and reactivation is not performed.
5) For the check code display contents, confirm on the check code list.

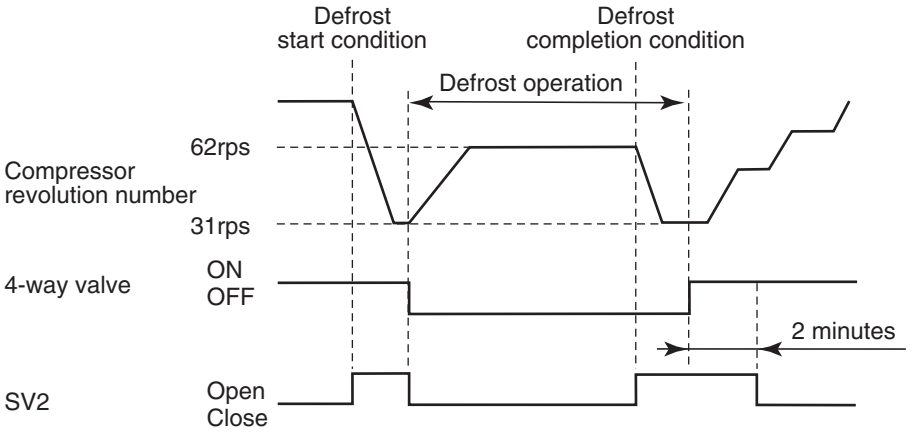


	HEAT	COOL
	TC	TL
a	62˚C	63˚C
b	57˚C	62˚C
c	55˚C	60˚C
d	53˚C	58˚C
e	49˚C	54˚C

12. SV2 valve control

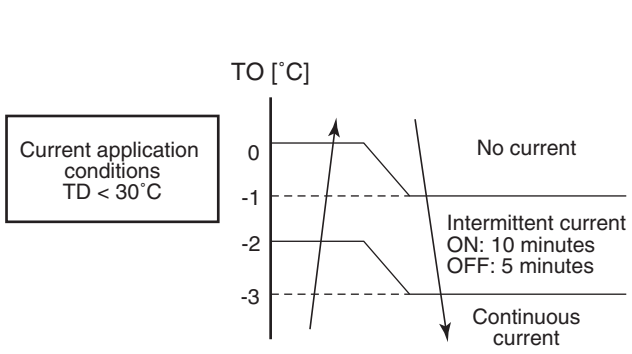
The conditions for opening and closing the SV2 valve are shown in the table below.

		SV2 Valve "Open" Conditions		SV2 Valve "Close" Conditions
Non-operation		(1)	When operation stopped after operating	When operation started after operating or when 30 minutes elapsed after opening SV2 under conditions (1) (2)
		(2)	When power placed "ON"	
During Cooling Operations		(3)	When 30 second elapses after first startup operation when power ON at TO ≤ 5˚ C	When 8 minutes elapsed after starting operation.
		(4)	When Ps ≤ 0.23 MPa	When Ps ≥ 0.27 MPa
During Heating Operations		(5)	When 30 second elapses after first startup operation when power ON at TC < 26˚C	When 8 minutes elapsed after starting operation or when TC ≥ 26˚C
		(6)	When Ps ≤ 0.14 MPa	When Ps ≥ 0.19 MPa
	During Defrost Operation	(7)	When conditions for defrost satisfied.	When 4-way valve is OFF during defrost startup.
		(8)	When conditions for defrost satisfied.	When 2 minutes elapsed after four-way valve is ON after defrost completion

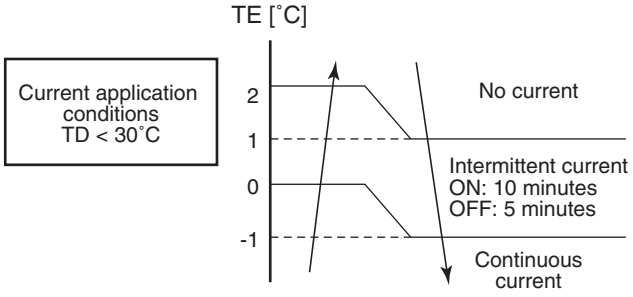


13. Coil heating control

1) This control has the function of heating the compressor by applying a current to the compressor when not operating instead using a case heater.
   This control is for the purpose of preventing stagnation of the refrigerant inside the compressor.
2) Malfunction in the compressor may result if a current is not applied for a specified time before a test run after installation as was previously the case.
   Similarly, starting operation after turning the power OFF and not operating for a long time also requires application of a current before starting operation, in the same manner as the test run.
3) Application of current is determined by TD and TO sensors.
   When the TO sensor is defective, a backup control is automatically performed by the TE sensor.
   When TO sensor is defective, make a determination using the LED display of the outdoor interface board.
4) The power is turned off when TD is 30°C or more.



(When TO sensor defective)



Intermittent current	Corresponding to 70w
Continuous current	Corresponding to 70w

(70W : Total power consumption of inverter and compressor)

NOTE

While heating and electrifying the winding wire, electrifying sound may generate. It is nor abnormal.

8. TROUBLESHOOTING

8-1. Summary of Troubleshooting

<Wired remote controller type>

1. Before troubleshooting

1) Required tools/instruments
   - ⊕and⊖screwdrivers, spanners, radio cutting pliers, nippers, push pins for reset switch
   - Tester, thermometer, pressure gauge, etc.

2) Confirmation points before check

a) The following operations are normal.

1. Compressor does not operate.
   - Is not 3-minutes delay (3 minutes after compressor OFF)?
   - Is not the outdoor unit in standby status though the remote controller reached the setup temperature?
   - Does not timer operate during fan operation?
   - Is not an overflow trouble detected on the indoor unit?
   - Is not outside high-temperature operation controlled in heating operation?

2. Indoor fan does not rotate.
   - Does not cool air discharge preventive control work in heating operation?

3. Outdoor fan does not rotate or air volume changes.
   - Does not high-temperature release operation control work in heating operation?
   - Does not outside low-temperature operation control work in cooling operation?
   - Is not defrost operation performed?

4. ON/OFF operation cannot be performed from remote controller.
   - Is not the control operation performed from outside/remote side?
   - Is not automatic address being set up?
     (When the power is turned on at the first time or when indoor unit address setting is changed, the operation cannot be performed for maximum approx. 5 minutes after power-ON.)
   - Is not being carried out a test run by operation of the outdoor controller?

b) Did you return the wiring to the initial positions?

c) Are connecting wiring of indoor unit and remote controller correct?

2. Troubleshooting procedure

When a trouble occurred, check the parts along with the following procedure.

Trouble → **Confirmation of check code display** → **Check defective position and parts.**

NOTE

For cause of a trouble, power conditions or malfunction/erroneous diagnosis of microcomputer due to outer noise is considered except the items to be checked. If there is any noise source, change the wires of the remote controller to shield wires.

<Wireless remote controller type>

1. Before troubleshooting

1) Required tools/instruments
   - ⊕ and ⊖ screwdrivers, spanners, radio cutting pliers, nippers, etc.
   - Tester, thermometer, pressure gauge, etc.

2) Confirmation points before check
   a) The following operations are normal.
      1. Compressor does not operate.
         - Is not 3-minutes delay (3 minutes after compressor OFF)?
         - Is not the outdoor unit in standby status though the remote controller reached the setup temperature?
         - Does not timer operate during fan operation?
         - Is not an overflow trouble detected on the indoor unit?
         - Is not outside high-temperature operation controlled in heating operation?
      2. Indoor fan does not rotate.
         - Does not cool air discharge preventive control work in heating operation?

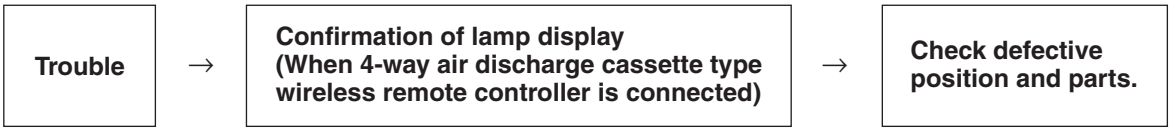
3) Outdoor fan does not rotate or air volume changes.
   - Does not high-temperature release operation control work in heating operation?
   - Does not outside low-temperature operation control work in cooling operation?
   - Is not defrost operation performed?

4) ON/OFF operation cannot be performed from remote controller.
   - Is not forced operation performed?
   - Is not the control operation performed from outside/remote side?
   - Is not automatic address being set up?
   - Is not being carried out a test run by operation of the outdoor controller?

   a) Did you return the wiring to the initial positions?
   b) Are connecting wires between indoor unit and receiving unit correct?

2. Troubleshooting procedure

(When the power is turned on at the first time or when indoor unit address setting is changed, the operation cannot be performed for maximum approx. 5 minutes after power-ON.)
When a trouble occurred, check the parts along with the following procedure.



1) Outline of judgment
   The primary judgment to check where a trouble occurred in indoor unit or outdoor unit is performed with the following method.

Method to judge the erroneous position by flashing indication on the display part of indoor unit (sensors of the receiving unit)

The indoor unit monitors operating status of the air conditioner, and the blocked contents of self-diagnosis are displayed restricted to the following cases if a protective circuit works.

8-2. Troubleshooting

8-2-1. Outline of judgment

The primary judgment to check whether a trouble occurred in the indoor unit or outdoor unit is carried out with the following method.

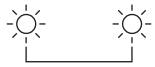
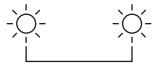
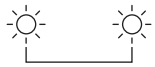
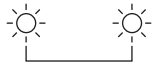
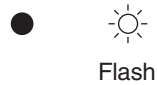
Method to judge the erroneous position by flashing indication on the display part of the indoor unit (sensors of the receiving part)

The indoor unit monitors the operating status of the air conditioner, and the blocked contents of self-diagnosis are displayed restricted to the following cases if a protective circuit works.

● : Go off, ○ : Go on, ☼ : Flash (0.5 sec.)

Lamp indication	Check code	Cause of trouble occurrence
Operation ● Timer ● Ready ● No indication at all	—	Power supply OFF or miswiring between receiving unit and indoor unit
Operation ☼ Flash Timer ● Ready ●	E01	Receiving trouble / Sending trouble } Receiving unit } Miswiring or wire connection trouble between receiving unit and indoor unit
	E02	
	E03	Communication stop
	E08	Duplicated indoor unit No. / Duplicated header units of remote controller } Setup trouble
	E09	
	E10	Communication trouble between CPUs on indoor unit P.C. board
	E18	Wire connection trouble between indoor units, Indoor power OFF (Communication stop between indoor header and follower or between header and follower indoor twin)
Operation ● Timer ● Ready ☼ Flash	E04	Miswiring between indoor unit and outdoor unit or connection trouble (Communication stop between indoor and outdoor units)
Operation ● Timer ☼ Ready ☼ Alternate flash	P01	Overflow was detected. / Indoor DC fan trouble } Protective device of indoor unit worked.
	P10	
	P12	
Operation ☼ Timer ● Ready ☼ Alternate flash	P03	Outdoor unit discharge temp. trouble / Outdoor high pressure system trouble } Protective device of outdoor unit worked. ∗1
	P04	
	P05	Negative phase detection trouble / Heat sink overheat trouble / Gas leak detection trouble } Outdoor unit trouble
	P07	
	P15	
	P19	4-way valve system trouble (Indoor or outdoor unit judged.)
	P20	Outdoor unit high pressure protection
	P22	Outdoor unit: Outdoor unit trouble / Outdoor unit: Inverter Idc operation / Outdoor unit: Position detection trouble } Protective device of outdoor unit worked. ∗1
	P26	
	P29	
	P31	Stopped because of trouble of other indoor unit in a group (Check codes of E03/L03/L07/L08)

∗1: These are representative examples and the check code differs according to the outdoor unit to be combined.

Lamp indication	Check code	Cause of trouble occurrence
Operation Timer Ready  Alternate flash	F01	Heat exchanger sensor (TCJ) trouble Heat exchanger sensor (TC) trouble Heat exchanger sensor (TA) trouble } Indoor unit sensor trouble
	F02	
	P10	
Operation Timer Ready  Alternate flash	F04	Discharge temp. sensor (TD) trouble Temp. sensor (TE) trouble Temp. sensor (TL) trouble Temp. sensor (TO) trouble Temp. sensor (TS) trouble Temp. sensor (TH) trouble Temp. Sensor miswiring (TE, TS) } Sensor trouble of outdoor unit ∗1
	F06	
	F07	
	F08	
	F12	
	F13	
	F15	
Operation Timer Ready  Simultaneous flash	F29	Indoor EEPROM trouble
Operation Timer Ready  Simultaneous flash	F31	Outdoor EEPROM trouble
Operation Timer Ready  Flash	H01	Compressor break down Compressor lock } Outdoor compressor system trouble ∗1
	H02	
	H03	Current detection circuit trouble } Power supply, outdoor P.C. board trouble
	H04	Case thermostat worked. } Compressor overheat, outdoor wiring trouble
	H06	PS pressure sensor trouble low pressure protective operation Outdoor unit low pressure system trouble
Operation Timer Ready  Simultaneous flash	L03	Duplicated header indoor units There is indoor unit of group connection in individual indoor unit. → AUTO address * If group construction and address are not normal when power supply turned on, automatically goes to address setup mode. Unsetting of group address Missed setting (Unset indoor capacity)
	L07	
	L08	
	L09	
Operation Timer Ready  Simultaneous flash	L10	Unset model type (Service board)
	L20	Duplicated indoor central addresses
	L29	Outdoor unit and other trouble
	L30	Outside interlock trouble
	L31	Negative phase trouble

∗1: These are representative examples and the check code differs according to the outdoor unit to be combined.

8-2-2. Others (Other than Check Code)

Lamp indication	Check code	Cause of trouble occurrence
Operation Timer Ready  Simultaneous flash	—	During test run
Operation Timer Ready ○  Alternate flash	—	Disagreement of cool/heat (Automatic cool/heat setting to automatic cool/heat prohibited model, or setting of heating to cooling-only model)

8-2-3. Monitor Function of Remote Controller Switch

■ Calling of sensor temperature display

<Contents>

Each data of the remote controller, indoor unit and outdoor unit can be understood by calling the service monitor mode from the remote controller.

<Procedure>

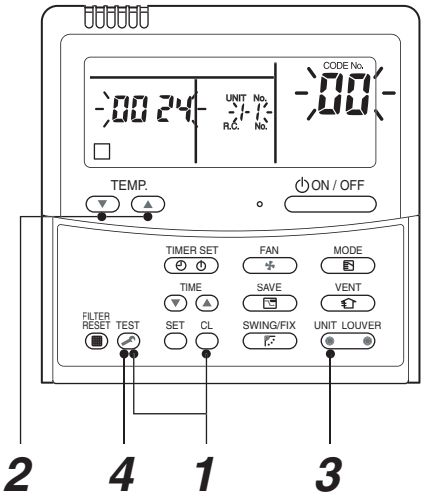
1 Push TEST + CL buttons simultaneously for 4 seconds to call the service monitor mode.

The service monitor goes on, the header indoor unit No. is displayed at first and then the temperature of CODE No. 00 is displayed.

⇩

2 Push temperature set TEMP. buttons and then change the CODE No. of data to be monitored.

The CODE No. list is shown below.



<Operation procedure>

1→ 2→ 3→ 4

Returned to usual display

	CODE No.	Data name	Unit
Indoor unit data	01	Room temperature (Remote controller)	˚C
	02	Indoor suction temperature (TA)	˚C
	03	Indoor heat exchanger (Coil) temperature (TCJ)	˚C
	04	Indoor heat exchanger (Coil) temperature (TC)	˚C
	∗ 07	Indoor fan revolution frequency	rpm
	∗ F2	Indoor fan calculated operation time	×100h
	F3	Filter sign time	×1h
	∗ F8	Indoor discharge temperature*1	˚C

	CODE No.	Data name	Unit
Outdoor unit data	60	Outdoor heat exchanger (Coil) temperature (TE)	˚C
	61	Outside temperature (TO)	˚C
	62	Compressor discharge temperature (TD)	˚C
	63	Compressor suction temperature (TS)	˚C
	65	Heat sink temperature (THS)	˚C
	6A	Operation current (× 1/10)	A
	∗ 6D	Outdoor heat exchanger (Coil) temperature (TL)	˚C
	∗ 70	Compressor operation frequency	rps
	∗ 72	Outdoor fan revolution frequency (Lower)	rpm
	∗ 73	Outdoor fan revolution frequency (Upper)	rpm
	F1	Compressor calculated operation time	×100h

The CODE No. with ∗ marks in the above table are displayed only on the indoor units of **4** series models and after.
(**4** series indoor units mean RAV-SM140**4**UT-E for example.).

⇩

3 Push UNIT LOUVER button to select the indoor unit to be monitored.
Each data of the indoor unit and its outdoor units can be monitored.

⇩

4 Pushing TEST button returns the status to the usual display.

∗1 The indoor discharge temperature of CODE No. [F8] is the estimated value from TC or TCJ sensor. Use this value to check discharge temperature at test run.
(A discharge temperature sensor is not provided to this model.)

- The data value of each item is not the real time, but value delayed by a few seconds to ten-odd seconds.

8-2-4. Check Code List (Outdoor)

○:Go on, ◎: Flash, ●: Go off

ALT (Alternate): Alternate flashing when there are two flashing LED SIM (Simultaneous): Simultaneous flashing when there are two flashing LED

Remote controller indication	Sensor lamp part				Representative defective position	Detection	Explanation of trouble contents	Automatic reset	Operation continuation
	Block indication								
	Operation	Timer	Ready	Flash					
F04	◎	◎	○	ALT	Outdoor unit Discharge temp. sensor (TD) trouble	Outdoor	Open/Short of discharge temp. sensor was detected.	×	×
F06	◎	◎	○	ALT	Outdoor unit Temp. sensor (TE, TS, TL) trouble	Outdoor	Open/Short of heat exchanger temp. sensor was detected. Miswiring between TE sensor and TS sensor	×	×
F08	◎	◎	○	ALT	Outdoor unit Outside temp. sensor (TO) trouble	Outdoor	Open/Short of outside temp. sensor was detected.	O	O
F07	◎	◎	○	ALT	Outdoor unit Temp. sensor (TL) trouble	Outdoor	Open/Short of heat exchanger temp. sensor was detected.	×	×
F12	◎	◎	○	ALT	Outdoor unit Temp. sensor (TS) trouble	Outdoor	Open/Short of suction temp. sensor was detected.	×	×
F13	◎	◎	○	ALT	Outdoor unit Temp. sensor (TH) trouble	Outdoor	Open/Short of heat sink temp. sensor (Board installed) was detected.	×	×
F15	◎	◎	○	ALT	Outdoor unit Misconnection of temp. sensor (TE, TS)	Outdoor	Misconnection of outdoor heat exchanger temp. sensor and suction temp. sensor was detected.	×	×
F31	◎	◎	○	SIM	Outdoor unit EEPROM trouble	Outdoor	Outdoor P.C. board part (EEPROM) trouble was detected.	×	×
H01	●	◎	●		Outdoor unit Compressor break down	Outdoor	When reached min-Hz by current release control, short-circuited current (Idc) after DC excitation was detected.	×	×
H02	●	◎	●		Outdoor unit Compressor lock	Outdoor	Compressor lock was detected.	×	×
H03	●	◎	●		Outdoor unit Current detection circuit trouble	Outdoor	Current detection circuit trouble	×	×
H04	●	◎	●		Outdoor unit Case thermostat operation	Outdoor	Case thermostat operation was detected.	×	×
H06	●	◎	●		Outdoor unit low pressure system trouble	Outdoor	Ps pressure sensor trouble, Low pressure protective operation	×	×
L10	◎	○	◎	SIM	Outdoor unit Setting trouble of service P.C. board type	Outdoor	When outdoor service P.C. board was used, model type select jumper setting was inappropriate.	×	×
L29	◎ Operation	○ Timer	◎ Ready	SIM Flash	Outdoor unit Other outdoor unit trouble	Outdoor	1) Defective parts on outdoor P.C. board (MCU communication, EEPROM, TH sensor trouble) 2) When outdoor service P.C. board was used, model type selection was inappropriate. 3) Other trouble (Heat sink abnormal overheat, gas leak, 4-way valve inverse trouble) was detected.	×	×
P03	◎	●	◎	ALT	Outdoor unit Discharge temp. trouble	Outdoor	Trouble was detected by discharge temp. release control.	×	×
P04	◎	●	◎	ALT	Outdoor unit High pressure system trouble, Power supply voltage trouble	Outdoor	When case thermostat worked, trouble was detected by high release control from indoor/ outdoor heat exchanger temp. sensor. Power supply voltage trouble	×	×
P05	◎	●	◎	ALT	Power supply trouble	Outdoor	Power supply voltage trouble	×	×
P07	◎	●	◎	ALT	Outdoor unit Heat sink overheat	Outdoor	Abnormal overheat was detected by outdoor heat sink temp. sensor.	×	×
P15	◎	●	◎	ALT	Gas leak detection	Outdoor	Abnormal overheat of discharge temp. or suction temp. was detected.	×	×
P20	◎	●	◎	ALT	Outdoor unit High pressure system trouble	Outdoor	Trouble was detected by high release control from indoor/outdoor heat exchanger temp. sensor.	×	×
P22	◎	●	◎	ALT	Outdoor unit Outdoor fan trouble	Outdoor	Trouble (Over-current, lock, etc.) was detected on outdoor fan drive circuit.	×	×
P26	◎	●	◎	ALT	Outdoor unit Inverter Idc operation	Outdoor	Short-circuited protective operation of compressor drive circuit element (G-Tr /IGBT) worked.	×	×
P29	◎	●	◎	ALT	Outdoor unit Position detection trouble	Outdoor	Position detection trouble of compressor motor was detected.	×	×
E01	◎	●	●		No remote controller header unit Remote controller communication trouble	Remote controller	Signal was not received from indoor unit. Main remote controller was not set. (including 2 remote controllers)	—	—
E02	◎	●	●		Remote controller send trouble	Remote controller	Signal cannot be sent to indoor unit.	—	—
E03	◎	●	●		Regular communication trouble between indoor and remote controller	Indoor	No communication from remote controller and network adapter	O	×
E04	●	●	◎		Indoor/Outdoor serial trouble	Indoor	Serial communication trouble between indoor and outdoor	O	×
E08	◎	●	●		Duplicated indoor addresses ✧	Indoor	Same address as yours was detected.	O	
E09	◎	●	●		Duplicated main remote controllers	Remote controller	In 2-remote controller control, both were set as header. (Indoor header unit stops warning and follower unit continues operation.)	×	×
E10	◎	●	●		Communication trouble between CPU	Indoor	MCU communication trouble between main motor and micro computer	O	△
E18	◎	●	●		Regular communication trouble between header and follower indoor units	Indoor	Regular communication was impossible between header and follower indoor units. Communication between twin header (Main unit) and follower (sub unit) was impossible.	O	×
L03	◎	●	◎	SIM	Duplicated indoor header units ✧	Indoor	There are multiple header units in a group.	×	×
L07	◎	●	◎	SIM	There is group cable in individual indoor unit. ✧	Indoor	When even one group connection indoor unit exists in individual indoor unit.	×	×
L08	◎	●	◎	SIM	Unset indoor group address ✧	Indoor	Indoor address group was unset.	×	×
L09	◎	●	◎	SIM	Unset indoor capacity	Indoor	Capacity of indoor unit was unset.	×	×
L30	◎	○	◎	SIM	Outside trouble input to indoor unit (Interlock)	Indoor	Abnormal stop by CN80 outside trouble input	×	×
P19	◎	●	◎	ALT	4-way valve inverse trouble	Indoor Outdoor	In heating operation, trouble was detected by temp. down of indoor heat exchanger or temp. up of TE, TS.	O	×

✧ When this warning was detected before group construction/address check finish at power supply was turned on, the mode shifts automatically to AUTO address setup mode.

○:Go on, ◎: Flash, ●: Go off

ALT (Alternate): Alternate flashing when there are two flashing LED SIM (Simultaneous): Simultaneous flashing when there are two flashing LED

Remote controller indication	Sensor lamp part				Representative defective position	Detection	Explanation of trouble contents	Automatic reset	Operation continuation
	Block indication								
	Operation	Timer	Ready	Flash					
F01	◎	◎	●	ALT	Indoor unit Heat exchanger sensor (TCJ) trouble	Indoor	Open/Short of heat exchanger (TCJ) was detected.	○	×
F02	◎	◎	●	ALT	Indoor unit Heat exchanger sensor (TC) trouble	Indoor	Open/Short of heat exchanger (TC) was detected.	○	×
F10	◎	◎	●	ALT	Indoor unit Room temp. sensor (TA) trouble	Indoor	Open/Short of room temp. (TA) was detected.	○	×
F29	◎	◎	●	SIM	Indoor unit Other indoor P.C. board trouble	Indoor	EEPROM trouble (Other trouble may be detected. If no trouble, automatic address is repeated.	×	×
P01	●	◎	◎	ALT	Indoor unit Indoor fan trouble	Indoor	Indoor AC fan trouble was detected. (Fan thermal relay worked.)	×	×
P10	●	◎	◎	ALT	Indoor unit Overflow detection	Indoor	Float switch worked.	×	×
P12	●	◎	◎	ALT	Indoor unit Indoor fan trouble	Indoor	Indoor fan trouble (Over-current / Lock, etc.) was detected.	×	×
P31	◎	●	◎	ALT	Other indoor unit trouble	Indoor	Other indoor under condition of warning in group. E03/L07/L03/L08 warning	○	×
—	By unit with warning No.			ALT	Trouble in indoor group	Network adapter	Sub remote controller trouble in a group (Details of remote controller are displayed with unit No. Only central control side is displayed.)	—	—
—	—				LAN system communication trouble	Network adapter/ Center	Communication trouble of central control system signal ＊ Is not displayed on the remote controller	○	○
L20	◎	○	◎	ALT	LAN system communication trouble	Network adapter/ Center	Duplicated indoor address of central control system communication	○	×
—	—				There are multiple communication adapters.	Network adapter	There are multiple communication adapters on remote controller communication line.	○	○

Failure mode detected by indoor unit

Operation of diagnostic function				Judgment and measures
Check code	**Cause of operation**	**Status of air conditioner**	**Condition**	
E03	No communication from remote controller (including wireless) and communication adapter	Stop (Automatic reset)	Displayed when trouble is detected	1. Check cables of remote controller and communication adapters. • Remote controller LCD display OFF (Disconnection) • Central remote controller [97] check code
E04	The serial signal is not output from outdoor unit to indoor unit. • Miswiring of inter-unit wire • Defective serial sending circuit on outdoor P.C. board • Defective serial receiving circuit on indoor P.C. board	Stop (Automatic reset)	Displayed when trouble is detected	1. Outdoor unit does not completely operate. • Inter-unit wire check, correction of miswiring • Check outdoor P.C. board. Correct wiring of P.C. board. 2. When outdoor unit normally operates Check P.C. board (Indoor receiving / Outdoor sending).
E08	Duplicated indoor unit address	Stop	Displayed when trouble is detected	1. Check whether remote controller connection (Group/Individual) was changed or not after power supply turned on (Finish of group construction/Address check). * If group construction and address are not normal when the power has been turned on, the mode automatically shifts to address setup mode. (Resetting of address)
L03	Duplicated indoor header unit			
L07	There is group wire in individual indoor unit.			
L08	Unset indoor group address			
L09	Unset indoor capacity	Stop	Displayed when trouble is detected	1. Set indoor capacity (DN=11)
L30	Abnormal input of outside interlock	Stop	Displayed when trouble is detected	1. Check outside devices. 2. Check indoor P.C. board.
P10	Float switch operation • Float circuit, Disconnection, Coming-off, Float switch contact trouble	Stop	Displayed when trouble is detected	1. Trouble of drain pump 2. Clogging of drain pump 3. Check float switch. 4. Check indoor P.C. board.
P12	Indoor DC fan trouble	Stop	Displayed when trouble is detected	1. Position detection trouble 2. Over-current protective circuit of indoor fan driving unit operated. 3. Indoor fan locked. 4. Check indoor P.C. board.
P19	4-way valve system trouble • After heating operation has started, indoor heat exchangers temp. is down.	Stop (Automatic reset)	Displayed when trouble is detected	1. Check 4-way valve. 2. Check 2-way valve and check valve. 3. Check indoor heat exchanger (TC/TCJ). 4. Check indoor P.C. board.
P31	Own unit stops while warning is output to other indoor units.	Stop (Follower unit) (Automatic reset)	Displayed when trouble is detected	1. Judge follower unit while header unit is [E03], [L03], [L07] or [L08]. 2. Check indoor P.C. board.
F01	Coming-off, disconnection or short of indoor heat exchanger temp. sensor (TCJ)	Stop (Automatic reset)	Displayed when trouble is detected	1. Check indoor heat exchanger temp. sensor (TCJ). 2. Check indoor P.C. board.
F02	Coming-off, disconnection or short of indoor heat exchanger temp. sensor (TC)	Stop (Automatic reset)	Displayed when trouble is detected	1. Check indoor heat exchanger temp. sensor (TC). 2. Check indoor P.C. board.
F10	Coming-off, disconnection or short of indoor heat exchanger temp. sensor (TA)	Stop (Automatic reset)	Displayed when trouble is detected	1. Check indoor heat exchanger temp. sensor (TA). 2. Check indoor P.C. board.
F29	Indoor EEPROM trouble • EEPROM access trouble	Stop (Automatic reset)	Displayed when trouble is detected	1. Check indoor EEPROM. (including socket insertion) 2. Check indoor P.C. board.
E10	Communication trouble between indoor MCU • Communication trouble between fan driving MCU and main MCU	Stop (Automatic reset)	Displayed when trouble is detected	1. Check indoor P.C. board.
E18	Regular communication trouble between indoor aster and follower units and between main and sub units	Stop (Automatic reset)	Displayed when trouble is detected	1. Check remote controller wiring. 2. Check indoor power supply wiring. 3. Check indoor P.C. board.

Failure mode detected by outdoor unit

Operation of diagnostic function				Judgment and measures
Check code / Indoor unit	Cause of operation	Status of air conditioner	Condition	
F04	Disconnection, short of discharge temp. sensor (TD)	Stop	Displayed when trouble is detected	1. Check discharge temp. sensor (TD). 2. Check outdoor P.C. board (MCC-1675).
F06	Disconnection, short of outdoor temp. sensor (TE)	Stop	Displayed when trouble is detected	1. Check temp. sensor (TE). 2. Check outdoor P.C. board (MCC-1675).
F07	Disconnection, short of outdoor temp. sensor (TL)	Stop	Displayed when trouble is detected	1. Check temp. sensor (TL). 2. Check outdoor P.C. board (MCC-1675).
F12	Disconnection, short of suction temp. sensor (TS)	Stop	Displayed when trouble is detected	1. Check suction temp. sensor (TS). 2. Check outdoor P.C. board (MCC-1675).
F15	Miss-mounting of outdoor temp. sensor (TE, TS)	Stop	Displayed when trouble is detected	1. Check temp. sensor (TE, TS). 2. Check outdoor P.C. board (MCC-1675).
F08	Disconnection, short of outside temp. sensor (TO)	Continue	Displayed when trouble is detected	1. Check outside temp. sensor (TO). 2. Check outdoor P.C. board (MCC-1675).
F13	Disconnection, short of heat sink temp. sensor (TH)	Stop	Displayed when trouble is detected	1. Check outdoor P.C. board (MCC-1675). (Q201 is incorporated in TH sensor.)
F31	Outdoor P.C. EEPROM trouble	Stop	Displayed when trouble is detected	1. Check outdoor P.C. board (MCC-1675).
L10	Unset jumper of service P.C. board	Stop	Displayed when trouble is detected	1. Outdoor service P.C. board Check model type setting jumper wire.
L29	Communication trouble between outdoor P.C. board MCU	Stop	Displayed when trouble is detected	1. Check outdoor P.C. board (MCC-1698, MCC-1597, MCC-1675). 2. Connection check between CN802 of MCC-1675 and CN505 of MCC-1597, and also connection check between CN504 of MCC-1597 and CN852 of MCC-1698.
P07	Heat sink overheat trouble ∗ Heat sink temp. sensor detected over specified temperature.	Stop	Displayed when trouble is detected	1. Check screw tightening between PC. Board and heat sink and check radiator grease (MCC-1596). 2. Check heat sink blast path.
P15	Detection of gas leak ∗ Discharge temp. sensor (TD), Suction temp. sensor (TS) detected temperature over specified temp.	Stop	Displayed when trouble is detected	1. Check gas leak, recharge 2. Check full open of service valve. 3. Check PMV (Pulse Motor Valve). 4. Check broken pipe. 5. Check discharge temp. sensor (TD), suction temp. sensor (TS).
P19	4-way valve inverse trouble ∗ After heating operation has started, indoor heat exchanger temp. lowers under the specified temp. ∗ After heating operation has started, outdoor heat exchanger / suction temp. rises over the specified temp.	Stop	Displayed when trouble is detected	1. Check operation of 4-way valve. 2. Check outdoor heat exchanger (TE), suction temp. sensor (TS). 3. Check indoor heat exchanger sensor (TC). 4. Check 4-way valve coil. 5. Check PMV (Pulse Motor Valve).
H01	Compressor break down ∗ Although operation has started, operation frequency decreases and operation stops.	Stop	Displayed when trouble is detected	1. Check power supply voltage. (AC342 to 457V) 2. Overload operation of refrigerating cycle
H02	Compressor lock ∗ Over-current detection after compressor start-up	Stop	Displayed when trouble is detected	1. Trouble of compressor (Lock, etc.): Replace compressor. 2. Wiring trouble of compressor (Open phase)
H03	Current detection circuit trouble	Stop	Displayed when trouble is detected	1. Check outdoor P.C. board (MCC-1698). (AC current detection circuit)
P05	Open phase of 3-phase power supply	Stop	Displayed when trouble is detected	1. Check open phase of 3-phase power supply. 2. Connection check between CN50 of MCC-1600 and CN608 of MCC-1675.
F23	Ps sensor trouble	Stop	Displayed when trouble is detected	1. Check connection of Ps sensor connector. 2. Check failure of Ps sensor. 3. Check compressing power trouble of compressor. 4. Check 4-way valve trouble. 5. Check outdoor P.C. board trouble.
H06	Low pressure protective operation	Stop	Displayed when trouble is detected	1. Check service valves are fully opened. (Gas side, Liquid side) 2. Check clogging of outdoor PMV. (PMV1, 2) 3. Check SV2 circuit. 4. Check Ps sensor trouble. 5. Check clogging of indoor filter. 6. Check clogging of refrigerant pipe. 7. Check of outdoor fan operation. (In heating mode) 8. Check short of refrigerant.

Operation of diagnostic function				Judgment and measures
Check code / Indoor unit	Cause of operation	Status of air conditioner	Condition	
P03	Discharge temp. trouble ∗ Discharge temp. (TD) over specified value was detected.	Stop	Displayed when trouble is detected	1. Check refrigerating cycle (Gas leak) 2. Trouble of electronic expansion valve 3. Check discharge temp. sensor (TD).
H04	Case thermostat operation ∗ Abnormal overheat of compressor	Stop	Displayed when trouble is detected	1. Check case thermostat and connector. 2. Check gas leak, recharge 3. Check full open of service valve. 4. Check PMV (Pulse Motor Valve). 5. Check broken pipe.
P04	High pressure SW system trouble	Stop	Displayed when trouble is detected	1. Check service valves are fully opened. (Gas side, Liquid side) 2. Check of outdoor fan operation. 3. Check motor trouble of outdoor fan. 4. Check clogging of outdoor PMV. (PMV1, 2) 5. Check clogging of heat exchanger in indoor/outdoor units. 6. Short-circuit status of suction/discharge air in outdoor unit. 7. Check outdoor P.C. board trouble. 8. Check fan system trouble (Cause of air volume drop) at indoor side. 9. Check PMV opening status in indoor unit.
P05	Power supply voltage trouble	Stop	Displayed when trouble is detected	1. Check power supply voltage. AC342 to 457V
	High pressure SW system trouble	Stop	Displayed when trouble is detected	1. Check service valves are fully opened. (Gas side, Liquid side) 2. Check of outdoor fan operation. 3. Check motor trouble of outdoor fan. 4. Check clogging of outdoor PMV. (PMV1, 2) 5. Check clogging of heat exchanger in indoor/outdoor units. 6. Short-circuit status of suction/discharge air in outdoor unit. 7. Check outdoor P.C. board trouble. 8. Check fan system trouble (Cause of air volume drop) at indoor side. 9. Check PMV opening status in indoor unit.
P20	High pressure protective operation ∗ During cooling operation, outdoor temp. sensor (TL) detected temperature over specified temp. ∗ During heating operation, indoor temp. sensor (TC, TCJ) detected temperature over specified temp.	Stop	Displayed when trouble is detected	1. Check outdoor heat exchanger sensor (TL). 2. Check indoor heat exchanger sensor (TC, TCJ). 3. Check full open of service valve. 4. Check indoor/outdoor fan. 5. Check PMV (Pulse Motor Valve). 6. Check clogging and short circuit of indoor/outdoor heat exchanger. 7. Overcharge of refrigerant. Recharge
P22	Outdoor fan system trouble	Stop	Displayed when trouble is detected	1. Check lock of fan motor. 2. Check power supply voltage between L2 and N. AC198 to 264V 3. Check outdoor P.C. board.
P26	Short-circuit trouble of compressor driving element	Stop	Displayed when trouble is detected	1. When performing operation while taking-off compressor wire, P26 trouble occurs. Check control P.C. board (MCC-1698). 2. When performing operation while taking-off compressor wire, an trouble does not occur. (Compressor rare short)
P29	Position detection circuit trouble	Stop	Displayed when trouble is detected	1. Check control P.C. board (MCC-1698).

Failure mode detected by remote controller or central controller (TCC-LINK)

Operation of diagnostic function				Judgment and measures
Check code	**Cause of operation**	**Status of air conditioner**	**Condition**	
Not displayed at all (Operation on remote controller is impossible.)	No communication with header indoor unit • Remote controller wiring is not correct. • Power of indoor unit is not turned on. • Automatic address cannot be completed.	Stop	—	Power supply trouble of remote controller, Indoor EEPROM trouble 1. Check remote controller inter-unit wiring. 2. Check remote controller. 3. Check indoor power wiring. 4. Check indoor P.C. board. 5. Check indoor EEPROM. (including socket insertion) → Automatic address repeating phenomenon generates.
E01 ∗2	No communication with header indoor unit • Disconnection of inter-unit wire between remote controller and header indoor unit (Detected by remote controller side)	Stop (Automatic reset) ∗ If center exists, operation continues.	Displayed when trouble is detected	Receiving trouble from remote controller 1. Check remote controller inter-unit wiring. 2. Check remote controller. 3. Check indoor power wiring. 4. Check indoor P.C. board.
E02	Signal send trouble to indoor unit (Detected by remote controller side)	Stop (Automatic reset) ∗ If center exists, operation continues.	Displayed when trouble is detected	Sending trouble of remote controller 1. Check sending circuit inside of remote controller. → Replace remote controller.
E09	There are multiple main remote controllers. (Detected by remote controller side)	Stop (Sub unit continues operation.)	Displayed when trouble is detected	1. In 2-remote controllers (including wireless), there are multiple main units. Check that there are 1 main remote controller and other sub remote controllers.
L20 Central controller L20	Duplicated indoor central addresses on communication of central control system (Detected by indoor/central controller side)	Stop (Automatic reset)	Displayed when trouble is detected	1. Check setting of central control system network address. (Network adapter SW01) 2. Check network adapter P.C. board.
— ∗3 Central controller (Send) C05 (Receive) C06	Communication circuit trouble of central control system (Detected by central controller side)	Continues (By remote controller)	Displayed when trouble is detected	1. Check communication wire / miswiring 2. Check communication (U3, U4 terminals) 3. Check network adapter P.C. board. 4. Check central controller (such as central control remote controller, etc.) 5. Check terminal resistance. (TCC-LINK)
— Central controller P30	Indoor Gr sub unit trouble (Detected by central controller side)	Continuation/Stop (According to each case)	Displayed when trouble is detected	Check the check code of the corresponding unit from remote controller.

∗2 The check code cannot be displayed by the wired remote controller. (Usual operation of air conditioner becomes unavailable.) For the wireless models, an trouble is notified with indication lamp.

∗3 This trouble is related to communication of remote controller (A, B), central system (TCC-LINK U3, U4), and [E01], [E02], [E03], [E09] or [E18] is displayed or no check display on the remote controller according to the contents.

8-2-5. 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 trouble occurred continuously by multiple times while LED of the outdoor P.C. board displays even an trouble which occurred once.
   Therefore the display on the remote controller may differ from that of LED.

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

[Service switch operation]

Currently occurring trouble indication

Even if only one of D800 to D804 is rapidly flashing then trouble has arisen. If any of D800 to D801 is slowly flashing or D805 is flashing then press and hold down SW01 and SW02 at the same time for at least 5 seconds.

D800 (YEL)	D801 (YEL)	D802 (YEL)	D803 (YEL)	D804 (YEL)	D805 (GRN)	
●	●	●	●	●	○	No trouble
◎	●	●	●	●	○	Trouble detected (Example. Discharge temp. trouble)

●: Go OFF ○: Go ON ◎: Flash (5 times/sec)

Latest trouble indication

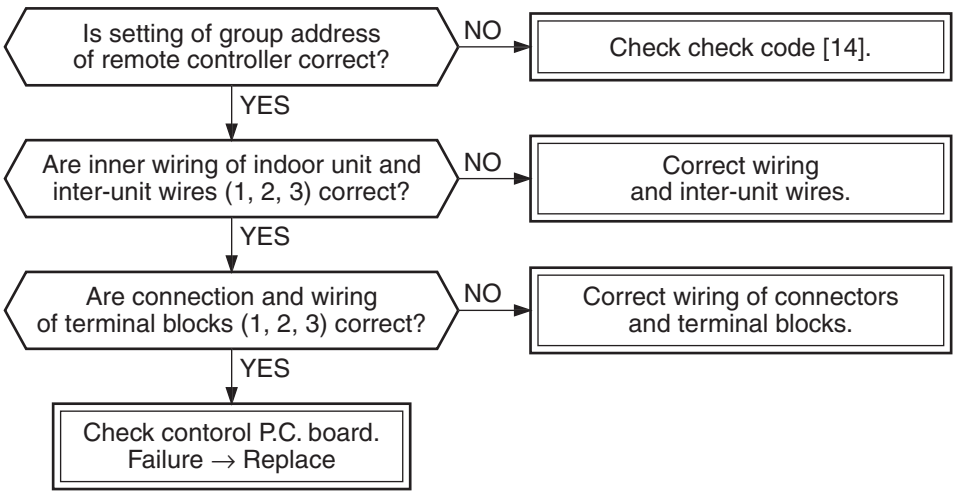
- The following operation results in the latest trouble being indicated. It is retained in the memory and hence can be confirmed even when the power supply has been turned off. (Excluding outside air temperature sensor (TO) trouble)
  1) Confirm D800 to D804 are off (or rapidly flashing) and that D805 is lit up. If D800 to D804 are slowly flashing or D805 is flashing then push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will turn off (or be rapidly flashing) and D805 will change to flashing.
  2) Push and hold down SW01 for at least 5 seconds. D804 will start slowly flashing.
  3) Push SW01 several times until reaching the LED indication (D800 to D804) of 'Latest (including current) trouble indication'.
  4) Push SW02. The latest trouble will be indicated.
  5) Ensure to carry out step 1) to set the LEDs to the initial state (current occurring trouble) when finished and then exit.

Latest (including current) trouble indication

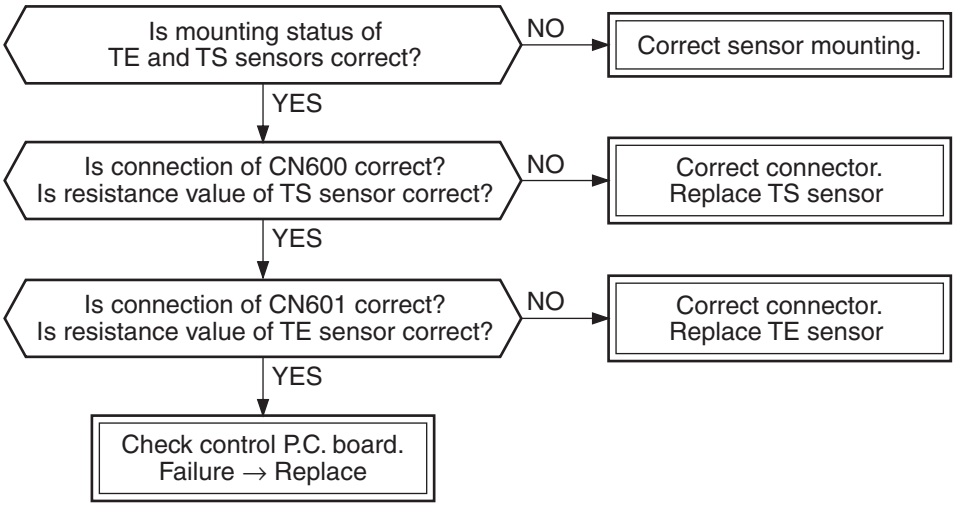
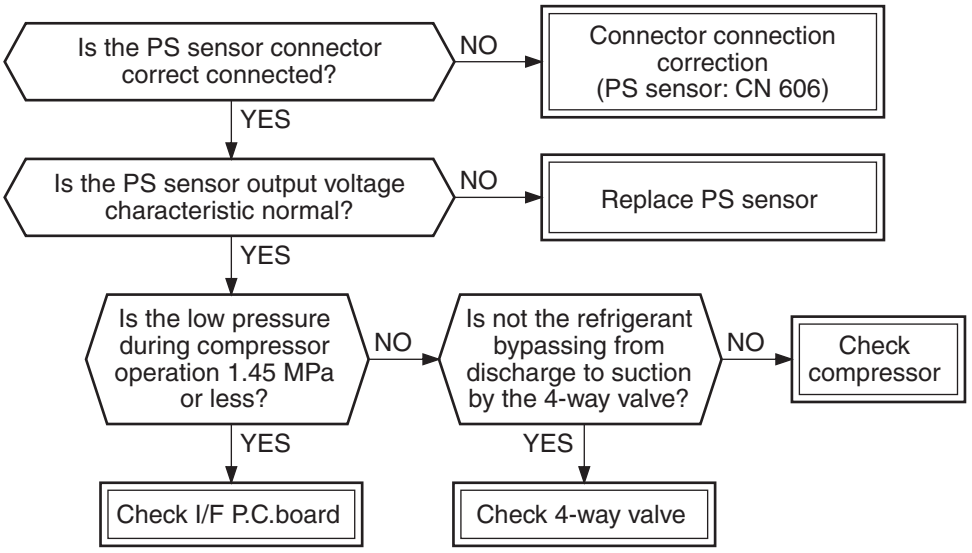
D800 (YEL)	D801 (YEL)	D802 (YEL)	D803 (YEL)	D804 (YEL)	D805 (GRN)
○	●	●	●	●	◎

●: Go OFF ○: Go ON ◎: Flash (5 times/sec)

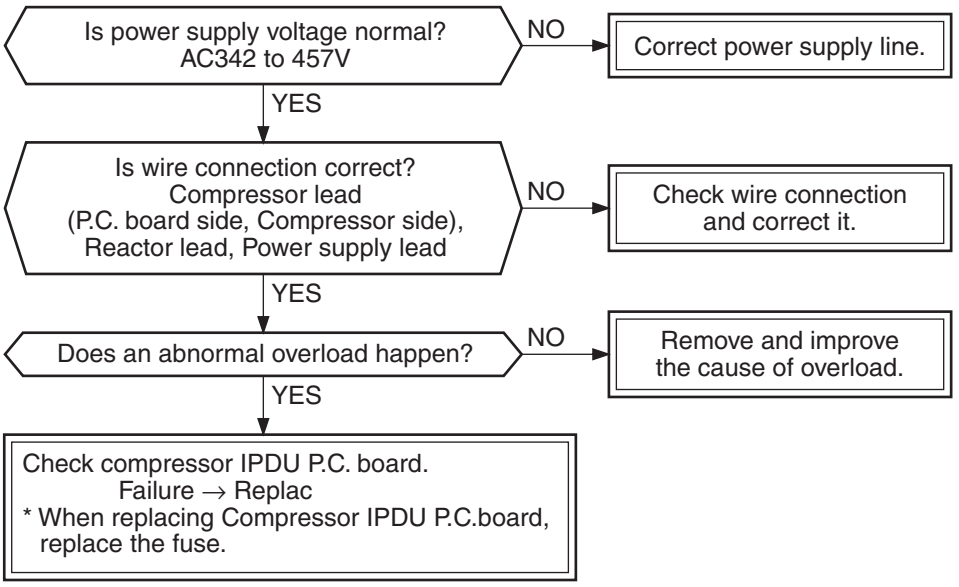
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[E04]	—	**[Indoor/Outdoor communication trouble]**



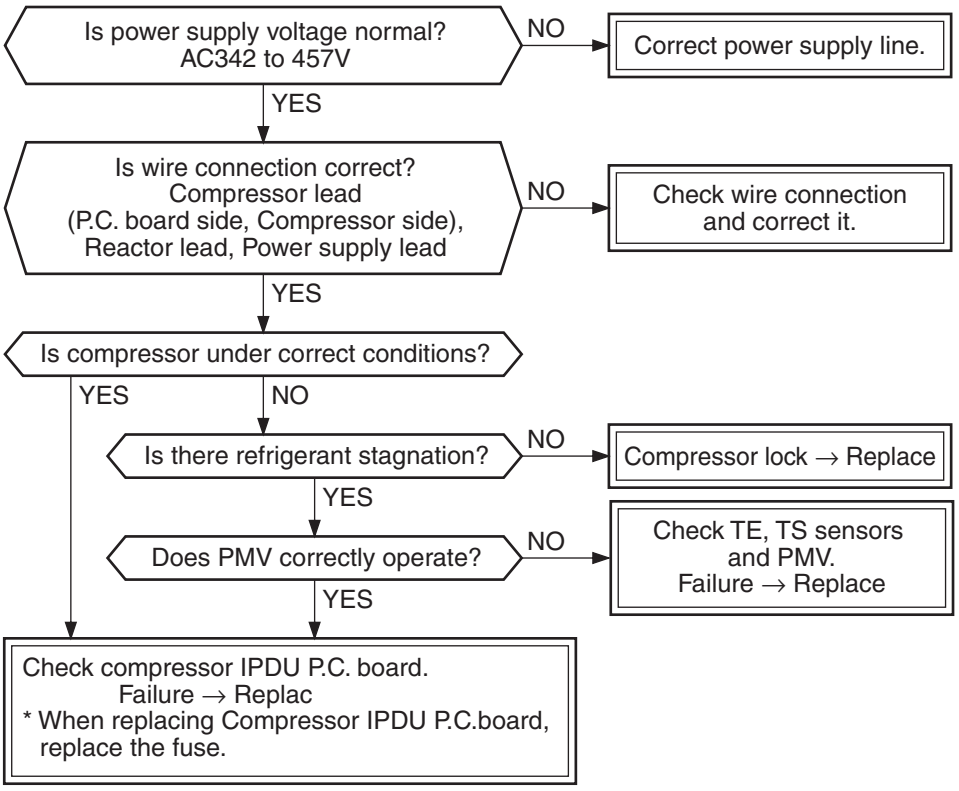
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[F04]	◎●●●●◎	**[Discharge temp. sensor (TD) trouble]** Is connection of CN603 correct? Is resistance value of TD sensor correct? → NO → Correct connector. Replace TD sensor YES → Check control P.C. board. Failure → Replace
[F06]	●◎●●●○	**[Heat exchanger temp. sensor (TE) trouble]** Is connection of CN601 correct? Is resistance value of TE sensor correct? → NO → Correct connector. Replace TE sensor YES → Check control P.C. board. Failure → Replace
[F07]	◎◎●●●○	**[Heat exchanger temp. sensor (TL) trouble]** Is connection of CN604 correct? Is resistance value of TL sensor correct? → NO → Correct connector. Replace TL sensor YES → Check control P.C. board. Failure → Replace
[F08]	●●◎●●○	**[Outside temp. sensor (TO) trouble]** Is connection of CN602 correct? Is resistance value of TO sensor correct? → NO → Correct connector. Replace TO sensor YES → Check control P.C. board. Failure → Replace
[F12]	◎●◎●●○	**[Suction temp. sensor (TS) trouble]** Is connection of CN600 correct? Is resistance value of TS sensor correct? → NO → Correct connector. Replace TS sensor YES → Check control P.C. board. Failure → Replace
[F13]	●◎◎●●○	**[Heat sink temp. sensor (TH) trouble]** Check compressor IPDU P.C. board. Failure → Replac * When replacing Compressor IPDU P.C.board, replace the fuse.

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[F15]	◎◎◎●●○	**[Miswiring of heat exchanger sensor (TE, TS)]** 
[F23]	●●●◎●○	**[Low pressure sensor (PS) trouble]** 
[F31]	●◎●◎●○	**[EEPROM trouble]** 

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[H01]	◎◎●◎●○	**[Compressor break down]**

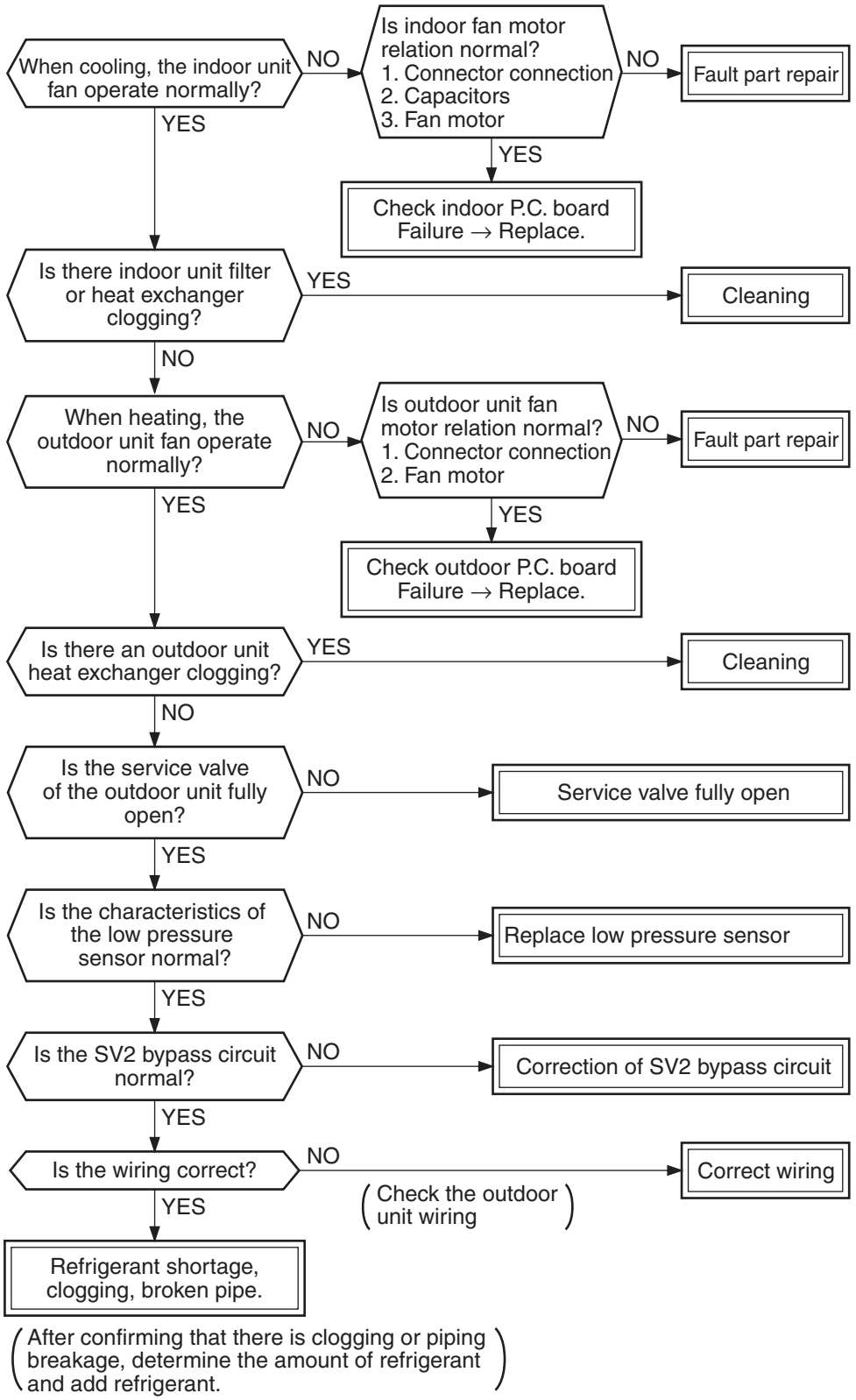


[H02]	●●◎◎●○	**[Compressor lock]**



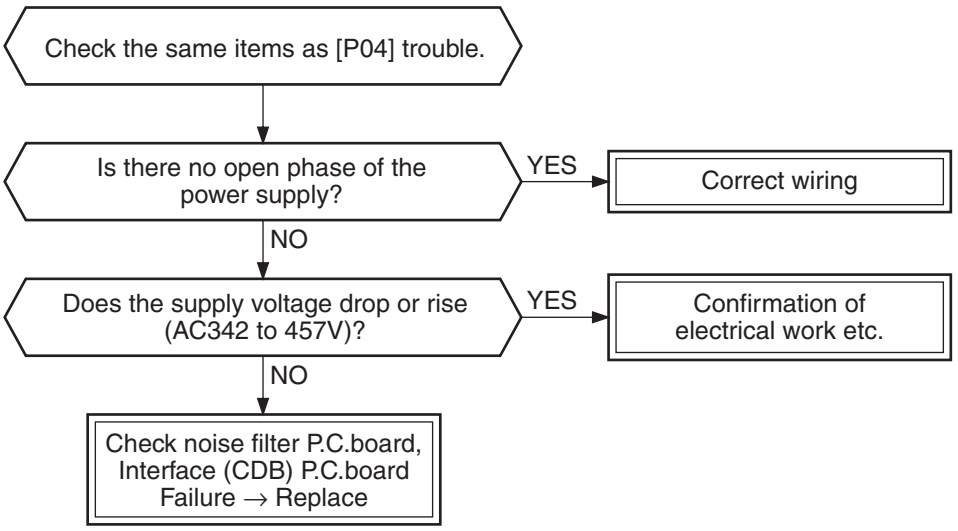
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[H03]	◎●◎◎●○	**[Current detection circuit trouble]** Check outdoor P.C. board (MCC-1698). Failure → Replace
[H04]	●◎◎◎●○	**[Case thermostat operation]** Are CN609 connection and case thermostat correct? NO → Correct connector. Case thermostat trouble → Replace YES When shorting the case thermostat, can you perform the cooling/heating operation? NO → Check compressor CDB P.C. board. Failure → Replac * When replacing Compressor CDB P.C.board, replace the fuse. YES Is there gas leak? Is there refrigerant shortage? YES → Fault part repair. Recharge refrigerant. NO Is service valve fully opened? NO → Open service valve fully. YES Is PMV normal? NO → Replace the PMV. YES Check crushed or broken pipe. Fault part repair

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[H06]	◎◎◎◎●○	**[Low pressure(PS) lowering trouble]**

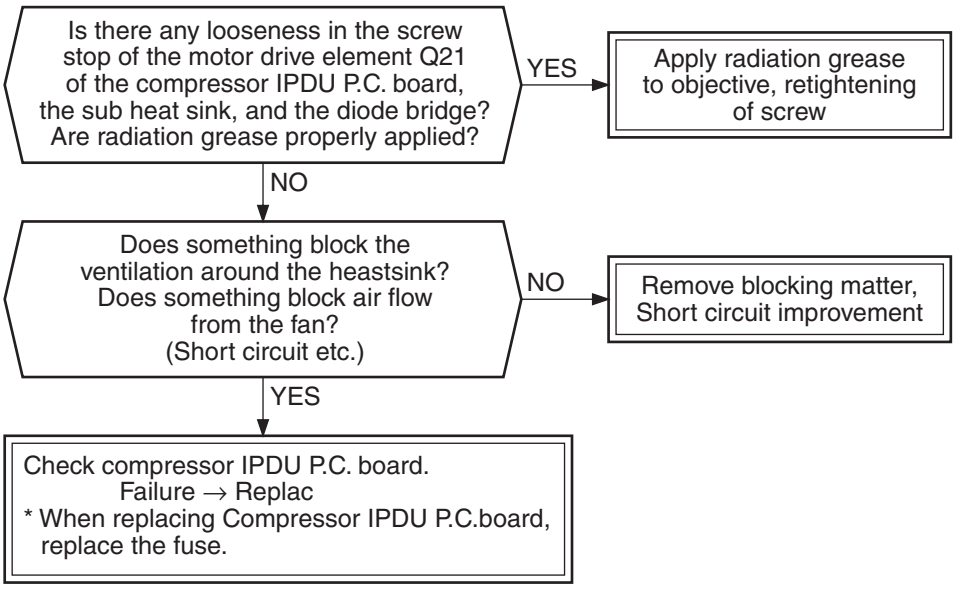


Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[L10]	●●●●◎○	**[Heat sink temp. sensor (TH) trouble]** Cut jumper line according to the explanation sheet packaged with the service P.C. board.
[L29]	◎●●●◎○	**[Communication trouble MCUs]** Is the communication line between the compressor IPDU P.C. board (CN 852) and the FAN - IPDU P.C. board (CN 504) connected? NO → Correct wiring YES Is the communication line between the control P.C.board (CN 802) and the FAN-IPDU P.C.board (CN 505) connected? NO → Correct wiring YES Check compressor IPDU P.C. board. Failure → Replac * When replacing Compressor IPDU P.C.board, replace the fuse.
[P03]	◎●●●●○	**[Discharge temp. trouble]** Is there gas leak? Is there refrigerant shortage? NO → Fault part repair. Recharge refrigerant. YES Is PMV normal? NO → Replace the PMV. YES Does an abnormal overload happen? YES → Remove and improve the cause of overload. NO Is connection of CN603 correct? Is resistance value of TD sensor correct? NO → Replace TD sensor. YES Check control P.C. board. Failure → Replace

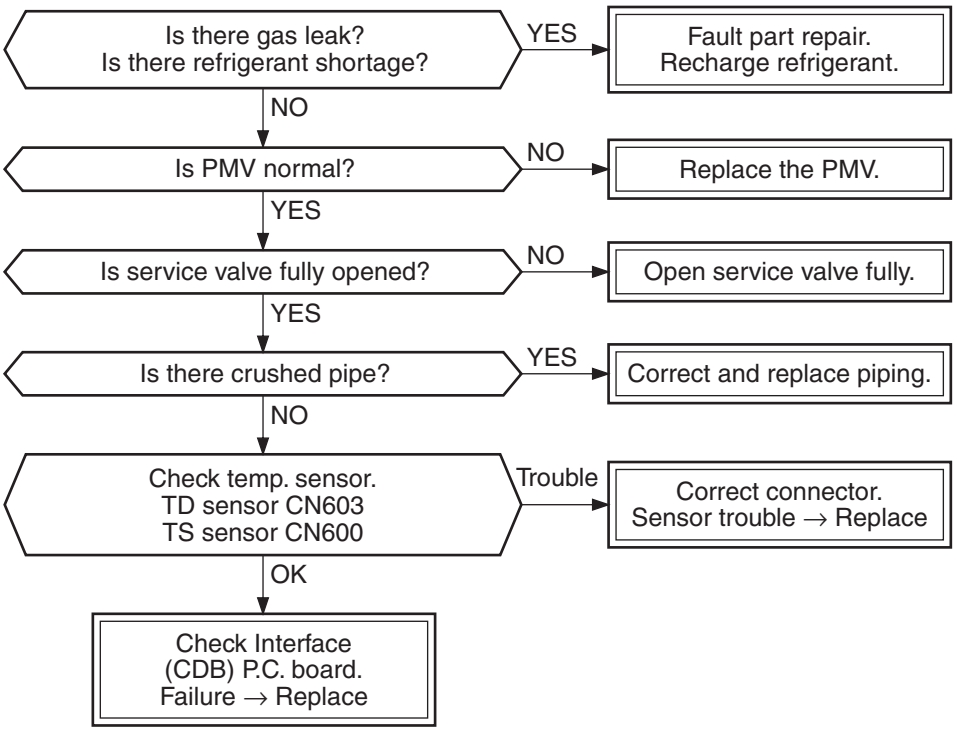
Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P05]	●●◎●◎○	**[Powersupply trouble] Voltage failure, open phase**



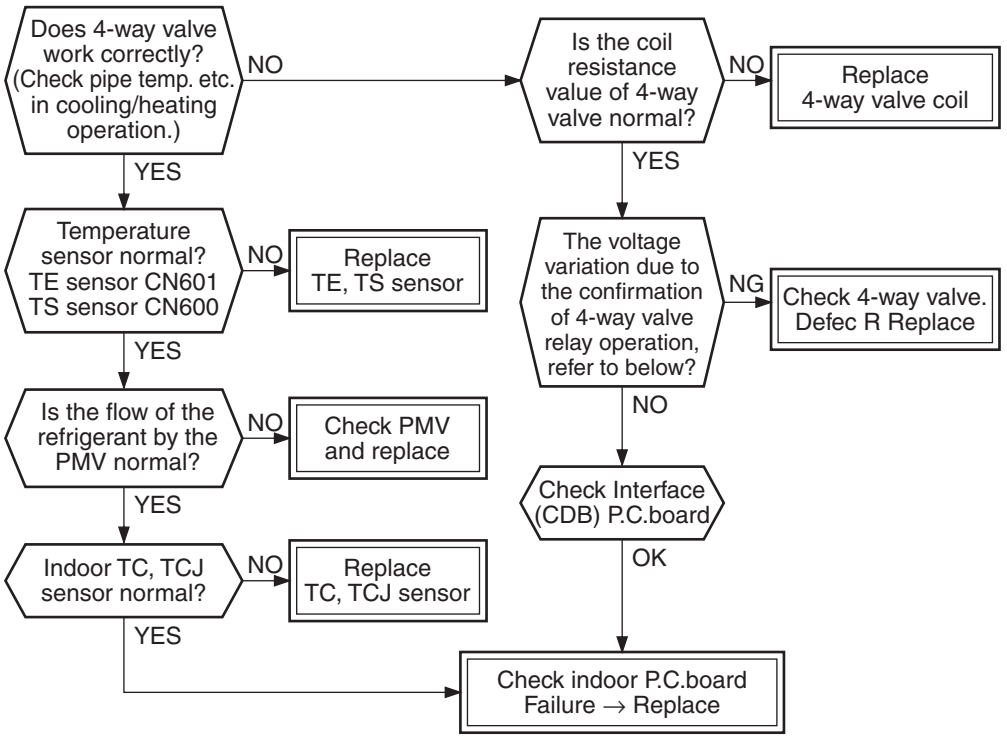
[P07]	●◎◎●◎○	**[Heat sink overheat trouble]**



Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P15]	◎◎◎●◎○	**[Gas leak detection]**



Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P19]	●●●◎◎○	**[4-way valve inverse trouble]**



[4-way valve relay operation check]

Service switches SW01 and SW02 can be used to check the operation of the 4-way valve relay.

Use to check whether there are any problems with the 4-way valve or 4-way valve coil.

[Method of operation]

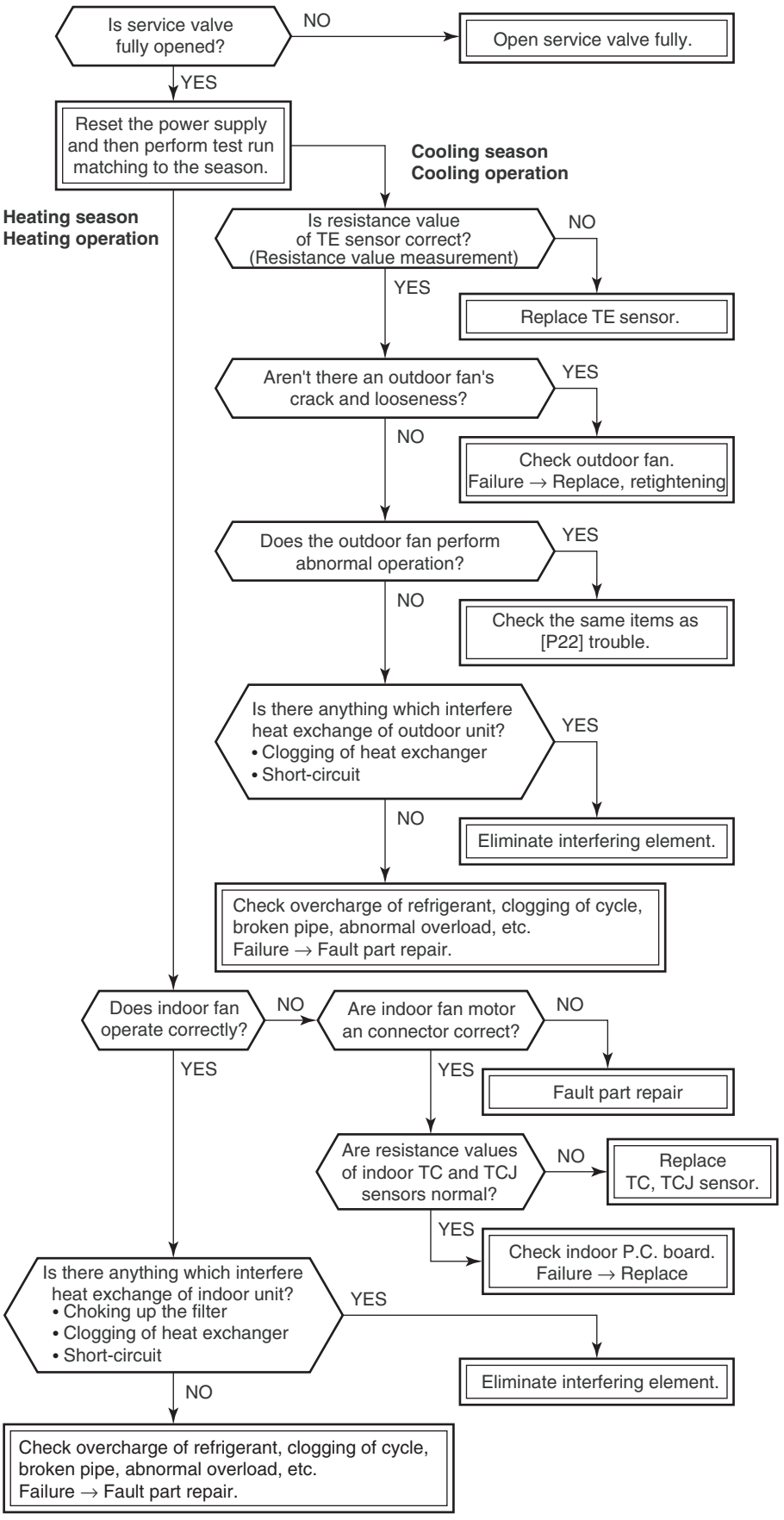
1) Push ensure that D800 to D804 are off (or rapidly flashing) and that D805 is lit up. If D800 to D804 are slowly flashing or D805 is flashing then push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will turn off (or rapidly flash) and D805 turn on.
2) Push and hold down SW01 for at least 5 seconds. D804 will start slowly flashing.
3) Push SW01 until reaching the below [4-way valve resistance value relay operation] LED indication.

4-way valve resistance value relay operation	D800	D801	D802	D803	D804
	●	●	○	○	◎

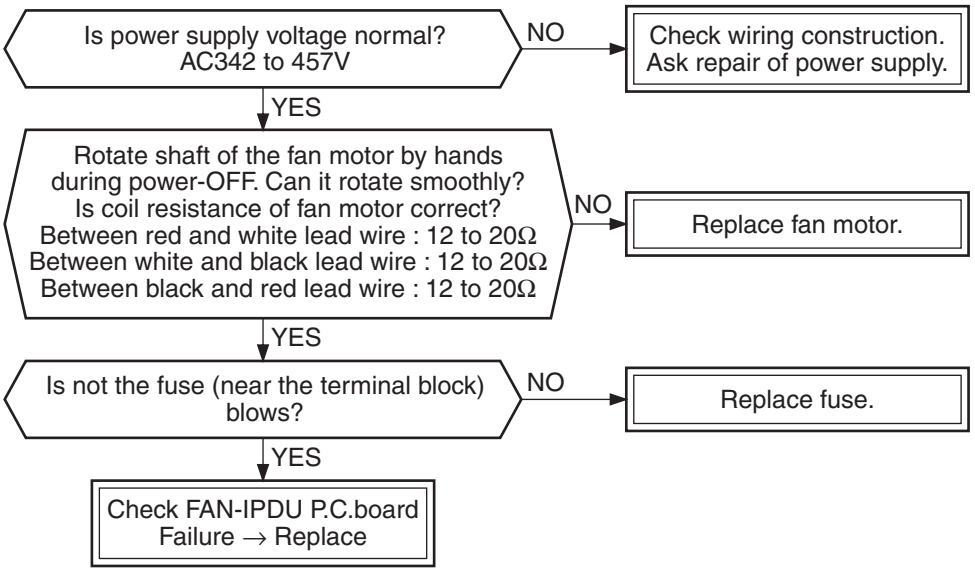
●: Go OFF ○: Go ON ◎: Flash (5 times/sec)

4) Push SW02 until D805 starts rapidly flashing.
5) Push and hold down SW02 for at least 5 seconds. D804 will start slowly flashing, D805 will turn on, and the 4-way valve resistance value relay operation will turn on.
6) Push and hold down SW01 and SW02 at the same time for at least 5 seconds or wait 2 minutes to return to normal control.

Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P20] [P04]	◎●●◎◎○ ◎◎●●◎○	**[High pressure protective operation]**



Check code	Outdoor LED display	Check and troubleshooting (Item without special mention Indicates part of outdoor unit.)
[P22]	●◎●◎◎○	**[Fan system trouble]**



[Confirmation of independent operation of outdoor fan]

Service switches SW01 and SW02 can be used to check the operation of the 4-way valve relay.

Use to check whether there are any problems with the 4-way valve or 4-way valve coil.

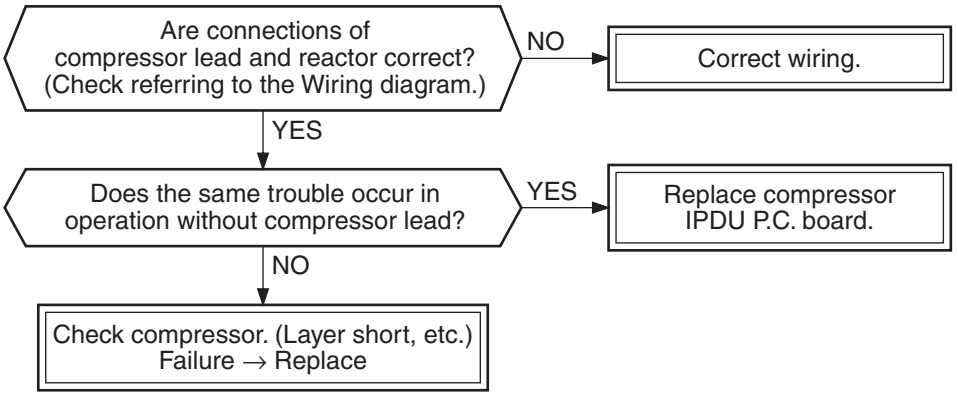
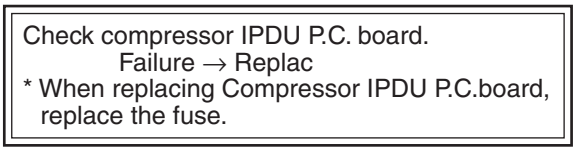
[Method of operation]

1) Push ensure that D800 to D804 are off (or rapidly flashing) and that D805 is lit up. If D800 to D804 are slowly flashing or D805 is flashing then please push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will turn off (or rapidly flash) and D805 turn on.
2) Push and hold down SW01 for at least 5 seconds. D804 will start slowly flashing.
3) Push SW01 until reaching the below [Confirmation of independent operation of outdoor fan] LED indication.

Confirmation of independent operation of outdoor fan	D800	D801	D802	D803	D804
	○	○	●	○	◎

●: Go OFF ○: Go ON ◎: Flash (5 times/sec)

4) Push SW02 until D805 starts rapidly flashing.
5) Push and hold down SW02 for at least 5 seconds. D804 will start slowly flashing, D805 will turn on, and the 4-way valve resistance value relay operation will turn on.
6) Push and hold down SW01 and SW02 at the same time for at least 5 seconds or wait 2 minutes to return to normal control.

<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>[P26]</td><td>◎◎●◎◎○</td><td>[Short-cuit of compressor drive element]
 
</td></tr>
<tr><td>[P29]</td><td>●●◎◎◎○</td><td>[Position detection circuit trouble]
 
</td></tr>
<tr><td>—
No code</td><td>◎●◎◎◎○</td><td>[Other trouble] --- Compressor step-out from sudden changes in load etc.
* Outdoor LED indication occurs but it automatically restarts and does not confirm any trouble.
* May occur also when the compressor is open phase and wiring disconnected.</td></tr>
</table>

Temperature sensor　　Temperature – Resistance value characteristic table

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

Representative value

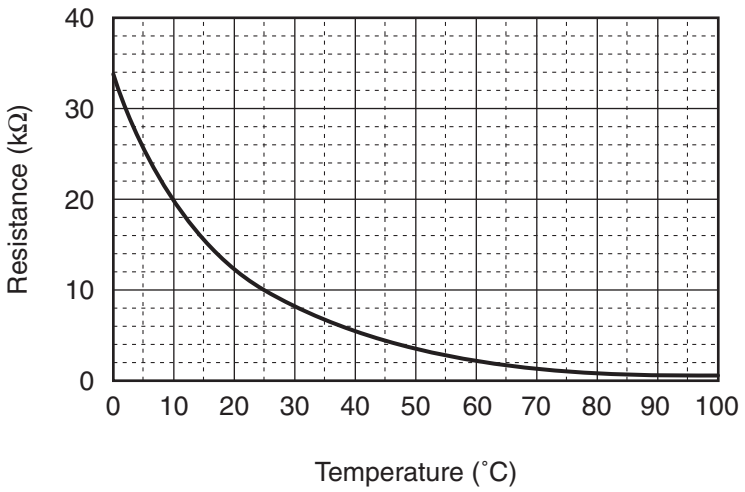
Temperature (˚C)	Resistance value (kΩ)		
	(Minimum value)	(Standard value)	(Maximum value)
0	32.33	33.80	35.30
10	19.63	20.35	21.09
20	12.23	12.59	12.95
25	9.75	10.00	10.25
30	7.764	7.990	8.218
40	5.013	5.192	5.375
50	3.312	3.451	3.594
60	2.236	2.343	2.454
70	1.540	1.623	1.709
80	1.082	1.146	1.213
90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

TD, TL sensors

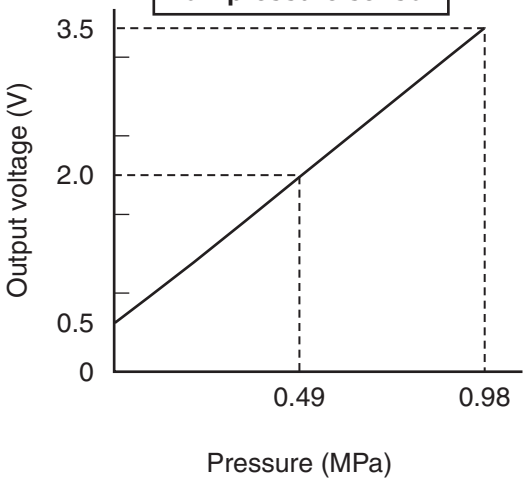
Representative value

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

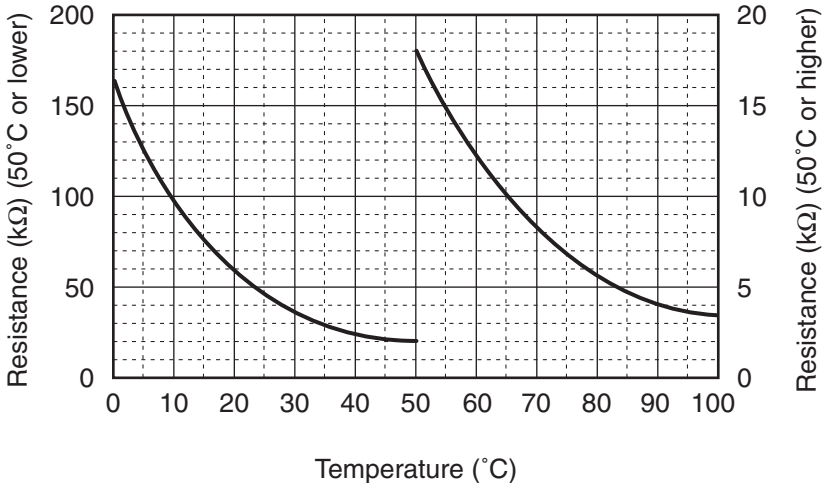
TA, TC, TCJ, TE, TS, TO sensors



Low pressure sensor



TD, TL sensors



Pressure sensor I/O wire connecting table

Pin No.	Input/output name	Lead wire
1	—	—
2	OUTPUT	White
3	GND	Black
4	DC5V	Red

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

9. SETUP AT LOCAL SITE AND OTHERS

9-1. Calling of Check code History

<Contents>

The trouble contents in the past can be called.

<Procedure>

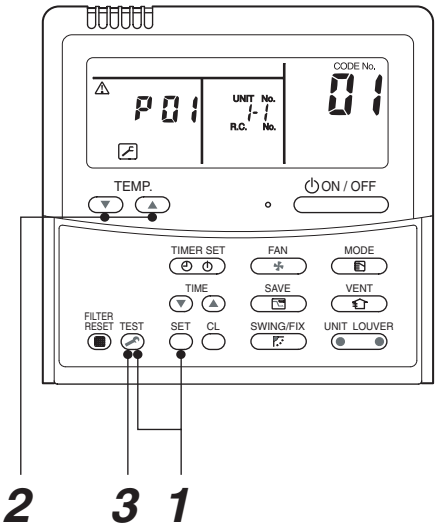
1 Push SET + TEST buttons simultaneously for 4 seconds or more to call the service check mode.

Service check goes on, the CODE No. 01 is displayed, and then the content of the latest alarm is displayed.
The number and trouble contents of the indoor unit in which a trouble occurred are displayed.

2 In order to monitor another check code history, push the set temperature ▼ / ▲ buttons to change the check code history No. (CODE No.).
CODE No. 01 (Latest) → CODE No. 04 (Old)

NOTE : 4 check code histories are stored in memory.

3 Pushing TEST button returns the display to usual display.



<Operation procedure>

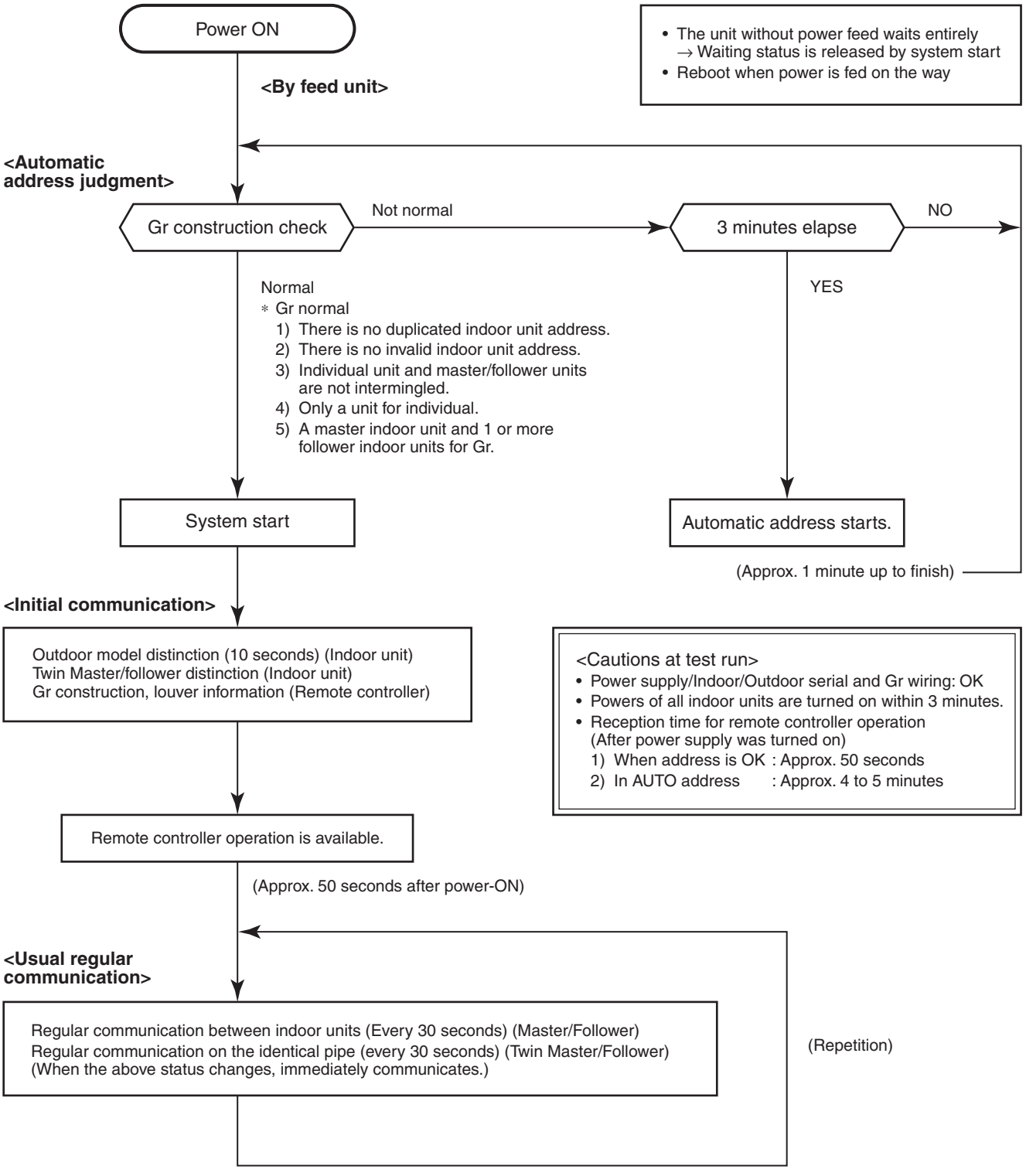
1 → 2 → 3

Returned to usual display

REQUIREMENT

Do not push CL button, otherwise all the check code histories of the indoor unit are deleted.

■ Indoor unit power-ON sequence

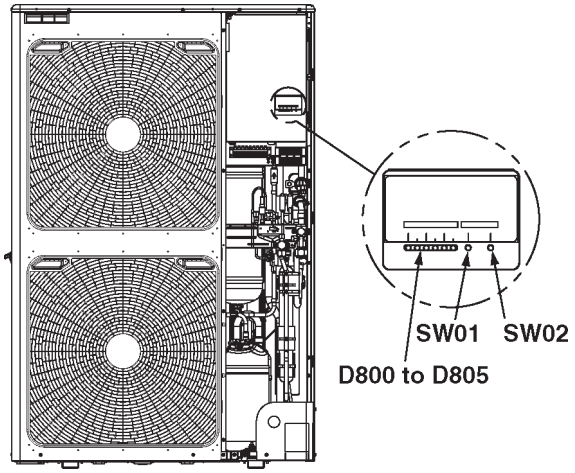


- In a group operation, if the indoor unit which was fed power after judgment of automatic address cannot receive regular communication from the master unit and regular communication on identical pipe within 120 seconds after power was turned on, it reboots (system reset).
  → The operation starts from judgment of automatic address (Gr construction check) again.
  (If the address of the master unit was determined in the previous time, the power fed to the master unit and reboot works, the master unit may change though the indoor unit line address is not changed.)

9-2. Outdoor Unit

Various status displays and operations can be accessed using the push buttons (service switches) on the outdoor Control P.C. board and LED display.

Service switch (SW01 and SW02) operation



Concerning the LED display

- The LED display has 4 patterns.
  ○ : Go ON ● : Go OFF ◎ : flash (5 times/sec) ◇ : flashing (1 time/sec)

- The initial state of the LED display is as shown on the right with D805 lit up.
  If not in the initial state (D805 flashing) then it can be returned to the initial state by pushing and holding down SW01 and SW02 at the same time for 5 seconds.

LED display: Initial state

D800 to D804 : Go Off and flash (5 times/sec)
D805 : Go ON

	D800	D801	D802	D803	D804	D805
LED	○ (Yellow)	○ (Yellow)	○ (Yellow)	○ (Yellow)	○ (Yellow)	○ (Green)

1. Various settings available via the outdoor unit (Existing pipe, Maximum frequency change, Snow guard fan control, Cooling only setup, etc.)

(1) Service switch setting

Various settings can be made using the service switches

[Method of operation]

1) Ensure the LED display shows the initial status. If not then ensure to restore the initial status.
2) Press SW01 for at least 5 seconds. D804 will start slowly flashing.
3) Push SW01 several times until reaching the required LED display function.

Functions	LED display	Control content
Existing pipe setting	D800 ● D801 ● D802 ○ D803 ● D804 ◎	Activate when existing Ø19.1 piping is used. Note that in this case, depending on the outdoor and indoor air temperature, the heating capacity may drop.
Cooling only setting	D800 ○ D801 ○ D802 ● D803 ● D804 ◎	Cooling only setting. (Can also be changed using the DN code [0F] on the wired remote control).
Snow guard fan control	D800 ● D801 ○ D802 ● D803 ● D804 ◎	The snow guard fan control enables snow to be diverted from the path of the fan and heat exchanger, thereby protecting the fan motor. And even when the compressor is not in use but the external temperature is less than 4˚C ensure the outdoor fan is going using W5.
Maximum frequency change	D800 ● D801 ● D802 ● D803 ○ D804 ◎	Enable this if you wish to lower the maximum compressor frequency. It will lower the maximum frequency during both cooling and heating. Note however it does reduce the maximum capacity. Maximum compressor frequency (rps)

Model	P224		P280	
	Cooling	Heating	Cooling	Heating
Standard status	78.0	88.8	91.2	105.0
When setting is valid	71.0	71.0	84.0	84.0

○: Go ON ●: Go OFF ◎: Flash (5 times/sec)

4) Push SW01 until D805 starts rapidly flashing.
5) Press and hold down SW02 for at least 5 seconds. D804 will start slowly flashing and D805 will light up, and the various settings will take effect.
6) To make more settings repeat steps 3) to 5).
7) To invalidate any settings made in steps 1 to 3 press SW01 to turn off D805.
8) Press and hold down SW02 for at least 5 seconds. D804 will start to slowly flash and D805 will turn off and the various settings will be invalidated.

∗ If any unclear point arises during an operation then can return to step 1 by pressing and holding down SW01 and SW02 at the same time for at least 5 seconds.

Various settings confirmation method

Whether the various settings are in effect or not can be confirmed.

1) Ensure the LED display shows the initial status. If not then ensure to restore the initial status.
2) Push SW01 for at least 5 seconds. D804 will start slowly flashing.
3) Push SW01 several times until reaching the desired function on the LED display. If the setting is valid D804 and D805 will rapidly flash. (If the setting is invalid then D804 will rapidly flash but D805 will turn off.)
4) Push and hold down SW01 and SW02 at the same time for at least 5 seconds to return the LED display to the initial state.

Returning to the factory default settings

The factory default stings can be restored using the following procedure.

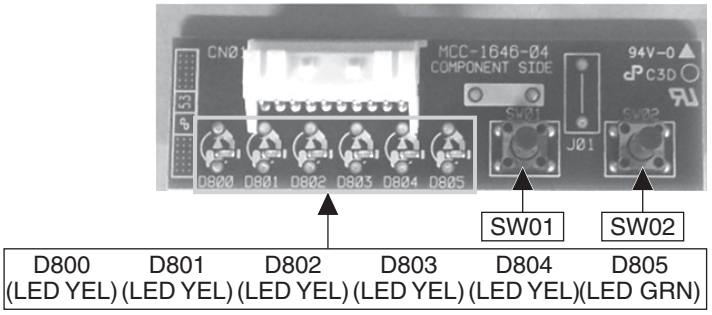
1) Ensure the LED display shows the initial state. If not then ensure to return it to the initial state.
2) Push and hold down SW01 for at least 5 seconds and confirm that D804 is slowly flashing.
3) Push SW01 several times until reaching the LED display (D800 to D805) shown on the right or 'Returning to the default factory setting LED display'.
4) Push and hold down SW02 for at least 5 seconds and confirm that D804 is slowly flashing.
5) Push and hold down SW01 and SW02 at the same time for at least 5 seconds to return to the initial state LED display.

Return to default factory setting LED display

D800	D801	D802	D803	D804	D805
●	●	●	●	◎	●

○: Go ON ●: Go OFF ◎: Flash (5 times/sec)

Sub-P.C. board switch and LED arrangement diagram



2. Service support functions (LED display and switch operation)

(1) LED display switching (SW01 and SW02 operation)

(1)-1. Display switch list

Service switches SW01 and SW02 can be used to change the display content of LEDs D800 to D805 on the outdoor unit.

[Method of Operation]

1) Ensure the LED display shows the initial state. If not then ensure to return it to the initial state.
2) Push SW01 several times until reaching the desired display item.

LED display	Control content
D800 D801 D802 D803 D804 D805 ● ● ● ● ● ◎	Trouble indication (Current trouble) Displays the current trouble. Will not appear if no trouble has occurred. (Refer to (1)-2-1)
D800 D801 D802 D803 D804 D805 ○ ● ● ● ● ◎	Trouble indication (Latest trouble: latest and including current trouble) Previous trouble can be checked using this setting, for example, after previous trouble has been resolved (and even after the power has been turned off). ∗ If trouble is currently occurring then the same content will be displayed. ∗ TO sensor trouble only and thus this setting does not display. (Check using the current trouble setting). (Refer to (1)-2-2)
D800 D801 D802 D803 D804 D805 ● ○ ● ● ● ◎	Discharge temperature sensor (TD) indication Displays the discharge temperature sensor (TD) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ○ ○ ● ● ● ◎	Outdoor heat exchanger temperature sensor (TE) indication Displays the outdoor heat exchanger temperature sensor (TE) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ● ○ ○ ● ● ◎	Outdoor heat exchanger temperature sensor (TL) indication Displays the outdoor heat exchanger sensor (TL) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ● ● ○ ● ● ◎	Inlet temperature sensor (TS) indication. Displays the inlet temperature sensor (TS) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ○ ● ○ ● ● ◎	Outdoor external temperature sensor (TO) indication. Displays the outdoor external temperature sensor (TO) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ○ ○ ○ ● ● ◎	Heat sink temperature sensor (TH) indication. Displays the heat sink temperature sensor (TH) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ○ ● ● ○ ● ◎	Current indication. Displays the outdoor unit current value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ● ○ ● ○ ● ◎	Compressor operation frequency indication. Displays the operating frequency of the compressor. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ○ ○ ● ○ ● ◎	PMV opening indication. Displays the degree to which the PMV is open. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ● ● ○ ○ ● ◎	Indoor suction temperature sensor (TA) indication. Displays the indoor suction temperature sensor (TA) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ○ ● ○ ○ ● ◎	Indoor heat exchange temperature sensor (TC) indication. Displays the indoor heat exchange temperature sensor (TC) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ● ○ ○ ○ ● ◎	Indoor heat exchanger sensor (TCJ) indication. Displays the indoor heat exchanger sensor (TCJ) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ○ ○ ○ ○ ● ◎	Low pressure sensor (Ps) indication. Displays the low pressure sensor (Ps) value. (Refer to (1)-3)
D800 D801 D802 D803 D804 D805 ● ● ● ○ ● ◎	Refrigerant leak indication. Displays if a certain amount of refrigerant has leaked. (Refer to (1)-4)

○: Go ON ●: Go OFF ◎: Flash (5 times/sec)

3) Push SW02 to switch to the desired display item.
4) To access the other display items repeat steps 1) to 3).
5) Before exiting ensure to perform step 1) and set the LED to the initial state (current abnormality indication).

(1)-2. Trouble display

Current and the latest trouble (latest and including the present trouble) can be checked using the lighting status of the LEDs D800 to D805 on the outdoor unit.

(1)-2-1. Current trouble indication

LED indication						Name of trouble	Wired remote control trouble code
D800	D801	D802	D803	D804	D805		
●	●	●	●	●	○	Normal	—
◎	●	●	●	●	○	Discharg temp. sensoe (TD) trouble	F04
●	◎	●	●	●	○	Heat exchanger temp. sensoe (TE) trouble	F06
◎	◎	●	●	●	○	Heat exchanger temp. sensoe (TL) trouble	F07
●	●	◎	●	●	○	Outside temp. sensoe (TO) trouble	F08
◎	●	◎	●	●	○	Suction temp. sensoe (TS) trouble	F12
●	◎	◎	●	●	○	Heat sink temp. sensoe (TH) trouble	F13
◎	◎	◎	●	●	○	Miswiring of heat exchanger temp. sensoe (TE, TS)	F15
●	●	●	◎	●	○	Low pressure sensoe (Ps) trouble	F23
●	◎	●	◎	●	○	EEPROM trouble	F31
◎	◎	●	◎	●	○	Compressor break down	H01
●	●	◎	◎	●	○	Compressor lock	H02
◎	●	◎	◎	●	○	Current detection circuit trouble	H03
●	◎	◎	◎	●	○	Case thermostat operation	H04
◎	◎	◎	◎	●	○	Low pressure protective operation	H06
●	●	●	●	◎	○	Unset model type	L10
◎	●	●	●	◎	○	Communication trouble between MCUs	L29
●	◎	●	●	◎	○	Discharge temp. sensoe trouble	P03
◎	◎	●	●	◎	○	High pressure SW operation	P04
●	●	◎	●	◎	○	Power supply trouble	P05
●	◎	◎	●	◎	○	Heat sink overheat trouble	P07
◎	◎	◎	●	◎	○	Gas leak detection	P15
●	●	●	◎	◎	○	4-way valve reversal trouble	P19
◎	●	●	◎	◎	○	High pressure protective operation	P20
●	◎	●	◎	◎	○	Fan system trouble	P22
◎	◎	●	◎	◎	○	Short-circuit of compressor drive element	P26
●	●	◎	◎	◎	○	Position detection circuit trouble	P29

○: Go ON ●: Go OFF ◎: Flash (5 times/sec)

(1)-2-2. Latest (including current) trouble indication

LED indication						Name of trouble
D800	D801	D802	D803	D804	D805	
●	●	●	●	●	◇	Normal
◎	●	●	●	●	◇	Discharg temp. sensoe (TD) trouble
●	◎	●	●	●	◇	Heat exchanger temp. sensoe (TE) trouble
◎	◎	●	●	●	◇	Heat exchanger temp. sensoe (TL) trouble
●	●	◎	●	●	◇	Outside temp. sensoe (TO) trouble
◎	●	◎	●	●	◇	Suction temp. sensoe (TS) trouble
●	◎	◎	●	●	◇	Heat sink temp. sensoe (TH) trouble
◎	◎	◎	●	●	◇	Miswiring of heat exchanger temp. sensoe (TE, TS)
●	●	●	◎	●	◇	Low pressure sensoe (Ps) trouble
●	◎	●	◎	●	◇	EEPROM trouble
◎	◎	●	◎	●	◇	Compressor break down
●	●	◎	◎	●	◇	Compressor lock
◎	●	◎	◎	●	◇	Current detection circuit trouble
●	◎	◎	◎	●	◇	Case thermostat operation
◎	◎	◎	◎	●	◇	Low pressure protective operation
●	●	●	●	◎	◇	Unset model type
◎	●	●	●	◎	◇	Communication trouble between MCUs
●	◎	●	●	◎	◇	Discharge temp. sensoe trouble
◎	◎	●	●	◎	◇	High pressure SW operation
●	●	◎	●	◎	◇	Power supply trouble
●	◎	◎	●	◎	◇	Heat sink overheat trouble
◎	◎	◎	●	◎	◇	Gas leak detection
●	●	●	◎	◎	◇	4-way valve reversal trouble
◎	●	●	◎	◎	◇	High pressure protective operation
●	◎	●	◎	◎	◇	Fan system trouble
◎	◎	●	◎	◎	◇	Short-circuit of compressor drive element
●	●	◎	◎	◎	◇	Position detection circuit trouble

○: Go ON ●: Go OFF ◎: Flash (5 times/sec) ◇: flashing (1 time/sec)

(1)-3. Sensor, current, compressor operation frequency, PMV opening indication

Interface (CDB) P.C. board detected values (for example temperature and current sensor values) can be easily checked.

* Temperature sensors ... TD, TE, TL, TS, TO, TH, TA, TC, TCJ
* Current ..... Current sensor (CT) value detected
* Pressure..... Low pressure sensor (Ps) value detected

LED indication						Temperature sensor (˚C)	Current (A)	Compressor frequency (rps)	Degree of PMV opening (pls)	Pressure (kg/cm²•G)
D800 (YEL)	D801 (YEL)	D802 (YEL)	D803 (YEL)	D804 (YEL)	D805 (GRN)					
●	●	●	●	●	◇	Less than -25	0 ~	0	0 ~ 39	-2 ~
○	●	●	●	●	◇	-25 ~	2 ~	5	40 ~ 79	-1 ~
●	○	●	●	●	◇	-20 ~	4 ~	10	80 ~ 119	0 ~
○	○	●	●	●	◇	-15 ~	6 ~	15	120 ~ 159	1 ~
●	●	○	●	●	◇	-10 ~	8 ~	20	160 ~ 199	2 ~
○	●	○	●	●	◇	-5 ~	10 ~	25	200 ~ 239	3 ~
●	○	○	●	●	◇	0 ~	12 ~	30	240 ~ 279	4 ~
○	○	○	●	●	◇	5 ~	14 ~	35	280 ~ 319	5 ~
●	●	●	○	●	◇	10 ~	16 ~	40	320 ~ 359	6 ~
○	●	●	○	●	◇	15 ~	18 ~	45	360 ~ 399	7 ~
●	○	●	○	●	◇	20 ~	20 ~	50	400 ~ 439	8 ~
○	○	●	○	●	◇	25 ~	22 ~	55	440 ~ 479	9 ~
●	●	○	○	●	◇	30 ~	24 ~	60	480 ~ 519	10 ~
○	●	○	○	●	◇	35 ~	26 ~	65	520 ~ 559	11 ~
●	○	○	○	●	◇	40 ~	28 ~	70	560 ~ 599	12 ~
○	○	○	○	●	◇	45 ~	30 ~	75	600 ~ 639	13 ~
●	●	●	●	○	◇	50 ~	32 ~	80	640 ~ 679	14 ~
○	●	●	●	○	◇	55 ~	34 ~	85	680 ~ 719	15 ~
●	○	●	●	○	◇	60 ~	36 ~	90	720 ~ 759	16 ~
○	○	●	●	○	◇	65 ~	38 ~	95	760 ~ 799	17 ~
●	●	○	●	○	◇	70 ~	40 ~	100	800 ~ 839	18 ~
○	●	○	●	○	◇	75 ~	42 ~	105	840 ~ 879	19 ~
●	○	○	●	○	◇	80 ~	44 ~	110	880 ~ 919	20 ~
○	○	○	●	○	◇	85 ~	46 ~	115	920 ~ 959	21 ~
●	●	●	○	○	◇	90 ~	48 ~	120	960 ~ 999	22 ~
○	●	●	○	○	◇	95 ~	50 ~	125	1000	23 ~
●	○	●	○	○	◇	100 ~	52 ~	130	—	24 ~
○	○	●	○	○	◇	105 ~	54 ~	135	—	25 ~
●	●	○	○	○	◇	110 ~	56 ~	140	—	26 ~
○	●	○	○	○	◇	115 ~	58 ~	145	—	27 ~
●	○	○	○	○	◇	120 ~	60 ~	150	—	28 ~
○	○	○	○	○	◇	Sensor trouble	62 or more	155 or more	—	29 or more

○: Go ON ●: Go OFF ◇: flashing (1 time/sec)

(1)-4. Refrigerant leak detection function

Monitors the amount of refrigerant being circulated based on the temperature sensors, compressor rotation speed, PMV opening during operation, and detects any refrigerant leaks during operation and indicates it using the LEDs on the outdoor unit.

⚠ CAUTION

* Detects any slow leaks at the stages of not cool not heat and trouble stoppages' during operation but may not detect fast leaks sometimes.
* Refrigerant leaks may even be detected because of refrigerant circulation failures due to PMV (Pulse Motor Valve) blockages, operation failures, capillary blockages, strainer blockages, etc.
* Refrigerant leak detection may not be possible depending on the external air temperature conditions during operation.

If any refrigerant leaks are detected ensure to identify where the leak is, recover the remaining refrigerant, and then recharge with the correct amount using the appropriate methods.

[Confirmation method]

1) Ensure the LED display shows the initial state. If not then it can be returned to the initial state by pushing and holding down SW01 and SW02 at the same time for at least 5 seconds.
2) Push SW01 several times until reaching the 'refrigerant leak indication' LED display.

D800	D801	D802	D803	D804	D805	Refrigerant leak indication Displays if a certain amount of refrigerant has leaked.
●	●	●	○	●	◎	

○: Go ON ●: Go OFF ◎: Flash (5 times/sec)

3) Briefly pushing SW02 enables the presence of a leak to be detected using the LED display.

D800	D801	D802	D803	D804	D805	Judgment
●	●	●	●	●	◇	No refrigeration leak detected
○	●	●	●	●	◇	Refrigeration leak detected

○: Go ON ●: Go OFF ◇: Flash (1 time/sec)

4) Before exiting, push and hold down SW01 and SW02 at the same time for at least 5 seconds and set the LED to the initial state.

(2) Maintenance inspections Special operations (SW01 and SW02 operations)

The following special maintenance and inspection operations can be carried out using the service switches SW01 and SW02.

[Method of operation]

1) Ensure the LED display shows the initial state. If not then please ensure to return it to the initial state.
2) Push and hold down SW01 for at least 5 seconds. D804 will start slowly flashing.
3) Push SW01 until reaching the LED display function you wish to set.

Special operations	LED display	Control content
Refrigerant recovery operation	D800 ○ D801 ● D802 ● D803 ● D804 ◎	The outdoor unit performs cooling operations. Indoor units do not operate with just this operation and hence do any fan only operations in advance. (Refer to 1.)
PMV fully open operation	D800 ○ D801 ● D802 ○ D803 ● D804 ◎	PMV (Puls Motor Valve) fully opens. Perform step 6) below or returns to normal control after 2 minutes. (⇒ Note 1)
PMV fully closed operation	D800 ● D801 ○ D802 ○ D803 ● D804 ◎	PMV (Puls Motor Valve) fully closed. Perform step 6) below or returns to normal control after 2 minutes. (⇒ Note 1)
PMV intermediate open operation	D800 ○ D801 ○ D802 ○ D803 ● D804 ◎	Sets the PMV (Puls Motor Valve) to intermediate open (500 pulses). Perform step 6) below or returns to normal control after 2 minutes. (⇒ Note 1)
Indoor heating test command	D800 ○ D801 ● D802 ● D803 ○ D804 ◎	Performs a heating test run. Carrying out step 6) below returns to normal control. (⇒ Note 2)
Indoor cooling test run command	D800 ● D801 ○ D802 ● D803 ○ D804 ◎	Performs a cooling test run. Carrying out step 6) below returns to normal control. (⇒ Note 2)
Forced fan motor operation	D800 ○ D801 ○ D802 ● D803 ○ D804 ◎	Forcibly operates the fan motor. Perform step 6) below or returns to normal control after 2 minutes. (⇒ Note 1)
4 way valve relay operation	D800 ● D801 ● D802 ○ D803 ○ D804 ◎	Turns on the 4 way valve relay. Perform step 6) below or returns to normal control after 2 minutes. (⇒ Note 1)
SV2 valve opening/ closing	D800 ● D801 ◎ D802 ● D803 ● D804 ◎	Forces the SV2 valve to move to the opposite position to the current position. After 2 minutes returns to normal control. (⇒ Note 1)

○: Go ON ●: Go OFF ◎: Flash (5 times/sec)

Note 1 : The operations can take place while the equipment is on but it is better if it has been turned off first. A sudden change in pressure could occur while the operations are taking place, which can be dangerous.

Note 2 : Trial indoor cooling operation request/trial indoor heating operation request

> Cooling/Heating test operations can only take place from the outdoor unit when combined with the following indoor units. ensure to utilize the outdoor unit.
> Test runs supported : 5 series or later indoor units (AI∗AP∗∗∗5H)
> Not supported : Indoor units other than above. In addition, any when twin connections include any other indoor units than above.

Caution) Forced test operations using this setting cannot be cancelled using the indoor remote control. Refer to (6) below.

4) Push SW02 until D805 starts rapidly flashing.
5) Push and hold down SW02 for at least 5 seconds. D804 will start slowly flashing and D805 will turn on and the special operation will take effect.
6) To invalidate any of the various settings push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will be off (or rapidly flashing) and D805 lit up (initial state: current trouble indication) and the special operation will have been disabled (normal control).

∗ If any uncertainty arises then push and hold down SW01 and SW02 at the same time for at least 5 seconds. You will return to step 1).

3. Outdoor application operation

Optional connector kit (TCB-KBOS3E)

(1) Peak-cut control
- Saves the power of the outdoor unit by the external peak-cut signal to suppress temporary peak power dissipation.
- The power saving can be switched to three levels: 75%, 50%, and operation stop.

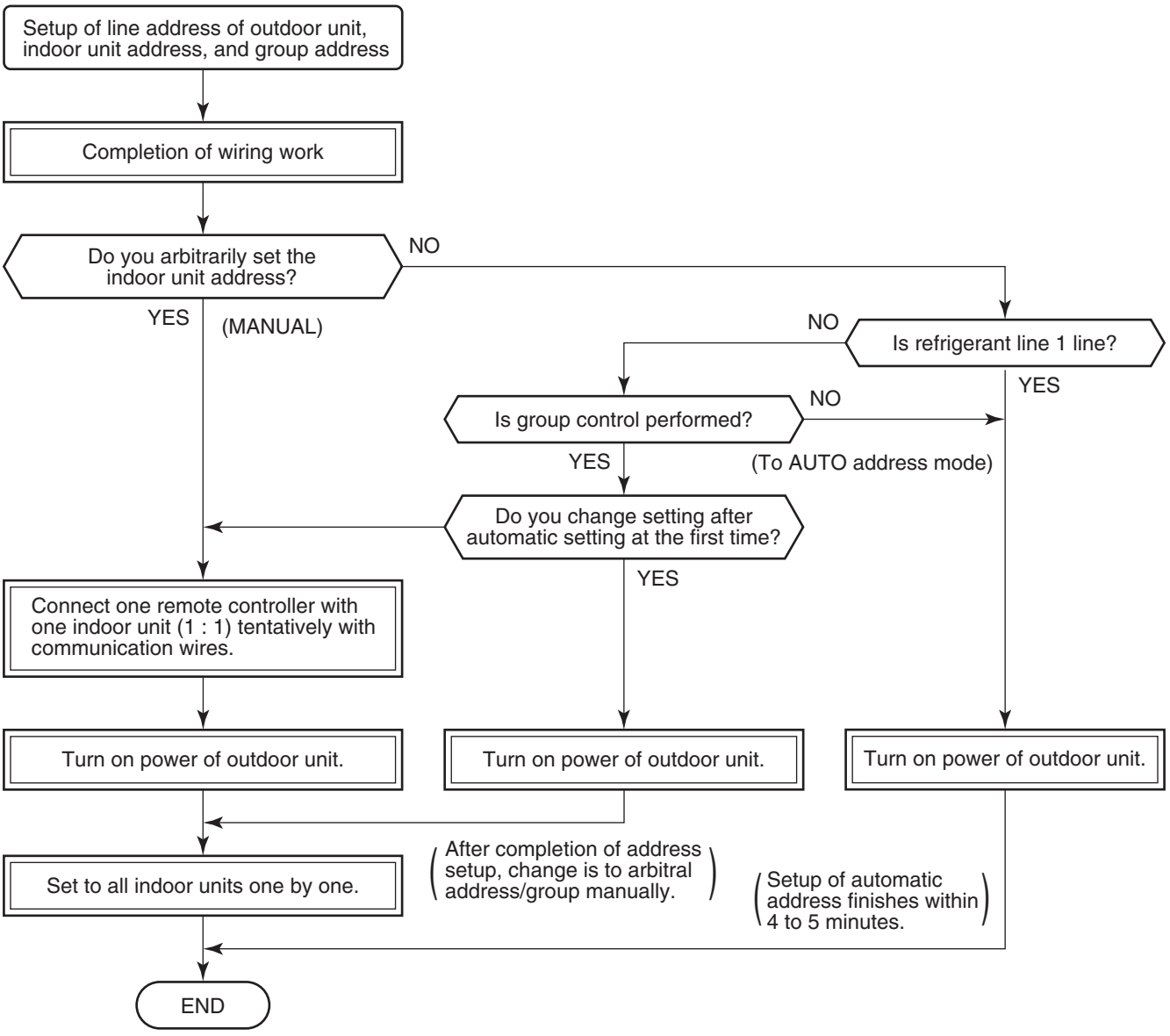
(2) Night operation
- Reduces the capacity of the air conditioner by the input signal from a commercially available timer (procured locally) regardless of the outside air temperature or load to reduce operating noise.

(3) Compressor output
- Turns on the no-voltage contact output while the compressor is operating.

10. ADDRESS SETUP

10-1. Address Setup Procedure

When an outdoor unit and an indoor unit are connected, or when an outdoor unit is connected to each indoor unit respectively in the group operation even if multiple refrigerant lines are provided, the automatic address setup completes with power-ON of the outdoor unit. The operation of the remote controller is not accepted while automatic address works. (Approx. 4 to 5 minutes)



- When the following addresses are not stored in the EEPROM on the indoor P.C. board, a test run operation cannot be performed. (Unfixed data at shipment from factory)

	Item code	Data at shipment	Setup data range
Line address	12	0099	0001 (No. 1 unit) to 0064 (No. 64 unit)
Indoor unit address	13	0099	0001 (No. 1 unit) to 0064 (No. 64 unit) Max. value of indoor units in the identical refrigerant line
Group address	14	0099	0000 : Individual (Indoor units which are not controlled in a group) 0001 : Master unit (1 indoor unit in group control) 0002 : Sub unit (Indoor units other than master unit in group control)

10-2. Address Setup & Group Control

<Definitions of terms>

Indoor unit No. : N - n = Outdoor unit line address N (Max. 30) - Indoor unit address n (Max. 64)

Group address : 0 = Single (Not group control)
1 = Master unit in group control
2 = Sub unit in group control

Master unit (= 1) : The representative of multiple indoor units in group operation sends/receives signals to/from the remote controllers and sub indoor units.
(* It has no relation with an indoor unit which communicates serially with the outdoor units.)
The operation mode and setup temperature range are displayed on the remote controller LCD.
(Except air direction adjustment of louver)

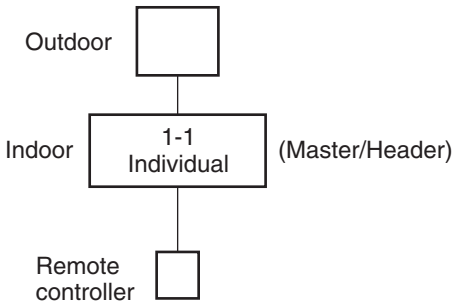
Sub unit (= 2) : Indoor units other than master unit in group operation
Basically, sub units do not send/receive signals to/from the remote controllers.
(Except alarm and response to demand of service data)

Header unit (Representative unit) (Master Twin)
: This unit communicates with the indoor unit (follower) which serial-communicates with the outdoor units and sends/receives signal (Command from compressor) to/from the outdoor units as the representative of the cycle control in the indoor units of the identical line address within the minimum unit which configures one of the refrigerating cycles of Twin.

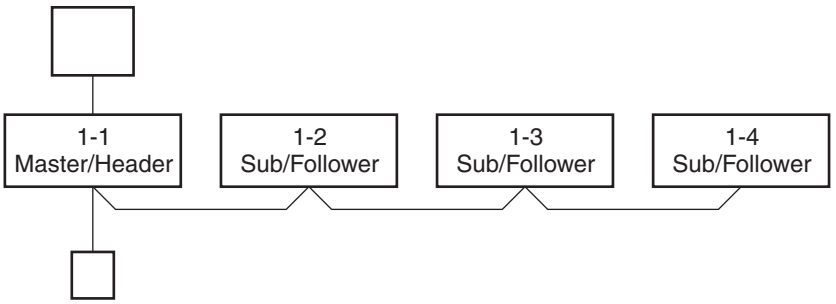
Follower unit (Subordinate unit) (Sub Twin)
: Indoor units excluding the header unit in Twin
This unit communicates with (Header) indoor unit in the identical line address and performs control synchronized with (Header) indoor unit.
This unit does not perform the signal send/receive operation with the outdoor units. :
No judgment for serial signal trouble.

10-2-1. System Configuration

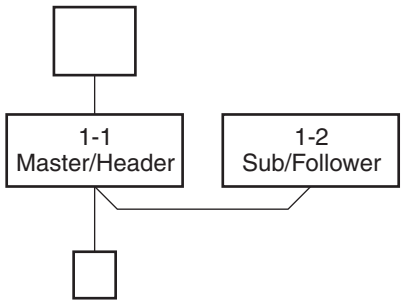
1. Single



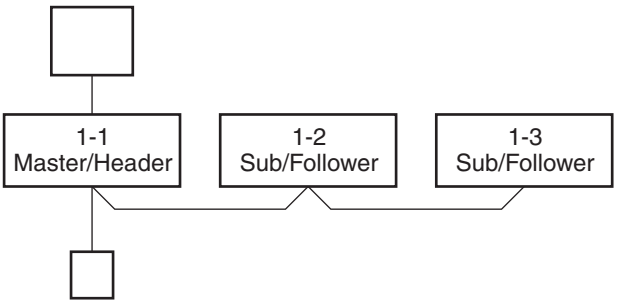
2. Double twin



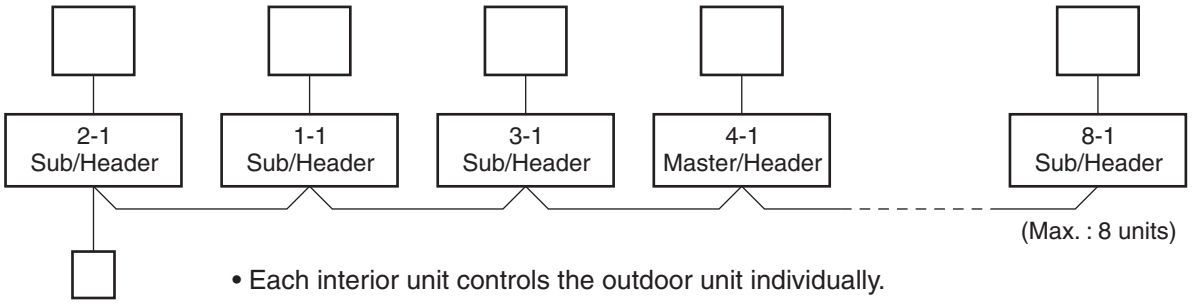
3. Twin



4. Triple

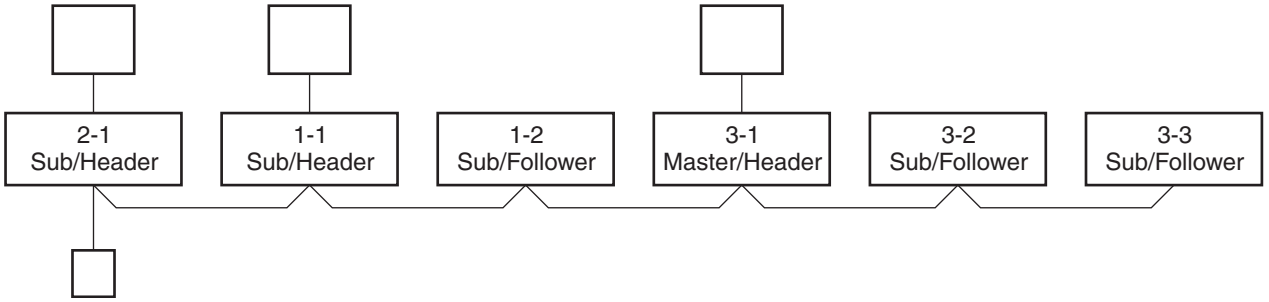


5. Single group operation



• Each interior unit controls the outdoor unit individually.

6. Multiple groups operation (Single, Twin, Triple operation) (Manually addresses change)

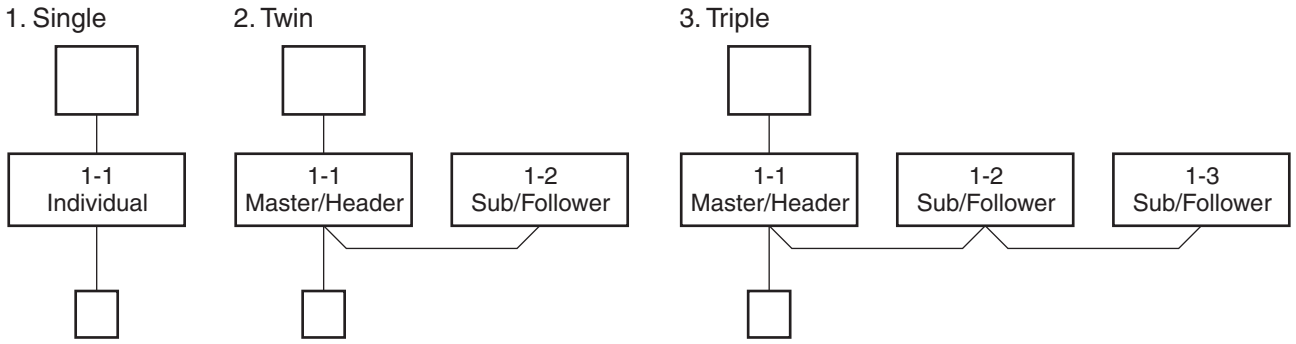


• Header unit: The header unit receives the indoor unit data (thermostat status) of the follower (Without identical line address & indoor/outdoor serial) and then finally controls the outdoor compressor matching with its own thermostat status.
The header unit sends this command information to the follower unit.

• Follower unit: The follower unit receives the indoor unit data from the header (With identical line address & indoor/outdoor serial) and then performs the thermostat operation synchronized with the header unit.
The follower unit sends own thermostat ON/OFF demand to the header unit.
(Example)
No. 3-1 header unit sends/receives signal to/from No. 3-2 and No. 3-3 follower units.
(It is not influenced by the refrigerating line 1 or 2 address indoor unit.)

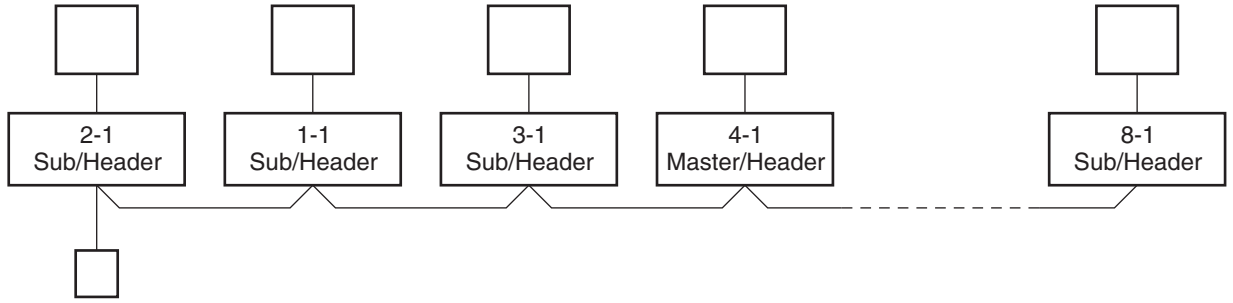
10-2-2. Automatic Address Example from Unset Address (No miswiring)

1. Standard (One outdoor unit)



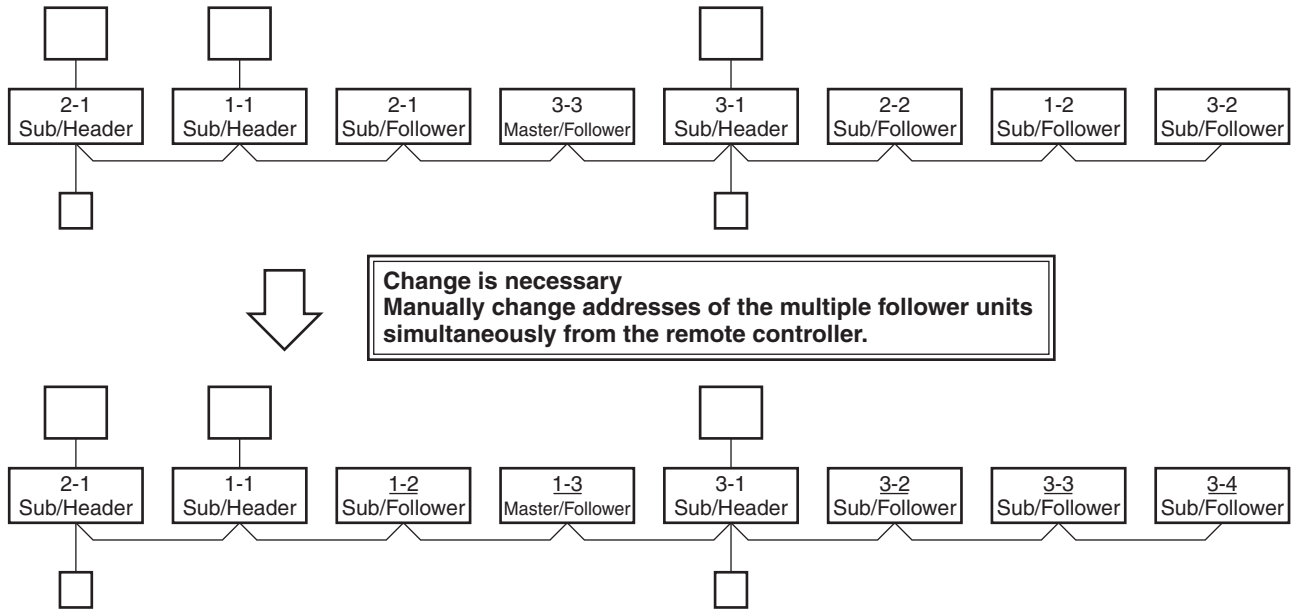
Only turning on source power supply (Automatic completion)

2. Single group operation (Multiple outdoor units = Miltiple indoor units only with serial communication)



Only turning on source power supply (Automatic completion)

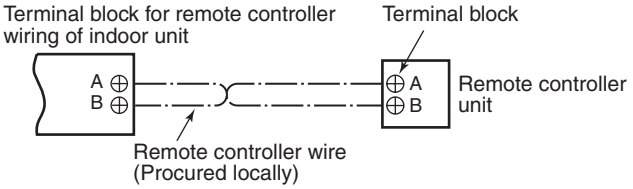
3. Multiple groups operation (Single, Triple, Double twin operation)



10-3. Remote Controller Wiring

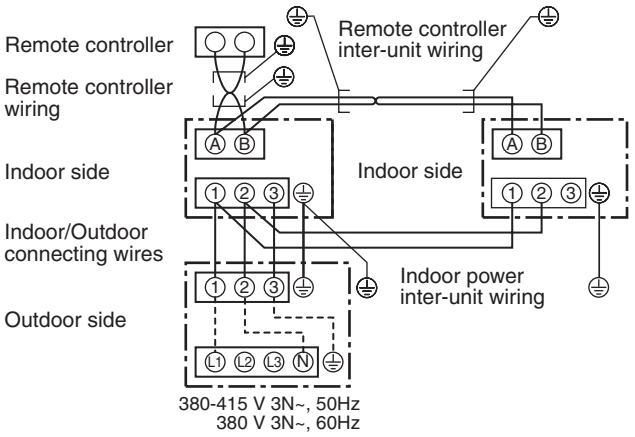
- Strip off approx. 9 mm the wire to be connected.
- For single system, use non polarity, 2 core wire is used for wiring of the remote controller. (0.5 mm² to 2.0 mm² wires)
- For the synchronous twin, triple system, use 2-conre shield wire (Vinyl cord for microphone 0.5 to 2.0 mm²) to conform to the EMC standard.

Wiring diagram

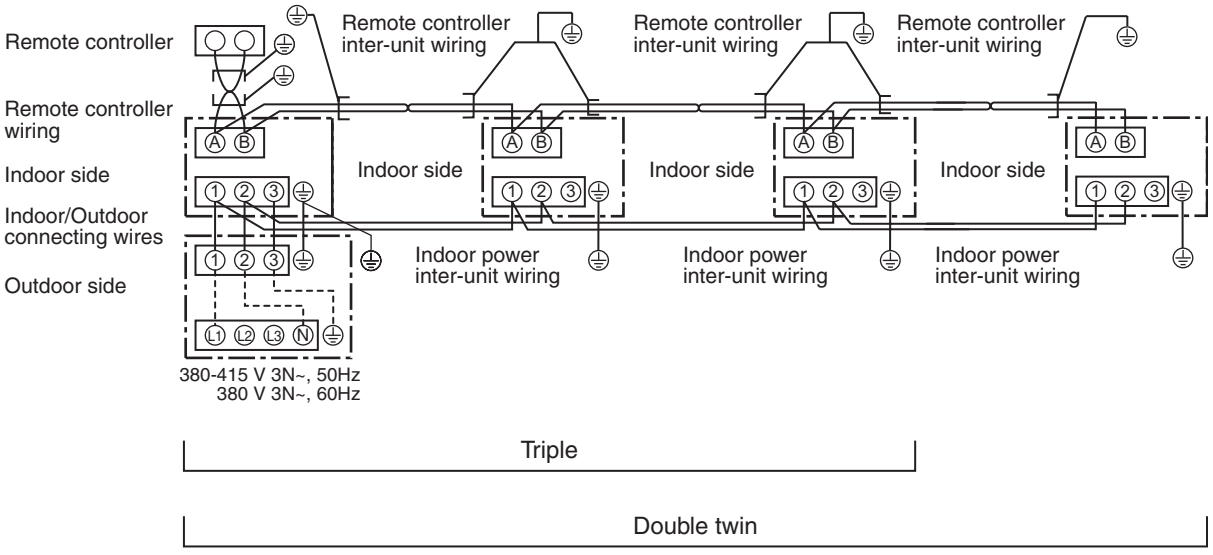


* For details of wiring/installation of the remote controller, refer to the Installation Manual enclosed with the remote controller.

Simultaneous twin system



Simultaneous triple and double twin system



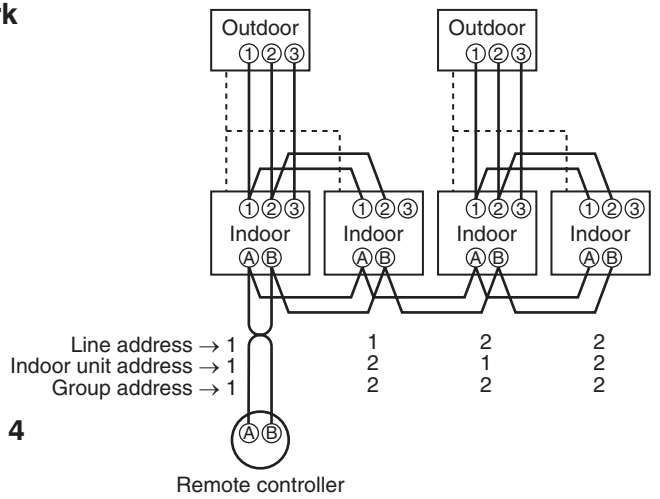
* Use 2-core shield wire (MVVS 0.5 to 2.0 mm² or more) for the remote controller wiring in the simultaneous twin, simultaneous triple and simultaneous double twin systems to prevent noise problems. Be sure to connect both ends of the shield wire to earth leads.
* Connect earth wires for each indoor unit in the simultaneous twin, simultaneous triple and simultaneous double twin systems.

10-4. Address Setup (Manual setting from remote controller)

In case that addresses of the indoor units will be determined prior to piping work after wiring work

- Set an indoor unit per a remote controller.
- Turn on power supply.

(Example of 2-lines wiring)
(Real line: Wiring, Broken line: Refrigerant pipe)



For the above example, perform setting by connecting singly the wired remote controller without remote controller group wiring.

Group address
Individual : 0000
Master unit : 0001
Sub unit : 0002
} In case of group control

1 **Push SET + CL + TEST buttons simultaneously for 4 seconds or more.**

2 **(← Line address)**
Using the temperature setup ▼ / ▲ buttons, set 12 to the CODE No.

3 **Using timer time ▼ / ▲ buttons, set the line address.**

4 **Push SET button. (OK when display goes on.)**

5 **(← Indoor unit address)**
Using the temperature setup ▼ / ▲ buttons, set 13 to the CODE No.

6 **Using timer time ▼ / ▲ buttons, set 1 to the line address.**

7 **Push SET button.** (OK when display goes on.)

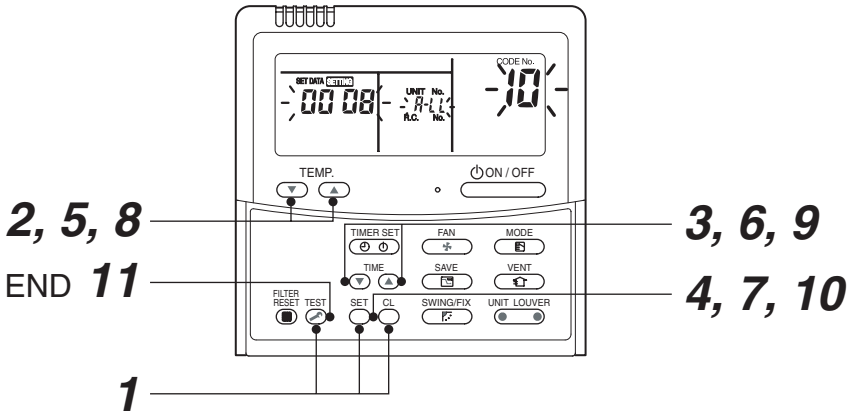
8 **(← Group address)**
Using the temperature setup ▼ / ▲ buttons, set 14 to the CODE No.

9 **Using timer time ▼ / ▲ buttons, set 0000 to Individual, 0001 to Header unit, and 0002 to Follower unit.**

10 **Push SET button. (OK when display goes on.)**

11 **Push TEST button.**

Setup completes. (The status returns to the usual stop status.)



<Operation procedure>

1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9 → 10 → 11 END

10-5. Confirmation of Indoor Unit No. Position

1. To know the indoor unit addresses though position of the indoor unit body is recognized

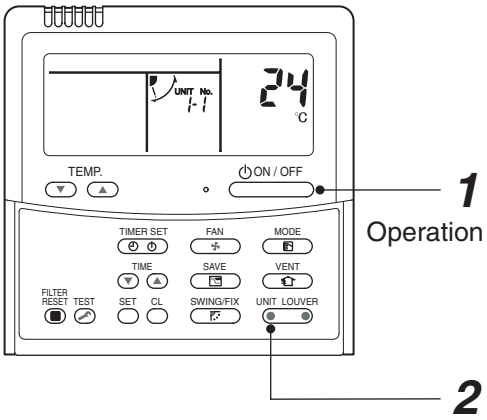
- In case of individual operation (Wired remote controller : indoor unit = 1 : 1)
  (Follow to the procedure during operation)

<Procedure>

1 **Push ON / OFF button if the unit stops.**

2 **Push UNIT LOUVER button (button of left side).**

Unit No. 1-1 is displayed on LCD.
(It disappears after several seconds.)
The displayed unit No. indicate line address and indoor unit address.
(When other indoor units are connected to the identical remote controller (Group control unit), other unit numbers are also displayed every pushing UNIT LOUVER button (button of left side).



<Operation procedure>

1 → ***2*** END

2. To know the position of indoor unit body by address

- To confirm the unit No. in the group control
  (Follow to the procedure during operation) (in this procedure, the indoor units in group control stop.)

<Procedure>

The indoor unit numbers in the group control are successively displayed, and fan, louver, and drain pump of the corresponding indoor unit are turned on.
(Follow to the procedure during operation)

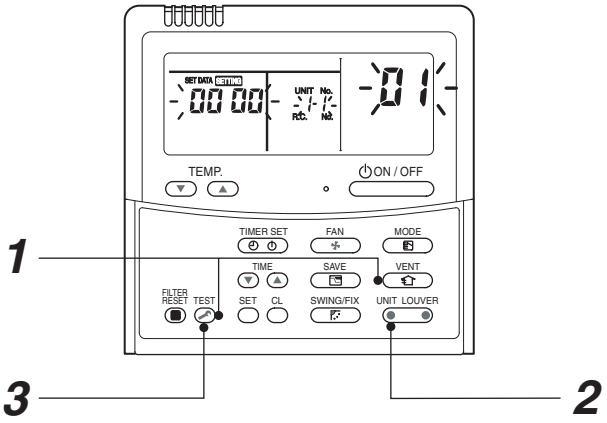
1 **Push VENT and TEST buttons simultaneously for 4 seconds or more.**

- Unit No. ALL is displayed.
- Fans and louvers of all the indoor units in the group control operate.

2 **Every pushing UNIT LOUVER button (button of left side), the unit numbers in the group control are successively displayed.**

- The unit No. displayed at the first time indicates the master unit address.
- Fan and louver of the selected indoor unit only operate.

3 **Push TEST button to finish the procedure.**
All the indoor units in the group control stop.



<Operation procedure>

1 → ***2*** → ***3*** END

<Maintenance/Check list>

Aiming in environmental preservation, it is strictly recommended to clean and maintain the indoor/outdoor units of the operating air conditioning system regularly to secure effective operation of the air conditioner.

It is also recommended to maintain the units once a year regularly when operating the air conditioner for a long time.

Check periodically signs of rust or scratches, etc. on coating of the outdoor units.

Repair the defective position or apply the rust resisting paint if necessary.

If an indoor unit operates for approx. 8 hours or more per day, usually it is necessary to clean the indoor/outdoor units once three months at least.

These cleaning and maintenance should be carried out by a qualified dealer.

Although the customer has to pay the charge for the maintenance, the life of the unit can be prolonged.

Failure to clean the indoor/outdoor units regularly will cause shortage of capacity, freezing, water leakage or trouble on the compressor.

Part name	Object		Contents of check	Contents of maintenance
	Indoor	Outdoor		
Heat exchanger	○	○	• Blocking with dust, damage check	• Clean it when blocking is found.
Fan motor	○	○	• Audibility for sound	• When abnormal sound is heard
Filter	○	—	• Visual check for dirt and breakage	• Clean with water if dirty • Replace if any breakage
Fan	○	○	• Visual check for swing and balance • Check adhesion of dust and external appearance.	• Replace fan when swinging or balance is remarkably poor. • If a large dust adheres, clean it with brush or water.
Suction/ Discharge grille	○	—	• Visual check for dirt and scratch	• Repair or replace it if deformation or damage is found.
Drain pan	○	—	• Check blocking by dust and dirt of drain water.	• Clean drain pan, Inclination check
Face panel, Louver	○	—	• Check dirt and scratch.	• Cleaning/Coating with repair painting
External appearance	—	○	• Check rust and pealing of insulator • Check pealing and floating of coating film	• Coating with repair painting

11. REPLACEMENT OF THE SERVICE P.C. BOARD

11-1. Interface (CDB) P.C. BOARD MCC-1675 (4316V622)

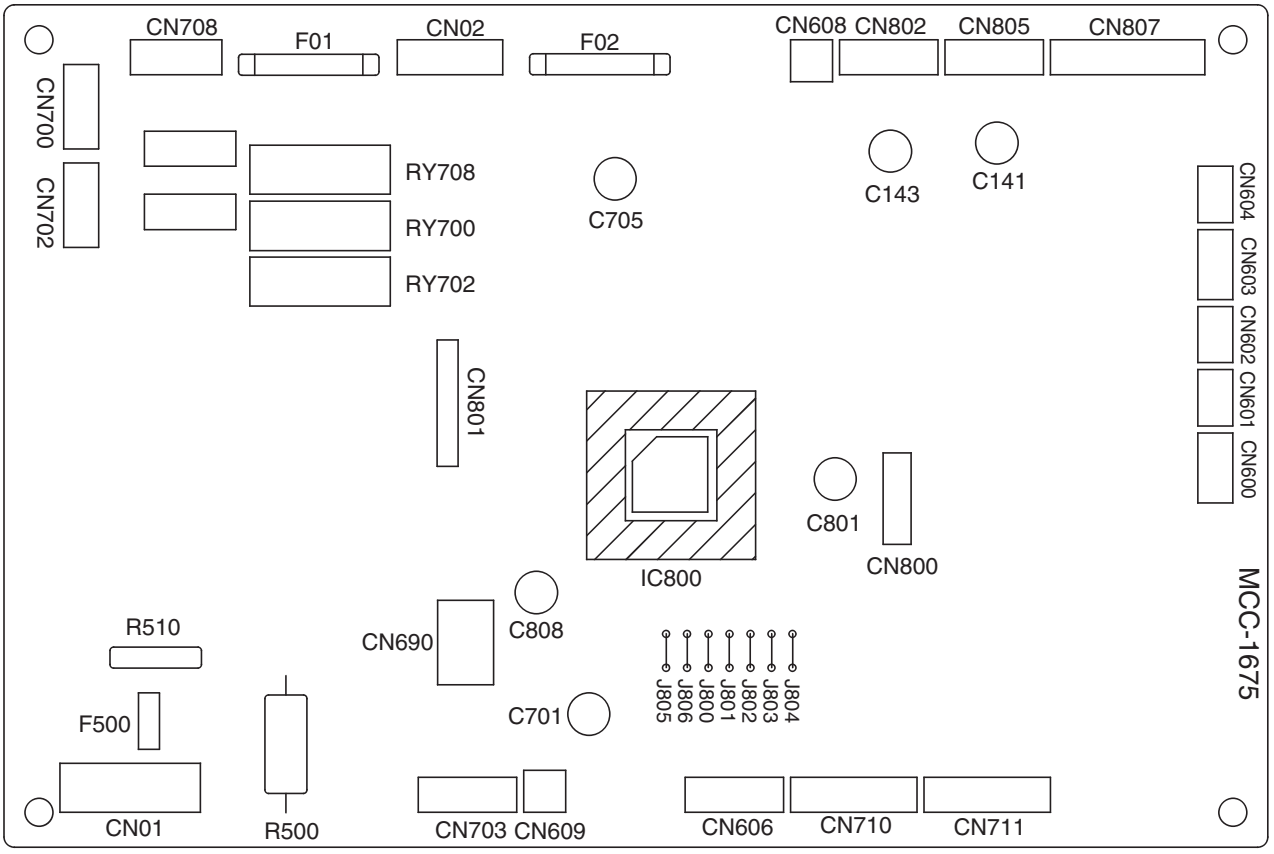
1. Setting the jumper wires

Part name		Function	Setting
Jumper wire	J800 ~ J803	Model switching	Cutthese jumper wires according to the following table.

Model switching (J800 to J803)

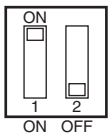
Since this service P.C. board is available for several models, cut the jumper wires according to the following table.
If they are not cut correctly, an error code “L10” or “L29” appears on the remote controller and the operation of the air conditioner is disabled.

Model name	J 800	J 801	J 802	J 803
Factory setting (default)	O	O	O	O
RAV-SM2246AT*-**	×	O	O	O
RAV-SM2806AT*-**	O	×	O	O
	O:Connected, ×:Cut			



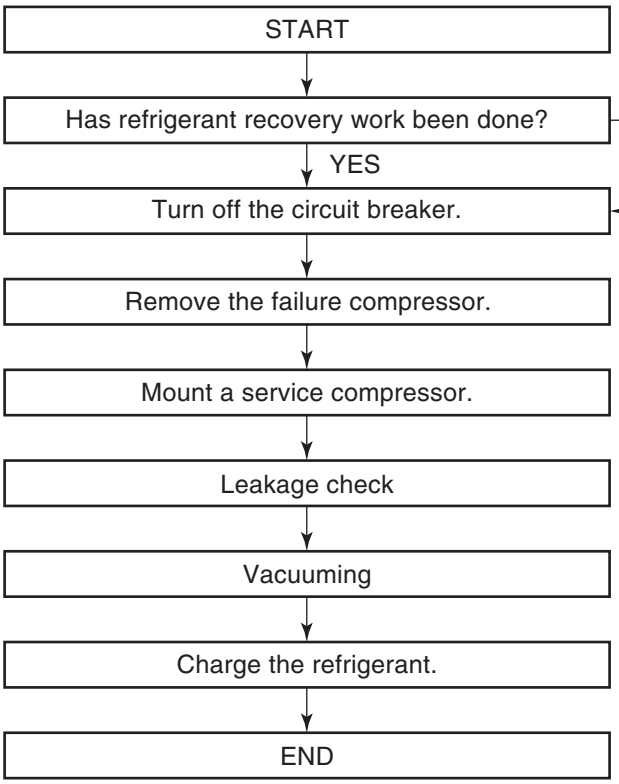
11-2. Compressor IPDU P.C. BOARD MCC-1698 (4316V624)

1. Check SW800 on the compressor IPDU P.C Board (MCC-1698) like of the following figure.



12. HOW TO EXCHANGE COMPRESSOR

12-1. Exchanging Procedure of Compressor (Outline)



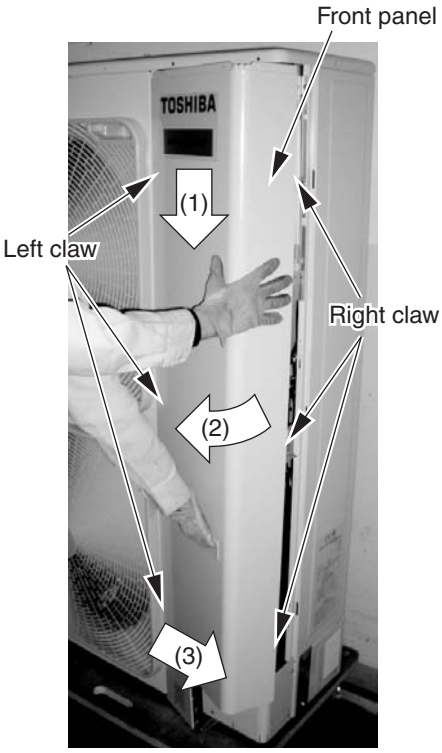
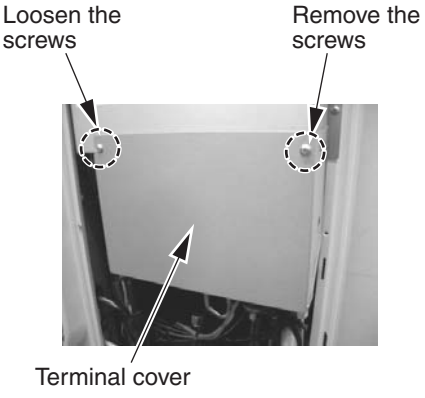
Never recover the refrigerant to the outdoor unit.

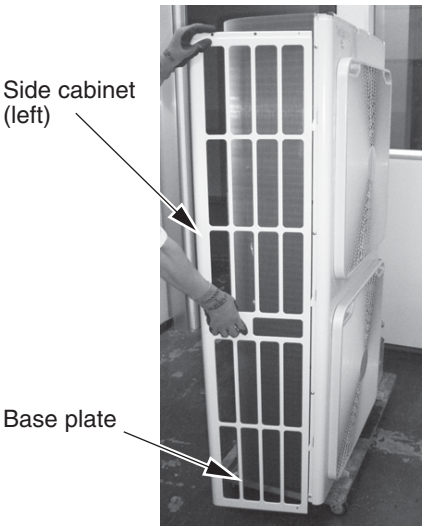
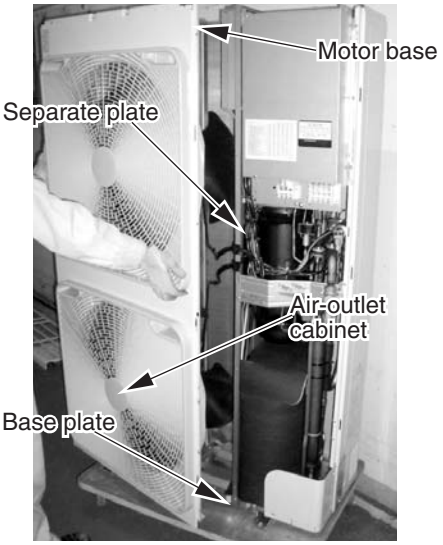
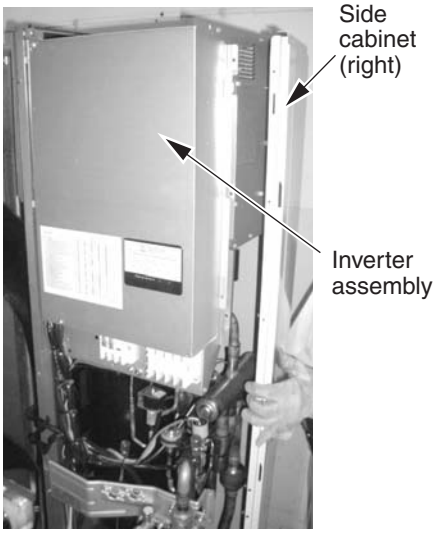
- For the refrigerant recovery work during reinstallation
- of repair work, be sure to use the refrigerant recovery unit.
- Recovery of refrigerant to the outdoor unit is unavailable;
- otherwise a serious accident such as explosion or
- injury may be caused.

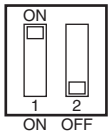
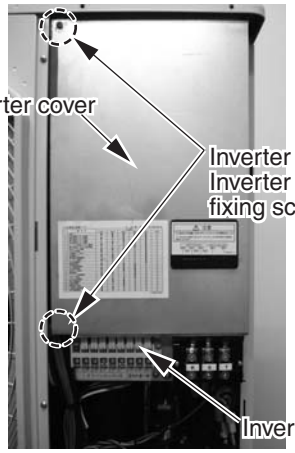
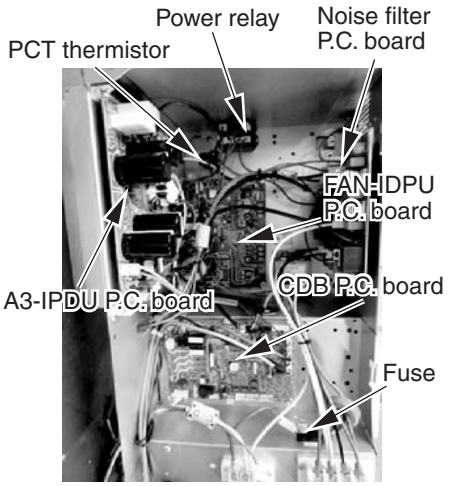
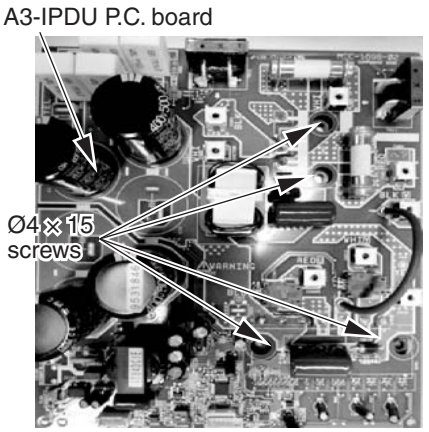
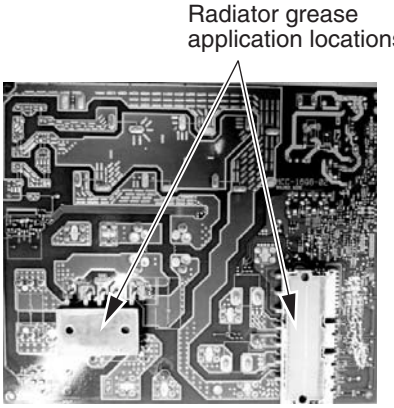
12-2. Exchange of Compressor

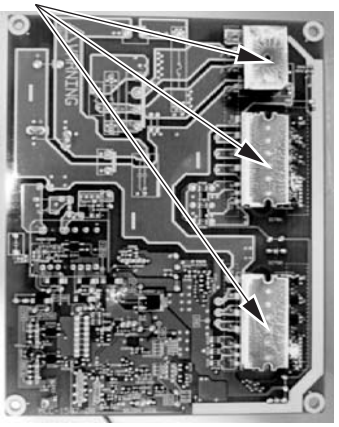
For exchange of compressors, refer to (11) Compressor in Section **13. Detachments**.

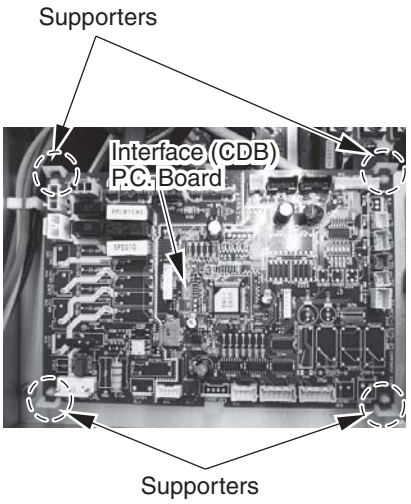
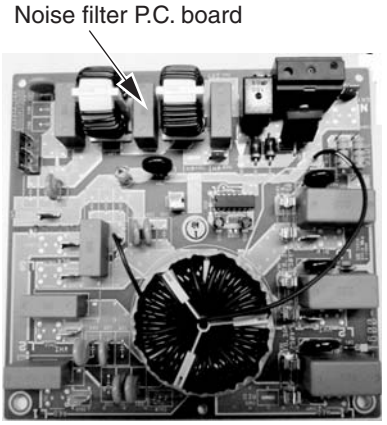
13. DETACHMENTS

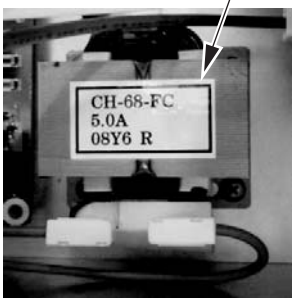
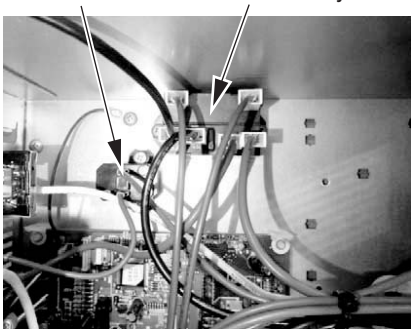
No.	Part name	Procedure	Remarks
①	Common procedures	**⚠ WARNING** Stop operation of the air conditioner and turn off breaker switch. **⚠ CAUTION** Ensure wearing of gloves when performing any work in order to avoid injury from parts, etc. **1. Detachment** 1) Stop operation of the air conditioner, and turn off the main switch of the breaker for air conditioner. 2) Remove the front panel. (3 pcs, Ø4 ×10 hexagonal screws) (1) After removing the screws slide the front panel downwards. (2) Pull the front panel forwards and then loosen the right claw. (3) Pull the front panel to the right, loosen the left claw, and then remove the front panel. 3) Remove the terminal cover. (2 pcs, Ø4 ×8) 4) Remove the power and indoor/outdoor connection wires from the wire clamps and terminals. 5) Remove the top cover. (6 pcs, Ø4 ×10 hexagon screws) **2. Attachment** 1) Attach the top cover. (6 pcs, Ø4 ×10 hexagon screws) 2) Connect the power and indoor/outdoor connection wires to the terminal and fix in place using the code clamps. **NOTE** The power and indoor/outdoor connection wires should be fixed in place along the crossing pipes using commercially available code clamps so as to avoid any contact with the compressor, gas side valve, gas side piping, and discharge pipe. 3) Attach the front panel. (3 pcs, Ø4 ×10 hexagon screws)	  

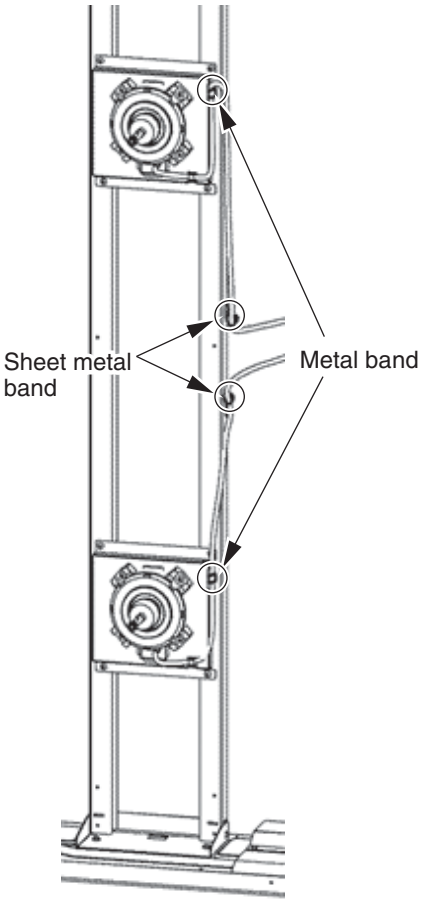
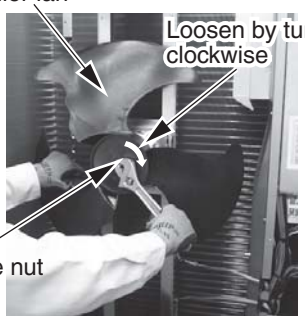
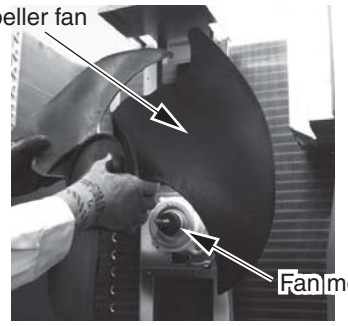
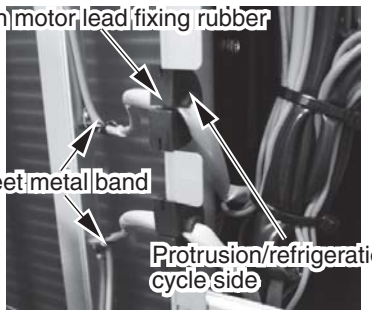
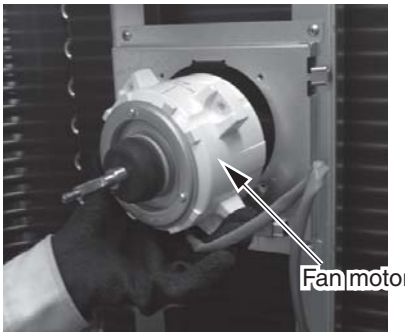
No.	Part name	Procedure	Remarks
②	Side cabinet (left)	1) Following to work of item 1of ①. 2) Remove the side cabinet (left) and base plate screws. (2 pcs, Ø4 ×10 hexagon screws) 3) Slide the side cabinet (left) downwards and remove.	
③	Air-outlet cabinet	1) Following to work of item 1 ② of ①. 2) Remove the screws from the Air-outlet cabinet and separate plate. (4 pcs, Ø4 × 8) 3) Remove the screws from the Air-outlet cabinet and base plate. (2 pcs, Ø4 × 10 hexagon screws) 4) Remove the screws from the Air-outlet cabinet and motor base. (2 pcs, Ø4 × 8) 5) Remove the screws form the Air-outlet cabinet and heat exchanger. (4 pcs, Ø4 × 8)	
③	Side cabinet (right)	1) Following to work of item 1 of ①. 2) Remove the screws securing the inverter assembly and side cabinet (right). (3 pcs, Ø4 × 8) 3) Remove the screws form the side cabinet (right) and valve fixing plate. (2 pcs, Ø4 × 8) 4) Remove the screws form the side cabinet (right) and piping panel (rear). (2 pcs, Ø4 ×10 hexagon screws) 5) Remove the screws form the side cabinet (right) and base plate. (1pcs, Ø4 ×10 hexagon screw) 6) Remove the screws from the side cabinet (right) and heat exchanger. (5pcs, Ø4 × 10 hexagon screws)	

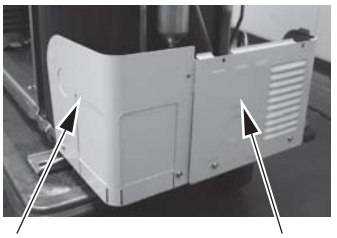
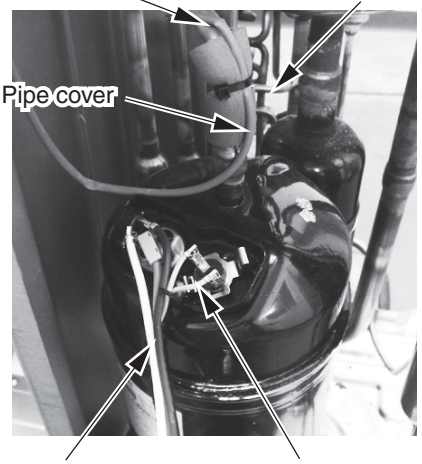
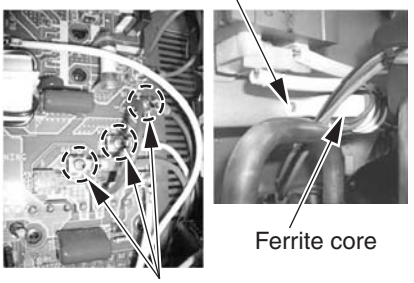
No.	Part name	Procedure	Remarks
⑤	Electrical part replacement	**WARNING** There is a risk of electric shock because of the voltage remains in the electrolytic capacitor on the P.C. board for a while after the power is turned off. Make sure that the voltage does not remain with a tester before disassembling the inverter assembly. When replacing any electrical parts please ensure to tighten the screws using the following tightening torque requirements. Note that use of the product with insufficiently tightened screws could cause a malfunction. M3 screw: 0.55 N•m M4 screw: 1.20 N•m M5 screw: 1.80 N•m M6 screw: 2.40 N•m **1. A3-IPDU P.C. board** 1) Following to work of item to 3) of 1 of ①. 2) Loosen the screws (upper and lower) that fix the inverter cover and inverter box together. (2 pcs, Ø4 × 8) 3) Remove the A3-IPDU P.C. board and other P.C. board connectors. (2 pcs) CN101 ... FAN-IPDU P.C. board and CN502 connector (2P: White) CN852 ... FAN-IPDU P.C. board and CN504 connector (5P: White) 4) Remove the leads connected to the A3-IPDU P.C. board (9 places) CN01 ..... Power relay connector (Red) CN02 ..... CN12 of the noise filter P.C. board connector (White) CN03 ..... Power relay connector (Black) CN04 ..... PTC thermistor connector (Red) CN203 ... Compressor connector (Red) CN202 ... Compressor connector (White) CN201 ... Compressor connector (Black) CN09 ..... Reactor (CH90) connector CN10 ..... Reactor (CH90) connector 5) Remove the screws fixing the heat sink to the A3-IPDU P.C. board. (4 pcs, Ø4 × 15) 6) Remove the A3-IPDU P.C. board. (2 supporters) 7) Set the dip switch (SW800) of the new A3-IPDU P.C. board as follows.  8) Apply radiator grease to the rear of the new A3-IPDU P.C. board where it will be fixed to the heat sink and then attach to the heat sink. Note that insufficient radiator grease could result in insufficient heat dissipation and then a malfunction.	   

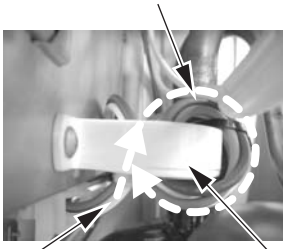
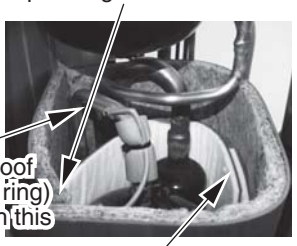
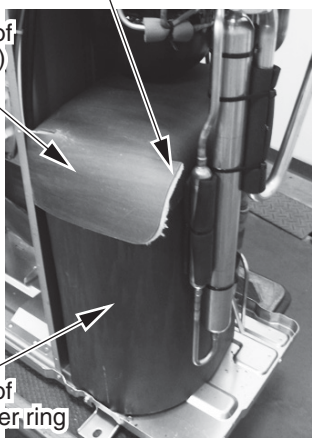
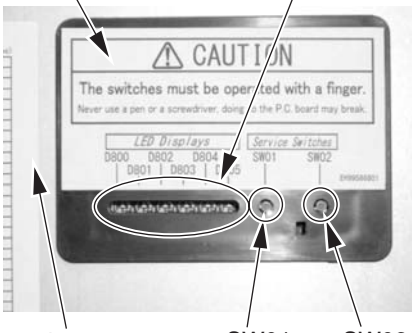
No.	Part name	Procedure	Remarks
⑤	Electrical part replacement (continued)	**2. FAN-IPDU P.C. board** 1) Following to work of item to 2) of 1 of ⑤. 2) Remove the connectors (6 places) from the FAN-IPDU P.C. board. CN750 ... Fan motor (upper) connector (3P: White) CN700 ... Fan motor (lower) connector (3P: Blue) CN500 ... Reactor (CH68) and noise filter P.C. board (CN22) connector (4P: Red) CN502 ... CN101 of the A3-IPDU P.C. board connector (2P: White) CN504 ... CN852 of the A3-IPDU P.C. board connector (5P: Blue) CN602 ... CN51 of the noise filter P.C. board connector (2P: Black) 3) Remove the screws from the FAN-IPDU P.C. board and heat sink. (5 pcs, Ø3 × 14) 4) Remove the FAN-IPDU P.C. board. (3 supporters) 5) Apply radiator grease to back of the new FAN-IPDU P.C. board where it will attached to the heat sink before then attached it. Exercise caution as insufficient radiator grease could result in too much heat and a malfunction.	Screws  Radiator grease application locations 

No.	Part name	Procedure	Remarks
⑤	Electrical part replacement (continued)	**3. Interface (CDB) P.C. board** 1) Following to work of item to 2) of 1 of ⑤. 2) Remove the Interface (CDB) P.C. board connectors (18 places) CN603 ... TD sensor (3P: White, tube: Red) CN602 ... TO sensor (2P: Yellow, tube: Red) CN601 ... TE sensor (2P: White, tube: Black) CN600 ... TS sensor (3P: White, tube: Gray) CN604 ... TL sensor (2P: White, tube: Blue) CN700 ... 4-way valve coil (3P: Yellow) CN702 ... 2-way valve coil (2P: White) CN710 ... PMV coil 1 (6P: White) CN711 ... PMV coil 2 (6P: White) CN606 ... Pressure sensor (4P: White) CN609 ... Case thermostat (2P: Blue) CN802 ... FAN-IPDU board connector (5P: Red) CN02 ..... Noise filter board connector (3P: Red) CN608 ... Noise filter board connector (2P: White) CN690 ... A3-IPDU connector (3P: Green) CN708 ... Magnetic switch connector (2P: Blue) CN01 ..... Indoor/outdoor terminal block connector (3P: White) CN807 ... Display board connector (10P: White) 3) Remove the Interface (CDB) P.C. board. (4 supporters) 4) Attach the new Interface (CDB) P.C. board to the inverter box. **4. Noise filter P.C. board** 1) Following to work of item to 2) of 1 of ⑤. 2) Remove the connectors (3 places) from the noise filter P.C. board. CN22 ..... CN500 of the FAN-IPDU P.C. board connector (2P: Red) CN50 ..... CN608 of the CDB P.C. board connector (2P: White) CN51 ..... CN602 of the FAN-IPDU P.C. board connector (2P: Black) 3) Remove the lead wires (10 places) connected to the noise filter P.C. board. CN05 ..... Power terminal block connector (Red) CN06 ..... Power terminal block connector (White) CN07 ..... Power terminal block connector (Black) CN08 ..... Power terminal block connector (Gray) CN09 ..... Ground connector (Brown) CN10 ..... CN02 of the CDB P.C. board connector (Red) CN19 ..... CN02 of the CDB P.C. board connector (Gray) CN16 ..... Power relay connector (Red) CN17 ..... A3-IPDU P.C. board connector (White) CN18 ..... Power relay connector (Black) 4) Remove the earth screw on the noise filter P.C. board. 5) Remove the noise filter P.C. board. (3 supporters) 6) Attach the new noise filter P.C. board to the inverter box.	 

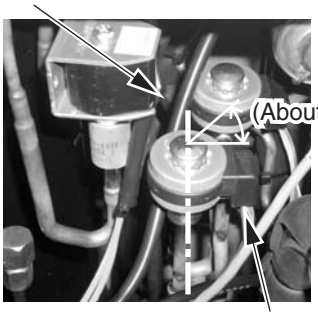
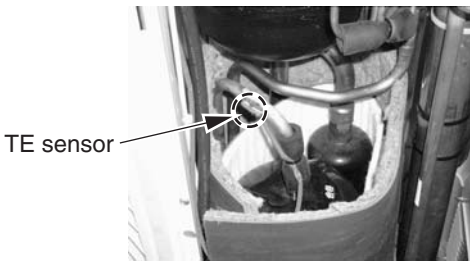
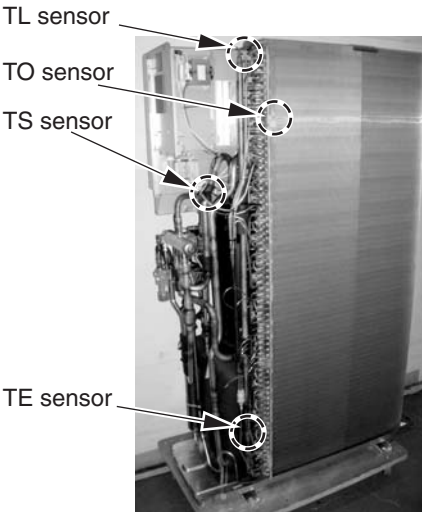
No.	Part name	Procedure	Remarks
⑤	Electrical part replacement (continued)	**5. Indoor unit reactor** 1) Following to work of item to 2) of 1 of ⑤. 2) Remove the connecter of the reactor lead wire connected to the reactor. 3) Remove the fixing screws of the reactor. (2 pcs Ø4×8) 4) Attach a new reactor to the inverter box. **6. FAN-IPDU board reactor** 1) Following to work of item to 2) of 1 of ⑤. 2) Remove the wires connected to the PTC thermistor. 3) Remove the fixing screws of the PTC thermistor. (2 pcs, Ø4 × 12) 4) Attach the new reactor to the inverter box. **7. Reactor (CH90)** 1) Following to work of item to 2) of 1 of ⑤. 2) Following to work of item ④. 3) Remove the lead wires attached to CN09 and CN10 of the A3-IPDU P.C. board. 4) Remove the fixing screws of the reactor. (2 pcs, Ø4 × 8) 5) Attach the a new reactor in the inverter box. **8. Power relay** 1) Following to work of item to 2) of 1 of ⑤. 2) Remove the fixing screws of the lead wires connected to the power relay. 3) Remove the power relay. (2 pcs, Ø4 × 12) 4) Attach the new power relay to the inverter box. **9. PTC thermistor** 1) Following to work of item to 2) of 1 of ⑤. 2) Remove the lead wires connected to the PTC thermistor. 3) Remove the fixing screws of the PTC thermistor. (2 pcs, Ø4 × 12) 4) Attach the new PTC thermistor to the inverter box.	Indoor unit reactor (CH68)  FAN-IPDU board reactor (CH85)  Reactor (CH90)  PTC thermistor Power relay 

No.	Part name	Procedure	Remarks
⑥	Fan motor	1) Following to work of item 1, ② and ③ of ①. 2) Remove the flange nut from the fan motor and propeller fan. • Loosen the flange nut by turning clock wise. (To tighten the flange nut, turn it counter clockwise) 3) Remove the propeller fan. 4) Remove the fan motor connector from the FAN-IPDU P.C. board. 5) Remove the fan motor lead from the fan motor lead fixing rubber where it penetrates the separate plate. 6) Remove the screws (4 each) fixing it in place while supporting it by hand so that the fan motor does not fall. ∗ Precautions when assembling the fan motor • Tighten the flange nut to 4.95 N•m (50 kgf·cm). • To prevent the fan motor leads from coming in contact with the propeller fan ensure to adjust the length of the fan motor lead fixing rubber so that the fan motor lead has no slack. Attach the fan motor lead fixing rubber to the separate plate so that the projection is on the refrigeration cycle side. • Ensure to bundle again with a commercially available code clamp where the code clamp was removed.  **NOTE** Ensure to fix the fan motor lead to the motor base with the motor base metal band and sheet metal band to ensure it does not come in contact with the propeller fan.	Propeller fan  Propeller fan    

No.	Part name	Procedure	Remarks
⑦	Compressor and compressor lead	**1. Removing a broken compressor** 1) Recover refrigerant gas. 2) Following to work of item 1 and ④ of ①. 3) Remove the piping panel (front). Remove the screws from piping panel (front) and base plate. (2 pcs, Ø4 × 10 hexagon screws) Remove the screws from the piping panel (front) and piping panel (rear). (1 pcs, Ø4 × 10 hexagon screw) 4) Remove the piping panel (rear). Remove the screws on the piping panel (rear) and the bottom plate. (2 pcs, Ø4×10 hexagon screws) 5) Remove the soundproofing material (upper, inner, and outer). 6) Remove the compressor's terminal cover and compressor lead and compressor case thermostat. 7) Remove the TD sensor fixed to the discharge pipe. 8) Following to work of item t 2) of 1 of ⑤. 9) Remove the fixing the screws compressor lead from the comp substrate. (3 screws) 10) Remove the fixing the screws ferrite core and compressor lead. (1 pcs, ST3T Ø4 × 8) 11) Remove the discharge and suction pipes connected to the compressor using a burner. **⚠ WARNING** Ensure extreme caution when removing piping by melting the weld with a burner as fire may result if there is any oil within the piping. **NOTE** Carefully avoid contact with the 4-way valve and PMV with the flame (could result in a malfunction). 12) Remove the refrigeration cycle discharge and suction pipes by pulling them upwards. 13) Remove the compressor nuts securing the compressor to the base plate. (3 nuts) 14) Pull the compressor forwards. **NOTE** The compressor weighs at least 20kg. Ensure two people carry out the work.	 Pipe panel (front) Pipe panel (rear) TD sensor Code clamp (heat resistant)  Pipe cover Compressor lead Case thermostat lead Fixing the screw ferrite core (1 screw)  Ferrite core Fixing the screw compressor lead (3 screws) Remove the screws  Compressor nuts

No.	Part name	Procedure	Remarks
⑦	Compressor and compressor lead (continued)	**2. Compressor attachment** 1) Detachment of the reverse order of removal. **NOTE** • Also ensure to replace the compressor lead after replacing the compressor. (Compressor lead replacement code: 43160658) At this time please ensure to wind the compressor lead 4 times around the ferrite core. (Ensure to position the ferrite core the same as when before removed.) • Install the sound insulation board (inner and outer) through the space between the compressor and the piping, and between the pipes and separate plate as shown on the right. • Fix in place with commercially available heat-resistant code clamps through the pipe cover so that the TD sensor lead does not come in direct contact with the discharge pipe. **3. Vacuum** 1) Connect the vacuum pump to the charge port of the liquid and gas pipe valves and the check joint on the high pressure side, and then operate the vacuum pump. 2) Vacuum until the vacuum low pressure gauge reaches 1 (mmHg). **NOTE** Fully open the electronic control valve before the vacuum process. If closed the vacuum pipe between the liquid pipe valve and electronic control valve of the outdoor unit may not be able to be drawn through. Method for forcibly fully opening the electronic control valve • Turn on the power supply breaker. • Ensure that D805 of the LED indication of the outdoor unit is lit up. If D805 is not lit up (off or flashing) then push and hold down SW01 and SW02 at the same time for at least 5 seconds and check that D805 lights up. • Push and hold SW01 down for at least 5 seconds or to confirm that D804 is slowly flashing (once/second). • Push SW01 several times until the the LED indications (D800 to D804) become the following. ○: Go ON, ●: Go OFF, ◎: cflash (5 times/sec.) • Push SW02 and D805 will start rapidly flashing. • Push and hold SW02 down for at least 5 seconds and D804 will start slowly flashing. Once D805 lights up the PMV will start to open. After 30 seconds turn off the power breaker. **4. Refrigerant encapsulation** 1) Add the amount of refrigerant determined by the pipe length using the charge port of the valve.	Wind the compressor lead 4 times around the ferrite core  Compressor lead Ferrite core Excess compressor leads and compressor case thermo leads should be positioned between the inside and outside of the soundproofing board.  The soundproof board (outer ring) should match this position Pass the soundproof board (inner ring) through the compressor, the discharge pipe, and the suction pipe and overlap it in this position. Do not leave any gap between the soundproof board (top) and the soundproof board (outer ring). Soundproof board (top)  Soundproof board (outer ring) LED display board LED indication  Inverter cover SW01 SW02

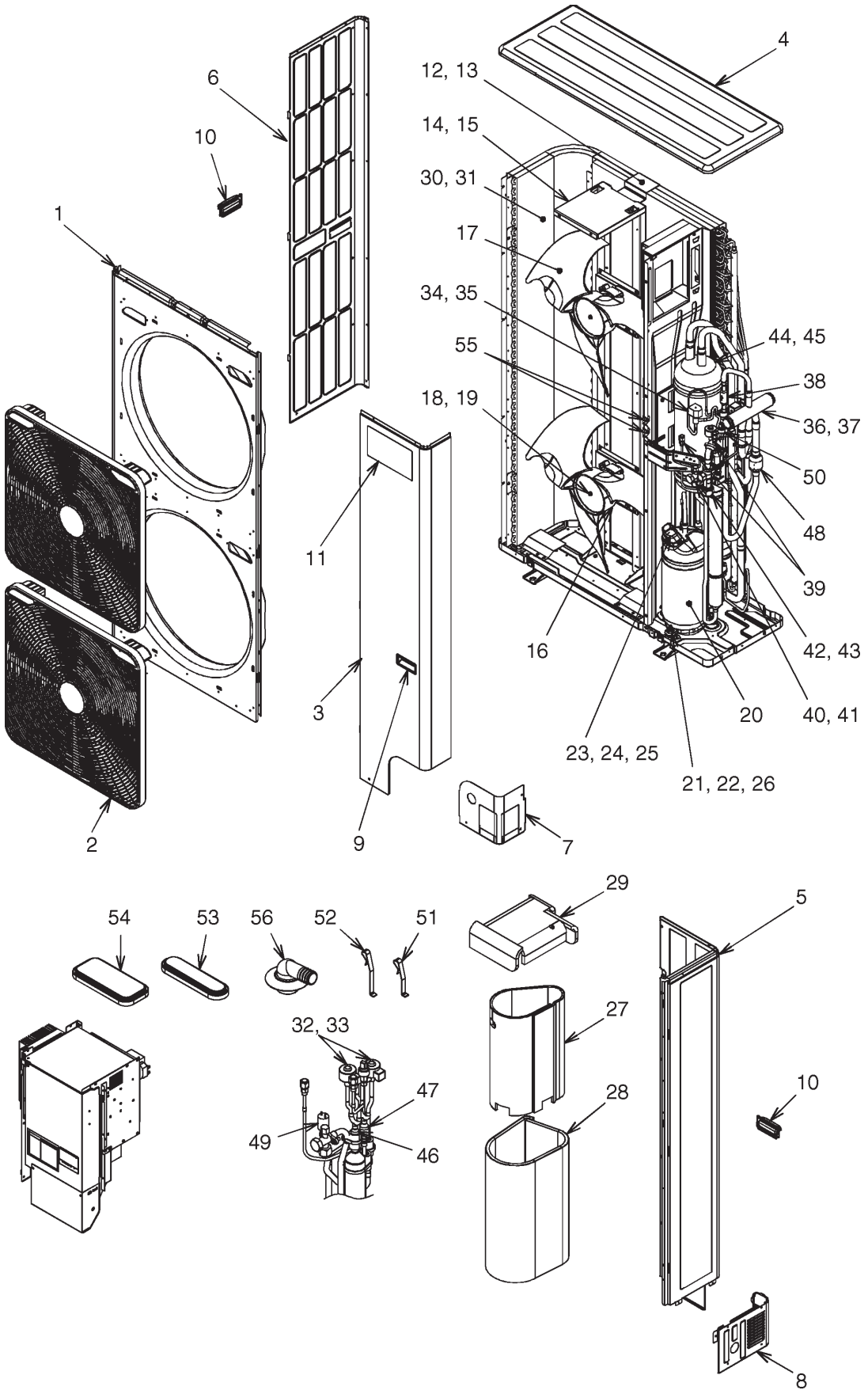
D800	D801	D802	D803	D804
○	●	○	●	◎

No.	Part name	Procedure	Remarks
⑧	PMV coil	**1. Detachment** 1) Following to work of item 1 of ①. 2) Remove the coil from the PMV body by rotating the coil (about 45°) while drawing the coil upward. **2. Attachment** 1) Fix the coil positioning protrusions securely in the concavities of the PMV body so that the PMV leads are on the front right side.	PMV coil 
⑨	Fan guard	**1. Detachment** 1) Following to work of item 1, ②, and ③ of ①. **NOTE** Do the work on cardboard or a cloth etc. spread out to prevent the product from being scratched. 2) Remove the outlet cabinet and place the fan guard side facing down. 3) Remove the claws (8 places) of the fan guard. **2. Attachment** 1) Hook the hooks from the front side and press the claws (8 places) by hand to fix them in place. **NOTE** Ensure that all the claws are fixed in their specified position.	
⑩	[Reference] Sensor mount positions	1) TD sensor: discharge pipe 2) TL sensor: heat exchanger upside 3) TS sensor: 4-way valve - between accumulator 4) TE sensor: lowest capillary joint 5) TO sensor: Heat exchange surface  	

14. EXPLODED VIEWS AND PARTS LIST

14-1. Outdoor Unit

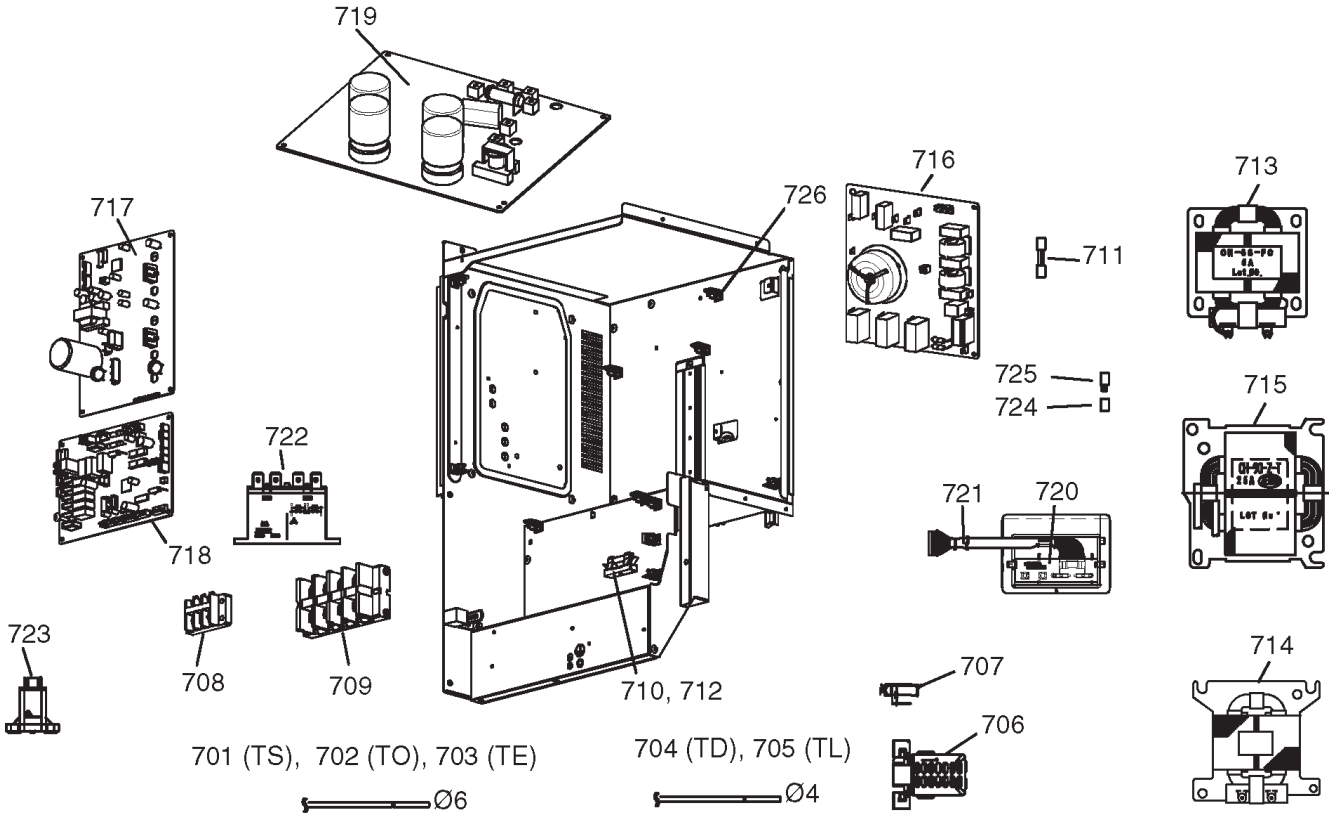
RAV-SM2246AT8(J)-E, RAV-SM2806AT8(J)-E,
RAV-SM2246AT8-TR, RAV-SM2806AT8-TR



Location No.	Part No.	Description	Q'ty/Set RAV-SM					
			2246 AT8-E	2806 AT8-E	2246 AT8J-E	2806 AT8J-E	2246 AT8-TR	2806 AT8-TR
1	4310A114	PANEL, AIR OUTLET	1	1	1	1	1	1
2	43109437	GUARD, FAN	2	2	2	2	2	2
3	4310A116	PANEL, FRONT	1	1	1	1	1	1
4	4310A117	PANEL, ROOF	1	1	1	1	1	1
5	4310A126	PANEL, SIDE	1	1	1	1	1	1
6	4310A127	PANEL, SIDE, LEFT	1	1	1	1	1	1
7	43100437	PANEL, FRONT, PIPING	1	1	1	1	1	1
8	4310A115	PANEL, BACK, PIPING	1	1	1	1	1	1
9	43107276	HANGER	1	1	1	1	1	1
10	43107295	HADLE, HANGER	2	2	2	2	2	2
11	4311M691	MARK, TOSHIBA	1	1	1	1	1	1
12	43122160	PLATE	1	1			1	1
13	43122161	PLATE			1	1		
14	43122162	SUPPORTER, MOTOR	1	1			1	1
15	43122163	SUPPORTER, MOTOR			1	1		
16	4312C149	MOTOR, FAN, ICF-340-A200-1	2	2	2	2	2	2
17	43120270	FAN, PROPELLER, PS561	2	2	2	2	2	2
18	43F47669	NUT, FLANGE	2	2			2	2
19	43197164	NUT, FLANGE			2	2		
20	43141628	COMPRESSOR, RA640A3F-21M	1	1	1	1	1	1
21	43F97212	NUT	3	3			3	3
22	43197174	NUT, COMP			3	3		
23	43160658	LEAD ASSY, COMPRESSOR	1	1	1	1	1	1
24	43F50407	THERMOSTAT,BIMETAL	1	1	1	1	1	1
25	43F63317	HOLDER,THERMOSTAT	1	1	1	1	1	1
26	43149324	RUBBER, CUSHION	3	3	3	3	3	3
27	43111370	INSULATOR, SOUND, IN	1	1	1	1	1	1
28	43111371	INSULATOR, SOUND, OUT	1	1	1	1	1	1
29	43111372	INSULATOR, SOUND, UP	1	1	1	1	1	1
30	4314G333	CONDENSER ASSY	1	1			1	1
31	4314G335	CONDENSER ASSY			1	1		
32	4314N128	VALVE, PLUS, MODULATING	2	2	2	2	2	2
33	4314N153	COIL, PMV	2	2	2	2	2	2
34	43146700	VALVE, 2-WAY, VPV-603D	1	1	1	1	1	1
35	4314N038	COIL, SOLENOID, VPV-MOAJ510B0	1	1	1	1	1	1
36	4314N078	VALVE, 4WAY, STF-H0731	1	1	1	1	1	1
37	4314N080	COIL, SOLENOID, STF-H01AJ1736A1	1	1	1	1	1	1
38	4314N115	VALVE, CHECK	1	1	1	1	1	1
39	4314N077	JOINT, CHECK	2	2	2	2	2	2
40	4314N094	VALVE, PACKED, 1/2 IN	1	1	1	1	1	1
41	43147195	BONNET, 1/2 IN	1	1	1	1	1	1
42	43146725	VALVE, BALL, SBV-JA6GTC-1	1	1	1	1	1	1
43	43147451	BONNET, 3/4 IN	1	1	1	1	1	1
44	43148285	ACCUMULATOR	1	1			1	1
45	43148286	ACCUMULATOR			1	1		
46	4314Q123	STRAINER	1	1	1	1	1	1
47	4314Q124	STRAINER	1	1	1	1	1	1
48	4314Q004	STRAINER	1	1	1	1	1	1
49	43151301	SWITCH, PRESSURE, ACB-4UB83W	1	1	1	1	1	1
50	43151313	SENSOR ASSY, LOW PRESSURE, NSK-BC010F-067	1	1	1	1	1	1
51	43F19822	HOLDER, SENSOR	2	2	2	2	2	2
52	43F19904	HOLDER, SENSOR (TS)	1	1	1	1	1	1
53	43F89160	CAP, WATERPROOF	1	1	1	1	1	1
54	43179165	CAP, WATERPROOF	4	4	4	4	4	4
55	43196113	BUSHING	2	2	2	2	2	2
56	43F32441	NIPPLE, DRAIN	1	1	1	1	1	1

14-2. Inverter Assembly

RAV-SM2246AT8(J)-E, RAV-SM2806AT8(J)-E, RAV-SM2246AT8-TR, RAV-SM2806AT8-TR



Location No.	Part No.	Description	Q'ty/Set RAV-SM					
			2246 AT8-E	2806 AT8-E	2246 AT8J-E	2806 AT8J-E	2246 AT8-TR	2806 AT8-TR
701	43150360	SENSOR ASSY, SERVICE, TS	1	1	1	1	1	1
702	43150373	SENSOR ASSY, SERVICE, TO	1	1	1	1	1	1
703	43150376	SENSOR ASSY, SERVICE, TE	1	1	1	1	1	1
704	43150374	SENSOR ASSY, SERVICE, TD	1	1	1	1	1	1
705	43150375	SENSOR ASSY, SERVICE, TL	1	1	1	1	1	1
706	43163055	HOLDER, SENSOR	1	1	1	1	1	1
707	43F63325	HOLDER, SENSOR (TE)	1	1	1	1	1	1
708	43160565	TERMINAL BLOCK, 3P, AC250V, 20A	1	1	1	1	1	1
709	43160579	TERMINAL BLOCK, 30A, 4P	1	1	1	1	1	1
710	43F60639	FUSE, 25A, 250V	1	1	1	1	1	1
711	43160590	FUSE, 6.3A, 250VAC	3	3	3	3	3	3
712	43160667	FUSE BLOCK	1	1	1	1	1	1
713	43158207	REACTOR, CH-68	1	1	1	1	1	1
714	43158237	REACTOR, CH-85	1	1	1	1	1	1
715	43158238	REACTOR, CH-90	1	1	1	1	1	1
716	4316V620	PC BOARD ASSY, MCC-1600, N/F	1	1	1	1	1	1
717	4316V625	PC BOARD ASSY, MCC-1597, FAN-IPDU	1	1	1	1	1	1
718	4316V622	PC BOARD ASSY, MCC-1675, CDB	1	1	1	1	1	1
719	4316V624	PC BOARD ASSY, MCC-1698, IPDU	1	1	1	1	1	1
720	4316V550	PC BOARD ASSY, MCC-1646, DSP	1	1	1	1	1	1
721	43160660	LEAD ASSY, DSP	1	1	1	1	1	1
722	43154177	RELAY, 480V,20A (CONTACT)	1	1	1	1	1	1
723	43153007	THERMISTOR, PTC, MZ32-101RMAD01E	1	1	1	1	1	1
724	43282001	BUSHING	1	1	1	1	1	1
725	43183020	COLLAR	1	1	1	1	1	1
726	43F63248	SUPPORTER, ASSY	3	3	3	3	3	3

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